C.C. Tatham & Associates Ltd.
Consulting Engineers

BLUE VISTA

Town of The Blue Mountains

Preliminary Stormwater Management Report

prepared by:

C.C. Tatham & Associates Ltd.
115 Sandford Fleming Drive, Suite 200
Collingwood, ON L9Y 5A6
Tel: (705) 444-2565 Fax: (705) 444-2327
info@cctatham.com

prepared for

Royalton Homes Inc.

February 27, 2019

CCTA File 117159

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF DRAWINGS

1 Introduction

This preliminary stormwater management report has been prepared in support of the Blue Vista residential development located on the west side of Grey Road 21 (Osler Bluff Road), north of Grey Road 19/Mountain Road, in the Town of The Blue Mountains, as illustrated in Figure 1 overleaf.

The purpose of this report is to address the requirements of the Town of The Blue Mountains (The Town), Grey Sauble Conservation Authority (GSCA), and Nottawasaga Valley Conservation Authority (NVCA) with respect to internal and external servicing to achieve the relevant stormwater management (SWM) design criteria and ultimately ensure that the project is appropriately developed to minimize the impact on the downstream drainage systems.

The proposed SWM Plan was developed recognizing the pertinent Municipal and Provincial guidelines on municipal design, water resources, and the environment, as well as other reports prepared in support of the proposed development including the following:

- *Design Guidelines for Sewage Works.* Ministry of the Environment, Conservation and Parks (2008);
- *Engineering Standards.* Town of The Blue Mountains (April 2009);
- *Stormwater Management Practices Planning and Design Manual.* Ministry of the Environment, Conservation and Parks (2003); and
- *Preliminary Infiltration Assessment*. Peto MacCallum Ltd. (August 20, 2018).

Chapter 2 of this report addresses the existing site conditions, detailing the existing topography, soils, drainage outlets and specific peak flow characteristics. Chapter 3 discusses the design criteria for the stormwater management plan with respect to the Town, GSCA, NVCA, and the Ministry of Environment, Conservation and Parks (MECP). The proposed drainage conditions and proposed SWM plan are addressed in Chapter 4 including the proposed stormwater quantity and quality controls. Erosion Hazard are discussed in Chapter 4, and Chapter 4 addresses the erosion and sediment control plan for construction activities. Lastly, Chapter 5 summarizes the report and the key findings.

NO.	REVISIONS	DATE
1.	DRAFT PLAN APPROVAL	FEB/19

BLUE VISTA
TOWN OF THE BLUE MOUNTAINS

LOCATION PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

SCALE:	1 : 2,500			JOB NO.	117159
DESIGN:	JPA	CHECKED:	RS	DWG.	**FIG-1**
DRAWN:	RD	DATE:	NOV/18		

2 Blue Vista Development

2.1 Site Location and Description

The Blue Vista property is bordered by Grey Road 21 (Osler Bluff Road) to the east, the Scandinave Spa and the Windfall Development Lands to the south, the Second Nature Phase 2 and 3 Development Lands to the west, and the Monterra golf course to the north. The legal description of the site refers to Part Lot 17, Concession 1, Town of The Blue Mountains (formerly the Township of Collingwood), in the County of Grey. The Blue Vista property consists of approximately 20.4 ha of undeveloped land.

Existing site topography, ground cover, land use and drainage patterns were established through site visitation, interpretation of topographic maps, aerial photography and a site survey. The development site generally slopes from southwest to the northeast with approximately 15 m of fall across the property. An intermittent tributary watercourse wetland feature bisects the property into a west and east portion. The central and west portions have predominantly woodland ground cover and the east portion has predominantly pasture ground cover. Ontario Soil Survey Report No. 17 (Grey County North) defines the site to be a mix of Kemble silty clay (Ksc) and Brighton sand (Brs).

2.2 Proposed Land Use

Residential Units

The proposed development is for 133 single detached residential dwellings units. The proposed units will have a minimum lot depth of 30 m with 15 m of frontage. A secondary development plan, to increase the unit count to 180 residential units (accomplished through changing select single-detached units to semi-detached units), will be considered should the Town require an increased lot density.

Other Amenities

The proposed development will also include park areas, an open space area, two stormwater management blocks, and community trails with connection to the existing Town community trail system. As noted in the site plan, a 5.2 m widening along Grey Road 21 (Osler Bluff Road) has been dedicated to Grey County for future development and expansion of Grey Road 21.

Area Land Uses

Historically, land use in the surrounding area has been a mix of woodland, residential as well as recreational and agricultural activities. Residential development of the surrounding areas has increased in recent years resulting in required upgrades to municipal infrastructure to service the area appropriately.

3 Existing Drainage Conditions

A Pre-Development Drainage Plan (Drawing DP-1) has been prepared illustrating the pre-development drainage patterns of the site. Under existing conditions, drainage is conveyed as overland flow to two outlet locations described below:

1. Outlet 1 is the Grey Road 21 (Osler Bluff Road) roadside ditch located at the northeast corner of the property. Approximately 7.6 ha of drainage from the site (Catchment 101) discharges to this roadside ditch and continues flowing north to an unnamed tributary watercourse (referred to as Watercourse 1). This outlet is within the GSCA watershed.

2. Outlet 2 is an intermittent watercourse that bisects the property and drains to the southeast corner of the property. Approximately 12.8 ha of drainage from the development lands and 0.02 ha of external lands drain overland as sheet flow into the watercourse (Catchment 102). The watercourse also receives drainage from the Second Nature, Windfall and Le Scandinave spa development lands (Catchments 501 and 502). The watercourse drains to an existing 600 mm diameter culvert that crosses under Grey Road 21 (Osler Bluff Road) and continues to flow in an eastwardly direction to Silver Creek. This outlet is within the NVCA watershed.

To quantify the pre-development flow rates at the site's two drainage outlets, a Visual OTTHYMO hydrologic model was prepared encompassing the entirety of the Blue Vista property and external areas. The catchment area delineation and hydrologic model input parameters utilized in the model are illustrated on the Pre Development Drainage Plan (Drawing DP-1) enclosed. The model was run using the Town standard Owen Sound 4-hour Chicago and 24-hour SCS design storm events. The hydrologic model results are included in Appendix A and summarized in Table 1.

Table 1: Pre-Development Peak Flow Summary

Storm Event	Outlet 1 Peak Flow Rates (m^3/s)		Outlet 2 Peak Flow Rates (m^3/s)	
	Chicago Design Storm	SCS Design Storm	Chicago Design Storm	SCS Design Storm
25 mm	0.01	-	0.03	-
2 Year	0.02	0.03	0.07	0.10
5 Year	0.04	0.05	0.13	0.17
10 Year	0.05	0.06	0.18	0.22
25 Year	0.07	0.09	0.24	0.30
50 Year	0.09	0.11	0.31	0.36
100 Year	0.11	0.13	0.37	0.42
Regional	0.25	-	0.72	-

The existing 600 mm diameter culvert crossing at Grey Road 21 (Osler Bluff Road) is considered a point of interest as it is also the discharge outlet for adjacent properties. The hydrologic model results for this point of interest are summarized in Table 2.

Table 2: Point of Interest 1 Pre-Development Peak Flow Summary

Storm Event	Point of Interest 1 Peak Flow Rates (m^3/s)	
	Chicago Design Storm	SCS Design Storm
25 mm	0.09	-
2 Year	0.22	0.33
5 Year	0.42	0.55
10 Year	0.58	0.72
25 Year	0.80	0.94
50 Year	0.98	1.12
100 Year	1.17	1.30
Regional	1.96	-

A HY-8 hydraulic model was prepared to determine the maximum capacity of the existing culvert crossing and the extent of flooding over Grey Road 21 (Osler Bluff Road) during storms which exceeded the conveyance capacity of the culvert. The modelling results are included in Appendix B and summarized in Table 3.

Table 3: Grey Road 21 (Osler Bluff Road) Culvert Crossing Hydraulic Summary

Storm Event	Peak Flow Rate (m^3/s)	Culvert Discharge (m^3/s)	Discharge over Roadway (m^3/s)	Depth of Overtopping (m)
25 mm	0.09	0.09	0.00	0.00
2 Year	0.33	0.33	0.00	0.00
5 Year	0.55	0.55	0.00	0.00
10 Year	0.72	0.72	0.00	0.00
25 Year	0.94	0.94	0.00	0.00
50 Year	1.12	1.07	0.04	0.01
100 Year	1.30	1.07	0.22	0.02
Regional	1.96	1.08	0.88	0.05

Note: Calculations ignore available floodplain storage upstream of Grey Road 21 (Osler Bluff Road).

4 Proposed Stormwater Management Plan

4.1 Design Criteria

As discussed, to achieve the relevant stormwater management (SWM) design requirements and ultimately ensure that the project is appropriately developed to minimize the impact on the downstream drainage systems, the following design criteria will be addressed in subsequent sections:

- the stormwater management plan will maintain existing stormwater runoff rates at all site outlets by restricting post development peak flow rates to pre-development levels for the 2 through 100-year design storms;
- the stormwater management plan will achieve the required Level 1 "Enhanced" water quality treatment to Provincial standards in the form of 80% total suspended solids (TSS) removal for the site effluent;
- safe conveyance of the Regulatory storm event peak flows through the site to the downstream drainage system will be provided for surface runoff generated within the development;
- the proposed storm sewer system for the newly developed areas will be designed to collect and convey the peak flow generated by the 5-year storm as a minimum objective; and
- the appropriate erosion hazard setback from the watercourse will be maintained.

4.2 Proposed Drainage Conditions

A Post Development Drainage Plan (Drawing DP-2) illustrating the drainage conditions of the proposed development is enclosed and should be referenced in conjunction with this report.

Under proposed conditions, the residential development will drain internally via a combination of storm sewers, drainage swales and the internal road network to the proposed off-line SWM facilities. The storm sewers will be sized to convey the minor storm (5-year design storm) peak flows underground to the end of pipe SWM facilities. The road network will be designed to convey the major storm (100-year design storm) peak flows to the SWM facilities overland. The design of the internal roadways will limit surface ponding during major storm events to depths of 0.30 m or less providing safe access/egress throughout the proposed development.

The drainage directed to Outlet 1 has been minimized as much as possible. However, due to site grading constraints, approximately 2.9 ha (Catchments 201, 203 and 204) will continue to discharge to this outlet. The remainder of the proposed development, approximately 20.5 ha (Catchments 202 and 205), will discharge to Outlet 2.

Flows from Catchment 201 will be conveyed to the northeast SWM Block. A proposed dry pond SWM facility has been designed to provide quantity control to reduce post development peak flows to pre-

development levels at Outlet 1. Water quality control will be provided through a combination of Best Management Practices (dry SWMF, oil grit separator and grassed swales) to achieve the requisite water quality controls.

Catchment 205 will be conveyed to the southeast SWM Block. A proposed wet pond SWM facility has been designed to provide quality and quantity control to provide Level 1 "Enhanced" water quality treatment and reduce post development peak flows to pre-development levels at Outlet 2.

Catchments 203 and 204 will drain directly to Outlet 1, by-passing the dry pond SWMF. Similarly, Catchment 202 will drain directly to the watercourse and Outlet 2, by-passing the wet pond SWMF. These catchments consist of primarily rear yards and open space blocks. As such, the drainage from these catchments is considered clean and treatment is not required. However, these catchments were included in the hydrologic analysis to confirm post development peak flows are attenuated to pre-development levels.

4.3 Water Quantity Control

Post development peak flows to the site outlets must match or be less than the pre-development rates for the 2 through 100-year design storms. This will be achieved on site by storing the surface water runoff within two proposed SWM facilities; a dry pond in the northeast SWM Block discharging to Outlet 1, and a wet pond in the southeast SWM Block discharging to Outlet 2. These ponds will release runoff to the respective outlets at attenuated rates via controlled outlets. The two SWMFs are described in the following sections.

Dry Pond

The dry pond has been designed and sized to provide the requisite water quantity control to limit discharges to Outlet 1 at or below pre-development levels, accounting for the uncontrolled runoff release from Catchments 203 and 204. The dry pond will have approximately 950 m^3 of active storage including 500 m^3 of extended detention storage. Discharge from the pond will be controlled by a series of engineered outlets as follows:

- a primary low flow outlet consisting of a 55 mm diameter orifice and a 450 mm diameter outlet pipe designed to attenuate the 2 through 100-year design storms; and
- a trapezoidal spillway with a 5 m wide sill that will convey the Regional storm event with sufficient capacity to convey the uncontrolled pond inflow to Outlet 1 during emergency conditions (obstruction of the primary outlet).

Preliminary details of the proposed dry pond are illustrated on the Dry Pond SWMF Conceptual Design (Figure SWM-1) enclosed.

Wet Pond

The wet pond has been designed and sized to provide the requisite water quantity control to limit discharges to Outlet 2 at or below pre-development levels, accounting for the uncontrolled runoff release from Catchment 202. The wet pond will have approximately 8,180 m^3 of active storage including 4,660 m^3 of extended detention storage. Discharge from the pond will be controlled by a series of engineered outlets as follows:

- a primary low flow outlet consisting of a 120 mm diameter orifice and a 450 mm diameter outlet pipe;
- a secondary outlet consisting of a 600 mm x 600 mm ditch inlet catchbasin; and
- a trapezoidal spillway with a 10 m wide sill that will convey the Regional storm event with sufficient capacity to convey the uncontrolled pond inflow to Outlet 2 during emergency conditions (obstruction of the primary and secondary outlets).

Preliminary details of the proposed wet pond are illustrated on the Wet Pond SWMF Conceptual Design (Figure SWM-2) enclosed.

To quantify the post development flows to Outlet 1 and Outlet 2 under proposed conditions, a hydrologic analysis was completed using the Visual OTTHYMO hydrologic modelling software. The catchment area delineation and hydrologic model input parameters utilized in the model are illustrated on the Post Development Drainage Plan (Drawing DP-2) enclosed. The hydrologic model results are included in Appendix C and summarized in Table 4.

Table 4: Post Development Peak Flow Summary

Storm Event	Outlet 1 Peak Flow Rates (m^3/s)		Outlet 2 Peak Flow Rates (m^3/s)	
	Chicago Design Storm	SCS Design Storm	Chicago Design Storm	SCS Design Storm
25 mm	0.01 *(0.01)*	-	0.03 *(0.03)*	-
2 Year	0.02 *(0.02)*	0.02 *(0.03)*	0.06 *(0.07)*	0.08 *(0.10)*
5 Year	0.02 *(0.04)*	0.02 *(0.05)*	0.10 *(0.13)*	0.13 *(0.17)*
10 Year	0.03 *(0.05)*	0.03 *(0.06)*	0.14 *(0.18)*	0.16 *(0.22)*
25 Year	0.03 *(0.07)*	0.04 *(0.09)*	0.18 *(0.24)*	0.21 *(0.30)*
50 Year	0.04 *(0.09)*	0.04 *(0.11)*	0.22 *(0.31)*	0.29 *(0.36)*
100 Year	0.05 *(0.11)*	0.05 *(0.13)*	0.30 *(0.37)*	0.38 *(0.42)*
Regional	0.18 *(0.25)*	-	1.27*(0.72)*	-

Note: *(0.01)* – Pre-development peak flow rates

A comparison of the post development to pre-development peak flow rates confirms that the proposed SWM plan for the development provides the requisite water quantity control.

Preliminary design details for the SWM facilities are provided in Appendix D. The post development peak flow rates at Point of Interest 1 were tabulated considering the ultimate build-out of the Second Nature development lands and the Windfall development lands and are summarized in Table 5.

A post development HY-8 hydraulic model was prepared to determine the maximum capacity of the existing culvert crossing and the extent of flooding over Grey Road 21 (Osler Bluff Road) under proposed conditions. The hydraulic model results are included in Appendix E and summarized in Table 6. Additional conveyance calculations for the proposed 600 mm diameter CSP crossing the intermittent tributary watercourse as well as for the conveyance swales are also provided in Appendix E.

Table 5: Point of Interest 1 Post Development Peak Flow Summary

Storm Event	Point of Interest 1 Peak Flow Rates (m^3/s)	
	Chicago Design Storm	SCS Design Storm
25 mm	0.05 *(0.09)*	-
2 Year	0.08 *(0.22)*	0.10 *(0.33)*
5 Year	0.16 *(0.42)*	0.25 *(0.55)*
10 Year	0.27 *(0.58)*	0.39 *(0.72)*
25 Year	0.47 *(0.80)*	0.62 *(0.94)*
50 Year	0.66 *(0.98)*	0.85 *(1.12)*
100 Year	0.88 *(1.17)*	1.07 *(1.30)*
Regional	2.27 *(1.96)*	-

Note: *(0.09)* – Pre-development peak flow rates

Table 6: Grey Road 21 (Osler Bluff Road) Culvert Crossing Hydraulic Summary (Proposed Conditions)

Storm Event	Peak Flow Rate (m^3/s)	Culvert Discharge (m^3/s)	Discharge over Roadway (m^3/s)	Depth of Overtopping (m)
25 mm	0.05	0.05	0.00	0.00
2 Year	0.10	0.10	0.00	0.00
5 Year	0.25	0.25	0.00	0.00
10 Year	0.39	0.39	0.00	0.00
25 Year	0.62	0.62	0.00	0.00
50 Year	0.85	0.85	0.00	0.00
100 Year	1.07	1.07	0.00	0.00
Regional	2.27	1.08	1.18	0.07

Note: Calculations ignore available floodplain storage upstream of Grey Road 21 (Osler Bluff Road)

4.4 Water Quality Control

As previously discussed in Section 4.1, "Enhanced" or Level 1 water quality treatment in the form of 80% total suspended solids (TSS) removal is required for the development. The proposed dry pond in combination with an oil-grit separator (OGS) unit will provide the requisite water quality treatment for effluent to Outlet 1 and the proposed wet pond will provide the requisite treatment for its tributary area to Outlet 2.

Outlet 1

Under proposed conditions, approximately 1.6 ha will drain to the dry pond SWM facility. The imperviousness of the catchment area has been calculated to be approximately 50%. An oil-grit separator (OGS) will be installed upstream of the dry pond within the minor drainage system to provide pre-treatment for the runoff from the roadway.

The required extended detention storage volume for the dry pond was determined to be 136 m^3/ha, equating to approximately 212 m^3. The sizing of the SWM facility also considered the erosion control requirements for the receiving roadside ditch. The simplified approach was used to determine the erosion control storage volume requirement. The dry pond requires 351 m^3 of extended detention storage for erosion control. The design extended detention volume for the pond is 500 m^3, exceeding both the requirements. In combination, the dry SWM pond and oil-grit separator will provide 80% TSS removal. Water quality calculations and a preliminary OGS sizing report are provided in Appendix F.

Outlet 2

Under proposed conditions, approximately 11.1 ha will drain to the wet pond SWM facility. The imperviousness of the catchment area has been calculated to be approximately 50%. For Level 1 water quality treatment, the required permanent pool volume is 1,515 m^3. The required extended detention storage volume for the wet pond was taken as the greater of 40 m^3/ha or the runoff volume from the 25 mm event which are 446 m^3 and 1,321 m^3 respectively. The design permanent pool and extended detention volumes are approximately 3,110 m^3 and 3,960 m^3 respectively; both exceeding the requirements. As such, the wet pond SWMF will provide 80% TSS removal.

The sizing of the SWM facility also considered the erosion control requirements for the receiving watercourse. The simplified approach was used to determine the erosion control storage volume requirement. For the simplified approach, the wet pond requires 2,507 m^3 of extended detention storage for erosion control. The design extended detention volume for the pond is 3,960 m^3. As such, the proposed SWM facility provides the requisite level of erosion control. Refer to Appendix F for supporting calculations.

4.5 Natural Erosion Hazard Limit

A natural hazards assessment was conducted to determine the appropriate erosion hazard setback from the watercourse/banks for development. The erosion hazard limit was established with reference to the *Adaptive Management of Stream Corridors in Ontario Natural Hazards Technical Guides* produced by the Ministry of Natural Resources and Forestry and the Institute of Watershed Science. The erosion hazard limit is illustrated on the Natural Hazards Plan (Drawing HAZ-1) enclosed.

The erosion hazard limit was derived by the summation of the following:

- the toe erosion allowance which is taken as a 5 m horizontal setback from the natural toe of slope along the watercourse.
- the stable slope allowance is defined by a 3:1 (horizontal:vertical) slope from the toe erosion allowance to existing grade; and
- the erosion access allowance is a 6 m horizontal setback from the stable slope allowance where slopes are less than 3:1.

The proposed development concept has been developed respecting the erosion hazard limit. As such, the development is located outside the natural hazards on-site.

4.6 Erosion and Sediment Control

Erosion and sediment control (ESC) will be implemented for all construction activities within the development site, including vegetation clearing, topsoil stripping, road construction and stockpiling of

materials. The basic principles considered to minimize erosion and sedimentation and the resultant negative environmental impacts include:

- minimize disturbance activities where possible;
- expose the smallest possible land area to erosion for the shortest possible time;
- institute erosion control measures as-required immediately;
- implement sediment control measures before the onset of construction activities; and
- carry out regular inspections of erosion/sediment control measures and repair or maintain as necessary.

The proposed grading, servicing and building construction should be carried out in such a manner that a minimum amount of erosion occurs and such that sedimentation facilities control any erosion that does occur.

Sediment control basins are proposed in the locations of the dry pond and wet pond SWM facilities to settle out sediment in the surface runoff from the disturbed areas on-site before it is released at Outlet 1 or Outlet 2. Temporary drainage swales will be constructed to intercept surface runoff and direct it into the sediment basins. Additional siltation and erosion control measures should include the following:

- erecting silt fence around all construction sites;
- constructing mud mats to prevent off-site tracking of material at all construction access points; and
- providing sediment traps (e.g. berms, geotextile and stone/straw bale barriers in swales).

5 Summary

The proposed Stormwater Management Plan has been prepared considering correspondence and input from all approval agencies while recognizing the pertinent Conservation Authority and Provincial guidelines on water resources and the environment. The SWM Plan ensures that the development can be constructed in accordance with all applicable Municipal, Regional and Provincial guidelines while minimizing the impact of the development on the local drainage systems.

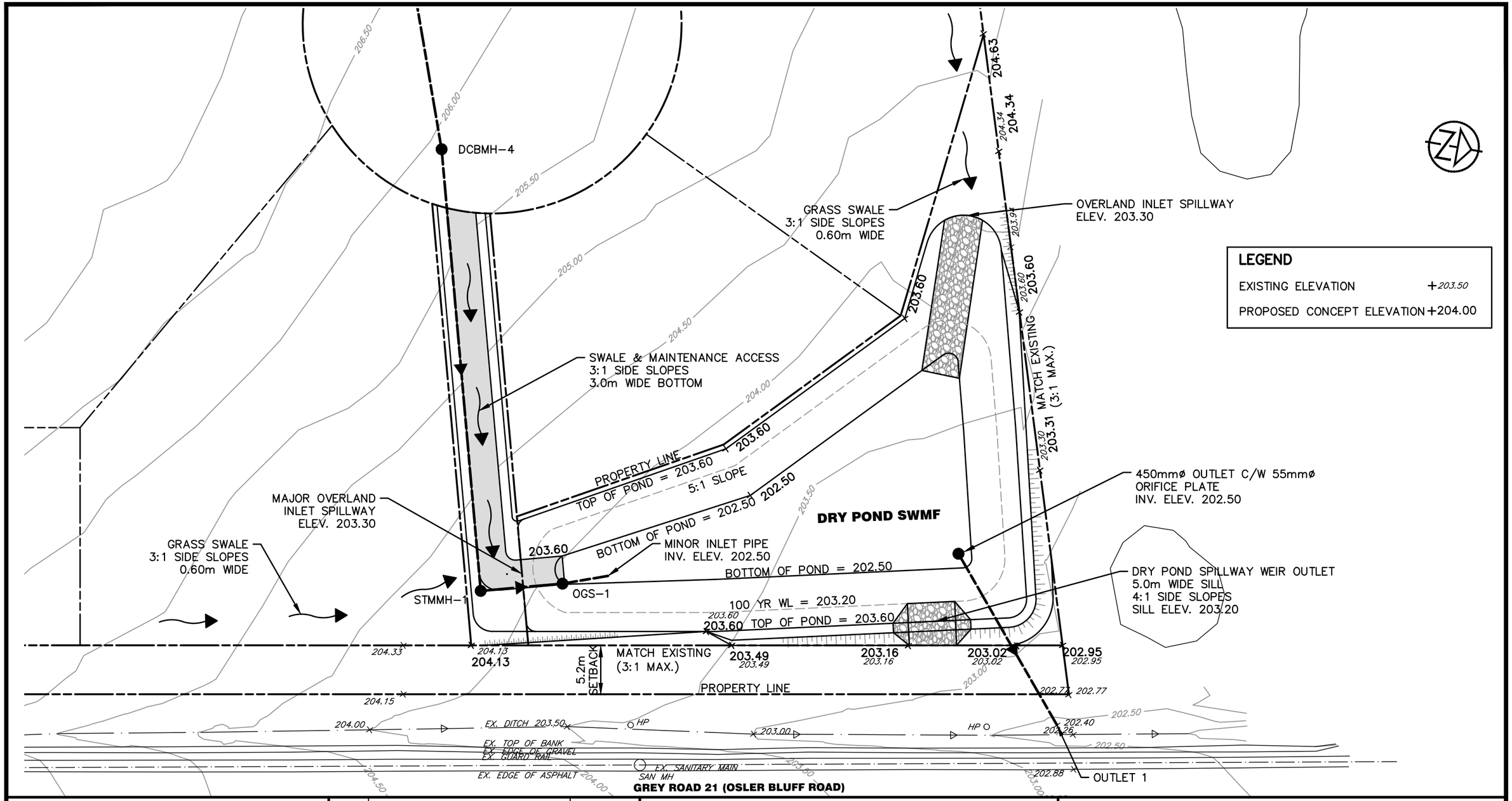
The SWM facilities proposed on site will provide the requisite water quantity and quality controls in the form of post to pre-development peak flow matching and 80% TSS removal. The SWM facilities also provide the requisite extended detention storage volumes to satisfy the erosion control criteria for the development. The proposed development plan was also prepared respecting the natural hazards on-site.

Construction and maintenance of siltation and erosion control facilities and implementation of erosion and sediment control best management practices during site servicing and building construction will reduce the transportation of sediment from the site, improving stormwater quality and mitigation environmental impacts during construction.

In conclusion, the proposed stormwater management plan supports the concept of an environmentally sustainable development. The proposed plan will mitigate anticipated stormwater impacts associated with the development of the proposed residential subdivision.

