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:

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Reviewed By:

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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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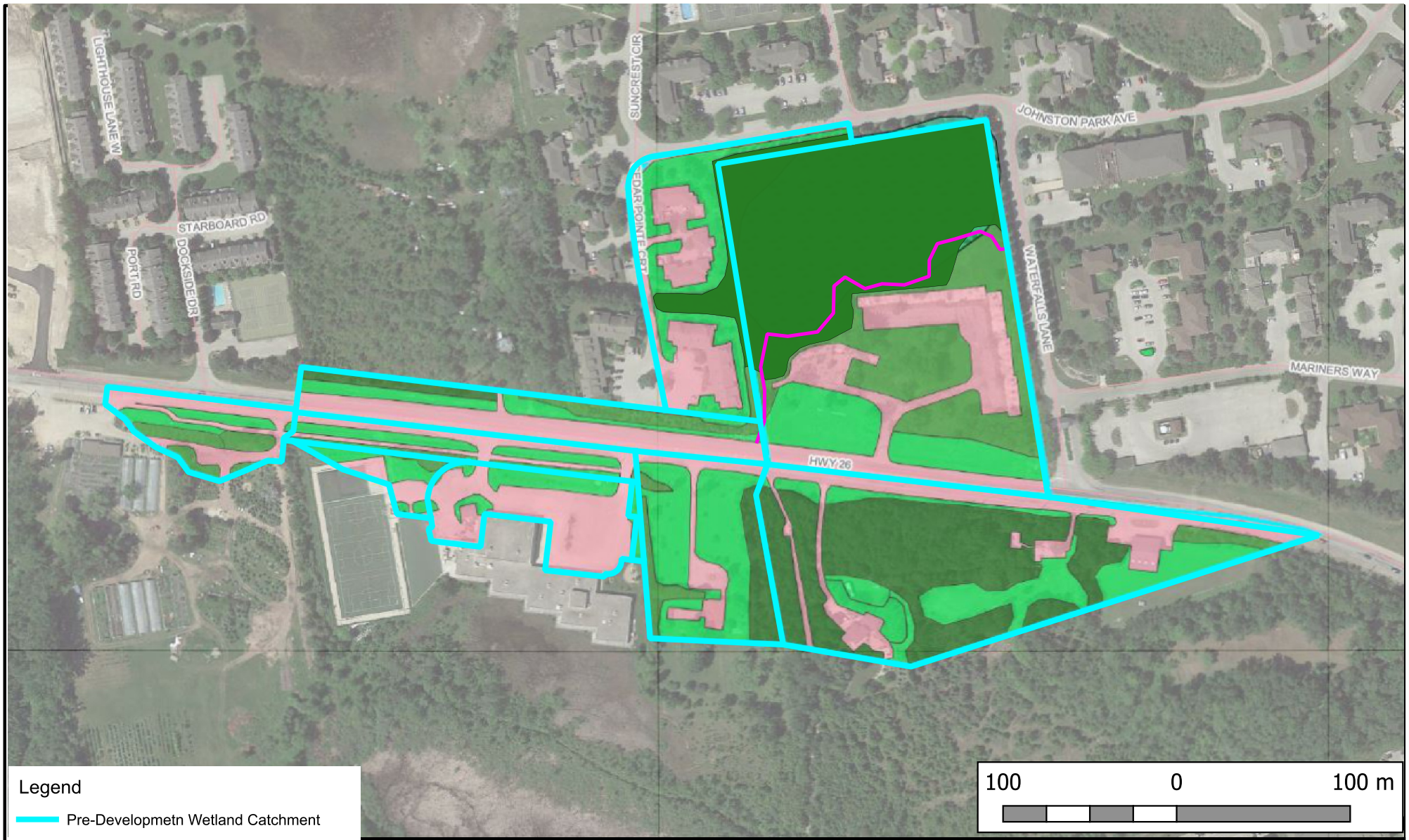

Legend

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

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

Title: **Pre-Development Conceptual Model**

N

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

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	DH	S.W	April 2026
Rev: 0	Scale: As Shown	Project No.: 22-189-401	Figure No.: 1

