

1665426 ONTARIO INC

STORMWATER MANAGEMENT REPORT

HILTON HEAD HEIGHTS DEVELOPMENT
MUNICIPALITY OF MEAFORD

JULY 2020

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1. INTRODUCTION

Cobide Engineering Inc. was retained by 1665426 Ontario Inc to complete a final stormwater management report in support of Site Plan Approval Application. The application will be to service a portion of the Meaford Golf Course property into a 51 unit vacant land condominium.

A copy of the Overall Plan has been included in Appendix A as Drawing DP1.

1.1 LOCATION

The proposed subdivision development is located Part of Lots 1654 to 1659 and 1695, Registered Plan 309, Former Geographic Town of Meaford, Municipality of Meaford, County of Grey (described herein as the "site"). A Site Location Map is included as Figure 1. The subject property is approximately 41 hectares in area however only 4 ha will be developed in this phase.

1.2 DEVELOPMENT PROPOSAL

This phase of the development will consist of 51 single family residential units along a new private street as well as a stormwater management pond.

The road network will connect to Ridge Road.

1.3 SCOPE OF WORK

The stormwater management report addresses the design and implementation of drainage and stormwater management facilities for the development.

The report includes:

- Details for erosion protection and sedimentation control for short term, construction phase and the long term.
- Quantity Control
- Quality Control
- Establish lot grading requirements for the proposed subdivision
- Provisions for major flows through the development

1.4 BACKGROUND INFORMATION

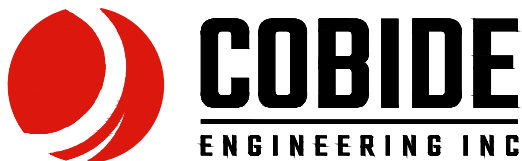
In support of this application, the following information was prepared:

- A Stormwater Management Report was completed for the easterly portion of the development by GSS Engineering as part of the approval process for the Life Lease development to the north.

Since the development of the Life Lease Development, it was decided to develop both the east and west portions of the Hilton Head Heights Development at the same time and therefore the SWM plan prepared by GSS was no longer valid as the development area had increased considerably.



MAP SOURCE - MTO ROAD MAP



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Municipality of Meaford, Ontario
STORMWATER MANAGEMENT REPORT

Figure No.

1

Title

REGIONAL LOCATION MAP

2. DRAINAGE CHARACTERISTICS

2.1 REGIONAL

Two unnamed Tributaries to Pete's Creek traverse the site from west to east outletting under Ridge Road. The development of Hilton Head Heights will discharge to these Tributaries. Previous work completed on the site identified the limits of the existing floodplain. The stormwater management pond and the various building sites are all located outside the existing floodplain.

2.2 LOCAL

There are a number of swales and water features located throughout the site. All of the existing water features are being avoided with the development of Hilton Head Heights with the exception of some servicing that needs to be installed under the northern unnamed Tributary. The watercourse will be restored to existing condition following installation of the services.

2.3 SOILS

According to the Grey County Soils Survey (January, 1954), the soils on the site are classified as Brighton Sand (Brs). Brighton Sands are described as well sorted sandy outwash soils with imperfect drainage. These soils are typically associated with the Hydrologic Soils Group (HSG) A.

2.4 DISCHARGE POINTS

For the purposes of the report, Discharge Point #1 is any runoff that into Unnamed Tributary A.
Discharge Point #2 is the Unnamed Tributary B.

3. STORMWATER CONTROL

The design guidelines and constraints utilized in the stormwater management review for the development are as follows:

3.1 DESIGN GUIDELINES

The main design guideline utilized in the review is the Ministry of the Environment's "Stormwater Management Planning and Design (SWMP&D) Manual," dated March 2003.

The SWMP&D Manual details the methodologies for the preparation and evaluation of urban/suburban stormwater management measures. The document provides direction on the design of drainage/stormwater management facilities required to meet the goals and objectives of the various Municipal/Provincial Review Agencies.

The SWMP&D Manual also provides information on the long-term operation and maintenance techniques for stormwater management facilities that may be implemented in the development of the development.

The storm sewer design criteria to be used are as follows:

- Runoff from the 5 year storm is to be conveyed to a sufficient outlet via a combination of storm sewers and grass swales/ditches;
- Major storm runoff (i.e. >5 years) is to be contained within specified drainage corridors and not adversely impact any of the proposed units within the development or off-site properties;

3.2 METHODOLOGY FOR COMPUTING STORMWATER RUNOFF

As noted previously, the objectives of the Stormwater Management (SWM) Plan for development is to ensure that there is an adequate outlet to convey the runoff from the minor and major storm systems.

The objectives are to be achieved by completing the following tasks:

- i. Determining the existing drainage conditions.
- ii. Determining the post-development drainage conditions.
- iii. Design stormwater management measures that meet the criteria of the Municipality of Meaford, Ministry of Environment, Conservation and Parks (MECP) and Grey Sauble Conservation Authority (GSCA).
- iv. Summarize the analysis by identifying conclusions and recommendations.

4. EXISTING CONDITIONS

The site is currently used as a golf course.

The existing catchments areas are delineated in Drawing SWM1 in Appendix A.

Summarized below is a description of each of the drainage catchment areas.

4.1 CATCHMENT AREA 101

- This catchment area encompasses the majority of the Hilton Head Heights Development Area.
- Surface water flows by sheet flow and discharges Unnamed Tributary A.
- Catchment Area 101 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 4.45 ha.

4.2 CATCHMENT AREA 102

- This catchment area encompasses the southern portion of the development area.
- Surface water flows by sheet flow to Unnamed Tributary B.
- Catchment Area 102 is considered to discharge at Discharge Point #2 for the purposes of this report.
- Drainage Area = 0.73 ha.

5. PROPOSED CONDITIONS

The proposed catchment area boundaries are delineated on Drawing SWM2 in Appendix A.

Summarized below is a description of each of the drainage catchment areas.

5.1 CATCHMENT 201

- This catchment area encompasses the majority of the Hilton Head Heights Development.
- Minor flows will be captured by the storm sewers and major flows will flow overland, both discharging to the SWM facility.
- Catchment Area 201 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 4.09 ha.

5.2 CATCHMENT 202

- This catchment area encompasses the entrance road and easterly most lots.
- Minor flows will be captured by the storm sewers and major flows will flow overland, both discharging to Unnamed Tributary A. Due to the topography of the site it is not possible to provide quantity control for this portion of the development
- Catchment Area 202 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 0.65 ha.

5.3 CATCHMENT 203

- This catchment area encompasses the rear of the lots on the south side of the development.
- All flows will be conveyed overland to Unnamed Tributary B.
- Catchment Area 203 is considered to discharge at Discharge Point #2 for the purposes of this report.
- Drainage Area = 0.34 ha.

6. QUANTITY CONTROL MODELLING

The hydrologic modelling software PCSWMM Version 5.6.1803 Professional 2D was used to determine the pre and post-development peak flows of the 2 yr., 5 yr., 25 yr., 50 yr., and 100 yr. storm events (6 hour duration, SCS Type II, AMC II storm, Owen Sound IDF Parameters). The goal of the development is to try and ensure that all post development flows must match pre-development levels to the respective outlets.

The pre-development and post development parameters and model outputs are contained in Appendix B and C respectively.

6.1 DESIGN REQUIREMENTS

The intent of stormwater quantity control is to limit the flows under proposed conditions to existing levels or less to protect the downstream watercourses, infrastructure and properties.

Minor flows from the majority of the development will be conveyed to the proposed stormwater management facility via a new storm sewer collection system that will be constructed throughout the development. This storm sewer collection system will be designed to accommodate all flows up to and including the 5 year storm event.

Major flows (>5 year), will be conveyed overland within the road allowance of each street.

Due to the increase in impervious area, stormwater quantity control will be required for the site. The design of the stormwater management facility has assumed a free outlet from the pond.

6.2 SWM FACILITY CHARACTERISTICS

The stormwater management facility and outlet structure have been designed to control peak runoff rates as well as conform to MECP best practices.

In order to provide the above required volumes and discharges, the following SWM Facility geometry is being proposed:

Table 6.1 – SWM Facility Geometry

SWM FACILITY	DETAILED DESIGN
Side Slope	3:1
SWM Facility Bottom	195.50
Top Elevation	198.00 m
High Water Elevation	197.44 m

The outlet configuration for the SWM Facility will be as follows:

- A ditch inlet catchbasin with an inlet elevation of 195.50. The outlet will be a 300mm diameter pipe with an invert of 195.10 m with a 50mm orifice installed.;

As seen by the proposed inverts, the proposed stormwater management facility will be constructed as a dry pond.

6.2.1 SWM FACILITY PERFORMANCE

Below is a summary of the hydraulic performance of the stormwater SWM Facility during the various storm events.

Table 6.2 – SWM Facility Performance

RETURN PERIOD	ELEVATION (m)	STORAGE (m ³)	DISCHARGE (l/s)
2 Year	196.49	652	6.61
5 Year	196.76	943	7.23
25 Year	197.14	1,419	8.02
50 Year	197.29	1,629	8.32
100 Year	197.44	1,842	8.60

6.3 MODELLING RESULTS

Based upon the above outlet structure, the following summarizes the pre-development and post development peak flows to the two (2) discharge points.

Table 6.3 - Peak Flow Summary

RETURN PERIOD	DISCHARGE POINT #1 (l/s)		DISCHARGE POINT #2 (l/s)	
	PRE	POST	PRE	POST
2 Year	18	31	5	8
5 Year	35	41	10	12
25 Year	74	59	20	20
50 Year	97	67	25	23
100 Year	123	75	31	27

The following summarizes the pre-development and post development results at each discharge point:

6.3.1 DISCHARGE POINT #1

The 2 and 5 year design storm event have a slight increase over the pre-development levels but all peak flows during the remaining storm events are equal to or less than pre-development levels. Based on the extremely small increase in flows and the fact that the discharge is to a watercourse rather than a storm sewer, the increase is not expected to cause issues

downstream. The increase is also quite small in comparison to the expected flows from the entire watershed. The flows cannot be controlled any further as the orifice proposed is the smallest recommended diameter as per MECP guidelines.

6.3.2 DISCHARGE POINT #2

The 2 and 5 year design storm event have a slight increase over the pre-development levels but all peak flows during the remaining storm events are equal to or less than pre-development levels. Based on the extremely small increase in flows and the fact that the discharge is to a watercourse rather than a storm sewer, the increase is not expected to cause issues downstream. The increase is also quite small in comparison to the expected flows from the entire watershed.

7. QUALITY CONTROL

To meet the requirements of the SVCA and the MECP, stormwater quality control will be provided for the proposed development. The MECP SWMP&D Manual recommends that the required level of protection be associated with the habitat sensitivity of the receiving watercourse. The ultimate receiving watercourse for this development is Pete's Creek. For the purposes of this report, an 'Enhanced' water quality protection level will be implemented in accordance to the MECP 2003 Guidelines and GSCA requirements.

