Town of Oakville
Stormwater Management Master Plan

Project # TP115045 | Town of Oakville

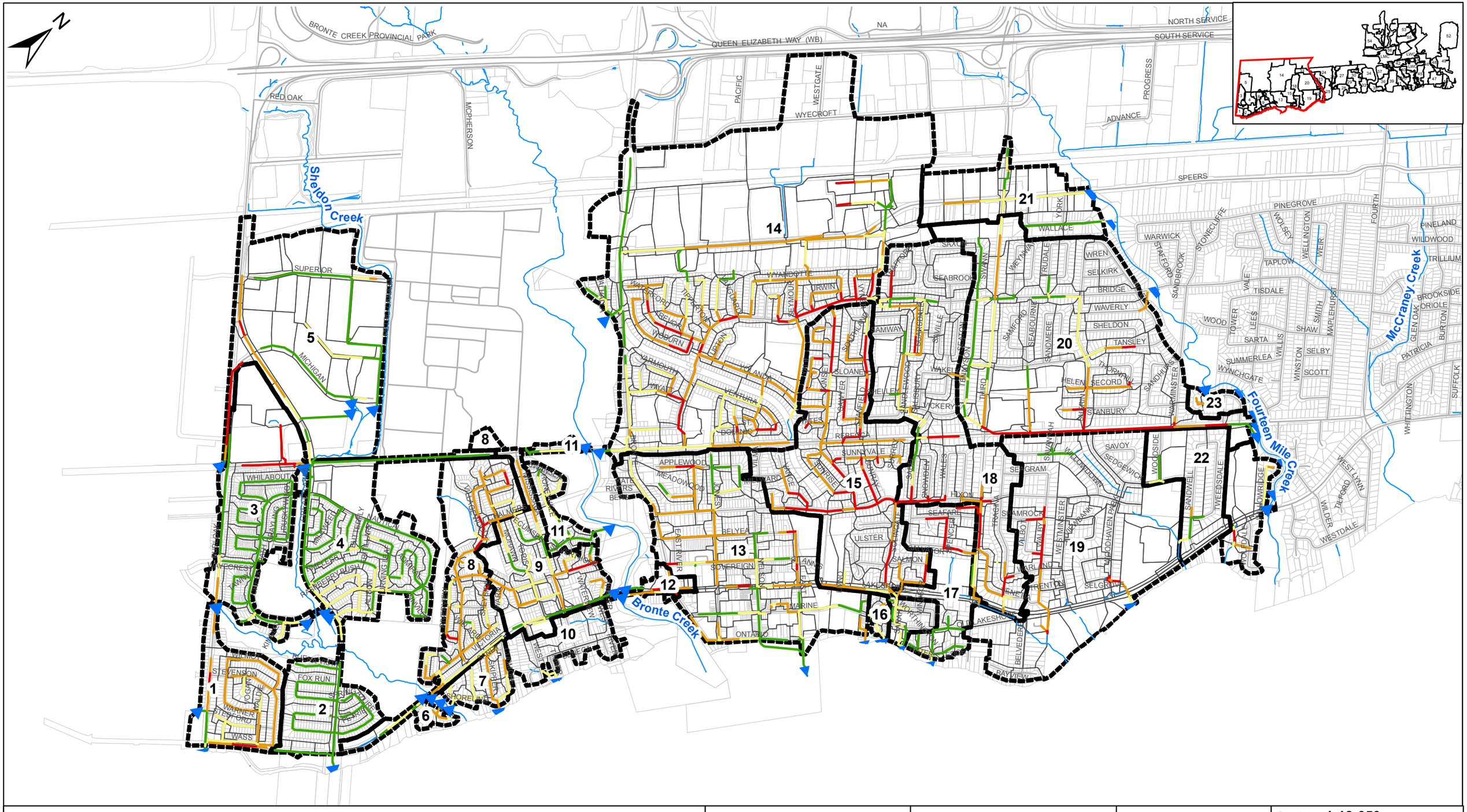
Prepared for:

Town of Oakville
1225 Trafalgar Road, Oakville, Ontario L6H 0H3

November 13, 2019

Appendix F

Existing Conditions Capacity Assessment Results



Legend

- Network
- Subcatchment
- Parcels
- Roads
- Streams
- Outfalls

Minor System Performance

- Unsurcharged
- Below 1/2 Surcharging Depth and Above Obvert
- Above 1/2 Surcharging Depth and Below Rim Elevation
- Surcharged Above Rim Elevation

Stormwater Management Master Plan

Phase 2

Town of Oakville

5 Year Minor System Performance Assessment - Existing Condition (Part 1)

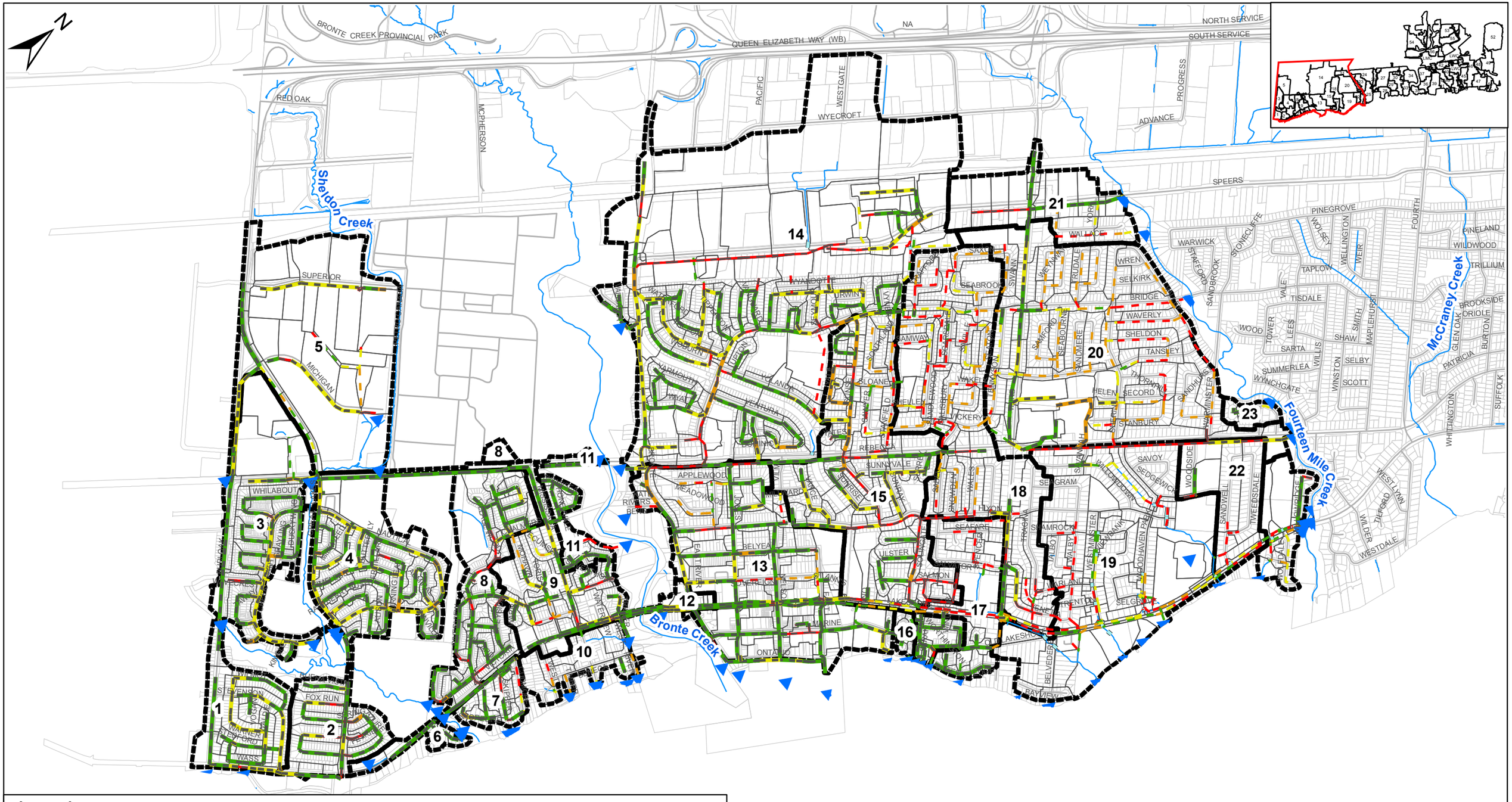
wood.

Scale **1:18,650**

0 100 200 400 600 800 Meters

Project No. **TP 115045**

Drawing No. **F1-1**



Legend

- Network
- Subcatchment
- Parcels
- Roads
- Streams
- Culverts
- Outfalls

Major System Performance

- Flow Contained Within Ditch
- Flow Contained Within Curb
- Flow Above Ditch But Contained Within ROW
- Flow Above Curb But Contained Within ROW
- Flow Beyond ROW (Less Than 50% to Building) - Ditches
- Flow Beyond ROW (Less Than 50% to Building) - Curbed
- Flow Beyond ROW (Greater Than 50% to Building) - Ditches
- Flow Beyond ROW (Greater Than 50% to Building) - Curbed

Stormwater Management Master Plan

Phase 2

Town of Oakville

100 Year Major System Performance Assessment - Existing Condition (Part 1)

wood.

Scale **1:18,650**

0 100 200 400 600 800 Meters

Project No. **TP 115045**

Drawing No. **F4-1**

Legend

- Network
- Subcatchment
- Parcels
- Roads
- Pump
- Storage
- Outfalls

Minor System

- Unsurcharged
- Below 1/2 Surcharging Depth and Above Obvert
- Above 1/2 Surcharging Depth and Below Rim Elevation
- Surcharged Above Rim Elevation

Stormwater Management Master Plan **Phase 2** **Town of Oakville**	**Minor System Capacity Assessment (Part 1)** **100-Year Existing Condition**	wood.	Scale **1:15,000** 200 100 0 200 Meters Project No. **TP 115045** Figure No. **F6-1**

Appendix H

Preferred Alternative Summary Drawings

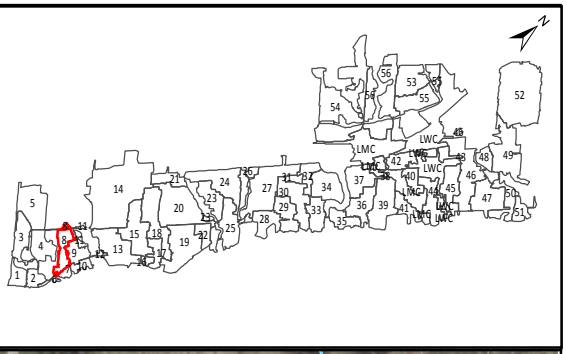
Legend

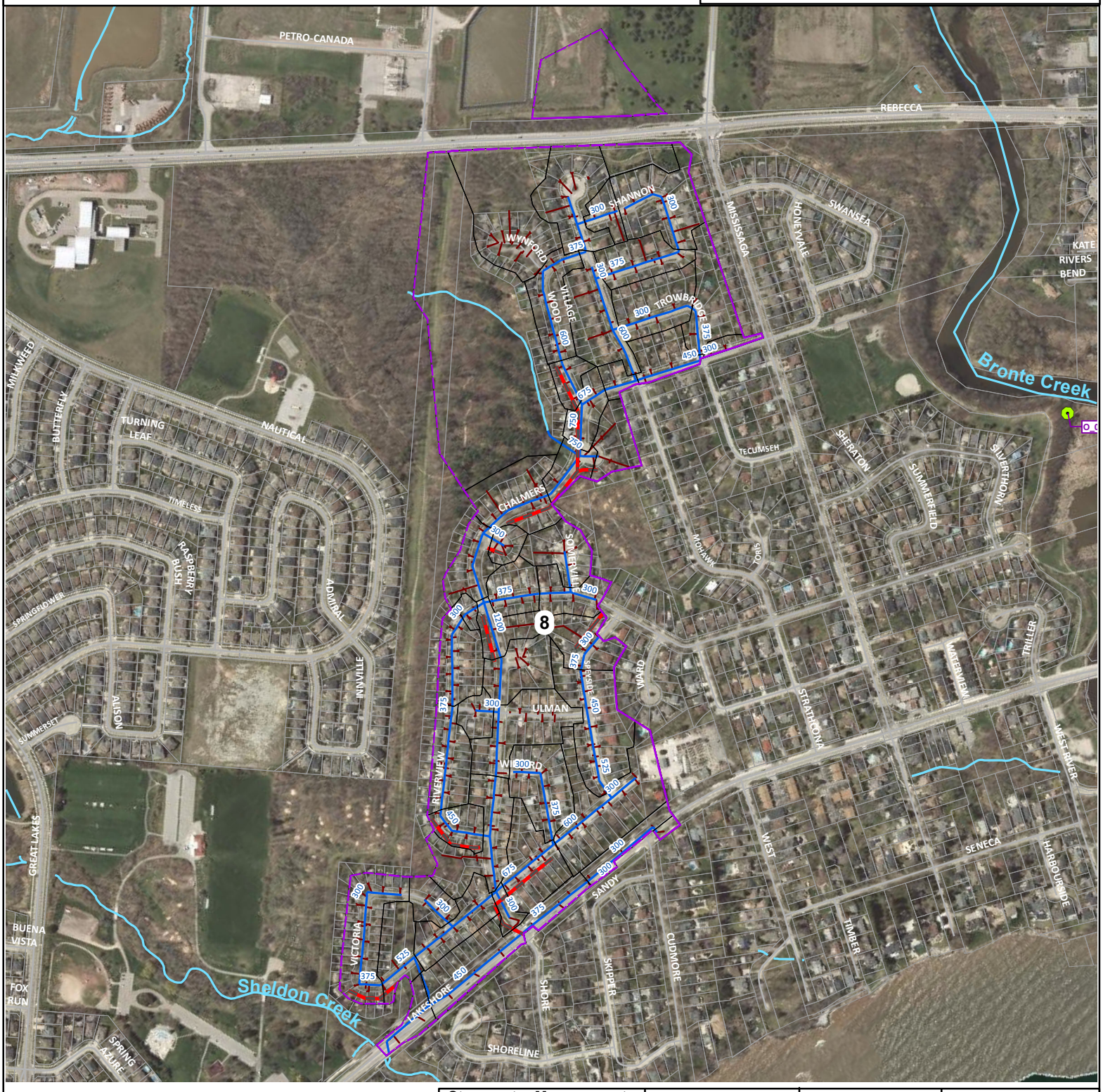
- Network
- Subcatchments
- Parcel
- Roads
- Channels
- Remnant Channels
- Basement Lateral Storm
- Existing Pipes
- Dry SWM Facility Retrofit
- Drainage Areas to Dry SWM Facility - Retrofit
- Outfalls
- Outfall Retrofit

Major System Improvement Locations

- Curbed
- Ditches

1500 - Existing Pipe Size (mm)





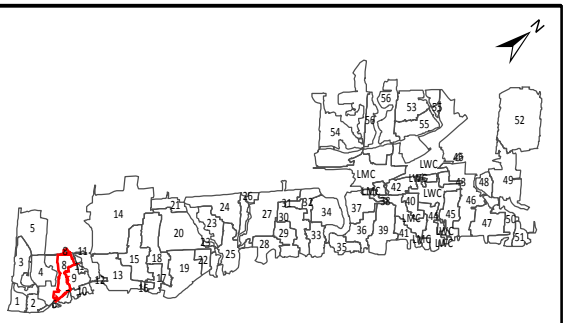
Stormwater Management Master Plan **Phase 2** **Town of Oakville**	**Recommended Works** **Sewershed 8**	wood.	Not to Scale (NTS) Project No. **TP 115045** Figure No. H8A