Authored by: Alysse Overholt, B.E.Sc., M.Eng., EIT
Intern Engineer

Reviewed by: Daniel Twigger, B.Sc.Eng., P.Eng.
Senior Engineer, Group Leader



PRELIMINARY

NO.	REVISIONS	DATE
1.	DRAFT PLAN APPROVAL	FEB/19

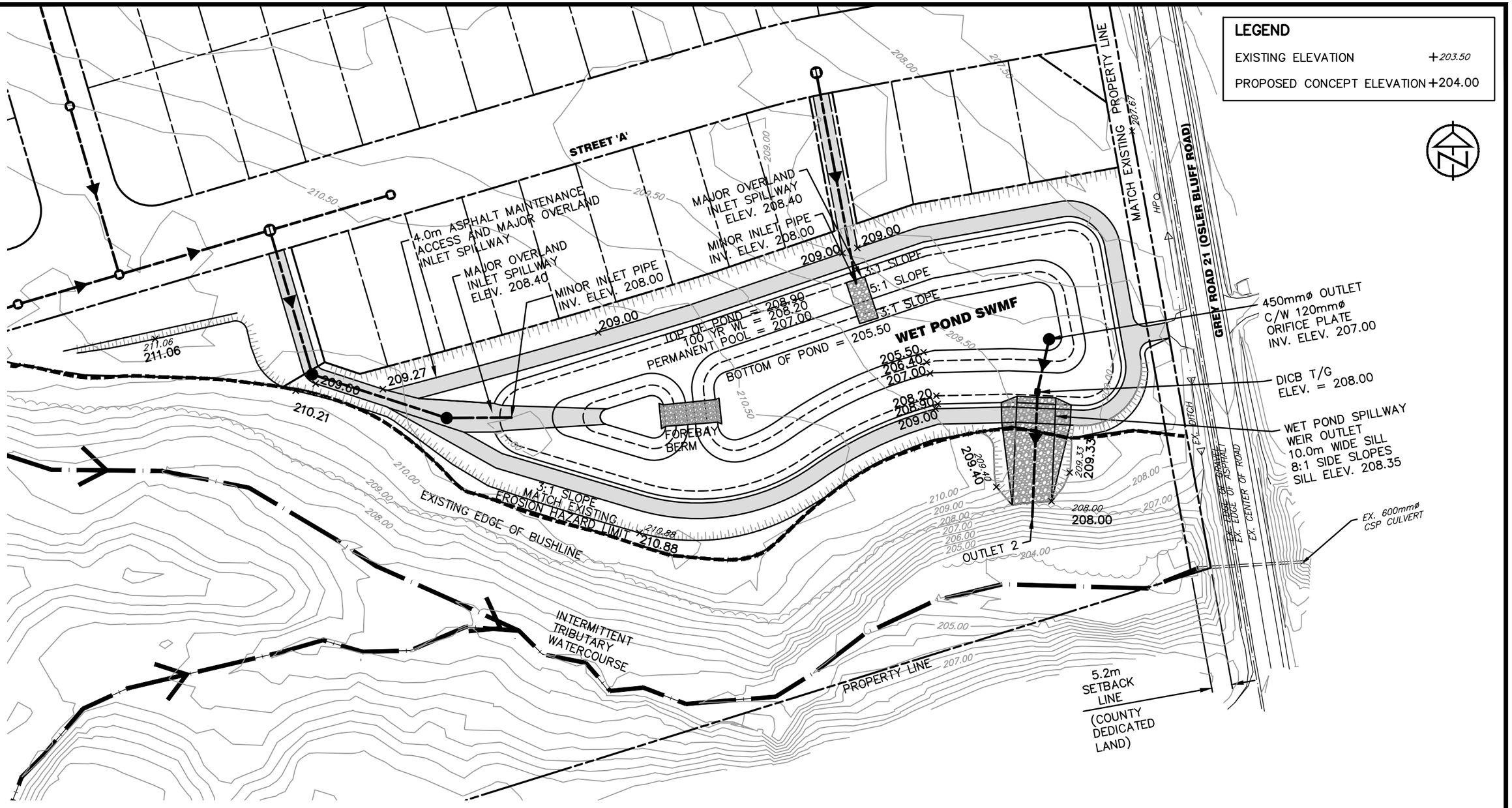
BLUE VISTA
TOWN OF THE BLUE MOUNTAINS

DRY POND SWMF
CONCEPTUAL DESIGN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

SCALE:	1 : 400	JOB NO.	117159
DESIGN:	ARO	CHECKED:	RS
DRAWN:	RD	DATE:	NOV/18

DWG. **SWM-1**



PRELIMINARY

NO.	REVISIONS	DATE
1.	DRAFT PLAN APPROVAL	FEB/19

BLUE VISTA
TOWN OF THE BLUE MOUNTAINS

WET POND SWMF CONCEPTUAL DESIGN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

SCALE:	1 : 1000		JOB NO. 117159
DESIGN:	ARO	CHECKED: RS	DWG. **SWM-2**
DRAWN:	RD	DATE: NOV/18	

APPENDIX A:
EXISTING CONDITION HYDROLOGIC ANALYSIS

C.C. Tatham & Associates Ltd. Consulting Engineers Collingwood Bracebridge Orillia Barrie		
	Project:	BlueVista Subdivision
	File No.:	117159
	Date:	November 2018
	Designed By:	ARO
	Checked By:	DRT
	Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

Pre Development

Catchment 101 **Area** 7.57 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
BRS	BRIGHTON	A	Sand	1	7.57	1	0		32	0		49	7.57	1	38	0		62	0		100	0.757	0.10	50	43
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**7.57**	**1**	**0**	**0**		**0**	**0**		**7.57**	**1**		**0**	**0**		**0**	**0**		**0.757**	**0.1**		**43.0**

Initial Abstraction	**8 mm**

Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	211	m
Minimum Catchment Elevation	203	m
Catchment length	307	m
Catchment Slope	3%	
Catchment Area	7.57	ha
Time of Concentration (Minutes)	**11.80**	
Time of Concentration (Hours)	**0.20**	
Time to Peak (2/3 x Time of Concentration)	**0.13**	

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	211	m
Minimum Catchment Elevation	203	m
Catchment length	307	m
Catchment Slope	1%	
Catchment Area	7.57	ha
Time of Concentration (Minutes)	**72.16**	
Time of Concentration (Hours)	**1.20**	
Time to Peak (2/3 x Time of Concentration)	**0.80**	

Time to Peak	**0.80 hrs**

Runoff Coefficient	**0.10**

Landuse Type	Soil Series				
	BRS	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.095	#N/A	#N/A	#N/A	#N/A

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie

Project:	BlueVista Subdivision
File No.:	117159
Date:	November 2018
Designed By:	ARO
Checked By:	DRT
Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

Pre Development

Catchment 102 **Area** 12.96 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
BRS	BRIGHTON	A	Sand	1	3.1104	0.24	2.4883	0.8	32	0		49	0.4355	0.14	38	0		62	0		100	0.1866	0.06	50	33.92
kc-sh	KEMBLE	D	Clay Loam or Clay	3	9.8496	0.76	8.0767	0.82	79	0		84	1.3789	0.14	81	0		86	0		100	0.394	0.04	50	78.12
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	12.96	1	10.565	0.8152		0	0		1.8144	0.14		0	0		0	0		0.58061	0.0448		67.5

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	210.75	m
Minimum Catchment Elevation	203.5	m
Catchment length	575.5	m
Catchment Slope	1%	
Catchment Area	12.96	ha
Time of Concentration (Minutes)	**24.24**	
Time of Concentration (Hours)	**0.40**	
Time to Peak (2/3 x Time of Concentration)	**0.27**	

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	210.75	m
Minimum Catchment Elevation	203.5	m
Catchment length	575.5	m
Catchment Slope	1%	
Catchment Area	12.96	ha
Time of Concentration (Minutes)	**81.19**	
Time of Concentration (Hours)	**1.35**	
Time to Peak (2/3 x Time of Concentration)	**0.90**	

Time to Peak	**0.90 hrs**

Initial Abstraction	**9.272 mm**

Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.27**

Landuse Type	Soil Series				
	BRS	kc-sh	0	0	0
	1	3	#N/A	#N/A	#N/A
Forest/Woodland	0.08	0.35	#N/A	#N/A	#N/A
Cultivated	0.22	0.55	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	0.4	#N/A	#N/A	#N/A
Impervious	0.95	0.95	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	0.05	#N/A	#N/A	#N/A
Meadows	0.09	0.38	#N/A	#N/A	#N/A
Soil Series Total	0.0796	0.3355	#N/A	#N/A	#N/A

C.C. Tatham & Associates Ltd. Consulting Engineers — Collingwood Bracebridge Orillia Barrie	**Project:**	BlueVista Subdivision
	File No.:	117159
	Date:	November 2018
	Designed By:	ARO
	Checked By:	DRT
	Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

Pre Development

Catchment 501 **Area** 15.30 ha

WEIGHTED CN VALUE																									
Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
kc-sh	KEMBLE	D	Clay Loam or Clay	3	15.3	1	15.3	1	79	0		84	0		81	0		86	0		100	0		50	79
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**15.3**	**1**	**15.3**	**1**		**0**	**0**		**0**	**0**		**0**	**0**		**0**	**0**		**0**	**0**		**79.0**

Time of Concentration Calculations

Initial Abstraction	**10 mm**

Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	220	m
Minimum Catchment Elevation	217.5	m
Catchment length	425	m
Catchment Slope	1%	
Catchment Area	15.3	ha
Time of Concentration (Minutes)	**20.51**	
Time of Concentration (Hours)	**0.34**	
Time to Peak (2/3 x Time of Concentration)	**0.23**	

Time to Peak	**0.67 hrs**

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	220	m
Minimum Catchment Elevation	217.5	m
Catchment length	425	m
Catchment Slope	1%	
Catchment Area	15.3	ha
Time of Concentration (Minutes)	**60.05**	
Time of Concentration (Hours)	**1.00**	
Time to Peak (2/3 x Time of Concentration)	**0.67**	

Runoff Coefficient	**0.35**

Landuse Type	Soil Series				
	kc-sh	0	0	0	0
	3	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.35	#N/A	#N/A	#N/A	#N/A
Cultivated	0.55	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.4	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.38	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.35	#N/A	#N/A	#N/A	#N/A

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie

Project:	BlueVista Subdivision
File No.:	117159
Date:	November 2018
Designed By:	ARO
Checked By:	DRT
Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

Pre Development

Catchment 502 **Area** 1.13 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
kc-sh	KEMBLE	D	Clay Loam or Clay	3	1.13	1	1.13	1	79	0		84	0		81	0		86	0		100	0		50	79
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**1.13**	**1**	**1.13**	**1**		**0**	**0**		**0**	**0**		**0**	**0**		**0**	**0**		**0**	**0**		**79.0**

Time of Concentration Calculations

Initial Abstraction	**10 mm**

Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	220	m
Minimum Catchment Elevation	217.5	m
Catchment length	285	m
Catchment Slope	1%	
Catchment Area	1.13	ha
Time of Concentration (Minutes)	**16.47**	
Time of Concentration (Hours)	**0.27**	
Time to Peak (2/3 x Time of Concentration)	**0.18**	

Time to Peak	**0.48 hrs**

For Runoff Coefficients less than 0.4

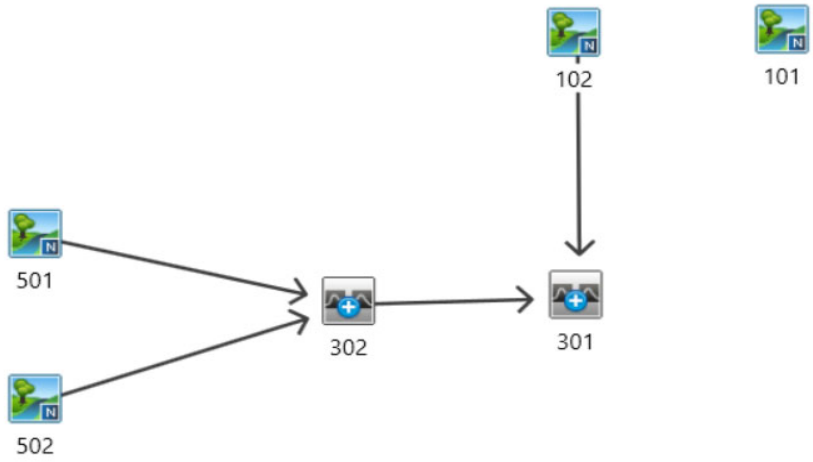
Airport Method

Maximum Catchment Elevation	220	m
Minimum Catchment Elevation	217.5	m
Catchment length	285	m
Catchment Slope	1%	
Catchment Area	1.13	ha
Time of Concentration (Minutes)	**43.10**	
Time of Concentration (Hours)	**0.72**	
Time to Peak (2/3 x Time of Concentration)	**0.48**	

Runoff Coefficient	**0.35**

Landuse Type	Soil Series				
	kc-sh	0	0	0	0
	3	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.35	#N/A	#N/A	#N/A	#N/A
Cultivated	0.55	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.4	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.38	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.35	#N/A	#N/A	#N/A	#N/A

BLUEVISTA SUBDIVISION
PRE-DEVELOPMENT CONDITIONS



Nashyd		Route Pipe		Duhyd	
Standhyd		Route Channel		Diverthyd	
Addhyd		Route Reservoir			

C.C. TATHAM & ASSOCIATES LTD.
Consulting Engineers

Project:	BLUEVISTA
File No.:	117159
Subject:	Otthymo Flow Schematic
Date:	Dec-18 **Figure:** 1

PRE DEVELOPMENT 4-HR CHICAGO

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


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\25b5b42f-bcaf-460b-9416-4ebbf6a0d582\s
  Summary         filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\25b5b42f-bcaf-460b-9416-4ebbf6a0d582\s


DATE: 01-15-2019                          TIME: 09:27:26

USER:


COMMENTS: ____________________________________________________________


  ***********************************************
  ** SIMULATION : Run 01                       **  25 mm STORM
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                    6.0
    [ Ptot= 24.97 mm ]
    fname      :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.01  3.00   0.81 0.03   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
    READ STORM                    6.0
    [ Ptot= 24.97 mm ]
    fname      :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.03  3.17   1.79 0.07   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                    6.0
    [ Ptot= 24.97 mm ]
    fname      :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.06  2.83   2.68 0.11   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    READ STORM                    6.0
    [ Ptot= 24.97 mm ]
    fname      :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.01  2.58   2.72 0.11   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.06  2.83   2.68  n/a   0.000
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    0.09  2.92   2.29  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\e287941d-3243-4ce3-91c3-3f8b9a51346e\s
  Summary         filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\e287941d-3243-4ce3-91c3-3f8b9a51346e\s


DATE: 01-15-2019                          TIME: 09:27:25

USER:


COMMENTS: ____________________________________________________________


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

```
  ** SIMULATION : Run 02                          ** 2 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                    6.0
    [ Ptot= 33.75 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.02  2.92   1.83 0.05   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
    READ STORM                    6.0
    [ Ptot= 33.75 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.07  3.08   4.08 0.12   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                    6.0
    [ Ptot= 33.75 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.14  2.75   6.10 0.18   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    READ STORM                    6.0
    [ Ptot= 33.75 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.01  2.50   6.18 0.18   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.16  2.75   6.11  n/a   0.000
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    0.22  2.83   5.21  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
```

```
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\322b3340-a0ec-44a4-8894-5068f9e05eac\s
  Summary          filename:        C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\322b3340-a0ec-44a4-8894-5068f9e05eac\s


DATE: 01-15-2019                            TIME: 09:27:26

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 03                          ** 5 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                    6.0
    [ Ptot= 44.07 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.04  2.92   3.49 0.08   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
    READ STORM                    6.0
    [ Ptot= 44.07 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.13  3.00   7.71 0.17   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                    6.0
    [ Ptot= 44.07 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.28  2.75  11.29 0.26   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
```

```
    READ STORM                 6.0
    [ Ptot= 44.07 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.03  2.50  11.42 0.26   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.30  2.67  11.30  n/a   0.000
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    0.42  2.75   9.71  n/a   0.000
*
================================================================================
=========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\5a085746-ead8-4a88-a647-d5ba9e518e4a\s
  Summary          filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\5a085746-ead8-4a88-a647-d5ba9e518e4a\s


DATE: 01-15-2019                          TIME: 09:27:26

USER:


COMMENTS: _____________________________________________________________


  ***********************************************
  ** SIMULATION : Run 04                       **  10 YEAR STORM
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.05  2.83   4.78 0.09   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.18  3.00  10.43 0.21   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.38  2.67  15.07 0.30   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.04  2.42  15.24 0.30   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.41  2.67  15.08  n/a   0.000
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    0.58  2.75  13.03  n/a   0.000
*
================================================================================
=========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
```

```
\3212affb-35da-4852-9d0b-9c8922c19c40\f8d7234b-cf7b-4e7c-8081-47b57a1cff4f\s
  Summary         filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\f8d7234b-cf7b-4e7c-8081-47b57a1cff4f\s


DATE: 01-15-2019                          TIME: 09:27:26

USER:


COMMENTS: _____________________________________________________

  ************************************************
  ** SIMULATION : Run 05                        **  25 YEAR STORM
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.07  2.83   6.73 0.11   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.25  3.00  14.41 0.24   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.52  2.67  20.44 0.35   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.05  2.42  20.65 0.35   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    ADD [  0501+  0502] 0302  3  5.0   16.43    0.57  2.67  20.46  n/a   0.000
*
    ADD [  0102+  0302] 0301  3  5.0   29.39    0.80  2.75  17.79  n/a   0.000
*
 FINISH

================================================================================
==========================


================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\1bb3af0e-f885-4e05-8845-e83899ceb8bd\s
  Summary           filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\1bb3af0e-f885-4e05-8845-e83899ceb8bd\s


DATE: 01-15-2019                          TIME: 09:27:25

USER:


COMMENTS: _____________________________________________________

  ************************************************
  ** SIMULATION : Run 06                        **  50 YEAR STORM
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.09  2.83   8.43 0.13   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
    READ STORM                  6.0
```

```
    [ Ptot= 65.65 mm ]
    fname       :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.31  2.92  17.79 0.27   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname       :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.65  2.67  24.90 0.38   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname       :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.06  2.42  25.14 0.38   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.70  2.67  24.92  n/a   0.000
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    0.98  2.75  21.77  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\375fa188-b9a8-4b16-9431-d39d2f6e662f\s
  Summary          filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\375fa188-b9a8-4b16-9431-d39d2f6e662f\s


DATE: 01-15-2019                          TIME: 09:27:26
```

```
USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 07                     **  100 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

     START @  0.00 hrs
     ---------------------
    READ STORM                  6.0
    [ Ptot= 71.77 mm ]
    fname       :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.11  2.83  10.15 0.14   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
    READ STORM                  6.0
    [ Ptot= 71.77 mm ]
    fname       :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.37  2.92  21.14 0.29   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                  6.0
    [ Ptot= 71.77 mm ]
    fname       :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.76  2.67  29.23 0.41   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    READ STORM                  6.0
    [ Ptot= 71.77 mm ]
    fname       :       C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.07  2.42  29.51 0.41   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.83  2.67  29.25  n/a   0.000
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    1.17  2.75  25.67  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
```

```
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\01992cbd-5d70-45d1-a3ac-b0f0c3925fda\s
  Summary          filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\01992cbd-5d70-45d1-a3ac-b0f0c3925fda\s


DATE: 01-15-2019                          TIME: 09:27:25

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 08                     ** REGIONAL STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.25  7.58  65.60 0.34   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.72  7.67 110.30 0.57   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 ** CALIB NASHYD         0501  1  5.0   15.30    1.18  7.33 133.03 0.69   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname      :      C:\Users\ALOverholt\AppData\Local\Temp\1b283559-8e56-4c72-
b3aa-487fc45de076\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.10  7.17 133.67 0.69   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    1.27  7.33 133.07  n/a   0.000
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    1.96  7.42 123.03  n/a   0.000
*
```

PRE DEVELOPMENT 24-HR SCS

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


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\46d65693-d244-4788-b1ee-2df4f945002e\s
  Summary           filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\46d65693-d244-4788-b1ee-2df4f945002e\s


DATE: 01-15-2019                          TIME: 09:27:21

USER:


COMMENTS: _____________________________________________________________


  ***********************************************
  ** SIMULATION : Run 01                       **  2 YEAR STORM
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    MASS STORM                  5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.02 12.42  14.10 0.29   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    MASS STORM                  5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.22 12.67  13.94 0.29   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.23 12.58  13.95  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.10 12.92   9.61 0.20   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    0.33 12.67  12.04  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.03 12.83   4.39 0.09   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\e428fe02-5452-495f-9b9e-9a6e9dd8617b\s
  Summary           filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\e428fe02-5452-495f-9b9e-9a6e9dd8617b\s


DATE: 01-15-2019                          TIME: 09:27:22

USER:


COMMENTS: _____________________________________________________________


  ***********************************************
  ** SIMULATION : Run 02                       **  5 YEAR STORM
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.03 12.42  22.62 0.36   0.000
```

```
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.36 12.58  22.39 0.36   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.39 12.58  22.41  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.17 12.92  15.88 0.26   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    0.55 12.67  19.53  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.05 12.75   7.46 0.12   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\0595769c-6944-4456-aef4-949709215c72\s
  Summary         filename:        C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\0595769c-6944-4456-aef4-949709215c72\s


DATE: 01-15-2019                          TIME: 09:27:21

USER:


COMMENTS: _____________________________________________________________
```

```
  ********************************************
  ** SIMULATION : Run 03                    **  10 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      ----------------
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.04 12.33  28.88 0.41   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.47 12.58  28.61 0.40   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.51 12.58  28.63  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.22 12.92  20.65 0.29   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    0.72 12.67  25.11  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.07 12.75   9.90 0.14   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****
```

```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\0ddf58ba-7fe4-4a3b-9938-8af866cb2095\s
  Summary          filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\0ddf58ba-7fe4-4a3b-9938-8af866cb2095\s


DATE: 01-15-2019                              TIME: 09:27:21

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 04                         **  25 YEAR STORM
  ************************************************

  W/E COMMAND              HYD ID   DT     AREA   ' Qpeak Tpeak    R.V. R.C.    Qbase
                                    min      ha    '  cms   hrs      mm           cms

      START @  0.00 hrs
      --------------------
    MASS STORM                      5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB NASHYD          0502  1  5.0     1.13    0.06 12.33  37.15 0.45   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    MASS STORM                      5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB NASHYD          0501  1  5.0    15.30    0.61 12.58  36.83 0.45   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    ADD [  0501+  0502]  0302  3  5.0    16.43    0.67 12.58  36.85  n/a   0.000
*
    MASS STORM                      5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB NASHYD          0102  1  5.0    12.96    0.30 12.83  27.12 0.33   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    ADD [  0102+  0302]  0301  3  5.0    29.39    0.94 12.67  32.56  n/a   0.000
*
    MASS STORM                      5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB NASHYD          0101  1  5.0     7.57    0.09 12.75  13.33 0.16   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V V    I      SS   U   U  A   A  L
          VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\e61987e9-f748-4094-aa2d-ed99496b51e4\s
  Summary          filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\e61987e9-f748-4094-aa2d-ed99496b51e4\s


DATE: 01-15-2019                              TIME: 09:27:22

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 05                         **  50 YEAR STORM
  ************************************************

  W/E COMMAND              HYD ID   DT     AREA   ' Qpeak Tpeak    R.V. R.C.    Qbase
                                    min      ha    '  cms   hrs      mm           cms

      START @  0.00 hrs
      --------------------
    MASS STORM                      5.0
    [ Ptot= 90.30 mm ]
*
 ** CALIB NASHYD          0502  1  5.0     1.13    0.07 12.33  43.62 0.48   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    MASS STORM                      5.0
    [ Ptot= 90.30 mm ]
*
 ** CALIB NASHYD          0501  1  5.0    15.30    0.73 12.58  43.26 0.48   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    ADD [  0501+  0502]  0302  3  5.0    16.43    0.79 12.58  43.29  n/a   0.000
*
    MASS STORM                      5.0
    [ Ptot= 90.30 mm ]
*
 ** CALIB NASHYD          0102  1  5.0    12.96    0.36 12.83  32.29 0.36   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    ADD [  0102+  0302]  0301  3  5.0    29.39    1.12 12.67  38.44  n/a   0.000
*
    MASS STORM                      5.0
```

```
    [ Ptot= 90.30 mm ]
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.11 12.75  16.17 0.18   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
 FINISH

================================================================================
==========================


================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\cd03120c-1db4-4633-b6d1-f4ef6e6e180c\s
  Summary          filename:        C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\cd03120c-1db4-4633-b6d1-f4ef6e6e180c\s


