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11476 Highway 26

STORMWATER MANAGEMENT REPORT

Integricon Property Restoration and Construction Group Inc.

File 120232 | April 29, 2026

Document Control

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Date: **April 29, 2029**		

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Issue	Date	Description
1	February 17, 2023	Issued for SPA – 1st Submission
2	June 26, 2025	Issued for SPA - 2nd Submission
3	April 29, 2026	Issued for SPA – 3rd Submission

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1 Introduction

Tatham Engineering Limited (Tatham) has been retained by Integricon Property Restoration and Construction Group Inc. to complete a Stormwater Management Report in support of a proposed condominium development (formerly the Beacon Glow Motel) located in the Town of Collingwood (Town).

1.1 OBJECTIVES

The primary objective of this report is to demonstrate how the proposed SWM plan will address any potentially adverse impacts the development may have on surrounding water resources, specifically, local surface water features and surface water quality.

1.2 BACKGROUND & GUIDANCE REPORTS

The proposed SWM plan was developed in recognition of applicable Municipal and Provincial guidelines and relevant background documents including:

- Ministry of the Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment (MOE), *Stormwater Management Practices and Design Manual* 2003*;*
- Sustainable Technologies Evaluation Program (STEP), *Low Impact Development Stormwater Management Planning and Design Guide*, 2010;
- Corporation of the Town of Collingwood, *Development Standards* (July 2007 Version, August 2022 amendments);
- Nottawasaga Valley Conservation Authority (NVCA), *Stormwater Technical Guide:* December 2013*;* and
- Ainley and Associates Ltd., *Lighthouse Point (Collingwood) 'As-Constructed' Engineering Drawings*, 1991.

This report was also prepared utilizing the following site-specific background reports and studies:

- DS Consultants Ltd. (DS Consultants), *Geotechnical Investigation Proposed Residential Buildings 11476 Highway 26 Collingwood, Ontario, 2022*;
- DS Consultants Ltd., *Preliminary Hydrogeological Investigation, Proposed Residential and Commercial Development 11476 Highway 26, Collingwood, Ontario*, dated February 15, 2023;
- DS Consultants Ltd., *Surface Water and Groundwater Level Monitoring, 11476 Highway 26, Collingwood, Ontario*, dated October 18, 2024;

- DS Consultants Ltd., *Surface Water and Groundwater Level Monitoring, Wetland Risk Evaluation and Feature Based Water Balance Study, 11476 Highway 26, Collingwood, Ontario*, dated April 21, 2025;
- DS Consultants Ltd., *Update to Wetland Risk Evaluation and Feature Based Water Balance Study, 11476 Highway 26, Collingwood, Ontario*, dated April 16, 2026
- LGL Limited Environmental Research Associates, *Environmental Impact Study Report*, June 2025;
- Tatham Engineering Limited, *Functional Servicing Report*, February 2023;
- Tatham Engineering Limited, *Traffic Impact Study*, February 2023;
- Tatham Engineering Limited, *Parking Justification Study*, February 2023;
- Tatham Engineering Limited, *Water Taking and Discharge Plan*, June 2025;
- Tatham Engineering Limited, *Soil Management Plan*, June 2025; and
- Tatham Engineering Limited, *Construction Management Plan*, June 2025.

2 Development Site

2.1 SITE LOCATION

The site is located on Highway 26 approximately 0.8 km east of Princeton Shore Boulevard in the Town of Collingwood, County of Simcoe. The legal description of the site is Part 1 of plan 51R-27666. More specifically, the property is approximately 2.7 hectares (ha) and is surrounded by the Lighthouse Point Development on all sides excluding Highway 26. The site is bounded by Highway 26 to the South, Johnston Park Avenue to the North, Waterfalls Lane to the East and existing medium density residential properties to the west as illustrated in Figure 1.

2.2 SITE CONDITIONS

The site was formerly known as the Beacon Glow Motel and consisted of approximately two dozen motel units, an office, modest amenities, and parking. The property has since been vacant for several years and is covered in tall grass, moderate vegetation, and trees as well as coastal shoreline wetlands in the north portion. The *Environmental Impact Study Report* was completed and provides a detailed description of the existing wetland and adjacent environmental features.

The topography of the site generally slopes to the northeast and northwest corners of the site, directing storm runoff towards Johnston Park Avenue. Due to existing grades, it is expected some of the flow will drain internally due to low areas. Overland flow from the property travels north and eventually drains to Georgian Bay located approximately 200 m from the site.

2.3 SUBSURFACE CONDITIONS

A geotechnical investigation prepared by DS Consulting revealed the underlying soils to consist of topsoil, silty sand, sandy gravel before reaching bedrock at approximately 0.9 metres to 1.6 metres below grade. Ground water elevations are estimated to be approximately 0.7 metres and 0.9 metres below grade.

2.4 PROPOSED BUILDING

The proposed building features two 6-storey, 100 and 94-unit residential buildings connected by a ground floor common area including a pub, lounge, exercise facilities and changerooms. A portion of the roof will consist of a green roof system, with the remainder consisting of mechanical rooms, a lounge, washrooms, and outdoor patio. Site access will be provided by a private driveway access from Highway 26. The majority of the property will remain in its current state in order to preserve the designated coastal wetland as identified above in Section 2.2.

3 Existing Drainage Conditions

3.1 BACKGROUND INFORMATION

Information relating to existing topography, land cover and drainage patterns was obtained through a review of available plans and base mapping followed by a detailed topographic survey of the property in 2014.

3.2 LAND COVER & DRAINAGE PATTERNS

As mentioned, the site is currently vacant and consists of the surface-water fed coastal shoreline wetlands, pasture, and woodland areas, as well as remnants of building foundations and driveway areas from the Beacon Glow Motel. The site is approximately 2.7 ha, however, due to the wetland and its associated 30.0 m buffer, approximately 0.87 ha has been deemed developable.

Site runoff is understood to drain overland towards the wetland to the north as well as an existing road allowance and ditch along the western property boundary which was constructed in the late 1980's as part of the Lighthouse Point Development. The existing ditch and wetland drains to an existing 800 mm dia. CSP culvert at the northwest corner of the site, identified as Outlet #1, which is connected to a series of 800 mm dia. CSP pipes which outlet directly to Georgian Bay, approximately 200 m from the site. Original design drawings for the drainage channel and culverts are provided in Appendix B for reference. Based on a review of previous work Tatham completed for the site, approximately 5.9 ha of external area and Highway 26 also currently drains to this culvert.

Based on review of the topographic survey, the existing 500 mm dia. CSP culvert at the northeast quadrant of the site is perched by approximately 0.30m, and outlets to a 600mm dia. culvert crossing Johnston Park Avenue on the Lighthouse Point site. The 500 mm culvert on the subject site is not utilized until significant ponding occurs in the wetland. As such, site runoff is understood to be captured within the existing wetlands. Runoff from approximately 1.9 ha of external area is believed to be conveyed within existing ditching along Lighthouse Lane and drains through this 600 mm culvert under Johnston Park Avenue bypassing the site and, therefore, has been excluded from the hydrologic assessment.

The site is located within the Nottawasaga Valley Conservation Authority (NVCA) watershed and due to the existing wetland, is partially located within the NVCA's regulated area.

3.3 EXISTING HYDROLOGY

A hydrologic model was developed to quantify pre-development peak flows and estimate storage volumes within the existing wetland for the 1:2-year through 1:100-year design storms and Regional (Timmins) storm for the site using Visual OTTHYMO (VO 6.2) modelling software. The 4 hour Chicago (CHI) and 24 hour SCS Type II distributions were modelled using rainfall data taken form the Owen Sound Atmospheric Environment Services in accordance with NVCA and Town standards.

The site has been modelled as two drainage catchments (Catchment 101 and Catchment 102) and assessed at one drainage point of interest (POI) location defined as the existing 800 mm dia. CSP culvert at the northwestern corner of the site (Outlet #1). Catchment 101 is approximately 0.87 ha and has an impervious ratio of 24%. Catchment 102 is approximately 2.23 ha and has an impervious ratio of 26%. Runoff from Catchment 101 and 102 drains north towards Outlet #1. External drainage areas have been modelled as nine drainage Catchments (Catchments 1, 3, 4, 5, 9, 20, 21, 22 and 23). Existing site drainage patterns are illustrated on the Pre-Development Drainage Plan (Drawing DP-1), provided in Appendix G while overall drainage patterns are illustrated on the Overall Drainage Plan (Drawing ODP-1) also provided in Appendix G for reference.

A summary of existing discharge rates for Catchments 101, 102, and the downstream 800mm dia. Culvert at Outlet #1 are provided in Table 1 below while detailed model results are provided in Appendix B for reference.

Table 1: Discharge Rates Summary – Existing Conditions

STORM	DISCHARGE RATE (m^3/s) (CATCHMENT 101)		DISCHARGE RATE (m^3/s) (CATCHMENT 102)		DISCHARGE RATE (m^3/s) (OUTLET #1)	
	4-HR CHI	24-HR SCS	4-HR CHI	24-HR SCS	4-HR CHI	24-HR SCS
25 mm 4 -hour Chicago	0.006		0.014		0.080	
1:2-Year	0.012	0.014	0.028	0.026	0.200	0.291
1:5-Year	0.019	0.026	0.039	0.051	0.335	0.460
1:10-Year	0.027	0.034	0.053	0.070	0.442	0.568
1:25-Year	0.040	0.046	0.081	0.098	0.596	0.734
1:50-Year	0.051	0.057	0.106	0.120	0.724	0.862
1:100-Year	0.063	0.067	0.132	0.145	0.824	0.989
Regional (Timmins)	0.073		0.175		0.835	

The 1:100-year flows for the area are higher than the Regional (Timmins) Storm and will therefore be the Regulatory storm for the site.

3.4 EXISTING OUTLET

In support of the hydrologic model, a simple hydraulic grade line assessment of the existing 800 mm dia. CSP culvert was completed using Hydraflow Express to generate discharge rates and equivalent headwater elevations. The culvert was modelled assuming the water level at the downstream end was at normal depth i.e. no tail water condition. Equivalent storage volumes at each headwater elevation were calculated within the wetland using the detailed topographic survey and Civil3D software. As shown on Drawing DP-1, the maximum confined water surface elevation was found to be 178.63 and had an equivalent storage volume of 2,158 m^3.

Due to an existing berm, runoff directed to the northeast corner of the property is understood to pond within the existing wetland to an elevation of 178.46 where it then spills, west, to Outlet #1 and eventually drains to Georgian Bay. As such, to be conservative, equivalent storage volumes within the northeastern quadrant of the wetland below 178.46 have been excluded from equivalent storage volume calculations. The 500 mm culvert at the north east corner of the site has been conservatively not included for this analysis. Once the wetland is filled up to an elevation of 179.23 it will spill out to Johnston Park Ave at Outlet #1 and conveyed overland to Georgian Bay.

A summary of existing discharge rates, storage volumes and equivalent water surface elevations at Outlet is provided in Table 2 while detailed model results and detailed stage-storage-discharge calculations are provided in Appendix B for reference. Existing water surface elevations for the 1:2-year through Regional storm events are also depicted on Drawing DP-1.

Table 2: Outlet #1 Operating Characteristics Summary – Existing Conditions

STORM	DISCHARGE RATE (m^3/s) (NODE 909)		STORAGE VOLUME REQUIRED (m^3) (NODE 401)		WATER SURFACE ELEVATION (m)	
	4-HR CHI	24-HR SCS	4-HR CHI	24-HR SCS	4-HR CHI	24-HR SCS
25 mm 4-hr Chicago	0.07		9		178.20	
1:2-Year	0.14	0.17	76	133	178.30	178.33
1:5-Year	0.21	0.24	200	270	178.37	178.40
1:10-Year	0.24	0.25	323	407	178.42	178.45
1:25-Year	0.25	0.25	592	678	178.48	178.49
1:50-Year	0.25	0.25	873	906	178.51	178.51
1:100-Year	0.25	0.25	1,161	1,150	178.54	178.54
Regional (Timmins)	0.83		2,158		178.63 Note 2	

Note 1: Peak flows controlled by full flow capacity of existing 800 mm dia. culvert with full flow capacity up to 0.026m^3/s.
Note 2: There is insufficient storage volume within the wetland under existing conditions to contain the Regional (Timmins) storm. Therefore, the Regional Flow is understood spill into the Johnson Park Avenue road allowance and be safely conveyed to Georgian Bay.

4 Stormwater Management Plan

The proposed SWM plan has been developed to address any potentially adverse impacts the development may have on the local surface water features and on surface water quality to achieve the design criteria specified below.

4.1 STORMWATER MANAGEMENT DESIGN CRITERIA

This SWM report is subject to the review and approval of the Town and NVCA. The following design criteria are to be satisfied in the proposed SWM plan:

- Water quantity controls must be provided to ensure post-development peak flow rates do not exceed pre-development rates at any drainage outlet to ensure no adverse impacts to downstream landowners or surface water conditions;
- Water quality controls must be provided to satisfy the MECP SWM Planning and Design Manual. As such, "Enhanced" Level 1 water quality treatment is required which corresponds to 80% long-term total suspended solids (TSS) removal;
- Safe Conveyance of the Regulatory Storm event through the site to a sufficient outlet;
- In accordance with NVCA requirements, the equivalent runoff volume generated from impervious areas during the 5 mm storm must be retained on-site for erosion control;
- Pre and Post development water balance calculations with a target of achieving pre-development annual infiltration volumes and runoff volumes through best-efforts strategies;
- A phosphorous budget analysis must be completed and where necessary, mitigation efforts be provided to ensure post-development phosphorous loads match pre-development loads; and
- A detailed siltation and erosion control strategy must be provided for implementation during all construction activities.

4.2 PROPOSED HYDROLOGY

The SWM Plan was developed recognizing the wetland portion of the site should not be used as storm water attenuation. Under proposed conditions, drainage for the developed portion of the site (Catchment 201) will be directed through an underground storm water retention chamber and then be pumped/drained north towards the existing wetland, before draining through the existing culvert at the northwest of the property. In the undeveloped portion of the site (Catchment 202), existing foundation and asphalt will be removed and the area restored as a wetland buffer. Existing drainage patterns will remain, directing external runoff from the south through the site to the north along the west side of the property.

The site has been modelled as two drainage catchments (Catchment 201 and Catchment 202) and assessed at one drainage point of interest location defined as the existing 800 mm dia. CSP culvert at the northwestern corner of the site (Outlet #1). Catchment 201 is approximately 0.87 ha and has an impervious ratio of 73%, and the green roof has been assumed to be impervious. Catchment 202 is approximately 2.23 ha and has an impervious ratio of 14%. Runoff from Catchment 201 and 202 drains northwest towards Outlet #1. External drainage will continue to be conveyed through the existing unopened road occupancy along the western property boundary to Outlet #1. Post-development drainage patterns are illustrated on the Post-Development Catchment Plan (Drawing DP-2) provided in Appendix G for reference.

4.3 WATER QUANTITY CONTROL

An underground storm water attenuation chamber will be implemented to provide the requisite water quantity control for the development. The chamber will contain a pump discharging stormwater at a constant rate, as well as an overflow orifice near the top of the tank to provide discharge during high volume storm events. The design parameters of the proposed chamber can be found in Table 3. Detailed design calculations and the stage-storage-discharge relationship can be found in Appendix C for reference.

Table 3: Stormwater Attenuation Chamber Design Parameters

PARAMETER	VALUE
Base of Module Elevation (masl)	177.00
Module Footprint (m^2)	100
Module Height (m)	3.5
Module Volume (m^3)	350
Invert of Pump (from base of module) (m)	0.10
Module Dead Storage (m^3)	7
Pump rate (L/s)	10
Overflow Orifice dia. (mm)	200
Invert of Overflow Orifice (from base of module) (m)	2.4

A portion of the chamber will be dead storage to be used for irrigation on the site. A summary of peak flows and storage volumes at the outlet of Catchment 201, 202 (outlet of storage chamber), and Outlet #1 under existing and proposed conditions is provided in Table 4 while detailed model results are provided in Appendix C for reference.

Table 4: Discharge Rates and Chamber Storage Volumes Summary – Proposed Conditions

STORM	DISCHARGE RATE (m^3/s) (CATCHMENT 201/NODE 402)		DISCHARGE RATE (m^3/s) (CATCHMENT 202)		DISCHARGE RATE (m^3/s) (OUTLET #1)		STORAGE VOLUME REQUIRED (m^3) (CHAMBER/NODE 402)	
	4-HR CHI	24-HR SCS	4-HR CHI	24-HR SCS	4-HR CHI	24-HR SCS	4-HR CHI	24-HR SCS
25 mm 4 -hour Chicago	0.010 (0.006)		0.005 *(0.014)*		0.076 *(0.070)*		70	
1:2-Year	0.010 *(0.012)*	0.010 *(0.014)*	0.013 *(0.028)*	0.022 *(0.026)*	0.183 *(0.200)*	0.276 *(0.291)*	125	110
1:5-Year	0.010 *(0.019)*	0.010 *(0.026)*	0.029 *(0.039)*	0.043 *(0.051)*	0.308 *(0.335)*	0.430 *(0.460)*	190	160
1:10-Year	0.012 *(0.027)*	0.010 *(0.034)*	0.044 *(0.053)*	0.059 *(0.070)*	0.408 *(0.442)*	0.529 *(0.568)*	230	195
1:25-Year	0.029 *(0.040)*	0.015 *(0.046)*	0.068 *(0.081)*	0.086 *(0.098)*	0.553 *(0.596)*	0.683 *(0.734)*	250	235
1:50-Year	0.043 *(0.051)*	0.025 *(0.057)*	0.090 *(0.106)*	0.107 *(0.120)*	0.673 *(0.724)*	0.798 *(0.862)*	260	250
1:100-Year	0.058 *(0.063)*	0.038 *(0.067)*	0.113 *(0.132)*	0.130 *(0.145)*	0.765 *(0.824)*	0.914 *(0.989)*	270	255
Regional (Timmins)	0.083 *(0.073)*		0.165 *(0.175)*		0.836 *(0.835)*		310	

Note 1: Values in italics denote existing condition discharge rates, storage volumes and water surface

As shown, the proposed stormwater attenuation chamber provides adequate peak flow attenuation for the majority of storm events. It is noted proposed peak flows are marginally higher at the outlet culvert during the Timmins storm event; however, this represents an increase of less than 1% from the pre-development peak discharge.

4.4 WATER BALANCE

To evaluate the site's impact on the wetland and to assess the change in post-development to pre-development water balance, Geobase Solutions (GBS) has prepared a Feature Water Balance Study for the site (March 2025 with DS Engineering addendum April 2026). Please refer to the addendum and report for the water balance assessment in Appendix D.

With the increase in imperviousness the proposed site will decrease infiltration and increase runoff. However, the installation of LIDs outside of the wetland buffer were explored and initially thought to be a plausible approach, however, were eliminated due to the constrained developable limit, high groundwater table, shallow bedrock and underground parking limits. This includes rain gardens and infiltration areas and were determined to be unsuitable for the proposed site as they require sufficient separation from groundwater tables. A green roof and a dead storage portion of the stormwater chamber have been included in the development plan in an attempt to decrease the changes in water balance. The green roof is designed to capture 10 mm of rainfall, with the dead storage retaining 2.5 mm from the remainder of the roof area. The DS addendum states the overall infiltration water balance deficiency is 296 m^3/yr, which is relatively small and therefore negligible when considering the total annual volume of infiltration is 11,316 m^3/yr. The total runoff is estimated at 24,557 m^3/yr, and with the proposed green roof and dead storage nearly matches the pre-development runoff volume.

4.5 NVCA EROSION CONTROL CRITERIA

In developing the site, NVCA requires retaining 5 mm from all surfaces on the site for erosion control. The proposed 0.63 ha of new impervious surfaces will require retaining 31.5 m^3, equivalent to the required 5 mm. The existing impervious areas being removed account for roughly 0.58 ha of existing hardscape. With removing and restoring the concrete and asphalt onsite within the 30 m wetland buffer, 0.37 ha of hardscape will be removed and restored. This will change the initial abstraction from 2 mm to 10 mm (assuming woods/transition). As noted previously, the proposed green roof will capture 10mm, while the dead storage will capture 2.5mm from the remaining area. See Appendix E for additional information on the green roof. The remainder of the pervious area will have an initial abstraction of 2mm. See Table 5 for summary of the erosion control.

Table 5: Erosion Control Summary

DESCRIPTION	AREA (ha)	ABSTRACTION (mm)	VOLUME (m^3)
Removal of Existing Impervious Area	0.370	8.0	29.6
Green Roof	0.124	10.0	12.4
Dead Storage	0.246	2.5	6.2
Impervious Abstraction	0.250	2.0	5.0
		Total Retained Volume	**53.2**

With the proposed removal of impervious area, the green roof, dead storage, and the 2 mm retained on the proposed hardscape, we note the 53.2 m^3 retained on the site in the proposed condition exceeds the 31.5 m^3 required for erosion control.

4.6 MINOR FLOW CONVEYANCE

Minor event runoff up to and including the 1:100-year storm event from the majority of the developed area within Catchment 201 will be collected via the internal storm sewer system and be conveyed to an oil grit separator (OGS) unit. Outflow from the OGS will be conveyed into an underground storm water chamber then discharge into the wetland buffer towards the north of the property and flow north towards Outlet #1. Approximately 0.3 ha of rooftop area will be directly conveyed to the underground stormwater chamber.

Detailed end treatment calculations have been completed to adequately size erosion controls at the underground storm chamber discharge point and are provided in Appendix C for reference. Detailed sections are provided on the Details Plan (Drawing DE-1) provided in the engineering drawing set.

4.7 MAJOR FLOW CONVEYANCE

The stormwater pipes for the rooftops and the parking lot will be sized for the 1:100-year storm event as part of the internal mechanical design of the building. In the event the inlets become clogged, runoff will pond up to the top of curb and then proceed to overflow to the ditch along Highway 26. Maximum ponding depths will not exceed 0.3 m per the attached grading plan (Drawing SG-01). The area drains in the landscaped areas on top of the parking garage will similarly pond to a maximum depth of 0.3 m before overflowing to the north and east, where it will then flow north.

Major and minor flow conveyance from Catchment 202 and the Highway 26 ditch will continue to drain overland towards Outlet #1. Using available survey data the peak conveyance of the swale at the south end of the unopened road allowance was calculated to be 0.71 m^3/s (Node 907). The existing contributing flow to the swale with the proposed development area during the Timmins storm is 0.67m^3/s. The existing swale has capacity for roughly the 1:5-year storm from the external areas, and as such the proposed development will not direct water to this swale during the 1:100-year storm. Detailed calculations are provided in Appendix C for reference. Although the proposed development will decrease flows during the 1:2 through 1:100-year rainfall events slightly, it is expected the downstream culvert will continue to operate as it does currently with events overtopping the culvert and being conveyed along Johnston Park Avenue and directed to the lake. The proposed site has been graded to be higher than Johnston Park Avenue to ensure safe access to the site from Highway 26. Refer to Drawing SSG-1 for grading details.

5 Water Quality Control

Enhanced level water quality control corresponding to 80% TSS removal is required for developed areas of the site. Water quality controls for the developed portion of Catchment 201 (exclusive of areas undisturbed by the proposed development) will be provided via a treatment train comprised of an OGS unit and the vegetated drainage easement.

The OGS unit is located upstream of the proposed stormwater storage chamber and will be used to treat only the run-off from the parking lot. It is specified as a Stormceptor EF04 unit which has been sized to provide up to 92% TSS removal for a contributing drainage of 0.25 ha and associated imperviousness of 100%. See Appendix E for details. It is noted typically, water quality controls are not required for rooftop areas, as runoff generated from these areas are typically considered to be "clean". The location of the OGS and contributing drainage area is illustrated on Drawing DP-2 for reference.

As the proposed green roof is expected to capture 10 mm from each storm, this represents approximately 70% of the total rainfall each year. As such a 70% TSS removal efficiency was applied for the portion of roof area that is green roof.

With respect to the water quality treatment provided by the outlet swale, considering the shallow bottom slopes are approximately0.3%, a TSS removal rate of 50% has been applied. Based on review of the Low Impact Development Stormwater Management Planning and Design Guide prepared by the Credit Valley Conservation (CVC) Authority, enhanced swales have been found to provide up to 76% TSS removal. However, as no rock check dams can be implemented due to conveyance requirements, sufficient contact time is anticipated to be provided within the outlet swale to justify the reduced treatment level. As shown in Table 6, the proposed site controls will result in a total removal efficiency of 92.0%.

Table 6: Water Quality TSS Removal Summary

DESCRIPTION	AREA (ha)	OIL GRIT SEPARATOR	GREEN ROOF	CONVEYANCE CONTROL	SWALE/ VEGETATED FILTER	TSS PERCENT REMOVAL
Parking Area	0.25	92%		-	50%	96%
Roof Top (Green Roof)	0.12		70%	80%	50%	97%
Roof Tops and landscaping	0.50	-	-	80%	50%	90%
Total	0.87					92.7%

6 Phosphorous Mitigation

A preliminary phosphorus loading assessment has been completed for the site using loading rates and removal efficiency values from the NVCA Database Tool. Results are summarized below.

6.1 EXISTING CONDITIONS

Under existing conditions, the old motel site has been modelled as Transition, Wetland, Transportation, Open Water, Low-Intensity Residential, and High-Intensity Residential land uses. The corresponding loading rates are 0.07 kg/ha/year, 0.05 kg/ha/year, 1.82 kg/ha/year, 0.26 kg/ha/year, and 0.13 kg/ha/year, and 1.32 kg/ha/yr respectively. Applying this loading rate, the annual pre-development phosphorous load is 1.73 kg/year.

6.2 PROPOSED CONDITIONS

Under proposed conditions, the pavement, parking lot, and building areas have been modelled as High-Intensity Residential with a phosphorous loading rate of 1.32 kg/ha/year. The remaining site area has been modelled as Transition, Wetland, and Transportation. Applying this loading rate, the annual post-development phosphorous load is 1.47 kg/year.

Due to the constrained developable limit, high groundwater table, and underground parking limits, many types of LID's were explored but ultimately could not be implemented within the developable area. Best efforts are proposed with an oil-grit separator, underground storage tank, green roof on a portion of the roof top, and utilizing the 30 m buffer from the wetland to the building to filter runoff before entering the easement and wetland. Therefore, the total annual post-development phosphorous load is reduced to 0.75 kg/year. A summary of the phosphorous loading for the pre-development, post-development without mitigation, and post-development with mitigation is provided in Table 7 below. Additional details are provided in Appendix F.

Table 7: Phosphorous Loading Summary

SCENARIO	AREA (ha)	PHOSPHOROUS LOADING (kg/year)
Pre-development	3.1	1.73
Post-Development (without mitigation)	3.1	1.47
Post-development (with mitigation)	3.1	0.69

7 Erosion & Sediment Control

7.1 EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION

Erosion and sediment control will be implemented for all construction activities within the site including vegetation clearing, topsoil stripping, site access construction and stockpiling of materials. The basic principles considered to minimize erosion and sedimentation and the potential negative environmental impacts include:

- Minimize disturbance activities where possible;
- Expose the smallest possible land area to erosion for the shortest amount of time;
- Institute erosion control measures as required immediately;
- Implement sediment control measures before the outset of construction activities; and
- Carry out regular inspection of erosion/sediment control measures and repair or maintain, as necessary.

Erosion and Sediment Control measures shall be implemented in accordance with the Erosion Sediment Control Best Management Practices Guide and the Town of Collingwood Development Standards. As illustrated on the Erosion Control and Construction Coordination Plan (Drawing EC-1) provided in the engineering drawing set, the following erosion and sediment control practices will be implemented on site:

- Double-walled wired-backed sediment control fence;
- Construction access mat; and
- Heavy-duty silt fence surrounding the material stockpile area.

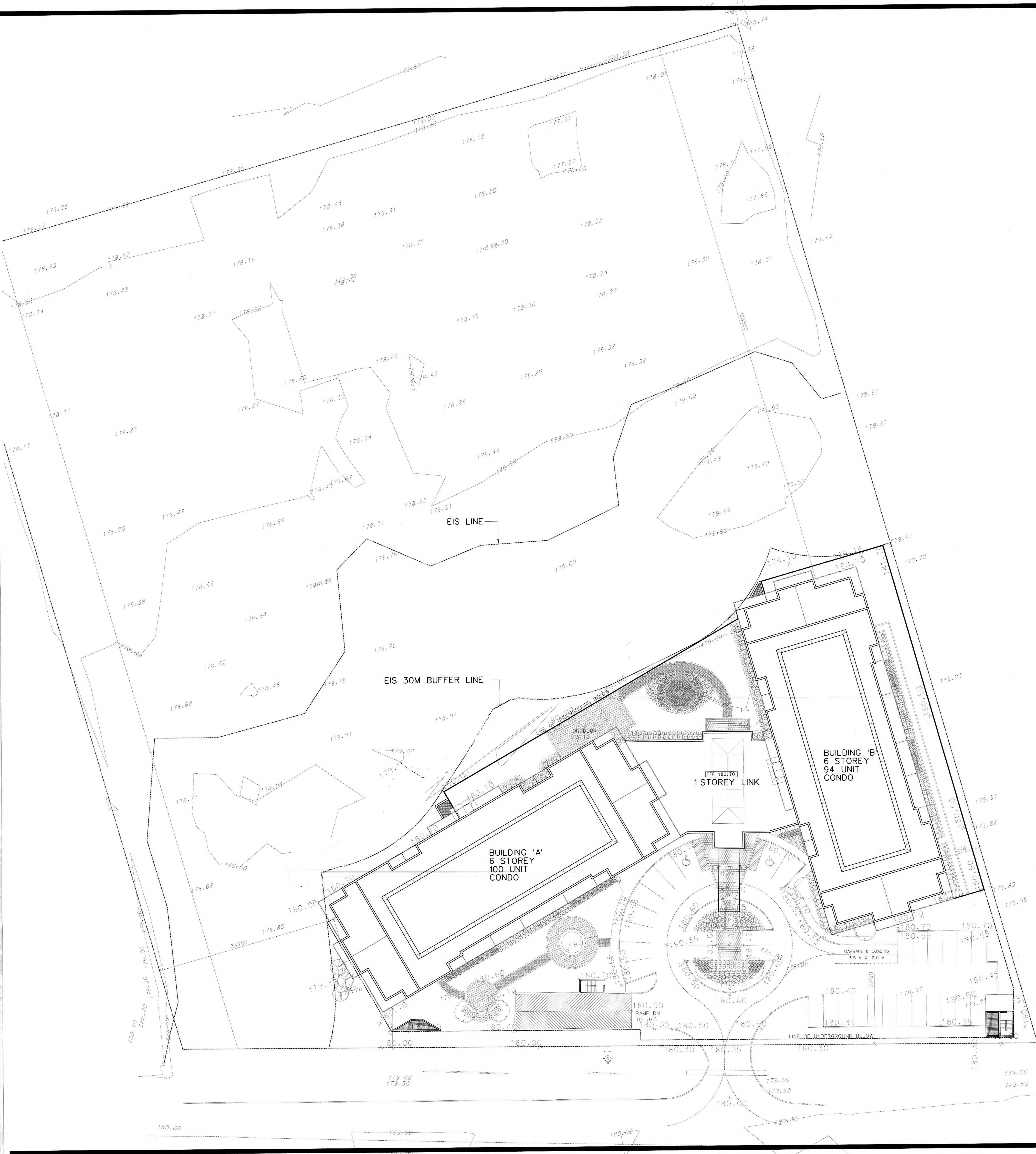
8 Summary

This Stormwater Management plan demonstrates the proposed development will not negatively impact local surface water conditions. All developed site generated runoff will be directed to the proposed stormwater attenuation chamber which will provide the required water quantity controls. Enhanced level water quality treatment will be provided via treatment train comprised of an OGS unit, green roof, and the drainage swale through the wetland buffer.

Finally, a series of siltation and erosion controls including heavy duty silt fence, mud mat, will be implemented for all construction activities.

Figure 1: Site Location Map

Appendix A:
Site Plan



SITE STATISTICS

SITE AREA	28,144.97 M2 (302,960 FT2)		
LESS ENVIROMENTAL	19,434.53 M2 (209,198 FT2)		
NET SITE AREA	8,710.44 M2 (93,762 FT2)		
BUILDING COVERAGE (NET)	3,481.65 M2 (37,477 FT2) - 39.97%		
G.F.A. BUILDING 'A' (INCLUDING LINK)		T.S.A. BUILDING 'A'	
GROUND FLOOR	1,962.38 M2 (21,124 FT2)	1,110.76 M2 (11,957 FT2)	- 56.60%
2ND FLOOR	1,436.32 M2 (15,460 FT2)	1,277.98 M2 (13,757 FT2)	- 88.98%
3RD FLOOR	1,436.32 M2 (15,460 FT2)	1,277.98 M2 (13,757 FT2)	- 88.98%
4TH FLOOR	1,436.32 M2 (15,460 FT2)	1,277.98 M2 (13,757 FT2)	- 88.98%
5TH FLOOR	1,436.32 M2 (15,460 FT2)	1,277.98 M2 (13,757 FT2)	- 88.98%
6TH FLOOR	1,118.29 M2 (12,038 FT2)	967.77 M2 (10,417 FT2)	- 86.54%
TOTAL	8,825.95 M2 (95,005 FT2)	7,190.45 M2 (77,400 FT2)	- 81.47%
G.F.A. BUILDING 'B'		T.S.A. BUILDING 'B'	
GROUND FLOOR	1,458.96 M2 (15,705 FT2)	675.30 M2 (7,269 FT2)	- 46.29%
2ND FLOOR	1,436.32 M2 (15,460 FT2)	1,277.98 M2 (13,757 FT2)	- 88.98%
3RD FLOOR	1,436.32 M2 (15,460 FT2)	1,277.98 M2 (13,757 FT2)	- 88.98%
4TH FLOOR	1,436.32 M2 (15,460 FT2)	1,277.98 M2 (13,757 FT2)	- 88.98%
5TH FLOOR	1,436.32 M2 (15,460 FT2)	1,277.98 M2 (13,757 FT2)	- 88.98%
6TH FLOOR	1,118.29 M2 (12,038 FT2)	967.77 M2 (10,417 FT2)	- 86.54%
TOTAL	8,322.53 M2 (89,586 FT2)	6,754.99 M2 (72,712 FT2)	- 81.16%
TOTAL G.F.A.	17,148.48 M2 (184,591 FT2)	13,945.44 M2 (150,112 FT2)	- 81.32%

UNIT COUNT	BUILDING 'A'	BUILDING 'B'	TOTAL
GROUND FLOOR	16 UNITS	10 UNITS	26 UNITS
2ND FLOOR	18 UNITS	18 UNITS	36 UNITS
3RD FLOOR	18 UNITS	18 UNITS	36 UNITS
4TH FLOOR	18 UNITS	18 UNITS	36 UNITS
5TH FLOOR	18 UNITS	18 UNITS	36 UNITS
6TH FLOOR	12 UNITS	12 UNITS	24 UNITS
TOTAL	100 UNITS	94 UNITS	194 UNITS

UNIT BREAKDOWN BUILDING 'A'	STUDIO	1 BED	1 + DEN	2 BED	2 + DEN	TOTAL
GROUND FLOOR	0	2	9	4	1	16
2ND FLOOR	0	1	11	5	1	18
3RD FLOOR	0	1	11	5	1	18
4TH FLOOR	0	1	11	5	1	18
5TH FLOOR	0	1	11	5	1	18
6TH FLOOR	0	1	5	1	5	12
TOTAL	0	7	58	25	10	100

UNIT BREAKDOWN BUILDING 'B'	STUDIO	1 BED	1 + DEN	2 BED	2 + DEN	TOTAL
GROUND FLOOR	0	1	6	2	1	10
2ND FLOOR	0	1	11	5	1	18
3RD FLOOR	0	1	11	5	1	18
4TH FLOOR	0	1	11	5	1	18
5TH FLOOR	0	1	11	5	1	18
6TH FLOOR	0	1	5	1	5	12
TOTAL	0	6	55	23	10	94

UNIT BREAKDOWN TOTAL	STUDIO	1 BED	1 + DEN	2 BED	2 + DEN	TOTAL
TOTAL	0	13	113	48	20	194

R4 ZONE	REQUIRED - APARTMENTS	PROVIDED
MINIMUM LOT AREA	NIL	8,710.44 M2
MINIMUM LOT FRONTAGE	30 M	152.47 M
MINIMUM FRONT YARD	7.5 M	7.5 M
MINIMUM EXTERIOR SIDE YARD	7.5 M	N/A
MINIMUM INTERIOR SIDE YARD	7.5 M	7.5 M, 34.70 M
MINIMUM REAR YARD	7.5 M	105.36 M
MAXIMUM HEIGHT	18 M	
MAXIMUM LOT COVERAGE	40%	3,481.65 M2 (39.97%)
MINIMUM LANDSCAPED OPEN SPACE	40%	3,633.03 M2 (39,107 FT2) 41.71%
PARKING	1 SPACE PER UNIT, PLUS AN ADDITIONAL 0.20 SPACE PER UNIT FOR VISITOR PARKING 194 X 1.20 = 233 SPACES AND ANY TYPE OF COMMERICAL WILL REQUIRE PARKING. WE WOULD USE A GENERAL CATEGORY FOR NOW (3 SPACES PER 100 SQM)	U/G - 202 SPACES SURFACE - 32 SPACES TOTAL - 234 SPACES
COMMERICAL USES	6.2.3 FOOTNOTE (B) ACCESSORY COMMERICAL USES 6.2.3.1 ACCESSORY COMMERICAL USES SHALL BE LIMITED TO A CONVENIENCE STORE, A DAY-CARE CENTRE, A DRY-CLEANER'S ESTABLISHMENT, A LAUNDROMAT AND A PERSONAL SERVICE SHOP THESE USES SHALL ONLY BE LOCATED ON THE FIRST STOREY OF THE MAIN BUILDING AND SHALL NOT OCCUPY AN AREA GREATER THEN 25% OF THE GROSS FLOOR AREA OF THE FIRST STOREY	
BICYCLE SPACES	0.5 BICYCLE SPACES PER DWELLING UNIT TO A MAX OF 20	20 PROVIDED

LEGEND

▲	MAIN ENTRANCE	CB	CATCH BASIN
△	ENTRANCE	H.P.	HYDRO POLE
▲	EXIT	MH	MANHOLE
▲	SERVICE		FIRE HYDRANT
x 180.00	EXISTING ELEVATION	L.S.	LIGHT STANDARD
180.00	PROPOSED ELEVATION		HANDICAPPED PARKING

TATHAM: SWM REPORT
JUNE 2025

DATE

No	Date

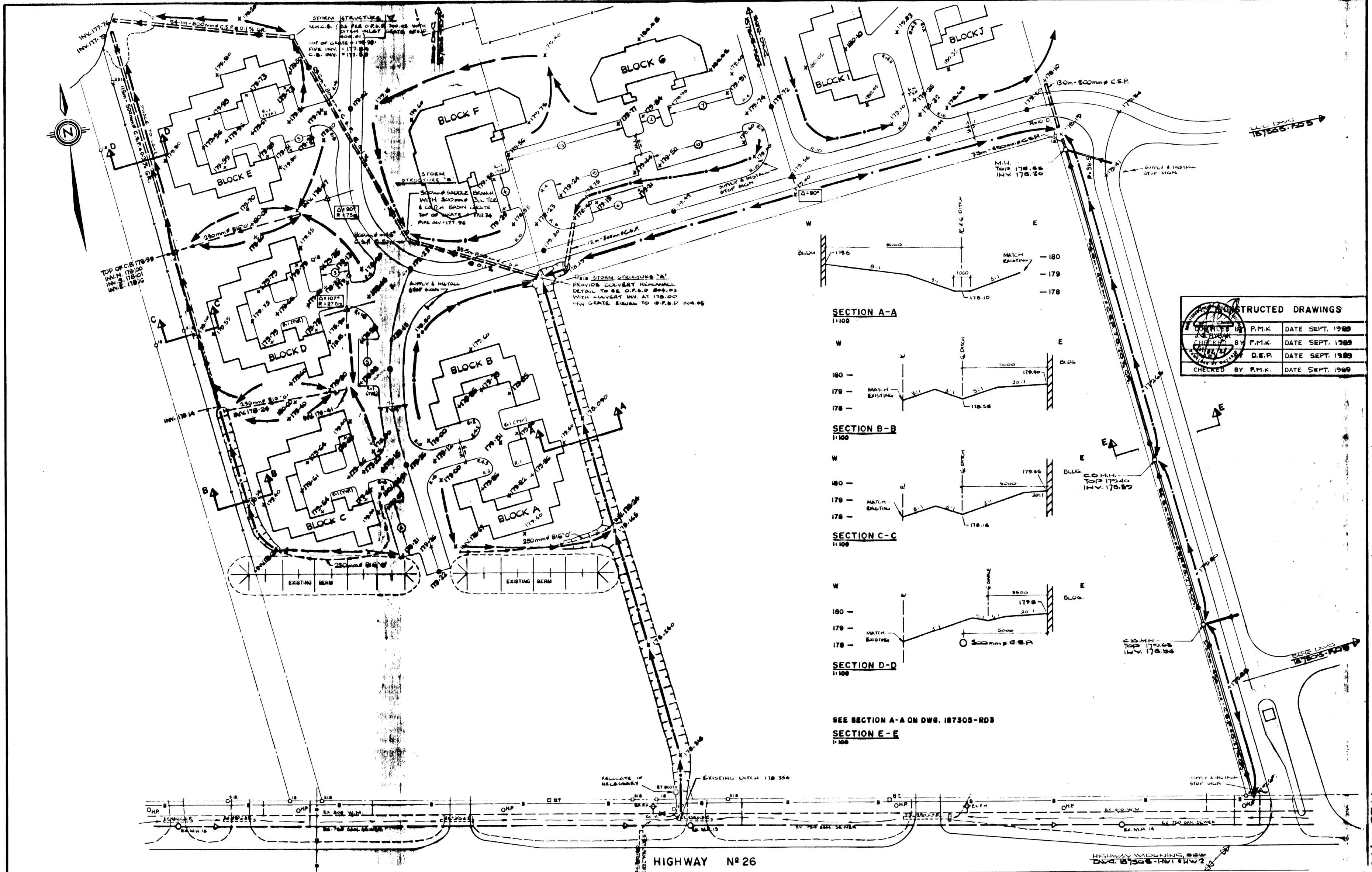
CONTRACTOR MUST CHE
AND BE RESPONSIBLE
DISCREPANCIES TO TH
WORK.
ALL DRAWINGS, PRINT
THE PROPERTY OF THE
RETURNED TO HIM ON
LATEST APPROVED DRA
CONSTRUCTION.
PRINTS ARE NOT TO B

ONTARIO ASSOCIATION OF ARCHITECTS
DAVID M. ARSENAULT
LICENCE
5152

Tel (416).255.4378
Fax (416).255.4351

ARCHITECT :
JOB CAPTAIN :
DRAWN BY :
DATE OF PLOT :
SCALE :
CLIENT'S NAME :
INTEGRICON DE
219 WESTBROOK D
WOODBRIDGE ONTA
PROJECT NAME :
COLLINGWOOD
11476 HIGHWAY 2
COLLINGWOOD ONT
DRAWING TITLE :
SITE PLA
6 STOREY
PROJECT NO. :
20-109

Appendix B:
Existing Drainage Conditions



No.	Revisions	Date	Initial
4	REVISED 'AS CONSTRUCTED'	FEB./91	P.M.
3	REVISED 'AS CONSTRUCTED'	OCT./89	R.M.
2	REVISED 'AS CONSTRUCTED'	SEPT/89	R.M.
1	800 mm Ø CSP & STORM STRUCTURE 'B'	JAN/89	S.L.

