

**SUNVALE HOMES**

# **STORMWATER MANAGEMENT REPORT**

**MOUNT FOREST SUBDIVISION**

**TOWNSHIP OF WELLINGTON NORTH**

REVISED OCTOBER 2022

COBIDE Engineering Inc  
517 10<sup>th</sup> Street  
Hanover, ON N4N 1R4  
TEL: 519-506-5959  
[www.cobideeng.com](http://www.cobideeng.com)

# TABLE OF CONTENTS

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Location .....	1
1.2	Development Proposal .....	1
1.3	Scope of Work .....	1
1.4	Background Information .....	1
<b>2.</b>	<b>DRAINAGE CHARACTERISTICS .....</b>	<b>4</b>
2.1	Regional .....	4
2.2	Local .....	4
2.3	Soils .....	4
2.4	Discharge Points .....	4
<b>3.</b>	<b>STORMWATER CONTROL .....</b>	<b>5</b>
3.1	Design Guidelines .....	5
3.2	Methodology for Computing Stormwater Runoff .....	5
<b>4.</b>	<b>EXISTING CONDITIONS .....</b>	<b>6</b>
4.1	Catchment Area 101 .....	6
4.2	Catchment Area 102 .....	6
4.3	Catchment Area 103 .....	6
4.4	Catchment Area EXT1 .....	6
4.5	Catchment Area EXT2 .....	7
4.6	Catchment Area EXT3 .....	7
4.7	Catchment Area EXT4 .....	7
4.8	Catchment Area EXT5 .....	7
4.9	Catchment Area EXT6 .....	7
<b>5.</b>	<b>PROPOSED CONDITIONS .....</b>	<b>9</b>
5.1	Catchment 201 .....	9
5.2	Catchment 202 .....	9
5.3	Catchment 203 .....	9
5.4	Catchment 204 .....	9
5.5	Catchment Area EXT1 .....	10
5.6	Catchment Area EXT2 .....	10

5.7	Catchment Area EXT3.....	10
5.8	Catchment Area EXT4.....	10
5.9	Catchment Area EXT5.....	10
5.10	Catchment Area EXT6.....	10
<b>6.</b>	<b>QUANTITY CONTROL MODELLING .....</b>	<b>11</b>
6.1	Design Requirements .....	11
6.2	Peak Flow Modelling Results.....	11
6.2.1	Discharge Point #1 .....	12
6.2.2	Discharge Point #2.....	12
6.2.3	Discharge Point #3.....	12
6.3	Total Volume Modelling Results.....	12
6.4	Watercourse Modelling Results .....	13
<b>7.</b>	<b>MAJOR STORM EVENTS .....</b>	<b>14</b>
7.1	MTO 100 Year Storm Event Overland Flow .....	14
7.2	Hurricane Hazel Flood Event .....	14
<b>8.</b>	<b>QUALITY CONTROL .....</b>	<b>15</b>
8.1	Lot Level Control Measures .....	15
8.2	Conveyance Control Measures .....	15
8.3	End-of-Pipe Control Measures .....	15
<b>9.</b>	<b>EROSION &amp; SEDIMENTATION CONTROL .....</b>	<b>17</b>
9.1	Construction Stage .....	17
9.2	Lot Development .....	17
<b>10.</b>	<b>CONCLUSIONS &amp; RECOMMENDATIONS .....</b>	<b>18</b>

### LIST OF TABLES

Table 6.1 - Peak Flow Summary .....	11
Table 6.2 – Total Volume Summary .....	12
Table 6.3 – Watercourse Modelling Summary .....	13

### LIST OF FIGURES

Figure 1 - Site Location Map .....	3
Figure 2 - Overland Flow .....	14

## APPENDICES

### A – Drawings

DP1 – Proposed Draft Plan

SWM1 – Existing Drainage Conditions

SWM2 – Proposed Drainage Conditions

GR1 – Proposed Grading Plan

### B – Pre Consultation

### C – IDF Parameters

### D – Pre-Development Model Output

### E – Post Development Model Output

### F – OGS Sizing

# 1. INTRODUCTION

Cobide Engineering Inc. was retained by Sunvale Homes to complete a preliminary stormwater management report in support of a Draft Plan Approval Application. The application will be to subdivide the property into a 141 unit subdivision.

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

## 1.1 LOCATION

The proposed subdivision development is located Part of Park Lots 10,11 &12 south of Princess Street, Plan Town of Mount Forest & Part of Park Lots I, J, K & L MacDonald's Survey & Part 2 of Division 1 of Lot 2 Concession WSOR (Arthur), Town of Mount Forest, Township of Wellington North, County of Wellington (described herein as the "site"). A Site Location Map is included as Figure 1. The subject property is approximately 9.793 hectares in area.

## 1.2 DEVELOPMENT PROPOSAL

The proposed development consists of 9.793 hectares of land within the Mount Forest settlement area.

The proposed plan is to develop the site into a residential subdivision. The subdivision will involve the creation of a number of new streets. The development will consist of the following:

- 63 Single Family Lots (Lots 1-45 & 112-129)
- 30 Semi-Detached Lots (Lots 46-61 & 98-111)
- 36 Street Townhouse Lots (Lots 62-97)
- One (1) Cluster Townhouse Block (Block 130)
- One (1) Open Space Blocks for stormwater conveyance
- One (1) Walkway Block

The road network within the subdivision will include the construction of Streets A-E. Streets C & E will connect to Cork Street.

## 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

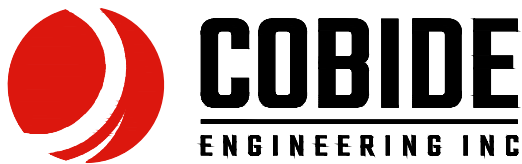
## 1.4 BACKGROUND INFORMATION

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

- Pre-consultation with the County of Wellington, Township of Wellington North and Saugeen Valley Conservation Authority (SVCA) which will be discussed later in the report. A copy of the correspondence from the pre consultation meeting has been included in Appendix B.



MAP SOURCE - MTO ROAD MAP



517 - 10th STREET, Hanover, Ontario N4N 1R4  
 Telephone: (519) 506-5959  
 www.cobideeng.com

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 Township of Wellington North, Ontario  
 STORMWATER MANAGEMENT REPORT

Figure No.

1

Title

REGIONAL LOCATION MAP

## 2. DRAINAGE CHARACTERISTICS

### 2.1 REGIONAL

The site is located north of the South Saugeen River; however no part of the subdivision abuts the river.

### 2.2 LOCAL

On the east side of the property, there is a drainage corridor that conveys runoff from the site and Cork Street and the surrounding streets to the South Saugeen River.

There is also an unnamed watercourse to the west of the site that a portion of the runoff from this site would reach to be conveyed to the South Saugeen River. This unnamed watercourse conveys runoff from a significant area upstream of the development site. Based on aerial photos and site inspections, this watercourse is partially enclosed downstream of the proposed development where it enters a ditch inlet catchbasin before it opens back into an open channel before reaching the South Saugeen River.

### 2.3 SOILS

According to the Wellington County Soils Survey (1963), the soils on the site are classified as Listowel Silt Loam (LiS). Listowel Silt Loams are a glacial till derived from soft yellowish brown limestones with imperfect drainage. These soils are typically associated with the Hydrologic Soils Group (HSG) BC.

### 2.4 DISCHARGE POINTS

For the purposes of the report, Discharge Point #1 is any runoff that discharges the South Saugeen River to the south.

Discharge Point #2 is any runoff the discharges to the neighbouring property to the west on the south portion of the property to the unnamed watercourse.

Discharge Point #3 is any runoff the discharges to the neighbouring property to the west on the north portion of the property to the unnamed watercourse.

## 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 subdivision.

The storm sewer design criteria to be used within the subdivision 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 Township of Wellington North, MECP and Saugeen Valley Conservation Authority (SVCA).
- iv. Summarize the analysis by identifying conclusions and recommendations.

## 4. EXISTING CONDITIONS

The site was previously used for agricultural purposes.

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 southeast corner of the development.
- Surface water flows by sheet flow to the drainage course on the development site and to the South Saugeen River.
- Catchment Area 101 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 2.85 ha.

### 4.2 CATCHMENT AREA 102

- This catchment area encompasses the central portion of the development site.
- Surface water flows by sheet flow to the unnamed watercourse to the west side of the site discharging from the site along the southern portion of the west side.
- Catchment Area 102 is considered to discharge at Discharge Point #2 for the purposes of this report.
- Drainage Area = 5.52 ha.

### 4.3 CATCHMENT AREA 103

- This catchment area encompasses the northwest corner of the development site.
- Surface water flows by sheet flow to the unnamed watercourse to the west side of the site discharging from the site along the northern portion of the west side.
- Catchment Area 103 is considered to discharge at Discharge Point #3 for the purposes of this report.
- Drainage Area = 1.56 ha.

### 4.4 CATCHMENT AREA EXT1

- This catchment area encompasses the Van Den Broek Subdivision and semi detached units along Cork Street to the northeast of the development site as well as the westerly portion of the Strathcona Village Phase 1 development.
- Minor flows within the existing subdivision are captured by the storm sewers and major flows from the entire subdivision will flow overland both discharging to the South Saugeen River via the existing storm sewers and the existing drainage course.
- Catchment Area EXT1 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 11.62 ha.

#### **4.5 CATCHMENT AREA EXT2**

- This catchment area encompasses the Betty Dee Property to the east of the development site.
- Minor flows within the catchment area will be captured by storm sewers and major flows from the site will flow overland both discharging to the South Saugeen River via the existing storm sewers and the existing drainage course.
- Catchment Area EXT2 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 1.52 ha.

#### **4.6 CATCHMENT AREA EXT3**

- This catchment area encompasses Phase 2 of the Strathcona Village Development.
- The modelling was based on the original Henderson Paddon and Associates report as it will provide a more conservative model as the Phase 2 flows were controlled further under the most recent development on site.
- Catchment Area EXT3 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 0.76 ha.

#### **4.7 CATCHMENT AREA EXT4**

- This catchment area encompasses Phase 1 of the Strathcona Village Development.
- The modelling was based on the original Henderson Paddon and Associates report.
- Catchment Area EXT4 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 2.08 ha.

#### **4.8 CATCHMENT AREA EXT5**

- This catchment area encompasses the lots fronting onto Martin Street.
- Minor flows within the catchment area will be captured by storm sewers and major flows from the site will flow overland both discharging to the South Saugeen River via the existing storm sewers and the existing drainage course.
- Catchment Area EXT5 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 2.10 ha.

#### **4.9 CATCHMENT AREA EXT6**

- This catchment area encompasses the driveway to the WWTP and the associated ditches as well as the closed landfill area.
- Minor and major flows within the catchment will be captured by ditches/ swales discharging to the South Saugeen River via the existing drainage course.
- Catchment Area EXT6 is considered to discharge at Discharge Point #1 for the purposes of this report.

Stormwater Management Report  
Sunvale Homes Subdivision

- Drainage Area = 3.70 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 property.
- Minor flows will be captured by the storm sewers and major flows will flow overland both discharging to the South Saugeen River. Major flows will be collected downstream of the proposed roads and conveyed via a storm sewer sized for the 100 year storm event.
- Catchment Area 201 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 7.43 ha.

### 5.2 CATCHMENT 202

- This catchment area encompasses the southeast corner of the development.
- Minor flows within the proposed townhouses will be captured by the storm sewers and major flows from the entire catchment will flow overland both discharging to the South Saugeen River via the existing drainage course.
- Catchment Area 202 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 1.73 ha.

### 5.3 CATCHMENT 203

- This catchment area encompasses the rear yards along the northern portion of the west side of the site.
- Minor flows and major flows will flow overland both discharging towards the unnamed water course to the west of the site.
- Catchment Area 203 is considered to discharge at Discharge Point #3 for the purposes of this report.
- Drainage Area = 0.15 ha.

### 5.4 CATCHMENT 204

- This catchment area encompasses the rear yards along the southern portion of the west side of the site.
- Minor flows and major flows will flow overland both discharging towards the unnamed water course to the west of the site.
- Catchment Area 204 is considered to discharge at Discharge Point #2 for the purposes of this report.
- Drainage Area = 0.54 ha.

## **5.5 CATCHMENT AREA EXT1**

- This catchment area encompasses the Van Den Broek Subdivision and semi detached units along Cork Street to the northeast of the development site as well as the westerly portion of Phase 1 of the Strathcona Village development. A portion of Lot 120 is also included in this drainage area.
- Minor flows within the existing subdivision are captured by the storm sewers and major flows from the entire subdivision will flow overland both discharging to the South Saugeen River via the existing storm sewers and the existing drainage course.
- Catchment Area EXT1 is considered to discharge at Discharge Point #1 for the purposes of this report.
- Drainage Area = 11.65 ha.

## **5.6 CATCHMENT AREA EXT2**

- This Catchment has remained unchanged from the Pre-Development Conditions.

## **5.7 CATCHMENT AREA EXT3**

- This Catchment has remained unchanged from the Pre-Development Conditions.

## **5.8 CATCHMENT AREA EXT4**

- This Catchment has remained unchanged from the Pre-Development Conditions.

## **5.9 CATCHMENT AREA EXT5**

- This Catchment has remained unchanged from the Pre-Development Conditions.

## **5.10 CATCHMENT AREA EXT6**

- This Catchment has remained unchanged from the Pre-Development Conditions.

## 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, Mount Forest IDF Parameters). Based on the pre-consultation meeting minutes, previously discussed, it was indicated that all post development flows must match pre-development levels to the neighbouring property to the west. Based on a proposed direct outlet to the South Saugeen River, post development flows do not have to meet predevelopment levels for this outlet. A copy of this correspondence has been included in Appendix B. The IDF Parameters used have been included as Appendix C.

The pre-development and post development parameters and model outputs are contained in Appendix D and E 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 where a direct outlet to a major watercourse cannot be achieved. This is the intent for the discharge to the west.

Minor flows from the majority of the development will be conveyed 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.

As noted previously, a direct outlet to the South Saugeen River will be provided for this development. To ensure the direct outlet does not cause erosion concerns along the outlet route, the storm sewer from the development to the outlet will be sized to convey the 100 year design storm event.

An inlet pond is proposed to collect the major flow and provide an inlet into the oversized storm sewer. Preliminary grading of this pond is shown on the proposed grading plan included in Appendix A.

### 6.2 PEAK FLOW MODELLING RESULTS

The following summarizes the pre-development and post development peak flows to the two (2) discharge points.

Table 6.1 - Peak Flow Summary

RETURN PERIOD	DISCHARGE POINT #1 (l/s)		DISCHARGE POINT #2 (l/s)		DISCHARGE POINT #3 (l/s)	
	PRE	POST	PRE	POST	PRE	POST
	2 Year	775	1,262	47	18	14
5 Year	1,076	1,715	83	27	24	6
25 Year	1,572	2,435	156	41	47	10
50 Year	1,777	2,731	195	47	59	12

100 Year	1,971	3,016	237	53	71	13
MTO 100 Year	2,242	3,391	305	63	91	16

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

### 6.2.1 DISCHARGE POINT #1

All storm events in the post development scenario are above pre-development levels however since a direct outlet is being provided to the South Saugeen River that is fully contained within the storm sewer there is no erosion or flooding risk between the development and the South Saugeen River. Erosion protection will be provided at the outlet to the South Saugeen River.

### 6.2.2 DISCHARGE POINT #2

All storm events in the post development scenario are less than or equal to pre-development levels.

### 6.2.3 DISCHARGE POINT #3

All storm events in the post development scenario are less than or equal to pre-development levels.

## 6.3 TOTAL VOLUME MODELLING RESULTS

The following summarizes the pre-development and post development total volume discharged for Discharge Points #2 and #3 where it is not a direct outlet to a watercourse.

Table 6.2 – Total Volume Summary

RETURN PERIOD	DISCHARGE POINT #2 (m <sup>3</sup> )		DISCHARGE POINT #3 (m <sup>3</sup> )	
	PRE	POST	PRE	POST
	2 Year	636	53	175
5 Year	968	72	265	92
25 Year	1540	102	420	134
50 Year	1790	116	490	153
100 Year	2050	129	562	172
MTO 100 Year	2460	149	673	200

As seen in the Table above, the total volume of runoff on the west side is less than pre-development levels for all storm events at both discharge locations. Based on the above modelling results and the reduction in both peak flow and volume to the western property boundary, we do not foresee any issues at Discharge Points #2 and #3.

## 6.4 WATERCOURSE MODELLING RESULTS

The following table will outline the modelling results at various locations along the existing watercourse during the MTO 100 Year Design Storm.

**Table 6.3 – Watercourse Modelling Summary**

RETURN PERIOD	PEAK FLOW (l/s)		DEPTH (m)		VELOCITY (m/s)	
	PRE	POST	PRE	POST	PRE	POST
	Cork Street Storm outlet to Upstream of the WWTP Driveway	565	1790	0.31	0.47	0.87
Downstream of the WWTP Driveway to Upstream of the Walking Trail	707	1966	0.33	0.48	2.09	2.70
Downstream of the Walking Trail	775	3391	0.15	0.37	1.55	2.58

The existing infrastructure is can adequately convey the runoff with the upgrades proposed. The channel upstream of the WWTP driveway will be able to adequately convey the runoff without additional upgrades beyond extending the storm sewer. The additional flows are mainly a result of the development of Block 130 and that runoff can discharge immediately upstream of the existing culvert to ensure as little area as possible has impacts.

The existing culvert can provide for some attenuation of flows without impacting any upstream lots. The areas downstream of the WWTP driveway can be reviewed further during detailed design to determine in additional erosion controls are required. Since the majority of the runoff from the development including the major flows will be conveyed via storm sewer directly to the river, we do not foresee an erosion issues along the proposed outlet route.

Erosion control measures will be implemented at the outlet. These will be determined during detailed design in consultation with the Township and SVCA staff.

## 7. MAJOR STORM EVENTS

### 7.1 MTO 100 YEAR STORM EVENT OVERLAND FLOW

The capacity of the road as a channel was modelled to determine the maximum depth of flow on the road. Utilizing the proposed cross section and the minimum road slope of 0.5%, the total flow from Catchment 201 can be conveyed while still being contained within the road allowance with a depth of flow above the centerline of the road of 5cm. Based on the proposed grading and road alignments, there is no section that will be required to convey the full amount of the 100 year design storm. The storm sewers will also convey approximately half of the total flow based on being designed for the 5 year storm event. Therefore in reality the depth of flow during a design major storm event is expected to be less than 5cm.

A section showing the depth of flow with the full peak flow from the MTO 100 year design storm event with a channel slope of 0.5%.

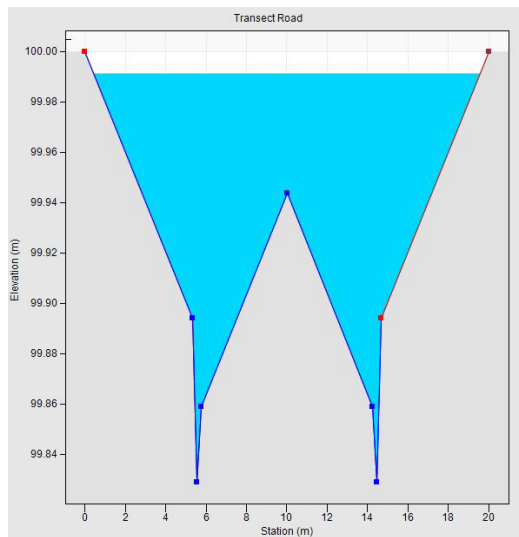


Figure 2 - Overland Flow

This is shown as Conduit C12 in the modelling.

### 7.2 HURRICANE HAZEL FLOOD EVENT

The proposed design has been modelled to determine the Hurricane Hazel Flood Event (HHFE) Floodplain Elevations.

The existing storm sewer outlet from Cork Street is proposed to be extended to the south side of the proposed street. The existing channel will be maintained from the proposed storm sewer outlet to the WWTP access road.

At the proposed outlet during the Hurricane Hazel event the water level will be 0.77 m in depth therefore the HHFE floodplain elevation at this location is 409.47 m. As seen on the proposed grading plan, this depth will not impact any of the proposed lots. At the existing culvert under the WWTP access road, the water level will be 1.96 m in depth therefore the HHFE Floodplain elevation will be 408.61 m. The lowest point in the access road is 409.37 m therefore the HHFE does not overtop the access road. The proposed lots also will not be impacted. The HHFE has been shown on the drawings to show the extend of the flooding during the HHFE.

The modelling also indicates that the proposed pond for collection of overland flow from the development can also contain the HHFE without overtopping.

## 8. QUALITY CONTROL

To meet the requirements of the SVCA and the MECP, stormwater quality control will be provided for the proposed development. The MOE 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 the South Saugeen River. For the purposes of this report, an 'Enhanced' water quality protection level will be implemented in accordance to the MOE 2003 Guidelines and SVCA 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:

### 8.1 LOT LEVEL CONTROL MEASURES

The Township'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. There are also concerns that based on the ongoing maintenance typically is not being completed that the long term viability of this option is not realistic.

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.

### 8.2 CONVEYANCE CONTROL MEASURES

The Township'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.

### 8.3 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 OGS will be placed upstream of the major storm inlet basin but 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-8HC from Hydro International as supplied by Armtec or approved equivalent.

The OGS sizing is included in Appendix E. The OGS area is slightly less than Catchment 201 as the OGS is sized based on what is being conveyed via the storm sewers within the roads and Catchment 201 includes Block 126 that will flow overland to the inlet basin.

## 9. EROSION & SEDIMENTATION CONTROL

### 9.1 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.

A detailed Erosion and Sedimentation Control plan including drawings will be completed during detailed design.

### 9.2 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.

## 10. CONCLUSIONS & RECOMMENDATIONS

The above report presented the Preliminary Stormwater Management Plan in support of the Draft Plan of Subdivision Application. Based on the findings of this report, the following conclusions are made:

1. Stormwater quantity control is not required as the runoff to the South Saugeen River is outletting at the river and therefore poses no risk to lands between the river and the development and post development runoff to the unnamed watercourse to the west is less than or equal to pre development peak flows and total volume.
2. 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. The OGS alone is capable of providing an enhanced level of quality control and therefore the Lot Level and Conveyance controls are over and above treatments.

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 County of Wellington, SVCA, and Township of Wellington North as part of the Draft Plan Approval Application.

Sincerely,

**Cobide Engineering Inc.**



---

Travis Burnside, P. Eng.



# Appendix A

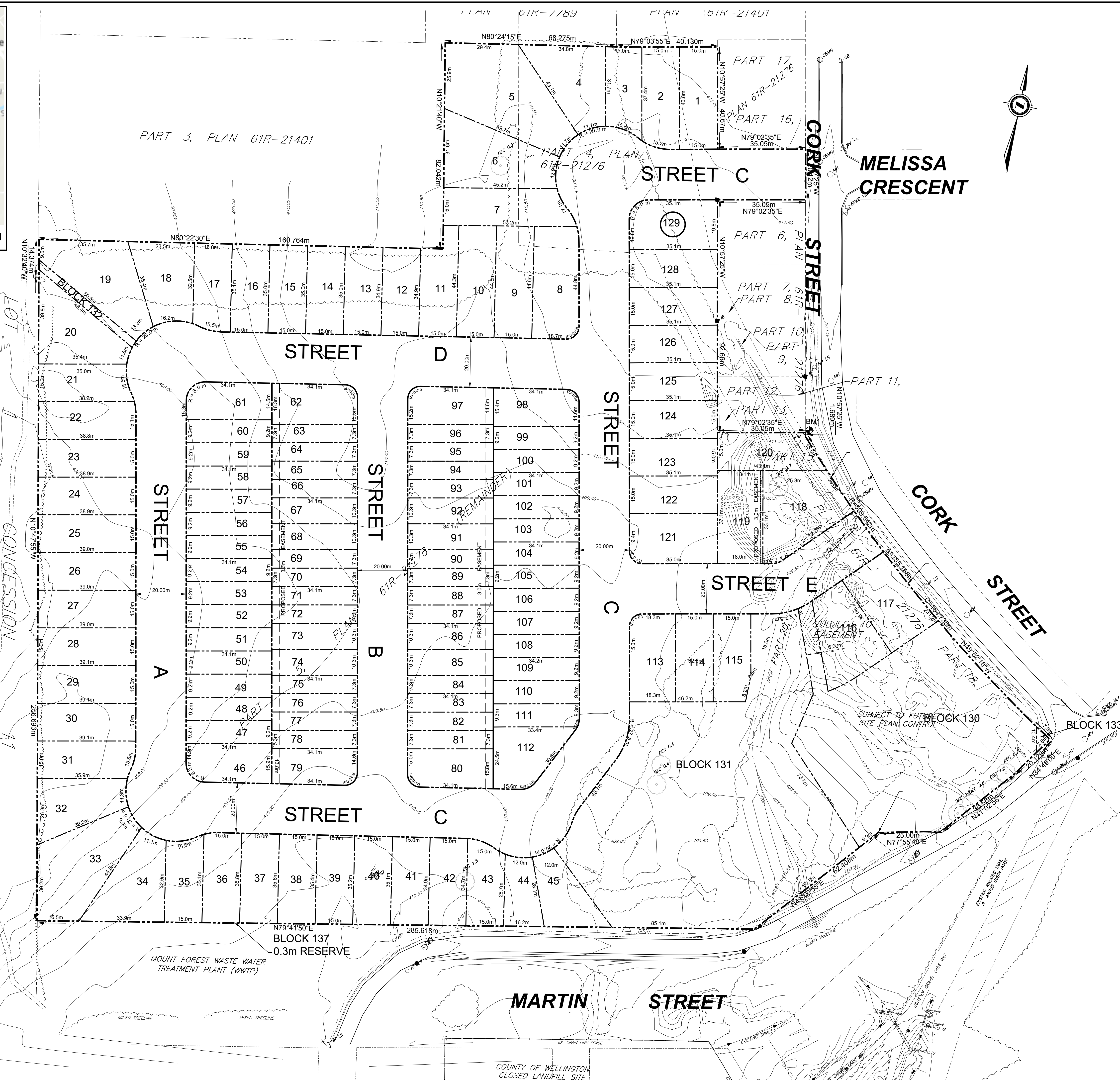
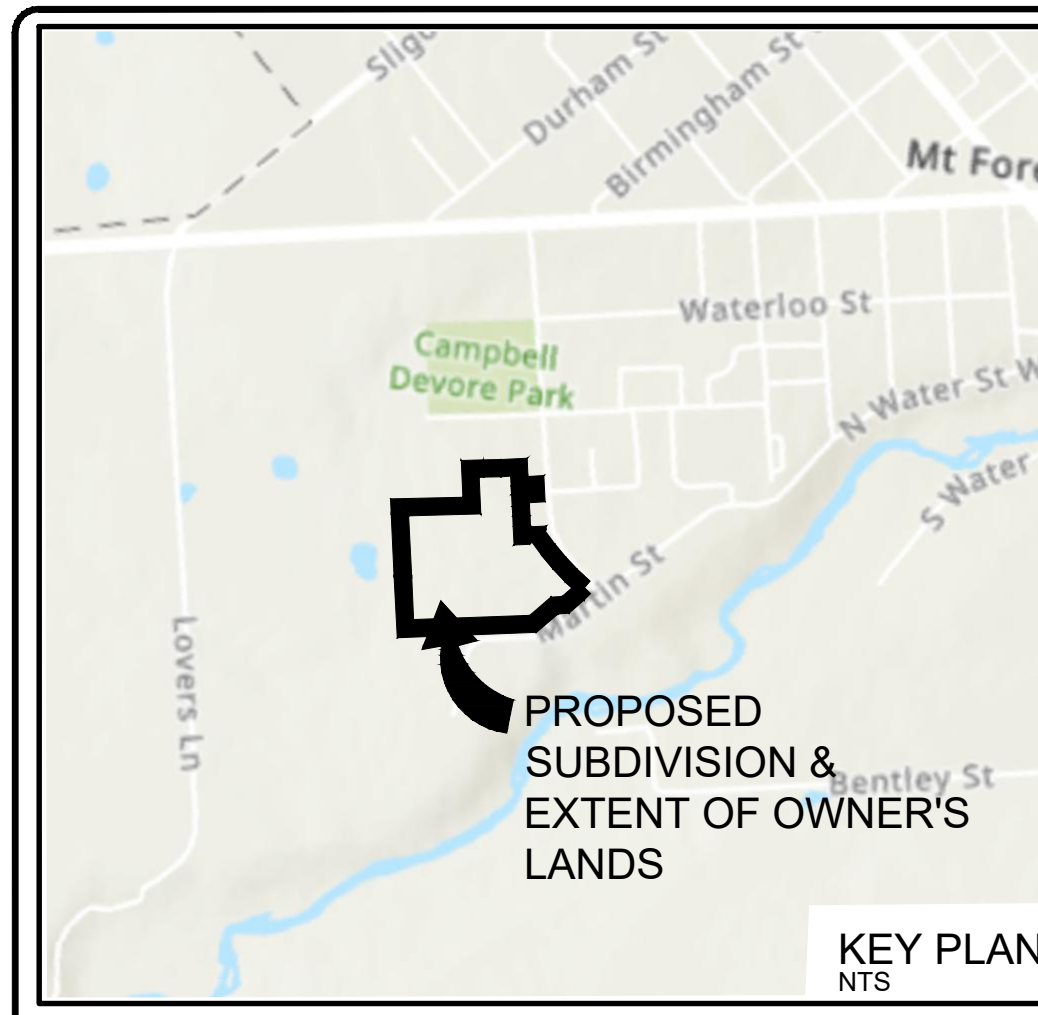
**DRAWINGS**

**STORMWATER MANAGEMENT REPORT**

**SUNVALE HOMES MOUNT FOREST SUBDIVISION**

**TOWNSHIP OF WELLINGTON NORTH**

H:\Sunvale Homes\00702 Sunvale Homes Mount Forest Subdivision\Drawings\Submissions\Draft Plans\2022-09-12 Third Submission\00702 DP Sept.12-22.dwg Oct 17, 2022 - 4:12pm



**LEGEND**

	EXISTING STREET/PROPERTY LINES
	PROPOSED STREET/PROPERTY LINES
	EDGE OF EXISTING PAVEMENT
	EDGE OF EXISTING GRAVEL
	EXISTING STORM SEWER
	EXISTING FENCE
	EXISTING TREE LINE
	EXISTING DITCH
	EXISTING MANHOLE
	EXISTING CATCH BASIN
	EXISTING HYDRO GUY WIRE
	EXISTING HYDRO POLE
	EXISTING TELEPHONE PEDESTAL
	STANDARD IRON BAR
	IRON BAR
	EXISTING DECIDUOUS TREE AND DIAMETER
	EXISTING CONIFEROUS TREE AND DIAMETER
	EXISTING CONTOUR

**DRAFT PLAN OF SUBDIVISION**  
 PART OF PARK LOTS 10, 11 & 12  
 SOUTH OF PRINCESS STREET  
 PLAN TOWN OF MOUNT FOREST &  
 PART OF PARK LOTS 'I', 'K' & 'L'  
 MACDONALD'S SURVEY &  
 PART OF DIVISION 1 OF  
 LOT 2 CON WOSR (ARTHUR)  
 (TOWN OF MOUNT FOREST)  
 TOWNSHIP OF WELLINGTON NORTH  
 COUNTY OF WELLINGTON

**RELEVANT SITE INFORMATION**

DETACHED RESIDENTIAL LOTS (LOTS 1 TO 45 INCL AND 112-129 INCL.)	3,893 ha.
SEMI-DETACHED RESIDENTIAL LOTS (LOTS 46 TO 61 INCL. & 98 TO 111 INCL.)	1,028 ha.
MULTI-FAMILY RESIDENTIAL LOTS (LOTS 62 TO 97)	1,116 ha.
MULTI-FAMILY RESIDENTIAL LOTS (BLOCK 130)	0,542 ha.
MUNICIPAL STREET (STREETS A TO E)	2,323 ha.
OPEN SPACE (BLOCK 131)	0,867 ha.
WALKWAY (BLOCK 132)	0,010 ha.
RESERVES/ DAYLIGHTING (BLOCKS 133-137)	0,014 ha.
<b>TOTAL PROPOSED SUBDIVISION</b>	<b>9,793 ha.</b>

**ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 OF THE PLANNING ACT**

a. AS SHOWN	g. AS SHOWN
b. AS SHOWN	h. MUNICIPAL WATER SUPPLY
c. AS SHOWN	i. SANDY/SANDY SILT & GRAVEL
d. SINGLE FAMILY RESIDENTIAL	j. AS SHOWN
e. SEMI-DETACHED RESIDENTIAL	k. WATER, STORM SEWERS, SANITARY SEWERS, HYDRO, TELEPHONE
f. AS SHOWN	l. AS SHOWN

**SURVEYOR'S CERTIFICATE**

I CERTIFY THAT:  
 THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED  
 AND THEIR RELATIONSHIP TO THE ADJACENT LANDS  
 ARE CORRECTLY SHOWN.  
 OCTOBER 9, 2020  
 DATE

LUKE WILCOX  
 ONTARIO LAND SURVEYOR  
 VAN HARTEN SURVEYING INC.  
 680 RIDDELL ROAD, UNIT 1  
 ORANGEVILLE, ON L9W5G5

**OWNER'S CERTIFICATE**

I, THE REGISTERED OWNER OF THESE LANDS, HEREBY  
 AUTHORIZE COBIDE ENGINEERING INC. TO SUBMIT  
 THIS DRAFT PLAN FOR APPROVAL.

OCTOBER 14, 2022  
 DATE

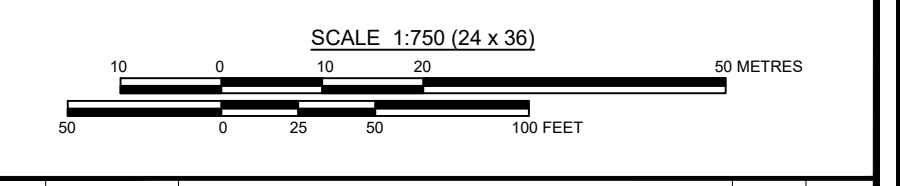
OWNER  
 JOHN WELTON  
 I HAVE THE AUTHORIZATION TO BIND THE CORPORATION  
 JOHN WELTON CUSTOM HOMEBUILDING LTD.  
 685 RIDDELL ROAD, UNIT 6  
 ORANGEVILLE, ON  
 L9W 5J7

**Notes**

1. TOPOGRAPHICAL INFORMATION DERIVED FROM TOPOGRAPHICAL SURVEY BY TRITON ENGINEERING LTD. AND FIELD SURVEY BY COBIDE ENGINEERING INC. 2016.
2. PROPERTY BOUNDARY DERIVED FROM NOTES AND RECORDS OF VAN HARTEN SURVEYING INC. PROJECT # 28708-20

**Benchmark Information**

BM1 TOP OF SIB LOCATED ON THE WEST SIDE OF CORK STREET AT THE SOUTHEAST CORNER OF PART 12 PLAN 61R-21276.  
 ELEVATION 410.86m



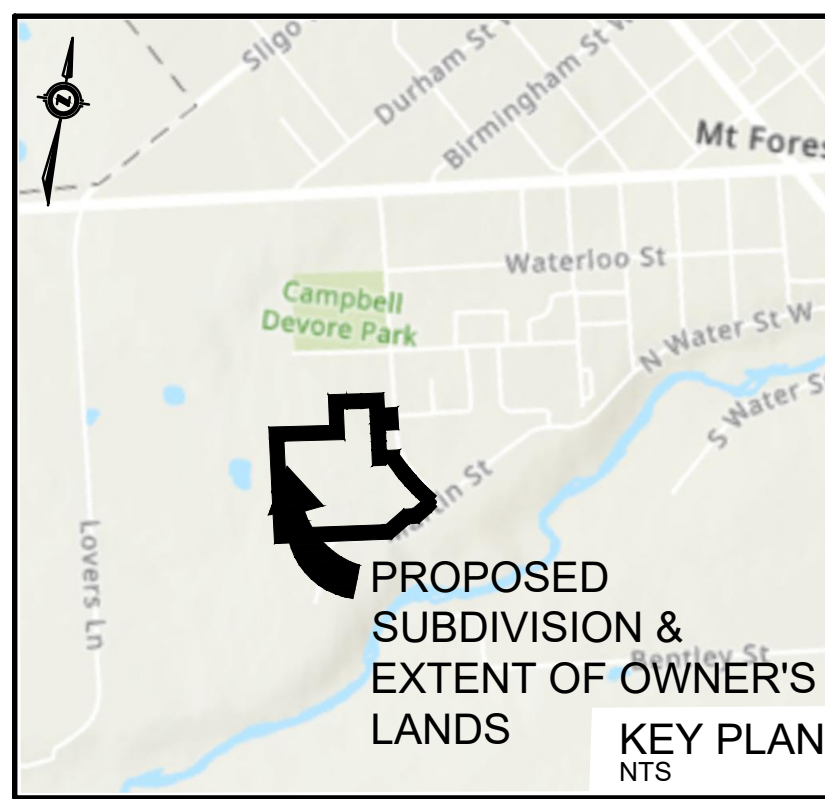
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1	DEC 17/21	SECOND SUBMISSION	TLB	TLB
0	OCT 9/20	FIRST SUBMISSION	TLB	TLB
No.	DATE	DESCRIPTION	BY	APPD
REVISION / ISSUE				

517 10th STREET, Hanover, Ontario N4N 1R4  
 Telephone: (519) 506-5959  
 www.cobideeng.com

Client: JOHN WELTON CUSTOM HOMEBUILDING LTD.

