

**Loyalist Solar Project – Block B
Stormwater Management and
Erosion and Sediment Control
Report**



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Table of Contents

1.0	INTRODUCTION	1.1
1.1	STUDY APPROACH.....	1.1
1.2	BACKGROUND INFORMATION	1.3
1.3	STORMWATER MANAGEMENT CRITERIA.....	1.4
2.0	EXISTING CONDITIONS.....	2.1
2.1	TOPOGRAPHY AND SURFACE DRAINAGE	2.1
2.2	GEOTECHNICAL INFORMATION	2.2
2.3	HYDROGEOLOGICAL INFORMATION	2.2
3.0	PROPOSED CONDITIONS.....	3.1
4.0	STORMWATER MANAGEMENT DESIGN.....	4.1
4.1	STORMWATER MANAGEMENT DURING CONSTRUCTION	4.1
4.1.1	Soil Management	4.1
4.1.2	Stormwater Detention.....	4.2
4.1.3	Vegetated Buffers	4.2
4.1.4	Grassed Waterways	4.3
4.2	STORMWATER MANAGEMENT POST-CONSTRUCTION	4.3
4.2.1	Permanent Slope Interruption Berms.....	4.4
4.2.2	Vegetated Buffers	4.4
4.2.3	Grassed Waterways	4.4
4.3	HYDROLOGIC ANALYSIS.....	4.4
4.3.1	Design Storms	4.5
4.3.2	Hydrologic Parameters	4.5
4.3.3	Hydrologic Analysis Results.....	4.5
4.4	GROUNDWATER/SURFACE WATER INTERACTION	4.9
4.5	STORMWATER MANAGEMENT MONITORING AND MAINTENANCE.....	4.9
5.0	EROSION AND SEDIMENT CONTROL PLAN.....	5.1
5.1	SITE EROSION POTENTIAL	5.1
5.2	DURING CONSTRUCTION DEWATERING	5.1
5.3	EROSION AND SEDIMENT CONTROL MEASURES	5.2
5.4	CONTINGENCY PLAN.....	5.4
5.4.1	Contingency Measures in Case of Failure	5.4
5.4.2	Contingency Measures where there is a High Risk of Failure	5.5
5.5	EROSION AND SEDIMENT CONTROL MONITORING PROGRAM	5.5
5.6	LONG TERM EROSION AND SEDIMENT CONTROL	5.6
6.0	CONCLUSION AND RECOMMENDATIONS.....	6.1

LIST OF TABLES

Table 1: Peak Flows and Runoff Volumes – AMC II.....	4.6
Table 2: Peak Flows and Runoff Volumes – AMC III.....	4.8

TABLE OF CONTENTS

LIST OF FIGURES

Figure 1: Location Plan Block 'B'.....	1.2
Figure 2: Pre-Development Catchments Block 'B'.....	2.3
Figure 3: Post-Development Catchments Block 'B'.....	3.3

LIST OF APPENDICES

Appendix A – Design Calculations
Appendix B – Existing Conditions
Appendix C – Interim Conditions
Appendix D – Proposed Conditions
Appendix E – Publications

LIST OF DRAWINGS

Drawing No. C-012 Block B Site Plan
Drawing No. C-052 Block B Existing Conditions, Clearing, Grubbing and Fencing Plan
Drawing No. C-402 Block B Grading Plan
Drawing No. C-602 Block B Sedimentation and Erosion Control Plan
Drawing No. C-650 Sedimentation and Erosion Control Notes and Details

LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Introduction
December 21, 2017

1.0 INTRODUCTION

Stantec has been retained by PCL Constructors Canada Inc. (PCL) to assist with final design engineering services related to the proposed development of the 54-megawatt (MW) Loyalist Solar Project (Project) in the Township of Stone Mills, County of Lennox & Addington, Ontario.

Generation Block B is located on the north side of Hinch Road approximately 1 km east of Rattie Road, as shown on **Figure 1**. The site is generally bounded by Hinch Road to the south, existing agricultural lands to the east and west, and Mud Creek and associated Provincially Significant Wetland (PSW) complex to the north.

This Stormwater Management (SWM) and Erosion and Sediment Control (ESC) Report summarizes the assessment of potential hydrologic impacts associated with the construction phase (i.e., ESC) and operational phase (i.e., SWM) of the Project. Potential hydrologic impacts assessed include changes to the runoff quality and/or quantity discharged to the surface receiving systems. The objective of the report is to demonstrate that the Project design and proposed mitigation measures associated with the construction and operation phases of the Project, as described in the REA Application, detailed engineering design, and herein, are sufficient to address any potential impacts to environmental features within the Project area and, further, to provide details on the mitigation measures and control measures that will be implemented.

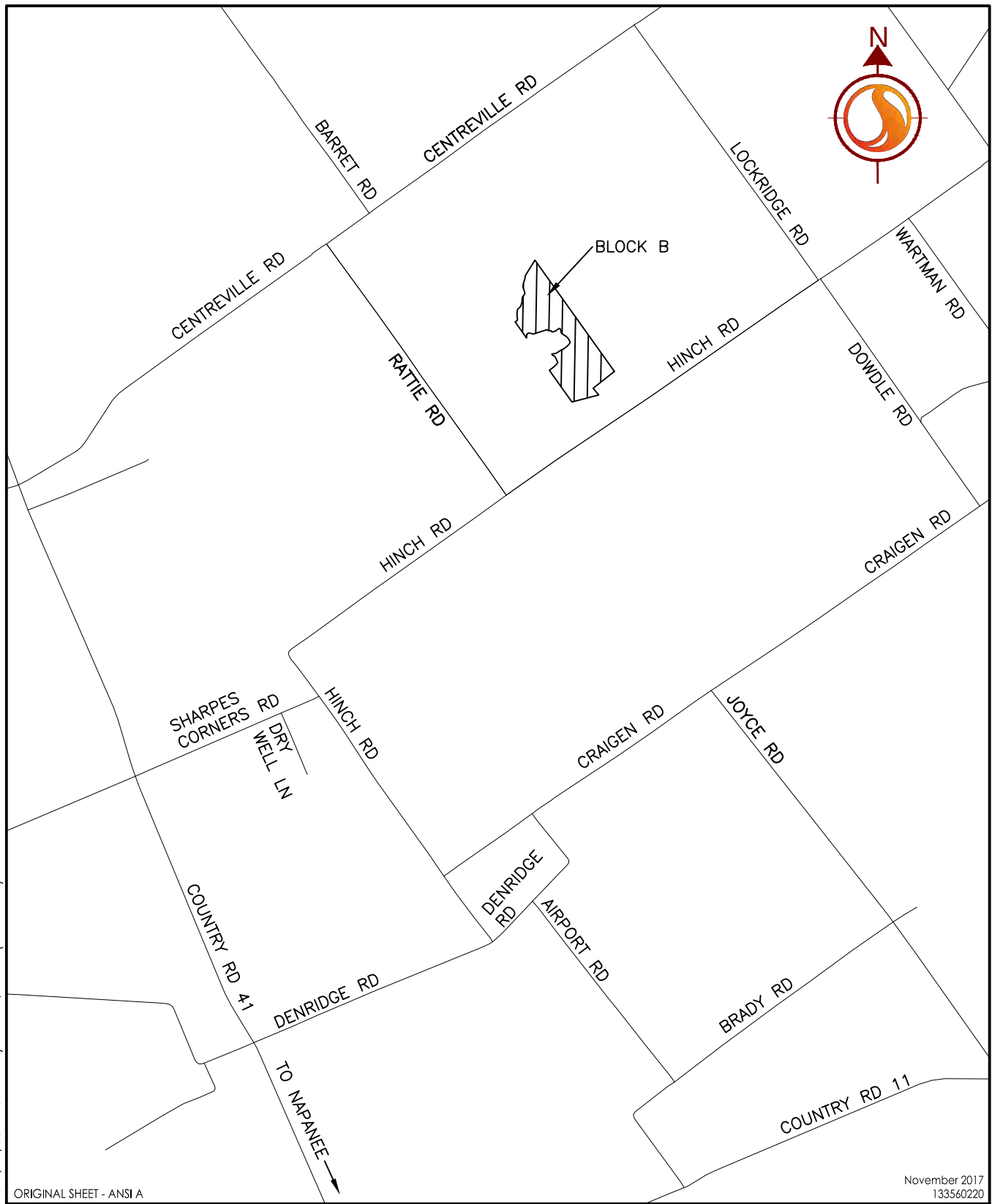
1.1 STUDY APPROACH

The study approach involves the following components:

- A quantitative assessment of existing hydrologic conditions of the project area and receiving systems;
- A review of the proposed Project activities as described in the REA Application with an emphasis on assessing the potential for impacts associated with changes in hydrology;
- Completion of final design of SWM measures to control site runoff in a manner consistent with Ministry of Environment and Climate Change (MOECC) and Quinte Conservation (QC) requirements; and
- Development of an ESC strategy outlining the anticipated approach to minimize impacts related to construction.



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Client/Project

BLUEARTH RENEWABLES INC.
LOYALIST SOLAR PROJECT
County of Lennox and Addington, ON

Figure No.

FIG 1

Title

LOCATION PLAN
BLOCK 'B'

LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Introduction
December 21, 2017

1.2 BACKGROUND INFORMATION

A variety of sources have been referenced during the preparation of this SWM and ESC report, including project-specific documentation, such as various reports submitted in support of the Renewable Energy Application (REA), and more general industry-standard design guidance documentation and/or literature references, as follows:

General Guidance Documentation / Literature

- *Hydrologic Response of Solar Farms* article in the *Journal of Hydrologic Engineering*, Cook and McCuen, May 2013
- *Quinte Conservation Stormwater Management Submission Guidelines*, Quinte Conservation, May 2012
- *Low Impact Development Stormwater Management Planning and Design Guide (LID Design Guide)*, Credit Valley Conservation Authority and Toronto Region Conservation, 2010
- *Erosion & Sediment Control Guideline for Urban Construction (ESC Guideline)*, Greater Golden Horseshoe Conservation Authorities (GGHCA), December 2006
- *Stormwater Management Planning and Design Manual (SWMPD Manual)*, Ontario Ministry of the Environment, March 2003
- *Control of Erosion – Fact Sheet*, Ontario Ministry of Food and Agriculture and Rural Affairs (OMAFRA), October 1986

Project-Specific Consultation / Documentation

- *Loyalist Solar Project Geotechnical Investigation – Township of Stone Mills, ON*, Tulloch Engineering Inc., November 2015
- *Pre-consultation meeting with Quinte Conservation, Stantec, PCL and BlueEarth Renewables*, October 20, 2017
- *Draft Geotechnical Report – Loyalist Solar Project – 230 kV/34.5 kV Collector Station, Township of Stone Mills, ON*, Tulloch Engineering Inc., October 2017
- *Preliminary Stormwater Management and Erosion and Sediment Control Plan*, Tulloch Engineering Inc., March 2017
- *Hydrogeological Assessment – Loyalist Solar Project – Township of Stone Mills*, Harden Environmental Services Ltd., May 2017
- *Loyalist Solar Project – Project Description Report*, Dillon Consulting Ltd., February 2017
- *Loyalist Solar Project – Construction Plan Report*, Dillon Consulting Ltd., February 2017



LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Introduction
December 21, 2017

- *Loyalist Solar Project – Design and Operations Report*, Dillon Consulting Ltd., February 2017
- *Loyalist Solar Project – Water Body Report*, Dillon Consulting Ltd., February 2017
- *Loyalist Solar Project – Water Assessment Report*, Dillon Consulting Ltd., February 2017

1.3 STORMWATER MANAGEMENT CRITERIA

Based on the background information and pre-consultation noted above, the following SWM design criteria have been established for the Loyalist Solar Project:

- Water Quantity Control
 - o Control post-development runoff rates to pre-development levels for the 2-year to 100-year storm events
 - o The designer must also check the 25 mm storm for erosion protection
 - o Accommodate future climate change scenarios by designing facilities with an additional 10% design storage capacity
- Water Quality Control
 - o Provide MOECC Normal Protection Level (70% Total Suspended Solids (TSS) removal) water quality control
- Erosion and Sediment Control
 - o Provide appropriate erosion and sediment control during construction/area grading to protect adjacent properties and downstream watercourses, wetlands and other sensitive receivers from potential siltation

LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Existing Conditions
December 21, 2017

2.0 EXISTING CONDITIONS

2.1 TOPOGRAPHY AND SURFACE DRAINAGE

The location of proposed Generation Block B is currently vacant agricultural lands with moderate to scattered tree cover. Runoff from the northwest portion of the site travels northwest as shallow overland flow to the neighboring Mud Creek PSW. The runoff from the center and northeast portions of the site flows west as shallow overland flow to another small wetland feature. The average site slopes range from approximately 0.5% to 2.7%, and elevations range from approximately 144 m on the eastern site boundary to approximately 133.5 m on the northwestern site boundaries. Drainage catchments were delineated using a combination of topographical survey, Light Detection and Radar (LiDAR) survey, aerial imagery and observations made during site visits completed by Stantec on September 26 and 27, 2017. The pre-development drainage catchments are shown on **Figure 2** and are described as follows:

Catchment EXT B-1 – This external drainage area is comprised of vacant agricultural land and wooded area. Runoff from this area travels west as shallow overland flow to Catchment B-101 and Mud Creek Wetlands.

Catchment EXT B-2 – This external drainage area is comprised of mostly vacant agricultural land, with some active agricultural land and scattered tree cover. Runoff from this area travels westward as shallow overland flow to catchment B-102.

Catchment EXT B-3 – This external drainage area is comprised of mostly vacant agricultural land, with some active agricultural land and scattered tree cover. Runoff from this area travels westward as shallow overland flow to catchment B-103.

Catchment EXT B-4 – This external drainage area is comprised of vacant agricultural land with scattered tree cover. Runoff from this area travels westward as shallow overland flow.

Catchment B-101 – Vegetation on this vacant agricultural area is comprised of a mixture of weeds and grasses with scattered tree cover. Runoff from this catchment travels westward as shallow overland flow to Mud Creek Wetlands.

Catchment B-102 – This catchment consists of vacant agricultural land and pasture, and is comprised of a mixture of weeds and grasses with scattered tree cover. The runoff from this catchment travels westward towards Mud Creek Wetlands.

Catchment B-103 – This catchment consists of vacant agricultural land and pasture that is largely weeds and grasses, with scattered tree cover. The runoff from this catchment travels westward towards adjacent agricultural lands.



LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Existing Conditions
December 21, 2017

2.2 GEOTECHNICAL INFORMATION

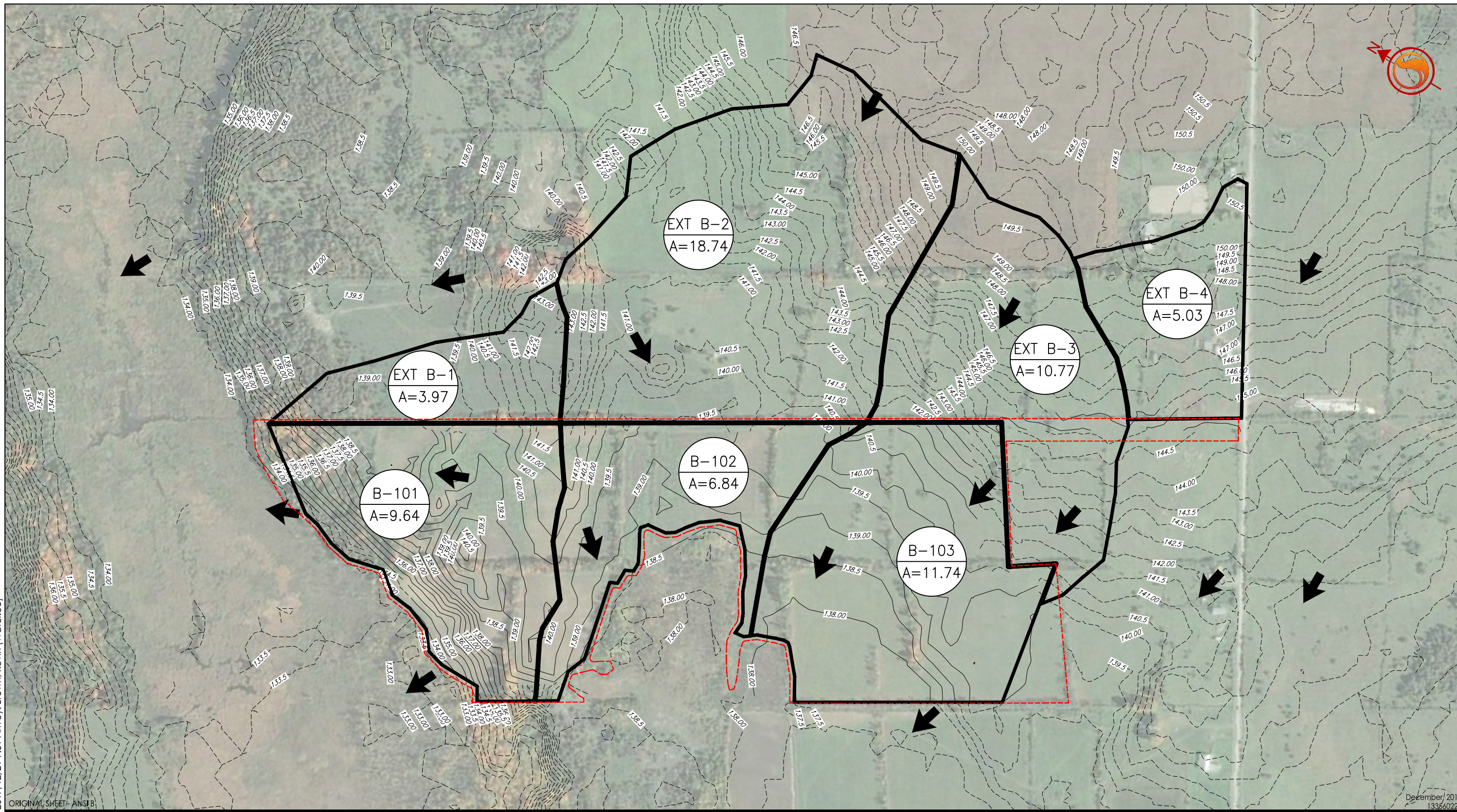
The Soil Map of Lennox and Addington County suggests that the site soils are characterized as Farmington loam, Moscow Clay, and Otonabee Loam. A detailed geotechnical investigation was completed by Tulloch Engineering Inc. (Tulloch) in 2017 and a hydrogeological assessment was completed by Harden Environmental Services (Harden) in 2017. The investigation results are mostly consistent with the soil description presented in the soil survey. Seven boreholes were completed within the Generation Block B limits. The results show that the site soils are typically comprised of approximately 0.4 to 0.8 m of topsoil overlying sandy silt and clayey silt. The soil depth in this area (based on the boreholes) ranges from 0.10 m to 2.50 m above the bedrock.

2.3 HYDROGEOLOGICAL INFORMATION

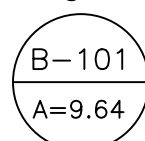
A hydrogeological assessment was done by Harden Environmental Services Ltd. (Harden) in 2017, which provided in-depth information on soil types, groundwater levels, groundwater flow, and surface water levels. Observations of surface water and groundwater levels in Mud Creek wetland confirm that there is likely no significant groundwater discharge to Mud Creek. The small percentage of land represented by the proposed solar installations compared to the total catchment area of Mud Creek wetland indicate that any hydrological changes at the site would only result in minor or insignificant changes to the hydrology of the wetland. The Harden hydrogeological assessment states that any increase in runoff or infiltration will be small relative to the overall hydrogeological support for Mud Creek wetland.

Site observations noted the presence of exposed surface fractures in the bedrock within the proposed work limits. However, the investigation notes that these fractures do not penetrate deeply into the bedrock and the report findings suggest that subsurface flow through the fractures is not significant. This conclusion is supported by surface water monitoring in Mud Creek, which showed a steady decrease in the summer 2016 water levels, suggesting that groundwater discharges to the wetland are not significant.

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Legend



AREA NUMBER

CONTRIBUTING AREA (ha)



OVERLAND FLOW ROUTE



DRAINAGE BOUNDARY



PROJECT LIMIT BOUNDARY

Scale



Client/Project

LOYALIST SOLAR LP
LOYALIST SOLAR PROJECT
54MW GROUND-MOUNT SOLAR FARM

Figure No.

FIG 2

Title

PRE-DEVELOPMENT CATCHMENTS
BLOCK 'B'

LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Proposed Conditions
December 21, 2017

3.0 PROPOSED CONDITIONS

The Loyalist Solar Project employs a low-impact approach to site development. The grading plans presented on **Drawing C-402** show that the proposed grades will match existing grades wherever possible; existing drainage patterns are preserved wherever possible; roads will typically be constructed at grade to maintain existing drainage patterns; and site excavation will only occur to allow construction of the access road network and inverter stations.

Once the panels and racking are in place, all accessible areas will be scarified to alleviate soil compaction prior to seeding. The post-development hydrology will mimic a permanent pasture, similar to the existing vacant agricultural land use.

Generation Block B includes approximately 1555 m of 5 m wide access roads, four inverter stations located on granular pads and the ground mounted solar panels. Runoff from Generation Block B travels as shallow overland flow to the neighboring Mud Creek Provincially Significant Wetland, a small wetland in the central portion of the block, and to neighboring agricultural lands. Drainage catchments were delineated using a combination of topographical survey, Light Detection and Radar (LiDAR) survey, aerial imagery and observations made during site visits completed by Stantec on September 26 and 27, 2017. The seven catchments were identified to quantify the changes in the runoff flow and volume from pre to post-development. The proposed drainage catchments are shown on **Figure 3** and are described below:

Catchment EXT B-1 – This external drainage area is comprised of vacant agricultural land and wooded area. Runoff from this area travels west as shallow overland flow to Catchment B-201 and Mud Creek Wetlands. This area is not proposed to change from existing to post-development conditions.

Catchment EXT B-2 – This external drainage area is comprised of mostly vacant agricultural land, with some active agricultural land and scattered tree cover. Runoff from this area travels westward as shallow overland flow to catchment B-202. This area is not proposed to change from existing to post-development conditions.

Catchment EXT B-3 – This external drainage area is comprised of mostly vacant agricultural land, with some active agricultural land and scattered tree cover. Runoff from this area travels westward as shallow overland flow to catchment B-203. An approximately 175 m long 5 m wide access road will be constructed in this catchment.

Catchment EXT B-4 – This external drainage area is comprised of vacant agricultural land with scattered tree cover. Runoff from this area travels westward as shallow overland flow outside of the project boundaries. An approximately 140 m long 5 m wide access road will be constructed in this catchment.



LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Proposed Conditions
December 21, 2017

Catchment B-201 – The proposed development within this catchment includes ground mounted solar panels, access roads, and inverter stations. Runoff from this catchment travels westward as shallow overland flow to Mud Creek Wetlands.

Catchment B-202 – The proposed development within this catchment includes ground mounted solar panels and access roads. The runoff from this catchment travels westward towards Mud Creek Wetlands.

Catchment B-203 – The proposed development within this catchment includes ground mounted solar panels, inverter stations, and access roads. Similar to existing conditions, the runoff from this catchment travels westward towards adjacent agricultural lands.

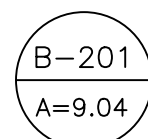
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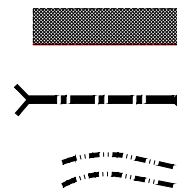


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Legend



AREA NUMBER
CONTRIBUTING AREA (ha)
OVERLAND FLOW ROUTE
DRAINAGE BOUNDARY



TEMPORARY
LAYDOWN AREA
PROPOSED CULVERT
GRASSED WATERWAY

Scale



Client/Project

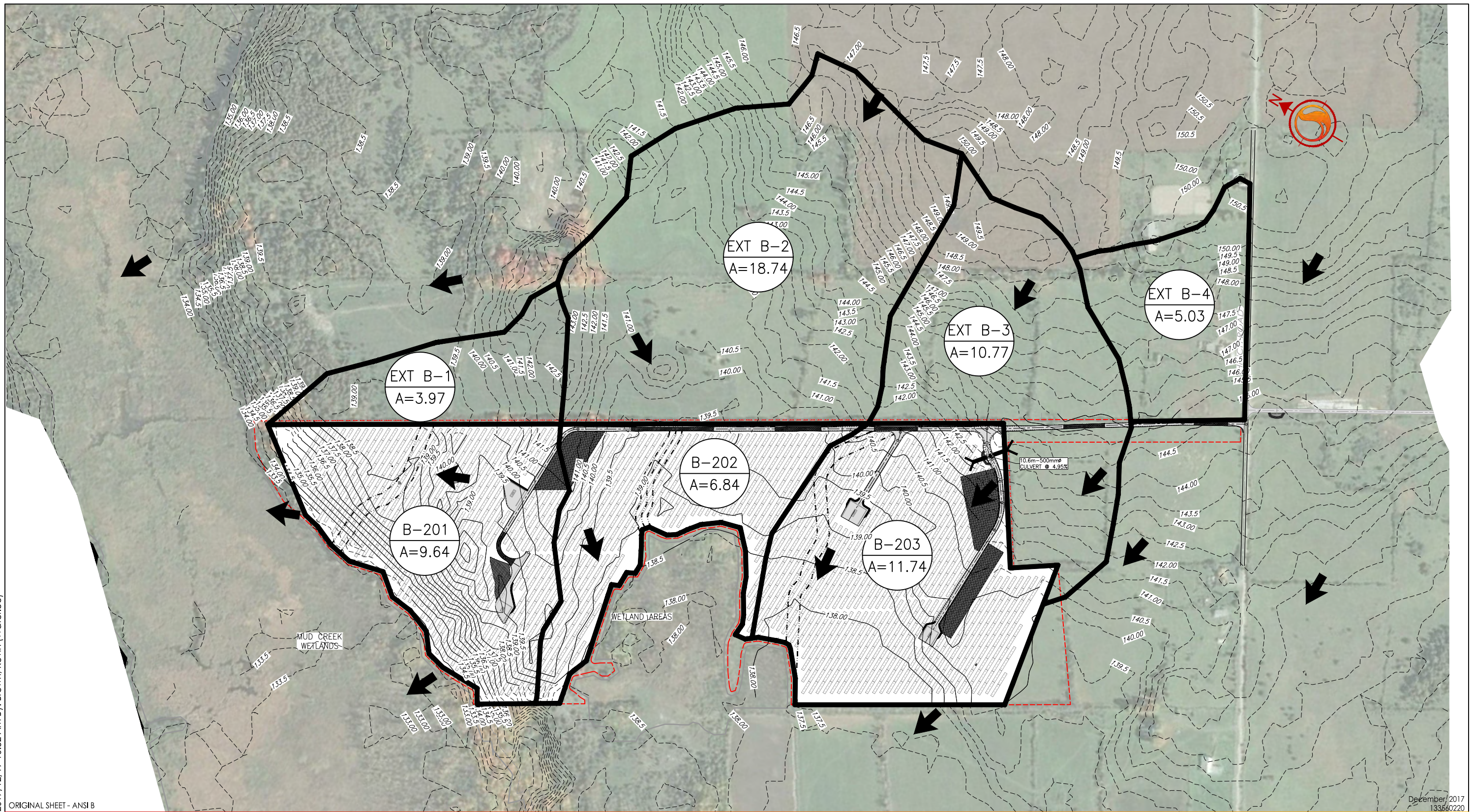
LOYALIST SOLAR LP
LOYALIST SOLAR PROJECT
54MW GROUND-MOUNT SOLAR FARM

Figure No.

FIG 3

Title

POST-DEVELOPMENT CATCHMENTS
BLOCK 'B'



December 2017
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LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

4.0 STORMWATER MANAGEMENT DESIGN

In accordance with guidance provided by the MOECC, the Generation Block B stormwater management strategy was developed to treat the runoff from the site under the following conditions:

- During and immediately after construction, prior to establishment of the stabilization vegetation; and
- Following construction, after all stabilization vegetation is established.

A portion of Generation Block B has less than one meter of soil above bedrock. This shallow depth to bedrock within the Generation Block B project limits presents a significant design constraint for conventional SWM design, as it prevents excavation of detention areas or channels, particularly in the north portion of the site. Consequently, the proposed SWM strategy relies on at-source controls to reduce runoff and meet the site stormwater management control criteria.

4.1 STORMWATER MANAGEMENT DURING CONSTRUCTION

Recent experience has shown that vegetation clearing and soil compaction caused by construction traffic during solar project site construction typically results in peak runoff discharges and volumes greater than those anticipated post-construction. Furthermore, several growing seasons may be required before the restoration vegetation becomes fully established and the site's hydrologic response meets the conditions anticipated in the proposed SWM strategy. Consequently, an interim SWM strategy was developed to manage the additional site runoff anticipated during construction. The interim SWM strategy includes the following measures to manage the site runoff during construction:

- Soil management practices to reduce runoff and augment infiltration;
- Stormwater detention to capture additional runoff and reduce peak flows and volumes from the site,
- Vegetated buffers to provide additional water quality treatment to the site runoff; and
- Grassed waterways to convey runoff from external drainage areas.

4.1.1 Soil Management

The following soil management measures are proposed for Generation Block B to promote infiltration and reduce the site runoff volumes:

- Minimizing topsoil stripping; and
- Ground surface scarification.

Preserving the quantity and quality of the site topsoil is critical to preserve the site infiltration capacity both during and after construction and to promote restoration vegetation



LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

establishment. Topsoil stripping will be limited to the areas necessary for access road and inverter station construction and for the creation of temporary laydown areas, as required. The proposed stripping limits are identified on **Drawing C-052**. Furthermore, all stripped topsoil must remain on the site and be reused for landscaping or slope interruption berms.

Contour plowing is an agricultural soil conservation practice where tillage is performed perpendicular to the slope. This results in furrows oriented perpendicular to overland flow that provide depression storage and increased surface roughness, which improves infiltration rates, reduces runoff peaks and volumes, and promotes sheet flow. Scarification will be performed on Generation Block B to achieve similar results.

Following clearing and grubbing, the Generation Block B work limits will be scarified to a minimum depth of 150 mm, where topsoil depth permits. In accordance with the guidance presented in the ESC Guideline (GGHCA, 2006), scarification will be performed with a chisel plow to retain as much vegetation residue on the soil surface as possible. Plowing will be performed perpendicular to the ground surface slopes to create furrows perpendicular to overland flow. Scarification will be performed again at the end of construction, immediately before restoration seeding, to mitigate soil compaction caused by construction traffic and to promote seed establishment.

4.1.2 Stormwater Detention

As shown on **Drawing C-602**, stormwater detention is provided by a series of slope interruption berms that intercept the Generation Block B surface runoff to reduce the peak discharges and volumes. Collected stormwater is released via infiltration and evaporation.

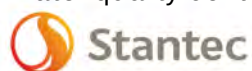
The proposed 300 mm high slope interruption berms are constructed of topsoil and are oriented perpendicular to the ground surface slopes. Each berm has a uniform crest elevation, and the spacing between the proposed berms was developed based on the filter berm design guidance presented in the ESC Guideline (GGHCA, 2006) to promote sheet flow. The proposed slope interruption berm stage/storage/discharge relationships are presented in **Appendix A**.

The proposed berms provide sufficient storage to capture all runoff from the 25 mm water quality design rainfall event. Since the captured stormwater is released via infiltration and evaporation, the proposed slope interruption berms provide all necessary water quality treatment for the site runoff.

The slope interruption berms will require periodic regrading during construction to repair ruts and compaction caused by construction traffic.

4.1.3 Vegetated Buffers

Vegetated buffers located along the western side of the road in catchments EXT B-3 and EXT B-4, and along the western border of catchments B-201, B-202, and B-203 provides additional water quality control for shallow overland runoff from these catchments. The vegetated buffers



LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

are comprised of 5 m wide swaths of undisturbed native vegetation draining via shallow overland flow. Water quality benefits of the proposed vegetated buffers are achieved by the runoff / vegetation interaction which reduces the velocity of runoff, thereby promoting the sedimentation of particulate matter. The vegetation also provides nutrient uptake benefits to help reduce biological pollutants such as nitrogen and phosphorous.

4.1.4 Grassed Waterways

Runoff from the existing catchments draining towards the site will be collected and conveyed through the site in a series of grassed waterways. These grassed waterways will be constructed using either the natural drainage draws present on the site or by constructing the waterways. Collecting and conveying the external drainage through a dedicated channel will reduce the risk of erosion on site, and eliminate the need to provide additional capacity in the proposed slope interruption berms to accommodate the external flows. The grassed waterways will help to maintain surface flows to the downstream Hinch Swamp, agricultural lands, and woodlot lands, similar to existing conditions.

Rock check dams and berms will be constructed on the downstream limits of the grassed waterways to re-distribute and disperse the flow. The limits of the grassed waterway are to be delineated during construction with flagging, stakes, or construction fence, and must be hydroseeded and maintained through construction.

4.2 STORMWATER MANAGEMENT POST-CONSTRUCTION

The Loyalist Solar Project increases site impervious coverage to approximately 1.09 ha, or 3.9% of the total site area, mainly in the form of roadways and inverter platforms. The granular roadways will be compacted over the course of construction, and have been considered as impervious surfaces. As noted in *Hydrologic Response of Solar Farms* (Cook and McCuen; Journal of Hydrologic Engineering, May 2013), included in **Appendix E** for reference, solar panels suspended on racking above vegetated cover do not functionally contribute to site imperviousness and do not have “a significant effect on the runoff volumes, peaks or times to peak” of solar farm development sites. Thus, once the site restoration vegetation is fully established, the Generation Block B peak runoff rates and volumes will be similar to the existing conditions values.

However, recent solar project experience has shown that several growing seasons are necessary for the site restoration vegetation to become fully established. Consequently, the slope interruption berms, the vegetated buffers and the grassed waterways used to manage runoff during the site construction will remain as permanent features to mitigate the risk of downstream flooding or erosion caused by the site development. Temporary erosion and sediment control measures implemented during construction will remain in place until the site restoration vegetation has become sufficiently established to provide adequate stabilization.



LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

4.2.1 Permanent Slope Interruption Berms

The proposed slope interruption berms used to control the site runoff during construction will be retained as a passive stormwater management measure during the operation phase of the Loyalist Solar Project. Similar to their role during site construction, the proposed berms will provide the following stormwater management functions:

- Intercepting and detaining site runoff;
- Promoting sheet flow; and
- Reducing runoff velocities.

The proposed permanent slope interruption berms will also serve to distribute runoff evenly across the site during the operation phase of the Loyalist Solar Project. In locations where the solar panel rows are oriented parallel to the ground surface slope, runoff may not travel into the sheltered area beneath the panels, reducing the percentage of the site surface available for infiltration. However, this effect will be mitigated by the permanent slope interruption berms, which will act similar to level spreaders, distributing runoff across the site slopes, including the areas under the solar panels.

At the end of construction, the slope interruption berms will be regraded to repair compaction and damage caused by construction vehicles. The berms will be seeded with restoration seed mix when the rest of the site is stabilized. The slope interruption berms will provide stormwater quantity and quality control while the stabilization vegetation becomes established.

4.2.2 Vegetated Buffers

The 5 m vegetated buffers located on the western side of the road in catchments EXT B-3 and EXT B-4, and along the western border of catchments B-201, B-202, and B-203 will continue to provide additional water quality control for shallow overland runoff from Generation Block B following construction.

4.2.3 Grassed Waterways

The grassed waterways will continue to direct the external area flow through the site, reducing erosion and maintaining the flow from external areas to the surrounding area.

4.3 HYDROLOGIC ANALYSIS

A hydrologic analysis was performed to characterize the existing conditions peak flows and runoff volumes and to evaluate the interim and proposed condition SWM strategies. The hydrologic calculations were performed using the Stormwater Management Hydrologic Model (SWMHYMO).



LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

4.3.1 Design Storms

In accordance with requirements provided by Quinte Conservation, existing and proposed development conditions were modelled for the 2-, 5- and 100-year rainfall events. The Atmospheric Environment Service (AES) 30% 1-hour and 12-hour synthetic storm distributions were used for each rain event. The AES distribution was selected since it was previously used in the *Preliminary Stormwater Management and Erosion and Sediment Control Plan* (Tulloch, 2017). A 25 mm, 4-hour Chicago design storm was used to assess erosion protection for the site. Rainfall Intensity-Duration-Frequency (IDF) data was obtained from the Environment Canada Belleville station.

4.3.2 Hydrologic Parameters

As per direction provided by Quinte Conservation, the hydrologic calculations were performed for both Antecedent Moisture Condition (AMC) II and III. Soil Conservation Service (SCS) curve numbers and hydrologic parameters were calculated for each catchment based on land use, slopes, overland flow path lengths, and soil type and are provided in **Appendix A**, while detailed modeling files are included in **Appendices B, C, and D**.

4.3.3 Hydrologic Analysis Results

Hydrologic calculations were performed to estimate the peak stormwater discharges under existing, interim, and proposed conditions. The corresponding results are summarized in the following tables.

LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

Table 1: Peak Flows and Runoff Volumes – AMC II

Discharge Location ¹	Condition ²	Design Storm						
		25 mm	2-year		5-year		100-year	
		4-hr	1-hr	12-hr	1-hr	12-hr	1-hr	12-hr
Peak Discharge (m³/s)								
Northwest	Existing	0.11	0.12	0.08	0.19	0.13	0.45	0.32
	Interim	0.03	0.03	0.02	0.05	0.04	0.12	0.38
	Proposed	0.03	0.03	0.02	0.05	0.04	0.12	0.32
Centre	Existing	0.14	0.16	0.15	0.26	0.24	0.60	0.56
	Interim	0.12	0.13	0.11	0.21	0.18	0.50	0.42
	Proposed	0.12	0.13	0.11	0.21	0.18	0.50	0.42
Southwest	Existing	0.17	0.19	0.15	0.31	0.24	0.70	0.57
	Interim	0.08	0.09	0.07	0.14	0.11	0.33	0.25
	Proposed	0.08	0.09	0.07	0.14	0.11	0.33	0.25
South	Existing	0.03	0.03	0.03	0.04	0.05	0.10	0.11
	Interim	0.03	0.03	0.03	0.05	0.05	0.11	0.11
	Proposed	0.03	0.03	0.03	0.05	0.05	0.11	0.11
Runoff Volume (mm)								
Northwest	Existing	3.5	2.8	9.6	4.4	15.9	10.4	37.8
	Interim	1.0	0.8	2.7	1.3	4.5	3.0	28.1
	Proposed	1.01	0.8	2.7	1.3	4.5	3.0	19.5
Centre	Existing	3.5	2.7	9.4	4.3	15.5	10.1	37.1
	Interim	2.52	2.0	6.9	3.2	11.4	7.4	27.2
	Proposed	2.52	2.0	6.9	3.12	11.4	7.4	27.2
Southwest	Existing	4.0	3.1	10.7	5.0	17.5	11.5	41.0
	Interim	1.7	1.3	4.6	2.1	7.7	5.0	20.1
	Proposed	1.71	1.3	4.6	2.1	7.7	5.0	18.2
South	Existing	3.5	2.7	9.4	4.3	15.5	10.1	37.1
	Interim	3.6	2.8	9.7	4.5	16.0	10.5	38.1
	Proposed	3.58	2.8	9.7	4.5	16.0	10.5	38.1
Notes: ¹ Discharges at the northwest site boundary represented by Catchment B-101/201 EXT B-1. Discharges at the centre site boundary represented by Catchment B-102/202 and EXT B-2. Discharges at the southwest site boundary represented by Catchment B-103/203 and EXT B-3. Discharges at the south site boundary represented by Catchment EXT B-4. ² The interim condition calculations were performed using SCS curve numbers consistent with contour farming in poor hydrologic condition to represent the scarified site surfaces. Furthermore, the CALIB NASHYD command was used to define an initial abstraction consistent with plowed surfaces, selected based on the guidance presented in Effects of Tillage on Soil Microrelief, Surface Depression Storage and Soil Water Storage (Guzha, 2003).								

LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

The AMC II calculation results show that the proposed condition peak flows are less than the existing conditions peak flows for all design storms, and the interim condition peak flows are less than the existing conditions for all design storms except for the 100-year 12-hour event for the Northwest (201) catchment. While the peak calculated discharge for this event is greater than the target, no downstream negative impacts are anticipated since:

1. The total runoff volumes are reduced, compared to existing conditions, with the exception of the external area in the south,
2. The magnitude of the increases is small – maximum of 0.06 m³/s,
3. The additional runoff is distributed as sheet flow. Along the 590 m of the northwest perimeter, the increase in runoff corresponds to a maximum increase in peak unit flow of only 0.0001 m³/s/m.
4. The downstream receiver is the Mud Creek PSW, which at approximately 285 ha in total size (3400 ha contributing area), is unlikely to be affected by minor increases in peak discharges.

Modeling indicates that peak flows to the south increase by less than 0.01 m³/s under the 5-year 1-hour and 100-year 1-hour. This negligible increase is the result of the installation of the access road to the site.

The AMC II proposed condition results suggest that the proposed site SWM strategy captures all of the site runoff for all of the evaluated storms, with the exception of the 100-year 12-hour design event during construction.

LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

Table 2: Peak Flows and Runoff Volumes – AMC III

Discharge Location ¹	Condition ²	Design Storm						
		25 mm	2-year		5-year		100-year	
		4-hr	1-hr	12-hr	1-hr	12-hr	1-hr	12-hr
Peak Discharge (m³/s)								
Northwest	Existing	0.22	0.24	0.15	0.37	0.23	0.80	0.51
	Interim	0.06	0.06	0.04	0.10	0.17	0.21	0.56
	Proposed	0.06	0.06	0.04	0.10	0.07	0.21	0.46
Centre	Existing	0.29	0.33	0.26	0.51	0.41	1.09	0.90
	Interim	0.24	0.27	0.20	0.42	0.31	0.90	0.68
	Proposed	0.24	0.27	0.20	0.42	0.31	0.90	0.68
Southwest	Existing	0.34	0.38	0.26	0.58	0.41	1.23	0.88
	Interim	0.16	0.18	0.12	0.27	0.18	0.58	0.73
	Proposed	0.16	0.18	0.12	0.27	0.18	0.58	0.49
South	Existing	0.05	0.06	0.05	0.09	0.08	0.19	0.17
	Interim	0.05	0.06	0.05	0.09	0.08	0.19	0.17
	Proposed	0.05	0.06	0.05	0.09	0.08	0.19	0.17
Runoff Volume (mm)								
Northwest	Existing	7.0	5.6	17.2	8.5	26.9	18.5	57.5
	Interim	2.0	1.6	5.0	2.5	11.7	5.4	45.7
	Proposed	2.03	1.6	5.0	2.5	7.9	5.4	39.3
Centre	Existing	7.0	5.6	17.2	8.5	26.9	18.5	57.5
	Interim	5.1	4.1	12.6	6.3	19.7	13.5	42.1
	Proposed	5.10	4.1	12.6	6.3	19.7	13.5	42.1
Southwest	Existing	7.8	6.2	18.8	9.5	29.0	20.0	60.7
	Interim	3.3	2.7	8.2	4.1	12.9	8.8	37.7
	Proposed	3.33	2.7	8.2	4.1	12.9	8.8	33.6
South	Existing	7.0	5.6	17.2	8.5	26.9	18.5	57.5
	Interim	7.0	5.6	17.2	8.5	26.9	18.5	57.5
	Proposed	6.97	5.3	17.2	8.5	26.9	18.5	57.2
Notes:								
¹ Discharges at the northwest site boundary represented by Catchment B-101/201 and EXT B-1. Discharges at the centre site boundary represented by Catchment B-102/202 and EXT B-2. Discharges at the southwest site boundary represented by Catchment B-103/203 and EXT B-3. Discharges at the south site boundary represented by Catchment EXT B-4.								
² The interim condition calculations were performed using SCS curve numbers consistent with contour farming in poor hydrologic condition to represent the scarified site surfaces. Furthermore, the CALIB NASHYD command was used to define an initial abstraction consistent with plowed surfaces, selected based on the guidance presented in Effects of Tillage on Soil Microrelief, Surface Depression Storage and Soil Water Storage (Guzha, 2003).								



LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

The AMC III interim condition calculation results are similar to the AMC II calculation results. The interim condition peak flows are less than the existing conditions peak flows for all design storms except for the 100-year 12-hour event (northwest catchment). While the 12-hour 100-year event calculated peak discharge is slightly higher than the existing condition magnitudes, no downstream negative impacts are anticipated, for the reasons noted above.

4.4 GROUNDWATER/SURFACE WATER INTERACTION

Site observations identified the presence of exposed surface fractures in the bedrock within the proposed work limits. However, the hydrogeological assessment completed by Harden Environmental Services Ltd. (Harden) notes that while these fractures likely play a significant role in capturing site runoff, they do not penetrate deeply into the bedrock and the report findings suggest that subsurface flow through the fractures is not significant.

The proposed slope interruption berm alignments will be modified in the field to prevent surface water from ponding on top of exposed fractures to mitigate the risk of increasing local subsurface flows.

In areas where cable is trenched or blasted into bedrock, the resulting trench is proposed to be backfilled with clay or concrete to prevent the trench from acting as a conduit for flows.

4.5 STORMWATER MANAGEMENT MONITORING AND MAINTENANCE

The proposed permanent slope interruption berms are a passive and simple type of stormwater management practice, with operational and maintenance requirements to match. The site owner's inspection, operational, and maintenance activities can be generally limited to:

- Routine observations as to the presence of trash/debris and accumulated sediment upstream of the berms that could be conveyed downstream and/or affect the capacity of the system, and removal of same as needed.
- A semi-annual walking inspection should be completed each spring and autumn to identify areas of bare soil and/or erosion. Remediation efforts would typically involve re-grading the affected berm and/or re-vegetating with sod or appropriate seed mix, with fertilizer and water applied as necessary to ensure germination and stabilization.
- Concurrent with the walking inspections, a visual assessment of any areas of persistent sediment build-up should be identified. Excessive sedimentation is an issue requiring attention if it remains in a non-vegetated condition and is, therefore, prone to re-suspension and transport downstream, or if it occurs to an extent that it affects the storage capacity of the berms. If any such condition occurs, the sediment should be removed and the area re-stabilized.
- The walking inspections will also include a review of the ground surface conditions along the entire downstream site perimeter to identify any areas of erosion or concentrated



LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Stormwater Management Design
December 21, 2017

stormwater flows. Downstream impacts will be identified and the Owner will develop a remediation plan to address them.

- The density and health of vegetation around the berms should be evaluated during the walking inspections. Deficiencies in this regard could be indicative of poor species selection and replanting should be undertaken to ensure sufficient vegetation densities.
- The height of the permanent slope interruption berms will likely decline over time due to soil bioturbation, erosion, and compaction by maintenance vehicles. The berm crests shall be restored to their design elevations once the berm heights are reduced to 200 mm or if downstream erosion or surface flow concerns are identified.
- Driving on the slope interruption berms should be avoided during wet periods to reduce the possibility of excessive rutting.

LOYALIST SOLAR PROJECT – BLOCK B
STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Erosion and Sediment Control Plan
December 21, 2017

5.0 EROSION AND SEDIMENT CONTROL PLAN

5.1 SITE EROSION POTENTIAL

An assessment of the erosion potential of the construction area was completed following the methodology outlined in the *ESC Guideline (GGHCA, 2006)*. The erosion potential is based on an assessment of three primary factors, namely slope gradient, slope length and soil texture (erodibility), with the resultant designation of either “low”, “medium” or “high” erosion potential. The relative level of erosion potential dictates, to some extent, the comprehensiveness of the resultant ESC system design, monitoring, and maintenance program.

The existing and proposed (post-construction) condition gradients on Generation Block B are classified as moderate (2-10%), with predominantly long slopes (greater than 30 m). Site soils are primarily loam, which has a high erosion potential (*Table A, ESC Guidelines*). Therefore, based on this classification, this site has a “high” erodibility potential (*Table A2, ESC Guidelines*).

Beyond the three-parameter approach described by the *ESC Guidelines*, it is also appropriate to account for additional factors that may result in potential sediment transport offsite during construction. In this particular case, construction is anticipated to commence January 2018, which will prohibit in the establishment of vegetative stabilization measures until springtime. Furthermore, removal of the scattered trees during site clearing and grubbing will likely cause localized soil disturbance.

5.2 DURING CONSTRUCTION DEWATERING

No significant excavation is proposed within Generation Block B. While pile installation for the proposed solar panel racking is anticipated to intercept the groundwater table, significant dewatering is not anticipated due to the low bedrock permeability.

However, if necessary, any required dewatering operations will be completed such that discharge rates will not adversely impact flooding or erosion conditions upstream or downstream of Generation Block B. To mitigate the risk of sediment migration to downstream areas, dewatering discharges may be treated with a variety of measures including, but not limited to, filter socks and sediment traps at the discretion of the contractor in consultation with the owner's engineer and regulatory agencies (if required). Dewatering measures will be directed through the sediment control measures to a gently sloped, vegetated area (when possible) greater than 30 m from any watercourse or wetland feature. Although an exceedance isn't expected, should anticipated pumping rates exceed 50,000 L/day an Environmental Activity Sector Registration (EASR) application is required. Should anticipated pumping rates exceed 400,000 L/day a Permit to Take Water (PTTW) application is required.

LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Erosion and Sediment Control Plan
December 21, 2017

5.3 EROSION AND SEDIMENT CONTROL MEASURES

The various construction activities required to construct Generation Block B include topsoil redistribution, clearing and grubbing, minor grading activities, and general construction traffic. If left unmitigated, these activities will result in impacts ranging from disturbance of at-surface soils, possible exposure of fractured bedrock to potential erosion and sediment transport to offsite locations.

Erosion control will be achieved primarily by:

- Managing disturbed soils using soil conservation practices to reduce runoff and sediment transport during construction;
- Providing temporary runoff detention to reduce peak flows and promote settling; and
- Constructing barriers to filter runoff.

Erosion and sediment control measures will be implemented prior to any grading or servicing works commencing as shown on the accompanying Plans (**Drawings C-602 and C-650**), and include, but are not necessarily be limited to, the following measures:

- A perimeter silt fence will be installed at the downstream side of the work limits concurrent with the construction of the site chain link fence. Since the shallow topsoil depths will likely prevent the installation of separate silt fence stakes, the perimeter silt fence will be fixed to the upstream side of the permanent chain link fence. Where shallow topsoil depths prevent trenching in the filter fabric, 150 mm of clear stone or pea gravel will be used to provide contact between the fabric and the ground surface;
- A 5 m wide vegetated buffer will be provided on the downstream side of all disturbed areas, as shown on **Drawing C-602**. The vegetated buffer will consist of undisturbed native vegetation and any areas of sparse vegetation will be seeded;
- Following all clearing and grubbing operations, contour plowing will be performed in all disturbed areas, where the soil depth permits, to scarify the soil surface. Contour plowing will be performed with a chisel plow to keep existing vegetation near the soil surface;
- Slope interruption berms will be constructed of stripped topsoil from road and inverter station locations to promote sheet flow and provide temporary stormwater detention.
- A construction entrance feature (“mud mat”) will be provided at the site entrance to minimize the offsite transport of sediment via construction vehicles;
- Hinch Road will be cleaned daily of any sediment deposited by site construction traffic;
- Stabilize topsoil stockpiles expected to be left in place in excess of 30 days with vegetative cover (i.e., hydroseeding) or a rolled erosion control product in the event of unfavourable growing conditions (i.e., during the winter);



LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Erosion and Sediment Control Plan
December 21, 2017

- Natural drainage routes will be protected with erosion control blanket and will have rock check dams to help attenuate flows and encourage deposition of suspended sediment where appropriate;
- No equipment will be permitted to enter any area beyond the proposed work limits during construction;
- Temporarily stockpiled excavated native materials and imported materials with a D_{50} less than 4.75 mm (typical D_{50} of Granular A) will be covered with rolled erosion control products when the material is expected to be left in place in excess of 30 days, while imported materials with a D_{50} of 4.75 mm or greater can remain uncovered. Granular A and B (Type II) gradation requirements allow up to 55% percent passing a 4.75 mm sieve (#4 sieve), and may be stockpiled without covering with rolled erosion control products. Uncovered stockpiles will be surrounded with a double layer of light duty silt fence (1 m separation between layers) to provide a secondary layer of protection from sediment migration;
- Re-vegetate all disturbed areas where construction is not expected for 30 days with a minimum 50 mm of topsoil and hydro-seeding or other stabilizing vegetation / erosion protection measures (per OPSS 804). If vegetation establishment is not possible, given seasonal restriction or other revegetation limiting factors, the disturbed area should be stabilized against erosion impacts by non-vegetated means such as erosion control blankets;
- All materials and equipment used for the purpose of site preparation and project construction should be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from migrating to offsite receivers:
 - o Refueling and maintenance of construction equipment should occur in designated areas, a minimum of 30 m from a water body, wetland, or other sensitive receiver;
 - o All spills shall be reported to the Environmental Monitor for assessment and documentation, and to establish a remedial plan based on the contractor's project-specific spill response plan. Based on the assessment of the extent of the impact, The Environmental Monitor shall determine if the MOECC Spills Action Centre should be notified. Should the incident require that the Spills Action Centre be notified, this notification will be undertaken as quickly as possible by calling 1-800-268-6060;
- In the event of inclement weather or unfavourable terrain for construction, construction best practices, such as temporary rig-mats may be used to prevent disruption of surface soils and vegetative cover by construction vehicles and equipment.

The ESC measures shall be maintained in good repair during the entire construction period, and removed as contributing drainage areas are restored and stabilized. ESC measures shall not be removed until a qualified erosion and sediment control inspector determines that the measures are no longer required and the risk of surface water and environmental impacts from construction activities are negligible. In addition, the condition of erosion control works, their



LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Erosion and Sediment Control Plan
December 21, 2017

overall performance, and any repairs, replacement, or modifications to the installed item shall be noted in logbooks to be kept on-site.

5.4 CONTINGENCY PLAN

The purpose of the contingency plan is to help minimize the risk or consequence of failure of the erosion and sediment control works. Failure could result from insufficient measures, lack of maintenance, or severe weather conditions. The contingency plan includes two areas of consideration: the procedures that will be followed where a failure has occurred; and the contingency measures that will be implemented where there is potential for failure.

The Contractor shall be responsible for following the contingency plan, and will prepare the following items:

- Workers shall be on call for emergency situations for all aspects of the emergency from design to construction of emergency sediment and erosion control measures. Any associated health and safety issues are the responsibility of the Contractor;
- Heavy duty silt fence, double-net straw matting erosion control blankets, straw bales and stakes, sandbags, appropriate sized rip-rap, and clean gravel fill shall be available on-site for emergency installation;
- Heavy equipment shall be on standby for emergency works;
- Fuel spill containment supplies and equipment shall be available on-site for emergency spills of deleterious substances; and
- A contact list for any further required equipment or materials shall be prepared and made available for emergency use.

5.4.1 Contingency Measures in Case of Failure

In the event of a failure, the Contractor will cease all construction related work and focus on erosion and sediment control as required to effectively stabilize the site where a failure has occurred or is imminent.

If significant long-term damage to downstream fish habitat or property is suspected, the Environmental Monitor will immediately assess and document the situation and report the incident to the MOECC Spills Action Centre. The Contractor will develop a restoration plan in consultation with MOECC. Development of the initial restoration plan will begin within 24 hours of the discovery of sediment discharge, and will be implemented as soon as possible, following consultation and approval from the MOECC, QC, DFO (if necessary) and the Township of Stone Mills. . The plan will address:

- Removal and disposal of sediment from outside the work limits;
- Restoration of the affected area; and



LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Erosion and Sediment Control Plan
December 21, 2017

- Restoration of any areas disturbed through deposition or removal.

5.4.2 Contingency Measures where there is a High Risk of Failure

Conditions that may potentially cause failures can be identified through two methods: monitoring of the erosion and sediment control measures, and weather forecasts that anticipate severe weather conditions.

5.4.2.1 High Risk Identified Through Monitoring

Where monitoring has identified a high potential for failure, steps shall be immediately taken to reduce the risk. These measures may include repair to existing measures, modification of existing measures, and the addition of new measures.

5.4.2.2 Severe Weather Anticipated

In cases where the weather forecast indicates that significant rainfall (more than 10 mm) is expected within a 24-hour period, the Contractor shall immediately complete the following:

- Verify that all erosion and sediment control measures are secure and that there is no exposed soil that could erode and be deposited downstream;
- Verify that all other measures are in good working order;
- Monitor all measures during the rainfall event, and where a potential for failure is identified, take corrective measures.

If unforeseen events cause the strategies set out in the contingency plan to be insufficient or inappropriate to meet the objective of containing sediment within the work limits, the Contractor will respond in a timely manner with all reasonable measures consistent with safety, to prevent, counteract or remedy any negative effects on the natural environment or adjacent properties.

5.5 EROSION AND SEDIMENT CONTROL MONITORING PROGRAM

To ensure the effectiveness of the various erosion and sediment control measures, a routine program should be implemented which includes the inspection of the erosion and sediment controls daily and after each significant rainfall event (10 mm), and immediate repair of any deficiencies. Non-urgent repairs (i.e., no immediate risk of sediment discharges to the downstream environment) will be completed within 48 hours of identifying the deficiency, or prior to the next anticipated rainfall event, whichever is less. This program will consist of the following activities:

- Visual inspection of the ESC measures to ensure discharged flows are generally free of sediment and turbidity;



LOYALIST SOLAR PROJECT – BLOCK B STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Erosion and Sediment Control Plan
December 21, 2017

- Inspection of vegetation protection, erosion control blankets and silt fencing to ensure that they are maintained in good repair;
- Removal of construction debris that may accumulate; and
- Implementation of remedial measures including erosion stabilization, repair of damaged measures and any other remediation where required.

If the monitoring program outlined above indicates a persistent problem, then the following steps should be undertaken to determine appropriate mitigative measures (if step 1 does not resolve the issue, proceed to step 2):

1. Analysis of the monitoring information and field visits as required, determine the cause of the problem and develop a mitigation plan to address the issue in consultation with the qualified Environmental Monitor.
 - a. Implement additional mitigation measures and monitor the results.
2. Convene a meeting with the appropriate review agencies (i.e., MOECC, QC and/or Stone Mills Township, etc.)
 - a. Develop a consensus on a proposed plan of action to resolve the problem in consultation with agency staff.
 - b. Implement additional mitigation measures and monitor the results.

5.6 LONG TERM EROSION AND SEDIMENT CONTROL

Approximately one (1) year after completion of construction, a site inspection will be completed to ensure that long-term erosion control measures have been effective. Seeded or replanted areas will be inspected to ensure that vegetation measures were successful and reseeding or replanting will occur where necessary.

If erosion control measures are found to be less than fully effective during this survey, reseeding or replanting of problem areas will take place. Should there be residual effects noted during post-construction monitoring, advice on contingency measures will be sought and applied.

LOYALIST SOLAR PROJECT – BLOCK B

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL REPORT

Conclusion and Recommendations
December 21, 2017

6.0 CONCLUSION AND RECOMMENDATIONS

A site stormwater management strategy was developed for proposed Generation Block B to control runoff both during the construction phase and for the project operation phase. The proposed stormwater management strategy focuses on retaining the site runoff at source to better mimic the existing conditions hydrology. The on-site detention is provided by a series of slope interruption berms that will remain until the solar project is decommissioned. Hydrologic calculation results suggest that the proposed site SWM strategy mitigates the risk of downstream flooding, erosion or water quality impacts caused by the site development.

Based on the findings of the report, the following recommendations are provided:

- The proposed SWM measures provided in this report shall be constructed as designed;
- The ESC measures documented herein shall be implemented during construction; and
- The Stormwater Monitoring and Maintenance Program shall be carried out during and following construction.