Notes:

LEGEND
- DRAINAGE SWALE
- DRAINAGE DITCH
- STORM SEWER
- × 178.29 FINAL GRADE ELEVATION
- ● 179.40 FINAL ℄ ROAD ELEVATION
- Nº OF PARKING SPACES (2.75m x 6.0m EACH)
- POINT OF INTERSECTION

Approved

R. G. McNALTY

LIGHTHOUSE POINT (COLLINGWOOD)
YACHT AND TENNIS CLUB
R.B. INVESTMENTS LTD.

LOT GRADING AND ROAD ALIGNMENT PLAN

Ainley and Associates Ltd.
Consulting Engineers and Planners
Collingwood — Barrie — Belleville

SCALE: 1:800 METRIC
CONTRACT Nº 1
DESIGN RM/SL. CHECKED C.K.K.
DRAWN D.E. DATE JULY 1988
DWG. Nº 187305-RD1

TATHAM ENGINEERING

PROJECT	11476 Highway 26	FILE	120232
		DATE	6/24/2024
SUBJECT	Land Use Allocation - StandHyd - Existing	NAME	PNW
		PAGE	1 OF 1

CATCHMENT 101

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious (XIMP)	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	0.61	0%	0.00	0%	0.00	0.61	74	5
Hardscape	0.21	100%	0.21	24%	0.05	0.00	100	2
Woodland	0.05	0%	0.00	0%	0.00	0.05	67	10
Total	**0.87**	**24%**	**0.21**	**6%**	**0.05**	**0.66**	**73.5**	**5.4**

CATCHMENT 102

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious (XIMP)	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	0.60	0%	0.00	0%	0.00	0.60	74	5
Hardscape	0.37	100%	0.37	35%	0.13	0.00	100	2
Woodland	1.06	0%	0.00	0%	0.00	1.06	67	10
Waterbody	0.20	100%	0.20	0%	0.00	0.00	50	12
Total	**2.23**	**26%**	**0.57**	**6%**	**0.13**	**1.66**	**69.5**	**8.2**

Culvert Report

Outlet #1 - Existing 800 mm dia. CSP Culvert

Invert Elev Dn (m)	=	177.9600
Pipe Length (m)	=	35.5000
Slope (%)	=	0.1127
Invert Elev Up (m)	=	178.0000
Rise (mm)	=	800.0
Shape	=	Circular
Span (mm)	=	800.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Headwall
Coeff. K,M,c,Y,k	=	0.0078, 2, 0.0379, 0.69, 0.5

Embankment

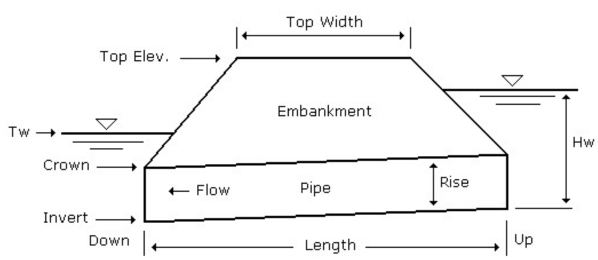
Top Elevation (m)	=	179.2500
Top Width (m)	=	10.0000
Crest Width (m)	=	10.0000

Calculations

Qmin (cms)	=	0.0050
Qmax (cms)	=	0.9280
Tailwater Elev (m)	=	Normal

Highlighted

Qtotal (cms)	=	0.0050
Qpipe (cms)	=	0.0050
Qovertop (cms)	=	0.0000
Veloc Dn (m/s)	=	0.1898
Veloc Up (m/s)	=	0.5187
HGL Dn (m)	=	178.0404
HGL Up (m)	=	178.0407
Hw Elev (m)	=	178.0540
Hw/D (m)	=	0.0675
Flow Regime	=	Inlet Control



Culvert Profile

Q			Veloc		Depth	
Total	Pipe	Over	Dn	Up	Dn	Up
(cms)	(cms)	(cms)	(m/s)	(m/s)	(mm)	(mm)
0.0050	0.0050	0.0000	0.1898	0.5187	80.3672	40.6859
0.0150	0.0150	0.0000	0.2647	0.6866	136.0103	70.7678
0.0250	0.0250	0.0000	0.3061	0.7849	175.5242	91.5107
0.0350	0.0350	0.0000	0.3371	0.8563	207.9501	108.5515
0.0450	0.0450	0.0000	0.3658	0.9147	234.7764	123.3413
0.0550	0.0550	0.0000	0.3869	0.9644	260.6725	136.6056
0.0650	0.0650	0.0000	0.4041	1.0087	285.3221	148.6979
0.0750	0.0750	0.0000	0.4195	1.0488	308.5021	159.9158
0.0850	0.0850	0.0000	0.4344	1.0852	330.0450	170.4268
0.0950	0.0950	0.0000	0.4496	1.1175	349.8205	180.5285
0.1050	0.1050	0.0000	0.4591	1.1490	371.6982	189.9791
0.1150	0.1150	0.0000	0.4700	1.1779	391.6784	199.0762
0.1250	0.1250	0.0000	0.4825	1.2055	409.6866	207.7827
0.1350	0.1350	0.0000	0.4909	1.2323	429.6482	216.0798
0.1450	0.1450	0.0000	0.4985	1.2562	449.5540	224.2840
0.1550	0.1550	0.0000	0.5057	1.2806	469.3295	232.0603
0.1650	0.1650	0.0000	0.5150	1.3031	486.9842	239.7249
0.1750	0.1750	0.0000	0.5217	1.3254	506.3877	247.0733
0.1850	0.1850	0.0000	0.5263	1.3463	527.4283	254.3101
0.1950	0.1950	0.0000	0.5313	1.3676	548.0782	261.2306
0.2050	0.2050	0.0000	0.5368	1.3868	568.2816	268.1883
0.2150	0.2150	0.0000	0.5396	1.4067	591.4988	274.8297
0.2250	0.2250	0.0000	0.5436	1.4260	613.8974	281.3037
0.2350	0.2350	0.0000	0.5450	1.4438	640.2214	287.8150
0.2450	0.2450	0.0000	0.5443	1.4614	670.9544	294.1588
0.2550	0.2550	0.0000	0.5390	0.5444	713.1285	703.8454

Q			Veloc		Depth	
Total	Pipe	Over	Dn	Up	Dn	Up
(cms)	(cms)	(cms)	(m/s)	(m/s)	(mm)	(mm)
0.2650	0.2650	0.0000	0.5273	0.5272	800.0000	800.0000
0.2750	0.2750	0.0000	0.5472	0.5471	800.0000	800.0000
0.2850	0.2850	0.0000	0.5671	0.5670	800.0000	800.0000
0.2950	0.2950	0.0000	0.5870	0.5869	800.0000	800.0000
0.3050	0.3050	0.0000	0.6069	0.6068	800.0000	800.0000
0.3150	0.3150	0.0000	0.6268	0.6267	800.0000	800.0000
0.3250	0.3250	0.0000	0.6467	0.6466	800.0000	800.0000
0.3350	0.3350	0.0000	0.6666	0.6665	800.0000	800.0000
0.3450	0.3450	0.0000	0.6865	0.6864	800.0000	800.0000
0.3550	0.3550	0.0000	0.7064	0.7062	800.0000	800.0000
0.3650	0.3650	0.0000	0.7263	0.7261	800.0000	800.0000
0.3750	0.3750	0.0000	0.7462	0.7460	800.0000	800.0000
0.3850	0.3850	0.0000	0.7661	0.7659	800.0000	800.0000
0.3950	0.3950	0.0000	0.7860	0.7858	800.0000	800.0000
0.4050	0.4050	0.0000	0.8059	0.8057	800.0000	800.0000
0.4150	0.4150	0.0000	0.8258	0.8256	800.0000	800.0000
0.4250	0.4250	0.0000	0.8457	0.8455	800.0000	800.0000
0.4350	0.4350	0.0000	0.8656	0.8654	800.0000	800.0000
0.4450	0.4450	0.0000	0.8855	0.8853	800.0000	800.0000
0.4550	0.4550	0.0000	0.9054	0.9052	800.0000	800.0000
0.4650	0.4650	0.0000	0.9253	0.9251	800.0000	800.0000
0.4750	0.4750	0.0000	0.9452	0.9450	800.0000	800.0000
0.4850	0.4850	0.0000	0.9651	0.9649	800.0000	800.0000
0.4950	0.4950	0.0000	0.9850	0.9848	800.0000	800.0000
0.5050	0.5050	0.0000	1.0049	1.0047	800.0000	800.0000
0.5150	0.5150	0.0000	1.0247	1.0246	800.0000	800.0000

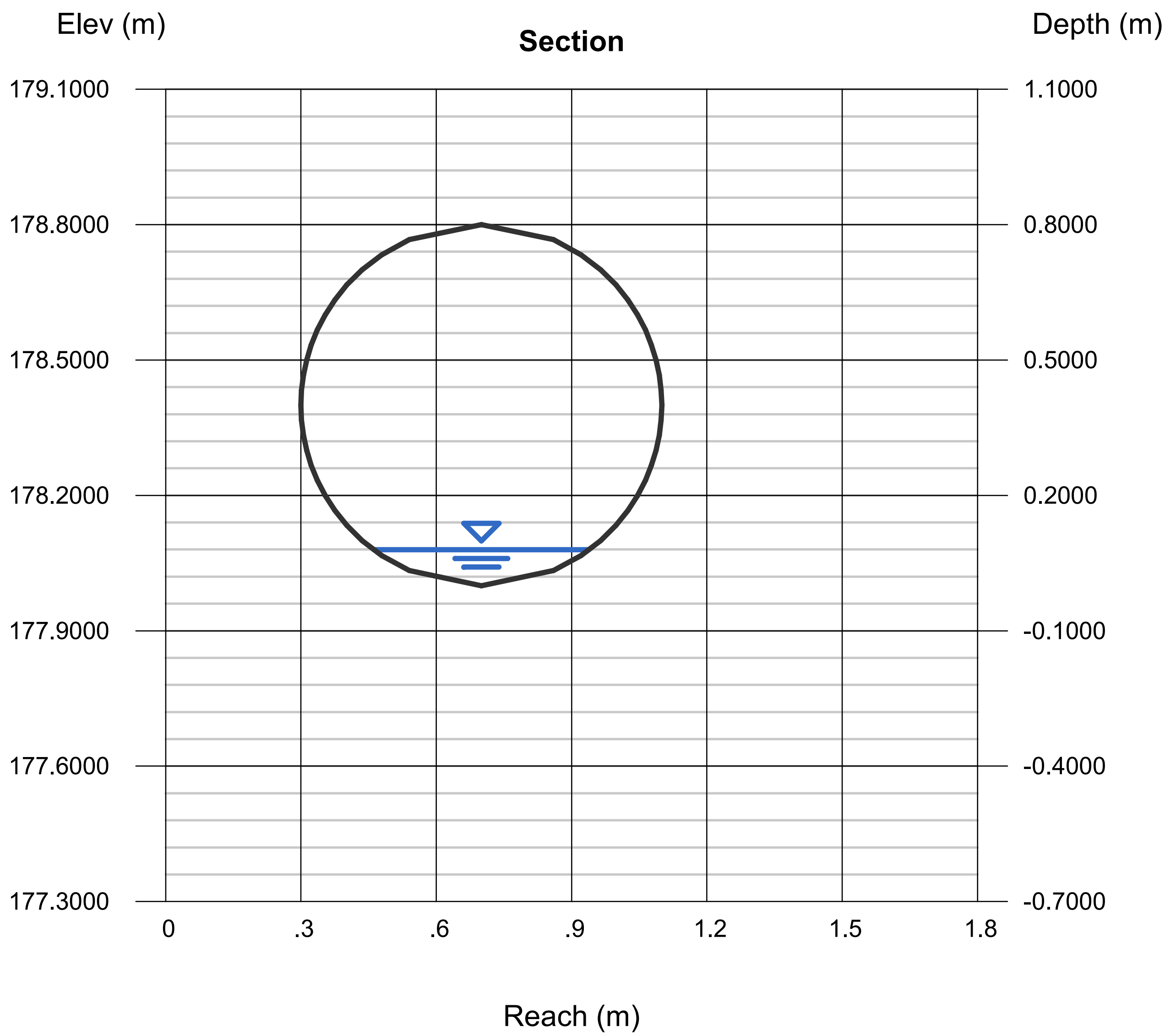
HGL			
Dn	Up	Hw	Hw/D
(m)	(m)	(m)	
178.0404	178.0407	178.0540	0.0675
178.0960	178.0708	178.0944	0.1180
178.1355	178.0915	178.1225	0.1532
178.1680	178.1086	178.1456	0.1820
178.1948	178.1233	178.1658	0.2072
178.2207	178.1366	178.1839	0.2299
178.2453	178.1487	178.2006	0.2507
178.2685	178.1599	178.2161	0.2702
178.2901	178.1704	178.2308	0.2885
178.3098	178.1805	178.2447	0.3059
178.3317	178.1900	178.2580	0.3225
178.3517	178.1991	178.2707	0.3384
178.3697	178.2078	178.2830	0.3538
178.3896	178.2161	178.2949	0.3687
178.4096	178.2243	178.3065	0.3831
178.4293	178.2321	178.3177	0.3971
178.4470	178.2397	178.3286	0.4108
178.4664	178.2471	178.3393	0.4242
178.4874	178.2543	178.3498	0.4372
178.5081	178.2612	178.3600	0.4500
178.5283	178.2682	178.3701	0.4626
178.5515	178.2748	178.3800	0.4750
178.5739	178.2813	178.3897	0.4871
178.6002	178.2878	178.3993	0.4991
178.6310	178.2942	178.4087	0.5109
178.6731	178.7038	178.7265	0.9082

HGL			
Dn	Up	Hw	Hw/D
(m)	(m)	(m)	
178.7600	178.8086	178.8299	1.0374
178.7600	178.8124	178.8353	1.0441
178.7600	178.8163	178.8409	1.0511
178.7600	178.8203	178.8466	1.0583
178.7600	178.8244	178.8526	1.0657
178.7600	178.8287	178.8587	1.0734
178.7600	178.8331	178.8651	1.0814
178.7600	178.8377	178.8717	1.0896
178.7600	178.8424	178.8784	1.0981
178.7600	178.8472	178.8854	1.1068
178.7600	178.8522	178.8926	1.1157
178.7600	178.8574	178.8999	1.1249
178.7600	178.8626	178.9075	1.1344
178.7600	178.8680	178.9153	1.1441
178.7600	178.8736	178.9232	1.1540
178.7600	178.8792	178.9314	1.1642
178.7600	178.8851	178.9398	1.1747
178.7600	178.8910	178.9483	1.1854
178.7600	178.8971	178.9571	1.1963
178.7600	178.9033	178.9660	1.2075
178.7600	178.9097	178.9752	1.2190
178.7600	178.9162	178.9845	1.2307
178.7600	178.9229	178.9941	1.2426
178.7600	178.9296	179.0038	1.2548
178.7600	178.9366	179.0138	1.2672
178.7600	178.9436	179.0239	1.2799

Channel Report

Existing 800 mm dia. CSP Culvert

Circular		**Highlighted**	
Diameter (m)	= 0.8000	Depth (m)	= 0.0800
		Q (cms)	= 0.005
		Area (sqm)	= 0.0263
Invert Elev (m)	= 178.0000	Velocity (m/s)	= 0.1923
Slope (%)	= 0.1127	Wetted Perim (m)	= 0.5160
N-Value	= 0.024	Crit Depth, Yc (m)	= 0.0427
		Top Width (m)	= 0.4810
Calculations		EGL (m)	= 0.0819
Compute by:	Q vs Depth		
No. Increments	= 10		



Depth	Q	Area	Veloc	Wp
(m)	(cms)	(sqm)	(m/s)	(m)
0.0800	0.005	0.026	0.1923	0.5160
0.1600	0.021	0.072	0.2951	0.7440
0.2400	0.047	0.127	0.3714	0.9280
0.3200	0.081	0.188	0.4317	1.0960
0.4000	0.121	0.253	0.4792	1.2600
0.4800	0.162	0.316	0.5134	1.4200
0.5600	0.202	0.377	0.5359	1.5880
0.6400	0.235	0.431	0.5452	1.7720
0.7200	0.256	0.477	0.5377	2.0000
0.8000	0.240	0.503	0.4783	2.5133

Yc	TopWidth	Energy
(m)	(m)	(m)
0.0427	0.4810	0.0819
0.0853	0.6413	0.1644
0.1280	0.7334	0.2470
0.1676	0.7839	0.3295
0.2073	0.8000	0.4117
0.2377	0.7834	0.4934
0.2652	0.7324	0.5746
0.2896	0.6397	0.6552
0.3018	0.4788	0.7347
0.2926	0.0000	0.8117

TATHAM ENGINEERING

PROJECT	11476 Highway 26	FILE	120232
		DATE	12-12-2022
SUBJECT	Volume Summary - Wetland	NAME	LB
		PAGE	1 OF 3

Culvert Inlet Elevation 178.00

Top of Ponding Elevation Assessed 178.63

		Area (m^2)		Volume (m^3)		
Elevation (masl)	**Depth (m)**	**Area (m^2)**	**Average Area (m^2)**	**Cumulative (m^3)**	**Dead Storage***	**Total**
178.00	0.00	**0**	0	**0**	0	**0**
178.10	0.10	**11**	6	**1**	0	**1**
178.20	0.20	**263**	137	**9**	0	**9**
178.30	0.30	**1,130**	697	**75**	0	**75**
178.40	0.40	**2,381**	1,756	**257**	0	**257**
178.46	0.46	**3,136**	2,758	**423**	0	**423**
178.50	0.50	**9,278**	6,207	**1,814**	1,037	**777**
178.55	0.55	**10,383**	9,831	**2,304**	1,037	**1,267**
178.60	0.60	**11,202**	10,793	**2,842**	1,037	**1,805**
178.63	0.63	**11,811**	11,507	**3,195**	1,037	**2,158**

Note: Bolded values have been measured and calculated directly in Civil 3D

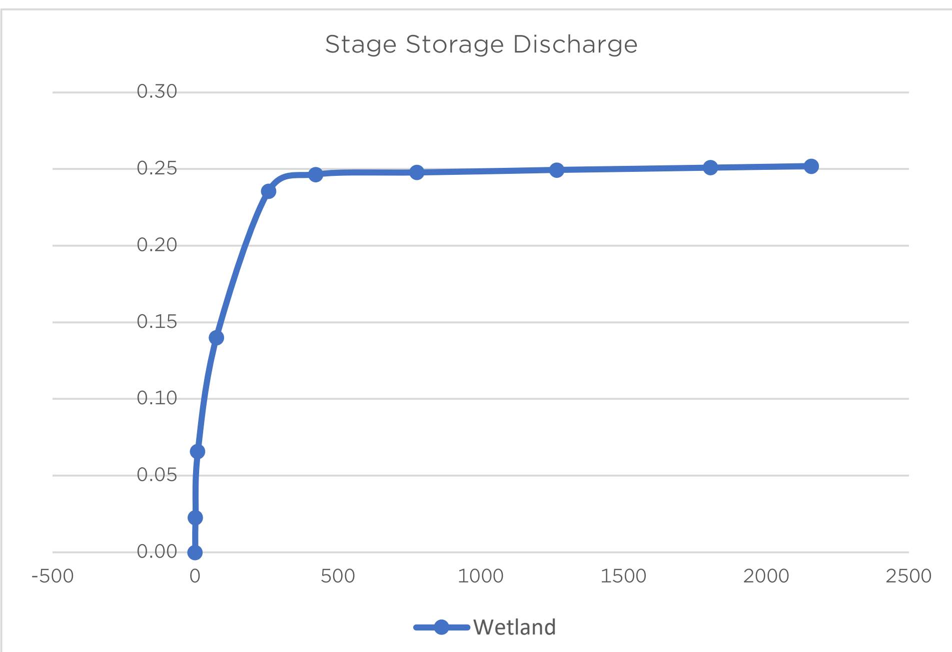
Note: Dead Storage is the total volume within the east cell at 178.46 (1,037 m^3)

TATHAM ENGINEERING

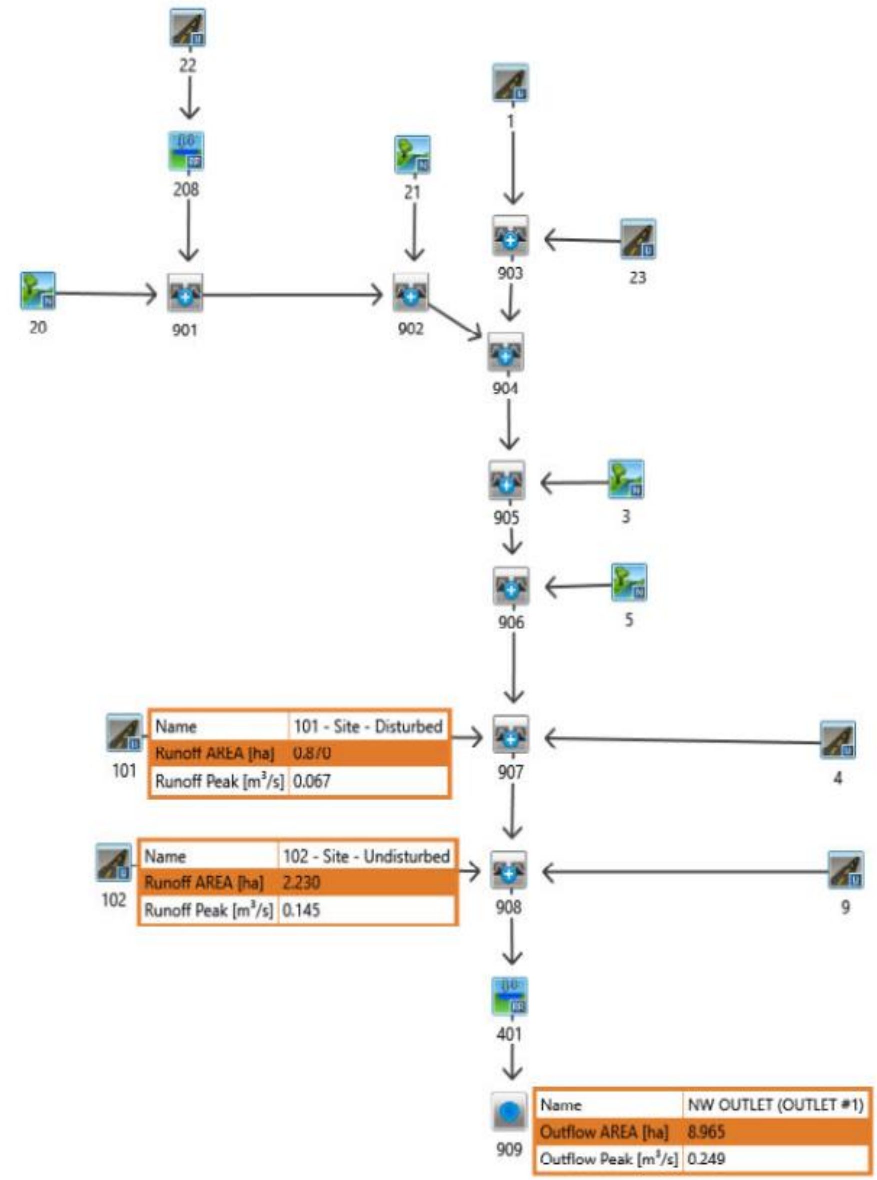
PROJECT	11476 Highway 26	FILE	120232
		DATE	12-12-2022
SUBJECT	Discharge Summary - Ex. 800 mm dia. Culvert	NAME	LB
		PAGE	2 OF 3

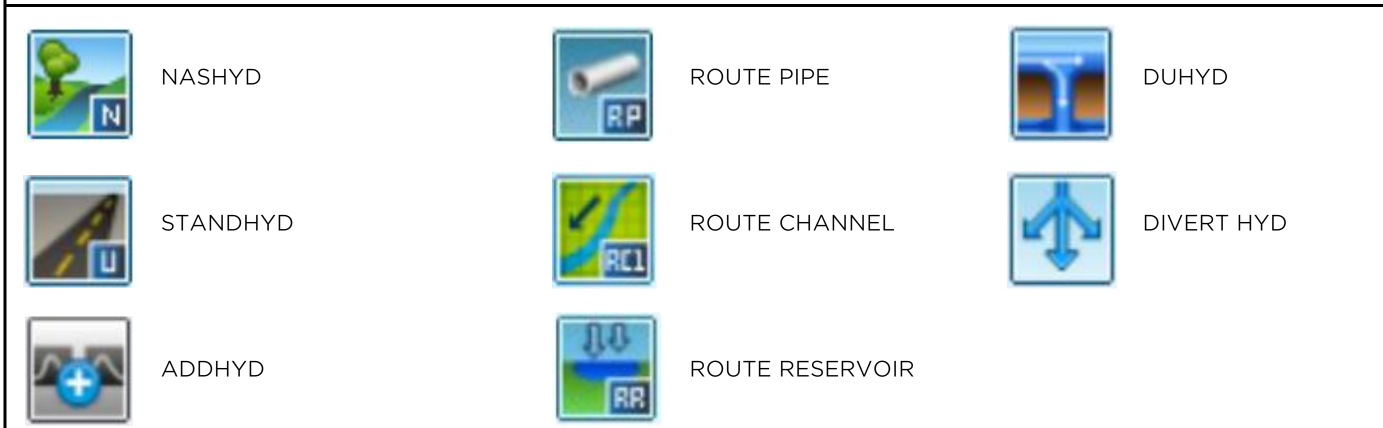
HYDRAFLOW Output		Equivalent Discharge	
HW Elevation (masl)	**Discharge (m^3/s)**	**Elevation (masl)**	**Discharge (m^3/s)**
178.00	0.000	178.00	0.00
178.05	0.005	178.10	0.02
178.18	0.055	178.20	0.07
178.26	0.105	178.30	0.14
178.32	0.155	178.40	0.24
178.37	0.205	178.46	0.25
178.40	0.235	178.50	0.25
178.41	0.245	178.55	0.25
178.73	0.255	178.60	0.25
178.83	0.265	178.63	0.25

Elevation (masl)	Outlet Pipe Discharge (m^3/s)	Total Discharge (m^3/s)	Total Volume (m^3)
178.00	0.00	0.00	0
178.10	0.02	0.02	1
178.20	0.07	0.07	9
178.30	0.14	0.14	75
178.40	0.24	0.24	257
178.46	0.25	0.25	423
178.50	0.25	0.25	777
178.55	0.25	0.25	1267
178.60	0.25	0.25	1805
178.63	0.25	0.25	2158



PROJECT	11476 Highway 26	FILE	120232
		DATE	2026-04-21
SUBJECT	Existing Conditions VO Schematic	NAME	ANF
		PAGE	1 OF 1





O:\Collingwood\2020 Projects\120232 - 11476 Highway 26 Collingwood\Design\SWM\3rd submission\120232 - VO Schematic Portait.xlsx

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

      V    V   I   SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\ae733394-89ea-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\ae733394-89ea-

DATE: 04-21-2026                           TIME: 12:04:13

USER:

COMMENTS: ____________________________________________________________

  ***********************************************
  ** SIMULATION : Run 01 - 2yr 4hr 10min Chicag **
  ***********************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.00  1.38    5.06 0.15   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.06  1.33   20.04 0.59   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01  2.02   19.70  n/a   0.000
*
    ADD [  0020+  0208]   0901  3  1.0     0.62    0.01  1.42   17.10  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 ** CALIB NASHYD          0021  1  1.0     0.02    0.00  1.40    3.63 0.11   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]   0902  3  1.0     0.64    0.01  1.42   16.68  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0023  1  1.0     0.42    0.03  1.40   18.24 0.54   0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0001  1  1.0     0.35    0.02  1.33   13.41 0.40   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]   0903  3  1.0     0.77    0.05  1.37   16.03  n/a   0.000
*
    ADD [  0902+  0903]   0904  3  1.0     1.41    0.06  1.37   16.33  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB NASHYD          0003  1  1.0     0.76    0.04  1.35    8.22 0.24   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]   0905  3  1.0     2.17    0.09  1.35   13.48  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB NASHYD          0005  1  1.0     2.10    0.04  1.55    6.45 0.19   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]   0906  3  1.0     4.26    0.11  1.37   10.02  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0004  1  1.0     0.69    0.02  1.35   11.34 0.34   0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0101  1  2.0     0.87    0.01  1.33    9.78 0.29   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]   0907  3  1.0     1.56    0.03  1.33   10.47  n/a   0.000
*
    ADD [  0907+  0906]   0907  1  1.0     5.82    0.14  1.37   10.14  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0009  1  1.0     0.91    0.04  1.53   15.83 0.47   0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0102  1  2.0     2.23    0.03  1.33    8.04 0.24   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]   0908  3  1.0     3.14    0.06  1.35   10.29  n/a   0.000
*
    ADD [  0908+  0907]   0908  1  1.0     8.97    0.20  1.37   10.19  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0     8.97    0.14  1.67   10.19  n/a   0.000
*
==============================================================================================================

      V    V   I   SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\d3f6ad95-03d4-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\d3f6ad95-03d4-

DATE: 04-21-2026                           TIME: 12:04:13

USER:

COMMENTS: ____________________________________________________________

  ***********************************************
  ** SIMULATION : Run 02 - 5yr 4hr 10min Chicag **
  ***********************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.00  1.38    9.20 0.21   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.08  1.33   27.74 0.63   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01  2.12   27.40  n/a   0.000
*
    ADD [  0020+  0208]   0901  3  1.0     0.62    0.01  1.40   24.17  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 ** CALIB NASHYD          0021  1  1.0     0.02    0.00  1.38    6.76 0.15   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]   0902  3  1.0     0.64    0.01  1.40   23.63  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0023  1  1.0     0.42    0.05  1.38   26.72 0.61   0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0001  1  1.0     0.35    0.03  1.33   19.66 0.45   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]   0903  3  1.0     0.77    0.07  1.37   23.49  n/a   0.000
*
    ADD [  0902+  0903]   0904  3  1.0     1.41    0.09  1.37   23.55  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB NASHYD          0003  1  1.0     0.76    0.06  1.35   13.79 0.31   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]   0905  3  1.0     2.17    0.15  1.35   20.12  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB NASHYD          0005  1  1.0     2.10    0.08  1.53   11.30 0.26   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]   0906  3  1.0     4.26    0.19  1.37   15.78  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0004  1  1.0     0.69    0.03  1.55   17.55 0.40   0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0101  1  2.0     0.87    0.02  2.00   15.58 0.35   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]   0907  3  1.0     1.56    0.04  1.35   16.45  n/a   0.000
*
    ADD [  0907+  0906]   0907  1  1.0     5.82    0.24  1.37   15.96  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0009  1  1.0     0.91    0.07  1.50   23.63 0.54   0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0102  1  2.0     2.23    0.04  1.33   13.18 0.30   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]   0908  3  1.0     3.14    0.10  1.37   16.21  n/a   0.000
*
    ADD [  0908+  0907]   0908  1  1.0     8.97    0.33  1.37   16.05  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0     8.97    0.21  1.77   16.05  n/a   0.000
*
==============================================================================================================

      V    V   I   SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\5551219a-f8f5-
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DATE: 04-21-2026                           TIME: 12:04:12

USER:

COMMENTS: ____________________________________________________________

  ***********************************************
  ** SIMULATION : Run 03 - 10yr 4hr 10min Chica **
  ***********************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 50.58 mm ]
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.01  1.38   12.26 0.24   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                 10.0
    [ Ptot= 50.58 mm ]
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.10  1.33   32.82 0.65   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01  2.20   32.48  n/a   0.000
```