DATE: 01-15-2019                          TIME: 09:27:21

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 06                      ** 100 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha    '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    MASS STORM                 5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB NASHYD         0502  1  5.0    1.13    0.08 12.33  50.20 0.51   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 0.48]
*
    MASS STORM                 5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB NASHYD         0501  1  5.0   15.30    0.84 12.58  49.81 0.51   0.000
    [CN=78.7         ]
    [ N = 3.0:Tp 0.67]
*
    ADD [  0501+  0502]  0302  3  5.0   16.43    0.91 12.58  49.84  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB NASHYD         0102  1  5.0   12.96    0.42 12.83  37.64 0.38   0.000
    [CN=67.5         ]
    [ N = 3.0:Tp 0.90]
*
    ADD [  0102+  0302]  0301  3  5.0   29.39    1.30 12.67  44.46  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB NASHYD         0101  1  5.0    7.57    0.13 12.75  19.17 0.19   0.000
    [CN=43.0         ]
    [ N = 3.0:Tp 0.80]
*
```

APPENDIX B:
EXISTING CONDITION HYDRAULIC ANALYSIS

HY-8 Culvert Analysis Report
E. 600 mm Diameter Culvert Crossing at County Road 21 (Existing Flows)

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 1 - Summary of Culvert Flows at Crossing: EX. 600 mm CULVERT (PreDev)

Headwater Elevation (m)	Discharge Names	Total Discharge (cms)	Culvert 1 Discharge (cms)	Roadway Discharge (cms)	Iterations
203.56	25mm	0.09	0.09	0.00	1
203.94	2YR-SCS	0.33	0.33	0.00	1
204.54	5YR-SCS	0.55	0.55	0.00	1
205.37	10YR-SCS	0.72	0.72	0.00	1
206.75	25YR-SCS	0.94	0.94	0.00	1
207.74	50YR-SCS	1.12	1.07	0.04	30
207.75	100YR-SCS	1.30	1.07	0.22	5
207.78	REGIONAL	1.96	1.08	0.88	4
207.73	Overtopping	1.07	1.07	0.00	Overtopping

Table 2 - Culvert Summary Table: Culvert 1

Discharge Names	Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
25mm	0.09	0.09	203.56	0.280	0.0*	1-S2n	0.188	0.190	0.188	0.030	1.144	0.215
2YR-SCS	0.33	0.33	203.94	0.630	0.661	7-M2c	0.404	0.374	0.374	0.066	1.783	0.360
5YR-SCS	0.55	0.55	204.54	1.045	1.255	7-M2c	0.600	0.484	0.484	0.090	2.252	0.440
10YR-SCS	0.72	0.72	205.37	1.525	2.092	7-M2c	0.600	0.539	0.539	0.105	2.690	0.489
25YR-SCS	0.94	0.94	206.75	2.380	3.468	7-M2c	0.600	0.561	0.561	0.123	3.419	0.543
50YR-SCS	1.12	1.07	207.74	3.009	4.459	6-FFc	0.600	0.600	0.600	0.137	3.794	0.582
100YR-SCS	1.30	1.07	207.75	3.017	4.471	6-FFc	0.600	0.600	0.600	0.150	3.800	0.616
REGIONAL	1.96	1.08	207.78	3.037	4.504	6-FFc	0.600	0.600	0.600	0.192	3.814	0.723

* Full Flow Headwater elevation is below inlet invert.

****

Straight Culvert

Inlet Elevation (invert): 203.28 m, Outlet Elevation (invert): 202.88 m

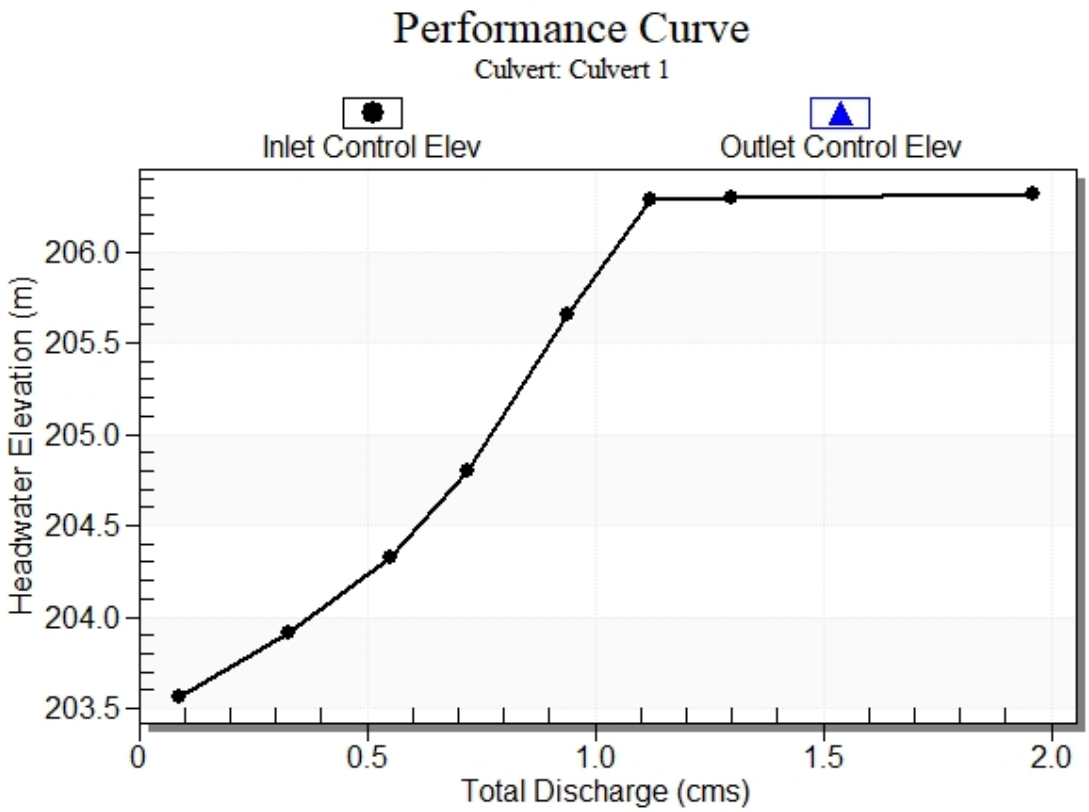
Culvert Length: 27.70 m, Culvert Slope: 0.0144

****

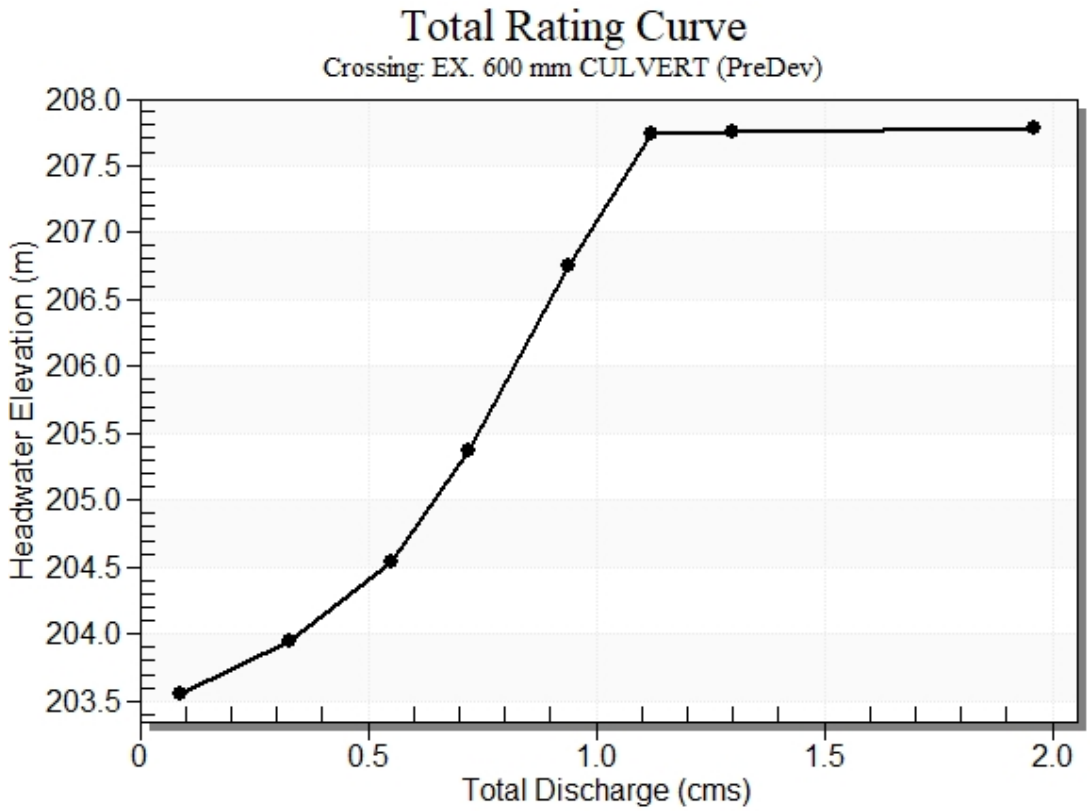
Table 3 - Downstream Channel Rating Curve (Crossing: EX. 600 mm CULVERT (PreDev))

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.09	202.91	0.03	0.22	2.97	0.40
0.33	202.95	0.07	0.36	6.46	0.45
0.55	202.97	0.09	0.44	8.78	0.47
0.72	202.99	0.11	0.49	10.32	0.48
0.94	203.00	0.12	0.54	12.10	0.50
1.12	203.02	0.14	0.58	13.44	0.51
1.30	203.03	0.15	0.62	14.70	0.51
1.96	203.07	0.19	0.72	18.78	0.53

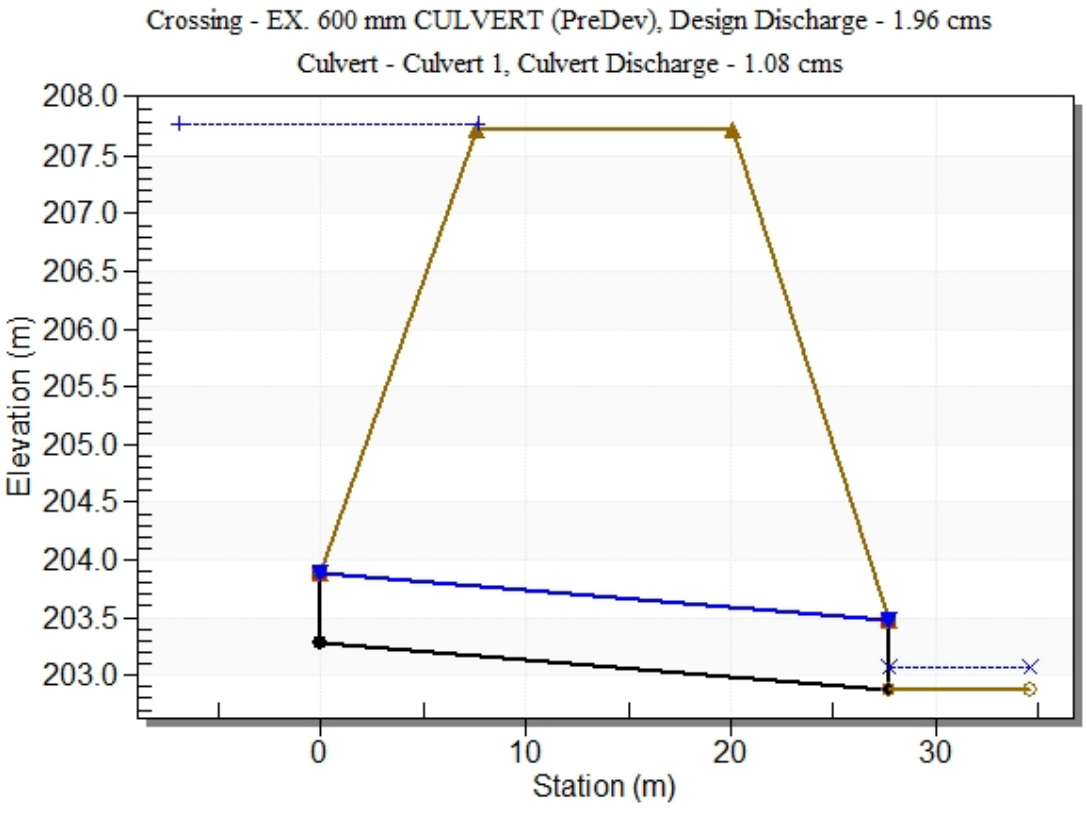
Culvert Performance Curve Plot: Culvert 1



Rating Curve Plot for Crossing: EX. 600 mm CULVERT (PreDev)



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 203.28 m

Outlet Station: 27.70 m

Outlet Elevation: 202.88 m

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Tailwater Channel Data - EX. 600 mm CULVERT (PreDev)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 13.77 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0100

Channel Manning's n: 0.0450

Channel Invert Elevation: 202.88 m

Roadway Data for Crossing: EX. 600 mm CULVERT (PreDev)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 43.28 m

Crest Elevation: 207.73 m

Roadway Surface: Paved

Roadway Top Width: 12.50 m

APPENDIX C:
POST DEVELOPMENT HYDROLOGIC ANALYSIS

BLUEVISTA DEVELOPMENT - 117159

PERCENT IMPERVIOUS CALCULATIONS

November 2018

Catchment : 201

Landuse Designation	Area (ha)	% Impervious	Impervious Area (ha)	% Impervious Area that is Directly Connected	Directed Connected Area (ha)	% Impervious Area that is Directly Connected
Single Family Residential	1.18	45.6%	0.54	5.3%	0.03	5.3%
Semi-detached Residential	0.00	50.2%	0.00	18.4%	0.00	0.0%
Road R.O.W.	0.29	55.0%	0.16	85.0%	0.14	85.0%
Park Block	0.00	6.5%	0.00	0.0%	0.00	0.0%
SWM Block	0.09	60.0%	0.05	100.0%	0.05	100.0%
Total	**1.56**	**48.2%**	**0.75**	**28.8%**	**0.22**	**28.8%**

Notes: 1) Average impervious percentages based on Windfall Development as-built statistics.

2) Roof leaders are to be directed to grassed areas and not connected to storm sewer.

3) Includes an allowance (30 sq.m per lot/180 lots) for driveways for single residential, semi detached and street townhouse lots.

BLUEVISTA DEVELOPMENT - 117159

PERCENT IMPERVIOUS CALCULATIONS

November 2018

Catchment : 202

Landuse Designation	Area (ha)	% Impervious	Impervious Area (ha)
Single Family Residential	1.23	39.7%	0.49
Semi-detached Residential	0.00	50.2%	0.00
Road R.O.W.	0.00	55.0%	0.00
Park Block	0.12	6.5%	0.01
Open Space	5.13	5.0%	0.26
Total	**6.48**	**11.6%**	**0.75**

Notes: 1) Average impervious percentages based on Windfall Development as-built statistics.

2) Roof leaders are to be directed to grassed areas and not connected to storm sewer.

3) Includes an allowance (30 sq.m per lot/180 lots) for driveways for single residential, semi detached and street townhouse lots.

BLUEVISTA DEVELOPMENT - 117159

PERCENT IMPERVIOUS CALCULATIONS

November 2018

Catchment : 203

Landuse Designation	Area (ha)	% Impervious	Impervious Area (ha)	% Impervious Area that is Directly Connected	Directed Connected Area (ha)	% Impervious Area that is Directly Connected
Single Family Residential	0.29	43.0%	0.12	5.3%	0.01	5.3%
Semi-detached Residential	0.00	50.2%	0.00	18.4%	0.00	0.0%
Road R.O.W.	0.04	55.0%	0.02	85.0%	0.02	85.0%
Park Block	0.00	6.5%	0.00	0.0%	0.00	0.0%
SWM Block	0.00	60.0%	0.00	100.0%	0.00	0.0%
Total	**0.33**	**44.4%**	**0.15**	**17.0%**	**0.02**	**17.0%**

Notes: 1) Average impervious percentages based on Windfall Development as-built statistics.

2) Roof leaders are to be directed to grassed areas and not connected to storm sewer.

3) Includes an allowance (30 sq.m per lot/180 lots) for driveways for single residential, semi detached and street townhouse lots.

BLUEVISTA DEVELOPMENT - 117159

PERCENT IMPERVIOUS CALCULATIONS

November 2018

Catchment : 204

Landuse Designation	Area (ha)	% Impervious	Impervious Area (ha)
Single Family Residential	0.99	39.7%	0.39
Semi-detached Residential	0.00	50.2%	0.00
Road R.O.W.	0.00	55.0%	0.00
Park Block	0.00	6.5%	0.00
SWM Block	0.00	60.0%	0.00
Total	**0.99**	**39.7%**	**0.39**

Notes: 1) Average impervious percentages based on Windfall Development as-built statistics.

2) Roof leaders are to be directed to grassed areas and not connected to storm sewer.

3) Includes an allowance (30 sq.m per lot/180 lots) for driveways for single residential, semi detached and street townhouse lots.

BLUEVISTA DEVELOPMENT - 117159

PERCENT IMPERVIOUS CALCULATIONS

November 2018

Catchment : 205

Landuse Designation	Area (ha)	% Impervious	Impervious Area (ha)	% Impervious Area that is Directly Connected	Directed Connected Area (ha)	% Impervious Area that is Directly Connected
Single Family Residential	4.97	48.8%	2.43	5.3%	0.13	5.3%
Semi-detached Residential	1.42	50.2%	0.71	18.4%	0.13	20.0%
Road R.O.W.	2.89	55.0%	1.59	85.0%	1.35	85.0%
Park Block	1.00	6.5%	0.06	0.0%	0.00	0.0%
SWM Block	0.86	80.0%	0.69	100.0%	0.69	100.0%
Total	**11.14**	**49.2%**	**5.48**	**41.9%**	**2.30**	**41.9%**

Notes: 1) Average impervious percentages based on Windfall Development as-built statistics.

2) Roof leaders are to be directed to grassed areas and not connected to storm sewer.

3) Includes an allowance (30 sq.m per lot/180 lots) for driveways for single residential, semi detached and street townhouse lots.

C.C. Tatham & Associates Ltd.
Consulting Engineers

Collingwood Bracebridge Orillia Barrie

Project:	BlueVista Subdivision
File No.:	117159
Date:	November 2018
Designed By:	ARO
Checked By:	DRT
Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

Post Development

Catchment 201 **Area** 1.56 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
BRS	BRIGHTON	A	Sand	1	1.56	1	0		32	1.56	1	49	0		38	0		62	0		100	0		50	49
				Totals	1.56	1	0	0		1.56	1		0	0		0	0		0	0		0	0		49.0

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie

Project:	BlueVista Subdivision
File No.:	117159
Date:	November 2018
Designed By:	ARO
Checked By:	DRT
Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

Post Development

Catchment 202 **Area** 6.48 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
BRS	BRIGHTON	A	Sand	1	1.5552	0.24	1.2753	0.82	32	0		49	0		38	0		62	0.1866	0.12	100	0.0933	0.06	50	41.24
kc-sh	KEMBLE	D	Clay Loam or Clay	3	4.9248	0.76	4.1368	0.84	79	0		84	0		81	0		86	0.591	0.12	100	0.197	0.04	50	80.36
				Totals	**6.48**	**1**	**5.4121**	**0.8352**		**0**	**0**		**0**	**0**		**0**	**0**		**0.7776**	**0.12**		**0.2903**	**0.0448**		**71.0**

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	210.75	m
Minimum Catchment Elevation	203.5	m
Catchment length	575.5	m
Catchment Slope	1%	
Catchment Area	6.48	ha
Time of Concentration (Minutes)	**25.98**	
Time of Concentration (Hours)	**0.43**	
Time to Peak (2/3 x Time of Concentration)	**0.29**	

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	210.75	m
Minimum Catchment Elevation	203.5	m
Catchment length	575.5	m
Catchment Slope	1%	
Catchment Area	6.48	ha
Time of Concentration (Minutes)	**73.64**	
Time of Concentration (Hours)	**1.23**	
Time to Peak (2/3 x Time of Concentration)	**0.82**	

Time to Peak	**0.82 hrs**

Initial Abstraction	**8.59 mm**

Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.35**

Landuse Type	Soil Series				
	BRS	kc-sh	0	0	0
	1	3	#N/A	#N/A	#N/A
Forest/Woodland	0.08	0.35	#N/A	#N/A	#N/A
Cultivated	0.22	0.55	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	0.4	#N/A	#N/A	#N/A
Impervious	0.95	0.95	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	0.05	#N/A	#N/A	#N/A
Meadows	0.09	0.38	#N/A	#N/A	#N/A
Soil Series Total	0.1826	0.404	#N/A	#N/A	#N/A

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie

Project:	BlueVista Subdivision
File No.:	117159
Date:	November 2018
Designed By:	ARO
Checked By:	DRT
Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

Post Development

Catchment 203 **Area** 0.33 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
BRS	BRIGHTON	A	Sand	1	0.33	1	0		32	0.33	1	49	0		38	0		62	0		100	0		50	49
				Totals	0.33	1	0	0		0.33	1		0	0		0	0		0	0		0	0		49.0

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie

Project:	BlueVista Subdivision
File No.:	117159
Date:	November 2018
Designed By:	ARO
Checked By:	DRT
Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

Post Development

Catchment 204 **Area** 0.99 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
BRS	BRIGHTON	A	Sand	1	0.99	1	0		32	0.99	1	49	0		38	0		62	0		100	0		50	49
			Totals		0.99	1	0	0		0.99	1		0	0		0	0		0	0		0	0		49.0

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	212	m
Minimum Catchment Elevation	207.5	m
Catchment length	210	m
Catchment Slope	2%	
Catchment Area	0.99	ha
Time of Concentration (Minutes)	**10.29**	
Time of Concentration (Hours)	**0.17**	
Time to Peak (2/3 x Time of Concentration)	**0.11**	

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	212	m
Minimum Catchment Elevation	207.5	m
Catchment length	210	m
Catchment Slope	1%	
Catchment Area	0.99	ha
Time of Concentration (Minutes)	**59.38**	
Time of Concentration (Hours)	**0.99**	
Time to Peak (2/3 x Time of Concentration)	**0.66**	

Time to Peak	**0.66 hrs**

Initial Abstraction	**5.00 mm**

Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.10**

Landuse Type	Soil Series				
	BRS	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.1	#N/A	#N/A	#N/A	#N/A

C.C. Tatham & Associates Ltd.
Consulting Engineers

Collingwood Bracebridge Orillia Barrie

Project:	BlueVista Subdivision
File No.:	117159
Date:	November 2018
Designed By:	ARO
Checked By:	DRT
Subject:	CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

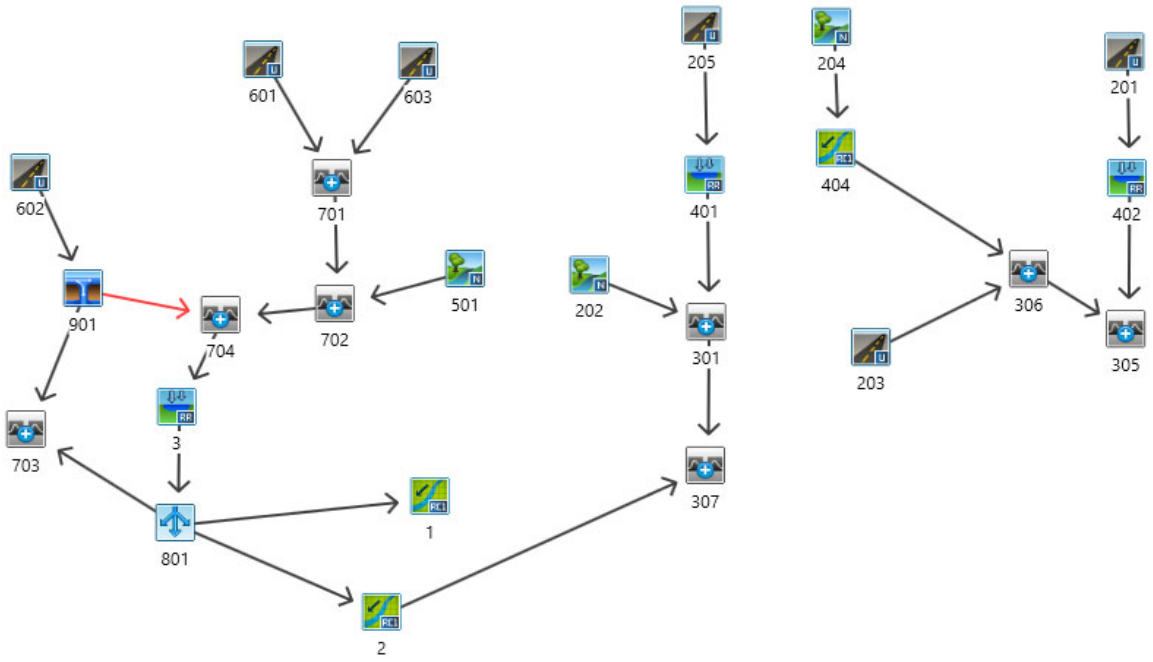
Post Development

Catchment 205 **Area** 11.14 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
BRS	BRIGHTON	A	Sand	1	5.7928	0.52	0		32	5.7928	1	49	0		38	0		62	0		100	0		50	49
kc-sh	KEMBLE	D	Clay Loam or Clay	3	5.3472	0.48	0		79	5.3472	1	84	0		81	0		86	0		100	0		50	84
				Totals	11.14	1.00	0	0		11.14	1		0	0		0	0		0	0		0	0		65.8

BLUEVISTA SUBDIVISION
PROPOSED CONDITIONS



1 Nashyd		1 Route Pipe		1 Duhyd	
1 Standhyd		1 Route Channel		1 Diverthyd	
1 Addhyd		1 Route Reservoir			

C.C. TATHAM & ASSOCIATES LTD.
Consulting Engineers

Project:	BLUEVISTA
File No.:	117159
Subject:	Otthymo Flow Schematic
Date:	Dec-18 **Figure:** 2

POST DEVELOPMENT 4-HR CHICAGO

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


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\914d8941-296f-4848-9247-906c5d323249\s
  Summary           filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\914d8941-296f-4848-9247-906c5d323249\s


DATE: 01-15-2019                          TIME: 11:41:06

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 01                        ** 25 mm STORM
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 ** CALIB NASHYD         0204  1  5.0    0.99    0.00  2.75   1.40 0.06   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.00  2.83   1.40  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.01  1.92   5.98 0.24   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.01  1.92   2.55  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.07  1.92   8.41 0.34   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00  4.00   7.70  n/a   0.000
      {ST=  0.01 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.01  1.92   5.34  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 *  CALIB NASHYD         0501  1  1.0    4.80    0.03  2.68   3.27 0.13   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 *  CALIB STANDHYD       0601  1  1.0   20.90    0.63  2.22  12.45 0.50   0.000
    [I%=25.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 *  CALIB STANDHYD       0603  1  1.0    2.60    0.26  1.93  16.69 0.67   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    0.72  2.12  12.92  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    0.73  2.13  11.28  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 *  CALIB STANDHYD       0602  1  1.0   15.80    0.47  2.22  12.31 0.49   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    0.47  2.22  12.31  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.80    0.47  2.22  12.31  n/a   0.000
*
```

```
    ADD [  0702+  0901]  0704  3  1.0   44.10    1.20  2.13  11.65  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    0.08  4.37   9.82  n/a   0.000
      {ST=  0.44 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    0.08  4.37   9.82  n/a   0.000
       Outflow           0003  2  1.0   31.84    0.06  4.37   9.82  n/a   0.000
       Outflow           0003  3  1.0    4.39    0.01  4.37   9.82  n/a   0.000
       Outflow           0003  4  1.0    7.88    0.01  4.37   9.82  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    4.39    0.01  4.37   9.82  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   31.84    0.06  4.37   9.82  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0    7.88    0.01  4.37   9.82  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 *  CALIB NASHYD         0202  1  5.0    6.48    0.02  3.00   2.23 0.09   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                6.0
    [ Ptot= 24.97 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7f39c85b-08fa-4363-a172-
    remark: CHIC25MM
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    0.67  1.92  11.85 0.47   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.02  4.08  11.68  n/a   0.000
      {ST=  0.12 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.03  3.08   8.20  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   25.50    0.05  3.17   7.57  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                    *****  S U M M A R Y   O U T P U T  *****
```

```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\9048fc08-1dc1-4886-85d7-9d1dd498100a\s
  Summary           filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\9048fc08-1dc1-4886-85d7-9d1dd498100a\s


DATE: 01-15-2019                              TIME: 11:41:05

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 02                        **  2 YEAR STORM
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                6.0
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 ** CALIB NASHYD         0204  1  5.0    0.99    0.00  2.67   2.82 0.08   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.00  2.83   2.82  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.01  1.92   9.24 0.27   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.01  1.92   4.42  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.10  1.92  12.33 0.37   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00  4.00  11.63  n/a   0.000
      {ST=  0.02 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.02  1.92   8.32  n/a   0.000
*
    READ STORM                6.0
```

```
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 *  CALIB NASHYD         0501  1  1.0    4.80    0.06  2.63   7.01 0.21   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    READ STORM                  6.0
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 *  CALIB STANDHYD       0601  1  1.0   20.90    1.10  2.20  19.18 0.57   0.000
    [I%=25.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 *  CALIB STANDHYD       0603  1  1.0    2.60    0.37  1.93  23.90 0.71   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    1.22  2.10  19.70  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    1.24  2.15  17.55  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 *  CALIB STANDHYD       0602  1  1.0   15.80    0.82  2.20  18.97 0.56   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    0.82  2.20  18.97  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.80    0.82  2.20  18.97  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    2.06  2.18  18.06  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    0.11  4.37  15.76  n/a   0.000
      {ST=  0.70 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    0.11  4.37  15.76  n/a   0.000
       Outflow           0003  2  1.0   32.48    0.08  4.37  15.76  n/a   0.000
       Outflow           0003  3  1.0    4.14    0.01  4.37  15.76  n/a   0.000
       Outflow           0003  4  1.0    7.48    0.02  4.37  15.76  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    4.14    0.01  4.35  15.76  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   32.48    0.08  4.37  15.76  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0    7.48    0.02  4.35  15.76  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 *  CALIB NASHYD         0202  1  5.0    6.48    0.04  2.92   4.91 0.15   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                  6.0
    [ Ptot= 33.75 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\afd99867-183a-4a73-a02e-
    remark: OSCHI2-4hr
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    0.95  1.92  17.19 0.51   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.02  4.08  17.01  n/a   0.000
      {ST=  0.17 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.06  3.00  12.56  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   25.10    0.08  3.00  11.78  n/a   0.000
*
================================================================================
=========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                    *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\4651ffec-7e10-4b73-bcb0-4038e26c3e34\s
  Summary          filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\4651ffec-7e10-4b73-bcb0-4038e26c3e34\s


DATE: 01-15-2019                              TIME: 11:41:04

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 03                     **
  ********************************************
```