APPENDIX A – DESIGN CALCULATIONS

SWMHYMO Parameters

Slope Interruption Berm Storage – Catchment B-201

Slope Interruption Berm Storage – Catchment B-202

Slope Interruption Berm Storage – Catchment B-203

Subject: SWMHYMO Parameters
Project: Loyalist Solar Project
Site: Block 'B'
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 21, 2017

Existing Conditions

Catchment Number	SWMHYMO Command	Area	CN (AMC II)	CN (AMC III)	Rise	Length	Catchment Slope	Tc	Tp
		(ha)			(m)	(m)	(%)	(hrs)	(hrs)
EXT B-1	DESIGN NASHYD	3.97	65	82	8.0	410	2.0	0.72	0.43
EXT B-2	DESIGN NASHYD	18.74	65	82	10.5	540	1.9	0.83	0.50
EXT B-3	DESIGN NASHYD	10.77	65	82	8.5	400	2.1	0.69	0.42
EXT B-4	DESIGN NASHYD	5.03	65	82	11.5	840	1.4	1.16	0.70
B-101	DESIGN NASHYD	9.64	66	82	8.5	310	2.7	0.56	0.34
B-102	DESIGN NASHYD	6.84	65	82	3.0	610	0.5	1.39	0.83
B-103	DESIGN NASHYD	11.74	72	86	6.5	460	1.4	0.85	0.51

66.73

Interim Conditions

Catchment Number	SWMHYMO Command	Area	CN (AMC II)	CN (AMC III)	Rise	Length	Catchment Slope	Tc	Tp
		(ha)			(m)	(m)	(%)	(hrs)	(hrs)
EXT B-1	DESIGN NASHYD	3.97	65	82	8.0	410	2.0	0.72	0.43
EXT B-2	DESIGN NASHYD	18.74	65	82	10.5	540	1.9	0.83	0.50
EXT B-3	DESIGN NASHYD	10.77	66	82	8.5	400	2.1	0.69	0.42
EXT B-4	DESIGN NASHYD	5.03	66	82	11.5	840	1.4	1.16	0.70
B-201	CALIB NASHYD	9.64	82	92	8.5	310	2.7	0.51	0.31
B-202	CALIB NASHYD	6.84	82	92	3.0	610	0.5	1.27	0.76
B-203	CALIB NASHYD	11.74	85	94	6.5	460	1.4	0.78	0.47

66.73

Proposed Conditions

Catchment Number	SWMHYMO Command	Area	CN (AMC II)	CN (AMC III)	Rise	Length	Catchment Slope	Tc	Tp
		(ha)			(m)	(m)	(%)	(hrs)	(hrs)
EXT B-1	DESIGN NASHYD	3.97	65	82	8.0	410	2.0	0.72	0.43
EXT B-2	DESIGN NASHYD	18.74	65	82	10.5	540	1.9	0.83	0.50
EXT B-3	DESIGN NASHYD	10.77	66	82	8.5	400	2.1	0.69	0.42
EXT B-4	DESIGN NASHYD	5.03	66	82	11.5	840	1.4	1.16	0.70
B-201	DESIGN NASHYD	9.64	70	85	8.5	310	2.7	0.56	0.34
B-202	DESIGN NASHYD	6.84	70	85	3.0	610	0.5	1.39	0.83
B-203	DESIGN NASHYD	11.74	75	88	6.5	460	1.4	0.85	0.51

66.73

Notes:

Time of Concentration calculated using the Airport Method
(For areas less than 100 ha)

$$T_c = [3.26 (1.1-C) L^{0.5}] / S^{0.33} \text{ [min]}$$

Where:

C = Runoff Coefficient = 0.28 for undeveloped areas (flat pasture on silt loam)

C = Runoff Coefficient = 0.35 for interim) plowed conditions

L = Length of Overland Flow (m)

S = Slope (%)

Time to Peak

$$T_p = 0.6T_c$$

CN is a weighted average for DESIGN NASHYD

\\Cd1004-f01\work_group\01614\active\133560220\design\analysis\SWM\Block B\[SWMHYMO_Block_B_V3.xlsx]Tc and Tp

Subject: Slope Interruption Berm Storage
Project: Loyalist Solar Project
Site: Block B
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 21, 2017

Catchment ID: B-201
Berm Height (mm): 300
Total Berm Length (m): 1630
Surface Slope: 2.7%
Infiltration Rate (mm/hr): 7
Weir Discharge Coefficient: 1.5

Ponding Depth (m)	Ponding Width (m)	Cross Sectional Area (m ²)	Ponding Volume (m ³)	Head (m)	Discharge (m ³ /s)	Incremental Drawdown Time (h)	Cumulative Drawdown Time (h)
0	0	0	0			0	0
0.01	0.4	0.00	3			1.4	1.4
0.02	0.8	0.01	13			1.4	2.9
0.03	1.2	0.02	29			1.4	4.3
0.04	1.6	0.03	52			1.4	5.7
0.05	2.0	0.05	82			1.4	7.1
0.06	2.4	0.07	117			1.4	8.6
0.07	2.8	0.10	160			1.4	10.0
0.08	3.2	0.13	209			1.4	11.4
0.09	3.6	0.16	264			1.4	12.9
0.1	4.0	0.20	326			1.4	14.3
0.11	4.4	0.24	395			1.4	15.7
0.12	4.8	0.29	470			1.4	17.1
0.13	5.2	0.34	551			1.4	18.6
0.14	5.6	0.39	640			1.4	20.0
0.15	6.0	0.45	734			1.4	21.4
0.16	6.4	0.51	835			1.4	22.9
0.17	6.8	0.58	943			1.4	24.3
0.18	7.2	0.65	1057			1.4	25.7
0.19	7.6	0.72	1178			1.4	27.1
0.2	8.0	0.80	1305			1.4	28.6
0.21	8.4	0.88	1439			1.4	30.0
0.22	8.8	0.97	1579			1.4	31.4
0.23	9.2	1.06	1726			1.4	32.9
0.24	9.6	1.15	1879			1.4	34.3
0.25	10.0	1.25	2039			1.4	35.7
0.26	10.4	1.35	2206			1.4	37.1
0.27	10.8	1.46	2379			1.4	38.6
0.28	11.2	1.57	2558			1.4	40.0
0.29	11.6	1.68	2744			1.4	41.4
0.3	12.0	1.80	2937	0	0.0	1.4	42.9
0.31	12.4	1.92	3136	0.01	2.4	0.0	42.9
0.32	12.8	2.05	3341	0.02	6.9	0.0	42.9
0.33	13.2	2.18	3553	0.03	12.7	0.0	42.9
0.34	13.6	2.31	3772	0.04	19.6	0.0	42.9
0.35	14.0	2.45	3997	0.05	27.3	0.0	42.9

Subject: Slope Interruption Berm Storage
Project: Loyalist Solar Project
Site: Block B
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 21, 2017

Catchment ID: B-202
Berm Height (mm): 300
Total Berm Length (m): 1460
Surface Slope: 0.5%
Infiltration Rate (mm/hr): 7
Weir Discharge Coefficient: 1.5

Ponding Depth (m)	Ponding Width (m)	Cross Sectional Area (m ²)	Ponding Volume (m ³)	Head (m)	Discharge (m ³ /s)	Incremental Drawdown Time (h)	Cumulative Drawdown Time (h)
0	0	0	0			0	0
0.01	2.0	0.01	15			1.4	1.4
0.02	4.1	0.04	59			1.4	2.9
0.03	6.1	0.09	133			1.4	4.3
0.04	8.1	0.16	237			1.4	5.7
0.05	10.2	0.25	370			1.4	7.1
0.06	12.2	0.37	533			1.4	8.6
0.07	14.2	0.50	726			1.4	10.0
0.08	16.2	0.65	948			1.4	11.4
0.09	18.3	0.82	1200			1.4	12.9
0.1	20.3	1.02	1482			1.4	14.3
0.11	22.3	1.23	1793			1.4	15.7
0.12	24.4	1.46	2134			1.4	17.1
0.13	26.4	1.72	2504			1.4	18.6
0.14	28.4	1.99	2905			1.4	20.0
0.15	30.5	2.28	3334			1.4	21.4
0.16	32.5	2.60	3794			1.4	22.9
0.17	34.5	2.93	4283			1.4	24.3
0.18	36.5	3.29	4801			1.4	25.7
0.19	38.6	3.66	5350			1.4	27.1
0.2	40.6	4.06	5928			1.4	28.6
0.21	42.6	4.48	6535			1.4	30.0
0.22	44.7	4.91	7172			1.4	31.4
0.23	46.7	5.37	7839			1.4	32.9
0.24	48.7	5.85	8536			1.4	34.3
0.25	50.8	6.34	9262			1.4	35.7
0.26	52.8	6.86	10018			1.4	37.1
0.27	54.8	7.40	10803			1.4	38.6
0.28	56.8	7.96	11618			1.4	40.0
0.29	58.9	8.54	12463			1.4	41.4
0.3	60.9	9.14	13337	0	0.0	1.4	42.9
0.31	62.9	9.75	14241	0.01	2.2	0.2	43.1
0.32	65.0	10.39	15175	0.02	6.2	0.1	43.1
0.33	67.0	11.05	16138	0.03	11.4	0.0	43.2
0.34	69.0	11.73	17131	0.04	17.5	0.0	43.2
0.35	71.1	12.43	18153	0.05	24.5	0.0	43.2

Subject: Slope Interruption Berm Storage
Project: Loyalist Solar Project
Site: Block B
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 21, 2017

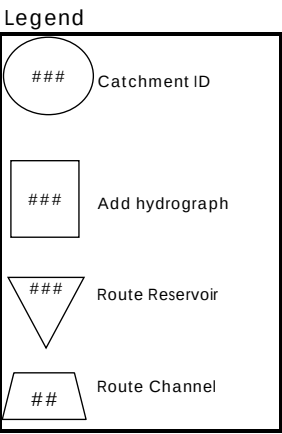
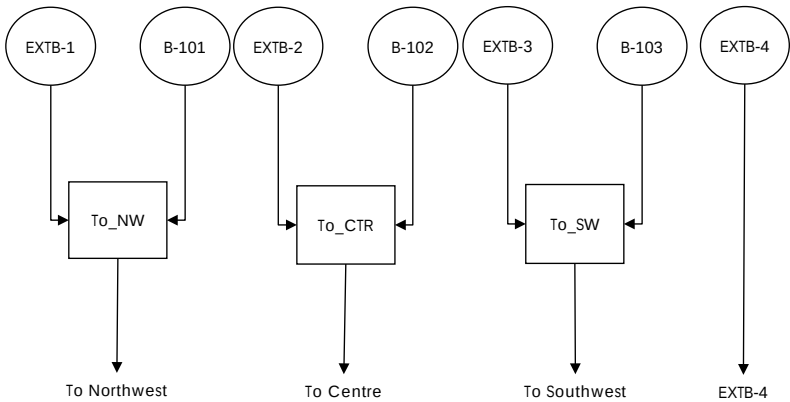
Catchment ID: B-203
Berm Height (mm): 300
Total Berm Length (m): 1950
Surface Slope: 1.4%
Infiltration Rate (mm/hr): 7
Weir Discharge Coefficient: 1.5

Ponding Depth (m)	Ponding Width (m)	Cross Sectional Area (m ²)	Ponding Volume (m ³)	Head (m)	Discharge (m ³ /s)	Incremental Drawdown Time (h)	Cumulative Drawdown Time (h)
0	0	0	0			0	0
0.01	0.7	0.00	7			1.4	1.4
0.02	1.5	0.01	29			1.4	2.9
0.03	2.2	0.03	65			1.4	4.3
0.04	3.0	0.06	116			1.4	5.7
0.05	3.7	0.09	181			1.4	7.1
0.06	4.5	0.13	261			1.4	8.6
0.07	5.2	0.18	356			1.4	10.0
0.08	6.0	0.24	464			1.4	11.4
0.09	6.7	0.30	588			1.4	12.9
0.1	7.4	0.37	726			1.4	14.3
0.11	8.2	0.45	878			1.4	15.7
0.12	8.9	0.54	1045			1.4	17.1
0.13	9.7	0.63	1226			1.4	18.6
0.14	10.4	0.73	1422			1.4	20.0
0.15	11.2	0.84	1633			1.4	21.4
0.16	11.9	0.95	1858			1.4	22.9
0.17	12.7	1.08	2097			1.4	24.3
0.18	13.4	1.21	2351			1.4	25.7
0.19	14.1	1.34	2620			1.4	27.1
0.2	14.9	1.49	2903			1.4	28.6
0.21	15.6	1.64	3200			1.4	30.0
0.22	16.4	1.80	3512			1.4	31.4
0.23	17.1	1.97	3839			1.4	32.9
0.24	17.9	2.14	4180			1.4	34.3
0.25	18.6	2.33	4535			1.4	35.7
0.26	19.4	2.52	4906			1.4	37.1
0.27	20.1	2.71	5290			1.4	38.6
0.28	20.8	2.92	5689			1.4	40.0
0.29	21.6	3.13	6103			1.4	41.4
0.3	22.3	3.35	6531	0	0.0	1.4	42.9
0.31	23.1	3.58	6974	0.01	2.9	0.1	42.9
0.32	23.8	3.81	7431	0.02	8.3	0.0	43.0
0.33	24.6	4.05	7903	0.03	15.2	0.0	43.0
0.34	25.3	4.30	8389	0.04	23.4	0.0	43.0
0.35	26.1	4.56	8890	0.05	32.7	0.0	43.0

APPENDIX B – EXISTING CONDITIONS

SWMHYMO Schematic – Existing Conditions
NRCS (SCS) Curve Number Determination – Existing Conditions
Existing Conditions SWMHYMO Output – AMC II
Existing Conditions SWMHYMO Output – AMC III

Subject: Existing Schematic
Project: Loyalist Solar Project
Site: Block 'B'
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: November 30, 2017



Subject: NRCS (SCS) Curve Number Determination - Existing Conditions
Project: Loyalist Solar Project
Site: Block 'B'
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 21, 2017

TABLE OF CURVE NUMBERS (CN's)									Source
Land Use		Hydrologic Soil Type							
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	65	71	75	78	USDA
Woodlot	"Fair"	36	48	60	67	73	76	79	USDA
Lawns	"Good"	39	50	61	68	74	77	80	USDA
Pasture/Range "Fair"		49	55	60	70	79	82	84	USDA
Crop - SR + CR "Good"		64	70	75	79	82	84	85	USDA
Gravel		76	81	85	87	89	90	91	USDA
Bare Soil (Fallow)		77	82	86	89	91	93	94	USDA
Wetland/Lake		100	100	100	100	100	100	100	USDA
Impervious		98	98	98	98	98	98	98	USDA

USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology,
 Chapter 9 Hydrologic Soil Cover Complexes

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
EXT B-1				100				100
EXT B-2				100				100
EXT B-3				100				100
EXT B-4				100				100
B-101				100				100
B-102				100				100
B-103				60		40		100

LAND USE (%) - Existing Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Gravel	Bare Soil	Wetland	Impervious	Total
EXT B-1	80	5		15						100
EXT B-2	80	5		15						100
EXT B-3	80	5		15						100
EXT B-4	80	5		15						100
B-101	70	10		20						100
B-102	80	10		10						100
B-103	40	10		50						100

CURVE NUMBER (CN) - Existing Conditions											
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Gravel	Bare Soil	Wetland/ Lakes	Impervious	Weighted CN (AMC II)	Weighted CN (AMC III)
EXT B-1	52	3		10						65	82
EXT B-2	52	3		10						65	82
EXT B-3	52	3		10						65	82
EXT B-4	52	3		10						65	82
B-101	45	7		14						66	82
B-102	52	7		7						65	82
B-103	27	7		37						72	86

Notes: AMC II assumed - AMC III Conversion Per Soil Conservation Service Curve Number (SCS-CN) Methodology (Mishra, Surendra and Vijay P. Sing (2003))
 Hydrological Soil Groups based on guidance presented in National Engineering Handbook

\\Cd1004-f01\work_group\01614\active\133560220\design\analysis\SWM\Block B\ [SWMHYMO_Block_B_V3.xlsx]Tc and Tp

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00003> SSSSS W W W M M M H H H H Y Y M M M 0 0 # 9 9 9 9 Ver 4.05
00004> S W W M M H H Y M M 0 0 9999 9999 Sept 2011
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00006> Stormwater Management Hydrologic Model 999 999 =====
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00008> ***** SMWYMO Ver/4.05 *****
00009> ***** A single event and continuous hydrologic simulation model *****
00010> ***** based on the principles of HYMO and its successors *****
00011> ***** OTTHYMO-83 and OTTHYMO-89. *****
00012> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00013> ***** Ottawa, Ontario: (613) 836-3884 *****
00014> ***** Gatineau, Quebec: (819) 243-6858 *****
00015> ***** E-Mail: smwymo@jfsa.com *****
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00142> RUNOFF VOLUME (mm)= 2.697
00143> TOTAL RAINFALL (mm)= 22.100
00144> RUNOFF COEFFICIENT = .122
00145>
00146> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00147>
00148>
00149>
00150>
00151> DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=65.00
00152> 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00153> U.H. Tp(hrs)= .830
00154>
00155> Unit Hyd Qpeak (cms)= .315
00156>
00157> PEAK FLOW (cms)= .032 (i)
00158> TIME TO PEAK (hrs)= 1.317
00159> RUNOFF VOLUME (mm)= 2.697
00160> TOTAL RAINFALL (mm)= 22.100
00161> RUNOFF COEFFICIENT = .122
00162>
00163> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00164>
00165>
00166>
00167>
00168> ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00169> (ha) (cms) (hrs) (mm) (cms)
00170> ID1 01:EXTB-2 18.74 .133 1.02 2.70 .000
00171> +ID2 02:B-102 6.84 .032 1.32 2.70 .000
00172>
00173> SUM 09:To_CTR 25.58 .160 1.05 2.70 .000
00174>
00175> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00176>
00177>
00178>
00179>
00180> DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=65.00
00181> 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00182> U.H. Tp(hrs)= .420
00183>
00184> Unit Hyd Qpeak (cms)= .979
00185>
00186> PEAK FLOW (cms)= .086 (i)
00187> TIME TO PEAK (hrs)= .933
00188> RUNOFF VOLUME (mm)= 2.697
00189> TOTAL RAINFALL (mm)= 22.100
00190> RUNOFF COEFFICIENT = .122
00191>
00192> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00193>
00194>
00195>
00196>
00197> DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=72.00
00198> 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00199> U.H. Tp(hrs)= .510
00200>
00201> Unit Hyd Qpeak (cms)= .879
00202>
00203> PEAK FLOW (cms)= .108 (i)
00204> TIME TO PEAK (hrs)= 1.017
00205> RUNOFF VOLUME (mm)= 3.555
00206> TOTAL RAINFALL (mm)= 22.100
00207> RUNOFF COEFFICIENT = .161
00208>
00209> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00210>
00211>
00212>
00213>
00214> ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00215> (ha) (cms) (hrs) (mm) (cms)
00216> ID1 01:EXTB-3 10.77 .086 .93 2.70 .000
00217> +ID2 02:B-103 11.74 .108 1.02 3.55 .000
00218>
00219> SUM 08:To_SW 22.51 .193 .98 3.14 .000
00220>
00221> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00222>
00223>
00224>
00225>
00226> DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=65.00
00227> 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00228> U.H. Tp(hrs)= .700
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00230> Unit Hyd Qpeak (cms)= .274
00231>
00232> PEAK FLOW (cms)= .027 (i)
00233> TIME TO PEAK (hrs)= 1.200
00234> RUNOFF VOLUME (mm)= 2.697
00235> TOTAL RAINFALL (mm)= 22.100
00236> RUNOFF COEFFICIENT = .122
00237>
00238> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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00277>
00278>
00279>
00280>
00281>
00282>

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00283>      2.00 11.440 | 5.00 6.160 | 8.00 .440 | 11.00 .000
00284>      3.00 8.800 | 6.00 3.520 | 9.00 .000 | 12.00 .000
00285>
00286>
00287> 002:0003-----
00288> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
00289> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00290> | U.H. Tp(hrs)= .430
00291>
00292> Unit Hyd Qpeak (cms)= .353
00293>
00294> PEAK FLOW (cms)= .023 (i)
00295> TIME TO PEAK (hrs)= 5.083
00296> RUNOFF VOLUME (mm)= 9.350
00297> TOTAL RAINFALL (mm)= 42.240
00298> RUNOFF COEFFICIENT = .221
00299>
00300> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00301>
00302>
00303>
00304> 002:0004-----
00305> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=66.00
00306> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00307> | U.H. Tp(hrs)= .340
00308>
00309> Unit Hyd Qpeak (cms)= 1.083
00310>
00311> PEAK FLOW (cms)= .059 (i)
00312> TIME TO PEAK (hrs)= 5.050
00313> RUNOFF VOLUME (mm)= 9.673
00314> TOTAL RAINFALL (mm)= 42.240
00315> RUNOFF COEFFICIENT = .229
00316>
00317> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00318>
00319>
00320>
00321> 002:0005-----
00322> | ADD HYD (To_Nw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00323> | (ha) (cms) (hrs) (mm) (cms)
00324> ID1 01:EXTB-1 3.97 .023 5.08 9.35 .000
00325> +ID2 02:B-101 9.64 .059 5.05 9.67 .000
00326>
00327> SUM 10:To_Nw 13.61 .083 5.05 9.58 .000
00328>
00329>
00330> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00331>
00332>
00333> 002:0006-----
00334> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
00335> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00336> | U.H. Tp(hrs)= .500
00337>
00338> Unit Hyd Qpeak (cms)= 1.432
00339>
00340> PEAK FLOW (cms)= .110 (i)
00341> TIME TO PEAK (hrs)= 5.100
00342> RUNOFF VOLUME (mm)= 9.350
00343> TOTAL RAINFALL (mm)= 42.240
00344> RUNOFF COEFFICIENT = .221
00345>
00346> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00347>
00348>
00349>
00350> 002:0007-----
00351> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=65.00
00352> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00353> | U.H. Tp(hrs)= .830
00354>
00355> Unit Hyd Qpeak (cms)= .315
00356>
00357> PEAK FLOW (cms)= .039 (i)
00358> TIME TO PEAK (hrs)= 5.200
00359> RUNOFF VOLUME (mm)= 9.350
00360> TOTAL RAINFALL (mm)= 42.240
00361> RUNOFF COEFFICIENT = .221
00362>
00363> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00364>
00365>
00366>
00367> 002:0008-----
00368> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00369> | (ha) (cms) (hrs) (mm) (cms)
00370> ID1 01:EXTB-2 18.74 .110 5.10 9.35 .000
00371> +ID2 02:B-102 6.84 .830 5.20 9.35 .000
00372>
00373> SUM 09:To_CTR 25.58 .148 5.10 9.35 .000
00374>
00375> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00376>
00377>
00378>
00379> 002:0009-----
00380> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=65.00
00381> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00382> | U.H. Tp(hrs)= .420
00383>
00384> Unit Hyd Qpeak (cms)= .979
00385>
00386> PEAK FLOW (cms)= .064 (i)
00387> TIME TO PEAK (hrs)= 5.067
00388> RUNOFF VOLUME (mm)= 9.350
00389> TOTAL RAINFALL (mm)= 42.240
00390> RUNOFF COEFFICIENT = .221
00391>
00392> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00393>
00394>
00395>
00396> 002:0010-----
00397> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=72.00
00398> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00399> | U.H. Tp(hrs)= .510
00400>
00401> Unit Hyd Qpeak (cms)= .879
00402>
00403> PEAK FLOW (cms)= .086 (i)
00404> TIME TO PEAK (hrs)= 5.083
00405> RUNOFF VOLUME (mm)= 11.896
00406> TOTAL RAINFALL (mm)= 42.240
00407> RUNOFF COEFFICIENT = .282
00408>
00409> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00410>
00411>
00412>
00413> 002:0011-----
00414> | ADD HYD (To_Sw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00415> | (ha) (cms) (hrs) (mm) (cms)
00416> ID1 01:EXTB-3 10.77 .064 5.07 9.35 .000
00417> +ID2 02:B-103 11.74 .086 5.08 11.90 .000
00418>
00419> SUM 08:To_Sw 22.51 .150 5.08 10.68 .000
00420>
00421> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00422>
00423>

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00424>-----
00425> 002:0012-----
00426> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=65.00
00427> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00428> | U.H. Tp(hrs)= .700
00429>
00430> Unit Hyd Qpeak (cms)= .274
00431>
00432> PEAK FLOW (cms)= .029 (i)
00433> TIME TO PEAK (hrs)= 5.150
00434> RUNOFF VOLUME (mm)= 9.350
00435> TOTAL RAINFALL (mm)= 42.240
00436> RUNOFF COEFFICIENT = .221
00437>
00438> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00439>
00440>
00441>
00442> 002:0013-----
00443>
00444> 002:0002-----
00445> ** END OF RUN : 2
00446>
00447>-----
00448>
00449>
00450>
00451>
00452>
00453>
00454> | START | Project dir.: C:\usr\LOYB\
00455> | TZERO = .00 hrs on Rainfall dir.: C:\usr\LOYB\
00456>
00457> METOUT= 2 (output = METRIC)
00458> NRUN = 003
00459> NSTORM= 1
00460> # 1=LYA5.1hr
00461>
00462> 003:0002-----
00463> *****
00464> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00465> *# Date : 12-21-2017
00466> *# Modeller : [D. Williams]
00467> *# Company : Stantec Consulting Ltd. (Waterloo)
00468> *# License # : 4730904
00469> *****
00470> *#
00471> *# Block B - EXISTING CONDITIONS
00472> *#
00473> *# Hydrologic conditions represent site prior to construction
00474> *# - AMC II Conditions
00475> *#
00476> *****
00477>
00478> 003:0002-----
00479>
00480> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 5 Year)
00481> | Ptotal= 28.00 mm | Comments: Belleville IDF (1-hr 30% AES - 5 Year)
00482>
00483> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00484> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00485> .08 30.240 | .33 36.960 | .58 33.600 | .83 10.000
00486> .17 47.040 | .42 43.680 | .67 16.800 | .92 3.360
00487> .25 70.560 | .50 30.240 | .75 13.440 | 1.00 .000
00488>
00489>
00490> 003:0003-----
00491> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
00492> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00493> | U.H. Tp(hrs)= .430
00494>
00495> Unit Hyd Qpeak (cms)= .353
00496>
00497> PEAK FLOW (cms)= .050 (i)
00498> TIME TO PEAK (hrs)= .950
00499> RUNOFF VOLUME (mm)= 4.301
00500> TOTAL RAINFALL (mm)= 28.000
00501> RUNOFF COEFFICIENT = .154
00502>
00503> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00504>
00505>
00506>
00507> 003:0004-----
00508> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=66.00
00509> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00510> | U.H. Tp(hrs)= .340
00511>
00512> Unit Hyd Qpeak (cms)= 1.083
00513>
00514> PEAK FLOW (cms)= .144 (i)
00515> TIME TO PEAK (hrs)= .850
00516> RUNOFF VOLUME (mm)= 4.463
00517> TOTAL RAINFALL (mm)= 28.000
00518> RUNOFF COEFFICIENT = .159
00519>
00520> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00521>
00522>
00523>
00524> 003:0005-----
00525> | ADD HYD (To_Nw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00526> | (ha) (cms) (hrs) (mm) (cms)
00527> ID1 01:EXTB-1 3.97 .050 .95 4.30 .000
00528> +ID2 02:B-101 9.64 .144 .85 4.46 .000
00529>
00530> SUM 10:To_Nw 13.61 .193 .87 4.42 .000
00531>
00532> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00533>
00534>
00535>
00536> 003:0006-----
00537> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
00538> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00539> | U.H. Tp(hrs)= .500
00540>
00541> Unit Hyd Qpeak (cms)= 1.432
00542>
00543> PEAK FLOW (cms)= .211 (i)
00544> TIME TO PEAK (hrs)= 1.000
00545> RUNOFF VOLUME (mm)= 4.301
00546> TOTAL RAINFALL (mm)= 28.000
00547> RUNOFF COEFFICIENT = .154
00548>
00549> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00550>
00551>
00552>
00553> 003:0007-----
00554> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=65.00
00555> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00556> | U.H. Tp(hrs)= .830
00557>
00558> Unit Hyd Qpeak (cms)= .315
00559>
00560> PEAK FLOW (cms)= .051 (i)
00561> TIME TO PEAK (hrs)= 1.317
00562> RUNOFF VOLUME (mm)= 4.301
00563> TOTAL RAINFALL (mm)= 28.000
00564>

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00565> RUNOFF COEFFICIENT = .154
00566>
00567> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00568>
00569>
00570> 003:0008-----
00571>
00572> | ADD HYD (To_CTR ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00573> |-----|-----|-----|-----|-----|-----|
00574> | ID1 01:EXTB-2 | 18.74 .211 1.00 4.30 .000
00575> | +ID2 02:B-102 | 6.84 .051 1.32 4.30 .000
00576> |-----|-----|-----|-----|-----|-----|
00577> | SUM 09:To_CTR | 25.58 .255 1.05 4.30 .000
00578>
00579> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00580>
00581>
00582> 003:0009-----
00583>
00584> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=65.00
00585> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00586> | U.H. Tp(hrs)= .420
00587>
00588> Unit Hyd Qpeak (cms)= .979
00589>
00590> PEAK FLOW (cms)= .137 (i)
00591> TIME TO PEAK (hrs)= .933
00592> RUNOFF VOLUME (mm)= 4.301
00593> TOTAL RAINFALL (mm)= 28.000
00594> RUNOFF COEFFICIENT = .154
00595>
00596> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00597>
00598>
00599> 003:0010-----
00600>
00601> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=72.00
00602> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00603> | U.H. Tp(hrs)= .510
00604>
00605> Unit Hyd Qpeak (cms)= .879
00606>
00607> PEAK FLOW (cms)= .170 (i)
00608> TIME TO PEAK (hrs)= 1.017
00609> RUNOFF VOLUME (mm)= 5.606
00610> TOTAL RAINFALL (mm)= 28.000
00611> RUNOFF COEFFICIENT = .200
00612>
00613> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00614>
00615>
00616> 003:0011-----
00617>
00618> | ADD HYD (To_Sw ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00619> |-----|-----|-----|-----|-----|-----|
00620> | ID1 01:EXTB-3 | 10.77 .137 .93 4.30 .000
00621> | +ID2 02:B-103 | 11.74 .170 1.02 5.61 .000
00622> |-----|-----|-----|-----|-----|-----|
00623> | SUM 08:To_Sw | 22.51 .305 .97 4.98 .000
00624>
00625> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00626>
00627>
00628> 003:0012-----
00629>
00630> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=65.00
00631> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00632> | U.H. Tp(hrs)= .700
00633>
00634> Unit Hyd Qpeak (cms)= .274
00635>
00636> PEAK FLOW (cms)= .043 (i)
00637> TIME TO PEAK (hrs)= 1.200
00638> RUNOFF VOLUME (mm)= 4.301
00639> TOTAL RAINFALL (mm)= 28.000
00640> RUNOFF COEFFICIENT = .154
00641>
00642> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00643>
00644>
00645> 003:0013-----
00646>
00647> 003:0002-----
00648>
00649> 003:0002-----
00650> ** END OF RUN : 3
00651>
00652>
00653>
00654>
00655>
00656>
00657>
00658>
00659> | START | Project dir.: C:\usr\LOYB\
00660> | Rainfall dir.: C:\usr\LOYB\
00661> | TZERO = .00 hrs on 0
00662> | METOUT= 2 (output= METRIC)
00663> | NRUN = 004
00664> | NSTORM= 1
00665> | # 1=LYA5.12h
00666>
00667> 004:0002-----
00668>
00669> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[13560220]
00670> *# Date : 12-21-2017
00671> *# Modeller : [D. Williams]
00672> *# Company : Stantec Consulting Ltd. (Waterloo)
00673> *# License # : 4730904
00674> *#
00675> *#
00676> *# Block B - EXISTING CONDITIONS
00677> *#
00678> *# - Hydrologic conditions represent site prior to construction
00679> *# - AMC II Conditions
00680> *#
00681> *#
00682>
00683> 004:0002-----
00684>
00685> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 5 Year)
00686> | Ptotal= 55.97 mm | Comments: Belleville IDF (12-hr 30% AES - 5 Year)
00687>
00688> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
00689> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
00690> | 1.00 5.247 | 4.00 8.745 | 7.00 1.749 | 10.00 .000 |
00691> | 2.00 15.158 | 5.00 8.162 | 8.00 .583 | 11.00 .000 |
00692> | 3.00 11.600 | 6.00 4.664 | 9.00 .000 | 12.00 .000 |
00693>
00694>
00695> 004:0003-----
00696>
00697> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
00698> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00699> | U.H. Tp(hrs)= .430
00700>
00701> Unit Hyd Qpeak (cms)= .353
00702>
00703> PEAK FLOW (cms)= .038 (i)
00704> TIME TO PEAK (hrs)= 5.067
00705> RUNOFF VOLUME (mm)= 15.514

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00706> TOTAL RAINFALL (mm)= 55.968
00707> RUNOFF COEFFICIENT = .277
00708>
00709> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00710>
00711>
00712> 004:0004-----
00713>
00714> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=66.00
00715> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00716> | U.H. Tp(hrs)= .340
00717>
00718> Unit Hyd Qpeak (cms)= 1.083
00719>
00720> PEAK FLOW (cms)= .006 (i)
00721> TIME TO PEAK (hrs)= 5.650
00722> RUNOFF VOLUME (mm)= 16.009
00723> TOTAL RAINFALL (mm)= 55.968
00724> RUNOFF COEFFICIENT = .286
00725>
00726> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00727>
00728>
00729> 004:0005-----
00730>
00731> | ADD HYD (To_NW ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00732> |-----|-----|-----|-----|-----|-----|
00733> | ID1 01:EXTB-1 | 9.64 .038 5.07 15.51 .000
00734> | +ID2 02:B-101 | 9.64 .096 5.05 16.81 .000
00735> |-----|-----|-----|-----|-----|-----|
00736> | SUM 10:To_NW | 13.61 .134 5.05 15.86 .000
00737>
00738> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00739>
00740>
00741> 004:0006-----
00742>
00743> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
00744> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00745> | U.H. Tp(hrs)= .500
00746>
00747> Unit Hyd Qpeak (cms)= 1.432
00748>
00749> PEAK FLOW (cms)= .178 (i)
00750> TIME TO PEAK (hrs)= 5.083
00751> RUNOFF VOLUME (mm)= 15.514
00752> TOTAL RAINFALL (mm)= 55.968
00753> RUNOFF COEFFICIENT = .277
00754>
00755> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00756>
00757>
00758> 004:0007-----
00759>
00760> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=65.00
00761> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00762> | U.H. Tp(hrs)= .830
00763>
00764> Unit Hyd Qpeak (cms)= .315
00765>
00766> PEAK FLOW (cms)= .063 (i)
00767> TIME TO PEAK (hrs)= 5.183
00768> RUNOFF VOLUME (mm)= 15.514
00769> TOTAL RAINFALL (mm)= 55.968
00770> RUNOFF COEFFICIENT = .277
00771>
00772> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00773>
00774>
00775> 004:0008-----
00776>
00777> | ADD HYD (To_CTR ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00778> |-----|-----|-----|-----|-----|-----|
00779> | ID1 01:EXTB-2 | 18.74 .178 5.08 15.51 .000
00780> | +ID2 02:B-102 | 6.84 .063 5.18 15.51 .000
00781> |-----|-----|-----|-----|-----|-----|
00782> | SUM 09:To_CTR | 25.58 .242 5.10 15.51 .000
00783>
00784> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00785>
00786>
00787> 004:0009-----
00788>
00789> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=65.00
00790> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00791> | U.H. Tp(hrs)= .420
00792>
00793> Unit Hyd Qpeak (cms)= .979
00794>
00795> PEAK FLOW (cms)= .103 (i)
00796> TIME TO PEAK (hrs)= 5.067
00797> RUNOFF VOLUME (mm)= 15.514
00798> TOTAL RAINFALL (mm)= 55.968
00799> RUNOFF COEFFICIENT = .277
00800>
00801> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00802>
00803>
00804> 004:0010-----
00805>
00806> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=72.00
00807> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00808> | U.H. Tp(hrs)= .510
00809>
00810> Unit Hyd Qpeak (cms)= .879
00811>
00812> PEAK FLOW (cms)= .137 (i)
00813> TIME TO PEAK (hrs)= 5.083
00814> RUNOFF VOLUME (mm)= 19.360
00815> TOTAL RAINFALL (mm)= 55.968
00816> RUNOFF COEFFICIENT = .346
00817>
00818> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00819>
00820>
00821> 004:0011-----
00822>
00823> | ADD HYD (To_Sw ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00824> |-----|-----|-----|-----|-----|-----|
00825> | ID1 01:EXTB-3 | 10.77 .137 .93 4.30 .000
00826> | +ID2 02:B-103 | 11.74 .170 1.02 5.61 .000
00827> |-----|-----|-----|-----|-----|-----|
00828> | SUM 08:To_Sw | 22.51 .305 .97 4.98 .000
00829>
00830> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00831>
00832>
00833> 004:0012-----
00834>
00835> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=65.00
00836> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00837> | U.H. Tp(hrs)= .700
00838>
00839> Unit Hyd Qpeak (cms)= .274
00840>
00841> PEAK FLOW (cms)= .047 (i)
00842> TIME TO PEAK (hrs)= 5.133
00843> RUNOFF VOLUME (mm)= 15.514
00844> TOTAL RAINFALL (mm)= 55.968
00845> RUNOFF COEFFICIENT = .277
00846>

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00989: SUM 09:To_CTR 25.58 .598 1.03 10.12 .000
00990:
00991: NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00992:
00993: -----
00994: 005:0009
00995:
00996: | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=65.00
00997: | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00998: | U.H. Tp(hrs)= .420
00999:
01000: Unit Hyd Qpeak (cms)= .979
01001:
01002: PEAK FLOW (cms)= .320 (i)
01003: TIME TO PEAK (hrs)= .917
01004: RUNOFF VOLUME (mm)= 10.117
01005: TOTAL RAINFALL (mm)= 44.100
01006: RUNOFF COEFFICIENT = .229
01007:
01008: (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01009:
01010: -----
01011: 005:0010
01012:
01013: | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=72.00
01014: | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01015: | U.H. Tp(hrs)= .510
01016:
01017: Unit Hyd Qpeak (cms)= .879
01018:
01019: PEAK FLOW (cms)= .387 (i)
01020: TIME TO PEAK (hrs)= 1.000
01021: RUNOFF VOLUME (mm)= 12.830
01022: TOTAL RAINFALL (mm)= 44.100
01023: RUNOFF COEFFICIENT = .291
01024:
01025: (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01026:
01027: -----
01028: 005:0011
01029:
01030: | ADD HYD (To_SW) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01031: | (ha) (cms) (hrs) (mm) (cms)
01032: | ID1 01:EXTB-3 10.77 .320 .92 10.12 .000
01033: | +ID2 02:B-103 11.74 .387 1.00 12.84 .000
01034: | -----
01035: | SUM 00:To_SW 22.51 .704 .97 11.54 .000
01036:
01037: NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01038:
01039: -----
01040: 005:0012
01041:
01042: | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=65.00
01043: | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01044: | U.H. Tp(hrs)= .700
01045:
01046: Unit Hyd Qpeak (cms)= .274
01047:
01048: PEAK FLOW (cms)= .102 (i)
01049: TIME TO PEAK (hrs)= 1.183
01050: RUNOFF VOLUME (mm)= 10.117
01051: TOTAL RAINFALL (mm)= 44.100
01052: RUNOFF COEFFICIENT = .229
01053:
01054: (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01055:
01056: -----
01057: 005:0013
01058:
01059: 005:0002
01060:
01061: 005:0002
01062:
01063: 005:0002
01064:
01065: 005:0002
01066: ** END OF RUN : 5
01067:
01068: *****
01069:
01070:
01071:
01072:
01073:
01074:
01075: | START | Project dir.: C:\usr\LOVB\
01076: | Rainfall dir.: C:\usr\LOVB\
01077: | TZERO = .00 hrs on 0
01078: | METOUT= 2 (output = METRIC)
01079: | NRUN = 006
01080: | NSTORM=
01081: | # 1=LYA100.12h
01082:
01083: 006:0002
01084:
01085: *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01086: *# Date : 12-21-2017
01087: *# Modeller : [D. Williams]
01088: *# Company : Stantec Consulting Ltd. (Waterloo)
01089: *# License # : 4730904
01090: *#
01091: *#
01092: *# Block B - EXISTING CONDITIONS
01093: *#
01094: *# Hydrologic conditions represent site prior to construction
01095: *# - AMC II Conditions
01096: *#
01097:
01098: -----
01099: 006:0002
01100:
01101: Filename: Belleville IDF (12-hr 30% AES - 100 Year
01102: | Ptotal= 93.70 mm Comments: Belleville IDF (12-hr 30% AES - 100 Year
01103:
01104: TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01105: | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01106: | 1.00 8.784 | 4.00 14.640 | 7.00 2.928 | 10.00 .000
01107: | 2.00 25.376 | 5.00 13.664 | 8.00 .976 | 11.00 .000
01108: | 3.00 19.520 | 6.00 7.808 | 9.00 .000 | 12.00 .000
01109:
01110: -----
01111: 006:0003
01112:
01113: | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
01114: | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01115: | U.H. Tp(hrs)= .430
01116:
01117: Unit Hyd Qpeak (cms)= .353
01118:
01119: PEAK FLOW (cms)= .090 (i)
01120: TIME TO PEAK (hrs)= 3.217
01121: RUNOFF VOLUME (mm)= 37.324
01122: TOTAL RAINFALL (mm)= 93.690
01123: RUNOFF COEFFICIENT = .396
01124:
01125: (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01126:
01127: -----
01128: 006:0004

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01129>-----
01130>| DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=66.00
01131>| 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01132>| U.H. Tp(hrs)= .340
01133>-----
01134> Unit Hyd Qpeak (cms)= 1.083
01135>-----
01136> PEAK FLOW (cms)= .231 (i)
01137> TIME TO PEAK (hrs)= 3.133
01138> RUNOFF VOLUME (mm)= 38.110
01139> TOTAL RAINFALL (mm)= 93.696
01140> RUNOFF COEFFICIENT = .467
01141>-----
01142> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01143>-----
01144>-----
01145> 006:0005-----
01146>-----
01147>| ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01148>| (ha) (cms) (hrs) (mm) (cms)
01149>| ID1 01:EXTB-1 3.97 .090 3.22 37.12 .000
01150>| +ID2 02:B-101 9.64 .231 3.13 38.11 .000
01151>|=====
01152>| SUM 10:To_NW 13.61 .321 3.15 37.82 .000
01153>-----
01154> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01155>-----
01156>-----
01157> 006:0006-----
01158>-----
01159>| DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
01160>| 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01161>| U.H. Tp(hrs)= .500
01162>-----
01163> Unit Hyd Qpeak (cms)= 1.432
01164>-----
01165> PEAK FLOW (cms)= .419 (i)
01166> TIME TO PEAK (hrs)= 3.300
01167> RUNOFF VOLUME (mm)= 37.124
01168> TOTAL RAINFALL (mm)= 93.696
01169> RUNOFF COEFFICIENT = .396
01170>-----
01171> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01172>-----
01173>-----
01174> 006:0007-----
01175>-----
01176>| DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=65.00
01177>| 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01178>| U.H. Tp(hrs)= .830
01179>-----
01180> Unit Hyd Qpeak (cms)= .315
01181>-----
01182> PEAK FLOW (cms)= .148 (i)
01183> TIME TO PEAK (hrs)= 5.117
01184> RUNOFF VOLUME (mm)= 37.124
01185> TOTAL RAINFALL (mm)= 93.696
01186> RUNOFF COEFFICIENT = .396
01187>-----
01188> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01189>-----
01190>-----
01191> 006:0008-----
01192>-----
01193>| ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01194>| (ha) (cms) (hrs) (mm) (cms)
01195>| ID1 01:EXTB-2 18.74 .419 3.30 37.12 .000
01196>| +ID2 02:B-102 6.84 .148 5.12 37.12 .000
01197>|=====
01198>| SUM 09:To_CTR 25.58 .556 5.07 37.12 .000
01199>-----
01200> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01201>-----
01202>-----
01203> 006:0009-----
01204>-----
01205>| DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=65.00
01206>| 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01207>| U.H. Tp(hrs)= .420
01208>-----
01209> Unit Hyd Qpeak (cms)= .979
01210>-----
01211> PEAK FLOW (cms)= .246 (i)
01212> TIME TO PEAK (hrs)= 3.200
01213> RUNOFF VOLUME (mm)= 37.124
01214> TOTAL RAINFALL (mm)= 93.696
01215> RUNOFF COEFFICIENT = .396
01216>-----
01217> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01218>-----
01219>-----
01220> 006:0010-----
01221>-----
01222>| DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=72.00
01223>| 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01224>| U.H. Tp(hrs)= .510
01225>-----
01226> Unit Hyd Qpeak (cms)= .879
01227>-----
01228> PEAK FLOW (cms)= .320 (i)
01229> TIME TO PEAK (hrs)= 3.267
01230> RUNOFF VOLUME (mm)= 44.509
01231> TOTAL RAINFALL (mm)= 93.696
01232> RUNOFF COEFFICIENT = .475
01233>-----
01234> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01235>-----
01236>-----
01237> 006:0011-----
01238>-----
01239>| ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01240>| (ha) (cms) (hrs) (mm) (cms)
01241>| ID1 01:EXTB-3 10.77 .246 3.20 37.12 .000
01242>| +ID2 02:B-103 11.74 .320 3.27 44.51 .000
01243>|=====
01244>| SUM 08:To_SW 22.51 .565 3.23 40.98 .000
01245>-----
01246> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01247>-----
01248>-----
01249> 006:0012-----
01250>-----
01251>| DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=65.00
01252>| 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01253>| U.H. Tp(hrs)= .700
01254>-----
01255> Unit Hyd Qpeak (cms)= .274
01256>-----
01257> PEAK FLOW (cms)= .109 (i)
01258> TIME TO PEAK (hrs)= 5.083
01259> RUNOFF VOLUME (mm)= 37.124
01260> TOTAL RAINFALL (mm)= 93.696
01261> RUNOFF COEFFICIENT = .396
01262>-----
01263> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01264>-----
01265>-----
01266> 006:0013-----
01267>-----
01268> 006:0002-----
01269>-----
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01270> 006:0002-----
01271>-----
01272> 006:0002-----
01273>-----
01274> 006:0002-----
01275>-----
01276> 006:0002-----
01277> ** END OF RUN : 6
01278>-----
01279>-----
01280>-----
01281>-----
01282>-----
01283>-----
01284>-----
01285>-----
01286>| START | Project dir.: C:\usr\LOYB\
01287>| Rainfall dir.: C:\usr\LOYB\
01288>| TZERO = .00 hrs on 0
01289>| METOUT= 2 (output = METRIC)
01290>| NRUN = 007
01291>| NSTORM= 1
01292>| # 1=25mm.4hr
01293>-----
01294> 007:0002-----
01295> *-----
01296> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01297> *# Date : 12-21-2017
01298> *# Modeller : [D. Williams]
01299> *# Company : Stantec Consulting Ltd. (Waterloo)
01300> *# License # : 4730904
01301> *-----
01302> *#
01303> *# Block B - EXISTING CONDITIONS
01304> *#
01305> *# - Hydrologic conditions represent site prior to construction
01306> *# - AMC II Conditions
01307> *#
01308> *#-----
01309>-----
01310> 007:0002-----
01311>-----
01312>| READ STORM | Filename: 25 mm, 4hr Chicago Storm
01313>| Ptotal= 25.00 mm | Comments: 25 mm, 4hr Chicago Storm
01314>-----
01315> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
01316> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
01317> .08 1.465 1.08 4.024 2.08 5.764 3.08 2.074
01318> .17 1.540 1.17 4.814 2.17 4.969 3.17 1.977
01319> .25 1.625 1.25 6.025 2.25 4.374 3.25 1.809
01320> .33 1.720 1.33 8.114 2.33 3.913 3.33 1.810
01321> .42 1.829 1.42 12.526 2.42 3.545 3.42 1.737
01322> .50 1.955 1.50 27.198 2.50 3.245 3.50 1.671
01323> .58 2.101 1.58 74.855 2.58 2.994 3.58 1.610
01324> .67 2.274 1.67 31.419 2.67 2.782 3.67 1.553
01325> .75 2.482 1.75 16.819 2.75 2.601 3.75 1.501
01326> .83 2.736 1.83 11.357 2.83 2.443 3.83 1.453
01327> .92 3.055 1.92 8.563 2.92 2.305 3.92 1.408
01328> 1.00 3.468 2.00 6.882 3.00 2.183 4.00 1.366
01329>-----
01330>-----
01331> 007:0003-----
01332>-----
01333>| DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
01334>| 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01335>| U.H. Tp(hrs)= .430
01336>-----
01337> Unit Hyd Qpeak (cms)= .353
01338>-----
01339> PEAK FLOW (cms)= .027 (i)
01340> TIME TO PEAK (hrs)= 2.133
01341> RUNOFF VOLUME (mm)= 3.446
01342> TOTAL RAINFALL (mm)= 25.000
01343> RUNOFF COEFFICIENT = .138
01344>-----
01345> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01346>-----
01347>-----
01348> 007:0004-----
01349>-----
01350>| DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=66.00
01351>| 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01352>| U.H. Tp(hrs)= .340
01353>-----
01354> Unit Hyd Qpeak (cms)= 1.083
01355>-----
01356> PEAK FLOW (cms)= .080 (i)
01357> TIME TO PEAK (hrs)= 2.017
01358> RUNOFF VOLUME (mm)= 3.578
01359> TOTAL RAINFALL (mm)= 25.000
01360> RUNOFF COEFFICIENT = .143
01361>-----
01362> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01363>-----
01364>-----
01365> 007:0005-----
01366>-----
01367>| ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01368>| (ha) (cms) (hrs) (mm) (cms)
01369>| ID1 01:EXTB-1 3.97 .027 2.13 3.45 .000
01370>| +ID2 02:B-101 9.64 .080 2.02 3.58 .000
01371>|=====
01372>| SUM 10:To_NW 13.61 .106 2.03 3.54 .000
01373>-----
01374> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01375>-----
01376>-----
01377> 007:0006-----
01378>-----
01379>| DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
01380>| 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01381>| U.H. Tp(hrs)= .500
01382>-----
01383> Unit Hyd Qpeak (cms)= 1.432
01384>-----
01385> PEAK FLOW (cms)= .115 (i)
01386> TIME TO PEAK (hrs)= 2.233
01387> RUNOFF VOLUME (mm)= 3.446
01388> TOTAL RAINFALL (mm)= 25.000
01389> RUNOFF COEFFICIENT = .138
01390>-----
01391> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01392>-----
01393>-----
01394> 007:0007-----
01395>-----
01396>| DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=65.00
01397>| 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01398>| U.H. Tp(hrs)= .830
01399>-----
01400> Unit Hyd Qpeak (cms)= .315
01401>-----
01402> PEAK FLOW (cms)= .030 (i)
01403> TIME TO PEAK (hrs)= 2.667
01404> RUNOFF VOLUME (mm)= 3.446
01405> TOTAL RAINFALL (mm)= 25.000
01406> RUNOFF COEFFICIENT = .138
01407>-----
01408> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01409>-----
01410>-----
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01411> 007:0008-----
01412> -----
01413> | ADD HYD (To_CTR ) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
01414> -----
01415> ID1 01:EXTB-2      18.74      .115      2.23      3.45      .000
01416> +ID2 02:B-102      6.84      .030      2.67      3.45      .000
01417> -----
01418> SUM 09:To_CTR      25.58      .140      2.28      3.45      .000
01419>
01420> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01421>
01422> -----
01423> 007:0009-----
01424> -----
01425> | DESIGN NASHYD | Area (ha)= 10.77      Curve Number (CN)=65.00
01426> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500      # of Linear Res.(N)= 3.00
01427> U.H. Tp(hrs)= .420
01428>
01429> Unit Hyd Qpeak (cms)= .979
01430>
01431> PEAK FLOW (cms)= .075 (i)
01432> TIME TO PEAK (hrs)= 2.117
01433> RUNOFF VOLUME (mm)= 3.446
01434> TOTAL RAINFALL (mm)= 25.000
01435> RUNOFF COEFFICIENT = .138
01436>
01437> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01438>
01439> -----
01440> 007:0010-----
01441> -----
01442> | DESIGN NASHYD | Area (ha)= 11.74      Curve Number (CN)=72.00
01443> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500      # of Linear Res.(N)= 3.00
01444> U.H. Tp(hrs)= .510
01445>
01446> Unit Hyd Qpeak (cms)= .879
01447>
01448> PEAK FLOW (cms)= .094 (i)
01449> TIME TO PEAK (hrs)= 2.233
01450> RUNOFF VOLUME (mm)= 4.516
01451> TOTAL RAINFALL (mm)= 25.000
01452> RUNOFF COEFFICIENT = .181
01453>
01454> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01455>
01456> -----
01457> 007:0011-----
01458> -----
01459> | ADD HYD (To_Sw ) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
01460> -----
01461> ID1 01:EXTB-3      10.77      .075      2.12      3.45      .000
01462> +ID2 02:B-103      11.74      .094      2.23      4.52      .000
01463> -----
01464> SUM 08:To_Sw      22.51      .167      2.18      4.00      .000
01465>
01466> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01467>
01468> -----
01469> 007:0012-----
01470> -----
01471> | DESIGN NASHYD | Area (ha)= 5.03      Curve Number (CN)=65.00
01472> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500      # of Linear Res.(N)= 3.00
01473> U.H. Tp(hrs)= .700
01474>
01475> Unit Hyd Qpeak (cms)= .274
01476>
01477> PEAK FLOW (cms)= .025 (i)
01478> TIME TO PEAK (hrs)= 2.500
01479> RUNOFF VOLUME (mm)= 3.446
01480> TOTAL RAINFALL (mm)= 25.000
01481> RUNOFF COEFFICIENT = .138
01482>
01483> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01484>
01485> -----
01486> 007:0013-----
01487> -----
01488> 007:0002-----
01489> -----
01490> 007:0002-----
01491> -----
01492> 007:0002-----
01493> -----
01494> 007:0002-----
01495> -----
01496> 007:0002-----
01497> -----
01498> 007:0002-----
01499> FINISH
01500> -----
01501> *****
01502> WARNINGS / ERRORS / NOTES
01503> -----
01504> Simulation ended on 2017-12-21 at 17:26:12
01505> =====
01506>
01507>
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00001> SSSSS W W M M H H Y Y M M M 000 999 999 =====
00002> S W W W M M M H H Y Y M M M 0 0 9 9 9 9
00003> SSSSS W W W M M M H H H H Y Y M M M 0 0 # 9 9 9 9 Ver 4.05
00004> S W W M M H H Y M M 0 0 9999 9999 Sept 2011
00005> SSSSS W W M M H H Y M M 0 0 9 9 9 # 4730994
00006> Stormwater Management Hydrologic Model 999 999 =====
00007>
00008> ***** SMWYMO Ver/4.05 *****
00009> ***** A single event and continuous hydrologic simulation model *****
00010> ***** based on the principles of HYMO and its successors *****
00011> ***** OTTHYMO-83 and OTTHYMO-89. *****
00012> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00013> ***** Ottawa, Ontario: (613) 836-3884 *****
00014> ***** Gatineau, Quebec: (819) 243-6858 *****
00015> ***** E-Mail: smwymo@jfsa.com *****
00016>
00017> *****
00018> *****
00019> *****
00020> *****
00021> *****
00022> *****
00023> *****
00024> ***** Licensed user: Stantec Consulting Ltd. (Kitchener) *****
00025> ***** Kitchener SERIAL#: 4730904 *****
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00141> *****

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00142> RUNOFF VOLUME (mm)= 5.558
00143> TOTAL RAINFALL (mm)= 22.100
00144> RUNOFF COEFFICIENT = .251
00145>
00146> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00147>
00148>
00149>
00150>
00151> DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
00152> 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00153> U.H. Tp(hrs)= .830
00154>
00155> Unit Hyd Qpeak (cms)= .315
00156>
00157> PEAK FLOW (cms)= .066 (i)
00158> TIME TO PEAK (hrs)= 1.317
00159> RUNOFF VOLUME (mm)= 5.558
00160> TOTAL RAINFALL (mm)= 22.100
00161> RUNOFF COEFFICIENT = .251
00162>
00163> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00164>
00165>
00166>
00167>
00168> ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00169> (ha) (cms) (hrs) (mm) (cms)
00170> ID1 01:EXTB-2 18.74 .273 1.00 5.56 .000
00171> +ID2 02:B-102 6.84 .066 1.32 5.56 .000
00172>
00173> SUM 08:To_CTR 25.58 .330 1.03 5.56 .000
00174>
00175> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00176>
00177>
00178>
00179>
00180> DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00181> 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00182> U.H. Tp(hrs)= .420
00183>
00184> Unit Hyd Qpeak (cms)= .979
00185>
00186> PEAK FLOW (cms)= .177 (i)
00187> TIME TO PEAK (hrs)= .933
00188> RUNOFF VOLUME (mm)= 5.558
00189> TOTAL RAINFALL (mm)= 22.100
00190> RUNOFF COEFFICIENT = .251
00191>
00192> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00193>
00194>
00195>
00196>
00197> DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=86.00
00198> 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00199> U.H. Tp(hrs)= .510
00200>
00201> Unit Hyd Qpeak (cms)= .879
00202>
00203> PEAK FLOW (cms)= .207 (i)
00204> TIME TO PEAK (hrs)= 1.000
00205> RUNOFF VOLUME (mm)= 6.850
00206> TOTAL RAINFALL (mm)= 22.100
00207> RUNOFF COEFFICIENT = .310
00208>
00209> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00210>
00211>
00212>
00213>
00214> ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00215> (ha) (cms) (hrs) (mm) (cms)
00216> ID1 01:EXTB-3 10.77 .177 .93 5.56 .000
00217> +ID2 02:B-103 11.74 .207 1.00 6.85 .000
00218>
00219> SUM 06:To_SW 22.51 .382 .97 6.23 .000
00220>
00221> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00222>
00223>
00224>
00225>
00226> DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
00227> 04:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00228> U.H. Tp(hrs)= .700
00229>
00230> Unit Hyd Qpeak (cms)= .274
00231>
00232> PEAK FLOW (cms)= .056 (i)
00233> TIME TO PEAK (hrs)= 1.183
00234> RUNOFF VOLUME (mm)= 5.558
00235> TOTAL RAINFALL (mm)= 22.100
00236> RUNOFF COEFFICIENT = .251
00237>
00238> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00239>
00240>
00241>
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00279>
00280>
00281>
00282>

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00283>      2.00 11.440 | 5.00 6.160 | 8.00 .440 | 11.00 .000
00284>      3.00 8.800 | 6.00 3.520 | 9.00 .000 | 12.00 .000
00285>
00286>
00287> 002:0003-----
00288> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00289> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00290> | U.H. Tp(hrs)= .430
00291>
00292> Unit Hyd Qpeak (cms)= .353
00293>
00294> PEAK FLOW (cms)= .042 (i)
00295> TIME TO PEAK (hrs)= 3.217
00296> RUNOFF VOLUME (mm)= 17.200
00297> TOTAL RAINFALL (mm)= 42.240
00298> RUNOFF COEFFICIENT = .407
00299>
00300> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00301>
00302>
00303>
00304> 002:0004-----
00305> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
00306> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00307> | U.H. Tp(hrs)= .340
00308>
00309> Unit Hyd Qpeak (cms)= 1.083
00310>
00311> PEAK FLOW (cms)= .105 (i)
00312> TIME TO PEAK (hrs)= 3.133
00313> RUNOFF VOLUME (mm)= 17.200
00314> TOTAL RAINFALL (mm)= 42.240
00315> RUNOFF COEFFICIENT = .407
00316>
00317> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00318>
00319>
00320>
00321> 002:0005-----
00322> | ADD HYD (To_Nw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00323> | (ha) (cms) (hrs) (mm) (cms)
00324> ID1 01:EXTB-1 3.97 .042 3.22 17.20 .000
00325> +ID2 02:B-101 9.64 .105 3.13 17.20 .000
00326>
00327> =====
00328> SUM 09:To_Nw 13.61 .147 3.15 17.20 .000
00329>
00330> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00331>
00332>
00333> 002:0006-----
00334> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
00335> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00336> | U.H. Tp(hrs)= .500
00337>
00338> Unit Hyd Qpeak (cms)= 1.432
00339>
00340> PEAK FLOW (cms)= .196 (i)
00341> TIME TO PEAK (hrs)= 3.300
00342> RUNOFF VOLUME (mm)= 17.200
00343> TOTAL RAINFALL (mm)= 42.240
00344> RUNOFF COEFFICIENT = .407
00345>
00346> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00347>
00348>
00349>
00350> 002:0007-----
00351> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
00352> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00353> | U.H. Tp(hrs)= .830
00354>
00355> Unit Hyd Qpeak (cms)= .315
00356>
00357> PEAK FLOW (cms)= .069 (i)
00358> TIME TO PEAK (hrs)= 5.117
00359> RUNOFF VOLUME (mm)= 17.200
00360> TOTAL RAINFALL (mm)= 42.240
00361> RUNOFF COEFFICIENT = .407
00362>
00363> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00364>
00365>
00366>
00367> 002:0008-----
00368> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00369> | (ha) (cms) (hrs) (mm) (cms)
00370> ID1 01:EXTB-2 18.74 .196 3.30 17.20 .000
00371> +ID2 02:B-102 6.84 .069 5.12 17.20 .000
00372>
00373> =====
00374> SUM 08:To_CTR 25.58 .260 5.07 17.20 .000
00375>
00376> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00377>
00378>
00379> 002:0009-----
00380> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00381> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00382> | U.H. Tp(hrs)= .420
00383>
00384> Unit Hyd Qpeak (cms)= .979
00385>
00386> PEAK FLOW (cms)= .115 (i)
00387> TIME TO PEAK (hrs)= 3.200
00388> RUNOFF VOLUME (mm)= 17.200
00389> TOTAL RAINFALL (mm)= 42.240
00390> RUNOFF COEFFICIENT = .407
00391>
00392> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00393>
00394>
00395>
00396> 002:0010-----
00397> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=86.00
00398> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00399> | U.H. Tp(hrs)= .510
00400>
00401> Unit Hyd Qpeak (cms)= .879
00402>
00403> PEAK FLOW (cms)= .146 (i)
00404> TIME TO PEAK (hrs)= 3.267
00405> RUNOFF VOLUME (mm)= 20.210
00406> TOTAL RAINFALL (mm)= 42.240
00407> RUNOFF COEFFICIENT = .479
00408>
00409> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00410>
00411>
00412>
00413> 002:0011-----
00414> | ADD HYD (To_Sw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00415> | (ha) (cms) (hrs) (mm) (cms)
00416> ID1 01:EXTB-3 10.77 .115 3.20 17.20 .000
00417> +ID2 02:B-103 11.74 .146 3.27 20.22 .000
00418>
00419> =====
00420> SUM 06:To_Sw 22.51 .261 3.23 18.77 .000
00421>
00422> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00423>

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00424>-----
00425> 002:0012-----
00426> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
00427> | 04:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00428> | U.H. Tp(hrs)= .700
00429>
00430> Unit Hyd Qpeak (cms)= .274
00431>
00432> PEAK FLOW (cms)= .051 (i)
00433> TIME TO PEAK (hrs)= 5.003
00434> RUNOFF VOLUME (mm)= 17.200
00435> TOTAL RAINFALL (mm)= 42.240
00436> RUNOFF COEFFICIENT = .407
00437>
00438> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00439>
00440>
00441>
00442> 002:0013-----
00443>
00444> 002:0002-----
00445> ** END OF RUN : 2
00446>
00447>-----
00448>
00449>
00450>
00451>
00452>
00453>
00454> | START | Project dir.: C:\usr\LOYB\
00455> | TZERO = .00 hrs on 0 Rainfall dir.: C:\usr\LOYB\
00456> | METOUT= 2 (output = METRIC)
00457> | NRUN = 003
00458> | NSTORM= 1
00459> | # 1=LYA5.1hr
00460>
00461>
00462> 003:0002-----
00463> #*****
00464> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00465> # Date : 12-21-2017
00466> # Modeller : [D. Williams]
00467> # Company : Stantec Consulting Ltd. (Waterloo)
00468> # License # : 4730904
00469> #*****
00470> #
00471> # Block B - EXISTING CONDITIONS
00472> #
00473> # Hydrologic conditions represent site prior to construction
00474> # - AMC III Conditions
00475> #
00476> #*****
00477>
00478> 003:0002-----
00479>
00480> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 5 Year)
00481> | Ptotal= 28.00 mm | Comments: Belleville IDF (1-hr 30% AES - 5 Year)
00482>
00483> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00484> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00485> .08 30.240 | .33 36.960 | .58 33.600 | .83 10.000
00486> .17 47.040 | .42 43.680 | .67 16.800 | .92 3.360
00487> .25 70.560 | .50 30.240 | .75 13.440 | 1.00 .000
00488>
00489>
00490> 003:0003-----
00491> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00492> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00493> | U.H. Tp(hrs)= .430
00494>
00495> Unit Hyd Qpeak (cms)= .353
00496>
00497> PEAK FLOW (cms)= .098 (i)
00498> TIME TO PEAK (hrs)= .933
00499> RUNOFF VOLUME (mm)= 8.537
00500> TOTAL RAINFALL (mm)= 28.000
00501> RUNOFF COEFFICIENT = .305
00502>
00503> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00504>
00505>
00506>
00507> 003:0004-----
00508> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
00509> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00510> | U.H. Tp(hrs)= .340
00511>
00512> Unit Hyd Qpeak (cms)= 1.083
00513>
00514> PEAK FLOW (cms)= .275 (i)
00515> TIME TO PEAK (hrs)= .833
00516> RUNOFF VOLUME (mm)= 8.537
00517> TOTAL RAINFALL (mm)= 28.000
00518> RUNOFF COEFFICIENT = .305
00519>
00520> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00521>
00522>
00523>
00524> 003:0005-----
00525> | ADD HYD (To_Nw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00526> | (ha) (cms) (hrs) (mm) (cms)
00527> ID1 01:EXTB-1 3.97 .098 .93 8.54 .000
00528> +ID2 02:B-101 9.64 .275 .83 8.54 .000
00529>
00530> =====
00531> SUM 09:To_Nw 13.61 .371 .87 8.54 .000
00532>
00533> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00534>
00535>
00536>
00537> 003:0006-----
00538> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
00539> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00540> | U.H. Tp(hrs)= .500
00541>
00542> Unit Hyd Qpeak (cms)= 1.432
00543>
00544> PEAK FLOW (cms)= .418 (i)
00545> TIME TO PEAK (hrs)= 1.000
00546> RUNOFF VOLUME (mm)= 8.537
00547> TOTAL RAINFALL (mm)= 28.000
00548> RUNOFF COEFFICIENT = .305
00549>
00550> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00551>
00552>
00553> 003:0007-----
00554> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
00555> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00556> | U.H. Tp(hrs)= .830
00557>
00558> Unit Hyd Qpeak (cms)= .315
00559>
00560> PEAK FLOW (cms)= .101 (i)
00561> TIME TO PEAK (hrs)= 1.300
00562> RUNOFF VOLUME (mm)= 8.537
00563> TOTAL RAINFALL (mm)= 28.000
00564>

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00565> RUNOFF COEFFICIENT = .305
00566>
00567> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00568>
00569>
00570> 003:0008-----
00571>
00572> | ADD HYD (To_CTR ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00573> |-----|-----|-----|-----|-----|-----|
00574> | ID1 01:EXTB-2 | 18.74 .418 1.00 8.54 .000
00575> | +ID2 02:B-102 | 6.84 .101 1.30 8.54 .000
00576> |-----|-----|-----|-----|-----|-----|
00577> | SUM 08:To_CTR | 25.58 .505 1.03 8.54 .000
00578>
00579> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00580>
00581>
00582> 003:0009-----
00583>
00584> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00585> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00586> | U.H. Tp(hrs)= .420
00587>
00588> Unit Hyd Qpeak (cms)= .979
00589>
00590> PEAK FLOW (cms)= .271 (i)
00591> TIME TO PEAK (hrs)= .917
00592> RUNOFF VOLUME (mm)= 8.537
00593> TOTAL RAINFALL (mm)= 28.000
00594> RUNOFF COEFFICIENT = .305
00595>
00596> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00597>
00598>
00599> 003:0010-----
00600>
00601> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=86.00
00602> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00603> | U.H. Tp(hrs)= .510
00604>
00605> Unit Hyd Qpeak (cms)= .879
00606>
00607> PEAK FLOW (cms)= .313 (i)
00608> TIME TO PEAK (hrs)= 1.000
00609> RUNOFF VOLUME (mm)= 10.350
00610> TOTAL RAINFALL (mm)= 28.000
00611> RUNOFF COEFFICIENT = .370
00612>
00613> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00614>
00615>
00616> 003:0011-----
00617>
00618> | ADD HYD (To_Sw ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00619> |-----|-----|-----|-----|-----|-----|
00620> | ID1 01:EXTB-3 | 10.77 .271 .92 8.54 .000
00621> | +ID2 02:B-103 | 11.74 .313 1.00 10.35 .000
00622> |-----|-----|-----|-----|-----|-----|
00623> | SUM 06:To_Sw | 22.51 .580 .97 9.48 .000
00624>
00625> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00626>
00627>
00628> 003:0012-----
00629>
00630> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
00631> | 04:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00632> | U.H. Tp(hrs)= .700
00633>
00634> Unit Hyd Qpeak (cms)= .274
00635>
00636> PEAK FLOW (cms)= .086 (i)
00637> TIME TO PEAK (hrs)= 1.183
00638> RUNOFF VOLUME (mm)= 8.537
00639> TOTAL RAINFALL (mm)= 28.000
00640> RUNOFF COEFFICIENT = .305
00641>
00642> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00643>
00644>
00645> 003:0013-----
00646>
00647> 003:0002-----
00648>
00649> 003:0002-----
00650> ** END OF RUN : 3
00651>
00652>
00653>
00654>
00655>
00656>
00657>
00658>
00659> | START | Project dir.: C:\usr\LOYB\
00660> | Rainfall dir.: C:\usr\LOYB\
00661> | TZERO = .00 hrs on 0
00662> | METOUT = 2 (output = METRIC)
00663> | NRUN = 004
00664> | NSTORM= 1
00665> | # I=LYA5.12h
00666>
00667> 004:0002-----
00668>
00669> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[13560220]
00670> *# Date : 12-21-2017
00671> *# Modeller : [D. Williams]
00672> *# Company : Stantec Consulting Ltd. (Waterloo)
00673> *# License # : 4730904
00674> *#
00675> *#
00676> *# Block B - EXISTING CONDITIONS
00677> *#
00678> *# - Hydrologic conditions represent site prior to construction
00679> *# - AMC III Conditions
00680> *#
00681> *#
00682>
00683> 004:0002-----
00684>
00685> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 5 Year)
00686> | Ptotal= 55.97 mm | Comments: Belleville IDF (12-hr 30% AES - 5 Year)
00687>
00688> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
00689> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
00690> | 1.00 5.247 | 4.00 8.745 | 7.00 1.749 | 10.00 .000 |
00691> | 2.00 15.158 | 5.00 8.162 | 8.00 .583 | 11.00 .000 |
00692> | 3.00 11.600 | 6.00 4.664 | 9.00 .000 | 12.00 .000 |
00693>
00694>
00695> 004:0003-----
00696>
00697> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00698> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00699> | U.H. Tp(hrs)= .430
00700>
00701> Unit Hyd Qpeak (cms)= .353
00702>
00703> PEAK FLOW (cms)= .067 (i)
00704> TIME TO PEAK (hrs)= 3.183
00705> RUNOFF VOLUME (mm)= 26.916

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00706> TOTAL RAINFALL (mm)= 55.968
00707> RUNOFF COEFFICIENT = .481
00708>
00709> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00710>
00711>
00712> 004:0004-----
00713>
00714> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
00715> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00716> | U.H. Tp(hrs)= .340
00717>
00718> Unit Hyd Qpeak (cms)= 1.083
00719>
00720> PEAK FLOW (cms)= .166 (i)
00721> TIME TO PEAK (hrs)= 3.117
00722> RUNOFF VOLUME (mm)= 26.916
00723> TOTAL RAINFALL (mm)= 55.968
00724> RUNOFF COEFFICIENT = .481
00725>
00726> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00727>
00728>
00729> 004:0005-----
00730>
00731> | ADD HYD (To_Nw ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00732> |-----|-----|-----|-----|-----|-----|
00733> | ID1 01:EXTB-1 | 3.97 .067 3.18 26.92 .000
00734> | +ID2 02:B-101 | 9.64 .166 3.12 26.92 .000
00735> |-----|-----|-----|-----|-----|-----|
00736> | SUM 09:To_Nw | 13.61 .233 3.13 26.92 .000
00737>
00738> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00739>
00740>
00741> 004:0006-----
00742>
00743> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
00744> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00745> | U.H. Tp(hrs)= .500
00746>
00747> Unit Hyd Qpeak (cms)= 1.432
00748>
00749> PEAK FLOW (cms)= .311 (i)
00750> TIME TO PEAK (hrs)= 3.250
00751> RUNOFF VOLUME (mm)= 26.916
00752> TOTAL RAINFALL (mm)= 55.968
00753> RUNOFF COEFFICIENT = .481
00754>
00755> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00756>
00757>
00758> 004:0007-----
00759>
00760> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
00761> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00762> | U.H. Tp(hrs)= .830
00763>
00764> Unit Hyd Qpeak (cms)= .315
00765>
00766> PEAK FLOW (cms)= .106 (i)
00767> TIME TO PEAK (hrs)= 4.317
00768> RUNOFF VOLUME (mm)= 26.916
00769> TOTAL RAINFALL (mm)= 55.968
00770> RUNOFF COEFFICIENT = .481
00771>
00772> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00773>
00774>
00775> 004:0008-----
00776>
00777> | ADD HYD (To_CTR ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00778> |-----|-----|-----|-----|-----|-----|
00779> | ID1 01:EXTB-2 | 18.74 .311 3.25 26.92 .000
00780> | +ID2 02:B-102 | 6.84 .106 4.32 26.92 .000
00781> |-----|-----|-----|-----|-----|-----|
00782> | SUM 08:To_CTR | 25.58 .410 3.35 26.92 .000
00783>
00784> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00785>
00786>
00787> 004:0009-----
00788>
00789> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00790> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00791> | U.H. Tp(hrs)= .420
00792>
00793> Unit Hyd Qpeak (cms)= .979
00794>
00795> PEAK FLOW (cms)= .182 (i)
00796> TIME TO PEAK (hrs)= 3.183
00797> RUNOFF VOLUME (mm)= 26.916
00798> TOTAL RAINFALL (mm)= 55.968
00799> RUNOFF COEFFICIENT = .481
00800>
00801> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00802>
00803>
00804> 004:0010-----
00805>
00806> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=86.00
00807> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00808> | U.H. Tp(hrs)= .510
00809>
00810> Unit Hyd Qpeak (cms)= .879
00811>
00812> PEAK FLOW (cms)= .228 (i)
00813> TIME TO PEAK (hrs)= 3.233
00814> RUNOFF VOLUME (mm)= 30.963
00815> TOTAL RAINFALL (mm)= 55.968
00816> RUNOFF COEFFICIENT = .553
00817>
00818> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00819>
00820>
00821> 004:0011-----
00822>
00823> | ADD HYD (To_Sw ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
00824> |-----|-----|-----|-----|-----|-----|
00825> | ID1 01:EXTB-3 | 10.77 .228 3.18 26.92 .000
00826> | +ID2 02:B-103 | 11.74 .228 3.23 30.96 .000
00827> |-----|-----|-----|-----|-----|-----|
00828> | SUM 06:To_Sw | 22.51 .410 3.20 29.93 .000
00829>
00830> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00831>
00832>
00833> 004:0012-----
00834>
00835> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
00836> | 04:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00837> | U.H. Tp(hrs)= .700
00838>
00839> Unit Hyd Qpeak (cms)= .274
00840>
00841> PEAK FLOW (cms)= .079 (i)
00842> TIME TO PEAK (hrs)= 3.633
00843> RUNOFF VOLUME (mm)= 26.916
00844> TOTAL RAINFALL (mm)= 55.968
00845> RUNOFF COEFFICIENT = .481
00846>