```
*
    ADD [  0020+  0208]  0901  3  1.0     0.62     0.01  1.40  28.89  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 ** CALIB NASHYD         0021  1  1.0     0.02     0.00  1.38   9.12 0.18    0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64     0.01  1.38  28.27  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0023  1  1.0     0.42     0.07  1.38  32.32 0.64    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0001  1  1.0     0.35     0.03  1.33  23.93 0.47    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77     0.10  1.37  28.48  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41     0.11  1.37  28.39  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB NASHYD         0003  1  1.0     0.76     0.09  1.35  17.74 0.35    0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17     0.19  1.35  24.65  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB NASHYD         0005  1  1.0     2.10     0.11  1.53  14.82 0.29    0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26     0.26  1.37  19.81  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0004  1  1.0     0.69     0.04  1.53  21.85 0.43    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0101  1  2.0     0.87     0.03  1.87  19.65 0.39    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0     1.56     0.06  1.53  20.62  n/a    0.000
*
    ADD [  0907+  0906]  0907  1  1.0     5.82     0.31  1.37  20.03  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0009  1  1.0     0.91     0.09  1.47  28.86 0.57    0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0102  1  2.0     2.23     0.05  2.00  16.84 0.33    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0     3.14     0.13  1.37  20.33  n/a    0.000
*
    ADD [  0908+  0907]  0908  1  1.0     8.97     0.44  1.37  20.13  n/a    0.000
*
 ** Reservoir
    OUTFLOW:             0401  1  1.0     8.97     0.24  1.88  20.13  n/a    0.000
*
===================================================================================================
```

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\bd4cfb56-e5af-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\bd4cfb56-e5af-

DATE: 04-21-2026                         TIME: 12:04:13

USER:

COMMENTS: ____________________________________________________________

  ************************************************
  ** SIMULATION : Run 04 - 25yr 4hr 10min Chica **
  ************************************************

  W/E COMMAND              HYD ID   DT     AREA  ' Qpeak Tpeak    R.V. R.C.    Qbase
                                    min     ha   '  cms   hrs      mm           cms
      START @  0.00 hrs
      --------------------
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 ** CALIB NASHYD         0020  1  1.0     0.11     0.01  1.38  16.68 0.28    0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 ** CALIB STANDHYD       0022  1  1.0     0.51     0.12  1.33  39.64 0.67    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0208  1  1.0     0.51     0.01  2.25  39.30  n/a    0.000
*
    ADD [  0020+  0208]  0901  3  1.0     0.62     0.02  1.38  35.28  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 ** CALIB NASHYD         0021  1  1.0     0.02     0.00  1.38  12.59 0.21    0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64     0.02  1.38  34.57  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0023  1  1.0     0.42     0.08  1.38  39.83 0.67    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0001  1  1.0     0.35     0.04  1.35  29.80 0.50    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77     0.12  1.37  35.24  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41     0.14  1.37  34.94  n/a    0.000
*
    CHIC STORM                   10.0
```

```
    [ Ptot= 59.07 mm ]
*
 *  CALIB NASHYD         0003  1  1.0     0.76     0.11  1.35  23.29 0.39    0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17     0.25  1.35  30.85  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB NASHYD         0005  1  1.0     2.10     0.15  1.52  19.82 0.34    0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26     0.35  1.37  25.42  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0004  1  1.0     0.69     0.06  1.52  27.79 0.47    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0101  1  2.0     0.87     0.04  1.80  25.31 0.43    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0     1.56     0.08  1.53  26.41  n/a    0.000
*
    ADD [  0907+  0906]  0907  1  1.0     5.82     0.42  1.37  25.68  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0009  1  1.0     0.91     0.12  1.40  35.94 0.61    0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0102  1  2.0     2.23     0.08  1.87  22.01 0.37    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0     3.14     0.17  1.37  26.05  n/a    0.000
*
    ADD [  0908+  0907]  0908  1  1.0     8.97     0.60  1.37  25.81  n/a    0.000
*
 ** Reservoir
    OUTFLOW:             0401  1  1.0     8.97     0.25  2.07  25.81  n/a    0.000
*
===================================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\e5ae6cd5-cc19-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\e5ae6cd5-cc19-

DATE: 04-21-2026                         TIME: 12:04:14

USER:

COMMENTS: ____________________________________________________________
```

```
  ************************************************
  ** SIMULATION : Run 05 - 50yr 4hr 10min Chica **
  ************************************************

  W/E COMMAND              HYD ID   DT     AREA  ' Qpeak Tpeak    R.V. R.C.    Qbase
                                    min     ha   '  cms   hrs      mm           cms
      START @  0.00 hrs
      --------------------
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 ** CALIB NASHYD         0020  1  1.0     0.11     0.01  1.38  20.39 0.31    0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 ** CALIB STANDHYD       0022  1  1.0     0.51     0.14  1.33  45.05 0.69    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0208  1  1.0     0.51     0.01  2.33  44.71  n/a    0.000
*
    ADD [  0020+  0208]  0901  3  1.0     0.62     0.02  1.38  40.39  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 ** CALIB NASHYD         0021  1  1.0     0.02     0.00  1.38  15.55 0.24    0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64     0.02  1.38  39.62  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0023  1  1.0     0.42     0.10  1.37  45.76 0.70    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0001  1  1.0     0.35     0.05  1.35  34.54 0.53    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77     0.15  1.37  40.63  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41     0.17  1.37  40.17  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB NASHYD         0003  1  1.0     0.76     0.14  1.35  27.85 0.42    0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17     0.31  1.35  35.84  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB NASHYD         0005  1  1.0     2.10     0.18  1.52  23.97 0.37    0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26     0.42  1.37  30.00  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0004  1  1.0     0.69     0.07  1.50  32.62 0.50    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0101  1  2.0     0.87     0.05  1.77  29.94 0.46    0.000
    [I%= 6.0:S%= 1.00]
*
```

```
   ADD [  0101+  0004]  0907  3  1.0    1.56    0.11  1.52  31.13  n/a   0.000
*
   ADD [  0907+  0906]  0907  1  1.0    5.82    0.52  1.37  30.30  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 65.64 mm ]
*
 * CALIB STANDHYD        0009  1  1.0    0.91    0.15  1.40  41.57 0.63   0.000
   [I%=10.0:S%= 1.00]
*
   CHIC STORM                 10.0
   [ Ptot= 65.64 mm ]
*
 * CALIB STANDHYD        0102  1  2.0    2.23    0.11  1.83  26.28 0.40   0.000
   [I%= 6.0:S%= 1.00]
*
   ADD [  0102+  0009]  0908  3  1.0    3.14    0.21  1.37  30.71  n/a   0.000
*
   ADD [  0908+  0907]  0908  1  1.0    8.97    0.72  1.37  30.45  n/a   0.000
*
** Reservoir
   OUTFLOW:             0401  1  1.0    8.97    0.25  2.18  30.45  n/a   0.000
*
==========================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\4532cc99-aa56-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\4532cc99-aa56-

DATE: 04-21-2026                        TIME: 12:04:12

USER:

COMMENTS: ____________________________________________________________

  **************************************************
  ** SIMULATION : Run 06 - 100yr 4hr 10min Chic **
  **************************************************

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

     START @  0.00 hrs
     -------------------
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
** CALIB NASHYD          0020  1  1.0    0.11    0.01  1.37  24.04 0.34   0.000
   [CN=70.7        ]
   [ N = 3.0:Tp 0.08]
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
** CALIB STANDHYD        0022  1  1.0    0.51    0.16  1.33  50.17 0.70   0.000
   [I%=50.0:S%= 2.00]
*
** Reservoir
   OUTFLOW:             0208  1  1.0    0.51    0.01  2.38  49.83  n/a   0.000
*
   ADD [  0020+  0208]  0901  3  1.0    0.62    0.02  1.38  45.26  n/a   0.000
*
```

```
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
** CALIB NASHYD          0021  1  1.0    0.02    0.00  1.38  18.50 0.26   0.000
   [CN=62.0        ]
   [ N = 3.0:Tp 0.08]
*
   ADD [  0021+  0901]  0902  3  1.0    0.64    0.02  1.38  44.42  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
 * CALIB STANDHYD        0023  1  1.0    0.42    0.08  1.47  51.34 0.72   0.000
   [I%=10.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
 * CALIB STANDHYD        0001  1  1.0    0.35    0.06  1.35  39.09 0.54   0.000
   [I%=25.0:S%= 2.00]
*
   ADD [  0001+  0023]  0903  3  1.0    0.77    0.13  1.38  45.74  n/a   0.000
*
   ADD [  0902+  0903]  0904  3  1.0    1.41    0.15  1.38  45.14  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
 * CALIB NASHYD          0003  1  1.0    0.76    0.16  1.35  32.26 0.45   0.000
   [CN=78.2        ]
   [ N = 3.0:Tp 0.05]
*
   ADD [  0003+  0904]  0905  3  1.0    2.17    0.31  1.35  40.62  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
 * CALIB NASHYD          0005  1  1.0    2.10    0.22  1.52  28.03 0.39   0.000
   [CN=74.8        ]
   [ N = 3.0:Tp 0.17]
*
   ADD [  0005+  0905]  0906  3  1.0    4.26    0.45  1.38  34.42  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
 * CALIB STANDHYD        0004  1  1.0    0.69    0.09  1.48  37.26 0.52   0.000
   [I%=10.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
 * CALIB STANDHYD        0101  1  2.0    0.87    0.06  1.73  34.41 0.48   0.000
   [I%= 6.0:S%= 1.00]
*
   ADD [  0101+  0004]  0907  3  1.0    1.56    0.13  1.50  35.67  n/a   0.000
*
   ADD [  0907+  0906]  0907  1  1.0    5.82    0.57  1.38  34.75  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
 * CALIB STANDHYD        0009  1  1.0    0.91    0.18  1.40  46.92 0.65   0.000
   [I%=10.0:S%= 1.00]
*
   CHIC STORM                 10.0
   [ Ptot= 71.75 mm ]
*
 * CALIB STANDHYD        0102  1  2.0    2.23    0.13  1.77  30.43 0.42   0.000
   [I%= 6.0:S%= 1.00]
*
   ADD [  0102+  0009]  0908  3  1.0    3.14    0.25  1.37  35.20  n/a   0.000
*
   ADD [  0908+  0907]  0908  1  1.0    8.97    0.82  1.38  34.91  n/a   0.000
*
** Reservoir
   OUTFLOW:             0401  1  1.0    8.97    0.25  2.28  34.91  n/a   0.000
*
==========================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\b3ceec72-5b40-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\b3ceec72-5b40-

DATE: 04-21-2026                        TIME: 12:04:14

USER:

COMMENTS: ____________________________________________________________

  **************************************************
  ** SIMULATION : Run 07 - 25mm                   **
  **************************************************

  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                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
** CALIB NASHYD          0020  1  1.0    0.11    0.00  1.68   2.37 0.09   0.000
   [CN=70.7        ]
   [ N = 3.0:Tp 0.08]
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
** CALIB STANDHYD        0022  1  1.0    0.51    0.03  1.50  13.94 0.56   0.000
   [I%=50.0:S%= 2.00]
*
** Reservoir
   OUTFLOW:             0208  1  1.0    0.51    0.01  2.15  13.60  n/a   0.000
*
   ADD [  0020+  0208]  0901  3  1.0    0.62    0.01  2.05  11.60  n/a   0.000
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
** CALIB NASHYD          0021  1  1.0    0.02    0.00  1.68   1.65 0.07   0.000
   [CN=62.0        ]
   [ N = 3.0:Tp 0.08]
*
   ADD [  0021+  0901]  0902  3  1.0    0.64    0.01  2.05  11.29  n/a   0.000
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
 * CALIB STANDHYD        0023  1  1.0    0.42    0.01  1.67  11.63 0.46   0.000
   [I%=10.0:S%= 2.00]
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
 * CALIB STANDHYD        0001  1  1.0    0.35    0.01  1.50   8.71 0.35   0.000
```

```
   [I%=25.0:S%= 2.00]
*
   ADD [  0001+  0023]  0903  3  1.0    0.77    0.02  1.53  10.29  n/a   0.000
*
   ADD [  0902+  0903]  0904  3  1.0    1.41    0.02  1.53  10.75  n/a   0.000
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
 * CALIB NASHYD          0003  1  1.0    0.76    0.01  1.52   4.35 0.17   0.000
   [CN=78.2        ]
   [ N = 3.0:Tp 0.05]
*
   ADD [  0003+  0904]  0905  3  1.0    2.17    0.03  1.52   8.50  n/a   0.000
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
 * CALIB NASHYD          0005  1  1.0    2.10    0.01  1.77   3.20 0.13   0.000
   [CN=74.8        ]
   [ N = 3.0:Tp 0.17]
*
   ADD [  0005+  0905]  0906  3  1.0    4.26    0.04  1.53   5.89  n/a   0.000
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
 * CALIB STANDHYD        0004  1  1.0    0.69    0.01  1.52   6.82 0.27   0.000
   [I%=10.0:S%= 2.00]
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
 * CALIB STANDHYD        0101  1  2.0    0.87    0.01  1.50   5.63 0.22   0.000
   [I%= 6.0:S%= 1.00]
*
   ADD [  0101+  0004]  0907  3  1.0    1.56    0.01  1.50   6.15  n/a   0.000
*
   ADD [  0907+  0906]  0907  1  1.0    5.82    0.05  1.53   5.96  n/a   0.000
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
 * CALIB STANDHYD        0009  1  1.0    0.91    0.01  1.85   9.88 0.39   0.000
   [I%=10.0:S%= 1.00]
*
   READ STORM                 10.0
   [ Ptot= 25.02 mm ]
   fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
   remark: 25MMCHI
*
 * CALIB STANDHYD        0102  1  2.0    2.23    0.01  1.50   4.47 0.18   0.000
   [I%= 6.0:S%= 1.00]
*
   ADD [  0102+  0009]  0908  3  1.0    3.14    0.03  1.50   6.04  n/a   0.000
*
   ADD [  0908+  0907]  0908  1  1.0    8.97    0.08  1.53   5.99  n/a   0.000
*
** Reservoir
   OUTFLOW:             0401  1  1.0    8.97    0.07  1.58   5.99  n/a   0.000
*
==========================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
```

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\f100dde6-4c3e-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\f100dde6-4c3e-

DATE: 04-21-2026                           TIME: 12:04:17

USER:

COMMENTS: ____________________________________________________________

  ***********************************************
  ** SIMULATION : Run 08 - 2yr 24hr 15min SCS T **
  ***********************************************

  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                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0    0.11    0.00 12.27   8.06 0.17   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0    0.51    0.05 12.25  29.87 0.64   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0    0.51    0.01 12.80  29.53  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.01 12.27  26.15  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0    0.02    0.00 12.27   5.91 0.13   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.01 12.27  25.58  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0023  1  1.0    0.42    0.04 12.28  29.08 0.62   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0001  1  1.0    0.35    0.02 12.25  21.44 0.46   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.05 12.27  25.58  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.07 12.27  25.58  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0003  1  1.0    0.76    0.05 12.25  12.31 0.26   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.12 12.25  22.02  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0005  1  1.0    2.10    0.07 12.33   9.92 0.21   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.18 12.27  17.46  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0004  1  1.0    0.69    0.02 12.28  19.34 0.41   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0101  1  2.0    0.87    0.01 12.93  17.27 0.37   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.04 12.27  18.18  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.21 12.27  17.65  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0009  1  1.0    0.91    0.05 12.30  25.83 0.55   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                 15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0102  1  2.0    2.23    0.03 13.03  14.70 0.31   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.08 12.27  17.92  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.29 12.27  17.75  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0    8.97    0.17 12.48  17.75  n/a   0.000
*
 FINISH

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

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

       V    V   I    SSSSS  U    U    A    L              (v 6.2.2022)
       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
```



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\ed0f9d62-292a-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\ed0f9d62-292a-

DATE: 04-21-2026                           TIME: 12:04:16

USER:

COMMENTS: ____________________________________________________________

  ***********************************************
  ** SIMULATION : Run 09 - 5yr 24hr 15min SCS T **
  ***********************************************

  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                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0    0.11    0.01 12.27  13.47 0.22   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0    0.51    0.07 12.25  40.30 0.67   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0    0.51    0.01 12.83  39.96  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.01 12.27  35.91  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0    0.02    0.00 12.27  10.09 0.17   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.01 12.27  35.19  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0023  1  1.0    0.42    0.05 12.27  40.55 0.68   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0001  1  1.0    0.35    0.03 12.27  30.37 0.51   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.08 12.27  35.89  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.10 12.27  35.57  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0003  1  1.0    0.76    0.08 12.25  19.31 0.32   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.17 12.25  31.45  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0005  1  1.0    2.10    0.12 12.33  16.10 0.27   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.28 12.27  25.97  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0004  1  1.0    0.69    0.04 12.30  28.38 0.47   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0101  1  2.0    0.87    0.03 12.73  25.87 0.43   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.06 12.28  26.98  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.34 12.27  26.24  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0009  1  1.0    0.91    0.08 12.30  36.62 0.61   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                 15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0102  1  2.0    2.23    0.05 12.80  22.53 0.38   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.12 12.27  26.61  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.46 12.27  26.37  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0    8.97    0.24 12.55  26.37  n/a   0.000
*
==========================================================================================

       V    V   I    SSSSS  U    U    A    L              (v 6.2.2022)
       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
```



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\4b595f0e-dbbf-
```

```
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\4b595f0e-dbbf-

DATE: 04-21-2026                          TIME: 12:04:15

USER:

COMMENTS: _____________________________________________________________

  **********************************************
  ** SIMULATION : Run 10 - 10yr 24hr 15min SCS  **
  **********************************************

  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              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.01 12.27  17.05 0.25   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.08 12.25  46.60 0.69   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01 12.85  46.26  n/a   0.000
*
    ADD [  0020+  0208]   0901  3  1.0     0.62    0.02 12.27  41.86  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0     0.02    0.00 12.27  12.90 0.19   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]   0902  3  1.0     0.64    0.02 12.27  41.07  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0023  1  1.0     0.42    0.06 12.27  47.45 0.70   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0001  1  1.0     0.35    0.03 12.27  35.91 0.53   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]   0903  3  1.0     0.77    0.10 12.27  42.17  n/a   0.000
*
    ADD [  0902+  0903]   0904  3  1.0     1.41    0.11 12.27  41.67  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD          0003  1  1.0     0.76    0.09 12.25  23.78 0.35   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]   0905  3  1.0     2.17    0.21 12.25  37.28  n/a   0.000
*
```

```
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD          0005  1  1.0     2.10    0.15 12.33  20.12 0.30   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]   0906  3  1.0     4.26    0.34 12.27  31.33  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0004  1  1.0     0.69    0.05 12.30  34.02 0.50   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0101  1  2.0     0.87    0.03 12.67  31.28 0.46   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]   0907  3  1.0     1.56    0.08 12.28  32.49  n/a   0.000
*
    ADD [  0907+  0906]   0907  1  1.0     5.82    0.42 12.27  31.64  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0009  1  1.0     0.91    0.10 12.30  43.19 0.64   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM              15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0102  1  2.0     2.23    0.07 12.73  27.52 0.41   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]   0908  3  1.0     3.14    0.15 12.27  32.06  n/a   0.000
*
    ADD [  0908+  0907]   0908  1  1.0     8.97    0.57 12.27  31.79  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0     8.97    0.25 12.70  31.79  n/a   0.000
*
==========================================================================================

      V    V   I    SSSSS  U   U    A    L               (v 6.2.2022)
      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 Smart City Water Inc
```



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\7a07ef5c-f14e-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\7a07ef5c-f14e-

DATE: 04-21-2026                          TIME: 12:04:16

USER:
```

```
COMMENTS: _____________________________________________________________

  **********************************************
  ** SIMULATION : Run 11 - 25yr 24hr 15min SCS  **
  **********************************************

  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              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.01 12.27  22.44 0.29   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.10 12.25  55.56 0.71   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01 12.87  55.22  n/a   0.000
*
    ADD [  0020+  0208]   0901  3  1.0     0.62    0.02 12.27  50.39  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0     0.02    0.00 12.27  17.22 0.22   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]   0902  3  1.0     0.64    0.02 12.27  49.50  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0023  1  1.0     0.42    0.08 12.27  57.20 0.73   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0001  1  1.0     0.35    0.04 12.27  43.93 0.56   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]   0903  3  1.0     0.77    0.12 12.27  51.13  n/a   0.000
*
    ADD [  0902+  0903]   0904  3  1.0     1.41    0.14 12.27  50.39  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD          0003  1  1.0     0.76    0.12 12.25  30.37 0.39   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]   0905  3  1.0     2.17    0.26 12.25  45.68  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD          0005  1  1.0     2.10    0.19 12.33  26.11 0.33   0.000
    [CN=74.8        ]
```

```
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]   0906  3  1.0     4.26    0.43 12.27  39.14  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0004  1  1.0     0.69    0.07 12.30  42.19 0.54   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0101  1  2.0     0.87    0.05 12.63  39.17 0.50   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]   0907  3  1.0     1.56    0.10 12.28  40.51  n/a   0.000
*
    ADD [  0907+  0906]   0907  1  1.0     5.82    0.53 12.27  39.50  n/a   0.000
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0009  1  1.0     0.91    0.13 12.28  52.53 0.67   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM              15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0102  1  2.0     2.23    0.10 12.67  34.87 0.45   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]   0908  3  1.0     3.14    0.20 12.28  39.99  n/a   0.000
*
    ADD [  0908+  0907]   0908  1  1.0     8.97    0.73 12.27  39.68  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0     8.97    0.25 12.85  39.68  n/a   0.000
*
==========================================================================================

      V    V   I    SSSSS  U   U    A    L               (v 6.2.2022)
      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 Smart City Water Inc
```



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\5cd798cd-8240-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\5cd798cd-8240-

DATE: 04-21-2026                          TIME: 12:04:15

USER:

COMMENTS: _____________________________________________________________

  **********************************************
  ** SIMULATION : Run 12 - 50yr 24hr 15min SCS  **
  **********************************************
```

```
  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                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.01 12.27  26.43 0.31   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.11 12.25  61.90 0.72   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01 12.88  61.56  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0     0.62    0.02 12.27  56.46  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0     0.02    0.00 12.27  20.46 0.24   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64    0.02 12.27  55.50  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0023  1  1.0     0.42    0.09 12.27  64.06 0.75   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0001  1  1.0     0.35    0.05 12.27  49.68 0.58   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77    0.14 12.27  57.48  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41    0.16 12.27  56.58  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD          0003  1  1.0     0.76    0.14 12.25  35.16 0.41   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17    0.30 12.25  51.68  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD          0005  1  1.0     2.10    0.22 12.32  30.51 0.36   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26    0.50 12.27  44.77  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
```

```
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0004  1  1.0     0.69    0.08 12.28  48.07 0.56   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0101  1  2.0     0.87    0.06 12.57  44.87 0.53   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0     1.56    0.13 12.28  46.28  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0     5.82    0.62 12.27  45.17  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0009  1  1.0     0.91    0.15 12.28  59.14 0.69   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0102  1  2.0     2.23    0.12 12.63  40.22 0.47   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0     3.14    0.24 12.28  45.70  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0     8.97    0.86 12.27  45.36  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0     8.97    0.25 12.92  45.36  n/a   0.000
*
==========================================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\22a35ff5-8ac4-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\22a35ff5-8ac4-

DATE: 04-21-2026                          TIME: 12:04:14

USER:

COMMENTS: ____________________________________________________________

  ************************************************
  ** SIMULATION : Run 13 - 100yr 24hr 15min SCS **
  ************************************************

  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                 15.0
```

```
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.02 12.27  30.68 0.33   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.12 12.25  68.44 0.74   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01 12.92  68.10  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0     0.62    0.02 12.27  62.74  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0     0.02    0.00 12.27  23.95 0.26   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64    0.03 12.27  61.72  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0023  1  1.0     0.42    0.10 12.27  71.09 0.77   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0001  1  1.0     0.35    0.06 12.27  55.66 0.60   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77    0.16 12.27  64.03  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41    0.18 12.27  62.98  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD          0003  1  1.0     0.76    0.16 12.25  40.19 0.43   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17    0.34 12.25  57.90  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD          0005  1  1.0     2.10    0.26 12.32  35.15 0.38   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26    0.57 12.27  50.65  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0004  1  1.0     0.69    0.10 12.28  54.18 0.58   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
```

```
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0101  1  2.0     0.87    0.07 12.57  50.81 0.55   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0     1.56    0.15 12.28  52.30  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0     5.82    0.71 12.27  51.09  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0009  1  1.0     0.91    0.17 12.28  65.95 0.71   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD        0102  1  2.0     2.23    0.15 12.60  45.82 0.49   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0     3.14    0.28 12.28  51.66  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0     8.97    0.99 12.27  51.29  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0     8.97    0.25 12.98  51.29  n/a   0.000
*
==========================================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\e5bf50af-90ea-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\e5bf50af-90ea-

DATE: 04-21-2026                          TIME: 12:04:16

USER:

COMMENTS: ____________________________________________________________

  ************************************************
  ** SIMULATION : Run 14 - TIMMINS.STM          **
  ************************************************

  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                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.01  7.00 117.89 0.61   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
```

```
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 ** CALIB STANDHYD       0022  1  1.0    0.51    0.05  7.00 161.02 0.83   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0208  1  1.0    0.51    0.05  7.02 160.68  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.06  7.00 153.09  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 ** CALIB NASHYD         0021  1  1.0    0.02    0.00  7.00 100.40 0.52   0.000
    [CN=62.0          ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.07  7.00 151.44  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 *  CALIB STANDHYD       0023  1  1.0    0.42    0.05  7.00 168.22 0.87   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 *  CALIB STANDHYD       0001  1  1.0    0.35    0.03  7.00 143.59 0.74   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.08  7.00 156.95  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.15  7.00 154.44  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 *  CALIB NASHYD         0003  1  1.0    0.76    0.08  7.00 136.32 0.71   0.000
    [CN=78.2          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.22  7.00 148.08  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 *  CALIB NASHYD         0005  1  1.0    2.10    0.20  7.02 127.57 0.66   0.000
    [CN=74.8          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.42  7.00 137.98  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 *  CALIB STANDHYD       0004  1  1.0    0.69    0.07  7.00 143.69 0.74   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 *  CALIB STANDHYD       0101  1  2.0    0.87    0.07  7.03 138.84 0.72   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.14  7.00 140.98  n/a   0.000
```

```
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.56  7.00 138.78  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 *  CALIB STANDHYD       0009  1  1.0    0.91    0.10  7.00 161.34 0.84   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
 *  CALIB STANDHYD       0102  1  2.0    2.23    0.18  7.03 130.77 0.68   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.27  7.02 139.63  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.84  7.00 139.08  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0401  1  1.0    8.97    0.26 11.18 139.08  n/a   0.000
*
```

Appendix C:
Proposed Drainage Conditions

TATHAM ENGINEERING

PROJECT	11476 Highway 26	FILE	120232
		DATE	2026-04-21
SUBJECT	Land Use Allocation - StandHyd - Proposed	NAME	ANF
		PAGE	1 OF 1

CATCHMENT 201

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious (XIMP)	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	0.23	0%	0.00	0%	0.00	0.23	74	5
Rooftop	0.37	100%	0.37	100%	0.37	0.00	100	2
Hardscape	0.27	100%	0.27	80%	0.22	0.00	100	2
Total	**0.87**	**74%**	**0.64**	**67%**	**0.59**	**0.23**	**74.0**	**5.0**

CATCHMENT 102

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious (XIMP)	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	0.86	0%	0.00	0%	0.00	0.86	74	5
Hardscape	0.11	100%	0.11	35%	0.04	0.00	100	2
Woodland	1.06	0%	0.00	0%	0.00	1.06	67	10
Waterbody	0.20	100%	0.20	0%	0.00	0.00	50	12
Total	**2.23**	**14%**	**0.31**	**2%**	**0.04**	**1.92**	**70.1**	**7.8**

TATHAM ENGINEERING

PROJECT	11476 Highway 26	FILE	120232
		DATE	14-Apr-26
SUBJECT	Underground Quantity Storage	NAME	ANF
		PAGE	1 OF 4

Stage Storage Table Underground Quantity Storage Volume

Unit:
Module Footprint: 100 m^2
Height of Module: 3.5 m
Void Ratio per module: 1.00
Void Ratio of stone: 0.40

Elevation	Elevation Reference	Incremental Depth (m)	Incremental Volume (m^3)	Cumulative Active Volume - Pump (m^3)	Cumulative Active Volume - Orifice(m^3)
177.00	**Base of Module**	0.00	-	0	0
177.10	**Active Storage**	0.10	10	0	0
177.20		0.10	10	10	0
177.30		0.10	10	20	0
177.40		0.10	10	30	0
177.50		0.10	10	40	0
177.60		0.10	10	50	0
177.70		0.10	10	60	0
177.80		0.10	10	70	0
177.90		0.10	10	80	0
178.00		0.10	10	90	0
178.10		0.10	10	100	0
178.20		0.10	10	110	0
178.30		0.10	10	120	0
178.40		0.10	10	130	0
178.50		0.10	10	140	0
178.60		0.10	10	150	0
178.70		0.10	10	160	0
178.80		0.10	10	170	0
178.90		0.10	10	180	0
179.00		0.10	10	190	0
179.10		0.10	10	200	0
179.20		0.10	10	210	0
179.30		0.10	10	220	0
179.40	**Outlet Pipe Invert**	0.10	10	230	0
179.50		0.10	10	230	10
179.60		0.10	10	230	20
179.70		0.10	10	230	30
179.80		0.10	10	230	40
179.90		0.10	10	230	50
180.00		0.10	10	230	60
180.10		0.10	10	230	70

Elevation	Elevation Reference	Incremental Depth (m)	Incremental Volume (m^3)	Cumulative Active Volume - Pump (m^3)	Cumulative Active Volume - Orifice(m^3)
180.20		0.10	10	230	80
180.30		0.10	10	230	90
180.40		0.10	10	230	100
180.50		0.10	10	230	110
180.60	**Top of Module**	0.10	10	230	120

TATHAM ENGINEERING

PROJECT	11476 Highway 26	FILE	120232
		DATE	21-Apr-26
SUBJECT	Partially Full Orifice Control - Chamber #1	NAME	ANF
		PAGE	3 OF 4

Primary Orifice Control - for Pipes Flowing Full or Partially Full

Orifice Equation
$Q = C \times A \times (2gH)^{0.5}$
Q = flow rate (m^3)
C = constant
A = area of opening (m^2)
H = net head on the orifice
g = Acceleration due to

Orifice Constant (C): **0.63**
Depth Increment (m): **0.10**
Minimum Elevation (Invert of Control) (m): **179.40**
Maximum Elevation (Top of Ponding) (m): **180.70**

Water Elevation	Depth from Min. Elevation	Pipe Partially Full Inlet Control Flow
m	m	m^3/s
179.40	0.00	0.000
179.50	0.10	0.007
179.60	0.20	0.021
179.70	0.30	0.036
179.80	0.40	0.048
179.90	0.50	0.055
180.00	0.60	0.062
180.10	0.70	0.068
180.20	0.80	0.073
180.30	0.90	0.078
180.40	1.00	0.083
180.50	1.10	0.088
180.60	1.20	0.092
180.70	1.30	0.096

Control Features
Orifice Diameter (m): **0.200**
Mannings Value: **0.013**
Invert Elevation: **179.40**
Inlet Type: **2**
1 = Projecting
2 = Flush

Inlet Control Equation (Smith) Projecting Inlet
MMF Model y=(a*b+c*x^d)/(b+x^d)
Coefficient Data
a = 0.0168
b = 1.77
c = 3.06
d = 2.27

Inlet Control Equation (Smith) Flush Inlet
MMF Model y=(a*b+c*x^d)/(b+x^d)
Coefficient Data
a = -1.08E-03
b = 2.30E+00
c = 3.95
d = 2.08

Orifice Control

Orifice Dia. (mm)	200
Orifice Invert (m)	179.40
Orifice Area (m)	0.031
Orifice Coefficient	0.63

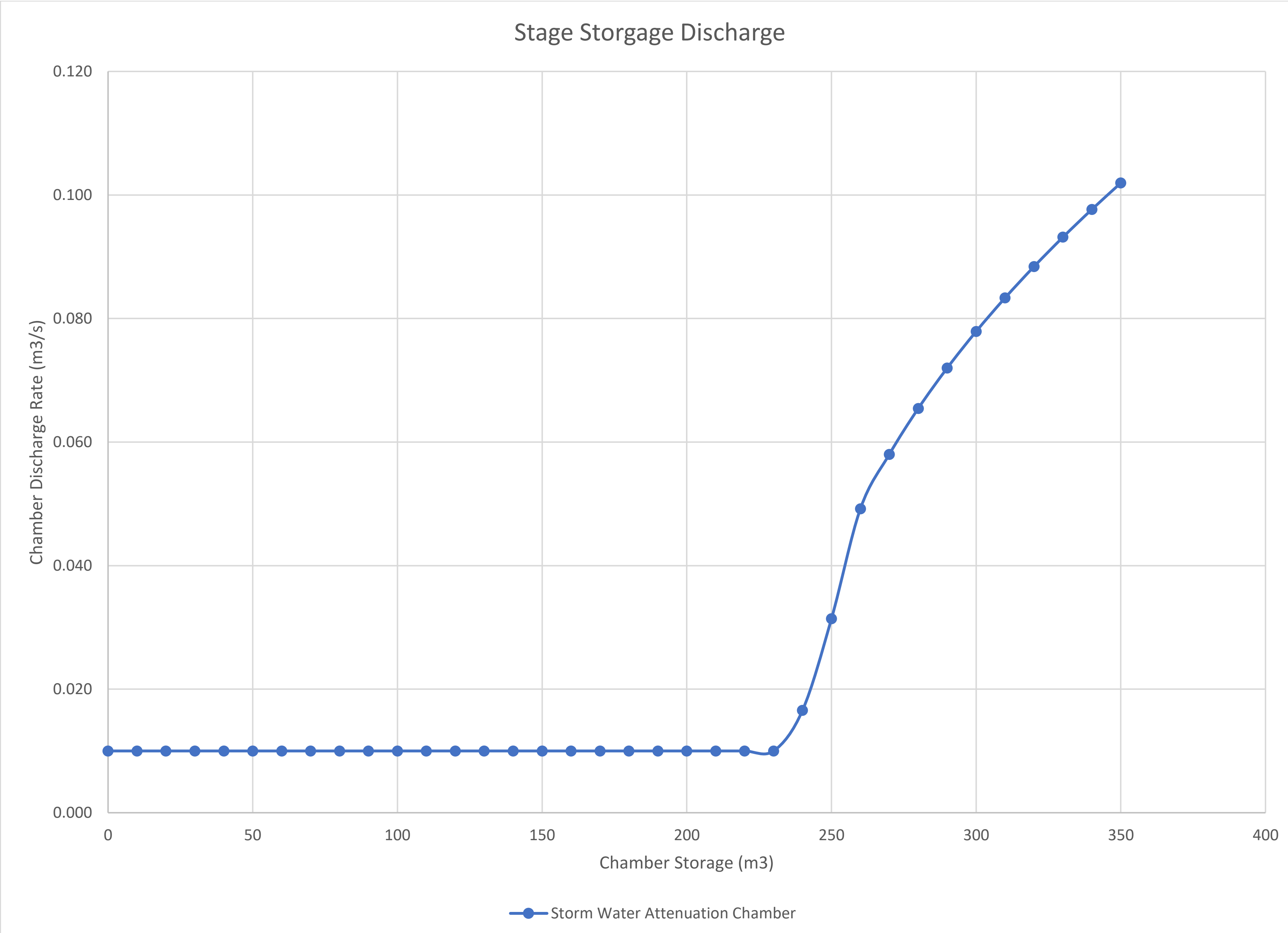
Orifice Equation

$Q = C \times A \times (2gH)^{0.5}$

Q = flow rate (m^3)
C = constant
A = area of opening (m^2)
H = net head on the orifice
g = Acceleration due to gravity

Note: Shaded cells have been calculated using partially full orifice equations (Hydraulic Structures, C.D. Smith, University of Saskatchewan)

Elevation	Head (m)	Orifice Discharge (m^3/s)	Total Discharge (m^3/s)	Total Storage ($m^{3)}$)
177.10	0.00	0.000	0.010	0
177.20	0.00	0.000	0.010	10
177.30	0.00	0.000	0.010	20
177.40	0.00	0.000	0.010	30
177.50	0.00	0.000	0.010	40
177.60	0.00	0.000	0.010	50
177.70	0.00	0.000	0.010	60
177.80	0.00	0.000	0.010	70
177.90	0.00	0.000	0.010	80
178.00	0.00	0.000	0.010	90
178.10	0.00	0.000	0.010	100
178.20	0.00	0.000	0.010	110
178.30	0.00	0.000	0.010	120
178.40	0.00	0.000	0.010	130
178.50	0.00	0.000	0.010	140
178.60	0.00	0.000	0.010	150
178.70	0.00	0.000	0.010	160
178.80	0.00	0.000	0.010	170
178.90	0.00	0.000	0.010	180
179.00	0.00	0.000	0.010	190
179.10	0.00	0.000	0.010	200
179.20	0.00	0.000	0.010	210
179.30	0.00	0.000	0.010	220
179.40	0.00	0.000	0.010	230
179.50	0.00	0.007	0.017	240
179.60	0.10	0.021	0.031	250
179.70	0.20	0.039	0.049	260
179.80	0.30	0.048	0.058	270
179.90	0.40	0.055	0.065	280
180.00	0.50	0.062	0.072	290
180.10	0.60	0.068	0.078	300
180.20	0.70	0.073	0.083	310
180.30	0.80	0.078	0.088	320
180.40	0.90	0.083	0.093	330
180.50	1.00	0.088	0.098	340
180.60	1.10	0.092	0.102	350


Stage Storgage Discharge
Chamber Discharge Rate (m3/s)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
0
50
100
150
200
250
300
350
400
Chamber Storage (m3)
Storm Water Attenuation Chamber

Storm Sewer Outlet End Treatment Riprap and Apron Sizing

$D_{50} = 0.2\ D\ (Q\ /\ (\sqrt{g}\ D^{2.5}\ ))^{4/3}\ (\ D\ /\ TW)$

(U.S. Department of Transportation, Federal Highway Administration, HEC-14, Equation 10.4)

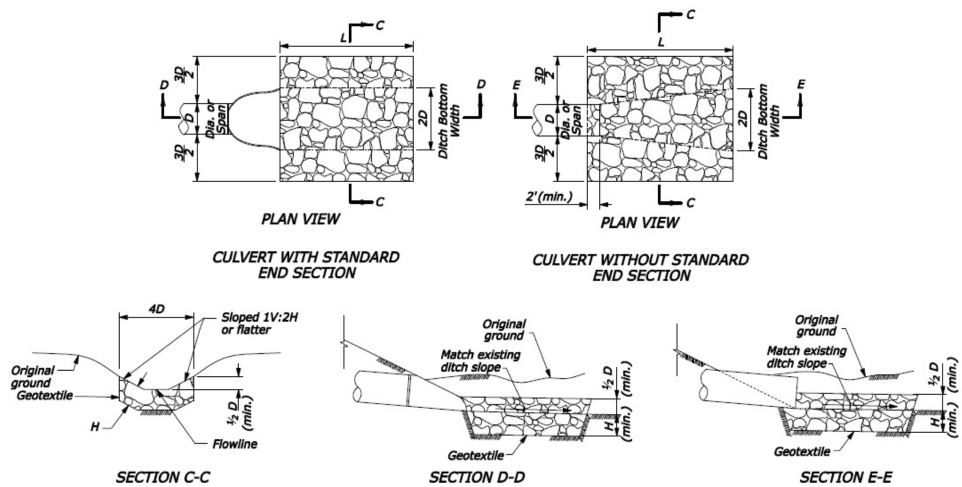
Where:

D_{50}	=	riprap size	(mm)
D	=	culvert diameter	(m)
Q	=	design discharge	(m^3/s)
g	=	acceleration due to gravity, 9.81	(m/s^2)
TW	=	tailwater depth	(m) limited between 0.4D and 1D

Outlet #3 End Treatment (1:100-year Flow)

D =	0.375	m	D_{50} =	0.041	m	Round to 125mm
Q =	0.087	(m^3/s)	Apron Bottom Length =	2.50	m	
TW* =	0.15	m	Apron Bottom Depth =	0.438	m	

*minimum tailwater assumed to yield maximum D_{50}

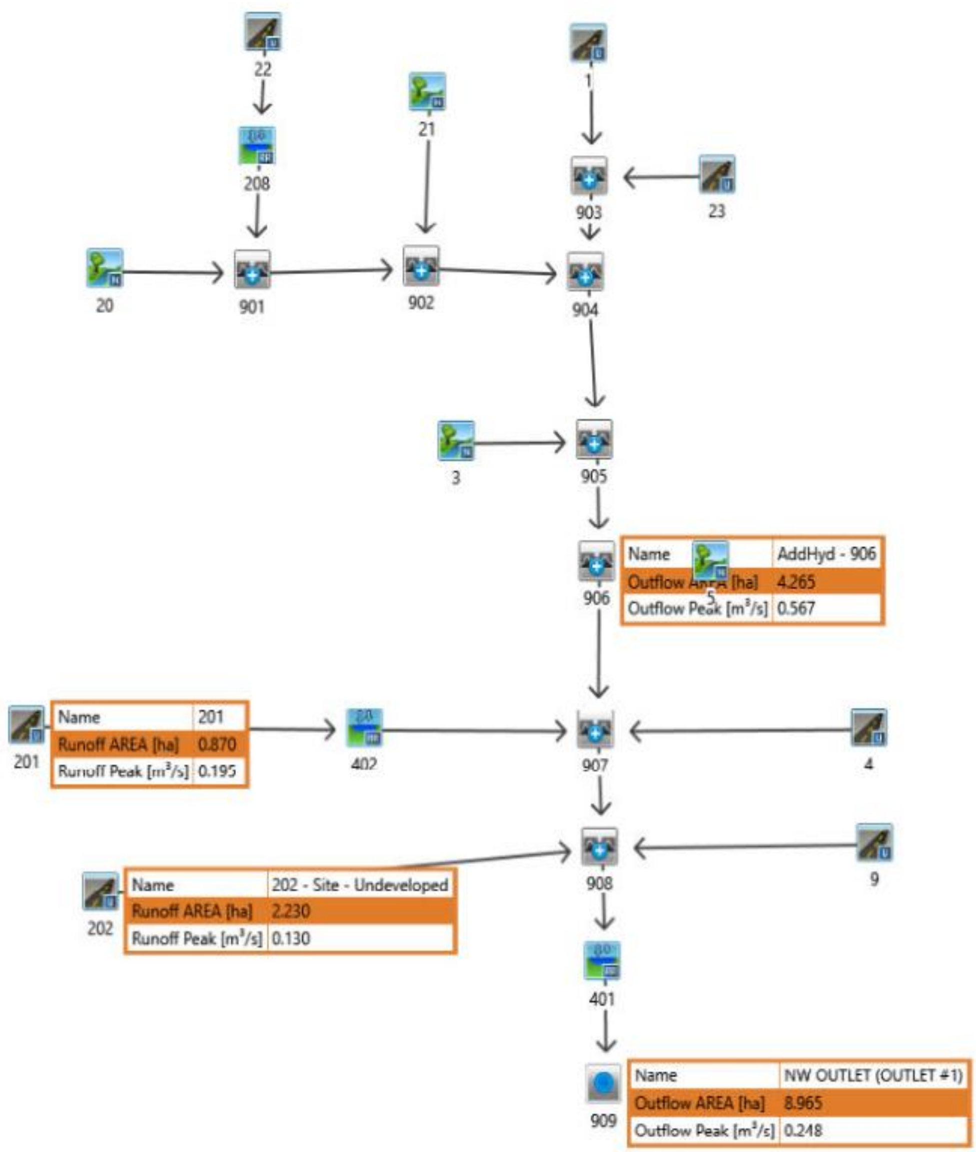


PROTECTIVE APRON AT CULVERT OUTLET WITH DITCH

Class	D_{50} (mm)	Apron Length (L)	Apron Depth (H)
1	125	4D	$3.5D_{50}$
2	150	4D	$3.3D_{50}$
3	250	5D	$2.4D_{50}$
4	350	6D	$2.2D_{50}$
5	500	7D	$2.0D_{50}$
6	550	8D	$2.0D_{50}$

TATHAM ENGINEERING

PROJECT	11476 Highway 26	FILE	120232
		DATE	2026-04-21
SUBJECT	Proposed Conditions VO Schematic	NAME	ANF
		PAGE	1 OF 1



NASHYD
ROUTE PIPE
DUHYD
STANDHYD
ROUTE CHANNEL
DIVERT HYD
ADDHYD
ROUTE RESERVOIR

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

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\ae733394-89ea-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\ae733394-89ea-

DATE: 04-21-2026                          TIME: 12:04:13

USER:

COMMENTS: ____________________________________________________________

  **************************************************
  ** SIMULATION : Run 01 - 2yr 4hr 10min Chicag **
  **************************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.00  1.38    5.06 0.15    0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.06  1.33   20.04 0.59    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01  2.02   19.70  n/a    0.000
*
    ADD [  0020+  0208]  0901  3  1.0     0.62    0.01  1.42   17.10  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 ** CALIB NASHYD          0021  1  1.0     0.02    0.00  1.40    3.63 0.11    0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64    0.01  1.42   16.68  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0023  1  1.0     0.42    0.03  1.40   18.24 0.54    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0001  1  1.0     0.35    0.02  1.33   13.41 0.40    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77    0.05  1.37   16.03  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41    0.06  1.37   16.33  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB NASHYD          0003  1  1.0     0.76    0.04  1.35    8.22 0.24    0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17    0.09  1.35   13.48  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB NASHYD          0005  1  1.0     2.10    0.04  1.55    6.45 0.19    0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26    0.11  1.37   10.02  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0004  1  1.0     0.69    0.02  1.35   11.34 0.34    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0101  1  2.0     0.87    0.01  1.33    9.78 0.29    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0     1.56    0.03  1.33   10.47  n/a    0.000
*
    ADD [  0907+  0906]  0907  1  1.0     5.82    0.14  1.37   10.14  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0009  1  1.0     0.91    0.04  1.53   15.83 0.47    0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                 10.0
    [ Ptot= 33.75 mm ]
*
 *  CALIB STANDHYD        0102  1  2.0     2.23    0.03  1.33    8.04 0.24    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0     3.14    0.06  1.35   10.29  n/a    0.000
*
    ADD [  0908+  0907]  0908  1  1.0     8.97    0.20  1.37   10.19  n/a    0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0     8.97    0.14  1.67   10.19  n/a    0.000
*
==================================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\d3f6ad95-03d4-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\d3f6ad95-03d4-

DATE: 04-21-2026                          TIME: 12:04:13

USER:

COMMENTS: ____________________________________________________________

  **************************************************
  ** SIMULATION : Run 02 - 5yr 4hr 10min Chicag **
  **************************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.00  1.38    9.20 0.21    0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.08  1.33   27.74 0.63    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01  2.12   27.40  n/a    0.000
*
    ADD [  0020+  0208]  0901  3  1.0     0.62    0.01  1.40   24.17  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 ** CALIB NASHYD          0021  1  1.0     0.02    0.00  1.38    6.76 0.15    0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64    0.01  1.40   23.63  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0023  1  1.0     0.42    0.05  1.38   26.72 0.61    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0001  1  1.0     0.35    0.03  1.33   19.66 0.45    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77    0.07  1.37   23.49  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41    0.09  1.37   23.55  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB NASHYD          0003  1  1.0     0.76    0.06  1.35   13.79 0.31    0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17    0.15  1.35   20.12  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB NASHYD          0005  1  1.0     2.10    0.08  1.53   11.30 0.26    0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26    0.19  1.37   15.78  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0004  1  1.0     0.69    0.03  1.55   17.55 0.40    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0101  1  2.0     0.87    0.02  2.00   15.58 0.35    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0     1.56    0.04  1.35   16.45  n/a    0.000
*
    ADD [  0907+  0906]  0907  1  1.0     5.82    0.24  1.37   15.96  n/a    0.000
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0009  1  1.0     0.91    0.07  1.50   23.63 0.54    0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                 10.0
    [ Ptot= 44.06 mm ]
*
 *  CALIB STANDHYD        0102  1  2.0     2.23    0.04  1.33   13.18 0.30    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0     3.14    0.10  1.37   16.21  n/a    0.000
*
    ADD [  0908+  0907]  0908  1  1.0     8.97    0.33  1.37   16.05  n/a    0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0     8.97    0.21  1.77   16.05  n/a    0.000
*
==================================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\5551219a-f8f5-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\5551219a-f8f5-

DATE: 04-21-2026                          TIME: 12:04:12

USER:

COMMENTS: ____________________________________________________________

  **************************************************
  ** SIMULATION : Run 03 - 10yr 4hr 10min Chica **
  **************************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 50.58 mm ]
*
 ** CALIB NASHYD          0020  1  1.0     0.11    0.01  1.38   12.26 0.24    0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                 10.0
    [ Ptot= 50.58 mm ]
*
 ** CALIB STANDHYD        0022  1  1.0     0.51    0.10  1.33   32.82 0.65    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0     0.51    0.01  2.20   32.48  n/a    0.000
```

```
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.01  1.40  28.89  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 ** CALIB NASHYD         0021  1  1.0    0.02    0.00  1.38   9.12 0.18    0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.01  1.38  28.27  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0023  1  1.0    0.42    0.07  1.38  32.32 0.64    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0001  1  1.0    0.35    0.03  1.33  23.93 0.47    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.10  1.37  28.48  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.11  1.37  28.39  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB NASHYD         0003  1  1.0    0.76    0.09  1.35  17.74 0.35    0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.19  1.35  24.65  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB NASHYD         0005  1  1.0    2.10    0.11  1.53  14.82 0.29    0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.26  1.37  19.81  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0004  1  1.0    0.69    0.04  1.53  21.85 0.43    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0101  1  2.0    0.87    0.03  1.87  19.65 0.39    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.06  1.53  20.62  n/a    0.000
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.31  1.37  20.03  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0009  1  1.0    0.91    0.09  1.47  28.86 0.57    0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                   10.0
    [ Ptot= 50.58 mm ]
*
 *  CALIB STANDHYD       0102  1  2.0    2.23    0.05  2.00  16.84 0.33    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.13  1.37  20.33  n/a    0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.44  1.37  20.13  n/a    0.000
*
 ** Reservoir
    OUTFLOW:             0401  1  1.0    8.97    0.24  1.88  20.13  n/a    0.000
*
==========================================================================================
```

```
     V    V   I    SSSSS  U    U    A    L               (v 6.2.2022)
     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
```