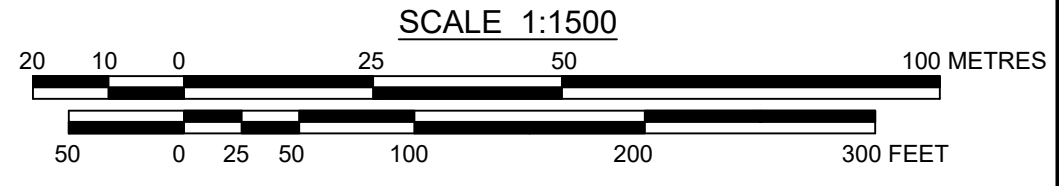
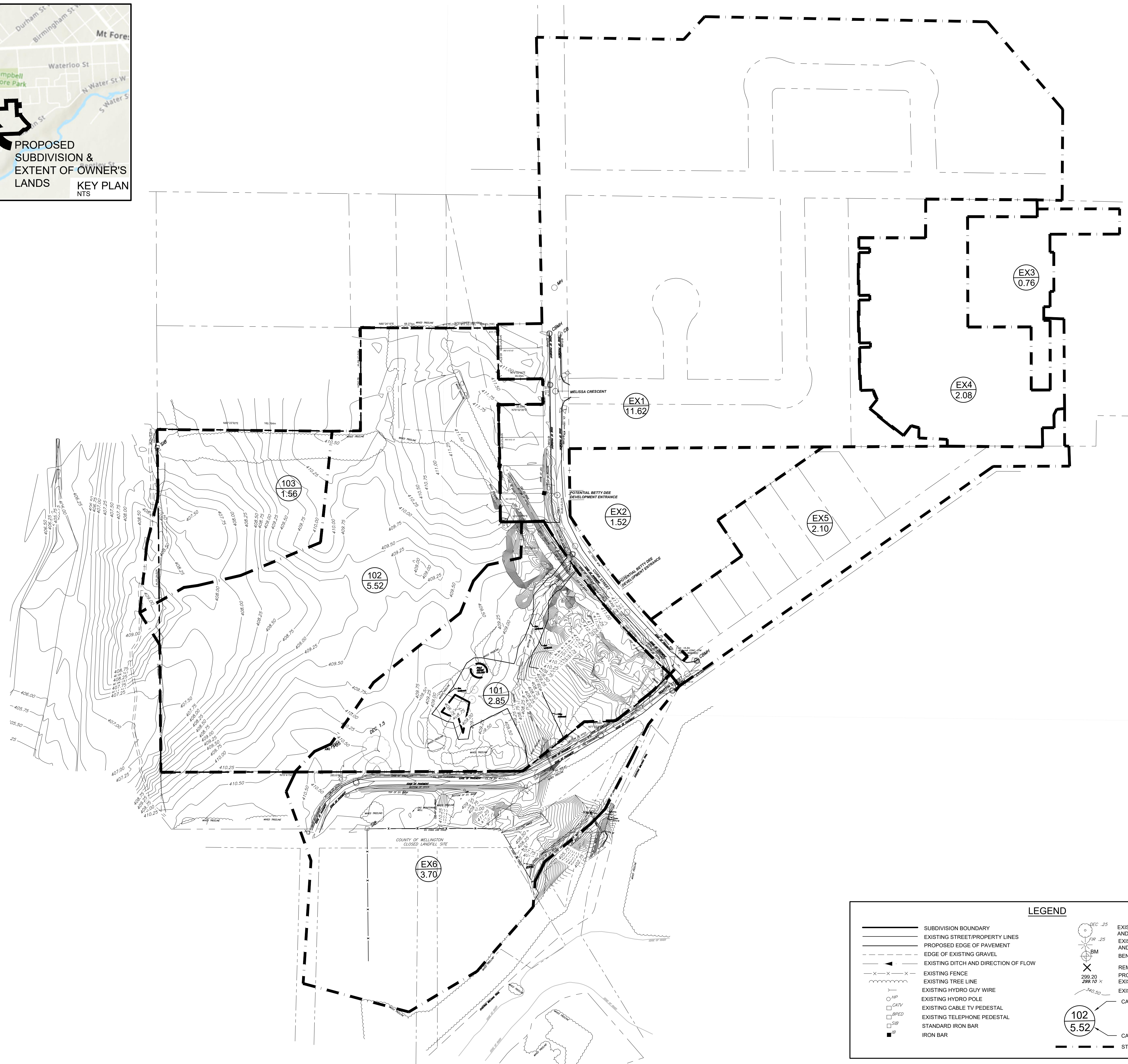
Design:	TLB	Scale:	1:750
Drawn:	JAF	Approved:	
Checked:	SJC		
Date:	AUG 2020		
Design Engineer:			

DRAWING No. 00702-DP1



CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMANS, 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.

**Notes**  
1. TOPOGRAPHIC INFORMATION DERIVED FROM FIELD SURVEY BY TRITON ENGINEERING COMPLETED IN 2018.  
2. LOT FABRIC OF DERIVED FROM PLAN 61R-21276 PREPARED BY WILSON FORD SURVEYING ON FEBRUARY 14, 2018.



**Benchmark Information**  
BM1 TOP OF SIB LOCATED ON THE WEST SIDE OF CORK STREET AT THE SOUTHEAST CORNER OF PART 12 PLAN 61R-21276. ELEVATION 410.86m

No.	DATE	DESCRIPTION	BY	APPD
2	OCT 14/22	REVISED DRAFT PLAN APPROVAL SUBMISSION	TLB	TLB
1	DEC 17/21	REVISED DRAFT PLAN APPROVAL SUBMISSION	TLB	TLB
0	SEPT 16/20	DRAFT PLAN APPROVAL SUBMISSION	TLB	TLB

REVISION / ISSUE

Seal not valid unless signed and dated

**COBIDE ENGINEERING INC**  
517 10th STREET Hanover, Ontario N4N 1R4  
Telephone: (519) 506-5959  
www.cobideeng.com

**SUNVALE HOMES**  
PROPOSED MOUNT FOREST SUBDIVISION  
Township of Wellington North  
PRE DEVELOPMENT CATCHMENT AREAS

Client: **SUNVALE HOMES**

Design: TLB  
Drawn: TLB  
Checked: TLB  
Date: JAN 2019

Scale: 1:1500  
Approved: [Signature]  
Design Engineer

DRAWING No. 00702-SWM1

**LEGEND**

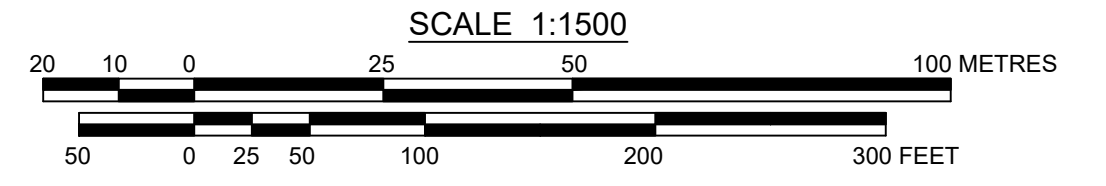
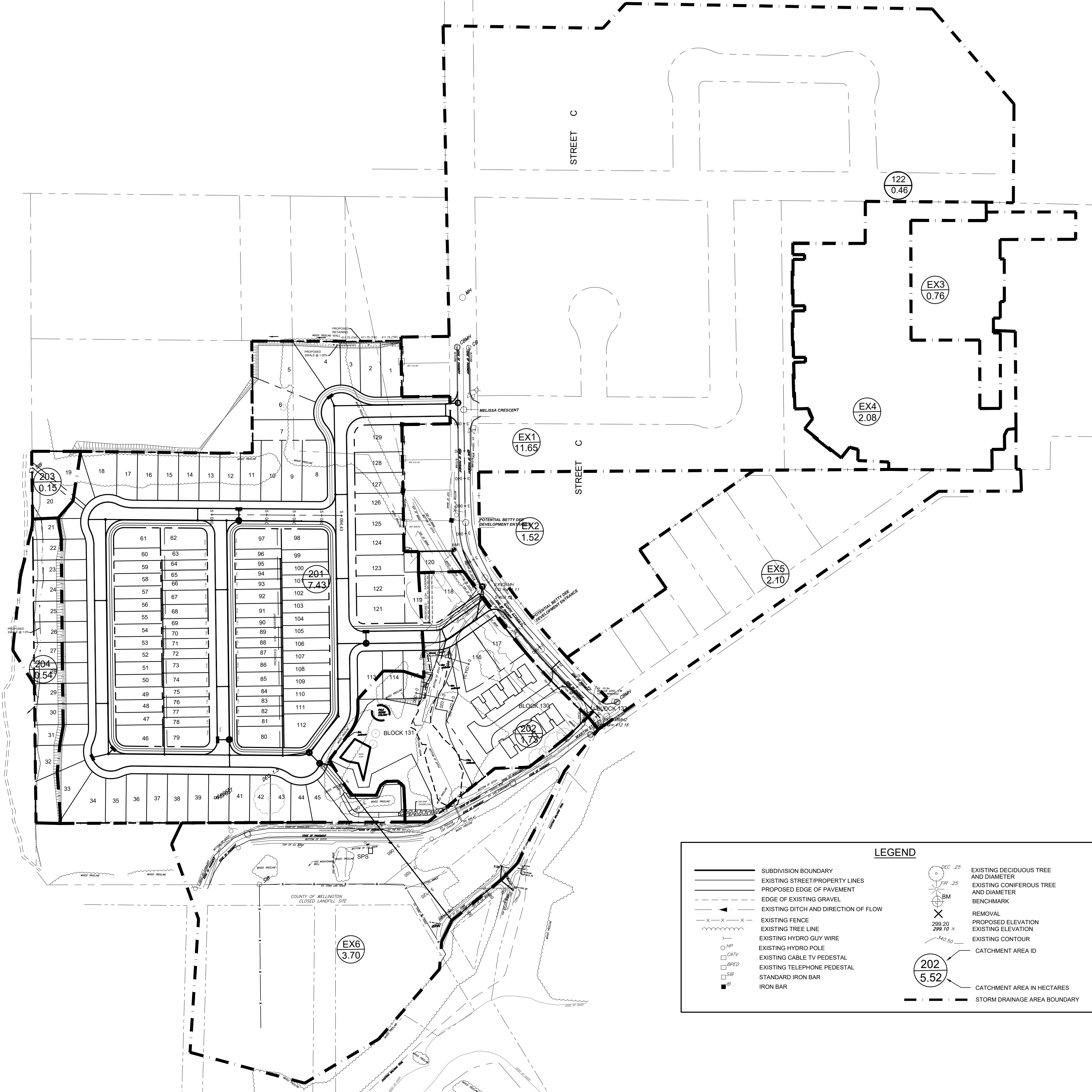
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—	EXISTING STREET/PROPERTY LINES	○	EXISTING CONIFEROUS TREE AND DIAMETER
—	PROPOSED EDGE OF PAVEMENT	⊕	BENCHMARK
—	EDGE OF EXISTING GRAVEL	⊗	REMOVAL PROPOSED ELEVATION
—	EXISTING DITCH AND DIRECTION OF FLOW	⊗	EXISTING ELEVATION
—	EXISTING FENCE	—	EXISTING CONTOUR
—	EXISTING TREE LINE	—	CATCHMENT AREA ID
—	EXISTING HYDRO GUY WIRE	—	CATCHMENT AREA IN HECTARES
—	EXISTING HYDRO POLE	—	STORM DRAINAGE AREA BOUNDARY
—	EXISTING CABLE TV PEDESTAL		
—	EXISTING TELEPHONE PEDESTAL		
—	STANDARD IRON BAR		
—	IRON BAR		

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CAUTION:  
THE POSITION OF POLE LINES, CONDUITS, WATERMANS, 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.

- Notes**
1. TOPOGRAPHIC INFORMATION DERIVED FROM FIELD SURVEY BY TRITON ENGINEERING COMPLETED IN 2018.
  2. LOT FABRIC OF DERIVED FROM PLAN 61R-21276 PREPARED BY WILSON FORD SURVEYING ON FEBRUARY 14, 2018.



**Benchmark Information**

BM1 TOP OF SIB LOCATED ON THE WEST SIDE OF CORK STREET AT THE SOUTHEAST CORNER OF PART 12 PLAN 61R-21276. ELEVATION 410.86m

No.	DATE	DESCRIPTION	BY	APPD
2	OCT 14/22	REVISED DRAFT PLAN APPROVAL SUBMISSION	TLB	TLB
1	NOV 18/21	REVISED DRAFT PLAN APPROVAL SUBMISSION	TLB	TLB
0	SEPT 16/20	DRAFT PLAN APPROVAL SUBMISSION	TLB	TLB

REVISION / ISSUE

Seal not valid unless signed and dated

**COBIDE ENGINEERING INC**

517 10th STREET Hanover, Ontario N4N 1R4  
Telephone: (519) 506-5959  
www.cobideeng.com

**SUNVALE HOMES**

PROPOSED MOUNT FOREST SUBDIVISION  
Township of Wellington North  
POST DEVELOPMENT CATCHMENT AREAS

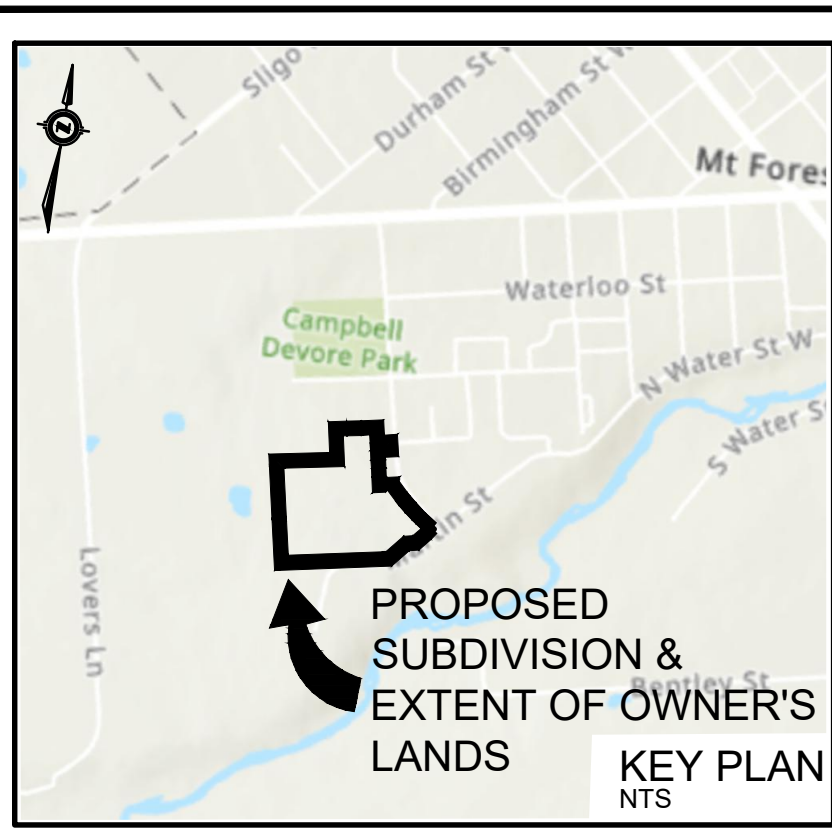
Client: **SUNVALE HOMES**

Design: TLB Scale: 1:1500  
Drawn: TLB Approved:  
Checked: TLB  
Date: JAN 2019 Design Engineer  
DRAWING No. 00702-SWM2

**LEGEND**

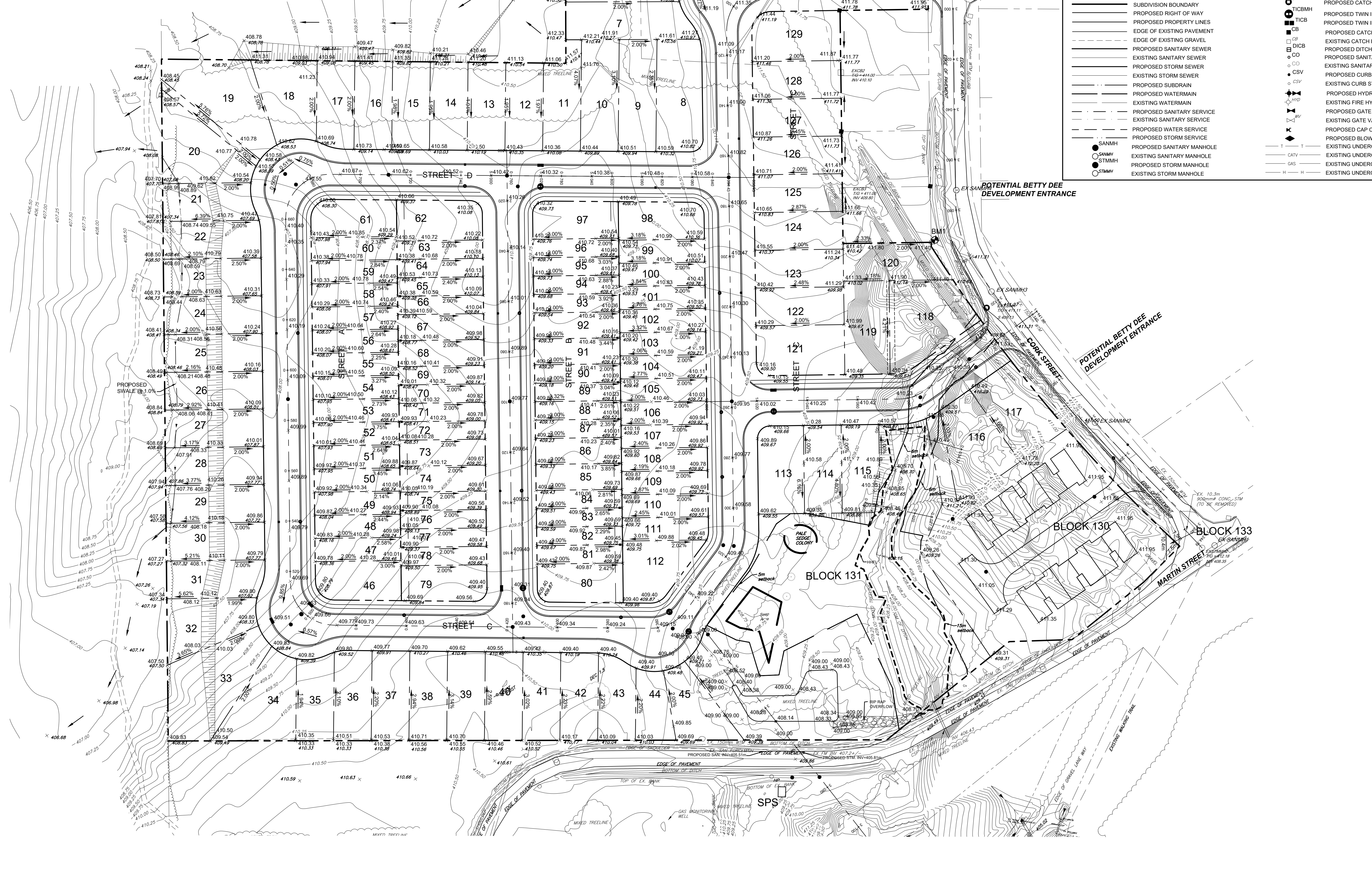
—	SUBDIVISION BOUNDARY	○	EXISTING DECIDUOUS TREE AND DIAMETER
—	EXISTING STREET/PROPERTY LINES	○	EXISTING CONIFEROUS TREE AND DIAMETER
—	PROPOSED EDGE OF PAVEMENT	⊕	BENCHMARK
—	EDGE OF EXISTING GRAVEL	⊗	REMOVAL PROPOSED ELEVATION
—	EXISTING DITCH AND DIRECTION OF FLOW	⊗	EXISTING ELEVATION
—	EXISTING FENCE	⊗	EXISTING CONTOUR
—	EXISTING TREE LINE	⊗	CATCHMENT AREA ID
—	EXISTING HYDRO GUY WIRE	⊗	CATCHMENT AREA IN HECTARES
—	EXISTING HYDRO POLE	⊗	STORM DRAINAGE AREA BOUNDARY
—	EXISTING CABLE TV PEDESTAL	⊗	
—	EXISTING TELEPHONE PEDESTAL	⊗	
—	STANDARD IRON BAR	⊗	
—	IRON BAR	⊗	

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CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMANS, 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.

Notes  
 1. TOPOGRAPHIC INFORMATION DERIVED FROM FIELD SURVEY BY TRITON ENGINEERING COMPLETED IN 2018.  
 2. LOT FABRIC OF DERIVED FROM PLAN 61R-21276 PREPARED BY WILSON FORD SURVEYING ON FEBRUARY 14, 2018.



# Appendix B

**PRE-CONSULTATION**

**STORMWATER MANAGEMENT REPORT**

**SUNVALE HOMES MOUNT FOREST SUBDIVISION**

**TOWNSHIP OF WELLINGTON NORTH**



### 3.0 ZONING BY-LAW

The property is currently zoned 'Future Development' therefore, a Zoning By-Law Amendment will be required to allow for residential development of the property. It was discussed that the Zoning By-Law amendment and Draft Plan be submitted at the same time and therefore only one public meeting will be required.

*Action:  
Davidson*

A Planning Justification report will be required as part of the Zoning By-Law Amendment.

The development is 9.79 ha in total area however 0.55 ha has been outlined in the EIS as undevelopable lands. This leaves 9.24 ha available for development.

The plan currently shows 15 units/ha. The County will be looking for a density of 16 units/ha in the final plan however a lower density may be accepted if it can be demonstrated why achieving the requested density is not feasible.

*Action:  
Davidson*

Subsequent to the meeting, the Townships current setbacks were discussed. The Zoning By-Law Amendment Application will likely include a request for site specific zoning to allow for reduced setbacks.

### 4.0 ENVIRONMENTAL IMPACT STUDY (EIS)

An EIS for the property was completed by the previous owner. An amendment to the EIS will be required to review the storm outlet which is discussed in further detail in later sections.

*Action:  
Cobide*

The SVCA would welcome the opportunity to review the EIS and provide initial comments ahead of the Draft Plan Application being submitted.

### 5.0 FUNCTIONAL SERVICING REPORT

A FSR will be required to address the sanitary sewer, storm sewer, watermain capacity and pressure, as well as servicing from various utilities (Wellington North Power, Wightman, Eastlink, Union Gas).

*Action:  
Cobide*

The FSR will need to review the viability of using the Cork Street Sanitary Pumping Station including the lowering of sanitary sewers along Cork Street. If this is not feasible, the option of a new sanitary pumping station can be addressed.

### 6.0 STORMWATER MANAGEMENT

A stormwater management report will be required to address the impacts of the development. Runoff will be required to be treated to an enhanced level of treatment.

*Action:  
Cobide*

It is currently proposed to provide a direct outlet from the development to South Saugeen River. The storm sewer would outlet close the existing Martin Street storm sewer outlet. This storm sewer may need to be sized to accommodate the 100 year storm event to reduce erosion concerns on Martin Street and the proposed walking trail.

As per previous correspondence with the SVCA, the proposed outlet must be located above the Hurricane Hazel Flood Elevation.

Any runoff that is directed to the westerly property line must meet pre development peak flow rates as well as pre development peak volumes as this area is not owned by the Township.

#### **7.0 ARCHAEOLOGICAL ASSESSMENT**

An archaeological assessment is required to be completed.

*Action:  
Cobide*

#### **8.0 TRAFFIC IMPACT STUDY**

A traffic impact study is required for this development

*Action:  
Cobide*

#### **9.0 GEOTECHNICAL INVESTIGATION**

A geotechnical investigation will be required as part of the development. The geotechnical report shall include review of the storm sewer outlet.

*Action:  
Cobide*

The geotechnical report is not required as part of the Draft Plan Application.

It will be completed after the proposed sanitary servicing and preliminary grading has been worked out.

#### **10.0 SITE SERVICING**

The site will be serviced with a storm sewer system that will outlet directly to the South Saugeen River.

The catchment area may be too large for an OGS to service. A settling basin may be proposed to provide quality control to an enhanced level.

The existing sanitary sewer on Cork Street is not deep enough to service the proposed development. Therefore, the sewer either has to be lowered and a sanitary pumping station installed. The Township preference is for all lots to have a gravity connection that outlet to either a new pumping station or the existing Cork Street station.

If a new Sanitary Pumping Station is proposed, further discussions will need to be had regarding the forcemain connection to the existing system. The new forcemain could either connect to existing sanitary sewer on Cork Street or directly to the WWTP.

The watermain will connect to the existing system at both connections to Cork Street. BM Ross confirmed there are no capacity issues in this part of Mount Forest.

The Town will require the internal road to be built to an urban cross section with 8.5m of asphalt, curb and gutter and 1.5m sidewalk on one side of the road.

The plan will need to be revised to have 13.25m edge of pavement radii on bends not at intersections.

A sidewalk may be required to be installed on Cork Street as part of this project. The Township has already collected money from other developments to pay for this work.

As part of the development, Cork Street may need to be reconstructed to an urban standard. This includes a 900mm diameter storm sewer from the current crossing to Martin Street. If required, the development would be able to use this storm sewer for a portion of its runoff such as from the cluster Townhouse development.

As per The Townships servicing standards, all water services shall be copper.

As per The Townships servicing standards, all storm sewers 450mm diameter and larger shall be concrete.

#### **11.0 PARKLAND**

The Parkland requirements were not discussed at the meeting however should be confirmed prior to submission of the application. The current proposal does not include any parkland. If the Township wishes for Parkland to be included we would request that we be notified as soon as possible.

#### **12.0 OTHER BUSINESS**

The Draft Plan Approval Application will trigger a review by Wellington County of the previously completed Methane Gas Monitoring Report regarding the decommissioned landfill located between the development and the WWTP.

The meeting adjourned at 3:00 pm.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

#### **COBIDE ENGINEERING INC.**



Travis Burnside  
Director

# Appendix C

**IDF PARAMETERS**

**STORMWATER MANAGEMENT REPORT**

**SUNVALE HOMES MOUNT FOREST SUBDIVISION**

**TOWNSHIP OF WELLINGTON NORTH**

Environment and Climate Change Canada  
 Environnement et Changement climatique Canada

Short Duration Rainfall Intensity-Duration-Frequency Data  
 Données sur l'intensité, la durée et la fréquence des chutes  
 de pluie de courte durée

Gumbel - Method of moments/Méthode des moments

2019/02/27

```
=====
MOUNT FOREST (AUT)                                ON          6145504
Latitude:  43 59'N   Longitude: 80 45'W   Elevation/Altitude: 414      m
Years/Années : 1962 - 2016           # Years/Années :    38
=====
```

\*\*\*\*\*

Table 1 : Annual Maximum (mm)/Maximum annuel (mm)

\*\*\*\*\*

Year Année	5 min	10 min	15 min	30 min	1 h	2 h	6 h	12 h	24 h
1962	10.4	14.7	18.0	18.0	19.6	23.9	33.0	38.9	45.0
1963	14.0	15.2	21.1	31.7	43.7	49.3	51.3	54.9	61.0
1964	10.4	12.2	14.7	25.7	28.4	29.5	35.3	37.6	61.2
1965	10.2	14.5	17.0	22.6	31.5	32.3	33.0	33.5	33.5
1966	9.9	15.2	19.3	21.1	24.6	27.2	28.2	38.1	56.1
1967	11.2	12.7	13.7	17.3	22.9	24.6	36.3	49.8	50.0
1968	8.4	13.5	17.8	28.7	43.4	52.1	74.4	74.7	83.8
1969	6.1	10.4	12.4	18.0	20.1	20.1	35.1	37.6	39.6
1970	8.6	13.2	13.5	15.7	19.0	20.1	36.8	53.6	56.9
1971	12.7	15.0	15.7	16.0	17.8	20.3	26.2	27.2	34.0
1972	6.9	10.2	13.0	18.0	22.4	33.3	45.2	47.5	50.3
1973	5.6	9.4	11.2	13.2	15.2	18.0	23.1	24.4	32.5
1974	5.3	7.1	9.7	19.0	35.6	40.6	42.7	42.7	42.7
1975	6.3	8.4	9.7	18.0	21.1	28.4	36.1	47.5	51.1
1976	9.1	13.5	16.5	19.0	27.7	33.8	35.8	35.8	43.4
1977	11.7	17.0	18.8	20.1	27.7	41.1	69.1	81.3	81.3
1978	14.8	15.4	18.0	21.2	21.6	25.6	40.3	43.7	52.5
1979	10.5	11.1	11.1	14.4	16.6	32.4	40.5	53.4	64.5
1980	8.9	16.3	19.3	25.4	34.3	43.5	48.3	49.4	49.4
1981	7.7	8.8	10.8	12.7	13.4	17.2	31.0	35.8	41.4
1982	6.9	10.9	13.9	18.6	24.6	29.6	30.4	30.6	32.6

1983	7.9	13.7	15.8	31.4	37.2	38.2	38.2	42.0	43.3
1984	6.8	9.2	11.2	14.6	14.6	20.2	25.2	32.8	33.0
1985	8.8	16.4	22.0	38.6	49.2	53.9	56.2	56.2	64.4
1986	8.2	12.7	15.7	22.7	27.2	39.8	46.8	64.4	93.3
2003	9.2	15.8	18.0	23.6	29.2	34.6	37.0	37.0	40.2
2004	8.4	13.0	16.0	20.0	22.4	25.0	39.0	39.4	39.4
2005	5.6	9.2	12.0	20.0	26.8	32.2	32.2	32.4	40.0
2006	8.6	15.2	20.0	21.0	23.2	34.0	48.8	55.2	55.4
2007	11.4	19.0	22.6	30.0	33.8	35.8	35.8	43.4	55.4
2008	9.8	12.8	14.0	19.0	23.2	33.4	47.0	53.0	78.4
2009	12.4	17.6	18.8	24.6	25.2	28.0	38.6	44.4	56.6
2010	8.0	11.6	12.2	17.6	22.8	31.4	59.2	64.8	65.4
2012	6.8	7.8	8.2	12.4	17.0	20.8	34.8	45.4	53.8
2013	8.2	11.2	15.0	26.0	28.4	42.4	65.2	67.2	67.8
2014	9.8	15.4	18.0	25.4	28.0	29.2	33.2	40.2	40.6
2015	8.2	10.2	10.8	12.6	17.6	20.0	29.0	30.6	31.4
2016	9.0	12.0	15.8	24.4	44.4	51.2	52.2	53.8	54.2
-----									
# Yrs. Années	38	38	38	38	38	38	38	38	38
Mean Moyenne	9.0	12.8	15.3	21.0	26.4	31.9	40.8	45.8	52.0
Std. Dev. Écart-type	2.3	2.9	3.7	5.9	8.8	9.9	12.0	12.9	15.3
Skew. Dissymétrie	0.58	-0.05	0.05	0.85	0.91	0.56	1.12	0.81	0.83
Kurtosis	3.38	2.46	2.39	4.02	3.57	2.89	4.15	3.69	3.59

\*-99.9 Indicates Missing Data/Données manquantes

\*\*\*\*\*

Table 2a : Return Period Rainfall Amounts (mm)  
Quantité de pluie (mm) par période de retour

\*\*\*\*\*

Duration/Durée	2	5	10	25	50	100	#Years Années
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	
5 min	8.6	10.6	12.0	13.6	14.9	16.1	38
10 min	12.3	14.9	16.7	18.8	20.4	22.0	38
15 min	14.7	17.9	20.1	22.8	24.8	26.8	38
30 min	20.0	25.3	28.7	33.1	36.3	39.5	38
1 h	24.9	32.7	37.8	44.3	49.1	53.9	38
2 h	30.3	39.0	44.8	52.1	57.5	62.9	38
6 h	38.8	49.4	56.4	65.3	71.9	78.4	38
12 h	43.7	55.1	62.7	72.3	79.4	86.4	38
24 h	49.5	63.0	71.9	83.2	91.5	99.9	38

\*\*\*\*\*

Table 2b :

Return Period Rainfall Rates (mm/h) - 95% Confidence limits  
 Intensité de la pluie (mm/h) par période de retour - Limites de confiance de 95%

\*\*\*\*\*

Duration/Durée	2	5	10	25	50	100	#Years
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	103.8	127.8	143.6	163.7	178.6	193.4	38
	+/- 7.9	+/- 13.3	+/- 18.0	+/- 24.3	+/- 29.1	+/- 33.9	38
10 min	74.1	89.6	99.9	113.0	122.6	132.2	38
	+/- 5.1	+/- 8.7	+/- 11.7	+/- 15.8	+/- 18.9	+/- 22.0	38
15 min	58.8	71.8	80.4	91.3	99.3	107.3	38
	+/- 4.3	+/- 7.2	+/- 9.8	+/- 13.2	+/- 15.8	+/- 18.4	38
30 min	40.1	50.5	57.4	66.1	72.6	79.0	38
	+/- 3.4	+/- 5.8	+/- 7.8	+/- 10.6	+/- 12.6	+/- 14.7	38
1 h	24.9	32.7	37.8	44.3	49.1	53.9	38
	+/- 2.6	+/- 4.3	+/- 5.8	+/- 7.9	+/- 9.4	+/- 10.9	38
2 h	15.1	19.5	22.4	26.0	28.8	31.4	38
	+/- 1.4	+/- 2.4	+/- 3.3	+/- 4.4	+/- 5.3	+/- 6.2	38
6 h	6.5	8.2	9.4	10.9	12.0	13.1	38
	+/- 0.6	+/- 1.0	+/- 1.3	+/- 1.8	+/- 2.1	+/- 2.5	38
12 h	3.6	4.6	5.2	6.0	6.6	7.2	38
	+/- 0.3	+/- 0.5	+/- 0.7	+/- 1.0	+/- 1.2	+/- 1.3	38
24 h	2.1	2.6	3.0	3.5	3.8	4.2	38
	+/- 0.2	+/- 0.3	+/- 0.4	+/- 0.6	+/- 0.7	+/- 0.8	38