In keeping with the approach suggested in the SWMP&D manual however, a 'treatment train' approach to stormwater quality management has been proposed for this development. This approach consists of three (3) levels of treatment which are described as follows:

- Lot level control measures
- Conveyance control measures
- End-of-Pipe control measures

A review of each measure and it's suitability for use in the development is discussed below:

7.1 LOT LEVEL CONTROL MEASURES

The Town's design standards require minimum grades of 2% from the back of curb to the property line. Therefore, reduced lot grading of the front, side and rear yards to less than 2% is not feasible.

The subdivision property contains native soils that exhibit average drainage characteristics. The use of individual drainage pits and infiltration trenches therefore has not been considered as a feasible option based on the ongoing maintenance typically is not.

It is proposed that all runoff draining from rooftops be directed overland across the grass lawns to encourage infiltration and filtering of pollutants from this runoff. The following note will be added to the Lot Grading Plan "Roof drain troughs shall be directed to grassed areas of the property and not to driveways or private drain connections".

7.2 CONVEYANCE CONTROL MEASURES

The Town's standard road cross section only allows for the use of curb and gutter in new urban type subdivisions. Therefore, the use of grass swales as a conveyance control measure for runoff from the subdivision streets cannot be implemented.

Grassed drainage swales may be proposed to be constructed in the rear yards of some of the lots. These swales will provide rear yard drainage for the proposed lots. Swales will have slopes of at least 2.0% where possible. This will assist with removing pollutants and sediment from the runoff prior to draining into the municipal storm sewer system.

All catchbasins and manholes within the subdivision will be provided with minimum 600 mm and 300 mm sumps respectively which will assist in removing a portion of the sediment contained in the runoff from the street.

7.3 END-OF-PIPE CONTROL MEASURES

The use of an Oil Grit Separator (OGS) was selected as an 'end of pipe' control measure. The basic function of an OGS is to remove pollutants from runoff. An OGS was selected to maximize the developable area.

The OGS will be designed during the detailed design stages in conformance with the MOE design guidelines to achieve an "Enhanced" Level of protection. The dry pond will have a small inlet permanent

pool during construction only to help with sediment removal. The OGS will be placed upstream of the pond close to the proposed road for ease of maintenance.

The OGS has been designed in conformance with the MECP design guidelines to achieve an "Enhanced" Level of protection. The OGS will be a FD-6HC from Hydro International as supplied by Armtec or approved equivalent.

8. EROSION & SEDIMENTATION CONTROL

8.1 CONSTRUCTION STAGE

The following are details regarding the erosion and sediment control measures to be implemented during construction:

- Placement of siltation fences in all areas where surface drainage flows over disturbed areas. Siltation fence shall remain erect until construction is completed and the upstream area is fully re-vegetated.
- The stormwater management pond should be constructed first to act as a sedimentation pond during construction;
- Placement of temporary straw check dams within swales and any other locations where a concentrated flow of runoff may occur. All proposed drainage swales are to be seeded during construction;
- Installation of filter cloth under all new and existing catchbasin grates until paving of the subdivision streets is completed;
- Mud mats will be placed at construction accesses to keep public roadways free from debris during the construction period.

Once the ground surface of the site has been stabilized, the straw bale check dams and siltation fences can then be removed.

During the construction phase, it is important to ensure that erosion/sediment control is in place to ensure against transport of sediment into the existing downstream drainage ditches.

8.2 LOT DEVELOPMENT

During individual construction of homes within the subdivision, siltation barriers are to be constructed, as appropriate, to prevent the erosion of materials into the storm sewer system or the existing drainage ditches. The siltation barriers can be in the form of siltation fences or shallow excavated sediment traps in the direction of flow from the construction site to the proposed drainage system.

The responsibility for the individual sediment control is the landowner constructing the dwelling.

9. CONCLUSIONS & RECOMMENDATIONS

The above report presented the Final Stormwater Management Plan in support of the Site Plan Approval Application. Based on the findings of this report, the following conclusions are made:

1. Stormwater quantity control will be provided via a dry pond with an outlet configuration as described previously.
2. Stormwater quantity control for the development will maintain or lower pre-development flows at all discharge points with the exception of slight increases during the minor storm events.
3. Stormwater quality will be provided by a treatment train approach which will include lot level control, conveyance control and 'end-of-pipe' control measures.

Lot level control will be provided by directing most impervious areas not directly connected to the municipal storm sewer system, over vegetated areas and directing all rear yard drainage to grass swales prior to discharging into the proposed storm sewer system.

Conveyance control will be provided by and providing a minimum 600 mm sumps in all catchbasins and a minimum 300 mm sumps in all catchbasin manholes.

End-of-pipe control will be provided by an OGS upstream of the pond.

All three levels of the treatment train approach will be used for the development to provide an "Enhanced" Level of protection for the development.

Based on the above conclusions of this report, it is recommended that the above Stormwater Management Report for the subdivision be submitted to the GSCA and Municipality of Meaford in support of the Site Plan Approval Application.

Sincerely,

Cobide Engineering Inc.



Travis Burnside, P. Eng.



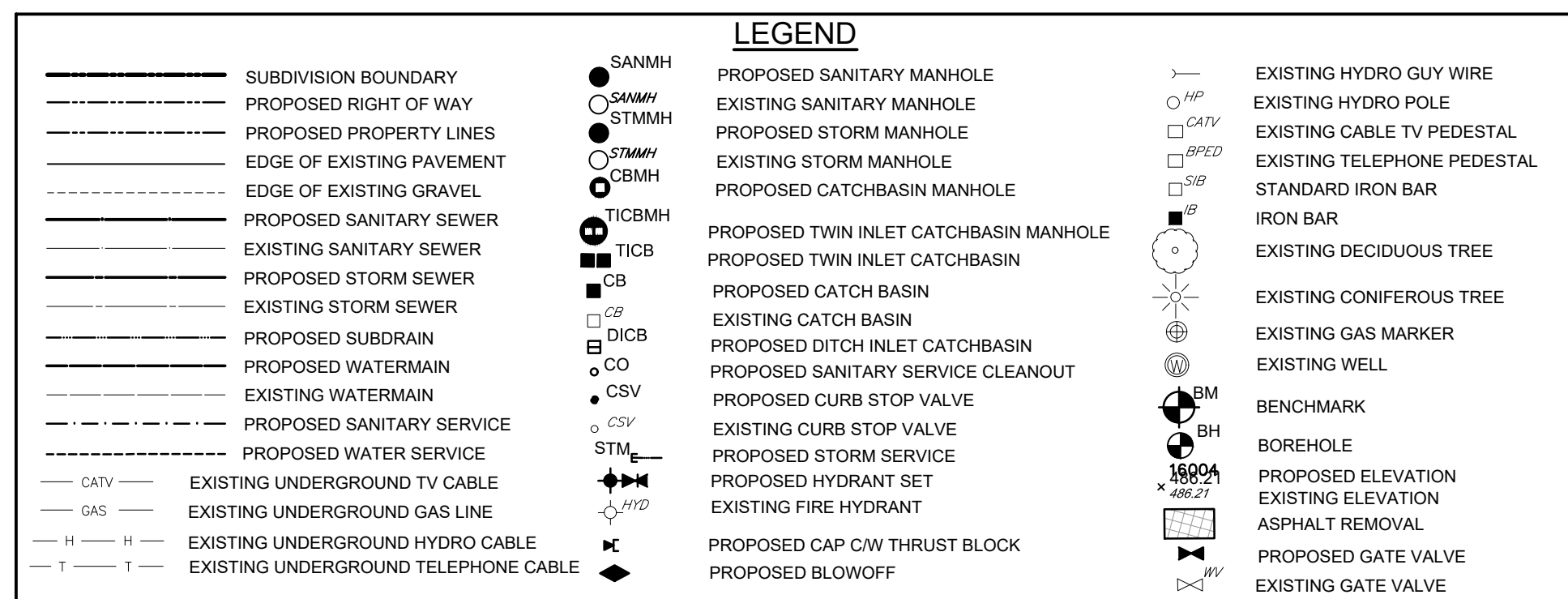
Appendix A

DRAWINGS

STORMWATER MANAGEMENT REPORT

HILTON HEAD HEIGHTS DEVELOPMENT

MUNICIPALITY OF MEAFORD



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CAUTION:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND
OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS
NOT NECESSARILY SHOWN ON THE DRAWINGS, AND, WHERE SHOWN, THE
ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT
GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL
INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND
STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

KEY PLAN
NTS

UNNAMED TRIBUTARY (A) TO PETE'S CREEK

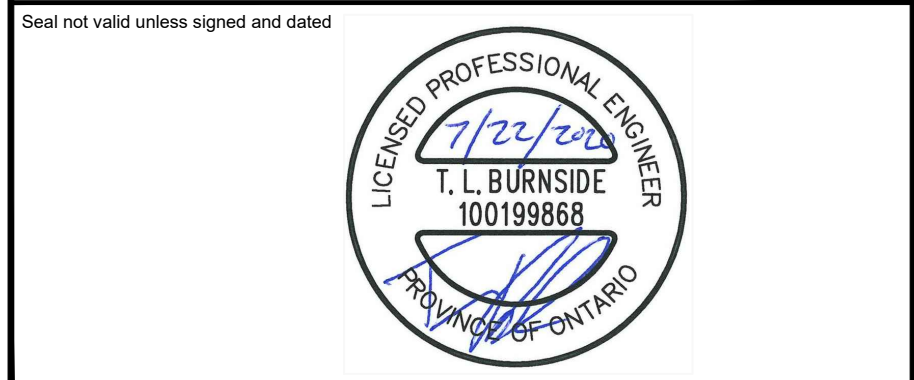
UNNAMED TRIBUTARY (A) TO PETE'S CREEK

101
4.45ha

102
0.73ha

Benchmark Information				
BM1	ON METAL POST SOUTH WEST CORNER OF DECK AT CLUB HOUSE.	ELEVATION	197.79m	
BM2	TOP OF GRATE OF SANITARY MANHOLE (SANMH-109) AT THE INTERSECTION OF THE SERVING ACCESS ROUTE FROM AREA A AND THE SANITARY EASEMENT FOR AREA B.	ELEVATION	196.61m	
BM3	TOP OF SIB LOCATED ON THE SOUTH EAST CORNER OF HILTON HEAD HEIGHTS AND RIDGE ROAD.	ELEVATION	193.45m	

1	JUL 22/20	FIRST SUBMISSION	TLB	SJC
No.	DATE	DESCRIPTION	BY	APPD
REVISION / ISSUE				



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Title: **HILTON HEAD HEIGHTS
Municipality of Meaford
HILTON HEAD HEIGHTS
PRE DEVELOPMENT CATCHMENT AREAS**