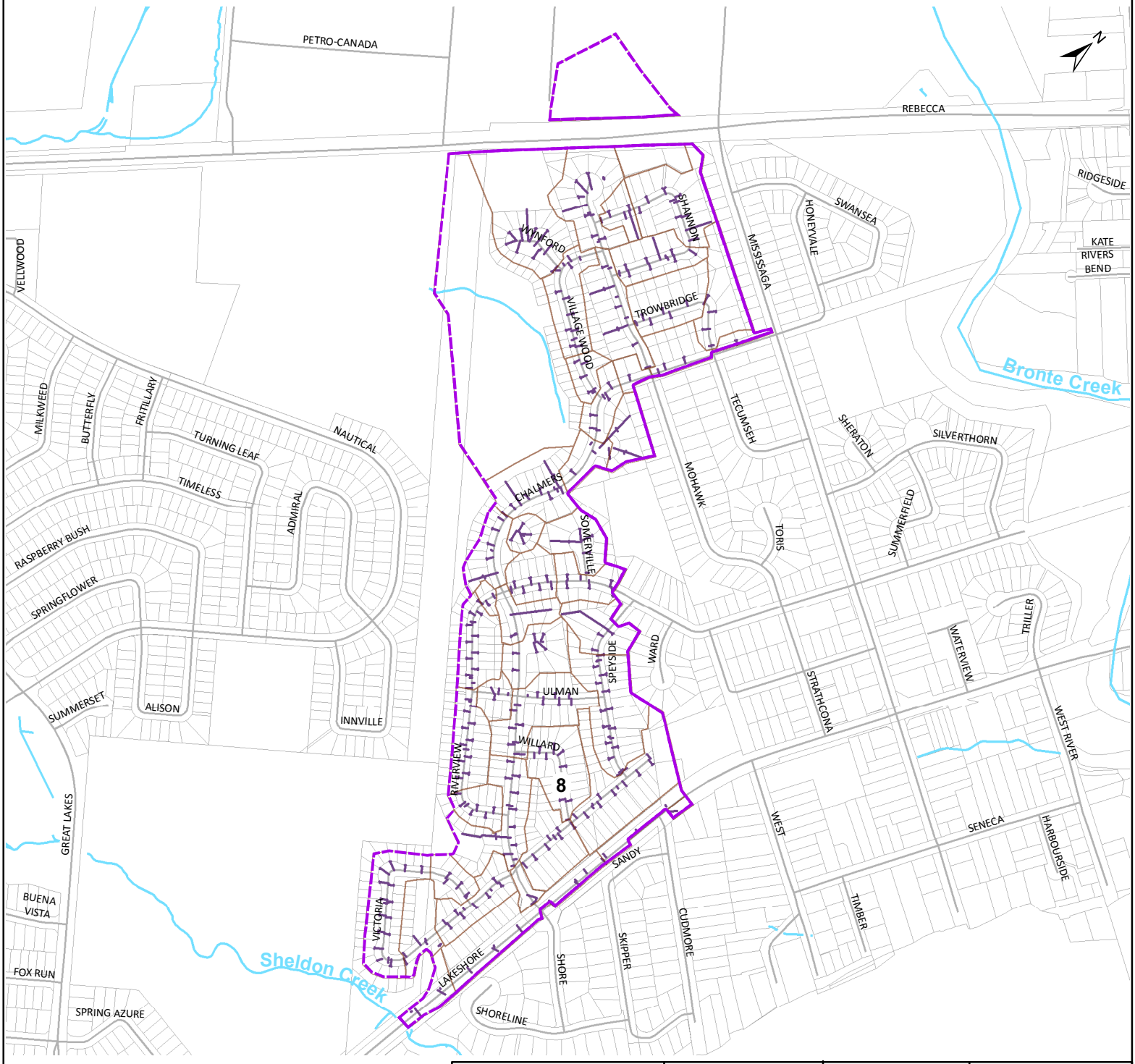
Legend

- Network
- Subcatchments
- Parcel
- Roads
- Channels
- Remnant Channels
- Lateral
- 1500 - Proposed Pipe Size (mm)
- Outfalls
- Proposed Subsurface Quantity Storage Unit
- Inlet Improvement Locations
- Potential Higher Capacity Catch Basins

Pipe Upgrade Recommandations

- 1 Up
- 2 Up
- 3 Up
- 4 Up
- >4 Up
- Diversion
- Install New Storm Sewers
- Replace with Like Sized Pipe





Stormwater Management Master Plan **Phase 2** **Town of Oakville**	**Recommended Works** **Sewershed 8**	wood.	Not to Scale (NTS) Project No. **TP 115045** Figure No. H8B

Network 8 Summary Sheet

Network Prioritization

Net Level of Service (LOS):	D	Weighted Net Score:	2.67
Minor System - Basement Connected LOS:	D	Minor System - Basement Not Connected LOS:	A
Major System LOS:	A	Future Study Recommended:	Confirmatory

Network Characteristics

Area (ha):	38.44	Existing Conditions Imperviousness (%):	50.46	Future Conditions Imperviousness (%):	52.24		
Land Use (ha):	Residential	28.93	Open Space	7.96	Commercial/Industrial	1.56	
Number of Private Properties:	480						

Infrastructure Characteristics

Modeled Sewer Length (m):	4,583	Basement Connected Sewer (m):	3,809	Not Connected (m):	774
Sewer Outfalls (#):	1	Modelled Sewer Manholes (#):	94	Catch Basins (#):	148
Existing ICD Implementation (%):	0	Existing SWM Facilities (#):	None	Existing SWM Storage (m^3):	N/A

Recommended Works

A. Quantity Control				
Minor System - Storm Sewers				
ICD Implementation	> 75 % of Inlets	148 # of CB	$	49,777
Replace with Like Sized Pipe		- m	$	-
Replace and Upgrade 1 Pipe Size		- m	$	-
Replace and Upgrade 2 Pipe Sizes		- m	$	-
Replace and Upgrade 3 Pipe Sizes		- m	$	-
Replace and Upgrade 4 Pipe Sizes		- m	$	-
Replace and Upgrade > 4 Pipe Sizes		- m	$	-
Diversion Sewers and New Sewers		- m	$	-
Online Storage		- m^3	$	-
Offline Storage		- m^3	$	-
Inlet Improvements				
Inlets Identified for Improvement:		- # of Inlets	$	-
CB Upgrades				
Higher Capacity Catch Basin Upgrades:		- # of CB	$	-
Minor System - Ditches				
Culvert Improvement		- m	$	-
Resectioning/Reditching		- m	$	-
Major System				
Replace Pipes		-		
Storage		-		
Urban Road LID Implementation		933 m	$	315,064
Resectioning/Reprofiling		845 m *		
Remnant Channels				
Remnant Channel I.D.		N/A		
Diversion		- m	$	-
Online Storage		-	$	-
Optimize Outlet		-		
Increase Pipe Size (Online)		-		
Reprofiling/Regrading		- m	$	-
B. Quality Control				
Proposed Stormwater Quality Outfall Retrofits:		- # of Facilities		
Impervious Area Treated to Enhanced Standard):		- ha	$	-
Stormwater Quality Retrofits to Existing Dry Facilities:		- # of Facilities		
Impervious Area Treated to Enhanced Standard:		- ha	$	-
Total Capital Works Costs			$	364,841
Preliminary and Detailed Design Future Studies (Schedule A/A+) Cost			$	4,978
Detailed Future Studies (Schedule B) Cost			$	-
Detailed Network Analysis Studies Cost			$	-
Total Capital Works and Future Studies Costs			$	369,819
Network Unitary Cost for All Recommended Works ($/Private Properties)			$	770

Storm Sewer Condition

Structural Grade						
Rating	1 (Excellent)	2	3	4	5 (Poor)	Total
Total Length of Pipes (m)	2573	1070	1025	108	39	4967
Total Percentage of Pipes (%)	51.8	21.5	20.6	2.2	0.8	97
O & M Rating						
Rating	1 (Excellent)	2	3	4	5 (Poor)	Total
Total Length of Pipes (m)	1071	2457	896	244	147	4967
Total Length of Pipes (%)	21.6	49.5	18	4.9	3	97

Notes: Significant mitigation efforts, other than ICDs, are not required.

* Major system reprofiling has been recommended for review in areas which lack a suitable alternative for mitigating poor surface drainage. Reprofiling should be considered at the time of roadway reconstruction.

Legend

- Network
- Subcatchments
- Parcel
- Roads
- Channels
- Remnant Channels
- Basement Lateral Storm
- Existing Pipes
- Dry SWM Facility Retrofit
- Drainage Areas to Dry SWM Facility - Retrofit
- Outfalls
- Outfall Retrofit

Major System Improvement Locations

- Curbed
- Ditches

1500 - Existing Pipe Size (mm)

Stormwater Management Master Plan **Phase 2** **Town of Oakville**	**Recommended Works** **Sewershed 9**	wood.	Not to Scale (NTS) Project No. **TP 115045** Figure No. H9A

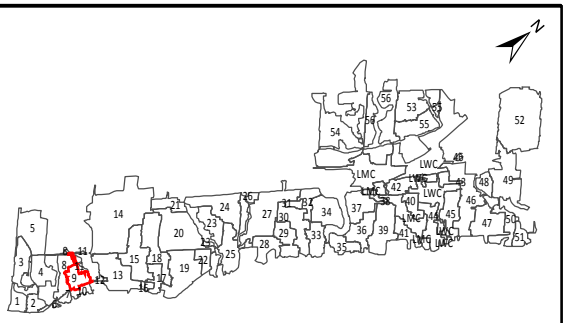
Legend

- Network
- Subcatchments
- Parcel
- Roads
- Channels
- Remnant Channels
- Lateral
- Outfalls
- Proposed Subsurface Quantity Storage Unit
- Inlet Improvement Locations
- Potential Higher Capacity Catch Basins

1500 - Proposed Pipe Size (mm)

Pipe Upgrade Recommandations

- 1 Up
- 2 Up
- 3 Up
- 4 Up
- >4 Up
- Diversion
- Install New Storm Sewers
- Replace with Like Sized Pipe



Stormwater Management Master Plan **Phase 2** **Town of Oakville**	**Recommended Works** **Sewershed 9**	wood.	Not to Scale (NTS) Project No. **TP 115045** Figure No. H9B

Network 9 Summary Sheet

Network Prioritization

Net Level of Service (LOS):	C	Weighted Net Score:	1.91
Minor System - Basement Connected LOS:	D	Minor System - Basement Not Connected LOS:	A
Major System LOS:	A	Future Study Recommended:	Further Assessment

Network Characteristics

Area (ha):	32.17	Existing Conditions Imperviousness (%):	51.24			Future Conditions Imperviousness (%):	57.36
Land Use (ha):	Residential	29.31	Open Space	2.14	Commercial/Industrial		0.71
Number of Private Properties:	298						

Infrastructure Characteristics

Modeled Sewer Length (m):	3,869	Basement Connected Sewer (m):	2,294	Not Connected (m):	1,575
Sewer Outfalls (#):	1	Modelled Sewer Manholes (#):	61	Catch Basins (#):	133
Existing ICD Implementation (%):	0	Existing SWM Facilities (#):	None	Existing SWM Storage (m^3):	N/A

Recommended Works

A. Quantity Control				
Minor System - Storm Sewers				
ICD Implementation	75 % of Inlets	100 # of CB	$	33,549
Replace with Like Sized Pipe		- m	$	-
Replace and Upgrade 1 Pipe Size		193 m	$	329,073
Replace and Upgrade 2 Pipe Sizes		177 m	$	301,351
Replace and Upgrade 3 Pipe Sizes		- m	$	-
Replace and Upgrade 4 Pipe Sizes		- m	$	-
Replace and Upgrade > 4 Pipe Sizes		- m	$	-
Diversion Sewers and New Sewers		- m	$	-
Online Storage		- m^3	$	-
Offline Storage		- m^3	$	-
Inlet Improvements				
Inlets Identified for Improvement:		- # of Inlets	$	-
CB Upgrades				
Higher Capacity Catch Basin Upgrades:		- # of CB	$	-
Minor System - Ditches				
Culvert Improvement		310 m	$	33,063
Resectioning/Reditching		310 m	$	30,972
Major System				
Replace Pipes		-		
Storage		-		
Urban Road LID Implementation		736 m	$	248,623
Resectioning/Reprofiling		347 m *		
Remnant Channels				
Remnant Channel I.D.		N/A		
Diversion		- m	$	-
Online Storage		-	$	-
Optimize Outlet		-		
Increase Pipe Size (Online)		-		
Reprofiling/Regrading		- m	$	-
B. Quality Control				
Proposed Stormwater Quality Outfall Retrofits:		- # of Facilities		
Impervious Area Treated to Enhanced Standard):		- ha	$	-
Stormwater Quality Retrofits to Existing Dry Facilities:		- # of Facilities		
Impervious Area Treated to Enhanced Standard:		- ha	$	-
Total Capital Works Costs			$	976,632
Preliminary and Detailed Design Future Studies (Schedule A/A+) Cost			$	66,397
Detailed Future Studies (Schedule B) Cost			$	3,097
Detailed Network Analysis Studies Cost			$	80,000
Total Capital Works and Future Studies Costs			$	1,126,126
Network Unitary Cost for All Recommended Works ($/Private Properties)			$	3,779

Storm Sewer Condition

Structural Grade						
Rating	1 (Excellent)	2	3	4	5 (Poor)	Total
Total Length of Pipes (m)	2477	385	636	0	0	3498
Total Percentage of Pipes (%)	70.8	11	18.2	0	0	100
O & M Rating						
Rating	1 (Excellent)	2	3	4	5 (Poor)	Total
Total Length of Pipes (m)	431	2087	838	74	68	3498
Total Length of Pipes (%)	12.3	59.7	24	2.1	1.9	100

Notes: Minor Pipe replacement upgrades are also recommended in addition to pipe upgrades as per the Lakeshore Road (Draft) Class EA. Instances of surcharge at isolated locations with basement connections or foundations drains should be considered for disconnection from the storm sewer system. Future study recommended with additional investigation to address residual data gaps and to validate alternatives.

* Major system reprofiling has been recommended for review in areas which lack a suitable alternative for mitigating poor surface drainage. Reprofiling should be considered at the time of roadway reconstruction.

Project: 22-004-100 **October 13, 2022**

SCS Consulting Group Ltd.
30 Centurian Drive, Suite 100
Markham, ON,
L3R 8B8

Attention: Mr. Nick McIntosh, M.A.Sc, P.Eng

via email: nmcintosh@scsconsultinggroup.com

Re: Site Water Balance Assessment - 3171 Lakeshore Rd. W. Oakville, Ontario

GeoBase Solutions Ltd. (GBS) was retained to complete a site water balance assessment for the proposed development located at 3171 Lakeshore Rd. W. in Oakville, Ontario (site). The site has a total area of about 11,700 m^2 and is currently developed as a garden center. The site is to be developed for residential purposes and will involve the construction of townhouses with landscaped yards, an internal road system and municipal services. This investigation is in support of the proposed draft site plan application for the City of Oakville, and to satisfy the requirements of the Conservation Halton (CH).

EXISTING CONDITIONS

The subject Site has a total area of about 11,700 m^2 and is currently developed as a garden center with pervious landscaped areas (8,100 m^2), impervious paved areas and hardscaping (3,100 m^2), and buildings/roof area (500 m^2). Surrounding land use mostly includes residential properties.

PROPOSED DEVELOPMENT

The subject property is to be developed for residential purposes and will involve the construction of townhouses with landscaped yards and an internal road system. For the site water balance calculations in this report, post development areas were estimated based on site plan designs provided to GBS. The total building area will occupy approximately 3,300 m^2. Ground level impervious areas (roads/walkway /parking areas) will occupy 3,700 m^2. The remainder of the site will be pervious landscaped area and will occupy approximately 4,700 m^2. **Appendix A** shows the post-development conceptual model considered for establishing post-hydrologic conditions.

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, precipitation and stormwater run-on. 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/evapotranspire (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:

$$P = ET + R + I + ST$$

Based on the physiographic setting and proximity to climate stations, the Burlington TS Climate Station was chosen as the most representative database. The most recent 30-year normal (average weather data) available from Environment Canada covers the period from January 1981 to December 2010. Table A-1, Appendix A summarizes the monthly and annual averages for precipitation and daily temperature.

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 A.

PRECIPITATION (P)

Based on the 30-year average for the Burlington TS Climate Station, the average precipitation for the area is about 863 mm/year. The monthly distribution of precipitation is presented in Table A-1, Appendix A.

STORAGE (ST)

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 and respective water holding capacities chosen to represent existing conditions at the site include cultivated, forested and shrub/pasture with a silt loam soil. Using the procedures outlined in the SWM Planning & Design Manual for the above land use and soil type, the annul change in storage is 0. The monthly distribution of ST for each of the land us/soil types is presented in Table A-2, Appendix A.

EVAPORATION / EVAPOTRANSPIRATION (ET)

In the pre-development scenario, there are existing impervious surfaces resulting in evaporation which is estimated as 15% of precipitation (129 mm/yr). As a result, evaporation volume for pre-development conditions was calculated at 466 m^3/yr.

Evapotranspiration in the pre-development scenario occurs over each pervious land use. 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). Considering a total annual precipitation of 863 mm, adjusted Potential Evapotranspiration (PET) is estimated at 629.5 mm.

A comparison between PET and Precipitation (P) produces a soil moisture deficit which begins in June and is increases to a maximum of 153 mm in August. 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. Estimated AET for landscaped areas was calculated at 541 mm/yr. The total annual volume of AET across the existing site is estimated at 4,379 m^3/yr. Detailed calculations and the monthly distribution of AET is presented in Table A-2, Appendix A.