\*\*\*\*\*

Table 3 : Interpolation Equation / Équation d'interpolation:  $R = A \cdot T^B$

R = Interpolated Rainfall rate (mm/h)/Intensité interpolée de la pluie (mm/h)

RR = Rainfall rate (mm/h) / Intensité de la pluie (mm/h)

T = Rainfall duration (h) / Durée de la pluie (h)

\*\*\*\*\*

Statistics/Statistiques	2	5	10	25	50	100
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans
Mean of RR/Moyenne de RR	36.5	45.3	51.0	58.3	63.7	69.1
Std. Dev. /Écart-type (RR)	35.7	43.5	48.7	55.3	60.2	65.0
Std. Error/Erreur-type	8.4	10.6	12.1	14.1	15.5	17.0
Coefficient (A)	21.9	27.5	31.2	35.9	39.4	42.9
Exponent/Exposant (B)	-0.701	-0.693	-0.689	-0.686	-0.683	-0.682
Mean % Error/% erreur moyenne	9.3	10.4	11.1	11.8	12.2	12.5

# Appendix D

**PRE DEVELOPMENT MODEL PARAMETERS AND OUTPUT**

**STORMWATER MANAGEMENT REPORT**

**SUNVALE HOMES MOUNT FOREST SUBDIVISION**

**TOWNSHIP OF WELLINGTON NORTH**

**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 (%)	Manning's 'n' (Perv.)	CN (Perv.)
South Saugeen	101	Southeast Portion of Property	2.85	320	89	3.0	0.0	0.28	72.3
Unnamed Watercourse	102	Middle of the Development	5.52	320	173	3.0	0.0	0.17	76.4
Unnamed Watercourse	103	Northwest corner of development	1.56	132	118	3.0	0.0	0.20	75.0
South Saugeen	Ex 1	Van Den Broek Subdivision	11.61	3060	38	2.0	47.7	0.25	77.0
South Saugeen	Ex 2	Betty Dee Property	1.52	150	101	2.0	0.0	0.30	72.0
South Saugeen	EX3	Strathcona Village - Phase 2	0.76	100	76	2.0	95.1	0.25	77.0
South Saugeen	EX4	Strathcona Village - Phase 1	2.08	455	46	2.0	26.3	0.25	77.0
South Saugeen	EX5	Martin Street Lots	2.10	360	58	2.0	22.7	0.22	78.5
South Saugeen	EX6	WWTP Driveway, Closed Landfill Site and Trail Area	3.70	750	49	15.0	8.9	0.33	70.4

Table A.2 Site Soils: (as per Ontario Soil Survey Report No. 35 for Wellington County)

Soil Type  
Listowel Silt Loam

Hydrologic Soil Group  
BC

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 Existing

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							
	A	AB	B	BC	C	CD	D	TOTAL
101	0	0	0	100	0	0	0	100
102	0	0	0	100	0	0	0	100
103	0	0	0	100	0	0	0	100
EX1	0	0	0	100	0	0	0	100
EX2	0	0	0	100	0	0	0	100
EX3	0	0	0	100	0	0	0	100
EX4	0	0	0	100	0	0	0	100
EX5	0	0	0	100	0	0	0	100
EX6	0	0	0	100	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	20	59	0	0.0	21.0	0	0.0	0.0	100
102	0	12	5	0	0	83	0	0.0	0.0	100
103	0	27	0	0	0	73	0	0.0	0.0	100
EX1	0	0	0	52	0.0	0	0	24.0	23.7	100
EX2	0	0	100	0	0	0	0	0.0	0.0	100
EX3	0	0	0	5	0	0	0	0.0	95.1	100
EX4	0	0	0	74	0	0	0	0.0	26.3	100
EX5	0	0	0.0	68	0	0	0	8.8	22.7	100
EX6	0	30	61.1	0	0	0	0	0.0	8.9	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	65	67	72	77	70.5	78	89	77	90	72.3	0.28
102	65	67.0	72	77	70.5	78	89	77	90	76.4	0.17
103	65	67	72	77	70.5	78	89	77	90	75.0	0.20
EX1	65	67	72	77	70.5	78	89	77	90	77.0	0.25
EX2	65	67	72	77	70.5	78	89	77	90	72.0	0.30
EX3	65	67	72	77	70.5	78	89	77	90	77.0	0.25
EX4	65	67	72	77	70.5	78	89	77	90	77.0	0.25
EX5	65	67	72	77	70.5	78	89	77	90	78.5	0.22
EX6	64.5	67	72	77	70.5	78	89	77	90	70.4	0.33

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

**Existing Conditions**

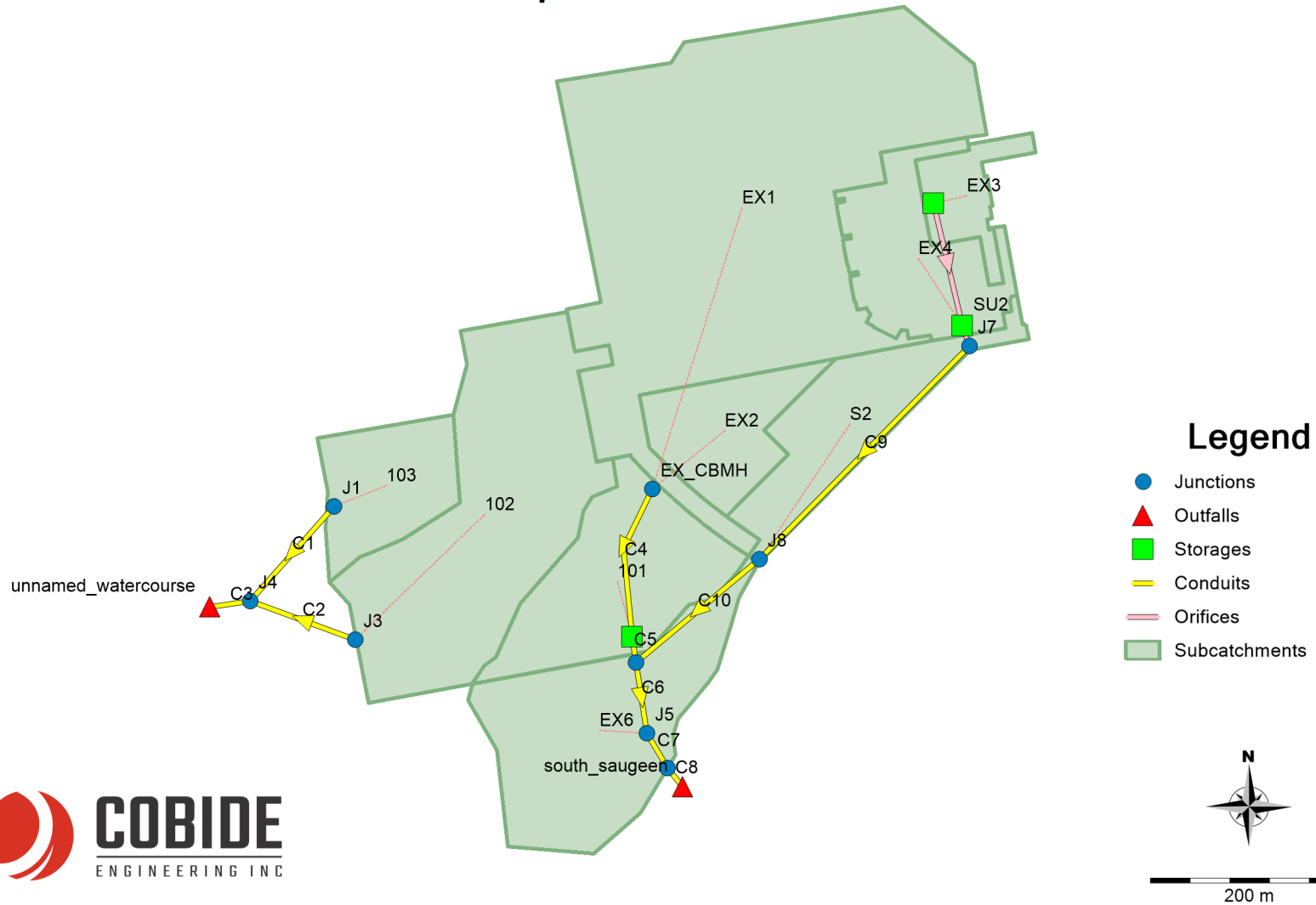
Area of Concern	Total Area (ha)	Impervious Area Connected		Impervious Area Not Connected (Rooftops)		Total (%)
		(ha)	(%)	(ha)	(%)	
101	2.85	0.00	0.0	0.00	0.0	0.0
102	5.52	0.00	0.0	0.00	0.0	0.0
103	1.56	0.00	0.0	0.00	0.0	0.0
EX1	11.61	2.76	23.7	2.78	24.0	47.7
EX2	1.52	0.00	0.0	0.00	0.0	0.0
EX3	0.76	0.72	95.1	0.00	0.0	95.1
EX4	2.08	0.55	26.3	0.00	0.0	26.3
EX5	2.10	0.48	22.7	0.19	8.8	31.5
EX6	3.70	0.33	8.9	0.00	0.0	8.9

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

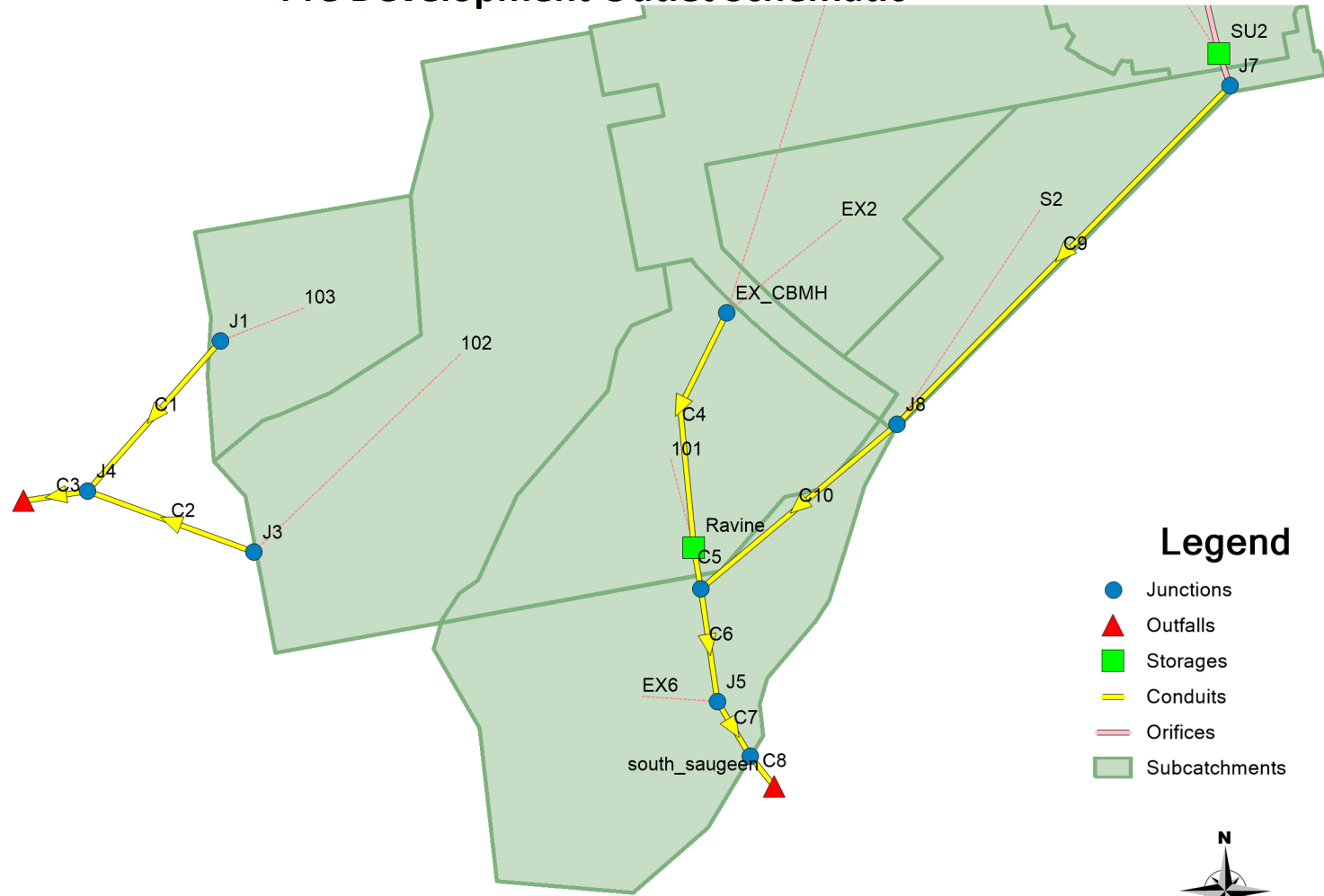
Catchment					Imperv. Area	Imperv %
101	0	m of	20	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
	0	Impervious Area	814	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
	0	Roof Area	220	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
					<b>0.00 ha</b>	
102	0	m of	10	m wide ROW @ 50% imperv.	0.00 ha	0.0 %
	0	Impervious Area	3490	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
	0	Roof Area	220	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
					<b>0.00 ha</b>	
103	0	m of	20	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
	0	Impervious Area	1826	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
	0	Roof Area	2025	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
					<b>0.00 ha</b>	
EX1	1530	m of	20	m wide ROW @ 55% imperv.	1.68 ha	14.5 %
	1	Impervious Area	1900	m <sup>2</sup> @ 100% imperv.	0.19 ha	1.6 %
	70	Impervious Area	90	m <sup>2</sup> @ 100% imperv.	0.63 ha	5.4 %
	59	Impervious Area	75	m <sup>2</sup> @ 100% imperv.	0.44 ha	3.8 %
	13	Townhouse Roof Ar	130	m <sup>2</sup> @ 100% imperv.	0.17 ha	1.5 %
	46	Semi Roof Area	165	m <sup>2</sup> @ 100% imperv.	0.76 ha	6.5 %
	70	Single Roof Area	265	m <sup>2</sup> @ 100% imperv.	1.86 ha	16.0 %
				<b>5.73 ha</b>		
EX2	0	m of	20	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
	0	Impervious Area	220	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
	0	Roof Area	250	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
				<b>0.00 ha</b>		

EX3	1	m of	20	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
		Impervious Area	7230	m <sup>2</sup> @ 100% imperv.	0.72 ha	95.1 %
		Roof Area	250	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
					<b>0.72 ha</b>	
EX4	1	m of	20	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
		Impervious Area	5465	m <sup>2</sup> @ 100% imperv.	0.55 ha	26.3 %
		Roof Area	250	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
					<b>0.55 ha</b>	
EX5	360	m of	20	m wide ROW @ 55% imperv.	0.40 ha	18.9 %
		Impervious Area	90	m <sup>2</sup> @ 100% imperv.	0.08 ha	3.9 %
		Roof Area	265	m <sup>2</sup> @ 100% imperv.	0.19 ha	8.8 %
					<b>0.66 ha</b>	
EX6	550	m of	12	m wide ROW @ 50% imperv.	0.33 ha	8.9 %
		Impervious Area	65	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
		Roof Area	65	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
					<b>0.33 ha</b>	

# Sunvale Homes - Mount Forest Subdivision - Pre Development Model Schematic



# Sunvale Homes - Mount Forest Subdivision - Pre Development Outlet Schematic



## Legend

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



100 m

# Sunvale Homes – Mount Forest Subdivision – Pre Development Model Details

**[TITLE]**

**[OPTIONS]**

```

;;Options          Value
;;-----
FLOW_UNITS        LPS
INFILTRATION      CURVE_NUMBER
FLOW_ROUTING      DYNWAVE
LINK_OFFSETS      ELEVATION
MIN_SLOPE         0
ALLOW_PONDING     NO
SKIP_STEADY_STATE NO

START_DATE        9/10/2020
START_TIME        00:00
REPORT_START_DATE 9/10/2020
REPORT_START_TIME 00:00
END_DATE          9/11/2020
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

INERTIAL_DAMPING  PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP     0.75
LENGTHENING_STEP 0
MIN_SURFAREA     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
;;-----
Hurricane_Hazel_(Southern_Ontario) INTENSITY 1:00    1.0      TIMESERIES Hurricane_Hazel_(Southern_Ontario)
SCS_6h_38.8mm_2yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_38.8mm_2yr
SCS_6h_49.4mm_5yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_49.4mm_5yr
SCS_6h_65.3mm_25yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_65.3mm_25yr
SCS_6h_71.9mm_50yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_71.9mm_50yr
SCS_6h_78.4mm_100yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_78.4mm_100yr
SCS_6h_88mm_MTO100Yr INTENSITY 0:05    1.0      TIMESERIES SCS_6h_88mm_MTO100Yr
    
```

**[SUBCATCHMENTS]**

```

;;
;;Name            Raingage      Outlet      Total      Pcnt.      Pcnt.      Curb      Snow
;;              Raingage      Outlet      Area      Imperv      Width      Slope      Length      Pack
;;-----
101              SCS_6h_38.8mm_2yr Ravine      2.85      0          320      3          0
102              SCS_6h_38.8mm_2yr J3          5.52      0          320      3          0
103              SCS_6h_38.8mm_2yr J1          1.56      0          132      3          0
EX1              SCS_6h_38.8mm_2yr EX_CBMH     11.6191   47.7      3060     2          0
EX2              SCS_6h_38.8mm_2yr EX_CBMH     1.52      0          150      2          0
EX3              SCS_6h_38.8mm_2yr SU1         0.762     95         100      2          0
EX4              SCS_6h_38.8mm_2yr SU2         2.0783    26.3      455      2          0
EX6              SCS_6h_38.8mm_2yr J5          3.7003    8.9       750      15         0
S2               SCS_6h_38.8mm_2yr J8          2.1017    22.7      360      2          0
    
```

**[SUBAREAS]**

```

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

## Sunvale Homes – Mount Forest Subdivision – Pre Development Model Details

```

-----
101      0.01      0.28      0.05      0.05      25      OUTLET
102      0.01      0.17      0.05      0.05      25      OUTLET
103      0.01      0.2       0.05      0.05      25      OUTLET
EX1      0.01      0.25      0.05      0.05      25      OUTLET
EX2      0.01      0.3       0.05      0.05      25      OUTLET
EX3      0.01      0.25      0.05      0.05      25      OUTLET
EX4      0.01      0.25      0.05      0.05      25      OUTLET
EX6      0.01      0.33      0.05      0.05      25      OUTLET
S2       0.01      0.22      0.05      0.05      25      OUTLET
    
```

**[INFILTRATION]**

```

;;Subcatchment CurveNum HydCon DryTime
-----
101      72.3      0.5       7
102      76.4      0.5       7
103      75       0.5       7
EX1      77       12.7      7
EX2      72       0.5       7
EX3      77       12.7      7
EX4      77       12.7      7
EX6      70.4     12.7      7
S2       78.5     12.7      7
    
```

**[JUNCTIONS]**

```

;;
;;Name Invert Max. Init. Surcharge Ponded
      Elev. Depth Depth Depth Area
-----
EX_CBMH 409.13 1.98 0 0 0
J1      407.5 0.5 0 0 0
J2      406.3 1 0 0 0
J3      407 0.5 0 0 0
J4      406 0.5 0 0 0
J5      402.3 2.7 0 0 0
J6      401.8 1.7 0 0 0
J7      416.32 2 0 0 0
J8      408.35 4 0 0 0
    
```

**[OUTFALLS]**

```

;;
;;Name Invert Outfall Stage/Table Tide
      Elev. Type Time Series Gate Route To
-----
south_saugeen 401.5 FREE NO
unnamed_watercourse 405.5 FREE NO
    
```

**[STORAGE]**

```

;;
;;Name Invert Max. Init. Storage Curve Evap.
      Elev. Depth Depth Curve Params Frac.
-----
Infiltration parameters
-----
Ravine 406.65 2.75 0 TABULAR Ravine 0 0
SU1 418.5 1.3 0 TABULAR Strathcona-Phase2 0 0
SU2 417 2.5 0 TABULAR Stractcona-Phase1 0 0
    
```

**[CONDUITS]**

```

;;
;;Name Inlet Outlet Length Manning Inlet Outlet Init. Max.
      Node Node Length N Offset Offset Flow Flow
-----
C1      J1      J4      75      0.013 407.5 406 0 0
C10     J8      J2      161.828 0.013 408.35 406.3 0 0
C2      J3      J4      111.98 0.013 407 406 0 0
C3      J4      unnamed_watercourse 40.99 0.013 406 405.5 0 0
C4      EX_CBMH Ravine 100 0.04 409.13 408.15 0 0
C5      Ravine J2      15 0.024 406.65 406.43 0 0
C6      J2      J5      45 0.03 406.3 404.2 0 0
C7      J5      J6      14.26 0.02 402.3 402.2 0 0
C8      J6      south_saugeen 10 0.03 401.8 401.5 0 0
C9      J7      J8      300.639 0.013 416.32 408.35 0 0
    
```

**[ORIFICES]**

```

;;
;;Name Inlet Outlet Orifice Crest Disch. Flap Open/Close
      Node Node Type Height Height Coeff. Gate Time
    
```

## Sunvale Homes – Mount Forest Subdivision – Pre Development Model Details

```

;;-----
OR1          SU1          SU2          SIDE          418.5        0.63        NO          0
OR2          SU2          J7          SIDE          417          0.63        NO          0
    
```

**[XSECTIONS]**

```

;;Link      Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;;-----
C1          TRIANGULAR  0.5        35         0          0          1
C10         CIRCULAR   0.9        0          0          0          1
C2          TRIANGULAR  0.5        45         0          0          1
C3          RECT_OPEN  0.5        50         0          0          1
C4          TRAPEZOIDAL 0.5        0.6        5          5          1
C5          CIRCULAR   0.75       0          0          0          1
C6          TRIANGULAR  0.8        5          0          0          1
C7          CIRCULAR   0.95       0          0          0          1
C8          TRAPEZOIDAL 0.8        3          1.2        2          1
C9          CIRCULAR   0.375     0          0          0          1
OR1         CIRCULAR   0.16       0          0          0
OR2         CIRCULAR   0.22       0          0          0
    
```

**[LOSSES]**

```

;;Link      Inlet      Outlet      Average      Flap Gate      SeepageRate
;;-----
    
```

**[CURVES]**

```

;;Name      Type      X-Value      Y-Value
;;-----
Ravine      Storage   0            0
Ravine      Storage   0.35         9
Ravine      Storage   0.85         70
Ravine      Storage   1.35         345
Ravine      Storage   1.85         1090
Ravine      Storage   2.35         3710

Stractcona-Phase1 Storage   0            0
Stractcona-Phase1 Storage   0.125        62.4
Stractcona-Phase1 Storage   0.25         82.4
Stractcona-Phase1 Storage   0.375        103.2
Stractcona-Phase1 Storage   0.5          127.2
Stractcona-Phase1 Storage   0.625        152
Stractcona-Phase1 Storage   0.75         179.2
Stractcona-Phase1 Storage   0.875        209.6
Stractcona-Phase1 Storage   1            240
Stractcona-Phase1 Storage   1.125        274.4
Stractcona-Phase1 Storage   1.25         308.8
Stractcona-Phase1 Storage   1.375        346.4
Stractcona-Phase1 Storage   1.5          386.4
Stractcona-Phase1 Storage   1.625        427.2
Stractcona-Phase1 Storage   1.75         471.2
Stractcona-Phase1 Storage   2.125        612.8
Stractcona-Phase1 Storage   2.25         664
Stractcona-Phase1 Storage   2.375        718.4
Stractcona-Phase1 Storage   2.5          772.8

Strathcona-Phase2 Storage   0            0
Strathcona-Phase2 Storage   0.065        156.9230769
Strathcona-Phase2 Storage   0.13         161.5384615
Strathcona-Phase2 Storage   0.195        167.6923077
Strathcona-Phase2 Storage   0.26         172.3076923
Strathcona-Phase2 Storage   0.325        176.9230769
Strathcona-Phase2 Storage   0.39         183.0769231
Strathcona-Phase2 Storage   0.455        189.2307692
Strathcona-Phase2 Storage   0.52         195.3846154
Strathcona-Phase2 Storage   0.585        200
Strathcona-Phase2 Storage   0.65         206.1538462
Strathcona-Phase2 Storage   0.715        212.3076923
Strathcona-Phase2 Storage   0.78         218.4615385
Strathcona-Phase2 Storage   0.845        223.0769231
Strathcona-Phase2 Storage   0.91         230.7692308
Strathcona-Phase2 Storage   0.975        236.9230769
Strathcona-Phase2 Storage   1.04         241.5384615
Strathcona-Phase2 Storage   1.105        249.2307692
Strathcona-Phase2 Storage   1.17         255.3846154
Strathcona-Phase2 Storage   1.235        263.0769231
    
```

## Sunvale Homes – Mount Forest Subdivision – Pre Development Model Details

Strathcona-Phase2                      1.3                      267.6923077

### [TIMESERIES]

```
;;Name                      Date                      Time                      Value
;-----
;Hurricane Hazel (Southern Ontario) design storm for 0 - 25 km², total rainfall = 211 mm (100%), rain units =
mm/hr.
Hurricane_Hazel_(Southern_Ontario)                      0                      6.33
Hurricane_Hazel_(Southern_Ontario)                      1                      4.22
Hurricane_Hazel_(Southern_Ontario)                      2                      6.33
Hurricane_Hazel_(Southern_Ontario)                      3                      12.66
Hurricane_Hazel_(Southern_Ontario)                      4                      16.88
Hurricane_Hazel_(Southern_Ontario)                      5                      12.66
Hurricane_Hazel_(Southern_Ontario)                      6                      23.21
Hurricane_Hazel_(Southern_Ontario)                      7                      12.66
Hurricane_Hazel_(Southern_Ontario)                      8                      12.66
Hurricane_Hazel_(Southern_Ontario)                      9                      52.75
Hurricane_Hazel_(Southern_Ontario)                      10                      37.98
Hurricane_Hazel_(Southern_Ontario)                      11                      12.66
Hurricane_Hazel_(Southern_Ontario)                      12                      0

;SCS_6h_38.8mm design storm, total rainfall = 38.8 mm, rain units = mm/hr.
SCS_6h_38.8mm_2yr

;SCS_6h_49.4mm design storm, total rainfall = 49.4 mm, rain units = mm/hr.
SCS_6h_49.4mm_5yr

;SCS_6h_65.3mm design storm, total rainfall = 65.3 mm, rain units = mm/hr.
SCS_6h_65.3mm_25yr

;SCS_6h_71.9mm design storm, total rainfall = 71.9 mm, rain units = mm/hr.
SCS_6h_71.9mm_50yr

;SCS_6h_78.4mm design storm, total rainfall = 78.4 mm, rain units = mm/hr.
SCS_6h_78.4mm_100yr

;SCS_6h_88mm design storm, total rainfall = 88 mm, rain units = mm/hr.
SCS_6h_88mm_MTO100Yr
```

### [REPORT]

```
;;Reporting Options
INPUT                      YES
CONTROLS                      NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL
```

### [TAGS]

#### [MAP]

```
DIMENSIONS                      520098.9657                      4868335.6372                      521011.2903                      4869271.9308
UNITS                      Meters
```

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 2 Yr Storm Event

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

\*\*\*\*\*  
Element Count  
\*\*\*\*\*

Number of rain gages ..... 7  
Number of subcatchments ... 9  
Number of nodes ..... 14  
Number of links ..... 12  
Number of pollutants ..... 0  
Number of land uses ..... 0

\*\*\*\*\*  
Raingage Summary  
\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*  
Subcatchment Summary  
\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.85	320.00	0.00	3.0000	SCS_6h_38.8mm_2yr	Ravine
102	5.52	320.00	0.00	3.0000	SCS_6h_38.8mm_2yr	J3
103	1.56	132.00	0.00	3.0000	SCS_6h_38.8mm_2yr	J1
EX1	11.62	3060.00	47.70	2.0000	SCS_6h_38.8mm_2yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_38.8mm_2yr	EX_CBMH
EX3	0.76	100.00	95.00	2.0000	SCS_6h_38.8mm_2yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_38.8mm_2yr	SU2
EX6	3.70	750.00	8.90	15.0000	SCS_6h_38.8mm_2yr	J5
S2	2.10	360.00	22.70	2.0000	SCS_6h_38.8mm_2yr	J8

\*\*\*\*\*  
Node Summary  
\*\*\*\*\*

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J2	JUNCTION	406.30	1.00	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	402.30	2.70	0.0	
J6	JUNCTION	401.80	1.70	0.0	
J7	JUNCTION	416.32	2.00	0.0	
J8	JUNCTION	408.35	4.00	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Ravine	STORAGE	406.65	2.75	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

\*\*\*\*\*  
Link Summary  
\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
------	-----------	---------	------	--------	--------	-----------

## Sunvale Homes – Mount Forest Subdivision – Pre Development – 2 Yr Storm Event

Conduit	Junction	Junction	Type	Length	Area	Flow
C1	J1	J4	CONDUIT	75.0	2.0004	0.0130
C10	J8	J2	CONDUIT	161.8	1.2669	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	EX_CBMH	Ravine	CONDUIT	100.0	0.9800	0.0400
C5	Ravine	J2	CONDUIT	15.0	1.4668	0.0240
C6	J2	J5	CONDUIT	45.0	4.6718	0.0300
C7	J5	J6	CONDUIT	14.3	0.7013	0.0200
C8	J6	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C9	J7	J8	CONDUIT	300.6	2.6520	0.0130
OR1	SU1	SU2	ORIFICE			
OR2	SU2	J7	ORIFICE			

\*\*\*\*\*  
 Cross Section Summary  
 \*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	37770.94
C10	CIRCULAR	0.90	0.64	0.23	0.90	1	2037.73
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1610.43
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01
C7	CIRCULAR	0.95	0.71	0.24	0.95	1	1138.29
C8	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C9	CIRCULAR	0.38	0.11	0.09	0.38	1	285.54

\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	1.231	38.807
Evaporation Loss	0.000	0.000
Infiltration Loss	0.652	20.558
Surface Runoff	0.575	18.145
Final Storage	0.004	0.117

## Sunvale Homes – Mount Forest Subdivision – Pre Development – 2 Yr Storm Event

Continuity Error (%) ..... -0.036

```

*****
Flow Routing Continuity
*****

```

	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	0.575	5.755
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	0.575	5.754
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	0.001
Continuity Error (%) .....	-0.002	

```

*****
Time-Step Critical Elements
*****
Link C7 (24.14%)

```

```

*****
Highest Flow Instability Indexes
*****
All links are stable.

```

```

*****
Routing Time Step Summary
*****
Minimum Time Step      :      1.11 sec
Average Time Step      :      4.73 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
*****

```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
101	38.81	0.00	0.00	28.64	9.98	0.28	21.15	0.257
102	38.81	0.00	0.00	27.08	11.52	0.64	46.72	0.297
103	38.81	0.00	0.00	27.43	11.20	0.17	13.89	0.289
EX1	38.81	0.00	0.00	13.43	25.35	2.95	566.91	0.653
EX2	38.81	0.00	0.00	29.29	9.25	0.14	9.34	0.238
EX3	38.81	0.00	0.00	1.28	37.53	0.29	60.43	0.967
EX4	38.81	0.00	0.00	19.06	19.68	0.41	66.01	0.507
EX6	38.81	0.00	0.00	25.93	12.81	0.47	68.36	0.330
S2	38.81	0.00	0.00	19.49	19.24	0.40	61.33	0.496

```

*****
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
EX_CBMH	JUNCTION	0.07	0.36	409.49	0 02:25	0.36
J1	JUNCTION	0.01	0.03	407.53	0 02:45	0.03

## Sunvale Homes – Mount Forest Subdivision – Pre Development – 2 Yr Storm Event

J2	JUNCTION	0.08	0.33	406.63	0	02:26	0.33
J3	JUNCTION	0.02	0.05	407.05	0	02:47	0.05
J4	JUNCTION	0.00	0.00	406.00	0	02:48	0.00
J5	JUNCTION	0.10	0.54	402.84	0	02:26	0.54
J6	JUNCTION	0.02	0.15	401.95	0	02:26	0.15
J7	JUNCTION	0.03	0.13	416.45	0	02:35	0.13
J8	JUNCTION	0.03	0.15	408.50	0	02:28	0.15
south_saugeen	OUTFALL	0.02	0.15	401.65	0	02:26	0.15
unnamed_watercourse	OUTFALL	0.00	0.00	405.50	0	02:48	0.00
Ravine	STORAGE	0.09	0.49	407.14	0	02:25	0.49
SU1	STORAGE	0.05	0.43	418.93	0	02:33	0.43
SU2	STORAGE	0.08	0.59	417.59	0	02:34	0.59

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EX_CBMH	JUNCTION	572.59	572.59	0 02:25	3.09	3.09	0.007
J1	JUNCTION	13.89	13.89	0 02:45	0.175	0.175	0.008
J2	JUNCTION	0.00	707.50	0 02:26	0	4.47	0.003
J3	JUNCTION	46.72	46.72	0 02:45	0.636	0.636	0.016
J4	JUNCTION	0.00	60.42	0 02:47	0	0.81	0.020
J5	JUNCTION	68.36	775.05	0 02:26	0.474	4.94	0.001
J6	JUNCTION	0.00	775.10	0 02:26	0	4.94	0.002
J7	JUNCTION	0.00	73.65	0 02:34	0	0.695	0.000
J8	JUNCTION	61.33	128.28	0 02:27	0.404	1.1	0.003
south_saugeen	OUTFALL	0.00	775.12	0 02:26	0	4.94	0.000
unnamed_watercourse	OUTFALL	0.00	60.38	0 02:48	0	0.81	0.000
Ravine	STORAGE	21.15	580.74	0 02:25	0.285	3.37	0.001
SU1	STORAGE	60.43	60.43	0 02:25	0.286	0.286	0.000
SU2	STORAGE	66.01	97.07	0 02:25	0.409	0.695	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Ravine	0.000	0	0	0	0.004	0	0 02:25	580.45
SU1	0.007	3	0	0	0.068	26	0 02:33	33.39
SU2	0.005	1	0	0	0.051	6	0 02:34	73.65

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Flow	Avg	Max	Total
------	-----	-----	-------

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 2 Yr Storm Event

Outfall Node	Freq Pcnt	Flow LPS	Flow LPS	Volume 10^6 ltr
south_saugeen	99.85	74.53	775.12	4.944
unnamed_watercourse	95.10	11.74	60.38	0.810
System	97.48	86.27	817.30	5.754

\*\*\*\*\*  
 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	13.86	0 02:46	1.19	0.00	0.04
C10	CONDUIT	128.14	0 02:28	1.03	0.06	0.27
C2	CONDUIT	46.59	0 02:48	1.22	0.00	0.06
C3	CONDUIT	60.38	0 02:48	0.25	0.00	0.01
C4	CONDUIT	565.00	0 02:25	0.87	0.35	0.61
C5	CONDUIT	580.45	0 02:26	1.93	0.79	0.64
C6	CONDUIT	706.72	0 02:26	2.09	0.09	0.41
C7	CONDUIT	775.10	0 02:26	1.93	0.68	0.55
C8	CONDUIT	775.12	0 02:26	1.55	0.06	0.19
C9	CONDUIT	73.60	0 02:35	2.04	0.26	0.37
OR1	ORIFICE	33.39	0 02:33			1.00
OR2	ORIFICE	73.65	0 02:34			1.00

\*\*\*\*\*  
 Flow Classification Summary  
 \*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl	
C1	1.00	0.03	0.00	0.00	0.01	0.96	0.00	0.00	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.03	0.00	0.00	0.01	0.97	0.00	0.00	0.00	0.00
C3	1.00	0.04	0.00	0.00	0.76	0.21	0.00	0.00	0.00	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.70	0.30	0.00	0.00	0.03	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00

\*\*\*\*\*  
 Conduit Surcharge Summary  
 \*\*\*\*\*

No conduits were surcharged.