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00847> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00848>
00849>
00850> 004:0013-----
00851>
00852> 004:0002-----
00853>
00854> 004:0002-----
00855>
00856> 004:0002-----
00857> ** END OF RUN : 4
00858>
00859>
00860>
00861>
00862>
00863>
00864>
00865>
00866> | START | Project dir.: C:\usr\LOYB\
00867> | Rainfall dir.: C:\usr\LOYB\
00868> TZERO = .00 hrs on 0
00869> METOUT= 2 (output = METRIC)
00870> NRUN = 005
00871> NSTORM= 1
00872> # 1=LYA100.12hr
00873>
00874> 005:0002-----
00875>
00876> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00877> # Date : 12-21-2017
00878> # Modeller : [D. Williams]
00879> # Company : Stantec Consulting Ltd. (Waterloo)
00880> # License # : 4730904
00881>
00882> #
00883> # Block B - EXISTING CONDITIONS
00884> #
00885> # - Hydrologic conditions represent site prior to construction
00886> # - AMC III Conditions
00887> #
00888> #
00889>
00890> 005:0002-----
00891>
00892> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 100 Year)
00893> | Ptotal= 44.10 mm | Comments: Belleville IDF (1-hr 30% AES - 100 Year)
00894>
00895>
00896> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00897> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00898> .08 47.628 | .33 58.212 | .58 52.928 | .83 15.876
00899> .17 74.088 | .42 68.796 | .67 26.460 | .92 5.292
00900> .25 111.132 | .50 47.628 | .75 21.168 | 1.00 .000
00901>
00902> 005:0003-----
00903>
00904> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00905> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00906> | U.H. Tp(hrs)= .430
00907>
00908> Unit Hyd Qpeak (cms)= .353
00909>
00910> PEAK FLOW (cms)= .211 (i)
00911> TIME TO PEAK (hrs)= .917
00912> RUNOFF VOLUME (mm)= 18.451
00913> TOTAL RAINFALL (mm)= 44.100
00914> RUNOFF COEFFICIENT = .418
00915>
00916> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00917>
00918>
00919> 005:0004-----
00920>
00921> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
00922> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00923> | U.H. Tp(hrs)= .340
00924>
00925> Unit Hyd Qpeak (cms)= 1.083
00926>
00927> PEAK FLOW (cms)= .591 (i)
00928> TIME TO PEAK (hrs)= .817
00929> RUNOFF VOLUME (mm)= 18.451
00930> TOTAL RAINFALL (mm)= 44.100
00931> RUNOFF COEFFICIENT = .418
00932>
00933> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00934>
00935>
00936> 005:0005-----
00937>
00938> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00939> | ID1 01:EXTB-1 | (ha) (cms) (hrs) (mm) (cms)
00940> +ID2 02:B-101 9.64 .591 .82 18.45 .000
00941>
00942> SUM 09:To_NW 13.61 .796 .85 18.45 .000
00943>
00944>
00945> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00946>
00947>
00948> 005:0006-----
00949>
00950> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
00951> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00952> | U.H. Tp(hrs)= .500
00953>
00954> Unit Hyd Qpeak (cms)= 1.432
00955>
00956> PEAK FLOW (cms)= .900 (i)
00957> TIME TO PEAK (hrs)= .983
00958> RUNOFF VOLUME (mm)= 18.451
00959> TOTAL RAINFALL (mm)= 44.100
00960> RUNOFF COEFFICIENT = .418
00961>
00962> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00963>
00964>
00965> 005:0007-----
00966>
00967> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
00968> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00969> | U.H. Tp(hrs)= .830
00970>
00971> Unit Hyd Qpeak (cms)= .315
00972>
00973> PEAK FLOW (cms)= .217 (i)
00974> TIME TO PEAK (hrs)= 1.283
00975> RUNOFF VOLUME (mm)= 18.451
00976> TOTAL RAINFALL (mm)= 44.100
00977> RUNOFF COEFFICIENT = .418
00978>
00979> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00980>
00981>
00982> 005:0008-----
00983>
00984> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00985> | ID1 01:EXTB-2 | (ha) (cms) (hrs) (mm) (cms)
00986> +ID2 02:B-102 18.74 .900 .98 18.45 .000
00987> 6.84 .217 1.28 18.45 .000
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00988>
00989> SUM 08:To_CTR 25.58 1.088 1.02 18.45 .000
00990>
00991> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00992>
00993>
00994> 005:0009-----
00995>
00996> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00997> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00998> | U.H. Tp(hrs)= .420
00999>
01000> Unit Hyd Qpeak (cms)= .979
01001>
01002> PEAK FLOW (cms)= .582 (i)
01003> TIME TO PEAK (hrs)= .900
01004> RUNOFF VOLUME (mm)= 18.451
01005> TOTAL RAINFALL (mm)= 44.100
01006> RUNOFF COEFFICIENT = .418
01007>
01008> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01009>
01010>
01011> 005:0010-----
01012>
01013> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=86.00
01014> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01015> | U.H. Tp(hrs)= .510
01016>
01017> Unit Hyd Qpeak (cms)= .879
01018>
01019> PEAK FLOW (cms)= .650 (i)
01020> TIME TO PEAK (hrs)= .903
01021> RUNOFF VOLUME (mm)= 21.617
01022> TOTAL RAINFALL (mm)= 44.100
01023> RUNOFF COEFFICIENT = .490
01024>
01025> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01026>
01027>
01028> 005:0011-----
01029>
01030> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01031> | ID1 01:EXTB-3 | (ha) (cms) (hrs) (mm) (cms)
01032> +ID2 02:B-103 11.74 .650 .98 21.62 .000
01033>
01034> SUM 06:To_SW 22.51 1.226 .95 20.10 .000
01035>
01036>
01037> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01038>
01039>
01040> 005:0012-----
01041>
01042> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01043> | 04:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01044> | U.H. Tp(hrs)= .700
01045>
01046> Unit Hyd Qpeak (cms)= .274
01047>
01048> PEAK FLOW (cms)= .185 (i)
01049> TIME TO PEAK (hrs)= 1.167
01050> RUNOFF VOLUME (mm)= 18.451
01051> TOTAL RAINFALL (mm)= 44.100
01052> RUNOFF COEFFICIENT = .418
01053>
01054> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01055>
01056>
01057> 005:0013-----
01058>
01059> 005:0002-----
01060>
01061> 005:0002-----
01062>
01063> 005:0002-----
01064>
01065> ** END OF RUN : 5
01066>
01067>
01068>
01069>
01070>
01071>
01072>
01073>
01074>
01075> | START | Project dir.: C:\usr\LOYB\
01076> | Rainfall dir.: C:\usr\LOYB\
01077> TZERO = .00 hrs on 0
01078> METOUT= 2 (output = METRIC)
01079> NRUN = 006
01080> NSTORM= 1
01081> # 1=LYA100.12hr
01082>
01083> 006:0002-----
01084>
01085> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01086> # Date : 12-21-2017
01087> # Modeller : [D. Williams]
01088> # Company : Stantec Consulting Ltd. (Waterloo)
01089> # License # : 4730904
01090>
01091> #
01092> # Block B - EXISTING CONDITIONS
01093> #
01094> # - Hydrologic conditions represent site prior to construction
01095> # - AMC III Conditions
01096> #
01097> #
01098>
01099> 006:0002-----
01100>
01101> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 100 Year)
01102> | Ptotal= 93.70 mm | Comments: Belleville IDF (12-hr 30% AES - 100 Year)
01103>
01104>
01105> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01106> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01107> 1.00 8.784 | 4.00 14.648 | 7.00 2.928 | 10.00 .000
01108> 2.00 25.376 | 5.00 13.664 | 8.00 .976 | 11.00 .000
01109> 3.00 19.520 | 6.00 7.808 | 9.00 .000 | 12.00 .000
01110>
01111> 006:0003-----
01112>
01113> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
01114> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01115> | U.H. Tp(hrs)= .430
01116>
01117> Unit Hyd Qpeak (cms)= .353
01118>
01119> PEAK FLOW (cms)= .146 (i)
01120> TIME TO PEAK (hrs)= 3.133
01121> RUNOFF VOLUME (mm)= 57.452
01122> TOTAL RAINFALL (mm)= 93.696
01123> RUNOFF COEFFICIENT = .613
01124>
01125> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01126>
01127>
01128> 006:0004-----
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01129>-----
01130> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
01131> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01132> | U.H. Tp(hrs)= .340
01133>-----
01134> Unit Hyd Qpeak (cms)= 1.083
01135>-----
01136> PEAK FLOW (cms)= .360 (i)
01137> TIME TO PEAK (hrs)= 3.083
01138> RUNOFF VOLUME (mm)= 57.452
01139> TOTAL RAINFALL (mm)= 93.696
01140> RUNOFF COEFFICIENT = .613
01141>-----
01142> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01143>-----
01144>-----
01145> 006:0005-----
01146>-----
01147> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01148> | (ha) (cms) (hrs) (mm) (cms)
01149> ID1 01:EXTB-1 3.97 .146 3.13 57.45 .000
01150> +ID2 02:B-101 9.64 .360 3.08 57.45 .000
01151>=====
01152> SUM 09:To_NW 13.61 .506 3.10 57.45 .000
01153>-----
01154> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01155>-----
01156>-----
01157> 006:0006-----
01158>-----
01159> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
01160> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01161> | U.H. Tp(hrs)= .500
01162>-----
01163> Unit Hyd Qpeak (cms)= 1.432
01164>-----
01165> PEAK FLOW (cms)= .602 (i)
01166> TIME TO PEAK (hrs)= 3.183
01167> RUNOFF VOLUME (mm)= 57.452
01168> TOTAL RAINFALL (mm)= 93.696
01169> RUNOFF COEFFICIENT = .613
01170>-----
01171> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01172>-----
01173>-----
01174> 006:0007-----
01175>-----
01176> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
01177> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01178> | U.H. Tp(hrs)= .830
01179>-----
01180> Unit Hyd Qpeak (cms)= .315
01181>-----
01182> PEAK FLOW (cms)= .229 (i)
01183> TIME TO PEAK (hrs)= 3.700
01184> RUNOFF VOLUME (mm)= 57.452
01185> TOTAL RAINFALL (mm)= 93.696
01186> RUNOFF COEFFICIENT = .613
01187>-----
01188> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01189>-----
01190>-----
01191> 006:0008-----
01192>-----
01193> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01194> | (ha) (cms) (hrs) (mm) (cms)
01195> ID1 01:EXTB-2 18.74 .602 3.18 57.45 .000
01196> +ID2 02:B-102 6.84 .229 3.70 57.45 .000
01197>=====
01198> SUM 08:To_CTR 25.58 .901 3.25 57.45 .000
01199>-----
01200> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01201>-----
01202>-----
01203> 006:0009-----
01204>-----
01205> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
01206> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01207> | U.H. Tp(hrs)= .420
01208>-----
01209> Unit Hyd Qpeak (cms)= .979
01210>-----
01211> PEAK FLOW (cms)= .397 (i)
01212> TIME TO PEAK (hrs)= 3.117
01213> RUNOFF VOLUME (mm)= 57.452
01214> TOTAL RAINFALL (mm)= 93.696
01215> RUNOFF COEFFICIENT = .613
01216>-----
01217> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01218>-----
01219>-----
01220> 006:0010-----
01221>-----
01222> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=86.00
01223> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01224> | U.H. Tp(hrs)= .510
01225>-----
01226> Unit Hyd Qpeak (cms)= .879
01227>-----
01228> PEAK FLOW (cms)= .479 (i)
01229> TIME TO PEAK (hrs)= 3.150
01230> RUNOFF VOLUME (mm)= 63.650
01231> TOTAL RAINFALL (mm)= 93.696
01232> RUNOFF COEFFICIENT = .679
01233>-----
01234> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01235>-----
01236>-----
01237> 006:0011-----
01238>-----
01239> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01240> | (ha) (cms) (hrs) (mm) (cms)
01241> ID1 01:EXTB-3 10.77 .397 3.12 57.45 .000
01242> +ID2 02:B-103 11.74 .479 3.15 63.65 .000
01243>=====
01244> SUM 06:To_SW 22.51 .876 3.13 60.68 .000
01245>-----
01246> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01247>-----
01248>-----
01249> 006:0012-----
01250>-----
01251> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01252> | 04:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01253> | U.H. Tp(hrs)= .700
01254>-----
01255> Unit Hyd Qpeak (cms)= .274
01256>-----
01257> PEAK FLOW (cms)= .174 (i)
01258> TIME TO PEAK (hrs)= 3.417
01259> RUNOFF VOLUME (mm)= 57.452
01260> TOTAL RAINFALL (mm)= 93.696
01261> RUNOFF COEFFICIENT = .613
01262>-----
01263> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01264>-----
01265>-----
01266> 006:0013-----
01267>-----
01268> 006:0002-----
01269>-----

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```

01270> 006:0002-----
01271>-----
01272> 006:0002-----
01273>-----
01274> 006:0002-----
01275>-----
01276> 006:0002-----
01277> ** END OF RUN : 6
01278>-----
01279>-----
01280>-----
01281>-----
01282>-----
01283>-----
01284>-----
01285>-----
01286> | START | Project dir.: C:\usr\LOYB\
01287> | Rainfall dir.: C:\usr\LOYB\
01288> TZERO = .00 hrs on 0
01289> METOUT= 2 (output = METRIC)
01290> NRUN = 007
01291> NSTORM= 1
01292>-----
01293> # 1=25mm.4hr
01294>-----
01295> 007:0002-----
01296> *#-----
01297> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01298> *# Date : 12-21-2017
01299> *# Modeller : [D. Williams]
01300> *# Company : Stantec Consulting Ltd. (Waterloo)
01301> *# License # : 4730904
01302> *#-----
01303> *#-----
01304> *#-----
01305> *#-----
01306> *#-----
01307> *#-----
01308> *#-----
01309>-----
01310> 007:0002-----
01311>-----
01312> | READ STORM | Filename: 25 mm, 4hr Chicago Storm
01313> | Ptotal= 25.00 mm | Comments: 25 mm, 4hr Chicago Storm
01314>-----
01315> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
01316> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
01317> .08 1.465 1.08 4.024 2.08 5.764 3.08 2.074
01318> .17 1.540 1.17 4.814 2.17 4.969 3.17 1.977
01319> .25 1.625 1.25 6.025 2.25 4.374 3.25 1.809
01320> .33 1.720 1.33 8.114 2.33 3.913 3.33 1.810
01321> .42 1.829 1.42 12.526 2.42 3.545 3.42 1.737
01322> .50 1.955 1.50 27.198 2.50 3.245 3.50 1.671
01323> .58 2.101 1.58 74.855 2.58 2.994 3.58 1.610
01324> .67 2.274 1.67 31.419 2.67 2.782 3.67 1.553
01325> .75 2.482 1.75 16.819 2.75 2.601 3.75 1.501
01326> .83 2.736 1.83 11.357 2.83 2.443 3.83 1.453
01327> .92 3.055 1.92 8.563 2.92 2.305 3.92 1.408
01328> 1.00 3.468 2.00 6.002 3.00 2.183 4.00 1.366
01329>-----
01330>-----
01331> 007:0003-----
01332>-----
01333> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
01334> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01335> | U.H. Tp(hrs)= .430
01336>-----
01337> Unit Hyd Qpeak (cms)= .353
01338>-----
01339> PEAK FLOW (cms)= .056 (i)
01340> TIME TO PEAK (hrs)= 2.117
01341> RUNOFF VOLUME (mm)= 6.968
01342> TOTAL RAINFALL (mm)= 25.000
01343> RUNOFF COEFFICIENT = .279
01344>-----
01345> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01346>-----
01347>-----
01348> 007:0004-----
01349>-----
01350> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
01351> | 02:B-101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01352> | U.H. Tp(hrs)= .340
01353>-----
01354> Unit Hyd Qpeak (cms)= 1.083
01355>-----
01356> PEAK FLOW (cms)= .160 (i)
01357> TIME TO PEAK (hrs)= 2.000
01358> RUNOFF VOLUME (mm)= 6.968
01359> TOTAL RAINFALL (mm)= 25.000
01360> RUNOFF COEFFICIENT = .279
01361>-----
01362> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01363>-----
01364>-----
01365> 007:0005-----
01366>-----
01367> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01368> | (ha) (cms) (hrs) (mm) (cms)
01369> ID1 01:EXTB-1 3.97 .056 2.12 6.97 .000
01370> +ID2 02:B-101 9.64 .160 2.00 6.97 .000
01371>=====
01372> SUM 09:To_NW 13.61 .215 2.03 6.97 .000
01373>-----
01374> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01375>-----
01376>-----
01377> 007:0006-----
01378>-----
01379> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
01380> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01381> | U.H. Tp(hrs)= .500
01382>-----
01383> Unit Hyd Qpeak (cms)= 1.432
01384>-----
01385> PEAK FLOW (cms)= .240 (i)
01386> TIME TO PEAK (hrs)= 2.217
01387> RUNOFF VOLUME (mm)= 6.968
01388> TOTAL RAINFALL (mm)= 25.000
01389> RUNOFF COEFFICIENT = .279
01390>-----
01391> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01392>-----
01393>-----
01394> 007:0007-----
01395>-----
01396> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
01397> | 02:B-102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01398> | U.H. Tp(hrs)= .830
01399>-----
01400> Unit Hyd Qpeak (cms)= .315
01401>-----
01402> PEAK FLOW (cms)= .061 (i)
01403> TIME TO PEAK (hrs)= 2.650
01404> RUNOFF VOLUME (mm)= 6.968
01405> TOTAL RAINFALL (mm)= 25.000
01406> RUNOFF COEFFICIENT = .279
01407>-----
01408> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01409>-----
01410>-----

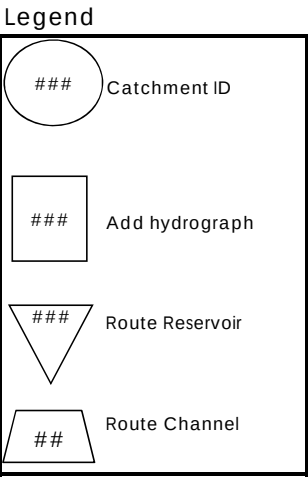
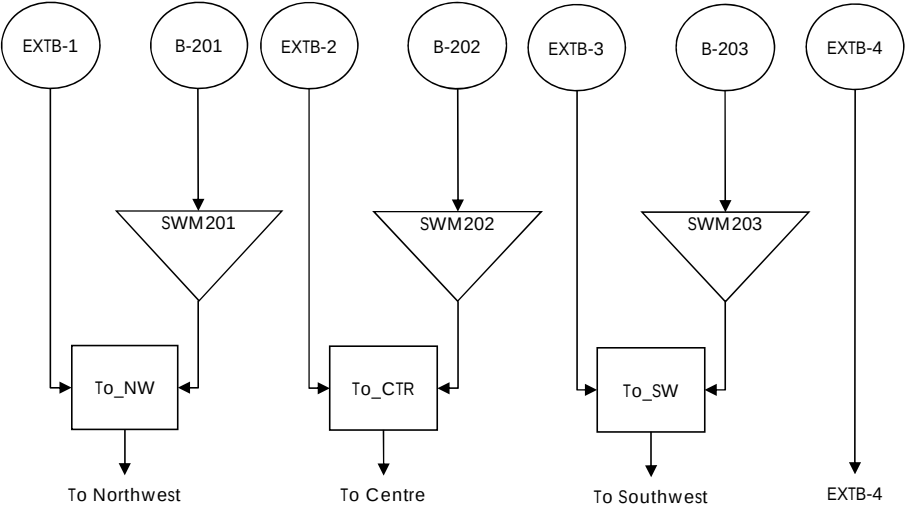
```