5 YEAR STORM

```
  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 ** CALIB NASHYD        0204  1  5.0    0.99    0.01  2.67   5.03 0.11   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.01  2.83   5.03  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.02  1.92  13.61 0.31   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.02  1.92   7.17  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.14  1.92  17.40 0.39   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00  4.08  16.69  n/a   0.000
      {ST=  0.02 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.02  1.92  12.33  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 *  CALIB NASHYD        0501  1  1.0    4.80    0.11  2.60  12.54 0.28   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 *  CALIB STANDHYD       0601  1  1.0   20.90    1.72  2.17  27.71 0.63   0.000
    [I%=25.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 *  CALIB STANDHYD       0603  1  1.0    2.60    0.51  1.93  32.76 0.74   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    1.90  2.13  28.26  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    1.95  2.15  25.60  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 *  CALIB STANDHYD       0602  1  1.0   15.80    1.29  2.17  27.43 0.62   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    1.29  2.17  27.43  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.80    1.29  2.17  27.43  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    3.24  2.15  26.25  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    0.40  3.58  23.62  n/a   0.000
      {ST=  0.93 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    0.40  3.58  23.62  n/a   0.000
       Outflow           0003  2  1.0   32.21    0.29  3.58  23.62  n/a   0.000
       Outflow           0003  3  1.0    4.52    0.04  3.58  23.62  n/a   0.000
       Outflow           0003  4  1.0    7.37    0.07  3.58  23.62  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    4.52    0.04  3.58  23.62  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   32.21    0.29  3.58  23.62  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0    7.37    0.07  3.58  23.62  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 *  CALIB NASHYD        0202  1  5.0    6.48    0.08  2.92   9.04 0.21   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                  6.0
    [ Ptot= 44.07 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\86dfcc95-9290-4299-a86a-
    remark: OSCHI5-4hr
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    1.31  1.92  23.95 0.54   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.02  4.08  23.77  n/a   0.000
      {ST=  0.25 ha.m }
*
```

```
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.10  2.92  18.35  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   24.99    0.16  3.27  17.23  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\a3b9e2c6-e478-4207-80c9-ee3563bfa419\s
  Summary          filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\a3b9e2c6-e478-4207-80c9-ee3563bfa419\s


DATE: 01-15-2019                          TIME: 11:41:07

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 04                     **  10 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha    '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 ** CALIB NASHYD        0204  1  5.0    0.99    0.01  2.67   6.70 0.13   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.01  2.83   6.70  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.02  1.92  16.67 0.33   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.02  1.92   9.19  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.17  1.92  20.84 0.41   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00  4.08  20.13  n/a   0.000
      {ST=  0.03 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.03  1.92  15.12  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 *  CALIB NASHYD         0501  1  1.0    4.80    0.15  2.58  16.52 0.33   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 *  CALIB STANDHYD       0601  1  1.0   20.90    2.21  2.15  33.34 0.66   0.000
    [I%=25.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 *  CALIB STANDHYD       0603  1  1.0    2.60    0.62  1.93  38.53 0.76   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    2.45  2.12  33.91  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    2.52  2.12  30.96  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 *  CALIB STANDHYD       0602  1  1.0   15.80    1.66  2.15  33.02 0.65   0.000
    [I%=25.0:S%= 2.00]
*
```

```
    DUHYD               0901  1  1.0   15.80    1.66  2.15  33.02  n/a   0.000
       MAJOR SYSTEM:    0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:    0901  3  1.0   15.80    1.66  2.15  33.02  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    4.17  2.13  31.70  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    0.65  3.25  29.01  n/a   0.000
      {ST=  1.06 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    0.65  3.25  29.01  n/a   0.000
       Outflow           0003  2  1.0   32.14    0.47  3.25  29.01  n/a   0.000
       Outflow           0003  3  1.0    4.05    0.04  3.25  29.01  n/a   0.000
       Outflow           0003  4  1.0    7.91    0.15  3.25  29.01  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    4.05    0.04  3.25  29.01  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   32.14    0.47  3.25  29.01  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0    7.91    0.15  3.25  29.01  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 *  CALIB NASHYD         0202  1  5.0    6.48    0.11  2.92  12.10 0.24   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                6.0
    [ Ptot= 50.59 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\4c712121-ba98-4156-a793-
    remark: OSCHI10-4hr
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    1.55  1.92  28.45 0.56   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.03  4.17  28.28  n/a   0.000
      {ST=  0.29 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.14  2.92  22.33  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   25.53    0.27  3.12  21.02  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
```



```
                    *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\eefed17c-962b-4659-bf65-70e7f9682ced\s
  Summary           filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\eefed17c-962b-4659-bf65-70e7f9682ced\s


DATE: 01-15-2019                              TIME: 11:41:08

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 05                     ** 25 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      ------------------
    READ STORM                6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 ** CALIB NASHYD         0204  1  5.0    0.99    0.02  2.67   9.18 0.16   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.01  2.83   9.18  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.03  1.92  20.93 0.35   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.03  1.92  12.12  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.20  1.92  25.55 0.43   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00  4.08  24.85  n/a   0.000
      {ST=  0.04 ha.m }
```

```
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.03  1.92  19.01  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 *  CALIB NASHYD         0501  1  1.0    4.80    0.21  2.57  22.14 0.37   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 *  CALIB STANDHYD       0601  1  1.0   20.90    2.84  2.13  40.86 0.69   0.000
    [I%=25.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 *  CALIB STANDHYD       0603  1  1.0    2.60    0.75  1.93  46.18 0.78   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    3.14  2.10  41.45  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    3.23  2.12  38.17  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 *  CALIB STANDHYD       0602  1  1.0   15.80    2.12  2.13  40.50 0.69   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    2.12  2.13  40.50  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.80    2.12  2.13  40.50  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    5.36  2.12  39.01  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    0.93  3.10  36.25  n/a   0.000
      {ST=  1.24 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    0.93  3.10  36.25  n/a   0.000
       Outflow           0003  2  1.0   31.16    0.59  3.10  36.25  n/a   0.000
       Outflow           0003  3  1.0    3.54    0.05  3.10  36.25  n/a   0.000
       Outflow           0003  4  1.0    9.40    0.29  3.10  36.25  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    3.54    0.05  3.10  36.25  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   31.16    0.59  3.10  36.25  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0    9.40    0.29  3.10  36.25  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 *  CALIB NASHYD         0202  1  5.0    6.48    0.15  2.83  16.52 0.28   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                  6.0
    [ Ptot= 59.08 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\55c9d0c9-46d9-4f05-8d32-
    remark: OSCHI25-4hr
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    1.92  1.92  34.55 0.58   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.03  4.08  34.38  n/a   0.000
      {ST=  0.36 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.18  2.83  27.81  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   27.02    0.47  3.03  26.39  n/a   0.000
*
 FINISH

================================================================================
=========================

================================================================================
=========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output              filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\89ea8cac-d2cf-45bb-971d-d29a49142e58\s
  Summary          filename:          C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\89ea8cac-d2cf-45bb-971d-d29a49142e58\s


DATE: 01-15-2019                          TIME: 11:41:05
```

```
USER:

COMMENTS: _____________________________________________________________

  ********************************************
  ** SIMULATION : Run 06                     ** 50 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
 ** CALIB NASHYD        0204  1  5.0    0.99    0.02  2.67  11.32 0.17   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.02  2.75  11.32  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
  *  CALIB STANDHYD       0203  1  5.0    0.33    0.03  1.92  24.43 0.37   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.04  1.92  14.60  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
  *  CALIB STANDHYD       0201  1  5.0    1.56    0.23  1.92  29.38 0.45   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00  4.08  28.68  n/a   0.000
      {ST=  0.04 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.04  1.92  22.23  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
  *  CALIB NASHYD        0501  1  1.0    4.80    0.25  2.57  26.77 0.41   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
  *  CALIB STANDHYD       0601  1  1.0   20.90    3.38  2.12  46.81 0.71   0.000
    [I%=25.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
  *  CALIB STANDHYD       0603  1  1.0    2.60    0.84  1.93  52.20 0.80   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    3.74  2.08  47.40  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    3.86  2.10  43.90  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
  *  CALIB STANDHYD       0602  1  1.0   15.80    2.53  2.12  46.42 0.71   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    2.53  2.12  46.42  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.10    0.14  2.12  46.42  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.70    2.39  2.05  46.42  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.00    6.24  2.10  44.80  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.00    1.18  3.02  41.99  n/a   0.000
      {ST=  1.39 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.00    1.18  3.02  41.99  n/a   0.000
       Outflow           0003  2  1.0   29.93    0.69  3.02  41.99  n/a   0.000
       Outflow           0003  3  1.0    3.22    0.05  3.02  41.99  n/a   0.000
       Outflow           0003  4  1.0   10.84    0.45  3.02  41.99  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    3.22    0.05  3.00  41.99  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   30.04    0.69  3.02  42.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0   10.84    0.45  3.00  41.99  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
  *  CALIB NASHYD        0202  1  5.0    6.48    0.19  2.83  20.25 0.31   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                  6.0
    [ Ptot= 65.65 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
```

```
a3b01d897221\7b698a1b-1f1a-4102-9080-
    remark: OSCHI50-4hr
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    2.17  1.92  39.44 0.60   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.05  4.08  39.26  n/a   0.000
      {ST=  0.41 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.22  2.83  32.27  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   28.46    0.66  2.97  30.95  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\d55dbdf6-7591-4a0f-aaae-bbafe65b736f\s
  Summary          filename:        C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\d55dbdf6-7591-4a0f-aaae-bbafe65b736f\s


DATE: 01-15-2019                          TIME: 11:41:08

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 07                     ** 100 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

     START @  0.00 hrs
     --------------------
    READ STORM                6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 ** CALIB NASHYD         0204  1  5.0    0.99    0.02  2.67  13.46 0.19   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.02  2.75  13.46  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.04  1.92  27.84 0.39   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.05  1.92  17.06  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.26  1.92  33.07 0.46   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00  4.08  32.36  n/a   0.000
      {ST=  0.05 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.05  1.92  25.35  n/a   0.000
*
    READ STORM                6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 *  CALIB NASHYD         0501  1  1.0    4.80    0.30  2.55  31.25 0.44   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    READ STORM                6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 *  CALIB STANDHYD       0601  1  1.0   20.90    3.83  2.12  52.41 0.73   0.000
    [I%=25.0:S%= 2.00]
*
    READ STORM                6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 *  CALIB STANDHYD       0603  1  1.0    2.60    0.96  1.93  57.85 0.81   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    4.23  2.08  53.01  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    4.37  2.10  49.32  n/a   0.000
*
```

```
    READ STORM                  6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 *  CALIB STANDHYD       0602  1  1.0   15.80    2.87  2.12  52.00 0.72   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    2.87  2.12  52.00  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.56    0.48  2.12  52.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.24    2.39  2.00  52.00  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   43.54    6.75  2.10  50.26  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   43.54    1.48  2.93  47.39  n/a   0.000
      {ST=  1.51 ha.m }
*
    DIVERT HYD           0801  1  1.0   43.54    1.48  2.93  47.39  n/a   0.000
       Outflow           0003  2  1.0   29.00    0.85  2.93  47.39  n/a   0.000
       Outflow           0003  3  1.0    2.95    0.05  2.93  47.39  n/a   0.000
       Outflow           0003  4  1.0   11.59    0.57  2.93  47.39  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    2.95    0.05  2.93  47.39  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   29.55    0.85  2.93  47.47  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0   11.59    0.57  2.93  47.39  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 *  CALIB NASHYD         0202  1  5.0    6.48    0.22  2.83  23.91 0.33   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                  6.0
    [ Ptot= 71.77 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\b5ab0902-e54d-49be-9d43-
    remark: OSCHI100-4hr
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    2.44  1.92  44.09 0.61   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.10  3.58  43.91  n/a   0.000
      {ST=  0.43 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.31  3.00  36.56  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   29.21    0.88  2.93  35.76  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output              filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\222da8f4-05ed-44d9-9834-56fb5165298a\s
  Summary           filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\222da8f4-05ed-44d9-9834-56fb5165298a\s


DATE: 01-15-2019                          TIME: 11:41:04

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 08                        ** REGIONAL STORM
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 12.0
    [ Ptot=193.00 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 ** CALIB NASHYD         0204  1  5.0    0.99    0.04  7.33  78.13 0.40   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.04  7.50  78.13  n/a   0.000
*
    READ STORM                 12.0
    [ Ptot=193.00 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.03  7.00 114.01 0.59   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.06  7.00  87.10  n/a   0.000
*
    READ STORM                 12.0
    [ Ptot=193.00 mm ]
```

```
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.13  7.00 122.18 0.63   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.13  7.00 121.48  n/a   0.000
      {ST=  0.05 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.18  7.00 105.72  n/a   0.000
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 *  CALIB NASHYD         0501  1  1.0    4.80    0.40  7.23 136.76 0.71   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 *  CALIB STANDHYD       0601  1  1.0   20.90    2.21  7.05 169.31 0.88   0.000
    [I%=25.0:S%= 2.00]
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 *  CALIB STANDHYD       0603  1  1.0    2.60    0.30  7.00 174.82 0.91   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    2.50  7.02 169.92  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    2.88  7.03 164.30  n/a   0.000
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 *  CALIB STANDHYD       0602  1  1.0   15.80    1.67  7.05 168.65 0.87   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    1.67  7.05 168.65  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.80    1.67  7.05 168.65  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    4.54  7.03 165.86  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    3.81  7.37 160.41  n/a   0.000
      {ST=  1.93 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    3.81  7.37 160.41  n/a   0.000
       Outflow           0003  2  1.0   29.32    2.73  7.37 160.41  n/a   0.000
       Outflow           0003  3  1.0    1.68    0.05  7.37 160.41  n/a   0.000
       Outflow           0003  4  1.0   13.10    1.03  7.37 160.41  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    1.68    0.05  7.38 160.41  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   29.32    2.73  7.37 160.41  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0   13.10    1.03  7.38 160.41  n/a   0.000
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 *  CALIB NASHYD         0202  1  5.0    6.48    0.40  7.50 118.01 0.61   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                12.0
    [ Ptot=193.00 mm ]
    fname    :    C:\Users\ALOverholt\AppData\Local\Temp\93eaf720-79aa-4a47-bd4b-
a3b01d897221\3d0c981b-df6b-4723-97f6-
    remark: TIMMINS
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    1.08  7.00 148.43 0.77   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.91  7.08 148.26  n/a   0.000
      {ST=  0.62 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    1.27  7.17 137.14  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   30.72    2.27  7.17 139.75  n/a   0.000
*
```

POST DEVELOPMENT 24-HR SCS

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


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\3cbac376-8935-438b-a080-4fa747a0e3ad\s
  Summary          filename:        C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\3cbac376-8935-438b-a080-4fa747a0e3ad\s


DATE: 01-15-2019                          TIME: 11:41:40

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 01                        ** 2 YEAR STORM
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    MASS STORM                 5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB NASHYD        0501  1  1.0    4.80    0.09 12.53  11.65 0.24   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    MASS STORM                 5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB STANDHYD      0601  1  1.0   20.90    1.12 12.18  31.69 0.65   0.000
    [I%=25.0:S%= 2.00]
*
    MASS STORM                 5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB STANDHYD      0603  1  1.0    2.60    0.27 12.00  36.85 0.76   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    1.23 12.15  32.26  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    1.29 12.17  29.39  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB STANDHYD      0602  1  1.0   15.80    0.84 12.18  31.39 0.64   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    0.84 12.18  31.39  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.80    0.84 12.18  31.39  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    2.13 12.17  30.11  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    0.22 14.50  21.66  n/a   0.000
      {ST=  0.83 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    0.22 14.50  21.66  n/a   0.000
       Outflow           0003  2  1.0   32.50    0.16 14.50  21.66  n/a   0.000
       Outflow           0003  3  1.0    4.64    0.03 14.50  21.66  n/a   0.000
       Outflow           0003  4  1.0    6.96    0.03 14.50  21.66  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    4.64    0.03 14.50  21.66  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   32.50    0.16 14.50  21.66  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 48.70 mm ]
*
 ** CALIB NASHYD        0204  1  5.0    0.99    0.01 12.58   6.20 0.13   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.01 12.75   6.20  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 48.70 mm ]
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.01 12.00  15.75 0.32   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.01 12.00   8.59  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 48.70 mm ]
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.08 12.00  19.82 0.41   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00 14.75  19.12  n/a   0.000
      {ST=  0.02 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.02 12.00  14.29  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0    6.96    0.03 14.50  21.66  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 48.70 mm ]
*
```

```
 *  CALIB NASHYD         0202  1  5.0    6.48    0.06 12.83  11.18 0.23   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    MASS STORM                  5.0
    [ Ptot= 48.70 mm ]
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    0.74 12.00  27.13 0.56   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.02 16.25  26.96  n/a   0.000
      {ST=  0.21 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.08 12.83  21.15  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   24.58    0.10 13.12  16.05  n/a   0.000
*
================================================================================
=========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\2520346e-82e1-4cf3-98e4-2bfdf9032f70\s
  Summary          filename:         C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\2520346e-82e1-4cf3-98e4-2bfdf9032f70\s


DATE: 01-15-2019                          TIME: 11:41:39

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 02                     **  5 YEAR STORM
  ********************************************

  W/E COMMAND            HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                 min     ha   '  cms   hrs     mm          cms

     START @  0.00 hrs
     --------------------
   MASS STORM                 5.0
    [ Ptot= 62.00 mm ]
*
 **  CALIB NASHYD         0501  1  1.0    4.80    0.14 12.50  18.82 0.30   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 **  CALIB STANDHYD       0601  1  1.0   20.90    1.67 12.17  43.49 0.70   0.000
    [I%=25.0:S%= 2.00]
*
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 **  CALIB STANDHYD       0603  1  1.0    2.60    0.36 12.00  48.85 0.79   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    1.84 12.12  44.08  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    1.93 12.13  40.71  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 **  CALIB STANDHYD       0602  1  1.0   15.80    1.25 12.17  43.12 0.70   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    1.25 12.17  43.12  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.80    1.25 12.17  43.12  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    3.17 12.15  41.57  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    0.59 13.22  32.32  n/a   0.000
      {ST=  1.03 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    0.59 13.22  32.32  n/a   0.000
       Outflow           0003  2  1.0   32.22    0.43 13.22  32.32  n/a   0.000
       Outflow           0003  3  1.0    4.39    0.04 13.22  32.32  n/a   0.000
       Outflow           0003  4  1.0    7.50    0.12 13.22  32.32  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    4.39    0.04 13.22  32.32  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   32.22    0.43 13.22  32.32  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 **  CALIB NASHYD         0204  1  5.0    0.99    0.01 12.58  10.11 0.16   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.01 12.75  10.11  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 62.00 mm ]
*
 *  CALIB STANDHYD       0203  1  5.0    0.33    0.02 12.00  22.45 0.36   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.02 12.00  13.19  n/a   0.000
```

```
*
    MASS STORM                   5.0
    [ Ptot= 62.00 mm ]
*
 *  CALIB STANDHYD       0201  1  5.0    1.56    0.11 12.00  27.23 0.44   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00 16.08  26.53  n/a   0.000
      {ST=  0.03 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.02 12.00  20.42  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0    7.50    0.12 13.22  32.32  n/a   0.000
*
    MASS STORM                   5.0
    [ Ptot= 62.00 mm ]
*
 *  CALIB NASHYD         0202  1  5.0    6.48    0.10 12.83  18.15 0.29   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    MASS STORM                   5.0
    [ Ptot= 62.00 mm ]
*
 *  CALIB STANDHYD       0205  1  5.0   11.14    1.02 12.00  36.71 0.59   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.03 16.58  36.53  n/a   0.000
      {ST=  0.30 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.13 12.83  29.77  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   25.12    0.25 13.08  22.50  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output          filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\16bdf02e-c17e-4494-809b-e844440fe48c\s
  Summary         filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\16bdf02e-c17e-4494-809b-e844440fe48c\s


DATE: 01-15-2019                          TIME: 11:41:38
```

USER:

COMMENTS: _____

```
  ********************************************
  ** SIMULATION : Run 03                    **  10 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA   ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha    '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    MASS STORM                   5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB NASHYD         0501  1  1.0    4.80    0.18 12.50  24.11 0.34   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    MASS STORM                   5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB STANDHYD       0601  1  1.0   20.90    2.04 12.15  51.61 0.73   0.000
    [I%=25.0:S%= 2.00]
*
    MASS STORM                   5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB STANDHYD       0603  1  1.0    2.60    0.43 12.00  57.04 0.80   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    2.26 12.10  52.21  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    2.37 12.12  48.55  n/a   0.000
*
    MASS STORM                   5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB STANDHYD       0602  1  1.0   15.80    1.53 12.15  51.20 0.72   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                0901  1  1.0   15.80    1.53 12.15  51.20  n/a   0.000
       MAJOR SYSTEM:     0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:     0901  3  1.0   15.80    1.53 12.15  51.20  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    3.90 12.13  49.50  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    0.84 13.10  39.91  n/a   0.000
      {ST=  1.17 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    0.84 13.10  39.91  n/a   0.000
       Outflow           0003  2  1.0   31.75    0.56 13.10  39.91  n/a   0.000
       Outflow           0003  3  1.0    3.95    0.04 13.10  39.91  n/a   0.000
       Outflow           0003  4  1.0    8.40    0.23 13.10  39.91  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    3.95    0.04 13.10  39.91  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   31.75    0.56 13.10  39.91  n/a   0.000
```

```
*
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
 ** CALIB NASHYD        0204  1  5.0    0.99    0.01 12.58  13.15 0.19   0.000
    [CN=49.0       ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.01 12.75  13.15  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
  * CALIB STANDHYD       0203  1  5.0    0.33    0.02 12.00  27.34 0.39   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.03 12.00  16.70  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
  * CALIB STANDHYD       0201  1  5.0    1.56    0.13 12.00  32.53 0.46   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00 16.08  31.83  n/a   0.000
      {ST=  0.03 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.03 12.00  24.89  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0    8.40    0.23 13.10  39.91  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
  * CALIB NASHYD        0202  1  5.0    6.48    0.14 12.75  23.38 0.33   0.000
    [CN=71.0       ]
    [ N = 3.0:Tp 0.82]
*
    MASS STORM                  5.0
    [ Ptot= 70.90 mm ]
*
  * CALIB STANDHYD       0205  1  5.0   11.14    1.20 12.00  43.42 0.61   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.03 20.00  43.24  n/a   0.000
      {ST=  0.36 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.16 12.75  35.94  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   26.02    0.39 13.00  27.45  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
```

```
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output             filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\aa070414-f2ba-42c8-8a11-c765f160e62e\s
  Summary          filename:        C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\aa070414-f2ba-42c8-8a11-c765f160e62e\s


DATE: 01-15-2019                          TIME: 11:41:41

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 04                     ** 25 YEAR STORM
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    MASS STORM                  5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB NASHYD         0501  1  1.0    4.80    0.23 12.48  31.13 0.38   0.000
    [CN=79.9       ]
    [ N = 3.0:Tp 0.56]
*
    MASS STORM                  5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB STANDHYD       0601  1  1.0   20.90    2.55 12.13  61.91 0.76   0.000
    [I%=25.0:S%= 2.00]
*
    MASS STORM                  5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB STANDHYD       0603  1  1.0    2.60    0.51 12.00  67.41 0.82   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    2.82 12.08  62.52  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    2.96 12.10  58.55  n/a   0.000
*
    MASS STORM                  5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB STANDHYD       0602  1  1.0   15.80    1.91 12.13  61.46 0.75   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                 0901  1  1.0   15.80    1.91 12.13  61.46  n/a   0.000
       MAJOR SYSTEM:      0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
```

```
      MINOR SYSTEM:     0901  3  1.0   15.80    1.91 12.13  61.46  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    4.86 12.12  59.59  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    1.12 13.00  49.73  n/a   0.000
      {ST=  1.37 ha.m }
*
    DIVERT HYD           0801  1  1.0   44.10    1.12 13.00  49.73  n/a   0.000
       Outflow           0003  2  1.0   30.39    0.66 13.00  49.73  n/a   0.000
       Outflow           0003  3  1.0    3.55    0.05 13.00  49.73  n/a   0.000
       Outflow           0003  4  1.0   10.16    0.42 13.00  49.73  n/a   0.000
       Outflow           0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow           0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    3.55    0.05 13.00  49.73  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   30.39    0.66 13.00  49.73  n/a   0.000
*
    MASS STORM                5.0
    [ Ptot= 82.00 mm ]
*
 ** CALIB NASHYD           0204  1  5.0    0.99    0.02 12.58  17.37 0.21   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.02 12.75  17.37  n/a   0.000
*
    MASS STORM                5.0
    [ Ptot= 82.00 mm ]
*
  * CALIB STANDHYD         0203  1  5.0    0.33    0.03 12.00  33.83 0.41   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.03 12.00  21.48  n/a   0.000
*
    MASS STORM                5.0
    [ Ptot= 82.00 mm ]
*
  * CALIB STANDHYD         0201  1  5.0    1.56    0.16 12.00  39.47 0.48   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00 16.25  38.77  n/a   0.000
      {ST=  0.04 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.04 12.00  30.85  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0   10.16    0.42 13.00  49.73  n/a   0.000
*
    MASS STORM                5.0
    [ Ptot= 82.00 mm ]
*
  * CALIB NASHYD           0202  1  5.0    6.48    0.18 12.75  30.42 0.37   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    MASS STORM                5.0
    [ Ptot= 82.00 mm ]
*
  * CALIB STANDHYD         0205  1  5.0   11.14    1.52 12.00  52.07 0.64   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.06 16.00  51.90  n/a   0.000
      {ST=  0.41 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.21 12.75  44.00  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   27.78    0.62 12.93  35.53  n/a   0.000
*
 FINISH

================================================================================
==========================

================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output            filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\597dff5b-7c86-42e7-bad7-62209150c686\s
  Summary           filename:      C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\597dff5b-7c86-42e7-bad7-62209150c686\s


DATE: 01-15-2019                          TIME: 11:41:40

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 05                     ** 50 YEAR STORM
  ********************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
*
 ** CALIB NASHYD           0501  1  1.0    4.80    0.27 12.48  36.63 0.41   0.000
    [CN=79.9         ]
    [ N = 3.0:Tp 0.56]
*
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
```

```
*
 ** CALIB STANDHYD       0601  1  1.0   20.90    2.94 12.12  69.71 0.77   0.000
    [I%=25.0:S%= 2.00]
*
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
*
 ** CALIB STANDHYD       0603  1  1.0    2.60    0.57 12.00  75.23 0.83   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    3.29 12.07  70.32  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    3.44 12.07  66.14  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
*
 ** CALIB STANDHYD       0602  1  1.0   15.80    2.20 12.12  69.24 0.77   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                 0901  1  1.0   15.80    2.20 12.12  69.24  n/a   0.000
       MAJOR SYSTEM:      0901  2  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       MINOR SYSTEM:      0901  3  1.0   15.80    2.20 12.12  69.24  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.10    5.63 12.10  67.25  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.10    1.45 12.88  57.24  n/a   0.000
      {ST=  1.50 ha.m }
*
    DIVERT HYD            0801  1  1.0   44.10    1.45 12.88  57.24  n/a   0.000
       Outflow            0003  2  1.0   29.63    0.84 12.88  57.24  n/a   0.000
       Outflow            0003  3  1.0    3.30    0.05 12.88  57.24  n/a   0.000
       Outflow            0003  4  1.0   11.17    0.56 12.88  57.24  n/a   0.000
       Outflow            0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow            0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    3.30    0.05 12.88  57.24  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   29.63    0.84 12.88  57.24  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
*
 ** CALIB NASHYD         0204  1  5.0    0.99    0.02 12.58  20.81 0.23   0.000
    [CN=49.0         ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.02 12.75  20.81  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
*
  * CALIB STANDHYD       0203  1  5.0    0.33    0.03 12.00  38.93 0.43   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.04 12.00  25.34  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
*
  * CALIB STANDHYD       0201  1  5.0    1.56    0.18 12.00  44.88 0.50   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.00 16.42  44.18  n/a   0.000
      {ST=  0.05 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.04 12.00  35.54  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0   11.17    0.56 12.88  57.24  n/a   0.000
*
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
*
  * CALIB NASHYD         0202  1  5.0    6.48    0.21 12.75  36.00 0.40   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.82]
*
    MASS STORM                 5.0
    [ Ptot= 90.30 mm ]
*
  * CALIB STANDHYD       0205  1  5.0   11.14    1.73 12.00  58.72 0.65   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.10 14.25  58.54  n/a   0.000
      {ST=  0.44 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.29 13.00  50.25  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   28.79    0.85 12.92  42.63  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.