Analysis begun on: Mon Oct 17 14:43:49 2022  
 Analysis ended on: Mon Oct 17 14:43:49 2022  
 Total elapsed time: < 1 sec

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 5 Yr Storm Event

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

\*\*\*\*\*  
Element Count  
\*\*\*\*\*

Number of rain gages ..... 7  
Number of subcatchments ... 9  
Number of nodes ..... 14  
Number of links ..... 12  
Number of pollutants ..... 0  
Number of land uses ..... 0

\*\*\*\*\*  
Raingage Summary  
\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*  
Subcatchment Summary  
\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.85	320.00	0.00	3.0000	SCS_6h_49.4mm_5yr	Ravine
102	5.52	320.00	0.00	3.0000	SCS_6h_49.4mm_5yr	J3
103	1.56	132.00	0.00	3.0000	SCS_6h_49.4mm_5yr	J1
EX1	11.62	3060.00	47.70	2.0000	SCS_6h_49.4mm_5yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_49.4mm_5yr	EX_CBMH
EX3	0.76	100.00	95.00	2.0000	SCS_6h_49.4mm_5yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_49.4mm_5yr	SU2
EX6	3.70	750.00	8.90	15.0000	SCS_6h_49.4mm_5yr	J5
S2	2.10	360.00	22.70	2.0000	SCS_6h_49.4mm_5yr	J8

\*\*\*\*\*  
Node Summary  
\*\*\*\*\*

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J2	JUNCTION	406.30	1.00	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	402.30	2.70	0.0	
J6	JUNCTION	401.80	1.70	0.0	
J7	JUNCTION	416.32	2.00	0.0	
J8	JUNCTION	408.35	4.00	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Ravine	STORAGE	406.65	2.75	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

\*\*\*\*\*  
Link Summary  
\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
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## Sunvale Homes – Mount Forest Subdivision – Pre Development – 5 Yr Storm Event

Conduit	Shape	Depth	Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	J1	J4	CONDUIT	75.0	2.0004	0.0130	
C10	J8	J2	CONDUIT	161.8	1.2669	0.0130	
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130	
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130	
C4	EX_CBMH	Ravine	CONDUIT	100.0	0.9800	0.0400	
C5	Ravine	J2	CONDUIT	15.0	1.4668	0.0240	
C6	J2	J5	CONDUIT	45.0	4.6718	0.0300	
C7	J5	J6	CONDUIT	14.3	0.7013	0.0200	
C8	J6	south_saugeen	CONDUIT	10.0	3.0014	0.0300	
C9	J7	J8	CONDUIT	300.6	2.6520	0.0130	
OR1	SU1	SU2	ORIFICE				
OR2	SU2	J7	ORIFICE				

\*\*\*\*\*  
 Cross Section Summary  
 \*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	37770.94
C10	CIRCULAR	0.90	0.64	0.23	0.90	1	2037.73
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1610.43
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01
C7	CIRCULAR	0.95	0.71	0.24	0.95	1	1138.29
C8	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C9	CIRCULAR	0.38	0.11	0.09	0.38	1	285.54

\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		
*****	-----	-----
Total Precipitation .....	1.567	49.408
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.766	24.156
Surface Runoff .....	0.798	25.151
Final Storage .....	0.004	0.118

## Sunvale Homes – Mount Forest Subdivision – Pre Development – 5 Yr Storm Event

Continuity Error (%) ..... -0.036

```

*****
Flow Routing Continuity
*****

```

	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	0.798	7.977
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	0.798	7.976
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	0.001
Continuity Error (%) .....	-0.001	

```

*****
Time-Step Critical Elements
*****
Link C7 (28.26%)

```

```

*****
Highest Flow Instability Indexes
*****
All links are stable.

```

```

*****
Routing Time Step Summary
*****
Minimum Time Step      :      1.61 sec
Average Time Step      :      4.62 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
*****

```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
101	49.41	0.00	0.00	33.92	15.31	0.44	38.12	0.310
102	49.41	0.00	0.00	31.65	17.54	0.97	83.29	0.355
103	49.41	0.00	0.00	32.24	16.99	0.27	24.49	0.344
EX1	49.41	0.00	0.00	15.68	33.70	3.92	770.40	0.682
EX2	49.41	0.00	0.00	34.75	14.39	0.22	15.97	0.291
EX3	49.41	0.00	0.00	1.50	47.93	0.37	77.27	0.970
EX4	49.41	0.00	0.00	22.30	27.04	0.56	94.92	0.547
EX6	49.41	0.00	0.00	30.85	18.49	0.68	108.62	0.374
S2	49.41	0.00	0.00	22.68	26.66	0.56	89.62	0.540

```

*****
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
EX_CBMH	JUNCTION	0.08	0.41	409.54	0 02:25	0.40
J1	JUNCTION	0.01	0.04	407.54	0 02:45	0.04

## Sunvale Homes – Mount Forest Subdivision – Pre Development – 5 Yr Storm Event

J2	JUNCTION	0.09	0.37	406.67	0	02:26	0.37
J3	JUNCTION	0.02	0.07	407.07	0	02:45	0.07
J4	JUNCTION	0.00	0.01	406.01	0	02:46	0.01
J5	JUNCTION	0.12	0.65	402.95	0	02:26	0.65
J6	JUNCTION	0.03	0.19	401.99	0	02:26	0.19
J7	JUNCTION	0.04	0.14	416.46	0	02:46	0.14
J8	JUNCTION	0.04	0.18	408.53	0	02:29	0.18
south_saugeen	OUTFALL	0.03	0.19	401.69	0	02:26	0.19
unnamed_watercourse	OUTFALL	0.00	0.01	405.51	0	02:46	0.01
Ravine	STORAGE	0.10	0.62	407.27	0	02:26	0.62
SU1	STORAGE	0.07	0.56	419.06	0	02:34	0.56
SU2	STORAGE	0.12	0.82	417.82	0	02:46	0.82

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EX_CBMH	JUNCTION	781.73	781.73	0 02:25	4.13	4.13	0.005
J1	JUNCTION	24.49	24.49	0 02:45	0.265	0.265	0.005
J2	JUNCTION	0.00	968.50	0 02:26	0	6.06	0.002
J3	JUNCTION	83.29	83.29	0 02:45	0.968	0.968	0.011
J4	JUNCTION	0.00	107.49	0 02:45	0	1.23	0.015
J5	JUNCTION	108.62	1076.22	0 02:26	0.685	6.74	0.000
J6	JUNCTION	0.00	1076.28	0 02:26	0	6.74	0.003
J7	JUNCTION	0.00	89.17	0 02:46	0	0.927	0.001
J8	JUNCTION	89.62	168.96	0 02:27	0.56	1.49	0.002
south_saugeen	OUTFALL	0.00	1076.30	0 02:26	0	6.74	0.000
unnamed_watercourse	OUTFALL	0.00	107.40	0 02:46	0	1.23	0.000
Ravine	STORAGE	38.12	802.14	0 02:25	0.436	4.57	0.001
SU1	STORAGE	77.27	77.27	0 02:25	0.365	0.365	0.000
SU2	STORAGE	94.92	131.18	0 02:25	0.562	0.927	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Ravine	0.000	0	0	0	0.009	0	0 02:26	800.70
SU1	0.010	4	0	0	0.093	35	0 02:34	39.03
SU2	0.009	1	0	0	0.090	10	0 02:46	89.17

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Flow	Avg	Max	Total
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# Sunvale Homes – Mount Forest Subdivision – Pre Development – 5 Yr Storm Event

Outfall Node	Freq Pcnt	Flow LPS	Flow LPS	Volume 10^6 ltr
south_saugeen	99.87	109.48	1076.30	6.743
unnamed_watercourse	95.90	19.32	107.40	1.233
System	97.89	128.80	1160.82	7.976

\*\*\*\*\*  
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	24.47	0 02:45	1.35	0.00	0.05
C10	CONDUIT	168.84	0 02:29	1.13	0.08	0.30
C2	CONDUIT	83.04	0 02:45	1.39	0.00	0.07
C3	CONDUIT	107.40	0 02:46	0.31	0.00	0.01
C4	CONDUIT	771.44	0 02:25	0.95	0.48	0.70
C5	CONDUIT	800.70	0 02:26	2.15	1.10	0.78
C6	CONDUIT	967.74	0 02:26	2.26	0.13	0.46
C7	CONDUIT	1076.28	0 02:26	2.16	0.95	0.66
C8	CONDUIT	1076.30	0 02:26	1.75	0.08	0.23
C9	CONDUIT	89.16	0 02:46	2.15	0.31	0.42
OR1	ORIFICE	39.03	0 02:34			1.00
OR2	ORIFICE	89.17	0 02:46			1.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl	
C1	1.00	0.02	0.00	0.00	0.01	0.97	0.00	0.00	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.02	0.00	0.00	0.00	0.97	0.00	0.00	0.00	0.00
C3	1.00	0.03	0.00	0.00	0.73	0.24	0.00	0.00	0.07	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.68	0.32	0.00	0.00	0.04	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00

\*\*\*\*\*  
Conduit Surcharge Summary  
\*\*\*\*\*

Conduit	Hours Full			Hours Above Full Normal Flow	Hours Capacity Limited
	Both Ends	Upstream	Dnstream		
C5	0.01	0.01	0.01	0.19	0.01

Analysis begun on: Mon Oct 17 14:43:11 2022  
 Analysis ended on: Mon Oct 17 14:43:12 2022  
 Total elapsed time: 00:00:01

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 25 Yr Storm Event

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

\*\*\*\*\*

Element Count

\*\*\*\*\*

Number of rain gages ..... 7  
 Number of subcatchments ... 9  
 Number of nodes ..... 14  
 Number of links ..... 12  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*

Subcatchment Summary

\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.85	320.00	0.00	3.0000	SCS_6h_65.3mm_25yr	Ravine
102	5.52	320.00	0.00	3.0000	SCS_6h_65.3mm_25yr	J3
103	1.56	132.00	0.00	3.0000	SCS_6h_65.3mm_25yr	J1
EX1	11.62	3060.00	47.70	2.0000	SCS_6h_65.3mm_25yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_65.3mm_25yr	EX_CBMH
EX3	0.76	100.00	95.00	2.0000	SCS_6h_65.3mm_25yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_65.3mm_25yr	SU2
EX6	3.70	750.00	8.90	15.0000	SCS_6h_65.3mm_25yr	J5
S2	2.10	360.00	22.70	2.0000	SCS_6h_65.3mm_25yr	J8

\*\*\*\*\*

Node Summary

\*\*\*\*\*

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J2	JUNCTION	406.30	1.00	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	402.30	2.70	0.0	
J6	JUNCTION	401.80	1.70	0.0	
J7	JUNCTION	416.32	2.00	0.0	
J8	JUNCTION	408.35	4.00	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Ravine	STORAGE	406.65	2.75	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

\*\*\*\*\*

Link Summary

\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
------	-----------	---------	------	--------	--------	-----------

## Sunvale Homes – Mount Forest Subdivision – Pre Development – 25 Yr Storm Event

Conduit	Junction	Junction	Material	Length	Area	Flow
C1	J1	J4	CONDUIT	75.0	2.0004	0.0130
C10	J8	J2	CONDUIT	161.8	1.2669	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	EX_CBMH	Ravine	CONDUIT	100.0	0.9800	0.0400
C5	Ravine	J2	CONDUIT	15.0	1.4668	0.0240
C6	J2	J5	CONDUIT	45.0	4.6718	0.0300
C7	J5	J6	CONDUIT	14.3	0.7013	0.0200
C8	J6	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C9	J7	J8	CONDUIT	300.6	2.6520	0.0130
OR1	SU1	SU2	ORIFICE			
OR2	SU2	J7	ORIFICE			

\*\*\*\*\*  
 Cross Section Summary  
 \*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	37770.94
C10	CIRCULAR	0.90	0.64	0.23	0.90	1	2037.73
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1610.43
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01
C7	CIRCULAR	0.95	0.71	0.24	0.95	1	1138.29
C8	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C9	CIRCULAR	0.38	0.11	0.09	0.38	1	285.54

\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	2.071	65.310
Evaporation Loss	0.000	0.000
Infiltration Loss	0.907	28.611
Surface Runoff	1.161	36.605
Final Storage	0.004	0.119

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 25 Yr Storm Event

Continuity Error (%) ..... -0.038

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.161	11.610
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.161	11.609
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	0.001
Continuity Error (%) .....	0.000	

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link C7 (28.04%)  
 Link C5 (3.66%)

\*\*\*\*\*  
 Highest Flow Instability Indexes  
 \*\*\*\*\*  
 All links are stable.

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*  
 Minimum Time Step : 0.45 sec  
 Average Time Step : 4.46 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  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
101	65.31	0.00	0.00	40.58	24.55	0.70	73.41	0.376
102	65.31	0.00	0.00	37.25	27.84	1.54	157.35	0.426
103	65.31	0.00	0.00	38.20	26.94	0.42	47.47	0.412
EX1	65.31	0.00	0.00	18.47	46.82	5.44	1102.33	0.717
EX2	65.31	0.00	0.00	41.54	23.50	0.36	30.85	0.360
EX3	65.31	0.00	0.00	1.75	63.60	0.48	102.65	0.974
EX4	65.31	0.00	0.00	26.18	39.07	0.81	145.55	0.598
EX6	65.31	0.00	0.00	37.09	28.16	1.04	183.07	0.431
S2	65.31	0.00	0.00	26.49	38.75	0.81	139.88	0.593

\*\*\*\*\*  
 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
EX_CBMH	JUNCTION	0.10	0.47	409.60	0 02:25	0.47

## Sunvale Homes – Mount Forest Subdivision – Pre Development – 25 Yr Storm Event

J1	JUNCTION	0.02	0.05	407.55	0	02:31	0.05
J2	JUNCTION	0.11	0.42	406.72	0	02:27	0.42
J3	JUNCTION	0.03	0.08	407.08	0	02:32	0.08
J4	JUNCTION	0.00	0.01	406.01	0	02:33	0.01
J5	JUNCTION	0.16	0.84	403.14	0	02:27	0.83
J6	JUNCTION	0.04	0.23	402.03	0	02:27	0.23
J7	JUNCTION	0.04	0.16	416.48	0	02:52	0.16
J8	JUNCTION	0.05	0.21	408.56	0	02:27	0.21
south_saugeen	OUTFALL	0.04	0.23	401.73	0	02:27	0.23
unnamed_watercourse	OUTFALL	0.00	0.01	405.51	0	02:33	0.01
Ravine	STORAGE	0.14	0.98	407.63	0	02:27	0.98
SU1	STORAGE	0.11	0.76	419.26	0	02:34	0.76
SU2	STORAGE	0.20	1.16	418.16	0	02:51	1.16

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum		Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
		Lateral Inflow LPS	Total Inflow LPS				
EX_CBMH	JUNCTION	1126.50	1126.50	0 02:25	5.8	5.8	0.003
J1	JUNCTION	47.47	47.47	0 02:30	0.42	0.42	0.002
J2	JUNCTION	0.00	1389.70	0 02:27	0	8.61	0.001
J3	JUNCTION	157.35	157.35	0 02:30	1.54	1.54	0.008
J4	JUNCTION	0.00	203.45	0 02:32	0	1.96	0.010
J5	JUNCTION	183.07	1571.66	0 02:27	1.04	9.65	0.000
J6	JUNCTION	0.00	1571.69	0 02:27	0	9.65	0.003
J7	JUNCTION	0.00	108.81	0 02:51	0	1.3	0.002
J8	JUNCTION	139.88	234.43	0 02:25	0.815	2.11	0.002
south_saugeen	OUTFALL	0.00	1571.71	0 02:27	0	9.65	0.000
unnamed_watercourse	OUTFALL	0.00	203.26	0 02:33	0	1.96	0.000
Ravine	STORAGE	73.41	1175.63	0 02:25	0.7	6.5	0.001
SU1	STORAGE	102.65	102.65	0 02:25	0.485	0.485	0.000
SU2	STORAGE	145.55	188.53	0 02:25	0.812	1.3	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max Occurrence days hr:min	Maximum Outflow LPS
	Volume 1000 m3	Pcnt Full	Pcnt Loss	Pcnt Loss		Volume 1000 m3		
Ravine	0.001	0	0	0	0.035	1	0 02:27	1155.73
SU1	0.018	7	0	0	0.134	51	0 02:34	46.29
SU2	0.022	3	0	0	0.172	20	0 02:51	108.81

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 25 Yr Storm Event

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.90	175.47	1571.71	9.652
unnamed_watercourse	96.67	34.16	203.26	1.957
System	98.29	209.62	1755.09	11.609

\*\*\*\*\*  
 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	47.22	0 02:31	1.54	0.00	0.06
C10	CONDUIT	234.02	0 02:27	1.24	0.11	0.35
C2	CONDUIT	156.41	0 02:32	1.61	0.00	0.09
C3	CONDUIT	203.26	0 02:33	0.40	0.00	0.02
C4	CONDUIT	1112.18	0 02:25	1.04	0.69	0.81
C5	CONDUIT	1155.73	0 02:27	2.69	1.58	0.94
C6	CONDUIT	1389.32	0 02:27	2.48	0.18	0.53
C7	CONDUIT	1571.69	0 02:27	2.51	1.38	0.82
C8	CONDUIT	1571.71	0 02:27	1.99	0.12	0.29
C9	CONDUIT	108.81	0 02:52	2.29	0.38	0.48
OR1	ORIFICE	46.29	0 02:34			1.00
OR2	ORIFICE	108.81	0 02:51			1.00

\*\*\*\*\*  
 Flow Classification Summary  
 \*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry		Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.02	0.00	0.00	0.01	0.98	0.00	0.00	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.02	0.00	0.00	0.01	0.98	0.00	0.00	0.00	0.00
C3	1.00	0.03	0.00	0.00	0.69	0.28	0.00	0.00	0.14	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.65	0.35	0.00	0.00	0.06	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00

\*\*\*\*\*  
 Conduit Surcharge Summary  
 \*\*\*\*\*

Conduit	Hours Full			Hours Above Full Capacity	
	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C5	0.01	0.32	0.01	0.44	0.01
C7	0.01	0.01	0.01	0.39	0.01

Analysis begun on: Mon Oct 17 14:42:45 2022  
 Analysis ended on: Mon Oct 17 14:42:45 2022  
 Total elapsed time: < 1 sec

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 50 Yr Storm Event

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

\*\*\*\*\*

Element Count

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Number of rain gages ..... 7  
 Number of subcatchments ... 9  
 Number of nodes ..... 14  
 Number of links ..... 12  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*

Subcatchment Summary

\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.85	320.00	0.00	3.0000	SCS_6h_71.9mm_50yr	Ravine
102	5.52	320.00	0.00	3.0000	SCS_6h_71.9mm_50yr	J3
103	1.56	132.00	0.00	3.0000	SCS_6h_71.9mm_50yr	J1
EX1	11.62	3060.00	47.70	2.0000	SCS_6h_71.9mm_50yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_71.9mm_50yr	EX_CBMH
EX3	0.76	100.00	95.00	2.0000	SCS_6h_71.9mm_50yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_71.9mm_50yr	SU2
EX6	3.70	750.00	8.90	15.0000	SCS_6h_71.9mm_50yr	J5
S2	2.10	360.00	22.70	2.0000	SCS_6h_71.9mm_50yr	J8

\*\*\*\*\*

Node Summary

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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J2	JUNCTION	406.30	1.00	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	402.30	2.70	0.0	
J6	JUNCTION	401.80	1.70	0.0	
J7	JUNCTION	416.32	2.00	0.0	
J8	JUNCTION	408.35	4.00	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Ravine	STORAGE	406.65	2.75	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

\*\*\*\*\*

Link Summary

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Name	From Node	To Node	Type	Length	%Slope	Roughness
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# Sunvale Homes – Mount Forest Subdivision – Pre Development – 50 Yr Storm Event

C1	J1	J4	CONDUIT	75.0	2.0004	0.0130
C10	J8	J2	CONDUIT	161.8	1.2669	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	EX_CBMH	Ravine	CONDUIT	100.0	0.9800	0.0400
C5	Ravine	J2	CONDUIT	15.0	1.4668	0.0240
C6	J2	J5	CONDUIT	45.0	4.6718	0.0300
C7	J5	J6	CONDUIT	14.3	0.7013	0.0200
C8	J6	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C9	J7	J8	CONDUIT	300.6	2.6520	0.0130
OR1	SU1	SU2	ORIFICE			
OR2	SU2	J7	ORIFICE			

\*\*\*\*\*  
 Cross Section Summary  
 \*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	37770.94
C10	CIRCULAR	0.90	0.64	0.23	0.90	1	2037.73
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1610.43
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01
C7	CIRCULAR	0.95	0.71	0.24	0.95	1	1138.29
C8	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C9	CIRCULAR	0.38	0.11	0.09	0.38	1	285.54

\*\*\*\*\*  
 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.  
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\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		
*****	-----	-----
Total Precipitation .....	2.280	71.911
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.957	30.174
Surface Runoff .....	1.321	41.644
Final Storage .....	0.004	0.120

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 50 Yr Storm Event

Continuity Error (%) ..... -0.039

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity		
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.321	13.208
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.321	13.207
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	0.001
Continuity Error (%) .....	0.001	

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link C7 (29.31%)  
 Link C5 (4.37%)

\*\*\*\*\*  
 Highest Flow Instability Indexes  
 \*\*\*\*\*  
 All links are stable.

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*  
 Minimum Time Step : 1.68 sec  
 Average Time Step : 4.39 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  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
101	71.91	0.00	0.00	42.88	28.86	0.82	92.36	0.401
102	71.91	0.00	0.00	39.22	32.48	1.79	196.87	0.452
103	71.91	0.00	0.00	40.31	31.43	0.49	59.21	0.437
EX1	71.91	0.00	0.00	19.42	52.48	6.10	1247.24	0.730
EX2	71.91	0.00	0.00	43.88	27.76	0.42	38.33	0.386
EX3	71.91	0.00	0.00	1.85	70.12	0.53	113.21	0.975
EX4	71.91	0.00	0.00	27.58	44.28	0.92	168.64	0.616
EX6	71.91	0.00	0.00	39.41	32.45	1.20	218.33	0.451
S2	71.91	0.00	0.00	27.79	44.06	0.93	162.97	0.613

\*\*\*\*\*  
 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
EX_CBMH	JUNCTION	0.11	0.49	409.62	0 02:25	0.49

## Sunvale Homes – Mount Forest Subdivision – Pre Development – 50 Yr Storm Event

J1	JUNCTION	0.02	0.05	407.55	0	02:30	0.05
J2	JUNCTION	0.12	0.44	406.74	0	02:28	0.44
J3	JUNCTION	0.03	0.09	407.09	0	02:31	0.09
J4	JUNCTION	0.00	0.01	406.01	0	02:32	0.01
J5	JUNCTION	0.18	0.95	403.25	0	02:28	0.95
J6	JUNCTION	0.05	0.25	402.05	0	02:28	0.25
J7	JUNCTION	0.05	0.17	416.49	0	02:55	0.17
J8	JUNCTION	0.06	0.22	408.57	0	02:27	0.22
south_saugeen	OUTFALL	0.05	0.25	401.75	0	02:28	0.25
unnamed_watercourse	OUTFALL	0.00	0.01	405.51	0	02:32	0.01
Ravine	STORAGE	0.16	1.14	407.79	0	02:28	1.14
SU1	STORAGE	0.13	0.84	419.34	0	02:34	0.84
SU2	STORAGE	0.25	1.30	418.30	0	02:54	1.30

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum		Time of Max Occurrence	Lateral Inflow Volume	Total Inflow Volume	Flow Balance Error
		Lateral Inflow LPS	Total Inflow LPS				
EX_CBMH	JUNCTION	1278.28	1278.28	0 02:25	6.52	6.52	0.002
J1	JUNCTION	59.21	59.21	0 02:30	0.49	0.49	0.001
J2	JUNCTION	0.00	1560.62	0 02:28	0	9.72	0.001
J3	JUNCTION	196.87	196.87	0 02:30	1.79	1.79	0.007
J4	JUNCTION	0.00	253.96	0 02:31	0	2.28	0.010
J5	JUNCTION	218.33	1776.73	0 02:28	1.2	10.9	0.000
J6	JUNCTION	0.00	1776.75	0 02:28	0	10.9	0.003
J7	JUNCTION	0.00	115.71	0 02:54	0	1.45	0.002
J8	JUNCTION	162.97	263.12	0 02:25	0.926	2.38	0.002
south_saugeen	OUTFALL	0.00	1776.75	0 02:28	0	10.9	0.000
unnamed_watercourse	OUTFALL	0.00	253.64	0 02:32	0	2.28	0.000
Ravine	STORAGE	92.36	1343.47	0 02:25	0.822	7.34	0.001
SU1	STORAGE	113.21	113.21	0 02:25	0.534	0.534	0.000
SU2	STORAGE	168.64	214.12	0 02:25	0.92	1.45	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume	Max Pcnt Full	Time of Max Occurrence	Maximum Outflow
	1000 m3				1000 m3		days hr:min	LPS
Ravine	0.002	0	0	0	0.065	2	0 02:28	1298.37
SU1	0.021	8	0	0	0.152	57	0 02:34	48.99
SU2	0.031	4	0	0	0.214	25	0 02:54	115.71

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 50 Yr Storm Event

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.92	207.36	1776.75	10.924
unnamed_watercourse	96.89	41.60	253.64	2.283
System	98.41	248.96	2015.89	13.207

\*\*\*\*\*  
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	58.86	0 02:30	1.61	0.00	0.06
C10	CONDUIT	262.38	0 02:27	1.27	0.13	0.37
C2	CONDUIT	195.28	0 02:31	1.69	0.01	0.10
C3	CONDUIT	253.64	0 02:32	0.44	0.00	0.02
C4	CONDUIT	1263.00	0 02:25	1.08	0.78	0.85
C5	CONDUIT	1298.37	0 02:28	2.99	1.78	0.95
C6	CONDUIT	1560.36	0 02:28	2.55	0.21	0.55
C7	CONDUIT	1776.75	0 02:28	2.63	1.56	0.91
C8	CONDUIT	1776.75	0 02:28	2.08	0.13	0.31
C9	CONDUIT	115.70	0 02:55	2.34	0.41	0.50
OR1	ORIFICE	48.99	0 02:34			1.00
OR2	ORIFICE	115.71	0 02:54			1.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry		Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.02	0.00	0.00	0.01	0.98	0.00	0.00	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.02	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00
C3	1.00	0.02	0.00	0.00	0.68	0.30	0.00	0.00	0.15	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.63	0.37	0.00	0.00	0.06	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00

\*\*\*\*\*  
Conduit Surcharge Summary  
\*\*\*\*\*

Conduit	Hours Full			Hours Above Full Capacity	
	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C5	0.01	0.41	0.01	0.51	0.01
C7	0.01	0.03	0.01	0.46	0.01

Analysis begun on: Mon Oct 17 14:42:11 2022  
 Analysis ended on: Mon Oct 17 14:42:12 2022  
 Total elapsed time: 00:00:01

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 100 Yr Storm Event

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

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Element Count

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Number of rain gages ..... 7  
 Number of subcatchments ... 9  
 Number of nodes ..... 14  
 Number of links ..... 12  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*

Subcatchment Summary

\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.85	320.00	0.00	3.0000	SCS_6h_78.4mm_100yr	Ravine
102	5.52	320.00	0.00	3.0000	SCS_6h_78.4mm_100yr	J3
103	1.56	132.00	0.00	3.0000	SCS_6h_78.4mm_100yr	J1
EX1	11.62	3060.00	47.70	2.0000	SCS_6h_78.4mm_100yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_78.4mm_100yr	EX_CBMH
EX3	0.76	100.00	95.00	2.0000	SCS_6h_78.4mm_100yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_78.4mm_100yr	SU2
EX6	3.70	750.00	8.90	15.0000	SCS_6h_78.4mm_100yr	J5
S2	2.10	360.00	22.70	2.0000	SCS_6h_78.4mm_100yr	J8

\*\*\*\*\*

Node Summary

\*\*\*\*\*

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J2	JUNCTION	406.30	1.00	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	402.30	2.70	0.0	
J6	JUNCTION	401.80	1.70	0.0	
J7	JUNCTION	416.32	2.00	0.0	
J8	JUNCTION	408.35	4.00	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Ravine	STORAGE	406.65	2.75	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

\*\*\*\*\*

Link Summary

\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
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## Sunvale Homes – Mount Forest Subdivision – Pre Development – 100 Yr Storm Event

Conduit	Junction	Junction	Type	Length	Area	Flow
C1	J1	J4	CONDUIT	75.0	2.0004	0.0130
C10	J8	J2	CONDUIT	161.8	1.2669	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	EX_CBMH	Ravine	CONDUIT	100.0	0.9800	0.0400
C5	Ravine	J2	CONDUIT	15.0	1.4668	0.0240
C6	J2	J5	CONDUIT	45.0	4.6718	0.0300
C7	J5	J6	CONDUIT	14.3	0.7013	0.0200
C8	J6	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C9	J7	J8	CONDUIT	300.6	2.6520	0.0130
OR1	SU1	SU2	ORIFICE			
OR2	SU2	J7	ORIFICE			

\*\*\*\*\*  
 Cross Section Summary  
 \*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	37770.94
C10	CIRCULAR	0.90	0.64	0.23	0.90	1	2037.73
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1610.43
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01
C7	CIRCULAR	0.95	0.71	0.24	0.95	1	1138.29
C8	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C9	CIRCULAR	0.38	0.11	0.09	0.38	1	285.54

\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00
Ending Date ..... 09/11/2020 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 ..... 2
Head Tolerance ..... 0.001524 m
  
```

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	2.487	78.413
Evaporation Loss	0.000	0.000
Infiltration Loss	1.002	31.594
Surface Runoff	1.482	46.730
Final Storage	0.004	0.120

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 100 Yr Storm Event

Continuity Error (%) ..... -0.040

```

*****
Flow Routing Continuity
*****
Volume      Volume
hectare-m   10^6 ltr
-----
Dry Weather Inflow ..... 0.000 0.000
Wet Weather Inflow ..... 1.482 14.821
Groundwater Inflow ..... 0.000 0.000
RDII Inflow ..... 0.000 0.000
External Inflow ..... 0.000 0.000
External Outflow ..... 1.482 14.820
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 0.001
Continuity Error (%) ..... 0.001
    
```

```

*****
Time-Step Critical Elements
*****
Link C7 (30.07%)
Link C5 (5.14%)
    
```

```

*****
Highest Flow Instability Indexes
*****
All links are stable.
    
```

```

*****
Routing Time Step Summary
*****
Minimum Time Step      : 0.47 sec
Average Time Step      : 4.33 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
*****
    
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
101	78.41	0.00	0.00	45.05	33.18	0.95	112.87	0.423
102	78.41	0.00	0.00	40.99	37.21	2.05	239.38	0.475
103	78.41	0.00	0.00	42.22	36.03	0.56	71.79	0.459
EX1	78.41	0.00	0.00	20.28	58.12	6.75	1393.17	0.741
EX2	78.41	0.00	0.00	46.10	32.05	0.49	46.29	0.409
EX3	78.41	0.00	0.00	1.93	76.55	0.58	123.63	0.976
EX4	78.41	0.00	0.00	28.79	49.58	1.03	192.34	0.632
EX6	78.41	0.00	0.00	41.46	36.91	1.37	255.10	0.471
S2	78.41	0.00	0.00	29.00	49.35	1.04	186.75	0.629

```

*****
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
EX_CBMH	JUNCTION	0.12	0.57	409.70	0 02:25	0.57

### Sunvale Homes – Mount Forest Subdivision – Pre Development – 100 Yr Storm Event

J1	JUNCTION	0.02	0.06	407.56	0	02:30	0.06
J2	JUNCTION	0.13	0.46	406.76	0	02:30	0.46
J3	JUNCTION	0.03	0.10	407.10	0	02:31	0.10
J4	JUNCTION	0.00	0.01	406.01	0	02:31	0.01
J5	JUNCTION	0.19	1.03	403.33	0	02:30	1.03
J6	JUNCTION	0.05	0.27	402.07	0	02:30	0.27
J7	JUNCTION	0.05	0.17	416.49	0	02:59	0.17
J8	JUNCTION	0.06	0.23	408.58	0	02:26	0.23
south_saugeen	OUTFALL	0.05	0.27	401.77	0	02:30	0.27
unnamed_watercourse	OUTFALL	0.00	0.01	405.51	0	02:31	0.01
Ravine	STORAGE	0.18	1.30	407.95	0	02:30	1.30
SU1	STORAGE	0.16	0.92	419.42	0	02:34	0.92
SU2	STORAGE	0.29	1.43	418.43	0	02:58	1.43

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum	Maximum	Time of Max Occurrence days hr:min	Lateral	Total	Flow Balance Error Percent
		Lateral Inflow LPS	Total Inflow LPS		Inflow Volume 10^6 ltr	Inflow Volume 10^6 ltr	
EX_CBMH	JUNCTION	1431.85	1431.85	0 02:25	7.24	7.24	0.003
J1	JUNCTION	71.79	71.79	0 02:30	0.562	0.562	0.001
J2	JUNCTION	0.00	1721.92	0 02:30	0	10.8	0.001
J3	JUNCTION	239.38	239.38	0 02:30	2.05	2.05	0.006
J4	JUNCTION	0.00	308.40	0 02:31	0	2.62	0.009
J5	JUNCTION	255.10	1971.44	0 02:30	1.37	12.2	0.000
J6	JUNCTION	0.00	1971.43	0 02:30	0	12.2	0.003
J7	JUNCTION	0.00	121.95	0 02:58	0	1.61	0.002
J8	JUNCTION	186.75	292.02	0 02:25	1.04	2.65	0.001
south_saugeen	OUTFALL	0.00	1971.44	0 02:30	0	12.2	0.000
unnamed_watercourse	OUTFALL	0.00	307.94	0 02:31	0	2.62	0.000
Ravine	STORAGE	112.87	1503.92	0 02:25	0.946	8.19	0.001
SU1	STORAGE	123.63	123.63	0 02:25	0.583	0.583	0.000
SU2	STORAGE	192.34	240.16	0 02:25	1.03	1.61	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours	Max. Height	Min. Depth
		Surcharged	Above Crown Meters	Below Rim Meters
EX_CBMH	JUNCTION	0.16	0.067	1.413

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max	Maximum
	Volume 1000 m3	Pcnt Full	Pcnt Loss	Pcnt Loss	Volume 1000 m3	Pcnt Full	Occurrence days hr:min	Outflow LPS
Ravine	0.004	0	0	0	0.109	3	0 02:30	1432.97
SU1	0.026	10	0	0	0.170	64	0 02:34	51.49
SU2	0.041	5	0	0	0.259	30	0 02:58	121.95

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 100 Yr Storm Event

\*\*\*\*\*  
 Outfall Loading Summary  
 \*\*\*\*\*

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.93	241.23	1971.44	12.204
unnamed_watercourse	97.07	49.73	307.94	2.616
System	98.50	290.96	2271.90	14.820

\*\*\*\*\*  
 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	71.36	0 02:30	1.67	0.00	0.07
C10	CONDUIT	290.92	0 02:26	1.31	0.14	0.38
C2	CONDUIT	237.23	0 02:31	1.76	0.01	0.11
C3	CONDUIT	307.94	0 02:31	0.47	0.00	0.03
C4	CONDUIT	1403.83	0 02:25	1.13	0.87	0.88
C5	CONDUIT	1432.97	0 02:30	3.28	1.96	0.96
C6	CONDUIT	1721.66	0 02:30	2.61	0.23	0.57
C7	CONDUIT	1971.43	0 02:30	2.88	1.73	0.93
C8	CONDUIT	1971.44	0 02:30	2.15	0.15	0.33
C9	CONDUIT	121.95	0 02:59	2.38	0.43	0.52
OR1	ORIFICE	51.49	0 02:35			1.00
OR2	ORIFICE	121.95	0 02:58			1.00

\*\*\*\*\*  
 Flow Classification Summary  
 \*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Upstream		Downstream		Sup Crit		Down Crit		Inlet
C1	1.00	0.02	0.00	0.00	0.01	0.98	0.00	0.00	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.00	0.00
C3	1.00	0.02	0.00	0.00	0.67	0.31	0.00	0.00	0.15	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.62	0.38	0.00	0.00	0.07	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00

\*\*\*\*\*  
 Conduit Surcharge Summary  
 \*\*\*\*\*

Conduit	Hours Full		Hours Above Full Normal Flow		Hours Capacity Limited
	Both Ends	Upstream	Dnstream		
C4	0.01	0.16	0.01	0.01	0.01
C5	0.01	0.47	0.01	0.65	0.01
C7	0.01	0.23	0.01	0.58	0.01

# Sunvale Homes – Mount Forest Subdivision – Pre Development – 100 Yr Storm Event

Analysis begun on: Mon Oct 17 14:41:41 2022  
Analysis ended on: Mon Oct 17 14:41:42 2022  
Total elapsed time: 00:00:01

# Sunvale Homes – Mount Forest Subdivision – Pre Development – MTO 100 Yr Storm Event

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

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Element Count

\*\*\*\*\*

Number of rain gages ..... 7  
 Number of subcatchments ... 9  
 Number of nodes ..... 14  
 Number of links ..... 12  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*

Subcatchment Summary

\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.85	320.00	0.00	3.0000	SCS_6h_88mm_MTO100Yr	Ravine
102	5.52	320.00	0.00	3.0000	SCS_6h_88mm_MTO100Yr	J3
103	1.56	132.00	0.00	3.0000	SCS_6h_88mm_MTO100Yr	J1
EX1	11.62	3060.00	47.70	2.0000	SCS_6h_88mm_MTO100Yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_88mm_MTO100Yr	EX_CBMH
EX3	0.76	100.00	95.00	2.0000	SCS_6h_88mm_MTO100Yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_88mm_MTO100Yr	SU2
EX6	3.70	750.00	8.90	15.0000	SCS_6h_88mm_MTO100Yr	J5
S2	2.10	360.00	22.70	2.0000	SCS_6h_88mm_MTO100Yr	J8

\*\*\*\*\*

Node Summary

\*\*\*\*\*

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J2	JUNCTION	406.30	1.00	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	402.30	2.70	0.0	
J6	JUNCTION	401.80	1.70	0.0	
J7	JUNCTION	416.32	2.00	0.0	
J8	JUNCTION	408.35	4.00	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Ravine	STORAGE	406.65	2.75	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

\*\*\*\*\*

Link Summary

\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
------	-----------	---------	------	--------	--------	-----------

**Sunvale Homes – Mount Forest Subdivision – Pre Development – MTO 100 Yr Storm Event**

C1	J1	J4	CONDUIT	75.0	2.0004	0.0130
C10	J8	J2	CONDUIT	161.8	1.2669	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	EX_CBMH	Ravine	CONDUIT	100.0	0.9800	0.0400
C5	Ravine	J2	CONDUIT	15.0	1.4668	0.0240
C6	J2	J5	CONDUIT	45.0	4.6718	0.0300
C7	J5	J6	CONDUIT	14.3	0.7013	0.0200
C8	J6	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C9	J7	J8	CONDUIT	300.6	2.6520	0.0130
OR1	SU1	SU2	ORIFICE			
OR2	SU2	J7	ORIFICE			

\*\*\*\*\*  
 Cross Section Summary  
 \*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	37770.94
C10	CIRCULAR	0.90	0.64	0.23	0.90	1	2037.73
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1610.43
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01
C7	CIRCULAR	0.95	0.71	0.24	0.95	1	1138.29
C8	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C9	CIRCULAR	0.38	0.11	0.09	0.38	1	285.54

\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		
*****	-----	-----
Total Precipitation .....	2.791	88.013
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	1.063	33.509
Surface Runoff .....	1.726	54.419
Final Storage .....	0.004	0.120

# Sunvale Homes – Mount Forest Subdivision – Pre Development – MTO 100 Yr Storm Event

Continuity Error (%) ..... -0.041

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity		
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.726	17.260
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.726	17.259
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	0.001
Continuity Error (%) .....	0.001	

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link C7 (30.39%)  
 Link C5 (6.60%)

\*\*\*\*\*  
 Highest Flow Instability Indexes  
 \*\*\*\*\*  
 All links are stable.