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\bd4cfb56-e5af-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\bd4cfb56-e5af-

DATE: 04-21-2026                          TIME: 12:04:13

USER:

COMMENTS: ____________________________________________________________

  ************************************************
  ** SIMULATION : Run 04 - 25yr 4hr 10min Chica **
  ************************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 ** CALIB NASHYD         0020  1  1.0    0.11    0.01  1.38  16.68 0.28    0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 ** CALIB STANDHYD       0022  1  1.0    0.51    0.12  1.33  39.64 0.67    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0208  1  1.0    0.51    0.01  2.25  39.30  n/a    0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.02  1.38  35.28  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 ** CALIB NASHYD         0021  1  1.0    0.02    0.00  1.38  12.59 0.21    0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.02  1.38  34.57  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0023  1  1.0    0.42    0.08  1.38  39.83 0.67    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0001  1  1.0    0.35    0.04  1.35  29.80 0.50    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.12  1.37  35.24  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.14  1.37  34.94  n/a    0.000
*
    CHIC STORM                   10.0
```

```
    [ Ptot= 59.07 mm ]
*
 *  CALIB NASHYD         0003  1  1.0    0.76    0.11  1.35  23.29 0.39    0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.25  1.35  30.85  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB NASHYD         0005  1  1.0    2.10    0.15  1.52  19.82 0.34    0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.35  1.37  25.42  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0004  1  1.0    0.69    0.06  1.52  27.79 0.47    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0101  1  2.0    0.87    0.04  1.80  25.31 0.43    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.08  1.53  26.41  n/a    0.000
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.42  1.37  25.68  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0009  1  1.0    0.91    0.12  1.40  35.94 0.61    0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                   10.0
    [ Ptot= 59.07 mm ]
*
 *  CALIB STANDHYD       0102  1  2.0    2.23    0.08  1.87  22.01 0.37    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.17  1.37  26.05  n/a    0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.60  1.37  25.81  n/a    0.000
*
 ** Reservoir
    OUTFLOW:             0401  1  1.0    8.97    0.25  2.07  25.81  n/a    0.000
*
==========================================================================================

     V    V   I    SSSSS  U    U    A    L               (v 6.2.2022)
     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
```



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\e5ae6cd5-cc19-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\e5ae6cd5-cc19-

DATE: 04-21-2026                          TIME: 12:04:14

USER:

COMMENTS: ____________________________________________________________
```

```
  ************************************************
  ** SIMULATION : Run 05 - 50yr 4hr 10min Chica **
  ************************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 ** CALIB NASHYD         0020  1  1.0    0.11    0.01  1.38  20.39 0.31    0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 ** CALIB STANDHYD       0022  1  1.0    0.51    0.14  1.33  45.05 0.69    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0208  1  1.0    0.51    0.01  2.33  44.71  n/a    0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.02  1.38  40.39  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 ** CALIB NASHYD         0021  1  1.0    0.02    0.00  1.38  15.55 0.24    0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.02  1.38  39.62  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0023  1  1.0    0.42    0.10  1.37  45.76 0.70    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0001  1  1.0    0.35    0.05  1.35  34.54 0.53    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.15  1.37  40.63  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.17  1.37  40.17  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB NASHYD         0003  1  1.0    0.76    0.14  1.35  27.85 0.42    0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.31  1.35  35.84  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB NASHYD         0005  1  1.0    2.10    0.18  1.52  23.97 0.37    0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.42  1.37  30.00  n/a    0.000
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0004  1  1.0    0.69    0.07  1.50  32.62 0.50    0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0101  1  2.0    0.87    0.05  1.77  29.94 0.46    0.000
    [I%= 6.0:S%= 1.00]
*
```

```
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.11  1.52  31.13  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.52  1.37  30.30  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0009  1  1.0    0.91    0.15  1.40  41.57 0.63   0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                10.0
    [ Ptot= 65.64 mm ]
*
 *  CALIB STANDHYD       0102  1  2.0    2.23    0.11  1.83  26.28 0.40   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.21  1.37  30.71  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.72  1.37  30.45  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0401  1  1.0    8.97    0.25  2.18  30.45  n/a   0.000
*
==================================================================================================

       V    V   I    SSSSS  U   U    A    L               (v 6.2.2022)
       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 Smart City Water Inc


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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\4532cc99-aa56-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\4532cc99-aa56-

DATE: 04-21-2026                          TIME: 12:04:12

USER:

COMMENTS: _______________________________________________________________

  **************************************************
  ** SIMULATION : Run 06 - 100yr 4hr 10min Chic **
  **************************************************

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

      START @  0.00 hrs
      --------------------
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 ** CALIB NASHYD         0020  1  1.0    0.11    0.01  1.37  24.04 0.34   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 ** CALIB STANDHYD       0022  1  1.0    0.51    0.16  1.33  50.17 0.70   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0208  1  1.0    0.51    0.01  2.38  49.83  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.02  1.38  45.26  n/a   0.000
*
```

```
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 ** CALIB NASHYD         0021  1  1.0    0.02    0.00  1.38  18.50 0.26   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.02  1.38  44.42  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 *  CALIB STANDHYD       0023  1  1.0    0.42    0.08  1.47  51.34 0.72   0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 *  CALIB STANDHYD       0001  1  1.0    0.35    0.06  1.35  39.09 0.54   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.13  1.38  45.74  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.15  1.38  45.14  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 *  CALIB NASHYD         0003  1  1.0    0.76    0.16  1.35  32.26 0.45   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.31  1.35  40.62  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 *  CALIB NASHYD         0005  1  1.0    2.10    0.22  1.52  28.03 0.39   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.45  1.38  34.42  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 *  CALIB STANDHYD       0004  1  1.0    0.69    0.09  1.48  37.26 0.52   0.000
    [I%=10.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 *  CALIB STANDHYD       0101  1  2.0    0.87    0.06  1.73  34.41 0.48   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.13  1.50  35.67  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.57  1.38  34.75  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 *  CALIB STANDHYD       0009  1  1.0    0.91    0.18  1.40  46.92 0.65   0.000
    [I%=10.0:S%= 1.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.75 mm ]
*
 *  CALIB STANDHYD       0102  1  2.0    2.23    0.13  1.77  30.43 0.42   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.25  1.37  35.20  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.82  1.38  34.91  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0401  1  1.0    8.97    0.25  2.28  34.91  n/a   0.000
*
==================================================================================================

       V    V   I    SSSSS  U   U    A    L               (v 6.2.2022)
       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 Smart City Water Inc


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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\b3ceec72-5b40-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\b3ceec72-5b40-

DATE: 04-21-2026                          TIME: 12:04:14

USER:

COMMENTS: _______________________________________________________________

  **************************************************
  ** SIMULATION : Run 07 - 25mm                  **
  **************************************************

  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                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 ** CALIB NASHYD         0020  1  1.0    0.11    0.00  1.68   2.37 0.09   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 ** CALIB STANDHYD       0022  1  1.0    0.51    0.03  1.50  13.94 0.56   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0208  1  1.0    0.51    0.01  2.15  13.60  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.01  2.05  11.60  n/a   0.000
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 ** CALIB NASHYD         0021  1  1.0    0.02    0.00  1.68   1.65 0.07   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.01  2.05  11.29  n/a   0.000
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 *  CALIB STANDHYD       0023  1  1.0    0.42    0.01  1.67  11.63 0.46   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 *  CALIB STANDHYD       0001  1  1.0    0.35    0.01  1.50   8.71 0.35   0.000
```

```
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.02  1.53  10.29  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.02  1.53  10.75  n/a   0.000
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 *  CALIB NASHYD         0003  1  1.0    0.76    0.01  1.52   4.35 0.17   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.03  1.52   8.50  n/a   0.000
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 *  CALIB NASHYD         0005  1  1.0    2.10    0.01  1.77   3.20 0.13   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.04  1.53   5.89  n/a   0.000
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 *  CALIB STANDHYD       0004  1  1.0    0.69    0.01  1.52   6.82 0.27   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 *  CALIB STANDHYD       0101  1  2.0    0.87    0.01  1.50   5.63 0.22   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.01  1.50   6.15  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.05  1.53   5.96  n/a   0.000
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 *  CALIB STANDHYD       0009  1  1.0    0.91    0.01  1.85   9.88 0.39   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\09aa03fb-6ece-4043-8200-70c7
    remark: 25MMCHI
*
 *  CALIB STANDHYD       0102  1  2.0    2.23    0.01  1.50   4.47 0.18   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.03  1.50   6.04  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.08  1.53   5.99  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0401  1  1.0    8.97    0.07  1.58   5.99  n/a   0.000
*
==================================================================================================

       V    V   I    SSSSS  U   U    A    L               (v 6.2.2022)
       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
```

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\f100dde6-4c3e-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\f100dde6-4c3e-


DATE: 04-21-2026                          TIME: 12:04:17

USER:


COMMENTS: ____________________________________________________________


  ***********************************************
  ** SIMULATION : Run 08 - 2yr 24hr 15min SCS T **
  ***********************************************

  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               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0    0.11    0.00 12.27   8.06 0.17   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0    0.51    0.05 12.25  29.87 0.64   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0    0.51    0.01 12.80  29.53  n/a   0.000
*
    ADD [  0020+  0208]   0901  3  1.0    0.62    0.01 12.27  26.15  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0    0.02    0.00 12.27   5.91 0.13   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]   0902  3  1.0    0.64    0.01 12.27  25.58  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0023  1  1.0    0.42    0.04 12.28  29.08 0.62   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0001  1  1.0    0.35    0.02 12.25  21.44 0.46   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]   0903  3  1.0    0.77    0.05 12.27  25.58  n/a   0.000
*
    ADD [  0902+  0903]   0904  3  1.0    1.41    0.07 12.27  25.58  n/a   0.000
*
    READ STORM               15.0
```

```
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0003  1  1.0    0.76    0.05 12.25  12.31 0.26   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]   0905  3  1.0    2.17    0.12 12.25  22.02  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0005  1  1.0    2.10    0.07 12.33   9.92 0.21   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]   0906  3  1.0    4.26    0.18 12.27  17.46  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0004  1  1.0    0.69    0.02 12.28  19.34 0.41   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0101  1  2.0    0.87    0.01 12.93  17.27 0.37   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]   0907  3  1.0    1.56    0.04 12.27  18.18  n/a   0.000
*
    ADD [  0907+  0906]   0907  1  1.0    5.82    0.21 12.27  17.65  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0009  1  1.0    0.91    0.05 12.30  25.83 0.55   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM               15.0
    [ Ptot= 46.83 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\a826bf6c-8ba9-4d22-8a5d-78df
    remark: 2yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0102  1  2.0    2.23    0.03 13.03  14.70 0.31   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]   0908  3  1.0    3.14    0.08 12.27  17.92  n/a   0.000
*
    ADD [  0908+  0907]   0908  1  1.0    8.97    0.29 12.27  17.75  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0    8.97    0.17 12.48  17.75  n/a   0.000
*
 FINISH

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

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


       V    V   I    SSSSS  U    U    A    L              (v 6.2.2022)
       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
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```

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\ed0f9d62-292a-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\ed0f9d62-292a-


DATE: 04-21-2026                          TIME: 12:04:16

USER:


COMMENTS: ____________________________________________________________


  ***********************************************
  ** SIMULATION : Run 09 - 5yr 24hr 15min SCS T **
  ***********************************************

  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               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0    0.11    0.01 12.27  13.47 0.22   0.000
    [CN=70.7        ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0    0.51    0.07 12.25  40.30 0.67   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0    0.51    0.01 12.83  39.96  n/a   0.000
*
    ADD [  0020+  0208]   0901  3  1.0    0.62    0.01 12.27  35.91  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0    0.02    0.00 12.27  10.09 0.17   0.000
    [CN=62.0        ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]   0902  3  1.0    0.64    0.01 12.27  35.19  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0023  1  1.0    0.42    0.05 12.27  40.55 0.68   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0001  1  1.0    0.35    0.03 12.27  30.37 0.51   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]   0903  3  1.0    0.77    0.08 12.27  35.89  n/a   0.000
*
    ADD [  0902+  0903]   0904  3  1.0    1.41    0.10 12.27  35.57  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
```

```
*
 *  CALIB NASHYD          0003  1  1.0    0.76    0.08 12.25  19.31 0.32   0.000
    [CN=78.2        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]   0905  3  1.0    2.17    0.17 12.25  31.45  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0005  1  1.0    2.10    0.12 12.33  16.10 0.27   0.000
    [CN=74.8        ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]   0906  3  1.0    4.26    0.28 12.27  25.97  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0004  1  1.0    0.69    0.04 12.30  28.38 0.47   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0101  1  2.0    0.87    0.03 12.73  25.87 0.43   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]   0907  3  1.0    1.56    0.06 12.28  26.98  n/a   0.000
*
    ADD [  0907+  0906]   0907  1  1.0    5.82    0.34 12.27  26.24  n/a   0.000
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0009  1  1.0    0.91    0.08 12.30  36.62 0.61   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM               15.0
    [ Ptot= 59.88 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\61b7ea09-9424-429a-a7c7-8d1a
    remark: 5yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0102  1  2.0    2.23    0.05 12.80  22.53 0.38   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]   0908  3  1.0    3.14    0.12 12.27  26.61  n/a   0.000
*
    ADD [  0908+  0907]   0908  1  1.0    8.97    0.46 12.27  26.37  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0    8.97    0.24 12.55  26.37  n/a   0.000
*
==========================================================================================


       V    V   I    SSSSS  U    U    A    L              (v 6.2.2022)
       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
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\4b595f0e-dbbf-
```

```
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\4b595f0e-dbbf-

DATE: 04-21-2026                          TIME: 12:04:15

USER:

COMMENTS: ____________________________________________________________

  **********************************************
  ** SIMULATION : Run 10 - 10yr 24hr 15min SCS  **
  **********************************************

  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                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD           0020  1  1.0     0.11    0.01 12.27  17.05 0.25   0.000
    [CN=70.7          ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD         0022  1  1.0     0.51    0.08 12.25  46.60 0.69   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:               0208  1  1.0     0.51    0.01 12.85  46.26  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0     0.62    0.02 12.27  41.86  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD           0021  1  1.0     0.02    0.00 12.27  12.90 0.19   0.000
    [CN=62.0          ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64    0.02 12.27  41.07  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0023  1  1.0     0.42    0.06 12.27  47.45 0.70   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0001  1  1.0     0.35    0.03 12.27  35.91 0.53   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77    0.10 12.27  42.17  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41    0.11 12.27  41.67  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD           0003  1  1.0     0.76    0.09 12.25  23.78 0.35   0.000
    [CN=78.2          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17    0.21 12.25  37.28  n/a   0.000
*
```

```
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD           0005  1  1.0     2.10    0.15 12.33  20.12 0.30   0.000
    [CN=74.8          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26    0.34 12.27  31.33  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0004  1  1.0     0.69    0.05 12.30  34.02 0.50   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0101  1  2.0     0.87    0.03 12.67  31.28 0.46   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0     1.56    0.08 12.28  32.49  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0     5.82    0.42 12.27  31.64  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0009  1  1.0     0.91    0.10 12.30  43.19 0.64   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                15.0
    [ Ptot= 67.50 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\9c3df5b9-296b-47e9-810d-a488
    remark: 10yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0102  1  2.0     2.23    0.07 12.73  27.52 0.41   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0     3.14    0.15 12.27  32.06  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0     8.97    0.57 12.27  31.79  n/a   0.000
*
 ** Reservoir
    OUTFLOW:               0401  1  1.0     8.97    0.25 12.70  31.79  n/a   0.000
*
==========================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       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 Smart City Water Inc
```



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\7a07ef5c-f14e-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\7a07ef5c-f14e-

DATE: 04-21-2026                          TIME: 12:04:16

USER:
```

```
COMMENTS: ____________________________________________________________

  **********************************************
  ** SIMULATION : Run 11 - 25yr 24hr 15min SCS  **
  **********************************************

  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                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD           0020  1  1.0     0.11    0.01 12.27  22.44 0.29   0.000
    [CN=70.7          ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD         0022  1  1.0     0.51    0.10 12.25  55.56 0.71   0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:               0208  1  1.0     0.51    0.01 12.87  55.22  n/a   0.000
*
    ADD [  0020+  0208]  0901  3  1.0     0.62    0.02 12.27  50.39  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD           0021  1  1.0     0.02    0.00 12.27  17.22 0.22   0.000
    [CN=62.0          ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0     0.64    0.02 12.27  49.50  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0023  1  1.0     0.42    0.08 12.27  57.20 0.73   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0001  1  1.0     0.35    0.04 12.27  43.93 0.56   0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0     0.77    0.12 12.27  51.13  n/a   0.000
*
    ADD [  0902+  0903]  0904  3  1.0     1.41    0.14 12.27  50.39  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD           0003  1  1.0     0.76    0.12 12.25  30.37 0.39   0.000
    [CN=78.2          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0     2.17    0.26 12.25  45.68  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB NASHYD           0005  1  1.0     2.10    0.19 12.33  26.11 0.33   0.000
    [CN=74.8          ]
```

```
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0     4.26    0.43 12.27  39.14  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0004  1  1.0     0.69    0.07 12.30  42.19 0.54   0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0101  1  2.0     0.87    0.05 12.63  39.17 0.50   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0     1.56    0.10 12.28  40.51  n/a   0.000
*
    ADD [  0907+  0906]  0907  1  1.0     5.82    0.53 12.27  39.50  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0009  1  1.0     0.91    0.13 12.28  52.53 0.67   0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                15.0
    [ Ptot= 78.08 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\b95ee7a7-0d89-4f7c-9b0c-3a65
    remark: 25yr 24hr 15min SCS Type II (MTO)
*
  * CALIB STANDHYD         0102  1  2.0     2.23    0.10 12.67  34.87 0.45   0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0     3.14    0.20 12.28  39.99  n/a   0.000
*
    ADD [  0908+  0907]  0908  1  1.0     8.97    0.73 12.27  39.68  n/a   0.000
*
 ** Reservoir
    OUTFLOW:               0401  1  1.0     8.97    0.25 12.85  39.68  n/a   0.000
*
==========================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       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 Smart City Water Inc
```



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\5cd798cd-8240-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\5cd798cd-8240-

DATE: 04-21-2026                          TIME: 12:04:15

USER:

COMMENTS: ____________________________________________________________

  **********************************************
  ** SIMULATION : Run 12 - 50yr 24hr 15min SCS  **
  **********************************************
```

```
  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                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0    0.11    0.01 12.27  26.43 0.31    0.000
    [CN=70.7          ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0    0.51    0.11 12.25  61.90 0.72    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0    0.51    0.01 12.88  61.56  n/a    0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.02 12.27  56.46  n/a    0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0    0.02    0.00 12.27  20.46 0.24    0.000
    [CN=62.0          ]
    [ N = 3.0:Tp 0.08]
*
    ADD [  0021+  0901]  0902  3  1.0    0.64    0.02 12.27  55.50  n/a    0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0023  1  1.0    0.42    0.09 12.27  64.06 0.75    0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0001  1  1.0    0.35    0.05 12.27  49.68 0.58    0.000
    [I%=25.0:S%= 2.00]
*
    ADD [  0001+  0023]  0903  3  1.0    0.77    0.14 12.27  57.48  n/a    0.000
*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.16 12.27  56.58  n/a    0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0003  1  1.0    0.76    0.14 12.25  35.16 0.41    0.000
    [CN=78.2          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0003+  0904]  0905  3  1.0    2.17    0.30 12.25  51.68  n/a    0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB NASHYD          0005  1  1.0    2.10    0.22 12.32  30.51 0.36    0.000
    [CN=74.8          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.50 12.27  44.77  n/a    0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
```

```
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0004  1  1.0    0.69    0.08 12.28  48.07 0.56    0.000
    [I%=10.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0101  1  2.0    0.87    0.06 12.57  44.87 0.53    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0101+  0004]  0907  3  1.0    1.56    0.13 12.28  46.28  n/a    0.000
*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.62 12.27  45.17  n/a    0.000
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0009  1  1.0    0.91    0.15 12.28  59.14 0.69    0.000
    [I%=10.0:S%= 1.00]
*
    READ STORM                 15.0
    [ Ptot= 85.42 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\1be03e5a-93a3-4cc2-beb5-c60f
    remark: 50yr 24hr 15min SCS Type II (MTO)
*
 *  CALIB STANDHYD        0102  1  2.0    2.23    0.12 12.63  40.22 0.47    0.000
    [I%= 6.0:S%= 1.00]
*
    ADD [  0102+  0009]  0908  3  1.0    3.14    0.24 12.28  45.70  n/a    0.000
*
    ADD [  0908+  0907]  0908  1  1.0    8.97    0.86 12.27  45.36  n/a    0.000
*
 ** Reservoir
    OUTFLOW:              0401  1  1.0    8.97    0.25 12.92  45.36  n/a    0.000
*
==========================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       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
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                   *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\22a35ff5-8ac4-
  Summary filename: C:\Users\afry\AppData\Local\Civica\VH5\1282ccf0-8c55-4f1e-b555-6d670b64a25d\22a35ff5-8ac4-

DATE: 04-21-2026                          TIME: 12:04:14

USER:

COMMENTS: ____________________________________________________________

  ***********************************************
  ** SIMULATION : Run 13 - 100yr 24hr 15min SCS **
  ***********************************************

  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                 15.0
```

```
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0020  1  1.0    0.11    0.02 12.27  30.68 0.33    0.000
    [CN=70.7          ]
    [ N = 3.0:Tp 0.08]
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB STANDHYD        0022  1  1.0    0.51    0.12 12.25  68.44 0.74    0.000
    [I%=50.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0208  1  1.0    0.51    0.01 12.92  68.10  n/a    0.000
*
    ADD [  0020+  0208]  0901  3  1.0    0.62    0.02 12.27  62.74  n/a    0.000
*
    READ STORM                 15.0
    [ Ptot= 92.89 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\e0e15cc0-1056-48ad-bf8b-bb30
    remark: 100yr 24hr 15min SCS Type II (MTO)
*
 ** CALIB NASHYD          0021  1  1.0    0.02    0.00 12.27  23.95 0.26    0.000
    [CN=62.0          ]
    [ N = 3.0:Tp 0.08]
*
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*
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```

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*
    ADD [  0907+  0906]  0907  1  1.0    5.82    0.71 12.27  51.09  n/a    0.000
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*
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*
 ** Reservoir
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*
==========================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       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
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                   *****  S U M M A R Y   O U T P U T  *****

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DATE: 04-21-2026                          TIME: 12:04:16

USER:

COMMENTS: ____________________________________________________________

  ***********************************************
  ** SIMULATION : Run 14 - TIMMINS.STM          **
  ***********************************************

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

      START @  0.00 hrs
      --------------------
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```

```
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*
 ** Reservoir
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*
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    ADD [  0021+  0901]  0902  3  1.0    0.64    0.07  7.00 151.44  n/a   0.000
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*
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*
    ADD [  0902+  0903]  0904  3  1.0    1.41    0.15  7.00 154.44  n/a   0.000
*
    READ STORM                15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\afry\AppData\Local\Temp\3f34482c-eecc-4f56-9bc2-1fc54bd90b6f\3552f2f3-01d0-4883-bda1-cabd
    remark: TIMMINS.STM
*
  * CALIB NASHYD         0003  1  1.0    0.76    0.08  7.00 136.32 0.71   0.000
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    [ N = 3.0:Tp 0.05]
*
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    READ STORM                15.0
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*
    ADD [  0005+  0905]  0906  3  1.0    4.26    0.42  7.00 137.98  n/a   0.000
*
    READ STORM                15.0
    [ Ptot=193.00 mm ]
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    READ STORM                15.0
    [ Ptot=193.00 mm ]
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```