Image/Map Source: *Google Satellite Image*

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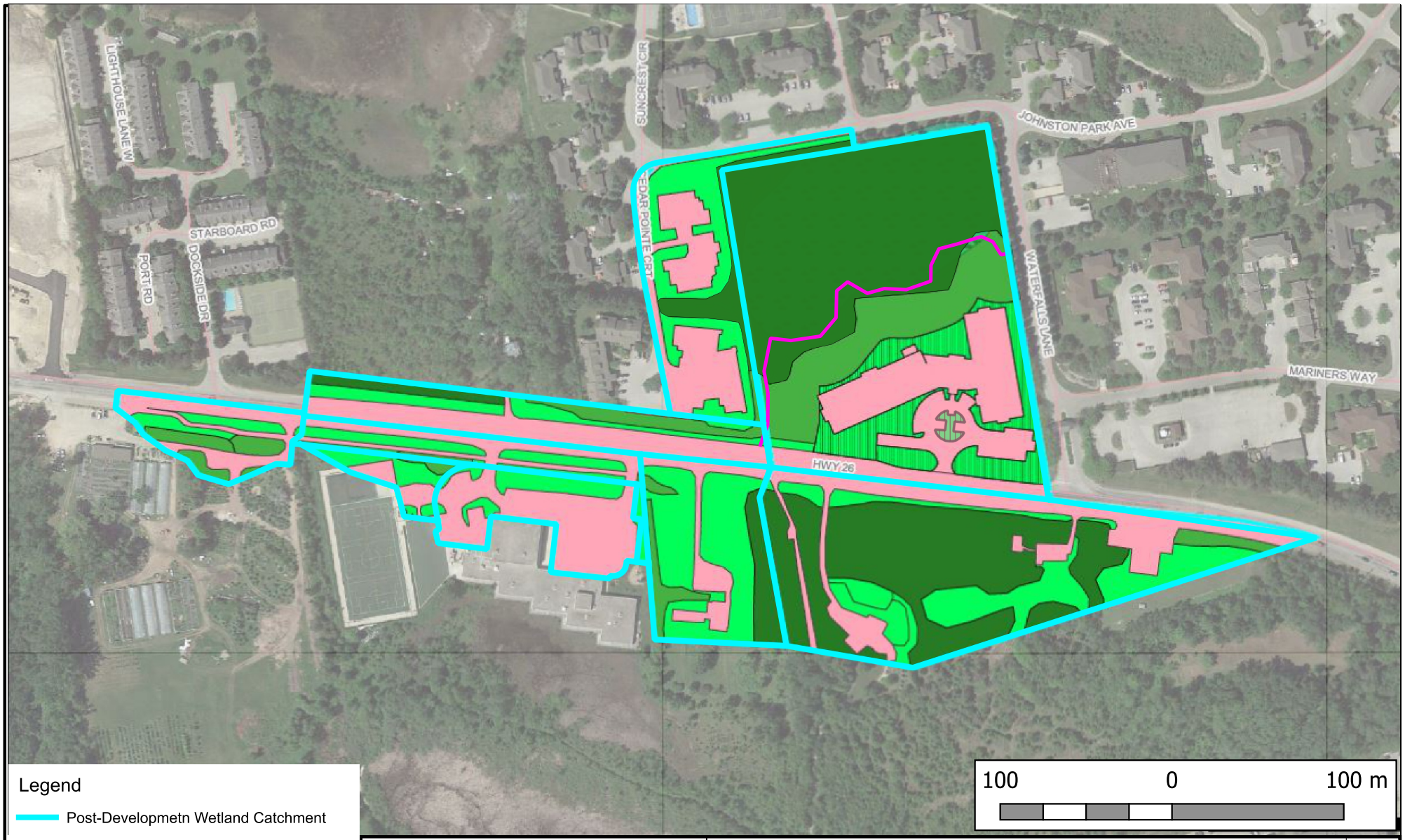

Legend

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

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

Title: **Post-Development Conceptual Model**

N

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

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	DH	S.W	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**

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	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**

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			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) = 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**

TABLE 4

Post-development 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	28.78	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**

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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FIGURES

APPENDICES:

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.