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*  
 Minimum Time Step : 1.09 sec  
 Average Time Step : 4.24 sec  
 Maximum Time Step : 5.00 sec  
 Percent in Steady State : 0.00  
 Average Iterations per Step : 2.00  
 Percent Not Converging : 0.03

\*\*\*\*\*  
 Subcatchment Runoff Summary  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
101	88.01	0.00	0.00	47.95	39.89	1.14	146.20	0.453
102	88.01	0.00	0.00	43.32	44.48	2.46	308.02	0.505
103	88.01	0.00	0.00	44.75	43.10	0.67	92.00	0.490
EX1	88.01	0.00	0.00	21.46	66.55	7.73	1613.48	0.756
EX2	88.01	0.00	0.00	49.14	38.61	0.59	60.59	0.439
EX3	88.01	0.00	0.00	2.04	86.05	0.66	139.04	0.978
EX4	88.01	0.00	0.00	30.45	57.52	1.20	228.83	0.654
EX6	88.01	0.00	0.00	44.32	43.66	1.62	312.62	0.496
S2	88.01	0.00	0.00	30.53	57.42	1.21	223.47	0.652

\*\*\*\*\*  
 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
EX_CBMH	JUNCTION	0.13	0.83	409.96	0 02:25	0.83

**Sunvale Homes – Mount Forest Subdivision – Pre Development – MTO 100 Yr Storm Event**

J1	JUNCTION	0.02	0.06	407.56	0	02:30	0.06
J2	JUNCTION	0.14	0.48	406.78	0	02:29	0.48
J3	JUNCTION	0.03	0.11	407.11	0	02:31	0.11
J4	JUNCTION	0.00	0.02	406.02	0	02:31	0.02
J5	JUNCTION	0.22	1.14	403.44	0	02:28	1.14
J6	JUNCTION	0.06	0.29	402.09	0	02:29	0.29
J7	JUNCTION	0.06	0.18	416.50	0	03:05	0.18
J8	JUNCTION	0.07	0.25	408.60	0	02:26	0.25
south_saugeen	OUTFALL	0.06	0.29	401.79	0	02:29	0.29
unnamed_watercourse	OUTFALL	0.00	0.02	405.52	0	02:31	0.02
Ravine	STORAGE	0.21	1.53	408.18	0	02:29	1.53
SU1	STORAGE	0.19	1.04	419.54	0	02:36	1.04
SU2	STORAGE	0.37	1.62	418.62	0	03:04	1.62

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum		Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
		Lateral Inflow LPS	Total Inflow LPS				
EX_CBMH	JUNCTION	1664.97	1664.97	0 02:25	8.32	8.32	0.001
J1	JUNCTION	92.00	92.00	0 02:30	0.672	0.673	0.000
J2	JUNCTION	0.00	1936.40	0 02:29	0	12.5	0.001
J3	JUNCTION	308.02	308.02	0 02:30	2.46	2.46	0.005
J4	JUNCTION	0.00	396.41	0 02:30	0	3.13	0.008
J5	JUNCTION	312.62	2241.56	0 02:28	1.62	14.1	0.000
J6	JUNCTION	0.00	2241.57	0 02:29	0	14.1	0.003
J7	JUNCTION	0.00	130.23	0 03:04	0	1.85	0.002
J8	JUNCTION	223.47	335.65	0 02:25	1.21	3.06	0.002
south_saugeen	OUTFALL	0.00	2241.58	0 02:29	0	14.1	0.000
unnamed_watercourse	OUTFALL	0.00	395.75	0 02:31	0	3.13	0.000
Ravine	STORAGE	146.20	1792.64	0 02:25	1.14	9.46	0.001
SU1	STORAGE	139.04	139.04	0 02:25	0.656	0.656	0.000
SU2	STORAGE	228.83	279.90	0 02:25	1.2	1.85	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height	Min. Depth
			Above Crown Meters	Below Rim Meters
EX_CBMH	JUNCTION	0.32	0.327	1.153

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max	Maximum
	Volume 1000 m3	Pcnt Full	Pcnt Loss	Pcnt Loss	Volume 1000 m3	Pcnt Full	Occurrence days hr:min	Outflow LPS
Ravine	0.009	0	0	0	0.210	6	0 02:29	1604.81
SU1	0.033	12	0	0	0.198	75	0 02:36	54.95
SU2	0.059	7	0	0	0.332	39	0 03:04	130.23

# Sunvale Homes – Mount Forest Subdivision – Pre Development – MTO 100 Yr Storm Event

\*\*\*\*\*  
 Outfall Loading Summary  
 \*\*\*\*\*

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.94	295.75	2241.58	14.131
unnamed_watercourse	97.30	63.26	395.75	3.128
System	98.62	359.01	2628.06	17.259

\*\*\*\*\*  
 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	91.46	0 02:30	1.75	0.00	0.08
C10	CONDUIT	334.11	0 02:26	1.39	0.16	0.40
C2	CONDUIT	305.13	0 02:31	1.87	0.01	0.12
C3	CONDUIT	395.75	0 02:31	0.52	0.00	0.03
C4	CONDUIT	1664.79	0 02:25	1.26	1.03	0.91
C5	CONDUIT	1604.81	0 02:29	3.66	2.20	0.98
C6	CONDUIT	1936.30	0 02:29	2.69	0.26	0.60
C7	CONDUIT	2241.57	0 02:29	3.23	1.97	0.95
C8	CONDUIT	2241.58	0 02:29	2.25	0.17	0.36
C9	CONDUIT	130.23	0 03:05	2.43	0.46	0.55
OR1	ORIFICE	54.95	0 02:36			1.00
OR2	ORIFICE	130.23	0 03:04			1.00

\*\*\*\*\*  
 Flow Classification Summary  
 \*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Upstream		Downstream		Sup Crit		Down Crit		Inlet
C1	1.00	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	1.00	0.00
C2	1.00	0.01	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00
C3	1.00	0.02	0.00	0.00	0.65	0.33	0.00	0.00	0.16	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.61	0.39	0.00	0.00	0.08	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00

\*\*\*\*\*  
 Conduit Surge Summary  
 \*\*\*\*\*

Conduit	Hours Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Normal Flow	Hours Full Capacity Limited
C4	0.01	0.32	0.01	0.07	0.01
C5	0.01	0.58	0.01	0.77	0.01
C7	0.01	0.40	0.01	0.71	0.01

## Sunvale Homes – Mount Forest Subdivision – Pre Development – MTO 100 Yr Storm Event

Analysis begun on: Mon Oct 17 14:40:49 2022  
Analysis ended on: Mon Oct 17 14:40:50 2022  
Total elapsed time: 00:00:01

# Appendix E

**POST DEVELOPMENT MODEL PARAMETERS AND OUTPUT**

**STORMWATER MANAGEMENT REPORT**

**SUNVALE HOMES MOUNT FOREST SUBDIVISION**

**TOWNSHIP OF WELLINGTON NORTH**

**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. (%)	Manning's 'n' (Perv.)	CN (Perv.)
South Saugeen	201	Majority of Development	7.43	2525	29	2.0	62.1	0.25	77.0
South Saugeen	202	Southeast corner of Development	1.73	600	29	3.0	19.6	0.31	73.1
Unnamed Watercourse	203	Rear Yards on Northwest corner of Development	0.15	50	30	4.0	17.7	0.28	75.2
Unnamed Watercourse	204	Rear Yards on Southwest corner of Development	0.54	220	25	4.0	24.5	0.28	75.0
South Saugeen	EX1	Van Den Broek Subdivision	11.65	3060	38	2.0	47.7	0.25	77.0
South Saugeen	EX2	Betty Dee Property	1.52	150	101	2.0	0.0	0.30	72.0
South Saugeen	EX3	Strathcona Village - Phase 2	0.76	100	76	2.0	95.1	0.25	77.0
South Saugeen	EX4	Strathcona Village - Phase 1	2.08	455	46	2.0	26.3	0.25	77.0
South Saugeen	EX5	Martin Street Lots	2.10	360	58	2.0	31.5	0.25	77.0
South Saugeen	EX6	WWTP Driveway, Closed Landfill Site and Trail Area	3.70	750	49	15.0	9.6	0.33	70.3

Table B.2 Site Soils: (as per Ontario Soil Survey Report No. 35 for Wellington County)

Soil Type  
Listowel Silt Loam

Hydrologic Soil Group  
BC

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	0	0	0	100	0	0	0	100
202	0	0	0	100	0	0	0	100
203	0	0	0	100	0	0	0	100
204	0	0	0	100	0	0	0	100
EX1	0	0	0	100	0	0	0	100
EX2	0	0	0	100	0	0	0	100
EX3	0	0	0	100	0	0	0	100
EX4	0	0	0	100	0	0	0	100
EX5	0	0	0	100	0	0	0	100
EX6	0	0	0	100	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	0	0	38	0	0	0	32.0	30.1	100
202	0	30	3	47	0	0	0	13.0	6.7	100
203	0	15	0	67.3	0	0	0	17.7	0.0	100
204	0	15	0	60	0	0	0	24.5	0.0	100
EX1	0	0	0	52	0	0	0	24.0	23.7	100
EX2	0	0	100	0	0	0	0	0.0	0.0	100
EX3	0	0	0	5	0	0	0	95.1	0.0	100
EX4	0	0	0.0	74	0	0	0	26.3	0.0	100
EX5	0	0	0	68	0	0	0	8.8	22.7	100
EX6	0	30	60.4	0	0	0	0	0.0	9.6	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	65	67	72	77	70.5	78	89	77	90	77.0	0.25
202	65	67.0	72	77	70.5	78	89	77.0	90	73.1	0.31
203	65	67	72	77	70.5	78	89	77	90	75.2	0.28
204	65	67	72	77	70.5	78	89	77	90	75.0	0.28
EX1	65	67	72	77	70.5	78	89	77	90	77.0	0.25
EX2	65	67	72	77	70.5	78	89	77	90	72.0	0.30
EX3	65	67	72	77	70.5	78	89	77	90	77.0	0.25
EX4	65	67	72	77	70.5	78	89	77	90	77.0	0.25
EX5	64.5	67	72	77	70.5	78	89	77	90	77.0	0.25
EX6	64.5	67	72	77	70.5	78	89	77	90	70.3	0.33

**Table B.3: Impervious Area Determination for Subcatchments 201 - 203****Proposed Conditions**

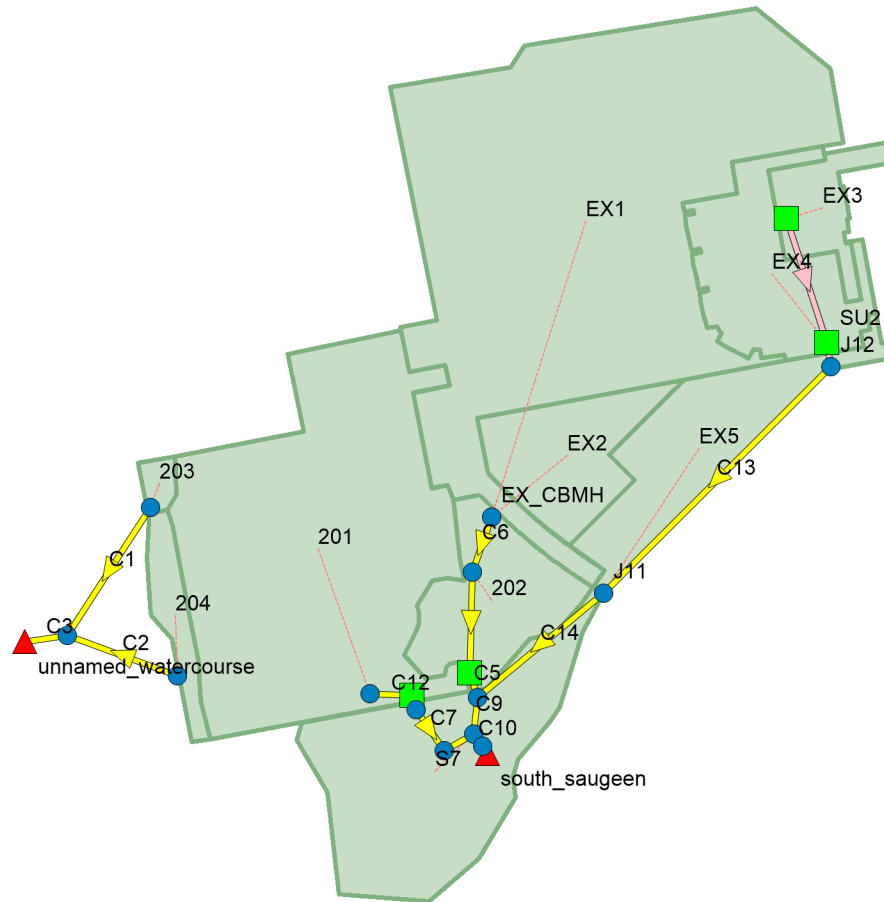
<b>Area of Concern</b>	<b>Total Area (ha)</b>	<b>Impervious Area Connected</b>		<b>Impervious Area Not Connected (Rooftops)</b>		<b>Total (%)</b>
		<b>(ha)</b>	<b>(%)</b>	<b>(ha)</b>	<b>(%)</b>	
201	7.43	2.24	30.1	2.38	32.0	62.1
202	1.73	0.12	6.7	0.22	13.0	19.6
203	0.15	0.00	0.0	0.03	17.7	17.7
204	0.54	0.00	0.0	0.13	24.5	24.5
EX1	11.65	2.76	23.7	2.80	24.0	47.7
EX2	1.52	0.00	0.0	0.00	0.0	0.0
EX3	0.76	0.00	0.0	0.72	95.1	95.1
EX4	2.08	0.00	0.0	0.55	26.3	26.3
EX5	2.10	0.48	22.7	0.19	8.8	31.5
EX6	3.70	0.36	9.6	0.00	0.0	9.6

**Table B.3 - Impervious Area Determination for Proposed Catchments 201 - 203**

Catchment				Imperv. Area	Imperv %
201	1100	m of	20 m wide ROW @ 55% imperv.	1.21 ha	16.3 %
	59	driveways @	90 m <sup>2</sup> @ 100% imperv.	0.53 ha	7.1 %
	66	driveways @	75 m <sup>2</sup> @ 100% imperv.	0.50 ha	6.7 %
	53.5	single res. homes with roof area of	265 m <sup>2</sup>	1.42 ha	19.1 %
	30	Duplex unit with roof area of	165 m <sup>2</sup>	0.50 ha	6.7 %
	36	Multi-family units with roof area of	130 m <sup>2</sup>	0.47 ha	6.3 %
				<b>4.62 ha</b>	
202	110	m of	6.1 m wide ROW @ 100% imperv.	0.07 ha	3.9 %
	55	m of	20 m wide ROW @ 55% imperv.	0.06 ha	3.5 %
	3	driveways @	90 m <sup>2</sup> @ 100% imperv.	0.03 ha	1.6
	12	driveways @	40 m <sup>2</sup> @ 100% imperv.	0.05 ha	2.8
	3.5	single res. homes with roof area of	265 m <sup>2</sup>	0.09 ha	5.4
		Duplex unit with roof area of	145 m <sup>2</sup>	0.00 ha	0.0
	12	Multi-family units with roof area of	110 m <sup>2</sup>	0.13 ha	7.6
			<b>0.43 ha</b>		
203		m of	20 m wide ROW @ 55% imperv.	0.00 ha	0.0 %
		driveways @	1826 m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
	1	single res. homes with roof area of	265 m <sup>2</sup>	0.03 ha	17.7 %
		Duplex unit with roof area of	145 m <sup>2</sup>	0.00 ha	0.0 %
		Multi-family units with roof area of	120 m <sup>2</sup>	0.00 ha	0.0 %
			<b>0.03 ha</b>		
204		m of	20 m wide ROW @ 55% imperv.	0.00 ha	0.0 %
		driveways @	90 m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
	5	single res. homes with roof area of	265 m <sup>2</sup>	0.13 ha	24.5 %
		Duplex unit with roof area of	250 m <sup>2</sup>	0.00 ha	0.0 %
		Multi-family Blocks with roof area of	750 m <sup>2</sup>	0.00 ha	0.0 %
			<b>0.13 ha</b>		
EX1	1530	m of	20 m wide ROW @ 55% imperv.	1.68 ha	14.4 %
	70	driveways @	90 m <sup>2</sup> @ 100% imperv.	0.63 ha	5.4 %
	59	driveways @	75 m <sup>2</sup> @ 100% imperv.	0.44 ha	3.8 %
	70.5	single res. homes with roof area of	265 m <sup>2</sup>	1.87 ha	16.0 %
	46	Duplex unit with roof area of	165 m <sup>2</sup>	0.76 ha	6.5 %
	13	Multi-family Blocks with roof area of	130 m <sup>2</sup>	0.17 ha	1.5 %
			<b>5.55 ha</b>		

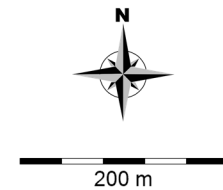
EX2		m of	20	m wide ROW @ 55% imperv.	0.00 ha	0.0 %
		driveways @	90	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
		single res. homes with roof area of	200	m <sup>2</sup>	0.00 ha	0.0 %
		Duplex unit with roof area of	250	m <sup>2</sup>	0.00 ha	0.0 %
		Multi-family Blocks with roof area of	750	m <sup>2</sup>	0.00 ha	0.0 %
				<b>0.00 ha</b>		
EX3		m of	20	m wide ROW @ 55% imperv.	0.00 ha	0.0 %
		driveways @	90	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
	1	Impervious Area	7230	m <sup>2</sup> @ 100% imperv.	0.72 ha	95.1 %
		Duplex unit with roof area of	250	m <sup>2</sup>	0.00 ha	0.0 %
		Multi-family Blocks with roof area of	750	m <sup>2</sup>	0.00 ha	0.0 %
				<b>0.72 ha</b>		
EX4		m of	20	m wide ROW @ 55% imperv.	0.00 ha	0.0 %
		driveways @	90	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
	1	Impervious Area	5465	m <sup>2</sup> @ 100% imperv.	0.55 ha	26.3 %
		Duplex unit with roof area of	250	m <sup>2</sup>	0.00 ha	0.0 %
		Permanent Pool	3500	m <sup>2</sup>	0.00 ha	0.0 %
				<b>0.55 ha</b>		
EX5	360	m of	20	m wide ROW @ 55% imperv.	0.40 ha	18.9 %
	9	Impervious Area	90	m <sup>2</sup> @ 100% imperv.	0.08 ha	3.9 %
	7	Roof Area	265	m <sup>2</sup> @ 100% imperv.	0.19 ha	8.8 %
		Duplex unit with roof area of	250	m <sup>2</sup>	0.00 ha	0.0 %
		Multi-family Blocks with roof area of	750	m <sup>2</sup>	0.00 ha	0.0 %
				<b>0.66 ha</b>		
EX6	550	m of	12	m wide ROW @ 50% imperv.	0.33 ha	8.9 %
	1	Impervious Area	250	m <sup>2</sup> @ 100% imperv.	0.03 ha	0.7 %
		Roof Area	65	m <sup>2</sup> @ 100% imperv.	0.00 ha	0.0 %
				<b>0.36 ha</b>		

# Sunvale Homes - Mount Forest Subdivision - Post Development Schematic

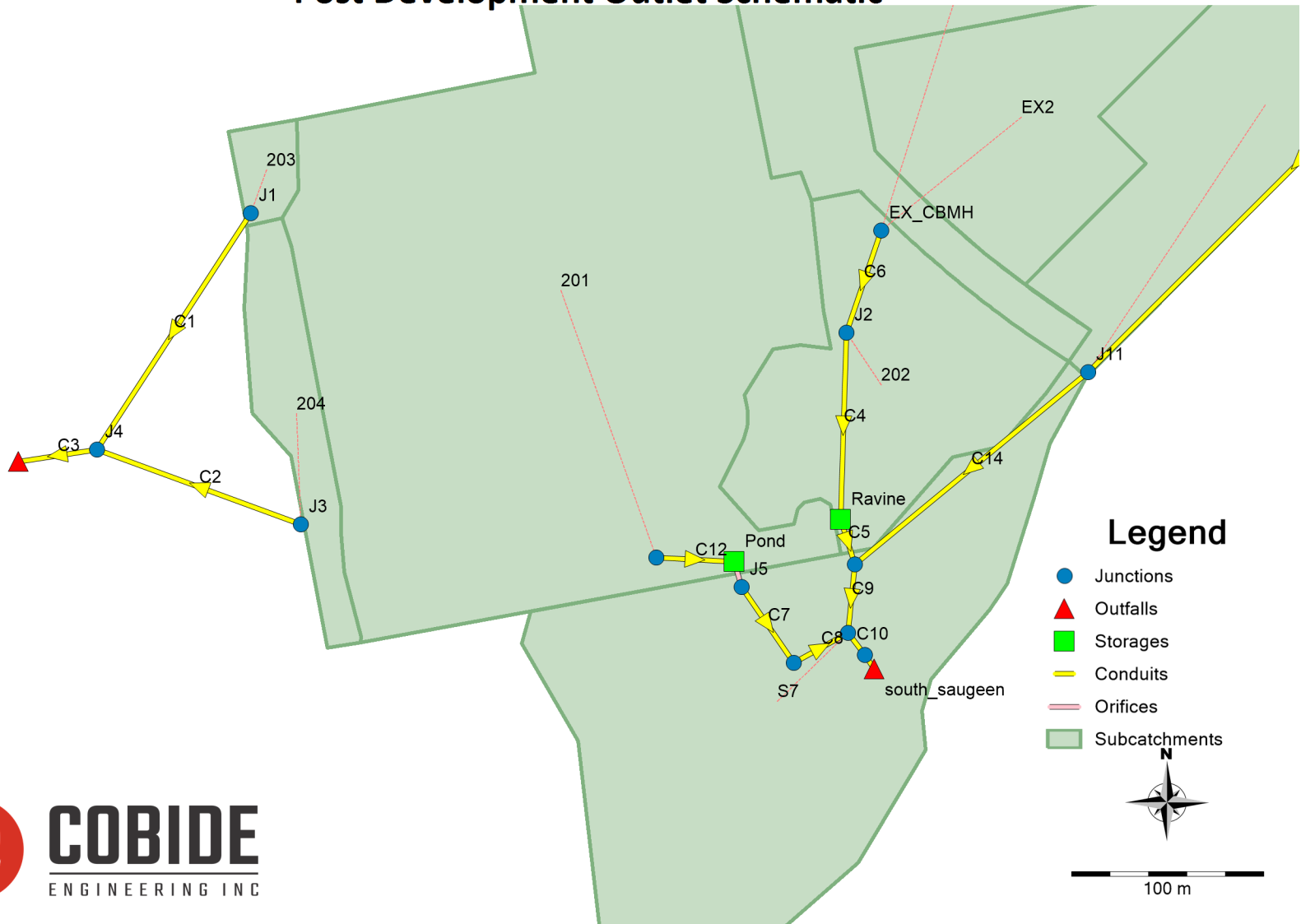


## Legend

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



# Sunvale Homes - Mount Forest Subdivision - Post Development Outlet Schematic



## Sunvale Homes – Mount Forest Subdivision – Post Development – Model Details

### [TITLE]

### [OPTIONS]

```

;;Options          Value
;;-----
FLOW_UNITS        LPS
INFILTRATION      CURVE_NUMBER
FLOW_ROUTING      DYNWAVE
LINK_OFFSETS      ELEVATION
MIN_SLOPE         0
ALLOW_PONDING     NO
SKIP_STEADY_STATE NO

START_DATE        9/10/2020
START_TIME        00:00
REPORT_START_DATE 9/10/2020
REPORT_START_TIME 00:00
END_DATE          9/11/2020
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

INERTIAL_DAMPING  PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP     0.75
LENGTHENING_STEP 0
MIN_SURFAREA      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 Type	Time Intrvl	Snow Catch	Data Source
Hurricane_Hazel_(Southern_Ontario)	INTENSITY	1:00	1.0	TIMESERIES Hurricane_Hazel_(Southern_Ontario)
SCS_6h_38.8mm_2yr	INTENSITY	0:05	1.0	TIMESERIES SCS_6h_38.8mm_2yr
SCS_6h_49.4mm_5yr	INTENSITY	0:05	1.0	TIMESERIES SCS_6h_49.4mm_5yr
SCS_6h_65.3mm_25yr	INTENSITY	0:05	1.0	TIMESERIES SCS_6h_65.3mm_25yr
SCS_6h_71.9mm_50yr	INTENSITY	0:05	1.0	TIMESERIES SCS_6h_71.9mm_50yr
SCS_6h_78.4mm_100yr	INTENSITY	0:05	1.0	TIMESERIES SCS_6h_78.4mm_100yr
SCS_6h_88mm_MTO100Yr	INTENSITY	0:05	1.0	TIMESERIES SCS_6h_88mm_MTO100Yr

### [SUBCATCHMENTS]

;;Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
201	Hurricane_Hazel_(Southern_Ontario)	J10	7.43	62.1	2525	2	0	
202	Hurricane_Hazel_(Southern_Ontario)	J2	1.73	19.6	600	3	0	
203	Hurricane_Hazel_(Southern_Ontario)	J1	0.15	17.7	50	4	0	
204	Hurricane_Hazel_(Southern_Ontario)	J3	0.54	24.2	220	4	0	
EX1	Hurricane_Hazel_(Southern_Ontario)	EX_CBMH	11.65	47.7	3060	2	0	
EX2	Hurricane_Hazel_(Southern_Ontario)	EX_CBMH	1.52	0	150	2	0	
EX3	Hurricane_Hazel_(Southern_Ontario)	SU1	0.762	95.1	100	2	0	
EX4	Hurricane_Hazel_(Southern_Ontario)	SU2	2.0783	26.3	455	2	0	
EX5	Hurricane_Hazel_(Southern_Ontario)	J11	2.1017	31.2	360	2	0	
S7	Hurricane_Hazel_(Southern_Ontario)	J7	3.7003	9.6	750	15	0	

### [SUBAREAS]

## Sunvale Homes – Mount Forest Subdivision – Post Development – Model Details

```

;;Subcatchment  N-Imperv  N-Perv  S-Imperv  S-Perv  PctZero  RouteTo  PctRouted
;;-----
201             0.01    0.25   0.05     0.05   25       OUTLET   -----
202             0.01    0.31   0.05     0.05   25       OUTLET   -----
203             0.01    0.28   0.05     0.05   25       OUTLET   -----
204             0.01    0.28   0.05     0.05   25       OUTLET   -----
EX1             0.01    0.25   0.05     0.05   25       OUTLET   -----
EX2             0.01    0.3    0.05     0.05   25       OUTLET   -----
EX3             0.01    0.25   0.05     0.05   25       OUTLET   -----
EX4             0.01    0.25   0.05     0.05   25       OUTLET   -----
EX5             0.01    0.25   0.05     0.05   25       OUTLET   -----
S7              0.01    0.33   0.05     0.05   25       OUTLET   -----
    
```

**[INFILTRATION]**

```

;;Subcatchment  CurveNum  HydCon  DryTime
;;-----
201             77        0.5     7
202             73.1     0.5     7
203             75.2     12.7    7
204             75        12.7    7
EX1             77        12.7    7
EX2             72        0.5     7
EX3             77        12.7    7
EX4             77        12.7    7
EX5             77        12.7    7
S7              70.3     12.7    7
    
```

**[JUNCTIONS]**

```

;;
;;Name          Invert    Max.      Init.     Surcharge  Ponded
;;             Elev.     Depth     Depth     Depth     Area
;;-----
EX_CBMH        409.13   1.98     0         0         0
J1             407.5    0.5      0         0         0
J10            409      1         0         0         0
J11            408.35   4         0         0         0
J12            416.32   2         0         0         0
J2             408.7    2.1      0         0         0
J3             407      0.5      0         0         0
J4             406      0.5      0         0         0
J5             405.97   3.03     0         0         0
J6             406.3    1         0         0         0
J7             402.3    2.7      0         0         0
J8             404.8    2.12     0         0         0
J9             401.8    1.7      0         0         0
    
```

**[OUTFALLS]**

```

;;
;;Name          Invert    Outfall   Stage/Table  Tide
;;             Elev.     Type      Time Series  Gate      Route To
;;-----
south_saugeen  401.5    FREE      FREE         NO
unnamed_watercourse 405.5    FREE      FREE         NO
    
```

**[STORAGE]**

```

;;
;;Name          Invert    Max.      Init.     Storage    Curve      Evap.
;;             Elev.     Depth     Depth     Curve      Params     Frac.
;;-----
Pond            408.14   0.86     0         TABULAR    Pond       0         0
Ravine          406.65   2.35     0         TABULAR    Ravine     0         0
SU1             418.5    1.3      0         TABULAR    Strathcona-Phase2  0         0
SU2             417      2.5      0         TABULAR    Strathcona-Phase1  0         0
    
```

**[CONDUITS]**

```

;;
;;Name          Inlet     Outlet     Length     Manning    Inlet     Outlet     Init.     Max.
;;             Node      Node      Length     N          Offset    Offset    Flow      Flow
;;-----
C1              J1        J4         145.301    0.013     407.5    406        0         0
C10             J7        J9         14.26     0.013     402.3    402.2     0         0
C11             J9        south_saugeen 10        0.03      401.8    401.5     0         0
C12             J10       Pond       50        0.013     409      408.75    0         0
C13             J12       J11       306.005    0.013     416.32   408.35    0         0
C14             J11       J6         155.922    0.013     408.35   406.3     0         0
    
```

## Sunvale Homes – Mount Forest Subdivision – Post Development – Model Details

C2	J3	J4	111.98	0.013	407	406	0	0
C3	J4	unnamed_watercourse	40.99	0.013	406	405.5	0	0
C4	J2	Ravine	50	0.04	408.7	408.15	0	0
C5	Ravine	J6	15	0.024	406.65	406.43	0	0
C6	EX_CBMH	J2	55.51	0.013	409.13	408.7	0	0
C7	J5	J8	103	0.013	405.97	404.91	0	0
C8	J8	J7	46	0.013	404.8	402.62	0	0
C9	J6	J7	45	0.03	406.3	404.2	0	0

**[ORIFICES]**

```

;;
;;Name      Inlet      Outlet      Orifice      Crest      Disch.      Flap Open/Close
;;          Node       Node        Type         Height     Coeff.      Gate Time
;;-----
OR1         Pond        J5          BOTTOM        408.14    0.65       NO          0
OR2         SU1         SU2         SIDE         418.5     0.63       NO          0
OR3         SU2         J12         SIDE         417       0.63       NO          0
    