```
*
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    READ STORM                15.0
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*
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    [ Ptot=193.00 mm ]
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*
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*
 ** Reservoir
    OUTFLOW:             0401  1  1.0    8.97    0.26 11.18 139.08  n/a   0.000
*
```

Manning's Equation Flow Calculations

Project Details

11476 Hwy 26	120232

Prepared By

PNW	6/10/2024

Manning's Equation: $$Q = \frac{1}{n} \cdot A \cdot R^{\frac{2}{3}} \cdot S^{\frac{1}{2}}$$

Where:

Q = flow (m^3/s)

n = Manning's roughness coefficient

A = area of flow (m^2)

R = hydraulic radius (m) equal to flow area divided by wetted perimeter

S = channel slope (m/m)

West Channel/Ditch - Pre Dev

Manning's n =	0.030				
Slope =	0.002	m/m			
Right Side Slope =	8.0	:1 (H:V)	Area =	0.720	m^2
Left Side Slope =	8.0	:1 (H:V)	Wetted Perimeter =	4.837	m
Depth =	0.30	m	Hydraulic Radius =	0.149	m
Bottom Width =	0.00	m	Flow =	0.322	m^3/s

Appendix D:
Water Balance Assessment

22-189-402 **April 16, 2026**

Integricon Property Restoration and Construction Group Inc. (IPCG)
219 Westcreek Drive
Vaughan, ON
L4L 9T7

RE: Update to Wetland Risk Evaluation and Feature-Based Water Balance Study – 11476 Highway 26, Collingwood, ON

1.0 Introduction

This memorandum has been prepared to provide an update to the previously completed *Wetland Risk Evaluation and Feature-Based Water Balance* for the proposed development located at **11476 Highway 26 in Collingwood, Ontario** (herein referred to as the "Site"). The update includes refinement of the water balance mitigation strategy and incorporation of revised figures in response to **NVCA comments received in November 2025**.

The original investigation and baseline assessment were completed by the undersigned under a previous affiliation with **GeoBase Solutions (GBS) Ltd.** The current update has been undertaken by **DS Consultants Ltd. (DS)**, with authorization from the Client, utilizing the original data, records, and analytical framework developed during the initial phase of work.

All previously collected data have been reviewed for consistency and applicability to the updated scope. Where appropriate, the existing dataset has been incorporated into the revised assessment to maintain continuity in methodology and interpretation. Any updated analysis and conclusions presented herein are the responsibility of DS.

This memorandum should be read in conjunction with the original assessment. For convenience, the original report is provided for reference in **Appendix B**.

2.0 Summary of Updates

This section provides a summary of updates to the feature-based water balance presented in Appendix B, reflecting the revised stormwater management approach for the Site. The original infiltration-based mitigation approach for stormwater management has been replaced with strategy focused on reducing runoff to the wetland. The new design includes on-site mitigation measures designed to retain roof runoff, including a green roof system and roof runoff capture for irrigation.

In addition, minor refinements to land use area have also been incorporated into the updated water balance, including a correction to the amount of landscaped area in the pre-development condition and an adjustment of impervious to pervious area in the post-development condition, to account for the pervious center of the round-a-bout.

3.0 Feature-Based Water Balance

The feature-based water balance assessment has been completed using the same methodology as outlined in the original report (**Appendix B**). The analysis continues to apply a Thornthwaite-based approach to estimate evapotranspiration, infiltration, and runoff, with updates limited to revised land use inputs and incorporation of the updated mitigation measures.

Supporting water balance calculation tables are provided in **Appendix A (Tables 1 through 5). Table 1** presents the climate normals (1991–2020) used for the assessment, including temperature, precipitation, and calculated potential evapotranspiration values. Subsequent tables are discussed and referenced in the sections below.

3.1 Existing Conditions

The existing (pre-development) condition reflects the previously established land use and hydrologic inputs to the wetland catchment, with minor refinements incorporated as part of this update. These refinements include only a correction to the extent of landscaped area. Detailed pre-development water balance calculations are provided in **Table 2, Appendix A.**

3.2 Proposed Conditions

The proposed development introduces additional impervious surfaces associated with buildings and access areas. Minor refinements have been incorporated into the post-development condition, including adjustments to impervious and pervious areas to account for the pervious centre of the roundabout. Post-development (unmitigated) water balance calculations are detailed in **Table 3, Appendix** A

3.3 Summary of Water Balance Analysis

A summary of the updated water balance results are provided below. Detailed calculations are included in the appended water balance tables which are summarized in **Table 5, Appendix A.**

Condition	AET (m^3/yr)	Evaporation (m^3/yr)	Infiltration (m^3/yr)	Runoff (m^3/yr)
Pre-Development	**32,620**	**3,429**	**11,612**	**23,705**
Post-Development (Unmitigated)	**32,009**	**3,561**	**11,316**	**24,481**
Difference	**-611**	**+132**	**-296**	**+775**

3.4 Post-Development Water Balance with Mitigation

The updated water balance incorporates on-site mitigation measures including green roof capture and roof runoff storage for irrigation. These measures function to reduce effective runoff to the wetland through evapotranspiration and reuse. The updated mitigation measures are incorporated in the water balance calculations presented in **Table 4, Appendix A.**

With mitigation, the water balance results are as follows:

Condition	AET (m^3/yr)	Evaporation (m^3/yr)	Infiltration (m^3/yr)	Runoff (m^3/yr)
Post-Development (Mitigated)	**32,787**	**3,561**	**11,316**	**23,702**
Difference from Pre-Development	**+167**	**+132**	**-296**	**-3**

4.0 Conclusion and Recommendations

The updated analysis indicates that the revised stormwater management strategy effectively offsets the increase in runoff associated with the proposed development. With implementation of the on-site mitigation measures, post-development runoff to the wetland catchment is consistent with pre-development conditions.

A small residual reduction in infiltration remains; however, this difference is minor in magnitude relative to the overall water balance and is not expected to result in a measurable impact to the wetland feature. Based on the results of the updated assessment, no additional mitigation measures are considered necessary.

Should you have any questions regarding these findings, please contact the undersigned.

Sincerely,
DS Consultants Limited

Prepared By:

Scott Watson, B.A.T.
Senior Project Manager - Hydrogeology

Reviewed By:

Don Hsu., P.Eng.
Manager - Hydrogeology

Enclosures:
Figure 1- Pre-Development Conceptual Model
Figure 2- Post-Development Conceptual Model
Appendix A- Water Balance Tables
Appendix B- Wetland Risk Evaluation and Feature Based Water Balance Study Report (Original)

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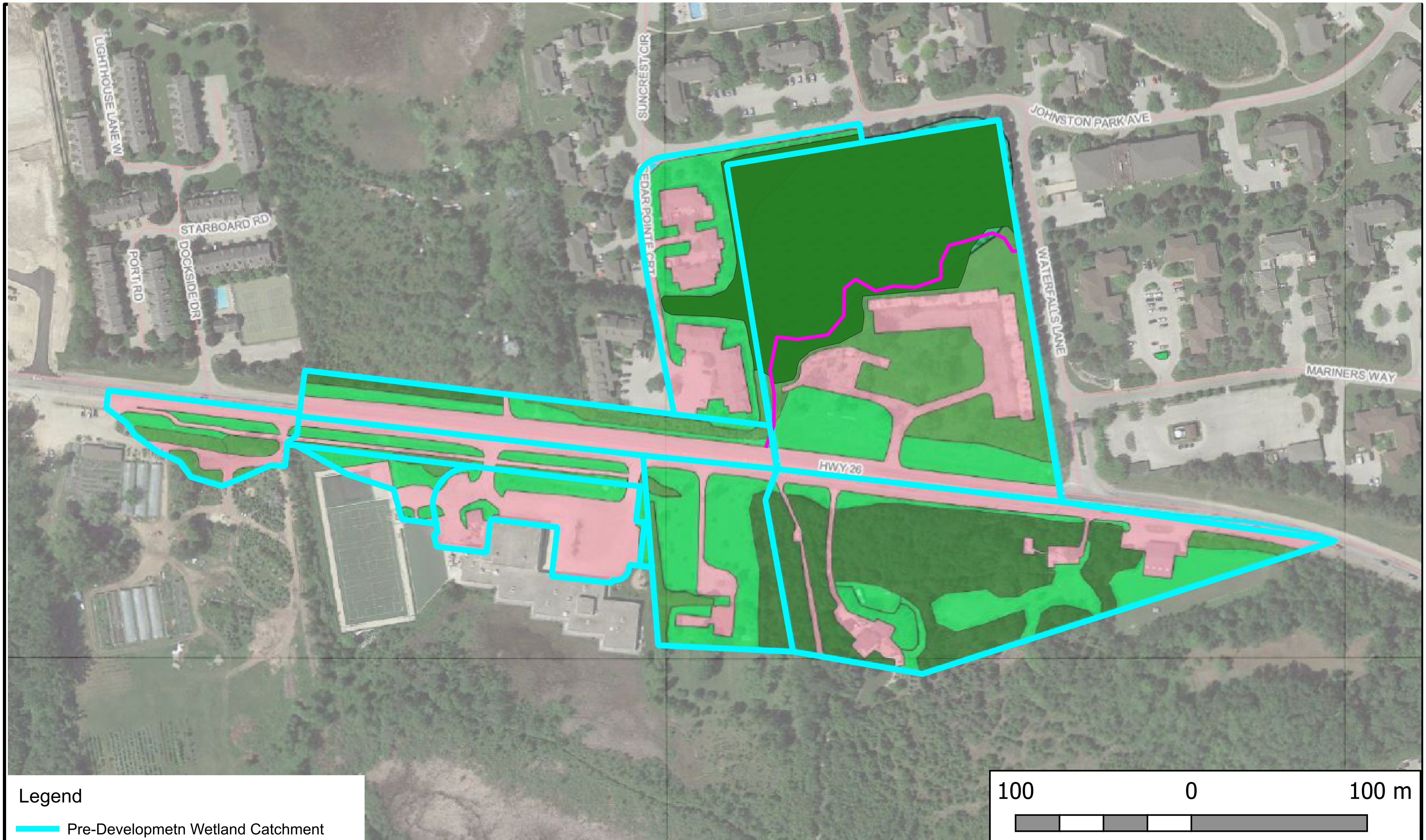


Legend

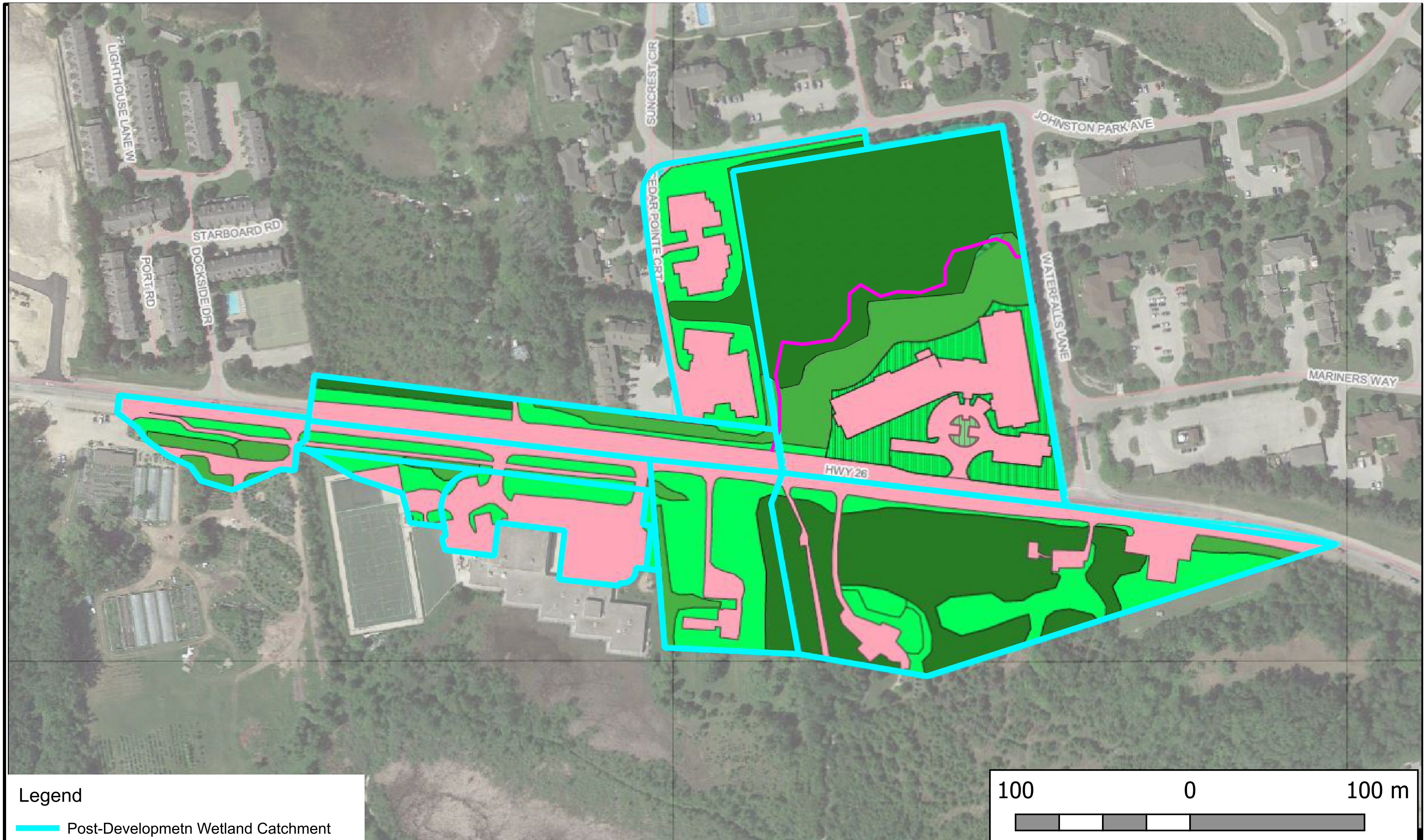
- Pre-Developmetn Wetland Catchment
- TA9135_StakedWetlandJuly2022
- Impervious Surface
- Mature Forest
- Pasture & Shrub
- Landscaped Surface
- Landscaped Surface (10% reduction)

DS CONSULTANTS LTD.
6221 Highway 7, UNIT 16
Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project:	Wetland Risk Evaluation & Feature Water Balance Study Proposed Development 11476 Highway 26, Collingwood, ON.
Title:	**Pre-Development Conceptual Model**
Client:	Integricon Property Restoration and Construction Group Inc. (IPCG)
Size:	8.5 x 11
Rev:	0
Approved By:	DH
Drawn By:	S.W
Date:	April 2026
Scale:	As Shown
Project No.:	22-189-401
Figure No.:	1
Image/Map Source:	*Google Satellite Image*

N

C:\Projects\11476 Hwy 26, Collingwood\post-devW1.qgz Apr-15 18:54



Legend

- Post-Developmetn Wetland Catchment
- TA9135_StakedWetlandJuly2022
- Impervious Surface
- Mature Forest
- Pasture & Shrub
- Landscaped Surface
- Landscaped Surface (10% reduction)

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Vaughan, Ontario L4H 0K8
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www.dsconsultants.ca

Project: Wetland Risk Evaluation & Feature Water Balance Study
Proposed Development 11476 Highway 26, Collingwood, ON.

Title: **Post-Development Conceptual Model**

Client: Integricon Property Restoration and Construction Group Inc. (IPCG)

Size: 8.5 x 11	Approved By: DH	Drawn By: S.W	Date: April 2026
Rev: 0	Scale: As Shown	Project No.: 22-189-401	Figure No.: 2
	Image/Map Source: *Google Satellite Image*		

TABLE 1
CLIMATE NORMALS 1991-2020 (EGBERT CLIMATE STATION)
11476 Highway 26, Collingwood, ON

Station	Climate ID	WMO ID	TC ID	Latitude	Longitude	Elevation (m)
EGBERT	6110+03	71296	XET	44°14'00.000" N	79°47'00.000" W	251

	Thornthwaite (1948)					
Month	**Mean Temperature (°C)**	**Heat Index**	**Unadjusted Potential Evapotranspiration (mm)**	**Daylight Correction Value**	**Adjusted Potential Evapotranspiration (mm)**	**Total Precipitation (mm)**
January	-7.2	0.0	0.0	0.77	0.0	54.7
February	-6.4	0.0	0.0	0.87	0.0	44.7
March	-1.3	0.0	0.0	0.99	0.0	47.9
April	5.6	1.2	25.7	1.12	28.8	61.6
May	12.3	3.9	59.4	1.23	73.0	73.9
June	17.5	6.7	86.4	1.29	111.4	83.0
July	20.1	8.2	100.1	1.26	126.1	77.9
August	19.2	7.7	95.3	1.16	110.6	82.6
September	15.3	5.4	74.9	1.04	77.9	72.3
October	8.9	2.4	42.1	0.92	38.7	65.4
November	2.7	0.4	11.8	0.81	9.6	71.8
December	-3.2	0.0	0.0	0.75	0.0	57.6
TOTALS		**35.9**	**495.6**		**576.0**	**793.4**

Notes: Daylight Correction values obtained from Instruction and Tables For Computing Potential Evapotranspiration and The Water Balance (Thornthwaite & Mather, 1957)

TABLE 2

Pre-development Water Balance

11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.78	73.00	111.41	126.10	110.57	77.86	38.70	9.58	0.00	0.00	0.00	576.00
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	793.40
		P-PET (mm)	47.90	32.82	0.90	-28.41	-48.20	-27.97	-5.56	26.70	62.22	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.41	-76.61	-104.57	-110.13	-83.44	-21.22	0.00	0.00	0.00	-
Wetland Catchment	Pervious Area (Forest)	**Soil Moisture Storage (mm)**	300.00	300.00	300.00	271.59	223.39	195.43	189.87	216.56	278.78	300.00	300.00	300.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	110.07	117.66	102.12	75.87	38.70	9.58	0.00	0.00	0.00	**555.79**
		P-AET (mm)	47.90	32.82	0.90	-27.07	-39.76	-19.52	-3.57	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-27.07	-66.83	-86.35	-89.92	-63.22	-1.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	27.07	39.76	19.52	3.57	-26.70	-62.22	-1.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	0.00	56.60	54.70	44.70	**237.61**
		MECP Infiltration Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	-
		Run-Off Coefficient	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	-
		Infiltration (mm)	38.32	26.25	0.72	0.00	0.00	0.00	0.00	0.00	0.00	45.28	43.76	35.76	**190.09**
		Run-Off (mm)	9.58	6.56	0.18	0.00	0.00	0.00	0.00	0.00	0.00	11.32	10.94	8.94	**47.52**
		Catchment Area (m^2) = 28814	**Monthly Volumes**												
		Total AET (m^3)	0.00	829.36	2103.51	3171.43	3390.28	2942.55	2186.09	1115.19	276.04	0.00	0.00	0.00	**16014.45**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	1104.15	756.46	20.67	0.00	0.00	0.00	0.00	0.00	0.00	1304.68	1260.90	1030.39	**5477.26**
		Total Runoff (m^3)	276.04	189.12	5.17	0.00	0.00	0.00	0.00	0.00	0.00	326.17	315.23	257.60	**1369.31**
	Pervious Area (Pasture / Shrub)	**Soil Moisture Storage (mm)**	150.00	150.00	150.00	121.59	73.39	45.43	39.87	66.56	128.78	150.00	150.00	150.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	108.72	109.22	93.68	73.88	38.70	9.58	0.00	0.00	0.00	**535.57**
		P-AET (mm)	47.90	32.82	0.90	-25.72	-31.32	-11.08	-1.58	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-25.72	-57.05	-68.12	-69.70	-43.01	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	25.72	31.32	11.08	1.58	-26.70	-43.01	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	19.21	57.60	54.70	44.70	**257.83**
		MECP Infiltration Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	-
		Run-Off Coefficient	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	-
		Infiltration (mm)	35.93	24.61	0.67	0.00	0.00	0.00	0.00	0.00	14.41	43.20	41.03	33.53	**193.37**
		Run-Off (mm)	11.98	8.20	0.22	0.00	0.00	0.00	0.00	0.00	4.80	14.40	13.68	11.18	**64.46**
		Catchment Area (m^2) = 10074	**Monthly Volumes**												
		Total AET (m^3)	0.00	289.96	735.43	1095.25	1100.33	943.70	744.27	389.90	96.51	0.00	0.00	0.00	**5395.35**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	361.91	247.95	6.78	0.00	0.00	0.00	0.00	0.00	145.18	435.20	413.29	337.73	**1948.02**
		Total Runoff (m^3)	120.64	82.65	2.26	0.00	0.00	0.00	0.00	0.00	48.39	145.07	137.76	112.58	**649.34**
	Pervious Area (Landscaped)	**Soil Moisture Storage (mm)**	75.00	75.00	75.00	46.59	0.00	0.00	0.00	26.70	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	106.03	92.87	82.60	72.30	38.70	9.58	0.00	0.00	0.00	**503.87**
		P-AET (mm)	47.90	32.82	0.90	-23.03	-14.97	0.00	0.00	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-23.03	-38.00	-38.00	-38.00	-11.30	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	23.03	14.97	0.00	0.00	-26.70	-11.30	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	50.92	57.60	54.70	44.70	**289.53**
		MECP Infiltration Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	-
		Run-Off Coefficient	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	-
		Infiltration (mm)	31.14	21.33	0.58	0.00	0.00	0.00	0.00	0.00	33.10	37.44	35.56	29.06	**188.20**
		Run-Off (mm)	16.77	11.49	0.31	0.00	0.00	0.00	0.00	0.00	17.82	20.16	19.15	15.65	**101.34**
		Catchment Area (m^2) = 22248	**Monthly Volumes**												
		Total AET (m^3)	0.00	640.37	1624.18	2358.95	2066.16	1837.68	1608.53	861.07	213.14	0.00	0.00	0.00	**11210.08**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	692.69	474.57	12.97	0.00	0.00	0.00	0.00	0.00	736.33	832.97	791.03	646.42	**4186.96**
		Total Runoff (m^3)	372.99	255.54	6.98	0.00	0.00	0.00	0.00	0.00	396.48	448.52	425.94	348.07	**2254.52**
	Impervious Area (Buildings and Driveway)	**Precipitation Surplus (mm)**	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793.40**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	**119.01**
		Run-Off (mm)	40.72	52.36	62.82	70.55	66.22	70.21	61.46	55.59	61.03	48.96	46.50	38.00	**674.39**
		Catchment Area (m^2) = 28814	**Monthly Volumes**												
		Total AET (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Evaporation (m^3)	207.03	266.24	319.40	358.73	336.69	357.01	312.49	282.67	310.33	248.95	236.42	193.20	**3429.15**
		Total Infiltration (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Runoff (m^3)	1173.16	1508.70	1809.95	2032.83	1907.92	2023.03	1770.76	1601.77	1758.52	1410.73	1339.71	1094.79	**19431.87**
	Site Total Monthly Volumes														
		Total AET (m^3)	0.00	1759.70	4463.12	6625.62	6556.77	5723.93	4538.89	2366.16	585.70	0.00	0.00	0.00	**32,620**
		Total Evaporation (m^3)	207.03	266.24	319.40	358.73	336.69	357.01	312.49	282.67	310.33	248.95	236.42	193.20	**3,429**
		Total Infiltration (m^3)	2158.75	1478.98	40.42	0.00	0.00	0.00	0.00	0.00	881.50	2572.84	2465.21	2014.54	**11,612**
		Total Runoff (m^3)	1942.82	2036.00	1824.36	2032.83	1907.92	2023.03	1770.76	1601.77	2203.39	2330.49	2218.63	1813.03	**23,705**

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TABLE 3

Post-development Water Balance

11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			March	April	May	June	July	August	September	October	November	December	January	February	Total
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.78	73.00	111.41	126.10	110.57	77.86	38.70	9.58	0.00	0.00	0.00	**576.00**
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793.40**
		P-PET (mm)	47.90	32.82	0.90	-28.41	-48.20	-27.97	-5.56	26.70	62.22	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.41	-76.61	-104.57	-110.13	-83.44	-21.22	0.00	0.00	0.00	-
Wetland Catchment	Pervious Area (Forest)	Soil Moisture Storage (mm)	300.00	300.00	300.00	271.59	223.39	195.43	189.87	216.56	278.78	300.00	300.00	300.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	110.07	117.66	102.12	75.87	38.70	9.58	0.00	0.00	0.00	**555.79**
		P-AET (mm)	47.90	32.82	0.90	-27.07	-39.76	-19.52	-3.57	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-27.07	-66.83	-86.35	-89.92	-63.22	-1.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	27.07	39.76	19.52	3.57	-26.70	-62.22	-1.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	0.00	56.60	54.70	44.70	**237.61**
		MECP Infiltration Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	-
		Run-Off Coefficient	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	-
		Infiltration (mm)	38.32	26.25	0.72	0.00	0.00	0.00	0.00	0.00	0.00	45.28	43.76	35.76	**190.09**
		Run-Off (mm)	9.58	6.56	0.18	0.00	0.00	0.00	0.00	0.00	0.00	11.32	10.94	8.94	**47.52**
		Catchment Area (m^2) = 28814	Monthly Volumes												
		Total AET (m^3)	0.00	829.36	2103.51	3171.43	3390.28	2942.55	2186.09	1115.19	276.04	0.00	0.00	0.00	**16014.45**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	1104.15	756.46	20.67	0.00	0.00	0.00	0.00	0.00	0.00	1304.68	1260.90	1030.39	**5477.26**
		Total Runoff (m^3)	276.04	189.12	5.17	0.00	0.00	0.00	0.00	0.00	0.00	326.17	315.23	257.60	**1369.31**
	Pervious Area (Pasture / Shrub)	Soil Moisture Storage (mm)	150.00	150.00	150.00	121.59	73.39	45.43	39.87	66.56	128.78	150.00	150.00	150.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	108.72	109.22	93.68	73.88	38.70	9.58	0.00	0.00	0.00	**535.57**
		P-AET (mm)	47.90	32.82	0.90	-25.72	-31.32	-11.08	-1.58	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-25.72	-57.05	-68.12	-69.70	-43.01	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	25.72	31.32	11.08	1.58	-26.70	-43.01	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	19.21	57.60	54.70	44.70	**257.83**
		MECP Infiltration Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	-
		Run-Off Coefficient	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	-
		Infiltration (mm)	35.93	24.61	0.67	0.00	0.00	0.00	0.00	0.00	14.41	43.20	41.03	33.53	**193.37**
		Run-Off (mm)	11.98	8.20	0.22	0.00	0.00	0.00	0.00	0.00	4.80	14.40	13.68	11.18	**64.46**
		Catchment Area (m^2) = 8431	Monthly Volumes												
		Total AET (m^3)	0.00	242.67	615.49	916.62	920.87	789.79	622.88	326.31	80.77	0.00	0.00	0.00	**4515.41**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	302.88	207.51	5.67	0.00	0.00	0.00	0.00	0.00	121.50	364.22	345.88	282.65	**1630.31**
		Total Runoff (m^3)	100.96	69.17	1.89	0.00	0.00	0.00	0.00	0.00	40.50	121.41	115.29	94.22	**543.44**
	Pervious Area (Landscaped)	Soil Moisture Storage (mm)	75.00	75.00	75.00	46.59	0.00	0.00	0.00	26.70	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	106.03	92.87	82.60	72.30	38.70	9.58	0.00	0.00	0.00	**503.87**
		P-AET (mm)	47.90	32.82	0.90	-23.03	-14.97	0.00	0.00	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-23.03	-38.00	-38.00	-38.00	-11.30	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	23.03	14.97	0.00	0.00	-26.70	-11.30	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	50.92	57.60	54.70	44.70	**289.53**
		MECP Infiltration Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	-
		Run-Off Coefficient	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	-
		Infiltration (mm)	31.14	21.33	0.58	0.00	0.00	0.00	0.00	0.00	33.10	37.44	35.56	29.06	**188.20**
		Run-Off (mm)	16.77	11.49	0.31	0.00	0.00	0.00	0.00	0.00	17.82	20.16	19.15	15.65	**101.34**
		Catchment Area (m^2) = 18595	Monthly Volumes												
		Total AET (m^3)	0.00	535.23	1357.49	1971.62	1726.91	1535.95	1344.42	719.69	178.14	0.00	0.00	0.00	**9369.45**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	578.96	396.65	10.84	0.00	0.00	0.00	0.00	0.00	615.43	696.20	661.15	540.28	**3499.49**
		Total Runoff (m^3)	311.75	213.58	5.84	0.00	0.00	0.00	0.00	0.00	331.38	374.88	356.00	290.92	**1884.34**
	Pervious Area (Landscaped with 10% reduction in infiltration) (Landscaped)	Soil Moisture Storage (mm)	75.00	75.00	75.00	46.59	0.00	0.00	0.00	26.70	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	106.03	92.87	82.60	72.30	38.70	9.58	0.00	0.00	0.00	**503.87**
		P-AET (mm)	47.90	32.82	0.90	-23.03	-14.97	0.00	0.00	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-23.03	-38.00	-38.00	-38.00	-11.30	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	23.03	14.97	0.00	0.00	-26.70	-11.30	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	50.92	57.60	54.70	44.70	**289.53**
		MECP Infiltration Factor	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	-
		Run-Off Coefficient	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	-
		Infiltration (mm)	28.02	19.20	0.52	0.00	0.00	0.00	0.00	0.00	29.79	33.70	32.00	26.15	**169.38**
		Run-Off (mm)	19.88	13.62	0.37	0.00	0.00	0.00	0.00	0.00	21.13	23.90	22.70	18.55	**120.16**
		Catchment Area (m^2) = 4186	Monthly Volumes												
		Total AET (m^3)	0.00	120.49	305.59	443.84	388.75	345.76	302.65	162.01	40.10	0.00	0.00	0.00	**2109.20**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	117.30	80.36	2.20	0.00	0.00	0.00	0.00	0.00	124.69	141.05	133.95	109.46	**709.01**
		Total Runoff (m^3)	83.21	57.01	1.56	0.00	0.00	0.00	0.00	0.00	88.45	100.06	95.02	77.65	**502.97**

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TABLE 3

Post-development Water Balance

11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.78	73.00	111.41	126.10	110.57	77.86	38.70	9.58	0.00	0.00	0.00	576.00
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	793.40
		P-PET (mm)	47.90	32.82	0.90	-28.41	-48.20	-27.97	-5.56	26.70	62.22	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.41	-76.61	-104.57	-110.13	-83.44	-21.22	0.00	0.00	0.00	-
Wetland Catchment (continued)	Impervious Area (Buildings and Driveway)	Precipitation Surplus (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	793.40
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	119.01
		Run-Off (mm)	40.72	52.36	62.82	70.55	66.22	70.21	61.46	55.59	61.03	48.96	46.50	38.00	674.39
		Catchment Area (m^2) = 29924	Monthly Volumes												
		Total AET (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total Evaporation (m^3)	215.00	276.50	331.71	372.55	349.66	370.76	324.53	293.55	322.28	258.54	245.53	200.64	3561.26
		Total Infiltration (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total Runoff (m^3)	1218.36	1566.82	1879.68	2111.14	1981.42	2100.96	1838.98	1663.48	1826.26	1465.08	1391.32	1136.96	20180.45
	Site Total Monthly Volumes														
		Total AET (m^3)	0.00	1727.75	4382.09	6503.51	6426.81	5614.04	4456.04	2323.20	575.06	0.00	0.00	0.00	32,009
		Total Evaporation (m^3)	215.00	276.50	331.71	372.55	349.66	370.76	324.53	293.55	322.28	258.54	245.53	200.64	3,561
		Total Infiltration (m^3)	2103.29	1440.98	39.38	0.00	0.00	0.00	0.00	0.00	861.61	2506.15	2401.88	1962.78	11,316
		Total Runoff (m^3)	1990.31	2095.69	1894.13	2111.14	1981.42	2100.96	1838.98	1663.48	2286.60	2387.59	2272.86	1857.35	24,481

TABLE 4

Post-development Water Balance With Mitigation

11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			March	April	May	June	July	August	September	October	November	December	January	February	Total
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.78	73.00	111.41	126.10	110.57	77.86	38.70	9.58	0.00	0.00	0.00	576.00
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	793.40
		P-PET (mm)	47.90	32.82	0.90	-28.41	-48.20	-27.97	-5.56	26.70	62.22	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.41	-76.61	-104.57	-110.13	-83.44	-21.22	0.00	0.00	0.00	-
Wetland Catchment	Pervious Area (Forest)	**Soil Moisture Storage (mm)**	300.00	300.00	300.00	271.59	223.39	195.43	189.87	216.56	278.78	300.00	300.00	300.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	110.07	117.66	102.12	75.87	38.70	9.58	0.00	0.00	0.00	**555.79**
		P-AET (mm)	47.90	32.82	0.90	-27.07	-39.76	-19.52	-3.57	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-27.07	-66.83	-86.35	-89.92	-63.22	-1.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	27.07	39.76	19.52	3.57	-26.70	-62.22	-1.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	0.00	56.60	54.70	44.70	**237.61**
		MECP Infiltration Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	-
		Run-Off Coefficient	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	-
		Infiltration (mm)	38.32	26.25	0.72	0.00	0.00	0.00	0.00	0.00	0.00	45.28	43.76	35.76	**190.09**
		Run-Off (mm)	9.58	6.56	0.18	0.00	0.00	0.00	0.00	0.00	0.00	11.32	10.94	8.94	**47.52**
		Catchment Area (m^2) = 28814	**Monthly Volumes**												
		Total AET (m^3)	0.00	829.36	2103.51	3171.43	3390.28	2942.55	2186.09	1115.19	276.04	0.00	0.00	0.00	**16014.45**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	1104.15	756.46	20.67	0.00	0.00	0.00	0.00	0.00	0.00	1304.68	1260.90	1030.39	**5477.26**
		Total Runoff (m^3)	276.04	189.12	5.17	0.00	0.00	0.00	0.00	0.00	0.00	326.17	315.23	257.60	**1369.31**
	Pervious Area (Pasture / Shrub)	**Soil Moisture Storage (mm)**	150.00	150.00	150.00	121.59	73.39	45.43	39.87	66.56	128.78	150.00	150.00	150.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	108.72	109.22	93.68	73.88	38.70	9.58	0.00	0.00	0.00	**535.57**
		P-AET (mm)	47.90	32.82	0.90	-25.72	-31.32	-11.08	-1.58	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-25.72	-57.05	-68.12	-69.70	-43.01	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	25.72	31.32	11.08	1.58	-26.70	-43.01	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	19.21	57.60	54.70	44.70	**257.83**
		MECP Infiltration Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	-
		Run-Off Coefficient	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	-
		Infiltration (mm)	35.93	24.61	0.67	0.00	0.00	0.00	0.00	0.00	14.41	43.20	41.03	33.53	**193.37**
		Run-Off (mm)	11.98	8.20	0.22	0.00	0.00	0.00	0.00	0.00	4.80	14.40	13.68	11.18	**64.46**
		Catchment Area (m^2) = 8431	**Monthly Volumes**												
		Total AET (m^3)	0.00	242.67	615.49	916.62	920.87	789.79	622.88	326.31	80.77	0.00	0.00	0.00	**4515.41**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	302.88	207.51	5.67	0.00	0.00	0.00	0.00	0.00	121.50	364.22	345.88	282.65	**1630.31**
		Total Runoff (m^3)	100.96	69.17	1.89	0.00	0.00	0.00	0.00	0.00	40.50	121.41	115.29	94.22	**543.44**
	Pervious Area (Landscaped)	**Soil Moisture Storage (mm)**	75.00	75.00	75.00	46.59	0.00	0.00	0.00	26.70	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	106.03	92.87	82.60	72.30	38.70	9.58	0.00	0.00	0.00	**503.87**
		P-AET (mm)	47.90	32.82	0.90	-23.03	-14.97	0.00	0.00	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-23.03	-38.00	-38.00	-38.00	-11.30	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	23.03	14.97	0.00	0.00	-26.70	-11.30	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	50.92	57.60	54.70	44.70	**289.53**
		MECP Infiltration Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	-
		Run-Off Coefficient	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	-
		Infiltration (mm)	31.14	21.33	0.58	0.00	0.00	0.00	0.00	0.00	33.10	37.44	35.56	29.06	**188.20**
		Run-Off (mm)	16.77	11.49	0.31	0.00	0.00	0.00	0.00	0.00	17.82	20.16	19.15	15.65	**101.34**
		Catchment Area (m^2) = 18595	**Monthly Volumes**												
		Total AET (m^3)	0.00	535.23	1357.49	1971.62	1726.91	1535.95	1344.42	719.69	178.14	0.00	0.00	0.00	**9369.45**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	578.96	396.65	10.84	0.00	0.00	0.00	0.00	0.00	615.43	696.20	661.15	540.28	**3499.49**
		Total Runoff (m^3)	311.75	213.58	5.84	0.00	0.00	0.00	0.00	0.00	331.38	374.88	356.00	290.92	**1884.34**
	Pervious Area (Landscaped with 10% reduction in infiltration) (Landscaped)	**Soil Moisture Storage (mm)**	75.00	75.00	75.00	46.59	0.00	0.00	0.00	26.70	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.78	73.00	106.03	92.87	82.60	72.30	38.70	9.58	0.00	0.00	0.00	**503.87**
		P-AET (mm)	47.90	32.82	0.90	-23.03	-14.97	0.00	0.00	26.70	62.22	57.60	54.70	44.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-23.03	-38.00	-38.00	-38.00	-11.30	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	23.03	14.97	0.00	0.00	-26.70	-11.30	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.82	0.90	0.00	0.00	0.00	0.00	0.00	50.92	57.60	54.70	44.70	**289.53**
		MECP Infiltration Factor	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	-
		Run-Off Coefficient	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	-
		Infiltration (mm)	28.02	19.20	0.52	0.00	0.00	0.00	0.00	0.00	29.79	33.70	32.00	26.15	**169.38**
		Run-Off (mm)	19.88	13.62	0.37	0.00	0.00	0.00	0.00	0.00	21.13	23.90	22.70	18.55	**120.16**
		Catchment Area (m^2) = 4186	**Monthly Volumes**												
		Total AET (m^3)	0.00	120.49	305.59	443.84	388.75	345.76	302.65	162.01	40.10	0.00	0.00	0.00	**2109.20**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	117.30	80.36	2.20	0.00	0.00	0.00	0.00	0.00	124.69	141.05	133.95	109.46	**709.01**
		Total Runoff (m^3)	83.21	57.01	1.56	0.00	0.00	0.00	0.00	0.00	88.45	100.06	95.02	77.65	**502.97**

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TABLE 4