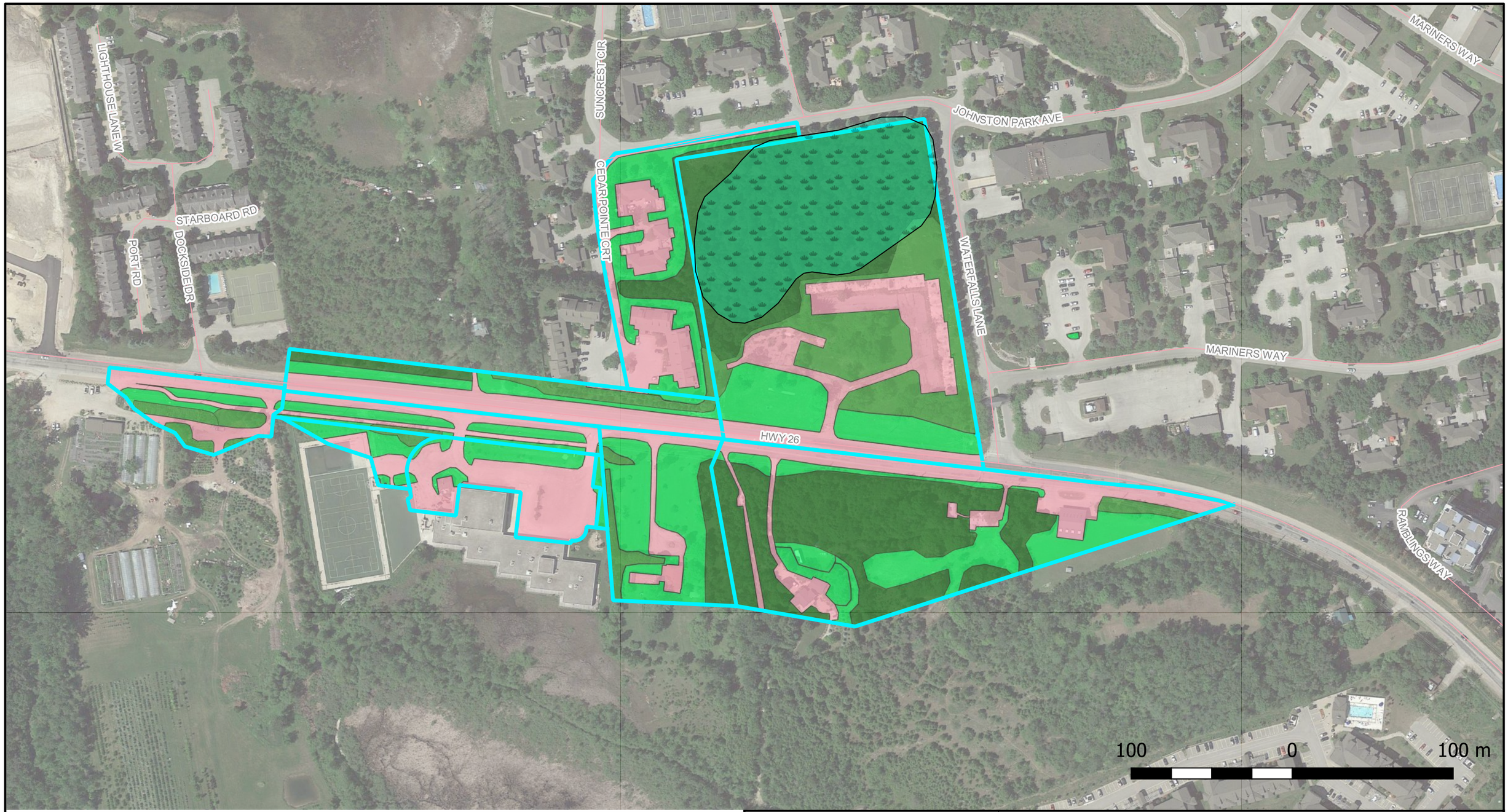
We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