```

**[XSECTIONS]**

```

;;Link      Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;;-----
C1          TRIANGULAR 0.5        35         0          0          1
C10         CIRCULAR   1.2        0          0          0          1
C11         TRAPEZOIDAL 0.8        3          1.2        2          1
C12         IRREGULAR  Road      0          0          0          1
C13         CIRCULAR   0.375     0          0          0          1
C14         CIRCULAR   0.9        0          0          0          1
C2          TRIANGULAR 0.5        45         0          0          1
C3          RECT_OPEN  0.5        50         0          0          1
C4          TRAPEZOIDAL 0.5        0.6        5          5          1
C5          CIRCULAR   0.75     0          0          0          1
C6          CIRCULAR   0.9        0          0          0          1
C7          CIRCULAR   0.9        0          0          0          1
C8          CIRCULAR   0.9        0          0          0          1
C9          TRIANGULAR 0.8        5          0          0          1
OR1         RECT_CLOSED 0.9        1.2        0          0          1
OR2         CIRCULAR   0.16     0          0          0          1
OR3         CIRCULAR   0.22     0          0          0          1
    
```

**[TRANSECTS]**

```

;;Transect Data in HEC-2 format
;
NC 0.025    0.025    0.013
X1 Road     9         4.69    14.69    0.0      0.0      0.0      0.0      0.0
GR 100      0         99.894  5.31     99.829  5.54     99.859  5.75     99.944  10
GR 99.859  14.25    99.829  14.46    99.894  14.69    100     20
    
```

**[LOSSES]**

```

;;Link      Inlet      Outlet      Average      Flap Gate      SeepageRate
;;-----
    
```

**[CURVES]**

```

;;Name      Type      X-Value      Y-Value
;;-----
Pond        Storage   0            0
Pond        Storage   0.3          575
Pond        Storage   0.9          1000

Ravine      Storage   0            0
Ravine      Storage   0.35         9
Ravine      Storage   0.85         70
Ravine      Storage   1.35         345
Ravine      Storage   1.85         1090
Ravine      Storage   2.35         3710

Strathcona-Phase1 Storage 0            0
Strathcona-Phase1 Storage 0.125       62.4
Strathcona-Phase1 Storage 0.25        82.4
Strathcona-Phase1 Storage 0.375       103.2
Strathcona-Phase1 Storage 0.5         127.2
Strathcona-Phase1 Storage 0.625      152
Strathcona-Phase1 Storage 0.75       179.2
Strathcona-Phase1 Storage 0.875     209.6
Strathcona-Phase1 Storage 1           240
Strathcona-Phase1 Storage 1.125     274.4
    
```

## Sunvale Homes – Mount Forest Subdivision – Post Development – Model Details

Strathcona-Phase1	1.25	308.8
Strathcona-Phase1	1.375	346.4
Strathcona-Phase1	1.5	386.4
Strathcona-Phase1	1.625	427.2
Strathcona-Phase1	1.75	471.2
Strathcona-Phase1	2.125	612.8
Strathcona-Phase1	2.25	664
Strathcona-Phase1	2.375	718.4
Strathcona-Phase1	2.5	772.8
Strathcona-Phase2 Storage	0	0
Strathcona-Phase2	0.065	156.9230769
Strathcona-Phase2	0.13	161.5384615
Strathcona-Phase2	0.195	167.6923077
Strathcona-Phase2	0.26	172.3076923
Strathcona-Phase2	0.325	176.9230769
Strathcona-Phase2	0.39	183.0769231
Strathcona-Phase2	0.455	189.2307692
Strathcona-Phase2	0.52	195.3846154
Strathcona-Phase2	0.585	200
Strathcona-Phase2	0.65	206.1538462
Strathcona-Phase2	0.715	212.3076923
Strathcona-Phase2	0.78	218.4615385
Strathcona-Phase2	0.845	223.0769231
Strathcona-Phase2	0.91	230.7692308
Strathcona-Phase2	0.975	236.9230769
Strathcona-Phase2	1.04	241.5384615
Strathcona-Phase2	1.105	249.2307692
Strathcona-Phase2	1.17	255.3846154
Strathcona-Phase2	1.235	263.0769231
Strathcona-Phase2	1.3	267.6923077

### [TIMESERIES]

```

;;Name      Date      Time      Value
;;-----
;Hurricane Hazel (Southern Ontario) design storm for 0 - 25 km², total rainfall = 211 mm (100%), rain units =
mm/hr.
Hurricane_Hazel_(Southern_Ontario)      0      6.33
Hurricane_Hazel_(Southern_Ontario)      1      4.22
Hurricane_Hazel_(Southern_Ontario)      2      6.33
Hurricane_Hazel_(Southern_Ontario)      3      12.66
Hurricane_Hazel_(Southern_Ontario)      4      16.88
Hurricane_Hazel_(Southern_Ontario)      5      12.66
Hurricane_Hazel_(Southern_Ontario)      6      23.21
Hurricane_Hazel_(Southern_Ontario)      7      12.66
Hurricane_Hazel_(Southern_Ontario)      8      12.66
Hurricane_Hazel_(Southern_Ontario)      9      52.75
Hurricane_Hazel_(Southern_Ontario)     10      37.98
Hurricane_Hazel_(Southern_Ontario)     11      12.66
Hurricane_Hazel_(Southern_Ontario)     12      0

;SCS_6h_38.8mm design storm, total rainfall = 38.8 mm, rain units = mm/hr.
SCS_6h_38.8mm_2yr

;SCS_6h_49.4mm design storm, total rainfall = 49.4 mm, rain units = mm/hr.
SCS_6h_49.4mm_5yr

;SCS_6h_65.3mm design storm, total rainfall = 65.3 mm, rain units = mm/hr.
SCS_6h_65.3mm_25yr

;SCS_6h_71.9mm design storm, total rainfall = 71.9 mm, rain units = mm/hr.
SCS_6h_71.9mm_50yr

;SCS_6h_78.4mm design storm, total rainfall = 78.4 mm, rain units = mm/hr.
SCS_6h_78.4mm_100yr

;SCS_6h_88mm design storm, total rainfall = 88 mm, rain units = mm/hr.
SCS_6h_88mm_MTO100Yr

```

### [REPORT]