INFILTRATION (I)

For pervious areas, precipitation surplus following AET has two 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 prescribed in Table 3.1 of the SWM Planning & Design Manual give infiltration factors for existing conditions on the site as shown below in Section Table 1.

Table 1: Existing Conditions – Infiltration Factor

LAND USES / SOIL TYPES	TOPOGRAPHY	SOIL	COVER	TOTAL INFILTRATION FACTOR
Landscaped	0.30	0.20	0.05	0.55

Considering the above infiltration factors, the total depth of Infiltration (I) estimated for existing conditions is about 177 mm/yr, or a total volume of 1,436 m^3/yr. The more detailed calculations are presented in Table A-2, Appendix A.

RUNOFF (R)

The runoff component calculated in the pre-development model is the remaining volume of precipitation surplus for both pervious and impervious areas. Considering the precipitation surpluses and the total Infiltration and evaporation volume over the site, the total volume of runoff estimated for existing conditions is about 3,816 m^3/yr. The more detailed calculations are presented in Table A-2, Appendix A.

POST-DEVELOPMENT WATER BALANCE (NO MITIGATION)

To predict outputs of the post-development water balance, the same elements of the 30-year average weather data and site latitude inputs were used. Various inputs and outputs of the post-development model are described in detail below. The detailed calculations are presented in Table A-3 Appendix A.

PRECIPITATION (P)

Precipitation remains the same (ie. The 30-year climate normals (1981-2010) for the Burlington TS Climate Station).

STORAGE (ST)

Groundwater storage (ST) of native soils for the post-development site remains the same as predevelopment conditions since both in consider only landscaped pervious areas. A soil moisture holding capacity of 125 was selected for silt loam soils. Similar to pre-development conditions, using the procedures outlined in the SWM Planning & Design Manual for each land use, the annual change in storage is 0. The monthly distribution of ST for each of the land use/soil types is presented in Table A-3 Appendix A.

EVAPORATION / EVAPOTRANSPIRATION (ET)

In the post construction scenario, changes in land use result in an about 3,400 m^2 of additional impervious surfaces. For impervious areas it is assumed that evaporation will occur and will amount to approximately 15% of total precipitation. Considering a total annual precipitation of 863 mm, evaporation is estimated at 129 mm. As a result, a total annual volume of evaporation is estimated at 906 m^3/yr. The detailed calculations for evaporation are included in Table A-3 Appendix A.

For post-development pervious areas, monthly PET is estimated using the same inputs and calculations described in the pre-development model respective of land use and soil moisture holding capacity. In the post-development scenario, annual AET is 2,541 m^3/yr. The monthly distribution of Post-development AET and detailed calculations are presented in Table A-3, Appendix A.

INFILTRATION (I)

The same accumulation of infiltration factors for topography, soil types and cover as prescribed in Table 3.1 of the SWM Planning & Design Manual were used give infiltration factors for post-development conditions. Considering the infiltration factors used, the total volume of Infiltration (I) estimated for post-development conditions is about 833 m^3/yr. The more detailed calculations are presented in Table A-3, Appendix A.

RUNOFF (R)

The runoff component calculated in the post-development model is a combination of the remaining volume of precipitation surplus for both pervious and impervious areas. The total volume of runoff (R) estimated for post-development conditions is 5,817 m^3/yr. The more detailed calculations are presented in Table A-3, Appendix A.

POST-DEVELOPMENT WATER BALANCE (WITH MITIGATION)

Based on results of the pre-development and post-development water balance completed, the proposed development will produce a reduction in annual AET (1,838 m^3/yr), an increase in annual ET (440 m^3/yr), a reduction in annual infiltration (603 m^3/yr) and an increase in annual runoff (2001 m^3/yr), as shown in Table A-4, Appendix A. The effects are mainly the result of increased impervious area, replacing pervious areas of the site.

Best efforts have been made to remove the infiltration deficit through the use of Low Impact Development (LID) measures. A mitigation plan was provided by SCS Consulting Group ltd. (SCS) for incorporation into a mitigated post-development site water balance. The mitigation plan includes a design with permeable pavers totalling an area of 260 m^2. The location of the pavers are provided in the Proposed Storm Drainage Plan (figure 3) provided in the SWM Report completed by SCS. Using comparisons between total annual rainfall depth and daily rainfall depth provided by Wet Weather Flow Management Guidelines, City of Toronto, 2006, the pavers were provided with a 94% efficiency rating considering their design to infiltrate a 25 mm storm event.

Based on results of the post-development water balance with mitigation, the proposed development will produce a reduction in annual AET (1,838 m^3/yr), an increase in annual ET (440 m^3/yr), a reduction in annual infiltration (424 m^3/yr) and an increase in annual runoff (1,822 m^3/yr), as shown in Table A-4, Appendix A. The effects are mainly the result of increased impervious area, replacing pervious areas of the site.

The detailed calculations for the mitigated site water balance is summarized in **Table A-4, Appendix A**. The post-development with mitigation infiltration deficit of 424 m^3/yr is 29% of the pre-development infiltration volume.

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.
Project Manager

Reviewed By:

Naeem Ehsan, M.Eng., P.Eng.
Senior Engineer

Appendix A

TABLE A-1

CLIMATE NORMALS 1981-2010 (BURLINGTON TS CLIMATE STATION)

Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

	Thornthwaite (1948)					
Month	Mean Temperature (°C)	Heat Index	Unadjusted Potential Evapotranspiration (mm)	Daylight Correction Value	Adjusted Potential Evapotranspiration (mm)	Total Precipitation (mm)
January	-4.4	0.0	0.0	0.78	0.0	66.0
February	-3.2	0.0	0.0	0.88	0.0	54.5
March	1.0	0.1	2.8	0.99	2.8	61.6
April	7.5	1.8	30.5	1.12	34.1	70.6
May	13.9	4.7	62.9	1.22	76.8	81.0
June	19.4	7.8	93.1	1.28	119.2	69.1
July	22.5	9.7	110.9	1.25	138.6	75.3
August	21.4	9.0	104.5	1.16	121.3	82.0
September	16.9	6.3	79.2	1.04	82.4	83.1
October	10.4	3.0	44.7	0.92	41.2	71.9
November	4.4	0.8	16.3	0.81	13.2	84.9
December	-1.0	0.0	0.0	0.75	0.0	63.0
TOTALS		**43.4**	**545.0**		**629.5**	**863.0**

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

GBS

TABLE A-2
Pre-development Water Balance
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 101	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **1500.00**	**Monthly Volumes**												
	Total AET (m^3)		4.23	51.17	115.17	163.77	145.78	125.72	123.55	61.74	19.76	0.00	0.00	0.00	**810.89**
	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)		48.49	30.10	3.48	0.00	0.00	0.00	0.00	0.00	32.52	51.98	54.45	44.96	**265.99**
	Total Runoff (m^3)		39.68	24.63	2.85	0.00	0.00	0.00	0.00	0.00	26.61	42.53	44.55	36.79	**217.63**
	Existing Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **400.00**	**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)		3.70	4.24	4.86	4.15	4.52	4.92	4.99	4.31	5.09	3.78	3.96	3.27	**51.78**
	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)		20.94	24.00	27.54	23.49	25.60	27.88	28.25	24.45	28.87	21.42	22.44	18.53	**293.42**
	Existing Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **100.00**	**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)		0.92	1.06	1.22	1.04	1.13	1.23	1.25	1.08	1.27	0.95	0.99	0.82	**12.95**
	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)		5.24	6.00	6.89	5.87	6.40	6.97	7.06	6.11	7.22	5.36	5.61	4.63	**73.36**
	Catchment 101 Total Monthly Volumes														
	Total AET (m^3)		4.23	51.17	115.17	163.77	145.78	125.72	123.55	61.74	19.76	0.00	0.00	0.00	**810.89**
	Total Evaporation (m^3)		4.62	5.30	6.08	5.18	5.65	6.15	6.23	5.39	6.37	4.73	4.95	4.09	**64.73**
	Total Infiltration (m^3)		48.49	30.10	3.48	0.00	0.00	0.00	0.00	0.00	32.52	51.98	54.45	44.96	**265.99**
	Total Runoff (m^3)		65.86	54.63	37.28	29.37	32.00	34.85	35.32	30.56	62.69	69.30	72.60	59.95	**584.40**

GBS

TABLE A-2
Pre-development Water Balance
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 102	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **6600.00**	0.60	Monthly Volumes											
	Total AET (m^3)		18.60	225.15	506.73	720.58	641.44	553.18	543.60	271.66	86.96	0.00	0.00	0.00	**3567.90**
	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)		213.38	132.45	15.33	0.00	0.00	0.00	0.00	0.00	143.09	228.69	239.58	197.84	**1170.35**
	Total Runoff (m^3)		174.58	108.37	12.54	0.00	0.00	0.00	0.00	0.00	117.07	187.11	196.02	161.87	**957.56**
	Existing Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **2700.00**	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)		24.95	28.59	32.81	27.99	30.50	33.21	33.66	29.12	34.38	25.52	26.73	22.07	**349.52**
	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)		141.37	162.03	185.90	158.58	172.81	188.19	190.71	165.01	194.85	144.59	151.47	125.08	**1980.59**
	Existing Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **400.00**	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)		3.70	4.24	4.86	4.15	4.52	4.92	4.99	4.31	5.09	3.78	3.96	3.27	**51.78**
	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)		20.94	24.00	27.54	23.49	25.60	27.88	28.25	24.45	28.87	21.42	22.44	18.53	**293.42**
	Catchment 102 Total Monthly Volumes														
	Total AET (m^3)		18.60	225.15	506.73	720.58	641.44	553.18	543.60	271.66	86.96	0.00	0.00	0.00	**3567.90**
	Total Evaporation (m^3)		28.64	32.83	37.67	32.13	35.01	38.13	38.64	33.43	39.48	29.30	30.69	25.34	**401.30**
	Total Infiltration (m^3)		213.38	132.45	15.33	0.00	0.00	0.00	0.00	0.00	143.09	228.69	239.58	197.84	**1170.35**
	Total Runoff (m^3)		336.90	294.40	225.98	182.08	198.42	216.07	218.97	189.46	340.79	353.12	369.93	305.47	**3231.56**

GBS

TABLE A-3
Post-development Water Balance
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 201	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **800.00**	**Monthly Volumes**												
	Total AET (m^3)		2.26	27.29	61.42	87.34	77.75	67.05	65.89	32.93	10.54	0.00	0.00	0.00	**432.47**
	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)		25.86	16.05	1.86	0.00	0.00	0.00	0.00	0.00	17.34	27.72	29.04	23.98	**141.86**
	Total Runoff (m^3)		21.16	13.14	1.52	0.00	0.00	0.00	0.00	0.00	14.19	22.68	23.76	19.62	**116.07**
	Proposed Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **900.00**	**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)		8.32	9.53	10.94	9.33	10.17	11.07	11.22	9.71	11.46	8.51	8.91	7.36	**116.51**
	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)		47.12	54.01	61.97	52.86	57.60	62.73	63.57	55.00	64.95	48.20	50.49	41.69	**660.20**
	Proposed Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **300.00**	**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)		2.77	3.18	3.65	3.11	3.39	3.69	3.74	3.24	3.82	2.84	2.97	2.45	**38.84**
	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)		15.71	18.00	20.66	17.62	19.20	20.91	21.19	18.33	21.65	16.07	16.83	13.90	**220.07**
	Catchment 201 Total Monthly Volumes														
	Total AET (m^3)		2.26	27.29	61.42	87.34	77.75	67.05	65.89	32.93	10.54	0.00	0.00	0.00	**432.47**
	Total Evaporation (m^3)		11.09	12.71	14.58	12.44	13.55	14.76	14.96	12.94	15.28	11.34	11.88	9.81	**155.34**
	Total Infiltration (m^3)		25.86	16.05	1.86	0.00	0.00	0.00	0.00	0.00	17.34	27.72	29.04	23.98	**141.86**
	Total Runoff (m^3)		83.99	85.15	84.14	70.48	76.81	83.64	84.76	73.34	100.79	86.94	91.08	75.21	**996.33**

GBS

TABLE A-3
Post-development Water Balance
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 202	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **1400.00**	0.60	Monthly Volumes											
	Total AET (m^3)		3.95	47.76	107.49	152.85	136.06	117.34	115.31	57.62	18.45	0.00	0.00	0.00	**756.83**
	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)		45.26	28.09	3.25	0.00	0.00	0.00	0.00	0.00	30.35	48.51	50.82	41.97	**248.26**
	Total Runoff (m^3)		37.03	22.99	2.66	0.00	0.00	0.00	0.00	0.00	24.83	39.69	41.58	34.34	**203.12**
	Proposed Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **400.00**	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)		3.70	4.24	4.86	4.15	4.52	4.92	4.99	4.31	5.09	3.78	3.96	3.27	**51.78**
	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)		20.94	24.00	27.54	23.49	25.60	27.88	28.25	24.45	28.87	21.42	22.44	18.53	**293.42**
	Proposed Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **600.00**	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)		5.54	6.35	7.29	6.22	6.78	7.38	7.48	6.47	7.64	5.67	5.94	4.91	**77.67**
	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)		31.42	36.01	41.31	35.24	38.40	41.82	42.38	36.67	43.30	32.13	33.66	27.80	**440.13**
	Catchment 202 Total Monthly Volumes														
	Total AET (m^3)		3.95	47.76	107.49	152.85	136.06	117.34	115.31	57.62	18.45	0.00	0.00	0.00	**756.83**
	Total Evaporation (m^3)		9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
	Total Infiltration (m^3)		45.26	28.09	3.25	0.00	0.00	0.00	0.00	0.00	30.35	48.51	50.82	41.97	**248.26**
	Total Runoff (m^3)		89.39	83.00	71.51	58.74	64.01	69.70	70.64	61.12	97.00	93.24	97.68	80.66	**936.67**

TABLE A-3
Post-development Water Balance
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 203	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **2100.00**	**Monthly Volumes**												
	Total AET (m^3)		5.92	71.64	161.23	229.27	204.09	176.01	172.96	86.44	27.67	0.00	0.00	0.00	**1135.24**
	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)		67.89	42.14	4.88	0.00	0.00	0.00	0.00	0.00	45.53	72.77	76.23	62.95	**372.38**
	Total Runoff (m^3)		55.55	34.48	3.99	0.00	0.00	0.00	0.00	0.00	37.25	59.54	62.37	51.50	**304.68**
	Proposed Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **2400.00**	**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)		22.18	25.42	29.16	24.88	27.11	29.52	29.92	25.88	30.56	22.68	23.76	19.62	**310.68**
	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)		125.66	144.02	165.24	140.96	153.61	167.28	169.52	146.68	173.20	128.52	134.64	111.18	**1760.52**
	Proposed Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **2200.00**	**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)		20.33	23.30	26.73	22.80	24.85	27.06	27.42	23.73	28.02	20.79	21.78	17.99	**284.79**
	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)		115.19	132.02	151.47	129.22	140.81	153.34	155.40	134.45	158.76	117.81	123.42	101.92	**1613.81**
	Catchment 203 Total Monthly Volumes														
	Total AET (m^3)		5.92	71.64	161.23	229.27	204.09	176.01	172.96	86.44	27.67	0.00	0.00	0.00	**1135.24**
	Total Evaporation (m^3)		42.50	48.71	55.89	47.68	51.96	56.58	57.34	49.61	58.58	43.47	45.54	37.61	**595.47**
	Total Infiltration (m^3)		67.89	42.14	4.88	0.00	0.00	0.00	0.00	0.00	45.53	72.77	76.23	62.95	**372.38**
	Total Runoff (m^3)		296.40	310.53	320.70	270.18	294.42	320.62	324.92	281.13	369.21	305.87	320.43	264.60	**3679.01**

GBS

TABLE A-3
Post-development Water Balance
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 204	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **400.00**	Monthly Volumes												
	Total AET (m^3)		1.13	13.65	30.71	43.67	38.88	33.53	32.95	16.46	5.27	0.00	0.00	0.00	**216.24**
	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)		12.93	8.03	0.93	0.00	0.00	0.00	0.00	0.00	8.67	13.86	14.52	11.99	**70.93**
	Total Runoff (m^3)		10.58	6.57	0.76	0.00	0.00	0.00	0.00	0.00	7.10	11.34	11.88	9.81	**58.03**
	Proposed Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **0.00**	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)		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)		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)		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**
	Proposed Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **200.00**	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)		1.85	2.12	2.43	2.07	2.26	2.46	2.49	2.16	2.55	1.89	1.98	1.64	**25.89**
	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)		10.47	12.00	13.77	11.75	12.80	13.94	14.13	12.22	14.43	10.71	11.22	9.27	**146.71**
	Catchment 204 Total Monthly Volumes														
	Total AET (m^3)		1.13	13.65	30.71	43.67	38.88	33.53	32.95	16.46	5.27	0.00	0.00	0.00	**216.24**
	Total Evaporation (m^3)		1.85	2.12	2.43	2.07	2.26	2.46	2.49	2.16	2.55	1.89	1.98	1.64	**25.89**
	Total Infiltration (m^3)		12.93	8.03	0.93	0.00	0.00	0.00	0.00	0.00	8.67	13.86	14.52	11.99	**70.93**
	Total Runoff (m^3)		21.05	18.57	14.53	11.75	12.80	13.94	14.13	12.22	21.53	22.05	23.10	19.08	**204.74**