                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output              filename:       C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\1cfbaf2e-00e8-4b08-887f-a0554a1a71d3\s
  Summary          filename:          C:\Users\ALOverholt\AppData\Local\Civica\VH5
\3212affb-35da-4852-9d0b-9c8922c19c40\1cfbaf2e-00e8-4b08-887f-a0554a1a71d3\s


DATE: 01-15-2019                          TIME: 11:41:39

USER:


COMMENTS: _____________________________________________________________

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

```
  ** SIMULATION : Run 06                          **  100 YEAR STORM
  ***********************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB NASHYD         0501  1  1.0    4.80    0.32 12.48  42.24 0.43   0.000
    [CN=79.9          ]
    [ N = 3.0:Tp 0.56]
*
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB STANDHYD       0601  1  1.0   20.90    3.35 12.12  77.48 0.79   0.000
    [I%=25.0:S%= 2.00]
*
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB STANDHYD       0603  1  1.0    2.60    0.64 12.00  83.02 0.84   0.000
    [I%=60.0:S%= 2.00]
*
    ADD [  0601+  0603]  0701  3  1.0   23.50    3.76 12.07  78.10  n/a   0.000
*
    ADD [  0501+  0701]  0702  3  1.0   28.30    3.94 12.07  73.73  n/a   0.000
*
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB STANDHYD       0602  1  1.0   15.80    2.52 12.12  76.98 0.78   0.000
    [I%=25.0:S%= 2.00]
*
    DUHYD                 0901  1  1.0   15.80    2.52 12.12  76.98  n/a   0.000
       MAJOR SYSTEM:      0901  2  1.0    0.05    0.13 12.12  76.98  n/a   0.000
       MINOR SYSTEM:      0901  3  1.0   15.75    2.39 12.07  76.98  n/a   0.000
*
    ADD [  0702+  0901]  0704  3  1.0   44.05    6.33 12.07  74.90  n/a   0.000
*
    RESRVR [ 2:  0704]   0003  1  1.0   44.05    1.87 12.77  64.73  n/a   0.000
      {ST=  1.62 ha.m }
*
    DIVERT HYD            0801  1  1.0   44.05    1.87 12.77  64.73  n/a   0.000
       Outflow            0003  2  1.0   29.27    1.13 12.77  64.73  n/a   0.000
       Outflow            0003  3  1.0    3.08    0.05 12.77  64.73  n/a   0.000
       Outflow            0003  4  1.0   11.70    0.69 12.77  64.73  n/a   0.000
       Outflow            0003  5  1.0    0.00    0.00  0.00   0.00  n/a   0.000
       Outflow            0003  6  1.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHANNEL[ 2:  0801]   0001  1  1.0    3.08    0.05 12.77  64.73  n/a   0.000
*
    ADD [  0801+  0901]  0703  3  1.0   29.32    1.13 12.77  64.75  n/a   0.000
*
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
 ** CALIB NASHYD         0204  1  5.0    0.99    0.02 12.58  24.43 0.25   0.000
    [CN=49.0          ]
    [ N = 3.0:Tp 0.66]
*
    CHANNEL[ 2:  0204]   0404  1  5.0    0.99    0.02 12.75  24.43  n/a   0.000
*
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
  * CALIB STANDHYD       0203  1  5.0    0.33    0.04 12.00  44.16 0.45   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0203+  0404]  0306  3  5.0    1.32    0.05 12.00  29.36  n/a   0.000
*
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
  * CALIB STANDHYD       0201  1  5.0    1.56    0.21 12.00  50.39 0.51   0.000
    [I%=28.8:S%= 2.00]
*
    RESRVR [ 2:  0201]   0402  1  5.0    1.56    0.02 14.00  49.68  n/a   0.000
      {ST=  0.05 ha.m }
*
    ADD [  0306+  0402]  0305  3  5.0    2.88    0.05 12.00  40.37  n/a   0.000
*
    CHANNEL[ 2:  0801]   0002  1  1.0   11.70    0.69 12.77  64.73  n/a   0.000
*
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
  * CALIB NASHYD         0202  1  5.0    6.48    0.25 12.75  41.74 0.42   0.000
    [CN=71.0          ]
    [ N = 3.0:Tp 0.82]
*
    MASS STORM                      5.0
    [ Ptot= 98.50 mm ]
*
  * CALIB STANDHYD       0205  1  5.0   11.14    1.93 12.00  65.42 0.66   0.000
    [I%=41.9:S%= 2.00]
*
    RESRVR [ 2:  0205]   0401  1  5.0   11.14    0.14 13.08  65.24  n/a   0.000
      {ST=  0.46 ha.m }
*
    ADD [  0202+  0401]  0301  3  5.0   17.62    0.38 12.83  56.60  n/a   0.000
*
    ADD [  0002+  0301]  0307  3  1.0   29.32    1.07 12.80  49.62  n/a   0.000
*
```

APPENDIX D:
PRELIMINARY SWM FACILITY DESIGN DETAILS

BlueVista Subdivision
Osler Bluff Road
117159

Dry Pond Volume Table

Active Pool

Side Slope 5 :1

Bottom Elev. 202.50

	Elev. (m)	Depth (m)	Areas		Live (m^3)	Accum. Live (m^3)
			Area (m^2)	Avg. Area (m^2)		
Bottom of Pond	202.50	0.00	425.00	0.00	0.0	0.0
	202.55	0.05	468.75	446.88	22.3	22.3
	202.60	0.10	512.50	490.63	24.5	46.9
	202.65	0.15	556.25	534.38	26.7	73.6
	202.70	0.20	600.00	578.13	28.9	102.5
	202.75	0.25	643.75	621.88	31.1	133.6
	202.80	0.30	687.50	665.63	33.3	166.9
	202.85	0.35	731.25	709.38	35.5	202.3
	202.90	0.40	775.00	753.13	37.7	240.0
	202.95	0.45	818.75	796.88	39.8	279.8
	203.00	0.50	862.50	840.63	42.0	321.9
	203.05	0.55	906.25	884.38	44.2	366.1
	203.10	0.60	950.00	928.13	46.4	412.5
	203.15	0.65	993.75	971.88	48.6	461.1
Weir	203.20	0.70	1037.50	1015.63	50.8	511.9
	203.25	0.75	1081.25	1059.38	53.0	564.8
	203.30	0.80	1125.00	1103.13	55.2	620.0
	203.35	0.85	1168.75	1146.88	57.3	677.3
	203.40	0.90	1212.50	1190.63	59.5	736.9
	203.45	0.95	1256.25	1234.38	61.7	798.6
	203.50	1.00	1300.00	1278.13	63.9	862.5
	203.55	1.05	1301.00	1300.50	65.0	927.5
Top of Pond	203.60	1.10	1302.00	1301.50	65.1	992.6

BlueVista Subdivision
Osler Bluff Road
117159

Dry Pond Discharge Table

	ORIFICE/PIPE CONTROL			WEIR CONTROL		
	Orifice Plate	Outlet Pipe			Overflow	
diameter =	55	450	mm	Length of Weir	5	m
area =	0.0024	0.1590	m^2	Weir Sill Elevation	203.20	m
Orifice C =	0.63	0.80		Weir constant K	1.6	
Invert =	202.50	202.50	m	Side Slope (H:V)	4	

Q = flow rate (cms)
C = constant
A = area of opening(sq. m)
H = net head on the orifice
g = Acceleration due to gravity

Q = K x L x H^1.5

where Q = flow rate (cms)
K = constant
L = length (m)
H = head on the weir (m)

	Water Level (m)	Orifice Head (m)	Orifice Discharge (cms)	Outlet Pipe Head (m)	Outlet Pipe Discharge (cms)	Emergency Spillway Head (m)	Emergency Spillway Discharge (cms)	Hydraulic Control	Total Discharge (cms)
Bottom of Pond	202.50	0.00	0.0000	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	202.55	0.02	0.0010	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	202.60	0.07	0.0018	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	202.65	0.12	0.0023	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	202.70	0.17	0.0028	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	202.75	0.22	0.0031	0.03	0.0891	0.00	0.0000	**ORIFICE**	0.0031
	202.80	0.27	0.0035	0.08	0.1543	0.00	0.0000	**ORIFICE**	0.0035
	202.85	0.32	0.0038	0.13	0.1993	0.00	0.0000	**ORIFICE**	0.0038
	202.90	0.37	0.0040	0.18	0.2358	0.00	0.0000	**ORIFICE**	0.0040
	202.95	0.42	0.0043	0.23	0.2673	0.00	0.0000	**ORIFICE**	0.0043
	203.00	0.47	0.0046	0.28	0.2955	0.00	0.0000	**ORIFICE**	0.0046
	203.05	0.52	0.0048	0.33	0.3213	0.00	0.0000	**ORIFICE**	0.0048
	203.10	0.57	0.0050	0.38	0.3451	0.00	0.0000	**ORIFICE**	0.0050
	203.15	0.62	0.0052	0.43	0.3674	0.00	0.0000	**ORIFICE**	0.0052
Weir	203.20	0.67	0.0054	0.48	0.3884	0.00	0.0000	**ORIFICE**	0.0054
	203.25	0.72	0.0056	0.53	0.4084	0.05	0.0930	**OVERFLOW**	0.0987
	203.30	0.77	0.0058	0.58	0.4274	0.10	0.2732	**OVERFLOW**	0.2790
	203.35	0.82	0.0060	0.63	0.4455	0.15	0.5205	**OVERFLOW**	0.5265
	203.40	0.87	0.0062	0.68	0.4630	0.20	0.8300	**OVERFLOW**	0.8362
	203.45	0.92	0.0064	0.73	0.4799	0.25	1.2000	**OVERFLOW**	1.2064
	203.50	0.97	0.0065	0.78	0.4961	0.30	1.6300	**OVERFLOW**	1.6366
	203.55	1.02	0.0067	0.83	0.5119	0.35	2.1203	**OVERFLOW**	2.1270
Top of Pond	203.60	1.07	0.0069	0.88	0.5272	0.40	2.6715	**OVERFLOW**	2.6784

BlueVista Subdivision
Osler Bluff Road
117159

Dry Pond Stage-Storage-Discharge Table

		Orifice	PIPE	Overflow				
	Water Level (m)	Orifice Plate Discharge (m^3/s)	Outlet Pipe Discharge (m^3/s)	Weir Discharge (m^3/s)	Hydraulic Control	Total Discharge (m^3/s)	Total Storage (ha-m)	
Bottom of Pond	202.50	0.0000	0.0000	0.0000	ORIFICE	**0.000**	0.0000	
	202.55	0.0010	0.0000	0.0000	ORIFICE	**0.000**	0.0022	
	202.60	0.0018	0.0000	0.0000	ORIFICE	**0.000**	0.0047	
	202.65	0.0023	0.0000	0.0000	ORIFICE	**0.000**	0.0074	
	202.70	0.0028	0.0000	0.0000	ORIFICE	**0.000**	0.0103	
	202.75	0.0031	0.0250	0.0000	ORIFICE	**0.003**	0.0134	25 mm W.L Elev.
	202.80	0.0035	0.0750	0.0000	ORIFICE	**0.003**	0.0167	2-Year W.L Elev.
	202.85	0.0038	0.1250	0.0000	ORIFICE	**0.004**	0.0202	
	202.90	0.0040	0.1750	0.0000	ORIFICE	**0.004**	0.0240	5-Year W.L Elev.
	202.95	0.0043	0.2250	0.0000	ORIFICE	**0.004**	0.0280	10-Year W.L Elev.
	203.00	0.0046	0.2750	0.0000	ORIFICE	**0.005**	0.0322	
	203.05	0.0048	0.3250	0.0000	ORIFICE	**0.005**	0.0366	25-Year W.L Elev.
	203.10	0.0050	0.3750	0.0000	ORIFICE	**0.005**	0.0413	50-Year W.L Elev.
	203.15	0.0052	0.4250	0.0000	ORIFICE	**0.005**	0.0461	100-Year W.L Elev.
Weir	203.20	0.0054	0.4750	0.0000	ORIFICE	**0.005**	0.0512	
	203.25	0.0056	0.5250	0.0930	OVERFLOW	**0.099**	0.0565	
	203.30	0.0058	0.5750	0.2732	OVERFLOW	**0.279**	0.0620	Timmins W.L Elev.
	203.35	0.0060	0.6250	0.5205	OVERFLOW	**0.527**	0.0677	
	203.40	0.0062	0.6750	0.8300	OVERFLOW	**0.836**	0.0737	
	203.45	0.0064	0.7250	1.2000	OVERFLOW	**1.206**	0.0799	
	203.50	0.0065	0.7750	1.6300	OVERFLOW	**1.637**	0.0863	
	203.55	0.0067	0.8250	2.1203	OVERFLOW	**2.127**	0.0928	
Top of Pond	203.60	0.0069	0.8750	2.6715	OVERFLOW	**2.678**	0.0993	

BlueVista Subdivision
Osler Bluff Road
117159

Wet Pond Volume Table

Active Pool
Side Slope Varies
Bottom Elev. 205.50
Permanent Pool 207.00

	Elev.	Depth	Areas		Storage			
			Area	Avg. Area	Dead	Accum. Dead	Live	Accum. Live
	(m)	(m)	(m^2)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)
Bottom of Pond	205.50	0.00	1200.00	0.00	0.0	0.0		
	205.55	0.05	1258.33	1229.17	61.5	61.5		
	205.60	0.10	1316.67	1287.50	64.4	125.8		
	205.65	0.15	1375.00	1345.83	67.3	193.1		
	205.70	0.20	1433.33	1404.17	70.2	263.3		
	205.75	0.25	1491.67	1462.50	73.1	336.5		
	205.80	0.30	1550.00	1520.83	76.0	412.5		
	205.85	0.35	1608.33	1579.17	79.0	491.5		
	205.90	0.40	1666.67	1637.50	81.9	573.3		
	205.95	0.45	1725.00	1695.83	84.8	658.1		
	206.00	0.50	1783.33	1754.17	87.7	745.8		
	206.05	0.55	1841.67	1812.50	90.6	836.5		
	206.10	0.60	1900.00	1870.83	93.5	930.0		
	206.15	0.65	1958.33	1929.17	96.5	1026.5		
	206.20	0.70	2016.67	1987.50	99.4	1125.8		
	206.25	0.75	2075.00	2045.83	102.3	1228.1		
	206.30	0.80	2133.33	2104.17	105.2	1333.3		
	206.35	0.85	2191.67	2162.50	108.1	1441.5		
	206.40	0.90	2250.00	2220.83	111.0	1552.5		
	206.45	0.95	2308.33	2279.17	114.0	1666.5		
	206.50	1.00	2366.67	2337.50	116.9	1783.3		
	206.55	1.05	2425.00	2395.83	119.8	1903.1		
	206.60	1.10	2483.33	2454.17	122.7	2025.8		
	206.65	1.15	2541.67	2512.50	125.6	2151.5		
	206.70	1.20	2600.00	2570.83	128.5	2280.0		
	206.75	1.25	2658.33	2629.17	131.5	2411.5		
	206.80	1.30	2716.67	2687.50	134.4	2545.8		
	206.85	1.35	2775.00	2745.83	137.3	2683.1		
	206.90	1.40	2833.33	2804.17	140.2	2823.3		
	206.95	1.45	2891.67	2862.50	143.1	2966.5		
Perm Pool	207.00	1.50	2950.00	2920.83	146.0	3112.5		
	207.05	1.55	3265.63	3107.81			155.4	155.4
	207.10	1.60	3343.75	3304.69			165.2	320.6
	207.15	1.65	3421.88	3382.81			169.1	489.8
	207.20	1.70	3500.00	3460.94			173.0	662.8
	207.25	1.75	3578.13	3539.06			177.0	839.8
	207.30	1.80	3656.25	3617.19			180.9	1020.6
	207.35	1.85	3734.38	3695.31			184.8	1205.4
	207.40	1.90	3812.50	3773.44			188.7	1394.1
	207.45	1.95	3890.63	3851.56			192.6	1586.6
	207.50	2.00	3968.75	3929.69			196.5	1783.1
	207.55	2.05	4046.88	4007.81			200.4	1983.5
	207.60	2.10	4125.00	4085.94			204.3	2187.8
	207.65	2.15	4203.13	4164.06			208.2	2396.0
	207.70	2.20	4281.25	4242.19			212.1	2608.1
	207.75	2.25	4359.38	4320.31			216.0	2824.1
	207.80	2.30	4437.50	4398.44			219.9	3044.1
	207.85	2.35	4515.63	4476.56			223.8	3267.9
	207.90	2.40	4593.75	4554.69			227.7	3495.6
	207.95	2.45	4671.88	4632.81			231.6	3727.3
DICB	208.00	2.50	4750.00	4710.94			235.5	3962.8
	208.05	2.55	4828.13	4789.06			239.5	4202.3
	208.10	2.60	4906.25	4867.19			243.4	4445.6
	208.15	2.65	4984.38	4945.31			247.3	4692.9
	208.20	2.70	5062.50	5023.44			251.2	4944.1
	208.25	2.75	5140.63	5101.56			255.1	5199.1
	208.30	2.80	5218.75	5179.69			259.0	5458.1
Overflow	208.35	2.85	5296.88	5257.81			262.9	5721.0
	208.40	2.90	5375.00	5335.94			266.8	5987.8
	208.45	2.95	5453.13	5414.06			270.7	6258.5
	208.50	3.00	5531.25	5492.19			274.6	6533.1
	208.55	3.05	5609.38	5570.31			278.5	6811.6
	208.60	3.10	5687.50	5648.44			282.4	7094.1
	208.65	3.15	5765.63	5726.56			286.3	7380.4
	208.70	3.20	5843.75	5804.69			290.2	7670.6
	208.75	3.25	5921.88	5882.81			294.1	7964.8
	208.80	3.30	6000.00	5960.94			298.0	8262.8
	208.85	3.35	6001.00	6000.50			300.0	8562.8
Top of Pond	208.90	3.40	6002.00	6001.50			300.1	8862.9

BlueVista Subdivision
Osler Bluff Road
117159

Wet Pond Discharge Table

ORIFICE/PIPE CONTROL

	Orifice Plate	Outlet Pipe	
diameter =	120	450	mm
area =	0.0113	0.1590	m^2
Orifice C =	0.63	0.80	
Invert =	207.00	207.00	m

Q = flow rate (cms)
C = constant
A = area of opening(sq. m)
H = net head on the orifice
g = Acceleration due to gravity

WEIR CONTROL

	DICB	Overflow	
Length of Weir	0.6	7	m
Weir Sill Elevation	208.00	208.35	m
Weir constant K	1.6	1.6	
Side Slope (H:V)	2	4	

Q = K x L x H^1.5

where Q = flow rate (cms)
K = constant
L = length (m)
H = head on the weir (m)

	Water Level	Orifice		Outlet Pipe		DICB		Emergency Spillway		Hydraulic Control	Total Discharge
	(m)	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)		(cms)
Bottom of Pond	205.50	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
Perm Pool	207.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	207.05	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	207.10	0.04	0.0063	0.00	0.0000	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	207.15	0.09	0.0095	0.00	0.0000	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	207.20	0.14	0.0118	0.00	0.0000	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0000
	207.25	0.19	0.0138	0.03	0.0891	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0138
	207.30	0.24	0.0155	0.08	0.1543	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0155
	207.35	0.29	0.0170	0.13	0.1993	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0170
	207.40	0.34	0.0184	0.18	0.2358	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0184
	207.45	0.39	0.0197	0.23	0.2673	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0197
	207.50	0.44	0.0209	0.28	0.2955	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0209
	207.55	0.49	0.0221	0.33	0.3213	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0221
	207.60	0.54	0.0232	0.38	0.3451	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0232
	207.65	0.59	0.0242	0.43	0.3674	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0242
	207.70	0.64	0.0252	0.48	0.3884	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0252
	207.75	0.69	0.0262	0.53	0.4084	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0262
	207.80	0.74	0.0271	0.58	0.4274	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0271
	207.85	0.79	0.0281	0.63	0.4455	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0281
	207.90	0.84	0.0289	0.68	0.4630	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0289
	207.95	0.89	0.0298	0.73	0.4799	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0298
DICB	208.00	0.94	0.0306	0.78	0.4961	0.00	0.0000	0.00	0.0000	**ORIFICE**	0.0306
	208.05	0.99	0.0314	0.83	0.5119	0.05	0.0149	0.00	0.0000	**DICB**	0.0463
	208.10	1.04	0.0322	0.88	0.5272	0.10	0.0395	0.00	0.0000	**DICB**	0.0717
	208.15	1.09	0.0330	0.93	0.5420	0.15	0.0754	0.00	0.0000	**DICB**	0.1084
	208.20	1.14	0.0337	0.98	0.5565	0.20	0.1227	0.00	0.0000	**DICB**	0.1564
	208.25	1.19	0.0344	1.03	0.5706	0.25	0.1813	0.00	0.0000	**DICB**	0.2158
	208.30	1.24	0.0351	1.08	0.5843	0.30	0.2513	0.00	0.0000	**DICB**	0.2864
Overflow	208.35	1.29	0.0358	1.13	0.5978	0.35	0.3325	0.00	0.0000	**DICB**	0.3684
	208.40	1.34	0.0365	1.18	0.6109	0.40	0.4251	0.05	0.1288	**Overflow**	0.5904
	208.45	1.39	0.0372	1.23	0.6238	0.45	0.5290	0.10	0.3744	**Overflow**	0.9406
	208.50	1.44	0.0379	1.28	0.6364	0.50	0.6442	0.15	0.7064	**Overflow**	1.3428
	208.55	1.49	0.0385	1.33	0.6487	0.55	0.7708	0.20	1.1162	**Overflow**	1.7650
	208.60	1.54	0.0392	1.38	0.6609	0.60	0.9087	0.25	1.6000	**Overflow**	2.2609
	208.65	1.59	0.0398	1.43	0.6728	0.65	1.0579	0.30	2.1558	**Overflow**	2.8286
	208.70	1.64	0.0404	1.48	0.6845	0.70	1.2184	0.35	2.7829	**Overflow**	3.4674
	208.75	1.69	0.0410	1.53	0.6960	0.75	1.3903	0.40	3.4810	**Overflow**	4.1770
	208.80	1.74	0.0416	1.58	0.7073	0.80	1.5735	0.45	4.2503	**Overflow**	4.9576
	208.85	1.79	0.0422	1.63	0.7184	0.85	1.7680	0.50	5.0912	**Overflow**	5.8096
Top of Pond	208.90	1.84	0.0428	1.68	0.7294	0.90	1.9738	0.55	6.0042	**Overflow**	6.7335

BlueVista Subdivision
Osler Bluff Road
117159

Wet Pond Stage-Storage-Discharge Table

		Orifice	PIPE	DICB	Overflow				
	Water Level (m)	50 mm Orifice Plate Discharge (m^3/s)	750 mm Outlet Pipe Discharge (m^3/s)	0.6 m DICB with 2:1 side slope Discharge (m^3/s)	Weir Discharge (m^3/s)	Hydraulic Control	Total Discharge (m^3/s)	Total Storage (ha-m)	
Bottom of Pond	205.50	0.0000	0.0000	0.0000	0.0000	ORIFICE	**0.000**	0.0000	
Perm Pool	207.00	0.0000	0.0000	0.0000	0.0000	ORIFICE	**0.000**	0.0000	
	207.05	0.0000	0.0000	0.0000	0.0000	ORIFICE	**0.000**	0.0155	
	207.10	0.0063	0.0000	0.0000	0.0000	ORIFICE	**0.000**	0.0321	
	207.15	0.0095	0.0000	0.0000	0.0000	ORIFICE	**0.000**	0.0490	
	207.20	0.0118	0.0000	0.0000	0.0000	ORIFICE	**0.000**	0.0663	
	207.25	0.0138	0.0250	0.0000	0.0000	ORIFICE	**0.014**	0.0840	
	207.30	0.0155	0.0750	0.0000	0.0000	ORIFICE	**0.015**	0.1021	25 mm W.L Elev.
	207.35	0.0170	0.1250	0.0000	0.0000	ORIFICE	**0.017**	0.1205	
	207.40	0.0184	0.1750	0.0000	0.0000	ORIFICE	**0.018**	0.1394	
	207.45	0.0197	0.2250	0.0000	0.0000	ORIFICE	**0.020**	0.1587	
	207.50	0.0209	0.2750	0.0000	0.0000	ORIFICE	**0.021**	0.1783	2-Year W.L Elev.
	207.55	0.0221	0.3250	0.0000	0.0000	ORIFICE	**0.022**	0.1984	
	207.60	0.0232	0.3750	0.0000	0.0000	ORIFICE	**0.023**	0.2188	
	207.65	0.0242	0.4250	0.0000	0.0000	ORIFICE	**0.024**	0.2396	5-Year W.L Elev.
	207.70	0.0252	0.4750	0.0000	0.0000	ORIFICE	**0.025**	0.2608	
	207.75	0.0262	0.5250	0.0000	0.0000	ORIFICE	**0.026**	0.2824	10-Year W.L Elev.
	207.80	0.0271	0.5750	0.0000	0.0000	ORIFICE	**0.027**	0.3044	
	207.85	0.0281	0.6250	0.0000	0.0000	ORIFICE	**0.028**	0.3268	
	207.90	0.0289	0.6750	0.0000	0.0000	ORIFICE	**0.029**	0.3496	25-Year W.L Elev.
	207.95	0.0298	0.7250	0.0000	0.0000	ORIFICE	**0.030**	0.3727	
DICB	208.00	0.0306	0.7750	0.0000	0.0000	ORIFICE	**0.031**	0.3963	
	208.05	0.0314	0.8250	0.0149	0.0000	DICB	**0.046**	0.4202	50-Year W.L Elev.
	208.10	0.0322	0.8750	0.0395	0.0000	DICB	**0.072**	0.4446	
	208.15	0.0330	0.9250	0.0754	0.0000	DICB	**0.108**	0.4693	100-Year W.L Elev.
	208.20	0.0337	0.9750	0.1227	0.0000	DICB	**0.156**	0.4944	
	208.25	0.0344	1.0250	0.1813	0.0000	DICB	**0.216**	0.5199	
	208.30	0.0351	1.0750	0.2513	0.0000	DICB	**0.286**	0.5458	
Overflow	208.35	0.0358	1.1250	0.3325	0.0000	DICB	**0.368**	0.5721	
	208.40	0.0365	1.1750	0.4251	0.1288	Overflow	**0.590**	0.5988	
	208.45	0.0372	1.2250	0.5290	0.3744	Overflow	**0.941**	0.6259	Timmins W.L Elev.
	208.50	0.0379	1.2750	0.6442	0.7064	Overflow	**1.343**	0.6533	
	208.55	0.0385	1.3250	0.7708	1.1162	Overflow	**1.765**	0.6812	
	208.60	0.0392	1.3750	0.9087	1.6000	Overflow	**2.261**	0.7094	
	208.65	0.0398	1.4250	1.0579	2.1558	Overflow	**2.829**	0.7380	
	208.70	0.0404	1.4750	1.2184	2.7829	Overflow	**3.467**	0.7671	
	208.75	0.0410	1.5250	1.3903	3.4810	Overflow	**4.177**	0.7965	
	208.80	0.0416	1.5750	1.5735	4.2503	Overflow	**4.958**	0.8263	
	208.85	0.0422	1.6250	1.7680	5.0912	Overflow	**5.810**	0.8563	
Top of Pond	208.90	0.0428	1.6750	1.9738	6.0042	Overflow	**6.734**	0.8863	