```

;;Reporting Options
INPUT      YES
CONTROLS   NO

```

# Sunvale Homes – Mount Forest Subdivision – Post Development – Model Details

SUBCATCHMENTS ALL  
NODES ALL  
LINKS ALL

**[TAGS]**

**[MAP]**  
DIMENSIONS      520098.9657      4868335.6372      521011.2903      4869271.9308  
UNITS              Meters

# Sunvale Homes – Mount Forest Subdivision – Post Development – 2 Yr Storm Event

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

\*\*\*\*\*

Element Count

\*\*\*\*\*

Number of rain gages ..... 7  
 Number of subcatchments ... 10  
 Number of nodes ..... 19  
 Number of links ..... 17  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*

Subcatchment Summary

\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	7.43	2525.00	62.10	2.0000	SCS_6h_38.8mm_2yr	J10
202	1.73	600.00	19.60	3.0000	SCS_6h_38.8mm_2yr	J2
203	0.15	50.00	17.70	4.0000	SCS_6h_38.8mm_2yr	J1
204	0.54	220.00	24.20	4.0000	SCS_6h_38.8mm_2yr	J3
EX1	11.65	3060.00	47.70	2.0000	SCS_6h_38.8mm_2yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_38.8mm_2yr	EX_CBMH
EX3	0.76	100.00	95.10	2.0000	SCS_6h_38.8mm_2yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_38.8mm_2yr	SU2
EX5	2.10	360.00	31.20	2.0000	SCS_6h_38.8mm_2yr	J11
S7	3.70	750.00	9.60	15.0000	SCS_6h_38.8mm_2yr	J7

\*\*\*\*\*

Node Summary

\*\*\*\*\*

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J10	JUNCTION	409.00	1.00	0.0	
J11	JUNCTION	408.35	4.00	0.0	
J12	JUNCTION	416.32	2.00	0.0	
J2	JUNCTION	408.70	2.10	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	405.97	3.03	0.0	
J6	JUNCTION	406.30	1.00	0.0	
J7	JUNCTION	402.30	2.70	0.0	
J8	JUNCTION	404.80	2.12	0.0	
J9	JUNCTION	401.80	1.70	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Pond	STORAGE	408.14	0.86	0.0	
Ravine	STORAGE	406.65	2.35	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 2 Yr Storm Event

\*\*\*\*\*  
Link Summary  
\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	J4	CONDUIT	145.3	1.0324	0.0130
C10	J7	J9	CONDUIT	14.3	0.7013	0.0130
C11	J9	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C12	J10	Pond	CONDUIT	50.0	0.5000	0.0130
C13	J12	J11	CONDUIT	306.0	2.6054	0.0130
C14	J11	J6	CONDUIT	155.9	1.3149	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	J2	Ravine	CONDUIT	50.0	1.1001	0.0400
C5	Ravine	J6	CONDUIT	15.0	1.4668	0.0240
C6	EX_CBMH	J2	CONDUIT	55.5	0.7747	0.0130
C7	J5	J8	CONDUIT	103.0	1.0292	0.0130
C8	J8	J7	CONDUIT	46.0	4.7445	0.0130
C9	J6	J7	CONDUIT	45.0	4.6718	0.0300
OR1	Pond	J5	ORIFICE			
OR2	SU1	SU2	ORIFICE			
OR3	SU2	J12	ORIFICE			

\*\*\*\*\*  
Cross Section Summary  
\*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	27134.53
C10	CIRCULAR	1.20	1.13	0.30	1.20	1	3265.09
C11	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C12	Road	0.17	1.53	0.07	20.00	1	1418.78
C13	CIRCULAR	0.38	0.11	0.09	0.38	1	283.02
C14	CIRCULAR	0.90	0.64	0.23	0.90	1	2075.97
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1706.19
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	CIRCULAR	0.90	0.64	0.23	0.90	1	1593.44
C7	CIRCULAR	0.90	0.64	0.23	0.90	1	1836.64
C8	CIRCULAR	0.90	0.64	0.23	0.90	1	3943.42
C9	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01

\*\*\*\*\*  
Transect Summary  
\*\*\*\*\*

Transect Road

Area:

0.0001	0.0003	0.0007	0.0013	0.0020
0.0029	0.0039	0.0052	0.0065	0.0086
0.0114	0.0150	0.0195	0.0248	0.0309
0.0378	0.0456	0.0541	0.0635	0.0741
0.0861	0.0997	0.1149	0.1316	0.1498
0.1695	0.1908	0.2136	0.2379	0.2638
0.2912	0.3201	0.3505	0.3825	0.4153
0.4489	0.4833	0.5185	0.5544	0.5911
0.6285	0.6667	0.7057	0.7454	0.7860
0.8272	0.8693	0.9121	0.9557	1.0000

Hrad:

0.0237	0.0474	0.0711	0.0948	0.1185
0.1423	0.1660	0.1897	0.1943	0.1688
0.1683	0.1776	0.1919	0.2090	0.2279
0.2479	0.2687	0.2902	0.3121	0.3243
0.3372	0.3507	0.3649	0.3796	0.3948
0.4104	0.4264	0.4428	0.4595	0.4764
0.4936	0.5110	0.5287	0.5486	0.5806
0.6120	0.6427	0.6729	0.7026	0.7317
0.7604	0.7886	0.8163	0.8437	0.8706

# Sunvale Homes – Mount Forest Subdivision – Post Development – 2 Yr Storm Event

Width:	0.8972	0.9234	0.9492	0.9748	1.0000
	0.0036	0.0072	0.0108	0.0144	0.0180
	0.0216	0.0252	0.0288	0.0358	0.0541
	0.0724	0.0907	0.1090	0.1273	0.1457
	0.1640	0.1823	0.2006	0.2189	0.2530
	0.2873	0.3215	0.3557	0.3900	0.4242
	0.4584	0.4927	0.5269	0.5611	0.5954
	0.6296	0.6638	0.6981	0.7259	0.7430
	0.7601	0.7773	0.7944	0.8115	0.8287
	0.8458	0.8629	0.8801	0.8972	0.9143
	0.9315	0.9486	0.9657	0.9829	1.0000

\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation .....	1.229	38.807
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.499	15.762
Surface Runoff .....	0.728	22.997
Final Storage .....	0.002	0.069
Continuity Error (%) .....	-0.053	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	0.728	7.283
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	0.728	7.283
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 (%) .....	-0.018	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 2 Yr Storm Event

\*\*\*\*\*  
 Highest Continuity Errors  
 \*\*\*\*\*  
 Node J4 (-1.02%)

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link C10 (24.76%)

\*\*\*\*\*  
 Highest Flow Instability Indexes  
 \*\*\*\*\*  
 Link C3 (5)

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*  
 Minimum Time Step : 0.93 sec  
 Average Time Step : 4.58 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  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10 <sup>6</sup> ltr	Peak Runoff LPS	Runoff Coeff
201	38.81	0.00	0.00	9.73	29.06	2.16	443.82	0.749
202	38.81	0.00	0.00	22.05	16.70	0.29	46.74	0.430
203	38.81	0.00	0.00	21.83	16.93	0.03	4.25	0.436
204	38.81	0.00	0.00	20.17	18.59	0.10	18.43	0.479
EX1	38.81	0.00	0.00	13.43	25.35	2.95	568.27	0.653
EX2	38.81	0.00	0.00	29.29	9.25	0.14	9.34	0.238
EX3	38.81	0.00	0.00	1.26	37.56	0.29	60.47	0.968
EX4	38.81	0.00	0.00	19.06	19.68	0.41	66.01	0.507
EX5	38.81	0.00	0.00	17.88	20.86	0.44	71.66	0.537
S7	38.81	0.00	0.00	25.76	12.98	0.48	70.12	0.334

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 Node Depth Summary  
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EX_CBMH	JUNCTION	0.07	0.37	409.50	0 02:25	0.37
J1	JUNCTION	0.01	0.02	407.52	0 02:28	0.02
J10	JUNCTION	0.03	0.12	409.12	0 02:25	0.12
J11	JUNCTION	0.04	0.16	408.51	0 02:26	0.16
J12	JUNCTION	0.03	0.13	416.45	0 02:35	0.13
J2	JUNCTION	0.07	0.35	409.05	0 02:25	0.35
J3	JUNCTION	0.01	0.04	407.04	0 02:26	0.04
J4	JUNCTION	0.00	0.00	406.00	0 02:28	0.00
J5	JUNCTION	0.05	0.30	406.27	0 02:26	0.30
J6	JUNCTION	0.08	0.34	406.64	0 02:26	0.34
J7	JUNCTION	0.10	0.52	402.82	0 02:26	0.52
J8	JUNCTION	0.03	0.20	405.00	0 02:26	0.20
J9	JUNCTION	0.03	0.21	402.01	0 02:26	0.21
south_saugeen	OUTFALL	0.03	0.21	401.71	0 02:26	0.21

## Sunvale Homes – Mount Forest Subdivision – Post Development – 2 Yr Storm Event

unnamed_watercourse	OUTFALL	0.00	0.00	405.50	0	02:28	0.00
Pond	STORAGE	0.02	0.15	408.29	0	02:25	0.15
Ravine	STORAGE	0.09	0.51	407.16	0	02:25	0.51
SU1	STORAGE	0.06	0.43	418.93	0	02:33	0.43
SU2	STORAGE	0.09	0.59	417.59	0	02:34	0.59

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Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EX_CBMH	JUNCTION	573.96	573.96	0 02:25	3.09	3.09	-0.000
J1	JUNCTION	4.25	4.25	0 02:25	0.0254	0.0254	0.013
J10	JUNCTION	443.82	443.82	0 02:25	2.16	2.16	-0.004
J11	JUNCTION	71.66	138.39	0 02:25	0.438	1.13	0.003
J12	JUNCTION	0.00	73.66	0 02:34	0	0.695	0.006
J2	JUNCTION	46.74	620.02	0 02:25	0.289	3.38	0.004
J3	JUNCTION	18.43	18.43	0 02:25	0.1	0.1	-0.005
J4	JUNCTION	0.00	22.04	0 02:26	0	0.126	-1.013
J5	JUNCTION	0.00	440.15	0 02:25	0	2.16	-0.001
J6	JUNCTION	0.00	753.07	0 02:25	0	4.52	0.001
J7	JUNCTION	70.12	1261.92	0 02:26	0.48	7.16	0.000
J8	JUNCTION	0.00	439.93	0 02:26	0	2.16	-0.000
J9	JUNCTION	0.00	1262.08	0 02:26	0	7.16	0.003
south_saugeen	OUTFALL	0.00	1262.10	0 02:26	0	7.16	0.000
unnamed_watercourse	OUTFALL	0.00	21.87	0 02:28	0	0.127	0.000
Pond	STORAGE	0.00	441.97	0 02:25	0	2.16	-0.000
Ravine	STORAGE	0.00	616.47	0 02:25	0	3.38	0.000
SU1	STORAGE	60.47	60.47	0 02:25	0.286	0.286	0.000
SU2	STORAGE	66.01	97.09	0 02:25	0.409	0.695	0.001

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Node Surcharge Summary  
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No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Pond	0.001	0	0	0	0.021	4	0 02:25	440.15
Ravine	0.000	0	0	0	0.005	0	0 02:25	615.89
SU1	0.008	3	0	0	0.068	26	0 02:33	33.41
SU2	0.005	1	0	0	0.051	6	0 02:34	73.66

\*\*\*\*\*  
Outfall Loading Summary  
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Flow Freq	Avg Flow	Max Flow	Total Volume
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# Sunvale Homes – Mount Forest Subdivision – Post Development – 2 Yr Storm Event

Outfall Node	Pcnt	LPS	LPS	10^6 ltr
south_saugeen	99.90	121.20	1262.10	7.156
unnamed_watercourse	55.89	3.82	21.87	0.127
System	77.90	125.02	1283.74	7.283

\*\*\*\*\*  
 Link Flow Summary  
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Link	Type	Maximum  Flow  LPS	Time of Max Occurrence days hr:min	Maximum  Veloc  m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	4.08	0 02:28	0.71	0.00	0.03
C10	CONDUIT	1262.08	0 02:26	2.70	0.39	0.43
C11	CONDUIT	1262.10	0 02:26	1.85	0.09	0.26
C12	CHANNEL	441.97	0 02:25	0.66	0.31	0.71
C13	CONDUIT	73.61	0 02:35	2.05	0.26	0.38
C14	CONDUIT	137.43	0 02:26	1.04	0.07	0.27
C2	CONDUIT	18.00	0 02:26	0.98	0.00	0.04
C3	CONDUIT	21.87	0 02:28	0.00	0.00	0.01
C4	CONDUIT	616.47	0 02:25	0.95	0.36	0.61
C5	CONDUIT	615.89	0 02:25	1.97	0.84	0.67
C6	CONDUIT	573.32	0 02:25	2.40	0.36	0.40
C7	CONDUIT	439.93	0 02:26	2.37	0.24	0.33
C8	CONDUIT	439.94	0 02:26	4.09	0.11	0.23
C9	CONDUIT	752.07	0 02:26	2.13	0.10	0.42
OR1	ORIFICE	440.15	0 02:25			
OR2	ORIFICE	33.41	0 02:33			1.00
OR3	ORIFICE	73.66	0 02:34			1.00

\*\*\*\*\*  
 Flow Classification Summary  
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl	
C1	1.00	0.00	0.00	0.00	0.11	0.89	0.00	0.00	0.01	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.67	0.33	0.00	0.00	0.04	0.00
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.92	0.00
C14	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C3	1.00	0.22	0.00	0.00	0.76	0.02	0.00	0.00	0.00	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.68	0.32	0.00	0.00	0.97	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C9	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

\*\*\*\*\*  
 Conduit Surcharge Summary  
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No conduits were surcharged.

Analysis begun on: Mon Oct 17 15:17:50 2022  
 Analysis ended on: Mon Oct 17 15:17:51 2022  
 Total elapsed time: 00:00:01

# Sunvale Homes – Mount Forest Subdivision – Post Development – 5 Yr Storm Event

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

\*\*\*\*\*  
 Element Count  
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Number of rain gages ..... 7  
 Number of subcatchments ... 10  
 Number of nodes ..... 19  
 Number of links ..... 17  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*  
 Raingage Summary  
 \*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*  
 Subcatchment Summary  
 \*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	7.43	2525.00	62.10	2.0000	SCS_6h_49.4mm_5yr	J10
202	1.73	600.00	19.60	3.0000	SCS_6h_49.4mm_5yr	J2
203	0.15	50.00	17.70	4.0000	SCS_6h_49.4mm_5yr	J1
204	0.54	220.00	24.20	4.0000	SCS_6h_49.4mm_5yr	J3
EX1	11.65	3060.00	47.70	2.0000	SCS_6h_49.4mm_5yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_49.4mm_5yr	EX_CBMH
EX3	0.76	100.00	95.10	2.0000	SCS_6h_49.4mm_5yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_49.4mm_5yr	SU2
EX5	2.10	360.00	31.20	2.0000	SCS_6h_49.4mm_5yr	J11
S7	3.70	750.00	9.60	15.0000	SCS_6h_49.4mm_5yr	J7

\*\*\*\*\*  
 Node Summary  
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J10	JUNCTION	409.00	1.00	0.0	
J11	JUNCTION	408.35	4.00	0.0	
J12	JUNCTION	416.32	2.00	0.0	
J2	JUNCTION	408.70	2.10	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	405.97	3.03	0.0	
J6	JUNCTION	406.30	1.00	0.0	
J7	JUNCTION	402.30	2.70	0.0	
J8	JUNCTION	404.80	2.12	0.0	
J9	JUNCTION	401.80	1.70	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Pond	STORAGE	408.14	0.86	0.0	
Ravine	STORAGE	406.65	2.35	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 5 Yr Storm Event

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Link Summary  
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	J4	CONDUIT	145.3	1.0324	0.0130
C10	J7	J9	CONDUIT	14.3	0.7013	0.0130
C11	J9	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C12	J10	Pond	CONDUIT	50.0	0.5000	0.0130
C13	J12	J11	CONDUIT	306.0	2.6054	0.0130
C14	J11	J6	CONDUIT	155.9	1.3149	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	J2	Ravine	CONDUIT	50.0	1.1001	0.0400
C5	Ravine	J6	CONDUIT	15.0	1.4668	0.0240
C6	EX_CBMH	J2	CONDUIT	55.5	0.7747	0.0130
C7	J5	J8	CONDUIT	103.0	1.0292	0.0130
C8	J8	J7	CONDUIT	46.0	4.7445	0.0130
C9	J6	J7	CONDUIT	45.0	4.6718	0.0300
OR1	Pond	J5	ORIFICE			
OR2	SU1	SU2	ORIFICE			
OR3	SU2	J12	ORIFICE			

\*\*\*\*\*  
Cross Section Summary  
\*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	27134.53
C10	CIRCULAR	1.20	1.13	0.30	1.20	1	3265.09
C11	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C12	Road	0.17	1.53	0.07	20.00	1	1418.78
C13	CIRCULAR	0.38	0.11	0.09	0.38	1	283.02
C14	CIRCULAR	0.90	0.64	0.23	0.90	1	2075.97
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1706.19
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	CIRCULAR	0.90	0.64	0.23	0.90	1	1593.44
C7	CIRCULAR	0.90	0.64	0.23	0.90	1	1836.64
C8	CIRCULAR	0.90	0.64	0.23	0.90	1	3943.42
C9	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01

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Transect Summary  
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Transect Road

Area:

0.0001	0.0003	0.0007	0.0013	0.0020
0.0029	0.0039	0.0052	0.0065	0.0086
0.0114	0.0150	0.0195	0.0248	0.0309
0.0378	0.0456	0.0541	0.0635	0.0741
0.0861	0.0997	0.1149	0.1316	0.1498
0.1695	0.1908	0.2136	0.2379	0.2638
0.2912	0.3201	0.3505	0.3825	0.4153
0.4489	0.4833	0.5185	0.5544	0.5911
0.6285	0.6667	0.7057	0.7454	0.7860
0.8272	0.8693	0.9121	0.9557	1.0000

Hrad:

0.0237	0.0474	0.0711	0.0948	0.1185
0.1423	0.1660	0.1897	0.1943	0.1688
0.1683	0.1776	0.1919	0.2090	0.2279
0.2479	0.2687	0.2902	0.3121	0.3243
0.3372	0.3507	0.3649	0.3796	0.3948
0.4104	0.4264	0.4428	0.4595	0.4764
0.4936	0.5110	0.5287	0.5486	0.5806
0.6120	0.6427	0.6729	0.7026	0.7317
0.7604	0.7886	0.8163	0.8437	0.8706

# Sunvale Homes – Mount Forest Subdivision – Post Development – 5 Yr Storm Event

Width:	0.8972	0.9234	0.9492	0.9748	1.0000
	0.0036	0.0072	0.0108	0.0144	0.0180
	0.0216	0.0252	0.0288	0.0358	0.0541
	0.0724	0.0907	0.1090	0.1273	0.1457
	0.1640	0.1823	0.2006	0.2189	0.2530
	0.2873	0.3215	0.3557	0.3900	0.4242
	0.4584	0.4927	0.5269	0.5611	0.5954
	0.6296	0.6638	0.6981	0.7259	0.7430
	0.7601	0.7773	0.7944	0.8115	0.8287
	0.8458	0.8629	0.8801	0.8972	0.9143
	0.9315	0.9486	0.9657	0.9829	1.0000

\*\*\*\*\*  
 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.  
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\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation .....	1.564	49.408
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.586	18.520
Surface Runoff .....	0.977	30.844
Final Storage .....	0.002	0.069
Continuity Error (%) .....	-0.052	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	0.977	9.768
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	0.977	9.768
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 (%) .....	-0.012	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 5 Yr Storm Event

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link C10 (30.84%)

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 Highest Flow Instability Indexes  
 \*\*\*\*\*  
 Link C3 (5)

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 Routing Time Step Summary  
 \*\*\*\*\*  
 Minimum Time Step : 0.48 sec  
 Average Time Step : 4.43 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  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10 <sup>6</sup> ltr	Peak Runoff LPS	Runoff Coeff
201	49.41	0.00	0.00	11.34	38.06	2.83	588.19	0.770
202	49.41	0.00	0.00	26.12	23.24	0.40	69.02	0.470
203	49.41	0.00	0.00	25.64	23.72	0.04	6.35	0.480
204	49.41	0.00	0.00	23.65	25.71	0.14	26.65	0.520
EX1	49.41	0.00	0.00	15.68	33.70	3.93	772.25	0.682
EX2	49.41	0.00	0.00	34.75	14.39	0.22	15.97	0.291
EX3	49.41	0.00	0.00	1.47	47.96	0.37	77.32	0.971
EX4	49.41	0.00	0.00	22.30	27.04	0.56	94.92	0.547
EX5	49.41	0.00	0.00	20.87	28.48	0.60	100.87	0.576
S7	49.41	0.00	0.00	30.66	18.69	0.69	110.45	0.378

\*\*\*\*\*  
 Node Depth Summary  
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EX_CBMH	JUNCTION	0.08	0.45	409.58	0 02:25	0.45
J1	JUNCTION	0.01	0.03	407.53	0 02:28	0.03
J10	JUNCTION	0.04	0.13	409.13	0 02:25	0.13
J11	JUNCTION	0.04	0.18	408.53	0 02:26	0.18
J12	JUNCTION	0.04	0.14	416.46	0 02:46	0.14
J2	JUNCTION	0.09	0.40	409.10	0 02:25	0.40
J3	JUNCTION	0.01	0.04	407.04	0 02:26	0.04
J4	JUNCTION	0.00	0.00	406.00	0 02:27	0.00
J5	JUNCTION	0.06	0.35	406.32	0 02:26	0.35
J6	JUNCTION	0.10	0.38	406.68	0 02:26	0.38
J7	JUNCTION	0.12	0.62	402.92	0 02:26	0.62
J8	JUNCTION	0.04	0.23	405.03	0 02:26	0.23
J9	JUNCTION	0.04	0.25	402.05	0 02:26	0.25
south_saugeen	OUTFALL	0.04	0.25	401.75	0 02:26	0.25
unnamed_watercourse	OUTFALL	0.00	0.00	405.50	0 02:27	0.00
Pond	STORAGE	0.02	0.18	408.32	0 02:25	0.18
Ravine	STORAGE	0.11	0.65	407.30	0 02:25	0.65
SU1	STORAGE	0.08	0.56	419.06	0 02:34	0.56
SU2	STORAGE	0.13	0.82	417.82	0 02:46	0.82

# Sunvale Homes – Mount Forest Subdivision – Post Development – 5 Yr Storm Event

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EX_CBMH	JUNCTION	783.59	783.59	0 02:25	4.15	4.15	-0.000
J1	JUNCTION	6.35	6.35	0 02:25	0.0356	0.0356	0.012
J10	JUNCTION	588.19	588.19	0 02:25	2.83	2.83	-0.004
J11	JUNCTION	100.87	179.93	0 02:25	0.599	1.53	0.002
J12	JUNCTION	0.00	89.18	0 02:46	0	0.928	0.005
J2	JUNCTION	69.02	851.68	0 02:25	0.402	4.55	0.003
J3	JUNCTION	26.65	26.65	0 02:25	0.139	0.139	-0.005
J4	JUNCTION	0.00	32.14	0 02:26	0	0.174	-0.723
J5	JUNCTION	0.00	582.92	0 02:25	0	2.83	-0.001
J6	JUNCTION	0.00	1022.69	0 02:26	0	6.07	0.001
J7	JUNCTION	110.45	1714.74	0 02:26	0.692	9.59	-0.001
J8	JUNCTION	0.00	582.71	0 02:26	0	2.83	0.006
J9	JUNCTION	0.00	1714.97	0 02:26	0	9.59	0.003
south_saugeen	OUTFALL	0.00	1715.00	0 02:26	0	9.59	0.000
unnamed_watercourse	OUTFALL	0.00	31.94	0 02:27	0	0.176	0.000
Pond	STORAGE	0.00	585.82	0 02:25	0	2.83	-0.000
Ravine	STORAGE	0.00	846.85	0 02:25	0	4.55	0.000
SU1	STORAGE	77.32	77.32	0 02:25	0.366	0.365	0.000
SU2	STORAGE	94.92	131.20	0 02:25	0.562	0.928	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Pond	0.002	0	0	0	0.031	6	0 02:25	582.92
Ravine	0.001	0	0	0	0.010	1	0 02:25	844.06
SU1	0.011	4	0	0	0.094	35	0 02:34	39.05
SU2	0.010	1	0	0	0.090	10	0 02:46	89.18

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.91	172.80	1715.00	9.593
unnamed_watercourse	57.78	5.46	31.94	0.176
System	78.84	178.26	1746.72	9.768

# Sunvale Homes – Mount Forest Subdivision – Post Development – 5 Yr Storm Event

\*\*\*\*\*  
 Link Flow Summary  
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Link	Type	Maximum  Flow  LPS	Time of Max Occurrence days hr:min	Maximum  Veloc  m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	6.12	0 02:28	0.78	0.00	0.03
C10	CONDUIT	1714.97	0 02:26	2.92	0.53	0.51
C11	CONDUIT	1715.00	0 02:26	2.05	0.13	0.31
C12	CHANNEL	585.82	0 02:25	0.72	0.41	0.77
C13	CONDUIT	89.17	0 02:46	2.17	0.32	0.42
C14	CONDUIT	178.76	0 02:26	1.14	0.09	0.31
C2	CONDUIT	26.09	0 02:26	1.07	0.00	0.05
C3	CONDUIT	31.94	0 02:27	0.19	0.00	0.01
C4	CONDUIT	846.85	0 02:25	1.03	0.50	0.70
C5	CONDUIT	844.06	0 02:26	2.19	1.16	0.81
C6	CONDUIT	782.72	0 02:25	2.68	0.49	0.47
C7	CONDUIT	582.71	0 02:26	2.56	0.32	0.39
C8	CONDUIT	582.70	0 02:26	4.12	0.15	0.30
C9	CONDUIT	1021.73	0 02:26	2.29	0.13	0.47
OR1	ORIFICE	582.92	0 02:25			
OR2	ORIFICE	39.05	0 02:34			1.00
OR3	ORIFICE	89.18	0 02:46			1.00

\*\*\*\*\*  
 Flow Classification Summary  
 \*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		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	0.10	0.90	0.00	0.00	0.01	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.65	0.35	0.00	0.00	0.05	0.00
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.94	0.00
C14	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C3	1.00	0.21	0.00	0.00	0.74	0.04	0.00	0.00	0.01	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.66	0.34	0.00	0.00	0.98	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.00	0.03	0.00	0.97	0.02	0.00
C9	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

\*\*\*\*\*  
 Conduit Surcharge Summary  
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Conduit	Hours Full			Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
C5	0.01	0.01	0.01	0.25	0.01

Analysis begun on: Mon Oct 17 15:17:16 2022  
 Analysis ended on: Mon Oct 17 15:17:17 2022  
 Total elapsed time: 00:00:01

# Sunvale Homes – Mount Forest Subdivision – Post Development – 25 Yr Storm Event

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

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Element Count

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Number of rain gages ..... 7  
 Number of subcatchments ... 10  
 Number of nodes ..... 19  
 Number of links ..... 17  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

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Subcatchment Summary

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Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	7.43	2525.00	62.10	2.0000	SCS_6h_65.3mm_25yr	J10
202	1.73	600.00	19.60	3.0000	SCS_6h_65.3mm_25yr	J2
203	0.15	50.00	17.70	4.0000	SCS_6h_65.3mm_25yr	J1
204	0.54	220.00	24.20	4.0000	SCS_6h_65.3mm_25yr	J3
EX1	11.65	3060.00	47.70	2.0000	SCS_6h_65.3mm_25yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_65.3mm_25yr	EX_CBMH
EX3	0.76	100.00	95.10	2.0000	SCS_6h_65.3mm_25yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_65.3mm_25yr	SU2
EX5	2.10	360.00	31.20	2.0000	SCS_6h_65.3mm_25yr	J11
S7	3.70	750.00	9.60	15.0000	SCS_6h_65.3mm_25yr	J7

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Node Summary

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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J10	JUNCTION	409.00	1.00	0.0	
J11	JUNCTION	408.35	4.00	0.0	
J12	JUNCTION	416.32	2.00	0.0	
J2	JUNCTION	408.70	2.10	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	405.97	3.03	0.0	
J6	JUNCTION	406.30	1.00	0.0	
J7	JUNCTION	402.30	2.70	0.0	
J8	JUNCTION	404.80	2.12	0.0	
J9	JUNCTION	401.80	1.70	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Pond	STORAGE	408.14	0.86	0.0	
Ravine	STORAGE	406.65	2.35	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

## Sunvale Homes – Mount Forest Subdivision – Post Development – 25 Yr Storm Event

\*\*\*\*\*  
 Link Summary  
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	J4	CONDUIT	145.3	1.0324	0.0130
C10	J7	J9	CONDUIT	14.3	0.7013	0.0130
C11	J9	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C12	J10	Pond	CONDUIT	50.0	0.5000	0.0130
C13	J12	J11	CONDUIT	306.0	2.6054	0.0130
C14	J11	J6	CONDUIT	155.9	1.3149	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	J2	Ravine	CONDUIT	50.0	1.1001	0.0400
C5	Ravine	J6	CONDUIT	15.0	1.4668	0.0240
C6	EX_CBMH	J2	CONDUIT	55.5	0.7747	0.0130
C7	J5	J8	CONDUIT	103.0	1.0292	0.0130
C8	J8	J7	CONDUIT	46.0	4.7445	0.0130
C9	J6	J7	CONDUIT	45.0	4.6718	0.0300
OR1	Pond	J5	ORIFICE			
OR2	SU1	SU2	ORIFICE			
OR3	SU2	J12	ORIFICE			

\*\*\*\*\*  
 Cross Section Summary  
 \*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	27134.53
C10	CIRCULAR	1.20	1.13	0.30	1.20	1	3265.09
C11	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C12	Road	0.17	1.53	0.07	20.00	1	1418.78
C13	CIRCULAR	0.38	0.11	0.09	0.38	1	283.02
C14	CIRCULAR	0.90	0.64	0.23	0.90	1	2075.97
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1706.19
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	CIRCULAR	0.90	0.64	0.23	0.90	1	1593.44
C7	CIRCULAR	0.90	0.64	0.23	0.90	1	1836.64
C8	CIRCULAR	0.90	0.64	0.23	0.90	1	3943.42
C9	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01

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 Transect Summary  
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Transect Road

Area:	0.0001	0.0003	0.0007	0.0013	0.0020
	0.0029	0.0039	0.0052	0.0065	0.0086
	0.0114	0.0150	0.0195	0.0248	0.0309
	0.0378	0.0456	0.0541	0.0635	0.0741
	0.0861	0.0997	0.1149	0.1316	0.1498
	0.1695	0.1908	0.2136	0.2379	0.2638
	0.2912	0.3201	0.3505	0.3825	0.4153
	0.4489	0.4833	0.5185	0.5544	0.5911
	0.6285	0.6667	0.7057	0.7454	0.7860
	0.8272	0.8693	0.9121	0.9557	1.0000

Hrad:

	0.0237	0.0474	0.0711	0.0948	0.1185
	0.1423	0.1660	0.1897	0.1943	0.1688
	0.1683	0.1776	0.1919	0.2090	0.2279
	0.2479	0.2687	0.2902	0.3121	0.3243
	0.3372	0.3507	0.3649	0.3796	0.3948
	0.4104	0.4264	0.4428	0.4595	0.4764
	0.4936	0.5110	0.5287	0.5486	0.5806
	0.6120	0.6427	0.6729	0.7026	0.7317
	0.7604	0.7886	0.8163	0.8437	0.8706

## Sunvale Homes – Mount Forest Subdivision – Post Development – 25 Yr Storm Event

Width:	0.8972	0.9234	0.9492	0.9748	1.0000
	0.0036	0.0072	0.0108	0.0144	0.0180
	0.0216	0.0252	0.0288	0.0358	0.0541
	0.0724	0.0907	0.1090	0.1273	0.1457
	0.1640	0.1823	0.2006	0.2189	0.2530
	0.2873	0.3215	0.3557	0.3900	0.4242
	0.4584	0.4927	0.5269	0.5611	0.5954
	0.6296	0.6638	0.6981	0.7259	0.7430
	0.7601	0.7773	0.7944	0.8115	0.8287
	0.8458	0.8629	0.8801	0.8972	0.9143
	0.9315	0.9486	0.9657	0.9829	1.0000

\*\*\*\*\*  
 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.  
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\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation .....	2.068	65.310
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.694	21.930
Surface Runoff .....	1.372	43.343
Final Storage .....	0.002	0.069
Continuity Error (%) .....	-0.050	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.373	13.726
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.373	13.727
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	0.001
Continuity Error (%) .....	-0.005	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 25 Yr Storm Event

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*

Link C10 (31.28%)  
 Link C5 (2.51%)

\*\*\*\*\*  
 Highest Flow Instability Indexes  
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Link C3 (4)

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*

Minimum Time Step : 0.72 sec  
 Average Time Step : 4.29 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  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10 <sup>6</sup> ltr	Peak Runoff LPS	Runoff Coeff
201	65.31	0.00	0.00	13.30	52.00	3.86	815.41	0.796
202	65.31	0.00	0.00	31.12	34.14	0.59	108.67	0.523
203	65.31	0.00	0.00	30.33	34.94	0.05	10.04	0.535
204	65.31	0.00	0.00	28.01	37.27	0.20	40.67	0.571
EX1	65.31	0.00	0.00	18.47	46.82	5.46	1105.00	0.717
EX2	65.31	0.00	0.00	41.54	23.50	0.36	30.85	0.360
EX3	65.31	0.00	0.00	1.72	63.63	0.48	102.70	0.974
EX4	65.31	0.00	0.00	26.18	39.07	0.81	145.55	0.598
EX5	65.31	0.00	0.00	24.54	40.72	0.86	151.56	0.623
S7	65.31	0.00	0.00	36.87	28.38	1.05	185.41	0.435

\*\*\*\*\*  
 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
EX_CBMH	JUNCTION	0.10	0.56	409.69	0 02:25	0.56
J1	JUNCTION	0.01	0.03	407.53	0 02:27	0.03
J10	JUNCTION	0.04	0.14	409.14	0 02:25	0.14
J11	JUNCTION	0.05	0.21	408.56	0 02:26	0.21
J12	JUNCTION	0.05	0.16	416.48	0 02:52	0.16
J2	JUNCTION	0.10	0.46	409.16	0 02:25	0.46
J3	JUNCTION	0.01	0.05	407.05	0 02:26	0.05
J4	JUNCTION	0.00	0.00	406.00	0 02:27	0.00
J5	JUNCTION	0.07	0.42	406.39	0 02:26	0.42
J6	JUNCTION	0.11	0.43	406.73	0 02:27	0.43
J7	JUNCTION	0.14	0.77	403.07	0 02:26	0.77
J8	JUNCTION	0.05	0.28	405.08	0 02:26	0.28
J9	JUNCTION	0.05	0.30	402.10	0 02:26	0.30
south_saugeen	OUTFALL	0.05	0.30	401.80	0 02:26	0.30
unnamed_watercourse	OUTFALL	0.00	0.00	405.50	0 02:27	0.00
Pond	STORAGE	0.03	0.22	408.36	0 02:25	0.22
Ravine	STORAGE	0.14	1.03	407.68	0 02:26	1.03
SU1	STORAGE	0.12	0.76	419.26	0 02:34	0.76
SU2	STORAGE	0.21	1.16	418.16	0 02:51	1.16

# Sunvale Homes – Mount Forest Subdivision – Post Development – 25 Yr Storm Event

\*\*\*\*\*  
Node Inflow Summary  
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EX_CBMH	JUNCTION	1129.17	1129.17	0 02:25	5.81	5.81	0.000
J1	JUNCTION	10.04	10.04	0 02:25	0.0524	0.0524	0.011
J10	JUNCTION	815.41	815.41	0 02:25	3.86	3.86	-0.003
J11	JUNCTION	151.56	246.08	0 02:25	0.856	2.15	0.002
J12	JUNCTION	0.00	108.82	0 02:51	0	1.3	0.005
J2	JUNCTION	108.67	1236.37	0 02:25	0.591	6.4	0.001
J3	JUNCTION	40.67	40.67	0 02:25	0.201	0.201	-0.006
J4	JUNCTION	0.00	49.54	0 02:26	0	0.254	-0.493
J5	JUNCTION	0.00	807.67	0 02:25	0	3.86	-0.000
J6	JUNCTION	0.00	1445.16	0 02:26	0	8.56	0.000
J7	JUNCTION	185.41	2434.48	0 02:26	1.05	13.5	-0.000
J8	JUNCTION	0.00	807.49	0 02:26	0	3.86	0.013
J9	JUNCTION	0.00	2434.63	0 02:26	0	13.5	0.003
south_saugeen	OUTFALL	0.00	2434.67	0 02:26	0	13.5	0.000
unnamed_watercourse	OUTFALL	0.00	49.28	0 02:27	0	0.255	0.000
Pond	STORAGE	0.00	812.40	0 02:25	0	3.86	-0.000
Ravine	STORAGE	0.00	1230.09	0 02:25	0	6.4	0.000
SU1	STORAGE	102.70	102.70	0 02:25	0.485	0.485	0.000
SU2	STORAGE	145.55	188.55	0 02:25	0.812	1.3	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Pond	0.003	1	0	0	0.047	9	0 02:25	807.67
Ravine	0.002	0	0	0	0.043	3	0 02:26	1200.93
SU1	0.019	7	0	0	0.134	51	0 02:34	46.31
SU2	0.024	3	0	0	0.172	20	0 02:51	108.82

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.94	261.99	2434.67	13.471
unnamed_watercourse	59.59	8.37	49.28	0.255

# Sunvale Homes – Mount Forest Subdivision – Post Development – 25 Yr Storm Event

System 79.76 270.35 2483.88 13.726

\*\*\*\*\*  
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	9.71	0 02:27	0.87	0.00	0.04
C10	CONDUIT	2434.63	0 02:26	3.16	0.75	0.64
C11	CONDUIT	2434.67	0 02:26	2.31	0.18	0.38
C12	CHANNEL	812.40	0 02:25	0.79	0.57	0.84
C13	CONDUIT	108.82	0 02:52	2.30	0.38	0.48
C14	CONDUIT	244.52	0 02:26	1.25	0.12	0.35
C2	CONDUIT	39.91	0 02:26	1.18	0.00	0.05
C3	CONDUIT	49.28	0 02:27	0.23	0.00	0.01
C4	CONDUIT	1230.09	0 02:25	1.14	0.72	0.82
C5	CONDUIT	1200.93	0 02:26	2.78	1.64	0.94
C6	CONDUIT	1127.76	0 02:25	3.04	0.71	0.57
C7	CONDUIT	807.49	0 02:26	2.79	0.44	0.46
C8	CONDUIT	807.49	0 02:26	4.03	0.20	0.40
C9	CONDUIT	1444.73	0 02:27	2.50	0.19	0.54
OR1	ORIFICE	807.67	0 02:25			
OR2	ORIFICE	46.31	0 02:34			1.00
OR3	ORIFICE	108.82	0 02:51			1.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		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	0.09	0.91	0.00	0.00	0.01	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.62	0.38	0.00	0.00	0.06	0.00
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.94	0.00
C14	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C3	1.00	0.20	0.00	0.00	0.73	0.07	0.00	0.00	0.02	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.63	0.37	0.00	0.00	0.97	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.00	0.06	0.00	0.94	0.03	0.00
C9	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

\*\*\*\*\*  
Conduit Surcharge Summary  
\*\*\*\*\*

Conduit	Hours Full		Hours Above Full		Hours Capacity
	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C5	0.01	0.37	0.01	0.45	0.01

Analysis begun on: Mon Oct 17 15:16:51 2022  
Analysis ended on: Mon Oct 17 15:16:52 2022  
Total elapsed time: 00:00:01

# Sunvale Homes – Mount Forest Subdivision – Post Development – 50 Yr Storm Event

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

\*\*\*\*\*  
 Element Count  
 \*\*\*\*\*

Number of rain gages ..... 7  
 Number of subcatchments ... 10  
 Number of nodes ..... 19  
 Number of links ..... 17  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*  
 Raingage Summary  
 \*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

\*\*\*\*\*  
 Subcatchment Summary  
 \*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	7.43	2525.00	62.10	2.0000	SCS_6h_71.9mm_50yr	J10
202	1.73	600.00	19.60	3.0000	SCS_6h_71.9mm_50yr	J2
203	0.15	50.00	17.70	4.0000	SCS_6h_71.9mm_50yr	J1
204	0.54	220.00	24.20	4.0000	SCS_6h_71.9mm_50yr	J3
EX1	11.65	3060.00	47.70	2.0000	SCS_6h_71.9mm_50yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_71.9mm_50yr	EX_CBMH
EX3	0.76	100.00	95.10	2.0000	SCS_6h_71.9mm_50yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_71.9mm_50yr	SU2
EX5	2.10	360.00	31.20	2.0000	SCS_6h_71.9mm_50yr	J11
S7	3.70	750.00	9.60	15.0000	SCS_6h_71.9mm_50yr	J7

\*\*\*\*\*  
 Node Summary  
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J10	JUNCTION	409.00	1.00	0.0	
J11	JUNCTION	408.35	4.00	0.0	
J12	JUNCTION	416.32	2.00	0.0	
J2	JUNCTION	408.70	2.10	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	405.97	3.03	0.0	
J6	JUNCTION	406.30	1.00	0.0	
J7	JUNCTION	402.30	2.70	0.0	
J8	JUNCTION	404.80	2.12	0.0	
J9	JUNCTION	401.80	1.70	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Pond	STORAGE	408.14	0.86	0.0	
Ravine	STORAGE	406.65	2.35	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 50 Yr Storm Event

\*\*\*\*\*  
Link Summary  
\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	J4	CONDUIT	145.3	1.0324	0.0130
C10	J7	J9	CONDUIT	14.3	0.7013	0.0130
C11	J9	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C12	J10	Pond	CONDUIT	50.0	0.5000	0.0130
C13	J12	J11	CONDUIT	306.0	2.6054	0.0130
C14	J11	J6	CONDUIT	155.9	1.3149	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	J2	Ravine	CONDUIT	50.0	1.1001	0.0400
C5	Ravine	J6	CONDUIT	15.0	1.4668	0.0240
C6	EX_CBMH	J2	CONDUIT	55.5	0.7747	0.0130
C7	J5	J8	CONDUIT	103.0	1.0292	0.0130
C8	J8	J7	CONDUIT	46.0	4.7445	0.0130
C9	J6	J7	CONDUIT	45.0	4.6718	0.0300
OR1	Pond	J5	ORIFICE			
OR2	SU1	SU2	ORIFICE			
OR3	SU2	J12	ORIFICE			

\*\*\*\*\*  
Cross Section Summary  
\*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	27134.53
C10	CIRCULAR	1.20	1.13	0.30	1.20	1	3265.09
C11	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C12	Road	0.17	1.53	0.07	20.00	1	1418.78
C13	CIRCULAR	0.38	0.11	0.09	0.38	1	283.02
C14	CIRCULAR	0.90	0.64	0.23	0.90	1	2075.97
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1706.19
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	CIRCULAR	0.90	0.64	0.23	0.90	1	1593.44
C7	CIRCULAR	0.90	0.64	0.23	0.90	1	1836.64
C8	CIRCULAR	0.90	0.64	0.23	0.90	1	3943.42
C9	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01

\*\*\*\*\*  
Transect Summary  
\*\*\*\*\*

Transect Road

Area:

0.0001	0.0003	0.0007	0.0013	0.0020
0.0029	0.0039	0.0052	0.0065	0.0086
0.0114	0.0150	0.0195	0.0248	0.0309
0.0378	0.0456	0.0541	0.0635	0.0741
0.0861	0.0997	0.1149	0.1316	0.1498
0.1695	0.1908	0.2136	0.2379	0.2638
0.2912	0.3201	0.3505	0.3825	0.4153
0.4489	0.4833	0.5185	0.5544	0.5911
0.6285	0.6667	0.7057	0.7454	0.7860
0.8272	0.8693	0.9121	0.9557	1.0000

Hrad:

0.0237	0.0474	0.0711	0.0948	0.1185
0.1423	0.1660	0.1897	0.1943	0.1688
0.1683	0.1776	0.1919	0.2090	0.2279
0.2479	0.2687	0.2902	0.3121	0.3243
0.3372	0.3507	0.3649	0.3796	0.3948
0.4104	0.4264	0.4428	0.4595	0.4764
0.4936	0.5110	0.5287	0.5486	0.5806
0.6120	0.6427	0.6729	0.7026	0.7317
0.7604	0.7886	0.8163	0.8437	0.8706

## Sunvale Homes – Mount Forest Subdivision – Post Development – 50 Yr Storm Event

Width:	0.8972	0.9234	0.9492	0.9748	1.0000
	0.0036	0.0072	0.0108	0.0144	0.0180
	0.0216	0.0252	0.0288	0.0358	0.0541
	0.0724	0.0907	0.1090	0.1273	0.1457
	0.1640	0.1823	0.2006	0.2189	0.2530
	0.2873	0.3215	0.3557	0.3900	0.4242
	0.4584	0.4927	0.5269	0.5611	0.5954
	0.6296	0.6638	0.6981	0.7259	0.7430
	0.7601	0.7773	0.7944	0.8115	0.8287
	0.8458	0.8629	0.8801	0.8972	0.9143
	0.9315	0.9486	0.9657	0.9829	1.0000

\*\*\*\*\*  
 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.  
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\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****		
Total Precipitation .....	2.277	71.911
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.733	23.147
Surface Runoff .....	1.543	48.730
Final Storage .....	0.002	0.070
Continuity Error (%) .....	-0.050	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****		
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.543	15.432
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.543	15.432
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	0.001
Continuity Error (%) .....	-0.001	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 50 Yr Storm Event

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*

Link C10 (31.97%)  
 Link C5 (3.96%)

\*\*\*\*\*  
 Highest Flow Instability Indexes  
 \*\*\*\*\*

Link C3 (4)

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*

Minimum Time Step : 1.63 sec  
 Average Time Step : 4.22 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  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10 <sup>6</sup> ltr	Peak Runoff LPS	Runoff Coeff
201	71.91	0.00	0.00	14.02	57.89	4.30	912.50	0.805
202	71.91	0.00	0.00	32.95	38.91	0.67	126.91	0.541
203	71.91	0.00	0.00	32.04	39.83	0.06	11.72	0.554
204	71.91	0.00	0.00	29.53	42.34	0.23	46.94	0.589
EX1	71.91	0.00	0.00	19.42	52.48	6.11	1250.28	0.730
EX2	71.91	0.00	0.00	43.88	27.76	0.42	38.33	0.386
EX3	71.91	0.00	0.00	1.81	70.15	0.53	113.27	0.976
EX4	71.91	0.00	0.00	27.58	44.28	0.92	168.64	0.616
EX5	71.91	0.00	0.00	25.84	46.02	0.97	174.61	0.640
S7	71.91	0.00	0.00	39.19	32.67	1.21	220.74	0.454

\*\*\*\*\*  
 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
EX_CBMH	JUNCTION	0.11	0.61	409.74	0 02:25	0.61
J1	JUNCTION	0.01	0.03	407.53	0 02:27	0.03
J10	JUNCTION	0.04	0.15	409.15	0 02:25	0.15
J11	JUNCTION	0.06	0.22	408.57	0 02:26	0.22
J12	JUNCTION	0.05	0.17	416.49	0 02:55	0.17
J2	JUNCTION	0.11	0.48	409.18	0 02:25	0.48
J3	JUNCTION	0.01	0.05	407.05	0 02:25	0.05
J4	JUNCTION	0.00	0.00	406.00	0 02:27	0.00
J5	JUNCTION	0.08	0.45	406.42	0 02:26	0.45
J6	JUNCTION	0.12	0.45	406.75	0 02:27	0.45
J7	JUNCTION	0.16	0.84	403.14	0 02:26	0.84
J8	JUNCTION	0.05	0.29	405.09	0 02:26	0.29
J9	JUNCTION	0.06	0.32	402.12	0 02:26	0.32
south_saugeen	OUTFALL	0.06	0.32	401.82	0 02:26	0.32
unnamed_watercourse	OUTFALL	0.00	0.00	405.50	0 02:27	0.00
Pond	STORAGE	0.03	0.24	408.38	0 02:25	0.24
Ravine	STORAGE	0.16	1.19	407.84	0 02:27	1.19
SU1	STORAGE	0.14	0.84	419.34	0 02:34	0.84
SU2	STORAGE	0.26	1.30	418.30	0 02:54	1.30

**Sunvale Homes – Mount Forest Subdivision – Post Development – 50 Yr Storm Event**

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EX_CBMH	JUNCTION	1281.32	1281.32	0 02:25	6.54	6.54	-0.000
J1	JUNCTION	11.72	11.72	0 02:25	0.0598	0.0598	0.010
J10	JUNCTION	912.50	912.50	0 02:25	4.3	4.3	-0.003
J11	JUNCTION	174.61	274.74	0 02:25	0.967	2.42	0.002
J12	JUNCTION	0.00	115.72	0 02:54	0	1.46	0.005
J2	JUNCTION	126.91	1406.56	0 02:25	0.673	7.21	0.001
J3	JUNCTION	46.94	46.94	0 02:25	0.229	0.229	-0.006
J4	JUNCTION	0.00	57.38	0 02:26	0	0.288	-0.430
J5	JUNCTION	0.00	903.75	0 02:25	0	4.3	-0.000
J6	JUNCTION	0.00	1613.68	0 02:27	0	9.63	0.000
J7	JUNCTION	220.74	2730.73	0 02:26	1.21	15.1	0.002
J8	JUNCTION	0.00	903.60	0 02:26	0	4.3	0.014
J9	JUNCTION	0.00	2730.86	0 02:26	0	15.1	0.003
south_saugeen	OUTFALL	0.00	2730.89	0 02:26	0	15.1	0.000
unnamed_watercourse	OUTFALL	0.00	57.09	0 02:27	0	0.29	0.000
Pond	STORAGE	0.00	909.27	0 02:25	0	4.3	-0.000
Ravine	STORAGE	0.00	1399.72	0 02:25	0	7.21	0.001
SU1	STORAGE	113.27	113.27	0 02:25	0.535	0.535	0.001
SU2	STORAGE	168.64	214.15	0 02:25	0.92	1.46	0.001

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Pond	0.004	1	0	0	0.055	11	0 02:25	903.75
Ravine	0.003	0	0	0	0.077	5	0 02:27	1341.94
SU1	0.022	8	0	0	0.152	58	0 02:34	49.01
SU2	0.032	4	0	0	0.214	25	0 02:54	115.72

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.94	305.00	2730.89	15.142
unnamed_watercourse	60.33	9.76	57.09	0.290

# Sunvale Homes – Mount Forest Subdivision – Post Development – 50 Yr Storm Event

System 80.14 314.75 2787.96 15.432

\*\*\*\*\*  
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	11.35	0 02:27	0.90	0.00	0.04
C10	CONDUIT	2730.86	0 02:26	3.23	0.84	0.70
C11	CONDUIT	2730.89	0 02:26	2.40	0.20	0.40
C12	CHANNEL	909.27	0 02:25	0.82	0.64	0.87
C13	CONDUIT	115.71	0 02:55	2.35	0.41	0.50
C14	CONDUIT	272.98	0 02:26	1.29	0.13	0.37
C2	CONDUIT	46.11	0 02:26	1.22	0.00	0.06
C3	CONDUIT	57.09	0 02:27	0.24	0.00	0.01
C4	CONDUIT	1399.72	0 02:25	1.17	0.82	0.86
C5	CONDUIT	1341.94	0 02:27	3.08	1.84	0.96
C6	CONDUIT	1279.75	0 02:25	3.17	0.80	0.61
C7	CONDUIT	903.60	0 02:26	2.88	0.49	0.50
C8	CONDUIT	903.60	0 02:26	4.08	0.23	0.45
C9	CONDUIT	1613.40	0 02:27	2.57	0.21	0.56
OR1	ORIFICE	903.75	0 02:25			
OR2	ORIFICE	49.01	0 02:34			1.00
OR3	ORIFICE	115.72	0 02:54			1.00

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Flow Classification Summary  
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		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	0.09	0.91	0.00	0.00	0.01	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.61	0.39	0.00	0.00	0.07	0.00
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.94	0.00
C14	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C2	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C3	1.00	0.20	0.00	0.00	0.72	0.08	0.00	0.00	0.02	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.62	0.38	0.00	0.00	0.98	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.00	0.07	0.00	0.93	0.03	0.00
C9	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

\*\*\*\*\*  
Conduit Surcharge Summary  
\*\*\*\*\*

Conduit	Hours Full		Hours Above Full		Hours Capacity
	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C5	0.01	0.42	0.01	0.50	0.01

Analysis begun on: Mon Oct 17 15:16:11 2022  
 Analysis ended on: Mon Oct 17 15:16:11 2022  
 Total elapsed time: < 1 sec

# Sunvale Homes – Mount Forest Subdivision – Post Development – 100 Yr Storm Event

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

\*\*\*\*\*

Element Count

\*\*\*\*\*

Number of rain gages ..... 7  
 Number of subcatchments ... 10  
 Number of nodes ..... 19  
 Number of links ..... 17  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

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Subcatchment Summary

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Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	7.43	2525.00	62.10	2.0000	SCS_6h_78.4mm_100yr	J10
202	1.73	600.00	19.60	3.0000	SCS_6h_78.4mm_100yr	J2
203	0.15	50.00	17.70	4.0000	SCS_6h_78.4mm_100yr	J1
204	0.54	220.00	24.20	4.0000	SCS_6h_78.4mm_100yr	J3
EX1	11.65	3060.00	47.70	2.0000	SCS_6h_78.4mm_100yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_78.4mm_100yr	EX_CBMH
EX3	0.76	100.00	95.10	2.0000	SCS_6h_78.4mm_100yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_78.4mm_100yr	SU2
EX5	2.10	360.00	31.20	2.0000	SCS_6h_78.4mm_100yr	J11
S7	3.70	750.00	9.60	15.0000	SCS_6h_78.4mm_100yr	J7

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Node Summary

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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J10	JUNCTION	409.00	1.00	0.0	
J11	JUNCTION	408.35	4.00	0.0	
J12	JUNCTION	416.32	2.00	0.0	
J2	JUNCTION	408.70	2.10	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	405.97	3.03	0.0	
J6	JUNCTION	406.30	1.00	0.0	
J7	JUNCTION	402.30	2.70	0.0	
J8	JUNCTION	404.80	2.12	0.0	
J9	JUNCTION	401.80	1.70	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Pond	STORAGE	408.14	0.86	0.0	
Ravine	STORAGE	406.65	2.35	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 100 Yr Storm Event

\*\*\*\*\*  
 Link Summary  
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	J4	CONDUIT	145.3	1.0324	0.0130
C10	J7	J9	CONDUIT	14.3	0.7013	0.0130
C11	J9	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C12	J10	Pond	CONDUIT	50.0	0.5000	0.0130
C13	J12	J11	CONDUIT	306.0	2.6054	0.0130
C14	J11	J6	CONDUIT	155.9	1.3149	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	J2	Ravine	CONDUIT	50.0	1.1001	0.0400
C5	Ravine	J6	CONDUIT	15.0	1.4668	0.0240
C6	EX_CBMH	J2	CONDUIT	55.5	0.7747	0.0130
C7	J5	J8	CONDUIT	103.0	1.0292	0.0130
C8	J8	J7	CONDUIT	46.0	4.7445	0.0130
C9	J6	J7	CONDUIT	45.0	4.6718	0.0300
OR1	Pond	J5	ORIFICE			
OR2	SU1	SU2	ORIFICE			
OR3	SU2	J12	ORIFICE			

\*\*\*\*\*  
 Cross Section Summary  
 \*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	27134.53
C10	CIRCULAR	1.20	1.13	0.30	1.20	1	3265.09
C11	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C12	Road	0.17	1.53	0.07	20.00	1	1418.78
C13	CIRCULAR	0.38	0.11	0.09	0.38	1	283.02
C14	CIRCULAR	0.90	0.64	0.23	0.90	1	2075.97
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1706.19
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	CIRCULAR	0.90	0.64	0.23	0.90	1	1593.44
C7	CIRCULAR	0.90	0.64	0.23	0.90	1	1836.64
C8	CIRCULAR	0.90	0.64	0.23	0.90	1	3943.42
C9	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01

\*\*\*\*\*  
 Transect Summary  
 \*\*\*\*\*

Transect Road

Area:

0.0001	0.0003	0.0007	0.0013	0.0020
0.0029	0.0039	0.0052	0.0065	0.0086
0.0114	0.0150	0.0195	0.0248	0.0309
0.0378	0.0456	0.0541	0.0635	0.0741
0.0861	0.0997	0.1149	0.1316	0.1498
0.1695	0.1908	0.2136	0.2379	0.2638
0.2912	0.3201	0.3505	0.3825	0.4153
0.4489	0.4833	0.5185	0.5544	0.5911
0.6285	0.6667	0.7057	0.7454	0.7860
0.8272	0.8693	0.9121	0.9557	1.0000

Hrad:

0.0237	0.0474	0.0711	0.0948	0.1185
0.1423	0.1660	0.1897	0.1943	0.1688
0.1683	0.1776	0.1919	0.2090	0.2279
0.2479	0.2687	0.2902	0.3121	0.3243
0.3372	0.3507	0.3649	0.3796	0.3948
0.4104	0.4264	0.4428	0.4595	0.4764
0.4936	0.5110	0.5287	0.5486	0.5806
0.6120	0.6427	0.6729	0.7026	0.7317
0.7604	0.7886	0.8163	0.8437	0.8706

# Sunvale Homes – Mount Forest Subdivision – Post Development – 100 Yr Storm Event

Width:	0.8972	0.9234	0.9492	0.9748	1.0000
	0.0036	0.0072	0.0108	0.0144	0.0180
	0.0216	0.0252	0.0288	0.0358	0.0541
	0.0724	0.0907	0.1090	0.1273	0.1457
	0.1640	0.1823	0.2006	0.2189	0.2530
	0.2873	0.3215	0.3557	0.3900	0.4242
	0.4584	0.4927	0.5269	0.5611	0.5954
	0.6296	0.6638	0.6981	0.7259	0.7430
	0.7601	0.7773	0.7944	0.8115	0.8287
	0.8458	0.8629	0.8801	0.8972	0.9143
	0.9315	0.9486	0.9657	0.9829	1.0000

\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation .....	2.483	78.413
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.767	24.229
Surface Runoff .....	1.715	54.153
Final Storage .....	0.002	0.070
Continuity Error (%) .....	-0.050	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.715	17.150
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.715	17.150
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	0.001
Continuity Error (%) .....	-0.002	

# Sunvale Homes – Mount Forest Subdivision – Post Development – 100 Yr Storm Event

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*

Link C10 (32.53%)  
 Link C5 (4.77%)

\*\*\*\*\*  
 Highest Flow Instability Indexes  
 \*\*\*\*\*

Link C3 (4)

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*

Minimum Time Step : 1.51 sec  
 Average Time Step : 4.16 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  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10 <sup>6</sup> ltr	Peak Runoff LPS	Runoff Coeff
201	78.41	0.00	0.00	14.64	63.77	4.74	1009.35	0.813
202	78.41	0.00	0.00	34.56	43.80	0.76	145.71	0.559
203	78.41	0.00	0.00	33.53	44.85	0.07	13.44	0.572
204	78.41	0.00	0.00	30.98	47.41	0.26	53.33	0.605
EX1	78.41	0.00	0.00	20.28	58.12	6.77	1396.57	0.741
EX2	78.41	0.00	0.00	46.10	32.05	0.49	46.29	0.409
EX3	78.41	0.00	0.00	1.89	76.58	0.58	123.69	0.977
EX4	78.41	0.00	0.00	28.79	49.58	1.03	192.34	0.632
EX5	78.41	0.00	0.00	26.97	51.39	1.08	198.27	0.655
S7	78.41	0.00	0.00	41.22	37.14	1.37	257.57	0.474

\*\*\*\*\*  
 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
EX_CBMH	JUNCTION	0.12	0.67	409.80	0 02:25	0.67
J1	JUNCTION	0.01	0.03	407.53	0 02:27	0.03
J10	JUNCTION	0.04	0.15	409.15	0 02:25	0.15
J11	JUNCTION	0.06	0.23	408.58	0 02:26	0.23
J12	JUNCTION	0.05	0.17	416.49	0 02:59	0.17
J2	JUNCTION	0.12	0.51	409.21	0 02:25	0.51
J3	JUNCTION	0.01	0.06	407.06	0 02:25	0.06
J4	JUNCTION	0.00	0.01	406.01	0 02:27	0.01
J5	JUNCTION	0.09	0.47	406.44	0 02:26	0.47
J6	JUNCTION	0.13	0.46	406.76	0 02:28	0.46
J7	JUNCTION	0.17	0.91	403.21	0 02:27	0.91
J8	JUNCTION	0.06	0.31	405.11	0 02:26	0.31
J9	JUNCTION	0.06	0.34	402.14	0 02:27	0.34
south_saugeen	OUTFALL	0.06	0.34	401.84	0 02:27	0.34
unnamed_watercourse	OUTFALL	0.00	0.01	405.51	0 02:27	0.01
Pond	STORAGE	0.04	0.26	408.40	0 02:25	0.26
Ravine	STORAGE	0.18	1.36	408.01	0 02:28	1.36
SU1	STORAGE	0.16	0.92	419.42	0 02:34	0.92
SU2	STORAGE	0.30	1.43	418.43	0 02:58	1.43

# Sunvale Homes – Mount Forest Subdivision – Post Development – 100 Yr Storm Event

\*\*\*\*\*  
 Node Inflow Summary  
 \*\*\*\*\*

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EX_CBMH	JUNCTION	1435.25	1435.25	0 02:25	7.26	7.26	-0.000
J1	JUNCTION	13.44	13.44	0 02:25	0.0673	0.0673	0.010
J10	JUNCTION	1009.35	1009.35	0 02:25	4.74	4.74	-0.003
J11	JUNCTION	198.27	303.49	0 02:25	1.08	2.69	0.002
J12	JUNCTION	0.00	121.96	0 02:58	0	1.61	0.005
J2	JUNCTION	145.71	1578.90	0 02:25	0.758	8.02	0.001
J3	JUNCTION	53.33	53.33	0 02:25	0.256	0.256	-0.006
J4	JUNCTION	0.00	65.38	0 02:26	0	0.323	-0.384
J5	JUNCTION	0.00	999.61	0 02:25	0	4.74	-0.000
J6	JUNCTION	0.00	1774.82	0 02:28	0	10.7	0.000
J7	JUNCTION	257.57	3016.18	0 02:26	1.37	16.8	-0.000
J8	JUNCTION	0.00	999.47	0 02:26	0	4.74	0.017
J9	JUNCTION	0.00	3016.19	0 02:27	0	16.8	0.003
south_saugeen	OUTFALL	0.00	3016.21	0 02:27	0	16.8	0.000
unnamed_watercourse	OUTFALL	0.00	65.07	0 02:27	0	0.325	0.000
Pond	STORAGE	0.00	1005.92	0 02:25	0	4.74	-0.000
Ravine	STORAGE	0.00	1555.41	0 02:25	0	8.02	0.001
SU1	STORAGE	123.69	123.69	0 02:25	0.584	0.584	0.001
SU2	STORAGE	192.34	240.18	0 02:25	1.03	1.61	0.001

\*\*\*\*\*  
 Node Surcharge Summary  
 \*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
 Node Flooding Summary  
 \*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
 Storage Volume Summary  
 \*\*\*\*\*

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Pond	0.005	1	0	0	0.063	12	0 02:25	999.61
Ravine	0.005	0	0	0	0.128	8	0 02:28	1476.43
SU1	0.027	10	0	0	0.170	64	0 02:34	51.51
SU2	0.042	5	0	0	0.259	30	0 02:58	121.96

\*\*\*\*\*  
 Outfall Loading Summary  
 \*\*\*\*\*

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.94	350.73	3016.21	16.825
unnamed_watercourse	60.96	11.24	65.07	0.325

# Sunvale Homes – Mount Forest Subdivision – Post Development – 100 Yr Storm Event

System 80.45 361.98 3081.28 17.150

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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	13.03	0 02:27	0.93	0.00	0.04
C10	CONDUIT	3016.19	0 02:27	3.28	0.92	0.76
C11	CONDUIT	3016.21	0 02:27	2.49	0.22	0.43
C12	CHANNEL	1005.92	0 02:25	0.84	0.71	0.90
C13	CONDUIT	121.96	0 02:59	2.39	0.43	0.52
C14	CONDUIT	301.54	0 02:26	1.33	0.15	0.39
C2	CONDUIT	52.43	0 02:25	1.26	0.00	0.06
C3	CONDUIT	65.07	0 02:27	0.25	0.00	0.01
C4	CONDUIT	1555.41	0 02:25	1.21	0.91	0.90
C5	CONDUIT	1476.43	0 02:28	3.38	2.02	0.97
C6	CONDUIT	1433.30	0 02:25	3.26	0.90	0.65
C7	CONDUIT	999.47	0 02:26	2.95	0.54	0.53
C8	CONDUIT	999.46	0 02:26	4.14	0.25	0.50
C9	CONDUIT	1774.55	0 02:28	2.63	0.23	0.58
OR1	ORIFICE	999.61	0 02:25			
OR2	ORIFICE	51.51	0 02:35			1.00
OR3	ORIFICE	121.96	0 02:58			1.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Sub Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.09	0.91	0.00	0.00	0.01	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.60	0.40	0.00	0.00	0.07	0.00
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.95	0.00
C14	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	1.00	0.00
C2	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C3	1.00	0.19	0.00	0.00	0.70	0.10	0.00	0.00	0.03	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.61	0.39	0.00	0.00	0.98	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.00	0.08	0.00	0.92	0.04	0.00
C9	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

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Conduit Surcharge Summary  
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Conduit	Hours Full			Hours Above Full	
	Both Ends	Upstream	Dnstream	Normal Flow	Capacity Limited
C4	0.01	0.06	0.01	0.01	0.01
C5	0.01	0.48	0.01	0.62	0.01

Analysis begun on: Mon Oct 17 15:15:37 2022  
Analysis ended on: Mon Oct 17 15:15:37 2022  
Total elapsed time: < 1 sec

# Sunvale Homes – Mount Forest Subdivision – Post Development – MTO 100 Yr Storm Event

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

\*\*\*\*\*

Element Count

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Number of rain gages ..... 7  
 Number of subcatchments ... 10  
 Number of nodes ..... 19  
 Number of links ..... 17  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

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Subcatchment Summary

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Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	7.43	2525.00	62.10	2.0000	SCS_6h_88mm_MTO100Yr	J10
202	1.73	600.00	19.60	3.0000	SCS_6h_88mm_MTO100Yr	J2
203	0.15	50.00	17.70	4.0000	SCS_6h_88mm_MTO100Yr	J1
204	0.54	220.00	24.20	4.0000	SCS_6h_88mm_MTO100Yr	J3
EX1	11.65	3060.00	47.70	2.0000	SCS_6h_88mm_MTO100Yr	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	SCS_6h_88mm_MTO100Yr	EX_CBMH
EX3	0.76	100.00	95.10	2.0000	SCS_6h_88mm_MTO100Yr	SU1
EX4	2.08	455.00	26.30	2.0000	SCS_6h_88mm_MTO100Yr	SU2
EX5	2.10	360.00	31.20	2.0000	SCS_6h_88mm_MTO100Yr	J11
S7	3.70	750.00	9.60	15.0000	SCS_6h_88mm_MTO100Yr	J7

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Node Summary

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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J10	JUNCTION	409.00	1.00	0.0	
J11	JUNCTION	408.35	4.00	0.0	
J12	JUNCTION	416.32	2.00	0.0	
J2	JUNCTION	408.70	2.10	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	405.97	3.03	0.0	
J6	JUNCTION	406.30	1.00	0.0	
J7	JUNCTION	402.30	2.70	0.0	
J8	JUNCTION	404.80	2.12	0.0	
J9	JUNCTION	401.80	1.70	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Pond	STORAGE	408.14	0.86	0.0	
Ravine	STORAGE	406.65	2.35	0.0	
SU1	STORAGE	418.50	1.30	0.0	
SU2	STORAGE	417.00	2.50	0.0	

**Sunvale Homes – Mount Forest Subdivision – Post Development – MTO 100 Yr Storm Event**

\*\*\*\*\*  
Link Summary  
\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	J4	CONDUIT	145.3	1.0324	0.0130
C10	J7	J9	CONDUIT	14.3	0.7013	0.0130
C11	J9	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C12	J10	Pond	CONDUIT	50.0	0.5000	0.0130
C13	J12	J11	CONDUIT	306.0	2.6054	0.0130
C14	J11	J6	CONDUIT	155.9	1.3149	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	J2	Ravine	CONDUIT	50.0	1.1001	0.0400
C5	Ravine	J6	CONDUIT	15.0	1.4668	0.0240
C6	EX_CBMH	J2	CONDUIT	55.5	0.7747	0.0130
C7	J5	J8	CONDUIT	103.0	1.0292	0.0130
C8	J8	J7	CONDUIT	46.0	4.7445	0.0130
C9	J6	J7	CONDUIT	45.0	4.6718	0.0300
OR1	Pond	J5	ORIFICE			
OR2	SU1	SU2	ORIFICE			
OR3	SU2	J12	ORIFICE			

\*\*\*\*\*  
Cross Section Summary  
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	27134.53
C10	CIRCULAR	1.20	1.13	0.30	1.20	1	3265.09
C11	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C12	Road	0.17	1.53	0.07	20.00	1	1418.78
C13	CIRCULAR	0.38	0.11	0.09	0.38	1	283.02
C14	CIRCULAR	0.90	0.64	0.23	0.90	1	2075.97
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1706.19
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	CIRCULAR	0.90	0.64	0.23	0.90	1	1593.44
C7	CIRCULAR	0.90	0.64	0.23	0.90	1	1836.64
C8	CIRCULAR	0.90	0.64	0.23	0.90	1	3943.42
C9	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01

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Transect Summary  
\*\*\*\*\*

Transect Road					
Area:					
	0.0001	0.0003	0.0007	0.0013	0.0020
	0.0029	0.0039	0.0052	0.0065	0.0086
	0.0114	0.0150	0.0195	0.0248	0.0309
	0.0378	0.0456	0.0541	0.0635	0.0741
	0.0861	0.0997	0.1149	0.1316	0.1498
	0.1695	0.1908	0.2136	0.2379	0.2638
	0.2912	0.3201	0.3505	0.3825	0.4153
	0.4489	0.4833	0.5185	0.5544	0.5911
	0.6285	0.6667	0.7057	0.7454	0.7860
	0.8272	0.8693	0.9121	0.9557	1.0000
Hrad:					
	0.0237	0.0474	0.0711	0.0948	0.1185
	0.1423	0.1660	0.1897	0.1943	0.1688
	0.1683	0.1776	0.1919	0.2090	0.2279
	0.2479	0.2687	0.2902	0.3121	0.3243
	0.3372	0.3507	0.3649	0.3796	0.3948
	0.4104	0.4264	0.4428	0.4595	0.4764
	0.4936	0.5110	0.5287	0.5486	0.5806
	0.6120	0.6427	0.6729	0.7026	0.7317
	0.7604	0.7886	0.8163	0.8437	0.8706

**Sunvale Homes – Mount Forest Subdivision – Post Development – MTO 100 Yr Storm Event**

Width:	0.8972	0.9234	0.9492	0.9748	1.0000
	0.0036	0.0072	0.0108	0.0144	0.0180
	0.0216	0.0252	0.0288	0.0358	0.0541
	0.0724	0.0907	0.1090	0.1273	0.1457
	0.1640	0.1823	0.2006	0.2189	0.2530
	0.2873	0.3215	0.3557	0.3900	0.4242
	0.4584	0.4927	0.5269	0.5611	0.5954
	0.6296	0.6638	0.6981	0.7259	0.7430
	0.7601	0.7773	0.7944	0.8115	0.8287
	0.8458	0.8629	0.8801	0.8972	0.9143
	0.9315	0.9486	0.9657	0.9829	1.0000

\*\*\*\*\*  
 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.  
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\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation .....	2.787	88.013
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.814	25.711
Surface Runoff .....	1.972	62.276
Final Storage .....	0.002	0.070
Continuity Error (%) .....	-0.050	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.972	19.722
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.973	19.725
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	0.001
Continuity Error (%) .....	-0.017	

# Sunvale Homes – Mount Forest Subdivision – Post Development – MTO 100 Yr Storm Event

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*

Link C10 (32.72%)  
 Link C5 (6.11%)

\*\*\*\*\*  
 Highest Flow Instability Indexes  
 \*\*\*\*\*

Link C3 (4)

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*

Minimum Time Step : 1.37 sec  
 Average Time Step : 4.08 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  
 \*\*\*\*\*

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10 <sup>6</sup> ltr	Peak Runoff LPS	Runoff Coeff
201	88.01	0.00	0.00	15.47	72.55	5.39	1154.23	0.824
202	88.01	0.00	0.00	36.73	51.25	0.89	174.79	0.582
203	88.01	0.00	0.00	35.58	52.40	0.08	16.09	0.595
204	88.01	0.00	0.00	32.83	55.16	0.30	63.07	0.627
EX1	88.01	0.00	0.00	21.46	66.55	7.75	1617.44	0.756
EX2	88.01	0.00	0.00	49.14	38.61	0.59	60.59	0.439
EX3	88.01	0.00	0.00	2.00	86.09	0.66	139.10	0.978
EX4	88.01	0.00	0.00	30.45	57.52	1.20	228.83	0.654
EX5	88.01	0.00	0.00	28.52	59.44	1.25	234.68	0.675
S7	88.01	0.00	0.00	44.07	43.90	1.62	315.15	0.499

\*\*\*\*\*  
 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
EX_CBMH	JUNCTION	0.13	0.76	409.89	0 02:25	0.76
J1	JUNCTION	0.01	0.04	407.54	0 02:27	0.04
J10	JUNCTION	0.05	0.16	409.16	0 02:25	0.16
J11	JUNCTION	0.07	0.25	408.60	0 02:25	0.25
J12	JUNCTION	0.06	0.18	416.50	0 03:05	0.18
J2	JUNCTION	0.13	0.64	409.34	0 02:26	0.64
J3	JUNCTION	0.02	0.06	407.06	0 02:25	0.06
J4	JUNCTION	0.00	0.01	406.01	0 02:26	0.01
J5	JUNCTION	0.09	0.51	406.48	0 02:26	0.51
J6	JUNCTION	0.14	0.48	406.78	0 02:30	0.48
J7	JUNCTION	0.19	1.01	403.31	0 02:26	1.01
J8	JUNCTION	0.06	0.33	405.13	0 02:26	0.33
J9	JUNCTION	0.07	0.37	402.17	0 02:26	0.37
south_saugeen	OUTFALL	0.07	0.37	401.87	0 02:27	0.37
unnamed_watercourse	OUTFALL	0.00	0.01	405.51	0 02:26	0.01
Pond	STORAGE	0.04	0.28	408.42	0 02:25	0.28
Ravine	STORAGE	0.21	1.57	408.22	0 02:31	1.57
SU1	STORAGE	0.20	1.04	419.54	0 02:36	1.04
SU2	STORAGE	0.38	1.62	418.62	0 03:04	1.62

**Sunvale Homes – Mount Forest Subdivision – Post Development – MTO 100 Yr Storm Event**

\*\*\*\*\*  
 Node Inflow Summary  
 \*\*\*\*\*

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EX_CBMH	JUNCTION	1668.93	1668.93	0 02:25	8.34	8.34	0.001
J1	JUNCTION	16.09	16.09	0 02:25	0.0786	0.0786	0.009
J10	JUNCTION	1154.23	1154.23	0 02:25	5.39	5.39	-0.003
J11	JUNCTION	234.68	346.84	0 02:25	1.25	3.1	0.002
J12	JUNCTION	0.00	130.24	0 03:04	0	1.85	0.005
J2	JUNCTION	174.79	1866.60	0 02:25	0.887	9.23	-0.001
J3	JUNCTION	63.07	63.07	0 02:25	0.298	0.298	-0.006
J4	JUNCTION	0.00	77.62	0 02:26	0	0.377	-0.328
J5	JUNCTION	0.00	1143.06	0 02:25	0	5.39	0.000
J6	JUNCTION	0.00	1966.38	0 02:30	0	12.3	-0.000
J7	JUNCTION	315.15	3391.01	0 02:26	1.62	19.3	-0.014
J8	JUNCTION	0.00	1142.93	0 02:26	0	5.39	0.010
J9	JUNCTION	0.00	3391.22	0 02:27	0	19.3	0.003
south_saugeen	OUTFALL	0.00	3391.25	0 02:27	0	19.3	0.000
unnamed_watercourse	OUTFALL	0.00	77.27	0 02:26	0	0.378	0.000
Pond	STORAGE	0.00	1150.55	0 02:25	0	5.39	-0.001
Ravine	STORAGE	0.00	1790.15	0 02:26	0	9.23	0.001
SU1	STORAGE	139.10	139.10	0 02:25	0.656	0.656	0.001
SU2	STORAGE	228.83	279.92	0 02:25	1.2	1.85	0.001

\*\*\*\*\*  
 Node Surcharge Summary  
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No nodes were surcharged.

\*\*\*\*\*  
 Node Flooding Summary  
 \*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
 Storage Volume Summary  
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Pond	0.006	1	0	0	0.075	14	0 02:25	1143.06
Ravine	0.009	1	0	0	0.237	14	0 02:31	1635.05
SU1	0.034	13	0	0	0.198	75	0 02:36	54.97
SU2	0.061	7	0	0	0.332	39	0 03:04	130.24

\*\*\*\*\*  
 Outfall Loading Summary  
 \*\*\*\*\*

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.95	422.86	3391.25	19.347
unnamed_watercourse	61.88	13.60	77.27	0.378

# Sunvale Homes – Mount Forest Subdivision – Post Development – MTO 100 Yr Storm Event

System 80.91 436.46 3468.51 19.725

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 Link Flow Summary  
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Link	Type	Maximum  Flow  LPS	Time of Max Occurrence days hr:min	Maximum  Veloc  m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	15.62	0 02:27	0.96	0.00	0.04
C10	CONDUIT	3391.22	0 02:27	3.35	1.04	0.84
C11	CONDUIT	3391.25	0 02:27	2.58	0.25	0.46
C12	CHANNEL	1150.55	0 02:25	0.88	0.81	0.94
C13	CONDUIT	130.24	0 03:05	2.44	0.46	0.55
C14	CONDUIT	344.62	0 02:25	1.43	0.17	0.40
C2	CONDUIT	62.08	0 02:25	1.31	0.00	0.07
C3	CONDUIT	77.27	0 02:26	0.27	0.00	0.01
C4	CONDUIT	1790.15	0 02:26	1.32	1.05	0.93
C5	CONDUIT	1635.05	0 02:31	3.72	2.24	0.98
C6	CONDUIT	1692.14	0 02:25	3.28	1.06	0.78
C7	CONDUIT	1142.93	0 02:26	3.04	0.62	0.57
C8	CONDUIT	1142.92	0 02:26	4.04	0.29	0.57
C9	CONDUIT	1966.09	0 02:30	2.70	0.26	0.60
OR1	ORIFICE	1143.06	0 02:25			
OR2	ORIFICE	54.97	0 02:36			1.00
OR3	ORIFICE	130.24	0 03:04			1.00

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 Flow Classification Summary  
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry		Sub Dry		Sup Crit		Down Crit		Norm Ltd
C1	1.00	0.00	0.00	0.00	0.09	0.91	0.00	0.00	0.01	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.59	0.41	0.00	0.00	0.07	0.00
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.95	0.00
C14	1.00	0.00	0.00	0.00	0.89	0.11	0.00	0.00	1.00	0.00
C2	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C3	1.00	0.19	0.00	0.00	0.67	0.13	0.00	0.00	0.03	0.00
C4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.59	0.41	0.00	0.00	0.97	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.00	0.13	0.00	0.87	0.06	0.00
C9	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

\*\*\*\*\*  
 Conduit Surcharge Summary  
 \*\*\*\*\*

Conduit	Hours Full			Hours Above Full	
	Both Ends	Upstream	Dnstream	Normal Flow	Capacity Limited
C10	0.01	0.01	0.01	0.14	0.01
C4	0.01	0.29	0.01	0.13	0.01
C5	0.01	0.58	0.01	0.81	0.01
C6	0.01	0.01	0.01	0.09	0.01

Analysis begun on: Fri Oct 14 15:17:13 2022  
 Analysis ended on: Fri Oct 14 15:17:13 2022  
 Total elapsed time: < 1 sec

# Sunvale Homes – Mount Forest Subdivision – Post Development – Hurricane Hazel Storm Event

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

\*\*\*\*\*

Element Count  
\*\*\*\*\*

Number of rain gages ..... 7  
 Number of subcatchments ... 10  
 Number of nodes ..... 19  
 Number of links ..... 17  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary  
\*\*\*\*\*

Name	Data Source	Data Type	Recording Interval
Hurricane_Hazel_(Southern_Ontario)	Hurricane_Hazel_(Southern_Ontario)	INTENSITY	60 min.
SCS_6h_38.8mm_2yr	SCS_6h_38.8mm_2yr	INTENSITY	5 min.
SCS_6h_49.4mm_5yr	SCS_6h_49.4mm_5yr	INTENSITY	5 min.
SCS_6h_65.3mm_25yr	SCS_6h_65.3mm_25yr	INTENSITY	5 min.
SCS_6h_71.9mm_50yr	SCS_6h_71.9mm_50yr	INTENSITY	5 min.
SCS_6h_78.4mm_100yr	SCS_6h_78.4mm_100yr	INTENSITY	5 min.
SCS_6h_88mm_MTO100Yr	SCS_6h_88mm_MTO100Yr	INTENSITY	5 min.

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Subcatchment Summary  
\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	7.43	2525.00	62.10	2.0000	Hurricane_Hazel_(Southern_Ontario)	J10
202	1.73	600.00	19.60	3.0000	Hurricane_Hazel_(Southern_Ontario)	J2
203	0.15	50.00	17.70	4.0000	Hurricane_Hazel_(Southern_Ontario)	J1
204	0.54	220.00	24.20	4.0000	Hurricane_Hazel_(Southern_Ontario)	J3
EX1	11.65	3060.00	47.70	2.0000	Hurricane_Hazel_(Southern_Ontario)	EX_CBMH
EX2	1.52	150.00	0.00	2.0000	Hurricane_Hazel_(Southern_Ontario)	EX_CBMH
EX3	0.76	100.00	95.10	2.0000	Hurricane_Hazel_(Southern_Ontario)	SU1
EX4	2.08	455.00	26.30	2.0000	Hurricane_Hazel_(Southern_Ontario)	SU2
EX5	2.10	360.00	31.20	2.0000	Hurricane_Hazel_(Southern_Ontario)	J11
S7	3.70	750.00	9.60	15.0000	Hurricane_Hazel_(Southern_Ontario)	J7

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Node Summary  
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
EX_CBMH	JUNCTION	409.13	1.98	0.0	
J1	JUNCTION	407.50	0.50	0.0	
J10	JUNCTION	409.00	1.00	0.0	
J11	JUNCTION	408.35	4.00	0.0	
J12	JUNCTION	416.32	2.00	0.0	
J2	JUNCTION	408.70	2.10	0.0	
J3	JUNCTION	407.00	0.50	0.0	
J4	JUNCTION	406.00	0.50	0.0	
J5	JUNCTION	405.97	3.03	0.0	
J6	JUNCTION	406.30	1.00	0.0	
J7	JUNCTION	402.30	2.70	0.0	
J8	JUNCTION	404.80	2.12	0.0	
J9	JUNCTION	401.80	1.70	0.0	
south_saugeen	OUTFALL	401.50	0.80	0.0	
unnamed_watercourse	OUTFALL	405.50	0.50	0.0	
Pond	STORAGE	408.14	0.86	0.0	
Ravine	STORAGE	406.65	2.35	0.0	
SU1	STORAGE	418.50	1.30	0.0	

# Sunvale Homes – Mount Forest Subdivision – Post Development – Hurricane Hazel Storm Event

SU2                                  STORAGE                                  417.00                                  2.50                                  0.0

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Link Summary  
\*\*\*\*\*

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	J4	CONDUIT	145.3	1.0324	0.0130
C10	J7	J9	CONDUIT	14.3	0.7013	0.0130
C11	J9	south_saugeen	CONDUIT	10.0	3.0014	0.0300
C12	J10	Pond	CONDUIT	50.0	0.5000	0.0130
C13	J12	J11	CONDUIT	306.0	2.6054	0.0130
C14	J11	J6	CONDUIT	155.9	1.3149	0.0130
C2	J3	J4	CONDUIT	112.0	0.8931	0.0130
C3	J4	unnamed_watercourse	CONDUIT	41.0	1.2199	0.0130
C4	J2	Ravine	CONDUIT	50.0	1.1001	0.0400
C5	Ravine	J6	CONDUIT	15.0	1.4668	0.0240
C6	EX_CBMH	J2	CONDUIT	55.5	0.7747	0.0130
C7	J5	J8	CONDUIT	103.0	1.0292	0.0130
C8	J8	J7	CONDUIT	46.0	4.7445	0.0130
C9	J6	J7	CONDUIT	45.0	4.6718	0.0300
OR1	Pond	J5	ORIFICE			
OR2	SU1	SU2	ORIFICE			
OR3	SU2	J12	ORIFICE			

\*\*\*\*\*  
Cross Section Summary  
\*\*\*\*\*

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	0.50	8.75	0.25	35.00	1	27134.53
C10	CIRCULAR	1.20	1.13	0.30	1.20	1	3265.09
C11	TRAPEZOIDAL	0.80	3.42	0.57	5.56	1	13546.71
C12	Road	0.17	1.53	0.07	20.00	1	1418.78
C13	CIRCULAR	0.38	0.11	0.09	0.38	1	283.02
C14	CIRCULAR	0.90	0.64	0.23	0.90	1	2075.97
C2	TRIANGULAR	0.50	11.25	0.25	45.00	1	32451.06
C3	RECT_OPEN	0.50	25.00	0.49	50.00	1	132058.05
C4	TRAPEZOIDAL	0.50	1.55	0.27	5.60	1	1706.19
C5	CIRCULAR	0.75	0.44	0.19	0.75	1	730.38
C6	CIRCULAR	0.90	0.64	0.23	0.90	1	1593.44
C7	CIRCULAR	0.90	0.64	0.23	0.90	1	1836.64
C8	CIRCULAR	0.90	0.64	0.23	0.90	1	3943.42
C9	TRIANGULAR	0.80	2.00	0.38	5.00	1	7573.01

\*\*\*\*\*  
Transect Summary  
\*\*\*\*\*

Transect Road  
Area:

0.0001	0.0003	0.0007	0.0013	0.0020
0.0029	0.0039	0.0052	0.0065	0.0086
0.0114	0.0150	0.0195	0.0248	0.0309
0.0378	0.0456	0.0541	0.0635	0.0741
0.0861	0.0997	0.1149	0.1316	0.1498
0.1695	0.1908	0.2136	0.2379	0.2638
0.2912	0.3201	0.3505	0.3825	0.4153
0.4489	0.4833	0.5185	0.5544	0.5911
0.6285	0.6667	0.7057	0.7454	0.7860
0.8272	0.8693	0.9121	0.9557	1.0000

Hrad:

0.0237	0.0474	0.0711	0.0948	0.1185
0.1423	0.1660	0.1897	0.1943	0.1688
0.1683	0.1776	0.1919	0.2090	0.2279
0.2479	0.2687	0.2902	0.3121	0.3243
0.3372	0.3507	0.3649	0.3796	0.3948

## Sunvale Homes – Mount Forest Subdivision – Post Development – Hurricane Hazel Storm Event

	0.4104	0.4264	0.4428	0.4595	0.4764
	0.4936	0.5110	0.5287	0.5486	0.5806
	0.6120	0.6427	0.6729	0.7026	0.7317
	0.7604	0.7886	0.8163	0.8437	0.8706
	0.8972	0.9234	0.9492	0.9748	1.0000
Width:					
	0.0036	0.0072	0.0108	0.0144	0.0180
	0.0216	0.0252	0.0288	0.0358	0.0541
	0.0724	0.0907	0.1090	0.1273	0.1457
	0.1640	0.1823	0.2006	0.2189	0.2530
	0.2873	0.3215	0.3557	0.3900	0.4242
	0.4584	0.4927	0.5269	0.5611	0.5954
	0.6296	0.6638	0.6981	0.7259	0.7430
	0.7601	0.7773	0.7944	0.8115	0.8287
	0.8458	0.8629	0.8801	0.8972	0.9143
	0.9315	0.9486	0.9657	0.9829	1.0000

\*\*\*\*\*  
 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.  
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\*\*\*\*\*  
 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 ..... 09/10/2020 00:00:00  
 Ending Date ..... 09/11/2020 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 ..... 2  
 Head Tolerance ..... 0.001524 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation .....	6.681	211.000
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	1.145	36.158
Surface Runoff .....	5.536	174.848
Final Storage .....	0.003	0.088
Continuity Error (%) .....	-0.044	

	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	5.536	55.361
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	5.499	54.995
Flooding Loss .....	0.034	0.338

## Sunvale Homes – Mount Forest Subdivision – Post Development – Hurricane Hazel Storm Event