GBS

TABLE A-4
Post-development Water Balance With Mitigation
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 201	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **800.00**	**Monthly Volumes**												
	AET Volume (m^3)		2.26	27.29	61.42	87.34	77.75	67.05	65.89	32.93	10.54	0.00	0.00	0.00	**432.47**
	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)		25.86	16.05	1.86	0.00	0.00	0.00	0.00	0.00	17.34	27.72	29.04	23.98	**141.86**
	Total Runoff (m^3)		21.16	13.14	1.52	0.00	0.00	0.00	0.00	0.00	14.19	22.68	23.76	19.62	**116.07**
	Proposed Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **900.00**	**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)		8.32	9.53	10.94	9.33	10.17	11.07	11.22	9.71	11.46	8.51	8.91	7.36	**116.51**
	Facility 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)		47.12	54.01	61.97	52.86	57.60	62.73	63.57	55.00	64.95	48.20	50.49	41.69	**660.20**
	Proposed Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **300.00**	**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)		2.77	3.18	3.65	3.11	3.39	3.69	3.74	3.24	3.82	2.84	2.97	2.45	**38.84**
	Facility 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)		15.71	18.00	20.66	17.62	19.20	20.91	21.19	18.33	21.65	16.07	16.83	13.90	**220.07**
	Catchment 201 Total Monthly Volumes														
	Total AET (m^3)		2.26	27.29	61.42	87.34	77.75	67.05	65.89	32.93	10.54	0.00	0.00	0.00	**432.47**
	Total Evaporation (m^3)		11.09	12.71	14.58	12.44	13.55	14.76	14.96	12.94	15.28	11.34	11.88	9.81	**155.34**
	Total Infiltration (m^3)		25.86	16.05	1.86	0.00	0.00	0.00	0.00	0.00	17.34	27.72	29.04	23.98	**141.86**
	Total Runoff (m^3)		83.99	85.15	84.14	70.48	76.81	83.64	84.76	73.34	100.79	86.94	91.08	75.21	**996.33**

GBS

TABLE A-4
Post-development Water Balance With Mitigation
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 202	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **1400.00**	**Monthly Volumes**												
	Total AET (m^3)		3.95	47.76	107.49	152.85	136.06	117.34	115.31	57.62	18.45	0.00	0.00	0.00	**756.83**
	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)		45.26	28.09	3.25	0.00	0.00	0.00	0.00	0.00	30.35	48.51	50.82	41.97	**248.26**
	Total Runoff (m^3)		37.03	22.99	2.66	0.00	0.00	0.00	0.00	0.00	24.83	39.69	41.58	34.34	**203.12**
	Proposed Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **400.00**	**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)		3.70	4.24	4.86	4.15	4.52	4.92	4.99	4.31	5.09	3.78	3.96	3.27	**51.78**
	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)		20.94	24.00	27.54	23.49	25.60	27.88	28.25	24.45	28.87	21.42	22.44	18.53	**293.42**
	Proposed Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **600.00**	**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)		5.54	6.35	7.29	6.22	6.78	7.38	7.48	6.47	7.64	5.67	5.94	4.91	**77.67**
	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)		31.42	36.01	41.31	35.24	38.40	41.82	42.38	36.67	43.30	32.13	33.66	27.80	**440.13**
	Catchment 202 Total Monthly Volumes														
	Total AET (m^3)		3.95	47.76	107.49	152.85	136.06	117.34	115.31	57.62	18.45	0.00	0.00	0.00	**756.83**
	Total Evaporation (m^3)		9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
	Total Infiltration (m^3)		45.26	28.09	3.25	0.00	0.00	0.00	0.00	0.00	30.35	48.51	50.82	41.97	**248.26**
	Total Runoff (m^3)		89.39	83.00	71.51	58.74	64.01	69.70	70.64	61.12	97.00	93.24	97.68	80.66	**936.67**

GBS

TABLE A-4
Post-development Water Balance With Mitigation
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 203	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **2100.00**	**Monthly Volumes**												
		Total AET (m^3)	5.92	71.64	161.23	229.27	204.09	176.01	172.96	86.44	27.67	0.00	0.00	0.00	**1135.24**
		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)	67.89	42.14	4.88	0.00	0.00	0.00	0.00	0.00	45.53	72.77	76.23	62.95	**372.38**
		Total Runoff (m^3)	55.55	34.48	3.99	0.00	0.00	0.00	0.00	0.00	37.25	59.54	62.37	51.50	**304.68**
	Proposed Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **2140.00**	**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)	19.77	22.66	26.00	22.18	24.17	26.32	26.68	23.08	27.25	20.22	21.19	17.49	**277.02**
		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)	112.05	128.42	147.34	125.69	136.97	149.16	151.16	130.79	154.43	114.60	120.05	99.14	**1569.80**
	Proposed Pervious Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **260.00**	Infiltration Efficiency		94.00%	**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)	2.40	2.75	3.16	2.69	2.94	3.20	3.24	2.80	3.31	2.46	2.57	2.13	**33.66**
		Total Infiltration (m^3)	12.80	14.67	16.83	14.35	15.64	17.03	17.26	14.94	17.64	13.09	13.71	11.32	**179.28**
		Total Runoff (m^3)	0.82	0.94	1.07	0.92	1.00	1.09	1.10	0.95	1.13	0.84	0.88	0.72	**11.44**
	Proposed Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **2200.00**	**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)	20.33	23.30	26.73	22.80	24.85	27.06	27.42	23.73	28.02	20.79	21.78	17.99	**284.79**
		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)	115.19	132.02	151.47	129.22	140.81	153.34	155.40	134.45	158.76	117.81	123.42	101.92	**1613.81**
		Catchment 203 Total Monthly Volumes													
		Total AET (m^3)	5.92	71.64	161.23	229.27	204.09	176.01	172.96	86.44	27.67	0.00	0.00	0.00	**1135.24**
		Total Evaporation (m^3)	42.50	48.71	55.89	47.68	51.96	56.58	57.34	49.61	58.58	43.47	45.54	37.61	**595.47**
		Total Infiltration (m^3)	80.69	56.81	21.70	14.35	15.64	17.03	17.26	14.94	63.17	85.85	89.94	74.27	**551.66**
		Total Runoff (m^3)	283.61	295.86	303.87	255.83	278.78	303.59	307.66	266.19	351.57	292.78	306.72	253.28	**3499.73**

GBS

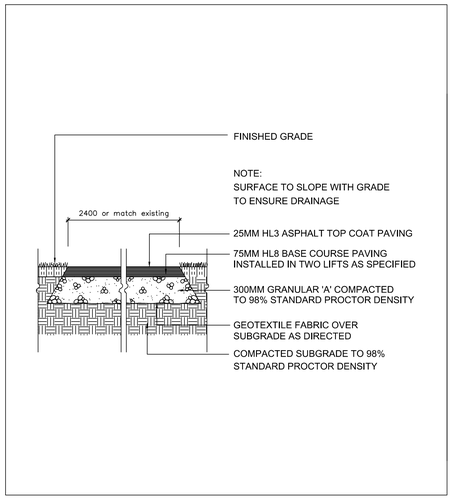
TABLE A-4
Post-development Water Balance With Mitigation
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			2.82	34.11	76.78	119.23	138.62	121.27	82.36	41.16	13.18	0.00	0.00	0.00	**629.53**
P - Total Precipitation (mm)			61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
P-PET (mm)			58.78	36.49	4.22	-50.13	-63.32	-39.27	0.74	30.74	71.72	63.00	66.00	54.50	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-50.13	-113.45	-152.72	-151.98	-121.24	-49.52	0.00	0.00	0.00	-
Catchment 204	lanscaped	Soil Moisture Storage (mm)	125.00	125.00	125.00	74.87	11.55	0.00	0.74	31.48	103.20	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	2.82	34.11	76.78	109.18	97.19	83.81	82.36	41.16	13.18	0.00	0.00	0.00	**540.59**
		P-AET (mm)	58.78	36.49	4.22	-40.08	-21.89	-1.81	0.74	30.74	71.72	63.00	66.00	54.50	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.08	-61.97	-63.78	-63.04	-32.31	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.08	21.89	1.81	-0.74	-30.74	-32.31	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.78	36.49	4.22	0.00	0.00	0.00	0.00	0.00	39.42	63.00	66.00	54.50	**322.41**
		MOECC Infiltration Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-
		Run-Off Coefficient	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	-
		Infiltration (mm)	32.33	20.07	2.32	0.00	0.00	0.00	0.00	0.00	21.68	34.65	36.30	29.98	**177.33**
		Run-Off (mm)	26.45	16.42	1.90	0.00	0.00	0.00	0.00	0.00	17.74	28.35	29.70	24.53	**145.08**
		Catchment Area* (m^2) = **400.00**	**Monthly Volumes**												
	Total AET (m^3)		1.13	13.65	30.71	43.67	38.88	33.53	32.95	16.46	5.27	0.00	0.00	0.00	**216.24**
	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)		12.93	8.03	0.93	0.00	0.00	0.00	0.00	0.00	8.67	13.86	14.52	11.99	**70.93**
	Total Runoff (m^3)		10.58	6.57	0.76	0.00	0.00	0.00	0.00	0.00	7.10	11.34	11.88	9.81	**58.03**
	Proposed Paved Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **0.00**	**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)		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)		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)		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**
	Proposed Roof Area	Precipitation (mm)	61.60	70.60	81.00	69.10	75.30	82.00	83.10	71.90	84.90	63.00	66.00	54.50	**863.00**
		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)	9.24	10.59	12.15	10.37	11.30	12.30	12.47	10.79	12.74	9.45	9.90	8.18	**129.45**
		Run-Off (mm)	52.36	60.01	68.85	58.74	64.01	69.70	70.64	61.12	72.17	53.55	56.10	46.33	**733.55**
		Catchment Area (m^2) = **200.00**	**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)		1.85	2.12	2.43	2.07	2.26	2.46	2.49	2.16	2.55	1.89	1.98	1.64	**25.89**
	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)		10.47	12.00	13.77	11.75	12.80	13.94	14.13	12.22	14.43	10.71	11.22	9.27	**146.71**
	Catchment 204 Total Monthly Volumes														
	Total AET (m^3)		1.13	13.65	30.71	43.67	38.88	33.53	32.95	16.46	5.27	0.00	0.00	0.00	**216.24**
	Total Evaporation (m^3)		1.85	2.12	2.43	2.07	2.26	2.46	2.49	2.16	2.55	1.89	1.98	1.64	**25.89**
	Total Infiltration (m^3)		12.93	8.03	0.93	0.00	0.00	0.00	0.00	0.00	8.67	13.86	14.52	11.99	**70.93**
	Total Runoff (m^3)		21.05	18.57	14.53	11.75	12.80	13.94	14.13	12.22	21.53	22.05	23.10	19.08	**204.74**

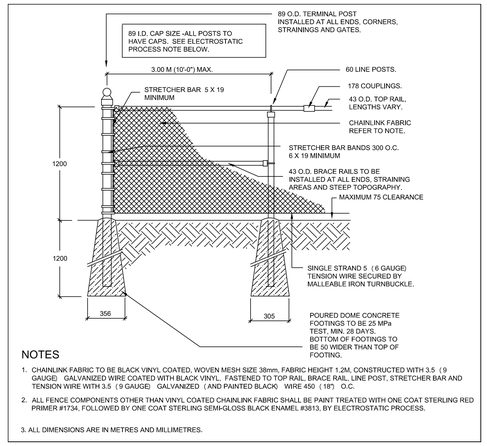
TABLE A-5
Site Water Balance Summary
Water Balance - 3171 Lakeshore Rd. W., Oakville, Ontario

Total Site	Month												Total
	March	April	May	June	July	August	September	October	November	December	January	February	
Pre-Development													
Total AET (m^3)	23	276	622	884	787	679	667	333	107	0	0	0	**4379**
Total ET (m^3)	33	38	44	37	41	44	45	39	46	34	36	29	**466**
Total Infiltration (m^3)	262	163	19	0	0	0	0	0	176	281	294	243	**1436**
Total Runoff (m^3)	403	349	263	211	230	251	254	220	403	422	443	365	**3816**
Post-Development without Mitigation													
Total AET (m^3)	13	160	361	513	457	394	387	193	62	0	0	0	**2541**
Total ET (m^3)	65	74	85	73	79	86	87	75	89	66	69	57	**906**
Total Infiltration (m^3)	152	94	11	0	0	0	0	0	102	163	171	141	**833**
Total Runoff (m^3)	491	497	491	411	448	488	494	428	589	508	532	440	**5817**
Post-Development with Mitigation													
Total AET (m^3)	13	160	361	513	457	394	387	193	62	0	0	0	**2541**
Total ET (m^3)	65	74	85	73	79	86	87	75	89	66	69	57	**906**
Total Infiltration (m^3)	165	109	28	14	16	17	17	15	120	176	184	152	**1013**
Total Runoff (m^3)	478	483	474	397	432	471	477	413	571	495	519	428	**5637**
Post-Development Deficit with Mitigation (-ve value implies a net gain)													
Total AET (m^3)	10	116	261	371	330	285	280	140	45	0	0	0	**1838**
Total ET (m^3)	-31	-36	-41	-35	-38	-42	-42	-37	-43	-32	-34	-28	**-440**
Total Infiltration (m^3)	97	54	-9	-14	-16	-17	-17	-15	56	105	110	91	**424**
Total Runoff (m^3)	-75	-134	-211	-185	-202	-220	-223	-193	-167	-73	-76	-63	**-1822**

GBS



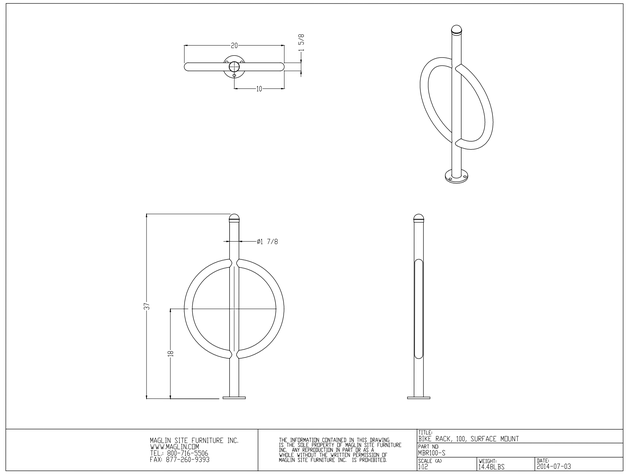
1 L-3 **Asphalt Paving Detail**
n.t.s.



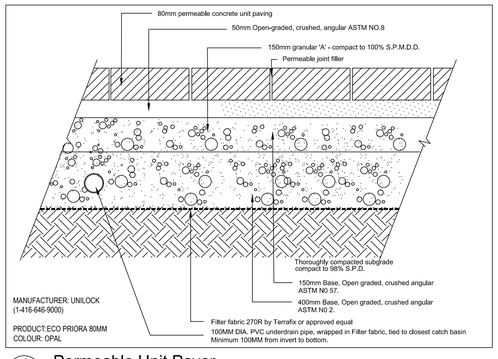
NOTES

1. CHAINLINK FABRIC TO BE BLACK VINYL COATED, WOVEN MESH SIZE 38mm, FABRIC HEIGHT 1.2M, CONSTRUCTED WITH 3.5 (9 GAUGE) GALVANIZED WIRE COATED WITH BLACK VINYL, FASTENED TO TOP RAIL, BRACE RAIL, LINE POST, STRETCHER BAR AND TENSION WIRE WITH 3.5 (9 GAUGE) GALVANIZED (AND PAINTED BLACK) WIRE #50 (1 1/8") O.C.
2. ALL FENCE COMPONENTS OTHER THAN VINYL COATED CHAINLINK FABRIC SHALL BE PAINT TREATED WITH ONE COAT STERLING RED PRIMER #1734, FOLLOWED BY ONE COAT STERLING SEMI-GLOSS BLACK ENAMEL #3813, BY ELECTROSTATIC PROCESS.
3. ALL DIMENSIONS ARE IN METRES AND MILLIMETRES.