```
01411> 007:0008-----
01412> -----
01413> | ADD HYD (To_CTR ) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
01414> -----
01415> ID1 01:EXTB-2      18.74      .248      2.22      6.97      .000
01416> +ID2 02:B-102      6.84      .061      2.65      6.97      .000
01417> -----
01418> SUM 08:To_CTR      25.58      .291      2.27      6.97      .000
01419> -----
01420> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01421> -----
01422> -----
01423> 007:0009-----
01424> -----
01425> | DESIGN NASHYD | Area (ha)= 10.77      Curve Number (CN)=82.00
01426> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500      # of Linear Res.(N)= 3.00
01427> U.H. Tp(hrs)= .420
01428> -----
01429> Unit Hyd Qpeak (cms)= .979
01430> -----
01431> PEAK FLOW (cms)= .155 (i)
01432> TIME TO PEAK (hrs)= 2.117
01433> RUNOFF VOLUME (mm)= 6.968
01434> TOTAL RAINFALL (mm)= 25.000
01435> RUNOFF COEFFICIENT = .279
01436> -----
01437> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01438> -----
01439> -----
01440> 007:0010-----
01441> -----
01442> | DESIGN NASHYD | Area (ha)= 11.74      Curve Number (CN)=86.00
01443> | 02:B-103 DT= 1.00 | Ia (mm)= 1.500      # of Linear Res.(N)= 3.00
01444> U.H. Tp(hrs)= .510
01445> -----
01446> Unit Hyd Qpeak (cms)= .879
01447> -----
01448> PEAK FLOW (cms)= .184 (i)
01449> TIME TO PEAK (hrs)= 2.217
01450> RUNOFF VOLUME (mm)= 8.516
01451> TOTAL RAINFALL (mm)= 25.000
01452> RUNOFF COEFFICIENT = .341
01453> -----
01454> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01455> -----
01456> -----
01457> 007:0011-----
01458> -----
01459> | ADD HYD (To_Sw ) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
01460> -----
01461> ID1 01:EXTB-3      10.77      .155      2.12      6.97      .000
01462> +ID2 02:B-103      11.74      .184      2.22      8.52      .000
01463> -----
01464> SUM 06:To_Sw      22.51      .336      2.17      7.78      .000
01465> -----
01466> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01467> -----
01468> -----
01469> 007:0012-----
01470> -----
01471> | DESIGN NASHYD | Area (ha)= 5.03      Curve Number (CN)=82.00
01472> | 04:EXTB-4 DT= 1.00 | Ia (mm)= 1.500      # of Linear Res.(N)= 3.00
01473> U.H. Tp(hrs)= .700
01474> -----
01475> Unit Hyd Qpeak (cms)= .274
01476> -----
01477> PEAK FLOW (cms)= .051 (i)
01478> TIME TO PEAK (hrs)= 2.467
01479> RUNOFF VOLUME (mm)= 6.968
01480> TOTAL RAINFALL (mm)= 25.000
01481> RUNOFF COEFFICIENT = .279
01482> -----
01483> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01484> -----
01485> -----
01486> 007:0013-----
01487> -----
01488> 007:0002-----
01489> -----
01490> 007:0002-----
01491> -----
01492> 007:0002-----
01493> -----
01494> 007:0002-----
01495> -----
01496> 007:0002-----
01497> -----
01498> 007:0002-----
01499> FINISH
01500> -----
01501> *****
01502> WARNINGS / ERRORS / NOTES
01503> -----
01504> Simulation ended on 2017-12-21 at 17:26:21
01505> =====
01506> -----
01507> -----
```

APPENDIX C – INTERIM CONDITIONS

SWMHYMO Schematic – Interim Conditions
NRCS (SCS) Curve Number Determination – Interim Conditions
Interim Conditions SWMHYMO Output – AMC II
Interim Conditions SWMHYMO Output – AMC III

Subject: Interim / Proposed Schematic
Project: Loyalist Solar Project
Site: Block 'B'
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 20, 2017



Subject: NRCS (SCS) Curve Number Determination - Interim Conditions
Project: Loyalist Solar Project
Site: Block 'B'
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 21, 2017

TABLE OF CURVE NUMBERS (CN's)								Source
Land Use	Hydrologic Soil Type							
	A	AB	B	BC	C	CD	D	
Meadow "Good"	30	44	58	65	71	75	78	USDA
Woodlot "Fair"	36	48	60	67	73	76	79	USDA
Lawns "Good"	39	50	61	68	74	77	80	USDA
Pasture/Range	49	55	60	70	79	82	84	USDA
Crop - SR + CR "Good"	64	70	75	79	82	84	85	USDA
Gravel	76	81	85	87	89	90	91	USDA
Scarified Soil	69	74	78	81	83	85	87	USDA
Wetland/Lake	100	100	100	100	100	100	100	USDA
Impervious	98	98	98	98	98	98	98	USDA

USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology,
 Chapter 9 Hydrologic Soil Cover Complexes

Scarified Soil CNs based on contour plowing & crop residue in poor hydrologic condition

HYDROLOGIC SOIL TYPE (%) - Interim Conditions								
Catchment	Hydrologic Soil Type							
	A	AB	B	BC	C	CD	D	TOTAL
EXT B-1				100				100
EXT B-2				100				100
EXT B-3				100				100
EXT B-4				100				100
B-201				100				100
B-202				100				100
B-203				60		40		100

LAND USE (%) - Interim Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Gravel	Scarified Soil	Wetland	Impervious	Total
EXT B-1	80	5		15						100
EXT B-2	80	5		15						100
EXT B-3	79	5		15					1	100
EXT B-4	78	5		15					2	100
B-201							94		6	100
B-202							95		5	100
B-203							86		14	100

CURVE NUMBER (CN) - Interim Conditions											
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Gravel	Scarified Soil	Wetland/Lakes	Impervious	Weighted CN (AMC II)	Weighted CN (AMC III)
EXT B-1	52	3		10						65	82
EXT B-2	52	3		10						65	82
EXT B-3	51	3		11					1	66	82
EXT B-4	51	3		10					2	66	82
B-201							76		6	82	92
B-202							77		5	82	92
B-203							71		14	85	94

Notes: AMC II assumed - AMC III Conversion Per Soil Conservation Service Curve Number (SCS-CN) Methodology (Mishra, Surendra and Vijay P. Sing (2003))
 Hydrological Soil Groups based on guidance presented in National Engineering Handbook

\\Cd1004-f01\work_group\01614\active\133560220\design\analysis\SWM\Block B\[SWMHYMO_Block_B_V3.xlsx]Tc and Tp

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00001> SSSSS W W M M H H Y Y M M M 000 999 999 =====
00002> S W W W M M M M H H Y Y M M M 0 0 9 9 9 9
00004> SSSSS W W W M M M H H H H Y Y M M M 0 0 # 9 9 9 9 Ver 4.05
00005> S W W M M M H H H Y Y M M M 0 0 9999 9999 Sept 2011
00007> SSSSS W W M M H H H Y M M M 000 9 9 # 4730994
00008> Stormwater Management Hydrologic Model 999 999 =====
00009>
00010> ***** SMWYMO Ver/4.05 *****
00011> ***** A single event and continuous hydrologic simulation model *****
00012> ***** based on the principles of HYMO and its successors *****
00013> ***** OTTHYMO-83 and OTTHYMO-89. *****
00014> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00015> ***** Ottawa, Ontario: (613) 836-3884 *****
00016> ***** Gatineau, Quebec: (819) 243-6858 *****
00017> ***** E-Mail: smwymo@jfsa.com *****
00018>
00019> *****
00020> *****
00021> *****
00022>
00023> *****
00024> ***** Licensed user: Stantec Consulting Ltd. (Kitchener) *****
00025> ***** Kitchener SERIAL#:4730904 *****
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00142> Unit Hyd Qpeak (cms)= .353
00143>
00144> PEAK FLOW (cms)= .031 (i)
00145> TIME TO PEAK (hrs)= .950
00146> RUNOFF VOLUME (mm)= 2.697
00147> TOTAL RAINFALL (mm)= 22.100
00148> RUNOFF COEFFICIENT = .122
00149>
00150> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00151>
00152>
00153> 001:0006
00154>
00155> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00156> | (ha) (cms) (hrs) (mm) (cms)
00157> | ID1 01:EXTB-1 3.97 .031 .95 .70 .000
00158> | +ID2 02:SWM201 9.64 .000 .00 .00 .000
00159>
00160> SUM 10:To_NW 13.61 .031 .95 .79 .000
00161>
00162> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00163>
00164>
00165> 001:0007
00166>
00167> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
00168> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00169> | U.H. Tp(hrs)= .760
00170>
00171> Unit Hyd Qpeak (cms)= .344
00172>
00173> PEAK FLOW (cms)= .052 (i)
00174> TIME TO PEAK (hrs)= 1.283
00175> RUNOFF VOLUME (mm)= 4.014
00176> TOTAL RAINFALL (mm)= 22.100
00177> RUNOFF COEFFICIENT = .182
00178>
00179> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00180>
00181>
00182> 001:0008
00183> *****
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00278> *****
00279> *****
00280> *****
00281> *****
00282> *****

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00283> TIME SHIFT OF PEAK FLOW (min)= -60.00
00284> MAXIMUM STORAGE USED (ha.m.)=-.5544E-01
00285>
00286> *** WARNING: Outflow volume is less than inflow volume.
00287>
00288> 001:0013-----
00289>
00290> DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
00291> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00292> | U.H. Tp(hrs)= .420
00293>
00294> Unit Hyd Qpeak (cms)= .979
00295>
00296> PEAK FLOW (cms)= .089 (i)
00297> TIME TO PEAK (hrs)= .933
00298> RUNOFF VOLUME (mm)= 2.802
00299> TOTAL RAINFALL (mm)= 22.100
00300> RUNOFF COEFFICIENT = .127
00301>
00302> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00303>
00304>
00305> 001:0014-----
00306>
00307> | ADD HYD (To_Sw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00308> |-----|-----|-----|-----|-----|-----|
00309> | ID1 01:To_Sw | 10.77 .089 .93 2.80 .000
00310> | +ID2 02:SwM203 | 11.74 .000 .00 .00 .000
00311> |-----|-----|-----|-----|-----|-----|
00312> | SUM 01:To_Sw | 22.51 .089 .93 1.34 .000
00313>
00314> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00315>
00316>
00317> 001:0015-----
00318>
00319> | DESIGN NASHYD | Area (ha)= 5.93 Curve Number (CN)=66.00
00320> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00321> | U.H. Tp(hrs)= .700
00322>
00323> Unit Hyd Qpeak (cms)= .274
00324>
00325> PEAK FLOW (cms)= .028 (i)
00326> TIME TO PEAK (hrs)= 1.200
00327> RUNOFF VOLUME (mm)= 2.802
00328> TOTAL RAINFALL (mm)= 22.100
00329> RUNOFF COEFFICIENT = .127
00330>
00331> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00332>
00333>
00334> 001:0016-----
00335> ** END OF RUN : 1
00336>
00337>
00338>
00339>
00340>
00341>
00342>
00343>
00344> | START | Project dir.: C:\usr\LOYB\
00345> | 10:EXTB-4 DT= 1.00 | Rainfall dir.: C:\usr\LOYB\
00346> | TZERO = .00 hrs on 0
00347> | METOUT= 2 (output = METRIC)
00348> | NRUN = 002
00349> | NSTORM= 1
00350> | # 1=LYA2.12h
00351>
00352> 002:0002-----
00353> # *****
00354> # Project Name: [Loyalist Block 'B' SWM] Project Number:[135560220]
00355> # Date : 12-21-2017
00356> # Modeller : [D. Williams]
00357> # Company : Stantec Consulting Ltd. (Waterloo)
00358> # License # : 4730904
00359> # *****
00360> #
00361> # Block B - INTERIM CONDITIONS
00362> #
00363> # - Hydrologic conditions represent site during construction, prior to
00364> # establishment of stabilization vegetation
00365> # - Assumes contour plowing performed to provide surface scarification
00366> # - ESC/SWM control provided by slope interruption berms
00367> # - AMC II Conditions
00368> # *****
00369> #
00370>
00371> 002:0002-----
00372>
00373> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 2 Year)
00374> | Ptotal= 42.24 mm | Comments: Belleville IDF (12-hr 30% AES - 2 Year)
00375>
00376> | TIME | RAIN | TIME | RAIN | TIME | RAIN | TIME | RAIN |
00377> | hrs | mm/hr | hrs | mm/hr | hrs | mm/hr | hrs | mm/hr |
00378> | 1.00 | 3.960 | 4.00 | 6.600 | 7.00 | 1.320 | 10.00 | .000 |
00379> | 2.00 | 11.440 | 5.00 | 6.160 | 8.00 | .440 | 11.00 | .000 |
00380> | 3.00 | 8.800 | 6.00 | 3.520 | 9.00 | .000 | 12.00 | .000 |
00381>
00382>
00383> 002:0003-----
00384>
00385> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
00386> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00387> | U.H. Tp(hrs)= .310
00388>
00389> Unit Hyd Qpeak (cms)= 1.188
00390>
00391> PEAK FLOW (cms)= .094 (i)
00392> TIME TO PEAK (hrs)= 5.033
00393> RUNOFF VOLUME (mm)= 14.913
00394> TOTAL RAINFALL (mm)= 42.240
00395> RUNOFF COEFFICIENT = .353
00396>
00397> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00398>
00399>
00400> 002:0004-----
00401> # *****
00402> # Route TO_NW flows through slope interruption berms
00403> # *****
00404>
00405> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00406> | IN=01:(B-201 ) |
00407> | OUT=02:(SWM201) |
00408> |-----|-----|-----|-----|-----|-----|
00409> | OUTFLOW | STORAGE | OUTFLOW | STORAGE |
00410> | (cms) | (ha.m.) | (cms) | (ha.m.) |
00411> | .000 | .0000E+00 | 2.500 | .3100E+00 |
00412> | .000 | .2900E+00 | 6.900 | .3300E+00 |
00413>
00414> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00415> |-----|-----|-----|-----|
00416> | INFLOW >01: (B-201 ) | 9.64 .000 .000 14.913
00417> | OUTFLOW >02: (SWM201) | 9.64 .000 .000 .000
00418> | OVERFLOW <10: (OVSWM1) | .00 .000 .000 .000
00419>
00420> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00421> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00422> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00423>

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00424> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00425> TIME SHIFT OF PEAK FLOW (min)= -302.00
00426> MAXIMUM STORAGE USED (ha.m.)=-.1438E+00
00427>
00428> *** WARNING: Outflow volume is less than inflow volume.
00429>
00430> 002:0005-----
00431>
00432> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
00433> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00434> | U.H. Tp(hrs)= .430
00435>
00436> Unit Hyd Qpeak (cms)= .353
00437>
00438> PEAK FLOW (cms)= .023 (i)
00439> TIME TO PEAK (hrs)= 5.683
00440> RUNOFF VOLUME (mm)= 9.350
00441> TOTAL RAINFALL (mm)= 42.240
00442> RUNOFF COEFFICIENT = .221
00443>
00444> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00445>
00446>
00447>
00448>
00449> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00450> |-----|-----|-----|-----|-----|-----|
00451> | ID1 01:EXTB-1 | 3.97 .023 5.68 9.35 .000
00452> | +ID2 02:SWM201 | 9.64 .000 .00 .00 .000
00453> |-----|-----|-----|-----|-----|-----|
00454> | SUM 10:To_NW | 13.61 .023 5.68 2.73 .000
00455>
00456> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00457>
00458>
00459> 002:0007-----
00460>
00461> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
00462> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00463> | U.H. Tp(hrs)= .760
00464>
00465> Unit Hyd Qpeak (cms)= .344
00466>
00467> PEAK FLOW (cms)= .064 (i)
00468> TIME TO PEAK (hrs)= 5.150
00469> RUNOFF VOLUME (mm)= 14.913
00470> TOTAL RAINFALL (mm)= 42.240
00471> RUNOFF COEFFICIENT = .353
00472>
00473> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00474>
00475>
00476> 002:0008-----
00477> # *****
00478> # Route TO_CTR flows through slope interruption berms
00479> # *****
00480>
00481> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00482> | IN=01:(B-202 ) |
00483> | OUT=02:(SWM202) |
00484> |-----|-----|-----|-----|-----|-----|
00485> | OUTFLOW | STORAGE | OUTFLOW | STORAGE |
00486> | (cms) | (ha.m.) | (cms) | (ha.m.) |
00487> | .000 | .0000E+00 | 2.200 | .1420E+01 |
00488> | .000 | .1330E+01 | 6.200 | .1520E+01 |
00489>
00489> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00490> |-----|-----|-----|-----|
00491> | INFLOW >01: (B-202 ) | 6.84 .064 5.150 14.913
00492> | OUTFLOW >02: (SWM202) | 6.84 .000 .000 .000
00493> | OVERFLOW <10: (OVSWM2) | .00 .000 .000 .000
00494>
00495> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00496> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00497> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00498>
00499>
00500> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00501> TIME SHIFT OF PEAK FLOW (min)= -309.00
00502> MAXIMUM STORAGE USED (ha.m.)=-.1020E+00
00503>
00504> *** WARNING: Outflow volume is less than inflow volume.
00505>
00506> 002:0009-----
00507>
00508> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
00509> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00510> | U.H. Tp(hrs)= .500
00511>
00512> Unit Hyd Qpeak (cms)= 1.432
00513>
00514> PEAK FLOW (cms)= .110 (i)
00515> TIME TO PEAK (hrs)= 5.100
00516> RUNOFF VOLUME (mm)= 9.350
00517> TOTAL RAINFALL (mm)= 42.240
00518> RUNOFF COEFFICIENT = .221
00519>
00520> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00521>
00522>
00523> 002:0010-----
00524>
00525> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00526> |-----|-----|-----|-----|-----|-----|
00527> | ID1 01:EXTB-2 | 18.74 .110 5.10 9.35 .000
00528> | +ID2 02:SWM202 | 6.84 .000 .00 .00 .000
00529> |-----|-----|-----|-----|-----|-----|
00530> | SUM 10:To_CTR | 25.58 .110 5.10 6.85 .000
00531>
00532> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00533>
00534>
00535> 002:0011-----
00536>
00537> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=85.00
00538> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00539> | U.H. Tp(hrs)= .470
00540>
00541> Unit Hyd Qpeak (cms)= .954
00542>
00543> PEAK FLOW (cms)= .126 (i)
00544> TIME TO PEAK (hrs)= 5.067
00545> RUNOFF VOLUME (mm)= 16.899
00546> TOTAL RAINFALL (mm)= 42.240
00547> RUNOFF COEFFICIENT = .400
00548>
00549> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00550>
00551>
00552> 002:0012-----
00553> # *****
00554> # Route TO_SW flows through slope interruption berms
00555> # *****
00556>
00557> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00558> | IN=01:(B-203 ) |
00559> | OUT=02:(SWM203) |
00560> |-----|-----|-----|-----|-----|-----|
00561> | OUTFLOW | STORAGE | OUTFLOW | STORAGE |
00562> | (cms) | (ha.m.) | (cms) | (ha.m.) |
00563> | .000 | .0000E+00 | 2.900 | .7000E+00 |
00564> | .000 | .6500E+00 | 8.300 | .7400E+00 |
00565>

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00565> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00566> (ha) (cms) (hrs) (mm)
00567> INFLOW>01: (B-203 ) 11.74 .126 5.067 16.800
00568> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
00569> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
00570>
00571> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00572> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00573> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00574>
00575> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00576> TIME SHIFT OF PEAK FLOW (min)= -304.00
00577> MAXIMUM STORAGE USED (ha.m.)=-1984E+00
00578>
00579> *** WARNING: Outflow volume is less than inflow volume.
00580>
00581> -----
00582> 002:0013-----
00583>
00584> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
00585> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00586> | U.H. Tp(hrs)= .420
00587>
00588> Unit Hyd Qpeak (cms)= .979
00589>
00590> PEAK FLOW (cms)= .066 (i)
00591> TIME TO PEAK (hrs)= 5.067
00592> RUNOFF VOLUME (mm)= 9.673
00593> TOTAL RAINFALL (mm)= 42.240
00594> RUNOFF COEFFICIENT = .229
00595>
00596> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00597>
00598> -----
00599> 002:0014-----
00600>
00601> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00602> (ha) (cms) (hrs) (mm) (cms)
00603> ID1 01:To_SW 10.77 .066 5.07 9.67 .000
00604> +ID2 02:SWM203 11.74 .000 .00 .00 .000
00605> =====
00606> SUM 01:To_SW 22.51 .066 5.07 4.63 .000
00607>
00608> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00609>
00610> -----
00611> 002:0015-----
00612>
00613> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
00614> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00615> | U.H. Tp(hrs)= .700
00616>
00617> Unit Hyd Qpeak (cms)= .274
00618>
00619> PEAK FLOW (cms)= .030 (i)
00620> TIME TO PEAK (hrs)= 5.150
00621> RUNOFF VOLUME (mm)= 9.673
00622> TOTAL RAINFALL (mm)= 42.240
00623> RUNOFF COEFFICIENT = .229
00624>
00625> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00626>
00627> -----
00628> 002:0016-----
00629>
00630> 002:0002-----
00631> ** END OF RUN : 2
00632>
00633> *****
00634>
00635>
00636>
00637>
00638>
00639>
00640> | START | Project dir.: C:\usr\LOYB\
00641> | Rainfall dir.: C:\usr\LOYB\
00642> TZERO = .00 hrs on 0
00643> METOUT= 2 (output = METRIC)
00644> NRUN = 003
00645> NSTORM= 1
00646> # 1=LYA5.1hr
00647>
00648> 003:0002-----
00649> # *****
00650> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00651> # Date : 12-21-2017
00652> # Modeller : [D. Williams]
00653> # Company : [Stantec Consulting Ltd. (Waterloo)]
00654> # License # : 4739984
00655> # *****
00656> #
00657> # Block B - INTERIM CONDITIONS
00658> #
00659> # - Hydrologic conditions represent site during construction, prior to
00660> # establishment of stabilization vegetation
00661> # - Assumes contour plowing performed to provide surface scarification
00662> # - ESC/SWM control provided by slope interruption berms
00663> # - AMC II Conditions
00664> #
00665> # *****
00666>
00667> 003:0002-----
00668>
00669> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 5 Year)
00670> | Ptotal= 28.00 mm | Comments: Belleville IDF (1-hr 30% AES - 5 Year)
00671>
00672> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00673> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00674> .00 30.240 | .33 36.900 | .58 33.600 | .83 30.000
00675> .17 47.040 | .42 43.600 | .67 16.800 | .92 3.360
00676> .25 70.560 | .50 30.240 | .75 13.440 | 1.00 .000
00677>
00678>
00679> 003:0003-----
00680>
00681> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
00682> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00683> | U.H. Tp(hrs)= .310
00684>
00685> Unit Hyd Qpeak (cms)= 1.188
00686>
00687> PEAK FLOW (cms)= .234 (i)
00688> TIME TO PEAK (hrs)= .833
00689> RUNOFF VOLUME (mm)= 6.717
00690> TOTAL RAINFALL (mm)= 28.000
00691> RUNOFF COEFFICIENT = .240
00692>
00693> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00694>
00695> -----
00696> 003:0004-----
00697> # *****
00698> # Route TO_NW flows through slope interruption berms
00699> # *****
00700>
00701> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00702> | IN=01:(B-201 ) |
00703> | OUT=02:(SWM201 ) |
00704>
00705>

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00706> .000 .000E+00 | 2.500 .3100E+00
00707> .000 .2900E+00 | 6.900 .3300E+00
00708>
00709> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00710> (ha) (cms) (hrs) (mm)
00711> INFLOW>01: (B-201 ) 9.64 .234 .833 6.717
00712> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
00713> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
00714>
00715> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00716> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00717> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00718>
00719> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00720> TIME SHIFT OF PEAK FLOW (min)= -50.00
00721> MAXIMUM STORAGE USED (ha.m.)=-.6475E-01
00722>
00723> *** WARNING: Outflow volume is less than inflow volume.
00724>
00725> -----
00726> 003:0005-----
00727>
00728> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
00729> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00730> | U.H. Tp(hrs)= .430
00731>
00732> Unit Hyd Qpeak (cms)= .353
00733>
00734> PEAK FLOW (cms)= .050 (i)
00735> TIME TO PEAK (hrs)= .950
00736> RUNOFF VOLUME (mm)= 4.301
00737> TOTAL RAINFALL (mm)= 28.000
00738> RUNOFF COEFFICIENT = .154
00739>
00740> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00741>
00742> -----
00743> 003:0006-----
00744>
00745> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00746> (ha) (cms) (hrs) (mm) (cms)
00747> ID1 01:EXTB-1 3.97 .050 .95 4.30 .000
00748> +ID2 02:SWM201 9.64 .000 .00 .00 .000
00749> =====
00750> SUM 10:To_NW 13.61 .050 .95 1.25 .000
00751>
00752> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00753>
00754> -----
00755> 003:0007-----
00756>
00757> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
00758> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00759> | U.H. Tp(hrs)= .760
00760>
00761> Unit Hyd Qpeak (cms)= .344
00762>
00763> PEAK FLOW (cms)= .086 (i)
00764> TIME TO PEAK (hrs)= 1.267
00765> RUNOFF VOLUME (mm)= 6.717
00766> TOTAL RAINFALL (mm)= 28.000
00767> RUNOFF COEFFICIENT = .240
00768>
00769> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00770>
00771> -----
00772> 003:0008-----
00773> # *****
00774> # Route TO_CTR flows through slope interruption berms
00775> # *****
00776>
00777> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00778> | IN=01:(B-202 ) |
00779> | OUT=02:(SWM202 ) |
00780>
00781>
00782>
00783>
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00846>

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00847>-----
00848> 003:0012-----
00849> #*****
00850> # Route To_SW flows through slope interruption berms
00851> #*****
00852>
00853> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00854> | IN=01:(B-203) |
00855> | OUT=02:(SWM203) |
00856>-----
00857> |===== OUTFLOW STORAGE TABLE =====|
00858> | OUTFLOW STORAGE | OUTFLOW STORAGE |
00859> | (cms) (ha.m.) | (cms) (ha.m.) |
00860> | .000 .0000E+00 | 2.900 .7000E+00 |
00861> | .000 .6500E+00 | 8.300 .7400E+00 |
00862>-----
00863> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00864> (ha) (cms) (hrs) (mm)
00865> INFLOW >01: (B-203) 11.74 .254 .903 7.800
00866> OUTFLOW=02: (SWM203) 11.74 .000 .000 .000
00867> OVERFLOW=10: (OVSWM3) .00 .000 .000 .000
00868>-----
00869> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00870> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00871> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00872>-----
00873> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00874> TIME SHIFT OF PEAK FLOW (min)= -59.00
00875> MAXIMUM STORAGE USED (ha.m.)= .9157E-01
00876>-----
00877> *** WARNING: Outflow volume is less than inflow volume.
00878>-----
00879> 003:0013-----
00880> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
00881> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00882> | U.H. Tp(hrs)= .420 |
00883>-----
00884> Unit Hyd Qpeak (cms)= .979
00885>-----
00886> PEAK FLOW (cms)= .142 (i)
00887> TIME TO PEAK (hrs)= .933
00888> RUNOFF VOLUME (mm)= 4.463
00889> TOTAL RAINFALL (mm)= 28.000
00890> RUNOFF COEFFICIENT = .159
00891>-----
00892> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00893>-----
00894> 003:0014-----
00895> | ADD HYD (To_SW) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00896> | | (ha) (cms) (hrs) (mm) (cms)
00897> | I01 01:To_SW 10.77 .142 .93 4.46 .000
00898> | +I02 02:SWM203 11.74 .000 .00 .00 .000
00899> |=====
00900> | SUM 01:To_SW 22.51 .142 .93 2.14 .000
00901>-----
00902> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00903>-----
00904> 003:0015-----
00905> | DESIGN NASHYD | Area (ha)= 5.83 Curve Number (CN)=66.00
00906> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00907> | U.H. Tp(hrs)= .700 |
00908>-----
00909> Unit Hyd Qpeak (cms)= .274
00910>-----
00911> PEAK FLOW (cms)= .045 (i)
00912> TIME TO PEAK (hrs)= 1.183
00913> RUNOFF VOLUME (mm)= 4.463
00914> TOTAL RAINFALL (mm)= 28.000
00915> RUNOFF COEFFICIENT = .159
00916>-----
00917> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00918>-----
00919> 003:0016-----
00920> 003:0002-----
00921> 003:0002-----
00922> ** END OF RUN : 3
00923>-----
00924> 003:0002-----
00925> 003:0002-----
00926> 003:0002-----
00927> 003:0002-----
00928> 003:0002-----
00929> ** END OF RUN : 3
00930>-----
00931> 003:0002-----
00932> 003:0002-----
00933> 003:0002-----
00934> 003:0002-----
00935> 003:0002-----
00936> 003:0002-----
00937> 003:0002-----
00938> | START | Project dir.: C:\usr\LOBY\
00939> | TZERO = .00 hrs on 0 | Rainfall dir.: C:\usr\LOBY\
00940> | NETOUT = 2 (output = METRIC) |
00941> | NRUN = 004 |
00942> | NSTORM = 1 |
00943> | # 1-LYAS.12h |
00944> |
00945>-----
00946> 004:0002-----
00947> #*****
00948> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00949> # Date : 12-21-2017
00950> # Modeller : [D. Williams]
00951> # Company : Stantec Consulting Ltd. (Waterloo)
00952> # License # : 4739994
00953> #*****
00954> #
00955> # Block B - INTERIM CONDITIONS
00956> #
00957> # - Hydrologic conditions represent site during construction, prior to
00958> # establishment of stabilization vegetation
00959> # - Assumes contour plowing performed to provide surface scarification
00960> # - ESC/SWM control provided by slope interruption berms
00961> # - AMC II Conditions
00962> #*****
00963> #*****
00964>-----
00965> 004:0002-----
00966> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 5 Year)
00967> | Ptotal= 55.97 mm | Comments: Belleville IDF (12-hr 30% AES - 5 Year)
00968>-----
00969> | TIME | RAIN | TIME | RAIN | TIME | RAIN | TIME | RAIN |
00970> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
00971> | 1.00 5.247 | 4.00 8.745 | 7.00 1.749 | 10.00 .000 |
00972> | 2.00 15.158 | 5.00 8.162 | 8.00 .583 | 11.00 .000 |
00973> | 3.00 11.660 | 6.00 4.664 | 9.00 .000 | 12.00 .000 |
00974> |
00975>-----
00976> 004:0003-----
00977> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
00978> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00979> | U.H. Tp(hrs)= .310 |
00980>-----
00981> Unit Hyd Qpeak (cms)= 1.188
00982>-----
00983> PEAK FLOW (cms)= .154 (i)
00984> TIME TO PEAK (hrs)= 3.117
00985> RUNOFF VOLUME (mm)= 24.341
00986>-----

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00988> TOTAL RAINFALL (mm)= 55.968
00989> RUNOFF COEFFICIENT = .435
00990>-----
00991> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00992>-----
00993> 004:0004-----
00994> #*****
00995> # Route To_NW flows through slope interruption berms
00996> #*****
00997> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00998> | IN=01:(B-201) |
00999> | OUT=02:(SWM201) |
01000>-----
01001> |===== OUTFLOW STORAGE TABLE =====|
01002> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01003> | (cms) (ha.m.) | (cms) (ha.m.) |
01004> | .000 .0000E+00 | 2.500 .3100E+00 |
01005> | .000 .2900E+00 | 6.900 .3300E+00 |
01006>-----
01007> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01008> (ha) (cms) (hrs) (mm)
01009> INFLOW >01: (B-201) 9.64 .154 3.117 24.341
01010> OUTFLOW=02: (SWM201) 9.64 .000 .000 .000
01011> OVERFLOW=10: (OVSWM1) .00 .000 .000 .000
01012>-----
01013> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01014> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01015> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01016>-----
01017> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01018> TIME SHIFT OF PEAK FLOW (min)= -187.00
01019> MAXIMUM STORAGE USED (ha.m.)= .2346E+00
01020>-----
01021> *** WARNING: Outflow volume is less than inflow volume.
01022>-----
01023> 004:0005-----
01024> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
01025> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01026> | U.H. Tp(hrs)= .430 |
01027>-----
01028> Unit Hyd Qpeak (cms)= .353
01029>-----
01030> PEAK FLOW (cms)= .038 (i)
01031> TIME TO PEAK (hrs)= 5.067
01032> RUNOFF VOLUME (mm)= 15.514
01033> TOTAL RAINFALL (mm)= 55.968
01034> RUNOFF COEFFICIENT = .277
01035>-----
01036> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01037>-----
01038> 004:0006-----
01039> | ADD HYD (To_NW) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01040> | | (ha) (cms) (hrs) (mm) (cms)
01041> | I01 01:EXTB-1 3.97 .038 5.07 15.51 .000
01042> | +I02 02:SWM201 9.64 .000 .00 .00 .000
01043> |=====
01044> | SUM 10:To_NW 13.61 .038 5.07 4.53 .000
01045>-----
01046> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01047>-----
01048> 004:0007-----
01049> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
01050> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01051> | U.H. Tp(hrs)= .760 |
01052>-----
01053> Unit Hyd Qpeak (cms)= .344
01054>-----
01055> PEAK FLOW (cms)= .101 (i)
01056> TIME TO PEAK (hrs)= 5.100
01057> RUNOFF VOLUME (mm)= 24.341
01058> TOTAL RAINFALL (mm)= 55.968
01059> RUNOFF COEFFICIENT = .435
01060>-----
01061> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01062>-----
01063> 004:0008-----
01064> #*****
01065> # Route To_CTR flows through slope interruption berms
01066> #*****
01067> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01068> | IN=01:(B-202) |
01069> | OUT=02:(SWM202) |
01070>-----
01071> |===== OUTFLOW STORAGE TABLE =====|
01072> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01073> | (cms) (ha.m.) | (cms) (ha.m.) |
01074> | .000 .0000E+00 | 2.200 .1420E+01 |
01075> | .000 .1330E+01 | 6.200 .1520E+01 |
01076>-----
01077> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01078> (ha) (cms) (hrs) (mm)
01079> INFLOW >01: (B-202) 6.84 .101 5.100 24.341
01080> OUTFLOW=02: (SWM202) 6.84 .000 .000 .000
01081> OVERFLOW=10: (OVSWM2) .00 .000 .000 .000
01082>-----
01083> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01084> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01085> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01086>-----
01087> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01088> TIME SHIFT OF PEAK FLOW (min)= -306.00
01089> MAXIMUM STORAGE USED (ha.m.)= .1665E+00
01090>-----
01091> *** WARNING: Outflow volume is less than inflow volume.
01092>-----
01093> 004:0009-----
01094> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
01095> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01096> | U.H. Tp(hrs)= .500 |
01097>-----
01098> Unit Hyd Qpeak (cms)= 1.432
01099>-----
01100> PEAK FLOW (cms)= .178 (i)
01101> TIME TO PEAK (hrs)= 5.083
01102> RUNOFF VOLUME (mm)= 15.514
01103> TOTAL RAINFALL (mm)= 55.968
01104> RUNOFF COEFFICIENT = .277
01105>-----
01106> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01107>-----
01108> 004:0010-----
01109> | ADD HYD (To_CTR) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01110> | | (ha) (cms) (hrs) (mm) (cms)
01111> | I01 01:EXTB-2 18.74 .178 5.08 15.51 .000
01112> | +I02 02:SWM202 6.84 .000 .00 .00 .000
01113> |=====
01114> | SUM 10:To_CTR 25.58 .178 5.08 11.37 .000
01115>-----
01116> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01117>-----
01118> 004:0011-----
01119> | CALIB NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
01120> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01121> | U.H. Tp(hrs)= .500 |
01122>-----
01123> Unit Hyd Qpeak (cms)= 1.432
01124>-----
01125> PEAK FLOW (cms)= .178 (i)
01126> TIME TO PEAK (hrs)= 5.083
01127> RUNOFF VOLUME (mm)= 15.514
01128>-----

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01129> 004:0011-----
01130> |-----|
01131> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=85.00
01132> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01133> |-----| U.H. Tp(hrs)= .470
01134>
01135> Unit Hyd Qpeak (cms)= .954
01136>
01137> PEAK FLOW (cms)= .203 (i)
01138> TIME TO PEAK (hrs)= 3.267
01139> RUNOFF VOLUME (mm)= 27.119
01140> TOTAL RAINFALL (mm)= 55.968
01141> RUNOFF COEFFICIENT = .485
01142>
01143> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01144>
01145> -----
01146> 004:0012-----
01147> *# Route To SW flows through slope interruption berms
01148> *#-----
01149> *#-----
01150>
01151> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01152> | IN=01:(B-203 ) |
01153> | OUT=02:(SWM203 ) |
01154> -----
01155> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01156> | (cms) (ha.m.) | (cms) (ha.m.) |
01157> | .000 .0000E+00 | 2.900 .7000E+00 |
01158> | .000 .6500E+00 | 8.300 .7400E+00 |
01159>
01160> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01161> | INFLW >01: (B-203 ) | (ha) (cms) (hrs) (mm) |
01162> | OUTFLOW=02: (SWM203 ) | 11.74 .000 3.267 27.119 |
01163> | OVERFLOW<10: (OVSWM3 ) | .00 .000 .000 .000 |
01164>
01165> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01166> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01167> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01168>
01169> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01170> TIME SHIFT OF PEAK FLOW (min)= -196.00
01171> MAXIMUM STORAGE USED (ha.m.)=-.3184E+00
01172>
01173> *** WARNING: Outflow volume is less than inflow volume.
01174>
01175> -----
01176> 004:0013-----
01177> |-----|
01178> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
01179> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01180> |-----| U.H. Tp(hrs)= .420
01181>
01182> Unit Hyd Qpeak (cms)= .979
01183>
01184> PEAK FLOW (cms)= .106 (i)
01185> TIME TO PEAK (hrs)= 5.067
01186> RUNOFF VOLUME (mm)= 16.009
01187> TOTAL RAINFALL (mm)= 55.968
01188> RUNOFF COEFFICIENT = .286
01189>
01190> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01191>
01192> -----
01193> 004:0014-----
01194> |-----|
01195> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01196> |-----| (ha) (cms) (hrs) (mm) (cms) |
01197> | ID1 01:To_SW | 10.77 .106 5.07 16.01 .000
01198> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000
01199>
01200> SUM 01:To_SW 22.51 .106 5.07 7.66 .000
01201>
01202> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01203>
01204> -----
01205> 004:0015-----
01206> |-----|
01207> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
01208> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01209> |-----| U.H. Tp(hrs)= .700
01210>
01211> Unit Hyd Qpeak (cms)= .274
01212>
01213> PEAK FLOW (cms)= .049 (i)
01214> TIME TO PEAK (hrs)= 5.133
01215> RUNOFF VOLUME (mm)= 16.009
01216> TOTAL RAINFALL (mm)= 55.968
01217> RUNOFF COEFFICIENT = .286
01218>
01219> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01220>
01221> -----
01222> 004:0016-----
01223> |-----|
01224> 004:0002-----
01225> |-----|
01226> 004:0002-----
01227> |-----|
01228> 004:0002-----
01229> ** END OF RUN : 4
01230>
01231> -----
01232>
01233>
01234>
01235>
01236>
01237>
01238> | START | Project dir.: C:\usr\LOYB\
01239> |-----| Rainfall dir.: C:\usr\LOYB\
01240>
01241> TZERO = .00 hrs on
01242> METOUT= 2 (output = METRIC)
01243> NRUN = 005
01244> NSTORM= 1
01245> # 1=LAY100.1hr
01246>
01247> 005:0002-----
01248> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01249> *# Date : 12-21-2017
01250> *# Modeller : [D. Williams]
01251> *# Company : Stantec Consulting Ltd. (Waterloo)
01252> *# License # : 4739994
01253> *#-----
01254> *#
01255> *# Block B - INTERIM CONDITIONS
01256> *#
01257> *# - Hydrologic conditions represent site during construction, prior to
01258> *# establishment of stabilization vegetation
01259> *# - Assumes contour plowing performed to provide surface scarification
01260> *# - ESC/SWM control provided by slope interruption berms
01261> *# - AMC II Conditions
01262> *#-----
01263>
01264>
01265> 005:0002-----
01266> |-----|
01267> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 100 Year)
01268> | Ptotal= 44.10 mm | Comments: Belleville IDF (1-hr 30% AES - 100 Year)
01269>

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01270> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01271> | h mm/hr | h mm/hr | h mm/hr | h mm/hr
01272> | .08 47.628 | .33 58.212 | .58 52.920 | .83 15.876
01273> | .17 74.088 | .42 68.796 | .67 26.460 | .92 5.292
01274> | .25 111.132 | .50 47.628 | .75 21.168 | 1.00 .000
01275>
01276>
01277> 005:0003-----
01278> |-----|
01279> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
01280> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01281> |-----| U.H. Tp(hrs)= .310
01282>
01283> Unit Hyd Qpeak (cms)= 1.188
01284>
01285> PEAK FLOW (cms)= .552 (i)
01286> TIME TO PEAK (hrs)= .800
01287> RUNOFF VOLUME (mm)= 16.117
01288> TOTAL RAINFALL (mm)= 44.100
01289> RUNOFF COEFFICIENT = .365
01290>
01291> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01292>
01293> -----
01294> 005:0004-----
01295> *# Route To NW flows through slope interruption berms
01296> *#-----
01297> *#-----
01298>
01299> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01300> | IN=01:(B-201 ) |
01301> | OUT=02:(SWM201 ) |
01302> -----
01303> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01304> | (cms) (ha.m.) | (cms) (ha.m.) |
01305> | .000 .0000E+00 | 2.500 .3100E+00 |
01306> | .000 .2900E+00 | 6.900 .3300E+00 |
01307>
01308> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01309> | INFLW >01: (B-201 ) | (ha) (cms) (hrs) (mm) |
01310> | OUTFLOW=02: (SWM201 ) | 9.64 .552 .800 16.117 |
01311> | OVERFLOW<10: (OVSWM1 ) | .00 .000 .000 .000 |
01312>
01313> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01314> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01315> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01316>
01317> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01318> TIME SHIFT OF PEAK FLOW (min)= -40.00
01319> MAXIMUM STORAGE USED (ha.m.)=-.1554E+00
01320>
01321> *** WARNING: Outflow volume is less than inflow volume.
01322>
01323> -----
01324> 005:0005-----
01325> |-----|
01326> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
01327> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01328> |-----| U.H. Tp(hrs)= .430
01329>
01330> Unit Hyd Qpeak (cms)= .353
01331>
01332> PEAK FLOW (cms)= .116 (i)
01333> TIME TO PEAK (hrs)= .933
01334> RUNOFF VOLUME (mm)= 10.117
01335> TOTAL RAINFALL (mm)= 44.100
01336> RUNOFF COEFFICIENT = .229
01337>
01338> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01339>
01340> -----
01341> 005:0006-----
01342> |-----|
01343> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01344> |-----| (ha) (cms) (hrs) (mm) (cms) |
01345> | ID1 01:EXTB-1 | 3.97 .116 .93 10.12 .000
01346> | +ID2 02:SWM201 | 9.64 .000 .00 .00 .000
01347>
01348> SUM 10:To_NW 13.61 .116 .93 2.95 .000
01349>
01350> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01351>
01352> -----
01353> 005:0007-----
01354> |-----|
01355> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
01356> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01357> |-----| U.H. Tp(hrs)= .760
01358>
01359> Unit Hyd Qpeak (cms)= .344
01360>
01361> PEAK FLOW (cms)= .206 (i)
01362> TIME TO PEAK (hrs)= 1.233
01363> RUNOFF VOLUME (mm)= 16.117
01364> TOTAL RAINFALL (mm)= 44.100
01365> RUNOFF COEFFICIENT = .365
01366>
01367> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01368>
01369> -----
01370> 005:0008-----
01371> *# Route To CTR flows through slope interruption berms
01372> *#-----
01373>
01374>
01375> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01376> | IN=01:(B-202 ) |
01377> | OUT=02:(SWM202 ) |
01378> -----
01379> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01380> | (cms) (ha.m.) | (cms) (ha.m.) |
01381> | .000 .0000E+00 | 2.200 .1420E+01 |
01382> | .000 .1330E+01 | 6.200 .1520E+01 |
01383>
01384> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01385> | INFLW >01: (B-202 ) | (ha) (cms) (hrs) (mm) |
01386> | OUTFLOW=02: (SWM202 ) | 6.84 .206 1.233 16.117 |
01387> | OVERFLOW<10: (OVSWM2 ) | .00 .000 .000 .000 |
01388>
01389> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01390> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01391> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01392>
01393> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01394> TIME SHIFT OF PEAK FLOW (min)= -74.00
01395> MAXIMUM STORAGE USED (ha.m.)=-.1102E+00
01396>
01397> *** WARNING: Outflow volume is less than inflow volume.
01398>
01399> -----
01400> 005:0009-----
01401> |-----|
01402> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
01403> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01404> |-----| U.H. Tp(hrs)= .500
01405>
01406> Unit Hyd Qpeak (cms)= 1.432
01407>
01408> PEAK FLOW (cms)= .495 (i)
01409> TIME TO PEAK (hrs)= 1.000
01410> RUNOFF VOLUME (mm)= 10.117

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01411> TOTAL RAINFALL (mm)= 44.100
01412> RUNOFF COEFFICIENT = .229
01413>
01414> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01415>
01416> -----
01417> 005:0010-----
01418>
01419> | ADD HYD (To_CTR ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01420> -----
01421> | ID1 01:EXTB-2 | 18.74 .495 1.00 10.12 .000
01422> | +ID2 02:SWM202 | 6.84 .000 .00 .00 .000
01423> -----
01424> | SUM 10:To_CTR | 25.58 .495 1.00 7.41 .000
01425>
01426> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01427>
01428> -----
01429> 005:0011-----
01430>
01431> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=85.00
01432> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01433> | U.H. Tp(hrs)= .470
01434>
01435> Unit Hyd Qpeak (cms)= .954
01436>
01437> PEAK FLOW (cms)= .588 (i)
01438> TIME TO PEAK (hrs)= .967
01439> RUNOFF VOLUME (mm)= 18.217
01440> TOTAL RAINFALL (mm)= 44.100
01441> RUNOFF COEFFICIENT = .413
01442>
01443> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01444>
01445> -----
01446> 005:0012-----
01447> *# Route To_SW flows through slope interruption berms
01448> *#-----
01449>
01450> |-----| Requested routing time step = 1.0 min.
01451> | ROUTE RESERVOIR |
01452> | IN=01:(B-203 ) |
01453> | OUT=02:(SWM203 ) |
01454> -----
01455> |-----|
01456> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01457> | (cms) (ha.m.) | (cms) (ha.m.) |
01458> | .000 .0000E+00 | 2.900 .7000E+00 |
01459>
01460> ROUTING RESULTS AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
01461> | INFLOW >01: (B-203 ) | 11.74 .500 .967 18.217
01462> | OUTFLOW=02: (SWM203 ) | 11.74 .000 .000 .000
01463> | OVERFLOW<10: (OVSWM3 ) | .00 .000 .000 .000
01464>
01465> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01466> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01467> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01468>
01469> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01470> TIME SHIFT OF PEAK FLOW (min)= -58.00
01471> MAXIMUM STORAGE USED (ha.m.)= .2139E+00
01472>
01473> *** WARNING: Outflow volume is less than inflow volume.
01474>
01475> -----
01476> 005:0013-----
01477>
01478> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
01479> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01480> | U.H. Tp(hrs)= .420
01481>
01482> Unit Hyd Qpeak (cms)= .979
01483>
01484> PEAK FLOW (cms)= .331 (i)
01485> TIME TO PEAK (hrs)= .917
01486> RUNOFF VOLUME (mm)= 10.463
01487> TOTAL RAINFALL (mm)= 44.100
01488> RUNOFF COEFFICIENT = .237
01489>
01490> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01491>
01492> -----
01493> 005:0014-----
01494>
01495> | ADD HYD (To_SW ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01496> -----
01497> | ID1 01:To_SW | 10.77 .331 .92 10.46 .000
01498> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000
01499> -----
01500> | SUM 01:To_SW | 22.51 .331 .92 5.01 .000
01501>
01502> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01503>
01504> -----
01505> 005:0015-----
01506>
01507> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
01508> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01509> | U.H. Tp(hrs)= .700
01510>
01511> Unit Hyd Qpeak (cms)= .274
01512>
01513> PEAK FLOW (cms)= .105 (i)
01514> TIME TO PEAK (hrs)= 1.183
01515> RUNOFF VOLUME (mm)= 10.463
01516> TOTAL RAINFALL (mm)= 44.100
01517> RUNOFF COEFFICIENT = .237
01518>
01519> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01520>
01521> -----
01522> 005:0016-----
01523>
01524> 005:0002-----
01525>
01526> 005:0002-----
01527>
01528> 005:0002-----
01529>
01530> 005:0002-----
01531> ** END OF RUN : 5
01532>
01533> -----
01534>
01535>
01536>
01537>
01538>
01539>
01540> | START | Project dir.: C:\usr\LOYB\
01541> |-----| Rainfall dir.: C:\usr\LOYB\
01542> | TZERO = .00 hrs on 0
01543> | METOUT = 2 (output = METRIC)
01544> | NRUN = 006
01545> | NSTORM= 1
01546> | # 1=LYA100.12h
01547>
01548> 005:0002-----
01549> *#-----
01550> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01551> *# Date : 12-21-2017

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01552> *# Modeller : [D. Williams]
01553> *# Company : Stantec Consulting Ltd. (Waterloo)
01554> *# License # : 4730904
01555> *#-----
01556> *#
01557> *# Block B - INTERIM CONDITIONS
01558> *#
01559> *# Hydrologic conditions represent site during construction, prior to
01560> *# establishment of stabilization vegetation
01561> *# Assumes contour plowing performed to provide surface scarification
01562> *# ESC/SWM control provided by slope interruption berms
01563> *# - AMC II Conditions
01564> *#
01565> *#-----
01566>
01567> 006:0002-----
01568>
01569> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 100 Year
01570> | Ptotal= 93.70 mm | Comments: Belleville IDF (12-hr 30% AES - 100 Year
01571>
01572> |-----|
01573> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
01574> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
01575> | 1.00 8.784 | 4.00 14.640 | 7.00 2.928 | 10.00 .000 |
01576> | 2.00 25.376 | 5.00 13.664 | 8.00 .976 | 11.00 .000 |
01577> | 3.00 19.520 | 6.00 7.808 | 9.00 .000 | 12.00 .000 |
01578>
01579> 006:0003-----
01580>
01581> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=82.00
01582> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01583> | U.H. Tp(hrs)= .310
01584>
01585> Unit Hyd Qpeak (cms)= 1.188
01586>
01587> PEAK FLOW (cms)= .349 (i)
01588> TIME TO PEAK (hrs)= 3.003
01589> RUNOFF VOLUME (mm)= 54.461
01590> TOTAL RAINFALL (mm)= 93.696
01591> RUNOFF COEFFICIENT = .581
01592>
01593> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01594>
01595> -----
01596> 006:0004-----
01597> *# Route To_Nw flows through slope interruption berms
01598> *#-----
01599>
01600> |-----| Requested routing time step = 1.0 min.
01601> | ROUTE RESERVOIR |
01602> | IN=01:(B-201 ) |
01603> | OUT=02:(SWM201 ) |
01604> -----
01605> |-----|
01606> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01607> | (cms) (ha.m.) | (cms) (ha.m.) |
01608> | .000 .0000E+00 | 2.500 .3100E+00 |
01609>
01610> ROUTING RESULTS AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
01611> | INFLOW >01: (B-201 ) | 9.64 .349 3.003 54.461
01612> | OUTFLOW=02: (SWM201 ) | 9.64 .297 4.283 24.378
01613> | OVERFLOW<10: (OVSWM1 ) | .00 .000 .000 .000
01614>
01615> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01616> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01617> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01618>
01619> PEAK FLOW REDUCTION [Qout/Qin](%)= 85.088
01620> TIME SHIFT OF PEAK FLOW (min)= 72.00
01621> MAXIMUM STORAGE USED (ha.m.)= .2924E+00
01622>
01623> *** WARNING: Outflow volume is less than inflow volume.
01624>
01625> -----
01626> 006:0005-----
01627>
01628> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
01629> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01630> | U.H. Tp(hrs)= .430
01631>
01632> Unit Hyd Qpeak (cms)= .353
01633>
01634> PEAK FLOW (cms)= .090 (i)
01635> TIME TO PEAK (hrs)= 3.217
01636> RUNOFF VOLUME (mm)= 37.124
01637> TOTAL RAINFALL (mm)= 93.696
01638> RUNOFF COEFFICIENT = .396
01639>
01640> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01641>
01642> -----
01643> 006:0006-----
01644>
01645> | ADD HYD (To_Nw ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01646> -----
01647> | ID1 01:EXTB-1 | 3.97 .090 3.22 37.12 .000
01648> | +ID2 02:SWM201 | 9.64 .297 4.28 24.38 .000
01649> -----
01650> | SUM 10:To_Nw | 13.61 .382 5.03 28.10 .000
01651>
01652> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01653>
01654> -----
01655> 006:0007-----
01656>
01657> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=82.00
01658> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01659> | U.H. Tp(hrs)= .760
01660>
01661> Unit Hyd Qpeak (cms)= .344
01662>
01663> PEAK FLOW (cms)= .223 (i)
01664> TIME TO PEAK (hrs)= 3.667
01665> RUNOFF VOLUME (mm)= 54.461
01666> TOTAL RAINFALL (mm)= 93.696
01667> RUNOFF COEFFICIENT = .581
01668>
01669> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01670>
01671> -----
01672> 006:0008-----
01673> *# Route To_CTR flows through slope interruption berms
01674> *#-----
01675>
01676> |-----| Requested routing time step = 1.0 min.
01677> | ROUTE RESERVOIR |
01678> | IN=01:(B-202 ) |
01679> | OUT=02:(SWM202 ) |
01680> -----
01681> |-----|
01682> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01683> | (cms) (ha.m.) | (cms) (ha.m.) |
01684> | .000 .0000E+00 | 2.200 .1420E+01 |
01685>
01686> ROUTING RESULTS AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
01687> | INFLOW >01: (B-202 ) | 6.84 .223 3.667 54.461
01688> | OUTFLOW=02: (SWM202 ) | 6.84 .000 .000 .000
01689> | OVERFLOW<10: (OVSWM2 ) | .00 .000 .000 .000
01690>
01691> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01692> CUMULATIVE TIME OF OVERFLOWS (hours)= .00

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01693> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01694>
01695>
01696> PEAK FLOW REDUCTION [Qout/Qin](%) = .000
01697> TIME SHIFT OF PEAK FLOW (min) = -220.00
01698> MAXIMUM STORAGE USED (ha.m.) = .3725E+00
01699>
01700> *** WARNING: Outflow volume is less than inflow volume.
01701>
01702> 006:0009-----
01703> | DESIGN NASHYD | Area (ha) = 18.74 Curve Number (CN)=65.00
01704> | 01:EXTB-2 DT= 1.00 | Ia (mm) = 1.500 # of Linear Res.(N)= 3.00
01705> | U.H. Tp(hrs)= .500
01706>
01707> Unit Hyd Qpeak (cms) = 1.432
01708>
01709>
01710> PEAK FLOW (cms) = .419 (i)
01711> TIME TO PEAK (hrs) = 3.300
01712> RUNOFF VOLUME (mm) = 37.124
01713> TOTAL RAINFALL (mm) = 93.696
01714> RUNOFF COEFFICIENT = .396
01715>
01716> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01717>
01718>-----
01719> 006:0010-----
01720> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01721> | (ha) (cms) (hrs) (mm) (cms)
01722> ID1 01:EXTB-2 18.74 .419 3.30 37.12 .000
01723> +ID2 02:SWM202 6.84 .000 .00 .00 .000
01724>=====
01725> SUM 10:To_CTR 25.58 .419 3.30 27.20 .000
01726>
01727>
01728> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01729>
01730>-----
01731> 006:0011-----
01732>-----
01733> | CALIB NASHYD | Area (ha) = 11.74 Curve Number (CN)=85.00
01734> | 01:B-203 DT= 1.00 | Ia (mm) = 5.000 # of Linear Res.(N)= 3.00
01735> | U.H. Tp(hrs)= .470
01736>
01737> Unit Hyd Qpeak (cms) = .954
01738>
01739>
01740> PEAK FLOW (cms) = .451 (i)
01741> TIME TO PEAK (hrs) = 3.167
01742> RUNOFF VOLUME (mm) = 58.920
01743> TOTAL RAINFALL (mm) = 93.696
01744> RUNOFF COEFFICIENT = .629
01745>
01746> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01747>
01748>-----
01749> 006:0012-----
01750> *# Route To_SW flows through slope interruption berms
01751> *#-----
01752>-----
01753> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01754> | IN=01:(B-203 ) |
01755> | OUT=02:(SWM203) | ===== OUTFLOW STORAGE TABLE =====
01756> | OUTFLOW STORAGE OUTFLOW STORAGE
01757> | (cms) (ha.m.) | (cms) (ha.m.)
01758> .000 .0000E+00 2.900 .7000E+00
01759> .000 .6500E+00 8.300 .7400E+00
01760>
01761> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01762> (ha) (cms) (hrs) (mm)
01763> INFLOW >01: (B-203 ) 11.74 .451 3.167 58.920
01764> OUTFLOW<02: (SWM203) 11.74 .113 7.000 3.670
01765> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
01766>
01767> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01768> CUMULATIVE TIME OF OVERFLOWS (hours) = .00
01769> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01770>
01771>
01772> PEAK FLOW REDUCTION [Qout/Qin](%) = 25.084
01773> TIME SHIFT OF PEAK FLOW (min) = 230.00
01774> MAXIMUM STORAGE USED (ha.m.) = .6520E+00
01775>
01776> *** WARNING: Outflow volume is less than inflow volume.
01777>
01778> 006:0013-----
01779>-----
01780> | DESIGN NASHYD | Area (ha) = 10.77 Curve Number (CN)=66.00
01781> | 01:EXTB-3 DT= 1.00 | Ia (mm) = 1.500 # of Linear Res.(N)= 3.00
01782> | U.H. Tp(hrs)= .420
01783>
01784> Unit Hyd Qpeak (cms) = .979
01785>
01786>
01787> PEAK FLOW (cms) = .253 (i)
01788> TIME TO PEAK (hrs) = 3.200
01789> RUNOFF VOLUME (mm) = 38.110
01790> TOTAL RAINFALL (mm) = 93.696
01791> RUNOFF COEFFICIENT = .407
01792>
01793> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01794>
01795>-----
01796> 006:0014-----
01797> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01798> | (ha) (cms) (hrs) (mm) (cms)
01799> ID1 01:To_SW 10.77 .253 3.20 38.11 .000
01800> +ID2 02:SWM203 11.74 .113 7.00 3.67 .000
01801>=====
01802> SUM 01:To_SW 22.51 .253 3.20 20.09 .000
01803>
01804> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01805>
01806>-----
01807> 006:0015-----
01808>-----
01809> | DESIGN NASHYD | Area (ha) = 5.03 Curve Number (CN)=66.00
01810> | 10:EXTB-4 DT= 1.00 | Ia (mm) = 1.500 # of Linear Res.(N)= 3.00
01811> | U.H. Tp(hrs)= .700
01812>
01813> Unit Hyd Qpeak (cms) = .274
01814>
01815>
01816> PEAK FLOW (cms) = .112 (i)
01817> TIME TO PEAK (hrs) = 5.003
01818> RUNOFF VOLUME (mm) = 38.110
01819> TOTAL RAINFALL (mm) = 93.696
01820> RUNOFF COEFFICIENT = .407
01821>
01822> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01823>
01824>-----
01825> 006:0016-----
01826> 006:0002-----
01827>-----
01828> 006:0002-----
01829>-----
01830> 006:0002-----
01831>-----
01832> 006:0002-----
01833>-----
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01834> 006:0002-----
01835> ** END OF RUN : 6
01836>
01837>-----
01838>-----
01839>-----
01840>-----
01841>-----
01842>-----
01843>-----
01844> | START | Project dir.: C:\usr\LOYB\
01845> | Rainfall dir.: C:\usr\LOYB\
01846> TZERO = .00 hrs on 0
01847> METOUT= 2 (output = METRIC)
01848> NRUN = 007
01849> NSTORM= 1
01850> # 1=25mm.4hr
01851>-----
01852> 007:0002-----
01853> *#-----
01854> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01855> *# Date : 12-21-2017
01856> *# Modeller : [D. Williams]
01857> *# Company : Stantec Consulting Ltd. (Waterloo)
01858> *# License # : 4730904
01859> *#-----
01860> *#
01861> *# Block B - INTERIM CONDITIONS
01862> *#
01863> *# - Hydrologic conditions represent site during construction, prior to
01864> *# establishment of stabilization vegetation
01865> *# - Assumes contour plowing performed to provide surface scarification
01866> *# - ESC/SWM control provided by slope interruption berms
01867> *# - AMC II Conditions
01868> *#
01869> *#-----
01870>-----
01871> 007:0002-----
01872>-----
01873> | READ STORM | Filename: 25 mm, 4hr Chicago Storm
01874> | Ptotal= 25.00 mm | Comments: 25 mm, 4hr Chicago Storm
01875>-----
01876> TIME RAIN TIME TIME TIME TIME TIME
01877> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
01878> .08 1.465 1.08 4.024 2.98 5.764 3.08 2.074
01879> .17 1.540 1.17 4.814 2.17 4.969 3.17 1.977
01880> .25 1.625 1.25 6.025 2.25 4.374 3.25 1.889
01881> .33 1.720 1.33 8.114 2.33 3.913 3.33 1.810
01882> .42 1.829 1.42 12.526 2.42 3.545 3.42 1.737
01883> .50 1.955 1.50 27.198 2.50 3.245 3.50 1.671
01884> .58 2.101 1.58 74.855 2.58 2.994 3.58 1.610
01885> .67 2.274 1.67 31.418 2.67 2.782 3.67 1.553
01886> .75 2.482 1.75 16.819 2.75 2.601 3.75 1.501
01887> .83 2.736 1.83 11.357 2.83 2.443 3.83 1.453
01888> .92 3.055 1.92 8.563 2.92 2.305 3.92 1.408
01889> 1.00 3.468 2.00 6.882 3.00 2.183 4.00 1.366
01890>
01891>-----
01892> 007:0003-----
01893>-----
01894> | CALIB NASHYD | Area (ha) = 9.64 Curve Number (CN)=82.00
01895> | 01:B-201 DT= 1.00 | Ia (mm) = 5.000 # of Linear Res.(N)= 3.00
01896> | U.H. Tp(hrs)= .310
01897>
01898> Unit Hyd Qpeak (cms) = 1.188
01899>
01900>
01901> PEAK FLOW (cms) = .120 (i)
01902> TIME TO PEAK (hrs) = 2.617
01903> RUNOFF VOLUME (mm) = 5.280
01904> TOTAL RAINFALL (mm) = 25.000
01905> RUNOFF COEFFICIENT = .211
01906>
01907> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01908>
01909>-----
01910> 007:0004-----
01911> *#-----
01912> *# Route To_Nw flows through slope interruption berms
01913> *#-----
01914>-----
01915> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01916> | IN=01:(B-201 ) |
01917> | OUT=02:(SWM201) | ===== OUTFLOW STORAGE TABLE =====
01918> | OUTFLOW STORAGE OUTFLOW STORAGE
01919> | (cms) (ha.m.) | (cms) (ha.m.)
01920> .000 .0000E+00 2.500 .3100E+00
01921> .000 .2000E+00 6.900 .3300E+00
01922>
01923> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01924> (ha) (cms) (hrs) (mm)
01925> INFLOW >01: (B-201 ) 9.64 .120 2.617 5.280
01926> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
01927> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
01928>
01929> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01930> CUMULATIVE TIME OF OVERFLOWS (hours) = .00
01931> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01932>
01933>
01934> PEAK FLOW REDUCTION [Qout/Qin](%) = .000
01935> TIME SHIFT OF PEAK FLOW (min) = -121.00
01936> MAXIMUM STORAGE USED (ha.m.) = .5090E-01
01937>
01938> *** WARNING: Outflow volume is less than inflow volume.
01939>-----
01940> 007:0005-----
01941>-----
01942> | DESIGN NASHYD | Area (ha) = 3.97 Curve Number (CN)=65.00
01943> | 01:EXTB-1 DT= 1.00 | Ia (mm) = 1.500 # of Linear Res.(N)= 3.00
01944> | U.H. Tp(hrs)= .430
01945>
01946> Unit Hyd Qpeak (cms) = .353
01947>
01948>
01949> PEAK FLOW (cms) = .027 (i)
01950> TIME TO PEAK (hrs) = 2.133
01951> RUNOFF VOLUME (mm) = 3.446
01952> TOTAL RAINFALL (mm) = 25.000
01953> RUNOFF COEFFICIENT = .138
01954>
01955> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01956>-----
01957> 007:0006-----
01958>-----
01959> | ADD HYD (To_Nw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01960> | (ha) (cms) (hrs) (mm) (cms)
01961> ID1 01:EXTB-1 3.97 .027 2.13 3.45 .000
01962> +ID2 02:SWM201 9.64 .000 .00 .00 .000
01963>=====
01964> SUM 10:To_Nw 13.61 .027 2.13 1.01 .000
01965>
01966> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01967>
01968>-----
01969> 007:0007-----
01970>-----
01971> | CALIB NASHYD | Area (ha) = 6.84 Curve Number (CN)=82.00
01972> | 01:B-202 DT= 1.00 | Ia (mm) = 5.000 # of Linear Res.(N)= 3.00
01973> | U.H. Tp(hrs)= .760
01974>
01975> Unit Hyd Qpeak (cms) = .344
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01975> PEAK FLOW (cms)= .047 (i)
01976> TIME TO PEAK (hrs)= 2.633
01977> RUNOFF VOLUME (mm)= 5.200
01978> TOTAL RAINFALL (mm)= 25.000
01980> RUNOFF COEFFICIENT = .211
01981>
01982> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01983>
01984> -----
01985> 007:0000-----
01986> *#*****
01987> *# Route To_CTR flows through slope interruption berms
01988> *#*****
01989>
01990> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01991> | IN=01:(B-202 ) |
01992> | OUT=02:(SWM202) |
01993> ===== OUTFLOW STORAGE TABLE =====
01994> OUTFLOW STORAGE OUTFLOW STORAGE
01995> (cms) (ha.m.) (cms) (ha.m.)
01996> .000 .0000E+00 2.200 .1420E+01
01997> .000 .1330E+01 6.200 .1520E+01
01998>
01999> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02000> (ha) (cms) (hrs) (mm)
02001> INFLOW >01: (B-202 ) 6.84 .047 2.633 5.200
02002> OUTFLOW<02: (SWM202) 6.84 .000 .000 .000
02003> OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
02004>
02005> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02006> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02007> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02008>
02009> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
02010> TIME SHIFT OF PEAK FLOW (min)= -158.00
02011> MAXIMUM STORAGE USED (ha.m.)=.3612E-01
02012>
02013> *** WARNING: Outflow volume is less than inflow volume.
02014>
02015> 007:0000-----
02016>
02017> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
02018> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02019> | U.H. Tp(hrs)= .500
02020>
02021> Unit Hyd Qpeak (cms)= 1.432
02022>
02023> PEAK FLOW (cms)= .115 (i)
02024> TIME TO PEAK (hrs)= 2.233
02025> RUNOFF VOLUME (mm)= 3.446
02026> TOTAL RAINFALL (mm)= 25.000
02027> RUNOFF COEFFICIENT = .138
02028>
02029> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02030>
02031> -----
02032> 007:0010-----
02033>
02034> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02035> (ha) (cms) (hrs) (mm) (cms)
02036> ID1 01:EXTB-2 18.74 .115 2.23 3.45 .000
02037> +ID2 02:SWM202 6.84 .000 .00 .00 .000
02038> =====
02039> SUM 10:To_CTR 25.58 .115 2.23 2.52 .000
02040>
02041> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02042>
02043> -----
02044> 007:0011-----
02045>
02046> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=85.00
02047> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
02048> | U.H. Tp(hrs)= .470
02049>
02050> Unit Hyd Qpeak (cms)= .954
02051>
02052> PEAK FLOW (cms)= .132 (i)
02053> TIME TO PEAK (hrs)= 2.233
02054> RUNOFF VOLUME (mm)= 6.171
02055> TOTAL RAINFALL (mm)= 25.000
02056> RUNOFF COEFFICIENT = .247
02057>
02058> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02059>
02060> -----
02061> 007:0012-----
02062> *#*****
02063> *# Route To_SW flows through slope interruption berms
02064> *#*****
02065>
02066> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02067> | IN=01:(B-203 ) |
02068> | OUT=02:(SWM203) |
02069> ===== OUTFLOW STORAGE TABLE =====
02070> OUTFLOW STORAGE OUTFLOW STORAGE
02071> (cms) (ha.m.) (cms) (ha.m.)
02072> .000 .0000E+00 2.900 .7090E+00
02073> .000 .6500E+00 8.300 .7400E+00
02074>
02075> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02076> (ha) (cms) (hrs) (mm)
02077> INFLOW >01: (B-203 ) 11.74 .132 2.233 6.171
02078> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
02079> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
02080>
02081> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02082> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02083> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02084>
02085> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
02086> TIME SHIFT OF PEAK FLOW (min)= -134.00
02087> MAXIMUM STORAGE USED (ha.m.)=.7245E-01
02088>
02089> *** WARNING: Outflow volume is less than inflow volume.
02090>
02091> 007:0013-----
02092>
02093> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
02094> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02095> | U.H. Tp(hrs)= .420
02096>
02097> Unit Hyd Qpeak (cms)= .979
02098>
02099> PEAK FLOW (cms)= .077 (i)
02100> TIME TO PEAK (hrs)= 2.117
02101> RUNOFF VOLUME (mm)= 3.578
02102> TOTAL RAINFALL (mm)= 25.000
02103> RUNOFF COEFFICIENT = .143
02104>
02105> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02106>
02107> -----
02108> 007:0014-----
02109>
02110> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02111> (ha) (cms) (hrs) (mm) (cms)
02112> ID1 01:To_SW 10.77 .077 2.12 3.58 .000
02113> +ID2 02:SWM203 11.74 .000 .00 .00 .000
02114> =====
02115> SUM 01:To_SW 22.51 .077 2.12 1.71 .000

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02116>
02117> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02118>
02119> -----
02120> 007:0015-----
02121>
02122> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
02123> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02124> | U.H. Tp(hrs)= .700
02125>
02126> Unit Hyd Qpeak (cms)= .274
02127>
02128> PEAK FLOW (cms)= .026 (i)
02129> TIME TO PEAK (hrs)= 2.500
02130> RUNOFF VOLUME (mm)= 3.578
02131> TOTAL RAINFALL (mm)= 25.000
02132> RUNOFF COEFFICIENT = .143
02133>
02134> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02135>
02136> -----
02137> 007:0016-----
02138>
02139> 007:0002-----
02140>
02141> 007:0002-----
02142>
02143> 007:0002-----
02144>
02145> 007:0002-----
02146>
02147> 007:0002-----
02148>
02149> 007:0002-----
02150> FINISH
02151>
02152> -----
02153> WARNINGS / ERRORS / NOTES
02154>
02155> 001:0004 ROUTE RESERVOIR
02156> *** WARNING: Outflow volume is less than inflow volume.
02157>
02158> 001:0008 ROUTE RESERVOIR
02159> *** WARNING: Outflow volume is less than inflow volume.
02160>
02161> 001:0012 ROUTE RESERVOIR
02162> *** WARNING: Outflow volume is less than inflow volume.
02163>
02164> 002:0004 ROUTE RESERVOIR
02165> *** WARNING: Outflow volume is less than inflow volume.
02166>
02167> 002:0008 ROUTE RESERVOIR
02168> *** WARNING: Outflow volume is less than inflow volume.
02169>
02170> 002:0012 ROUTE RESERVOIR
02171> *** WARNING: Outflow volume is less than inflow volume.
02172>
02173> 004:0004 ROUTE RESERVOIR
02174> *** WARNING: Outflow volume is less than inflow volume.
02175>
02176> 004:0008 ROUTE RESERVOIR
02177> *** WARNING: Outflow volume is less than inflow volume.
02178>
02179> 004:0012 ROUTE RESERVOIR
02180> *** WARNING: Outflow volume is less than inflow volume.
02181>
02182> 005:0004 ROUTE RESERVOIR
02183> *** WARNING: Outflow volume is less than inflow volume.
02184>
02185> 005:0012 ROUTE RESERVOIR
02186> *** WARNING: Outflow volume is less than inflow volume.
02187>
02188> 006:0008 ROUTE RESERVOIR
02189> *** WARNING: Outflow volume is less than inflow volume.
02190>
02191> 006:0012 ROUTE RESERVOIR
02192> *** WARNING: Outflow volume is less than inflow volume.
02193>
02194> 007:0004 ROUTE RESERVOIR
02195> *** WARNING: Outflow volume is less than inflow volume.
02196>
02197> 007:0012 ROUTE RESERVOIR
02198> *** WARNING: Outflow volume is less than inflow volume.
02199>
02200> Simulation ended on 2017-12-21 at 17:26:29

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00001> SSSSS W W M M H H Y Y M M M 000 999 999 =====
00002> S W W W M M M M H H Y Y M M M 0 0 9 9 9 9
00004> SSSSS W W W M M M H H H H Y Y M M M 0 0 # 9 9 9 9 Ver 4.05
00006> S W W W M M M M H H Y Y M M M 0 0 9999 9999 Sept 2011
00007> SSSSS W W W M M M H H Y Y M M M 000 9 9 # 4730994
00008> Stormwater Management Hydrologic Model 999 999 =====
00009>
00010> ***** SMWYMO Ver/4.05 *****
00011> ***** A single event and continuous hydrologic simulation model *****
00012> ***** based on the principles of HYMO and its successors *****
00013> ***** OTTHYMO-83 and OTTHYMO-89. *****
00014> *****
00015> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00016> ***** Ottawa, Ontario: (613) 836-3884 *****
00017> ***** Gatineau, Quebec: (819) 243-6858 *****
00018> ***** E-Mail: smwymo@jfsa.com *****
00019>
00020>
00021>
00022>
00023>
00024> ***** Licensed user: Stantec Consulting Ltd. (Kitchener) *****
00025> ***** 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: 2017-12-21 TIME: 17:26:34 RUN COUNTER: 001059 *
00039>
00040> * Input filename: C:\usr\LOYB\BINT3-2.dat *
00041> * Output filename: C:\usr\LOYB\BINT3-2.out *
00042> * Summary filename: C:\usr\LOYB\BINT3-2.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047>
00048>
00049>
00050> 001:0001-
00051> # *****
00052> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00053> # Date : 12-21-2017
00054> # Modeller : [D. Williams]
00055> # Company : Stantec Consulting Ltd. (Waterloo)
00056> # License # : 4730994
00057>
00058> #
00059> #
00060> #
00061> # - Hydrologic conditions represent site during construction, prior to
00062> # - establishment of stabilization vegetation
00063> # - Assume contour plowing performed to provide surface scarification
00064> # - ESC/SWM control provided by slope interruption berms
00065> # - AMC III Conditions
00066> #
00067> #
00068>
00069> | START | Project dir.: C:\usr\LOYB\
00070> | Rainfall dir.: C:\usr\LOYB\
00071> | TZERO = .00 hrs on 0
00072> | METOUT= 2 (output = METRIC)
00073> | NRUN = 001
00074> | NSTORM= 1
00075> | # 1=LYA2.1hr
00076>
00077> 001:0002-
00078>
00079> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 2 Year)
00080> | Ptotal= 22.10 mm | Comments: Belleville IDF (1-hr 30% AES - 2 Year)
00081>
00082> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
00083> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
00084> .00 23.868 .33 29.172 .58 26.520 .83 7.956
00085> .17 37.120 .42 54.476 .67 13.260 .92 2.652
00086> .25 55.692 .50 23.868 .75 10.608 1.00 .000
00087>
00088>
00089> 001:0003-
00090>
00091> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=92.00
00092> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00093> | U.H. Tp(hrs)= .310
00094>
00095> Unit Hyd Qpeak (cms)= 1.188
00096>
00097> PEAK FLOW (cms)= .263 (i)
00098> TIME TO PEAK (hrs)= .833
00099> RUNOFF VOLUME (mm)= 7.462
00100> TOTAL RAINFALL (mm)= 22.100
00101> RUNOFF COEFFICIENT = .338
00102>
00103> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00104>
00105>
00106> 001:0004-
00107> # *****
00108> # Route TO_NW flows through slope interruption berms
00109> # *****
00110>
00111> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00112> | IN=01: (B-201 ) |
00113> | OUT=02: (SWM201 ) |
00114>
00115> ***** OUTFLOW STORAGE TABLE *****
00116> OUTFLOW STORAGE OUTFLOW STORAGE
00117> (cms) (ha.m.) (cms) (ha.m.)
00118> .000 .2900E+00 6.900 .3300E+00
00119>
00120> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00121> (ha) (cms) (hrs) (mm)
00122> INFLOW >01: (B-201 ) 9.64 .263 .833 7.462
00123> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
00124> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
00125>
00126> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00127> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00128> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00129>
00130>
00131> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00132> TIME SHIFT OF PEAK FLOW (min)= -50.00
00133> MAXIMUM STORAGE USED (ha.m.)=-7193E-01
00134>
00135> *** WARNING: Outflow volume is less than inflow volume.
00136>
00137> 001:0005-
00138>
00139> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00140> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00141> | U.H. Tp(hrs)= .430

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00142> Unit Hyd Qpeak (cms)= .353
00143>
00144> PEAK FLOW (cms)= .064 (i)
00145> TIME TO PEAK (hrs)= .933
00146> RUNOFF VOLUME (mm)= 5.558
00147> TOTAL RAINFALL (mm)= 22.100
00148> RUNOFF COEFFICIENT = .251
00149>
00150> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00151>
00152>
00153> 001:0006-
00154>
00155> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00156> (ha) (cms) (hrs) (mm) (cms)
00157> ID1 01:EXTB-1 3.97 .064 .93 .000
00158> +ID2 02:SWM201 9.64 .000 .00 .000
00159>
00160> SUM 10:To_NW 13.61 .064 .93 1.62 .000
00161>
00162> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00163>
00164>
00165> 001:0007-
00166>
00167> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=92.00
00168> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00169> | U.H. Tp(hrs)= .760
00170>
00171> Unit Hyd Qpeak (cms)= .344
00172>
00173> PEAK FLOW (cms)= .096 (i)
00174> TIME TO PEAK (hrs)= 1.267
00175> RUNOFF VOLUME (mm)= 7.462
00176> TOTAL RAINFALL (mm)= 22.100
00177> RUNOFF COEFFICIENT = .338
00178>
00179> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00180>
00181>
00182> 001:0008-
00183> # *****
00184> # Route TO_CTR flows through slope interruption berms
00185> # *****
00186>
00187> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00188> | IN=01: (B-202 ) |
00189> | OUT=02: (SWM202 ) |
00190>
00191> ***** OUTFLOW STORAGE TABLE *****
00192> OUTFLOW STORAGE OUTFLOW STORAGE
00193> (cms) (ha.m.) (cms) (ha.m.)
00194> .000 .0000E+00 2.200 .1420E+01
00195> .000 .1330E+01 6.200 .1520E+01
00196>
00197> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00198> (ha) (cms) (hrs) (mm)
00199> INFLOW >01: (B-202 ) 6.84 .096 1.267 7.462
00200> OUTFLOW<02: (SWM202) 6.84 .000 .000 .000
00201> OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
00202>
00203> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00204> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00205> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00206>
00207> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00208> TIME SHIFT OF PEAK FLOW (min)= -76.00
00209> MAXIMUM STORAGE USED (ha.m.)= .5104E-01
00210>
00211> *** WARNING: Outflow volume is less than inflow volume.
00212>
00213> 001:0009-
00214>
00215> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
00216> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00217> | U.H. Tp(hrs)= .500
00218>
00219> Unit Hyd Qpeak (cms)= 1.432
00220>
00221> PEAK FLOW (cms)= .273 (i)
00222> TIME TO PEAK (hrs)= 1.000
00223> RUNOFF VOLUME (mm)= 5.558
00224> TOTAL RAINFALL (mm)= 22.100
00225> RUNOFF COEFFICIENT = .251
00226>
00227> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00228>
00229> 001:0010-
00230>
00231> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00232> (ha) (cms) (hrs) (mm) (cms)
00233> ID1 01:EXTB-2 18.74 .273 1.00 5.56 .000
00234> +ID2 02:SWM202 6.84 .000 .00 .000
00235>
00236> SUM 10:To_CTR 25.58 .273 1.00 4.07 .000
00237>
00238> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00239>
00240>
00241> 001:0011-
00242>
00243> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=94.00
00244> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00245> | U.H. Tp(hrs)= .470
00246>
00247> Unit Hyd Qpeak (cms)= .954
00248>
00249> PEAK FLOW (cms)= .288 (i)
00250> TIME TO PEAK (hrs)= .983
00251> RUNOFF VOLUME (mm)= 8.778
00252> TOTAL RAINFALL (mm)= 22.100
00253> RUNOFF COEFFICIENT = .397
00254>
00255> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00256>
00257>
00258> 001:0012-
00259> # *****
00260> # Route TO_SW flows through slope interruption berms
00261> # *****
00262>
00263> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00264> | IN=01: (B-203 ) |
00265> | OUT=02: (SWM203 ) |
00266>
00267> ***** OUTFLOW STORAGE TABLE *****
00268> OUTFLOW STORAGE OUTFLOW STORAGE
00269> (cms) (ha.m.) (cms) (ha.m.)
00270> .000 .0000E+00 2.900 .7000E+00
00271> .000 .6500E+00 8.300 .7400E+00
00272>
00273> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00274> (ha) (cms) (hrs) (mm)
00275> INFLOW >01: (B-203 ) 11.74 .288 .983 8.778
00276> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
00277> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
00278>
00279> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00280> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00281> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00282>
00283>
00284> PEAK FLOW REDUCTION [Qout/Qin](%)= .000

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00283> TIME SHIFT OF PEAK FLOW (min)= -59.00
00284> MAXIMUM STORAGE USED (ha.m.)=-1931E+00
00285>
00286> *** WARNING: Outflow volume is less than inflow volume.
00287>
00288> 001:0013-----
00289>
00290> DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00291> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00292> | U.H. Tp(hrs)= .420
00293>
00294> Unit Hyd Qpeak (cms)= .979
00295>
00296> PEAK FLOW (cms)= .177 (i)
00297> TIME TO PEAK (hrs)= .933
00298> RUNOFF VOLUME (mm)= 5.558
00299> TOTAL RAINFALL (mm)= 22.100
00300> RUNOFF COEFFICIENT = .251
00301>
00302> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00303>
00304>
00305> 001:0014-----
00306>
00307> | ADD HYD (To_Sw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00308> |-----|-----|-----|-----|-----|-----|
00309> | ID1 01:To_Sw | 10.77 .177 .93 5.56 .000
00310> | +ID2 02:SwM203 | 11.74 .000 .00 .00 .000
00311> |-----|-----|-----|-----|-----|-----|
00312> | SUM 01:To_Sw | 22.51 .177 .93 2.66 .000
00313>
00314> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00315>
00316>
00317> 001:0015-----
00318>
00319> | DESIGN NASHYD | Area (ha)= 5.93 Curve Number (CN)=82.00
00320> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00321> | U.H. Tp(hrs)= .700
00322>
00323> Unit Hyd Qpeak (cms)= .274
00324>
00325> PEAK FLOW (cms)= .056 (i)
00326> TIME TO PEAK (hrs)= 1.183
00327> RUNOFF VOLUME (mm)= 5.558
00328> TOTAL RAINFALL (mm)= 22.100
00329> RUNOFF COEFFICIENT = .251
00330>
00331> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00332>
00333>
00334> 001:0016-----
00335> ** END OF RUN : 1
00336>
00337>
00338>
00339>
00340>
00341>
00342>
00343>
00344> | START | Project dir.: C:\usr\LOYB\
00345> | 10:EXTB-4 DT= 1.00 | Rainfall dir.: C:\usr\LOYB\
00346> | TZERO = .00 hrs on 0
00347> | METOUT= 2 (output = METRIC)
00348> | NRUN = 002
00349> | NSTORM= 1
00350> | # 1=LYA2.12h
00351>
00352> 002:0002-----
00353>
00354> # Project Name: [Loyalist Block 'B' SWM] Project Number:[135560220]
00355> # Date : 12-21-2017
00356> # Modeller : [D. Williams]
00357> # Company : Stantec Consulting Ltd. (Waterloo)
00358> # License # : 4730904
00359>
00360> #
00361> # Block B - INTERIM CONDITIONS
00362> #
00363> # - Hydrologic conditions represent site during construction, prior to
00364> # establishment of stabilization vegetation
00365> # - Assumes contour plowing performed to provide surface scarification
00366> # - ESC/SWM control provided by slope interruption berms
00367> # - AMC III Conditions
00368> #
00369> #
00370>
00371> 002:0002-----
00372>
00373> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 2 Year)
00374> | Ptotal= 42.24 mm | Comments: Belleville IDF (12-hr 30% AES - 2 Year)
00375>
00376> | TIME | RAIN | TIME | RAIN | TIME | RAIN | TIME | RAIN |
00377> | hrs | mm/hr | hrs | mm/hr | hrs | mm/hr | hrs | mm/hr |
00378> | 1.00 | 3.960 | 4.00 | 6.600 | 7.00 | 1.320 | 10.00 | .000 |
00379> | 2.00 | 11.440 | 5.00 | 6.160 | 8.00 | .440 | 11.00 | .000 |
00380> | 3.00 | 8.800 | 6.00 | 3.520 | 9.00 | .000 | 12.00 | .000 |
00381>
00382>
00383> 002:0003-----
00384>
00385> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=92.00
00386> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00387> | U.H. Tp(hrs)= .310
00388>
00389> Unit Hyd Qpeak (cms)= 1.188
00390>
00391> PEAK FLOW (cms)= .155 (i)
00392> TIME TO PEAK (hrs)= 3.100
00393> RUNOFF VOLUME (mm)= 23.376
00394> TOTAL RAINFALL (mm)= 42.240
00395> RUNOFF COEFFICIENT = .553
00396>
00397> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00398>
00399>
00400> 002:0004-----
00401>
00402> # Route TO_NW flows through slope interruption berms
00403>
00404>
00405> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00406> | IN=01:(B-201 ) |
00407> | OUT=02:(SWM201) |
00408> |-----|-----|-----|-----|-----|-----|
00409> | OUTFLOW | STORAGE | OUTFLOW | STORAGE |
00410> | (cms) | (ha.m.) | (cms) | (ha.m.) |
00411> | .000 | .0000E+00 | 2.500 | .3100E+00 |
00412> | .000 | .2900E+00 | 6.900 | .3300E+00 |
00413>
00414> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00415> |-----|-----|-----|-----|
00416> | INFLOW >01: (B-201 ) | 9.64 .000 .000 23.376 |
00417> | OUTFLOW <02: (SWM201) | 9.64 .000 .000 .000 |
00418> | OVERFLOW<10: (OVSWM1) | .00 .000 .000 .000 |
00419>
00420> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00421> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00422> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00423>

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00424> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00425> TIME SHIFT OF PEAK FLOW (min)= -186.00
00426> MAXIMUM STORAGE USED (ha.m.)= .2253E+00
00427>
00428> *** WARNING: Outflow volume is less than inflow volume.
00429>
00430> 002:0005-----
00431>
00432> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00433> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00434> | U.H. Tp(hrs)= .430
00435>
00436> Unit Hyd Qpeak (cms)= .353
00437>
00438> PEAK FLOW (cms)= .042 (i)
00439> TIME TO PEAK (hrs)= 3.217
00440> RUNOFF VOLUME (mm)= 17.200
00441> TOTAL RAINFALL (mm)= 42.240
00442> RUNOFF COEFFICIENT = .407
00443>
00444> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00445>
00446>
00447>
00448>
00449> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00450> |-----|-----|-----|-----|-----|-----|
00451> | ID1 01:EXTB-1 | 3.97 .042 3.22 17.20 .000
00452> | +ID2 02:SWM201 | 9.64 .000 .00 .00 .000
00453> |-----|-----|-----|-----|-----|-----|
00454> | SUM 10:To_NW | 13.61 .042 3.22 5.02 .000
00455>
00456> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00457>
00458>
00459> 002:0007-----
00460>
00461> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=92.00
00462> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00463> | U.H. Tp(hrs)= .760
00464>
00465> Unit Hyd Qpeak (cms)= .344
00466>
00467> PEAK FLOW (cms)= .098 (i)
00468> TIME TO PEAK (hrs)= 4.100
00469> RUNOFF VOLUME (mm)= 23.376
00470> TOTAL RAINFALL (mm)= 42.240
00471> RUNOFF COEFFICIENT = .553
00472>
00473> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00474>
00475>
00476> 002:0008-----
00477>
00478> # Route TO_CTR flows through slope interruption berms
00479> #
00480>
00481> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00482> | IN=01:(B-202 ) |
00483> | OUT=02:(SWM202) |
00484> |-----|-----|-----|-----|-----|-----|
00485> | OUTFLOW | STORAGE | OUTFLOW | STORAGE |
00486> | (cms) | (ha.m.) | (cms) | (ha.m.) |
00487> | .000 | .0000E+00 | 2.200 | .1420E+01 |
00488> | .000 | .1330E+01 | 6.200 | .1520E+01 |
00489>
00490> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00491> |-----|-----|-----|-----|
00492> | INFLOW >01: (B-202 ) | 6.84 .000 4.100 23.376 |
00493> | OUTFLOW <02: (SWM202) | 6.84 .000 .000 .000 |
00494> | OVERFLOW<10: (OVSWM2) | .00 .000 .000 .000 |
00495>
00496> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00497> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00498> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00499>
00500>
00501> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00502> TIME SHIFT OF PEAK FLOW (min)= -246.00
00503> MAXIMUM STORAGE USED (ha.m.)= .1599E+00
00504>
00505> *** WARNING: Outflow volume is less than inflow volume.
00506>
00507> 002:0009-----
00508>
00509> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
00510> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00511> | U.H. Tp(hrs)= .500
00512>
00513> Unit Hyd Qpeak (cms)= 1.432
00514>
00515> PEAK FLOW (cms)= .196 (i)
00516> TIME TO PEAK (hrs)= 3.300
00517> RUNOFF VOLUME (mm)= 17.200
00518> TOTAL RAINFALL (mm)= 42.240
00519> RUNOFF COEFFICIENT = .407
00520>
00521> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00522>
00523>
00524> 002:0010-----
00525>
00526> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00527> |-----|-----|-----|-----|-----|-----|
00528> | ID1 01:EXTB-2 | 18.74 .196 3.30 17.20 .000
00529> | +ID2 02:SWM202 | 6.84 .000 .00 .00 .000
00530> |-----|-----|-----|-----|-----|-----|
00531> | SUM 10:To_CTR | 25.58 .196 3.30 12.60 .000
00532>
00533> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00534>
00535>
00536> 002:0011-----
00537>
00538> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=94.00
00539> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00540> | U.H. Tp(hrs)= .470
00541>
00542> Unit Hyd Qpeak (cms)= .954
00543>
00544> PEAK FLOW (cms)= .295 (i)
00545> TIME TO PEAK (hrs)= 3.200
00546> RUNOFF VOLUME (mm)= 25.945
00547> TOTAL RAINFALL (mm)= 42.240
00548> RUNOFF COEFFICIENT = .614
00549>
00550> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00551>
00552>
00553> 002:0012-----
00554>
00555> # Route TO_SW flows through slope interruption berms
00556> #
00557>
00558> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00559> | IN=01:(B-203 ) |
00560> | OUT=02:(SWM203) |
00561> |-----|-----|-----|-----|-----|-----|
00562> | OUTFLOW | STORAGE | OUTFLOW | STORAGE |
00563> | (cms) | (ha.m.) | (cms) | (ha.m.) |
00564> | .000 | .0000E+00 | 2.900 | .7900E+00 |
00565> | .000 | .6500E+00 | 8.300 | .7400E+00 |
00566>

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00565> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00566> (ha) (cms) (hrs) (mm)
00567> INFLOW >01: (B-203 ) 11.74 .205 3.200 25.945
00568> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
00569> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
00570>
00571> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00572> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00573> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00574>
00575> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00576> TIME SHIFT OF PEAK FLOW (min)= -192.00
00577> MAXIMUM STORAGE USED (ha.m.)= .3046E+00
00578>
00579> *** WARNING: Outflow volume is less than inflow volume.
00580>
00581> -----
00582> 002:0013-----
00583>
00584> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00585> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00586> | U.H. Tp(hrs)= .420
00587>
00588> Unit Hyd Qpeak (cms)= .979
00589>
00590> PEAK FLOW (cms)= .115 (i)
00591> TIME TO PEAK (hrs)= 3.200
00592> RUNOFF VOLUME (mm)= 17.200
00593> TOTAL RAINFALL (mm)= 42.240
00594> RUNOFF COEFFICIENT = .407
00595>
00596> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00597>
00598> -----
00599> 002:0014-----
00600>
00601> | ADD HYD (To_Sw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00602> (ha) (cms) (hrs) (mm) (cms)
00603> ID1 01:To_Sw 10.77 .115 3.20 17.20 .000
00604> +ID2 02:SWM203 11.74 .000 .00 .00 .000
00605> =====
00606> SUM 01:To_Sw 22.51 .115 3.20 8.23 .000
00607>
00608> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00609>
00610> -----
00611> 002:0015-----
00612>
00613> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
00614> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00615> | U.H. Tp(hrs)= .700
00616>
00617> Unit Hyd Qpeak (cms)= .274
00618>
00619> PEAK FLOW (cms)= .051 (i)
00620> TIME TO PEAK (hrs)= 5.083
00621> RUNOFF VOLUME (mm)= 17.200
00622> TOTAL RAINFALL (mm)= 42.240
00623> RUNOFF COEFFICIENT = .407
00624>
00625> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00626>
00627> -----
00628> 002:0016-----
00629>
00630> 002:0002-----
00631> ** END OF RUN : 2
00632>
00633> -----
00634>
00635>
00636>
00637>
00638>
00639>
00640> | START | Project dir.: C:\usr\LOYB\
00641> | Rainfall dir.: C:\usr\LOYB\
00642> TZERO = .00 hrs on 0
00643> METOUT= 2 (output = METRIC)
00644> NRUN = 003
00645> NSTORM= 1
00646> # 1=LYA5.1hr
00647>
00648> 003:0002-----
00649> # *****
00650> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00651> # Date : 12-21-2017
00652> # Modeller : [D. Williams]
00653> # Company : Stantec Consulting Ltd. (Waterloo)
00654> # License # 4739904
00655> # *****
00656> #
00657> # Block B - INTERIM CONDITIONS
00658> #
00659> # - Hydrologic conditions represent site during construction, prior to
00660> # establishment of stabilization vegetation
00661> # - Assumes contour plowing performed to provide surface scarification
00662> # - ESC/SWM control provided by slope interruption berms
00663> # - AMC III Conditions
00664> #
00665> # *****
00666>
00667> 003:0002-----
00668>
00669> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 5 Year)
00670> | Ptotal= 28.00 mm | Comments: Belleville IDF (1-hr 30% AES - 5 Year)
00671>
00672> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
00673> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
00674> .00 30.240 .33 36.900 .58 33.600 .83 10.000
00675> .17 47.040 .42 43.600 .67 16.000 .92 3.360
00676> .25 70.560 .50 30.240 .75 13.440 1.00 .000
00677>
00678>
00679> 003:0003-----
00680>
00681> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=92.00
00682> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00683> | U.H. Tp(hrs)= .310
00684>
00685> Unit Hyd Qpeak (cms)= 1.188
00686>
00687> PEAK FLOW (cms)= .407 (i)
00688> TIME TO PEAK (hrs)= .617
00689> RUNOFF VOLUME (mm)= 11.733
00690> TOTAL RAINFALL (mm)= 28.000
00691> RUNOFF COEFFICIENT = .419
00692>
00693> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00694>
00695> -----
00696> 003:0004-----
00697> # *****
00698> # Route TO_NW flows through slope interruption berms
00699> # *****
00700>
00701> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00702> | IN=01: (B-201 ) |
00703> | OUT=02: (SWM201) |
00704>
00705>

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00706> .000 .000E+00 | 2.500 .3100E+00
00707> .000 .2900E+00 | 6.900 .3300E+00
00708>
00709> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00710> (ha) (cms) (hrs) (mm)
00711> INFLOW >01: (B-201 ) 9.64 .407 .817 11.733
00712> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
00713> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
00714>
00715> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00716> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00717> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00718>
00719> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00720> TIME SHIFT OF PEAK FLOW (min)= -49.00
00721> MAXIMUM STORAGE USED (ha.m.)= .1131E+00
00722>
00723> *** WARNING: Outflow volume is less than inflow volume.
00724>
00725> -----
00726> 003:0005-----
00727>
00728> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00729> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00730> | U.H. Tp(hrs)= .430
00731>
00732> Unit Hyd Qpeak (cms)= .353
00733>
00734> PEAK FLOW (cms)= .098 (i)
00735> TIME TO PEAK (hrs)= .933
00736> RUNOFF VOLUME (mm)= 8.537
00737> TOTAL RAINFALL (mm)= 28.000
00738> RUNOFF COEFFICIENT = .305
00739>
00740> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00741>
00742> -----
00743> 003:0006-----
00744>
00745> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00746> (ha) (cms) (hrs) (mm) (cms)
00747> ID1 01:EXTB-1 3.97 .098 .93 8.54 .000
00748> +ID2 02:SWM201 9.64 .000 .00 .00 .000
00749> =====
00750> SUM 10:To_NW 13.61 .098 .93 2.49 .000
00751>
00752> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00753>
00754> -----
00755> 003:0007-----
00756>
00757> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=92.00
00758> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00759> | U.H. Tp(hrs)= .760
00760>
00761> Unit Hyd Qpeak (cms)= .344
00762>
00763> PEAK FLOW (cms)= .150 (i)
00764> TIME TO PEAK (hrs)= 1.250
00765> RUNOFF VOLUME (mm)= 11.733
00766> TOTAL RAINFALL (mm)= 28.000
00767> RUNOFF COEFFICIENT = .419
00768>
00769> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00770>
00771> -----
00772> 003:0008-----
00773> # *****
00774> # Route TO_CTR flows through slope interruption berms
00775> # *****
00776>
00777> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00778> | IN=01: (B-202 ) |
00779> | OUT=02: (SWM202) |
00780>
00781>
00782>
00783>
00784>
00785>
00786>
00787>
00788>
00789>
00790>
00791>
00792>
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00795>
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00797>
00798>
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00800>
00801>
00802>
00803>
00804>
00805>
00806>
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00835>
00836>
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00838>
00839>
00840>
00841>
00842>
00843>
00844>
00845>
00846>

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00847>-----
00848> 003:0012-----
00849> #*****
00850> # Route To_SW flows through slope interruption berms
00851> #*****
00852>
00853> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00854> | IN=01:(B-203) |
00855> | OUT=02:(SWM203) |
00856>-----
00857> |===== OUTFLOW STORAGE TABLE =====|
00858> | OUTFLOW STORAGE | OUTFLOW STORAGE |
00859> | (cms) (ha.m.) | (cms) (ha.m.) |
00860> | .000 .0000E+00 | 2.900 .7000E+00 |
00861> | .000 .6500E+00 | 8.300 .7400E+00 |
00862>-----
00863> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00864> (ha) (cms) (hrs) (mm)
00865> INFLOW >01: (B-203) 11.74 .438 .967 13.490
00866> OUTFLOW=02: (SWM203) 11.74 .000 .000 .000
00867> OVERFLOW=10: (OVSWM3) .00 .000 .000 .000
00868>-----
00869> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00870> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00871> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00872>-----
00873> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00874> TIME SHIFT OF PEAK FLOW (min)= -58.00
00875> MAXIMUM STORAGE USED (ha.m.)= .1584E+00
00876>-----
00877> *** WARNING: Outflow volume is less than inflow volume.
00878>-----
00879> 003:0013-----
00880> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00881> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00882> | U.H. Tp(hrs)= .420 |
00883>-----
00884> Unit Hyd Qpeak (cms)= .979
00885>-----
00886> PEAK FLOW (cms)= .271 (i)
00887> TIME TO PEAK (hrs)= .917
00888> RUNOFF VOLUME (mm)= 8.537
00889> TOTAL RAINFALL (mm)= 28.000
00890> RUNOFF COEFFICIENT = .385
00891>-----
00892> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00893>-----
00894> 003:0014-----
00895> | ADD HYD (To_SW) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00896> | | (ha) (cms) (hrs) (mm) (cms)
00897> | I01 01:To_SW 10.77 .271 .92 8.54 .000
00898> | +I02 02:SWM203 11.74 .000 .00 .00 .000
00899> |=====
00900> | SUM 01:To_SW 22.51 .271 .92 4.08 .000
00901>-----
00902> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00903>-----
00904> 003:0015-----
00905> | DESIGN NASHYD | Area (ha)= 5.83 Curve Number (CN)=82.00
00906> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00907> | U.H. Tp(hrs)= .700 |
00908>-----
00909> Unit Hyd Qpeak (cms)= .274
00910>-----
00911> PEAK FLOW (cms)= .086 (i)
00912> TIME TO PEAK (hrs)= 1.183
00913> RUNOFF VOLUME (mm)= 8.537
00914> TOTAL RAINFALL (mm)= 28.000
00915> RUNOFF COEFFICIENT = .385
00916>-----
00917> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00918>-----
00919> 003:0016-----
00920> 003:0002-----
00921> 003:0002-----
00922> ** END OF RUN : 3
00923>-----
00924> 003:0002-----
00925> 003:0002-----
00926> 003:0002-----
00927> 003:0002-----
00928> 003:0002-----
00929> ** END OF RUN : 3
00930>-----
00931> 003:0002-----
00932> 003:0002-----
00933> 003:0002-----
00934> 003:0002-----
00935> 003:0002-----
00936> 003:0002-----
00937> 003:0002-----
00938> | START | Project dir.: C:\usr\LOBY\
00939> | TZERO = .00 hrs on 0 | Rainfall dir.: C:\usr\LOBY\
00940> | NETOUT= 2 (output= METRIC) |
00941> | NRUN = 004 |
00942> | NSTORM= 1 |
00943> | # I-LYAS.12h |
00944> |
00945> |
00946> 004:0002-----
00947> #*****
00948> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00949> # Date : 12-21-2017
00950> # Modeller : [D. Williams]
00951> # Company : Stantec Consulting Ltd. (Waterloo)
00952> # License # : 4739994
00953> #*****
00954> #
00955> # Block B - INTERIM CONDITIONS
00956> #
00957> # - Hydrologic conditions represent site during construction, prior to
00958> # establishment of stabilization vegetation
00959> # - Assumes contour plowing performed to provide surface scarification
00960> # - ESC/SWM control provided by slope interruption berms
00961> # - AMC III Conditions
00962> #*****
00963> #*****
00964>-----
00965> 004:0002-----
00966> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 5 Year)
00967> | Ptotal= 55.97 mm | Comments: Belleville IDF (12-hr 30% AES - 5 Year)
00968>-----
00969> | TIME | RAIN | TIME | RAIN | TIME | RAIN | TIME | RAIN |
00970> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
00971> | 1.00 5.247 | 4.00 8.745 | 7.00 1.749 | 10.00 .000 |
00972> | 2.00 15.158 | 5.00 8.162 | 8.00 .583 | 11.00 .000 |
00973> | 3.00 11.660 | 6.00 4.664 | 9.00 .000 | 12.00 .000 |
00974> |
00975> |
00976>-----
00977> 004:0003-----
00978> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=92.00
00979> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
00980> | U.H. Tp(hrs)= .310 |
00981>-----
00982> Unit Hyd Qpeak (cms)= 1.188
00983>-----
00984> PEAK FLOW (cms)= .235 (i)
00985> TIME TO PEAK (hrs)= 3.067
00986> RUNOFF VOLUME (mm)= 35.559
00987>-----

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00988> TOTAL RAINFALL (mm)= 55.968
00989> RUNOFF COEFFICIENT = .635
00990>-----
00991> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00992>-----
00993> 004:0004-----
00994> #*****
00995> # Route To_NW flows through slope interruption berms
00996> #*****
00997> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00998> | IN=01:(B-201) |
00999> | OUT=02:(SWM201) |
01000>-----
01001> |===== OUTFLOW STORAGE TABLE =====|
01002> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01003> | (cms) (ha.m.) | (cms) (ha.m.) |
01004> | .000 .0000E+00 | 2.500 .3100E+00 |
01005> | .000 .2900E+00 | 6.900 .3300E+00 |
01006>-----
01007> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01008> (ha) (cms) (hrs) (mm)
01009> INFLOW >01: (B-201) 9.64 .235 3.067 35.559
01010> OUTFLOW=02: (SWM201) 9.64 .121 5.783 5.532
01011> OVERFLOW=10: (OVSWM1) .00 .000 .000 .000
01012>-----
01013> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01014> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01015> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01016>-----
01017> PEAK FLOW REDUCTION [Qout/Qin](%)= 51.455
01018> TIME SHIFT OF PEAK FLOW (min)= 163.00
01019> MAXIMUM STORAGE USED (ha.m.)= .2910E+00
01020>-----
01021> *** WARNING: Outflow volume is less than inflow volume.
01022>-----
01023> 004:0005-----
01024> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
01025> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01026> | U.H. Tp(hrs)= .430 |
01027>-----
01028> Unit Hyd Qpeak (cms)= .353
01029>-----
01030> PEAK FLOW (cms)= .067 (i)
01031> TIME TO PEAK (hrs)= 3.183
01032> RUNOFF VOLUME (mm)= 26.916
01033> TOTAL RAINFALL (mm)= 55.968
01034> RUNOFF COEFFICIENT = .481
01035>-----
01036> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01037>-----
01038> 004:0006-----
01039> | ADD HYD (To_NW) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01040> | | (ha) (cms) (hrs) (mm) (cms)
01041> | I01 01:EXTB-1 3.97 .067 3.18 26.92 .000
01042> | +I02 02:SWM201 9.64 .121 5.78 5.53 .000
01043> |=====
01044> | SUM 10:To_NW 13.61 .165 5.78 11.73 .000
01045>-----
01046> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01047>-----
01048> 004:0007-----
01049> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=92.00
01050> | 01:B-206 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01051> | U.H. Tp(hrs)= .760 |
01052>-----
01053> Unit Hyd Qpeak (cms)= .344
01054>-----
01055> PEAK FLOW (cms)= .149 (i)
01056> TIME TO PEAK (hrs)= 3.617
01057> RUNOFF VOLUME (mm)= 35.559
01058> TOTAL RAINFALL (mm)= 55.968
01059> RUNOFF COEFFICIENT = .635
01060>-----
01061> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01062>-----
01063> 004:0008-----
01064> #*****
01065> # Route To_CTR flows through slope interruption berms
01066> #*****
01067> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01068> | IN=01:(B-202) |
01069> | OUT=02:(SWM202) |
01070>-----
01071> |===== OUTFLOW STORAGE TABLE =====|
01072> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01073> | (cms) (ha.m.) | (cms) (ha.m.) |
01074> | .000 .0000E+00 | 2.200 .1420E+01 |
01075> | .000 .1330E+01 | 6.200 .1520E+01 |
01076>-----
01077> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01078> (ha) (cms) (hrs) (mm)
01079> INFLOW >01: (B-202) 6.84 .311 3.250 35.559
01080> OUTFLOW=02: (SWM202) 6.84 .000 .000 .000
01081> OVERFLOW=10: (OVSWM2) .00 .000 .000 .000
01082>-----
01083> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01084> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01085> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01086>-----
01087> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01088> TIME SHIFT OF PEAK FLOW (min)= -217.00
01089> MAXIMUM STORAGE USED (ha.m.)= .2432E+00
01090>-----
01091> *** WARNING: Outflow volume is less than inflow volume.
01092>-----
01093> 004:0009-----
01094> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
01095> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01096> | U.H. Tp(hrs)= .500 |
01097>-----
01098> Unit Hyd Qpeak (cms)= 1.432
01099>-----
01100> PEAK FLOW (cms)= .311 (i)
01101> TIME TO PEAK (hrs)= 3.250
01102> RUNOFF VOLUME (mm)= 26.916
01103> TOTAL RAINFALL (mm)= 55.968
01104> RUNOFF COEFFICIENT = .481
01105>-----
01106> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01107>-----
01108> 004:0010-----
01109> | ADD HYD (To_CTR) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01110> | | (ha) (cms) (hrs) (mm) (cms)
01111> | I01 01:EXTB-2 18.74 .311 3.25 26.92 .000
01112> | +I02 02:SWM202 6.84 .000 .00 .00 .000
01113> |=====
01114> | SUM 10:To_CTR 25.58 .311 3.25 19.72 .000
01115>-----
01116> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01117>-----
01118> 004:0010-----
01119> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
01120> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01121> | U.H. Tp(hrs)= .500 |
01122>-----
01123> Unit Hyd Qpeak (cms)= 1.432
01124>-----
01125> PEAK FLOW (cms)= .311 (i)
01126> TIME TO PEAK (hrs)= 3.250
01127> RUNOFF VOLUME (mm)= 26.916
01128>-----

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01129> 004:0011-----
01130> |-----|
01131> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=94.00
01132> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01133> |-----| U.H. Tp(hrs)= .470
01134>
01135> Unit Hyd Qpeak (cms)= .954
01136>
01137> PEAK FLOW (cms)= .307 (i)
01138> TIME TO PEAK (hrs)= 3.133
01139> RUNOFF VOLUME (mm)= 38.668
01140> TOTAL RAINFALL (mm)= 55.968
01141> RUNOFF COEFFICIENT = .691
01142>
01143> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01144>
01145> -----
01146> 004:0012-----
01147> *# Route To SW flows through slope interruption berms
01148> *#-----
01149> *#-----
01150>
01151> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01152> | IN=01:(B-203 ) |
01153> | OUT=02:(SWM203 ) |
01154> -----
01155> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01156> | (cms) (ha.m.) | (cms) (ha.m.) |
01157> | .000 .0000E+00 | 2.900 .7000E+00 |
01158> | .000 .6500E+00 | 8.300 .7400E+00 |
01159>
01160> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01161> | IN=01:(B-203 ) | (ha) (cms) (hrs) (mm)
01162> | OUTFLOW=02:(SWM203 ) | 11.74 .000 .000 .000
01163> | OVERFLOW=10:(OVSWM3 ) | .00 .000 .000 .000
01164>
01165> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01166> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01167> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01168>
01169> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01170> TIME SHIFT OF PEAK FLOW (min)= -188.00
01171> MAXIMUM STORAGE USED (ha.m.)= .4540E+00
01172>
01173> *** WARNING: Outflow volume is less than inflow volume.
01174>
01175> -----
01176> 004:0013-----
01177> |-----|
01178> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
01179> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01180> |-----| U.H. Tp(hrs)= .420
01181>
01182> Unit Hyd Qpeak (cms)= .979
01183>
01184> PEAK FLOW (cms)= .182 (i)
01185> TIME TO PEAK (hrs)= 3.183
01186> RUNOFF VOLUME (mm)= 26.916
01187> TOTAL RAINFALL (mm)= 55.968
01188> RUNOFF COEFFICIENT = .481
01189>
01190> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01191>
01192> -----
01193> 004:0014-----
01194> |-----|
01195> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01196> | | (ha) (cms) (hrs) (mm) (cms)
01197> | ID1 01:To_SW | 10.77 .182 3.18 26.92 .000
01198> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000
01199>
01200> SUM 01:To_SW 22.51 .182 3.18 26.92 .000
01201>
01202> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01203>
01204> -----
01205> 004:0015-----
01206> |-----|
01207> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01208> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01209> |-----| U.H. Tp(hrs)= .700
01210>
01211> Unit Hyd Qpeak (cms)= .274
01212>
01213> PEAK FLOW (cms)= .079 (i)
01214> TIME TO PEAK (hrs)= 3.633
01215> RUNOFF VOLUME (mm)= 26.916
01216> TOTAL RAINFALL (mm)= 55.968
01217> RUNOFF COEFFICIENT = .481
01218>
01219> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01220>
01221> -----
01222> 004:0016-----
01223> |-----|
01224> 004:0002-----
01225>
01226> 004:0002-----
01227>
01228> 004:0002-----
01229> ** END OF RUN : 4
01230>
01231> -----
01232>
01233>
01234>
01235>
01236>
01237>
01238> | START | Project dir.: C:\usr\LOYB\
01239> |-----| Rainfall dir.: C:\usr\LOYB\
01240>
01241> TZERO = .00 hrs on
01242> METOUT= 2 (output = METRIC)
01243> NRUN = 005
01244> NSTORM= 1
01245> # 1=LAY100.1hr
01246>
01247> 005:0002-----
01248> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01249> *# Date : 12-21-2017
01250> *# Modeller : [D. Williams]
01251> *# Company : Stantec Consulting Ltd. (Waterloo)
01252> *# License # : 4739994
01253> *#-----
01254> *#
01255> *# Block B - INTERIM CONDITIONS
01256> *#
01257> *# - Hydrologic conditions represent site during construction, prior to
01258> *# establishment of stabilization vegetation
01259> *# - Assumes contour plowing performed to provide surface scarification
01260> *# - ESC/SWM control provided by slope interruption berms
01261> *# - AMC III Conditions
01262> *#-----
01263>
01264>
01265> 005:0002-----
01266>
01267> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 100 Year)
01268> | Ptotal= 44.10 mm | Comments: Belleville IDF (1-hr 30% AES - 100 Year)
01269>

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01270> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01271> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01272> | .08 47.628 | .33 58.212 | .58 52.920 | .83 15.876
01273> | .17 74.088 | .42 68.796 | .67 26.460 | .92 5.292
01274> | .25 111.132 | .50 47.628 | .75 21.168 | 1.00 .000
01275>
01276>
01277> 005:0003-----
01278> |-----|
01279> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=92.00
01280> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01281> |-----| U.H. Tp(hrs)= .310
01282>
01283> Unit Hyd Qpeak (cms)= 1.188
01284>
01285> PEAK FLOW (cms)= .853 (i)
01286> TIME TO PEAK (hrs)= .767
01287> RUNOFF VOLUME (mm)= 24.986
01288> TOTAL RAINFALL (mm)= 44.100
01289> RUNOFF COEFFICIENT = .567
01290>
01291> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01292>
01293> -----
01294> 005:0004-----
01295> *# Route To NW flows through slope interruption berms
01296> *#-----
01297> *#-----
01298>
01299> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01300> | IN=01:(B-201 ) |
01301> | OUT=02:(SWM201 ) |
01302> -----
01303> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01304> | (cms) (ha.m.) | (cms) (ha.m.) |
01305> | .000 .0000E+00 | 2.500 .3100E+00 |
01306> | .000 .2900E+00 | 6.900 .3300E+00 |
01307>
01308> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01309> | IN=01:(B-201 ) | (ha) (cms) (hrs) (mm)
01310> | OUTFLOW=02:(SWM201 ) | 9.64 .853 .767 24.986
01311> | OVERFLOW=10:(OVSWM1 ) | .00 .000 .000 .000
01312>
01313> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01314> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01315> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01316>
01317> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01318> TIME SHIFT OF PEAK FLOW (min)= -46.00
01319> MAXIMUM STORAGE USED (ha.m.)= .2409E+00
01320>
01321> *** WARNING: Outflow volume is less than inflow volume.
01322>
01323> -----
01324> 005:0005-----
01325> |-----|
01326> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
01327> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01328> |-----| U.H. Tp(hrs)= .430
01329>
01330> Unit Hyd Qpeak (cms)= .353
01331>
01332> PEAK FLOW (cms)= .211 (i)
01333> TIME TO PEAK (hrs)= .917
01334> RUNOFF VOLUME (mm)= 18.451
01335> TOTAL RAINFALL (mm)= 44.100
01336> RUNOFF COEFFICIENT = .418
01337>
01338> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01339>
01340> -----
01341> 005:0006-----
01342> |-----|
01343> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01344> | | (ha) (cms) (hrs) (mm) (cms)
01345> | ID1 01:EXTB-1 | 3.97 .211 .92 18.45 .000
01346> | +ID2 02:SWM201 | 9.64 .000 .00 .00 .000
01347>
01348> SUM 10:To_NW 13.61 .211 .92 5.38 .000
01349>
01350> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01351>
01352> -----
01353> 005:0007-----
01354> |-----|
01355> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=92.00
01356> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01357> |-----| U.H. Tp(hrs)= .760
01358>
01359> Unit Hyd Qpeak (cms)= .344
01360>
01361> PEAK FLOW (cms)= .319 (i)
01362> TIME TO PEAK (hrs)= 1.217
01363> RUNOFF VOLUME (mm)= 24.986
01364> TOTAL RAINFALL (mm)= 44.100
01365> RUNOFF COEFFICIENT = .567
01366>
01367> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01368>
01369> -----
01370> 005:0008-----
01371> *# Route To CTR flows through slope interruption berms
01372> *#-----
01373>
01374> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01375> | IN=01:(B-202 ) |
01376> | OUT=02:(SWM202 ) |
01377> -----
01378> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01379> | (cms) (ha.m.) | (cms) (ha.m.) |
01380> | .000 .0000E+00 | 2.200 .1420E+01 |
01381> | .000 .1330E+01 | 6.200 .1520E+01 |
01382>
01383> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01384> | IN=01:(B-202 ) | (ha) (cms) (hrs) (mm)
01385> | OUTFLOW=02:(SWM202 ) | 6.84 .319 1.217 24.986
01386> | OVERFLOW=10:(OVSWM2 ) | .00 .000 .000 .000
01387>
01388> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01389> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01390> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01391>
01392> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01393> TIME SHIFT OF PEAK FLOW (min)= -73.00
01394> MAXIMUM STORAGE USED (ha.m.)= .1709E+00
01395>
01396> *** WARNING: Outflow volume is less than inflow volume.
01397>
01398> -----
01399> 005:0009-----
01400> |-----|
01401> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
01402> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01403> |-----| U.H. Tp(hrs)= .500
01404>
01405> Unit Hyd Qpeak (cms)= 1.432
01406>
01407> PEAK FLOW (cms)= .900 (i)
01408> TIME TO PEAK (hrs)= .983
01409> RUNOFF VOLUME (mm)= 18.451
01410>

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01411> TOTAL RAINFALL (mm)= 44.100
01412> RUNOFF COEFFICIENT = .418
01413>
01414> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01415>
01416> -----
01417> 005:0010-----
01418>
01419> | ADD HYD (To_CTR ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01420> -----
01421> | ID1 01:EXTB-2 | 11.74 .900 .98 18.45 .000
01422> | +ID2 02:SWM202 | 6.84 .000 .00 .00 .000
01423> |=====|
01424> | SUM 10:To_CTR | 25.58 .900 .98 13.52 .000
01425>
01426> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01427>
01428> -----
01429> 005:0011-----
01430>
01431> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=94.00
01432> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01433> |-----|
01434> | U.H. Tp(hrs)= .470
01435>
01436> Unit Hyd Qpeak (cms)= .954
01437>
01438> PEAK FLOW (cms)= .887 (i)
01439> TIME TO PEAK (hrs)= .933
01440> RUNOFF VOLUME (mm)= 27.639
01441> TOTAL RAINFALL (mm)= 44.100
01442> RUNOFF COEFFICIENT = .627
01443>
01444> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01445>
01446> -----
01447> 005:0012-----
01448> *# Route To_SW flows through slope interruption berms
01449> *#-----
01450>
01451> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01452> | IN=01:(B-203 ) |
01453> | OUT=02:(SWM203 ) |
01454> |-----|
01455> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01456> | (cms) (ha.m.) | (cms) (ha.m.) |
01457> | .000 .0000E+00 | 2.900 .7000E+00 |
01458> |-----|
01459>
01460> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01461> (ha) (cms) (hrs) (mm)
01462> INFLOW >01: (B-203 ) 11.74 .897 .933 27.639
01463> OUTFLOW=02: (SWM203) 11.74 .000 .000 .000
01464> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
01465>
01466> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01467> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01468> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01469>
01470> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01471> TIME SHIFT OF PEAK FLOW (min)= -56.00
01472> MAXIMUM STORAGE USED (ha.m.)= .3245E+00
01473>
01474> *** WARNING: Outflow volume is less than inflow volume.
01475>
01476> 005:0013-----
01477>
01478> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
01479> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01480> |-----|
01481> | U.H. Tp(hrs)= .420
01482>
01483> Unit Hyd Qpeak (cms)= .979
01484>
01485> PEAK FLOW (cms)= .582 (i)
01486> TIME TO PEAK (hrs)= .900
01487> RUNOFF VOLUME (mm)= 18.451
01488> TOTAL RAINFALL (mm)= 44.100
01489> RUNOFF COEFFICIENT = .418
01490>
01491> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01492>
01493> -----
01494> 005:0014-----
01495>
01496> | ADD HYD (To_SW ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01497> -----
01498> | ID1 01:To_SW | 10.77 .582 .90 18.45 .000
01499> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000
01500> |=====|
01501> | SUM 01:To_SW | 22.51 .582 .90 8.83 .000
01502>
01503> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01504>
01505> -----
01506> 005:0015-----
01507>
01508> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01509> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01510> |-----|
01511> | U.H. Tp(hrs)= .700
01512>
01513> Unit Hyd Qpeak (cms)= .274
01514>
01515> PEAK FLOW (cms)= .185 (i)
01516> TIME TO PEAK (hrs)= 1.167
01517> RUNOFF VOLUME (mm)= 18.451
01518> TOTAL RAINFALL (mm)= 44.100
01519> RUNOFF COEFFICIENT = .418
01520>
01521> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01522>
01523> -----
01524> 005:0016-----
01525>
01526> 005:0002-----
01527>
01528> 005:0002-----
01529>
01530> 005:0002-----
01531> ** END OF RUN : 5
01532>
01533> -----
01534>
01535>
01536>
01537>
01538>
01539>
01540> | START | Project dir.: C:\usr\LOYB\
01541> |-----| Rainfall dir.: C:\usr\LOYB\
01542> | TZERO = .00 hrs on 0
01543> | METOUT= 2 (output= METRIC)
01544> | NRUN = 006
01545> | NSTORM= 1
01546> | # 1=LYA100.12h
01547>
01548> 005:0002-----
01549> *#-----
01550> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[13560220]
01551> *# Date : 12-21-2017

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01552> *# Modeller : [D. Williams]
01553> *# Company : Stantec Consulting Ltd. (Waterloo)
01554> *# License # : 4730904
01555> *#-----
01556> *#
01557> *# Block B - INTERIM CONDITIONS
01558> *#
01559> *# Hydrologic conditions represent site during construction, prior to
01560> *# establishment of stabilization vegetation
01561> *# Assumes contour plowing performed to provide surface scarification
01562> *# ESC/SWM control provided by slope interruption berms
01563> *# - AMC III Conditions
01564> *#
01565> *#-----
01566>
01567> 006:0002-----
01568>
01569> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 100 Year
01570> | Ptotal= 93.70 mm | Comments: Belleville IDF (12-hr 30% AES - 100 Year
01571>
01572> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
01573> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
01574> 1.00 8.784 | 4.00 14.640 | 7.00 2.928 | 10.00 .000
01575> 2.00 25.376 | 6.00 13.664 | 8.00 .976 | 11.00 .000
01576> 3.00 19.520 | 6.00 7.808 | 9.00 .000 | 12.00 .000
01577>
01578>
01579> 006:0003-----
01580>
01581> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=92.00
01582> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01583> |-----|
01584> | U.H. Tp(hrs)= .310
01585>
01586> Unit Hyd Qpeak (cms)= 1.188
01587>
01588> PEAK FLOW (cms)= .478 (i)
01589> TIME TO PEAK (hrs)= 2.217
01590> RUNOFF VOLUME (mm)= 71.013
01591> TOTAL RAINFALL (mm)= 93.696
01592> RUNOFF COEFFICIENT = .758
01593>
01594> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01595>
01596> -----
01597> 006:0004-----
01598>
01599> *# Route To_Nw flows through slope interruption berms
01600> *#-----
01601>
01602> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01603> | IN=01:(B-201 ) |
01604> | OUT=02:(SWM201 ) |
01605> |-----|
01606> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01607> | (cms) (ha.m.) | (cms) (ha.m.) |
01608> | .000 .0000E+00 | 2.500 .3100E+00 |
01609> |-----|
01610>
01611> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01612> (ha) (cms) (hrs) (mm)
01613> INFLOW >01: (B-201 ) 9.64 .478 2.217 71.013
01614> OUTFLOW=02: (SWM201) 9.64 .417 3.367 40.930
01615> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
01616>
01617> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01618> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01619> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01620>
01621> PEAK FLOW REDUCTION [Qout/Qin](%)= 87.198
01622> TIME SHIFT OF PEAK FLOW (min)= 69.00
01623> MAXIMUM STORAGE USED (ha.m.)= .2933E+00
01624>
01625> *** WARNING: Outflow volume is less than inflow volume.
01626>
01627> 006:0005-----
01628>
01629> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
01630> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01631> |-----|
01632> | U.H. Tp(hrs)= .430
01633>
01634> Unit Hyd Qpeak (cms)= .353
01635>
01636> PEAK FLOW (cms)= .146 (i)
01637> TIME TO PEAK (hrs)= 3.133
01638> RUNOFF VOLUME (mm)= 57.452
01639> TOTAL RAINFALL (mm)= 93.696
01640> RUNOFF COEFFICIENT = .613
01641>
01642> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01643>
01644> -----
01645> 006:0006-----
01646>
01647> | ADD HYD (To_Nw ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01648> -----
01649> | ID1 01:EXTB-1 | 3.97 .146 3.13 57.45 .000
01650> | +ID2 02:SWM201 | 9.64 .417 3.37 40.93 .000
01651> |=====|
01652> | SUM 10:To_Nw | 13.61 .559 3.37 45.75 .000
01653>
01654> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01655>
01656> -----
01657> 006:0007-----
01658>
01659> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=92.00
01660> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01661> |-----|
01662> | U.H. Tp(hrs)= .760
01663>
01664> Unit Hyd Qpeak (cms)= .344
01665>
01666> PEAK FLOW (cms)= .304 (i)
01667> TIME TO PEAK (hrs)= 3.367
01668> RUNOFF VOLUME (mm)= 71.013
01669> TOTAL RAINFALL (mm)= 93.696
01670> RUNOFF COEFFICIENT = .758
01671>
01672> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01673>
01674> -----
01675> 006:0008-----
01676>
01677> *# Route To_CTR flows through slope interruption berms
01678> *#-----
01679>
01680> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01681> | IN=01:(B-202 ) |
01682> | OUT=02:(SWM202 ) |
01683> |-----|
01684> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01685> | (cms) (ha.m.) | (cms) (ha.m.) |
01686> | .000 .0000E+00 | 2.200 .1420E+01 |
01687> |-----|
01688>
01689> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01690> (ha) (cms) (hrs) (mm)
01691> INFLOW >01: (B-202 ) 6.84 .304 3.367 71.013
01692> OUTFLOW=02: (SWM202) 6.84 .000 .000 .000
01693> OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
01694>
01695> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01696> CUMULATIVE TIME OF OVERFLOWS (hours)= .00

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01693> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01694>
01695>
01696> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01697> TIME SHIFT OF PEAK FLOW (min)= -202.00
01698> MAXIMUM STORAGE USED (ha.m.)=-.4857E+00
01699>
01700> *** WARNING: Outflow volume is less than inflow volume.
01701>
01702> 006:0009-----
01703> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
01704> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01705> | U.H. Tp(hrs)= .500
01706>
01707> Unit Hyd Qpeak (cms)= 1.432
01708>
01709>
01710> PEAK FLOW (cms)= .682 (i)
01711> TIME TO PEAK (hrs)= 3.183
01712> RUNOFF VOLUME (mm)= 57.452
01713> TOTAL RAINFALL (mm)= 93.696
01714> RUNOFF COEFFICIENT = .613
01715>
01716> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01717>
01718> -----
01719> 006:0010-----
01720> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01721> | (ha) (cms) (hrs) (mm) (cms)
01722> ID1 01:EXTB-2 18.74 .682 3.18 57.45 .000
01723> +ID2 02:SWM202 6.84 .000 .00 .00 .000
01724>
01725> SUM 10:To_CTR 25.58 .682 3.18 42.09 .000
01726>
01727>
01728> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01729>
01730> -----
01731> 006:0011-----
01732>
01733> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=94.00
01734> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01735> | U.H. Tp(hrs)= .470
01736>
01737> Unit Hyd Qpeak (cms)= .954
01738>
01739>
01740> PEAK FLOW (cms)= .592 (i)
01741> TIME TO PEAK (hrs)= 2.650
01742> RUNOFF VOLUME (mm)= 74.989
01743> TOTAL RAINFALL (mm)= 93.696
01744> RUNOFF COEFFICIENT = .800
01745>
01746> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01747>
01748> 006:0012-----
01749> *# Route TO_SW flows through slope interruption berms
01750>
01751> -----
01752>
01753> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01754> | IN=01:(B-203 ) |
01755> | OUT=02:(SWM203) |
01756>
01757> ===== OUTFLOW STORAGE TABLE =====
01758> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01759> | (cms) (ha.m.) | (cms) (ha.m.) |
01760> .000 .0000E+00 2.900 .7000E+00
01761> .000 .6500E+00 8.300 .7400E+00
01762>
01763> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01764> (ha) (cms) (hrs) (mm)
01765> INFLOW >01: (B-203 ) 11.74 .592 2.650 74.989
01766> OUTFLOW<02: (SWM203) 11.74 .411 5.267 19.800
01767> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
01768>
01769> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01770> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01771> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01772>
01773> PEAK FLOW REDUCTION [Qout/Qin](%)= 60.492
01774> TIME SHIFT OF PEAK FLOW (min)= 157.00
01775> MAXIMUM STORAGE USED (ha.m.)=-.6571E+00
01776>
01777> *** WARNING: Outflow volume is less than inflow volume.
01778>
01779> 006:0013-----
01780> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
01781> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01782> | U.H. Tp(hrs)= .420
01783>
01784> Unit Hyd Qpeak (cms)= .979
01785>
01786>
01787> PEAK FLOW (cms)= .397 (i)
01788> TIME TO PEAK (hrs)= 3.117
01789> RUNOFF VOLUME (mm)= 57.452
01790> TOTAL RAINFALL (mm)= 93.696
01791> RUNOFF COEFFICIENT = .613
01792>
01793> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01794>
01795> 006:0014-----
01796>
01797> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01798> | (ha) (cms) (hrs) (mm) (cms)
01799> ID1 01:To_SW 10.77 .397 3.12 57.45 .000
01800> +ID2 02:SWM203 11.74 .411 5.27 19.81 .000
01801>
01802> SUM 01:To_SW 22.51 .728 5.23 37.72 .000
01803>
01804> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01805>
01806> -----
01807> 006:0015-----
01808>
01809> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01810> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01811> | U.H. Tp(hrs)= .700
01812>
01813> Unit Hyd Qpeak (cms)= .274
01814>
01815>
01816> PEAK FLOW (cms)= .174 (i)
01817> TIME TO PEAK (hrs)= 3.417
01818> RUNOFF VOLUME (mm)= 57.452
01819> TOTAL RAINFALL (mm)= 93.696
01820> RUNOFF COEFFICIENT = .613
01821>
01822> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01823>
01824> 006:0016-----
01825>
01826> 006:0002-----
01827>
01828> 006:0002-----
01829>
01830> 006:0002-----
01831>
01832> 006:0002-----
01833>

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01834> 006:0002-----
01835> ** END OF RUN : 6
01836>
01837> -----
01838>
01839>
01840>
01841>
01842>
01843>
01844> | START | Project dir.: C:\usr\LOYB\
01845> | Rainfall dir.: C:\usr\LOYB\
01846> TZERO = .00 hrs on 0
01847> METOUT= 2 (output = METRIC)
01848> NRUN = 007
01849> NSTORM= 1
01850> # 1=25mm.4hr
01851>
01852> 007:0002-----
01853>
01854> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01855> *# Date : 12-21-2017
01856> *# Modeller : [D. Williams]
01857> *# Company : Stantec Consulting Ltd. (Waterloo)
01858> *# License # : 4730904
01859> *#
01860> *#
01861> *#
01862> *# Block B - INTERIM CONDITIONS
01863> *# - Hydrologic conditions represent site during construction, prior to
01864> *# establishment of stabilization vegetation
01865> *# - Assumes contour plowing performed to provide surface scarification
01866> *# - ESC/SWM control provided by slope interruption berms
01867> *# - AMC III Conditions
01868> *#
01869> *#
01870>
01871> 007:0002-----
01872>
01873> | READ STORM | Filename: 25 mm, 4hr Chicago Storm
01874> | Ptotal= 25.00 mm | Comments: 25 mm, 4hr Chicago Storm
01875>
01876> TIME RAIN TIME TIME TIME TIME TIME TIME
01877> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
01878> .08 1.465 1.08 4.024 2.98 5.764 3.08 2.074
01879> .17 1.540 1.17 4.814 2.17 4.969 3.17 1.977
01880> .25 1.625 1.25 6.025 2.25 4.374 3.25 1.889
01881> .33 1.720 1.33 8.114 2.33 3.913 3.33 1.810
01882> .42 1.829 1.42 12.526 2.42 3.545 3.42 1.737
01883> .50 1.955 1.50 27.198 2.50 3.245 3.50 1.671
01884> .58 2.101 1.58 74.855 2.58 2.994 3.58 1.610
01885> .67 2.274 1.67 31.418 2.67 2.782 3.67 1.553
01886> .75 2.482 1.75 16.819 2.75 2.601 3.75 1.501
01887> .83 2.736 1.83 11.357 2.83 2.443 3.83 1.453
01888> .92 3.055 1.92 8.563 2.92 2.305 3.92 1.408
01889> 1.00 3.468 2.00 6.882 3.00 2.183 4.00 1.366
01890>
01891>
01892> 007:0003-----
01893>
01894> | CALIB NASHYD | Area (ha)= 9.64 Curve Number (CN)=92.00
01895> | 01:B-201 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01896> | U.H. Tp(hrs)= .310
01897>
01898> Unit Hyd Qpeak (cms)= 1.188
01899>
01900>
01901> PEAK FLOW (cms)= .230 (i)
01902> TIME TO PEAK (hrs)= 1.983
01903> RUNOFF VOLUME (mm)= 9.504
01904> TOTAL RAINFALL (mm)= 25.000
01905> RUNOFF COEFFICIENT = .380
01906>
01907> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01908>
01909> 007:0004-----
01910>
01911> *# Route TO_NW flows through slope interruption berms
01912>
01913> -----
01914>
01915> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01916> | IN=01:(B-201 ) |
01917> | OUT=02:(SWM201) |
01918>
01919> ===== OUTFLOW STORAGE TABLE =====
01920> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01921> | (cms) (ha.m.) | (cms) (ha.m.) |
01922> .000 .0000E+00 2.500 .3100E+00
01923> .000 .2000E+00 6.900 .3300E+00
01924>
01925> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01926> (ha) (cms) (hrs) (mm)
01927> INFLOW >01: (B-201 ) 9.64 .230 1.983 9.504
01928> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
01929> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
01930>
01931> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01932> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01933> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01934>
01935> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01936> TIME SHIFT OF PEAK FLOW (min)= -119.00
01937> MAXIMUM STORAGE USED (ha.m.)=-.9362E-01
01938>
01939> *** WARNING: Outflow volume is less than inflow volume.
01940>
01941> 007:0005-----
01942>
01943> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
01944> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01945> | U.H. Tp(hrs)= .430
01946>
01947> Unit Hyd Qpeak (cms)= .353
01948>
01949>
01950> PEAK FLOW (cms)= .056 (i)
01951> TIME TO PEAK (hrs)= 2.117
01952> RUNOFF VOLUME (mm)= 6.968
01953> TOTAL RAINFALL (mm)= 25.000
01954> RUNOFF COEFFICIENT = .279
01955>
01956> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01957>
01958> 007:0006-----
01959>
01960> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01961> | (ha) (cms) (hrs) (mm) (cms)
01962> ID1 01:EXTB-1 3.97 .056 2.12 6.97 .000
01963> +ID2 02:SWM201 9.64 .000 .00 .00 .000
01964>
01965> SUM 10:To_NW 13.61 .056 2.12 2.03 .000
01966>
01967> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01968>
01969> -----
01970>
01971> | CALIB NASHYD | Area (ha)= 6.84 Curve Number (CN)=92.00
01972> | 01:B-202 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
01973> | U.H. Tp(hrs)= .760
01974>
01975> Unit Hyd Qpeak (cms)= .344
01976>

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01975> PEAK FLOW (cms)= .008 (i)
01976> TIME TO PEAK (hrs)= 2.600
01977> RUNOFF VOLUME (mm)= 9.504
01978> TOTAL RAINFALL (mm)= 25.000
01979> RUNOFF COEFFICIENT = .300
01981>
01982> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01983>
01984> -----
01985> 007:0000-----
01986> *#*****
01987> # Route To_CTR flows through slope interruption berms
01988> *#*****
01989>
01990> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01991> | IN=01:(B-202 ) |
01992> | OUT=02:(SWM202) |
01993> ===== OUTFLOW STORAGE TABLE =====
01994> OUTFLOW STORAGE OUTFLOW STORAGE
01995> (cms) (ha.m.) (cms) (ha.m.)
01996> .000 .0000E+00 2.200 .1420E+01
01997> .000 .1330E+01 6.200 .1520E+01
01998>
01999> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02000> (ha) (cms) (hrs) (mm)
02001> INFLOW >01: (B-202 ) 6.84 .008 2.600 9.504
02002> OUTFLOW<02: (SWM202) 6.84 .000 .000 .000
02003> OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
02004>
02005> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02006> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02007> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02008>
02009> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
02010> TIME SHIFT OF PEAK FLOW (min)= -156.00
02011> MAXIMUM STORAGE USED (ha.m.)= .6501E-01
02012>
02013> *** WARNING: Outflow volume is less than inflow volume.
02014>
02015> 007:0000-----
02016>
02017> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
02018> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02019> | U.H. Tp(hrs)= .500
02020>
02021> Unit Hyd Qpeak (cms)= 1.432
02022>
02023> PEAK FLOW (cms)= .240 (i)
02024> TIME TO PEAK (hrs)= 2.217
02025> RUNOFF VOLUME (mm)= 6.968
02026> TOTAL RAINFALL (mm)= 25.000
02027> RUNOFF COEFFICIENT = .279
02028>
02029> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02030>
02031> -----
02032> 007:0010-----
02033>
02034> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02035> (ha) (cms) (hrs) (mm) (cms)
02036> ID1 01:EXTB-2 18.74 .240 2.22 6.97 .000
02037> +ID2 02:SWM202 6.84 .000 .00 .00 .000
02038> =====
02039> SUM 10:To_CTR 25.58 .240 2.22 5.10 .000
02040>
02041> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02042>
02043> -----
02044> 007:0011-----
02045>
02046> | CALIB NASHYD | Area (ha)= 11.74 Curve Number (CN)=94.00
02047> | 01:B-203 DT= 1.00 | Ia (mm)= 5.000 # of Linear Res.(N)= 3.00
02048> | U.H. Tp(hrs)= .470
02049>
02050> Unit Hyd Qpeak (cms)= .954
02051>
02052> PEAK FLOW (cms)= .251 (i)
02053> TIME TO PEAK (hrs)= 2.200
02054> RUNOFF VOLUME (mm)= 11.046
02055> TOTAL RAINFALL (mm)= 25.000
02056> RUNOFF COEFFICIENT = .442
02057>
02058> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02059>
02060> -----
02061> 007:0012-----
02062> *#*****
02063> # Route To_SW flows through slope interruption berms
02064> *#*****
02065>
02066> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02067> | IN=01:(B-203 ) |
02068> | OUT=02:(SWM203) |
02069> ===== OUTFLOW STORAGE TABLE =====
02070> OUTFLOW STORAGE OUTFLOW STORAGE
02071> (cms) (ha.m.) (cms) (ha.m.)
02072> .000 .0000E+00 2.900 .7000E+00
02073> .000 .6500E+00 8.300 .7400E+00
02074>
02075> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02076> (ha) (cms) (hrs) (mm)
02077> INFLOW >01: (B-203 ) 11.74 .251 2.200 11.046
02078> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
02079> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
02080>
02081> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02082> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02083> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02084>
02085> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
02086> TIME SHIFT OF PEAK FLOW (min)= -132.00
02087> MAXIMUM STORAGE USED (ha.m.)= .1297E+00
02088>
02089> *** WARNING: Outflow volume is less than inflow volume.
02090>
02091> 007:0013-----
02092>
02093> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
02094> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02095> | U.H. Tp(hrs)= .420
02096>
02097> Unit Hyd Qpeak (cms)= .979
02098>
02099> PEAK FLOW (cms)= .155 (i)
02100> TIME TO PEAK (hrs)= 2.117
02101> RUNOFF VOLUME (mm)= 6.968
02102> TOTAL RAINFALL (mm)= 25.000
02103> RUNOFF COEFFICIENT = .279
02104>
02105> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02106>
02107> -----
02108> 007:0014-----
02109>
02110> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02111> (ha) (cms) (hrs) (mm) (cms)
02112> ID1 01:To_SW 10.77 .155 2.12 6.97 .000
02113> +ID2 02:SWM203 11.74 .000 .00 .00 .000
02114> =====
02115> SUM 01:To_SW 22.51 .155 2.12 3.33 .000