117159 - BlueVista Subdivision
SWM Facility Design Calculations
Using MOE SWMPD Manual / March 2003
FOREBAY SIZING CALCULATIONS

Wet Pond

---

1) Settling

Dist	=	SQRT(r*Qp/Vs)	Dist = Forebay length (m)				
			r = Length to width ratio	r	=	2.0000	
			Qp = 25 mm SWM outflow - water quality (cms)	Qp	=	0.0150	cms
			Vs = settling velocity for 0.15 mm particles (m/s)	Vs	=	0.0003	m/s
Dist	**=**	**10.00 m**	Actual forebay length = 25 m				

---

2) Dispersion Length

Dist	=	8*Q/d*Vf	Dist =Length of dispersion (m)				
			Q = 5 Yr max inlet flow (cms)	Q	=	1.3060	cms
			d = depth of permanent pool in forebay (m)	d	=	1.0000	m
			Vf= desired velocity in forebay (m/s)	Vf	=	0.5000	m/s
Dist	**=**	**20.90 m**	Actual forebay length = 25 m				

---

3) Cleanout Frequency

Table 6.3 MOE SWMPD Manual

Cleanout	=	Vol/(load*Asew*eff.)	Asew = contributing sewer area (ha)	Asew	=	11.1	ha
			Actual Forebay Length	Alength	=	25.00	m
			Imp = avg. percent Impervious (%)	Imp	=	50	%
			load = sediment loading (cu.m/ha)	load	=	0.6	cu.m/ha
			eff, = removal effciency (%)	eff.	=	80%	
			Targ = cleanout Freqency Target (Years)	Targ	=	10	years
			Vol = bottom 0.5 m volume (cu.m)	Vol	=	384	cu.m
Cleanout	**=**	**72 years**					

BlueVista Subdivision
FILE No. 117159
Nov-18
DRAWDOWN TIME FOR EROSION CONTROL
(Using the falling head orifice equation)

Dry Pond

$$t = \frac{2 A_p}{C A_o (2g)^{0.5}} \quad (h_1^{0.5} - h_2^{0.5})$$

		Value		
where t =	drawdown time in seconds			
A_p =	surface area of pond (m^2)	666	m^2	
C =	discharge coefficient (typically 0.63)	0.63		
A_o =	cross-sectional area of orifice (m^2)	0.002376	m^2	55 mm diameter
g =	gravitational acceleration constant (9.81 m/s^2)	9.81	m/s^2	
h_1 =	starting water elevation above the orifice (m)	0.55	m	
h_2 =	ending water elevation above the orifice (m)	0.00	m	

$$t = \frac{2 * 2717}{0.63*0.01131*(2*9.81)^{0.5}} \quad (0.39^{0.5} - 0^{0.5})$$

t = 148,886.08 seconds

t = 41.36 hours

BlueVista Subdivision
FILE No. 117159
Nov-18
DRAWDOWN TIME FOR SURFACE STORAGE
(Using the falling head orifice equation)

Dry Pond

$$t = \frac{2 A_p}{C A_o (2g)^{0.5}} \quad (h_1^{0.5} - h_2^{0.5})$$

		Value		
where t =	drawdown time in seconds			
A_p =	surface area of pond (m^2)	731	m^2	
C =	discharge coefficient (typically 0.63)	0.63		
A_o =	cross-sectional area of orifice (m^2)	0.002376	m^2	55 mm diameter
g =	gravitational acceleration constant (9.81 m/s^2)	9.81	m/s^2	
h_1 =	starting water elevation above the orifice (m)	0.70	m	
h_2 =	ending water elevation above the orifice (m)	0.00	m	

$$t = \frac{2 * 2717}{0.63*0.01131*(2*9.81)^{0.5}} \quad (0.39^{0.5} - 0^{0.5})$$

t = 184,560.85 seconds

t = 51.27 hours

BlueVista Subdivision
FILE No. 117159
Nov-18
DRAWDOWN TIME FOR EROSION CONTROL
(Using the falling head orifice equation)

Wet Pond

$$t = \frac{2 A_p}{C A_o (2g)^{0.5}} \quad (h_1^{0.5} - h_2^{0.5})$$

		Value		
where t =	drawdown time in seconds			
A_p =	surface area of pond (m^2)	3615	m^2	
C =	discharge coefficient (typically 0.63)	0.63		
A_o =	cross-sectional area of orifice (m^2)	0.01131	m^2	120 mm diameter
g =	gravitational acceleration constant (9.81 m/s^2)	9.81	m/s^2	
h_1 =	starting water elevation above the orifice (m)	0.70	m	
h_2 =	ending water elevation above the orifice (m)	0.00	m	

$$t = \frac{2 * 2717}{0.63*0.01131*(2*9.81)^{0.5}} \quad (0.39^{0.5} - 0^{0.5})$$

t = 191,665.92 seconds

t = 53.24 hours

BlueVista Subdivision
FILE No. 117159
Nov-18
DRAWDOWN TIME FOR SURFACE STORAGE
(Using the falling head orifice equation)

Wet Pond

$$t = \frac{2 A_p}{C A_o (2g)^{0.5}} \quad (h_1^{0.5} - h_2^{0.5})$$

		Value		
where t =	drawdown time in seconds			
A_p =	surface area of pond (m^2)	3850	m^2	
C =	discharge coefficient (typically 0.63)	0.63		
A_o =	cross-sectional area of orifice (m^2)	0.01131	m^2	120 mm diameter
g =	gravitational acceleration constant (9.81 m/s^2)	9.81	m/s^2	
h_1 =	starting water elevation above the orifice (m)	1.00	m	
h_2 =	ending water elevation above the orifice (m)	0.00	m	

$$t = \frac{2 * 2717}{0.63*0.01131*(2*9.81)^{0.5}} \quad (0.39^{0.5} - 0^{0.5})$$

t = 243,976.67 seconds

t = 67.77 hours

APPENDIX E:
POST DEVELOPMENT HYDRAULIC ANALYSIS

HY-8 Culvert Analysis Report
Existing 600 mm Diameter Culvert Crossing at County Road 21

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 1 - Summary of Culvert Flows at Crossing: EX. 600 mm CULVERT (PostDev)

Headwater Elevation (m)	Discharge Names	Total Discharge (cms)	Culvert 1 Discharge (cms)	Roadway Discharge (cms)	Iterations
203.49	25mm	0.05	0.05	0.00	1
203.58	2YR-SCS	0.10	0.10	0.00	1
203.85	5YR-SCS	0.25	0.25	0.00	1
204.01	10YR-SCS	0.39	0.39	0.00	1
204.86	25YR-SCS	0.62	0.62	0.00	1
206.14	50YR-SCS	0.85	0.85	0.00	1
207.72	100YR-SCS	1.07	1.07	0.00	1
207.80	Regional	2.27	1.08	1.18	4
207.73	Overtopping	1.07	1.07	0.00	Overtopping

Table 2 - Culvert Summary Table: Culvert 1

Discharge Names	Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
25mm	0.05	0.05	203.49	0.205	0.0*	1-S2n	0.139	0.140	0.139	0.021	0.967	0.170
2YR-SCS	0.10	0.10	203.58	0.297	0.0*	1-S2n	0.199	0.200	0.199	0.032	1.180	0.224
5YR-SCS	0.25	0.25	203.85	0.515	0.565	2-M2c	0.335	0.324	0.324	0.056	1.606	0.322
10YR-SCS	0.39	0.39	204.01	0.725	0.731	7-M2c	0.466	0.408	0.408	0.073	1.905	0.384
25YR-SCS	0.62	0.62	204.86	1.223	1.580	7-M2c	0.600	0.510	0.510	0.096	2.422	0.462
50YR-SCS	0.85	0.85	206.14	2.001	2.860	7-M2c	0.600	0.563	0.563	0.116	3.084	0.522
100YR-SCS	1.07	1.07	207.72	2.995	4.437	6-FFc	0.600	0.600	0.600	0.133	3.784	0.571
Regional	2.27	1.08	207.80	3.045	4.515	6-FFc	0.600	0.600	0.600	0.209	3.819	0.765

* Full Flow Headwater elevation is below inlet invert.

****

Straight Culvert

Inlet Elevation (invert): 203.28 m, Outlet Elevation (invert): 202.88 m

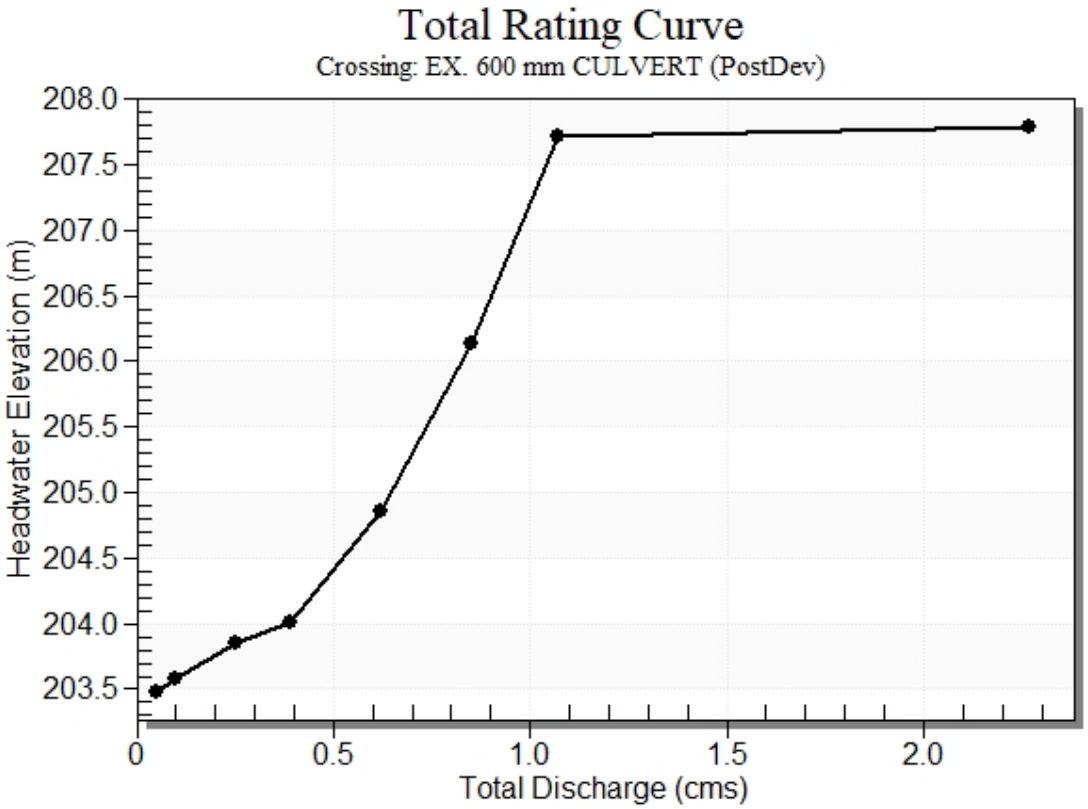
Culvert Length: 27.70 m, Culvert Slope: 0.0144

****

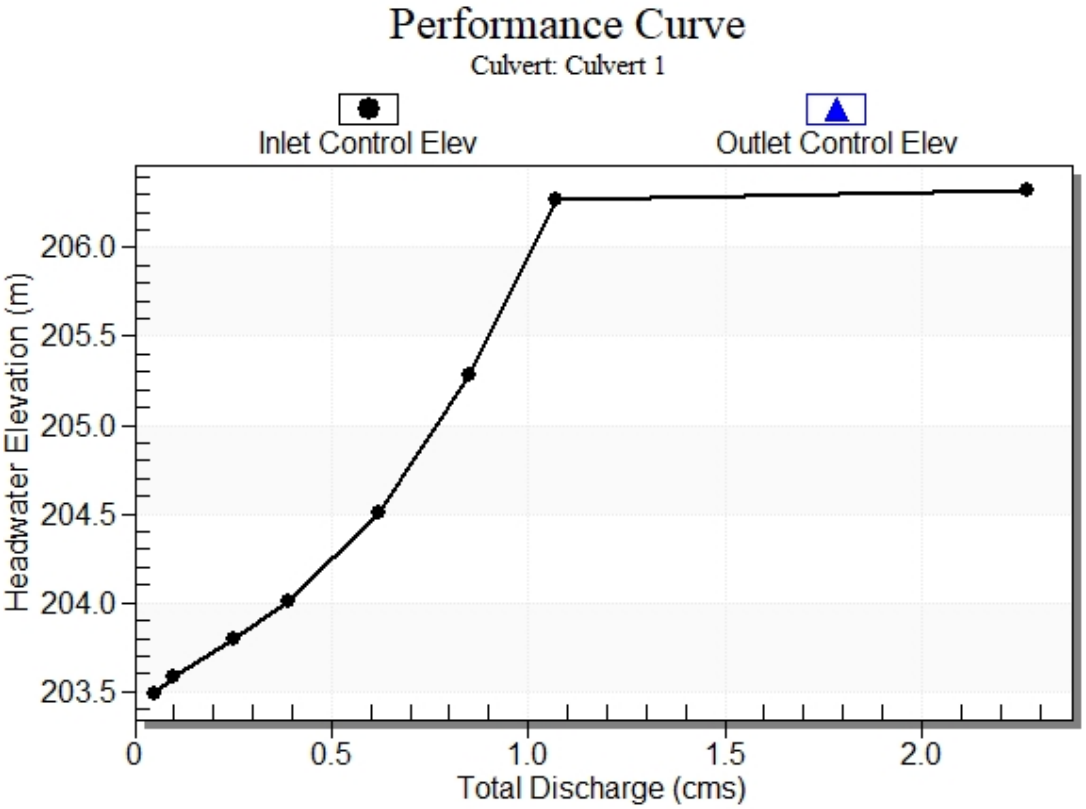
Table 3 - Downstream Channel Rating Curve (Crossing: EX. 600 mm CULVERT (PostDev))

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.05	202.90	0.02	0.17	2.09	0.37
0.10	202.91	0.03	0.22	3.16	0.40
0.25	202.94	0.06	0.32	5.47	0.44
0.39	202.95	0.07	0.38	7.15	0.46
0.62	202.98	0.10	0.46	9.43	0.48
0.85	203.00	0.12	0.52	11.39	0.49
1.07	203.01	0.13	0.57	13.08	0.50
2.27	203.09	0.21	0.76	20.51	0.54

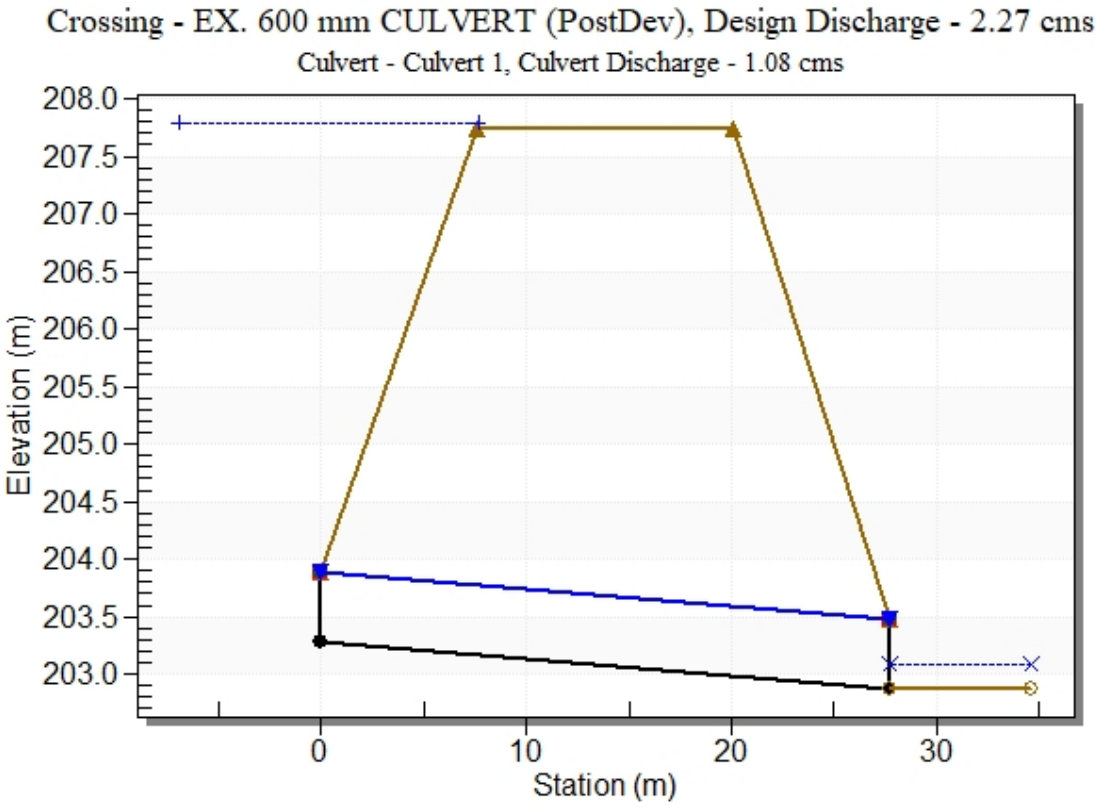
Rating Curve Plot for Crossing: EX. 600 mm CULVERT (PostDev)



Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 203.28 m

Outlet Station: 27.70 m

Outlet Elevation: 202.88 m

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Tailwater Channel Data - EX. 600 mm CULVERT (PostDev)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 13.77 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0100

Channel Manning's n: 0.0450

Channel Invert Elevation: 202.88 m

Roadway Data for Crossing: EX. 600 mm CULVERT (PostDev)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 43.28 m

Crest Elevation: 207.73 m

Roadway Surface: Paved

Roadway Top Width: 12.50 m

HY-8 Culvert Analysis Report
Proposed 600 mm Diameter Culvert Crossing
At Street 'A'

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 1 - Summary of Culvert Flows at Crossing: PROP. 600 mm CULVERT (PostDev)

Headwater Elevation (m)	Discharge Names	Total Discharge (cms)	Culvert 1 Discharge (cms)	Roadway Discharge (cms)	Iterations
209.44	25mm	0.02	0.02	0.00	1
209.51	2YR-SCS	0.04	0.04	0.00	1
209.59	5YR-SCS	0.08	0.08	0.00	1
209.65	10YR-SCS	0.11	0.11	0.00	1
209.72	25YR-SCS	0.15	0.15	0.00	1
209.78	50YR-SCS	0.19	0.19	0.00	1
209.83	100YR-SCS	0.22	0.22	0.00	1
210.23	Timmins	0.40	0.40	0.00	1
210.60	Overtopping	0.51	0.51	0.00	Overtopping

Table 2 - Culvert Summary Table: Culvert 1

Discharge Names	Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
25mm	0.02	0.02	209.44	0.126	0.138	2-M2c	0.111	0.085	0.085	0.013	0.771	0.139
2YR-SCS	0.04	0.04	209.51	0.192	0.210	2-M2c	0.167	0.130	0.130	0.022	0.957	0.192
5YR-SCS	0.08	0.08	209.59	0.268	0.295	2-M2c	0.234	0.180	0.180	0.032	1.138	0.245
10YR-SCS	0.11	0.11	209.65	0.316	0.349	2-M2c	0.278	0.210	0.210	0.038	1.244	0.276
25YR-SCS	0.15	0.15	209.72	0.379	0.421	2-M2c	0.337	0.250	0.250	0.047	1.366	0.312
50YR-SCS	0.19	0.19	209.78	0.431	0.479	2-M2c	0.389	0.280	0.280	0.053	1.455	0.338
100YR-SCS	0.22	0.22	209.83	0.481	0.534	2-M2c	0.447	0.306	0.306	0.059	1.543	0.361
Timmins	0.40	0.40	210.23	0.750	0.926	7-M2c	0.600	0.415	0.415	0.083	1.932	0.449

Straight Culvert

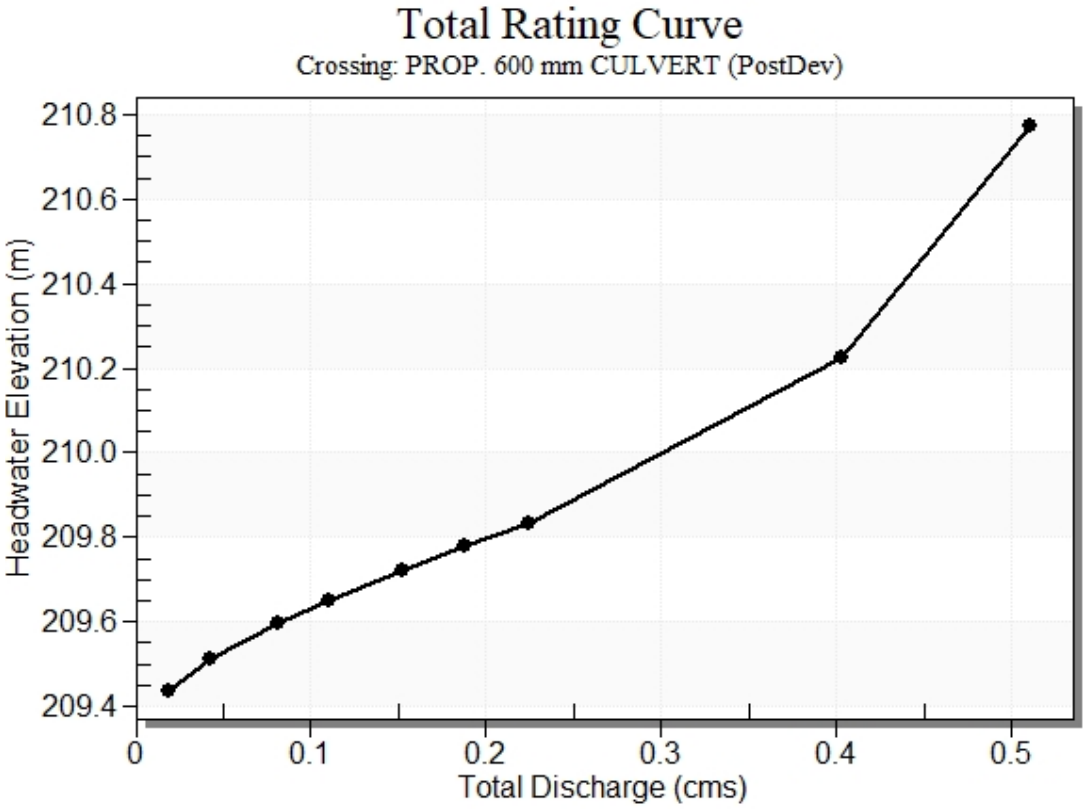
Inlet Elevation (invert): 209.30 m, Outlet Elevation (invert): 209.17 m

Culvert Length: 25.00 m, Culvert Slope: 0.0052

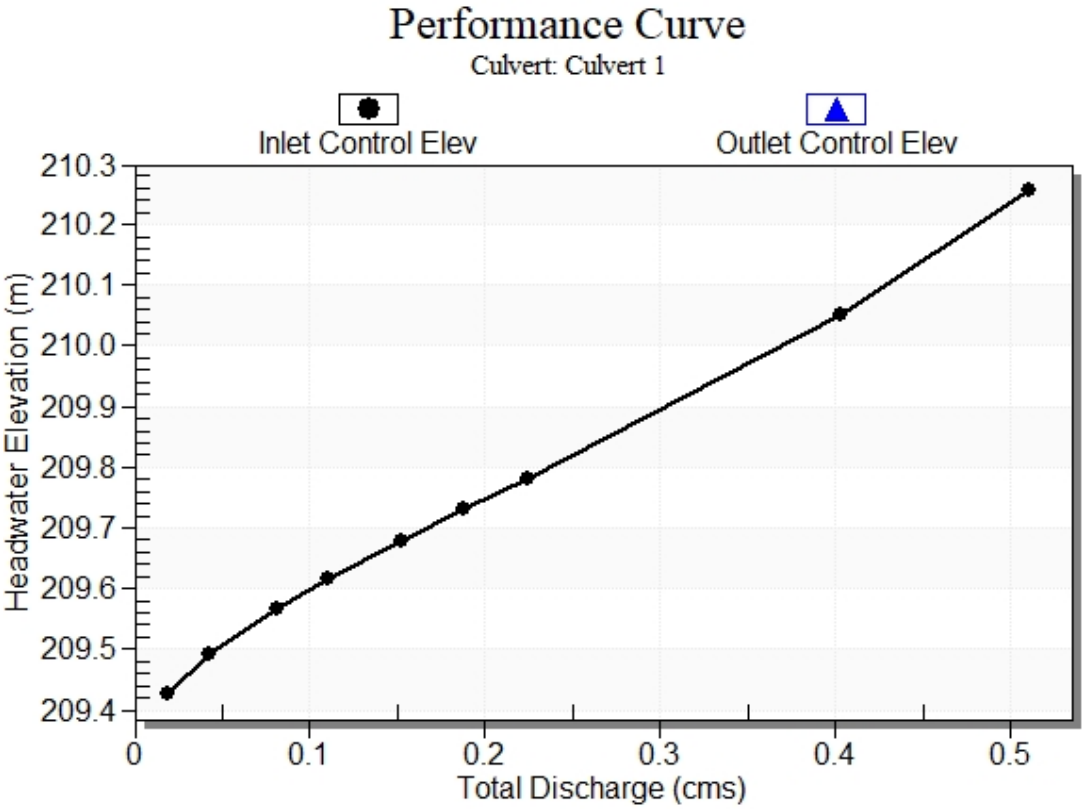
****

Table 3 - Downstream Channel Rating Curve (Crossing: PROP. 600 mm CULVERT (PostDev))