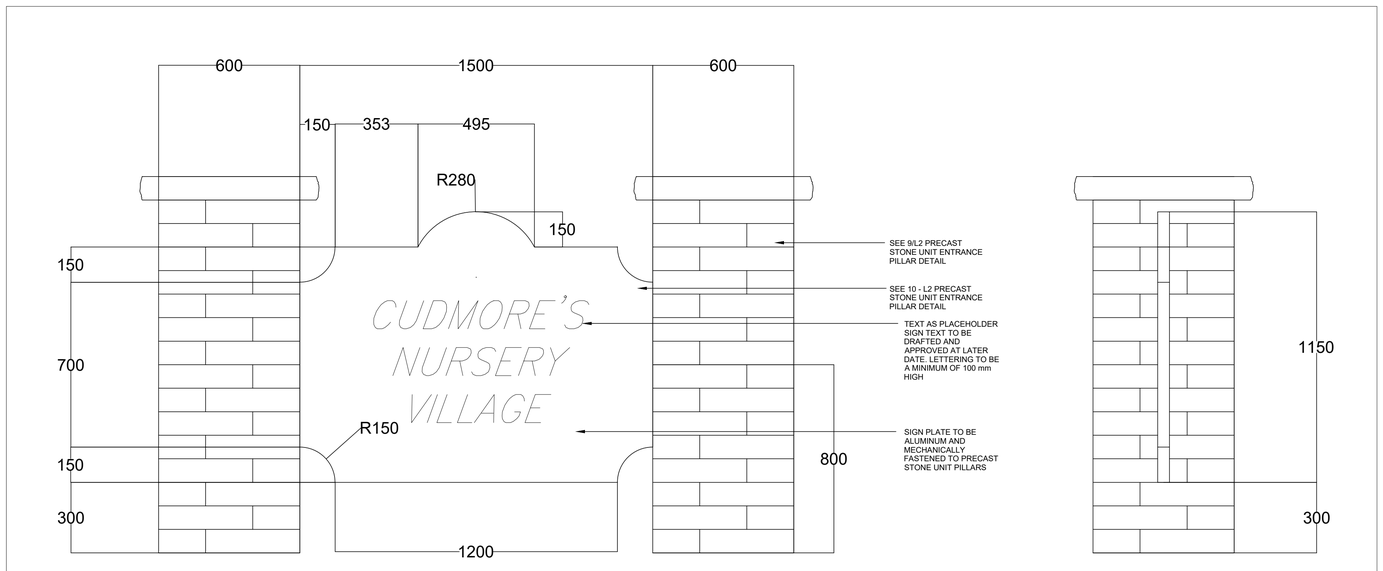
2 L-3 **1.2m Chain Link Fence**
n.t.s.



3 L-3 **Maglin BR100 Bike Rack**
n.t.s.



4 L-3 **Permeable Unit Paver**
n.t.s.



5 L-3 **Community Identification Signage**
PART OF SEPARATE PERMIT APPLICATION THROUGH ENFORCEMENT SERVICES

GENERAL NOTES

1. Do not scale the drawings. All dimensions are in millimetres unless noted otherwise.
2. This drawing is to be read in conjunction with the overall master plan and engineering drawings prepared by the project engineer and site plans prepared by the project architect.
3. The contractor shall check and verify all existing and proposed grading and conditions on the project and immediately report any discrepancies to the consultant before proceeding with any work.
4. The contractor is to be aware of all existing and proposed services and utilities. The contractor is responsible for having all underground services and utility lines staked by each agency having jurisdiction prior to commencing work.
5. This drawing is to be used for development approval only. For layout of all work refer to construction drawings.
6. Plant quantities indicated on the plan supercede the quantities from the plant list (report any discrepancies to the landscape architect).
7. Do not leave any holes open overnight.
8. Keep area outside construction zone clean and useable by others at all times. Contractor shall throughly clean areas surrounding the construction zone at the end of each work day.
9. Contractor to make good any and all damages outside of the development area that may occur as a result of construction at no extra cost.
10. This drawing is Copyright MHBC 2022

REVISION NO.	DATE	ISSUED / REVISION	BY
6.	OCTOBER 14, 2022	ISSUED FOR SPA	CC
5.	JANUARY 17, 2022	ISSUED FOR SPA	CC
4.	JANUARY 12, 2021	ISSUED FOR SPA	CC
3.	NOVEMBER 11, 2020	ISSUED FOR SPA	CC
2.	AUGUST 13, 2019	ISSUED FOR SPA	CC

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
230-7050 WESTON ROAD WOODBRIDGE, ON. L4L 8G7 | P: 905 761 5588 F: 905 761 5589 | WWW.MHBCPLAN.COM

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ASSOCIATION OF LANDSCAPE ARCHITECTS ONTARIO — NICOLA A. MILLS — OALA

ISSUED FOR SPA ONLY
NOT FOR CONSTRUCTION

All drawings and specifications are instruments of service and will remain the property of MHBC Planning and must be returned at the completion of the work. This drawing shall not be used for construction purposes unless the drawings are marked 'Issued for Construction' and the professional seal is signed and dated by the landscape architect.

DATE JULY 2019
DRAWN BY CC
PLAN SCALE 1:250
FILE NO. 11161E
CHECKED BY N.M.
OTHER

PROJECT
3171 LAKESHORE ROAD WEST
OAKVILLE, ON

FILE NAME
LANDSCAPE DETAILS

DWG NO.
L3

SOURCE
N:\11161\E - Cudmore's Nursery\2022\October\Cornell Restore\11161E - Landscape Plan - 10-12-2022.dwg

APPENDIX C

STORMWATER MANAGEMENT CALCULATIONS

SCS consulting group ltd

EXISTING WEIGHTED RUNOFF COEFFICIENT

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

Catchment 101 Outlets to: Victoria Street (West)

	Runoff Coefficient	Area (ha)	Weighted Runoff Coefficient
Asphalt	0.90	0.04	0.19
Rooftops	0.90	0.01	0.04
Pervious Area	0.25	0.15	0.19
TOTAL		0.20	0.41

Catchment 102 Outlets to: Lakeshore Road West

	Runoff Coefficient	Area (ha)	Weighted Runoff Coefficient
Asphalt	0.90	0.27	0.25
Rooftops	0.90	0.04	0.04
Pervious Area	0.25	0.66	0.17
TOTAL		0.97	0.46

Overall Total

Catchment	Runoff Coefficient	Area	Weighted Runoff Coefficient
101	0.41	0.20	0.07
102	0.46	0.97	0.38
TOTAL		1.17	0.45

ALLOWABLE RELEASE RATE

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

5 Year storm

IDF Parameters*

a = 1170
t = 10 min
b = 5.8
c = 0.843

Allowable Release Rate Calculation				
Outlet ID	**Area**	**time t**	**Intensity i=a/(t+b)^c**	**Flow Q=CiA/360**
	ha	***min***	***mm/hr***	***l/s***
Lakeshore Road West	0.969	10.00	114.21	140.6
Victoria Street (West)	0.204	10.00	114.21	26.8

* a,b,c's per Town of Oakville

100 Year storm

IDF Parameters*

a = 2150
t = 10 min
b = 5.7
c = 0.861

Allowable Release Rate Calculation				
Outlet ID	**Area**	**time t**	**Intensity i=a/(t+b)^c**	**Flow Q=CiA/360**
	ha	***min***	***mm/hr***	***l/s***
Lakeshore Road West	0.969	10.00	200.80	247.2
Victoria Street (West)	0.204	10.00	200.80	47.0

* a,b,c's per Town of Oakville

PROPOSED WEIGHTED RUNOFF COEFFICIENT

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

Catchment 201 Outlets to: Victoria Street (West)

	Runoff Coefficient	Area (ha)	Weighted Runoff Coefficient	Weighted Runoff Coefficient (100 Year)
Ground Level Impervious	0.90	0.09	0.41	0.45
Rooftops	0.90	0.03	0.14	0.15
Grass	0.25	0.08	0.10	0.13
TOTAL		0.20	0.64	0.73

Catchment 202 Outlets to: Lakeshore Road West

	Runoff Coefficient	Area (ha)	Weighted Runoff Coefficient	Weighted Runoff Coefficient (100 Year)
Ground Level Impervious	0.90	0.04	0.15	0.17
Rooftops	0.90	0.06	0.23	0.25
Grass	0.25	0.14	0.15	0.18
TOTAL		0.24	0.52	0.60

Catchment 203 Outlets to: Lakeshore Road West

	Runoff Coefficient	Area (ha)	Weighted Runoff Coefficient	Weighted Runoff Coefficient (100 Year)
Ground Level Impervious	0.90	0.24	0.32	0.36
Rooftops	0.90	0.22	0.30	0.33
Grass	0.25	0.21	0.08	0.10
TOTAL		0.67	0.70	0.78

Catchment 204 Outlets to: Victoria Street (East)

	Runoff Coefficient	Area (ha)	Weighted Runoff Coefficient	Weighted Runoff Coefficient (100 Year)
Ground Level Impervious	0.90	0.00	0.00	0.00
Rooftops	0.90	0.02	0.30	0.33
Grass	0.25	0.04	0.17	0.21
TOTAL		0.06	0.47	0.54

PROPOSED WEIGHTED RUNOFF COEFFICIENT

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

Victoria Street (East) Total

Catchment	Runoff Coefficient	Area	Weighted Runoff Coefficient
204	0.47	0.06	0.47
TOTAL		0.06	0.47

Lakeshore Road West Total

Catchment	Runoff Coefficient	Area	Weighted Runoff Coefficient
202	0.52	0.24	0.14
203	0.70	0.67	0.51
TOTAL		0.91	0.65

Victoria Street (West) Total

Catchment	Runoff Coefficient	Area	Weighted Runoff Coefficient
201	0.64	0.20	0.64
TOTAL		0.20	0.64

Overall Total

Catchment	Runoff Coefficient	Area	Weighted Runoff Coefficient
201	0.64	0.20	0.64
202	0.52	0.24	0.63
203	0.70	0.67	2.33
204	0.47	0.06	0.14
TOTAL		1.17	3.74

SUMMARY

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

			100 Year									
Catchment ID	Runoff Coef.	Area (ha)	Release Rate (L/s) [1]	Storage Required (m^3) [1]	Storage Available (m^3)	Orifice Size (mm) [2]	Orifice Release Rate (L/s)	Uncontrolled Release Rate (L/s)	Major (Overland) Flow (L/s)	Location of Orifice	Invert	VERTICAL/TUBE Control
201	0.73	0.20	43.0	23.0	23.0	85	24.8		18.2	MH12	82.420	VERTICAL
202	0.60	0.24	80.2	0.0	0.0	uncontrolled	-	80.2		-	100.000	-
203	0.78	0.67	133.6	106.8	107.4	200	133.6			MHTEE1 End Cap	82.340	TUBE
204	0.54	0.06	18.1	0.0	0.0	uncontrolled	-	18.1		-	100.000	-
Total		1.17	275.0	129.8	130.4	-	-			-	-	-

Lakeshore Road West Minor System Allowable Release Rate (Existing 5 Year)	140.6	L/s
Lakeshore Road West Minor System Proposed Release Rate (100 Year))	133.6	L/s
Lakeshore Road West and Victoria Street (East) 100 year Allowable Release Rate	247.2	L/s
Lakeshore Road West and Victoria Street (East) Proposed Release Rate	231.9	L/s
Victoria Street (West) Minor System Allowable Release Rate (Existing 5 Year)	26.8	L/s
Victoria Street (West) Minor System Proposed Release Rate (100 Year))	24.8	L/s
Victoria Street (West) 100 year Allowable Release Rate	47.0	L/s
Victoria Street (West) Proposed Release Rate	43.0	L/s

Notes:
[1] Per Modified Rational Calculations (attached)
[2] See attached for orifice details

			5 Year					
Catchment ID	Runoff Coef.	Area (ha)	Release Rate (L/s) [1]	Storage Required (m^3) [1]	Storage Available (m^3)	Orifice Size (mm) [2]	Orifice Release Rate (L/s)	Uncontrolled Release Rate (L/s)
201	0.64	0.20	14.4	20	23.0	85	14.4	0
202	0.52	0.24	39.7	0	0	uncontrolled	-	39.7
203	0.70	0.67	84.6	38.1	107.4	200	84.6	0
204	0.47	0.06	8.9	0	0	uncontrolled	-	8.9
Total		1.17	147.6	57.7	130.4			

Lakeshore Road West and Victoria Street (East) 5 year Allowable Release Rate	140.6	L/s
Lakeshore Road West and Victoria Street (East) Proposed Release Rate	133.2	L/s
Victoria Street (West) 5 year Allowable Release Rate	26.8	L/s
Victoria Street (West) Proposed Release Rate	14.4	L/s

Notes:
[1] Per Modified Rational Calculations (attached)
[2] See attached for orifice details

MODIFIED RATIONAL METHOD

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

Area ID: 201

Area = **0.200** ha
"C" = **0.73**
AC= **0.1450**
Tc = **10.0** min
Time Increment = **15.0** min
Release Rate = **43.01** l/s
Max.Storage = **23.0** m^3

Town of Oakville 100 Year
a= 2150
b= 5.7
c= 0.861

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (l/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	
10.0	200.8	80.94	48.6	25.8	22.8	
25.0	112.7	45.44	68.2	45.2	23.0	<<<<
40.0	80.0	32.26	77.4	64.5	12.9	
55.0	62.7	25.27	83.4	83.9	-0.5	
70.0	51.8	20.89	87.7	103.2	-15.5	
85.0	44.4	17.88	91.2	122.6	-31.4	
100.0	38.9	15.67	94.0	141.9	-47.9	
115.0	34.7	13.98	96.5	161.3	-64.8	
130.0	31.4	12.64	98.6	180.6	-82.1	
145.0	28.6	11.55	100.5	200.0	-99.5	
160.0	26.4	10.64	102.2	219.3	-117.2	
175.0	24.5	9.88	103.7	238.7	-135.0	
190.0	22.9	9.22	105.1	258.0	-152.9	
205.0	21.5	8.65	106.4	277.4	-171.0	
220.0	20.2	8.16	107.7	296.8	-189.1	
235.0	19.1	7.72	108.8	316.1	-207.3	
250.0	18.2	7.32	109.9	335.5	-225.6	
265.0	17.3	6.97	110.9	354.8	-243.9	
280.0	16.5	6.66	111.8	374.2	-262.3	
295.0	15.8	6.37	112.8	393.5	-280.8	
310.0	15.2	6.11	113.6	412.9	-299.2	
325.0	14.6	5.87	114.5	432.2	-317.8	
340.0	14.0	5.65	115.3	451.6	-336.3	
355.0	13.5	5.45	116.0	470.9	-354.9	

Area ID: 201

Area = **0.200** ha
"C" = **0.64**
AC= **0.1280**
Tc = **10.0** min
Time Increment = **15.0** min
Release Rate = **14.43** l/s
Max.Storage = **19.6** m^3

of Oakville 5 Year
a= 1170
b= 5.8
c= 0.843

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (l/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	
10.0	114.2	40.64	24.4	8.7	15.7	
25.0	65.1	23.15	34.7	15.2	19.6	<<<<
40.0	46.6	16.57	39.8	21.6	18.1	
55.0	36.7	13.05	43.1	28.1	14.9	
70.0	30.5	10.84	45.5	34.6	10.9	
85.0	26.2	9.31	47.5	41.1	6.3	
100.0	23.0	8.18	49.1	47.6	1.5	
115.0	20.6	7.32	50.5	54.1	-3.6	
130.0	18.6	6.63	51.7	60.6	-8.9	
145.0	17.1	6.07	52.8	67.1	-14.3	
160.0	15.7	5.60	53.8	73.6	-19.8	
175.0	14.6	5.21	54.7	80.1	-25.4	
190.0	13.7	4.87	55.5	86.6	-31.1	
205.0	12.9	4.58	56.3	93.1	-36.8	
220.0	12.1	4.32	57.0	99.6	-42.6	
235.0	11.5	4.09	57.7	106.1	-48.4	
250.0	10.9	3.89	58.3	112.6	-54.3	
265.0	10.4	3.70	58.9	119.1	-60.2	
280.0	9.9	3.54	59.5	125.5	-66.1	
295.0	9.5	3.39	60.0	132.0	-72.0	
310.0	9.1	3.25	60.5	138.5	-78.0	
325.0	8.8	3.13	61.0	145.0	-84.0	
340.0	8.5	3.01	61.5	151.5	-90.0	
355.0	8.2	2.91	62.0	158.0	-96.1	

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ON-SITE DETENTION AND ORIFICE DETAILS