```

```

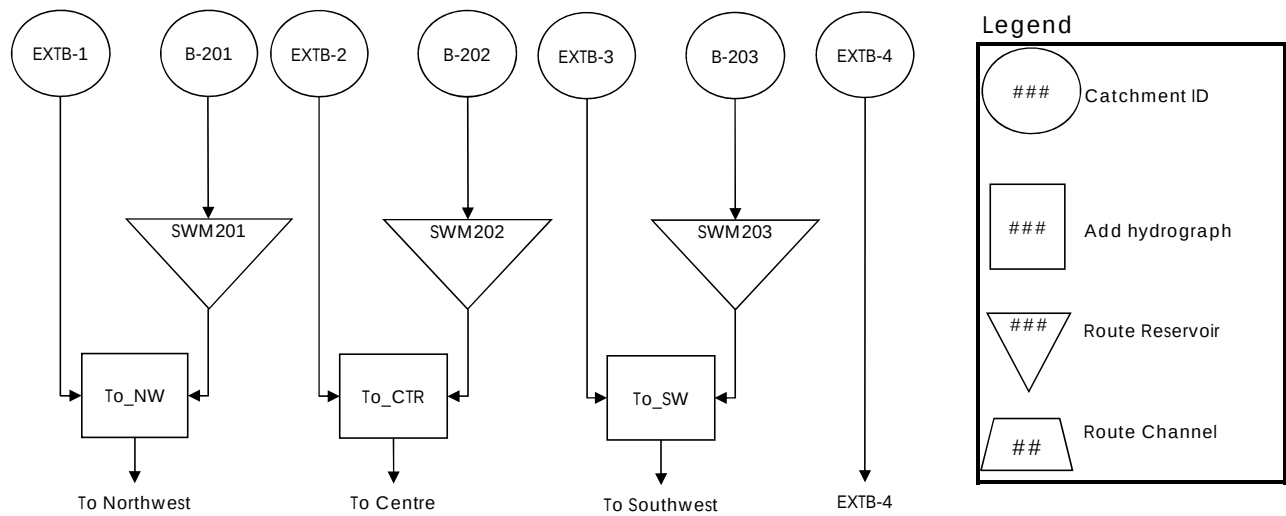
02116>
02117> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02118>
02119> -----
02120> 007:0015-----
02121>
02122> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
02123> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02124> | U.H. Tp(hrs)= .700
02125>
02126> Unit Hyd Qpeak (cms)= .274
02127>
02128> PEAK FLOW (cms)= .051 (i)
02129> TIME TO PEAK (hrs)= 2.467
02130> RUNOFF VOLUME (mm)= 6.968
02131> TOTAL RAINFALL (mm)= 25.000
02132> RUNOFF COEFFICIENT = .279
02133>
02134> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02135>
02136> -----
02137> 007:0016-----
02138>
02139> 007:0002-----
02140>
02141> 007:0002-----
02142>
02143> 007:0002-----
02144>
02145> 007:0002-----
02146>
02147> 007:0002-----
02148>
02149> 007:0002-----
02150> FINISH
02151>
02152> -----
02153> WARNINGS / ERRORS / NOTES
02154>
02155> 001:0004 ROUTE RESERVOIR
02156> *** WARNING: Outflow volume is less than inflow volume.
02157>
02158> 001:0008 ROUTE RESERVOIR
02159> *** WARNING: Outflow volume is less than inflow volume.
02160>
02161> 001:0012 ROUTE RESERVOIR
02162> *** WARNING: Outflow volume is less than inflow volume.
02163>
02164> 002:0004 ROUTE RESERVOIR
02165> *** WARNING: Outflow volume is less than inflow volume.
02166>
02167> 002:0008 ROUTE RESERVOIR
02168> *** WARNING: Outflow volume is less than inflow volume.
02169>
02170> 002:0012 ROUTE RESERVOIR
02171> *** WARNING: Outflow volume is less than inflow volume.
02172>
02173> 004:0004 ROUTE RESERVOIR
02174> *** WARNING: Outflow volume is less than inflow volume.
02175>
02176> 004:0008 ROUTE RESERVOIR
02177> *** WARNING: Outflow volume is less than inflow volume.
02178>
02179> 004:0012 ROUTE RESERVOIR
02180> *** WARNING: Outflow volume is less than inflow volume.
02181>
02182> 005:0004 ROUTE RESERVOIR
02183> *** WARNING: Outflow volume is less than inflow volume.
02184>
02185> 005:0012 ROUTE RESERVOIR
02186> *** WARNING: Outflow volume is less than inflow volume.
02187>
02188> 006:0008 ROUTE RESERVOIR
02189> *** WARNING: Outflow volume is less than inflow volume.
02190>
02191> 006:0012 ROUTE RESERVOIR
02192> *** WARNING: Outflow volume is less than inflow volume.
02193>
02194> 007:0004 ROUTE RESERVOIR
02195> *** WARNING: Outflow volume is less than inflow volume.
02196>
02197> 007:0008 ROUTE RESERVOIR
02198> *** WARNING: Outflow volume is less than inflow volume.
02199>
02200> Simulation ended on 2017-12-21 at 17:26:36
02201>
02202> =====

```

APPENDIX D – PROPOSED CONDITIONS

SWMHYMO Schematic – Proposed Conditions
NRCS (SCS) Curve Number Determination – Proposed Conditions
Proposed Conditions SWMHYMO Output – AMC II
Proposed Conditions SWMHYMO Output – AMC III

Subject: Interim / Proposed Schematic
Project: Loyalist Solar Project
Site: Block 'B'
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 20, 2017



Subject: NRCS (SCS) Curve Number Determination - Proposed Conditions
Project: Loyalist Solar Project
Site: Block 'B'
Project No.: 1335-60220
Client: Loyalist Solar LP
Date: December 21, 2017

TABLE OF CURVE NUMBERS (CN's)								
Land Use		Hydrologic Soil Type						
		A	AB	B	BC	C	CD	D
Meadow	"Good"	30	44	58	65	71	75	78
Woodlot	"Fair"	36	48	60	67	73	76	79
Lawns	"Good"	39	50	61	68	74	77	80
Pasture/Range		49	55	60	70	79	82	84
Crop - SR + CR	"Good"	64	70	75	79	82	84	85
Gravel		76	81	85	87	89	90	91
Scarified Soil		69	74	78	81	83	85	87
Wetland/Lake		100	100	100	100	100	100	100
Impervious		98	98	98	98	98	98	98

USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology, Chapter 9 Hydrologic Soil Cover Complexes

Scarified Soil CNs based on contour plowing & crop residue in poor hydrologic condition

HYDROLOGIC SOIL TYPE (%) - Proposed Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
EXT B-1				100				100
EXT B-2				100				100
EXT B-3				100				100
EXT B-4				100				100
B-201				100				100
B-202				100				100
B-203				60		40		100

LAND USE (%) - Proposed Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Gravel	Bare Soil	Wetland	Impervious	Total
EXT B-1	80	5		15						100
EXT B-2	80	5		15						100
EXT B-3	79	5		15					1	100
EXT B-4	78	5		15					2	100
B-201				97					3	100
B-202				97					3	100
B-203				96					4	100

CURVE NUMBER (CN) - Proposed Conditions											
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Gravel	Bare Soil	Wetland/Lakes	Impervious	Weighted CN (AMC II)	Weighted CN (AMC III)
EXT B-1	52	3		10						65	82
EXT B-2	52	3		10						65	82
EXT B-3	51	3		11					1	66	82
EXT B-4	51	3		10					2	66	82
B-201				68					3	70	85
B-202				68					3	70	85
B-203				71					4	75	88

Notes: AMC II assumed - AMC III Conversion Per Soil Conservation Service Curve Number (SCS-CN) Methodology (Mishra, Surendra and Vijay P. Sing (2003))
 Hydrological Soil Groups based on guidance presented in National Engineering Handbook

\\Cd1004-f01\work_group\01614\active\133560220\design\analysis\SWM\Block B\SWMHYMO_Block_B_V3.xlsx]Tc and Tp

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00001> SSSSS W W M M H H Y Y M M 000 999 999 =====
00002> S W W W M M M H H Y Y M M M 0 0 9 9 9 9 9
00003> SSSSS W W W M M M H H H H Y Y M M M 0 0 # 9 9 9 9 9 Ver 4.05
00004> S W W M M M H H Y Y M M M 0 0 9999 9999 Sept 2011
00005> SSSSS W W M M H H Y Y M M 000 9 9 9 # 4730994
00006> Stormwater Management Hydrologic Model 999 999 =====
00007>
00008> ***** SMWYMO Ver/4.05 *****
00009> ***** A single event and continuous hydrologic simulation model *****
00010> ***** based on the principles of HYMO and its successors *****
00011> ***** OTTHYMO-83 and OTTHYMO-89. *****
00012> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00013> ***** Ottawa, Ontario: (613) 836-3884 *****
00014> ***** Gatineau, Quebec: (819) 243-6858 *****
00015> ***** E-Mail: smwymo@jfsa.com *****
00016>
00017> *****
00018> *****
00019> *****
00020> *****
00021> *****
00022>
00023> *****
00024> ***** Licensed user: Stantec Consulting Ltd. (Kitchener) *****
00025> ***** SERIAL#: 4730904 *****
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00280> *****
00281> *****
00282> *****

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00283> TIME SHIFT OF PEAK FLOW (min)= -61.00
00284> MAXIMUM STORAGE USED (ha.m.)=-.4733E-01
00285>
00286> *** WARNING: Outflow volume is less than inflow volume.
00287>
00288> 001:0013-----
00289>
00290> DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
00291> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00292> | U.H. Tp(hrs)= .420
00293>
00294> Unit Hyd Qpeak (cms)= .979
00295>
00296> PEAK FLOW (cms)= .089 (i)
00297> TIME TO PEAK (hrs)= .933
00298> RUNOFF VOLUME (mm)= 2.802
00299> TOTAL RAINFALL (mm)= 22.100
00300> RUNOFF COEFFICIENT = .127
00301>
00302> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00303>
00304>
00305> 001:0014-----
00306>
00307> | ADD HYD (To_Sw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00308> |-----|-----|-----|-----|-----|-----|
00309> | ID1 01:To_Sw | 10.77 (.cms) (.hrs) (mm) (cms)
00310> | +ID2 02:SWM203 | 11.74 .089 .93 2.80 .000
00311> |-----|-----|-----|-----|-----|
00312> | SUM 01:To_Sw | 22.51 .089 .93 1.34 .000
00313>
00314> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00315>
00316>
00317> 001:0015-----
00318>
00319> | DESIGN NASHYD | Area (ha)= 5.93 Curve Number (CN)=66.00
00320> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00321> | U.H. Tp(hrs)= .700
00322>
00323> Unit Hyd Qpeak (cms)= .274
00324>
00325> PEAK FLOW (cms)= .028 (i)
00326> TIME TO PEAK (hrs)= 1.200
00327> RUNOFF VOLUME (mm)= 2.802
00328> TOTAL RAINFALL (mm)= 22.100
00329> RUNOFF COEFFICIENT = .127
00330>
00331> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00332>
00333>
00334> 001:0016-----
00335> ** END OF RUN : 1
00336>
00337>
00338>
00339>
00340>
00341>
00342>
00343>
00344> | START | Project dir.: C:\usr\LOYB\
00345> | 10:EXTB-4 DT= 1.00 | Rainfall dir.: C:\usr\LOYB\
00346> | TZERO = .00 hrs on 0
00347> | METOUT= 2 (output = METRIC)
00348> | NRUN = 002
00349> | NSTORM= 1
00350> | # 1=LYA2.12h
00351>
00352> 002:0002-----
00353>
00354> # Project Name: [Loyalist Block 'B' SWM] Project Number:[135560220]
00355> # Date : 12-21-2017
00356> # Modeller : [D. Williams]
00357> # Company : Stantec Consulting Ltd. (Waterloo)
00358> # License # : 4730904
00359>
00360> #
00361> # Block B - PROPOSED CONDITIONS
00362> #
00363> # - Hydrologic conditions represent site after stabilization vegetation is
00364> # fully established
00365> # - SWM control provided by slope interruption berms
00366> # - AMC II Conditions
00367> #
00368> #
00369> #
00370>
00371> 002:0002-----
00372>
00373> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 2 Year)
00374> | Ptotal= 42.24 mm | Comments: Belleville IDF (12-hr 30% AES - 2 Year)
00375>
00376> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
00377> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
00378> | 1.00 3.960 | 4.00 6.600 | 7.00 1.320 | 10.00 .000 |
00379> | 2.00 11.440 | 5.00 6.160 | 8.00 .440 | 11.00 .000 |
00380> | 3.00 8.800 | 6.00 3.520 | 9.00 .000 | 12.00 .000 |
00381>
00382>
00383> 002:0003-----
00384>
00385> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=70.00
00386> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00387> | U.H. Tp(hrs)= .340
00388>
00389> Unit Hyd Qpeak (cms)= 1.003
00390>
00391> PEAK FLOW (cms)= .067 (i)
00392> TIME TO PEAK (hrs)= 5.050
00393> RUNOFF VOLUME (mm)= 11.095
00394> TOTAL RAINFALL (mm)= 42.240
00395> RUNOFF COEFFICIENT = .263
00396>
00397> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00398>
00399>
00400> 002:0004-----
00401>
00402> # Route TO_NW flows through slope interruption berms
00403>
00404>
00405> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00406> | IN=01:(B-201 ) |
00407> | OUT=02:(SWM201) |
00408>
00409> |=====|=====|=====|=====|=====|=====|
00410> | OUTFLOW STORAGE | OUTFLOW STORAGE |
00411> | (cms) (ha.m.) | (cms) (ha.m.) |
00412> | .000 .0000E+00 | 2.500 .3100E+00 |
00413> | .000 .2900E+00 | 6.900 .3300E+00 |
00414>
00415> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00416> |-----|-----|-----|-----|
00417> | IN=01:(B-201 ) | 9.64 .067 5.050 11.095 |
00418> | OUT=02:(SWM201) | 9.64 .000 .000 .000 |
00419> | OVERFLOW<10: (OVSWM1) | .00 .000 .000 .000 |
00420>
00421> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00422> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00423> PERCENTAGE OF TIME OVERFLOWING (%)= .00

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00424> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00425> TIME SHIFT OF PEAK FLOW (min)= -303.00
00426> MAXIMUM STORAGE USED (ha.m.)=-.1070E+00
00427>
00428> *** WARNING: Outflow volume is less than inflow volume.
00429>
00430> 002:0005-----
00431>
00432> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
00433> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00434> | U.H. Tp(hrs)= .430
00435>
00436> Unit Hyd Qpeak (cms)= .353
00437>
00438> PEAK FLOW (cms)= .023 (i)
00439> TIME TO PEAK (hrs)= 5.683
00440> RUNOFF VOLUME (mm)= 9.350
00441> TOTAL RAINFALL (mm)= 42.240
00442> RUNOFF COEFFICIENT = .221
00443>
00444> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00445>
00446>
00447>
00448>
00449> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00450> |-----|-----|-----|-----|-----|-----|
00451> | ID1 01:EXTB-1 | 3.97 (.cms) (.hrs) (mm) (cms)
00452> | +ID2 02:SWM201 | 9.64 .000 .000 .000 |
00453> |-----|-----|-----|-----|-----|
00454> | SUM 10:To_NW | 13.61 .023 5.08 2.73 .000
00455>
00456> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00457>
00458>
00459> 002:0007-----
00460>
00461> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=70.00
00462> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00463> | U.H. Tp(hrs)= .830
00464>
00465> Unit Hyd Qpeak (cms)= .315
00466>
00467> PEAK FLOW (cms)= .046 (i)
00468> TIME TO PEAK (hrs)= 5.183
00469> RUNOFF VOLUME (mm)= 11.095
00470> TOTAL RAINFALL (mm)= 42.240
00471> RUNOFF COEFFICIENT = .263
00472>
00473> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00474>
00475>
00476> 002:0008-----
00477>
00478> # Route TO_CTR flows through slope interruption berms
00479>
00480>
00481> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00482> | IN=01:(B-202 ) |
00483> | OUT=02:(SWM202) |
00484>
00485> |=====|=====|=====|=====|=====|=====|
00486> | OUTFLOW STORAGE | OUTFLOW STORAGE |
00487> | (cms) (ha.m.) | (cms) (ha.m.) |
00488> | .000 .0000E+00 | 2.200 .1420E+01 |
00489> | .000 .1330E+01 | 6.200 .1520E+01 |
00490>
00491> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00492> |-----|-----|-----|-----|
00493> | IN=01:(B-202 ) | 6.84 .046 5.183 11.095 |
00494> | OUT=02:(SWM202) | 6.84 .000 .000 .000 |
00495> | OVERFLOW<10: (OVSWM2) | .00 .000 .000 .000 |
00496>
00497> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00498> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00499> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00500>
00501> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00502> TIME SHIFT OF PEAK FLOW (min)= -311.00
00503> MAXIMUM STORAGE USED (ha.m.)=-.7589E-01
00504>
00505> *** WARNING: Outflow volume is less than inflow volume.
00506>
00507> 002:0009-----
00508>
00509> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
00510> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00511> | U.H. Tp(hrs)= .500
00512>
00513> Unit Hyd Qpeak (cms)= 1.432
00514>
00515> PEAK FLOW (cms)= .110 (i)
00516> TIME TO PEAK (hrs)= 5.100
00517> RUNOFF VOLUME (mm)= 9.350
00518> TOTAL RAINFALL (mm)= 42.240
00519> RUNOFF COEFFICIENT = .221
00520>
00521> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00522>
00523>
00524> 002:0010-----
00525>
00526> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00527> |-----|-----|-----|-----|-----|-----|
00528> | ID1 01:EXTB-2 | 18.74 .110 5.10 9.35 .000
00529> | +ID2 02:SWM202 | 6.84 .000 .00 .00 .000
00530> |-----|-----|-----|-----|-----|
00531> | SUM 10:To_CTR | 25.58 .110 5.10 6.85 .000
00532>
00533> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00534>
00535>
00536> 002:0011-----
00537>
00538> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=75.00
00539> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00540> | U.H. Tp(hrs)= .510
00541>
00542> Unit Hyd Qpeak (cms)= .879
00543>
00544> PEAK FLOW (cms)= .095 (i)
00545> TIME TO PEAK (hrs)= 5.083
00546> RUNOFF VOLUME (mm)= 13.235
00547> TOTAL RAINFALL (mm)= 42.240
00548> RUNOFF COEFFICIENT = .313
00549>
00550> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00551>
00552>
00553> 002:0012-----
00554>
00555> # Route TO_SW flows through slope interruption berms
00556>
00557>
00558> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00559> | IN=01:(B-203 ) |
00560> | OUT=02:(SWM203) |
00561>
00562> |=====|=====|=====|=====|=====|=====|
00563> | OUTFLOW STORAGE | OUTFLOW STORAGE |
00564> | (cms) (ha.m.) | (cms) (ha.m.) |
00565> | .000 .0000E+00 | 2.900 .7900E+00 |
00566> | .000 .6500E+00 | 8.300 .7400E+00 |
00567>
00568>

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00565> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00566> (ha) (cms) (hrs) (mm)
00567> INFLOW >01: (B-203 ) 11.74 .000 5.083 13.235
00568> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
00569> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
00570>
00571> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00572> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00573> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00574>
00575> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00576> TIME SHIFT OF PEAK FLOW (min)= -305.00
00577> MAXIMUM STORAGE USED (ha.m.)= .1554E+00
00578>
00579> *** WARNING: Outflow volume is less than inflow volume.
00580>
00581> -----
00582> 002:0013-----
00583>
00584> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
00585> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00586> | U.H. Tp(hrs)= .420
00587>
00588> Unit Hyd Qpeak (cms)= .979
00589>
00590> PEAK FLOW (cms)= .066 (i)
00591> TIME TO PEAK (hrs)= 5.067
00592> RUNOFF VOLUME (mm)= 9.673
00593> TOTAL RAINFALL (mm)= 42.240
00594> RUNOFF COEFFICIENT = .229
00595>
00596> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00597>
00598> -----
00599> 002:0014-----
00600>
00601> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00602> (ha) (cms) (hrs) (mm) (cms)
00603> ID1 01:To_SW 10.77 .066 5.07 9.67 .000
00604> +ID2 02:SWM203 11.74 .000 .00 .00 .000
00605> =====
00606> SUM 01:To_SW 22.51 .066 5.07 4.63 .000
00607>
00608> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00609>
00610> -----
00611> 002:0015-----
00612>
00613> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
00614> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00615> | U.H. Tp(hrs)= .700
00616>
00617> Unit Hyd Qpeak (cms)= .274
00618>
00619> PEAK FLOW (cms)= .030 (i)
00620> TIME TO PEAK (hrs)= 5.150
00621> RUNOFF VOLUME (mm)= 9.673
00622> TOTAL RAINFALL (mm)= 42.240
00623> RUNOFF COEFFICIENT = .229
00624>
00625> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00626>
00627> -----
00628> 002:0016-----
00629>
00630> 002:0002-----
00631> ** END OF RUN : 2
00632>
00633> -----
00634>
00635>
00636>
00637>
00638>
00639>
00640> | START | Project dir.: C:\usr\LOYB\
00641> | Rainfall dir.: C:\usr\LOYB\
00642> TZERO = .00 hrs on 0
00643> METOUT= 2 (output = METRIC)
00644> NRUN = 003
00645> NSTORM= 1
00646> # 1=LYA5.1hr
00647>
00648> 003:0002-----
00649> #*****
00650> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00651> # Date : 12-21-2017
00652> # Modeller : [D. Williams]
00653> # Company : Stantec Consulting Ltd. (Waterloo)
00654> # License # 4739984
00655> #*****
00656> #
00657> # Block B - PROPOSED CONDITIONS
00658> #
00659> # - Hydrologic conditions represent site after stabilization vegetation is
00660> # fully established
00661> # - SWM control provided by slope interruption berms
00662> # - AMC II Conditions
00663> #
00664> #
00665> #*****
00666>
00667> 003:0002-----
00668>
00669> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 5 Year)
00670> | Ptotal= 28.00 mm | Comments: Belleville IDF (1-hr 30% AES - 5 Year)
00671>
00672> TIME RAIN | TIME RAIN | TIME RAIN
00673> hrs mm/hr | hrs mm/hr | hrs mm/hr
00674> .00 30.240 | .33 36.960 | .58 33.600 | .83 10.080
00675> .17 47.040 | .42 43.680 | .67 16.800 | .92 3.360
00676> .25 70.560 | .50 30.240 | .75 13.440 | 1.00 .000
00677>
00678> -----
00679> 003:0003-----
00680>
00681> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=70.00
00682> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00683> | U.H. Tp(hrs)= .340
00684>
00685> Unit Hyd Qpeak (cms)= 1.083
00686>
00687> PEAK FLOW (cms)= .167 (i)
00688> TIME TO PEAK (hrs)= .850
00689> RUNOFF VOLUME (mm)= 5.188
00690> TOTAL RAINFALL (mm)= 28.000
00691> RUNOFF COEFFICIENT = .185
00692>
00693> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00694>
00695> -----
00696> 003:0004-----
00697> #*****
00698> # Route TO_NW flows through slope interruption berms
00699> #*****
00700>
00701> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00702> | IN=01:(B-201 ) |
00703> | OUT=02:(SWM201 ) |
00704> -----
00705>

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00706> .000 .000E+00 | 2.500 .3100E+00
00707> .000 .2900E+00 | 6.900 .3300E+00
00708>
00709> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00710> (ha) (cms) (hrs) (mm)
00711> INFLOW >01: (B-201 ) 9.64 .167 .850 5.188
00712> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
00713> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
00714>
00715> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00716> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00717> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00718>
00719> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00720> TIME SHIFT OF PEAK FLOW (min)= -51.00
00721> MAXIMUM STORAGE USED (ha.m.)= .5001E-01
00722>
00723> *** WARNING: Outflow volume is less than inflow volume.
00724>
00725> -----
00726> 003:0005-----
00727>
00728> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
00729> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00730> | U.H. Tp(hrs)= .430
00731>
00732> Unit Hyd Qpeak (cms)= .353
00733>
00734> PEAK FLOW (cms)= .050 (i)
00735> TIME TO PEAK (hrs)= .950
00736> RUNOFF VOLUME (mm)= 4.301
00737> TOTAL RAINFALL (mm)= 28.000
00738> RUNOFF COEFFICIENT = .154
00739>
00740> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00741>
00742> -----
00743> 003:0006-----
00744>
00745> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00746> (ha) (cms) (hrs) (mm) (cms)
00747> ID1 01:EXTB-1 3.97 .050 .95 4.30 .000
00748> +ID2 02:SWM201 9.64 .000 .00 .00 .000
00749> =====
00750> SUM 10:To_NW 13.61 .050 .95 1.25 .000
00751>
00752> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00753>
00754> -----
00755> 003:0007-----
00756>
00757> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=70.00
00758> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00759> | U.H. Tp(hrs)= .830
00760>
00761> Unit Hyd Qpeak (cms)= .315
00762>
00763> PEAK FLOW (cms)= .061 (i)
00764> TIME TO PEAK (hrs)= 1.317
00765> RUNOFF VOLUME (mm)= 5.188
00766> TOTAL RAINFALL (mm)= 28.000
00767> RUNOFF COEFFICIENT = .185
00768>
00769> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00770>
00771> -----
00772> 003:0008-----
00773> #*****
00774> # Route TO_CTR flows through slope interruption berms
00775> #*****
00776>
00777> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00778> | IN=01:(B-202 ) |
00779> | OUT=02:(SWM202 ) |
00780> -----
00781>
00782> OUTFLOW STORAGE TABLE
00783> OUTFLOW STORAGE OUTFLOW STORAGE
00784> (cms) (ha.m.) (cms) (ha.m.)
00785> .000 .000E+00 2.200 .1420E+01
00786> .000 .1330E+01 6.200 .1520E+01
00787>
00788> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00789> (ha) (cms) (hrs) (mm)
00790> INFLOW >01: (B-202 ) 6.84 .061 1.317 5.188
00791> OUTFLOW<02: (SWM202) 6.84 .000 .000 .000
00792> OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
00793>
00794> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00795> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00796> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00797>
00798> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00799> TIME SHIFT OF PEAK FLOW (min)= -79.00
00800> MAXIMUM STORAGE USED (ha.m.)= .3549E-01
00801>
00802> *** WARNING: Outflow volume is less than inflow volume.
00803>
00804> -----
00805> 003:0009-----
00806>
00807> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
00808> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00809> | U.H. Tp(hrs)= .500
00810>
00811> Unit Hyd Qpeak (cms)= 1.432
00812>
00813> PEAK FLOW (cms)= .211 (i)
00814> TIME TO PEAK (hrs)= 1.000
00815> RUNOFF VOLUME (mm)= 4.301
00816> TOTAL RAINFALL (mm)= 28.000
00817> RUNOFF COEFFICIENT = .154
00818>
00819> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00820>
00821> -----
00822> 003:0010-----
00823>
00824> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00825> (ha) (cms) (hrs) (mm) (cms)
00826> ID1 01:EXTB-2 18.74 .211 1.00 4.30 .000
00827> +ID2 02:SWM202 6.84 .000 .00 .00 .000
00828> =====
00829> SUM 10:To_CTR 25.58 .211 1.00 3.15 .000
00830>
00831> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00832>
00833> -----
00834> 003:0011-----
00835>
00836> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=75.00
00837> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00838> | U.H. Tp(hrs)= .510
00839>
00840> Unit Hyd Qpeak (cms)= .879
00841>
00842> PEAK FLOW (cms)= .191 (i)
00843> TIME TO PEAK (hrs)= 1.017
00844> RUNOFF VOLUME (mm)= 6.317
00845> TOTAL RAINFALL (mm)= 28.000
00846> RUNOFF COEFFICIENT = .226
00847>
00848> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00849>

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00988: TOTAL RAINFALL (mm)= 55.968
00989: RUNOFF COEFFICIENT = .325
00990:
00991: (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00992:
00993:
00994: 004:0004
00995: *#*****
00996: # Route To_NW flows through slope interruption berms
00997: *#*****
00998:
00999: ROUTE RESERVOIR | Requested routing time step = 1.0 min.
1000: IN>01:(B-201) |
1001: OUT<02:(SWM201) |
=====
1002: OUTFLOW STORAGE | OUTFLOW STORAGE
1003: (cms) (ha.m.) | (cms) (ha.m.)
1004: .000 .000E+00 | 2.500 .310E+00
1005: .000 .290E+00 | 6.900 .330E+00
1006:
ROUTING RESULTS AREA APEAK TPEAK R.V.
1007: (ha) (cms) (hrs) (mm)
1008: INFLOW >01: (B-201) 9.64 .108 3.150 18.165
1009: OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
1010: OVERFLOW<10: (OVSM1) .00 .000 .000 .000
1011:
1012: TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
1013: CUMULATIVE TIME OF OVERFLOWS (hours)= .00
1014: PERCENTAGE OF TIME OVERFLOWING (%)= .00
1015:
1016: PEAK FLOW REDUCTION [Qout/Qin](%)= .000
1017: TIME SHIFT OF PEAK FLOW (min)= -189.00
1018: MAXIMUM STORAGE USED (ha.m.)=.1751E+00
1019:
1020: *** WARNING: Outflow volume is less than inflow volume.
1021:
1022:
1023: 004:0005
1024:
1025: DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
1026: 01:EXTB-1 DT= 1.00 | U.A. (mm)= 1.500 # of Linear Res.(N)= 3.00
1027: U.H. Tp(hrs)= .430
1028:
1029: Unit Hyd Qpeak (cms)= .353
1030:
1031: PEAK FLOW (cms)= .038 (i)
1032: TIME TO PEAK (hrs)= 5.067
1033: RUNOFF VOLUME (mm)= 15.514
1034: TOTAL RAINFALL (mm)= 55.968
1035: RUNOFF COEFFICIENT = .277
1036:
1037: (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
1038:
1039:
1040:
1041: 004:0006
1042:
1043: | ADD HYD (To_NW) | ID: NHYD AREA APEAK TPEAK R.V. DWF
1044: (ha) (cms) (hrs) (mm) (cms)
1045: ID1 01:EXTB-1 3.97 .038 5.07 15.51 .000
1046: +ID2 02:SWM201 9.64 .000 .000 .000
1047:
=====
1048: SUM 10:To_NW 13.61 .038 5.07 4.53 .000
1049:
1050: NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
1051:
1052:
1053: 004:0007
1054:
1055: DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=70.00
1056: 01:B-202 DT= 1.00 | U.A. (mm)= 1.500 # of Linear Res.(N)= 3.00
1057: U.H. Tp(hrs)= .830
1058:
1059: Unit Hyd Qpeak (cms)= .315
1060:
1061: PEAK FLOW (cms)= .074 (i)
1062: TIME TO PEAK (hrs)= 5.150
1063: RUNOFF VOLUME (mm)= 18.165
1064: TOTAL RAINFALL (mm)= 55.968
1065: RUNOFF COEFFICIENT = .325
1066:
1067: (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
1068:
1069:
1070: 004:0008
1071:
1072: # Route To_CTR flows through slope interruption berms
1073: *#*****
1074:
1075: ROUTE RESERVOIR | Requested routing time step = 1.0 min.
1076: IN>01:(B-202) |
1077: OUT<02:(SWM202) |
=====
1078: OUTFLOW STORAGE | OUTFLOW STORAGE
1079: (cms) (ha.m.) | (cms) (ha.m.)
1080: .000 .000E+00 | 2.200 .1420E+01
1081: .000 .1330E+01 | 6.200 .1520E+01
1082:
ROUTING RESULTS AREA APEAK TPEAK R.V.
1083: (ha) (cms) (hrs) (mm)
1084: INFLOW >01: (B-202) 6.84 .074 5.150 18.165
1085: OUTFLOW<02: (SWM202) 6.84 .000 .000 .000
1086: OVERFLOW<10: (OVSM2) .00 .000 .000 .000
1087:
1088: TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
1089: CUMULATIVE TIME OF OVERFLOWS (hours)= .00
1090: PERCENTAGE OF TIME OVERFLOWING (%)= .00
1091:
1092: PEAK FLOW REDUCTION [Qout/Qin](%)= .000
1093: TIME SHIFT OF PEAK FLOW (min)= -309.00
1094: MAXIMUM STORAGE USED (ha.m.)=.1242E+00
1095:
1096: *** WARNING: Outflow volume is less than inflow volume.
1097:
1098:
1099: 004:0009
1100:
1101: DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
1102: 01:EXTB-2 DT= 1.00 | U.A. (mm)= 1.500 # of Linear Res.(N)= 3.00
1103: U.H. Tp(hrs)= .500
1104:
1105: Unit Hyd Qpeak (cms)= 1.432
1106:
1107: PEAK FLOW (cms)= .178 (i)
1108: TIME TO PEAK (hrs)= 5.083
1109: RUNOFF VOLUME (mm)= 15.514
1110: TOTAL RAINFALL (mm)= 55.968
1111: RUNOFF COEFFICIENT = .277
1112:
1113: (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
1114:
1115:
1116:
1117: 004:0010
1118:
1119: | ADD HYD (To_CTR) | ID: NHYD AREA APEAK TPEAK R.V. DWF
1120: (ha) (cms) (hrs) (mm) (cms)
1121: ID1 01:EXTB-2 18.74 .178 5.08 15.51 .000
1122: +ID2 02:SWM202 6.84 .000 .000 .000
1123:
=====
1124: SUM 10:To_CTR 25.58 .178 5.08 11.37 .000
1125:
1126: NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
1127:
1128:

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01129> 004:0011-----
01130> |-----|
01131> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=75.00
01132> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01133> |-----| U.H. Tp(hrs)= .510
01134>
01135> Unit Hyd Qpeak (cms)= .879
01136>
01137> PEAK FLOW (cms)= .150 (i)
01138> TIME TO PEAK (hrs)= 3.317
01139> RUNOFF VOLUME (mm)= 21.323
01140> TOTAL RAINFALL (mm)= 55.968
01141> RUNOFF COEFFICIENT = .381
01142>
01143> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01144>
01145> -----
01146> 004:0012-----
01147> *# Route To SW flows through slope interruption berms
01148> *#-----
01149> *#-----
01150>
01151> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01152> | IN=01: (B-203 ) |
01153> | OUT=02: (SWM203) |
01154> -----
01155> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01156> | (cms) (ha.m.) | (cms) (ha.m.) |
01157> | .000 .0000E+00 | 2.900 .7000E+00 |
01158> | .000 .6500E+00 | 8.300 .7400E+00 |
01159>
01160> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01161> | INFLW >01: (B-203 ) | (ha) (cms) (hrs) (mm)
01162> | OUTFLOW=02: (SWM203) | 11.74 .000 .000 21.323
01163> | OVERFLOW<10: (OVSWM3) | .00 .000 .000 .000
01164>
01165> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01166> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01167> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01168>
01169> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01170> TIME SHIFT OF PEAK FLOW (min)= -199.00
01171> MAXIMUM STORAGE USED (ha.m.)= .2503E+00
01172>
01173> *** WARNING: Outflow volume is less than inflow volume.
01174>
01175> -----
01176> 004:0013-----
01177> |-----|
01178> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
01179> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01180> |-----| U.H. Tp(hrs)= .420
01181>
01182> Unit Hyd Qpeak (cms)= .979
01183>
01184> PEAK FLOW (cms)= .106 (i)
01185> TIME TO PEAK (hrs)= 5.067
01186> RUNOFF VOLUME (mm)= 16.009
01187> TOTAL RAINFALL (mm)= 55.968
01188> RUNOFF COEFFICIENT = .286
01189>
01190> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01191>
01192> -----
01193> 004:0014-----
01194> |-----|
01195> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01196> |-----| (ha) (cms) (hrs) (mm) (cms)
01197> | ID1 01:To_SW | 10.77 .106 5.07 16.01 .000
01198> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000
01199>
01200> SUM 01:To_SW 22.51 .106 5.07 7.66 .000
01201>
01202> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01203>
01204> -----
01205> 004:0015-----
01206> |-----|
01207> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
01208> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01209> |-----| U.H. Tp(hrs)= .700
01210>
01211> Unit Hyd Qpeak (cms)= .274
01212>
01213> PEAK FLOW (cms)= .049 (i)
01214> TIME TO PEAK (hrs)= 5.133
01215> RUNOFF VOLUME (mm)= 16.009
01216> TOTAL RAINFALL (mm)= 55.968
01217> RUNOFF COEFFICIENT = .286
01218>
01219> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01220>
01221> -----
01222> 004:0016-----
01223> |-----|
01224> 004:0002-----
01225> |-----|
01226> 004:0002-----
01227> |-----|
01228> 004:0002-----
01229> ** END OF RUN : 4
01230>
01231> -----
01232>
01233>
01234>
01235>
01236>
01237>
01238> | START | Project dir.: C:\usr\LOYB\
01239> |-----| Rainfall dir.: C:\usr\LOYB\
01240>
01241> TZERO = .00 hrs on
01242> METOUT= 2 (output= METRIC)
01243> NRUN = 005
01244> NSTORM= 1
01245> # 1=LYA100.1hr
01246>
01247> 005:0002-----
01248> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01249> *# Date : 12-21-2017
01250> *# Modeller : [D. Williams]
01251> *# Company : Stantec Consulting Ltd. (Waterloo)
01252> *# License # : 4739994
01253> *#-----
01254> *#
01255> *# Block B - PROPOSED CONDITIONS
01256> *#
01257> *# - Hydrologic conditions represent site after stabilization vegetation is
01258> *# fully established
01259> *# - SWM control provided by slope interruption berms
01260> *# - AMC II Conditions
01261> *#
01262> *#
01263> *#-----
01264>
01265> 005:0002-----
01266> |-----|
01267> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 100 Year)
01268> | Ptotal= 44.10 mm | Comments: Belleville IDF (1-hr 30% AES - 100 Year)
01269>

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01270> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01271> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01272> | .08 47.628 | .33 58.212 | .58 52.020 | .83 15.876
01273> | .17 74.088 | .42 68.796 | .67 26.460 | .92 5.292
01274> | .25 111.132 | .50 47.628 | .75 21.168 | 1.00 .000
01275>
01276>
01277> 005:0003-----
01278> |-----|
01279> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=70.00
01280> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01281> |-----| U.H. Tp(hrs)= .340
01282>
01283> Unit Hyd Qpeak (cms)= 1.083
01284>
01285> PEAK FLOW (cms)= .385 (i)
01286> TIME TO PEAK (hrs)= .833
01287> RUNOFF VOLUME (mm)= 11.982
01288> TOTAL RAINFALL (mm)= 44.100
01289> RUNOFF COEFFICIENT = .272
01290>
01291> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01292>
01293> -----
01294> 005:0004-----
01295> *# Route To NW flows through slope interruption berms
01296> *#-----
01297> *#-----
01298>
01299> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01300> | IN=01: (B-201 ) |
01301> | OUT=02: (SWM201) |
01302> -----
01303> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01304> | (cms) (ha.m.) | (cms) (ha.m.) |
01305> | .000 .0000E+00 | 2.500 .3100E+00 |
01306> | .000 .2900E+00 | 6.900 .3300E+00 |
01307>
01308> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01309> | INFLW >01: (B-201 ) | (ha) (cms) (hrs) (mm)
01310> | OUTFLOW=02: (SWM201) | 9.64 .385 .833 11.982
01311> | OVERFLOW<10: (OVSWM1) | .00 .000 .000 .000
01312>
01313> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01314> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01315> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01316>
01317> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01318> TIME SHIFT OF PEAK FLOW (min)= -50.982
01319> MAXIMUM STORAGE USED (ha.m.)= .1155E+00
01320>
01321> *** WARNING: Outflow volume is less than inflow volume.
01322>
01323> -----
01324> 005:0005-----
01325> |-----|
01326> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
01327> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01328> |-----| U.H. Tp(hrs)= .430
01329>
01330> Unit Hyd Qpeak (cms)= .353
01331>
01332> PEAK FLOW (cms)= .116 (i)
01333> TIME TO PEAK (hrs)= .933
01334> RUNOFF VOLUME (mm)= 10.117
01335> TOTAL RAINFALL (mm)= 44.100
01336> RUNOFF COEFFICIENT = .229
01337>
01338> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01339>
01340> -----
01341> 005:0006-----
01342> |-----|
01343> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01344> |-----| (ha) (cms) (hrs) (mm) (cms)
01345> | ID1 01:EXTB-1 | 3.97 .116 .93 10.12 .000
01346> | +ID2 02:SWM201 | 9.64 .000 .00 .00 .000
01347>
01348> SUM 10:To_NW 13.61 .116 .93 2.95 .000
01349>
01350> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01351>
01352> -----
01353> 005:0007-----
01354> |-----|
01355> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=70.00
01356> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01357> |-----| U.H. Tp(hrs)= .830
01358>
01359> Unit Hyd Qpeak (cms)= .315
01360>
01361> PEAK FLOW (cms)= .141 (i)
01362> TIME TO PEAK (hrs)= 1.300
01363> RUNOFF VOLUME (mm)= 11.982
01364> TOTAL RAINFALL (mm)= 44.100
01365> RUNOFF COEFFICIENT = .272
01366>
01367> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01368>
01369> -----
01370> 005:0008-----
01371> *# Route To CTR flows through slope interruption berms
01372> *#-----
01373> *#-----
01374>
01375> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01376> | IN=01: (B-202 ) |
01377> | OUT=02: (SWM202) |
01378> -----
01379> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01380> | (cms) (ha.m.) | (cms) (ha.m.) |
01381> | .000 .0000E+00 | 2.200 .1420E+01 |
01382> | .000 .1330E+01 | 6.200 .1520E+01 |
01383>
01384> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01385> | INFLW >01: (B-202 ) | (ha) (cms) (hrs) (mm)
01386> | OUTFLOW=02: (SWM202) | 6.84 .000 .000 .000
01387> | OVERFLOW<10: (OVSWM2) | .00 .000 .000 .000
01388>
01389> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01390> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01391> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01392>
01393> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01394> TIME SHIFT OF PEAK FLOW (min)= -78.00
01395> MAXIMUM STORAGE USED (ha.m.)= .8196E-01
01396>
01397> *** WARNING: Outflow volume is less than inflow volume.
01398>
01399> -----
01400> 005:0009-----
01401> |-----|
01402> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
01403> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01404> |-----| U.H. Tp(hrs)= .500
01405>
01406> Unit Hyd Qpeak (cms)= 1.432
01407>
01408> PEAK FLOW (cms)= .495 (i)
01409> TIME TO PEAK (hrs)= 1.000
01410> RUNOFF VOLUME (mm)= 10.117