Post-development Water Balance With Mitigation

11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			March	April	May	June	July	August	September	October	November	December	January	February	Total
			Month												
PET - Adjusted Potential Evapotranspiration (mm)			0.00	28.78	73.00	111.41	126.10	110.57	77.86	38.70	9.58	0.00	0.00	0.00	576.00
P - Total Precipitation (mm)			47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	793.40
P-PET (mm)			47.90	32.82	0.90	-28.41	-48.20	-27.97	-5.56	26.70	62.22	57.60	54.70	44.70	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-28.41	-76.61	-104.57	-110.13	-83.44	-21.22	0.00	0.00	0.00	-
Wetland Catchment (continued)	Impervious Roof Area to Green Roof	Precipitation Surplus (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793.40**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	**119.01**
		Green Roof Capture (10mm Apr-Nov)	0.00	36.65	43.97	49.39	46.35	49.15	43.02	38.91	42.72	0.00	0.00	0.00	**350.16**
		Runoff (mm)	40.72	15.71	18.84	21.17	19.86	21.06	18.44	16.68	18.31	48.96	46.50	38.00	**324.23**
		Catchment Area (m^2) = 1240	Monthly Volumes												
		Total AET (m^3)	0.00	45.45	54.52	61.24	57.47	60.94	53.34	48.25	52.97	0.00	0.00	0.00	**434.20**
		Total Evaporation (m^3)	8.91	11.46	13.75	15.44	14.49	15.36	13.45	12.16	13.35	10.71	10.17	8.31	**147.57**
		Total Infiltration (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Runoff (m^3)	50.49	19.48	23.37	26.24	24.63	26.12	22.86	20.68	22.70	60.71	57.65	47.11	**402.05**
	Impervious Roof Area to Storage	Precipitation Surplus (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793.40**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	**119.01**
		Storage for Irrigation (2.5mm Apr-Nov) (mm)	0.00	14.66	17.59	19.75	18.54	19.66	17.21	15.57	17.09	0.00	0.00	0.00	**140.06**
		Runoff (mm)	40.72	37.70	45.23	50.80	47.67	50.55	44.25	40.02	43.94	48.96	46.50	38.00	**534.33**
		Catchment Area (m^2) = 2460	Monthly Volumes												
		Total AET (m^3)	0.00	36.07	43.27	48.59	45.61	48.36	42.33	38.29	42.04	0.00	0.00	0.00	**344.55**
		Total Evaporation (m^3)	17.68	22.73	27.27	30.63	28.75	30.48	26.68	24.13	26.49	21.25	20.18	16.49	**292.76**
		Total Infiltration (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Runoff (m^3)	100.16	92.74	111.26	124.96	117.28	124.36	108.85	98.46	108.10	120.44	114.38	93.47	**1314.44**
	Impervious Area (Paved Area/Remaining Building)	Precipitation Surplus (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793.40**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	**119.01**
		Run-Off (mm)	40.72	52.36	62.82	70.55	66.22	70.21	61.46	55.59	61.03	48.96	46.50	38.00	**674.39**
		Catchment Area (m^2) = 26224	Monthly Volumes												
		Total AET (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Evaporation (m^3)	188.42	242.31	290.69	326.49	306.43	324.92	284.40	257.26	282.43	226.58	215.17	175.83	**3120.92**
		Total Infiltration (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Runoff (m^3)	1067.71	1373.09	1647.26	1850.10	1736.42	1841.19	1611.60	1457.79	1600.45	1283.93	1219.28	996.38	**17685.20**
	Site Total Monthly Volumes														
		Total AET (m^3)	0.00	1809.26	4479.88	6613.34	6529.90	5723.35	4551.71	2409.74	670.07	0.00	0.00	0.00	**32,787**
		Total Evaporation (m^3)	215.00	276.50	331.71	372.55	349.66	370.76	324.53	293.55	322.28	258.54	245.53	200.64	**3,561**
		Total Infiltration (m^3)	2103.29	1440.98	39.38	0.00	0.00	0.00	0.00	0.00	861.61	2506.15	2401.88	1962.78	**11,316**
		Total Runoff (m^3)	1990.31	2014.18	1796.34	2001.31	1878.33	1991.66	1743.31	1576.93	2191.59	2387.59	2272.86	1857.35	**23,702**

DS CONSULTANTS LTD.

Geotechnical ❖ Environmental ❖ Materials ❖ Hydrogeology

TABLE 5

Water Balance Summary

11476 Highway 26, Collingwood, ON

Total Site	Month												Total
	March	April	May	June	July	August	September	October	November	December	January	February	
Pre-Development													
Total AET (m^3)	0.00	1759.70	4463.12	6625.62	6556.77	5723.93	4538.89	2366.16	585.70	0.00	0.00	0.00	**32620**
Total Evaporation (m^3)	207.03	266.24	319.40	358.73	336.69	357.01	312.49	282.67	310.33	248.95	236.42	193.20	**3429**
Total Infiltration (m^3)	2158.75	1478.98	40.42	0.00	0.00	0.00	0.00	0.00	881.50	2572.84	2465.21	2014.54	**11612**
Total Runoff (m^3)	1942.82	2036.00	1824.36	2032.83	1907.92	2023.03	1770.76	1601.77	2203.39	2330.49	2218.63	1813.03	**23705**
Post-Development without Mitigation													
Total AET (m^3)	0.00	1727.75	4382.09	6503.51	6426.81	5614.04	4456.04	2323.20	575.06	0.00	0.00	0.00	**32009**
Total Evaporation (m^3)	215.00	276.50	331.71	372.55	349.66	370.76	324.53	293.55	322.28	258.54	245.53	200.64	**3561**
Total Infiltration (m^3)	2103.29	1440.98	39.38	0.00	0.00	0.00	0.00	0.00	861.61	2506.15	2401.88	1962.78	**11316**
Total Runoff (m^3)	1990.31	2095.69	1894.13	2111.14	1981.42	2100.96	1838.98	1663.48	2286.60	2387.59	2272.86	1857.35	**24481**
Post-Development Deficit without Mitigation													
Total AET (m^3)	0.00	31.95	81.03	122.11	129.96	109.89	82.85	42.96	10.63	0.00	0.00	0.00	**611**
Total Evaporation (m^3)	-7.98	-10.26	-12.30	-13.82	-12.97	-13.75	-12.04	-10.89	-11.95	-9.59	-9.11	-7.44	**-132**
Total Infiltration (m^3)	55.46	38.00	1.04	0.00	0.00	0.00	0.00	0.00	19.89	66.69	63.34	51.76	**296**
Total Runoff (m^3)	-47.49	-59.69	-69.77	-78.31	-73.50	-77.93	-68.22	-61.70	-83.20	-57.10	-54.23	-44.32	**-775**
Post-Development with Mitigation													
Total AET (m^3)	0.00	1809.26	4479.88	6613.34	6529.90	5723.35	4551.71	2409.74	670.07	0.00	0.00	0.00	**32787**
Total Evaporation (m^3)	215.00	276.50	331.71	372.55	349.66	370.76	324.53	293.55	322.28	258.54	245.53	200.64	**3561**
Total Infiltration (m^3)	2103.29	1440.98	39.38	0.00	0.00	0.00	0.00	0.00	861.61	2506.15	2401.88	1962.78	**11316**
Total Runoff (m^3)	1990.31	2014.18	1796.34	2001.31	1878.33	1991.66	1743.31	1576.93	2191.59	2387.59	2272.86	1857.35	**23702**
Post-Development Deficit with Mitigation													
Total AET (m^3)	0.00	-49.56	-16.76	12.28	26.87	0.58	-12.82	-43.58	-84.38	0.00	0.00	0.00	**-167**
Total Evaporation (m^3)	-7.98	-10.26	-12.30	-13.82	-12.97	-13.75	-12.04	-10.89	-11.95	-9.59	-9.11	-7.44	**-132**
Total Infiltration (m^3)	55.46	38.00	1.04	0.00	0.00	0.00	0.00	0.00	19.89	66.69	63.34	51.76	**296**
Total Runoff (m^3)	-47.49	21.82	28.02	31.52	29.58	31.37	27.46	24.84	11.81	-57.10	-54.23	-44.32	**3**

Note: negative (-ve) numbers imply net gain

REPORT ON
Wetland Risk Evaluation &
Feature Water Balance Study
Proposed Development
11476 Highway 26, Collingwood, Ontario

Prepared For:
DS Consultants Ltd.

PREPARED BY:
GeoBase Solutions (GBS) Ltd.

Project No: 25-008-100
Date: March 18, 2025

GeoBase Solutions (GBS) Ltd.
73 Pear Blossom Way, Holland Landing,
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Table of Contents

1. INTRODUCTION

GeoBase Solutions Ltd. (GBS) was retained by DS Consultants (Client), to complete a wetland risk evaluation and water balance study for the proposed development located at 11476 Highway 26 in Collingwood, Ontario (Site). The Site has a total area of approximately 2.7 hectares (ha) and was previously developed as a motel with amenities and paved parking in the south half of the property. A coastal wetland (Subject Wetland), known to be part of the Silver Creek Wetland Complex (CL7), is present in the north portion of the Site.

It is understood that the proposed development will consist of two 6 storey residential buildings consisting of 100 and 94 units with facilities and a private driveway. The development will occupy the south portion of the Site in the location of the vacant motel.

This report provides a wetland risk evaluation using Wetland Water Balance Risk Evaluation guidelines (TRCA, Nov 2017), to assess the magnitude of hydrologic change proposed to the Subject Wetland. The report also provides a feature-based water balance assessment using the Thornthwaite and Mather Soil-Moisture Balance methodology (1957). The water balance was completed within the boundaries of the Subject Wetland catchment to provide support for overall servicing and the integration of Low Impact Development (LID) measures.

2. WETLAND CATCHMENT

2.1 Pre-development Wetland Catchment

Pre-development drainage boundaries were provided by Tatham Engineering (Tatham), in their Stormwater Management Report for the Site, as prepared for Integricon Property Restoration and Construction Group Inc., dated February 17, 2023.

The pre-development mapping provided in drawing ODP-1 (Appendix A), shows drainage areas including catchment 101 which captures the entire Site and external drainage areas 1,3,4,5,6,9,10,20,21,22 and 23. Drainage areas 6 and 10 were found to bypass the Subject Wetland via a ditch and culvert along Lighthouse Lane and were excluded from the hydrologic model prepared to quantify pre-development peak flows and storage estimates within the Subject Wetland. For the purposes of this report, drainage areas 6 and 10 were also excluded resulting in a total catchment area of about 9.0 ha. **Figure 1** shows the total catchment area for the Subject Wetland.

2.2 Post-Development Wetland Catchment

Post-development drainage boundaries were also provided by Tatham Engineering (Tatham), in their Stormwater Management Report. Under proposed conditions, external and internal drainage areas will be maintained. Post-development mapping is provided in drawing DP-2 (Appendix B), and shows that catchment 201, which captures the same area as pre-development catchment 101, has an increased percent imperviousness from 25% (existing condition) to 29% (proposed condition). As a result, there is an increased impervious area of 0.124 ha in the proposed condition. **Figure 2** shows the total post-development catchment area for the Subject Wetland.

3. WETLAND RISK EVALUATION

To aid in determining the level of risk and evaluation requirements for the Subject Wetland, an assessment was completed using the Wetland Water Balance Risk Evaluation guidelines provided by the Toronto and Region Conservation Authority (TRCA, Nov 2017). The guideline provides criteria used to evaluate the magnitude of potential hydrological impact on a wetland. The criteria include:

- The proportion of impervious cover in the catchment of the wetland that would result from the proposal;
- The degree of change in the size of the wetland catchment;
- Water taking from, or discharge to, surface water bodies or aquifers directly connected to the wetland, and;
- The impact on locally significant recharge areas.

Considering the above criteria, increases to impervious cover and changes to wetland catchment size were evaluated.

3.1 Impervious Cover Score

An increase in the percent of impervious cover within a wetland catchment has the effect of reducing infiltration and potentially decreasing baseflow and/or interflow contributions to the wetland. It further increases runoff contributions and risks of flooding and potentially increases stormwater sediment and contaminant loading. To assess the risk of the proposed impervious surfaces on sensitive features including the subject wetland, the Impervious Cover Score (S) was calculated for the wetland catchment. The equation defining S is as follows:

$$S = \frac{IC \cdot Cdev}{C}$$

where,
IC - is the proportion of impervious cover proposed within the specific catchment (as a percentage between 0 and 100)
Cdev - is the total proposed development area within the catchment (in ha)
C - is the size of the wetland's catchment (in ha).

Results of the calculation of impervious cover (IC) are provided in **Table 3-1** and show that the catchment for the Subject Wetland is presented with low risk based on the proposed development area with a 65% imperviousness.

Table 3-1 –Impervious Cover Score - Probability and Magnitude of Hydrological Change

Subcatchment Area Name	Pre-development Catchment Size (m2)	Proposed Impervious Cover (m2)	Impervious Cover (S)	Sensitive Feature	Expected magnitude of hydrological change
Subject Wetland	89,950	1,240	0.01	Wetland	Low

Note: * Impervious Cover Score (S) calculated using equation 1 (TRCA - Wetland Water Balance Risk Evaluation, Nov 2017)

3.2 Change in Catchment Size

Changes to catchment size directly effects the volume and timing of stormwater contributions to downgradient features. To evaluate the magnitude of hydrological change these effects can have, pre-development and post-development catchments were compared. **Table 3-2** provides the area breakdown for pre and post-development conditions. The same magnitude thresholds used for impervious cover (10% and 25 %) are used as thresholds to define catchment size alteration. As a result, changes to catchment size for the Subject Wetland is considered to have no risk.

Table 3-2 –Changes to Catchment Size - Probability and Magnitude of Hydrological Change

Subcatchment Area Name	Pre-development catchment area (m2)	Post-Development Catchment Area (m2)	% Change in Catchment Area	Sensitive Feature	Magnitude of Hydrological Change *
Subject Wetland	89,950	89,950	0	Wetland	None

Note: * Based on Table 2: Criteria used to evaluate the probability and magnitude of hydrological change (TRCA - Wetland Water Balance Risk Evaluation, Nov 2017)

3.3 Water Taking from Aquifers Directly Connected to Wetland

When wetlands are directly connected to surface water bodies or to unconfined aquifers, water takings from the contributing water source have the potential to impact wetland hydrology. For the purposes of this evaluation, any water taking which is likely to result in direct alteration of wetland water levels is of potential concern. Permanent or temporary dewatering estimates for the development should be considered. Risk to the Subject Wetland can potentially be mitigated by directing discharged water to the wetland following treatment.

3.4 Recharge Areas

Certain areas within a wetland's surface water and groundwater catchments may be more sensitive to change than others, particularly where these areas act as locally significant groundwater recharge areas.

Considering the water balance in the following section of the report, risks associated with a reduction in groundwater recharge are considered mitigated.

4. WATER BALANCE ASSESSMENT

4.1 Existing Conditions

The Subject Wetland has a total catchment area of 89,950 m^2 and currently consists of developed and undeveloped areas. **Figure 1** shows the pre-development conceptual model considered for establishing current hydrologic conditions. A summary of pre-development wetland catchment land uses is provided below in **table 4-1.**

Table 4-1 –Summary of Pre-development Conditions

Subcatchment Area Name	Pre-development Catchment Size (ha)	Mature Forest (m2)	Pasture & Shrub (m2)	Landscaped Surface (m2)	Impervious Surface (m2)
Subject Wetland	89,950	28,814	10,074	22,865	28,814

4.2 Proposed Development

The post-development catchment for area for the Subject Wetland will be maintained. It is proposed that the development will increase the amount of impervious surface by 1,240 m^2. A summary of post-development wetland catchment land uses is provided below in **table 4-2.**

Table 4-2 –Summary of Post-Development Conditions

Subcatchment Area Name	Pre-development Catchment Size (ha)	Mature Forest (m2)	Pasture & Shrub (m2)	Landscaped Surface (m2)	Impervious Surface (m2)
Subject Wetland	89,950	28,814	8,431	22,650	30,054

4.3 Water Balance Components (Thornthwaite Monthly Water Balance Model)

The Thornthwaite water balance (Thornthwaite, 1948; Mather, 1978; 1979) is an accounting type method used to analyze the allocation of water among various components of the hydrologic cycle. Inputs to the model are monthly temperature, site latitude, and precipitation. Outputs include monthly potential and actual evapotranspiration, evaporation, water surplus, total infiltration, and total runoff. For ease of calculation, a spreadsheet model was used for the computation.

When precipitation (P) occurs, it can either runoff (R) through the surface water system, infiltrate (I) to the water table, or evaporate/evapotranspiration (ET) from the earth's surface and vegetation. The sum of R and I is termed as the water surplus (S). When long-term averages of P, R, I and ET are used, there is no net change in groundwater storage (ST). Annually, however, there is a potential for small changes in ST. The annual water budget can be stated as:

P = ET + R + I + ST

the components are discussed in Section 4.3.1 below.

4.3.1 Pre-development Water Balance

To predict outputs of the pre-development water balance, various inputs were entered into the Thornthwaite model including monthly precipitation and temperature, Site latitude, water holding capacity values for native soils and factors of infiltration. Various inputs and outputs of the model are described in detail below. The detailed calculations are presented in **Appendix C**.

Precipitation (P)

Based on Egbert Climate Station Climate Normals, the average precipitation for the area is about 793 mm/year for the period between 1991 and 2020. Average monthly temperature from this climate data set has been used. The monthly distribution of precipitation is presented in **Table 1, Appendix C**.

Storage (St) and Evapotranspiration / Evaporation (Et)

Groundwater storage (ST) of native soils for the existing Site was estimated using values of Water Holding Capacity (mm) of respective land use and soil types identified in Table 3.1 of the Storm Water Management (SWM) Planning & Design Manual (MOE, March 2003). The land uses, soil types (fine sandy loam) and respective water holding capacities shown in **Table 4-3** were chosen to represent existing conditions and applied to March for monthly calculations.

Table 4-3 Existing Conditions – Water Holding Capacity and AET of Native Soils in Pervious Areas

Land uses / soil types	Water Holding Capacity (mm/year)	AET (mm/year)
Pervious Area (Forest)	300	556
Pervious Area (Pasture / Shrub)	150	535
Pervious Area (Landscaped)	75	503

Using the procedures outlined in the SWM Planning & Design Manual for each of the above land uses and soil types, the annual change in storage is 0. Groundwater storage is the lowest in September for all land use types, and highest from March to May and December to February. The monthly distributions of ST are presented in **Table 2, Appendix C**.

Evapotranspiration (Et)

Monthly Potential Evapotranspiration (PET) is estimated using monthly temperature data and is defined as a water loss from a homogeneous vegetation-covered area that never lacks water (Thornthwaite,1948; Mather, 1978). In the Thornthwaite water balance model, PET is calculated using the Thornthwaite equation (1948);

PET = 16 (L/12) x (N/30) x (10T/I)a

Where:

T = the monthly mean temperature in degrees Celsius

N = the number of days in the month

L = the mean monthly hours of daylight

a = (6.75x10-7)I3 - (7.71x10-5)I2 + (1.792 x 10-2)I + 0.49239

I = Sum of 12 monthly heat index values = (T/5)1.514

The calculated unadjusted annual PET for the study area is 495.6 mm/year. Applying daylight correction values for a latitude of 44o, a total adjusted PET is calculated at 576 or about 73% of the total precipitation. A comparison between PET and Precipitation (P) produces a soil moisture deficit in the order of 110 mm by September.

The calculated Actual Evapotranspiration (AET) is based on PET and changes in ST (Δ ST). Where there is not enough P to satisfy PET, a reduction in ST occurs. As a result, volumes of AET are less than PET. The monthly distribution of ST for the land use/soil types representing existing conditions over the wetland catchment produced an annual AET of 556 mm/yr (Forest), 535 mm/yr (Pasture & Shrub) and 503 mm/yr (Landscaped surface).

Precipitation Surplus (S)

Precipitation surplus for pervious surfaces is calculated as P-AET. A surplus of 238 to 290 mm/year is calculated for the various pervious surfaces. Precipitation surplus for impervious surfaces is calculated as P-ET. A surplus of 674 mm/year (85% of P) is calculated for impervious areas and 119 mm/year (15% of P), is considered for evaporation.

Infiltration (I) and Runoff (R)

For pervious areas, precipitation surplus has two (2) components in the Thornthwaite model: a runoff component (overland flow that occurs when soil moisture capacity is exceeded), and an infiltration component. The accumulation of infiltration factors for topography, soil types and cover as detailed in

Table 3.1 of the SWM Planning & Design Manual, give infiltration factors for existing conditions on the Site as described below in **Table 4-4**.

Table 4-4 Existing Conditions – Infiltration Factor

Land uses / soil types	Topography	Soil	Cover	Total infiltration factor
Pervious Area (Forest) / Fine Sandy Loam	0.30	0.30	0.20	0.80
Pervious Area (Pasture & Shrub) / Fine Sandy Loam	0.30	0.30	0.15	0.75
Pervious Area (Landscaped) / Fine Sandy Loam	0.30	0.30	0.05	0.65

Considering the above infiltration factors, the respective total annual volume of infiltration for the wetland catchment is estimated to be 11,738 m^3/year.

The runoff component calculated in the pre-development model is the remaining volume of precipitation surplus following infiltration. Considering the precipitation surpluses and the total infiltration volume, the total annual volume of runoff directed to the wetland catchment is estimated as 23,772 m^3/year.

Detailed calculations and the monthly distribution of infiltration and runoff are presented in **Table 2, Appendix C**.

4.3.2 Post-development Water Balance

The majority of the post-development wetland catchment stays the same with the exception of an increase of impervious surface (1,240 m2) and a decrease in pasture & shrub and Landscaped surface (1,643 and 214 m2), respectively. A summary of post-development wetland catchment land uses is provided in table 4-2. To predict outputs of the post-development water balance, the same 30-year average climate data and Site latitude inputs were used. Various inputs and outputs of the post-development model are presented in **Table 3, Appendix C**.

Storage (St), Evaporation/Evapotranspiration (Et/AET) and Precipitation Surplus (S)

The same land uses, soil types and respective water holding capacities used in the pre-development water balance were chosen to represent proposed conditions and applied to March for monthly calculations. The calculated Evaporation and Actual Evapotranspiration (Et/AET) for each of the pervious land uses in the post-development water balance is also the same as those described in the pre-development water balance. The monthly distributions of ST are presented in **Table 3, Appendix C**.

Infiltration (I) and Runoff (R)

In the post-development water balance, the accumulation of infiltration factors for topography, soil types and cover are the same as those described in the pre-development water balance. A 10% reduction in the infiltration factor is included to account for soil compaction during construction post-development infiltration factors are provided below in **Table 4-5**.

Table 4-5 Existing Conditions – Infiltration Factor

Land uses / soil types	Topography	Soil	Cover	10% Reduction	Total infiltration factor
Pervious Area (Forest) / Fine Sandy Loam	0.30	0.30	0.20	-	0.80
Pervious Area (Pasture & Shrub) / Fine Sandy Loam	0.30	0.30	0.15	-	0.75
Pervious Area (Landscaped) / Fine Sandy Loam	0.30	0.30	0.05	-	0.65
Pervious Area (Landscaped) / Fine Sandy Loam	0.30	0.30	0.05	- 0.065	0.585

Considering the above infiltration factors, the respective total annual volume of infiltration for the post-development wetland catchment is estimated to be 11,303 m^3/year.

The runoff component calculated in the post-development model is the remaining volume of precipitation surplus following infiltration. Considering the precipitation surpluses and the total infiltration volume, the total runoff directed to the post-development wetland catchment is estimated at 24,557 m^3/year. Detailed calculations and the monthly distribution of infiltration and runoff are presented in **Table 3, Appendix C**.

4.3.3 Water Balance Summary

The results of the pre and post-development water balance shows there is a small infiltration deficit within the developable area of the Site of 435 m^3/yr. This area is completely within the wetland catchment. The water balance also shows there to be an increase in the volume of runoff directed to the wetland estimated at 785 m^3/yr. These changes to wetland hydrology are the result of increases in impervious surface following development. Results of the analysis are summarised below in **Table 4-6**. The detailed calculations are presented in **Table 5, Appendix C**.

Table 4-6 Summary of Water Balance Analysis- Pre-Development and Post-Development

Characteristic	Pre-Development	Post-Development	Change (Pre- to Post Development)
Proposed Development Area (m^2)	89,950	89,950	0
Precipitation (m^3/year)	71,366	71,366	0
Total Evapotranspiration (m^3/year)	0	448	-448
Total Evaporation (m^3/year)	541	438	103
Total Infiltration (m^3/year)	306	128	179
Total Runoff (m^3/year)	2,758	2,591	167

Note: - ve values represent an increase pre to post-development

4.3.4 Post-development Water Balance With Mitigation

To maintain infiltration across the Site and the wetland catchment, a LID strategy has been provided by Tatham in their Stormwater Management Report for the Site. The strategy relies on the use of a rain garden with a stone storage reservoir with the following dimensions.

Length: 90m
Width: 1.5m
Depth: 0.6m
Void Ratio: 40%
Storage: 27m^3 (reported)

Sizing of the facility considered an assumed 15mm/hr infiltration rate including a safety factor of 2. Considering the facilities depth and void ratio, there is a total water depth of 0.24m. Applying the 15mm/hr infiltration rate, the calculated total drawdown time is 1.6 hours and is considered suitable.

The rain garden is designed to accept runoff from the proposed building roofs with a total area of 3000 m^2. Given the size of the drainage area and the storage volume of the rain garden (27 m^3), it is estimated that the reservoir is sized to store a rainfall depth of approximately 9 mm. Using estimated values from Figure 1a - % of Total Annual Average Rainfall Depth Vs. Daily Rainfall Amounts (Wet Weather Flow Management Guidelines, City of Toronto, 2006), the gallery will store roof runoff totally about 67% of the total annual rainfall depth.

Based on the above details, it is estimated that the runoff available for infiltration via the rain garden is 1,416 m^3/yr. Detailed calculations and the monthly distribution of the mitigated water balance for areas contributing to the rain garden are provided in **Table 4, Appendix C**.

As a result of applying the infiltration benefits of the rain garden, the total site infiltration deficit is removed and an increase in annual site infiltration of 982 m^3/yr is estimated. The increased infiltration has a negative effect on available runoff to the wetland with a pre to post-development runoff deficit estimated at 631 m^3/yr. A summary of water balance results is provided in **Table 5, Appendix C**.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on results of this Wetland Risk Evolution, the proposed development will maintain the size of the wetland catchment and will slightly increase impervious surfaces by approximately 1%. Using Wetland Water Balance Risk Evaluation guidelines (TRCA, Nov 2017), the magnitude of hydrologic change is considered low risk. As a result, the feature based water balance assessment completed in this report is considered acceptable given the low level of risk to the wetland.

The mitigated water balance completed for the wetland catchment shows there is an increase in annual site infiltration of 982 m^3/yr and a decrease in runoff estimated at 631 m^3/yr. Considering that the reduction in runoff is small (2.7% of the total annual runoff available to the wetland), and the increase in infiltration upgradient of the wetland provides additional groundwater contributions, potential risks to the wetland are considered very low. The LID design provided by Tatham appears to provide a suitable amount of mitigation to mitigate potential risks to the wetland.

6. GENERAL COMMENTS AND LIMITATIONS OF REPORT

GBS should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, GBS will assume no responsibility for interpretation of the recommendations in the report.

This report is intended solely for the Client named and the owner of the Site who is understood to be Integricon Property Restoration and Construction Group Inc. The material in it reflects our best judgment in light of the information available to GBS at the time of preparation. Unless otherwise agreed in writing by GBS, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on designs and information made available to GBS at the time of writing. The information contained herein in no way reflects on the environmental aspects of the project, including any subsurface and/or groundwater conditions.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GBS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

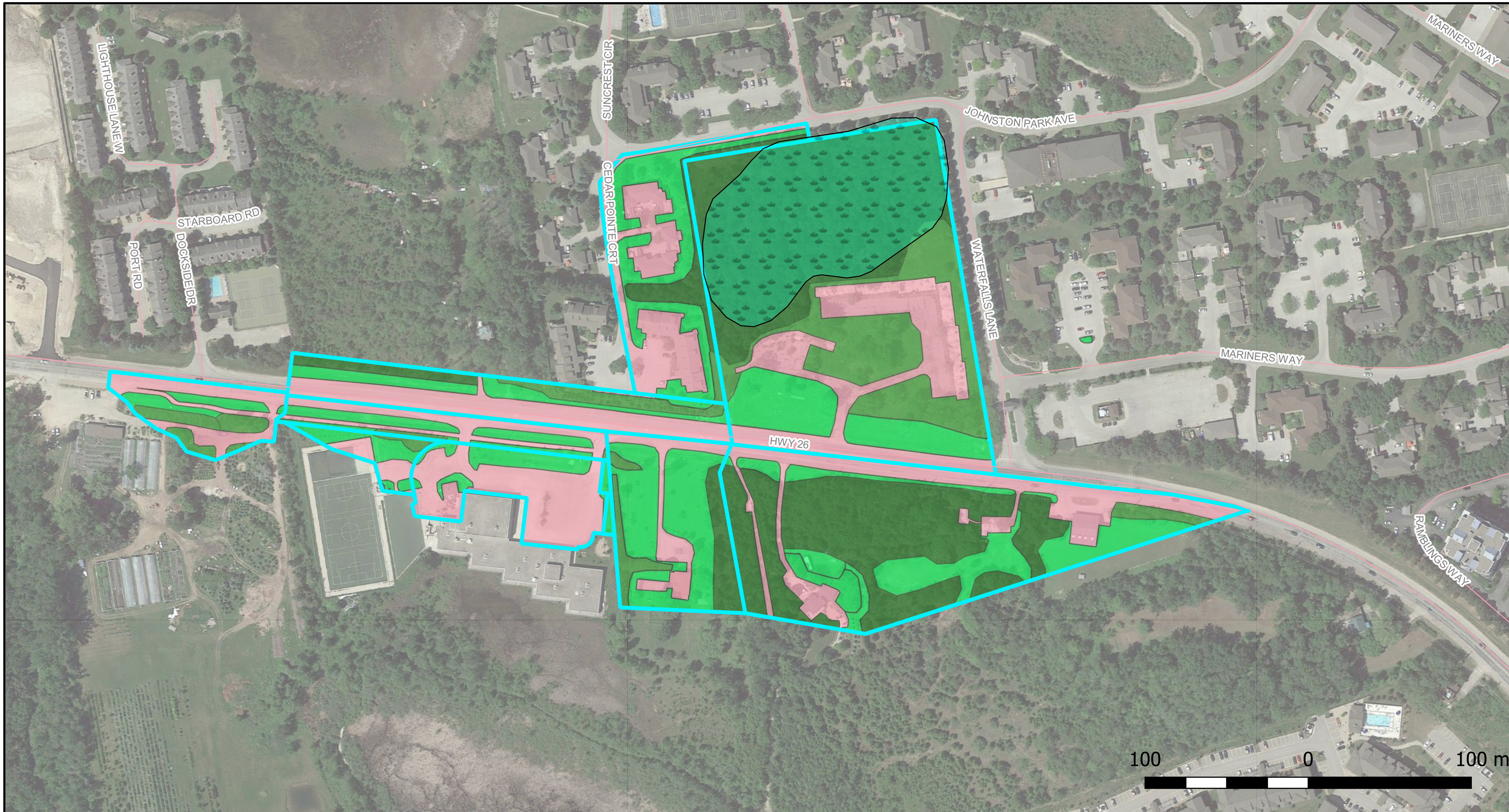
We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

GeoBase Solutions (GBS) Ltd.

Prepared By:

Scott Watson, B.A.T .
Principal

Figures



Legend