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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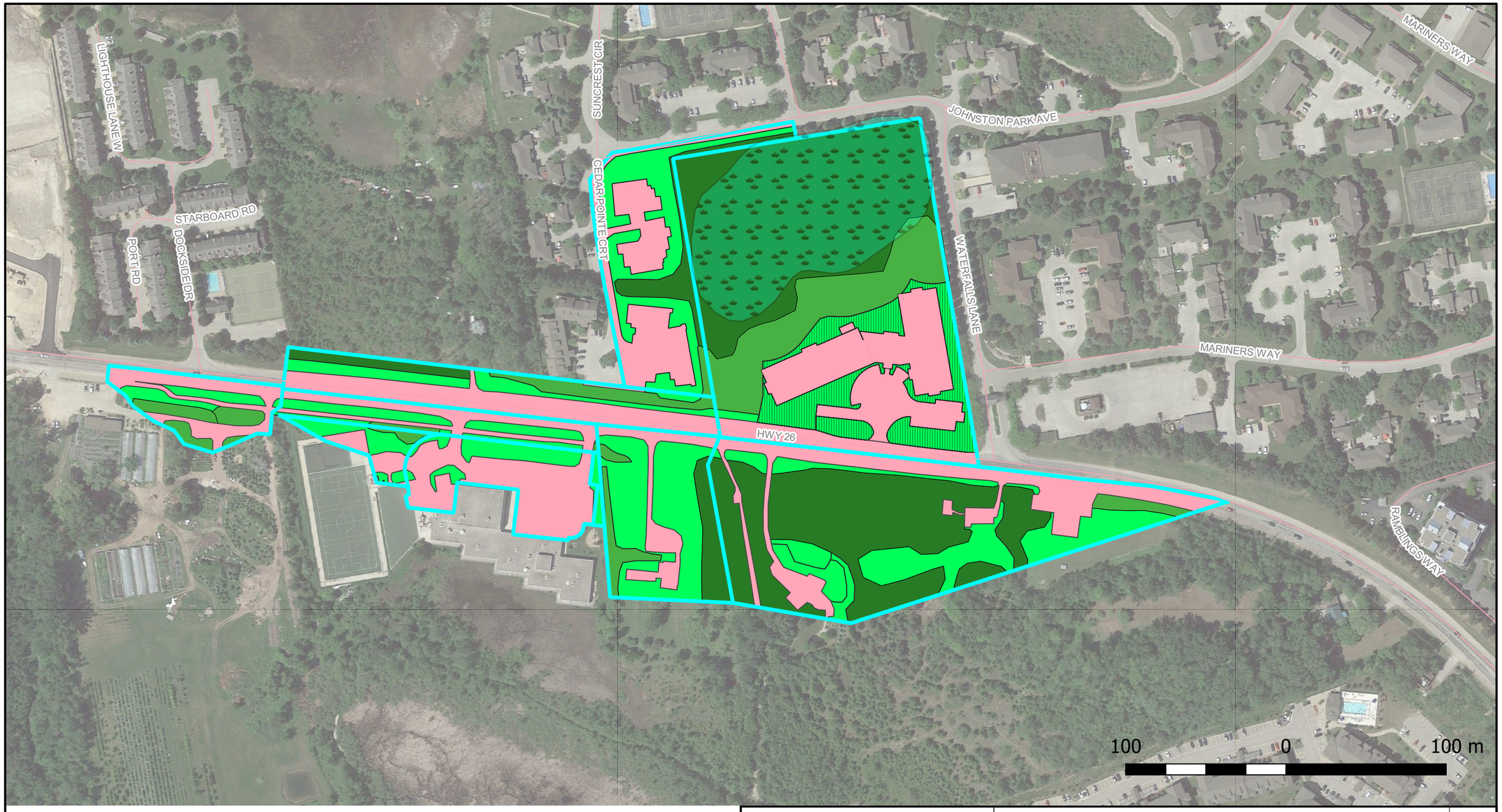
Project: Wetland Water Balance Study
11476 Highway 26, Collingwood, Ontario

Title: Pre-Development Conceptual Model

N

Client: DS Consultants Ltd.