Client:		1665426 ONTARIO INC.	
Design:	LFP	Scale:	1:750
Drawn:	LFP	Approved:	
Checked:	TLB		
Date:	JAN 2020		
DRAWING No.		02703 -SWM1	Design Engineer

LEGEND			
— SUBDIVISION BOUNDARY	● SANMH	— PROPOSED SANITARY MANHOLE	— EXISTING HYDRO GUY WIRE
— PROPOSED RIGHT OF WAY	○ SANMH	— EXISTING SANITARY MANHOLE	— EXISTING HYDRO POLE
— PROPOSED PROPERTY LINES	● STMMH	— PROPOSED STORM MANHOLE	— EXISTING CABLE TV PEDESTAL
— EDGE OF EXISTING PAVEMENT	○ STMMH	— EXISTING STORM MANHOLE	— EXISTING TELEPHONE PEDESTAL
— EDGE OF EXISTING GRAVEL	● CBMH	— PROPOSED CATCHBASIN MANHOLE	— STANDARD IRON BAR
— PROPOSED SANITARY SEWER	● TICBMH	— PROPOSED TWIN INLET CATCHBASIN MANHOLE	— IRON BAR
— EXISTING SANITARY SEWER	■ CB	— PROPOSED TWIN INLET CATCHBASIN	— EXISTING DECIDUOUS TREE
— PROPOSED STORM SEWER	■ CB	— PROPOSED CATCH BASIN	— EXISTING CONIFEROUS TREE
— EXISTING STORM SEWER	■ CB	— EXISTING CATCH BASIN	— EXISTING GAS MARKER
— PROPOSED SUBDRAIN	■ CB	— PROPOSED DITCH INLET CATCHBASIN	— EXISTING WELL
— PROPOSED WATERMAIN	■ CB	— PROPOSED SANITARY SERVICE CLEANOUT	— BENCHMARK
— EXISTING WATERMAIN	■ CB	— PROPOSED CURB STOP VALVE	— BOREHOLE
— PROPOSED SANITARY SERVICE	■ CB	— EXISTING CURB STOP VALVE	— PROPOSED ELEVATION
— PROPOSED WATER SERVICE	■ CB	— PROPOSED STORM SERVICE	— EXISTING ELEVATION
— CATV	— EXISTING UNDERGROUND TV CABLE	— EXISTING FIRE HYDRANT	— ASPHALT REMOVAL
— GAS	— EXISTING UNDERGROUND GAS LINE	— PROPOSED CAP C/W THRUST BLOCK	— PROPOSED GATE VALVE
— H	— EXISTING UNDERGROUND HYDRO CABLE	— PROPOSED BLOWOFF	— EXISTING GATE VALVE
— T	— EXISTING UNDERGROUND TELEPHONE CABLE		

CAUTION:
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NTS

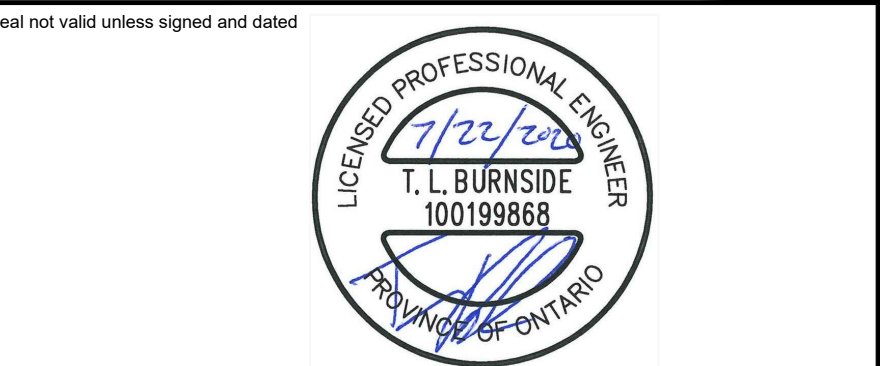
UNNAMED TRIBUTARY (A) TO PETE'S CREEK

UNNAMED TRIBUTARY (A) TO PETE'S CREEK

Benchmark Information

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Title: **HILTON HEAD HEIGHTS
Municipality of Meaford
HILTON HEAD HEIGHTS
POST DEVELOPMENT CATCHMENT AREAS**

Client:	1665426 ONTARIO INC.		
Design:	LFP	Scale:	1:750
Drawn:	LFP	Approved:	
Checked:	TLB		
Date:	JAN 2020		Design Engineer
DRAWING No.	02703 -SWM2		

LEGEND			
	SUBDIVISION BOUNDARY		SANMH
	PROPOSED RIGHT OF WAY		SANMH
	PROPOSED PROPERTY LINES		STMHM
	EDGE OF EXISTING PAVEMENT		STMHM
	EDGE OF EXISTING GRAVEL		CBMH
	PROPOSED SANITARY SEWER		TICBMH
	EXISTING SANITARY SEWER		TICB
	PROPOSED STORM SEWER		SB
	EXISTING STORM SEWER		SB
	PROPOSED SUBDRAIN		DICB
	PROPOSED WATERMAIN		CO
	EXISTING WATERMAIN		CSV
	PROPOSED SANITARY SERVICE		STM
	PROPOSED WATER SERVICE		STM
	CATV		EXISTING HYDRO GUY WIRE
	GAS		EXISTING HYDRO POLE
	H		EXISTING CABLE TV PEDESTAL
	T		EXISTING TELEPHONE PEDESTAL
			STANDARD IRON BAR
			IRON BAR
			EXISTING DECIDUOUS TREE
			EXISTING CONIFEROUS TREE
			EXISTING GAS MARKER
			EXISTING WELL
			BENCHMARK
			BOREHOLE
			PROPOSED ELEVATION
			EXISTING ELEVATION
			ASPHALT REMOVAL
			PROPOSED GATE VALVE
			EXISTING GATE VALVE

Appendix B

PRE DEVELOPMENT MODEL PARAMETERS AND OUTPUT

STORMWATER MANAGEMENT REPORT

HILTON HEAD HEIGHTS DEVELOPMENT

MUNICIPALITY OF MEAFORD

Table A.1 Parameter Summary Table

Existing Conditions										
Outlet Location	Model Catchment ID	Description	Area (ha)	Drainage Channel (m)	Flow Length (m)	Gradient (%)	Total Imperv. Connected (%)	Not Connected Imperv. (%)	Manning's 'n' (Perv.)	CN (Perv.)
Tributary A	101	North Side of Development Area	4.45	600	74	3.0	0.0	100%	0.28	58.0
Tributary B	102	South Side of Development Area	0.73	300	24	2.0	0.0	100%	0.28	58.0

Table A.2 Site Soils: (as per Ontario Soil Survey Report No. 16 for Bruce County)

Soil Type

Brighton Sand

Hydrologic Soil Group

A

TABLE OF CURVE NUMBERS (CN's)								
Land Use	Hydrologic Soil Type							Manning's 'n'
	A	AB	B	BC	C	CD	D	
Meadow	50	54	58	64.5	71	74.5	78	0.4
Woodlot	50	55.3	60.5	67	73.5	76.8	80	0.4
Long Grass	55	60	65	72	79	81.5	84	0.3
Lawns	60	65.5	71	77	83	86	89	0.25
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17
Crop	66	70	74	78	82	84	86	0.13
Fallow (bare)	77	82	86	89	91	93	94	0.05
Built-up	60	65.5	71	77	83	89	89	0.25
Streets, paved	98	98	98	98	98	98	98	0.01

continuous grass
forests
natural, not maintained
maintained
farm pasture
farm land
idle farm land (bare)
Lawns Existing

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101	100	0	0	0	0	0	0	100
102	100	0	0	0	0	0	0	100

LAND USE (%) - Existing Conditions										
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Imperv. Not Connected (Rooftops)	Imperv. Connected	Total
101	0	15	10	75	0.0	0.0	0	0.0	0.0	100
102	0	15	10	75	0	0	0	0.0	0.0	100

CURVE NUMBER (CN) - Existing Conditions											
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Built-up	Imperv. Not Connected (Rooftops)	Weighted CN - Pervious	Manning's 'n'
101	50	50	55	60	58	66	77	60	90	58.0	0.28
102	50	50	55	60	58.0	66	77	60	90	58.0	0.28

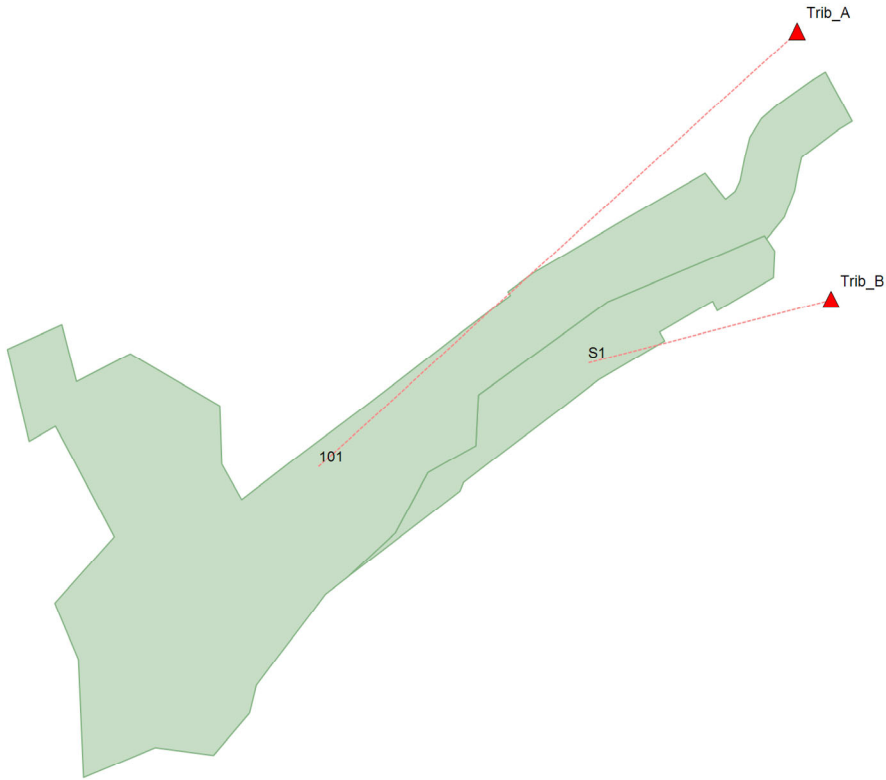
Table A.3: Impervious Area Determination for Subcatchment 101 - 102