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

Area ID 201

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Orifice Diameter:	85	mm
Area:	0.006	m^2
g =	9.81	m/sec^2
C_d =	0.62	

Type of Control:	VERTICAL
Location:	MH12

Pipe Storage

Diameter (mm)	Area (m^2)	Length (m)	Volume (m^3)
825	0.535	43.0	23.0
		Total Volume	**23.0**

	Stage (m)	Head (m)	Storage (m^3)	Discharge (m^3/s)
Invert E.L.	82.42	0.00	0.0	0.00
5 Year WL	83.32	0.86	19.6	0.014
100 Year WL (Surface spill elevation)	85.00	2.54	23.0	0.025

MODIFIED RATIONAL METHOD

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

Area ID: 203

Area = **0.670** ha
"C" = **0.78**
AC= **0.5256**
Tc = **10.0** min
Time Increment = **15.0** min
Release Rate = **133.56** l/s
Max.Storage = **106.8** m^3

of Oakville 100 Year
a= 2150
b= 5.7
c= 0.861

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (l/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	
10.0	200.8	293.42	176.1	80.1	95.9	
25.0	112.7	164.71	247.1	140.2	106.8	<<<<
40.0	80.0	116.94	280.7	200.3	80.3	
55.0	62.7	91.59	302.2	260.4	41.8	
70.0	51.8	75.73	318.1	320.5	-2.5	
85.0	44.4	64.81	330.5	380.6	-50.1	
100.0	38.9	56.81	340.9	440.7	-99.9	
115.0	34.7	50.68	349.7	500.8	-151.2	
130.0	31.4	45.82	357.4	560.9	-203.6	
145.0	28.6	41.86	364.2	621.0	-256.9	
160.0	26.4	38.58	370.3	681.2	-310.8	
175.0	24.5	35.80	375.9	741.3	-365.3	
190.0	22.9	33.43	381.1	801.4	-420.3	
205.0	21.5	31.37	385.8	861.5	-475.6	
220.0	20.2	29.56	390.2	921.6	-531.3	
235.0	19.1	27.97	394.4	981.7	-587.3	
250.0	18.2	26.55	398.3	1041.8	-643.5	
265.0	17.3	25.28	402.0	1101.9	-699.9	
280.0	16.5	24.13	405.4	1162.0	-756.5	
295.0	15.8	23.09	408.8	1222.1	-813.3	
310.0	15.2	22.15	411.9	1282.2	-870.3	
325.0	14.6	21.28	414.9	1342.3	-927.4	
340.0	14.0	20.48	417.8	1402.4	-984.6	
355.0	13.5	19.74	420.6	1462.5	-1041.9	

Area ID: 203

Area = **0.670** ha
"C" = **0.70**
AC= **0.4665**
Tc = **10.0** min
Time Increment = **15.0** min
Release Rate = **84.62** l/s
Max.Storage = **38.1** m^3

of Oakville 5 Year
a= 1170
b= 5.8
c= 0.843

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (l/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	
10.0	114.2	148.12	88.9	50.8	38.1	<<<<
25.0	65.1	84.38	126.6	88.9	37.7	
40.0	46.6	60.39	144.9	126.9	18.0	
55.0	36.7	47.56	157.0	165.0	-8.1	
70.0	30.5	39.49	165.9	203.1	-37.2	
85.0	26.2	33.92	173.0	241.2	-68.2	
100.0	23.0	29.82	178.9	279.3	-100.4	
115.0	20.6	26.66	184.0	317.3	-133.4	
130.0	18.6	24.16	188.4	355.4	-167.0	
145.0	17.1	22.12	192.4	393.5	-201.1	
160.0	15.7	20.42	196.0	431.6	-235.6	
175.0	14.6	18.98	199.3	469.7	-270.4	
190.0	13.7	17.75	202.3	507.7	-305.4	
205.0	12.9	16.67	205.1	545.8	-340.7	
220.0	12.1	15.74	207.7	583.9	-376.2	
235.0	11.5	14.91	210.2	622.0	-411.8	
250.0	10.9	14.17	212.5	660.1	-447.6	
265.0	10.4	13.50	214.7	698.1	-483.5	
280.0	9.9	12.90	216.7	736.2	-519.5	
295.0	9.5	12.36	218.7	774.3	-555.6	
310.0	9.1	11.86	220.6	812.4	-591.8	
325.0	8.8	11.40	222.4	850.5	-628.1	
340.0	8.5	10.99	224.1	888.6	-664.4	
355.0	8.2	10.60	225.8	926.6	-700.9	

ON-SITE DETENTION AND ORIFICE DETAILS

3171 Lakeshore Road West
Project Number: 1930
Date: October 2022
Designer Initials: M.M.H

Area ID 203

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Type of Control: TUBE
Location: MHTEE1 End Cap

	200	mm
Area:	0.031	m^2
g =	9.81	m/sec^2
C_d =	0.82	

Pipe Storage

Diameter (mm)	Area (m^2)	Length (m)	Volume (m^3)
1200	1.131	95.0	107.4
		Total Volume	**107.4**

	Stage (m)	Head (m)	Storage (m^3)	Discharge (m^3/s)
Invert E.L.	82.34	0.00	0.0	0.00
5 Year WL	82.99	0.55	38.1	0.085
100 Year WL	83.81	1.37	106.8	0.134

Superpipe Storage Summary

3171 Lakeshore Road W
Project Number: 1930
Date: September 2022
Designer Initials: N.D.M.

Laneway Superpipe Parameters

Length =	95	m
Slope =	0.4	%
Diameter =	1200	mm
Area of Pipe =	1.1310	m^2
D/S Superpipe Invert =	82.34	m
Elevation Increment =	0.02	m
Total Storage Provided =	107.44	m^3
U/S Superpipe Invert =	82.72	m
U/S Superpipe Obvert =	83.92	m
D/S Superpipe Obvert =	83.54	m

Cul-de-sac Parameters

Length =	43	m
Slope =	1	%
Diameter =	825	mm
Area of Pipe =	0.535	m^2
D/S Superpipe Invert =	82.42	m
Elevation Increment =	0.02	m
Total Storage Provided =	22.99	m^3
U/S Superpipe Invert =	82.85	m
U/S Superpipe Obvert =	83.68	m
D/S Superpipe Obvert =	83.25	m

Stage/Storage Table:

Stage (m)	Volume Pipe 1 (m3)
82.34	0.00
82.36	0.01
82.38	0.06
82.40	0.14
82.42	0.27
82.44	0.47
82.46	0.73
82.48	1.06
82.50	1.47
82.52	1.96
82.54	2.54
82.56	3.20
82.58	3.96
82.60	4.82
82.62	5.77
82.64	6.83
82.66	7.98
82.68	9.25
82.70	10.62
82.72	12.10
82.74	13.68
82.76	15.35
82.78	17.09
82.80	18.89
82.82	20.75
82.84	22.66
82.86	24.62
82.88	26.61
82.90	28.65
82.92	30.72
82.94	32.83
82.96	34.95
82.98	37.11
83.00	39.28
83.02	41.47
83.04	43.68
83.06	45.90
83.08	48.13
83.10	50.36
83.12	52.60
83.14	54.84
83.16	57.08
83.18	59.32
83.20	61.54
83.22	63.76
83.24	65.97
83.26	68.16
83.28	70.34
83.30	72.49
83.32	74.62
83.34	76.72
83.36	78.79
83.38	80.83
83.40	82.83
83.42	84.78
83.44	86.69
83.46	88.55
83.48	90.36
83.50	92.09
83.52	93.76
83.54	95.34
83.56	96.82
83.58	98.19
83.60	99.46
83.62	100.62
83.64	101.67
83.66	102.62
83.68	103.48
83.70	104.24
83.72	104.90
83.74	105.48
83.76	105.97
83.78	106.38
83.80	106.71
83.82	106.97
83.84	107.17
83.86	107.30
83.88	107.39
83.90	107.43
83.92	107.44

Stage/Storage Table:

Stage (m)	Volume Pipe 2 (m3)
82.42	0.00
82.44	0.00
82.46	0.02
82.48	0.04
82.50	0.09
82.52	0.15
82.54	0.24
82.56	0.35
82.58	0.48
82.60	0.64
82.62	0.83
82.64	1.04
82.66	1.28
82.68	1.56
82.70	1.86
82.72	2.20
82.74	2.56
82.76	2.96
82.78	3.39
82.80	3.86
82.82	4.36
82.84	4.89
82.86	5.45
82.88	6.04
82.90	6.65
82.92	7.27
82.94	7.91
82.96	8.57
82.98	9.23
83.00	9.89
83.02	10.57
83.04	11.24
83.06	11.92
83.08	12.59
83.10	13.26
83.12	13.93
83.14	14.58
83.16	15.23
83.18	15.87
83.20	16.49
83.22	17.10
83.24	17.68
83.26	18.23
83.28	18.76
83.30	19.24
83.32	19.70
83.34	20.13
83.36	20.52
83.38	20.88
83.40	21.20
83.42	21.50
83.44	21.77
83.46	22.00
83.48	22.21
83.50	22.39
83.52	22.54
83.54	22.67
83.56	22.77
83.58	22.85
83.60	22.91
83.62	22.95
83.64	22.97
83.66	22.98
83.68	22.99

Required Laneway R.O.W. Capacity

Town of Oakville 5 Year (Rational Method)	
Area (ha) =	0.39
Runoff Coeff. =	0.70
T_c (min) =	10.00
a=	**1170**
b=	**5.80**
c=	**0.843**
Intensity (mm/hr) =	114.21
Runoff (m^3/s)=	**0.087**

Town of Oakville 100 Year (Rational Method)	
Area (ha) =	0.67
100 Year Return Period Factor[1] =	1.25
100 Year Runoff Coeff. =	0.88
T_c (min) =	10.00
a=	**2150**
b=	**5.70**
c=	**0.861**
Intensity (mm/hr) =	200.80
Runoff (m^3/s)=	**0.327**

[1]100 year return period factor calculated as per MTO Design Chart 1.07

Area (ha)[1]	Runoff Coefficient[1]	Weighted Runoff Coefficient
0.39	0.70	0.70
0.39		0.70

[1]Refer to Lane A Catchments on Drawing DR-1 in **Appendix F**

Catchment 203		
Area (ha)	Runoff Coefficient[1]	Weighted Runoff Coefficient
0.67	0.70	0.70
0.67		0.70

[1]Refer to weighted runoff coefficient calculations in this Appendix

Major System Peak Flow:

$Q_{peak} = Q_{100yr} - Q_{5yr} =$ **0.240 m^3/s**

Therefore, there is sufficient capacity in the Catchment 203 laneway and entrance laneway (capacity of 0.416 cu.m/s and 0.276 cu.m/s respectively per calculations in this Appendix) to convey the peak flow of 0.24 cu.m/s.

Cul-de-sac 100 Year Capture Calculation
Catchment 201

3171 Lakeshore Road West, Oakville
Project Number: 1930
Date: October 2022
Designer Initials: C.M.D.

City of Oakville 100 Year (Rational Method)	
Area (ha) =	0.20
100 Year Return Period Factor[1] =	1.25
100 Year Runoff Coeff. =	0.80
T_c (min) =	10.00
a=	**2150**
b=	**5.70**
c=	**0.861**
Intensity (mm/hr) =	200.80
Runoff (m^3/s)=	**0.089**

[1]100 year return period factor calculated as per MTO Design Chart 1.07

Catchment 201			
Land Use	**Area (ha)**	**Runoff Coefficient[1]**	**Weighted Runoff Coefficient**
-	0.20	0.64	0.64
	0.20		0.64

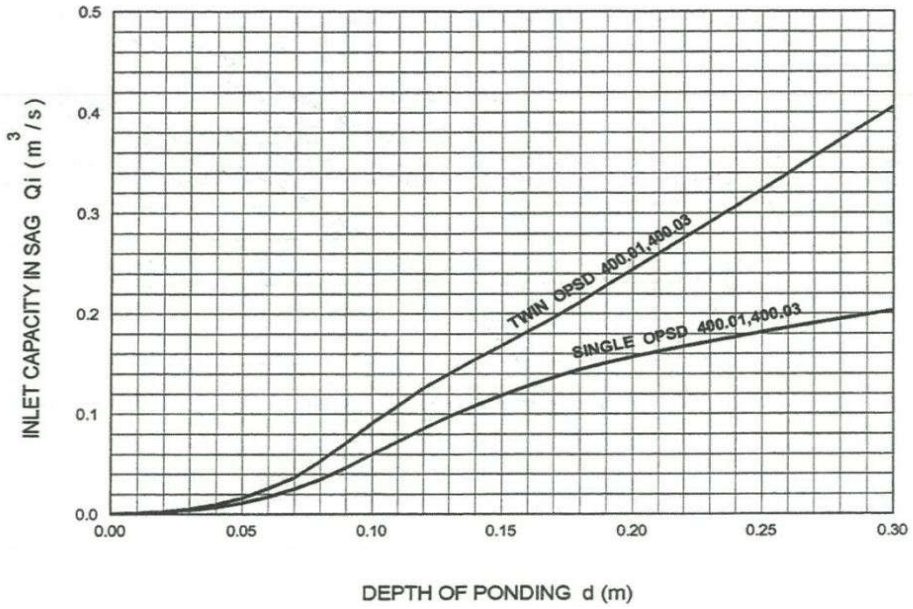
[1]Refer to weighted runoff coefficient calculations in this Appendix

100 Year Peak Flow:

Q_{100yr} = 0.089 m^3/s

Design Charts

Design Chart 4.19: Inlet Capacity at Road Sag



*Per Ministry of Transportation Ontario Drainage Manual

100 Year Capture Capacity for OPSD 400.01 & 400.03 - Catchment 201			
Required Capture Capacity	0.089	m^3/s	
Required Capture Capacity with 50% Blockage	0.178	m^3/s	
Type of Catch Basin	Twin		
Number of Catchbasins	2		
Required Capture Capacity Per Catchbasin	0.089	m^3/s	
Provided Capture Capacity per Catchbasin	0.103	m^3/s	
Ponding Depth Required	0.10	m	(85.04)
Ponding Depth Provided	0.11	m	(85.05-84.94)

Sizing CB Lead - Catchment 201			
Orifice Flow	Grate Elevation =	84.94	m
	Lead Invert =	83.26	m
	CB Lead Diameter =	0.300	m
	Required CB Lead Capacity =	0.089	m^3/s
	Orifice Coefficient =	0.82	
	Required Head Above CB Lead Centroid =	0.03	m
	Required Water Elevation =	83.44	m
Pipe Flow	CB Lead Slope =	1.0%	
	Provided CB Lead Pipe Full Flow Capacity =	0.097	m^3/s

Catchbasin Capacity (Borden Grate)			
Required depth above grate =	0.04	m	(84.37)
Provided depth above grate =	0.11	m	(84.44-84.33)
Area of Orifice =	0.0041	m^2	
Orifice Coefficient =	0.6		
Total Discharge, Q=	0.002	m^3/sec	
Discharge Vel., V=	0.546	m/sec	

Honeycomb Grating

Grating Length =	1.2	m
Grating Width =	0.6	m

Catchbasin Opening

Length =	1.200	m
Width =	0.600	m
Area =	0.720	m^2
Area Lost to Grating/Opening =	0.00091	m^2
Orifice Opening Area =	0.0041	m^2
Effective number of Openings =	142	
Grating Open Area =	0.586	m^2
Assumed Blockage =	**50.0**	**%**
Effective Grating Open Area =	0.293	m^2
Effective flow Capacity =	0.160	m^3/sec
Number of Catchbasins =	1	
Catchbasin Capacity =	0.160	m^3/sec
Super CB Lead Diameter =	0.375	m
Super CB Grate Invert =	84.33	
Super CB Lead Invert =	83.27	
Head over Lead Invert =	0.87	m
Super CB Lead Capacity =	0.332	m^3/sec
Inlet Capacity (0.04m Ponding Depth) =	**0.160**	m^3/sec

[1] See Required Laneway ROW Capacity calculation in this Appendix.

Therefore, a 1.2mx0.6m Borden grate and a 0.6mx0.6m Bordon grate have sufficient capacity with 50% blockage (0.160 m^3/s + 0.080 m^3/s) to capture the 100 year flow of 0.240 m^3/s.