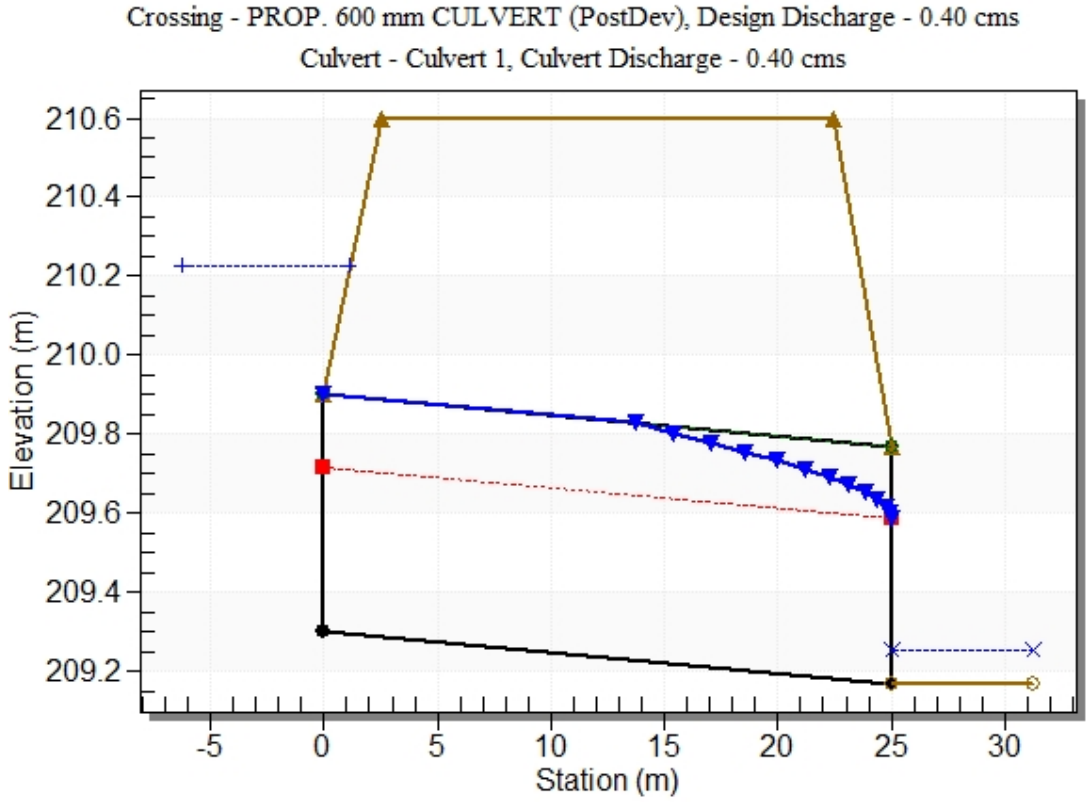
Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.02	209.18	0.01	0.14	1.65	0.39
0.04	209.19	0.02	0.19	2.69	0.42
0.08	209.20	0.03	0.25	3.92	0.44
0.11	209.21	0.04	0.28	4.71	0.46
0.15	209.22	0.05	0.31	5.70	0.47
0.19	209.22	0.05	0.34	6.47	0.48
0.22	209.23	0.06	0.36	7.18	0.49
0.40	209.25	0.08	0.45	10.15	0.52



Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 209.30 m

Outlet Station: 25.00 m

Outlet Elevation: 209.17 m

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Tailwater Channel Data - PROP. 600 mm CULVERT (PostDev)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 m

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0125

Channel Manning's n: 0.0450

Channel Invert Elevation: 209.17 m

Roadway Data for Crossing: PROP. 600 mm CULVERT (PostDev)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 50.00 m

Crest Elevation: 210.60 m

Roadway Surface: Paved

Roadway Top Width: 20.00 m

C.C.Tatham & Associates Ltd. Consulting Engineers Collingwood Bracebridge Orillia Barrie	Project: BlueVista	Date: December 2018
	File No.: 117159	Designed: ARO
	Subject: 100 - Year Peak Flows	Checked: DRT

(Municipal Standard - TOBM)

	IDF Parameters	
	5 YR	100 YR
A	29.1	47.7
B	-0.71	-0.738

Peak Rainfall Intensity

5 Year	=	78.30	mm/hr
100 Year	=	132.69	mm/hr

Catchment 201 Rear Lot Grass Swale to Dry Pond

Drainage Area (ha)	0.06
5 year Runoff Coefficient (C)	0.48
100 year Runoff Coefficient (C)	0.74
Time of Concentration (min)	15
5-Year Peak Flow (m^3/s)	0.006
100 - Year Peak Flow (m^3/s)	**0.016**

Catchment 201 Service Easement Swale to Dry Pond

Drainage Area (ha)	1.50
5 year Runoff Coefficient (C)	0.55
100 year Runoff Coefficient (C)	0.78
Time of Concentration (min)	15
5-Year Peak Flow (m^3/s)	0.179
100 - Year Peak Flow to Swale (m^3/s)	**0.428**
Overland Flow (100 Yr - 5 Yr)	**0.249**

Catchment 204 Rear Lot Grass Swale to North

Drainage Area (ha)	0.99
5 year Runoff Coefficient (C)	0.48
100 year Runoff Coefficient (C)	0.74
Time of Concentration (min)	15
5-Year Peak Flow (m^3/s)	0.103
100 - Year Peak Flow (m^3/s)	**0.270**

Catchment 205 Overland Flow Swale to Wet Pond

Drainage Area (ha)	11.14
5 year Runoff Coefficient (C)	0.55
100 year Runoff Coefficient (C)	0.78
Time of Concentration (min)	15
5-Year Peak Flow (m^3/s)	1.333
100 - Year Peak Flow (m^3/s)	3.182
Overland Flow (100 Yr - 5 Yr)	**1.850**

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Jan 15 2019

Swale 1: Catchment 201 Rear Lot Grass Swale to Dry Pond

Triangular

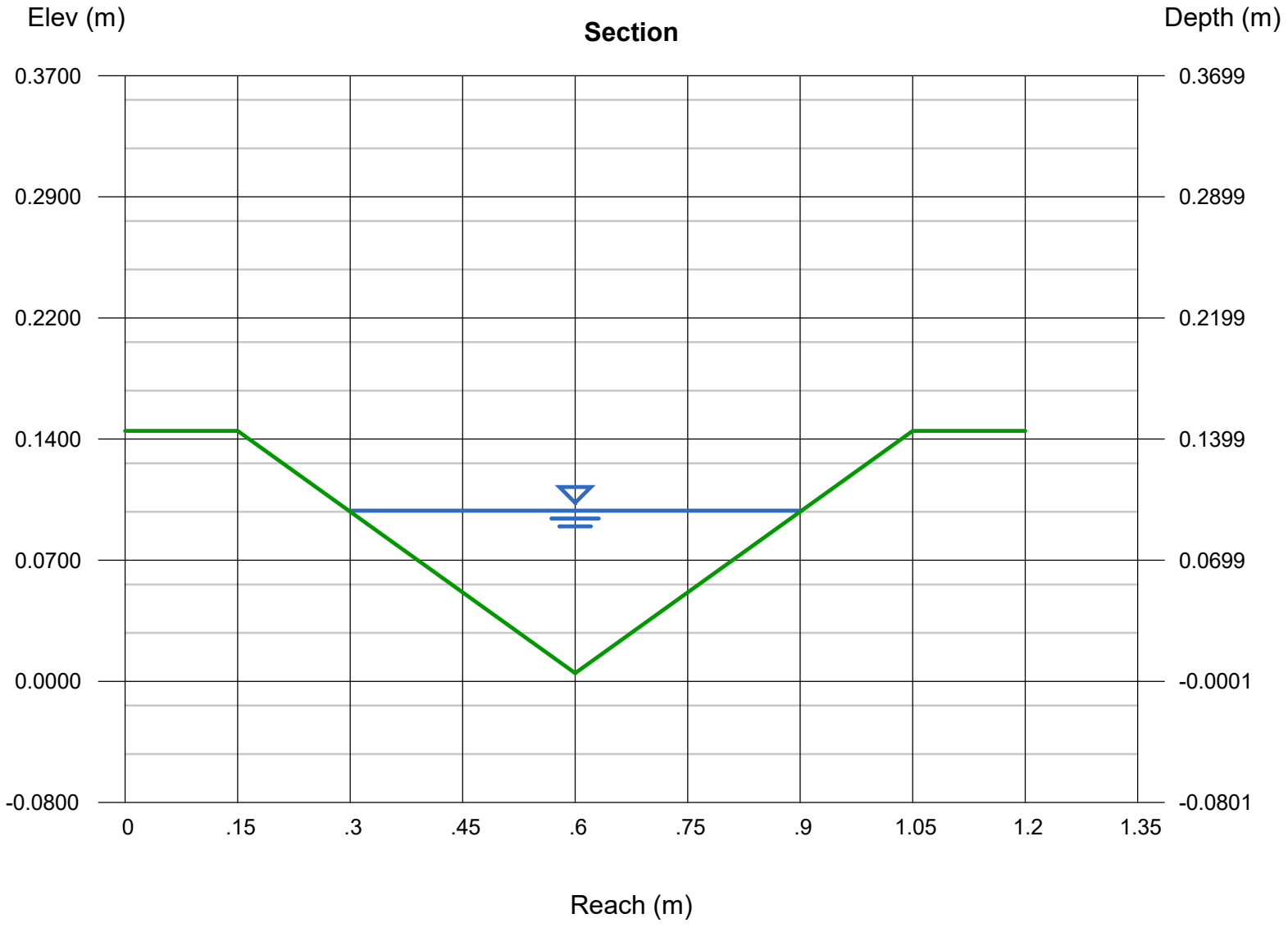
Side Slopes (z:1)	= 3.0000, 3.0000
Total Depth (m)	= 0.1500
Invert Elev (m)	= 0.0001
Slope (%)	= 2.2500
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cms)	= 0.0160

Highlighted

Depth (m)	= 0.1006
Q (cms)	= 0.016
Area (sqm)	= 0.0304
Velocity (m/s)	= 0.5272
Wetted Perim (m)	= 0.6361
Crit Depth, Yc (m)	= 0.0914
Top Width (m)	= 0.6035
EGL (m)	= 0.1148



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Jan 15 2019

Swale 2: Catchment 201 Service Easement Swale to Dry Pond

Triangular

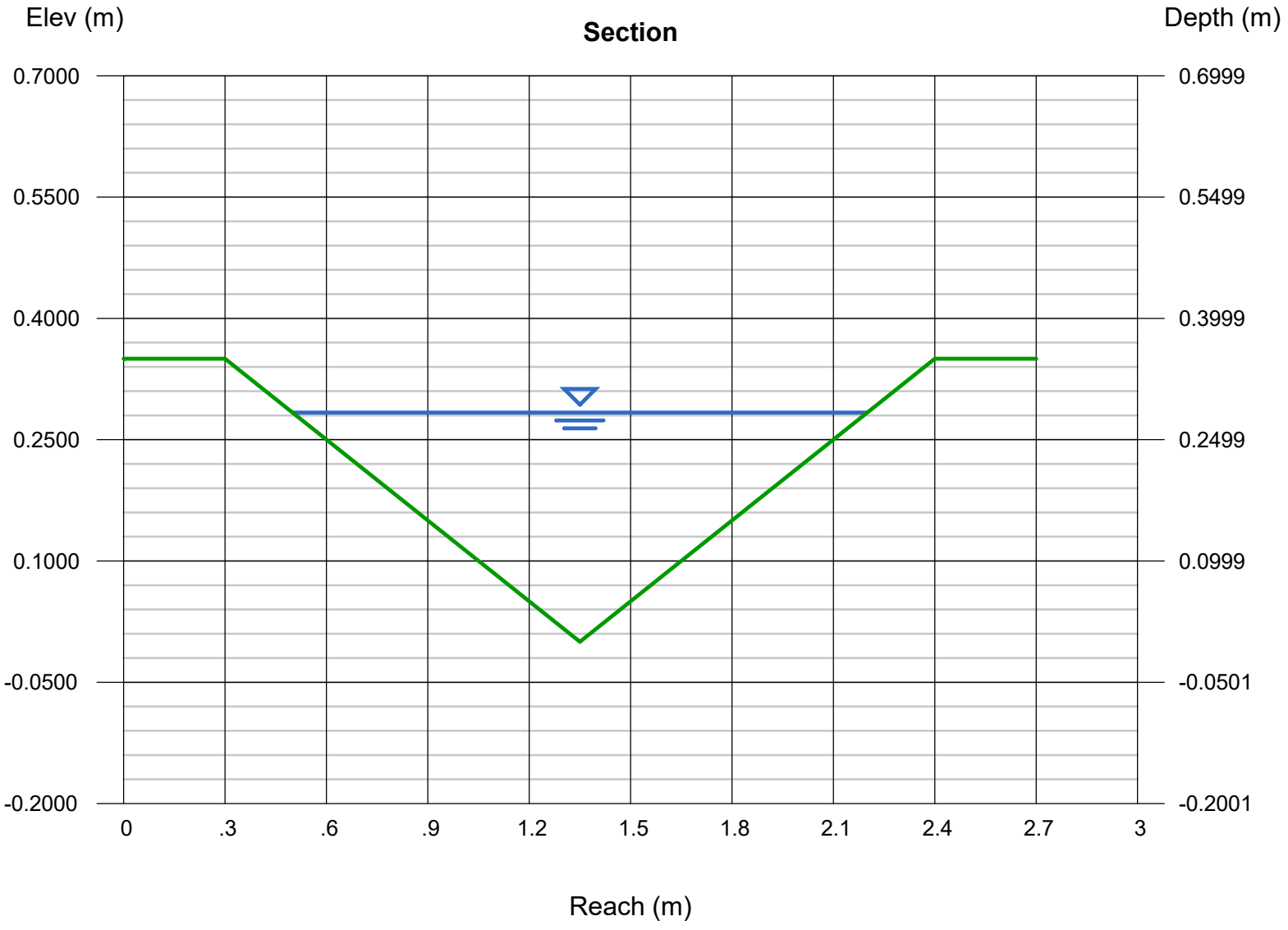
Side Slopes (z:1)	= 3.0000, 3.0000
Total Depth (m)	= 0.3500
Invert Elev (m)	= 0.0001
Slope (%)	= 2.0000
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cms)	= 0.2490

Highlighted

Depth (m)	= 0.2835
Q (cms)	= 0.249
Area (sqm)	= 0.2411
Velocity (m/s)	= 1.0330
Wetted Perim (m)	= 1.7928
Crit Depth, Yc (m)	= 0.2713
Top Width (m)	= 1.7008
EGL (m)	= 0.3379



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Jan 15 2019

Swale 3: Catchment 204 Grass Swale to North

Triangular

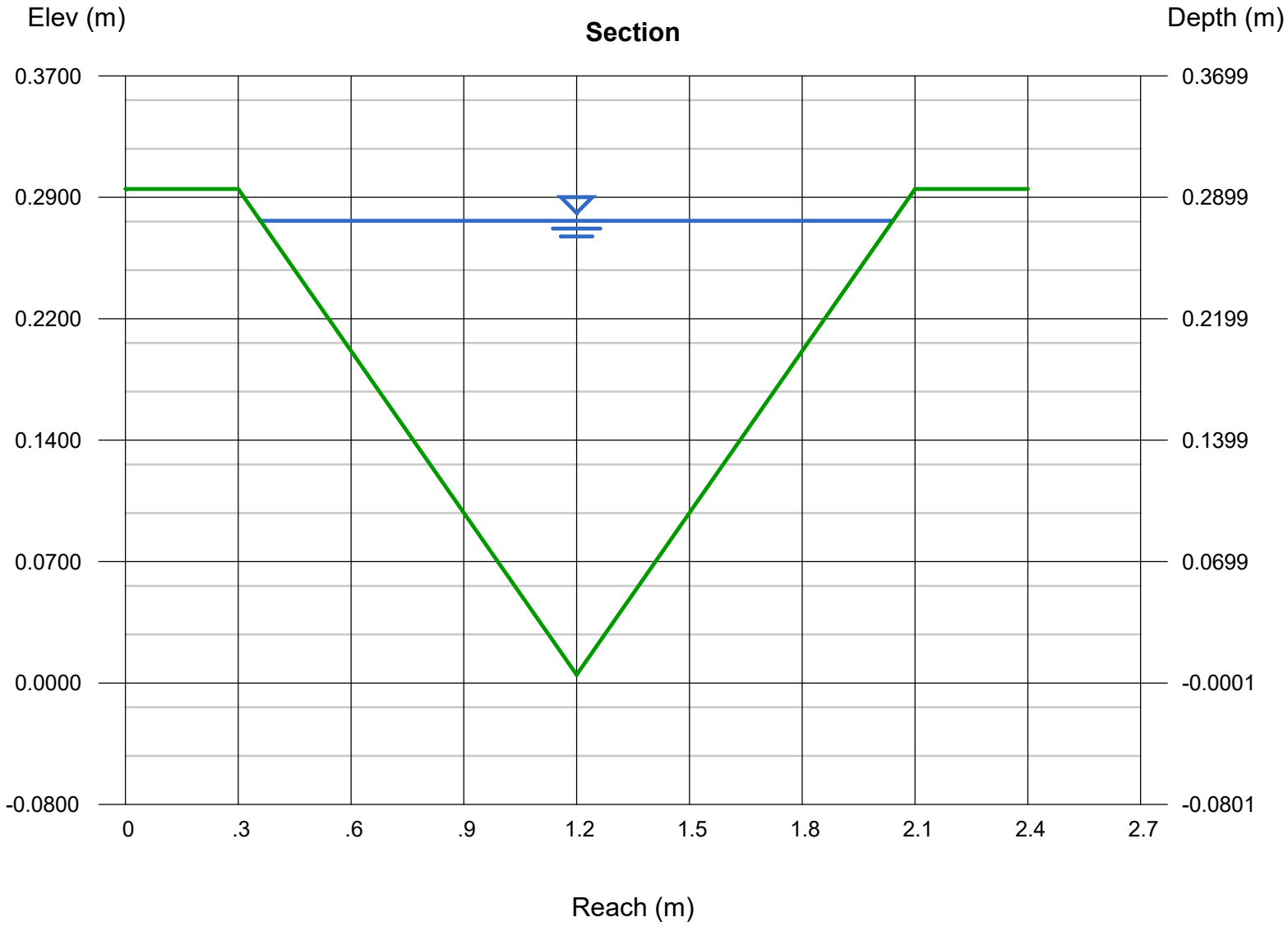
Side Slopes (z:1)	= 3.0000, 3.0000
Total Depth (m)	= 0.3000
Invert Elev (m)	= 0.0001
Slope (%)	= 2.4000
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cms)	= 0.2700

Highlighted

Depth (m)	= 0.2804
Q (cms)	= 0.270
Area (sqm)	= 0.2359
Velocity (m/s)	= 1.1446
Wetted Perim (m)	= 1.7735
Crit Depth, Yc (m)	= 0.2804
Top Width (m)	= 1.6825
EGL (m)	= 0.3472



Channel Report

Swale 4: Catchment 205 Overland Flow Swale to Wet Pond

Trapezoidal

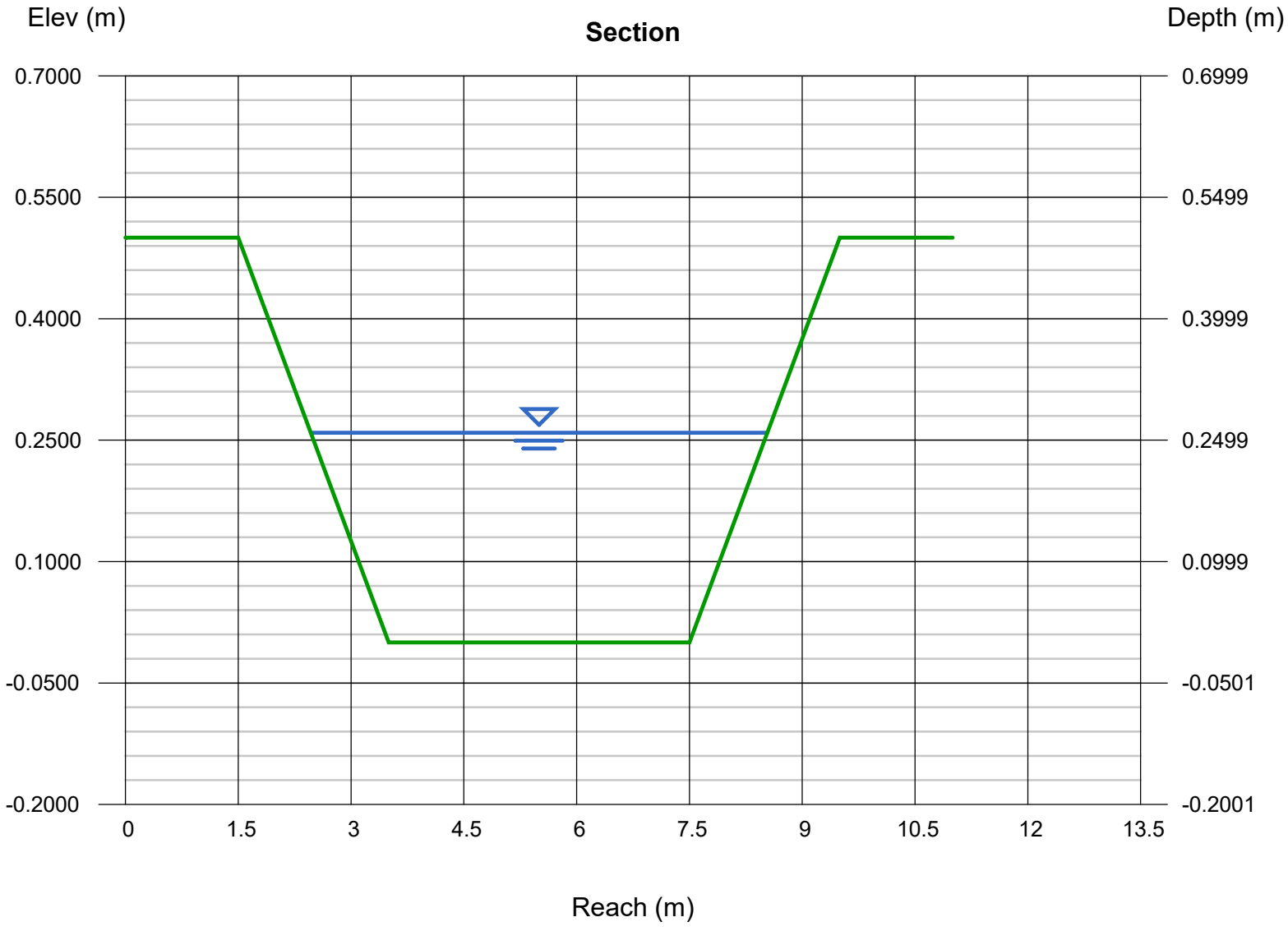
Bottom Width (m)	= 4.0000
Side Slopes (z:1)	= 4.0000, 4.0000
Total Depth (m)	= 0.5000
Invert Elev (m)	= 0.0001
Slope (%)	= 2.0000
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cms)	= 1.8500

Highlighted

Depth (m)	= 0.2591
Q (cms)	= 1.8500
Area (sqm)	= 1.3048
Velocity (m/s)	= 1.4178
Wetted Perim (m)	= 6.1364
Crit Depth, Yc (m)	= 0.2560
Top Width (m)	= 6.0726
EGL (m)	= 0.3616



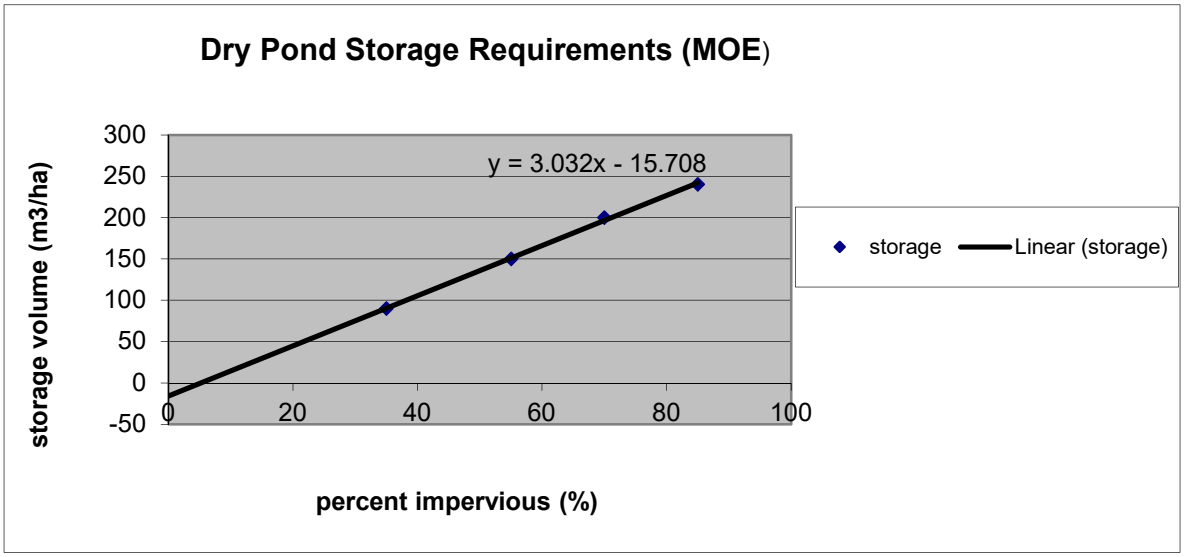
APPENDIX F:
WATER QUALITY CALCULATIONS

BlueVista Subdivision
FILE No. 117159
Nov-18

MOE Manual Storage Requirements

Dry Pond

% imp	storage
35	90
55	150
70	200
85	240



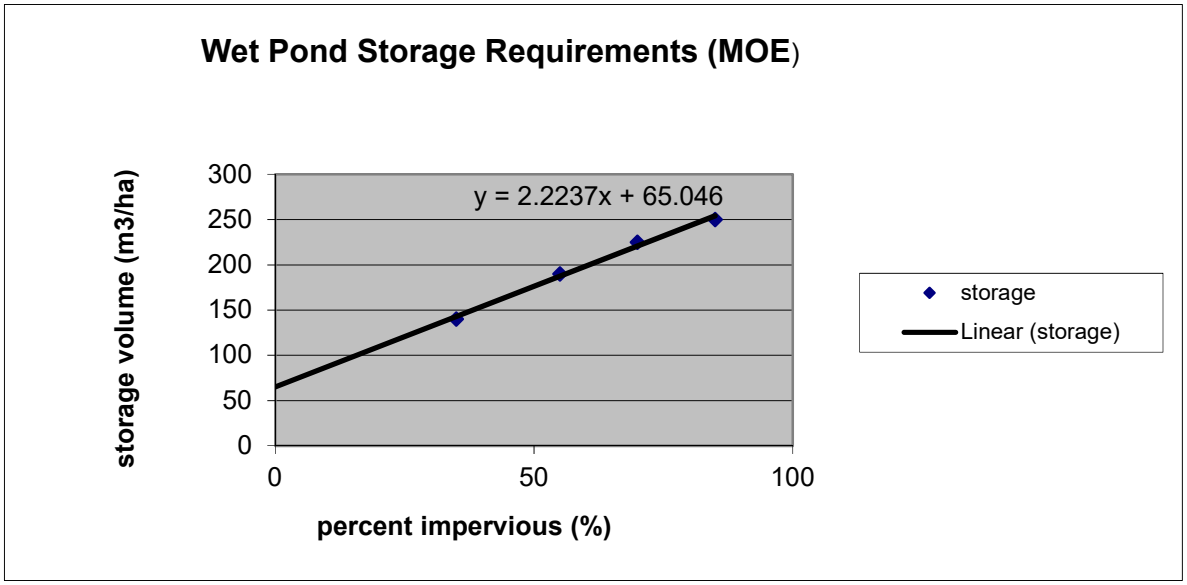
% imp	50	
Storage Volume (m^3/ha)	135.892	
Drainage Area (ha)	1.56	
Required Storage Volume (m^3)	212	
Provided Storage Volume (m^3)	**512**	ok

BlueVista Subdivision
FILE No. 117159
Nov-18

MOE Manual Storage Requirements

Wet Pond

% imp	storage
35	140
55	190
70	225
85	250



% imp	50	
Storage Volume (m^3/ha)	176	
Drainage Area (ha)	11.14	
Storage Volume ($m^{3)}$	1961	
Permanent Pool Volume (m^3)	**1515**	
Provided Permanent Pool Volume (m^3)	**3112**	ok
Active Storage Volume (m^3)	446	
25 mm Storm Runoff (mm)	11.855	
25 mm Storm Runoff Volume (m^3)	1321	
Required Extended Detention Storage (m^3)	**1321**	
Provided Extended Detention Storage (m^3)	3963	ok

C.C. Tatham & Associates Ltd. Consulting Engineers Collingwood Bracebridge Orillia Barrie	Project: BlueVista Subdivision	Date: December 2018
	File No.: 117159	Designed: ARO
	Subject: Erosion Control Calculations	Checked: DRT

SIMPLIFIED APPROACH (AS PER MOE-SWMPPD MANUAL SECTION C.4)

Catchments:	201	
Total Area (ha):	1.56 ha	
Total Directly Connected Impervious Area:	50%	
SCS Soil Group	A&B	
Source Control (m^3):	0	
Required Pond Active Storage Volume (m^3/ha):	225	*Fig. C1 MOE SWM Manual
Active Storage Volume Required (m^3):	351	
Active Storage Volume Provided (m^3):	512	*Active Storage Volume Controlled by Minor Orifice

Therefore, the Storage Volume provided is greater than required.