Existing Conditions						
Area of Concern	Total Area (ha)	Impervious Area Connected		Impervious Area Not Connected (Rooftops)		Total (%)
		(ha)	(%)	(ha)	(%)	
101	4.45	0.00	0.0	0.00	0.0	0.0
102	0.73	0.00	0.0	0.00	0.0	0.0

Table A.3 - Impervious Area Determination for Existing Catchments 101-102

Catchment					Imperv. Area	Imperv %
101	0	m of	20	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
	0	Impervious Area	814	m ² @ 100% imperv.	0.00 ha	0.0 %
	0	Roof Area	220	m ² @ 100% imperv.	0.00 ha	0.0 %
					0.00 ha	
102	0	m of	10	m wide ROW @ 50% imperv.	0.00 ha	0.0 %
	0	Impervious Area	3490	m ² @ 100% imperv.	0.00 ha	0.0 %
	0	Roof Area	220	m ² @ 100% imperv.	0.00 ha	0.0 %
					0.00 ha	

Pre Development Model Schematic



Legend

- ▲ Outfalls
- Subcatchments



150 m

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – MODEL DETAILS

[TITLE]

[OPTIONS]

```
;;Options      Value
;;-----
FLOW_UNITS      LPS
INFILTRATION     CURVE_NUMBER
FLOW_ROUTING     DYNWAVE
START_DATE       7/22/2020
START_TIME       00:00
REPORT_START_DATE 7/22/2020
REPORT_START_TIME 00:00
END_DATE         7/23/2020
END_TIME         00:00
SWEEP_START      1/1
SWEEP_END        12/31
DRY_DAYS         0
REPORT_STEP      00:01:00
WET_STEP         00:05:00
DRY_STEP         00:05:00
ROUTING_STEP     5
ALLOW_PONDING    NO
INERTIAL_DAMPING  PARTIAL
VARIABLE_STEP    0.75
LENGTHENING_STEP 0
MIN_SURFAREA     0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS     DEPTH
MIN_SLOPE        0
MAX_TRIALS       8
HEAD_TOLERANCE   0
SYS_FLOW_TOL     5
LAT_FLOW_TOL     5
MINIMUM_STEP     0.5
THREADS          2
```

[EVAPORATION]

```
;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
```

[RAINGAGES]

```
;;
;;Name      Rain      Time      Snow      Data
            Type      Intrvl  Catch      Source
;;-----
SCS_6h_38.4mm_2yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_38.4mm_2yr
SCS_6h_50.5mm_5yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_50.5mm_5yr
SCS_6h_68.7mm_25yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_68.7mm_25yr
SCS_6h_76.3mm_50yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_76.3mm_50yr
SCS_6h_83.8mm_100yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_83.8mm_100yr
```

[SUBCATCHMENTS]

```
;;
;;Name      Raingage      Outlet      Total      Pcnt.      Pcnt.      Curb
            Area      Imperv      Width      Slope      Length
Pack
;;-----
101          SCS_6h_83.8mm_100yr Trib_A      4.4492    0          600      3          0
S1           SCS_6h_83.8mm_100yr Trib_B      0.734     0          300      2          0
```

[SUBAREAS]

```
;;Subcatchment  N-Imperv  N-Perv      S-Imperv  S-Perv      PctZero      RouteTo      PctRouted
;;-----
```

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – MODEL DETAILS

101	0.01	0.28	0.05	0.05	25	OUTLET
S1	0.01	0.28	0.05	0.05	25	OUTLET

[INFILTRATION]

;;Subcatchment	CurveNum	HydCon	DryTime
101	58	0.5	7
S1	58	0.5	7

[OUTFALLS]

;;Name	Invert Elev.	Outfall Type	Stage/Table Time Series	Tide Gate Route To
Trib_A	189.45	FREE		NO
Trib_B	192.43	FREE		NO

[TIMESERIES]

;;Name	Date	Time	Value
SCS_6h_38.4mm design storm, total rainfall = 38.4 mm, rain units = mm/hr.			
SCS_6h_38.4mm_2yr			
SCS_6h_50.5mm design storm, total rainfall = 50.5 mm, rain units = mm/hr.			
SCS_6h_50.5mm_5yr			
SCS_6h_68.7mm design storm, total rainfall = 68.7 mm, rain units = mm/hr.			
SCS_6h_68.7mm_25yr			
SCS_6h_76.3mm design storm, total rainfall = 76.3 mm, rain units = mm/hr.			
SCS_6h_76.3mm_50yr			
SCS_6h_83.8mm design storm, total rainfall = 83.8 mm, rain units = mm/hr.			
SCS_6h_83.8mm_100yr			

[REPORT]

INPUT YES
 CONTROLS NO
 SUBCATCHMENTS ALL
 NODES ALL
 LINKS ALL

[TAGS]

[MAP]

DIMENSIONS 530711.488693729 4939507.80999224 531254.163899829 4939986.83489607
 UNITS Meters

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 2 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 2

Number of nodes 2

Number of links 0

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	4.45	600.00	0.00	3.0000	SCS_6h_38.4mm_2yr	Trib_A
S1	0.73	300.00	0.00	2.0000	SCS_6h_38.4mm_2yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
Trib_A	OUTFALL	189.45	0.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES

RDII NO

Snowmelt NO

Groundwater NO

Flow Routing NO

Water Quality NO

Infiltration Method CURVE_NUMBER

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 2 YR STORM EVENT

Starting Date 07/22/2020 00:00:00
 Ending Date 07/23/2020 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00

	Volume hectare-m	Depth mm
***** Runoff Quantity Continuity *****		
Total Precipitation	0.199	38.406
Evaporation Loss	0.000	0.000
Infiltration Loss	0.167	32.162
Surface Runoff	0.032	6.097
Final Storage	0.001	0.147
Continuity Error (%)	0.000	

	Volume hectare-m	Volume 10^6 ltr
***** Flow Routing Continuity *****		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.032	0.316
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.032	0.316
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Subcatchment Runoff Summary

Peak	Runoff	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff
Runoff	Coeff	mm	mm	mm	mm	mm	10^6 ltr
Subcatchment							
LPS							
101		38.41	0.00	0.00	32.23	6.02	0.27
18.01	0.157						
S1		38.41	0.00	0.00	31.77	6.55	0.05
4.68	0.171						

Analysis begun on: Thu Jul 23 12:10:46 2020
 Analysis ended on: Thu Jul 23 12:10:46 2020
 Total elapsed time: < 1 sec

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 5 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 2

Number of nodes 2

Number of links 0

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	4.45	600.00	0.00	3.0000	SCS_6h_50.5mm_5yr	Trib_A
S1	0.73	300.00	0.00	2.0000	SCS_6h_50.5mm_5yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
Trib_A	OUTFALL	189.45	0.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES

RDII NO

Snowmelt NO

Groundwater NO

Flow Routing NO

Water Quality NO

Infiltration Method CURVE_NUMBER

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 5 YR STORM EVENT

Starting Date 07/22/2020 00:00:00
 Ending Date 07/23/2020 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

Total Precipitation	0.262	50.509
Evaporation Loss	0.000	0.000
Infiltration Loss	0.209	40.316
Surface Runoff	0.052	10.045
Final Storage	0.001	0.148
Continuity Error (%)	0.000	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.052	0.521
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.052	0.521
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Subcatchment Runoff Summary

		Total	Total	Total	Total	Total	Total
Peak	Runoff	Precip	Runon	Evap	Infil	Runoff	Runoff
Runoff	Coeff						
Subcatchment		mm	mm	mm	mm	mm	10^6 ltr
LPS							
101		50.51	0.00	0.00	40.42	9.93	0.44
34.97	0.197						
S1		50.51	0.00	0.00	39.67	10.75	0.08
9.57	0.213						

Analysis begun on: Thu Jul 23 12:10:11 2020
 Analysis ended on: Thu Jul 23 12:10:11 2020
 Total elapsed time: < 1 sec

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 25 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 2

Number of nodes 2

Number of links 0

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	4.45	600.00	0.00	3.0000	SCS_6h_68.7mm_25yr	Trib_A
S1	0.73	300.00	0.00	2.0000	SCS_6h_68.7mm_25yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
Trib_A	OUTFALL	189.45	0.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES

RDII NO

Snowmelt NO

Groundwater NO

Flow Routing NO

Water Quality NO

Infiltration Method CURVE_NUMBER

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 25 YR STORM EVENT

Starting Date 07/22/2020 00:00:00
 Ending Date 07/23/2020 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.356	68.710
Evaporation Loss	0.000	0.000
Infiltration Loss	0.265	51.120
Surface Runoff	0.090	17.441
Final Storage	0.001	0.149
Continuity Error (%)	0.000	

	Volume	Volume
Flow Routing Continuity	hectare-m	10 ⁶ ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.090	0.904
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.090	0.904
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Subcatchment Runoff Summary

Peak	Runoff	Total	Total	Total	Total	Total	Total
		Precip	Runon	Evap	Infil	Runoff	Runoff
Runoff	Coeff						
Subcatchment		mm	mm	mm	mm	mm	10 ⁶ ltr
LPS							
101		68.71	0.00	0.00	51.26	17.29	0.77
74.15	0.252						
S1		68.71	0.00	0.00	50.30	18.33	0.13
20.06	0.267						

Analysis begun on: Thu Jul 23 12:09:41 2020
 Analysis ended on: Thu Jul 23 12:09:41 2020
 Total elapsed time: < 1 sec

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 50 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 2

Number of nodes 2

Number of links 0

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	4.45	600.00	0.00	3.0000	SCS_6h_76.3mm_50yr	Trib_A
S1	0.73	300.00	0.00	2.0000	SCS_6h_76.3mm_50yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
Trib_A	OUTFALL	189.45	0.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES

RDII NO

Snowmelt NO

Groundwater NO

Flow Routing NO

Water Quality NO

Infiltration Method CURVE_NUMBER

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 50 YR STORM EVENT

Starting Date 07/22/2020 00:00:00
 Ending Date 07/23/2020 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	0.396	76.311
Evaporation Loss	0.000	0.000
Infiltration Loss	0.286	55.168
Surface Runoff	0.109	20.994
Final Storage	0.001	0.150
Continuity Error (%)	0.000	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.109	1.088
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.109	1.088
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Subcatchment Runoff Summary

-----		Total	Total	Total	Total	Total	Total
Peak	Runoff	Precip	Runon	Evap	Infil	Runoff	Runoff
Runoff	Coeff						
Subcatchment		mm	mm	mm	mm	mm	10^6 ltr
LPS							

101		76.31	0.00	0.00	55.31	20.84	0.93
96.90	0.273						
S1		76.31	0.00	0.00	54.31	21.92	0.16
25.41	0.287						

Analysis begun on: Thu Jul 23 12:09:09 2020
 Analysis ended on: Thu Jul 23 12:09:09 2020
 Total elapsed time: < 1 sec