- Pre-Development Wetland Catchment
- Subject Wetland
- Impervious Surface
- Landscaped Surface
- Pasture & Shrub
- Mature Forest

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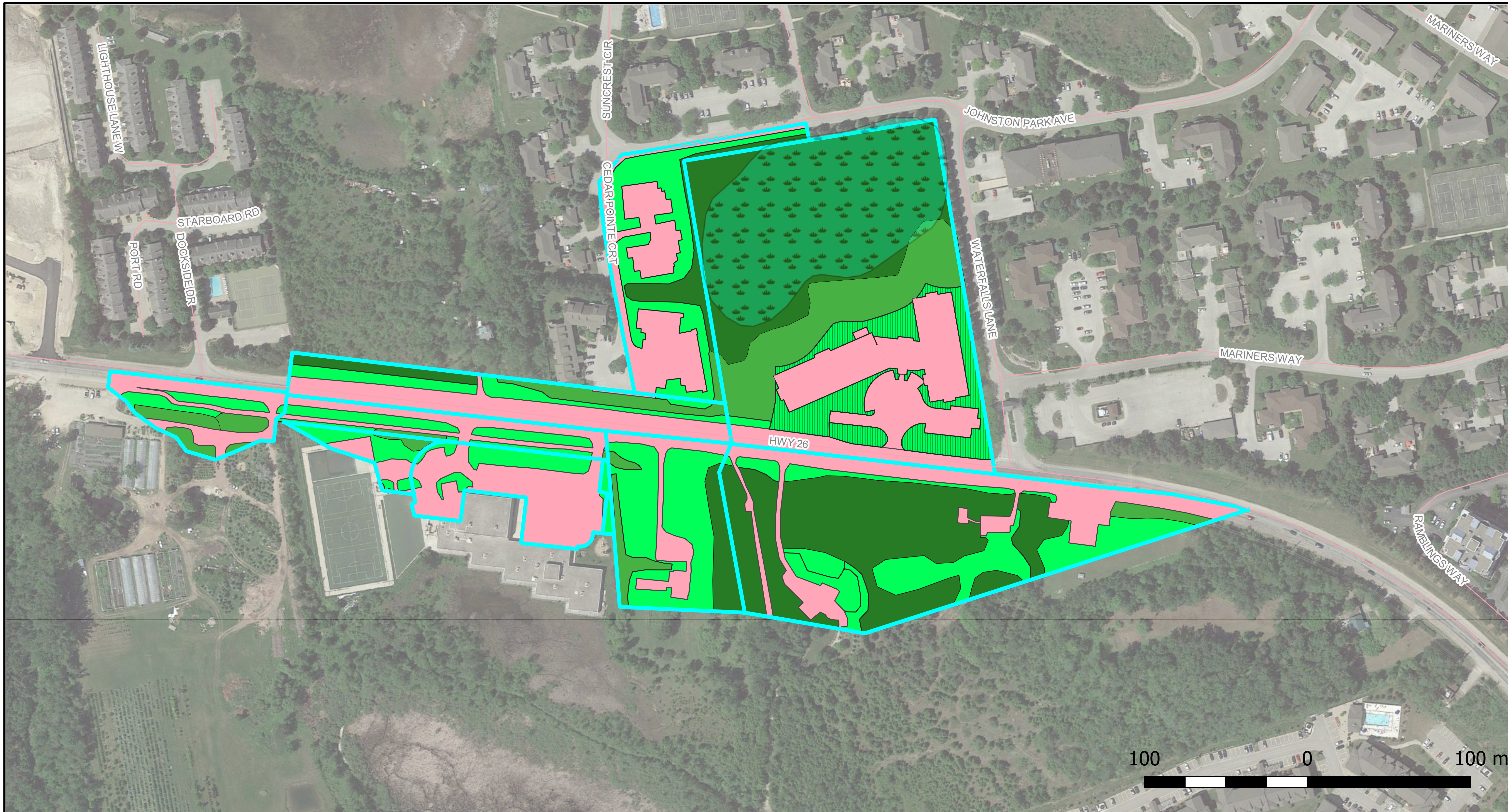
Project:	Wetland Water Balance Study 11476 Highway 26, Collingwood, Ontario						
Title:	Pre-Development Conceptual Model						
Client: DS Consultants Ltd.	Size: 11x17	Approved By:	N.E	Drawn By:	S.W	Date:	March 2025
	Rev. 0	Scale:	As Shown	Project No.:	25-008-100	Figure No.:	1
		Image/Map Source:	Google Satellite Image				



Legend

- Post-Development Wetland Catchment
- Subject Wetland
- Impervious Surface
- Mature Forest
- Pasture & Shrub
- Landscaped Surface
- Landscaped Surface (10% reduction in infiltration)

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Project:	Wetland Water Balance Study 11476 Highway 26, Collingwood, Ontario
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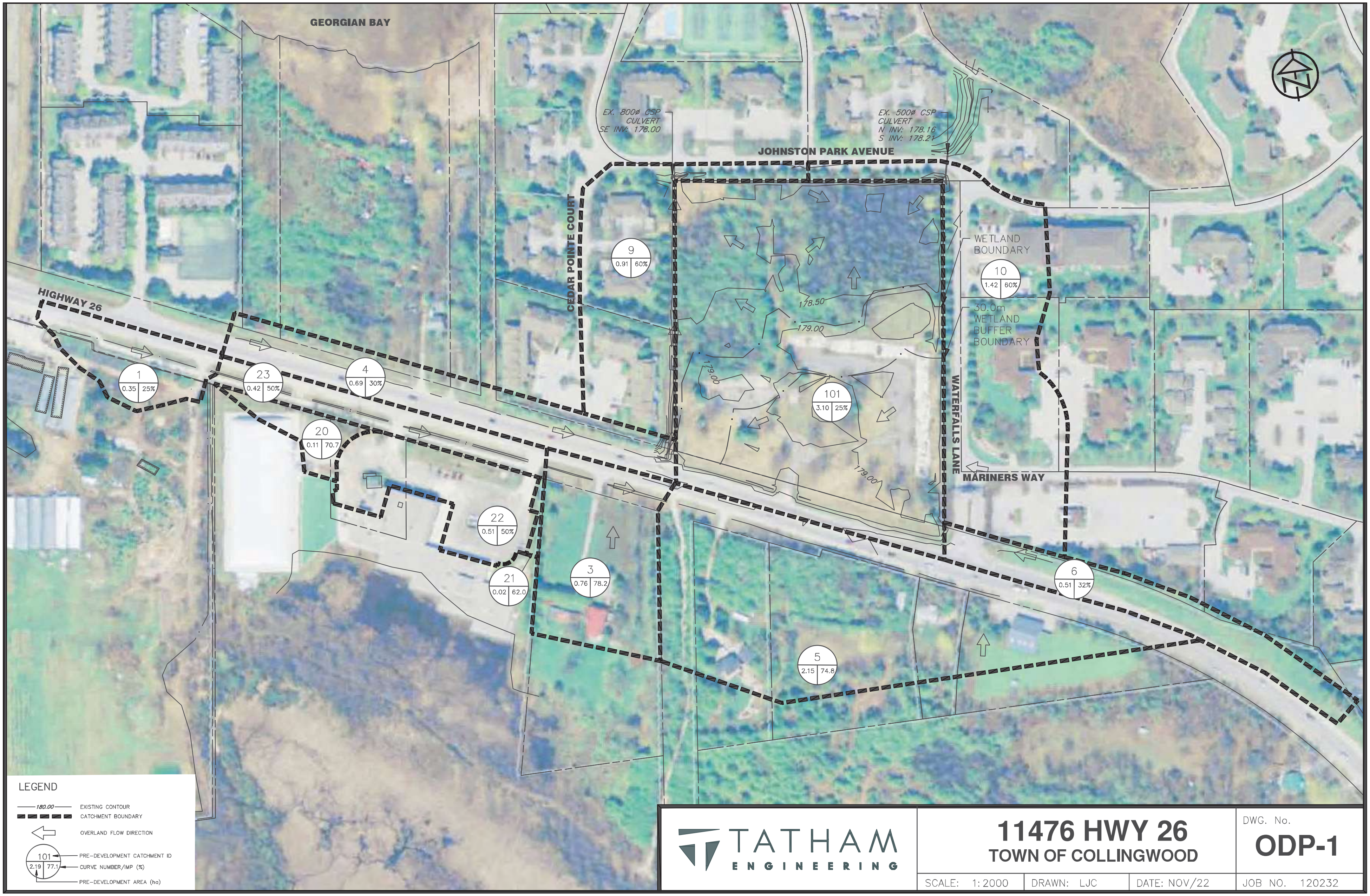
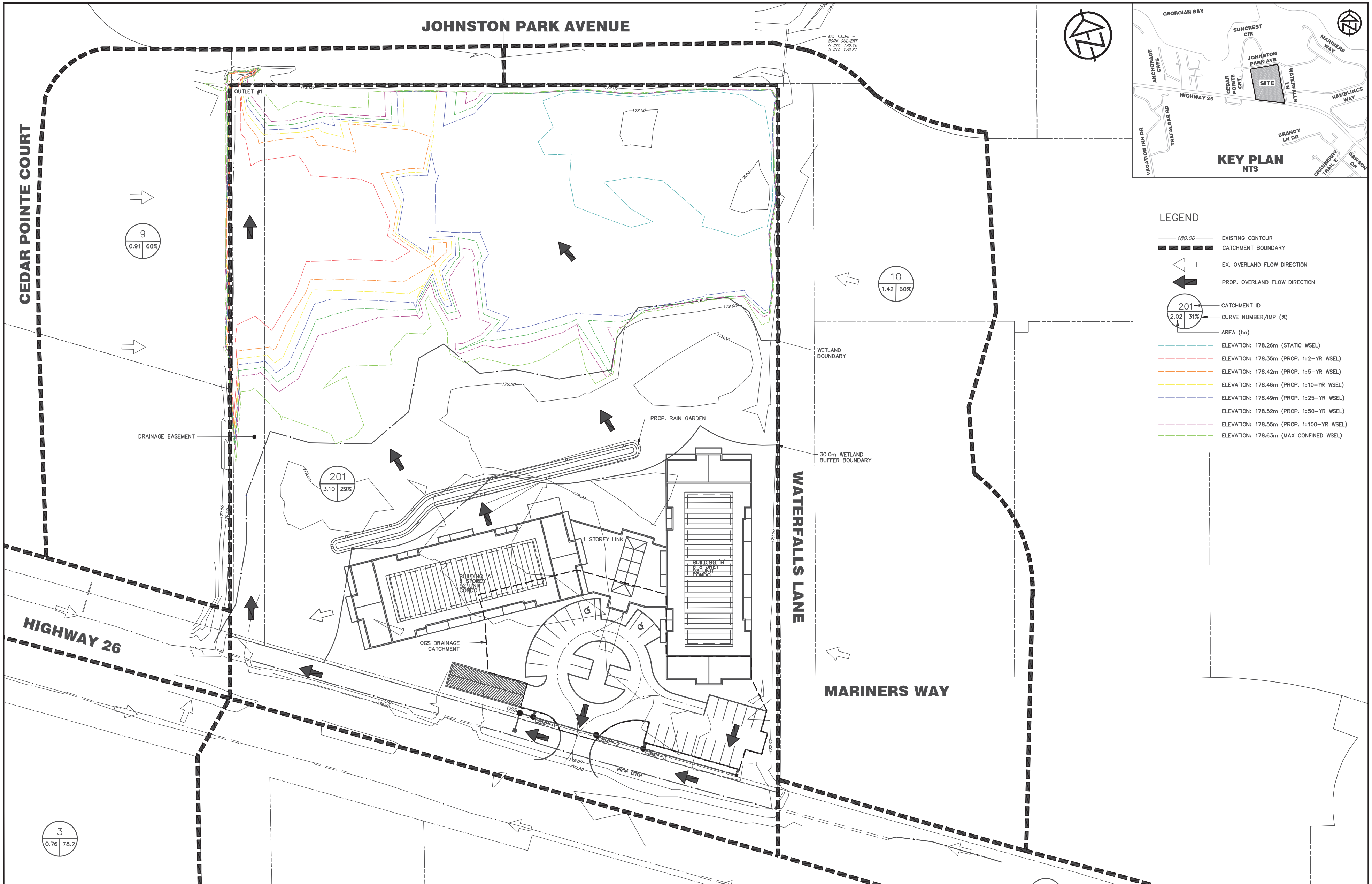
Project No.:	25-008-100
Figure No.:	2
Image/Map Source:	Google Satellite Image

N

Appendix A


GEORGIAN BAY
HIGHWAY 26
CEDAR POINTE COURT
JOHNSTON PARK AVENUE
WATERFALLS LANE
MARINERS WAY
EX. 800ø CSP CULVERT SE INV. 178.00
EX. 500ø CSP CULVERT N INV. 178.16 S INV. 178.21
WETLAND BOUNDARY
30.0m WETLAND BUFFER BOUNDARY
178.50
179.00
1 0.35 25%
23 0.42 50%
4 0.69 30%
20 0.11 70.7
22 0.51 50%
21 0.02 62.0
3 0.76 78.2
9 0.91 60%
101 3.10 25%
10 1.42 60%
6 0.51 32%
5 2.15 74.8
LEGEND
180.00 EXISTING CONTOUR
CATCHMENT BOUNDARY
OVERLAND FLOW DIRECTION
101 PRE-DEVELOPMENT CATCHMENT ID
2.19 77.1 CURVE NUMBER/IMP (%)
PRE-DEVELOPMENT AREA (ha)
TATHAM ENGINEERING
11476 HWY 26
TOWN OF COLLINGWOOD
DWG. No.
ODP-1
SCALE: 1:2000
DRAWN: LJC
DATE: NOV/22
JOB NO. 120232

Appendix B



DISCLAIMER AND COPYRIGHT

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.

BENCHMARKS

NOTES

REFER TO OVERALL DRAINAGE PLAN (DRAWING ODP-1) FOR EXTERNAL CATCHMENT AREAS.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

11476 HWY 26
TOWN OF COLLINGWOOD

POST-DEVELOPMENT DRAINAGE PLAN

TATHAM ENGINEERING

DESIGN: LB	FILE: 120232	DWG: DP-2
DRAWN: LJC	DATE: OCT 2022	
CHECK: RS	SCALE: 1:500	

Drawing Name: 120232-DP02.dwg, Plotted: Dec 12, 2022

Appendix C

TABLE 1

CLIMATE NORMALS 1991-2020 (EGBERT CLIMATE STATION)

11476 Highway 26, Collingwood, ON

Station	Climate ID	WMO ID	TC ID	Latitude	Longitude	Elevation (m)
EGBERT	6.11E+03	71296	XET	44°14'00.0	79°47'00.000" W	251

Month	Thornthwaite (1948) Mean Temperature (°C)	Heat Index	Unadjusted Potential Evapotranspiration (mm)	Daylight Correction Value	Adjusted Potential Evapotranspiration (mm)	Total Precipitation (mm)
January	-7.2	0.0	0.0	0.77	0.0	54.7
February	-6.4	0.0	0.0	0.87	0.0	44.7
March	-1.3	0.0	0.0	0.99	0.0	47.9
April	5.6	1.2	25.7	1.12	28.7	61.6
May	12.3	3.9	59.4	1.23	72.9	73.9
June	17.5	6.7	86.4	1.29	111.0	83.0
July	20.1	8.2	100.1	1.26	126.0	77.9
August	19.2	7.7	95.3	1.16	111.0	82.6
September	15.3	5.4	74.9	1.04	78.1	72.3
October	8.9	2.4	42.1	0.92	38.6	65.4
November	2.7	0.4	11.8	0.81	9.5	71.8
December	-3.2	0.0	0.0	0.75	0.0	57.6
TOTALS		**35.9**	**495.6**		**576.0**	**793.4**

Notes: Daylight Correction values obtained from Instruction and Tables For Computing Potential Evapotranspiration and The Water Balance (Thornthwaite & Mather, 1957)

TABLE 2
PRE-DEVELOPMENT SITE WATER BALANCE
11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			March	April	May	June	July	August	September	October	November	December	January	February	Total
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.75	72.93	111.04	125.97	111.03	78.08	38.64	9.54	0.00	0.00	0.00	**576**
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793**
		P-PET (mm)	47.90	32.85	0.97	-28.04	-48.07	-28.43	-5.78	26.76	62.26	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.04	-76.10	-104.53	-110.32	-83.55	-21.29	0.00	0.00	0.00	-
Wetland Catchment	Pervious Area (Forest)	Soil Moisture Storage (mm)	300.00	300.00	300.00	271.96	223.90	195.47	189.68	216.45	278.71	300.00	300.00	300.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	109.73	117.62	102.47	76.01	38.64	9.54	0.00	0.00	0.00	**556**
		P-AET (mm)	47.90	32.85	0.97	-26.73	-39.72	-19.87	-3.71	26.76	62.26	57.60	54.70	44.70	**238**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-26.73	-66.45	-86.32	-90.03	-63.27	-1.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	26.73	39.72	19.87	3.71	-26.76	-62.26	-1.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	0.00	56.60	54.70	44.70	**238**
		MECP Infiltration Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	-
		Run-Off Coefficient	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	-
		Infiltration (mm)	38.32	26.28	0.78	0.00	0.00	0.00	0.00	0.00	0.00	45.28	43.76	35.76	**190**
		Run-Off (mm)	9.58	6.57	0.19	0.00	0.00	0.00	0.00	0.00	0.00	11.32	10.94	8.94	**48**
		Catchment Area (m^2) = 28814	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	828.38	2101.33	3161.69	3389.26	2952.59	2190.23	1113.25	274.80	0.00	0.00	0.00	**16012**
		Infiltration (m^3)	1104.16	757.26	22.44	0.00	0.00	0.00	0.00	0.00	0.00	1304.60	1260.91	1030.40	**5480**
		Run-Off (m^3)	276.04	189.32	5.61	0.00	0.00	0.00	0.00	0.00	0.00	326.15	315.23	257.60	**1370**
	Pervious Area (Pasture / Shrub)	Soil Moisture Storage (mm)	150.00	150.00	150.00	121.96	73.90	45.47	39.68	66.45	128.71	150.00	150.00	150.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	108.42	109.28	93.91	73.94	38.64	9.54	0.00	0.00	0.00	**535**
		P-AET (mm)	47.90	32.85	0.97	-25.42	-31.38	-11.31	-1.64	26.76	62.26	57.60	54.70	44.70	**258**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-25.42	-56.80	-68.11	-69.75	-42.99	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	25.42	31.38	11.31	1.64	-26.76	-42.99	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	19.28	57.60	54.70	44.70	**258**
		MECP Infiltration Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	-
		Run-Off Coefficient	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	-
		Infiltration (mm)	35.93	24.64	0.73	0.00	0.00	0.00	0.00	0.00	14.46	43.20	41.03	33.53	**194**
		Run-Off (mm)	11.98	8.21	0.24	0.00	0.00	0.00	0.00	0.00	4.82	14.40	13.68	11.18	**65**
		Catchment Area (m^2) = 10074	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	289.61	734.63	1092.14	1100.86	946.02	744.86	389.20	96.07	0.00	0.00	0.00	**5393**
		Infiltration (m^3)	361.89	248.20	7.35	0.00	0.00	0.00	0.00	0.00	145.65	435.18	413.27	337.72	**1949**
		Run-Off (m^3)	120.63	82.73	2.45	0.00	0.00	0.00	0.00	0.00	48.55	145.06	137.76	112.57	**650**
	Pervious Area (Landscaped)	Soil Moisture Storage (mm)	75.00	75.00	75.00	46.96	0.00	0.00	0.00	26.76	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	105.80	92.95	82.60	72.30	38.64	9.54	0.00	0.00	0.00	**503**
		P-AET (mm)	47.90	32.85	0.97	-22.80	-15.05	0.00	0.00	26.76	62.26	57.60	54.70	44.70	**290**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-22.80	-37.85	-37.85	-37.85	-11.08	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	22.80	15.05	0.00	0.00	-26.76	-11.08	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	51.18	57.60	54.70	44.70	**290**
		MECP Infiltration Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	-
		Run-Off Coefficient	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	-
		Infiltration (mm)	31.14	21.35	0.63	0.00	0.00	0.00	0.00	0.00	33.27	37.44	35.56	29.06	**188**
		Run-Off (mm)	16.77	11.50	0.34	0.00	0.00	0.00	0.00	0.00	17.91	20.16	19.15	15.65	**101**
		Catchment Area (m^2) = 22865	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	657.33	1667.43	2418.98	2125.25	1888.61	1653.11	883.38	218.06	0.00	0.00	0.00	**11512**
		Infiltration (m^3)	711.89	488.23	14.47	0.00	0.00	0.00	0.00	0.00	760.67	856.05	812.95	664.33	**4309**
		Run-Off (m^3)	383.32	262.89	7.79	0.00	0.00	0.00	0.00	0.00	409.59	460.95	437.74	357.72	**2320**
	Impervious Area (Buildings and Driveway)	Precipitation Surplus (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	**119**
		Run-Off (mm)	40.72	52.36	62.82	70.55	66.22	70.21	61.46	55.59	61.03	48.96	46.50	38.00	**674**
		Catchment Area (m^2) = 28814	Monthly Volumes (Impervious Area)												
		Evaporation (m^3)	207.03	266.24	319.41	358.74	336.69	357.01	312.49	282.67	310.33	248.96	236.42	193.20	**3429**
		Run-Off (m^3)	1173.17	1508.71	1809.97	2032.85	1907.94	2023.05	1770.78	1601.78	1758.53	1410.75	1339.72	1094.80	**19432**
			Total Catchment Volumes												
		Total AET (m^3)	0.00	1775.32	4503.39	6672.81	6615.37	5787.23	4588.19	2385.82	588.92	0.00	0.00	0.00	**32917**
		Total Evaporation (m^3)	207.03	266.24	319.41	358.74	336.69	357.01	312.49	282.67	310.33	248.96	236.42	193.20	**3429**
		Total Infiltration (m^3)	2177.94	1493.68	44.26	0.00	0.00	0.00	0.00	0.00	906.31	2595.82	2487.13	2032.44	**11738**
		Total Runoff (m^3)	1953.17	2043.65	1825.82	2032.85	1907.94	2023.05	1770.78	1601.78	2216.67	2342.90	2230.44	1822.69	**23772**

GBS

GeoBase Solutions (GBS) Ltd.

TABLE 3
POST-DEVELOPMENT SITE WATER BALANCE
11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.75	72.93	111.04	125.97	111.03	78.08	38.64	9.54	0.00	0.00	0.00	**576**
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793**
		P-PET (mm)	47.90	32.85	0.97	-28.04	-48.07	-28.43	-5.78	26.76	62.26	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.04	-76.10	-104.53	-110.32	-83.55	-21.29	0.00	0.00	0.00	-
Wetland Catchment	Pervious Area (Forest)	Soil Moisture Storage (mm)	300.00	300.00	300.00	271.96	223.90	195.47	189.68	216.45	278.71	300.00	300.00	300.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	109.73	117.62	102.47	76.01	38.64	9.54	0.00	0.00	0.00	**556**
		P-AET (mm)	47.90	32.85	0.97	-26.73	-39.72	-19.87	-3.71	26.76	62.26	57.60	54.70	44.70	**238**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-26.73	-66.45	-86.32	-90.03	-63.27	-1.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	26.73	39.72	19.87	3.71	-26.76	-62.26	-1.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	0.00	56.60	54.70	44.70	**238**
		MECP Infiltration Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	-
		Run-Off Coefficient	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	-
		Infiltration (mm)	38.32	26.28	0.78	0.00	0.00	0.00	0.00	0.00	0.00	45.28	43.76	35.76	**190**
		Run-Off (mm)	9.58	6.57	0.19	0.00	0.00	0.00	0.00	0.00	0.00	11.32	10.94	8.94	**48**
		Catchment Area (m^2) = 28814	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	828.38	2101.33	3161.69	3389.26	2952.59	2190.23	1113.25	274.80	0.00	0.00	0.00	**16012**
		Infiltration (m^3)	1104.16	757.26	22.44	0.00	0.00	0.00	0.00	0.00	0.00	1304.60	1260.91	1030.40	**5480**
		Run-Off (m^3)	276.04	189.32	5.61	0.00	0.00	0.00	0.00	0.00	0.00	326.15	315.23	257.60	**1370**
	Pervious Area (Pasture / Shrub)	Soil Moisture Storage (mm)	150.00	150.00	150.00	121.96	73.90	45.47	39.68	66.45	128.71	150.00	150.00	150.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	108.42	109.28	93.91	73.94	38.64	9.54	0.00	0.00	0.00	**535**
		P-AET (mm)	47.90	32.85	0.97	-25.42	-31.38	-11.31	-1.64	26.76	62.26	57.60	54.70	44.70	**258**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-25.42	-56.80	-68.11	-69.75	-42.99	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	25.42	31.38	11.31	1.64	-26.76	-42.99	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	19.28	57.60	54.70	44.70	**258**
		MECP Infiltration Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	-
		Run-Off Coefficient	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	-
		Infiltration (mm)	35.93	24.64	0.73	0.00	0.00	0.00	0.00	0.00	14.46	43.20	41.03	33.53	**194**
		Run-Off (mm)	11.98	8.21	0.24	0.00	0.00	0.00	0.00	0.00	4.82	14.40	13.68	11.18	**65**
		Catchment Area (m^2) = 8431	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	242.37	614.81	914.01	921.30	791.72	623.36	325.72	80.40	0.00	0.00	0.00	**4514**
		Infiltration (m^3)	302.87	207.71	6.15	0.00	0.00	0.00	0.00	0.00	121.89	364.20	345.86	282.63	**1631**
		Run-Off (m^3)	100.96	69.24	2.05	0.00	0.00	0.00	0.00	0.00	40.63	121.40	115.29	94.21	**544**
	Pervious Area (Landscaped)	Soil Moisture Storage (mm)	75.00	75.00	75.00	46.96	0.00	0.00	0.00	26.76	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	105.80	92.95	82.60	72.30	38.64	9.54	0.00	0.00	0.00	**503**
		P-AET (mm)	47.90	32.85	0.97	-22.80	-15.05	0.00	0.00	26.76	62.26	57.60	54.70	44.70	**290**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-22.80	-37.85	-37.85	-37.85	-11.08	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	22.80	15.05	0.00	0.00	-26.76	-11.08	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	51.18	57.60	54.70	44.70	**290**
		MECP Infiltration Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	-
		Run-Off Coefficient	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	-
		Infiltration (mm)	31.14	21.35	0.63	0.00	0.00	0.00	0.00	0.00	33.27	37.44	35.56	29.06	**188**
		Run-Off (mm)	16.77	11.50	0.34	0.00	0.00	0.00	0.00	0.00	17.91	20.16	19.15	15.65	**101**
		Catchment Area (m^2) = 18595	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	534.60	1356.09	1967.32	1728.43	1535.97	1344.44	718.44	177.34	0.00	0.00	0.00	**9363**
		Infiltration (m^3)	578.97	397.07	11.77	0.00	0.00	0.00	0.00	0.00	618.64	696.21	661.16	540.29	**3504**
		Run-Off (m^3)	311.75	213.81	6.34	0.00	0.00	0.00	0.00	0.00	333.11	374.88	356.01	290.92	**1887**

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TABLE 3
POST-DEVELOPMENT SITE WATER BALANCE
11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.75	72.93	111.04	125.97	111.03	78.08	38.64	9.54	0.00	0.00	0.00	**576**
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793**
		P-PET (mm)	47.90	32.85	0.97	-28.04	-48.07	-28.43	-5.78	26.76	62.26	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.04	-76.10	-104.53	-110.32	-83.55	-21.29	0.00	0.00	0.00	-
Wetland Catchment	Pervious Area (Landscaped with 10% reduction in infiltration)	Soil Moisture Storage (mm)	75.00	75.00	75.00	46.96	0.00	0.00	0.00	26.76	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	105.80	92.95	82.60	72.30	38.64	9.54	0.00	0.00	0.00	**503**
		P-AET (mm)	47.90	32.85	0.97	-22.80	-15.05	0.00	0.00	26.76	62.26	57.60	54.70	44.70	**290**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-22.80	-37.85	-37.85	-37.85	-11.08	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	22.80	15.05	0.00	0.00	-26.76	-11.08	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	51.18	57.60	54.70	44.70	**290**
		MECP Infiltration Factor	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	-
		Run-Off Coefficient	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	-
		Infiltration (mm)	28.02	19.22	0.57	0.00	0.00	0.00	0.00	0.00	29.94	33.70	32.00	26.15	**170**
		Run-Off (mm)	19.88	13.63	0.40	0.00	0.00	0.00	0.00	0.00	21.24	23.90	22.70	18.55	**120**
		Catchment Area (m^2) = 4055	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	116.58	295.72	429.00	376.91	334.94	293.18	156.67	38.67	0.00	0.00	0.00	**2042**
		Infiltration (m^3)	113.63	77.93	2.31	0.00	0.00	0.00	0.00	0.00	121.41	136.64	129.76	106.04	**688**
		Run-Off (m^3)	80.61	55.28	1.64	0.00	0.00	0.00	0.00	0.00	86.13	96.93	92.05	75.22	**488**
	Impervious Area (Buildings and Driveway)	Precipitation Surplus (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	**119**
		Run-Off (mm)	40.72	52.36	62.82	70.55	66.22	70.21	61.46	55.59	61.03	48.96	46.50	38.00	**674**
		Catchment Area (m^2) = 30054	Monthly Volumes (Impervious Area)												
		Evaporation (m^3)	215.94	277.70	333.15	374.18	351.18	372.37	325.94	294.83	323.68	259.67	246.60	201.51	**3577**
		Run-Off (m^3)	1223.66	1573.64	1887.86	2120.33	1990.04	2110.11	1846.98	1670.72	1834.21	1471.46	1397.37	1141.91	**20268**
			Total Catchment Volumes												
		Total AET (m^3)	0.00	1721.93	4367.95	6472.01	6415.90	5615.23	4451.21	2314.07	571.21	0.00	0.00	0.00	**31929**
		Total Evaporation (m^3)	215.94	277.70	333.15	374.18	351.18	372.37	325.94	294.83	323.68	259.67	246.60	201.51	**3577**
		Total Infiltration (m^3)	2099.62	1439.97	42.67	0.00	0.00	0.00	0.00	0.00	861.94	2501.64	2397.69	1959.35	**11303**
		Total Runoff (m^3)	1993.01	2101.28	1903.49	2120.33	1990.04	2110.11	1846.98	1670.72	2294.08	2390.82	2275.95	1859.87	**24557**

GeoBase Solutions (GBS) Ltd.

TABLE 4
POST-DEVELOPMENT SITE WATER BALANCE WITH MITIGATION
11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.75	72.93	111.04	125.97	111.03	78.08	38.64	9.54	0.00	0.00	0.00	**576**
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793**
		P-PET (mm)	47.90	32.85	0.97	-28.04	-48.07	-28.43	-5.78	26.76	62.26	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.04	-76.10	-104.53	-110.32	-83.55	-21.29	0.00	0.00	0.00	-
Wetland Catchment	Pervious Area (Forest)	Soil Moisture Storage (mm)	300.00	300.00	300.00	271.96	223.90	195.47	189.68	216.45	278.71	300.00	300.00	300.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	109.73	117.62	102.47	76.01	38.64	9.54	0.00	0.00	0.00	**556**
		P-AET (mm)	47.90	32.85	0.97	-26.73	-39.72	-19.87	-3.71	26.76	62.26	57.60	54.70	44.70	**238**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-26.73	-66.45	-86.32	-90.03	-63.27	-1.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	26.73	39.72	19.87	3.71	-26.76	-62.26	-1.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	0.00	56.60	54.70	44.70	**238**
		MECP Infiltration Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	-
		Run-Off Coefficient	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	-
		Infiltration (mm)	38.32	26.28	0.78	0.00	0.00	0.00	0.00	0.00	0.00	45.28	43.76	35.76	**190**
		Run-Off (mm)	9.58	6.57	0.19	0.00	0.00	0.00	0.00	0.00	0.00	11.32	10.94	8.94	**48**
		Catchment Area (m^2) = 28814	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	828.38	2101.33	3161.69	3389.26	2952.59	2190.23	1113.25	274.80	0.00	0.00	0.00	**16012**
		Infiltration (m^3)	1104.16	757.26	22.44	0.00	0.00	0.00	0.00	0.00	0.00	1304.60	1260.91	1030.40	**5480**
		Run-Off (m^3)	276.04	189.32	5.61	0.00	0.00	0.00	0.00	0.00	0.00	326.15	315.23	257.60	**1370**
	Pervious Area (Pasture / Shrub)	Soil Moisture Storage (mm)	150.00	150.00	150.00	121.96	73.90	45.47	39.68	66.45	128.71	150.00	150.00	150.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	108.42	109.28	93.91	73.94	38.64	9.54	0.00	0.00	0.00	**535**
		P-AET (mm)	47.90	32.85	0.97	-25.42	-31.38	-11.31	-1.64	26.76	62.26	57.60	54.70	44.70	**258**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-25.42	-56.80	-68.11	-69.75	-42.99	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	25.42	31.38	11.31	1.64	-26.76	-42.99	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	19.28	57.60	54.70	44.70	**258**
		MECP Infiltration Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	-
		Run-Off Coefficient	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	-
		Infiltration (mm)	35.93	24.64	0.73	0.00	0.00	0.00	0.00	0.00	14.46	43.20	41.03	33.53	**194**
		Run-Off (mm)	11.98	8.21	0.24	0.00	0.00	0.00	0.00	0.00	4.82	14.40	13.68	11.18	**65**
		Catchment Area (m^2) = 8431	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	242.37	614.81	914.01	921.30	791.72	623.36	325.72	80.40	0.00	0.00	0.00	**4514**
		Infiltration (m^3)	302.87	207.71	6.15	0.00	0.00	0.00	0.00	0.00	121.89	364.20	345.86	282.63	**1631**
		Run-Off (m^3)	100.96	69.24	2.05	0.00	0.00	0.00	0.00	0.00	40.63	121.40	115.29	94.21	**544**
	Pervious Area (Landscaped)	Soil Moisture Storage (mm)	75.00	75.00	75.00	46.96	0.00	0.00	0.00	26.76	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	105.80	92.95	82.60	72.30	38.64	9.54	0.00	0.00	0.00	**503**
		P-AET (mm)	47.90	32.85	0.97	-22.80	-15.05	0.00	0.00	26.76	62.26	57.60	54.70	44.70	**290**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-22.80	-37.85	-37.85	-37.85	-11.08	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	22.80	15.05	0.00	0.00	-26.76	-11.08	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	51.18	57.60	54.70	44.70	**290**
		MECP Infiltration Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	-
		Run-Off Coefficient	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	-
		Infiltration (mm)	31.14	21.35	0.63	0.00	0.00	0.00	0.00	0.00	33.27	37.44	35.56	29.06	**188**
		Run-Off (mm)	16.77	11.50	0.34	0.00	0.00	0.00	0.00	0.00	17.91	20.16	19.15	15.65	**101**
		Catchment Area (m^2) = 18595	Monthly Volumes (Pervious Area)												
		AET (m^3)	0.00	534.60	1356.09	1967.32	1728.43	1535.97	1344.44	718.44	177.34	0.00	0.00	0.00	**9363**
		Infiltration (m^3)	578.97	397.07	11.77	0.00	0.00	0.00	0.00	0.00	618.64	696.21	661.16	540.29	**3504**
		Run-Off (m^3)	311.75	213.81	6.34	0.00	0.00	0.00	0.00	0.00	333.11	374.88	356.01	290.92	**1887**

GBS
GeoBase Solutions (GBS) Ltd.

TABLE 4
POST-DEVELOPMENT SITE WATER BALANCE WITH MITIGATION
11476 Highway 26, Collingwood, ON

Catchments and Hydrologic Components			March	April	May	June	July	August	September	October	November	December	January	February	Total
			Month												
		PET - Adjusted Potential Evapotranspiration (mm)	0.00	28.75	72.93	111.04	125.97	111.03	78.08	38.64	9.54	0.00	0.00	0.00	**576**
		P - Total Precipitation (mm)	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793**
		P-PET (mm)	47.90	32.85	0.97	-28.04	-48.07	-28.43	-5.78	26.76	62.26	57.60	54.70	44.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-28.04	-76.10	-104.53	-110.32	-83.55	-21.29	0.00	0.00	0.00	-
Wetland Catchment	Pervious Area (Landscaped with 10% reduction in infiltration)	**Soil Moisture Storage (mm)**	75.00	75.00	75.00	46.96	0.00	0.00	0.00	26.76	75.00	75.00	75.00	75.00	-
		Actual Potential Evapotranspiration (mm)	0.00	28.75	72.93	105.80	92.95	82.60	72.30	38.64	9.54	0.00	0.00	0.00	**503**
		P-AET (mm)	47.90	32.85	0.97	-22.80	-15.05	0.00	0.00	26.76	62.26	57.60	54.70	44.70	**290**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-22.80	-37.85	-37.85	-37.85	-11.08	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	22.80	15.05	0.00	0.00	-26.76	-11.08	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	47.90	32.85	0.97	0.00	0.00	0.00	0.00	0.00	51.18	57.60	54.70	44.70	**290**
		MECP Infiltration Factor	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.585	-
		Run-Off Coefficient	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	-
		Infiltration (mm)	28.02	19.22	0.57	0.00	0.00	0.00	0.00	0.00	29.94	33.70	32.00	26.15	**170**
		Run-Off (mm)	19.88	13.63	0.40	0.00	0.00	0.00	0.00	0.00	21.24	23.90	22.70	18.55	**120**
		Catchment Area (m^2) = 4055	**Monthly Volumes (Pervious Area)**												
		AET (m^3)	0.00	116.58	295.72	429.00	376.91	334.94	293.18	156.67	38.67	0.00	0.00	0.00	**2042**
		Infiltration (m^3)	113.63	77.93	2.31	0.00	0.00	0.00	0.00	0.00	121.41	136.64	129.76	106.04	**688**
		Run-Off (m^3)	80.61	55.28	1.64	0.00	0.00	0.00	0.00	0.00	86.13	96.93	92.05	75.22	**488**
	Impervious Area (Buildings and Driveway)	**Precipitation Surplus (mm)**	47.90	61.60	73.90	83.00	77.90	82.60	72.30	65.40	71.80	57.60	54.70	44.70	**793**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	**119**
		Run-Off (mm)	40.72	52.36	62.82	70.55	66.22	70.21	61.46	55.59	61.03	48.96	46.50	38.00	**674**
		Catchment Area (m^2) = 27054	**Monthly Volumes (Impervious Area)**												
		Evaporation (m^3)	194.38	249.98	299.90	336.83	316.13	335.20	293.40	265.40	291.37	233.75	221.98	181.40	**3220**
		Run-Off (m^3)	1101.51	1416.56	1699.41	1908.68	1791.40	1899.48	1662.62	1503.95	1651.12	1324.58	1257.89	1027.93	**18245**
	Impervious Area (Buildings to Infiltration Chamber 2)	**Evaporation Factor**	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.19	9.24	11.09	12.45	11.69	12.39	10.85	9.81	10.77	8.64	8.21	6.71	**119**
		Run-Off (mm)	40.72	52.36	62.82	70.55	66.22	70.21	61.46	55.59	61.03	48.96	46.50	38.00	**674**
		Catchment Area (m^2) = 3000	**Monthly Volumes (Impervious Area)**												
		Evaporation (m^3)	21.56	27.72	33.26	37.35	35.06	37.17	32.54	29.43	32.31	25.92	24.62	20.12	**357**
		Infiltration - Efficiency ~ 67%	85.50	109.96	131.91	148.16	139.05	147.44	129.06	116.74	128.16	102.82	97.64	79.79	**1416**
		Run-Off (m^3)	36.64	47.12	56.53	63.50	59.59	63.19	55.31	50.03	54.93	44.06	41.85	34.20	**607**
			Total Catchment Volumes												
		Total AET (m^3)	0.00	1721.93	4367.95	6472.01	6415.90	5615.23	4451.21	2314.07	571.21	0.00	0.00	0.00	**31929**
		Total Evaporation (m^3)	215.94	277.70	333.15	374.18	351.18	372.37	325.94	294.83	323.68	259.67	246.60	201.51	**3577**
		Total Infiltration (m^3)	2185.12	1549.93	174.58	148.16	139.05	147.44	129.06	116.74	990.10	2604.46	2495.33	2039.14	**12719**
		Total Runoff (m^3)	1907.51	1991.33	1771.58	1972.17	1850.99	1962.67	1717.93	1553.98	2165.92	2288.00	2178.31	1780.08	**23140**

GeoBase Solutions (GBS) Ltd.

TABLE 5
WATER BUDGET SUMMARY
11476 Highway 26, Collingwood, ON

Total Site	Month												Total
	March	April	May	June	July	August	September	October	November	December	January	February	
Pre-Development													
Total AET (m^3)	0	1775	4503	6673	6615	5787	4588	2386	589	0	0	0	**32917**
Total ET (m^3)	207	266	319	359	337	357	312	283	310	249	236	193	**3429**
Total Infiltration (m^3)	2178	1494	44	0	0	0	0	0	906	2596	2487	2032	**11738**
Total Runoff (m^3)	1953	2044	1826	2033	1908	2023	1771	1602	2217	2343	2230	1823	**23772**
Post-Development without Mitigation													
Total AET (m^3)	0	1722	4368	6472	6416	5615	4451	2314	571	0	0	0	**31929**
Total ET (m^3)	216	278	333	374	351	372	326	295	324	260	247	202	**3577**
Total Infiltration (m^3)	2100	1440	43	0	0	0	0	0	862	2502	2398	1959	**11303**
Total Runoff (m^3)	1993	2101	1903	2120	1990	2110	1847	1671	2294	2391	2276	1860	**24557**
Post-Development Deficit without Mitigation (-ve value implies a net gain)													
Total AET (m^3)	0	53	135	201	199	172	137	72	18	0	0	0	**988**
Total ET (m^3)	-9	-11	-14	-15	-14	-15	-13	-12	-13	-11	-10	-8	**-148**
Total Infiltration (m^3)	78	54	2	0	0	0	0	0	44	94	89	73	**435**
Total Runoff (m^3)	-40	-58	-78	-87	-82	-87	-76	-69	-77	-48	-46	-37	**-785**
Post-Development Deficit with Mitigation													
Total AET (m^3)	0	1722	4368	6472	6416	5615	4451	2314	571	0	0	0	**31929**
Total ET (m^3)	216	278	333	374	351	372	326	295	324	260	247	202	**3577**
Total Infiltration (m^3)	2185	1550	175	148	139	147	129	117	990	2604	2495	2039	**12719**
Total Runoff (m^3)	1908	1991	1772	1972	1851	1963	1718	1554	2166	2288	2178	1780	**23140**
Post-Development Deficit with Mitigation (-ve value implies a net gain)													
Total AET (m^3)	0	53	135	201	199	172	137	72	18	0	0	0	**988**
Total ET (m^3)	-9	-11	-14	-15	-14	-15	-13	-12	-13	-11	-10	-8	**-148**
Total Infiltration (m^3)	-7	-56	-130	-148	-139	-147	-129	-117	-84	-9	-8	-7	**-982**
Total Runoff (m^3)	46	52	54	61	57	60	53	48	51	55	52	43	**631**

GBS
GeoBase Solutions (GBS) Ltd.

Appendix E:
Water Quality Control

Next Level™
STORMWATER MANAGEMENT

StormCap™+

Superior Retention Extensive System

Specialized Stormwater Management System

Key Features

- Saturated weight is 187 kg/m^2; 38.5 lb/ft^2
- Superior water-retaining system that's pre-gown and instant green with 85% foliar coverage
- Engineered growing medium – a proprietary mix of lightweight minerals and organic components - encourages microbial soil health, healthier plants, reduces irrigation and potential need for fertilizers
- Hydro Blanket is non-petroleum, formaldehyde-free alternative. Acts as a water reservoir, holding up to 90% of its volume in water reliably throughout the lifespan of the roof
- Improves on site water balance (TGS WQ 1.1) with superior initial abstraction (IA)

WORLD'S FIRST VEGETATED ROOF WIND UPLIFT TEST METHOD

System Properties

Build-Up		Thickness (mm)	Dry Wt. (kg/m^2)	Sat. Wt. (kg/m^2)	Water ret. (l/m^2)
NL718	Sedum Blanket	20.00	17.20	29.70	12.50
NL600	Growing Medium	70.00	56.70	98.00	41.30
NL501	Hydro Blanket x2	51.60	7.80	57.60	49.80
NL400	Filter Fabric	0.55	0.10	0.40	0.30
NL300	Drainage Mat	17.00	0.34	0.34	0.00
NL120	Root Barrier	0.50	0.46	0.46	0.00
	Total	159.65	82.60	186.50	103.90

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Annual Water Retention and Initial Abstraction: StormCap+ Green Roof System

Summary

This report illustrates how StormCap+ retains 70% of the annual rainfall in Toronto which is equivalent to having an initiation abstraction value of 10 mm

StormCap+: A Green Roof with Enhanced Stormwater Management Capability

Next Level Stormwater Management's (NLSM) StormCap+ green roof system consists of a pre-vegetated sedum blanket that includes engineered growing media 20 mm, 70 mm of loose engineered growing medium, 50 mm needled mineral wool hydro blanket, a filter fabric, a drainage mat and a root barrier. Please see Figure 1 and Appendix A for details.

While the sedum blanket and growing medium retain up to 53.8 mm of water, the needled mineral wool hydro blanket underneath provides an additional depression storage of 49.8 mm of water. The total water retention capacity of the system is 103.9 mm. Please see Table 1 for details.

Figure 1 StormCap+ green roof system profile

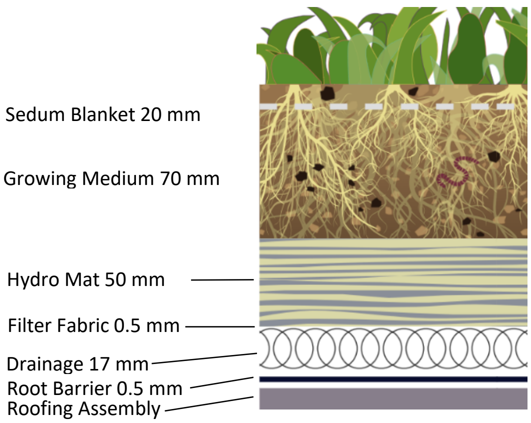


Table 1 Properties of StormCap+ system

Component	Thickness (mm)	Water Retention (l/m²)
Sedum Blanket	20.0	12.50
Growing Medium	70.0	41.30
NM Hydro Mat	50.0	49.80
Filter Fabric	0.5	0.30
Drainage Mat	17.0	0.00
Root Barrier	0.5	0.00
Total System	*159.65*	*103.9*

Green Roof Retention / Evapotranspiration Modeler

The StormCap+ system has significantly higher water retention and contains a specially designed depression storage compared to a typical green roof system. These advantages will be demonstrated through annual water balance calculations.

The Green Roof Retention / Evapotranspiration Modeler was used to calculate the annual water balance on the StormCap+ system. The model is developed and maintained by Green Roof Diagnostics, LLC and based on the results of years of testing of different systems using a rain simulator, measuring rainfall and runoff.