Catchbasin Capacity (Borden Grate)			
Required depth above grate =	0.04	m	(84.37)
Provided depth above grate =	0.11	m	(84.44-84.33)
Area of Orifice =	0.0041	m^2	
Orifice Coefficient =	0.6		
Total Discharge, Q=	0.002	m^3/sec	
Discharge Vel., V=	0.546	m/sec	

Honeycomb Grating

Grating Length =	0.6	m
Grating Width =	0.6	m

Catchbasin Opening

Length =	0.600	m
Width =	0.600	m
Area =	0.360	m^2
Area Lost to Grating/Opening =	0.00091	m^2
Orifice Opening Area =	0.0041	m^2
Effective number of Openings =	71	
Grating Open Area =	0.293	m^2
Assumed Blockage =	**50.0**	**%**
Effective Grating Open Area =	0.147	m^2
Effective flow Capacity =	0.080	m^3/sec
Number of Catchbasins =	1	
Catchbasin Capacity =	0.080	m^3/sec
Inlet Capacity (0.04m Ponding Depth) =	**0.080**	m^3/sec

[1] See Required Laneway ROW Capacity calculation in this Appendix.

Therefore, a 1.2mx0.6m Borden grate and a 0.6mx0.6m Bordon grate have sufficient capacity with 50% blockage (0.160 m^3/s + 0.080 m^3/s) to capture the 100 year flow of 0.240 m^3/s.

Entrance Laneway @ 1.84%

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Channel Slope	1.84 %
Normal Depth	0.093 m

Section Definitions

Station (m)	Elevation (m)
0+00.000	0.000
0+01.625	-0.033
0+01.650	-0.033
0+01.850	-0.108
0+02.125	-0.083
0+05.450	-0.016
0+08.775	-0.083
0+09.050	-0.108
0+09.250	-0.033
0+09.275	-0.033
0+10.000	-0.015

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 0.000)	(0+01.625, -0.033)	0.025
(0+01.625, -0.033)	(0+09.275, -0.033)	0.013
(0+09.275, -0.033)	(0+10.000, -0.015)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Discharge	0.276 m³/s
Roughness Coefficient	0.016
Elevation Range	-0.108 to 0.000 m
Flow Area	0.3 m²
Wetted Perimeter	9.261 m
Hydraulic Radius	0.033 m
Top Width	9.23 m
Normal Depth	0.093 m

Entrance Laneway @ 1.84%

Results		
Critical Depth	0.105	m
Critical Slope	0.69	%
Velocity	0.89	m/s
Velocity Head	0.041	m
Specific Energy	0.13	m
Froude Number	1.561	
Flow Type	Supercritical	

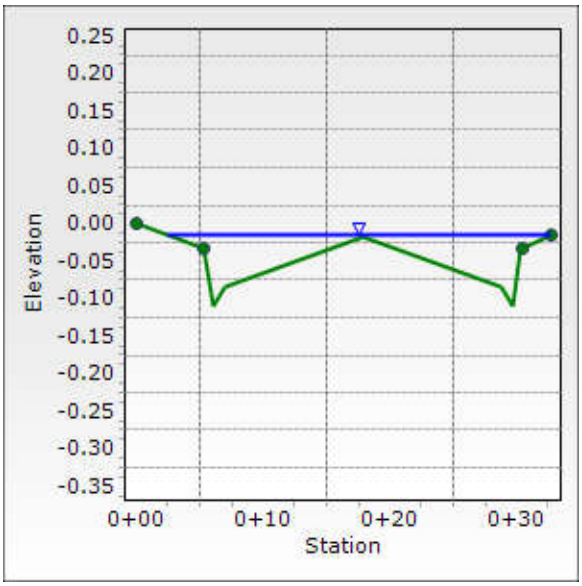
GVF Input Data		
Downstream Depth	0.000	m
Length	0.000	m
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.000	m
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.093	m
Critical Depth	0.105	m
Channel Slope	1.84	%
Critical Slope	0.69	%

Entrance Laneway @ 1.84%

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Channel Slope	1.84 %
Normal Depth	0.093 m
Discharge	0.276 m³/s



Laneway @ 1.84%

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Channel Slope	1.84 %
Normal Depth	0.108 m

Section Definitions

Station (m)	Elevation (m)
0+00.000	0.000
0+01.625	-0.033
0+01.650	-0.033
0+01.850	-0.108
0+02.125	-0.083
0+04.850	-0.028
0+07.575	-0.083
0+07.850	-0.108
0+08.050	-0.033
0+08.075	-0.033
0+09.700	0.000

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 0.000)	(0+01.625, -0.033)	0.025
(0+01.625, -0.033)	(0+08.075, -0.033)	0.013
(0+08.075, -0.033)	(0+09.700, 0.000)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Discharge	0.416 m³/s
Roughness Coefficient	0.018
Elevation Range	-0.108 to 0.000 m
Flow Area	0.4 m²
Wetted Perimeter	9.731 m
Hydraulic Radius	0.045 m
Top Width	9.70 m
Normal Depth	0.108 m

Laneway @ 1.84%

Results	
Critical Depth	0.120 m
Critical Slope	0.82 %
Velocity	0.95 m/s
Velocity Head	0.046 m
Specific Energy	0.15 m
Froude Number	1.438
Flow Type	Supercritical

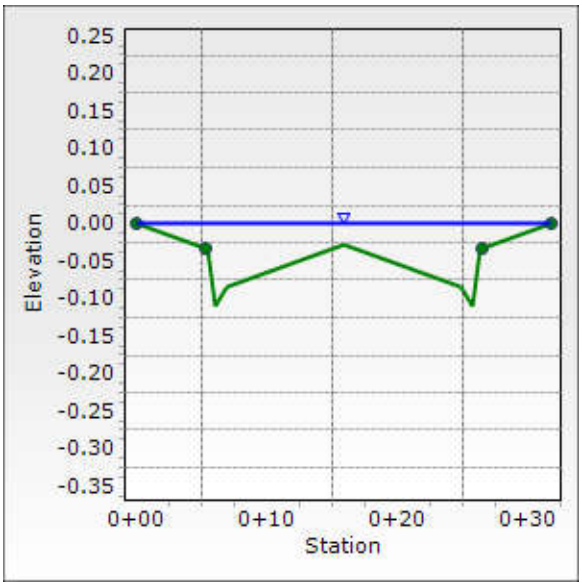
GVF Input Data	
Downstream Depth	0.000 m
Length	0.000 m
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 m
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity m/s
Upstream Velocity	Infinity m/s
Normal Depth	0.108 m
Critical Depth	0.120 m
Channel Slope	1.84 %
Critical Slope	0.82 %

Cross Section for Laneway @ 1.84%

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Channel Slope	1.84 %
Normal Depth	0.108 m
Discharge	0.416 m³/s



Parking Areas
Permeable Paver Sizing

3171 Lakeshore Road West, Oakville
Project Number: 1930
Date: September 2022
Designer Initials: C.M.D.

Water Balance Volume

Land Type	Area (ha)	Rainfall Depth (mm)	Rainfall Volume (m^3)	Initial Abstraction (mm)	Initial Abstraction Volume (m^3)	Runoff Volume (m^3)
	(1)	(2)	(3) = (2)x(1)x10 m3/ha-mm	(4)	(5) = (4)x(1)x10 m3/ha-mm	(6) = (3) - (5)
Permeable Paver Parking Area	0.026	25	6.4	1.0	0.3	6.1
Total	**0.026**	**25**	**6.4**	**1.0**	**0.3**	**6.1**

Minimum runoff storage volume to infiltrate the 25mm storm event= **6.1 m^3**

48 Hour Drawdown Calculation		
I - Infiltration Rate*	12.0	mm/h
n - Porosity	0.4	
t - Design Detention Time	48	h
SF - Safety Factor	2.5	
D - Maximum Depth of Infiltration Trench for 48 Hour Drawdown	0.6	m

$$D = \frac{I * t}{SF * n * 1000}$$

Permeable Paver Parking Storage Parameters		
Porosity Coefficient	0.4	
Minimum Depth	0.10	m
Area	255.4	m^2
Provided Runoff Storage Volume	**10.3**	**m^3**
Actual Drawdown Time	**8.3**	**h**

*Based on typical infiltration rate of silty clay soils

Therefore, the sizing for the Permeable Paver Parking Storage is approximately 0.1 m deep, with a surface area of 255.4 sq.m to provide a total 10.3 cu.m of runoff storage volume.

APPENDIX D

OIL-GRIT SEPARATOR SIZING AND MAINTENANCE INFORMATION

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

Province:	Ontario
City:	Oakville
Nearest Rainfall Station:	HAMILTON RBG CS
Climate Station Id:	6153301
Years of Rainfall Data:	20

Site Name:	3171 Lakeshore Rd. W

Drainage Area (ha):	0.66
Runoff Coefficient 'c':	0.69

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0
Required Water Quality Runoff Volume Capture (%):	90.0

Estimated Water Quality Flow Rate (L/s):	15.04
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	

Project Name:	3171 Lakeshore Rd. W
Project Number:	-
Designer Name:	Brandon O'Leary
Designer Company:	Forterra
Designer Email:	brandon.oleary@forterrabp.com
Designer Phone:	905-630-0359
EOR Name:	Melanie Hehn
EOR Company:	SCS Consulting Group Ltd.
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	54
EFO6	61
EFO8	65
EFO10	67
EFO12	69

Recommended Stormceptor EFO Model: EFO6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 61

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

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

Stormceptor® EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	20.9	20.9	1.27	76.0	29.0	70	14.7	14.7
2	17.0	37.9	2.53	152.0	58.0	69	11.7	26.4
3	13.3	51.2	3.80	228.0	87.0	64	8.5	34.9
4	9.0	60.2	5.06	304.0	116.0	62	5.5	40.5
5	7.2	67.4	6.33	380.0	144.0	59	4.2	44.7
6	6.0	73.5	7.60	456.0	173.0	57	3.4	48.1
7	3.5	76.9	8.86	532.0	202.0	54	1.9	50.0
8	3.2	80.1	10.13	608.0	231.0	53	1.7	51.7
9	3.5	83.7	11.39	684.0	260.0	52	1.9	53.6
10	3.0	86.7	12.66	760.0	289.0	52	1.5	55.1
11	1.9	88.6	13.93	836.0	318.0	51	1.0	56.1
12	1.6	90.2	15.19	912.0	347.0	50	0.8	56.9
13	1.2	91.4	16.46	987.0	375.0	49	0.6	57.5
14	1.0	92.4	17.72	1063.0	404.0	48	0.5	57.9
15	1.5	93.9	18.99	1139.0	433.0	47	0.7	58.7
16	0.7	94.6	20.26	1215.0	462.0	46	0.3	59.0
17	0.5	95.1	21.52	1291.0	491.0	45	0.2	59.2
18	0.4	95.5	22.79	1367.0	520.0	44	0.2	59.4
19	0.6	96.1	24.05	1443.0	549.0	44	0.3	59.6
20	0.4	96.5	25.32	1519.0	578.0	43	0.2	59.8
21	0.9	97.4	26.59	1595.0	607.0	42	0.4	60.2
22	0.2	97.6	27.85	1671.0	635.0	42	0.1	60.3
23	0.5	98.1	29.12	1747.0	664.0	42	0.2	60.5
24	0.7	98.8	30.38	1823.0	693.0	42	0.3	60.8
25	0.0	98.8	31.65	1899.0	722.0	41	0.0	60.8
30	0.8	99.6	37.98	2279.0	866.0	41	0.3	61.1
35	0.4	100.0	44.31	2659.0	1011.0	40	0.1	61.3
40	0.0	100.0	50.64	3038.0	1155.0	38	0.0	61.3
45	0.0	100.0	56.97	3418.0	1300.0	36	0.0	61.3
50	0.0	100.0	63.30	3798.0	1444.0	33	0.0	61.3
						Estimated Net Annual Sediment (TSS) Load Reduction =		**61 %**

Climate Station ID□□□□□□□□ Years of Rainfall Data□□□

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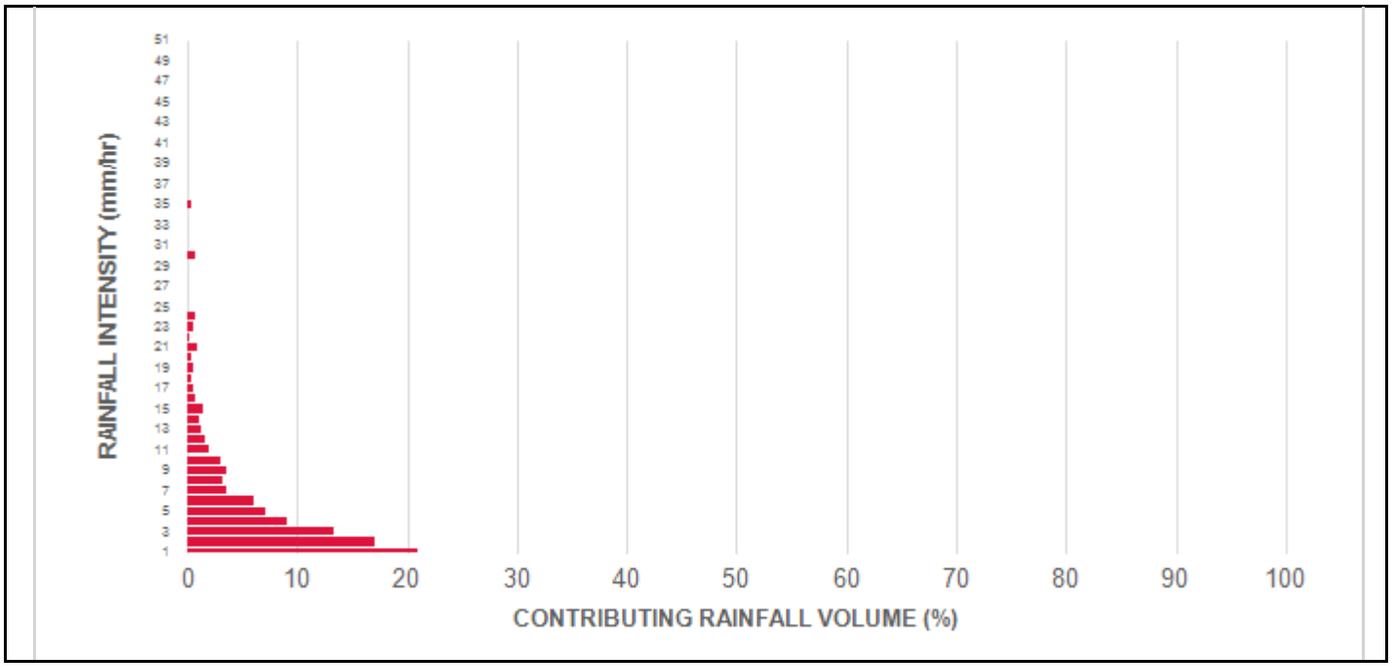
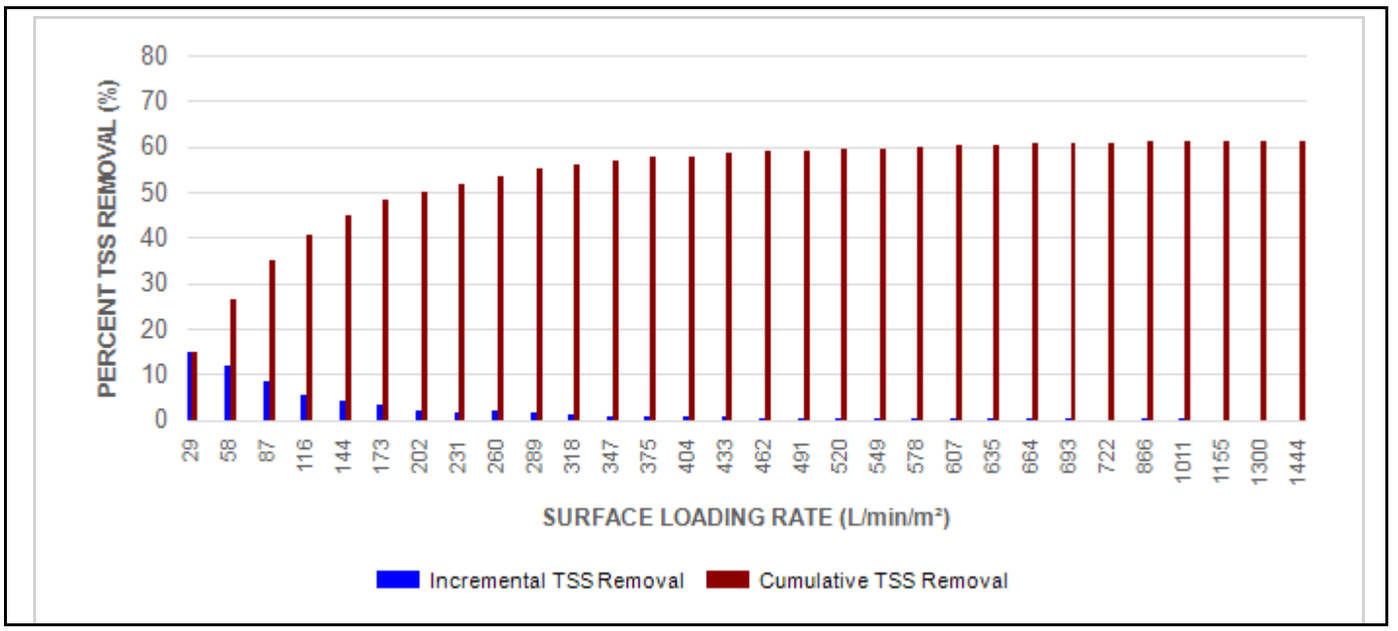
RAINFALL DATA FROM HAMILTON RBG CS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