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 100 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 2

Number of nodes 2

Number of links 0

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	4.45	600.00	0.00	3.0000	SCS_6h_83.8mm_100yr	Trib_A
S1	0.73	300.00	0.00	2.0000	SCS_6h_83.8mm_100yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
Trib_A	OUTFALL	189.45	0.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES

RDII NO

Snowmelt NO

Groundwater NO

Flow Routing NO

Water Quality NO

Infiltration Method CURVE_NUMBER

HILTON HEAD HEIGHTS – PRE DEVELOPMENT – 100 YR STORM EVENT

Starting Date 07/22/2020 00:00:00
 Ending Date 07/23/2020 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	0.434	83.812
Evaporation Loss	0.000	0.000
Infiltration Loss	0.306	58.942
Surface Runoff	0.128	24.721
Final Storage	0.001	0.150
Continuity Error (%)	-0.001	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.128	1.281
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.128	1.281
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Subcatchment Runoff Summary

Peak	Runoff	Total	Total	Total	Total	Total	Total
		Precip	Runon	Evap	Infil	Runoff	Runoff
Runoff	Coeff						
Subcatchment		mm	mm	mm	mm	mm	10^6 ltr
LPS							
101		83.81	0.00	0.00	59.09	24.56	1.09
122.75	0.293						
S1		83.81	0.00	0.00	58.02	25.71	0.19
31.17	0.307						

Analysis begun on: Wed Jul 22 08:45:26 2020
 Analysis ended on: Wed Jul 22 08:45:26 2020
 Total elapsed time: < 1 sec

Appendix C

POST DEVELOPMENT MODEL PARAMETERS AND OUTPUT

STORMWATER MANAGEMENT REPORT

HILTON HEAD HEIGHTS DEVELOPMENT

MUNICIPALITY OF MEAFORD

Table B.1 Parameter Summary Table

Proposed Conditions										
Outlet Location	Model Catchment ID	Description	Area (ha)	Drainage Channel (m)	Flow Length (m)	Gradient (%)	Total Imperv. (%)	Not Connected Imperv. (%)	Manning's 'n' (Perv.)	CN (Perv.)
Tributary A	201	Majority of Development	4.09	900	45	2.0	40.4	59.9	0.27	58.8
Tributary A	202	East end of Development	0.65	320	20	2.0	40.6	38.2	0.25	60.0
Tributary B	203	South side of Development	0.34	300	11	4.0	16.3	100.0	0.25	60.0

Table B.2 Site Soils: (as per Ontario Soil Survey Report No. 16 for Bruce County)

Soil Type

Brighton Sand

Hydrologic Soil Group

A

TABLE OF CURVE NUMBERS (CN's)								
Land Use	Hydrologic Soil Type							
	A	AB	B	BC	C	CD	D	Manning's 'n'
Meadow	50	54	58	64.5	71	74.5	78	0.4
Woodlot	50	55.3	60.5	67	73.5	76.8	80	0.4
Long Grass	55	60	65	72	79	81.5	84	0.3
Lawns	60	65.5	71	77	83	86	89	0.25
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17
Crop	66	70	74	78	82	84	86	0.13
Fallow (bare)	77	82	86	89	91	93	94	0.05
Built-up	60	65.5	71	77	83	89	89	0.25
Streets, paved	98	98	98	98	98	98	98	0.01

continuous grass
forests
natural, not maintained
maintained
farm pasture
farm land
idle farm land (bare)
Lawns Proposed

HYDROLOGIC SOIL TYPE (%) - Proposed Conditions								
Catchment	Hydrologic Soil Type							
	A	AB	B	BC	C	CD	D	TOTAL
201	100	0	0	0	0	0	0	100
202	100	0	0	0	0	0	0	100
203	100	0	0	0	0	0	0	100

LAND USE (%) - Proposed Conditions										
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Imperv. Not Connected (Rooftops)	Imperv. Connected	Total
201	0	7	0	53	0	0	0	24.2	16.2	100
202	0	0	0	59	0	0	0	15.5	25.1	100
203	0	0	0	84	0	0	0	16.3	0.0	100

CURVE NUMBER (CN) - Proposed Conditions											
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Built-up	Imperv. Not Connected (Rooftops)	Weighted CN - Pervious	Manning's 'n'
201	50.0	50	55	60	58	66	77	60	90	58.8	0.27
202	50.0	50.0	55	60	58.0	66	77	60	90	60.0	0.25
203	50.0	50	55	60	58	66	77	60	90	60.0	0.25

Table B.3: Impervious Area Determination for Subcatchment 201

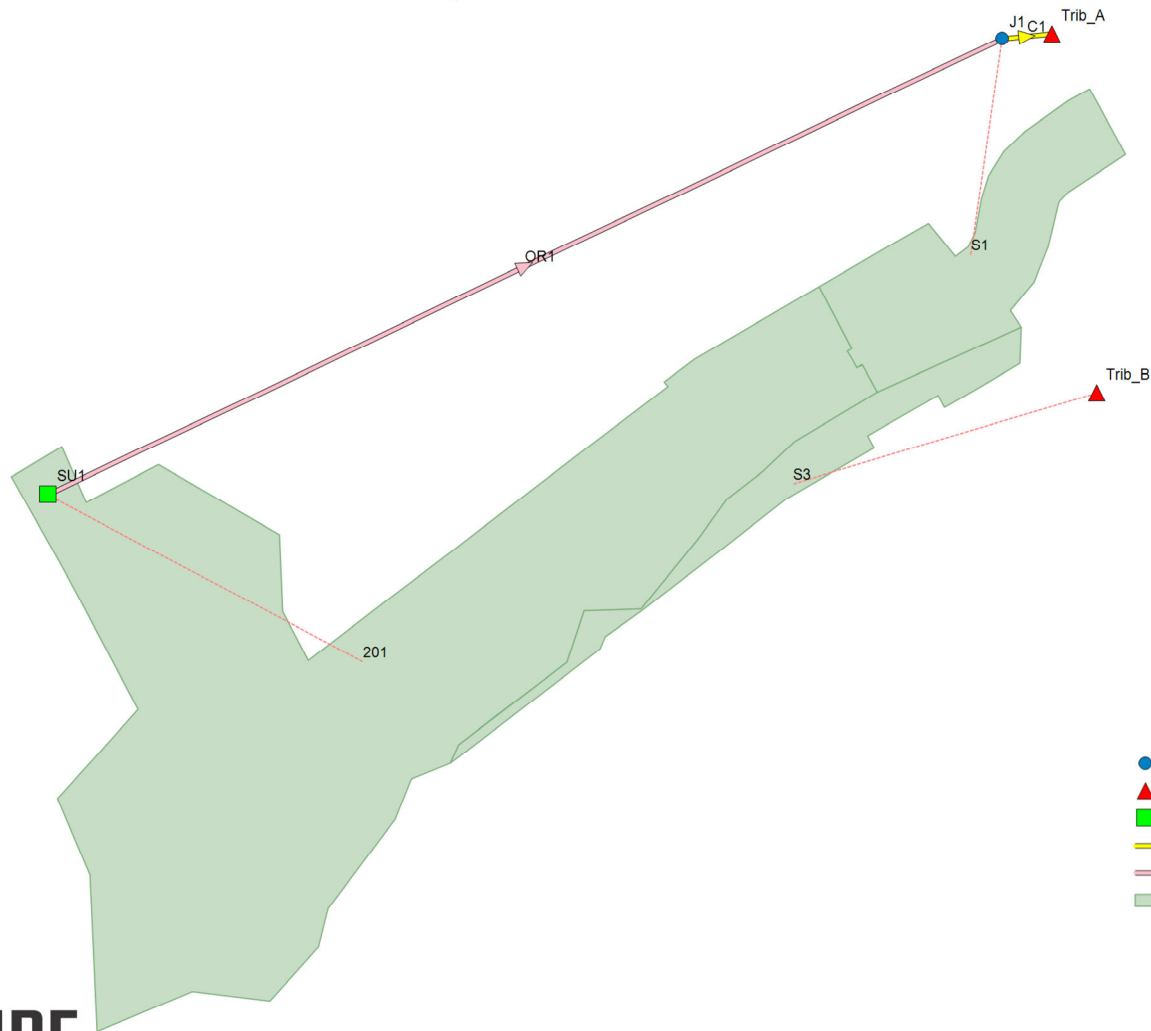
Proposed Conditions

Area of Concern	Total Area (ha)	Impervious Area Connected		Impervious Area Not Connected (Rooftops)		Total (%)
		(ha)	(%)	(ha)	(%)	
201	4.09	0.66	16.2	0.99	24.2	40.4
202	0.65	0.16	25.1	0.10	15.5	40.6
203	0.34	0.00	0.0	0.06	16.3	16.3

Table B.3 - Impervious Area Determination for Proposed Catchment 201

Catchment				Imperv. Area	Imperv %
201	490	m of	8 m wide ROW @ 100% imperv.	0.39 ha	9.6 %
	45	driveways @	60 m ² @ 100% imperv.	0.27 ha	6.6 %
		driveways @	90 m ² @ 100% imperv.	0.00 ha	0.0 %
	44	single res. homes with roof area of	225 m ²	0.99 ha	24.2 %
		Duplex unit with roof area of	250 m ²	0.00 ha	0.0 %
		Multi-family Blocks with impervious	3250 m ²	0.00 ha	0.0 %
		Apartment Block with impervious ar	4300 m ²	0.00 ha	0.0 %
		Permanent Pool of	4000 m ²	0.00 ha	0.0 %
				1.65 ha	
202	160	m of	8 m wide ROW @ 100% imperv.	0.13 ha	19.6 %
	6	driveways @	60 m ² @ 100% imperv.	0.04 ha	5.5
	4.5	single res. homes with roof area of	225 m ²	0.10 ha	15.5
		Duplex unit with roof area of	250 m ²	0.00 ha	0.0
		Multi-family Blocks with roof area of	750 m ²	0.00 ha	0.0
				0.13 ha	
203		m of	20 m wide ROW @ 55% imperv.	0.00 ha	0.0 %
		driveways @	1826 m ² @ 100% imperv.	0.00 ha	0.0 %
	2.5	single res. homes with roof area of	225 m ²	0.06 ha	16.3 %
		Duplex unit with roof area of	200 m ²	0.00 ha	0.0 %
		Multi-family Blocks with roof area of	750 m ²	0.00 ha	0.0 %
				0.06 ha	

Post Development Model Schematic



Legend

- Junctions
- ▲ Outfalls
- Storages
- Conduits
- Orifices
- Subcatchments



100 m

HILTON HEAD HEIGHTS – POST DEVELOPMENT – MODEL DETAILS

[TITLE]