Size:	Approved By:	Drawn By:	Date:
11x17	N.E	S.W	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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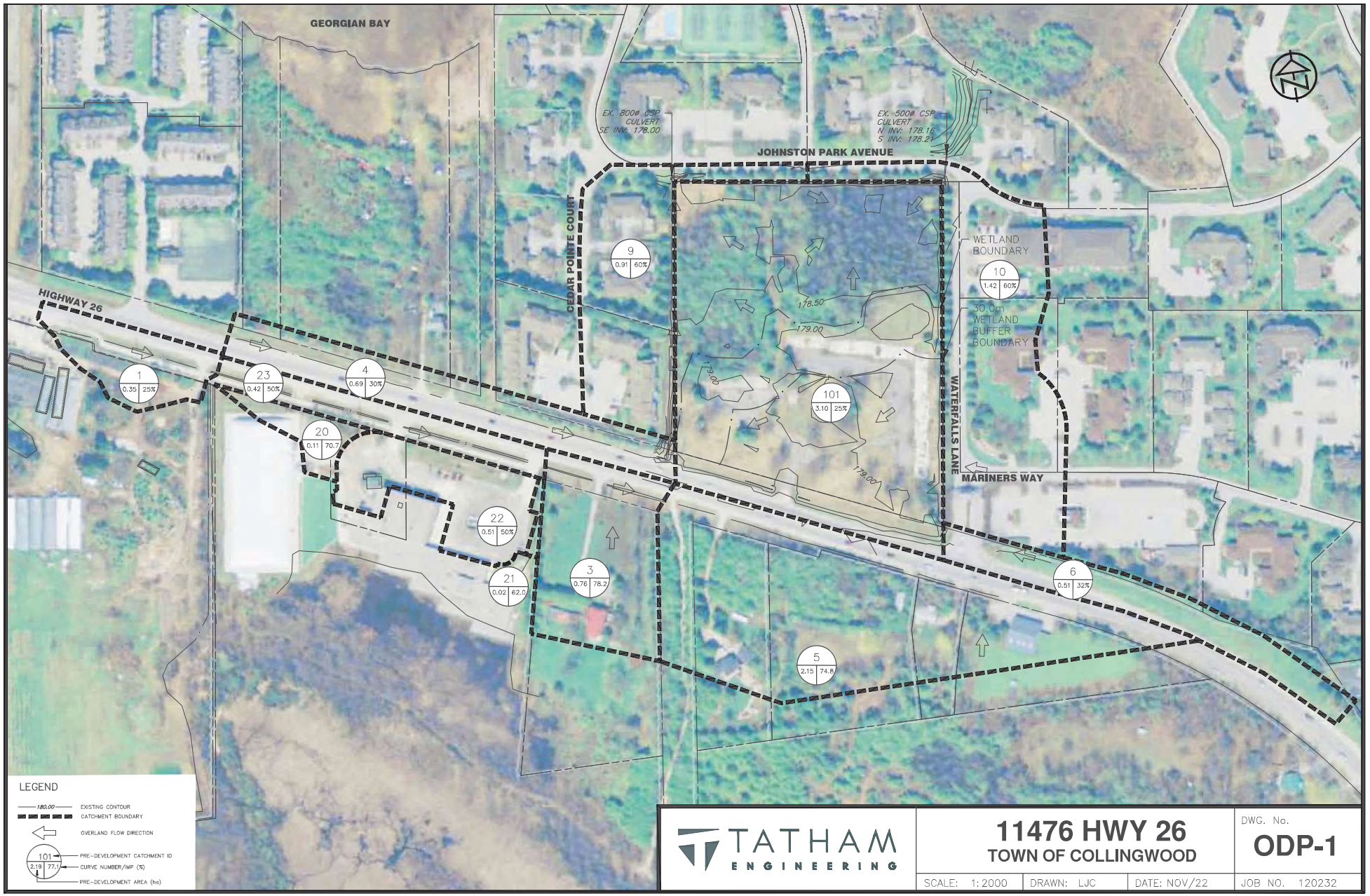
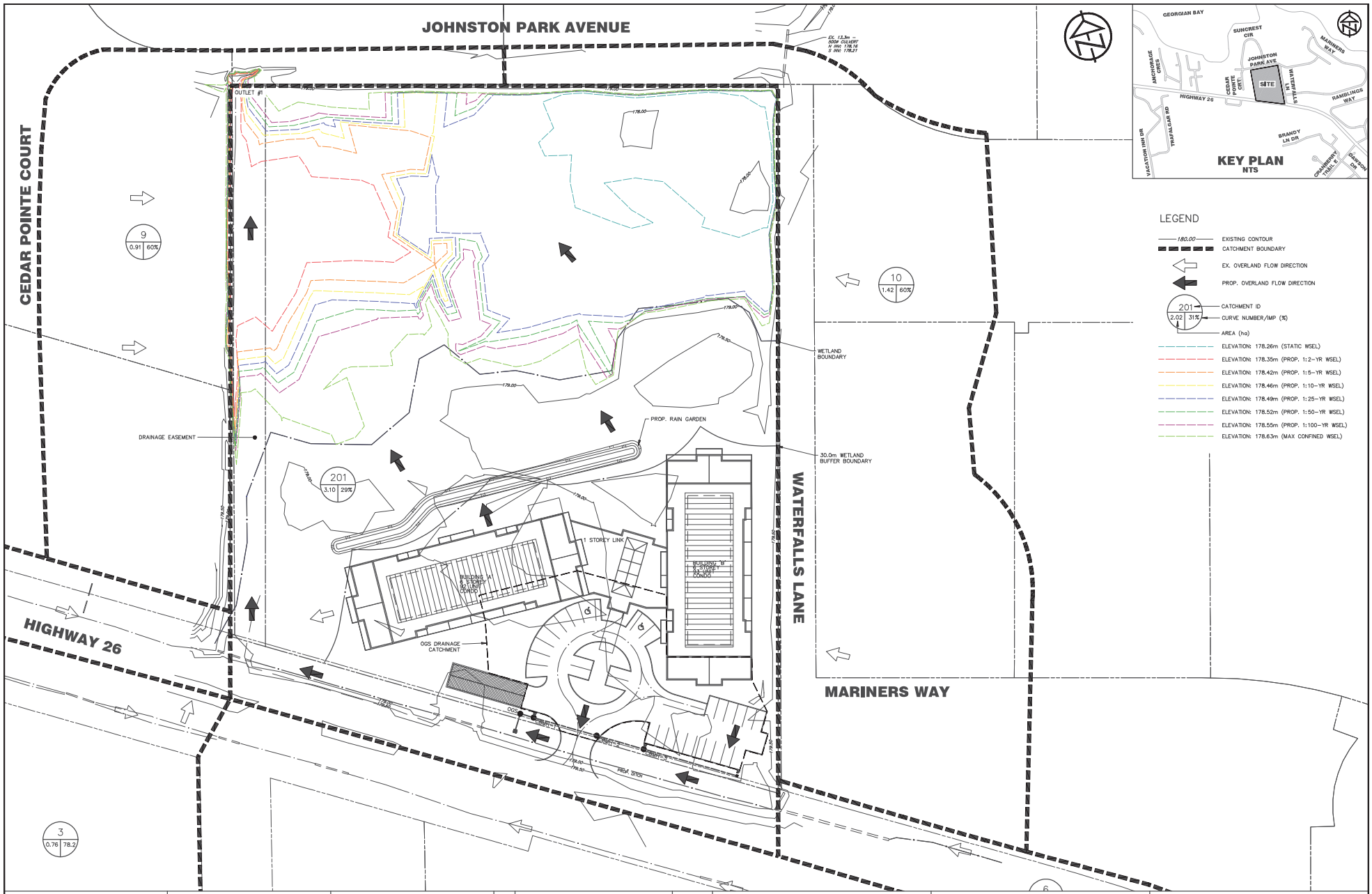
Size:	Approved By:	Drawn By:	Date:
11x17	N.E	S.W	March 2025
Rev. 0	Scale: As Shown	Project No.: 25-008-100	Figure No.: 2
	Image/Map Source: Google Satellite Image		

Appendix A


GEORGIAN BAY
EX. 800ø CSP CULVERT SE INV. 178.00
EX. 500ø CSP CULVERT N INV. 178.16 S INV. 178.21
JOHNSTON PARK AVENUE
CEDAR POINTE COURT
WETLAND BOUNDARY
30.0m WETLAND BUFFER BOUNDARY
HIGHWAY 26
WATERFALLS LANE
MARINERS WAY
178.50
179.00
179.00
179.00
9 0.91 60%
10 1.42 60%
1 0.35 25%
23 0.42 50%
4 0.69 30%
101 3.10 25%
20 0.11 70.7
22 0.51 50%
21 0.02 62.0
3 0.76 78.2
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



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, 2023

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

	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	28.7	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			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) = 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**

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 (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			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) = **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**

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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**

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