C.C.Tatham & Associates Ltd. Consulting Engineers Collingwood Bracebridge Orillia Barrie	Project: BlueVista Subdivision	Date: December 2018
	File No.: 117159	Designed: ARO
	Subject: Erosion Control Calculations	Checked: DRT

SIMPLIFIED APPROACH (AS PER MOE-SWMPPD MANUAL SECTION C.4)

Catchments:	205	
Total Area (ha):	11.14 ha	
Total Directly Connected Impervious Area:	50%	
SCS Soil Group	A&B	
Source Control (m^3):	0	
Required Pond Active Storage Volume (m^3/ha):	225	*Fig. C1 MOE SWM Manual
Active Storage Volume Required (m^3):	2,507	
Active Storage Volume Provided (m^3):	3,963	*Active Storage Volume Controlled by Minor Orifice

Therefore, the Storage Volume provided is greater than required.

C.C.Tatham & Associates Ltd. Consulting Engineers Collingwood Bracebridge Orillia Barrie Ottawa	Project:	BlueVista Subdivision	Date:	November 2018
	File No.:	117159	Designed:	ARO
	Subject:	Water Quality Calculations	Checked:	DRT

$$TSS\ Removal = 1 - ([(1 - R_P) - (1 - R_P)R_S]$$

where:

R_P = % TSS Removal provided by Primary Treatment Strategy

R_S = % TSS Removal provided by Secondary Treatment Strategy

Catchment 201

Drainage Area = 1.56 ha Imperviousness = 50%

Controls:

Device	Target Total Suspended Solids (TSS) Removal
Split Primary Treatment Grass Swale	50% *
Split Primary Treatment OGS Unit **	50% ***
Secondary Treatment Dry Pond	60%

* Chapter 4.8 *Low Impact Development Stormwater Management Planning and Design Guide, CVC 2011.*

** Oil-Grit Separator (OGS)

*** Unit Sized to provide 80% TSS removal, safety factor applied

TSS Removal Provided By Controls = 80%

Catchment 203

Drainage Area = 0.33 ha Imperviousness = 45%

Controls:

Device	Target Total Suspended Solids (TSS) Removal
Primary Treatment *	0%
Secondary Treatment **	0%

* No primary treatment recommended

** No secondary treatment recommended

TSS Removal Provided By Controls = 0%

Catchment 205

Drainage Area = 11.14 ha Imperviousness = 50%

Controls:

Device	Target Total Suspended Solids (TSS) Removal
Primary Treatment Impervious to Grass	50%
Secondary Treatment Wet Pond	80%

TSS Removal Provided By Controls = 90%

Site TSS Removal Efficiency

Catchment	Outlet	Area (ha)	TSS Removal
201	Outlet 1	1.56	80%
203	Outlet 1	0.33	0%
205	Outlet 2	11.14	90%

TSS Removal Provided By Controls = 87%

* Discharge from Catchments 202, and 204 are considered clean and do not require quality treatment.

Detailed Stormceptor Sizing Report – Blue Mountains

Project Information & Location			
Project Name	Blue Mountains	**Project Number**	-
City	Blue Mountains	**State/ Province**	Ontario
Country	Canada	**Date**	11/22/2018
Designer Information		**EOR Information (optional)**	
Name	Brandon O'Leary	**Name**	Alysse Overholt
Company	Forterra	**Company**	C.C. Tatham & Associates Ltd.
Phone #	905-630-0359	**Phone #**	
Email	brandon.oleary@forterrabp.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Blue Mountains
Recommended Stormceptor Model	EFO8
TSS Removal (%) Provided	84
PSD	Fine Distribution
RainFall Station	OWEN SOUND MOE

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

EFO Sizing Summary			
EFO Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**	**Standard EFO Hydrocarbon Storage Capacity**
EFO4	67	76	265 L (70 gal)
EFO6	78	89	610 L (160 gal)
EFO8	84	96	1070 L (280 gal)
EFO10	88	98	1670 L (440 gal)
EFO12	90	99	2475 L (655 gal)
Parallel Units / MAX	Custom	Custom	Custom

OVERVIEW

Stormceptor ® EF is a continuation and evolution of the most globally recognized oil-grit separator (OGS) stormwater treatment technology - **Stormceptor ®.** Also known as a hydrodynamic separator, the enhanced flow Stormceptor EF is a high performing oil-grit separator that effectively removes a wide variety of pollutants from stormwater and snowmelt runoff at higher flow rates as compared to the original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention technology and internal bypass ensures sediment is retained during all rainfall events.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	4492
Rainfall Station Name	OWEN SOUND MOE	**Total Rainfall (mm)**	18531.0
Station ID #	6132	**Average Annual Rainfall (mm)**	463.3
Coordinates	44°35'N, 80°56'W	**Total Evaporation (mm)**	912.7
Elevation (ft)	580	**Total Infiltration (mm)**	9225.3
Years of Rainfall Data	40	**Total Rainfall that is Runoff (mm)**	8393.0

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

ONLINE APPLICATION

Stormceptor EF's internal bypass and patent-pending scour prevention technology has demonstrated very effective retention of pollutants in third-party testing and verification following the Canadian ETV's **Procedure for Laboratory Testing of Oil-Grit Separators.** Sediment scour prevention demonstrated an effluent concentration of less than 10 mg/L for sediment particles ranging from 1 to 1,000 microns, even during peak influent flow rates associated with infrequent high intensity storm events. While Stormceptor EF will capture oil, only the Stormceptor EFO configuration has been third-party tested and verified to retain greater than 99% of captured oil. Based on these verified performance attributes, the most efficient and widely accepted application of Stormceptor EF is an online configuration, which allows all upstream conveyance flows to enter and exit the unit. The online application eliminates the need for costly additional bypass structures, piping and installation expense.

FLOW ENTRANCE OPTIONS

Single Inlet Pipe – A common design which includes one inlet pipe and one outlet pipe. A 90-degree (maximum) bend is also accepted with this configuration.

Inlet Grate – Allows surface runoff to enter the unit from grade. The inlet grate option can also be used in conjunction with one inlet pipe or multiple inlet pipes. A removable flow deflector is added in the Stormceptor EF4/EFO4.

Maximum Pipe Diameter		
Model	Inlet (In/mm)	Outlet (In/mm)
EF4 / EFO4	24 / 610	24 / 610
EF6 / EFO6	36 / 915	36 / 915
EF8/ EFO8	48 / 1220	48 / 1220
EF10/EFO10	72 / 1828	72 / 1828
EF12/EFO12	72 / 1828	72 / 1828

Multiple Inlet Pipe – Allows for multiple inlet pipes of various diameters to enter the unit.

Maximum Pipe Diameter		
Model	Inlet (In/mm)	Outlet (In/mm)
EF4 / EFO4	18 / 457	24 / 610
EF6 / EFO6	30 / 762	36 / 915
EF8/ EFO8	42 / 1067	48 / 1220
EF10/EFO10	60 / 1524	72 / 1828
EF12/EFO12	60 / 1524	72 / 1828

Drainage Area	
Total Area (ha)	1.64
Imperviousness %	50

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	90.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	Blue Mountains

Site Details

Drainage Area

Total Area (ha)	1.64
Imperviousness %	50
Oil Spill Capture Volume (L)	

Infiltration Parameters

Horton's equation is used to estimate infiltration	
Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Surface Characteristics

Width (m)	256.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (lps)	0

Maintenance Frequency

Maintenance Frequency (months) >	12

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	Build Up/ Wash-off

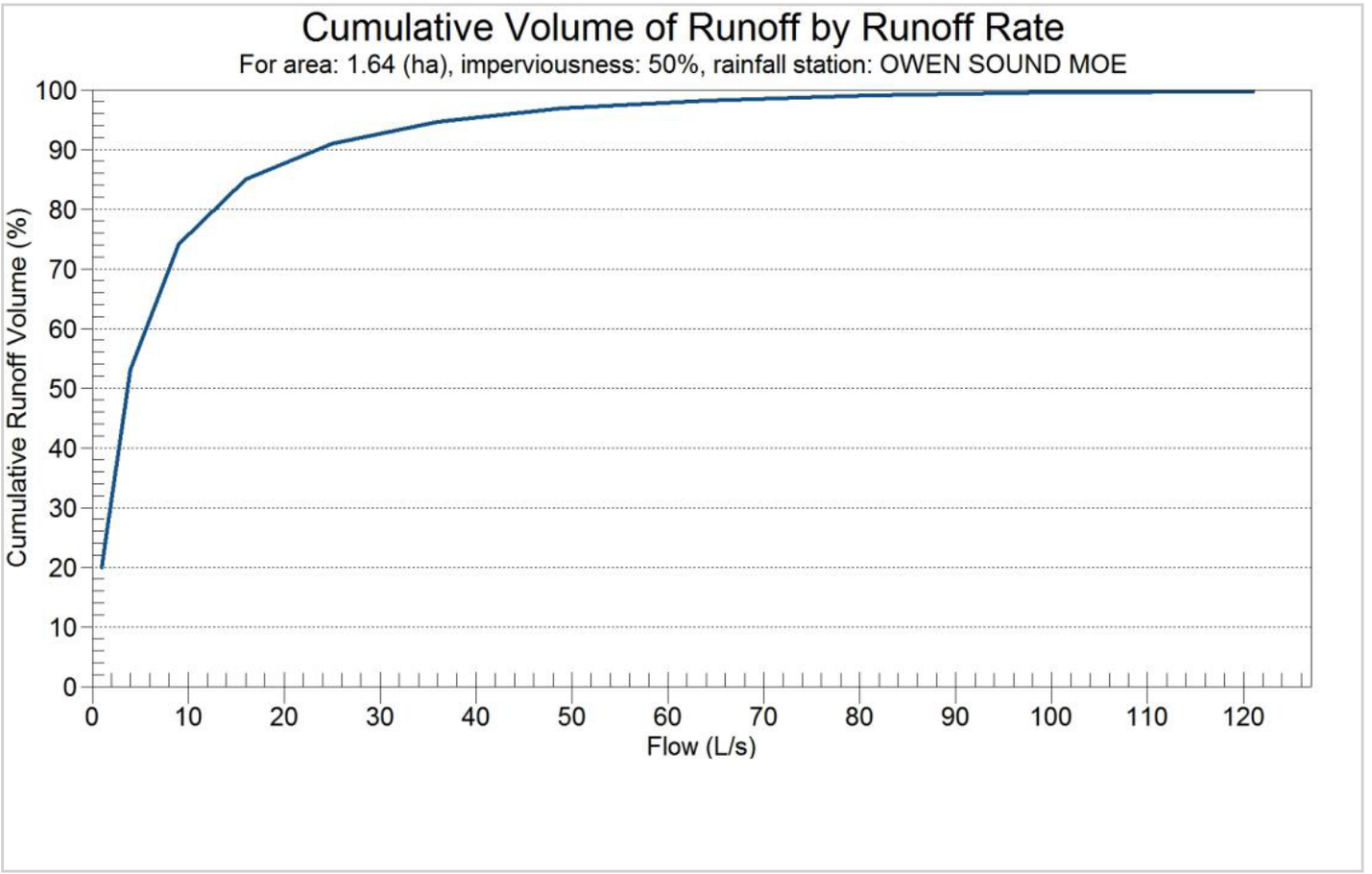
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	125
Exponential Buildup Power	0.40
Exponential Washoff Exponent	0.20

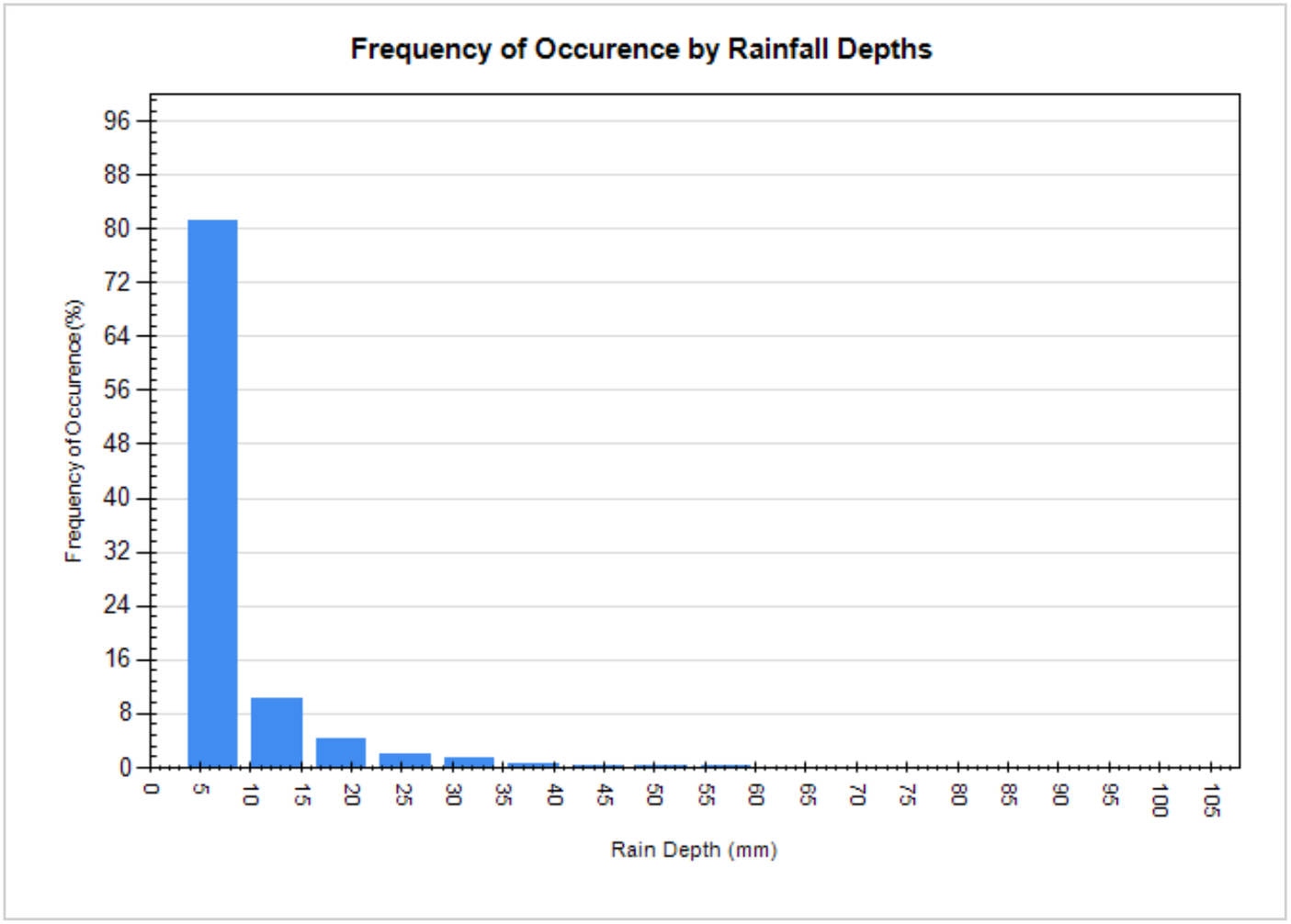
TSS Availability Parameters

Availability Constant A	0.057
Availability Factor B	0.04
Availability Exponent C	1.10
Min. Particle Size Affected by Availability (micron)	400

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	**Runoff Volume (m^3)**	**Volume Over (m^3)**	**Cumulative Runoff Volume (%)**
1	27733	110709	20.0
4	73526	64922	53.1
9	102611	35848	74.1
16	117729	20714	85.0
25	126035	12410	91.0
36	130960	7481	94.6
49	134109	4334	96.9
64	135992	2449	98.2
81	137094	1347	99.0
100	137680	760	99.5
121	138080	361	99.7
144	138277	164	99.9
169	138350	91	99.9
196	138396	45	100
225	138430	11	100
256	138441	0	100
289	138441	0	100


Cumulative Volume of Runoff by Runoff Rate
For area: 1.64 (ha), imperviousness: 50%, rainfall station: OWEN SOUND MOE
Cumulative Runoff Volume (%)
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
110
120
Flow (L/s)

Rainfall Event Analysis				
Rainfall Depth (mm)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (mm)**	**Percentage of Annual Volume (%)**
6.35	3645	81.1	5719	30.9
12.70	458	10.2	4102	22.1
19.05	191	4.3	2957	16.0
25.40	89	2.0	1936	10.5
31.75	57	1.3	1599	8.6
38.10	23	0.5	800	4.3
44.45	12	0.3	501	2.7
50.80	10	0.2	472	2.5
57.15	4	0.1	219	1.2
63.50	1	0.0	63	0.3
69.85	0	0.0	0	0.0
76.20	0	0.0	0	0.0
82.55	1	0.0	79	0.4
88.90	1	0.0	84	0.5
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

SECOND NATURE DEVELOPMENT (PHASE 3)

MONTERRA GOLF COURSE

502
1.13 | 79.0

101
7.57 | 43

102
13.0 | 67.5

501
15.3 | 79.0

EX. EDGE OF BUSHLINE

BLUE VISTA

GSCA WATERSHED

NVCA WATERSHED

INTERMITTENT TRIBUTARY WATERCOURSE

GREY ROAD 21 (OSLER BLUFF ROAD)

POINT OF INTEREST #1

EX. 600mmø CSP CULVERT

WINDFALL DEVELOPMENT (PHASE 4B)

SWM FACILITY

LA SCANDINAVE SPA

LEGEND

CATCHMENT ID — 201
CATCHMENT AREA (ha) — 13.6
CN VALUE — 50
CATCHMENT BOUNDARY
EXISTING MAJOR OVERLAND FLOW
EXISTING CONTOUR/ELEVATOIN — 290.0

CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

DRAWING REFERENCES

NO.	REVISIONS	DATE	INITIAL
1.	DRAFT PLAN APPROVAL	FEB/19	RS

APPROVED

PRELIMINARY

BLUE VISTA

TOWN OF THE BLUE MOUNTAINS

PRE DEVELOPMENT DRAINAGE PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

SCALE: 1:1,000 | JOB NO. 117159
DESIGN: DRT | CHECKED: DRT
DRAWN: DEP | DATE: SEPT/18
DWG. **DP-1**

SECOND NATURE DEVELOPMENT (PHASE 3)

MONTERRA GOLF COURSE

PROPERTY LINE

PROPOSED EDGE OF BUSHLINE

OPEN SPACE BLOCK

204 | 0.99 | 49.0

201 | 1.56 | 48%

203 | 0.33 | 44%

205 | 11.14 | 49%

202 | 6.48 | 71.0

STREET 'A'

STREET 'B'

STREET 'C'

STREET 'D'

PROPOSED DRY POND STORMWATER MANAGAGEMENT FACILITY (SEE DWG SWM-1)

OUTLET 1

SWM BLOCK

GREY RD 21 (OSLER BLUFF ROAD)

PROPOSED 600mmø CSP CULVERT

INTERMITTENT TRIBUTARY WATERCOURSE

PROPOSED COMMUNITY TRAIL

STORMWATER MANAGEMENT BLOCK

EXISTING EDGE OF BUSHLINE

EROSION HAZARD LIMIT

OUTLET 2

POINT OF INTEREST #1

EX. 600mmø CSP CULVERT

PROPOSED WET POND STORMWATER MANAGEMENT FACILITY (SEE DWG SWM-2)

5.2m SETBACK LINE (COUNTY DEDICATED LAND)

PARK BLOCK

WINDFALL DEVELOPMENT (PHASE 4B)

SWM FACILITY

LA SCANDINAVE SPA

LEGEND

- CATCHMENT ID — 201 | 13.6 | 0.50
- CATCHMENT AREA (ha)
- CN VALUE/% IMPERVIOUS
- CATCHMENT BOUNDARY
- PROPOSED MAJOR OVERLAND FLOW
- EXISTING MAJOR OVERLAND FLOW
- PROPOSED GRASSED SWALE
- EXISTING CONTOUR/ELEVATOIN 290.0

CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

DRAWING REFERENCES

NO.	REVISIONS	DATE	INITIAL
1.	DRAFT PLAN APPROVAL	FEB/19	RS

APPROVED

PRELIMINARY

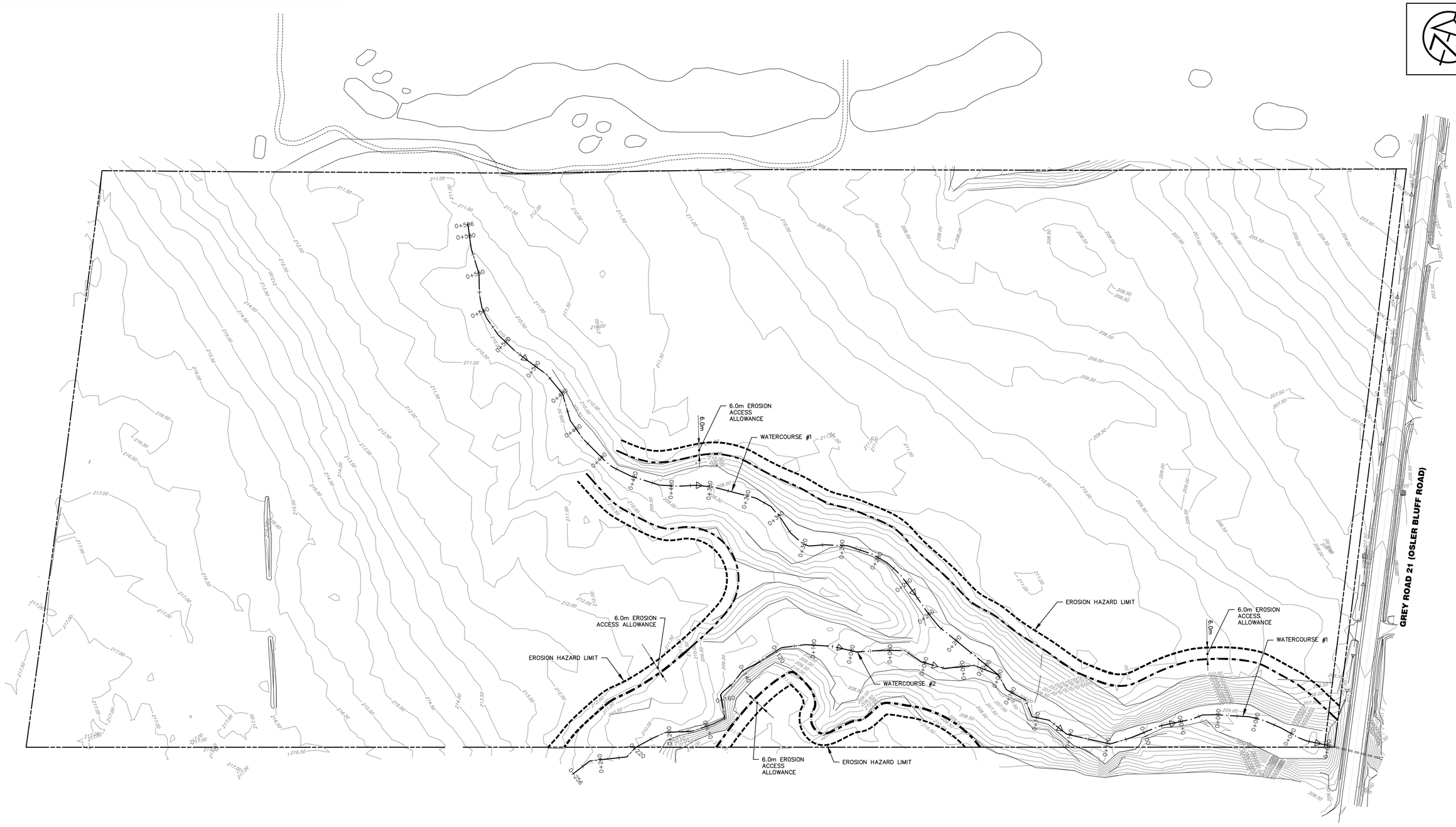
BLUE VISTA

TOWN OF THE BLUE MOUNTAINS

POST DEVELOPMENT DRAINAGE PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

SCALE: 1:1,000 | JOB NO. 117159
DESIGN: DRT | CHECKED: DRT
DRAWN: DEP/RD | DATE: APRIL/18
DWG. **DP-2**



CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

DRAWING REFERENCES

NO.	REVISIONS	DATE	INITIAL
1.	DRAFT PLAN APPROVAL	FEB/19	RS

APPROVED

PRELIMINARY

BLUE VISTA

TOWN OF THE BLUE MOUNTAINS

NATURAL HAZARDS PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

SCALE: 1:1,000		JOB NO.	117159
DESIGN: DRT	CHECKED: DRT	DWG.	**HAZ-2**
DRAWN: DEP	DATE: APRIL/18		