[OPTIONS]

```

;;Options      Value
;;-----
FLOW_UNITS     LPS
INFILTRATION   CURVE_NUMBER
FLOW_ROUTING   DYNWAVE
START_DATE     7/22/2020
START_TIME     00:00
REPORT_START_DATE 7/22/2020
REPORT_START_TIME 00:00
END_DATE       7/23/2020
END_TIME       00:00
SWEEP_START    1/1
SWEEP_END      12/31
DRY_DAYS       0
REPORT_STEP    00:01:00
WET_STEP       00:05:00
DRY_STEP       00:05:00
ROUTING_STEP   5
ALLOW_PONDING  NO
INERTIAL_DAMPING PARTIAL
VARIABLE_STEP  0.75
LENGTHENING_STEP 0
MIN_SURFAREA   0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS   ELEVATION
MIN_SLOPE      0
MAX_TRIALS     8
HEAD_TOLERANCE 0
SYS_FLOW_TOL   5
LAT_FLOW_TOL   5
MINIMUM_STEP   0.5
THREADS        2

```

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO

```

[RAINGAGES]

```

;;
;;Name      Rain      Time      Snow      Data
            Type      Intrvl  Catch      Source
;;-----
SCS_6h_38.4mm_2yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_38.4mm_2yr
SCS_6h_50.5mm_5yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_50.5mm_5yr
SCS_6h_68.7mm_25yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_68.7mm_25yr
SCS_6h_76.3mm_50yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_76.3mm_50yr
SCS_6h_83.8mm_100yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_83.8mm_100yr

```

[SUBCATCHMENTS]

```

;;
;;Name      Raingage      Outlet      Total      Pcnt.      Pcnt.      Curb
Pack                               Area      Imperv      Width      Slope      Length
;;-----
201          SCS_6h_83.8mm_100yr SU1          4.0915    40.4      900      2      0
S1            SCS_6h_83.8mm_100yr J1          0.6538    40.6      320      2      0
S3            SCS_6h_83.8mm_100yr Trib_B       0.3451    16.3      300      4      0

```

[SUBAREAS]

```

;;Subcatchment  N-Imperv  N-Perv  S-Imperv  S-Perv  PctZero  RouteTo  PctRouted

```

HILTON HEAD HEIGHTS – POST DEVELOPMENT – MODEL DETAILS

```

;;-----
201      0.01      0.27      0.05      0.05      25      OUTLET
S1       0.01      0.25      0.05      0.05      25      OUTLET
S3       0.01      0.25      0.05      0.05      25      OUTLET

[INFILTRATION]
;;Subcatchment CurveNum HydCon DryTime
;;-----
201      58.8      0.5      7
S1       60      0.5      7
S3       60      0.5      7

[JUNCTIONS]
;;      Invert      Max.      Init.      Surcharge      Pondered
;;Name      Elev.      Depth      Depth      Depth      Area
;;-----
J1      189.6      1.4      0      0      0

[OUTFALLS]
;;      Invert      Outfall      Stage/Table      Tide
;;Name      Elev.      Type      Time Series      Gate Route To
;;-----
Trib_A      189.45      FREE
Trib_B      192.43      FREE      NO
              NO

[STORAGE]
;;      Invert      Max.      Init.      Storage      Curve      Pondered      Evap.
;;Name      Elev.      Depth      Depth      Curve      Params      Area      Frac.
Infiltration parameters
;;-----
SU1      195.1      2.9      0      TABULAR      Pond      0      0

[CONDUITS]
;;      Inlet      Outlet      Manning      Inlet      Outlet
;;Init.      Max.      Node      Node      Length      N      Offset      Offset
;;Name      Flow      Flow
;;-----
C1      J1      Trib_A      21.84      0.013      189.6      189.45      0
0

[ORIFICES]
;;      Inlet      Outlet      Orifice      Crest      Disch.      Flap
;;Open/Close      Node      Node      Type      Height      Coeff.      Gate Time
;;Name
;;-----
OR1      SU1      J1      SIDE      195.1      0.65      NO      0

[XSECTIONS]
;;Link      Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;;-----
C1      TRAPEZOIDAL      1      0.5      4      4      1
OR1      CIRCULAR      0.05      0      0      0

[LOSSES]
;;Link      Inlet      Outlet      Average      Flap Gate      SeepageRate
;;-----