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Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

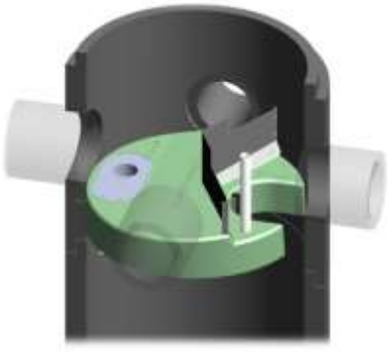
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

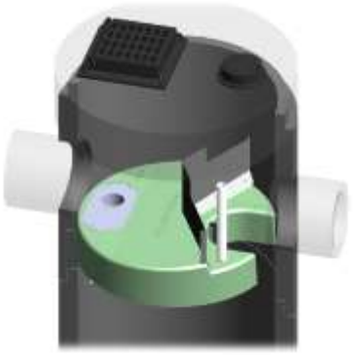
DESIGN FLEXIBILITY

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

OIL CAPTURE AND RETENTION

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





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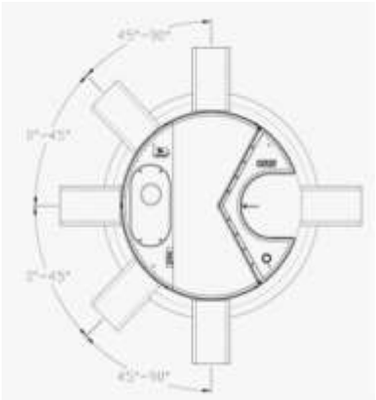

INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	46	1320	48	1980	35
30	70	690	46	1350	48	2010	34
60	67	720	45	1380	49	2040	34
90	63	750	45	1410	49	2070	33
120	61	780	45	1440	48	2100	33
150	58	810	45	1470	47	2130	32
180	56	840	45	1500	46	2160	32
210	54	870	45	1530	45	2190	31
240	53	900	45	1560	44	2220	31
270	52	930	44	1590	43	2250	30
300	51	960	44	1620	42	2280	30
330	50	990	44	1650	42	2310	30
360	49	1020	44	1680	41	2340	29
390	48	1050	45	1710	40	2370	29
420	48	1080	45	1740	39	2400	29
450	48	1110	45	1770	39	2430	28
480	47	1140	46	1800	38	2460	28
510	47	1170	46	1830	37	2490	28
540	47	1200	47	1860	37	2520	27
570	46	1230	47	1890	36	2550	27
600	46	1260	47	1920	36	2580	27
630	46	1290	48	1950	35		

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□hi□ □ection □□eci□ie□ re□uirement□ □or □electing□□i□ing□and de□igning an underground □il □rit Se□arator □□ □S□device □or □torm□ater □ualit□ treatment□□ith third□□art□te□ting re□ult□ and a Statement o□□eri□ication in accordance □ith □S□ □□□□□□ Environmental Management – Environmental □echnolog□ □eri□ication □E□□□□

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□S□ □□□□□□□□□□□□ Environmental management – Environmental technolog□ veri□ication □E□□□

Canadian Environmental Technology Verification (ETV) Program's □r□□□d□r□□□r□□□r□□□□r□□□r□□□□□□□□□□□□□□□ □ □□□□r□□S□□□□r□□□r□

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□□□□□□ All □ubmittal□□including □i□ing re□ort□□ □ho□ dra□ing□□□hall be □ubmitted u□on re□ue□t □ith each order to the contractor then □or□arded to the Engineer o□Record □or revie□ and acce□tance□ Sho□ dra□ing□ □hall detail all □□S com□onent□□elevation□□and □e□uence o□con□truction□

□□□□□□ Alternative device□□hall have □eature□ identical to or greater than the □□eci□ied device□including□ treatment chamber diameter□treatment chamber □et volume□□ediment □torage volume□and oil □torage volume□

□□□□□□ □nle□□ directed other□i□e b□ the Engineer o□Record□□ □S □torm□ater □ualit□ treatment □roduct □ub□titution□ or alternative□ □ubmitted □ithin ten da□□ □rior to □ro□ect bid □hall not be acce□ted□All alternative□ or □ub□titution□ □ubmitted □hall be □igned and □ealed b□ a local regi□tered □ro□e□□ional Engineer□ba□ed on the e□act □ame criteria detailed in Section □□in entiret□□□ub□ect to revie□ and a□□roval b□ the Engineer o□Record□

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□□□ □□S □□□□□□A□□ S□□RA□E

□he □□S device □hall include a □um□ □or □ediment □torage□and a □rotected volume □or the ca□ture and □torage o□ □etroleum h□drocarbon□and buo□ant gro□□ □ollutant□□□he minimum □ediment □ □etroleum h□drocarbon □torage ca□acit□ □hall be a□ □ollo□□□

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□he □□S □torm□ater □ualit□ treatment device □hall be veri□ied in accordance □ith □S□ □□□□□□□□□□ Environmental management – Environmental technolog□ veri□ication □E□□□ □he □□S □torm□ater □ualit□ treatment device □hall remove oil□ □ediment and gro□□ □ollutant□ □rom □torm□ater runo□□ during □re□uent □et □eather event□ and retain the□e □ollutant□ during le□□ □re□uent high □lo□ □et □eather event□ belo□ the in□ert □ithin the □□S □or later removal during maintenance□ □he Manu□acturer □hall have at lea□t ten □□□□ear□ o□ local e□□erience□ hi□tor□ and □ucce□□ in engineering de□ign□ manu□acturing and □roduction and □u□□l□ o□ □□S □torm□ater □ualit□ treatment device □□□tem□ acce□table to the Engineer o□ Record□

□□□ S□□□□ ME□□□□□□□□□

□he □□S device □hall be engineered□ de□igned and □i□ed to □rovide □torm□ater □ualit□ treatment ba□ed on treating a minimum o□ □□ □ercent o□ the average annual runo□□ volume and a minimum removal o□ an annual average □□□ o□ the □ediment □□SS□ load ba□ed on the □article Si□e □i□tribution □□S□ □□eci□ied in the □i□ing re□ort □or the □□eci□ied device□ Si□ing □hall be determined u□ing hi□torical rain□all data and a □ediment removal □er□ormance curve derived □rom the actual third□□art□ veri□ied laborator□ te□ting data□ □he □□S device □hall al□o have □u□□icient annual □ediment □torage ca□acit□ a□ □□eci□ied and calculated in Section □□□

□□□ □A□A□A□ E□□ or □S□ □□□□□ E□□ □ER□□□A□□□ □□S□□□R □ES□□□

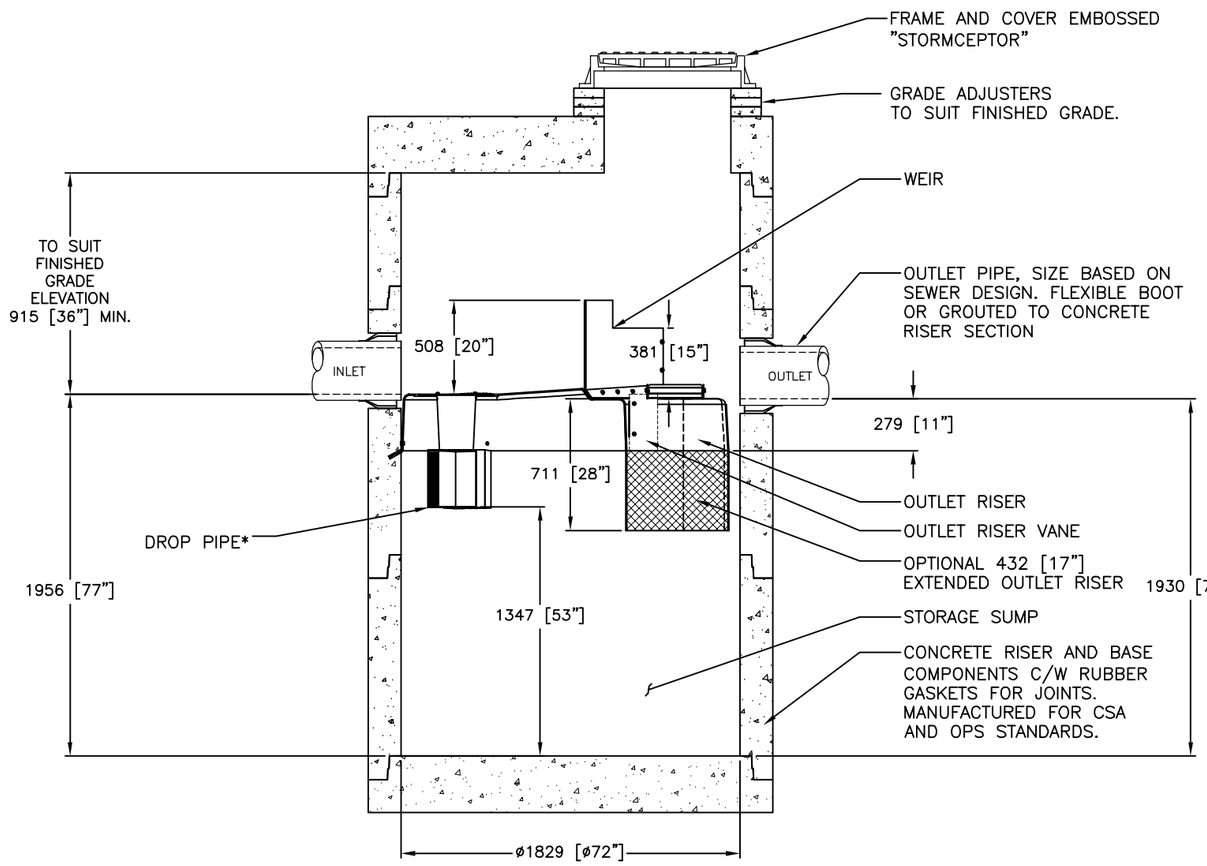
□he □□S device □hall have □anadian E□□ or □S□ □□□□□ E□□ □eri□ication o□ third□□art□ □cour te□ting conducted in accordance with the Canadian ETV Program's **□r□□□d□r□ □□r □□□□r□□□r□ □□□□□□□□□□ □□ □□□□□r□□□□□r□□r□□**

□□□□ □o be acce□table □or on□line in□tallation□ the □□S device mu□t demon□trate an average □cour te□t e□□luent concentration le□□ than □□ mg□□ at each □ur□ace loading rate te□ted□ u□ to and including □□□□ □□min□m□□

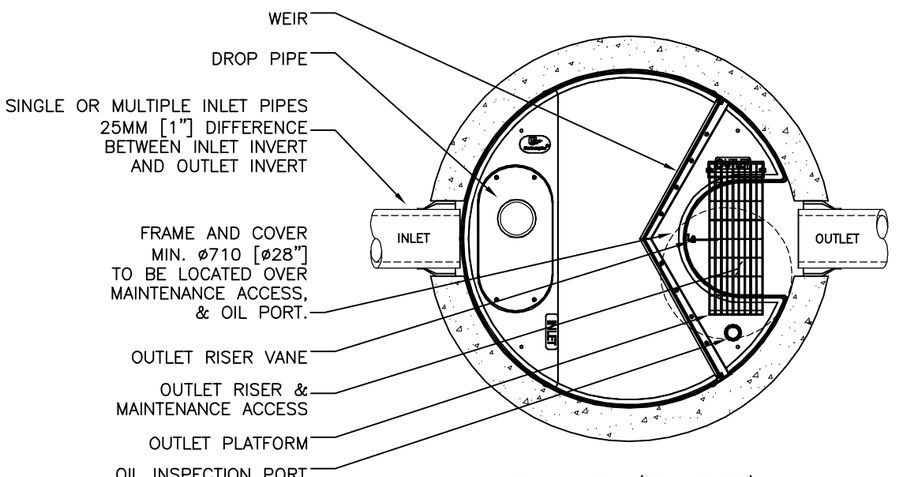
□□□ □□□□□ □□□□□ RE□E□□RA□□ME□□ S□M□□A□□□ □ES□□□

□he □□S device □hall have □anadian E□□ or □S□ □□□□□ E□□ □eri□ication o□ com□leted third□□art□ □ight □i□uid Re□entrainment Simulation □e□ting in accordance □ith the □anadian E□□ **Program's Procedure for Laboratory □□□□□□□□□□ □□ □□□□□r□□□□□r□□r□** □ith re□ult□ re□orted □ithin the □anadian E□□ or □S□ □□□□□ E□□ veri□ication□ □hi□ re□entrainment te□ting i□ conducted □ith the device □re□loaded □ith lo□ den□it□ □ol□eth□lene □□□□E□ □la□tic bead□ a□ a □urrogate □or light li□uid□ □uch a□ oil and □uel□ □e□ting i□ conducted on the □ame □□S unit te□ted □or □ediment removal to a□□e□□ □hether light li□uid□ ca□tured a□ter a □□ill are e□□ectivel□ retained at high □lo□ rate□□

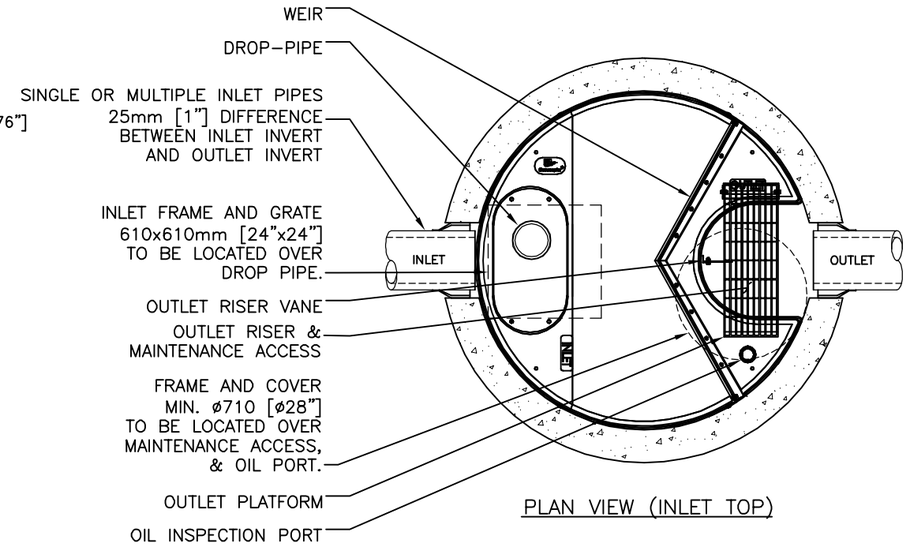
□□□□ □or an □□S device to be an acce□table □torm□ater treatment device on a □ite □here vehicular tra□□ic occur□ and the □otential □or an oil or □uel □□ill e□i□t□□ the □□S device mu□t have re□orted veri□ied □er□ormance re□ult□ o□ greater than □□□ cumulative retention o□ □□□E □la□tic bead□ □or the □ive □□eci□ied □ur□ace loading rate□ □ranging □□□ □□min□m□ to □□□□ □□min□m□□ in accordance □ith the □ight □i□uid Re□entrainment Simulation □e□ting within the Canadian ETV Program's **□r□□□d□r□ □□r □□□□r□□□r□ □□□□□□□□□□ □□ □□□□□r□□□□□r□□r□**□ □o□ever□ an □□S device □hall not be allo□ed i□ the □ight □i□uid Re□entrainment Simulation □e□ting □a□ □er□ormed □ith □creening com□onent□ □ithin the □□S device that are e□□ective at retaining the □□□E □la□tic bead□□ but □ould not be e□□ected to retain light li□uid□ □uch a□ oil and □uel□



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

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MARK	DATE	REVISION DESCRIPTION	BY
		RELEASE	
		ADDENDUM	
		ISSUED FOR	

Stormceptor® EF

SIZE

imbrium®
7037 RIDGE ROAD, SUITE 360, HANOVER, MD 21076
USA 1-866-279-8626 CA 800-565-4501 INTL +1-416-960-9900
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DESIGNED	SIZE
DRAWN	APPROVED
CHECKED	SHEET

SHEET

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