```

Evaporation Loss .....      0.000      0.000
Exfiltration Loss .....      0.000      0.000
Initial Stored Volume ....      0.000      0.000
Final Stored Volume .....      0.000      0.001
Continuity Error (%) .....      0.049
    
```

```

*****
Time-Step Critical Elements
*****
Link C10 (61.32%)
Link C5 (9.36%)
    
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```

*****
Highest Flow Instability Indexes
*****
Link C6 (1)
Link C5 (1)
    
```

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*****
Routing Time Step Summary
*****
Minimum Time Step      :      1.34 sec
Average Time Step      :      3.21 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
*****
    
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10 <sup>6</sup> ltr	Peak Runoff LPS	Runoff Coeff
201	211.00	0.00	0.00	21.26	189.81	14.10	1044.00	0.900
202	211.00	0.00	0.00	52.72	158.25	2.74	223.80	0.750
203	211.00	0.00	0.00	49.84	161.14	0.24	19.71	0.764
204	211.00	0.00	0.00	46.13	164.87	0.89	71.58	0.781
EX1	211.00	0.00	0.00	29.46	181.58	21.15	1608.53	0.861
EX2	211.00	0.00	0.00	71.05	139.55	2.12	168.51	0.661
EX3	211.00	0.00	0.00	2.74	208.42	1.59	111.08	0.988
EX4	211.00	0.00	0.00	41.84	169.12	3.51	278.50	0.802
EX5	211.00	0.00	0.00	39.16	171.80	3.61	282.56	0.814
S7	211.00	0.00	0.00	65.07	145.90	5.40	458.27	0.691

```

*****
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
EX_CBMH	JUNCTION	0.27	0.82	409.95	0 10:00	0.82
J1	JUNCTION	0.02	0.04	407.54	0 10:00	0.04
J10	JUNCTION	0.08	0.16	409.16	0 10:00	0.16
J11	JUNCTION	0.13	0.28	408.63	0 10:00	0.28
J12	JUNCTION	0.12	0.20	416.52	0 10:47	0.20
J2	JUNCTION	0.26	0.77	409.47	0 10:00	0.77
J3	JUNCTION	0.03	0.06	407.06	0 10:00	0.06
J4	JUNCTION	0.00	0.01	406.01	0 10:00	0.01
J5	JUNCTION	0.19	0.49	406.46	0 10:00	0.49
J6	JUNCTION	0.25	0.51	406.81	0 10:00	0.51



# Sunvale Homes – Mount Forest Subdivision – Post Development – Hurricane Hazel Storm Event

Pond	0.014	3	0	0	0.067	13	0	10:00	1043.37
Ravine	0.059	3	0	0	0.629	37	0	10:03	1859.60
SU1	0.084	32	0	0	0.265	100	0	09:56	47.96
SU2	0.219	26	0	0	0.855	100	0	10:31	164.03

\*\*\*\*\*  
 Outfall Loading Summary  
 \*\*\*\*\*

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
south_saugeen	99.97	1031.19	3788.10	53.863
unnamed_watercourse	84.97	26.30	91.13	1.132
System	92.47	1057.50	3879.22	54.995

\*\*\*\*\*  
 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	19.67	0 10:00	1.02	0.00	0.05
C10	CONDUIT	3788.01	0 10:00	3.58	1.16	0.88
C11	CONDUIT	3788.10	0 10:00	2.68	0.28	0.49
C12	CHANNEL	1043.78	0 10:00	0.85	0.74	0.91
C13	CONDUIT	164.03	0 10:47	2.75	0.58	0.64
C14	CONDUIT	436.55	0 10:00	1.62	0.21	0.44
C2	CONDUIT	71.51	0 10:00	1.35	0.00	0.07
C3	CONDUIT	91.13	0 10:00	0.29	0.00	0.01
C4	CONDUIT	1994.11	0 10:00	1.42	1.17	0.96
C5	CONDUIT	1859.60	0 10:03	4.21	2.55	1.00
C6	CONDUIT	1776.52	0 10:00	3.26	1.11	0.88
C7	CONDUIT	1043.31	0 10:00	2.98	0.57	0.54
C8	CONDUIT	1043.31	0 10:00	3.69	0.26	0.59
C9	CONDUIT	2288.71	0 10:00	2.81	0.30	0.64
OR1	ORIFICE	1043.37	0 10:00			
OR2	ORIFICE	47.96	0 09:25			1.00
OR3	ORIFICE	164.03	0 10:31			1.00

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 Flow Classification Summary  
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	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	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.26	0.74	0.00	0.00	0.10	0.00
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.90	0.00
C14	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	1.00	0.00
C2	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C3	1.00	0.00	0.00	0.00	0.56	0.43	0.00	0.00	0.06	0.00
C4	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.31	0.69	0.00	0.00	0.87	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.00	0.31	0.00	0.69	0.17	0.00

# Sunvale Homes – Mount Forest Subdivision – Post Development – Hurricane Hazel Storm Event

C9 1.00 0.00 0.00 0.00 0.00 0.00 0.00 1.00 0.00 0.00

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Conduit Surcharge Summary  
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Conduit	Hours Full			Hours	
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
C10	0.01	0.01	0.01	0.99	0.01
C4	0.01	1.09	0.01	0.80	0.01
C5	1.02	2.07	1.02	2.79	1.02
C6	0.01	0.01	0.01	0.73	0.01

Analysis begun on: Mon Oct 17 15:18:33 2022  
Analysis ended on: Mon Oct 17 15:18:34 2022  
Total elapsed time: 00:00:01

# Appendix F

**OGS SIZING**

**STORMWATER MANAGEMENT REPORT**

**SUNVALE HOMES MOUNT FOREST SUBDIVISION**

**TOWNSHIP OF WELLINGTON NORTH**

# ADS OGS Sizing Summary

<b>Project Name:</b>	Sunvale Subdivision	
<b>Consulting Engineer:</b>	Cobide Engineering	
<b>Location:</b>	Mount Forest, ON	
<b>Sizing Completed By:</b>	C. Neath	<b>Email:</b> <a href="mailto:cody.neath@ads-pipe.com">cody.neath@ads-pipe.com</a>

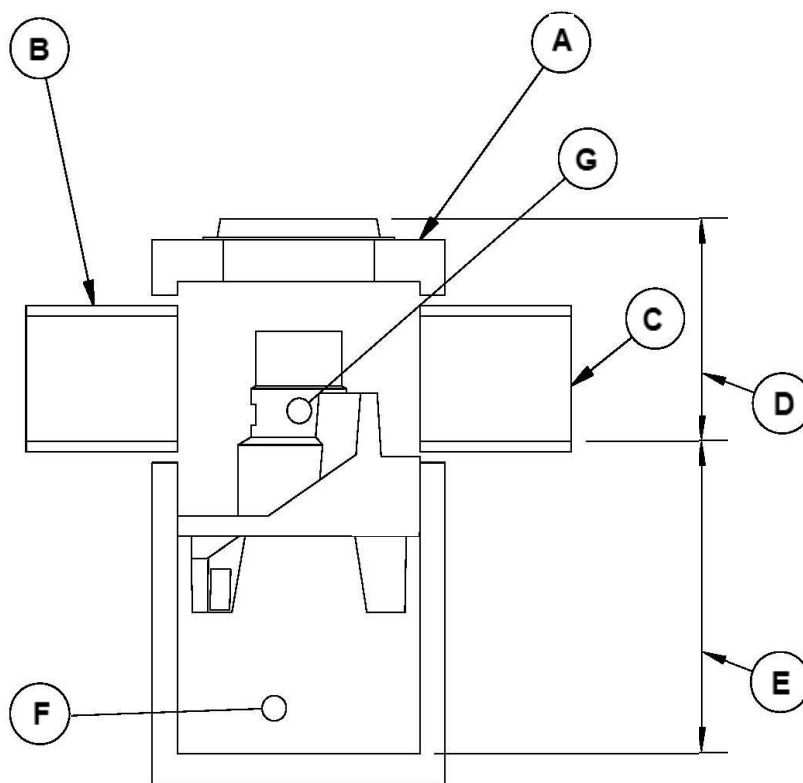
Treatment Requirements		
Treatment Goal:	Enhanced (MOE)	
Selected Parameters:	80% TSS	90% Volume
Selected Unit:	ADS FD-8HC	

Summary of Results		
Model	TSS Removal	Volume Treated
ADS FD-4HC	72.0%	87.5%
ADS FD-5HC	75.4%	94.2%
ADS FD-6HC	77.7%	97.2%
ADS FD-8HC	81.9%	98.9%

ADS FD-8HC Specification	
Unit Diameter (A):	2,400 mm
Inlet Pipe Diameter (B):	900 mm
Outlet Pipe Diameter (C):	900 mm
Height, T/G to Outlet Invert (D):	1600 mm
Height, Outlet Invert to Sump (E):	2,200 mm
Sediment Storage Capacity (F):	2.1 m <sup>3</sup>
Oil Storage Capacity (G):	4,239 L
Max. Pipe Diameter:	1,200 mm
Peak Flow Capacity:	1,415 L/s

Site Elevations:	
Rim Elevation:	100.00
Inlet Pipe Elevation:	98.40
Outlet Pipe Elevation:	98.40

Site Details	
Site Area:	6.97 ha
% Impervious:	59%
Rational C:	0.79
Rainfall Station:	Owen Sound
Particle Size Distribution:	Fine
Peak Flowrate:	931 L/s



## Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.



Project Name: Sunvale Subdivision  
 Consulting Engineer: Cobide Engineering  
 Location: Mount Forest, ON

### Net Annual Removal Efficiency Summary: ADS FD-8HC

Rainfall Intensity <sup>(1)</sup>	Fraction of Rainfall <sup>(1)</sup>	ADS FD-8HC Removal Efficiency <sup>(2)</sup>	Weighted Net-Annual Removal Efficiency
mm/hr	%	%	%
0.50	10.1%	98.0%	9.9%
1.00	10.7%	91.9%	9.8%
1.50	10.0%	88.5%	8.8%
2.00	8.4%	86.1%	7.2%
2.50	6.6%	84.3%	5.6%
3.00	6.2%	82.9%	5.1%
3.60	4.1%	81.5%	3.3%
4.10	4.2%	80.6%	3.4%
4.60	3.7%	79.7%	2.9%
5.10	3.8%	78.9%	3.0%
6.40	6.4%	77.3%	4.9%
7.60	4.6%	76.1%	3.5%
8.90	3.3%	75.0%	2.5%
10.20	2.4%	74.0%	1.8%
11.40	2.6%	73.2%	1.9%
12.70	1.5%	72.5%	1.1%
15.20	2.1%	71.3%	1.5%
19.10	2.3%	69.8%	1.6%
25.40	3.9%	68.0%	2.7%
38.10	1.4%	65.5%	0.9%
50.80	0.6%	63.7%	0.4%
<b>Total Net Annual Removal Efficiency:</b>			81.9%
<b>Total Runoff Volume Treated:</b>			98.9%

#### Notes:

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