The model uses temperature, humidity, sun hours, wind speed and several other factors from Open Weather and Weather Atlas to estimate the evapotranspiration rate using the FAO Pennman-Monteith method. Calculations take into account the green roof system profile components and their properties such as water retention capacity (ASTM E2399) and crop coefficient for the plant palette.

The model performs a daily water balance, calculating the evapotranspiration and runoff volumes, and plant stress based on water deficiency. After taking a snapshot at the end of the day, the parameters are used as the antecedent conditions for the following day. Please see Appendix B on how the model works.

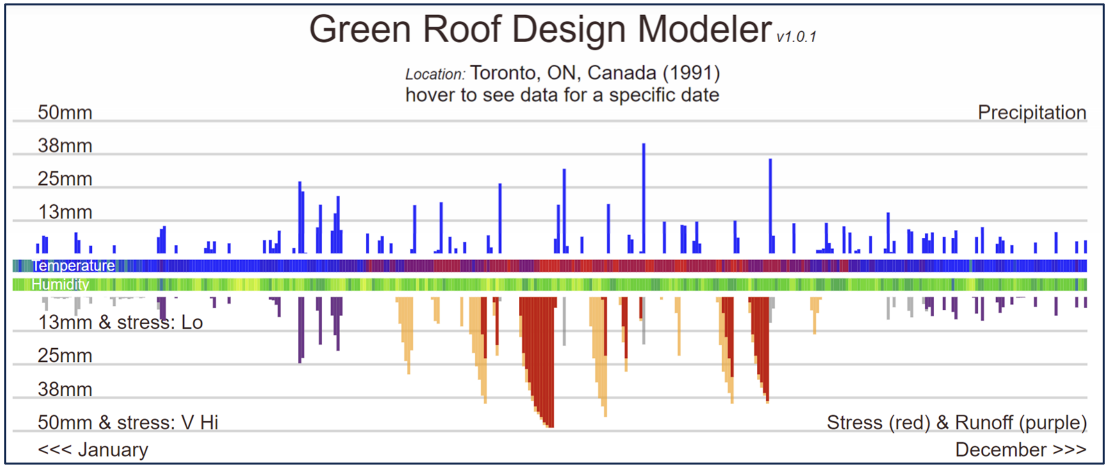
Water Balance Modeling of Green Roof System

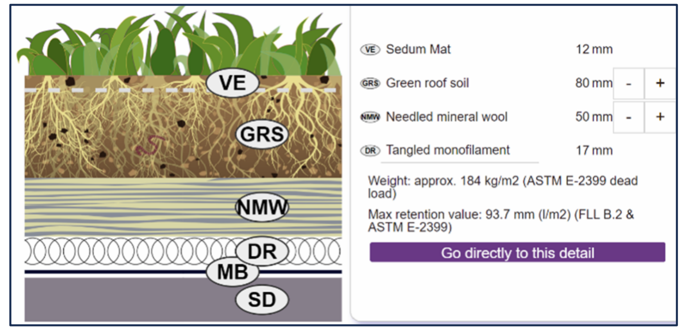
According to the City of Toronto WWFMG, a study of 23 years of the rainfall data from Pearson International Airport were reviewed and it was concluded that 1991 be considered as the most representative of long-term average annual precipitation patterns.

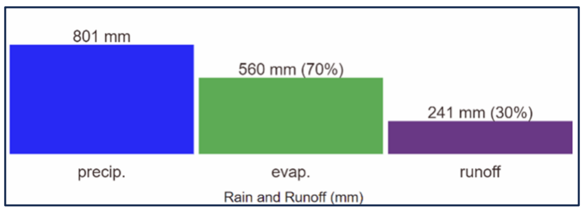
Therefore, the 1991 rainfall data provided by Toronto Water was used in the modeling, along with other climatic data such as temperature, humidity, sun hours, wind speed…etc. downloaded from Open Weather and Weather Atlas.

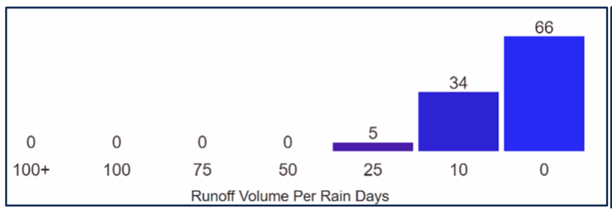
The StormCap+ system retained 560 mm out of 801 mm of the annual rainfall (i.e. 70%) in 1991. The outputs from the model are summarized in Figure 2. This is equivalent to a daily rainfall depth or initial abstraction of 10 mm as per Figure 1a in the WWFMG. Please see Figure 3 for details.

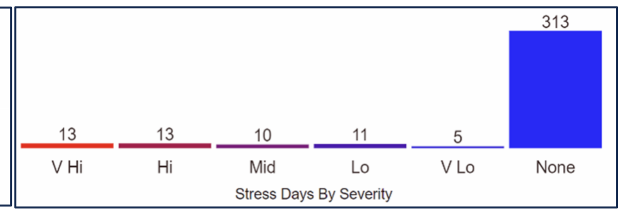
Figure 2 Annual water balance for the proposed green roof system.









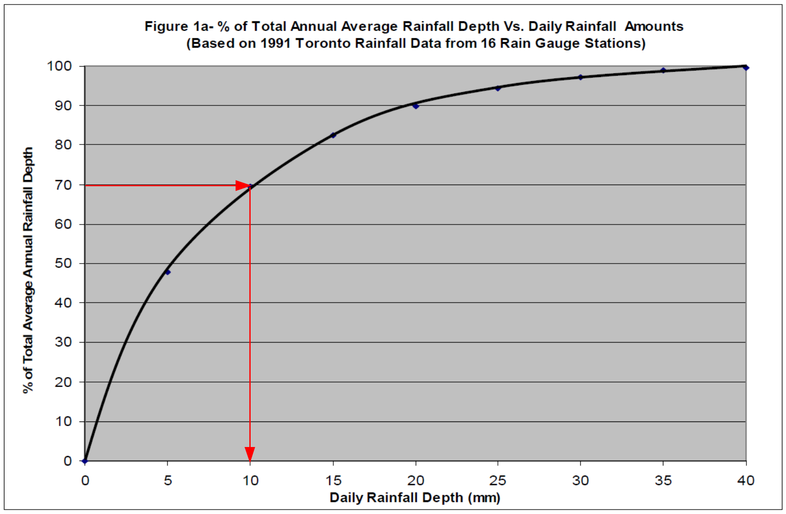


Weather statistics for Toronto, ON, Canada (1991) (elevation: 92 meters, latitude: 43.65, longitude: -79.38)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
rain (mm)	32	32	32	143	72	40	95	95	72	71	79	39	801
rain days	6	5	9	10	7	4	8	6	5	14	11	8	93
sun hours	194	163	259	208	309	289	346	309	262	156	113	134	2742
temperature (C)	-5	-2	0	3	16	19	23	23	19	9	2	0	107

The table above summarizes the output of our stochastic weather generator. Data sources used include: City of Toronto official rainfall data from April-October 1991, https://www.weather-atlas.com/en/canada/toronto, and https://openweathermap.org/. Note that our stochastic weather generator should produce weather that is statistically similar to observed normals, but with some expected variations from any given historical data set. Humidity is not summarized, as humidity is often highly variable from day-to-day.

Figure 3 Obtaining equivalent daily rainfall depth from total annual average rainfall depth (WWFMG)



Appendix A StormCap+ Green Roof System Profile, Properties and Technical Data Sheets

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STORMWATER MANAGEMENT

StormCap™+

Superior Retention Extensive System

Specialized Stormwater Management System

Key Features

- Saturated weight is 187 kg/m²; 38.5 lb/ft²
- Superior water-retaining system that's pre-gown and instant green with 85% foliar coverage
- Engineered growing medium – a proprietary mix of lightweight minerals and organic components - encourages microbial soil health, healthier plants, reduces irrigation and potential need for fertilizers
- Hydro Blanket is non-petroleum, formaldehyde-free alternative. Acts as a water reservoir, holding up to 90% of its volume in water reliably throughout the lifespan of the roof
- Improves on site water balance (TGS WQ 1.1) with superior initial abstraction (IA)

System Properties

Build-Up		Thickness (mm)	Dry Wt. (kg/m²)	Sat. Wt. (kg/m²)	Water ret. (l/m²)
NL718	Sedum Blanket	20.00	17.20	29.70	12.50
NL600	Growing Medium	70.00	56.70	98.00	41.30
NL501	Hydro Blanket x2	51.60	7.80	57.60	49.80
NL400	Filter Fabric	0.55	0.10	0.40	0.30
NL300	Drainage Mat	17.00	0.34	0.34	0.00
NL120	Root Barrier	0.50	0.46	0.46	0.00
	Total	159.65	82.60	186.50	103.90

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NL718 Sedum Blanket

Product Data Sheet

Product Description

The NL718 Sedum Blanket consists of a carrier made up of a filter fabric on one side and a polymer loop network on the other. The carrier is offset by 100mm, to create an overlap on both sides of the roll. Engineered growing medium and specially selected seeds and cuttings are then distributed evenly over the three-dimensional polymer coil loop network, to establish the pre-cultivated vegetation mat. NL718 Sedum Blankets are guaranteed to have a minimum of 80% vegetation coverage at the time of shipping.

Technical Data

Thickness (mm)	20.0
Dry weight (kg/m²)	17.2
Saturated weight (kg/m²)	29.7
Stormwater retention(L/m²)	12.5
Packaging Properties	
Length (m)	2.0
Width (m)	1.1
Area (m²)	2.0
Diameter of rolled vegetation (m)	0.2
Length of rolled vegetation (m)	1.1
Sat. Weight of rolled vegetation (kg)	59.4

Recommended application

- Abut tightly all end and side seams.
- Start next row with a half roll so the end joints stagger between rows.
- Cut and fit to the edge of the non-vegetated border zone along the roof edge and around penetrations.
- Saturate sedum mats thoroughly.
- Sedum is a low traffic plant. Avoid damage by excessive walking and storing items on vegetation.

Plant list

Sedum acre	Sedum kamtschaticum	Sedum spurium var. coccineum
Sedum album	Sedum pulchellum	Sedum spurium
Sedum spurium	Sedum reflexum (rupestre)	Sedum stenopetalum
Sedum floriferum	Sedum ellacombianum	Sedum stoloniferum

*Plant list is subject to change based on availability of seeds/cuttings.

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NL600 Growing Media

Product Data Sheet

Product Description

NL600 Growing Medium is a proprietary mixture of lightweight growing media especially formulated for a vegetated roof applications with maximum diversity. This mix of mineral based materials and high organic matter is derived from lightweight aggregated and composted plant materials. It provides maximum water retention, increased soil microbial biodiversity, improved plant health, and strong rooting systems.

Properties

Density Measurements		FLL Requirements	Values
Bulk Density (dry weight)	g/cm^3	none	0.70 - 1.00
Bulk Density (at maximum water capacity)	g/cm^3	none	1.20 - 1.50
Water and Air Management			
Maximum water capacity	vol %	35-65	40-60
Air content	vol %	≥10	≥9
Electrical Conductivity	mmhos/cm	<5	<5
pH and Salt Content			
pH (in $CaCl_2$)		6.0-8.5	6.0-8.5
Organic Substances			
Organic matter content	g/L	<65	80-100

NL501 Needled Mineral Hydro Blanket

Product Data Sheet

Next Level™ STORMWATER MANAGEMENT

Product Description

NL501 Needled Mineral Hydro Blanket is a mechanically engineered, fire resistant product consisting of a mixture of basalt, diabase and dolomite. Its physical integrity is achieved solely through the inter-twining (needling) of natural mineral wool fibers to exact specifications. The blanket is made of 100% natural raw material (pure rocks), completely free from organic/inorganic binders, as well as any fiber coatings. Binders leach out, compromising performance; since NL501 does not contain binders, it provides reliable long term water-holding performance as well as the ability to expand and contract freely, unaffected by freeze-thaw cycles.

Technical Data

▪ Material	Basalt, diabase, dolomite
▪ Thickness (mm)	26
▪ Density (kg/m³)	135
▪ Dry weight (kg/m²)	4.4
▪ Saturated weight (kg/m²)	30.1
▪ Water retention (mm)	25.6
▪ Water retention (l/m²)	25.6
▪ Color	Sand
▪ Width (m)	1.0
▪ Length (m)	5.0
▪ Area (m²)	5.0
▪ Diameter of roll (cm)	35
▪ Length of roll (cm)	100
▪ Weight of roll (kg)	22

Recommended Application

- Unroll NL501 on top of drainage.
- Install loose-laid with no overlap. Butt joints tightly.
- Start next row with a partial roll so the end joints stagger between rows.
- Continue NL501 up the sides of edge treatment (i.e. metal edging), acting like a filter fabric to prevent growing medium from washing out.
- Cut and fit to the edge of the non-vegetated border zone along the roof edge and around penetrations.
- Cover immediately to avoid displacement by wind.

Next Level™
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NL400 Filter Fabric
Product Data Sheet

Product Description

A non-woven geo-textile fabric layer to serve as filter against particle erosion to prevent obstruction of the drain. The bi-component filaments are thermally bonded, without any chemical treatment.

Recommended Application

- Install on top of the drainage layer with 300mm overlay, with either side facing up.
- Adjacent rolls shall be offset during installation to avoid alignment of end seams across rows.
- The filter must be taken to the vegetated roof edge to prevent the loss of growing media.

Technical Data	
Mechanical Properties	
▪ Material	Polyester, nylon
▪ Thickness (mm)	0.55
▪ Weight (g/m²)	100
▪ Breaking Strength, MD (N/5cm)	341.2
▪ Breaking Strength, CMD (N/5cm)	269.4
▪ Elongation to break, MD (%)	48.8
▪ Elongation to break, CMD (%)	52.0
▪ dtex per filament (dpf)	15
Packaging Properties	
▪ Color	Black
▪ Width (m)	2.44
▪ Length (m)	91.46
▪ Area (m²)	223.2
▪ Diameter of roll (m)	0.20
▪ Length of roll (m)	2.44
▪ Weight of roll (kg)	14.70

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NL300 Drainage Mat

Product Data Sheet

Product Description

NL300 is a three-dimensional, light and flexible composite matting made up of a drainage core of looped nylon filaments, which gives it a high drainage capacity. NL300 Drainage mat comes in long rolls effectively reducing installation costs by minimizing butt seams and eliminating interlocking.

Technical Data	
Mechanical Properties	
▪ Material	Polymer
▪ Thickness (mm)	17
▪ Weight (g/m^2)	390
▪ Longitudinal Tensile strength (kN/m)	5
▪ Transversal Tensile strength (kN/m)	4
▪ Recycled Content (%)	40
Packaging Properties	
▪ Length (m)	60
▪ Width (m)	1
▪ Area (m^2)	60
▪ Color	black
▪ Diameter of roll (m)	0.50
▪ Length of roll (m)	1.02
▪ Weight of roll (kg)	20.50

Recommended application

- Install NL300 on top the root barrier.
- Start the next row with a slightly shorter roll so the end joints stagger between adjacent rows.
- Install over entire roof surface. Coverage under non-vegetated perimeter zones is recommended.
- Cut and fit tightly along roof edge and around penetrations.
- Cover immediately to avoid damage from UV radiation or displacement by wind.

Next Level™
STORMWATER MANAGEMENT

NL120 Root Barrier

Product Data Sheet

Product Description

Designed as a root penetration barrier which protects the roofing membrane against potential ingress from perennial and grass root systems. NL120 is a flexible and impermeable sheet made of low density polyethylene (LDPE) that is chemically inert as well as physically and chemically compatible with all roofing and waterproofing membranes. It is also resistant to fats, oils, chemicals, microorganisms, and UV. NL120 is accordion folded and tightly rolled onto a heavy-duty core for ease of handling and time saving installation.

Technical Data	
Mechanical Properties	
▪ Material	LDPE
▪ Thickness (mm)	0.5
▪ Weight (kg/m²)	0.46
▪ Tensile strength (N/cm)	119-168
▪ Elongation at film break (%)	700-900
▪ Tear resistance (N/mm)	44-53
▪ Puncture resistance (N)	107-178
▪ Volatile loss (%)	<1
▪ Dimensional stability (%)	<2
▪ Use temperature (°C)	-56/82
▪ 2% secant modulus (max) MPa	414-207
▪ Carbon black content TGA (%)	1.6-2.4
Packaging Properties	
▪ Color	Black
▪ Width (m)	3.86
▪ Length (m)	33.52
▪ Area (m²)	129.4
▪ Diameter of roll (cm)	38
▪ Length of roll (m)	2.06

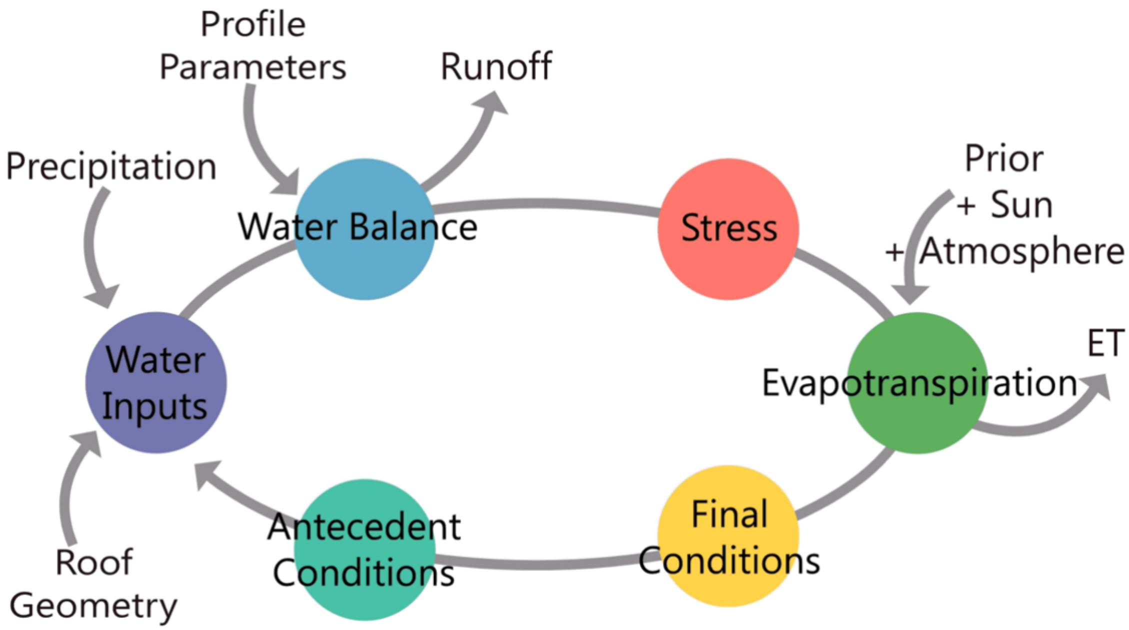
Recommended application

- Unroll NL120 Root barrier roll, cut to required length.
- Product comes folded in half lengthwise. Open the fold to expose true width of product.
- Install loose-laid with a min. 300mm overlap onto adjacent root barrier material.
- Continue root barrier under the non-vegetated zones and up the sides of the roof edges (wall/parapet) to the top of vegetated system.
- Start next row with a partial roll so the end joints stagger between rows.
- Cut and fit tightly along roof edge and around penetrations
- Cover immediately to avoid displacement by wind.

Appendix B How the Green Roof Retention / Evapotranspiration Modeler Works

How The Model Works

The diagram below illustrates the primary functions within the modeler. The modeler constructs a series of continuous flow vegetative and hydrologic models, using a daily timestep. Generally, there are six functions, as outlined below.



About the Modeler

Green Roof Retention / Evapotranspiration Modeler is a joint effort between Green Roof Diagnostics (GRD) and the consortium of companies who bring you the Purple-Roof concept. GRD selects equations, determines parameters, and is generally responsible for ensuring accuracy, applicability, and objectivity of the Green Roof Retention Modeler. The Purple-Roof consortium makes the Modeler accessible to the public via graphic user interface.

.

GRD are developing this project together to build upon collective strengths and shared interests. GRD seeks to improve performance standards and for practitioners, such as civil engineers, to utilize improved green roof performance standards. Purple-Roof wants to help architects and engineers use higher performing green roof assemblies on more of their projects.

GRD is actively developing this project and will continually release new versions. Each version will include full documentation of calculations, per below.

Model Equations

The following sections cover each of the steps above in greater detail. Please note that these are equations for version 1.0.1. This page will be updated with current equations for each version of the Modeler.

Version 1.0.1 utilizes a series of static, empirical equations in a continuous flow pattern.

1. Initial Antecedent Conditions

As antecedent conditions are not known before the first increment, the assumed antecedent condition is 0% plant stress and profile water retention of 20% of its ASTM maximum water storage capacity. These are reasonable assumptions that neither benefit nor penalize any particular assembly.

Regardless of the accuracy of this initial assumption, the effects of this initial assumption are minimal, as they have no bearing on the model after the first rain event.

2a. Roof Geometry

The Modeler assumes a uniform roof slope of 2 percent. Version 1.0.1 currently does not accept user input for these variables, though input will be allowed in later versions.

Note: slope is currently not considered in any equations other than water inputs. Future versions will utilize slope as a variable affecting the water balance equation.

2b. Water Inputs (Precipitation)

Version 1.0.1 utilizes stochastic weather data from a specific location conforming to 20-year historical averages. Weather statistics are obtained various reputable sources, and actual historical weather is obtained from Open Weather, though different sources may be used in the future. Open Weather aggregates weather data from a variety of pubic and private sources. We use a custom program to create stochastic weather that conforms to statistical averages as well as hourly patterning from historical data.

Note: later versions may consider other water input sources, such as cisterns or contributing drainage areas.

Rainfall that is observed falling from the sky onto the ground is not necessarily the same volume of rainfall that lands onto a rooftop, due to wind, roof slope, and orientation of roof slope. Observed rainfall is adjusted per the following equation.

$$W_{in} = R_{obs} * \Omega * \vartheta((X \times \pi) / 180) * (1 + a_{rain} * X)$$

Win = rainfall (mm day-1) adjusted to roof slope and orientation
Robs = the observed rainfall (mm day-1);
Ω (Omega) = surface area (m2) of the roof
arain = dimensionless program parameter; The value of arain depends on the orientation of the roof and local wind and rainfall characteristics since roofs oriented to a dominant wind direction receive more rainfall than flat roofs or those oriented towards another direction
X = slope of the roof (degrees).

Note that version 1.0.1 currently sets the value of arain to a constant value of 1, as local wind and rainfall characteristics are not currently available.
Citation

Eline Vanuytrecht."Runoff and vegetation stress of green roofs under different climate change scenarios".Landscape And Urban PlanningVolume 122, Februrary 2014.Equation #1
Find it at: Elsevier

3a. Profile Parameters

Differences between green roof profiles account for some of the more significant differences in performance between green roof applications. Green Roof Diagnostics and others are currently researching these conditions. Green Roof Diagnostics is parameterizing values to be used in modeling.

Version 1.0.1 currently utilizes the following parameters:

0.35	ASTM E-2399 maximum retention value of green roof soil / green roof media, i.e. 35% per volume (35% volumetric water capacity)
0.93	ASTM E-2399 maximum retention value of mineral wool in green roofs, i.e. 93% per volume (93% volumetric water capacity)
0.75	Efficiency factor without detention layer: actual retention is assumed to peak at 75% of ASTM values
1.05	Efficiency factor detention layer: actual retention is assumed to peak at 105% of ASTM values
Mixed Sedum	Plant palette assumed to be mixed sedum
0.56	Crop coefficient of evapotranspiration
12L	Stress threshold of available water. I.e. the selected plants are assumed to begin to exhibit stress when available water drops below 12 liters per square meter of soil surface area. For a 100mm (4-inch) thick green roof profile, this equates to 12% volumetric water capacity, or approximately 1/3 of total maximum water-holding capacity of a soil-only green roof.

The crop coefficient of 0.56 for Sedums is an estimated average for mixed Sedum, utilizing multiple publications that document a range of crop coefficients for a single species of Sedum. The ASTM values listed are based on values commonly observed within the industry, and documented by multiple ASTM tests. The remaining parameters are derived from soon-to-be-published research performed by Green Roof Diagnostics, based on research from 2016-2019.

3b. Water Balance Equation and Runoff

Currently the Green Roof Retention Modeler is using a very simple water balance equation. Conceptually a water balance equation assumes that the green roof is a "reservoir" that receives water (with 100% efficiency) until it reaches capacity, and after reaching capacity, runoff begins and occurs instantaneously.

We chose this simple equation for version 1.0.1, but future versions will more accurately predict efficiency and detention.

Wro = Win – (WSmax – WSact)
Wro = amount of water lost by runoff (l day-1) if Win exceeds the actual storage capacity of the roof
Win = rainfall (mm day-1) adjusted to roof slope and orientation (output of formula 1)
WSmax = maximum amount of water retained on the roof (l day-1). WSmax depends on the roof type and surface area.
WSact = actual amount of water retained on the roof (l day-1). WSact depends on incoming rainfall and outgoing green roof evapotranspiration and is updated on a daily basis. WSact varies between zero when the roof is completely dry and WSmax when the roof is saturated with rainfall.
Citation

> Eline Vanuytrecht."Runoff and vegetation stress of green roofs under different climate change scenarios".Landscape And Urban PlanningVolume 122, Februrary 2014.Equation #2
> Find it at: Elsevier

4. Stress

Plant stress is an important factor to consider when designing and selecting a green roof. We think it is important to include plant stress in any modeling efforts. Zero plant stress might not be an attainable goal, but plant stress should be minimized and/or reduced to a few manageable occurrences per year.

The primary contributor to plant stress is lack of available water, and the equation below only considers lack of available water as a factor causing stress. Later versions may consider other, minor, factors.

S = 100 * (1 - (WSact / (p * WSmax)))
S = stress level
p is the threshold for vegetation water stress
WSmax = maximum amount of water retained on the roof. Result of water balance equation.
WSact = actual amount of water retained on the roof. Result of water balance equation.
Citation

> Eline Vanuytrecht."Runoff and vegetation stress of green roofs under different climate change scenarios".Landscape And Urban PlanningVolume 122, Februrary 2014.Equation #4
> Find it at: Elsevier

5. Evapotranspiration (ET)

Evapotranspiration is the combined loss of water via evaporation and transpiration, i.e. all water that is lost from the green roof in the form of water vapor.

The definition of retained water is water that is absorbed by the green roof and which only leaves the roof through evaporative processes. Therefore evapotranspiration is the single most important process in the continued function of a retention-oriented green roof.

The Modeler uses the global standard FAO Penman-Monteith evapotranspiration equation. Specifically, FAO Penman-Monteith estimates evapotranspiration for a reference crop of grass. This value is then multiplied by a stress factor and a crop coefficient factor (see above for both) to determine evapotranspiration on a given date.

ETo =
0.408Δ (Rn - G) + γ
900

T + 273
U2 (es - ea)
Δ + γ (1 + 0.34U2)

ET = ETo * Ks * Kc
where
ETo = reference evapotranspiration [mm day-1],
Rn = net radiation at the crop surface [MJ m-2 day-1],
G = soil heat flux density [MJ m-2 day-1],
T = mean daily air temperature at 2 m height [°C],
u2 = wind speed at 2 m height [m s-1],
es = saturation vapour pressure [kPa],
ea = actual vapour pressure [kPa],
es - ea = saturation vapour pressure deficit [kPa],
Δ = slope vapour pressure curve [kPa °C-1],
γ = psychrometric constant [kPa °C-1].
Ks = water stress coefficient
Kc = crop coefficient

Unavailable climatic data is estimated using the FAO guidelines for missing climatic data, using formulae from the PyETo Python library.
Citation

> Food and Agriculture Organization (FAO) of the United Nations."Chapter 2 - FAO Penman-Monteith equation". *Crop evapotranspiration - Guidelines for computing crop water requirements - FAO Irrigation and drainage paper 56Rome*, 1998.
> Find it at: FAO

6. Final Conditions

The state of the green roof after evapotranspiration occurs is saved as an "increment" or a final snapshot of that day. The next day is then modeled, using the prior day's conditions as antecedent. E.g. when the model completes May 15, that data is saved, and the final water retained within the green roof and the final plant stress on May 15 becomes the antecedent conditions used by the Modeler to begin May 16.

This process is repeated for each day of the weather series. Currently version 1.0.1 is generating 365-day models, per calendar year.

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/16/2025

Province:	Ontario
City:	Collingwood
Nearest Rainfall Station:	BARRIE-ORO
Climate Station Id:	6117700
Years of Rainfall Data:	14

Site Name:	

Drainage Area (ha):	0.25
% Imperviousness:	100.00

Runoff Coefficient 'c': 0.90

Project Name:	11476 Hwy 26
Project Number:	120232
Designer Name:	Patrick Walsh
Designer Company:	Tatham Engineering
Designer Email:	pwalsh@tathameng.com
Designer Phone:	705-444-2565
EOR Name:	Patrick Walsh
EOR Company:	Tatham Engineering
EOR Email:	pwalsh@tathameng.com
EOR Phone:	705-444-2565

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	7.33
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	35.60
Influent TSS Concentration (mg/L):	100
Estimated Average Annual Sediment Load (kg/yr):	147
Estimated Average Annual Sediment Volume (L/yr):	119

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	92
EFO5	95
EFO6	97
EFO8	99
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 92

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

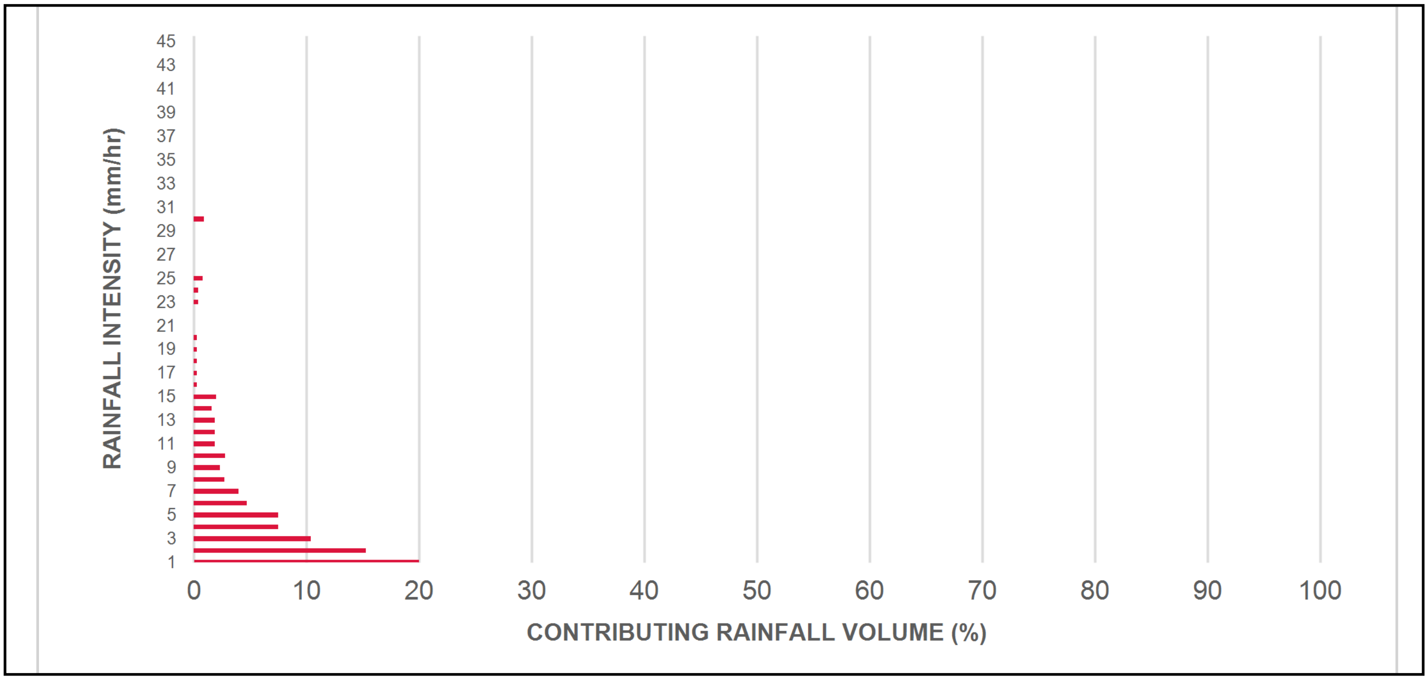
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

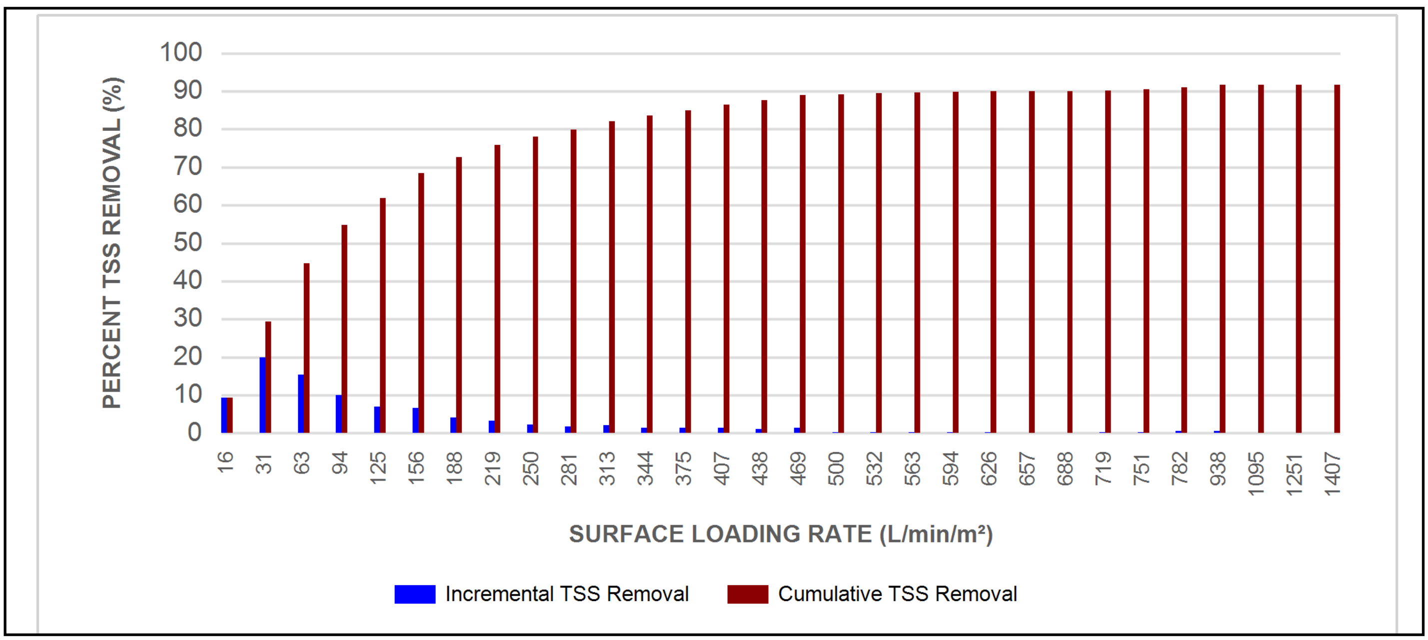
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	9.4	9.4	0.31	19.0	16.0	100	9.4	9.4
1.00	20.0	29.4	0.63	38.0	31.0	100	20.0	29.4
2.00	15.3	44.7	1.25	75.0	63.0	100	15.3	44.7
3.00	10.4	55.1	1.88	113.0	94.0	97	10.1	54.8
4.00	7.5	62.6	2.50	150.0	125.0	93	7.0	61.8
5.00	7.5	70.1	3.13	188.0	156.0	89	6.7	68.5
6.00	4.7	74.9	3.75	225.0	188.0	86	4.0	72.6
7.00	4.0	78.8	4.38	263.0	219.0	83	3.3	75.9
8.00	2.7	81.6	5.00	300.0	250.0	81	2.2	78.1
9.00	2.3	83.9	5.63	338.0	281.0	79	1.8	79.9
10.00	2.8	86.6	6.26	375.0	313.0	78	2.2	82.1
11.00	1.9	88.6	6.88	413.0	344.0	77	1.5	83.6
12.00	1.9	90.5	7.51	450.0	375.0	75	1.5	85.0
13.00	1.9	92.4	8.13	488.0	407.0	74	1.4	86.4
14.00	1.6	94.0	8.76	525.0	438.0	72	1.2	87.6
15.00	2.0	96.0	9.38	563.0	469.0	71	1.4	89.0
16.00	0.3	96.3	10.01	600.0	500.0	69	0.2	89.2
17.00	0.3	96.6	10.63	638.0	532.0	68	0.2	89.4
18.00	0.3	96.9	11.26	676.0	563.0	66	0.2	89.6
19.00	0.3	97.2	11.88	713.0	594.0	65	0.2	89.8
20.00	0.3	97.5	12.51	751.0	626.0	64	0.2	90.0
21.00	0.0	97.5	13.14	788.0	657.0	64	0.0	90.0
22.00	0.0	97.5	13.76	826.0	688.0	64	0.0	90.0
23.00	0.4	97.9	14.39	863.0	719.0	64	0.2	90.2
24.00	0.4	98.3	15.01	901.0	751.0	63	0.3	90.5
25.00	0.8	99.1	15.64	938.0	782.0	63	0.5	91.0
30.00	0.9	100.0	18.77	1126.0	938.0	62	0.6	91.6
35.00	0.0	100.0	21.89	1314.0	1095.0	59	0.0	91.6
40.00	0.0	100.0	25.02	1501.0	1251.0	56	0.0	91.6
45.00	0.0	100.0	28.15	1689.0	1407.0	52	0.0	91.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**92 %**

Climate Station ID: 6117700 *Years of Rainfall Data*: 14

RAINFALL DATA FROM BARRIE-ORO RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

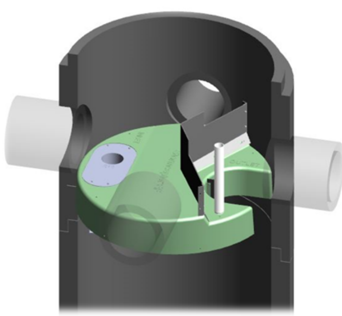
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

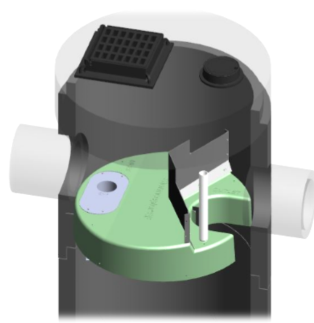
DESIGN FLEXIBILITY

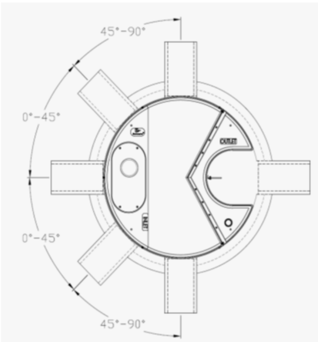
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

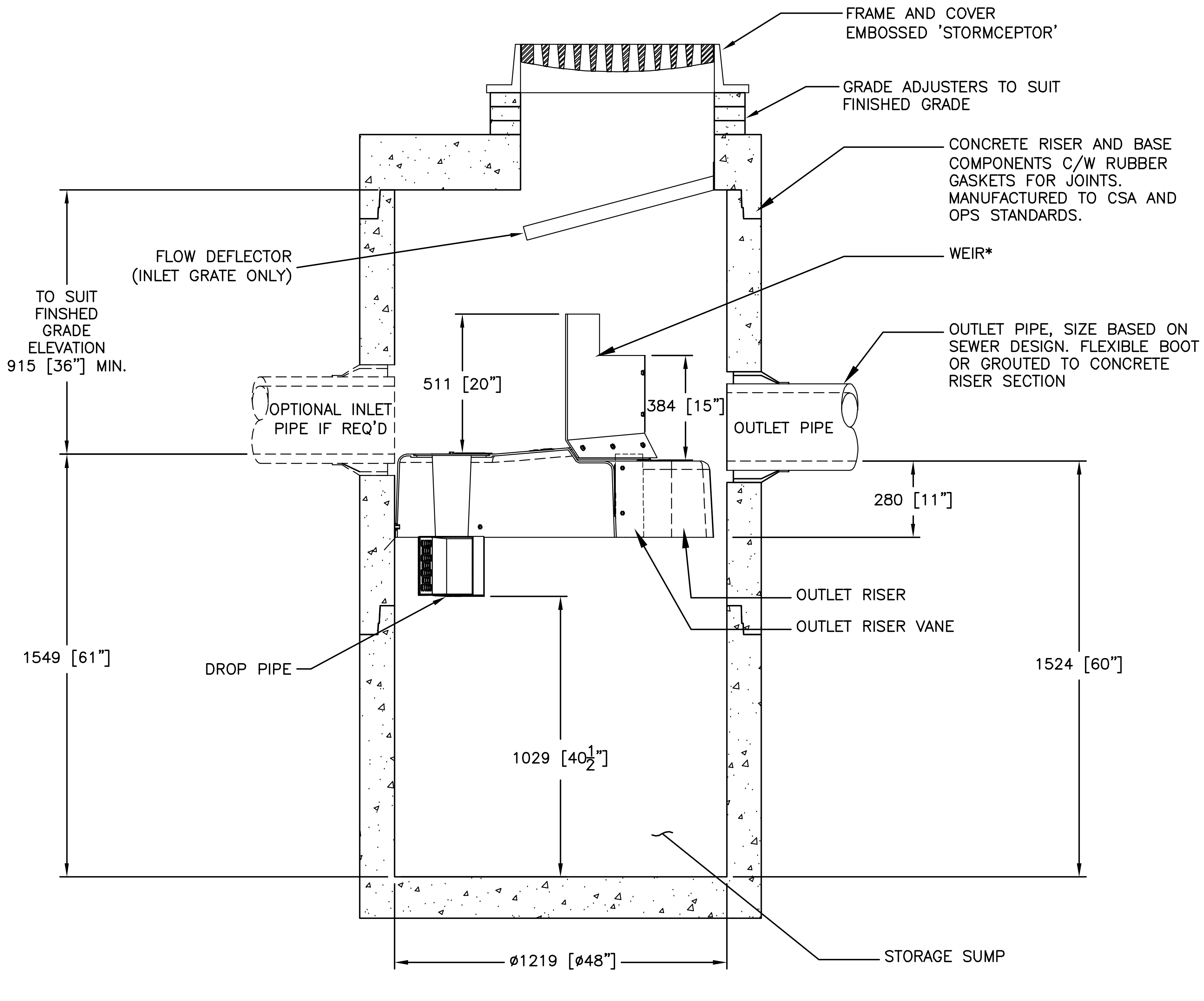
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

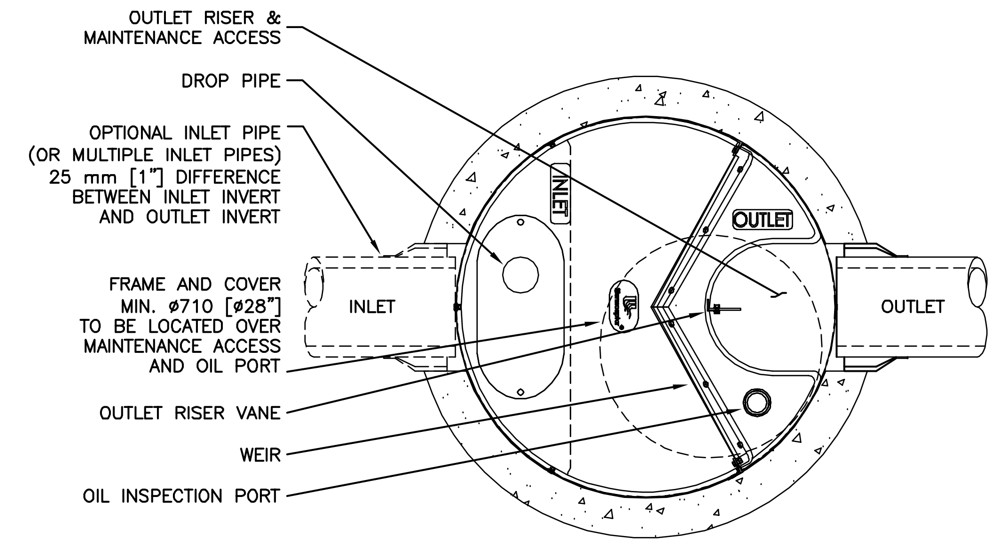
The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid

Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

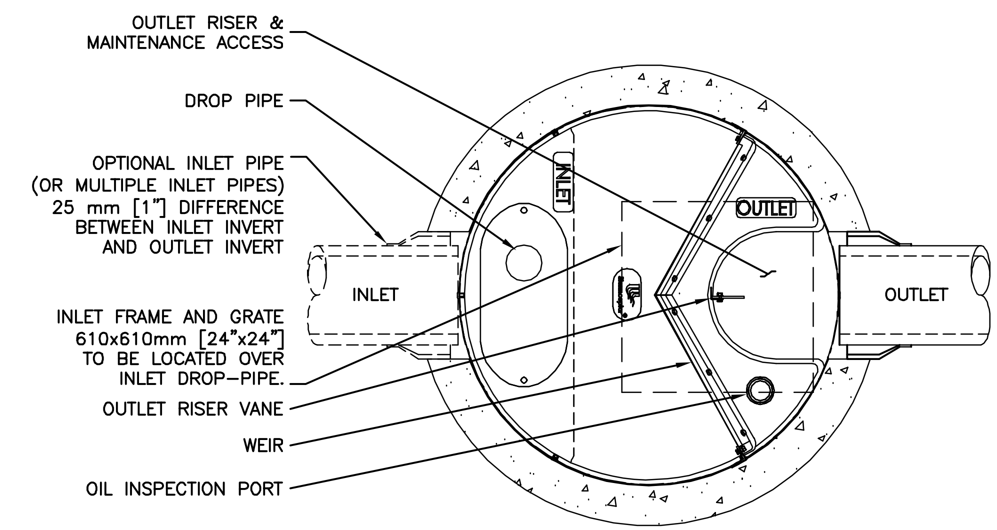
3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF4 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EF4				
STRUCTURE ID	*				
WATER QUALITY FLOW RATE (L/s)	*				
PEAK FLOW RATE (L/s)	*				
RETURN PERIOD OF PEAK FLOW (yrs)	*				
DRAINAGE AREA (HA)	*				
DRAINAGE AREA IMPERVIOUSNESS (%)	*				
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
####	####	####	####
####	####	####	####
####	####	####	####
1	6/8/18	UPDATES	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium

DATE: 5/26/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: SP
PROJECT No.: EF4	SEQUENCE No.: *
SHEET: 1 OF 1	

Appendix F:
Phosphorous Loading Assessment

TATHAM ENGINEERING

PROJECT	11476 Highway 26	FILE	120232
		DATE	2026-04-21
SUBJECT	Phosphorous Loading Assessment	NAME	ANF
		PAGE	1 OF 1

Phosphorus Loading

Land Use Category	Phosphorous Loading Rate (kg/ha/year)	Existing Area (ha)	Existing Phosphorous Load (kg/year)	Proposed Area (ha)	Proposed Phosphorous Load (kg/year)
Transition	0.07	0.64	0.04	0.80	0.06
Wetland	0.05	1.11	0.06	1.32	0.07
Transportation	1.82	0.11	0.20	0.11	0.20
Open Water	0.26	0.20	0.05	0.00	0.00
Low-Intensity Residential	0.13	0.00	0.00	0.00	0.00
High-Intensity Residential	1.32	1.04	1.37	0.87	1.15
Total		3.10	1.73	3.10	1.47

Controls

Area contributing to Mitigation Featu	Removal Efficiency (%) Hydro Dynamic Device (OGS)	Removal Efficiency (%) Green Roof	Removal Efficiency (%) Buffer Strip	Applied Removal Efficiency (%)	Mitigation Area (ha)	Mitigation Phosphorous Load (kg/year)
High-Intensity Residential (Green Roo		100%	65%	100%	0.12	0.00
High-Intensity Residential (Roof top)			65%	65%	0.25	0.12
High-Intensity Residential	0%		65%	65%	0.50	0.23

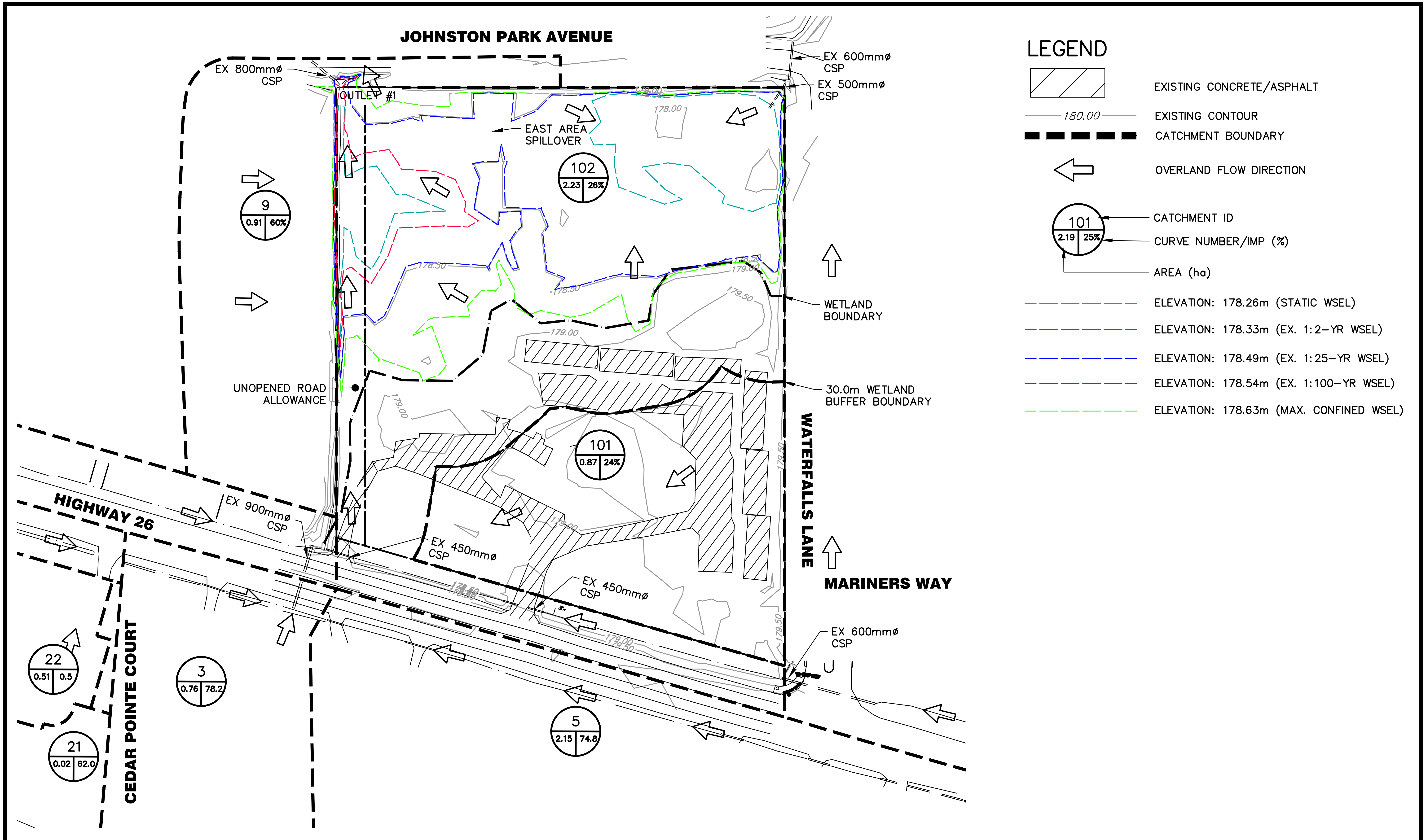
Note: Residential Phosphorous Export Rates per Table 2 of the MECP Phosphorous Budget Tool (2012), All remaining land use export rates taken from Table 1 of the NVCA Phosphorous Budget Tool (2014)

Note: Removal Rate of 65% applied to buffer strip as it is fully vegetated before it enters drainage easement, swale, and wetland.

Summary

Existing Phosphorous Load	1.73	kg/year
Post-Development Phosphorous Load (no mitigation)	1.47	kg/year
Post-Development Phosphorous Load (with mitigation)	0.67	kg/year

Appendix G: Drawings



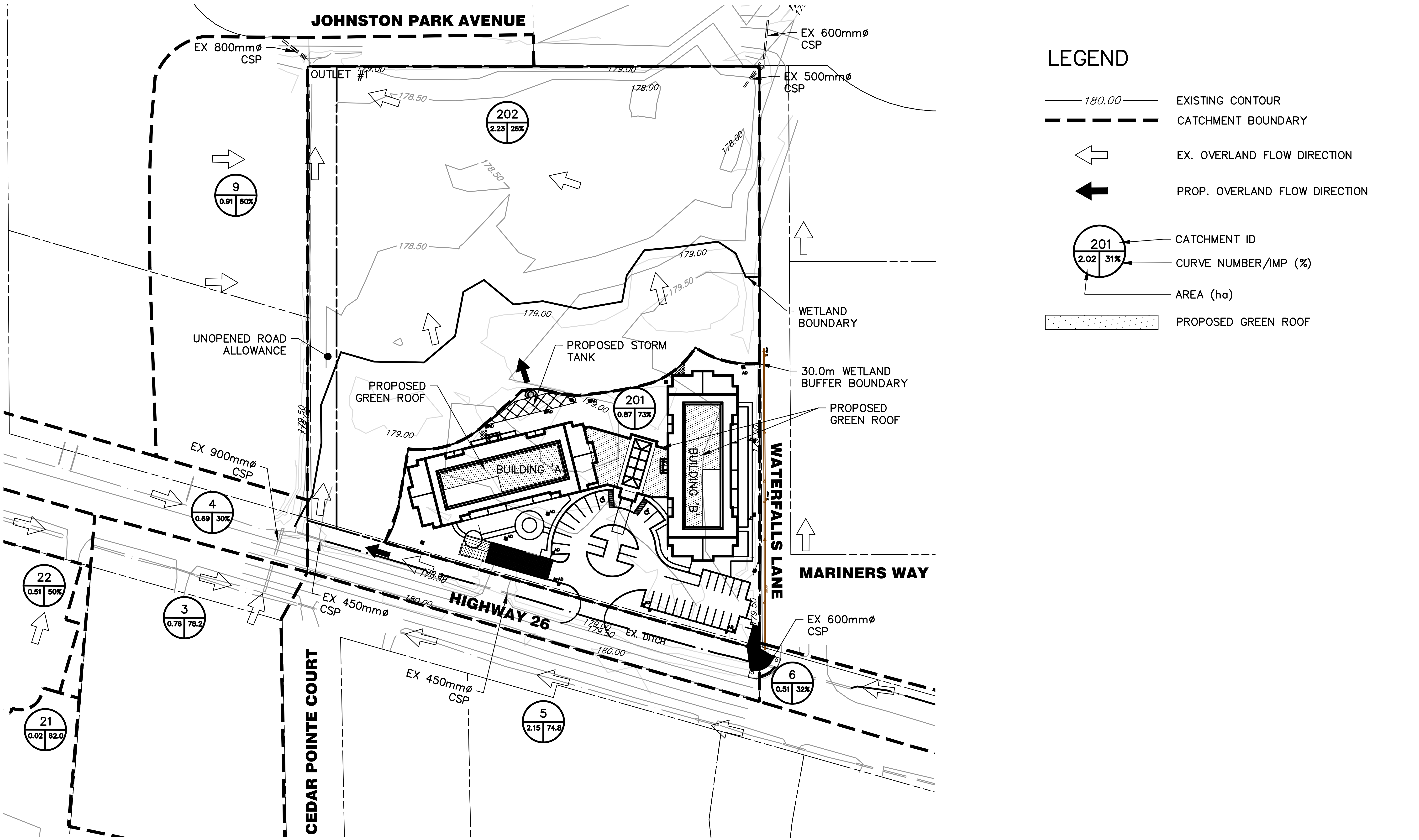
TATHAM ENGINEERING

11476 HIGHWAY 26
TOWN OF COLLINGWOOD

DWG. No. **DP-1**

SCALE: 1:1,250 | DRAWN: ANF | DATE: APR 2026 | JOB NO. 120232

Drawing Name: 120232-DP01.dwg, Plotted: Apr 29, 2026



REFER TO OVERALL DRAINAGE PLAN (DRAWING ODP–1)
FOR EXTERNAL CATCHMENT AREAS.

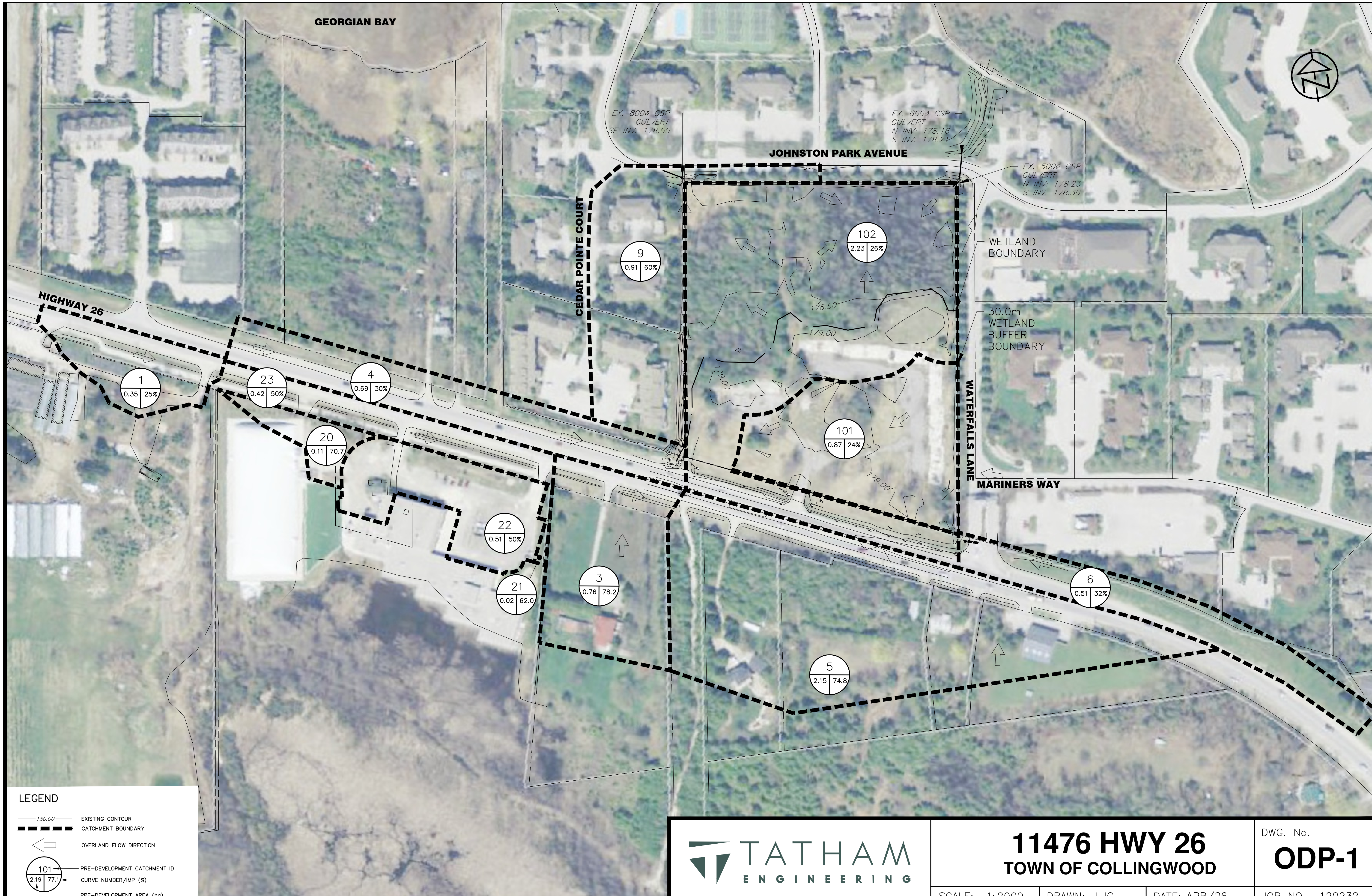
TATHAM ENGINEERING

11476 HIGHWAY 26
TOWN OF COLLINGWOOD

DWG. No. **DP-2**

SCALE: 1:1,250	DRAWN: KRL	DATE: APR 2026	JOB NO. 120232

Drawing Name: 120232–DP02–Overflow Chamber.dwg, Plotted: Apr 29, 2026



TATHAM ENGINEERING

11476 HWY 26
TOWN OF COLLINGWOOD

DWG. No. **ODP-1**

SCALE: 1:2000 | DRAWN: LJC | DATE: APR/26 | JOB NO. 120232