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01411> TOTAL RAINFALL (mm)= 44.100
01412> RUNOFF COEFFICIENT = .229
01413>
01414> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01415>
01416> -----
01417> 005:0010-----
01418>
01419> | ADD HYD (To_CTR ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01420> -----
01421> | ID1 01:EXTB-2 | 11.74 .495 1.00 10.12 .000
01422> | +ID2 02:SWM202 | 6.84 .000 .00 .00 .000
01423> |=====|
01424> | SUM 10:To_CTR | 25.58 .495 1.00 7.41 .000
01425>
01426> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01427>
01428> -----
01429> 005:0011-----
01430>
01431> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=75.00
01432> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01433> |-----|
01434> | U.H. Tp(hrs)= .510
01435>
01436> Unit Hyd Qpeak (cms)= .879
01437>
01438> PEAK FLOW (cms)= .430 (i)
01439> TIME TO PEAK (hrs)= 1.000
01440> RUNOFF VOLUME (mm)= 14.259
01441> TOTAL RAINFALL (mm)= 44.100
01442> RUNOFF COEFFICIENT = .323
01443>
01444> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01445>
01446> -----
01447> 005:0012-----
01448> *# Route To_SW flows through slope interruption berms
01449> *#-----
01450>
01451> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01452> | IN=01:(B-203 ) |
01453> | OUT=02:(SWM203 ) |
01454> |-----|
01455> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01456> | (cms) (ha.m.) | (cms) (ha.m.) |
01457> | .000 .0000E+00 | 2.900 .7000E+00 |
01458> |-----|
01459>
01460> ROUTING RESULTS AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
01461> | INFLOW >01: (B-203 ) | 11.74 .430 1.000 14.259
01462> | OUTFLOW=02: (SWM203 ) | 11.74 .000 .000 .000
01463> | OVERFLOW<10: (OVSWM3 ) | .00 .000 .000 .000
01464>
01465> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01466> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01467> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01468>
01469> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01470> TIME SHIFT OF PEAK FLOW (min)= -60.00
01471> MAXIMUM STORAGE USED (ha.m.)=.1674E+00
01472>
01473> *** WARNING: Outflow volume is less than inflow volume.
01474>
01475> -----
01476> 005:0013-----
01477>
01478> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
01479> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01480> |-----|
01481> | U.H. Tp(hrs)= .420
01482>
01483> Unit Hyd Qpeak (cms)= .979
01484>
01485> PEAK FLOW (cms)= .331 (i)
01486> TIME TO PEAK (hrs)= .917
01487> RUNOFF VOLUME (mm)= 10.463
01488> TOTAL RAINFALL (mm)= 44.100
01489> RUNOFF COEFFICIENT = .237
01490>
01491> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01492>
01493> -----
01494> 005:0014-----
01495>
01496> | ADD HYD (To_SW ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01497> -----
01498> | ID1 01:To_SW | 10.77 .331 .92 10.46 .000
01499> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000
01500> |=====|
01501> | SUM 01:To_SW | 22.51 .331 .92 5.01 .000
01502>
01503> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01504>
01505> -----
01506> 005:0015-----
01507>
01508> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
01509> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01510> |-----|
01511> | U.H. Tp(hrs)= .700
01512>
01513> Unit Hyd Qpeak (cms)= .274
01514>
01515> PEAK FLOW (cms)= .105 (i)
01516> TIME TO PEAK (hrs)= 1.183
01517> RUNOFF VOLUME (mm)= 10.463
01518> TOTAL RAINFALL (mm)= 44.100
01519> RUNOFF COEFFICIENT = .237
01520>
01521> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01522>
01523> -----
01524> 005:0016-----
01525>
01526> 005:0002-----
01527>
01528> 005:0002-----
01529>
01530> 005:0002-----
01531> ** END OF RUN : 5
01532>
01533> -----
01534>
01535>
01536>
01537>
01538>
01539>
01540> | START | Project dir.: C:\usr\LOYB\
01541> |-----| Rainfall dir.: C:\usr\LOYB\
01542> | TZERO = .00 hrs on 0
01543> | METOUT= 2 (output= METRIC)
01544> | NRUN = 006
01545> | NSTORM= 1
01546> | # 1=LYA100.12h
01547>
01548> 005:0002-----
01549> *#-----
01550> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01551> *# Date : 12-21-2017

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01552> *# Modeller : [D. Williams]
01553> *# Company : Stantec Consulting Ltd. (Waterloo)
01554> *# License # : 4730904
01555> *#-----
01556> *#
01557> *# Block B - PROPOSED CONDITIONS
01558> *#
01559> *# Hydrologic conditions represent site after stabilization vegetation is
01560> *# fully established
01561> *# - SWM control provided by slope interruption berms
01562> *# - AMC II Conditions
01563> *#
01564> *#
01565> *#-----
01566>
01567> 006:0002-----
01568>
01569> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 100 Year
01570> | Ptotal= 93.70 mm | Comments: Belleville IDF (12-hr 30% AES - 100 Year
01571>
01572> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
01573> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
01574> | 1.00 8.784 | 4.00 14.640 | 7.00 2.928 | 10.00 .000 |
01575> | 2.00 25.374 | 5.00 13.664 | 8.00 .976 | 11.00 .000 |
01576> | 3.00 19.520 | 6.00 7.808 | 9.00 .000 | 12.00 .000 |
01577>
01578> -----
01579> 006:0003-----
01580>
01581> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=70.00
01582> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01583> |-----|
01584> | U.H. Tp(hrs)= .340
01585>
01586> Unit Hyd Qpeak (cms)= 1.083
01587>
01588> PEAK FLOW (cms)= .258 (i)
01589> TIME TO PEAK (hrs)= 3.117
01590> RUNOFF VOLUME (mm)= 42.278
01591> TOTAL RAINFALL (mm)= 93.696
01592> RUNOFF COEFFICIENT = .451
01593>
01594> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01595>
01596> -----
01597> 006:0004-----
01598>
01599> *# Route To_Nw flows through slope interruption berms
01600> *#-----
01601>
01602> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01603> | IN=01:(B-201 ) |
01604> | OUT=02:(SWM201 ) |
01605> |-----|
01606> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01607> | (cms) (ha.m.) | (cms) (ha.m.) |
01608> | .000 .0000E+00 | 2.500 .3100E+00 |
01609> |-----|
01610>
01611> ROUTING RESULTS AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
01612> | INFLOW >01: (B-201 ) | 9.64 .258 3.117 42.278
01613> | OUTFLOW=02: (SWM201 ) | 9.64 .232 5.150 12.195
01614> | OVERFLOW<10: (OVSWM1 ) | .00 .000 .000 .000
01615>
01616> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01617> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01618> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01619>
01620> PEAK FLOW REDUCTION [Qout/Qin](%)= 89.938
01621> TIME SHIFT OF PEAK FLOW (min)= 122.00
01622> MAXIMUM STORAGE USED (ha.m.)=.2919E+00
01623>
01624> *** WARNING: Outflow volume is less than inflow volume.
01625>
01626> -----
01627> 006:0005-----
01628>
01629> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
01630> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01631> |-----|
01632> | U.H. Tp(hrs)= .430
01633>
01634> Unit Hyd Qpeak (cms)= .353
01635>
01636> PEAK FLOW (cms)= .090 (i)
01637> TIME TO PEAK (hrs)= 3.217
01638> RUNOFF VOLUME (mm)= 37.124
01639> TOTAL RAINFALL (mm)= 93.696
01640> RUNOFF COEFFICIENT = .396
01641>
01642> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01643>
01644> -----
01645> 006:0006-----
01646>
01647> | ADD HYD (To_Nw ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01648> -----
01649> | ID1 01:EXTB-1 | 3.97 .090 3.22 37.12 .000
01650> | +ID2 02:SWM201 | 9.64 .232 5.15 12.20 .000
01651> |=====|
01652> | SUM 10:To_Nw | 13.61 .318 5.15 19.47 .000
01653>
01654> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01655>
01656> -----
01657> 006:0007-----
01658>
01659> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=70.00
01660> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01661> |-----|
01662> | U.H. Tp(hrs)= .830
01663>
01664> Unit Hyd Qpeak (cms)= .315
01665>
01666> PEAK FLOW (cms)= .166 (i)
01667> TIME TO PEAK (hrs)= 5.083
01668> RUNOFF VOLUME (mm)= 42.278
01669> TOTAL RAINFALL (mm)= 93.696
01670> RUNOFF COEFFICIENT = .451
01671>
01672> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01673>
01674> -----
01675> 006:0008-----
01676>
01677> *# Route To_CTR flows through slope interruption berms
01678> *#-----
01679>
01680> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01681> | IN=01:(B-202 ) |
01682> | OUT=02:(SWM202 ) |
01683> |-----|
01684> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01685> | (cms) (ha.m.) | (cms) (ha.m.) |
01686> | .000 .0000E+00 | 2.200 .1420E+01 |
01687> |-----|
01688>
01689> ROUTING RESULTS AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
01690> | INFLOW >01: (B-202 ) | 6.84 .166 5.083 42.278
01691> | OUTFLOW=02: (SWM202 ) | 6.84 .000 .000 .000
01692> | OVERFLOW<10: (OVSWM2 ) | .00 .000 .000 .000
01693>
01694> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01695> CUMULATIVE TIME OF OVERFLOWS (hours)= .00

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01693> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01694>
01695>
01696> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01697> TIME SHIFT OF PEAK FLOW (min)= -305.00
01698> MAXIMUM STORAGE USED (ha.m.)=-.2892E+00
01699>
01700> *** WARNING: Outflow volume is less than inflow volume.
01701>
01702> 006:0009-----
01703> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
01704> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01705> | U.H. Tp(hrs)= .500
01706>
01707> Unit Hyd Qpeak (cms)= 1.432
01708>
01709>
01710> PEAK FLOW (cms)= .419 (i)
01711> TIME TO PEAK (hrs)= 3.300
01712> RUNOFF VOLUME (mm)= 37.124
01713> TOTAL RAINFALL (mm)= 93.696
01714> RUNOFF COEFFICIENT = .396
01715>
01716> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01717>
01718>-----
01719> 006:0010-----
01720> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01721> | (ha) (cms) (hrs) (mm) (cms)
01722> ID1 01:EXTB-2 18.74 .419 3.30 37.12 .000
01723> +ID2 02:SWM202 6.84 .000 .00 .00 .000
01724>=====
01725> SUM 10:To_CTR 25.58 .419 3.30 27.20 .000
01726>
01727>
01728> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01729>
01730>-----
01731> 006:0011-----
01732>-----
01733> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=75.00
01734> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01735> | U.H. Tp(hrs)= .510
01736>
01737> Unit Hyd Qpeak (cms)= .879
01738>
01739>
01740> PEAK FLOW (cms)= .349 (i)
01741> TIME TO PEAK (hrs)= 3.233
01742> RUNOFF VOLUME (mm)= 48.061
01743> TOTAL RAINFALL (mm)= 93.696
01744> RUNOFF COEFFICIENT = .513
01745>
01746> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01747>
01748>-----
01749> 006:0012-----
01750> *# Route TO_SW flows through slope interruption berms
01751> *#-----
01752>-----
01753> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01754> | IN=01:(B-203 ) |
01755> | OUT=02:(SWM203) | ===== OUTFLOW STORAGE TABLE =====
01756> | OUTFLOW STORAGE OUTFLOW STORAGE
01757> | (cms) (ha.m.) | (cms) (ha.m.)
01758> .000 .0000E+00 2.900 .7000E+00
01759> .000 .6500E+00 8.300 .7400E+00
01760>
01761> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01762> (ha) (cms) (hrs) (mm)
01763> INFLOW >01: (B-203 ) 11.74 .349 3.233 48.061
01764> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
01765> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
01766>
01767> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01768> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01769> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01770>
01771>
01772> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01773> TIME SHIFT OF PEAK FLOW (min)= -194.00
01774> MAXIMUM STORAGE USED (ha.m.)=-.5642E+00
01775>
01776> *** WARNING: Outflow volume is less than inflow volume.
01777>
01778> 006:0013-----
01779>-----
01780> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
01781> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01782> | U.H. Tp(hrs)= .420
01783>
01784> Unit Hyd Qpeak (cms)= .979
01785>
01786>
01787> PEAK FLOW (cms)= .253 (i)
01788> TIME TO PEAK (hrs)= 3.200
01789> RUNOFF VOLUME (mm)= 38.110
01790> TOTAL RAINFALL (mm)= 93.696
01791> RUNOFF COEFFICIENT = .407
01792>
01793> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01794>
01795>-----
01796> 006:0014-----
01797> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01798> | (ha) (cms) (hrs) (mm) (cms)
01799> ID1 01:To_SW 10.77 .253 3.20 38.11 .000
01800> +ID2 02:SWM203 11.74 .000 .00 .00 .000
01801>=====
01802> SUM 01:To_SW 22.51 .253 3.20 18.23 .000
01803>
01804> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01805>
01806>-----
01807> 006:0015-----
01808>-----
01809> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
01810> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01811> | U.H. Tp(hrs)= .700
01812>
01813> Unit Hyd Qpeak (cms)= .274
01814>
01815>
01816> PEAK FLOW (cms)= .112 (i)
01817> TIME TO PEAK (hrs)= 5.003
01818> RUNOFF VOLUME (mm)= 38.110
01819> TOTAL RAINFALL (mm)= 93.696
01820> RUNOFF COEFFICIENT = .407
01821>
01822> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01823>
01824>-----
01825> 006:0016-----
01826> 006:0002-----
01827>-----
01828> 006:0002-----
01829>-----
01830> 006:0002-----
01831>-----
01832> 006:0002-----
01833>-----
01834> 006:0002-----
01835> ** END OF RUN : 6
01836>
01837>-----
01838>-----
01839>-----
01840>-----
01841>-----
01842>-----
01843>-----
01844> | START | Project dir.: C:\usr\LOYB\
01845> | Rainfall dir.: C:\usr\LOYB\
01846> TZERO = .00 hrs on 0
01847> METOUT= 2 (output = METRIC)
01848> NRUN = 007
01849> NSTORM= 1
01850> # 1=25mm.4hr
01851>-----
01852> 007:0002-----
01853> *#-----
01854> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01855> *# Date : 12-21-2017
01856> *# Modeller : [D. Williams]
01857> *# Company : Stantec Consulting Ltd. (Waterloo)
01858> *# License # : 4730904
01859> *#-----
01860> *#
01861> *#
01862> *# Block B - PROPOSED CONDITIONS
01863> *# Hydrologic conditions represent site after stabilization vegetation is
01864> *# fully established
01865> *# SWM control provided by slope interruption berms
01866> *# AMC II Conditions
01867> *#
01868> *#
01869> *#-----
01870>-----
01871> 007:0002-----
01872>-----
01873> | READ STORM | Filename: 25 mm, 4hr Chicago Storm
01874> | Ptotal= 25.00 mm | Comments: 25 mm, 4hr Chicago Storm
01875>-----
01876> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
01877> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
01878> .08 1.465 1.08 4.024 2.98 5.764 3.08 2.074
01879> .17 1.540 1.17 4.814 2.17 4.969 3.17 1.977
01880> .25 1.625 1.25 6.025 2.25 4.374 3.25 1.889
01881> .33 1.720 1.33 8.114 2.33 3.913 3.33 1.810
01882> .42 1.829 1.42 12.526 2.42 3.545 3.42 1.737
01883> .50 1.955 1.50 27.198 2.50 3.245 3.50 1.671
01884> .58 2.101 1.58 74.855 2.58 2.994 3.58 1.610
01885> .67 2.274 1.67 31.418 2.67 2.782 3.67 1.553
01886> .75 2.482 1.75 16.819 2.75 2.601 3.75 1.501
01887> .83 2.736 1.83 11.357 2.83 2.443 3.83 1.453
01888> .92 3.055 1.92 8.563 2.92 2.305 3.92 1.408
01889> 1.00 3.468 2.00 6.882 3.00 2.183 4.00 1.366
01890>
01891>-----
01892> 007:0003-----
01893>-----
01894> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=70.00
01895> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01896> | U.H. Tp(hrs)= .340
01897>
01898> Unit Hyd Qpeak (cms)= 1.083
01899>
01900>
01901> PEAK FLOW (cms)= .093 (i)
01902> TIME TO PEAK (hrs)= 2.617
01903> RUNOFF VOLUME (mm)= 4.172
01904> TOTAL RAINFALL (mm)= 25.000
01905> RUNOFF COEFFICIENT = .167
01906>
01907> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01908>
01909>-----
01910> 007:0004-----
01911> *#-----
01912> *# Route TO_NW flows through slope interruption berms
01913> *#-----
01914>-----
01915> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01916> | IN=01:(B-201 ) |
01917> | OUT=02:(SWM201) | ===== OUTFLOW STORAGE TABLE =====
01918> | OUTFLOW STORAGE OUTFLOW STORAGE
01919> | (cms) (ha.m.) | (cms) (ha.m.)
01920> .000 .0000E+00 2.500 .3100E+00
01921> .000 .2000E+00 6.900 .3300E+00
01922>
01923> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01924> (ha) (cms) (hrs) (mm)
01925> INFLOW >01: (B-201 ) 9.64 .093 2.617 4.172
01926> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
01927> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
01928>
01929> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01930> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01931> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01932>
01933>
01934> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01935> TIME SHIFT OF PEAK FLOW (min)= -121.00
01936> MAXIMUM STORAGE USED (ha.m.)=-.4022E-01
01937>
01938> *** WARNING: Outflow volume is less than inflow volume.
01939>
01940>-----
01941> 007:0005-----
01942>-----
01943> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=65.00
01944> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01945> | U.H. Tp(hrs)= .430
01946>
01947> Unit Hyd Qpeak (cms)= .353
01948>
01949>
01950> PEAK FLOW (cms)= .027 (i)
01951> TIME TO PEAK (hrs)= 2.133
01952> RUNOFF VOLUME (mm)= 3.446
01953> TOTAL RAINFALL (mm)= 25.000
01954> RUNOFF COEFFICIENT = .138
01955>
01956> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01957>
01958>-----
01959> 007:0006-----
01960>-----
01961> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01962> | (ha) (cms) (hrs) (mm) (cms)
01963> ID1 01:EXTB-1 3.97 .027 2.13 3.45 .000
01964> +ID2 02:SWM201 9.64 .000 .00 .00 .000
01965>=====
01966> SUM 10:To_NW 13.61 .027 2.13 1.01 .000
01967>
01968> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01969>
01970>-----
01971> 007:0007-----
01972>-----
01973> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=70.00
01974> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01975> | U.H. Tp(hrs)= .830
01976>
01977> Unit Hyd Qpeak (cms)= .315
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01975> PEAK FLOW (cms)= .036 (i)
01976> TIME TO PEAK (hrs)= 2.667
01977> RUNOFF VOLUME (mm)= 4.172
01978> TOTAL RAINFALL (mm)= 25.000
01979> RUNOFF COEFFICIENT = .167
01981>
01982> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01983>
01984> -----
01985> 007:0008-----
01986> *****
01987> # Route To_CTR flows through slope interruption berms
01988> *****
01989>
01990> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01991> | IN=01:(B-202 ) |
01992> | OUT=02:(SWM202) |
01993> ===== OUTFLOW STORAGE TABLE =====
01994> OUTFLOW STORAGE OUTFLOW STORAGE
01995> (cms) (ha.m.) (cms) (ha.m.)
01996> .000 .0000E+00 2.200 .1420E+01
01997> .000 .1330E+01 6.200 .1520E+01
01998>
01999> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02000> (ha) (cms) (hrs) (mm)
02001> INFLOW >01: (B-202 ) 6.84 .036 2.667 4.172
02002> OUTFLOW<02: (SWM202) 6.84 .000 .000 .000
02003> OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
02004>
02005> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02006> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02007> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02008>
02009> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
02010> TIME SHIFT OF PEAK FLOW (min)= -160.00
02011> MAXIMUM STORAGE USED (ha.m.)= .2854E-01
02012>
02013> *** WARNING: Outflow volume is less than inflow volume.
02014> -----
02015> 007:0009-----
02016>
02017> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=65.00
02018> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02019> | U.H. Tp(hrs)= .500
02020>
02021> Unit Hyd Qpeak (cms)= 1.432
02022>
02023> PEAK FLOW (cms)= .115 (i)
02024> TIME TO PEAK (hrs)= 2.233
02025> RUNOFF VOLUME (mm)= 3.446
02026> TOTAL RAINFALL (mm)= 25.000
02027> RUNOFF COEFFICIENT = .138
02028>
02029> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02030>
02031> -----
02032> 007:0010-----
02033>
02034> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02035> (ha) (cms) (hrs) (mm) (cms)
02036> ID1 01:EXTB-2 18.74 .115 2.23 3.45 .000
02037> +ID2 02:SWM202 6.84 .000 .00 .00 .000
02038> =====
02039> SUM 10:To_CTR 25.58 .115 2.23 2.52 .000
02040>
02041> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02042> -----
02043>
02044> 007:0011-----
02045>
02046> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=75.00
02047> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02048> | U.H. Tp(hrs)= .510
02049>
02050> Unit Hyd Qpeak (cms)= .879
02051>
02052> PEAK FLOW (cms)= .107 (i)
02053> TIME TO PEAK (hrs)= 2.233
02054> RUNOFF VOLUME (mm)= 5.106
02055> TOTAL RAINFALL (mm)= 25.000
02056> RUNOFF COEFFICIENT = .204
02057>
02058> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02059>
02060> -----
02061> 007:0012-----
02062> *****
02063> # Route To_SW flows through slope interruption berms
02064> *****
02065>
02066> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02067> | IN=01:(B-203 ) |
02068> | OUT=02:(SWM203) |
02069> ===== OUTFLOW STORAGE TABLE =====
02070> OUTFLOW STORAGE OUTFLOW STORAGE
02071> (cms) (ha.m.) (cms) (ha.m.)
02072> .000 .0000E+00 2.900 .7090E+00
02073> .000 .6500E+00 8.300 .7409E+00
02074>
02075> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02076> (ha) (cms) (hrs) (mm)
02077> INFLOW >01: (B-203 ) 11.74 .107 2.233 5.106
02078> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
02079> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
02080>
02081> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02082> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02083> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02084>
02085> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
02086> TIME SHIFT OF PEAK FLOW (min)= -134.00
02087> MAXIMUM STORAGE USED (ha.m.)= .5994E-01
02088>
02089> *** WARNING: Outflow volume is less than inflow volume.
02090> -----
02091> 007:0013-----
02092>
02093> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=66.00
02094> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02095> | U.H. Tp(hrs)= .420
02096>
02097> Unit Hyd Qpeak (cms)= .979
02098>
02099> PEAK FLOW (cms)= .077 (i)
02100> TIME TO PEAK (hrs)= 2.117
02101> RUNOFF VOLUME (mm)= 3.578
02102> TOTAL RAINFALL (mm)= 25.000
02103> RUNOFF COEFFICIENT = .143
02104>
02105> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02106>
02107> -----
02108> 007:0014-----
02109>
02110> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02111> (ha) (cms) (hrs) (mm) (cms)
02112> ID1 01:To_SW 10.77 .077 2.12 3.58 .000
02113> +ID2 02:SWM203 11.74 .000 .00 .00 .000
02114> =====
02115> SUM 01:To_SW 22.51 .077 2.12 1.71 .000

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02116>
02117> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02118> -----
02119>
02120> 007:0015-----
02121>
02122> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=66.00
02123> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02124> | U.H. Tp(hrs)= .700
02125>
02126> Unit Hyd Qpeak (cms)= .274
02127>
02128> PEAK FLOW (cms)= .026 (i)
02129> TIME TO PEAK (hrs)= 2.500
02130> RUNOFF VOLUME (mm)= 3.578
02131> TOTAL RAINFALL (mm)= 25.000
02132> RUNOFF COEFFICIENT = .143
02133>
02134> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02135> -----
02136>
02137> 007:0016-----
02138>
02139> 007:0002-----
02140>
02141> 007:0002-----
02142>
02143> 007:0002-----
02144>
02145> 007:0002-----
02146>
02147> 007:0002-----
02148>
02149> 007:0002-----
02150> FINISH
02151> -----
02152>
02153> WARNINGS / ERRORS / NOTES
02154> -----
02155> 001:0004 ROUTE RESERVOIR
02156> *** WARNING: Outflow volume is less than inflow volume.
02157>
02158> 001:0008 ROUTE RESERVOIR
02159> *** WARNING: Outflow volume is less than inflow volume.
02160>
02161> 001:0012 ROUTE RESERVOIR
02162> *** WARNING: Outflow volume is less than inflow volume.
02163>
02164> 002:0004 ROUTE RESERVOIR
02165> *** WARNING: Outflow volume is less than inflow volume.
02166>
02167> 002:0008 ROUTE RESERVOIR
02168> *** WARNING: Outflow volume is less than inflow volume.
02169>
02170> 002:0012 ROUTE RESERVOIR
02171> *** WARNING: Outflow volume is less than inflow volume.
02172>
02173> 004:0004 ROUTE RESERVOIR
02174> *** WARNING: Outflow volume is less than inflow volume.
02175>
02176> 004:0008 ROUTE RESERVOIR
02177> *** WARNING: Outflow volume is less than inflow volume.
02178>
02179> 004:0012 ROUTE RESERVOIR
02180> *** WARNING: Outflow volume is less than inflow volume.
02181>
02182> 005:0004 ROUTE RESERVOIR
02183> *** WARNING: Outflow volume is less than inflow volume.
02184>
02185> 005:0012 ROUTE RESERVOIR
02186> *** WARNING: Outflow volume is less than inflow volume.
02187>
02188> 006:0008 ROUTE RESERVOIR
02189> *** WARNING: Outflow volume is less than inflow volume.
02190>
02191> 006:0012 ROUTE RESERVOIR
02192> *** WARNING: Outflow volume is less than inflow volume.
02193>
02194> 007:0004 ROUTE RESERVOIR
02195> *** WARNING: Outflow volume is less than inflow volume.
02196>
02197> 007:0008 ROUTE RESERVOIR
02198> *** WARNING: Outflow volume is less than inflow volume.
02199>
02200> Simulation ended on 2017-12-21 at 17:26:44
02201> -----
02202>

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00001> SSSSS W W M M H H Y Y M M 000 999 999 =====
00002> S W W W M M M M H H Y Y M M M M 0 0 9 9 9 9
00004> SSSSS W W W M M M H H H H Y Y M M M M 0 0 # 9 9 9 9 Ver 4.05
00006> S W W W M M M M H H Y Y M M M M 0 0 9999 9999 Sept 2011
00007> SSSSS W W W M M M H H Y Y M M M M 0 0 9 9 # 4730994
00008> Stormwater Management Hydrologic Model 999 999 =====
00009>
00010>
00011> ***** SMWYMO 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: smwymo@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: 2017-12-21 TIME: 17:26:50 RUN COUNTER: 001661 *
00039>
00040> * Input filename: C:\usr\LOYB\BPR3-2.dat *
00041> * Output filename: C:\usr\LOYB\BPR3-2.sum *
00042> * Summary filename: C:\usr\LOYB\BPR3-2.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047>
00048>
00049>
00050> 001:0001-
00051> # *****
00052> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00053> # Date : 12-21-2017
00054> # Modeller : [D. Williams]
00055> # Company : Stantec Consulting Ltd. (Waterloo)
00056> # License # : 4730994
00057>
00058> #
00059> #
00060> #
00061> # - Hydrologic conditions represent site after stabilization vegetation is
00062> # fully established
00063> # - SWM control provided by slope interruption berms
00064> # - AMC III Conditions
00065> #
00066> #
00067>
00068>
00069> | START | Project dir.: C:\usr\LOYB\
00070> | TZERO = .00 hrs on 0 Rainfall dir.: C:\usr\LOYB\
00071> | METOUT = 2 (output = METRIC)
00072> | NRUN = 001
00073> | NSTORM = 1
00074> | # 1=LYA2.1hr
00075>
00076>
00077> 001:0002-
00078> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 2 Year)
00079> | Ptotal = 22.10 mm | Comments: Belleville IDF (1-hr 30% AES - 2 Year)
00080>
00081>
00082> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
00083> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
00084> .00 23.868 .33 29.172 .58 26.520 .83 7.956
00085> .17 37.128 .42 54.476 .67 13.260 .92 2.652
00086> .25 55.692 .50 23.868 .75 10.608 1.00 .000
00087>
00088>
00089> 001:0003-
00090>
00091> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=85.00
00092> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00093> | U.H. Tp(hrs)= .340
00094>
00095> Unit Hyd Qpeak (cms)= 1.083
00096>
00097> PEAK FLOW (cms)= .210 (i)
00098> TIME TO PEAK (hrs)= 1.000
00099> RUNOFF VOLUME (mm)= 6.486
00100> TOTAL RAINFALL (mm)= 22.100
00101> RUNOFF COEFFICIENT = .293
00102>
00103> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00104>
00105>
00106> 001:0004-
00107> # *****
00108> # Route TO_NW flows through slope interruption berms
00109> # *****
00110>
00111> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00112> | IN=01: (B-201 ) |
00113> | OUT=02: (SWM201 ) |
00114>
00115> ***** OUTFLOW STORAGE TABLE *****
00116> OUTFLOW STORAGE OUTFLOW STORAGE
00117> (cms) (ha.m.) (cms) (ha.m.)
00118> .000 .2900E+00 6.900 .3300E+00
00119>
00120> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00121> (ha) (cms) (hrs) (mm)
00122> INFLOW >01: (B-201 ) 9.64 .210 .833 6.486
00123> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
00124> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
00125>
00126> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00127> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00128> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00129>
00130>
00131> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00132> TIME SHIFT OF PEAK FLOW (min)= -50.00
00133> MAXIMUM STORAGE USED (ha.m.)=-6253E-01
00134>
00135> *** WARNING: Outflow volume is less than inflow volume.
00136>
00137> 001:0005-
00138>
00139> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00140> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00141> | U.H. Tp(hrs)= .430

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00142> Unit Hyd Qpeak (cms)= .353
00143>
00144> PEAK FLOW (cms)= .064 (i)
00145> TIME TO PEAK (hrs)= .933
00146> RUNOFF VOLUME (mm)= 5.558
00147> TOTAL RAINFALL (mm)= 22.100
00148> RUNOFF COEFFICIENT = .251
00149>
00150> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00151>
00152>
00153> 001:0006-
00154>
00155> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00156> | (ha) (cms) (hrs) (mm) (cms)
00157> ID1 01:EXTB-1 3.97 .064 .93 .000
00158> +ID2 02:SWM201 9.64 .000 .00 .000
00159>
00160> SUM 10:To_NW 13.61 .064 .93 1.62 .000
00161>
00162> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00163>
00164>
00165> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=85.00
00166> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00167> | U.H. Tp(hrs)= .830
00168>
00169>
00170> Unit Hyd Qpeak (cms)= .315
00171>
00172> PEAK FLOW (cms)= .077 (i)
00173> TIME TO PEAK (hrs)= 1.300
00174> RUNOFF VOLUME (mm)= 6.486
00175> TOTAL RAINFALL (mm)= 22.100
00176> RUNOFF COEFFICIENT = .293
00177>
00178> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00179>
00180>
00181> 001:0007-
00182> # *****
00183> # Route TO_CTR flows through slope interruption berms
00184> # *****
00185>
00186> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00187> | IN=01: (B-202 ) |
00188> | OUT=02: (SWM202 ) |
00189>
00190> ***** OUTFLOW STORAGE TABLE *****
00191> OUTFLOW STORAGE OUTFLOW STORAGE
00192> (cms) (ha.m.) (cms) (ha.m.)
00193> .000 .0000E+00 2.200 .1420E+01
00194> .000 .1330E+01 6.200 .1520E+01
00195>
00196> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00197> (ha) (cms) (hrs) (mm)
00198> INFLOW >01: (B-202 ) 6.84 .077 1.300 6.486
00199> OUTFLOW<02: (SWM202) 6.84 .000 .000 .000
00200> OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
00201>
00202> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00203> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00204> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00205>
00206>
00207> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00208> TIME SHIFT OF PEAK FLOW (min)= -78.00
00209> MAXIMUM STORAGE USED (ha.m.)=-4437E-01
00210>
00211> *** WARNING: Outflow volume is less than inflow volume.
00212>
00213> 001:0009-
00214>
00215> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
00216> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00217> | U.H. Tp(hrs)= .500
00218>
00219> Unit Hyd Qpeak (cms)= 1.432
00220>
00221> PEAK FLOW (cms)= .273 (i)
00222> TIME TO PEAK (hrs)= 1.000
00223> RUNOFF VOLUME (mm)= 5.558
00224> TOTAL RAINFALL (mm)= 22.100
00225> RUNOFF COEFFICIENT = .251
00226>
00227> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00228>
00229> 001:0010-
00230>
00231> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00232> | (ha) (cms) (hrs) (mm) (cms)
00233> ID1 01:EXTB-2 18.74 .273 1.00 5.56 .000
00234> +ID2 02:SWM202 6.84 .000 .00 .000
00235>
00236> SUM 10:To_CTR 25.58 .273 1.00 4.07 .000
00237>
00238> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00239>
00240>
00241> 001:0011-
00242>
00243> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=80.00
00244> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00245> | U.H. Tp(hrs)= .510
00246>
00247> Unit Hyd Qpeak (cms)= .879
00248>
00249> PEAK FLOW (cms)= .233 (i)
00250> TIME TO PEAK (hrs)= 1.000
00251> RUNOFF VOLUME (mm)= 7.683
00252> TOTAL RAINFALL (mm)= 22.100
00253> RUNOFF COEFFICIENT = .348
00254>
00255> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00256>
00257>
00258> 001:0012-
00259> # *****
00260> # Route TO_SW flows through slope interruption berms
00261> # *****
00262>
00263> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00264> | IN=01: (B-203 ) |
00265> | OUT=02: (SWM203 ) |
00266>
00267> ***** OUTFLOW STORAGE TABLE *****
00268> OUTFLOW STORAGE OUTFLOW STORAGE
00269> (cms) (ha.m.) (cms) (ha.m.)
00270> .000 .0000E+00 2.200 .7000E+00
00271> .000 .6500E+00 6.200 .7400E+00
00272>
00273> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00274> (ha) (cms) (hrs) (mm)
00275> INFLOW >01: (B-203 ) 11.74 .233 1.000 7.683
00276> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
00277> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
00278>
00279> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00280> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00281> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00282>
00283>
00284> PEAK FLOW REDUCTION [Qout/Qin](%)= .000

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00283> TIME SHIFT OF PEAK FLOW (min)= -60.00
00284> MAXIMUM STORAGE USED (ha.m.)=-.9019E-01
00285>
00286> *** WARNING: Outflow volume is less than inflow volume.
00287>
00288> 001:0013-----
00289>
00290> DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00291> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00292> | U.H. Tp(hrs)= .420
00293>
00294> Unit Hyd Qpeak (cms)= .979
00295>
00296> PEAK FLOW (cms)= .177 (i)
00297> TIME TO PEAK (hrs)= .933
00298> RUNOFF VOLUME (mm)= 5.558
00299> TOTAL RAINFALL (mm)= 22.100
00300> RUNOFF COEFFICIENT = .251
00301>
00302> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00303>
00304>
00305> 001:0014-----
00306>
00307> | ADD HYD (To_Sw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00308> | | | (ha) (cms) (hrs) (mm) (cms)
00309> | ID1 01:To_Sw | 10.77 .177 .93 5.56 .000
00310> | +ID2 02:SwM203 | 11.74 .000 .00 .00 .000
00311>
00312> SUM 01:To_Sw 22.51 .177 .93 2.66 .000
00313>
00314> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00315>
00316>
00317> 001:0015-----
00318>
00319> | DESIGN NASHYD | Area (ha)= 5.93 Curve Number (CN)=82.00
00320> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00321> | U.H. Tp(hrs)= .700
00322>
00323> Unit Hyd Qpeak (cms)= .274
00324>
00325> PEAK FLOW (cms)= .056 (i)
00326> TIME TO PEAK (hrs)= 1.183
00327> RUNOFF VOLUME (mm)= 5.558
00328> TOTAL RAINFALL (mm)= 22.100
00329> RUNOFF COEFFICIENT = .251
00330>
00331> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00332>
00333>
00334> 001:0016-----
00335> ** END OF RUN : 1
00336>
00337>
00338>
00339>
00340>
00341>
00342>
00343>
00344> | START | Project dir.: C:\usr\LOYB\
00345> | | Rainfall dir.: C:\usr\LOYB\
00346> | TZERO = .00 hrs on 0
00347> | METOUT= 2 (output = METRIC)
00348> | NRUN = 002
00349> | NSTORM= 1
00350> | # 1=LYA2.12h
00351>
00352> 002:0002-----
00353> # *****
00354> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00355> # Date : 12-21-2017
00356> # Modeller : [D. Williams]
00357> # Company : Stantec Consulting Ltd. (Waterloo)
00358> # License # : 4730904
00359> # *****
00360> #
00361> # Block B - PROPOSED CONDITIONS
00362> #
00363> # - Hydrologic conditions represent site after stabilization vegetation is
00364> # fully established
00365> # - SWM control provided by slope interruption berms
00366> # - AMC III Conditions
00367> #
00368> # *****
00369>
00370>
00371> 002:0002-----
00372>
00373> | READ STORM | Filename: Belleville IDF (12-hr 30% AES - 2 Year)
00374> | Ptotal= 42.24 mm | Comments: Belleville IDF (12-hr 30% AES - 2 Year)
00375>
00376> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00377> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00378> | 1.00 3.960 | 4.00 6.600 | 7.00 1.320 | 10.00 .000
00379> | 2.00 11.440 | 5.00 6.160 | 8.00 .440 | 11.00 .000
00380> | 3.00 8.800 | 6.00 3.520 | 9.00 .000 | 12.00 .000
00381>
00382>
00383> 002:0003-----
00384>
00385> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=85.00
00386> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00387> | U.H. Tp(hrs)= .340
00388>
00389> Unit Hyd Qpeak (cms)= 1.003
00390>
00391> PEAK FLOW (cms)= .120 (i)
00392> TIME TO PEAK (hrs)= 3.133
00393> RUNOFF VOLUME (mm)= 19.398
00394> TOTAL RAINFALL (mm)= 42.240
00395> RUNOFF COEFFICIENT = .459
00396>
00397> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00398>
00399>
00400> 002:0004-----
00401> # *****
00402> # Route TO_NW flows through slope interruption berms
00403> # *****
00404>
00405> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00406> | IN=01:(B-201 ) |
00407> | OUT=02:(SWM201) |
00408>
00409> | OUTFLOW STORAGE | OUTFLOW STORAGE
00410> | (cms) (ha.m.) | (cms) (ha.m.)
00411> | .000 .0000E+00 | 2.500 .3100E+00
00412> | .000 .2900E+00 | 6.900 .3300E+00
00413>
00414> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00415> | (ha) (cms) (hrs) (mm)
00416> | INFLOW >01: (B-201 ) 9.64 .000 .000 19.398
00417> | OUTFLOW <02: (SWM201) 9.64 .000 .000 .000
00418> | OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
00419>
00420> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00421> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00422> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00423>

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00424> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00425> TIME SHIFT OF PEAK FLOW (min)= -180.00
00426> MAXIMUM STORAGE USED (ha.m.)=-.1870E+00
00427>
00428> *** WARNING: Outflow volume is less than inflow volume.
00429>
00430> 002:0005-----
00431>
00432> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00433> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00434> | U.H. Tp(hrs)= .430
00435>
00436> Unit Hyd Qpeak (cms)= .353
00437>
00438> PEAK FLOW (cms)= .042 (i)
00439> TIME TO PEAK (hrs)= 3.217
00440> RUNOFF VOLUME (mm)= 17.200
00441> TOTAL RAINFALL (mm)= 42.240
00442> RUNOFF COEFFICIENT = .407
00443>
00444> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00445>
00446>
00447>
00448>
00449> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00450> | | | (ha) (cms) (hrs) (mm) (cms)
00451> | ID1 01:EXTB-1 | 3.97 .042 3.22 17.20 .000
00452> | +ID2 02:SWM201 | 9.64 .000 .00 .00 .000
00453>
00454> SUM 10:To_NW 13.61 .042 3.22 5.02 .000
00455>
00456> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00457>
00458>
00459> 002:0007-----
00460>
00461> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=85.00
00462> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00463> | U.H. Tp(hrs)= .830
00464>
00465> Unit Hyd Qpeak (cms)= .315
00466>
00467> PEAK FLOW (cms)= .077 (i)
00468> TIME TO PEAK (hrs)= 5.083
00469> RUNOFF VOLUME (mm)= 19.398
00470> TOTAL RAINFALL (mm)= 42.240
00471> RUNOFF COEFFICIENT = .459
00472>
00473> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00474>
00475>
00476> 002:0008-----
00477> # *****
00478> # Route TO_CTR flows through slope interruption berms
00479> # *****
00480>
00481> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00482> | IN=01:(B-202 ) |
00483> | OUT=02:(SWM202) |
00484>
00485> | OUTFLOW STORAGE | OUTFLOW STORAGE
00486> | (cms) (ha.m.) | (cms) (ha.m.)
00487> | .000 .0000E+00 | 2.200 .1420E+01
00488> | .000 .1330E+01 | 6.200 .1520E+01
00489>
00490> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00491> | (ha) (cms) (hrs) (mm)
00492> | INFLOW >01: (B-202 ) 6.84 5.083 5.083 19.398
00493> | OUTFLOW <02: (SWM202) 6.84 .000 .000 .000
00494> | OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
00495>
00496> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00497> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00498> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00499>
00500>
00501> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00502> TIME SHIFT OF PEAK FLOW (min)= -305.00
00503> MAXIMUM STORAGE USED (ha.m.)=-.1327E+00
00504>
00505> *** WARNING: Outflow volume is less than inflow volume.
00506>
00507> 002:0009-----
00508>
00509> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
00510> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00511> | U.H. Tp(hrs)= .500
00512>
00513> Unit Hyd Qpeak (cms)= 1.432
00514>
00515> PEAK FLOW (cms)= .196 (i)
00516> TIME TO PEAK (hrs)= 3.300
00517> RUNOFF VOLUME (mm)= 17.200
00518> TOTAL RAINFALL (mm)= 42.240
00519> RUNOFF COEFFICIENT = .407
00520>
00521> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00522>
00523>
00524> 002:0010-----
00525>
00526> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00527> | | | (ha) (cms) (hrs) (mm) (cms)
00528> | ID1 01:EXTB-2 | 18.74 .196 3.30 17.20 .000
00529> | +ID2 02:SWM202 | 6.84 .000 .00 .00 .000
00530>
00531> SUM 10:To_CTR 25.58 .196 3.30 12.60 .000
00532>
00533> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00534>
00535>
00536> 002:0011-----
00537>
00538> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=88.00
00539> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00540> | U.H. Tp(hrs)= .510
00541>
00542> Unit Hyd Qpeak (cms)= .879
00543>
00544> PEAK FLOW (cms)= .161 (i)
00545> TIME TO PEAK (hrs)= 3.250
00546> RUNOFF VOLUME (mm)= 22.020
00547> TOTAL RAINFALL (mm)= 42.240
00548> RUNOFF COEFFICIENT = .521
00549>
00550> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00551>
00552>
00553> 002:0012-----
00554> # *****
00555> # Route TO_SW flows through slope interruption berms
00556> # *****
00557>
00558> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00559> | IN=01:(B-203 ) |
00560> | OUT=02:(SWM203) |
00561>
00562> | OUTFLOW STORAGE | OUTFLOW STORAGE
00563> | (cms) (ha.m.) | (cms) (ha.m.)
00564> | .000 .0000E+00 | 2.200 .7000E+00
00565> | .000 .6500E+00 | 6.200 .7400E+00
00566>

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00565> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00566> (ha) (cms) (hrs) (mm)
00567> INFLOW >01: (B-203 ) 11.74 .151 3.250 22.000
00568> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
00569> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
00570>
00571> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00572> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00573> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00574>
00575> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00576> TIME SHIFT OF PEAK FLOW (min)= -195.00
00577> MAXIMUM STORAGE USED (ha.m.)= .2585E+00
00578>
00579> *** WARNING: Outflow volume is less than inflow volume.
00580>
00581> -----
00582> 002:0013-----
00583>
00584> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
00585> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00586> | U.H. Tp(hrs)= .420
00587>
00588> Unit Hyd Qpeak (cms)= .979
00589>
00590> PEAK FLOW (cms)= .115 (i)
00591> TIME TO PEAK (hrs)= 3.200
00592> RUNOFF VOLUME (mm)= 17.200
00593> TOTAL RAINFALL (mm)= 42.240
00594> RUNOFF COEFFICIENT = .407
00595>
00596> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00597>
00598> -----
00599> 002:0014-----
00600>
00601> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00602> (ha) (cms) (hrs) (mm) (cms)
00603> ID1 01:To_SW 10.77 .115 3.20 17.20 .000
00604> +ID2 02:SWM203 11.74 .000 .00 .00 .000
00605> =====
00606> SUM 01:To_SW 22.51 .115 3.20 8.23 .000
00607>
00608> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00609>
00610> -----
00611> 002:0015-----
00612>
00613> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
00614> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00615> | U.H. Tp(hrs)= .700
00616>
00617> Unit Hyd Qpeak (cms)= .274
00618>
00619> PEAK FLOW (cms)= .051 (i)
00620> TIME TO PEAK (hrs)= 5.083
00621> RUNOFF VOLUME (mm)= 17.200
00622> TOTAL RAINFALL (mm)= 42.240
00623> RUNOFF COEFFICIENT = .407
00624>
00625> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00626>
00627> -----
00628> 002:0016-----
00629>
00630> 002:0002-----
00631> ** END OF RUN : 2
00632>
00633> -----
00634>
00635>
00636>
00637>
00638>
00639>
00640> | START | Project dir.: C:\usr\LOYB\
00641> | Rainfall dir.: C:\usr\LOYB\
00642> TZERO = .00 hrs on 0
00643> METOUT= 2 (output = METRIC)
00644> NRUN = 003
00645> NSTORM= 1
00646> # 1=LYA5.1hr
00647>
00648> 003:0002-----
00649> # *****
00650> # Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
00651> # Date : 12-21-2017
00652> # Modeller : [D. Williams]
00653> # Company : Stantec Consulting Ltd. (Waterloo)
00654> # License # 4739984
00655> # *****
00656> #
00657> # Block B - PROPOSED CONDITIONS
00658> #
00659> # - Hydrologic conditions represent site after stabilization vegetation is
00660> # fully established
00661> # - SWM control provided by slope interruption berms
00662> # - AMC III Conditions
00663> #
00664> #
00665> # *****
00666>
00667> 003:0002-----
00668>
00669> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 5 Year)
00670> | Ptotal= 28.00 mm | Comments: Belleville IDF (1-hr 30% AES - 5 Year)
00671>
00672> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00673> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00674> .00 30.240 | .33 36.960 | .58 33.600 | .83 30.000
00675> .17 47.040 | .42 43.680 | .67 16.800 | .92 3.360
00676> .25 70.560 | .50 30.240 | .75 13.440 | 1.00 .000
00677>
00678>
00679> 003:0003-----
00680>
00681> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=85.00
00682> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00683> | U.H. Tp(hrs)= .340
00684>
00685> Unit Hyd Qpeak (cms)= 1.083
00686>
00687> PEAK FLOW (cms)= .317 (i)
00688> TIME TO PEAK (hrs)= .833
00689> RUNOFF VOLUME (mm)= 9.846
00690> TOTAL RAINFALL (mm)= 28.000
00691> RUNOFF COEFFICIENT = .352
00692>
00693> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00694>
00695> -----
00696> 003:0004-----
00697> # *****
00698> # Route TO_NW flows through slope interruption berms
00699> # *****
00700>
00701> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00702> | IN=01:(B-201 ) |
00703> | OUT=02:(SWM201 ) |
00704>
00705>

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00706> .000 .000E+00 | 2.500 .3100E+00
00707> .000 .2900E+00 | 6.900 .3300E+00
00708>
00709> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00710> (ha) (cms) (hrs) (mm)
00711> INFLOW >01: (B-201 ) 9.64 .317 .833 9.846
00712> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
00713> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
00714>
00715> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00716> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00717> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00718>
00719> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
00720> TIME SHIFT OF PEAK FLOW (min)= -50.00
00721> MAXIMUM STORAGE USED (ha.m.)= .9492E-01
00722>
00723> *** WARNING: Outflow volume is less than inflow volume.
00724>
00725> -----
00726> 003:0005-----
00727>
00728> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
00729> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00730> | U.H. Tp(hrs)= .430
00731>
00732> Unit Hyd Qpeak (cms)= .353
00733>
00734> PEAK FLOW (cms)= .098 (i)
00735> TIME TO PEAK (hrs)= .933
00736> RUNOFF VOLUME (mm)= 8.537
00737> TOTAL RAINFALL (mm)= 28.000
00738> RUNOFF COEFFICIENT = .305
00739>
00740> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00741>
00742> -----
00743> 003:0006-----
00744>
00745> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00746> (ha) (cms) (hrs) (mm) (cms)
00747> ID1 01:EXTB-1 3.97 .098 .93 8.54 .000
00748> +ID2 02:SWM201 9.64 .000 .00 .00 .000
00749> =====
00750> SUM 10:To_NW 13.61 .098 .93 2.49 .000
00751>
00752> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00753>
00754> -----
00755> 003:0007-----
00756>
00757> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=85.00
00758> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00759> | U.H. Tp(hrs)= .830
00760>
00761> Unit Hyd Qpeak (cms)= .315
00762>
00763> PEAK FLOW (cms)= .116 (i)
00764> TIME TO PEAK (hrs)= 1.300
00765> RUNOFF VOLUME (mm)= 9.846
00766> TOTAL RAINFALL (mm)= 28.000
00767> RUNOFF COEFFICIENT = .352
00768>
00769> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00770>
00771> -----
00772> 003:0008-----
00773> # *****
00774> # Route TO_CTR flows through slope interruption berms
00775> # *****
00776>
00777> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00778> | IN=01:(B-202 ) |
00779> | OUT=02:(SWM202 ) |
00780>
00781>
00782>
00783>
00784>
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00843>
00844>
00845>
00846>

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01129> 004:0011-----
01130> |-----|
01131> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=88.00
01132> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01133> |-----| U.H. Tp(hrs)= .510
01134>
01135> Unit Hyd Qpeak (cms)= .879
01136>
01137> PEAK FLOW (cms)= .247 (i)
01138> TIME TO PEAK (hrs)= 3.200
01139> RUNOFF VOLUME (mm)= 33.296
01140> TOTAL RAINFALL (mm)= 55.968
01141> RUNOFF COEFFICIENT = .595
01142>
01143> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01144>
01145> -----
01146> 004:0012-----
01147> *# Route To SW flows through slope interruption berms
01148> *#-----
01149> *#-----
01150>
01151> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01152> | IN=01:(B-203 ) |
01153> | OUT=02:(SWM203) |
01154> -----
01155> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01156> | (cms) (ha.m.) | (cms) (ha.m.) |
01157> | .000 .0000E+00 | 2.200 .7000E+00 |
01158> | .000 .6500E+00 | 6.200 .7400E+00 |
01159>
01160> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01161> | (ha) (cms) (hrs) (mm) |
01162> | INFLW>01: (B-203 ) | 11.74 .247 3.200 33.296 |
01163> | OUTFLOW=02: (SWM203) | 11.74 .000 .000 .000 |
01164> | OVERFLOW=10: (OVSWM3) | .00 .000 .000 .000 |
01165>
01166> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01167> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01168> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01169>
01170> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01171> TIME SHIFT OF PEAK FLOW (min)= -192.00
01172> MAXIMUM STORAGE USED (ha.m.)= .3909E+00
01173>
01174> *** WARNING: Outflow volume is less than inflow volume.
01175>
01176> 004:0013-----
01177> |-----|
01178> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
01179> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01180> |-----| U.H. Tp(hrs)= .420
01181>
01182> Unit Hyd Qpeak (cms)= .979
01183>
01184> PEAK FLOW (cms)= .182 (i)
01185> TIME TO PEAK (hrs)= 3.183
01186> RUNOFF VOLUME (mm)= 26.916
01187> TOTAL RAINFALL (mm)= 55.968
01188> RUNOFF COEFFICIENT = .481
01189>
01190> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01191>
01192> -----
01193> 004:0014-----
01194> |-----|
01195> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01196> | (ha) (cms) (hrs) (mm) (cms) |
01197> | ID1 01:To_SW | 10.77 .182 3.18 26.92 .000 |
01198> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000 |
01199> |-----|
01200> | SUM 01:To_SW | 22.51 .182 3.18 12.88 .000 |
01201>
01202> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01203>
01204> -----
01205> 004:0015-----
01206> |-----|
01207> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01208> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01209> |-----| U.H. Tp(hrs)= .700
01210>
01211> Unit Hyd Qpeak (cms)= .274
01212>
01213> PEAK FLOW (cms)= .079 (i)
01214> TIME TO PEAK (hrs)= 3.633
01215> RUNOFF VOLUME (mm)= 26.916
01216> TOTAL RAINFALL (mm)= 55.968
01217> RUNOFF COEFFICIENT = .481
01218>
01219> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01220>
01221> -----
01222> 004:0016-----
01223> |-----|
01224> 004:0002-----
01225> |-----|
01226> 004:0002-----
01227> |-----|
01228> 004:0002-----
01229> ** END OF RUN : 4
01230>
01231> -----
01232>
01233>
01234>
01235>
01236>
01237>
01238> | START | Project dir.: C:\usr\LOYB\
01239> |-----| Rainfall dir.: C:\usr\LOYB\
01240>
01241> TZERO = .00 hrs on
01242> METOUT= 2 (output = METRIC)
01243> NRUN = 005
01244> NSTORM= 1
01245> # 1=LAY100.1hr
01246>
01247> 005:0002-----
01248> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01249> *# Date : 12-21-2017
01250> *# Modeller : [D. Williams]
01251> *# Company : Stantec Consulting Ltd. (Waterloo)
01252> *# License # : 4739994
01253> *#-----
01254> *#
01255> *# Block B - PROPOSED CONDITIONS
01256> *#
01257> *# - Hydrologic conditions represent site after stabilization vegetation is
01258> *# fully established
01259> *# - SWM control provided by slope interruption berms
01260> *# - AMC III Conditions
01261> *#
01262> *#
01263> *#-----
01264>
01265> 005:0002-----
01266> |-----|
01267> | READ STORM | Filename: Belleville IDF (1-hr 30% AES - 100 Year)
01268> | Ptotal= 44.10 mm | Comments: Belleville IDF (1-hr 30% AES - 100 Year)
01269>

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01270> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01271> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01272> | .08 47.628 | .33 58.212 | .58 52.920 | .83 15.876 |
01273> | .17 74.088 | .42 68.796 | .67 26.460 | .92 5.292 |
01274> | .25 111.132 | .50 47.628 | .75 21.168 | 1.00 .000 |
01275>
01276>
01277> 005:0003-----
01278> |-----|
01279> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=85.00
01280> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01281> |-----| U.H. Tp(hrs)= .340
01282>
01283> Unit Hyd Qpeak (cms)= 1.083
01284>
01285> PEAK FLOW (cms)= .664 (i)
01286> TIME TO PEAK (hrs)= .817
01287> RUNOFF VOLUME (mm)= 20.758
01288> TOTAL RAINFALL (mm)= 44.100
01289> RUNOFF COEFFICIENT = .471
01290>
01291> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01292>
01293> -----
01294> 005:0004-----
01295> *# Route To NW flows through slope interruption berms
01296> *#-----
01297> *#-----
01298>
01299> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01300> | IN=01:(B-201 ) |
01301> | OUT=02:(SWM201) |
01302> -----
01303> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01304> | (cms) (ha.m.) | (cms) (ha.m.) |
01305> | .000 .0000E+00 | 2.500 .1300E+00 |
01306> | .000 .2900E+00 | 6.900 .3300E+00 |
01307>
01308> ROUTING RESULTS AREA QPEAK TPEAK
01309> | (ha) (cms) (hrs) (mm) |
01310> | INFLW>01: (B-201 ) | 9.64 .664 .817 20.758 |
01311> | OUTFLOW=02: (SWM201) | 9.64 .000 .000 .000 |
01312> | OVERFLOW=10: (OVSWM1) | .00 .000 .000 .000 |
01313>
01314> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01315> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01316> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01317>
01318> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01319> TIME SHIFT OF PEAK FLOW (min)= -40.00
01320> MAXIMUM STORAGE USED (ha.m.)= .2001E+00
01321>
01322> *** WARNING: Outflow volume is less than inflow volume.
01323>
01324> 005:0005-----
01325> |-----|
01326> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
01327> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01328> |-----| U.H. Tp(hrs)= .430
01329>
01330> Unit Hyd Qpeak (cms)= .353
01331>
01332> PEAK FLOW (cms)= .211 (i)
01333> TIME TO PEAK (hrs)= .917
01334> RUNOFF VOLUME (mm)= 18.451
01335> TOTAL RAINFALL (mm)= 44.100
01336> RUNOFF COEFFICIENT = .418
01337>
01338> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01339>
01340> -----
01341> 005:0006-----
01342> |-----|
01343> | ADD HYD (To_NW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01344> | (ha) (cms) (hrs) (mm) (cms) |
01345> | ID1 01:EXTB-1 | 3.97 .211 .92 18.45 .000 |
01346> | +ID2 02:SWM201 | 9.64 .000 .00 .00 .000 |
01347> |-----|
01348> | SUM 10:To_NW | 13.61 .211 .92 5.38 .000 |
01349>
01350> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01351>
01352> -----
01353> 005:0007-----
01354> |-----|
01355> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=85.00
01356> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01357> |-----| U.H. Tp(hrs)= .830
01358>
01359> Unit Hyd Qpeak (cms)= .315
01360>
01361> PEAK FLOW (cms)= .244 (i)
01362> TIME TO PEAK (hrs)= 1.283
01363> RUNOFF VOLUME (mm)= 20.758
01364> TOTAL RAINFALL (mm)= 44.100
01365> RUNOFF COEFFICIENT = .471
01366>
01367> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01368>
01369> -----
01370> 005:0008-----
01371> *# Route To CTR flows through slope interruption berms
01372> *#-----
01373> *#-----
01374>
01375> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01376> | IN=01:(B-202 ) |
01377> | OUT=02:(SWM202) |
01378> -----
01379> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01380> | (cms) (ha.m.) | (cms) (ha.m.) |
01381> | .000 .0000E+00 | 2.200 .1420E+01 |
01382> | .000 .1330E+01 | 6.200 .1520E+01 |
01383>
01384> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01385> | (ha) (cms) (hrs) (mm) |
01386> | INFLW>01: (B-202 ) | 6.84 .244 1.283 20.758 |
01387> | OUTFLOW=02: (SWM202) | 6.84 .000 .000 .000 |
01388> | OVERFLOW=10: (OVSWM2) | .00 .000 .000 .000 |
01389>
01390> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01391> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01392> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01393>
01394> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01395> TIME SHIFT OF PEAK FLOW (min)= -77.00
01396> MAXIMUM STORAGE USED (ha.m.)= .1420E+00
01397>
01398> *** WARNING: Outflow volume is less than inflow volume.
01399>
01400> 005:0009-----
01401> |-----|
01402> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
01403> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01404> |-----| U.H. Tp(hrs)= .500
01405>
01406> Unit Hyd Qpeak (cms)= 1.432
01407>
01408> PEAK FLOW (cms)= .900 (i)
01409> TIME TO PEAK (hrs)= .983
01410> RUNOFF VOLUME (mm)= 18.451