[CURVES]
;;Name      Type      X-Value      Y-Value
;;-----
Pond      Storage      0      .36
Pond      .4      .36
Pond      .9      800
Pond      2.9      1750

```

HILTON HEAD HEIGHTS – POST DEVELOPMENT – MODEL DETAILS

[TIMESERIES]

Name	Date	Time	Value

SCS_6h_38.4mm design storm, total rainfall = 38.4 mm, rain units = mm/hr.			
SCS_6h_38.4mm_2yr			
SCS_6h_50.5mm design storm, total rainfall = 50.5 mm, rain units = mm/hr.			
SCS_6h_50.5mm_5yr			
SCS_6h_68.7mm design storm, total rainfall = 68.7 mm, rain units = mm/hr.			
SCS_6h_68.7mm_25yr			
SCS_6h_76.3mm design storm, total rainfall = 76.3 mm, rain units = mm/hr.			
SCS_6h_76.3mm_50yr			
SCS_6h_83.8mm design storm, total rainfall = 83.8 mm, rain units = mm/hr.			
SCS_6h_83.8mm_100yr			

[REPORT]

INPUT YES
 CONTROLS NO
 SUBCATCHMENTS ALL
 NODES ALL
 LINKS ALL

[TAGS]

[MAP]

DIMENSIONS 530719.245580512 4939507.73619516 531254.074009732 4939986.83841022
 UNITS Meters

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 2 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 3

Number of nodes 4

Number of links 2

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	4.09	900.00	40.40	2.0000	SCS_6h_38.4mm_2yr	SU1
S1	0.65	320.00	40.60	2.0000	SCS_6h_38.4mm_2yr	J1
S3	0.35	300.00	16.30	4.0000	SCS_6h_38.4mm_2yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	189.60	1.40	0.0	
Trib_A	OUTFALL	189.45	1.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	
SU1	STORAGE	195.10	2.90	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	Trib_A	CONDUIT	21.8	0.6868	0.0130
OR1	SU1	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	1.00	4.50	0.51	8.50	1	18421.07

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 2 YR STORM EVENT

 NOTE: The summary statistics displayed in this report are
 based on results found at every computational time step,
 not just on results from each reporting time step.

***** Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
 Infiltration Method CURVE_NUMBER
 Flow Routing Method DYNWAVE
 Starting Date 07/22/2020 00:00:00
 Ending Date 07/23/2020 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00
 Routing Time Step 5.00 sec
 Variable Time Step YES
 Maximum Trials 8
 Number of Threads 1
 Head Tolerance 0.001524 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	0.196	38.406
Evaporation Loss	0.000	0.000
Infiltration Loss	0.098	19.298
Surface Runoff	0.097	19.063
Final Storage	0.000	0.063
Continuity Error (%)	-0.044	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.097	0.971
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.069	0.688
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.028	0.282
Continuity Error (%)	0.022	

***** Time-Step Critical Elements

None

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 2 YR STORM EVENT

 Highest Flow Instability Indexes

 All links are stable.

 Routing Time Step Summary

 Minimum Time Step : 4.50 sec
 Average Time Step : 5.00 sec
 Maximum Time Step : 5.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 2.00
 Percent Not Converging : 0.00

 Subcatchment Runoff Summary

Peak Runoff		Total	Total	Total	Total	Total	Total
Runoff Coeff		Precip	Runon	Evap	Infil	Runoff	Runoff
Subcatchment		mm	mm	mm	mm	mm	10^6 ltr
LPS							
201		38.41	0.00	0.00	18.83	19.53	0.80
147.15	0.509						
S1		38.41	0.00	0.00	18.60	19.77	0.13
25.27	0.515						
S3		38.41	0.00	0.00	26.20	12.16	0.04
8.04	0.317						

 Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J1	JUNCTION	0.02	0.06	189.66	0 02:25	0.06
Trib_A	OUTFALL	0.02	0.06	189.51	0 02:25	0.06
Trib_B	OUTFALL	0.00	0.00	192.43	0 00:00	0.00
SU1	STORAGE	1.16	1.39	196.49	0 06:07	1.39

 Node Inflow Summary

Flow	Maximum	Maximum		Lateral	Total
Balance	Lateral	Total	Time of Max	Inflow	Inflow
Error	Inflow	Inflow	Occurrence	Volume	Volume

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 2 YR STORM EVENT

Node Percent	Type	LPS	LPS	days	hr:min	10^6 ltr	10^6 ltr

--							
J1	JUNCTION	25.27	30.90	0	02:25	0.129	0.647
0.027							
Trib_A	OUTFALL	0.00	30.88	0	02:25	0	0.646
0.000							
Trib_B	OUTFALL	8.04	8.04	0	02:25	0.042	0.042
0.000							
SU1	STORAGE	147.15	147.15	0	02:25	0.799	0.799
0.045							

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max
	Volume	Pcnt	Pcnt	Pcnt	Volume	Pcnt	Occurrence
Outflow							
Storage Unit	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min
LPS							

SU1	0.441	16	0	0	0.652	24	0 06:07
6.61							

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr

Trib_A	99.88	7.49	30.88	0.646
Trib_B	33.45	1.45	8.04	0.042

System	66.67	8.94	38.90	0.688

Link Flow Summary

	Maximum Flow	Time of Max Occurrence	Maximum Veloc	Max/ Full	Max/ Full

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 2 YR STORM EVENT

Link	Type	LPS	days	hr:min	m/sec	Flow	Depth
C1	CONDUIT	30.88	0	02:25	0.77	0.00	0.06
OR1	ORIFICE	6.61	0	06:07			1.00

Flow Classification Summary

	Adjusted	Fraction of Time in Flow Class								
	/Actual	Up		Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.87	0.00

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Wed Jul 22 13:15:11 2020
Analysis ended on: Wed Jul 22 13:15:11 2020
Total elapsed time: < 1 sec

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 5 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 3

Number of nodes 4

Number of links 2

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	4.09	900.00	40.40	2.0000	SCS_6h_50.5mm_5yr	SU1
S1	0.65	320.00	40.60	2.0000	SCS_6h_50.5mm_5yr	J1
S3	0.35	300.00	16.30	4.0000	SCS_6h_50.5mm_5yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	189.60	1.40	0.0	
Trib_A	OUTFALL	189.45	1.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	
SU1	STORAGE	195.10	2.90	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	Trib_A	CONDUIT	21.8	0.6868	0.0130
OR1	SU1	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	1.00	4.50	0.51	8.50	1	18421.07

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 5 YR STORM EVENT

 NOTE: The summary statistics displayed in this report are
 based on results found at every computational time step,
 not just on results from each reporting time step.

***** Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
 Infiltration Method CURVE_NUMBER
 Flow Routing Method DYNWAVE
 Starting Date 07/22/2020 00:00:00
 Ending Date 07/23/2020 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00
 Routing Time Step 5.00 sec
 Variable Time Step YES
 Maximum Trials 8
 Number of Threads 1
 Head Tolerance 0.001524 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	0.257	50.509
Evaporation Loss	0.000	0.000
Infiltration Loss	0.123	24.078
Surface Runoff	0.134	26.388
Final Storage	0.000	0.063
Continuity Error (%)	-0.040	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.134	1.344
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.081	0.810
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.053	0.534
Continuity Error (%)	0.017	

***** Time-Step Critical Elements

None

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 5 YR STORM EVENT

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

Subcatchment Runoff Summary

Peak Runoff		Total	Total	Total	Total	Total	Total
Runoff Coeff		Precip	Runon	Evap	Infil	Runoff	Runoff
Subcatchment		mm	mm	mm	mm	mm	10^6 ltr
LPS							
201		50.51	0.00	0.00	23.52	26.95	1.10
203.79	0.534						
S1		50.51	0.00	0.00	23.11	27.36	0.18
35.50	0.542						
S3		50.51	0.00	0.00	32.56	17.90	0.06
12.32	0.354						

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J1	JUNCTION	0.03	0.07	189.67	0 02:25	0.07
Trib_A	OUTFALL	0.03	0.07	189.52	0 02:25	0.06
Trib_B	OUTFALL	0.00	0.00	192.43	0 00:00	0.00
SU1	STORAGE	1.40	1.66	196.76	0 06:09	1.66

Node Inflow Summary

Flow	Maximum	Maximum		Lateral	Total
Balance	Lateral	Total	Time of Max	Inflow	Inflow
Error	Inflow	Inflow	Occurrence	Volume	Volume

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 5 YR STORM EVENT

Node Percent	Type	LPS	LPS	days	hr:min	10^6 ltr	10^6 ltr

J1	JUNCTION	35.50	41.48	0	02:25	0.179	0.748
0.025							
Trib_A	OUTFALL	0.00	41.45	0	02:25	0	0.748
0.000							
Trib_B	OUTFALL	12.32	12.32	0	02:25	0.0618	0.0618
0.000							
SU1	STORAGE	203.79	203.79	0	02:25	1.1	1.1
0.036							

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max
	Volume	Pcnt	Pcnt	Pcnt	Volume	Pcnt	Occurrence
Outflow							
Storage Unit	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min
LPS							

SU1	0.683	25	0	0	0.943	34	0 06:09
7.23							

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
Trib_A	99.90	8.67	41.45	0.748
Trib_B	34.08	2.09	12.32	0.062
System	66.99	10.76	53.75	0.810

Link Flow Summary

Maximum Flow	Time of Max Occurrence	Maximum Veloc	Max/ Full	Max/ Full
------------------	---------------------------	-------------------	--------------	--------------

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 5 YR STORM EVENT

Link	Type	LPS	days	hr:min	m/sec	Flow	Depth
C1	CONDUIT	41.45	0	02:25	0.84	0.00	0.07
OR1	ORIFICE	7.23	0	06:09			1.00

Flow Classification Summary

	Adjusted	Fraction of Time in Flow Class								
	/Actual	Up		Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.88	0.00

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Thu Jul 23 12:15:43 2020
Analysis ended on: Thu Jul 23 12:15:43 2020
Total elapsed time: < 1 sec

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 25 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 3

Number of nodes 4

Number of links 2

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	4.09	900.00	40.40	2.0000	SCS_6h_68.7mm_25yr	SU1
S1	0.65	320.00	40.60	2.0000	SCS_6h_68.7mm_25yr	J1
S3	0.35	300.00	16.30	4.0000	SCS_6h_68.7mm_25yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	189.60	1.40	0.0	
Trib_A	OUTFALL	189.45	1.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	
SU1	STORAGE	195.10	2.90	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	Trib_A	CONDUIT	21.8	0.6868	0.0130
OR1	SU1	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	1.00	4.50	0.51	8.50	1	18421.07

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 25 YR STORM EVENT

 NOTE: The summary statistics displayed in this report are
 based on results found at every computational time step,
 not just on results from each reporting time step.

Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES

RDII NO

Snowmelt NO

Groundwater NO

Flow Routing YES

Ponding Allowed NO

Water Quality NO

Infiltration Method CURVE_NUMBER

Flow Routing Method DYNWAVE

Starting Date 07/22/2020 00:00:00

Ending Date 07/23/2020 00:00:00

Antecedent Dry Days 0.0

Report Time Step 00:01:00

Wet Time Step 00:05:00

Dry Time Step 00:05:00

Routing Time Step 5.00 sec

Variable Time Step YES

Maximum Trials 8

Number of Threads 1

Head Tolerance 0.001524 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	0.350	68.710
Evaporation Loss	0.000	0.000
Infiltration Loss	0.155	30.443
Surface Runoff	0.195	38.229
Final Storage	0.000	0.063
Continuity Error (%)	-0.037	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.195	1.947
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.099	0.991
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.096	0.956
Continuity Error (%)	0.014	

Time-Step Critical Elements

None

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 25 YR STORM EVENT

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

Subcatchment Runoff Summary

Peak Runoff		Total	Total	Total	Total	Total	Total
Runoff Coeff		Precip	Runon	Evap	Infil	Runoff	Runoff
Subcatchment		mm	mm	mm	mm	mm	10^6 ltr
LPS							
201		68.71	0.00	0.00	29.79	38.89	1.59
299.59	0.566						
S1		68.71	0.00	0.00	29.03	39.64	0.26
52.62	0.577						
S3		68.71	0.00	0.00	40.91	27.77	0.10
19.95	0.404						

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J1	JUNCTION	0.03	0.08	189.68	0 02:25	0.08
Trib_A	OUTFALL	0.03	0.08	189.53	0 02:25	0.08
Trib_B	OUTFALL	0.00	0.00	192.43	0 00:00	0.00
SU1	STORAGE	1.75	2.04	197.14	0 06:12	2.04

Node Inflow Summary

Flow	Maximum	Maximum		Lateral	Total
Balance	Lateral	Total	Time of Max	Inflow	Inflow
Error	Inflow	Inflow	Occurrence	Volume	Volume

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 25 YR STORM EVENT

Node Percent	Type	LPS	LPS	days	hr:min	10^6 ltr	10^6 ltr

--							
J1	JUNCTION	52.62	59.08	0	02:25	0.259	0.895
0.024							
Trib_A	OUTFALL	0.00	59.04	0	02:25	0	0.895
0.000							
Trib_B	OUTFALL	19.95	19.95	0	02:25	0.0959	0.0959
0.000							
SU1	STORAGE	299.59	299.59	0	02:25	1.59	1.59
0.027							

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max
	Volume	Pcnt	Pcnt	Pcnt	Volume	Pcnt	Occurrence
Outflow							
Storage Unit	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min
LPS							

SU1	1.082	39	0	0	1.419	52	0 06:12
8.02							

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
Trib_A	99.92	10.36	59.04	0.895
Trib_B	34.64	3.20	19.95	0.096

System	67.28	13.56	78.96	0.991

Link Flow Summary

	Maximum Flow	Time of Max Occurrence	Maximum Veloc	Max/ Full	Max/ Full

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 25 YR STORM EVENT

Link	Type	LPS	days	hr:min	m/sec	Flow	Depth
C1	CONDUIT	59.04	0	02:25	0.93	0.00	0.08
OR1	ORIFICE	8.02	0	06:12			1.00

Flow Classification Summary

	Adjusted	Fraction of Time in Flow Class								
	/Actual	Up		Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.88	0.00

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Thu Jul 23 12:16:18 2020
Analysis ended on: Thu Jul 23 12:16:18 2020
Total elapsed time: < 1 sec

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 50 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 3

Number of nodes 4

Number of links 2

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	4.09	900.00	40.40	2.0000	SCS_6h_76.3mm_50yr	SU1
S1	0.65	320.00	40.60	2.0000	SCS_6h_76.3mm_50yr	J1
S3	0.35	300.00	16.30	4.0000	SCS_6h_76.3mm_50yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	189.60	1.40	0.0	
Trib_A	OUTFALL	189.45	1.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	
SU1	STORAGE	195.10	2.90	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	Trib_A	CONDUIT	21.8	0.6868	0.0130
OR1	SU1	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	1.00	4.50	0.51	8.50	1	18421.07

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 50 YR STORM EVENT

 NOTE: The summary statistics displayed in this report are
 based on results found at every computational time step,
 not just on results from each reporting time step.

***** Analysis Options

Flow Units LPS

Process Models:

Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
 Infiltration Method CURVE_NUMBER
 Flow Routing Method DYNWAVE
 Starting Date 07/22/2020 00:00:00
 Ending Date 07/23/2020 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00
 Routing Time Step 5.00 sec
 Variable Time Step YES
 Maximum Trials 8
 Number of Threads 1
 Head Tolerance 0.001524 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	0.388	76.311
Evaporation Loss	0.000	0.000
Infiltration Loss	0.167	32.786
Surface Runoff	0.221	43.489
Final Storage	0.000	0.064
Continuity Error (%)	-0.036	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.221	2.214
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.107	1.066
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.115	1.148
Continuity Error (%)	0.014	

***** Time-Step Critical Elements

None

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 50 YR STORM EVENT

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.01

Subcatchment Runoff Summary

Peak Runoff		Total	Total	Total	Total	Total	Total
Runoff Coeff		Precip	Runon	Evap	Infil	Runoff	Runoff
Subcatchment		mm	mm	mm	mm	mm	10^6 ltr
LPS							
201		76.31	0.00	0.00	32.08	44.19	1.81
343.12	0.579						
S1		76.31	0.00	0.00	31.25	45.03	0.29
60.29	0.590						
S3		76.31	0.00	0.00	44.03	32.25	0.11
23.49	0.423						

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J1	JUNCTION	0.03	0.08	189.68	0 02:25	0.08
Trib_A	OUTFALL	0.03	0.08	189.53	0 02:25	0.08
Trib_B	OUTFALL	0.00	0.00	192.43	0 00:00	0.00
SU1	STORAGE	1.89	2.19	197.29	0 06:13	2.19

Node Inflow Summary

Flow	Maximum	Maximum		Lateral	Total
Balance	Lateral	Total	Time of Max	Inflow	Inflow
Error	Inflow	Inflow	Occurrence	Volume	Volume

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 50 YR STORM EVENT

Node Percent	Type	LPS	LPS	days	hr:min	10^6 ltr	10^6 ltr

--							
J1	JUNCTION	60.29	66.94	0	02:25	0.295	0.955
0.023							
Trib_A	OUTFALL	0.00	66.90	0	02:25	0	0.955
0.000							
Trib_B	OUTFALL	23.49	23.49	0	02:25	0.111	0.111
0.000							
SU1	STORAGE	343.12	343.12	0	02:25	1.81	1.81
0.027							

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max
	Volume	Pcnt	Pcnt	Pcnt	Volume	Pcnt	Occurrence
Outflow							
Storage Unit	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min
LPS							

SU1	1.260	46	0	0	1.629	59	0 06:13
8.32							

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
Trib_A	99.93	11.06	66.90	0.955
Trib_B	34.81	3.70	23.49	0.111

System	67.37	14.76	90.35	1.066

Link Flow Summary

	Maximum Flow	Time of Max Occurrence	Maximum Veloc	Max/ Full	Max/ Full

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 50 YR STORM EVENT

Link	Type	LPS	days	hr:min	m/sec	Flow	Depth
C1	CONDUIT	66.90	0	02:25	0.96	0.00	0.08
OR1	ORIFICE	8.32	0	06:13			1.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.87	0.00

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Thu Jul 23 12:16:44 2020
Analysis ended on: Thu Jul 23 12:16:44 2020
Total elapsed time: < 1 sec

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 100 YR STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

Element Count

Number of rain gages 5

Number of subcatchments ... 3

Number of nodes 4

Number of links 2

Number of pollutants 0

Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
SCS_6h_38.4mm_2yr	SCS_6h_38.4mm_2yr	INTENSITY	5 min.
SCS_6h_50.5mm_5yr	SCS_6h_50.5mm_5yr	INTENSITY	5 min.
SCS_6h_68.7mm_25yr	SCS_6h_68.7mm_25yr	INTENSITY	5 min.
SCS_6h_76.3mm_50yr	SCS_6h_76.3mm_50yr	INTENSITY	5 min.
SCS_6h_83.8mm_100yr	SCS_6h_83.8mm_100yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	4.09	900.00	40.40	2.0000	SCS_6h_83.8mm_100yr	SU1
S1	0.65	320.00	40.60	2.0000	SCS_6h_83.8mm_100yr	J1
S3	0.35	300.00	16.30	4.0000	SCS_6h_83.8mm_100yr	Trib_B

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	189.60	1.40	0.0	
Trib_A	OUTFALL	189.45	1.00	0.0	
Trib_B	OUTFALL	192.43	0.00	0.0	
SU1	STORAGE	195.10	2.90	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	Trib_A	CONDUIT	21.8	0.6868	0.0130
OR1	SU1	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 100 YR STORM EVENT

```
-----
C1          TRAPEZOIDAL          1.00      4.50      0.51      8.50      1 18421.07
```

```
*****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****
```

Analysis Options

```
*****
```

```
Flow Units ..... LPS
```

Process Models:

```
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
  Infiltration Method ..... CURVE_NUMBER
  Flow Routing Method ..... DYNWAVE
  Starting Date ..... 07/22/2020 00:00:00
  Ending Date ..... 07/23/2020 00:00:00
  Antecedent Dry Days ..... 0.0
  Report Time Step ..... 00:01:00
  Wet Time Step ..... 00:05:00
  Dry Time Step ..... 00:05:00
  Routing Time Step ..... 5.00 sec
  Variable Time Step ..... YES
  Maximum Trials ..... 8
  Number of Threads ..... 1
  Head Tolerance ..... 0.001524 m
```

```
*****
                                Volume      Depth
Runoff Quantity Continuity    hectare-m      mm
*****                        -
Total Precipitation .....      0.427      83.812
Evaporation Loss .....      0.000      0.000
Infiltration Loss .....      0.178      35.033
Surface Runoff .....      0.248      48.745
Final Storage .....      0.000      0.063
Continuity Error (%) .....     -0.036
```

```
*****
                                Volume      Volume
Flow Routing Continuity      hectare-m      10^6 ltr
*****                        -
Dry Weather Inflow .....      0.000      0.000
Wet Weather Inflow .....      0.248      2.482
Groundwater Inflow .....      0.000      0.000
RDII Inflow .....      0.000      0.000
External Inflow .....      0.000      0.000
External Outflow .....      0.114      1.141
Flooding Loss .....      0.000      0.000
Evaporation Loss .....      0.000      0.000
Exfiltration Loss .....      0.000      0.000
Initial Stored Volume ....      0.000      0.000
Final Stored Volume .....      0.134      1.341
Continuity Error (%) .....      0.012
```

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 100 YR STORM EVENT

Time-Step Critical Elements

None

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

Subcatchment Runoff Summary

Peak Runoff		Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff
Subcatchment	Coeff	mm	mm	mm	mm	mm	10^6 ltr
LPS							
201		83.81	0.00	0.00	34.31	49.47	2.02
387.92	0.590						
S1		83.81	0.00	0.00	33.30	50.48	0.33
68.11	0.602						
S3		83.81	0.00	0.00	46.93	36.86	0.13
27.16	0.440						

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J1	JUNCTION	0.03	0.09	189.69	0 02:25	0.09
Trib_A	OUTFALL	0.03	0.09	189.54	0 02:25	0.09
Trib_B	OUTFALL	0.00	0.00	192.43	0 00:00	0.00
SU1	STORAGE	2.02	2.34	197.44	0 06:14	2.34

Node Inflow Summary

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 100 YR STORM EVENT

Flow		Maximum	Maximum	Time of Max	Lateral	Total
		Lateral	Total		Inflow	Inflow
Balance		Inflow	Inflow	Occurrence	Volume	Volume
Error	Type	LPS	LPS	days hr:min	10^6 ltr	10^6 ltr
Node						
Percent						

--						
J1	JUNCTION	68.11	74.95	0 02:25	0.33	1.01
0.023						
Trib_A	OUTFALL	0.00	74.91	0 02:25	0	1.01
0.000						
Trib_B	OUTFALL	27.16	27.16	0 02:25	0.127	0.127
0.000						
SU1	STORAGE	387.92	387.92	0 02:25	2.02	2.02
0.024						

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max
	Volume	Pcnt	Pcnt	Pcnt	Volume	Pcnt	Occurrence
Outflow							
Storage Unit	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min
LPS							

SU1	1.440	52	0	0	1.842	67	0 06:14
8.60							

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	LPS	LPS	10^6 ltr
Trib_A	99.94	11.74	74.91	1.013
Trib_B	34.95	4.21	27.16	0.127
System	67.44	15.94	102.02	1.141

HILTON HEAD HEIGHTS – POST DEVELOPMENT – 100 YR STORM EVENT

Link Flow Summary

Link	Type	Maximum Flow LPS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	74.91	0 02:25	0.99	0.00	0.09
OR1	ORIFICE	8.60	0 06:14			1.00

Flow Classification Summary

	Adjusted /Actual Length	Fraction of Time in Flow Class									
		Up		Down		Sub		Sup			
Conduit		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Down	Norm	Inlet
									Crit	Ltd	Ctrl
C1	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.87	0.00

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Thu Jul 23 12:17:15 2020
Analysis ended on: Thu Jul 23 12:17:15 2020
Total elapsed time: < 1 sec

Appendix D

OGS SIZING

STORMWATER MANAGEMENT REPORT

HILTON HEAD HEIGHTS DEVELOPMENT

MUNICIPALITY OF MEAFORD

Hydro First Defense® - HC



Rev. 9.6

Project Name: Hilton Head Heights
Street: Hilton Head Heights
Province: Ontario
Designer:
Report Date:
City: Meaford
Country:
email:

Paste

Net Annual Removal Model: FD-6HC

Intensity ⁽¹⁾	Fraction of Rainfall ⁽¹⁾	FD-6HC Removal Efficiency ⁽²⁾	Weighted Net Annual Efficiency
(mm/hr)	(%)	(%)	(%)
0.50	10.1%	99.6%	10.1%
1.00	10.7%	93.4%	10.0%
1.50	10.0%	89.9%	9.0%
2.00	8.4%	87.5%	7.4%
2.50	6.6%	85.7%	5.7%
3.00	6.2%	84.3%	5.2%
3.60	4.1%	82.9%	3.4%
4.10	4.2%	81.9%	3.4%
4.60	3.7%	81.0%	3.0%
5.10	3.8%	80.2%	3.0%
6.40	6.4%	78.6%	5.0%
7.60	4.6%	77.3%	3.6%
8.90	3.3%	76.2%	2.5%
10.20	2.4%	75.2%	1.8%
11.40	2.6%	74.5%	1.9%
12.70	1.5%	73.7%	1.1%
15.20	2.1%	72.5%	1.5%
19.10	2.3%	71.0%	1.6%
25.40	3.9%	69.1%	2.7%
38.10	1.4%	66.6%	0.9%
50.80	0.6%	64.8%	0.4%

Treatment Parameters:

Structure ID:
TSS Goal: 80 % Removal
TSS Particle Size: Fine
Area: 3.974 ha
Percent Impervious: 45%
Rational C value: 0.65 **Calc. Cn**
Rainfall Station: Owen Sound **MAP**
Peak Storm Flow: 479 L/s

RESULTS SUMMARY

Model	TSS	Volume
FD-3HC	73.2%	85.8%
FD-4HC	77.2%	95.0%
FD-5HC	80.9%	98.2%
FD-6HC	83.3%	98.8%
FD-8HC	87.3%	98.9%

Model Specification:

Model: FD-6HC
Diameter: 1800 mm
Peak Flow Capacity: 906.00 L/s
Sediment Storage: 1.22 m³
Oil Storage: 1878.00 L

Installation Configuration:

Placement: Online
Outlet Pipe Size: 750 mm OK
Inlet Pipe 1 Size: 750 mm OK
Inlet Pipe 2 Size: mm OK
Inlet Pipe 3 Size: mm OK
Rim Level: 198.030 m **Calc Invs.**
Outlet Pipe Invert: 195.840 m **Additional cover may be required**
Invert Pipe 1: 195.860 m **Check cover**
Invert Pipe 2: m
Invert Pipe 3: m

Total Net Annual Removal Efficiency: 83.3%

Total Annual Runoff Volume Treated: 98.8%

- Rainfall data based on 37 years of rainfall data for Canada Station Owen Sound, Owen Sound, Ontario, Canada.
- Based on third party verified data and approximating the removal of a PSD similar to the STC Fine distribution
- Rainfall adjusted to 5 min peak intensity based on hourly average.

Designer Notes:

Hydro
International



1	Vortex Chamber Diameter	1800 mm
2	Inlet Pipe Diameter	750 mm
3	Oil Storage Capacity	1878.00 L
4	Min. Provided Sediment Storage Capacity	1.22 m ³
5	Outlet Pipe Diameter	750 mm
6	Height(Final Grade to Outlet Invert)	2190 mm
7	Sump Depth(Outlet Invert to Sump)	1130 mm
	Total Depth	3320 mm

[illegible]