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01411> TOTAL RAINFALL (mm)= 44.100
01412> RUNOFF COEFFICIENT = .418
01413>
01414> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01415>
01416> -----
01417> 005:0010-----
01418>
01419> | ADD HYD (To_CTR ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01420> -----
01421> | ID1 01:EXTB-2 | 11.74 .900 .98 18.45 .000
01422> | +ID2 02:SWM203 | 6.84 .000 .00 .00 .000
01423> |=====|
01424> | SUM 10:To_CTR | 25.58 .900 .98 13.52 .000
01425>
01426> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01427>
01428> -----
01429> 005:0011-----
01430>
01431> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=88.00
01432> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01433> |-----|
01434> | U.H. Tp(hrs)= .510
01435>
01436> Unit Hyd Qpeak (cms)= .879
01437>
01438> PEAK FLOW (cms)= .706 (i)
01439> TIME TO PEAK (hrs)= .983
01440> RUNOFF VOLUME (mm)= 23.496
01441> TOTAL RAINFALL (mm)= 44.100
01442> RUNOFF COEFFICIENT = .533
01443>
01444> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01445>
01446> -----
01447> 005:0012-----
01448> *# Route To_SW flows through slope interruption berms
01449> *#-----
01450>
01451> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01452> | IN=01:(B-203 ) |
01453> | OUT=02:(SWM203 ) |
01454> |-----|
01455> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01456> | (cms) (ha.m.) | (cms) (ha.m.) |
01457> | .000 .0000E+00 | 2.200 .7000E+00 |
01458> | .000 .6500E+00 | 6.200 .7400E+00 |
01459>
01460> ROUTING RESULTS AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
01461> | INFLOW >01: (B-203 ) | 11.74 .706 .983 23.496
01462> | OUTFLOW=02: (SWM203 ) | 11.74 .000 .000 .000
01463> | OVERFLOW<10: (OVSWM3 ) | .00 .000 .000 .000
01464>
01465> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01466> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01467> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01468>
01469> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01470> TIME SHIFT OF PEAK FLOW (min)= -59.00
01471> MAXIMUM STORAGE USED (ha.m.)= -59.00
01472>
01473> *** WARNING: Outflow volume is less than inflow volume.
01474>
01475> -----
01476> 005:0013-----
01477>
01478> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
01479> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01480> |-----|
01481> | U.H. Tp(hrs)= .420
01482>
01483> Unit Hyd Qpeak (cms)= .979
01484>
01485> PEAK FLOW (cms)= .582 (i)
01486> TIME TO PEAK (hrs)= .900
01487> RUNOFF VOLUME (mm)= 18.451
01488> TOTAL RAINFALL (mm)= 44.100
01489> RUNOFF COEFFICIENT = .418
01490>
01491> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01492>
01493> -----
01494> 005:0014-----
01495>
01496> | ADD HYD (To_SW ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01497> -----
01498> | ID1 01:To_SW | 10.77 .582 .90 18.45 .000
01499> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000
01500> |=====|
01501> | SUM 01:To_SW | 22.51 .582 .90 8.83 .000
01502>
01503> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01504>
01505> -----
01506> 005:0015-----
01507>
01508> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01509> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01510> |-----|
01511> | U.H. Tp(hrs)= .700
01512>
01513> Unit Hyd Qpeak (cms)= .274
01514>
01515> PEAK FLOW (cms)= .185 (i)
01516> TIME TO PEAK (hrs)= 1.167
01517> RUNOFF VOLUME (mm)= 18.451
01518> TOTAL RAINFALL (mm)= 44.100
01519> RUNOFF COEFFICIENT = .418
01520>
01521> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01522>
01523> -----
01524> 005:0016-----
01525>
01526> | ADD HYD (To_SW ) | ID: NHYD AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
01527> -----
01528> | ID1 01:To_SW | 10.77 .582 .90 18.45 .000
01529> | +ID2 02:SWM203 | 11.74 .000 .00 .00 .000
01530> |=====|
01531> | SUM 01:To_SW | 22.51 .582 .90 8.83 .000
01532>
01533> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01534>
01535> -----
01536> 005:0017-----
01537>
01538> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01539> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01540> |-----|
01541> | U.H. Tp(hrs)= .700
01542>
01543> Unit Hyd Qpeak (cms)= .274
01544>
01545> PEAK FLOW (cms)= .185 (i)
01546> TIME TO PEAK (hrs)= 1.167
01547> RUNOFF VOLUME (mm)= 18.451
01548> TOTAL RAINFALL (mm)= 44.100
01549> RUNOFF COEFFICIENT = .418
01550>
01551> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01552>
01553> -----
01554> 005:0018-----
01555>
01556> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01557> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01558> |-----|
01559> | U.H. Tp(hrs)= .700
01560>
01561> Unit Hyd Qpeak (cms)= .274
01562>
01563> PEAK FLOW (cms)= .185 (i)
01564> TIME TO PEAK (hrs)= 1.167
01565> RUNOFF VOLUME (mm)= 18.451
01566> TOTAL RAINFALL (mm)= 44.100
01567> RUNOFF COEFFICIENT = .418
01568>
01569> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01570>
01571> -----
01572> 005:0019-----
01573>
01574> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01575> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01576> |-----|
01577> | U.H. Tp(hrs)= .700
01578>
01579> Unit Hyd Qpeak (cms)= .274
01580>
01581> PEAK FLOW (cms)= .185 (i)
01582> TIME TO PEAK (hrs)= 1.167
01583> RUNOFF VOLUME (mm)= 18.451
01584> TOTAL RAINFALL (mm)= 44.100
01585> RUNOFF COEFFICIENT = .418
01586>
01587> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01588>
01589> -----
01590> 005:0020-----
01591>
01592> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01593> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01594> |-----|
01595> | U.H. Tp(hrs)= .700
01596>
01597> Unit Hyd Qpeak (cms)= .274
01598>
01599> PEAK FLOW (cms)= .185 (i)
01600> TIME TO PEAK (hrs)= 1.167
01601> RUNOFF VOLUME (mm)= 18.451
01602> TOTAL RAINFALL (mm)= 44.100
01603> RUNOFF COEFFICIENT = .418
01604>
01605> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01606>
01607> -----
01608> 005:0021-----
01609>
01610> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01611> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01612> |-----|
01613> | U.H. Tp(hrs)= .700
01614>
01615> Unit Hyd Qpeak (cms)= .274
01616>
01617> PEAK FLOW (cms)= .185 (i)
01618> TIME TO PEAK (hrs)= 1.167
01619> RUNOFF VOLUME (mm)= 18.451
01620> TOTAL RAINFALL (mm)= 44.100
01621> RUNOFF COEFFICIENT = .418
01622>
01623> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01624>
01625> -----
01626> 005:0022-----
01627>
01628> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01629> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01630> |-----|
01631> | U.H. Tp(hrs)= .700
01632>
01633> Unit Hyd Qpeak (cms)= .274
01634>
01635> PEAK FLOW (cms)= .185 (i)
01636> TIME TO PEAK (hrs)= 1.167
01637> RUNOFF VOLUME (mm)= 18.451
01638> TOTAL RAINFALL (mm)= 44.100
01639> RUNOFF COEFFICIENT = .418
01640>
01641> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01642>
01643> -----
01644> 005:0023-----
01645>
01646> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01647> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01648> |-----|
01649> | U.H. Tp(hrs)= .700
01650>
01651> Unit Hyd Qpeak (cms)= .274
01652>
01653> PEAK FLOW (cms)= .185 (i)
01654> TIME TO PEAK (hrs)= 1.167
01655> RUNOFF VOLUME (mm)= 18.451
01656> TOTAL RAINFALL (mm)= 44.100
01657> RUNOFF COEFFICIENT = .418
01658>
01659> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01660>
01661> -----
01662> 005:0024-----
01663>
01664> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01665> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01666> |-----|
01667> | U.H. Tp(hrs)= .700
01668>
01669> Unit Hyd Qpeak (cms)= .274
01670>
01671> PEAK FLOW (cms)= .185 (i)
01672> TIME TO PEAK (hrs)= 1.167
01673> RUNOFF VOLUME (mm)= 18.451
01674> TOTAL RAINFALL (mm)= 44.100
01675> RUNOFF COEFFICIENT = .418
01676>
01677> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01678>
01679> -----
01680> 005:0025-----
01681>
01682> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01683> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01684> |-----|
01685> | U.H. Tp(hrs)= .700
01686>
01687> Unit Hyd Qpeak (cms)= .274
01688>
01689> PEAK FLOW (cms)= .185 (i)
01690> TIME TO PEAK (hrs)= 1.167
01691> RUNOFF VOLUME (mm)= 18.451
01692> TOTAL RAINFALL (mm)= 44.100
01693> RUNOFF COEFFICIENT = .418
01694>
01695> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01696>
01697> -----
01698> 005:0026-----
01699>
01700> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01701> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01702> |-----|
01703> | U.H. Tp(hrs)= .700
01704>
01705> Unit Hyd Qpeak (cms)= .274
01706>
01707> PEAK FLOW (cms)= .185 (i)
01708> TIME TO PEAK (hrs)= 1.167
01709> RUNOFF VOLUME (mm)= 18.451
01710> TOTAL RAINFALL (mm)= 44.100
01711> RUNOFF COEFFICIENT = .418
01712>
01713> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01714>
01715> -----
01716> 005:0027-----
01717>
01718> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01719> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01720> |-----|
01721> | U.H. Tp(hrs)= .700
01722>
01723> Unit Hyd Qpeak (cms)= .274
01724>
01725> PEAK FLOW (cms)= .185 (i)
01726> TIME TO PEAK (hrs)= 1.167
01727> RUNOFF VOLUME (mm)= 18.451
01728> TOTAL RAINFALL (mm)= 44.100
01729> RUNOFF COEFFICIENT = .418
01730>
01731> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01732>
01733> -----
01734> 005:0028-----
01735>
01736> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01737> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01738> |-----|
01739> | U.H. Tp(hrs)= .700
01740>
01741> Unit Hyd Qpeak (cms)= .274
01742>
01743> PEAK FLOW (cms)= .185 (i)
01744> TIME TO PEAK (hrs)= 1.167
01745> RUNOFF VOLUME (mm)= 18.451
01746> TOTAL RAINFALL (mm)= 44.100
01747> RUNOFF COEFFICIENT = .418
01748>
01749> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01750>
01751> -----
01752> 005:0029-----
01753>
01754> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01755> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01756> |-----|
01757> | U.H. Tp(hrs)= .700
01758>
01759> Unit Hyd Qpeak (cms)= .274
01760>
01761> PEAK FLOW (cms)= .185 (i)
01762> TIME TO PEAK (hrs)= 1.167
01763> RUNOFF VOLUME (mm)= 18.451
01764> TOTAL RAINFALL (mm)= 44.100
01765> RUNOFF COEFFICIENT = .418
01766>
01767> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01768>
01769> -----
01770> 005:0030-----
01771>
01772> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01773> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01774> |-----|
01775> | U.H. Tp(hrs)= .700
01776>
01777> Unit Hyd Qpeak (cms)= .274
01778>
01779> PEAK FLOW (cms)= .185 (i)
01780> TIME TO PEAK (hrs)= 1.167
01781> RUNOFF VOLUME (mm)= 18.451
01782> TOTAL RAINFALL (mm)= 44.100
01783> RUNOFF COEFFICIENT = .418
01784>
01785> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01786>
01787> -----
01788> 005:0031-----
01789>
01790> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01791> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01792> |-----|
01793> | U.H. Tp(hrs)= .700
01794>
01795> Unit Hyd Qpeak (cms)= .274
01796>
01797> PEAK FLOW (cms)= .185 (i)
01798> TIME TO PEAK (hrs)= 1.167
01799> RUNOFF VOLUME (mm)= 18.451
01800> TOTAL RAINFALL (mm)= 44.100
01801> RUNOFF COEFFICIENT = .418
01802>
01803> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01804>
01805> -----
01806> 005:0032-----
01807>
01808> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01809> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01810> |-----|
01811> | U.H. Tp(hrs)= .700
01812>
01813> Unit Hyd Qpeak (cms)= .274
01814>
01815> PEAK FLOW (cms)= .185 (i)
01816> TIME TO PEAK (hrs)= 1.167
01817> RUNOFF VOLUME (mm)= 18.451
01818> TOTAL RAINFALL (mm)= 44.100
01819> RUNOFF COEFFICIENT = .418
01820>
01821> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01822>
01823> -----
01824> 005:0033-----
01825>
01826> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01827> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01828> |-----|
01829> | U.H. Tp(hrs)= .700
01830>
01831> Unit Hyd Qpeak (cms)= .274
01832>
01833> PEAK FLOW (cms)= .185 (i)
01834> TIME TO PEAK (hrs)= 1.167
01835> RUNOFF VOLUME (mm)= 18.451
01836> TOTAL RAINFALL (mm)= 44.100
01837> RUNOFF COEFFICIENT = .418
01838>
01839> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01840>
01841> -----
01842> 005:0034-----
01843>
01844> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01845> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01846> |-----|
01847> | U.H. Tp(hrs)= .700
01848>
01849> Unit Hyd Qpeak (cms)= .274
01850>
01851> PEAK FLOW (cms)= .185 (i)
01852> TIME TO PEAK (hrs)= 1.167
01853> RUNOFF VOLUME (mm)= 18.451
01854> TOTAL RAINFALL (mm)= 44.100
01855> RUNOFF COEFFICIENT = .418
01856>
01857> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01858>
01859> -----
01860> 005:0035-----
01861>
01862> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01863> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01864> |-----|
01865> | U.H. Tp(hrs)= .700
01866>
01867> Unit Hyd Qpeak (cms)= .274
01868>
01869> PEAK FLOW (cms)= .185 (i)
01870> TIME TO PEAK (hrs)= 1.167
01871> RUNOFF VOLUME (mm)= 18.451
01872> TOTAL RAINFALL (mm)= 44.100
01873> RUNOFF COEFFICIENT = .418
01874>
01875> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01876>
01877> -----
01878> 005:0036-----
01879>
01880> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01881> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01882> |-----|
01883> | U.H. Tp(hrs)= .700
01884>
01885> Unit Hyd Qpeak (cms)= .274
01886>
01887> PEAK FLOW (cms)= .185 (i)
01888> TIME TO PEAK (hrs)= 1.167
01889> RUNOFF VOLUME (mm)= 18.451
01890> TOTAL RAINFALL (mm)= 44.100
01891> RUNOFF COEFFICIENT = .418
01892>
01893> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01894>
01895> -----
01896> 005:0037-----
01897>
01898> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01899> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01900> |-----|
01901> | U.H. Tp(hrs)= .700
01902>
01903> Unit Hyd Qpeak (cms)= .274
01904>
01905> PEAK FLOW (cms)= .185 (i)
01906> TIME TO PEAK (hrs)= 1.167
01907> RUNOFF VOLUME (mm)= 18.451
01908> TOTAL RAINFALL (mm)= 44.100
01909> RUNOFF COEFFICIENT = .418
01910>
01911> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01912>
01913> -----
01914> 005:0038-----
01915>
01916> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01917> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01918> |-----|
01919> | U.H. Tp(hrs)= .700
01920>
01921> Unit Hyd Qpeak (cms)= .274
01922>
01923> PEAK FLOW (cms)= .185 (i)
01924> TIME TO PEAK (hrs)= 1.167
01925> RUNOFF VOLUME (mm)= 18.451
01926> TOTAL RAINFALL (mm)= 44.100
01927> RUNOFF COEFFICIENT = .418
01928>
01929> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01930>
01931> -----
01932> 005:0039-----
01933>
01934> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01935> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01936> |-----|
01937> | U.H. Tp(hrs)= .700
01938>
01939> Unit Hyd Qpeak (cms)= .274
01940>
01941> PEAK FLOW (cms)= .185 (i)
01942> TIME TO PEAK (hrs)= 1.167
01943> RUNOFF VOLUME (mm)= 18.451
01944> TOTAL RAINFALL (mm)= 44.100
01945> RUNOFF COEFFICIENT = .418
01946>
01947> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01948>
01949> -----
01950> 005:0040-----
01951>
01952> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01953> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01954> |-----|
01955> | U.H. Tp(hrs)= .700
01956>
01957> Unit Hyd Qpeak (cms)= .274
01958>
01959> PEAK FLOW (cms)= .185 (i)
01960> TIME TO PEAK (hrs)= 1.167
01961> RUNOFF VOLUME (mm)= 18.451
01962> TOTAL RAINFALL (mm)= 44.100
01963> RUNOFF COEFFICIENT = .418
01964>
01965> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01966>
01967> -----
01968> 005:0041-----
01969>
01970> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01971> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01972> |-----|
01973> | U.H. Tp(hrs)= .700
01974>
01975> Unit Hyd Qpeak (cms)= .274
01976>
01977> PEAK FLOW (cms)= .185 (i)
01978> TIME TO PEAK (hrs)= 1.167
01979> RUNOFF VOLUME (mm)= 18.451
01980> TOTAL RAINFALL (mm)= 44.100
01981> RUNOFF COEFFICIENT = .418
01982>
01983> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01984>
01985> -----
01986> 005:0042-----
01987>
01988> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01989> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01990> |-----|
01991> | U.H. Tp(hrs)= .700
01992>
01993> Unit Hyd Qpeak (cms)= .274
01994>
01995> PEAK FLOW (cms)= .185 (i)
01996> TIME TO PEAK (hrs)= 1.167
01997> RUNOFF VOLUME (mm)= 18.451
01998> TOTAL RAINFALL (mm)= 44.100
01999> RUNOFF COEFFICIENT = .418
02000>
02001> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02002>
02003> -----
02004> 005:0043-----
02005>
02006> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
02007> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02008> |-----|
02009> | U.H. Tp(hrs)= .700
02010>
02011> Unit Hyd Qpeak (cms)= .274
02012>
02013> PEAK FLOW (cms)= .185 (i)
02014> TIME TO PEAK (hrs)= 1.167
02015> RUNOFF VOLUME (mm)= 18.451
02016> TOTAL RAINFALL (mm)= 44.100
02017> RUNOFF COEFFICIENT = .418
02018>
02019> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02020>
02021> -----
02022> 005:0044-----
02023>
02024> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
02025> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02026> |-----|
02027> | U.H. Tp(hrs)= .700
02028>
02029> Unit Hyd Qpeak (cms)= .274
02030>
02031> PEAK FLOW (cms)= .185 (i)
02032> TIME TO PEAK (hrs)= 1.167
02033> RUNOFF VOLUME (mm)= 18.451
02034> TOTAL RAINFALL (mm)= 44.100
02035> RUNOFF COEFFICIENT = .418
02036>
02037> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02038>
02039> -----
02040> 005:0045-----
02041>
02042> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
02043> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02044> |-----|
02045> | U.H. Tp(hrs)= .700
02046>
02047> Unit Hyd Qpeak (cms)= .274
02048>
02049> PEAK FLOW (cms)= .185 (i)
02050> TIME TO PEAK (hrs)= 1.167
02051> RUNOFF VOLUME (mm)= 18.451
02052> TOTAL RAINFALL (mm)= 44.100
02053> RUNOFF COEFFICIENT = .418
02054>
02055> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02056>
02057> -----
02058> 005:0046-----
02059>
02060> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
02061> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02062> |-----|
02063> | U.H. Tp(hrs)= .700
02064>
02065> Unit Hyd Qpeak (cms)= .274
02066>
02067> PEAK FLOW (cms)= .185 (i)
02068> TIME TO PEAK (hrs)= 1.167
02069> RUNOFF VOLUME (mm)= 18.451
02070> TOTAL RAINFALL (mm)= 44.100
02071> RUNOFF COEFFICIENT = .418
02072>
0207
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01693> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01694>
01695>
01696> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01697> TIME SHIFT OF PEAK FLOW (min)= -216.00
01698> MAXIMUM STORAGE USED (ha.m.)= .4243E+00
01699>
01700> *** WARNING: Outflow volume is less than inflow volume.
01701>
01702> 006:0009-----
01703> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
01704> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01705> | U.H. Tp(hrs)= .500
01706>
01707> Unit Hyd Qpeak (cms)= 1.432
01708>
01709>
01710> PEAK FLOW (cms)= .682 (i)
01711> TIME TO PEAK (hrs)= 3.183
01712> RUNOFF VOLUME (mm)= 57.452
01713> TOTAL RAINFALL (mm)= 93.696
01714> RUNOFF COEFFICIENT = .613
01715>
01716> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01717>
01718>
01719> 006:0010-----
01720> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01721> | (ha) (cms) (hrs) (mm) (cms)
01722> ID1 01:EXTB-2 18.74 .682 3.18 57.45 .000
01723> +ID2 02:SWM202 6.84 .000 .00 .00 .000
01724>
01725> SUM 10:To_CTR 25.58 .682 3.18 42.09 .000
01726>
01727>
01728> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01729>
01730>
01731> 006:0011-----
01732> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=88.00
01733> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01734> | U.H. Tp(hrs)= .510
01735>
01736> Unit Hyd Qpeak (cms)= .879
01737>
01738>
01739> PEAK FLOW (cms)= .507 (i)
01740> TIME TO PEAK (hrs)= 3.117
01741> RUNOFF VOLUME (mm)= 67.019
01742> TOTAL RAINFALL (mm)= 93.696
01743> RUNOFF COEFFICIENT = .715
01744>
01745> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01746>
01747>
01748> 006:0012-----
01749> *# Route To_SW flows through slope interruption berms
01750>
01751>
01752>
01753> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01754> | IN=01:(B-203 ) |
01755> | OUT=02:(SWM203) |
01756>
01757> ===== OUTFLOW STORAGE TABLE =====
01758> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01759> | (cms) (ha.m.) | (cms) (ha.m.) |
01760> .000 .0000E+00 2.200 .7000E+00
01761> .000 .6500E+00 6.200 .7400E+00
01762>
01763> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01764> (ha) (cms) (hrs) (mm)
01765> INFLOW >01: (B-203 ) 11.74 .507 3.117 67.019
01766> OUTFLOW<02: (SWM203) 11.74 .275 5.003 11.838
01767> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
01768>
01769> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01770> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01771> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01772>
01773> PEAK FLOW REDUCTION [Qout/Qin](%)= 54.312
01774> TIME SHIFT OF PEAK FLOW (min)= 172.00
01775> MAXIMUM STORAGE USED (ha.m.)= .6563E+00
01776>
01777> *** WARNING: Outflow volume is less than inflow volume.
01778>
01779> 006:0013-----
01780> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
01781> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01782> | U.H. Tp(hrs)= .420
01783>
01784> Unit Hyd Qpeak (cms)= .979
01785>
01786>
01787> PEAK FLOW (cms)= .397 (i)
01788> TIME TO PEAK (hrs)= 3.117
01789> RUNOFF VOLUME (mm)= 57.452
01790> TOTAL RAINFALL (mm)= 93.696
01791> RUNOFF COEFFICIENT = .613
01792>
01793> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01794>
01795>
01796> 006:0014-----
01797> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01798> | (ha) (cms) (hrs) (mm) (cms)
01799> ID1 01:To_SW 10.77 .397 3.12 57.45 .000
01800> +ID2 02:SWM203 11.74 .275 5.98 11.84 .000
01801>
01802> SUM 01:To_SW 22.51 .493 5.95 33.57 .000
01803>
01804> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01805>
01806>
01807> 006:0015-----
01808> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
01809> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01810> | U.H. Tp(hrs)= .700
01811>
01812> Unit Hyd Qpeak (cms)= .274
01813>
01814>
01815> PEAK FLOW (cms)= .174 (i)
01816> TIME TO PEAK (hrs)= 3.417
01817> RUNOFF VOLUME (mm)= 57.452
01818> TOTAL RAINFALL (mm)= 93.696
01819> RUNOFF COEFFICIENT = .613
01820>
01821> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01822>
01823>
01824> 006:0016-----
01825>
01826> 006:0002-----
01827>
01828> 006:0002-----
01829>
01830> 006:0002-----
01831>
01832> 006:0002-----
01833>
```

```
01834> 006:0002-----
01835> ** END OF RUN : 6
01836>
01837> *****
01838>
01839>
01840>
01841>
01842>
01843>
01844> | START | Project dir.: C:\usr\LOYB\
01845> | Rainfall dir.: C:\usr\LOYB\
01846> TZERO = .00 hrs on 0
01847> METOUT= 2 (output = METRIC)
01848> NRUN = 007
01849> NSTORM= 1
01850> 1=25mm.4hr
01851>
01852> 007:0002-----
01853>
01854> *# Project Name: [Loyalist Block 'B' SWM] Project Number:[133560220]
01855> *# Date : 12-21-2017
01856> *# Modeller : [D. Williams]
01857> *# Company : Stantec Consulting Ltd. (Waterloo)
01858> *# License # : 4730904
01859>
01860>
01861>
01862> Block B - PROPOSED CONDITIONS
01863> *# Hydrologic conditions represent site after stabilization vegetation is
01864> *# fully established
01865> *# SWM control provided by slope interruption berms
01866> *# AMC III Conditions
01867>
01868>
01869>
01870>
01871> 007:0002-----
01872>
01873> | READ STORM | Filename: 25 mm, 4hr Chicago Storm
01874> | Ptotal= 25.00 mm | Comments: 25 mm, 4hr Chicago Storm
01875>
01876> TIME RAIN TIME RAIN TIME RAIN TIME RAIN
01877> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
01878> .08 1.465 1.08 4.024 2.98 5.764 3.08 2.074
01879> .17 1.540 1.17 4.814 2.17 4.969 3.17 1.977
01880> .25 1.625 1.25 6.025 2.25 4.374 3.25 1.889
01881> .33 1.720 1.33 8.114 2.33 3.913 3.33 1.810
01882> .42 1.829 1.42 12.526 2.42 3.545 3.42 1.737
01883> .50 1.955 1.50 27.198 2.50 3.245 3.50 1.671
01884> .58 2.101 1.58 74.855 2.58 2.994 3.58 1.610
01885> .67 2.274 1.67 31.418 2.67 2.782 3.67 1.553
01886> .75 2.482 1.75 16.819 2.75 2.601 3.75 1.501
01887> .83 2.736 1.83 11.357 2.83 2.443 3.83 1.453
01888> .92 3.055 1.92 8.563 2.92 2.305 3.92 1.408
01889> 1.00 3.468 2.00 6.882 3.00 2.183 4.00 1.366
01890>
01891>
01892> 007:0003-----
01893>
01894> | DESIGN NASHYD | Area (ha)= 9.64 Curve Number (CN)=85.00
01895> | 01:B-201 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01896> | U.H. Tp(hrs)= .340
01897>
01898> Unit Hyd Qpeak (cms)= 1.083
01899>
01900>
01901> PEAK FLOW (cms)= .188 (i)
01902> TIME TO PEAK (hrs)= 2.608
01903> RUNOFF VOLUME (mm)= 8.083
01904> TOTAL RAINFALL (mm)= 25.000
01905> RUNOFF COEFFICIENT = .323
01906>
01907> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01908>
01909>
01910> 007:0004-----
01911> *# Route To_Nw flows through slope interruption berms
01912>
01913>
01914>
01915> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01916> | IN=01:(B-201 ) |
01917> | OUT=02:(SWM201) |
01918>
01919> ===== OUTFLOW STORAGE TABLE =====
01920> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01921> | (cms) (ha.m.) | (cms) (ha.m.) |
01922> .000 .0000E+00 2.500 .3100E+00
01923> .000 .2000E+00 6.900 .3300E+00
01924>
01925> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01926> (ha) (cms) (hrs) (mm)
01927> INFLOW >01: (B-201 ) 9.64 .188 2.000 8.083
01928> OUTFLOW<02: (SWM201) 9.64 .000 .000 .000
01929> OVERFLOW<10: (OVSWM1) .00 .000 .000 .000
01930>
01931> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01932> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01933> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01934>
01935> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
01936> TIME SHIFT OF PEAK FLOW (min)= -120.00
01937> MAXIMUM STORAGE USED (ha.m.)= .7792E-01
01938>
01939> *** WARNING: Outflow volume is less than inflow volume.
01940>
01941> 007:0005-----
01942> | DESIGN NASHYD | Area (ha)= 3.97 Curve Number (CN)=82.00
01943> | 01:EXTB-1 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01944> | U.H. Tp(hrs)= .430
01945>
01946> Unit Hyd Qpeak (cms)= .353
01947>
01948>
01949> PEAK FLOW (cms)= .056 (i)
01950> TIME TO PEAK (hrs)= 2.117
01951> RUNOFF VOLUME (mm)= 2.968
01952> TOTAL RAINFALL (mm)= 25.000
01953> RUNOFF COEFFICIENT = .279
01954>
01955> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01956>
01957>
01958> 007:0006-----
01959> | ADD HYD (To_Nw ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01960> | (ha) (cms) (hrs) (mm) (cms)
01961> ID1 01:EXTB-1 3.97 .056 2.12 6.97 .000
01962> +ID2 02:SWM201 9.64 .000 .00 .00 .000
01963>
01964> SUM 10:To_Nw 13.61 .056 2.12 2.03 .000
01965>
01966> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01967>
01968>
01969> 007:0007-----
01970> | DESIGN NASHYD | Area (ha)= 6.84 Curve Number (CN)=85.00
01971> | 01:B-202 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01972> | U.H. Tp(hrs)= .830
01973>
01974> Unit Hyd Qpeak (cms)= .315
```

```
01975>
01976> PEAK FLOW (cms)= .071 (i)
01977> TIME TO PEAK (hrs)= 2.633
01978> RUNOFF VOLUME (mm)= 8.083
01979> TOTAL RAINFALL (mm)= 25.000
01980> RUNOFF COEFFICIENT = .323
01981>
01982> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01983>
01984> -----
01985> 007:0008-----
01986> *****
01987> # Route To_CTR flows through slope interruption berms
01988> *****
01989>
01990> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01991> | IN=01:(B-202 ) |
01992> | OUT=02:(SWM202) |
01993> ===== OUTFLOW STORAGE TABLE =====
01994> OUTFLOW STORAGE OUTFLOW STORAGE
01995> (cms) (ha.m.) (cms) (ha.m.)
01996> .000 .0000E+00 2.200 .1420E+01
01997> .000 .1330E+01 6.200 .1520E+01
01998>
01999> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02000> (ha) (cms) (hrs) (mm)
02001> INFLOW >01: (B-202 ) 6.84 .071 2.633 8.083
02002> OUTFLOW<02: (SWM202) 6.84 .000 .000 .000
02003> OVERFLOW<10: (OVSWM2) .00 .000 .000 .000
02004>
02005> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02006> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02007> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02008>
02009> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
02010> TIME SHIFT OF PEAK FLOW (min)= -158.00
02011> MAXIMUM STORAGE USED (ha.m.)= .5529E-01
02012>
02013> *** WARNING: Outflow volume is less than inflow volume.
02014> -----
02015> 007:0009-----
02016>
02017> | DESIGN NASHYD | Area (ha)= 18.74 Curve Number (CN)=82.00
02018> | 01:EXTB-2 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02019> | U.H. Tp(hrs)= .500
02020>
02021> Unit Hyd Qpeak (cms)= 1.432
02022>
02023> PEAK FLOW (cms)= .240 (i)
02024> TIME TO PEAK (hrs)= 2.217
02025> RUNOFF VOLUME (mm)= 6.968
02026> TOTAL RAINFALL (mm)= 25.000
02027> RUNOFF COEFFICIENT = .279
02028>
02029> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02030>
02031> -----
02032> 007:0010-----
02033>
02034> | ADD HYD (To_CTR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02035> (ha) (cms) (hrs) (mm) (cms)
02036> ID1 01:EXTB-2 18.74 .240 2.22 6.97 .000
02037> +ID2 02:SWM202 6.84 .000 .00 .00 .000
02038> =====
02039> SUM 10:To_CTR 25.58 .240 2.22 5.10 .000
02040>
02041> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02042> -----
02043>
02044> 007:0011-----
02045>
02046> | DESIGN NASHYD | Area (ha)= 11.74 Curve Number (CN)=88.00
02047> | 01:B-203 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02048> | U.H. Tp(hrs)= .510
02049>
02050> Unit Hyd Qpeak (cms)= .879
02051>
02052> PEAK FLOW (cms)= .206 (i)
02053> TIME TO PEAK (hrs)= 2.217
02054> RUNOFF VOLUME (mm)= 9.499
02055> TOTAL RAINFALL (mm)= 25.000
02056> RUNOFF COEFFICIENT = .380
02057>
02058> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02059>
02060> -----
02061> 007:0012-----
02062> *****
02063> # Route To_SW flows through slope interruption berms
02064> *****
02065>
02066> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02067> | IN=01:(B-203 ) |
02068> | OUT=02:(SWM203) |
02069> ===== OUTFLOW STORAGE TABLE =====
02070> OUTFLOW STORAGE OUTFLOW STORAGE
02071> (cms) (ha.m.) (cms) (ha.m.)
02072> .000 .0000E+00 2.200 .7090E+00
02073> .000 .6500E+00 6.200 .7409E+00
02074>
02075> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02076> (ha) (cms) (hrs) (mm)
02077> INFLOW >01: (B-203 ) 11.74 .206 2.217 9.499
02078> OUTFLOW<02: (SWM203) 11.74 .000 .000 .000
02079> OVERFLOW<10: (OVSWM3) .00 .000 .000 .000
02080>
02081> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02082> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02083> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02084>
02085> PEAK FLOW REDUCTION [Qout/Qin](%)= .000
02086> TIME SHIFT OF PEAK FLOW (min)= -133.00
02087> MAXIMUM STORAGE USED (ha.m.)= .1115E+00
02088>
02089> *** WARNING: Outflow volume is less than inflow volume.
02090> -----
02091> 007:0013-----
02092>
02093> | DESIGN NASHYD | Area (ha)= 10.77 Curve Number (CN)=82.00
02094> | 01:EXTB-3 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02095> | U.H. Tp(hrs)= .420
02096>
02097> Unit Hyd Qpeak (cms)= .979
02098>
02099> PEAK FLOW (cms)= .155 (i)
02100> TIME TO PEAK (hrs)= 2.117
02101> RUNOFF VOLUME (mm)= 6.968
02102> TOTAL RAINFALL (mm)= 25.000
02103> RUNOFF COEFFICIENT = .279
02104>
02105> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02106>
02107> -----
02108> 007:0014-----
02109>
02110> | ADD HYD (To_SW ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02111> (ha) (cms) (hrs) (mm) (cms)
02112> ID1 01:To_SW 10.77 .155 2.12 6.97 .000
02113> +ID2 02:SWM203 11.74 .000 .00 .00 .000
02114> =====
02115> SUM 01:To_SW 22.51 .155 2.12 3.33 .000
```

```
02116>
02117> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02118> -----
02119>
02120> 007:0015-----
02121>
02122> | DESIGN NASHYD | Area (ha)= 5.03 Curve Number (CN)=82.00
02123> | 10:EXTB-4 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02124> | U.H. Tp(hrs)= .700
02125>
02126> Unit Hyd Qpeak (cms)= .274
02127>
02128> PEAK FLOW (cms)= .051 (i)
02129> TIME TO PEAK (hrs)= 2.467
02130> RUNOFF VOLUME (mm)= 6.968
02131> TOTAL RAINFALL (mm)= 25.000
02132> RUNOFF COEFFICIENT = .279
02133>
02134> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02135> -----
02136>
02137> 007:0016-----
02138>
02139> 007:0002-----
02140>
02141> 007:0002-----
02142>
02143> 007:0002-----
02144>
02145> 007:0002-----
02146>
02147> 007:0002-----
02148>
02149> 007:0002-----
02150> FINISH
02151>
02152>
02153> WARNINGS / ERRORS / NOTES
02154> -----
02155> 001:0004 ROUTE RESERVOIR
02156> *** WARNING: Outflow volume is less than inflow volume.
02157>
02158> 001:0008 ROUTE RESERVOIR
02159> *** WARNING: Outflow volume is less than inflow volume.
02160>
02161> 001:0012 ROUTE RESERVOIR
02162> *** WARNING: Outflow volume is less than inflow volume.
02163>
02164> 002:0004 ROUTE RESERVOIR
02165> *** WARNING: Outflow volume is less than inflow volume.
02166>
02167> 002:0008 ROUTE RESERVOIR
02168> *** WARNING: Outflow volume is less than inflow volume.
02169>
02170> 002:0012 ROUTE RESERVOIR
02171> *** WARNING: Outflow volume is less than inflow volume.
02172>
02173> 004:0004 ROUTE RESERVOIR
02174> *** WARNING: Outflow volume is less than inflow volume.
02175>
02176> 004:0008 ROUTE RESERVOIR
02177> *** WARNING: Outflow volume is less than inflow volume.
02178>
02179> 004:0012 ROUTE RESERVOIR
02180> *** WARNING: Outflow volume is less than inflow volume.
02181>
02182> 005:0004 ROUTE RESERVOIR
02183> *** WARNING: Outflow volume is less than inflow volume.
02184>
02185> 005:0012 ROUTE RESERVOIR
02186> *** WARNING: Outflow volume is less than inflow volume.
02187>
02188> 006:0008 ROUTE RESERVOIR
02189> *** WARNING: Outflow volume is less than inflow volume.
02190>
02191> 006:0012 ROUTE RESERVOIR
02192> *** WARNING: Outflow volume is less than inflow volume.
02193>
02194> 007:0004 ROUTE RESERVOIR
02195> *** WARNING: Outflow volume is less than inflow volume.
02196>
02197> 007:0008 ROUTE RESERVOIR
02198> *** WARNING: Outflow volume is less than inflow volume.
02199>
02200> Simulation ended on 2017-12-21 at 17:26:52
02201> -----
```

APPENDIX E – PUBLICATIONS

Hydrologic Response of Solar Farms
Effects of Tillage on soil Microrelief, Surface Depression Storage and Soil Water
Storage

Effects of tillage on soil microrelief, surface depression storage and soil water storage

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Abstract

Conservation of soil water is an important management objective for crop production in the semi-arid tropics where droughts are persistent. Identification of the best tillage methods to achieve this objective is thus imperative. The integrated effects of conservation tillage on soil micro topography and soil moisture on a sandy loam soil were evaluated. The field experiment consisted of five tillage treatments, namely tied ridging (TR), no till (NT), disc plough (DP), strip catchment tillage (SCT) and hand hoe (HH). Data measured in the field included soil moisture content, surface roughness, infiltration and sorghum grain yield. A depth storage model was used to estimate depression storage TR treatment and the higher the surface roughness, the greater the depression storage volume. Regression analysis showed that random roughness decreased exponentially with increase in cumulative rainfall. Higher moisture contents were associated with treatments having higher depressional storage. Infiltration rate was significantly higher in the tilled soils than the untilled soils. The DP treatment had the highest cumulative infiltration while NT had the lowest. The Infiltration model which was fitted to the infiltration data gave good fit. Grain yield was highest in TR and least in NT, whereas DP and HH had similar yields.

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Keywords: Depression storage; Soil water storage; Soil microrelief; Sorghum yield; Cumulative infiltration

1. Introduction

1.1. Background to tillage research

Tillage research has proceeded along two distinctly separate but complimentary directions. One direction referred to as the engineering approach (Hillel, 1980) has concentrated on the tillage operations (the forces involved and the soil conditions produced and described). The other referred to as the agronomic ap-

proach direction involves investigating the effects of the tillage induced conditions on crop production. A lot of work has been done to investigate the effects of various tillage techniques on crop yields (Nyakatawa et al., 1994; Thomlow and Bruneau, 1999; Li et al., 2001). Henderson (1979) remarked that most of the literature deal with studies on the effect of a tillage procedure on crop yield without providing an insight into how the procedure influenced crop growth and, therefore yield. Due to these general objectives, the results obtained were often site and year specific. In recent years, research on tillage has narrowed down to a few parameters and how they influence crop growth. It was observed, for example, that tillage could have an impact on crop production if physical properties of the soil hindering crop growth such as hard pans were

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removed. As a result many subsequent studies narrowed down their objectives to specific factors, such as tillage effects on bulk density and water infiltration. However, with this later approach, results have been contradictory and inconclusive due to variability in soils different researchers worked on. Therefore further research work on different types of soil is still being carried out. The new approach in tillage research moved away from associating crop yield with the type of implement used to associate it with the soil conditions produced by tillage implement. Research has also moved away from using crop yields as an indicator of the suitability for the soil conditions produced by tillage. The new dimension is to use soil physical properties such as soil water storage, soil temperature and mechanical impedance as indicators.

1.2. Surface roughness

Surface roughness is the configuration of the soil caused by the randomly oriented arrangement of soil clods. Tillage implements can produce two types of roughness; oriented roughness and random roughness (Allmaras et al., 1966). The second type of roughness is caused by the random occurrence of peaks and depressions resulting from soil clods and organization of aggregates which cannot be attributed to oriented roughness resulting from tillage tool marks or general slope effects. Random roughness is a very important property of tilled soils in terms of soil water storage. Infiltration, evaporation and runoff retardation are closely associated with random roughness. Burwell and Larson (1969) have shown highly significant correlation of infiltration capacities prior to the start of runoff with a roughness index and that differences can only occur due to the nature of the sealed or crusted layer formed at the soil surface. Allmaras et al. (1972) observed higher evaporation rates from rough surfaces, as well as increased porosity, which increased infiltration. The water stored in the surface depressions on the soil surface is termed depressional storage. It has been found that there is a positive correlation between the surface roughness and the depressional storage. Work has been done on how to measure depressional storage and predict storage values using different models that consider roughness (Linden, 1979; Onstad, 1984). Seginer (1971) developed a model to predict both drainage pattern and surface

storage capacity of the cultivated surfaces taking into account the slope of the field, direction of the furrows and roughness of the field. Mitchell and Jones (1976) developed models that use geometric models of the surface configuration. However most of these models are complex and very laborious. Their empirical nature often limits their use in estimating depression storage. Mitchell and Jones (1976) also developed another simpler depth storage model that can be expressed as

$$W = aD^b \quad (1)$$

where W is the water storage on the surface (cm), D the depth above the lowest point on the surface (cm), and a and b the fitted equation parameters.

The selection of appropriate methods for use needs careful consideration and the selection of any one single model depends on the purpose of the calculation and the objectives of the investigation (Makungu, 1991).

2. Dynamic nature of tillage induced soil physical conditions

Initially, tillage induced soil conditions have been found to decline as time progresses (Zoebeck and Onstad, 1987). The major cause of the decline is normally cumulative rainfall. A rough cloddy surface will gradually slake and be smoothed by raindrop energy. Dexter (1977) measured the random roughness of the soil and related it to cumulative natural rainfall. Johnson et al. (1979) and Zoebeck and Onstad (1987) also observed a similar exponential decay of the form shown in Eq. (2):

$$RR = \alpha RR_0 e^{-\beta P} \quad (2)$$

where RR is the random roughness on any day, RR_0 the initial random roughness, P the cumulative rainfall, e the exponential factor, and α and β the regression coefficients representing rate of decline in random roughness and the shape of the exponential curve, respectively.

Burwell and Larson (1969) observed that much of the random roughness and total pore space created by tillage decreased significantly by the time runoff begins. Similarly, porosity decreases in freshly tilled soils with cumulative rainfall. They found bulk density

increase to be very rapid at the beginning and gradually declines at later stages of water application.

The variations of the results obtained in previous studies prompted this study. This study was carried out in the semi-arid region of Dodoma, in Tanzania with a view to investigate the effect of tillage method on soil surface micro topography and how this influences the soil's ability to store and transmit water.

3. Materials and methods

3.1. Study area

The research work was conducted at Hombolo agricultural research institute (ARI) in Dodoma, central region of Tanzania. The institute is located 58 km northeast of the Dodoma town, 5°53'S latitude and 35°55'S longitude. The altitude is 1097 m a.s.l.

The soils are classified as Typic Untorthent in the US Soil Taxonomy and as Dystric Regosols in the FAO classification. The profile is fairly deep with texture ranging from sandy to sandy clay on the surface and loam subsoil. The structure is weakly developed. It is characterised by an ochric epipedon and no other diagnostic horizon is recognized. The sand fraction is dominated by quartz. The moisture and temperature regimes of the soil are ustic and thermic, respectively.

The general rainfall pattern in the study area is influenced by the movements of the inter-tropical convergence zone (ITCZ) between the northern and the southern hemispheres. The year is divided into two distinct seasons: a dry season between May and November and a rainy season from December to March. The average monthly rainfall amounts at Hombolo Meteorological Station from 1974 to 1992 are compared with the monthly totals during the experimental period are shown in Table 1.

The average annual rainfall is 589 mm but the distribution is highly variable with high intensities.

The mean temperature shows seasonal variation although the transition is not sharply marked. In July–August, it is relatively cooler than the rest of the year and July is the coolest month with an average temperature of 19.6 °C. November is the hottest month when temperatures soar up to as high as 35 °C. The average annual temperature is 22.7 °C. Average annual potential evaporation of 2123 mm (Christianson, 1981). The actual evaporation is 650 mm and on very few occasions the rainfall meets the evapotranspiration demand.

3.2. Tillage treatments

The five tillage treatments used in the experiments are described in Table 2.

3.3. Experimental design and layout

The experiment was laid out in a completely randomised design. The five tillage treatments were replicated three times thus a total of 15 field plots measuring 20 m long and 5 m wide were used. The lengths of all the plots were parallel to the direction of the slope and the general slope average was 4%. Plots were separated by pathways of 1 m wide each. Each plot was bordered with iron sheets on all the sides. This was done to prevent loss of water from the plots. The iron sheets were placed immediately after the tillage operations. Tillage was performed after the first rains in November and plating was done immediately. Drainage channels were cut at the top and bottom of the plots in order to drain away runoff from outside the plots as well as for emptying water from the surface runoff measurement drums.

Sorghum (*Sorghum bicolor* var. *Tegemeo*) was planted at a spacing of 0.75 m between rows and 0.3 m within rows to achieve a plant population of about 45 000–46 000 plants per hectare.

Table 1

Monthly averages of rainfall (mm) at Hombolo during the experiment period compared with the long-term (1974–1992) monthly averages

	Month											
	August	September	October	November	December	January	February	March	April	May	June	July
1974–1992	0	0	7	37	14	118	107	63	8	9	1	0
Period of study	0	9	0	34	55	120	45	67	32	0	0	0

Table 2
Tillage methods

Treatment	Description
NT	Soil remained undisturbed throughout the season. The only disturbance was during planting when the hand hoe was used to dig the holes for the seeds
HH	Flat cultivation with a hand hoe which involved digging across the slope to a depth of 10 cm. It produced uniform sized clods (8–15 cm diameter) and a relatively rough surface configuration
DP	Involved a three-furrow disc plough, pulled by a 50 HP tractor ploughing at a depth of 15 cm. It resulted in partial soil inversion of the soil with reduced pulverisation and a very rough surface
SCT	SCT is a reduced tillage method that creates minimal disturbance of the soil structure. Involved digging to 10 cm depth with a hand hoe a strip (5–10 cm width) in which planting of the seed was done and minimal disturbance of the soil occurred and surface roughness was relatively low
TR	Topsoil was heaped in bunds forming micro basins. Ridges were 0.75 m apart and tied at 1.5 m intervals with dimensions of 450 mm by 450 mm and 250 mm deep

3.4. Instrumentation and measurements

A microrelief meter was used to measure surface roughness. The microrelief meter used in this study was similar to the one used by Kuipers (1957). The instrument consists of a 130 cm × 90 cm mainframe of aluminium bars. Across the middle of the frame is a needle locking string. The string is designed to hold 23 needles that slide up and down. Each needle is fitted with a small foot to prevent it from penetrating the soil.

For height measurement, the whole device was placed horizontally with the needles locked up. The instrument was levelled by means of a spirit level and adjusting the support pins. The needles were then allowed to slide down until their feet touched the soil surface and were then locked in position. The height of each of the needles above the top of the frame was measured with a ruler. The needles were pulled up again, locked and the instrument moved to the next measuring position. The surface roughness was determined as the standard deviation of the pin height measurement. There were six measurement positions for each plot on each measurement day. These positions were selected randomly and spaced at least 3 m apart. Analysis of variance (ANOVA) was used to compare the differences in random roughness caused by different tillage treatments. The data for random roughness was fitted to the Zoebeck and Onstad (1987) equation. There was no consideration of the TR treatment because making the tied ridges created oriented roughness while all the other treatments had random roughness.

The Mitchell and Jones (1978) method represented by Eq. (1) was used in this study to determine depression storage. Microrelief meter data was processed to obtain depth storage values on the assumption that each point measurement was the centre of a 2.5 cm square level surface.

The values of actual elevations (measured) and line of best fit (LOBF) obtained by simple regression analysis were plotted against distance from measuring points. All points below the LOBF were taken as depressional storage. For the TR, covering a pond with a plastic sheet and measuring the volume of water required to fill the pond determined plots depression storage. This was done at the same time when surface roughness was determined for each treatment. Depressional storage was determined each time the random roughness was determined during the season to observe the influence of cumulative rainfall on the depressional storage produced by each tillage treatment.

Measurement of soil moisture was done using core samplers of diameter 6 cm and a length of 12 cm. Samples were collected randomly each week from each plot at three different depths: 0–15, 15–30 and 30–45 cm. The standard gravimetric method where soil samples were dried in an oven at 105 °C for 24 h was used. The gravimetric moisture content was then converted to volumetric moisture contents by multiplying with the bulk density of the soil. Each of the three values was assumed to represent an average value in a section of the profile of thickness 15 cm and the volume (in units of depth) contained within the soil profile of depth 45 cm was determined.

3.5. Determination of soil water infiltration

Infiltration was measured using a double ring infiltrometer (falling head) with the diameters of the inner ring and an outer ring 27.9 and 54.5 cm, respectively. The infiltration measurements were carried out at the beginning of the season after the tillage operations and before planting. The procedure was repeated midway through the season and after harvesting the sorghum crop. The experiments were conducted in the middle of the each plot. Infiltration data was also fitted to the [Phillip's model \(1957\)](#) which is described by the following equation

$$I = St^{0.5} + At \quad (3)$$

where I is the cumulative infiltration (cm), S the soil water sorptivity, A the parameter close to saturated hydraulic conductivity, and t the time (min).

Weather data (rainfall, temperature, wind speed, evaporation) was collected from the Hombolo Meteorological station situated about 100 m from the experimental plots. Data was collected for one full season. A computer package, SAS was used to carry out the statistical analysis. ANOVA was carried out on the data. Depression storage, profile moisture content, random roughness and crop yield were the dependent variable while tillage method and sampling time were the independent variables.

4. Results and discussion

4.1. Effects of tillage on surface random roughness

Generally random roughness values were significantly higher in tilled plots than untilled plots as shown in [Table 3](#). The DP treatments had the highest values of random roughness while the NT had the least. Random roughness however declined sharply with time in the DP due to the crumbling of the soil clods as a result of the raindrop effect. Random roughness declined rapidly with small amounts of rainfall and approached a steady rate of decline with additional rainfall. The initially high rate of decrease could probably be due to sloughing and breaking of soil clods as a result of wetting. Subsequent rate of reduction is checked by deposition into the depression and the shear resistance of the individual soil clods.

Table 3

Mean values of field measured random roughness of the four tillage treatments^a

Cumulative rainfall (mm)	Surface roughness (cm)			
	NT	SCT	DP	HH
0	0.69 a	3.34 b	8.33 c	4.80 d
142.4	0.60 a	2.87 b	6.33 c	1.85 d
315.4	0.59 a	1.66 b	5.28 c	1.54 b
407.6	0.54 a	1.15 b	4.77 c	1.91 d
637.4	0.54 a	0.56 a	1.63 b	0.61 a

^a Means with the same letter for each cumulative rainfall are not significantly different at the 5% level of the Duncan's multiple range test.

The derived regression equations for the tillage treatments used in this experiment are given in [Table 4](#). The high α value for the DP indicates a more rapid decline in the DP than the other treatments. The rates of decline in the SCT and HH were almost the same. The reduction in random roughness has a great significance in the soil water storage capacity. The slow and steady decline in the SCT and HH treatments would mean that more water would be held in the depressions at any time than in the DP were the roughness declined more rapidly. This may partly explain the greater amount of soil moisture in the SCT and HH treatments at times than in the DP. The high R^2 values for the tilled soils show that the Zoebeck equation was able to fully explain the observed variations.

The relatively low regression coefficient and negative value of α for the NT suggest that the variation of random roughness as described by the above equation does not truly characterise the changes in actual physical conditions on the NT surface. A number of rills developed on the NT surface with increase in cumulative precipitation and this created some oriented roughness which gave a picture of increase in random roughness and its residual value depends to a greater extent on the initial surface conditions, which is

Table 4

Fitted Zoebeck and Onstad (1987) equations for random roughness decline

Tillage treatment	Equation	R^2 ($n = 8$)
DP	$RR = 9.39RR_0 e^{-0.00265P}$	0.96
HH	$RR = 3.72RR_0 e^{-0.00277P}$	0.95
SCT	$RR = 3.47RR_0 e^{-0.00205P}$	0.96
NT	$RR = -3.37RR_0 e^{-0.00104P}$	0.91

contrary to what Dexter (1977) observed. He observed that random roughness reduction due to rainfall was independent of the initial random roughness and the surface conditions. The reduction in random roughness that occurs with pulverisation increases susceptibility of the soil to wind erosion because a smoother surface is less effective in reducing wind velocity. A smoother surface does reduce wind turbulence, but the effect of the decreasing turbulence in reducing wind erosion usually does not compensate entirely for the increased surface wind velocity (Chepil and Milne, 1941). The considerable turbulence that would occur over a rougher surface at higher wind velocities might be expected to enhance water vapour loss from the soil surface. The susceptibility of the smoother surfaces to crust formation would be greater, than for rougher surfaces. At the end of the season, random roughness for SCT, HH, and NT was not significantly different (Table 3).

4.2. Influence of tillage on depressional storage

The TR treatment had the highest values of depressional storage at all measurement times while the NT treatment had the least as shown in Fig. 1. The pulverisation of the soil clods caused by the HH resulted in lower depressional storage for the HH than the SCT treatment. Soil tilt with larger clods would always give higher depressional storage values. It was observed that the volume of tied ridges was eroded after intense storms as well as silting of the ponds. As a result the depressional storage was reduced signif-

icantly with time. The effect of the raindrop impact on the soil clods in the HH and DP plots resulted in a sharp decline in depressional storage. Such an observation would be expected since the random roughness in these treatments also declined rapidly with cumulative rainfall. The decline in depressional storage had a significant impact on soil water storage. The decline in depressional storage would result in an increase in surface runoff that is undesirable in semi-arid regions where rainfall is low and unreliable.

4.3. Influence of tillage on soil water storage

The influences of tillage method on the soil water storage were highly significant. Fig. 2 shows the results obtained in this experiment. The TR treatment had the highest values throughout the season for profile moisture content. The depressions kept water for longer periods and allowed it to infiltrate into the soils. The results agree very well with the results obtained by Makungu (1991) and Kayombo and Lal (1992). They noted that compared to either open ridging or flat cultivation, tied ridging increased soil water content, soil water retention and available water capacity. It also decreases runoff.

The SCT and DP treatments had high values of depressional storage but these were significantly lower than that for the TR treatment. Early in the season the NT treatment had significantly higher levels of soil water storage than the HH, SCT and DP treatment. This is contrary to what was expected. However, results showing relatively high soil water storage un-

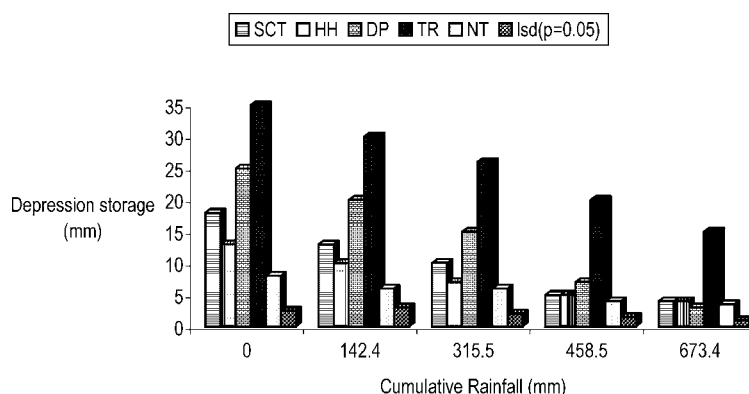


Fig. 1. The influence of rainfall on depressional storage for the five tillage methods.

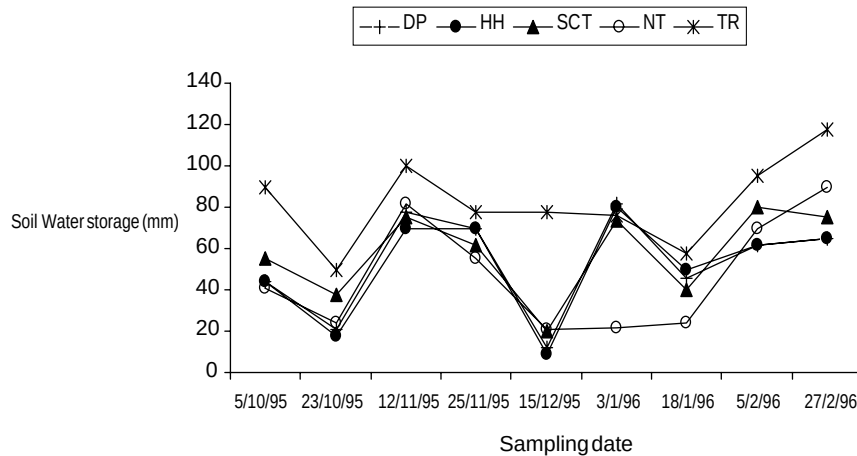


Fig. 2. Soil water content at different sampling times for the five tillage methods.

der NT in comparison to other tillage treatments have been noted in other studies (Kayombo et al., 1991; McFarland et al., 1991). The high moisture content in the NT treatment was attributed to improved infiltration rates under NT as a result of a more stable structure and existence of a more continuous pore system from dead roots and worm activity which are often lacking in the conventionally tilled soils. The merits of NT systems including soil moisture retention, in bio-structurally active soils have been documented in some tropical regions (Lal, 1985).

4.4. Influence of tillage on infiltration

Results obtained indicate that tilling the soils enhanced infiltration rates. Infiltration rates were significantly higher in the DP than the SCT treatment. This is probably due to the higher random roughness in the DP than the SCT treatment. The tilled plots had very high values of the initial infiltration rates, but these rates rapidly declined with time. This is probably due to rapid structural deterioration caused by slacking and dispersion. The large proportion of medium sized clods, which easily broke down and accelerated crust formation, might be the major cause for this behaviour.

Infiltration rates were significantly lower in the TR treatment than in the tilled soils. This is probably due to the fact that the infiltration studies were done in

the furrows where the soils were scooped to form the ridges thus exposing less the porous subsoil. However, the advantage of the TR treatment is that the ponds created in the field will capture most of the rainwater and allow it to infiltrate into the soil over time (Fig. 3).

4.5. Phillip (1957) model fitting to infiltration data

Infiltration data was analysed by fitting straight lines to the plots of infiltration rate (I) against the square root of cumulative time ($t^{0.5}$) in seconds. I (cm) was divided by a corresponding value of $t^{0.5}$ (s) in the entire infiltration run. The values obtained were then regressed against $t^{0.5}$ and S was the regression coefficient and A the slope of the regression line. The mean values of parameters S and A were determined together with their correlation coefficients and significance tests as shown in Table 5.

Parameter S indicates the capacity of a soil to absorb water and theoretically it is supposed to decrease with the increase of the initial soil moisture. It controls the initial infiltration rate. In contrast, equilibrium infiltration rate is governed by the transmissivity parameter, A , which indicates the ability of a soil to transmit water. The data showed significant differences in S for most of the treatments. However the average S in the TR treatment was similar to that for NT. The high sorptivity values for the tilled plots imply that tillage

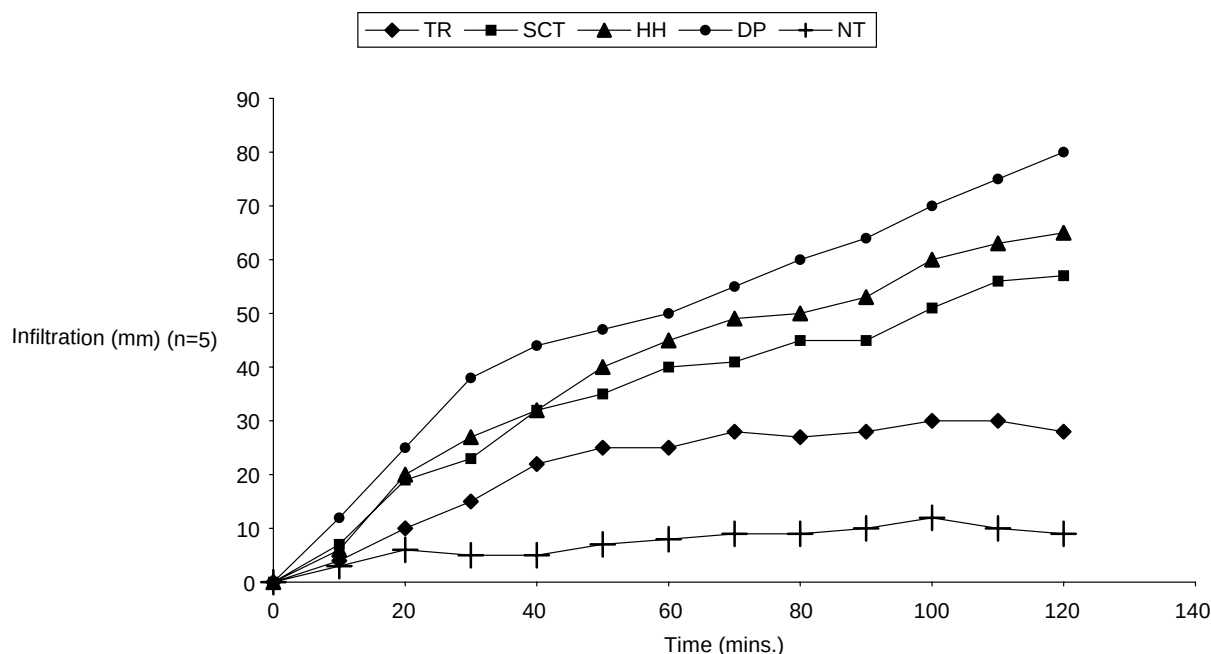


Fig. 3. Cumulative infiltration for the five tillage treatments after the tillage operations.

improves the soil's initial water intake ability. Parameter *A* had the same trend as *S*. The *A* values increased in the order TR, NT, SCT, HH and DP indicating that the soil transmissivity increased with the level of soil disturbance. Again the DP treatment had the highest significant values of parameter *A*. Similar results were obtained by Mwendera (1992) working on silty loam soils. Lal et al. (1989) however obtained negative values for the transmissivity parameter on the plough till treatments. Taylor and Ashcroft (1972) attributed the negative values of *A* to the heavy texture of the soils.

Table 5

Phillips model parameters and correlation coefficients for the five tillage treatments and their significance tests^a

Tillage method	Phillips parameters		
	<i>S</i> (mm h ^{-0.5})	<i>A</i> (mm h ⁻¹)	<i>R</i> ² (<i>n</i> = 8)
TR	10.73 a	2.08 a	0.95
NT	12.27 a	2.60 a	0.95
DP	50.74 b	14.17 b	0.90
SCT	23.24 c	5.86 c	0.92
HH	37.43 d	9.37 h	0.90

^a Means with the same letter in column are not significantly different at the 5% level of Duncan's multiple range test.

4.6. Effect of tillage methods on sorghum grain yield

The TR treatment had the highest grain yield as shown in Table 6. This would be probably due to the high water retention that was associated with this treatment. The SCT treatment also produced relatively higher yields. Hatibu (1995) also obtained similar results in the same area. In Ohio, Dick et al. (1991) obtained higher maize yields under NT than conventionally tilled soils in a 25 year experiment. However they observed that such an advantage of the NT system was only pronounced as the experiment

Table 6

Mean sorghum yields for the five tillage methods^a

Tillage method	Yield (kg ha ⁻¹)
HH	2143 a
SCT	2262 b
TR	2406 c
DP	2162 a
NT	2038 d

^a Means with the same letter are not significantly different at the 5% level of Duncan's multiple range test.

proceeded. In the initial years there were no significant advantages of the NT system. This could be the reason why in this work the NT system had lower yields than the yield from conventionally tilled soils.

5. Conclusion and recommendations

Within the confines of the obtained results, it can be concluded that treatments associated with high values of depressional storage had higher soil moisture contents throughout the season. The results therefore suggest that depressional storage is a suitable index for characterising effects of tillage that have a bearing on soil moisture conservation. Random roughness and depressional storage followed this order: TR > DP > SCT > HH > NT. TR had the highest values of depressional storage because of the oriented roughness associated with tied ridging. With cumulative rainfall, random roughness deteriorated drastically, and at the end of the season the values were almost the same for all tillage methods.

The obtained results also show that tilling soils resulted in increased ability of soil to hold and transmit water. This was evident from the infiltration tests done. The good precision of the Phillip equation also shows the validity of the equation under the given conditions. However the fit was relatively poor on tilled soils (DP, SCT, and HH). This could be because of the equation's inability to account for the instability of the soil porous system as a result of tillage.

There were significant yield differences among the tillage treatments indicating that tillage induced soil conditions influenced the yields. A higher soil moisture regime in the TR treatment resulted in higher yields.

It can also be concluded that the high degree of surface roughness and associated total porosity created by tillage increased infiltration into the soils. However, the susceptibility of the soils to structural degradation is a very important factor in soil water infiltration in tilled soils.

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Hydrologic Response of Solar Farms

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Abstract: Because of the benefits of solar energy, the number of solar farms is increasing; however, their hydrologic impacts have not been studied. The goal of this study was to determine the hydrologic effects of solar farms and examine whether or not storm-water management is needed to control runoff volumes and rates. A model of a solar farm was used to simulate runoff for two conditions: the pre- and postpaneled conditions. Using sensitivity analyses, modeling showed that the solar panels themselves did not have a significant effect on the runoff volumes, peaks, or times to peak. However, if the ground cover under the panels is gravel or bare ground, owing to design decisions or lack of maintenance, the peak discharge may increase significantly with storm-water management needed. In addition, the kinetic energy of the flow that drains from the panels was found to be greater than that of the rainfall, which could cause erosion at the base of the panels. Thus, it is recommended that the grass beneath the panels be well maintained or that a buffer strip be placed after the most downgradient row of panels. This study, along with design recommendations, can be used as a guide for the future design of solar farms. DOI: [10.1061/\(ASCE\)HE.1943-5584.0000530](https://doi.org/10.1061/(ASCE)HE.1943-5584.0000530). © 2013 American Society of Civil Engineers.

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Author keywords: Hydrology; Land use change; Solar energy; Flooding; Surface water runoff; Storm-water management.

Introduction

Storm-water management practices are generally implemented to reverse the effects of land-cover changes that cause increases in volumes and rates of runoff. This is a concern posed for new types of land-cover change such as the solar farm. Solar energy is a renewable energy source that is expected to increase in importance in the near future. Because solar farms require considerable land, it is necessary to understand the design of solar farms and their potential effect on erosion rates and storm runoff, especially the impact on offsite properties and receiving streams. These farms can vary in size from 8 ha (20 acres) in residential areas to 250 ha (600 acres) in areas where land is abundant.

The solar panels are impervious to rain water; however, they are mounted on metal rods and placed over pervious land. In some cases, the area below the panel is paved or covered with gravel. Service roads are generally located between rows of panels. Although some panels are stationary, others are designed to move so that the angle of the panel varies with the angle of the sun. The angle can range, depending on the latitude, from 22° during the summer months to 74° during the winter months. In addition, the angle and direction can also change throughout the day. The issue posed is whether or not these rows of impervious panels will change the runoff characteristics of the site, specifically increase runoff volumes or peak discharge rates. If the increases are hydrologically significant, storm-water management facilities may be needed. Additionally, it is possible that the velocity of water

draining from the edge of the panels is sufficient to cause erosion of the soil below the panels, especially where the maintenance roadways are bare ground.

The outcome of this study provides guidance for assessing the hydrologic effects of solar farms, which is important to those who plan, design, and install arrays of solar panels. Those who design solar farms may need to provide for storm-water management. This study investigated the hydrologic effects of solar farms, assessed whether or not storm-water management might be needed, and if the velocity of the runoff from the panels could be sufficient to cause erosion of the soil below the panels.

Model Development

Solar farms are generally designed to maximize the amount of energy produced per unit of land area, while still allowing space for maintenance. The hydrologic response of solar farms is not usually considered in design. Typically, the panels will be arrayed in long rows with separations between the rows to allow for maintenance vehicles. To model a typical layout, a unit width of one panel was assumed, with the length of the downgradient strip depending on the size of the farm. For example, a solar farm with 30 rows of 200 panels each could be modeled as a strip of 30 panels with space between the panels for maintenance vehicles. Rainwater that drains from the upper panel onto the ground will flow over the land under the 29 panels on the downgradient strip. Depending on the land cover, infiltration losses would be expected as the runoff flows to the bottom of the slope.

To determine the effects that the solar panels have on runoff characteristics, a model of a solar farm was developed. Runoff in the form of sheet flow without the addition of the solar panels served as the prepaneled condition. The paneled condition assumed a downgradient series of cells with one solar panel per ground cell. Each cell was separated into three sections: wet, dry, and spacer.

The dry section is that portion directly underneath the solar panel, unexposed directly to the rainfall. As the angle of the panel from the horizontal increases, more of the rain will fall directly onto

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the ground; this section of the cell is referred to as the wet section. The spacer section is the area between the rows of panels used by maintenance vehicles. Fig. 1 is an image of two solar panels and the spacer section allotted for maintenance vehicles. Fig. 2 is a schematic of the wet, dry, and spacer sections with their respective dimensions. In Fig. 1, tracks from the vehicles are visible on what is modeled within as the spacer section. When the solar panel is horizontal, then the length longitudinal to the direction that runoff will occur is the length of the dry and wet sections combined. Runoff from a dry section drains onto the downgradient spacer section. Runoff from the spacer section flows to the wet section of the next downgradient cell. Water that drains from a solar panel falls directly onto the spacer section of that cell.

The length of the spacer section is constant. During a storm event, the loss rate was assumed constant for the 24-h storm because a wet antecedent condition was assumed. The lengths of the wet and dry sections changed depending on the angle of the solar panel. The total length of the wet and dry sections was set



Fig. 1. Maintenance or “spacer” section between two rows of solar panels (photo by John E. Showler, reprinted with permission)

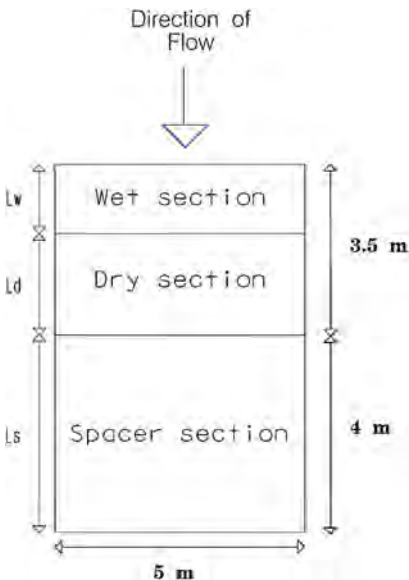


Fig. 2. Wet, dry, and spacer sections of a single cell with lengths L_w , L_s , and L_d with the solar panel covering the dry section

equal to the length of one horizontal solar panel, which was assumed to be 3.5 m. When a solar panel is horizontal, the dry section length would equal 3.5 m and the wet section length would be zero. In the paneled condition, the dry section does not receive direct rainfall because the rain first falls onto the solar panel then drains onto the spacer section. However, the dry section does infiltrate some of the runoff that comes from the upgradient wet section. The wet section was modeled similar to the spacer section with rain falling directly onto the section and assuming a constant loss rate.

For the presolar panel condition, the spacer and wet sections are modeled the same as in the paneled condition; however, the cell does not include a dry section. In the prepaneled condition, rain falls directly onto the entire cell. When modeling the prepaneled condition, all cells receive rainfall at the same rate and are subject to losses. All other conditions were assumed to remain the same such that the prepaneled and paneled conditions can be compared.

Rainfall was modeled after an natural resources conservation service (NRCS) Type II Storm (McCuen 2005) because it is an accurate representation of actual storms of varying characteristics that are imbedded in intensity-duration-frequency (IDF) curves. For each duration of interest, a dimensionless hyetograph was developed using a time increment of 12 s over the duration of the storm (see Fig. 3). The depth of rainfall that corresponds to each storm magnitude was then multiplied by the dimensionless hyetograph. For a 2-h storm duration, depths of 40.6, 76.2, and 101.6 mm were used for the 2-, 25-, and 100-year events. The 2- and 6-h duration hyetographs were developed using the center portion of the 24-h storm, with the rainfall depths established with the Baltimore IDF curve. The corresponding depths for a 6-h duration were 53.3, 106.7, and 132.1 mm, respectively. These magnitudes were chosen to give a range of storm conditions.

During each time increment, the depth of rain is multiplied by the cell area to determine the volume of rain added to each section of each cell. This volume becomes the storage in each cell. Depending on the soil group, a constant volume of losses was subtracted from the storage. The runoff velocity from a solar panel was calculated using Manning’s equation, with the hydraulic radius for sheet flow assumed to equal the depth of the storage on the panel (Bedient and Huber 2002). Similar assumptions were made to compute the velocities in each section of the surface sections.

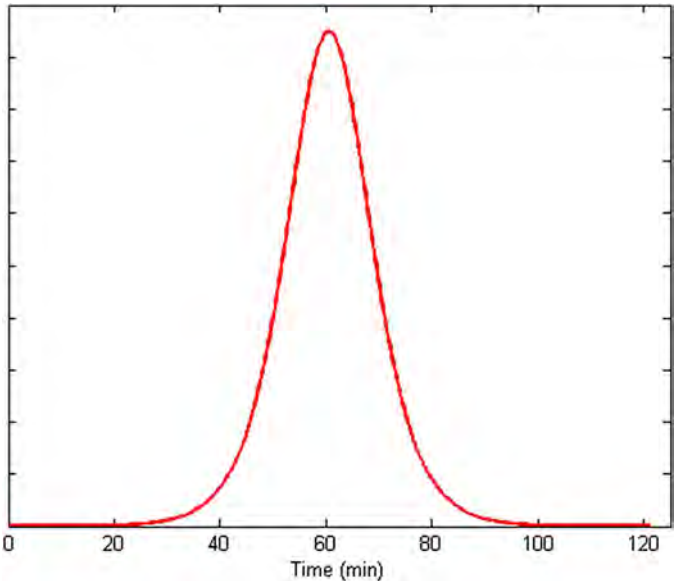


Fig. 3. Dimensionless hyetograph of 2-h Type II storm

Runoff from one section to the next and then to the next downgradient cell was routed using the continuity of mass. The routing coefficient depended on the depth of flow in storage and the velocity of runoff. Flow was routed from the wet section to the dry section to the spacer section, with flow from the spacer section draining to the wet section of the next cell. Flow from the most downgradient cell was assumed to be the outflow. Discharge rates and volumes from the most downgradient cell were used for comparisons between the prepaneled and paneled conditions.

Alternative Model Scenarios

To assess the effects of the different variables, a section of 30 cells, each with a solar panel, was assumed for the base model. Each cell was separated individually into wet, dry, and spacer sections. The area had a total ground length of 225 m with a ground slope of 1% and width of 5 m, which was the width of an average solar panel. The roughness coefficient (Engman 1986) for the silicon solar panel was assumed to be that of glass, 0.01. Roughness coefficients of 0.15 for grass and 0.02 for bare ground were also assumed. Loss rates of 0.5715 cm/h (0.225 in./h) and 0.254 cm/h (0.1 in./h) for B and C soils, respectively, were assumed.

The prepaneled condition using the 2-h, 25-year rainfall was assumed for the base condition, with each cell assumed to have a good grass cover condition. All other analyses were made assuming a paneled condition. For most scenarios, the runoff volumes and peak discharge rates from the paneled model were not significantly greater than those for the prepaneled condition. Over a total length of 225 m with 30 solar panels, the runoff increased by 0.26 m³, which was a difference of only 0.35%. The slight increase in runoff volume reflects the slightly higher velocities for the paneled condition. The peak discharge increased by 0.0013 m³, a change of only 0.31%. The time to peak was delayed by one time increment, i.e., 12 s. Inclusion of the panels did not have a significant hydrologic impact.

Storm Magnitude

The effect of storm magnitude was investigated by changing the magnitude from a 25-year storm to a 2-year storm. For the 2-year storm, the rainfall and runoff volumes decreased by approximately 50%. However, the runoff from the paneled watershed condition increased compared to the prepaneled condition by approximately the same volume as for the 25-year analysis, 0.26 m³. This increase represents only a 0.78% increase in volume. The peak discharge and the time to peak did not change significantly. These results reflect runoff from a good grass cover condition and indicated that the general conclusion of very minimal impacts was the same for different storm magnitudes.

Ground Slope

The effect of the downgradient ground slope of the solar farm was also examined. The angle of the solar panels would influence the velocity of flows from the panels. As the ground slope was increased, the velocity of flow over the ground surface would be closer to that on the panels. This could cause an overall increase in discharge rates. The ground slope was changed from 1 to 5%, with all other conditions remaining the same as the base conditions.

With the steeper incline, the volume of losses decreased from that for the 1% slope, which is to be expected because the faster velocity of the runoff would provide less opportunity for infiltration. However, between the prepaneled and paneled conditions, the increase in runoff volume was less than 1%. The peak discharge

and the time to peak did not change. Therefore, the greater ground slope did not significantly influence the response of the solar farm.

Soil Type

The effect of soil type on the runoff was also examined. The soil group was changed from B soil to C soil by varying the loss rate. As expected, owing to the higher loss rate for the C soil, the depths of runoff increased by approximately 7.5% with the C soil when compared with the volume for B soils. However, the runoff volume for the C soil condition only increased by 0.17% from the prepaneled condition to the paneled condition. In comparison with the B soil, a difference of 0.35% in volume resulted between the two conditions. Therefore, the soil group influenced the actual volumes and rates, but not the relative effect of the paneled condition when compared to the prepaneled condition.

Panel Angle

Because runoff velocities increase with slope, the effect of the angle of the solar panel on the hydrologic response was examined. Analyses were made for angles of 30° and 70° to test an average range from winter to summer. The hydrologic response for these angles was compared to that of the base condition angle of 45°. The other site conditions remained the same. The analyses showed that the angle of the panel had only a slight effect on runoff volumes and discharge rates. The lower angle of 30° was associated with an increased runoff volume, whereas the runoff volume decreased for the steeper angle of 70° when compared with the base condition of 45°. However, the differences (~0.5%) were very slight. Nevertheless, these results indicate that, when the solar panel was closer to horizontal, i.e., at a lower angle, a larger difference in runoff volume occurred between the prepaneled and paneled conditions. These differences in the response result are from differences in loss rates.

The peak discharge was also lower at the lower angle. At an angle of 30°, the peak discharge was slightly lower than at the higher angle of 70°. For the 2-h storm duration, the time to peak of the 30° angle was 2 min delayed from the time to peak of when the panel was positioned at a 70° angle, which reflects the longer travel times across the solar panels.

Storm Duration

To assess the effect of storm duration, analyses were made for 6-h storms, testing magnitudes for 2-, 25-, and 100-year return periods, with the results compared with those for the 2-h rainfall events. The longer storm duration was tested to determine whether a longer duration storm would produce a different ratio of increase in runoff between the prepaneled and paneled conditions. When compared to runoff volumes from the 2-h storm, those for the 6-h storm were 34% greater in both the paneled and prepaneled cases. However, when comparing the prepaneled to the paneled condition, the increase in the runoff volume with the 6-h storm was less than 1% regardless of the return period. The peak discharge and the time-to-peak did not differ significantly between the two conditions. The trends in the hydrologic response of the solar farm did not vary with storm duration.

Ground Cover

The ground cover under the panels was assumed to be a native grass that received little maintenance. For some solar farms, the area beneath the panel is covered in gravel or partially paved because the panels prevent the grass from receiving sunlight. Depending on the

volume of traffic, the spacer cell could be grass, patches of grass, or bare ground. Thus, it was necessary to determine whether or not these alternative ground-cover conditions would affect the runoff characteristics. This was accomplished by changing the Manning's n for the ground beneath the panels. The value of n under the panels, i.e., the dry section, was set to 0.015 for gravel, with the value for the spacer or maintenance section set to 0.02, i.e., bare ground. These can be compared to the base condition of a native grass ($n = 0.15$). A good cover should promote losses and delay the runoff.

For the smoother surfaces, the velocity of the runoff increased and the losses decreased, which resulted in increasing runoff volumes. This occurred both when the ground cover under the panels was changed to gravel and when the cover in the spacer section was changed to bare ground. Owing to the higher velocities of the flow, runoff rates from the cells increased significantly such that it was necessary to reduce the computational time increment. Fig. 4(a) shows the hydrograph from a 30-panel area with a time increment of 12 s. With a time increment of 12 s, the water in each cell is discharged at the end of every time increment, which results in no attenuation of the flow; thus, the undulations shown in Fig. 4(a) result. The time increment was reduced to 3 s for the 2-h storm, which resulted in watershed smoothing and a rational hydrograph shape [Fig. 4(b)]. The results showed that the storm runoff

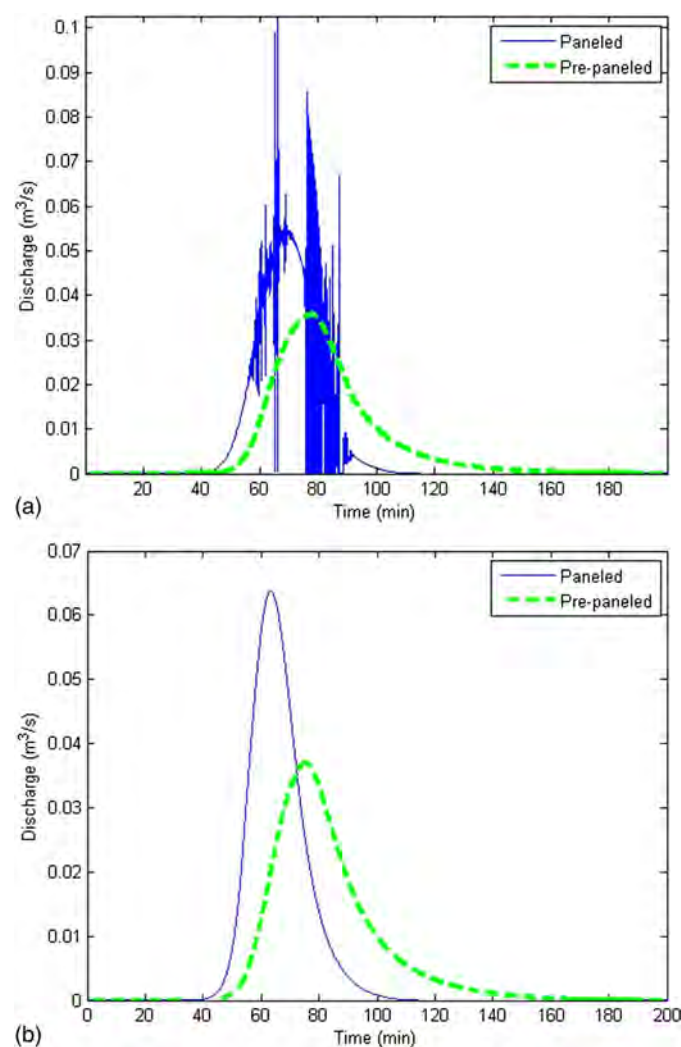


Fig. 4. Hydrograph with time increment of (a) 12 s; (b) 3 s with Manning's n for bare ground

increased by 7% from the grass-covered scenario to the scenario with gravel under the panel. The peak discharge increased by 73% for the gravel ground cover when compared with the grass cover without the panels. The time to peak was 10 min less with the gravel than with the grass, which reflects the effect of differences in surface roughness and the resulting velocities.

If maintenance vehicles used the spacer section regularly and the grass cover was not adequately maintained, the soil in the spacer section would be compacted and potentially the runoff volumes and rates would increase. Grass that is not maintained has the potential to become patchy and turn to bare ground. The grass under the panel may not get enough sunlight and die. Fig. 1 shows the result of the maintenance trucks frequently driving in the spacer section, which diminished the grass cover.

The effect of the lack of solar farm maintenance on runoff characteristics was modeled by changing the Manning's n to a value of 0.02 for bare ground. In this scenario, the roughness coefficient for the ground under the panels, i.e., the dry section, as well as in the spacer cell was changed from grass covered to bare ground ($n = 0.02$). The effects were nearly identical to that of the gravel. The runoff volume increased by 7% from the grass-covered to the bare-ground condition. The peak discharge increased by 72% when compared with the grass-covered condition. The runoff for the bare-ground condition also resulted in an earlier time to peak by approximately 10 min. Two other conditions were also modeled, showing similar results. In the first scenario, gravel was placed directly under the panel, and healthy grass was placed in the spacer section, which mimics a possible design decision. Under these conditions, the peak discharge increased by 42%, and the volume of runoff increased by 4%, which suggests that storm-water management would be necessary if gravel is placed anywhere.

Fig. 5 shows two solar panels from a solar farm in New Jersey. The bare ground between the panels can cause increased runoff rates and reductions in time of concentration, both of which could necessitate storm-water management. The final condition modeled involved the assumption of healthy grass beneath the panels and bare ground in the spacer section, which would simulate the condition of unmaintained grass resulting from vehicles that drive over the spacer section. Because the spacer section is 53% of the cell, the change in land cover to bare ground would reduce losses and decrease runoff travel times, which would cause runoff to amass as it



Fig. 5. Site showing the initiation of bare ground below the panels, which increases the potential for erosion (photo by John Showler, reprinted with permission)

moves downgradient. With the spacer section as bare ground, the peak discharge increased by 100%, which reflected the increases in volume and decrease in timing. These results illustrate the need for maintenance of the grass below and between the panels.

Design Suggestions

With well-maintained grass underneath the panels, the solar panels themselves do not have much effect on total volumes of the runoff or peak discharge rates. Although the panels are impervious, the rainwater that drains from the panels appears as runoff over the downgradient cells. Some of the runoff infiltrates. If the grass cover of a solar farm is not maintained, it can deteriorate either because of a lack of sunlight or maintenance vehicle traffic. In this case, the runoff characteristics can change significantly with both runoff rates and volumes increasing by significant amounts. In addition, if gravel or pavement is placed underneath the panels, this can also contribute to a significant increase in the hydrologic response.

If bare ground is foreseen to be a problem or gravel is to be placed under the panels to prevent erosion, it is necessary to counteract the excess runoff using some form of storm-water management. A simple practice that can be implemented is a buffer strip (Dabney et al. 2006) at the downgradient end of the solar farm. The buffer strip length must be sufficient to return the runoff characteristics with the panels to those of runoff experienced before the gravel and panels were installed. Alternatively, a detention basin can be installed.

A buffer strip was modeled along with the panels. For approximately every 200 m of panels, or 29 cells, the buffer must be 5 cells long (or 35 m) to reduce the runoff volume to that which occurred before the panels were added. Even if a gravel base is not placed under the panels, the inclusion of a buffer strip may be a good practice when grass maintenance is not a top funding priority. Fig. 6 shows the peak discharge from the graveled surface versus the length of the buffer needed to keep the discharge to prepaneled peak rate.

Water draining from a solar panel can increase the potential for erosion of the spacer section. If the spacer section is bare ground, the high kinetic energy of water draining from the panel can cause soil detachment and transport (Garde and Raju 1977; Beuselinck et al. 2002). The amount and risk of erosion was modeled using the velocity of water coming off a solar panel compared with the velocity and intensity of the rainwater. The velocity of panel

runoff was calculated using Manning's equation, and the velocity of falling rainwater was calculated using the following:

$$V_t = 120 d_r^{0.35} \quad (1)$$

where d_r = diameter of a raindrop, assumed to be 1 mm. The relationship between kinetic energy and rainfall intensity is

$$K_e = 916 + 330 \log_{10} i \quad (2)$$

where i = rainfall intensity (in./h) and K_e = kinetic energy (ft-tons per ac-in. of rain) of rain falling onto the wet section and the panel, as well as the water flowing off of the end of the panel (Wischmeier and Smith 1978). The kinetic energy (Salles et al. 2002) of the rainfall was greater than that coming off the panel, but the area under the panel (i.e., the product of the length, width, and cosine of the panel angle) is greater than the area under the edge of the panel where the water drains from the panel onto the ground. Thus, dividing the kinetic energy by the respective areas gives a more accurate representation of the kinetic energy experienced by the soil. The energy of the water draining from the panel onto the ground can be nearly 10 times greater than the rain itself falling onto the ground area. If the solar panel runoff falls onto an unsealed soil, considerable detachment can result (Motha et al. 2004). Thus, because of the increased kinetic energy, it is possible that the soil is much more prone to erosion with the panels than without. Where panels are installed, methods of erosion control should be included in the design.

Conclusions

Solar farms are the energy generators of the future; thus, it is important to determine the environmental and hydrologic effects of these farms, both existing and proposed. A model was created to simulate storm-water runoff over a land surface without panels and then with solar panels added. Various sensitivity analyses were conducted including changing the storm duration and volume, soil type, ground slope, panel angle, and ground cover to determine the effect that each of these factors would have on the volumes and peak discharge rates of the runoff.

The addition of solar panels over a grassy field does not have much of an effect on the volume of runoff, the peak discharge, nor the time to peak. With each analysis, the runoff volume increased slightly but not enough to require storm-water management facilities. However, when the land-cover type was changed under the panels, the hydrologic response changed significantly. When gravel or pavement was placed under the panels, with the spacer section left as patchy grass or bare ground, the volume of the runoff increased significantly and the peak discharge increased by approximately 100%. This was also the result when the entire cell was assumed to be bare ground.

The potential for erosion of the soil at the base of the solar panels was also studied. It was determined that the kinetic energy of the water draining from the solar panel could be as much as 10 times greater than that of rainfall. Thus, because the energy of the water draining from the panels is much higher, it is very possible that soil below the base of the solar panel could erode owing to the concentrated flow of water off the panel, especially if there is bare ground in the spacer section of the cell. If necessary, erosion control methods should be used.

Bare ground beneath the panels and in the spacer section is a realistic possibility (see Figs. 1 and 5). Thus, a good, well-maintained grass cover beneath the panels and in the spacer section is highly recommended. If gravel, pavement, or bare ground is

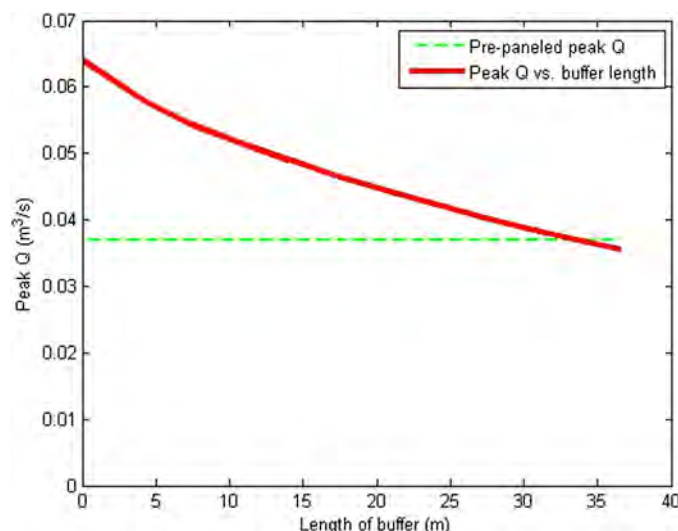


Fig. 6. Peak discharge over gravel compared with buffer length

deemed unavoidable below the panels or in the spacer section, it may necessary to add a buffer section to control the excess runoff volume and ensure adequate losses. If these simple measures are taken, solar farms will not have an adverse hydrologic impact from excess runoff or contribute eroded soil particles to receiving streams and waterways.

Acknowledgments

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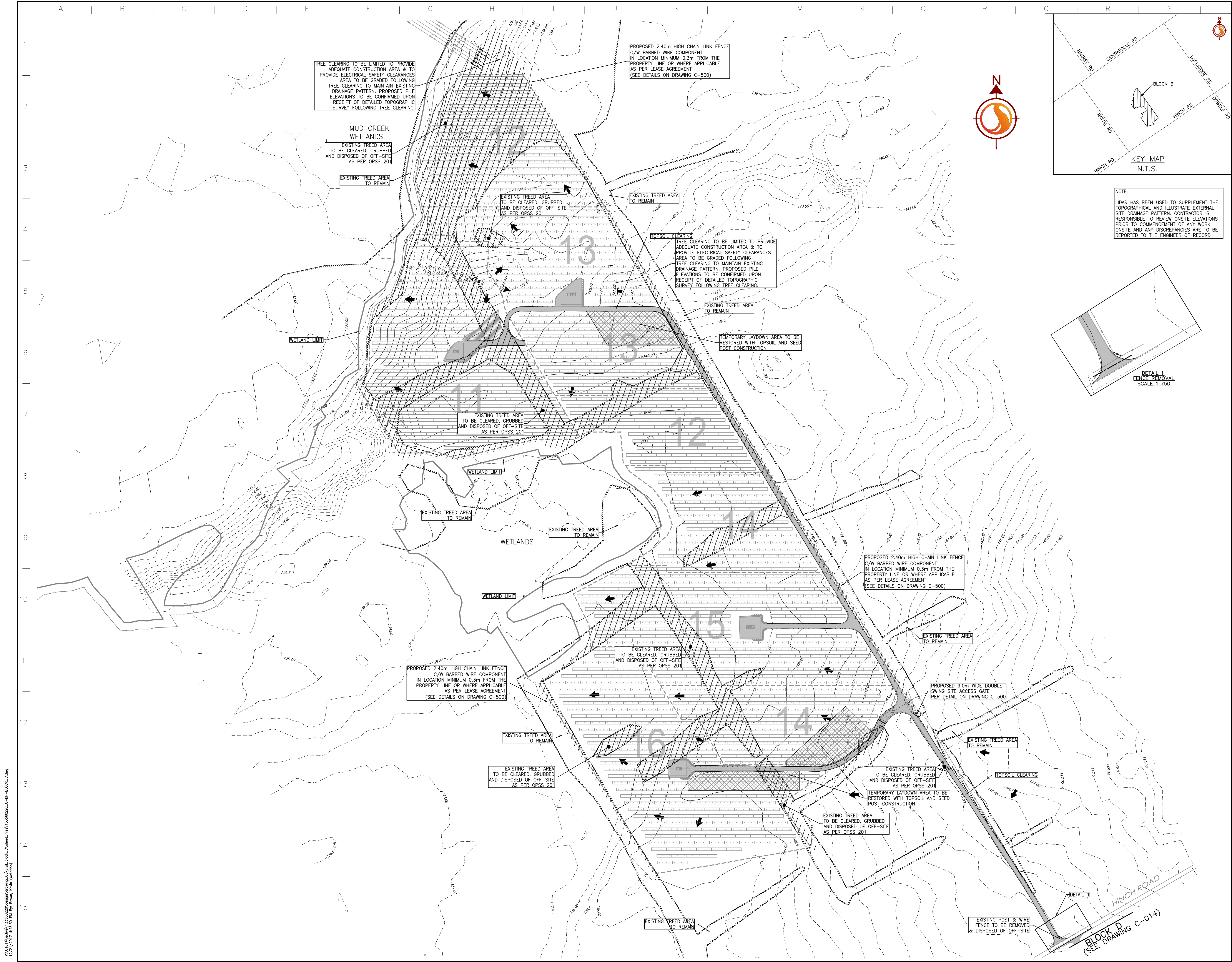
DRAWINGS

Drawing No. C-052 Block B Existing Conditions, Clearing, Grubbing and Fencing
Plan

Drawing No. C-402 Block D Grading Plan

Drawing No. C-602 Block D Sedimentation and Erosion Control Plan

Drawing No. C-650 Sedimentation and Erosion Control Notes and Details



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 6. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS (LATEST EDITION).
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 8. THE CONTRACTOR IS TO BE RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY.
 9. THE CONTRACTOR IS RESPONSIBLE FOR ALL DRAINAGE AND MEASURES TO CONTROL WATER. THE SITE IS TO BE FINE GRADED/LEVELED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED EVERYWHERE PRIOR TO THE INSTALLATION OF SOLAR PANELS.
 10. CONSTRUCTION TURNING RADIUS LIMITS IDENTIFY AREAS WHERE ADDITIONAL ROAD WIDTH IS REQUIRED TO ALLOW FOR ADEQUATE CLEARANCE FOR CONSTRUCTION VEHICLES.
 11. CULVERTS ARE TO BE INSTALLED AS PER OPSD 802.010. SOIL TYPE TO BE CONFIRMED ON SITE FOR DETERMINATION OF TRENCH WIDTH.
 12. ALL AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED. MIX AND APPLICATION RATE/METHOD TO BE SUBMITTED AND APPROVED BY OWNER PRIOR TO IMPLEMENTATION.
 13. CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSD 201.
 14. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSD 577.
 15. GRADINGS TO BE COMPLETED IN ACCORDANCE WITH OPSD 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSD 1010.
 16. CULVERT TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 802.010.
 17. WRAP AT CULVERT OUTLETS SHALL BE IN ACCORDANCE WITH OPSD 810.010 SECTION B-B.
 18. ALL SEEDING TO BE COMPLETED IN ACCORDANCE WITH OPSD 804.
 19. ROCK SPOIL FROM INSTALLATION TO BE REMOVED FROM GROUND SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.

Legend

PROPOSED	EXISTING

C.	RE-ISSUED FOR TENDER	KDB	CC	17.12.21
B.	ISSUED FOR TENDER	MALM	CC	17.11.30
A.	ISSUED FOR CLIENT REVIEW	MALM	DS	17.11.21
Revision		By	Appd.	YY.MM.DD

File Name:	133560220_C-DR-BLOCK_C.dwg	DRR	DS	DRR	17.10.27
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

LOYALIST SOLAR LP
LOYALIST SOLAR PROJECT

54MW GROUND-MOUNT SOLAR FARM

County of Lennox and Addington, Ontario

Title

BLOCK B
EXISTING CONDITIONS, CLEARING,
GRUBBING AND FENCING PLAN

Project No.

133560220

Scale

1:2000

Drawing No.

Sheet

Revision

C-052

1 of 1

C

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12/27/2017 4:23:30 PM By: Brian, Brian (brianb)



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300 Hagey Boulevard
Waterloo ON Canada
Tel. 519.579.4410
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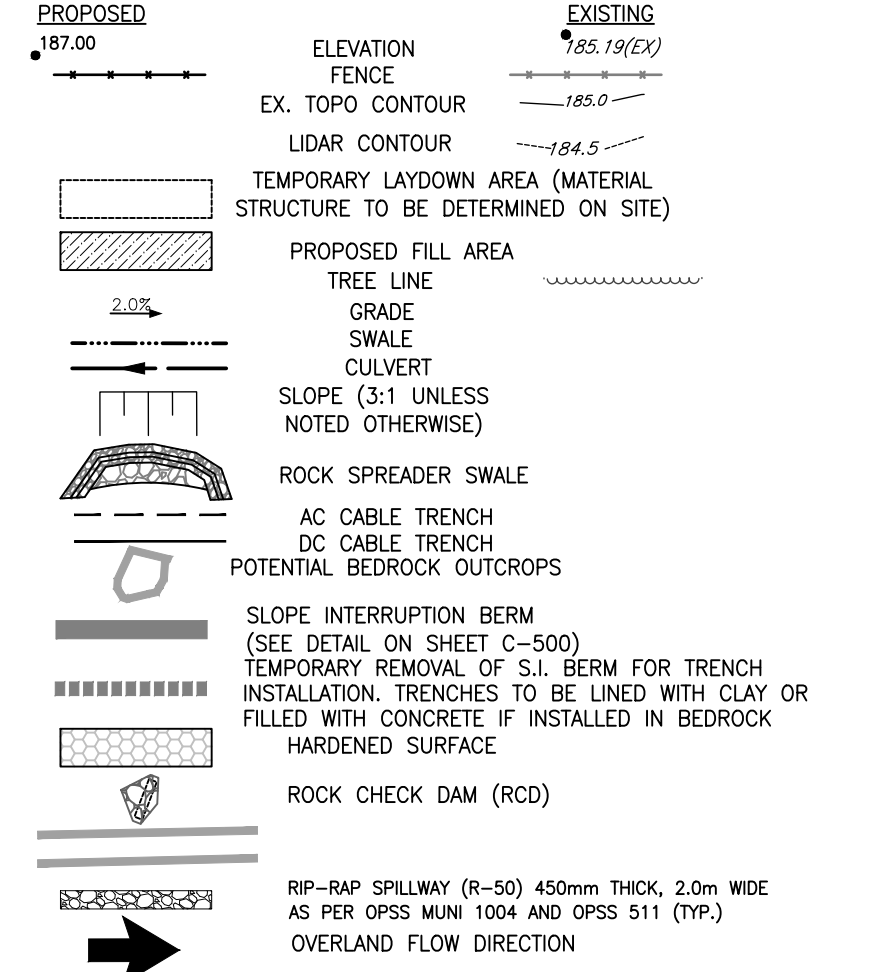
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Notes

- [illegible]

Legend



C. RE-ISSUED FOR TENDER	KDB	CC	17.12.21
B. ISSUED FOR TENDER	MALM	CC	17.11.30
A. ISSUED FOR CLIENT REVIEW	MALM	DS	17.11.21
Revision	By	Appd.	YY.MM.DD

Revision

File Name: 133560220_C-GP-BLOCK_C.dwg	DRR	DS	DRR	17.10.30
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

LOYALIST SOLAR LP
LOYALIST SOLAR PROJECT

54MW GROUND-MOUNT SOLAR FARM

SUNNY GROUND MOUNT SOLAR FARM

County of Lennox and Addington, Ontario

Title

BLOCK B

BLOCK B
GRADING PLAN

GRADING PLAN

Project No.	Scale	0	7.5	22.5	37.5m
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133560220 1:750 

Receiving No. Class Receiving

Drawing No. Sheet Revision

C-402 2 of 4 C

BLOCK B
(SEE DWG. NO. C-402 SHEET 1)

TEMPORARY LAYDOWN AREA, AREA
TO BE RESTORED WITH TOPSOIL AND
SEED POST CONSTRUCTION

NOTE:

LIDAR HAS BEEN USED TO SUPPLEMENT THE TOPOGRAPHICAL AND ILLUSTRATE EXTERNAL SITE DRAINAGE PATTERN. CONTRACTOR IS RESPONSIBLE TO REVIEW ONSITE ELEVATIONS PRIOR TO COMMENCEMENT OF ANY WORK ONSITE AND ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER OF RECORD

THIS PLAN IS TO BE READ IN CONJUNCTION
WITH THE STORM WATER MANAGEMENT PLAN
DATED DECEMBER 22, 2017.

GRADING NOTE:
FOR SLOPE INTERRUPTION BERMS SEE
GRADING TABLE ON THIS PAGE AND DETAILS
ON SHEET C-500 FOR GRADING &
CONSTRUCTION DETAILS

REFER TO ELECTRICAL DRAWINGS FOR FINAL
LOCATIONS OF TRENCHING

NOISE WALL CAN BE TEMPORARILY REMOVED
FOR POST CONSTRUCTION ACCESS TO
INVERTER STATIONS

EXISTING EXPOSED BEDROCK FRACTURE INFILLING TO BE MINIMIZED IF REQUIRED, FILL TO BE OF COARSE GRANULAR MATERIAL. REFER TO HYDROGEOLOGICAL ASSESSMENT (2017, HARDEN ENVIRONMENTAL SERVICES LTD.)

CONSTRUCTION TRAFFIC CROSSING OVER GRASSED WATERWAYS TO BE LIMITED TO AREAS OF EXPOSED BEDROCK, WHERE POSSIBLE. IN SITUATIONS THIS IS NOT POSSIBLE, DURING THE VARIOUS STAGES OF CONSTRUCTION, CONSTRUCTION TRAFFIC TO TAKE CARE OF VEGETATION BY SLOWER MOVING VEHICLES. MAINTENANCE OF GRASSED WATERWAYS REQUIRED TO MITIGATE ADDITIONAL SEDIMENT MIGRATION FROM SITE.

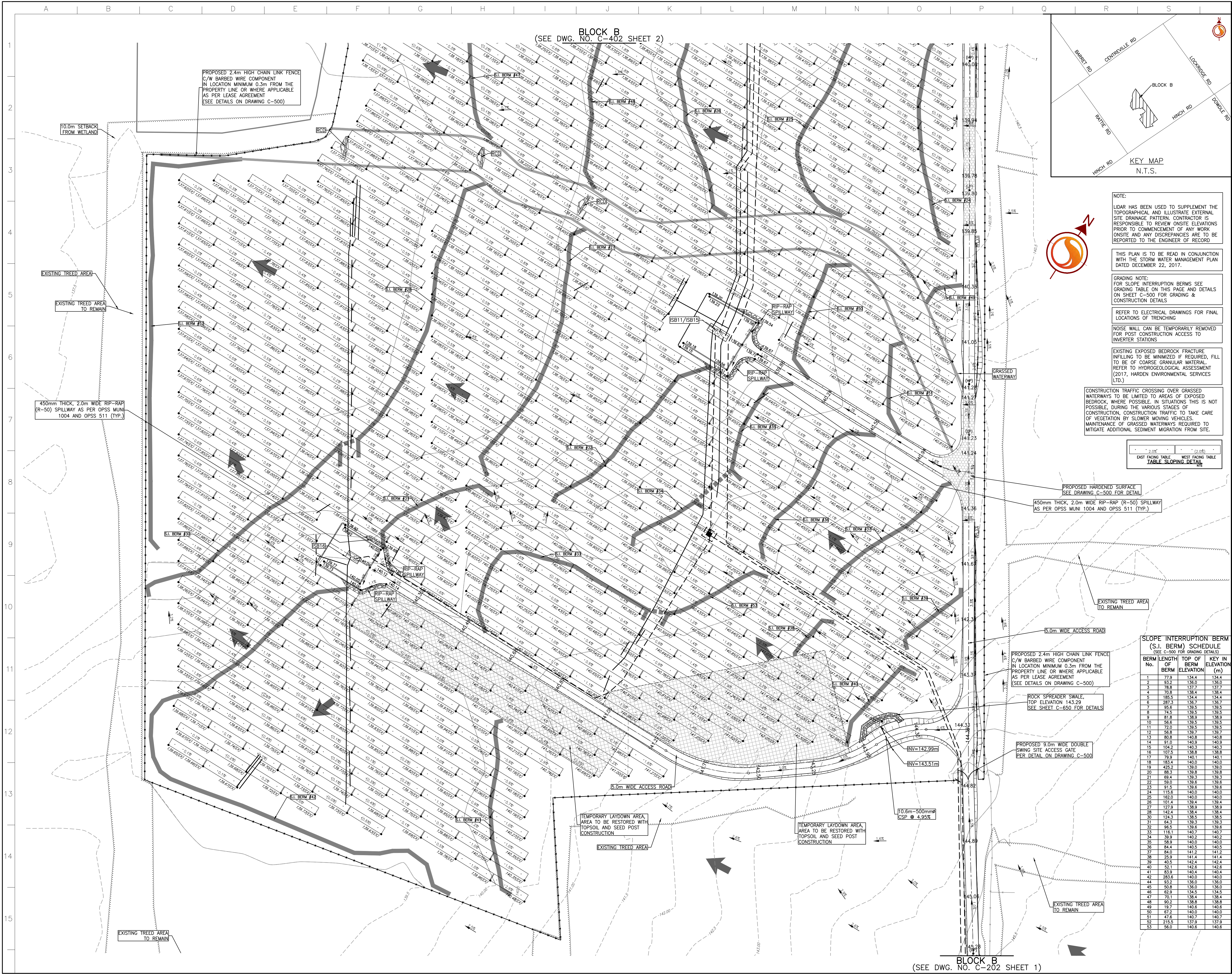
SLOPE INTERRUPTION BERM
(S.I. BERM) SCHEDULE
(SEE C. 500 FOR GRADING DETAILS)

BERM No.	LENGTH OF TOP OF ELEVATION	KEY IN ELEVATION
1	77.9 134.4	134.4
2	71.2 136.0	136.0
3	76.8 137.7	137.7
4	70.8 138.4	138.4
5	70.5 138.4	138.4
6	287.3 136.7	136.7
7	85.6 139.5	139.5
8	94.5 139.5	139.5
9	81.8 138.9	138.9
10	56.6 139.5	139.5
11	72.0 139.5	139.5
12	56.8 139.7	139.7
13	50.8 140.8	140.8
14	110.0 140.9	140.9
15	140.2 140.5	140.5
16	107.5 138.8	138.8
17	79.9 140.1	140.1
18	183.4 140.2	140.2
19	26.2 139.0	139.0
20	68.3 139.8	139.8
21	69.4 139.3	139.3
22	90.0 139.8	139.8
23	91.5 139.6	139.6
24	115.6 140.0	140.0
25	115.6 140.0	140.0
26	101.4 139.4	139.4
27	127.9 138.9	138.9
28	124.8 138.4	138.4
29	142.3 138.5	138.5
30	144.3 139.3	139.3
31	96.5 139.6	139.6
32	118.1 140.7	140.7
33	118.1 140.7	140.7
34	58.9 140.0	140.0
35	84.4 140.5	140.5
36	140.0 141.2	141.2
38	25.9 141.4	141.4
39	40.5 142.4	142.4
40	40.1 142.8	142.8
41	53.2 140.4	140.4
42	283.8 140.0	140.0
43	13.2 136.0	136.0
44	50.8 136.0	136.0
45	19.7 134.5	134.5
47	70.1 138.4	138.4
48	90.2 138.8	138.8
49	19.7 134.5	134.5
50	87.2 140.0	140.0
51	47.8 140.7	140.7
52	15.5 137.9	137.9
53	56.0 140.6	140.6

BLOCK B
(SEE DWG. NO. C-402 SHEET 3)

V:\01614\active\133560220\design\drawing_06\civil_block_C\sheet_files\133560220_C-GP-BLOCK_C.dwg
12/21/2017 4:28:43 PM Bv: Brown, Kevin (Waterloo)

ORIGINAL SHEET - ARCH D



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- Notes
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 2. EXISTING VEGETATION INFORMATION IS APPROXIMATE, PROVIDED FROM AERIAL IMAGERY. CONTRACTOR TO CONFIRM ALL TREE & SHRUB LOCATION ON SITE.
 3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS IN THIS SET PREPARED BY STANTEC CONSULTING LTD.
 4. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING AND VERIFYING DIMENSIONS, OBTAIN ALL UTILITY LOCATES AND OBTAIN ALL REQUIRED PERMITS/LICENSES AND VERIFY ELEVATIONS OF EXISTING SERVICES BEFORE PROCEEDING WITH ANY WORK.
 5. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS (LATEST EDITION).
 6. IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR HIS/HER REPRESENTATIVE MUST ENCLOSED ONTO PROPOSED LANDS TO UNDERTAKE ANY WORKS, HE/SHE MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNERS PRIOR TO ENTERING UPON THE PRIVATE PROPERTY TO PERFORM ANY WORKS. COPIES OF THESE LETTERS OF CONSENT MUST BE SUBMITTED TO THE OWNER AND CONTRACTOR, AND A COPY IS TO BE KEPT ON FILE ON SITE, PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNERS OWN RISK.
 7. THE CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED AREAS WITHIN THE MUNICIPAL RIGHT-OF-WAY.
 8. THE SITE IS TO BE FINE GRADED/LEVELLED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED DRAINING TOWARDS THE ADJACENT PROPERTY OWNERS.
 9. CONSTRUCTION TURNING RADIUS LIMITS IDENTIFY AREAS WHERE ADDITIONAL ROAD WIDTH IS REQUIRED TO ALLOW FOR ADEQUATE CLEARANCE FOR MOVING VEHICLES.
 10. CULVERTS ARE TO BE INSTALLED AS PER OPSD 802.010. SOIL TYPE TO BE CONFIRMED ON SITE FOR DETERMINATION OF TRENCH WIDTH.
 11. ALL AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED, MIX AND APPLICATION RATE/METHOD TO BE SUBMITTED AND APPROVED BY OWNER PRIOR TO IMPLEMENTATION.
 12. CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSD 201.
 13. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSD 577.
 14. GRADINGS TO BE COMPLETED IN ACCORDANCE WITH OPSD 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSD 1010.
 15. CULVERT TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 802.010.
 16. RIPRAP AT CULVERT OUTLETS SHALL BE IN ACCORDANCE WITH OPSD 810.010 SECTION B-B.
 17. ROCK SPILL FROM INSTALLATION TO BE REMOVED FROM SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.

Legend

PROPOSED 1:50

ELEVATION FENCE

EX. TOP CONTOUR

LIDAR CONTOUR

TEMPORARY LAYDOWN AREA (MATERIAL STRUCTURE TO BE DETERMINED ON SITE)

PROPOSED FILL AREA

TREE LINE

GRADE SWALE

SLOPE (3:1 UNLESS NOTED OTHERWISE)

ROCK SPREADER SWALE

AC CABLE TRENCH

DC CABLE TRENCH

POTENTIAL BEDROCK OUTCROPS

SLOPE INTERRUPTION BERM (SEE DETAIL ON SHEET C-500)

TEMPORARY REMOVAL OF S.I. BERM FOR TRENCH INSTALLATION. TRENCHES TO BE LINED WITH CLAY OR FILLED WITH CONCRETE IF INSTALLED IN BEDROCK

HARDENED SURFACE

ROCK CHECK DAM (RCD)

RIP-RAP SPILLWAY (R-50) 450mm THICK, 2.0m WIDE AS PER OPSD MUNI 1004 AND OPSD 511 (TYP.)

OVERLAND FLOW DIRECTION

C. REUSED FOR TENDER	KDB	CC	17.12.21
B. ISSUED FOR TENDER	MALM	CC	17.11.30
A. ISSUED FOR CLIENT REVIEW	MALM	DS	17.11.21
Revision	By	Appd.	YYMMDD

File Name:	133560220_C-GR-BLOCK_C.dwg	DRR	DS	DRR	17.10.30
		Dwn.	Chkd.	Dgtr.	YYMMDD

Permit-Seal

Client/Project

LOYALIST SOLAR LP
LOYALIST SOLAR PROJECT

54MW GROUND-MOUNT SOLAR FARM

County of Lennox and Addington, Ontario

Title

BLOCK B
GRADING PLAN

Project No.
133560220

Scale
1:750

Drawing No.
Sheet

Revision



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www.stantec.com

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 9. CONSTRUCTION TURNING RADIUS LIMITS IDENTIFY AREAS WHERE ADDITIONAL ROAD WIDTH IS REQUIRED TO ALLOW FOR ADEQUATE CLEARANCE FOR CONSTRUCTION VEHICLES.
 10. CULVERTS ARE TO BE INSTALLED AS PER OPSD 802.010. SOIL TYPE TO BE CONFIRMED ON SITE FOR DETERMINATION OF TRENCH WIDTH.
 11. ALL AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED, MIX AND APPLICATION RATE/METHOD TO BE SUBMITTED AND APPROVED BY OWNER PRIOR TO IMPLEMENTATION.
 12. CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSD 201.
 13. TEMPORARY EROSION CONTROL, TO BE COMPLETED IN ACCORDANCE WITH OPSD 577.
 14. GRADINGS TO BE COMPLETED IN ACCORDANCE WITH OPSD 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSD 1010.
 15. CULVERT TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 805.010.
 16. RIPRAP AT CULVERT OUTLETS SHALL BE IN ACCORDANCE WITH OPSD 810.010 SECTION 8-B.
 17. ALL SEEDING TO BE COMPLETED IN ACCORDANCE WITH OPSD 804.
 18. ROCK SPILL FROM INSTALLATION TO BE REMOVED FROM GROUND SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.

Legend

PROPOSED

EXISTING

PROPOSED FENCE

EX. TOPO CONTOUR

LIDAR CONTOUR

PROPOSED FILL AREA

TREE LINE

GRADE SWALE

CULVERT

SLOPE (3:1 UNLESS NOTED OTHERWISE)

ROCK SPREADER SWALE

AC CABLE TRENCH

OG CABLE TRENCH

POTENTIAL BEDROCK OUTCROPS

SLOPE INTERRUPTION BERM (SEE DETAIL ON SHEET C-500)

TEMPORARY REMOVAL OF S.I. BERM FOR TRENCH INSTALLATION: TRENCHES TO BE LINED WITH CLAY OR FILLED WITH CONCRETE IF INSTALLED IN BEDROCK

HARDENED SURFACE

ROCK CHECK DAM (RCD)

RIP-RAP SPILLWAY (R-50) 450mm THICK, 2.0m WIDE AS PER OPSD MUNI 1004 AND OPSD 511 (TYP.)

OVERLAND FLOW DIRECTION

C. REBUSED FOR TENDER	KDB	CC	17.12.21
B. ISSUED FOR TENDER	MALM	CC	17.11.30
A. ISSUED FOR CLIENT REVIEW	MALM	DS	17.11.21
Revision	By	Appd.	YY.MM.DD
File Name: 133560220_C-GR-BLOCK_C.dwg	DRR	DS	DRR 17.10.30
	Dwn.	Chkd.	Dgnr. YY.MM.DD

Permit-Seal

Client/Project

LOYALIST SOLAR LP
LOYALIST SOLAR PROJECT

54MW GROUND-MOUNT SOLAR FARM

County of Lennox and Addington, Ontario

Title

BLOCK B
GRADING PLAN

Project No.

133560220

Drawing No.

Sheet

Scale

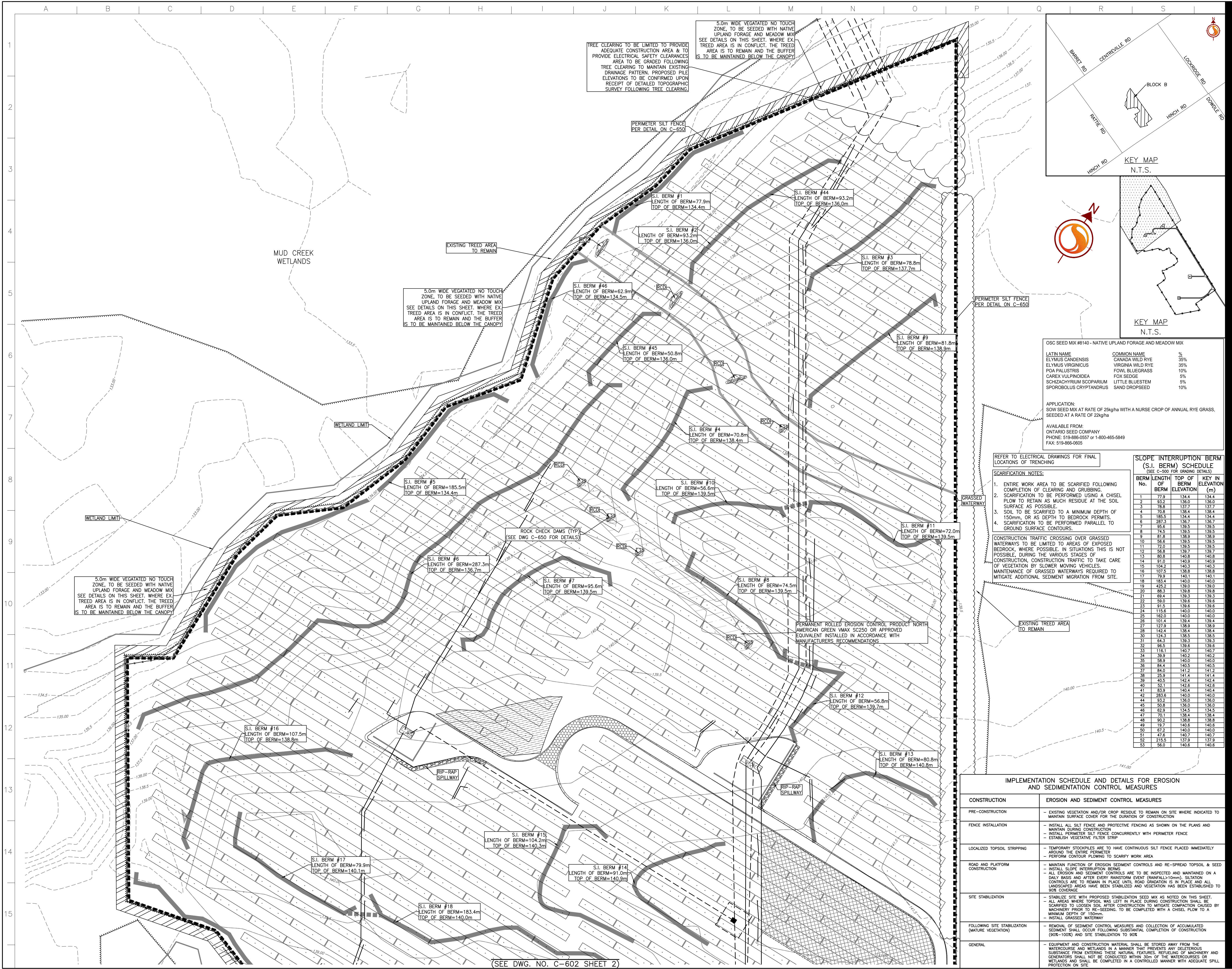
0 7.5 22.5 37.5m
1:750

Revision

C-402

4 of 4

C



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9. THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL DRAINAGE AND MEASURES TO CONTROL WATER, THE SITE IS TO BE FINE GRADED/LEVELED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED EVERYWHERE PRIOR TO THE INSTALLATION OF SOLAR PANELS.
10. CONSTRUCTION TURNING RADIUS LIMITS IDENTIFY AREAS WHERE ADDITIONAL ROAD WIDTH IS REQUIRED TO ALLOW FOR ADEQUATE CLEARANCE FOR CONSTRUCTION VEHICLES.
11. CULVERTS ARE TO BE INSTALLED AS PER OPSD 802.010. SOIL TYPE TO BE CONFIRMED ON SITE FOR DETERMINATION OF TRENCH WIDTH.
12. ALL AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED, MIX AND APPLICATION RATE/METHOD TO BE SUBMITTED AND APPROVED BY OWNER PRIOR TO IMPLEMENTATION.
13. CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSD 201.
14. TEMPORARY EROSION CONTROL MEASURES PRIOR TO BE COMPLETED IN ACCORDANCE WITH OPSD 577.
15. GRADINGS TO BE COMPLETED IN ACCORDANCE WITH OPSD 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSD 1010.
16. CULVERT TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 802.010.
17. REPAIR AT CULVERT OUTLETS SHALL BE IN ACCORDANCE WITH OPSD 810.010 SECTION 8-B.
18. ALL SEEDING TO BE COMPLETED IN ACCORDANCE WITH OPSD 804.
19. ROCK SPOIL FROM PILE INSTALLATION TO BE REMOVED FROM GROUND SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.

Legend

PROPOSED

PROPERTY LINE

FENCE

TOPOGRAPHIC SURVEY CONTOUR

LIDAR CONTOUR

PERMETER SILT FENCE (SEE DETAILS ON C-650)

CULVERT

ROCK CHECK DAMS (RCD) (PER OPSD 219.210 SEE DETAILS ON C-500)

OVERLAND FLOW DIRECTION

SLOPE INTERRUPTION BERM (S.I. BERM) (SEE DWG C-500 FOR DETAILS)

TEMPORARY REMOVAL OF S.I. BERM FOR TRENCH INSTALLATION. TRENCHES TO BE LINED WITH CLAY OR FILLED WITH CONCRETE IF INSTALLED IN BEDROCK

5.0M WIDE VEGETATED NO TOUCH ZONE

HARDENED SURFACE

ROLLED EROSION CONTROL PRODUCT

FILL AREA

ROCK CHECK SPREADER

AC CABLE TRENCH

DC CABLE TRENCH

C	RE-ISSUED FOR TENDER	KDB	CC	17.12.21
B	ISSUED FOR TENDER	MALM	DS	17.11.30
A	ISSUED FOR CLIENT REVIEW	MALM	DS	17.11.21

Revision

By Appd. YY.MM.DD

File Name: 133560220_C-EC-BLOCK_C.dwg

DRR DS DRR

Dwn. Chkd. Dgnr. YY.MM.DD

Permit-Seal

Client/Project

BLUEARTH RENEWABLES INC.
LOYALIST SOLAR PROJECT

54MW GROUND-MOUNT SOLAR FARM

County of Lennox and Addington, Ontario

Title

BLOCK B
SEDIMENTATION AND EROSION
CONTROL PLAN

Project No.

133560220

Scale

0 7.5 22.5 37.5m

1:750

Drawing No.

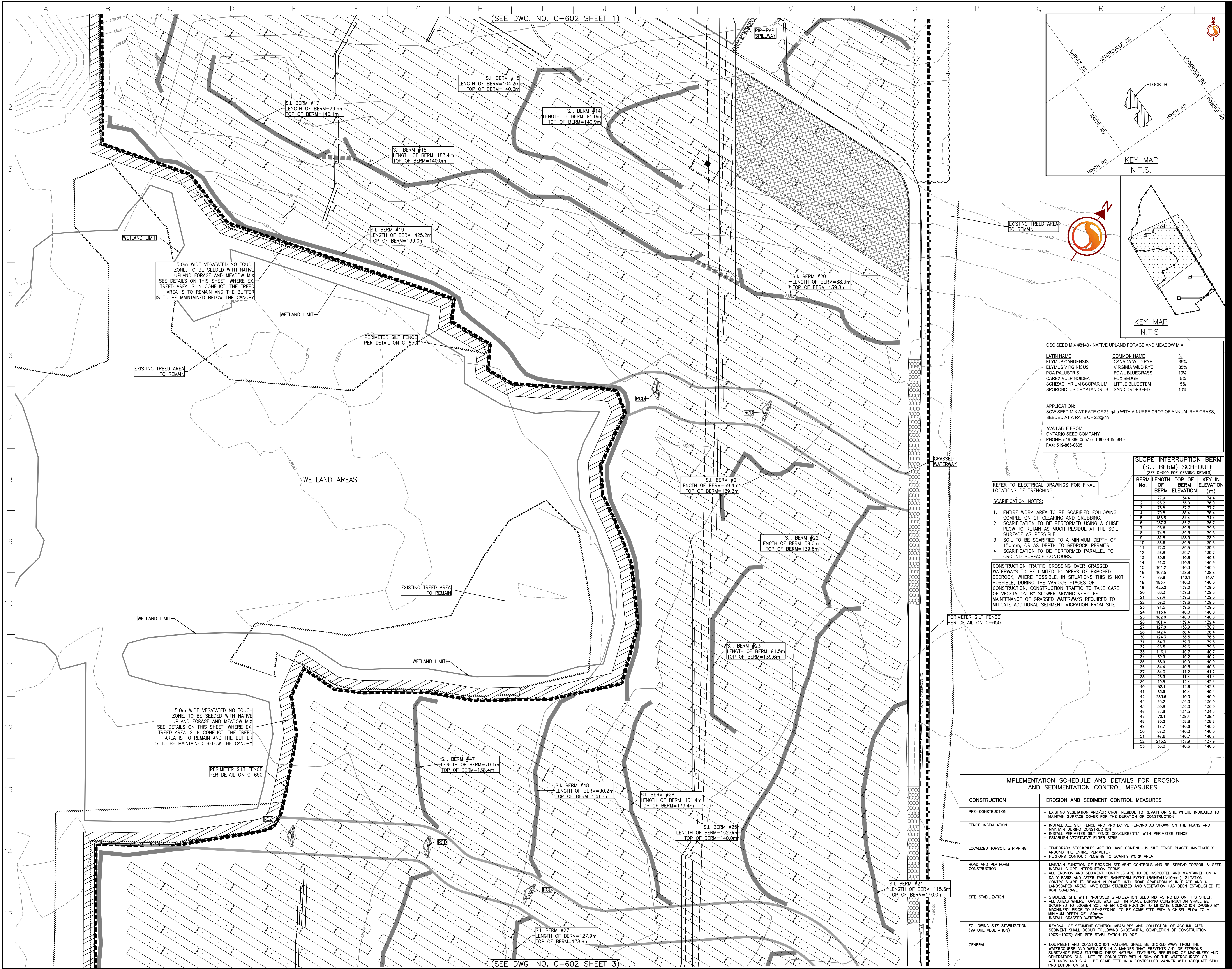
C-602

Sheet

Revision

1 of 4

C

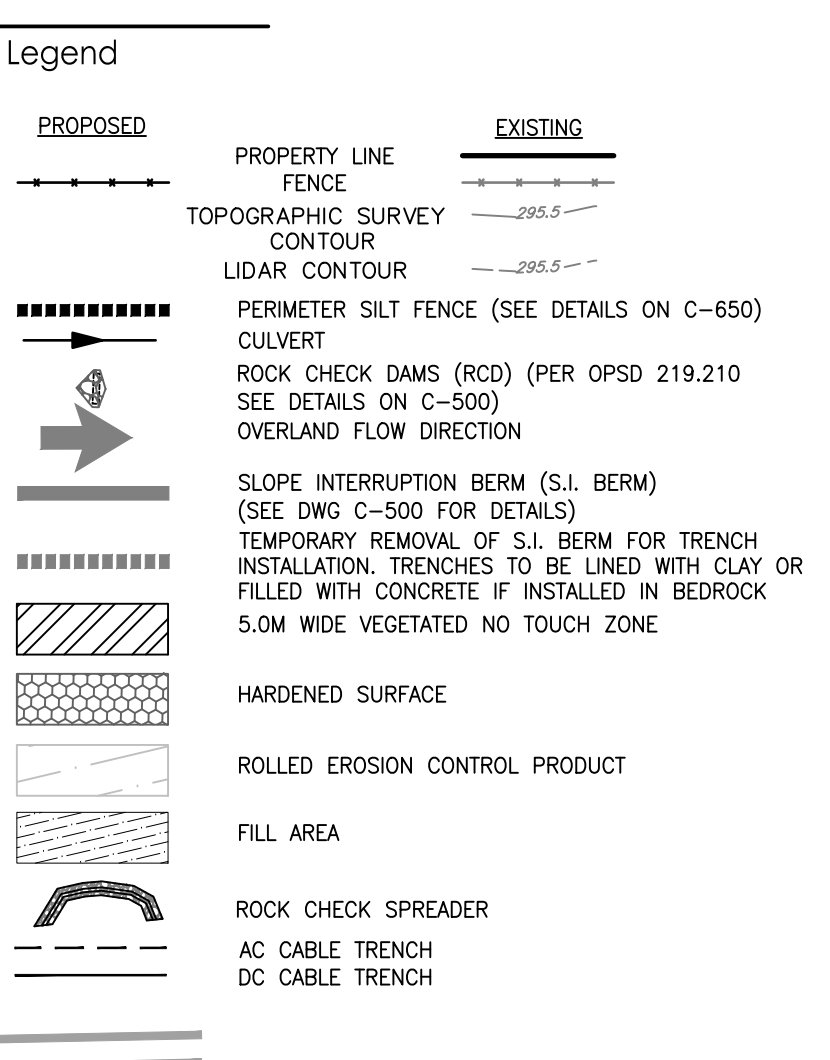


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 - CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSD 201. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSD 577.
 - GRADINGS TO BE COMPLETED IN ACCORDANCE WITH OPSD 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSD 1010.
 - CULVERTS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 802.010.
 - REPAIR AT CULVERT OUTLETS SHALL BE IN ACCORDANCE WITH OPSD 810.010 SECTION B-B.
 - ALL SEEDING TO BE COMPLETED IN ACCORDANCE WITH OPSD 804.
 - ROCK SPOIL FROM PILE INSTALLATION TO BE REMOVED FROM GROUND SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.



C	RE-ISSUED FOR TENDER	KDB	CC	17.12.21
B	ISSUED FOR TENDER	MALM	DS	17.11.30
A	ISSUED FOR CLIENT REVIEW	MALM	DS	17.11.21

Revision

By Appd. YYMMDD

File Name:	133560220_C-EC-BLOCK_C.dwg	DRR	DS	DRR	17.10.30
		Dwn.	Chkd.	Dgn.	YYMMDD

Permit-Seal

Client/Project

BLUEARIST RENEWABLES INC.
LOYALIST SOLAR PROJECT

54MW GROUND-MOUNT SOLAR FARM

County of Lennox and Addington, Ontario

Title

BLOCK B
SEDIMENTATION AND EROSION
CONTROL PLAN

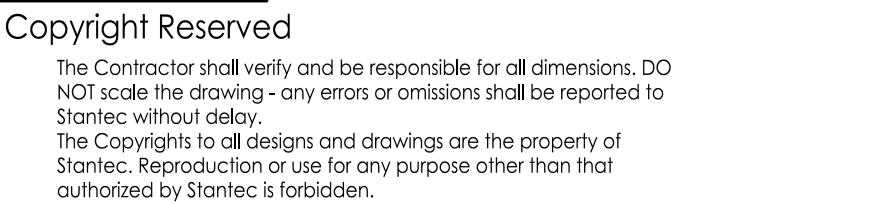
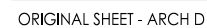
Project No.
133560220

Scale
1:750

Drawing No.
C-602

Sheet
2 of 4

Revision
C



1. TOPOGRAPHIC INFORMATION CONDUCTED BY LESLIE W. HIGGINS AND RECEIVED OCTOBER 24, 2017. THE INFORMATION WAS OBTAINED FROM THE MISSOURI DEPARTMENT OF CONSERVATION, DIVISION OF SURVEY, 2776 S.W. 26th, LEARN SURVEY SYSTEM, 1800 S.W. 15th, LEARN SURVEY INFORMATION PROVIDED BY PCL.

2. CONSTRUCTORS TO BE REQUIRED TO PROVIDE AERIAL PHOTOGRAPHY. CONTRACTOR TO CONFIRM ALL TREES & SHRUB LOCATION ON SITE.

3. CONTRACTORS TO BE REQUIRED TO IDENTIFY ALL OTHER DRAINAGES IN THIS SITE PREPARED BY STANTEC CONSULTING LTD.

4. CONTRACTORS TO BE REQUIRED TO CHECK AND VERIFY DIMENSIONS; OBTAIN ALL UTILITY LOCATES AND OBTAIN REQUIRED PERMITS/LOCATES AND VERIFY ELEVATIONS OF EXISTING SURFACES BEFORE PROCEEDING WITH CONSTRUCTION.

5. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS [LATEST EDITION].

6. IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR HIS/HER REPRESENTATIVE MUST ENCROACH ONTO ADJACENT PROPERTY OWNERS' LAND, THE CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN THE NECESSARY ADJACENT PROPERTY OWNERS' PERMISSION TO ENTERING UPON THE PRIVATE PROPERTY TO PERSONS' OWNERS. COPIES OF THESE LETTERS OF CONSENT MUST BE SUBMITTED TO THE OWNER AND THE ADJACENT PROPERTY OWNERS AND COPIES OF THESE LETTERS OF CONSENT TO ANY WORK BEING PERFORMED, FAILURE TO OBTAIN WITH THE ABOVE IS AT THE PROPERTY OWNERS OWN RISK.

7. CONTRACTORS TO BE REQUIRED TO MAINTAIN ALL EXISTING TREES AND SHRUBS UNDISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY.

8. CONTRACTORS TO BE REQUIRED TO OBTAIN PERMITS FOR ALL DRAINAGE AND MEASURES TO CONTROL WATER, WATER IS TO BE FINE GRADED/LEVELLED LEAVING THE SITE IN A NEAR APPROPRIATE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED EVERYWHERE RELATIVE TO THE INSTALLATION OF SOLAR PANELS.

9. CONTRACTORS TO BE REQUIRED TO OBTAIN NECESSARY PERMITS AND APPROVALS. CONTRACTORS IS REQUIRED TO ALLOW FOR ADEQUATE CLEARANCE FOR CONSTRUCTION VEHICLES.

10. CONTRACTORS TO BE REQUIRED TO OBTAIN NECESSARY PERMITS TO BE CONFIRMED ON SITE FOR DETERMINATION OF TREES WIDTH.

11. CONTRACTORS TO BE REQUIRED TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED, MIX AND APPLICATION RATE/METHOD TO BE SUBMITTED AND APPROVED BY OWNER FOR IMPLEMENTATION.

12. CLEANING AND GRASSING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPS 271.

13. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPS 271.

14. CONSTRUCTION TO BE COMPLETED WITHIN THE SPECIFIED TIME FRAME TO BE USED IN ACCORDANCE WITH OPS 1010.

15. CONTRACTORS TO BE REQUIRED TO OBTAIN ACCORDANCE WITH OPS 421, HEIGHT OF FILL TABLE FOR C/SU CONVEYERS TO COMPLY WITH OPS 805.010.

16. CONTRACTORS TO BE REQUIRED TO OBTAIN ACCORDANCE WITH OPS 810.010 SECTION B-B.

17. ALL SLOPING TO BE COMPLETED IN ACCORDANCE WITH OPS 804.

18. ALL EXCESS SOIL TO BE REMOVED FROM GRASS SURFACE PRIOR TO GRASS PREPARATION FOR RESTORATION SEEDING.

File Name: 133560220_C-EC-BLOCK_C.dwg	DRR	DS	DRR	17.10.30
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

BLUEARTH RENEWABLES INC.
LOYALIST SOLAR PROJECT
54MW GROUND-MOUNT SOLAR FARM

Title

BLOCK B
SEDIMENTATION AND EROSION
CONTROL PLAN

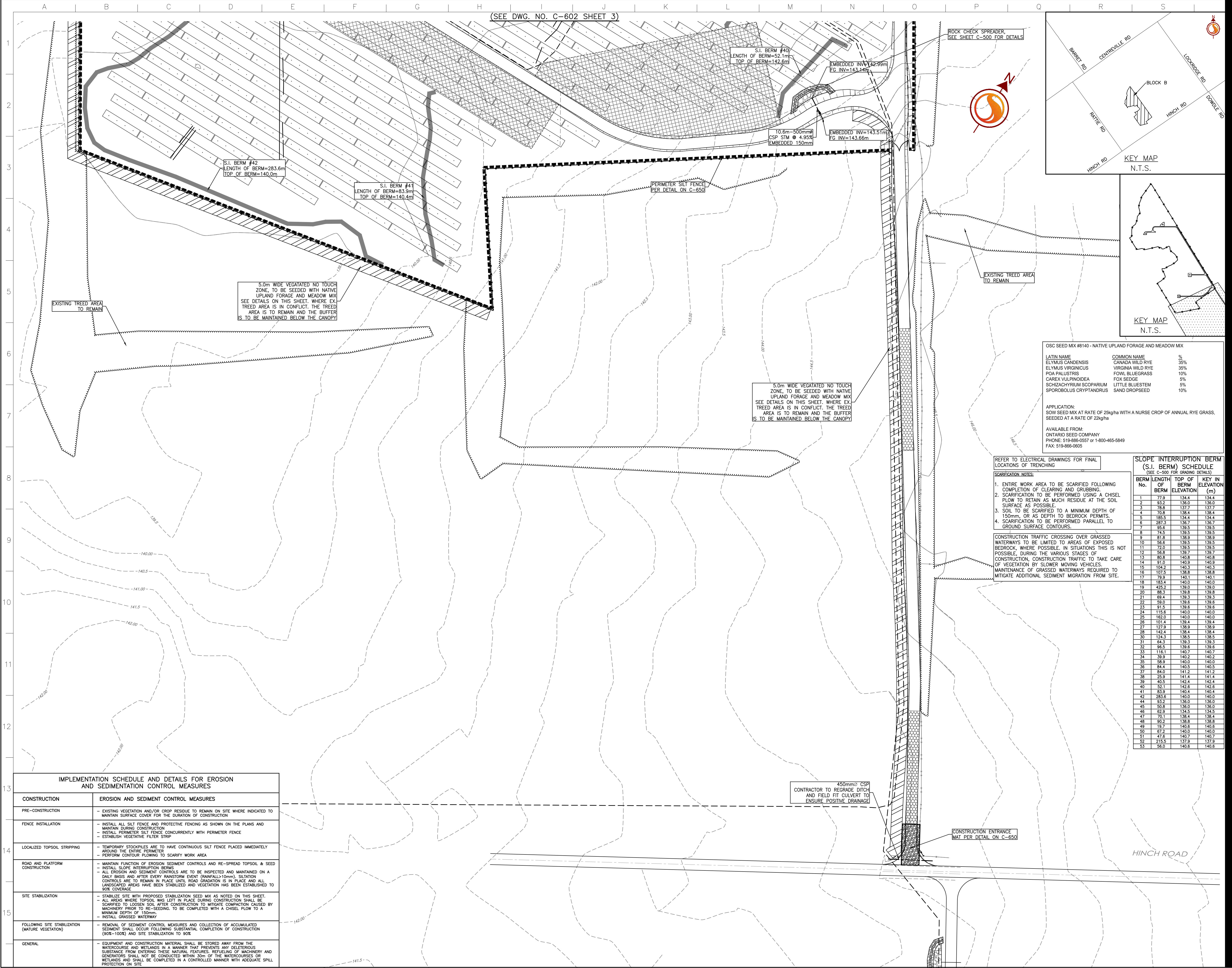
Project No. 133560220

Scale 1:750

0 7.5 22.5 37.5m

Drawing No.	Sheet	Revision
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C-602 3 of 4 C



Stantec

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Waterloo ON Canada
Tel. 519.579.4410
www.stantec.com

PCL

CONSTRUCTION LEADERS

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- Notes
- TOPOGRAPHIC INFORMATION CONDUCTED BY LESLIE M. HIGGINSON AND RECEIVED OCTOBER 24, 2017.
 - TOPOGRAPHIC SURVEY IS UTM 18R. LIDAR INFORMATION CONDUCTED BY TULLOCH ENGINEERING ON JUNE 27, 2016. LIDAR SURVEY IS UTM 18R. BEDROCK SURVEY INFORMATION PROVIDED BY PCL CONSTRUCTORS LTD. RECEIVED ON OCTOBER 31, 2017.
 - EXISTING VEGETATION INFORMATION IS APPROXIMATE, PROVIDED FROM AERIAL IMAGERY. CONTRACTOR TO CONFIRM ALL TREE & SHRUB LOCATION ON SITE.
 - THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS IN THIS SET PREPARED BY STANTEC CONSULTING LTD.
 - THE CONTRACTOR MUST CHECK AND VERIFY DIMENSIONS, OBTAIN ALL UTILITY LOCATES AND OBTAIN ALL REQUIRED PERMITS/LICENSES AND VERIFY ELEVATIONS OF EXISTING SERVICES BEFORE PROCEEDING WITH ANY WORK.
 - ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS (LATEST EDITION).
 - F. FOR UNFORESEEN REASONS, THE OWNER AND/OR HIS/HER REPRESENTATIVE MUST ENDOCRACH ONTO PRIVATE LANDS TO UNDERSTAND ANY WORKS, HE/SHE MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNERS PRIOR TO ENTERING UPON THE PRIVATE PROPERTY TO PERFORM ANY WORKS. COPIES OF THESE LETTERS OF CONSENT MUST BE SUBMITTED TO THE OWNER AND CONTRACTOR, AND A COPY IS TO BE KEPT ON FILE ON SITE, PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNERS OWN RISK.
 - THE CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY.
 - THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL DRAINAGE AND MEASURES TO CONTROL WATER. THE SITE IS TO BE FINE GRADED/LEVELED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED EVERYWHERE PRIOR TO THE INSTALLATION OF SOLAR PANELS.
 - CONSTRUCTION TURNING RADIUS LIMITS IDENTIFY AREAS WHERE ADDITIONAL ROAD WIDTH IS REQUIRED TO ALLOW FOR ADEQUATE CLEARANCE FOR CONSTRUCTION VEHICLES.
 - CULVERTS ARE TO BE INSTALLED AS PER OPSD 802.010. SOIL TYPE TO BE CONFIRMED ON SITE FOR DETERMINATION OF TRENCH WIDTH.
 - ALL AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED. MIX AND APPLICATION RATE/METHOD TO BE SUBMITTED AND APPROVED BY OWNER PRIOR TO IMPLEMENTATION.
 - CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSD 201.
 - TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSD 577.
 - GRADINGS TO BE COMPLETED IN ACCORDANCE WITH OPSD 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSD 1010.
 - CULVERT TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 805.010.
 - WIPUP AT CULVERT OUTLETS SHALL BE IN ACCORDANCE WITH OPSD 810.010 SECTION 8-B.
 - ALL SEEDING TO BE COMPLETED IN ACCORDANCE WITH OPSD 804.
 - ROCK SPOIL FROM PILE INSTALLATION TO BE REMOVED FROM GROUND SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.

Legend

PROPOSED

EXISTING

PROPERTY LINE

FENCE

TOPOGRAPHIC SURVEY CONTOUR

LIDAR CONTOUR

PERIMETER SILT FENCE (SEE DETAILS ON C-650)

CULVERT

ROCK CHECK DAMS (RCD) (PER OPSD 219.210 SEE DETAILS ON C-500)

OVERLAND FLOW DIRECTION

SLOPE INTERRUPTION BERM (S.I. BERM) (SEE DWG C-500 FOR DETAILS)

TEMPORARY REMOVAL OF S.I. BERM FOR TRENCH INSTALLATION. TRENCHES TO BE LINED WITH CLAY OR FILLED WITH CONCRETE IF INSTALLED IN BED ROCK

5.0m WIDE VEGETATED NO TOUCH ZONE

HARDENED SURFACE

ROLLED EROSION CONTROL PRODUCT

FILL AREA

ROCK CHECK SPREADER

AC CABLE TRENCH

DC CABLE TRENCH

C	RE-ISSUED FOR TENDER	KDB	CC	17.12.21
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LOYALIST SOLAR PROJECT

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0 7.5 22.5 37.5m

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Sheet

4 of 4

Revision

C

