



Technical memorandum

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To	Schlegel Urban Developments Corp.	Contact No.	519-340-3902
Copy to	Vaughn Bender, Schlegel Urban Developments Corp.	Email	sarah.andrew@ghd.com
From	Sarah Andrew, GHD Maxwell Robinson, GHD	Project No.	12637434
Project Name	St. Jacobs Lands		
Subject	Preliminary feature-based water balance assessment technical memorandum		

1. Introduction

GHD Limited (GHD) was retained by Schlegel Urban Developments Corp. (Schlegel) to complete a preliminary feature-based water balance assessment of a sensitive wetland feature in support of a proposed development at 52 Hawkesville Road, St. Jacobs (hereinafter referred to as the Site or Property). A non-continuous hydrological model (Thornthwaite and Mather) at a monthly resolution was adopted for this approach. The feature-based water balance assessment was completed for pre-development and post-development (uncontrolled & controlled) conditions. The Site location is shown on Figure 1.

1.1 Purpose of this technical memorandum

The purpose of the assessment is to conduct a monthly feature-based water balance analysis to assess the impact of the proposed development on the hydrological function of a sensitive tree species (SWD6-3) within the wetland complex (sensitive wetland feature), identified by Natural Resources Solutions Inc. (NRSI), located downstream of the Site. The assessment characterizes the hydroperiods for the adjacent wetland to the north of the Site and evaluates if the hydrological functions of the sensitive wetland feature will be maintained under post-development conditions. The approach used to complete the assessment is summarized below:

- Review available topographic data, climate data, hydrogeological data, and plans and drawings for the proposed development at the Site.
- Perform a subcatchment delineation to determine the contributing drainage areas of the wetland and watercourse features.
- Complete monthly water balance calculations using the Thornthwaite and Mather approach for the sensitive wetland feature under pre-development, post-development (uncontrolled), and post-development (controlled) conditions.
- Compare the predicted infiltration and runoff volumes between the pre- and post-development conditions to assess the impact of the proposed development on the hydrological function of the sensitive wetland feature, with and without stormwater management (SWM) and low impact development (LID) controls in place.

2. Scope and limitations

This technical memorandum: has been prepared by GHD for Schlegel and may only be used and relied on by Schlegel for the purpose agreed between GHD and Schlegel as set out in this technical memorandum.

GHD has prepared this technical memorandum on the basis of information provided by Schlegel and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the technical memorandum which were caused by errors or omissions in that information.

GHD otherwise disclaims responsibility to any person other than Schlegel arising in connection with this technical memorandum. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this technical memorandum were limited to those specifically detailed in the technical memorandum and are subject to the scope limitations set out in the technical memorandum.

The opinions, conclusions and any recommendations in this technical memorandum are based on conditions encountered and information reviewed at the date of preparation of the technical memorandum. GHD has no responsibility or obligation to update this technical memorandum to account for events or changes occurring subsequent to the date that the technical memorandum was prepared.

The opinions, conclusions and any recommendations in this technical memorandum are based on assumptions made by GHD described in this technical memorandum. GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this technical memorandum is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

3. Site description

3.1 Pre-development conditions

Under pre-development conditions, the Site is situated directly northwest of the Village of St. Jacobs (St. Jacobs). The Property (i.e., developable area) is bounded to the north by a wetland complex and woodlot, to the east by the properties fronting Northside Drive, to the south by Hawkesville Road, and to the west by the Waterloo Central Railway. The Site is approximately 28.98 hectares (ha) in size with a Property boundary of 15.24 ha. The Property currently consists of undeveloped, vacant property used for agricultural purposes as well as sections of swamp and residential property. The surficial soils within the Site and surrounding areas were primarily fine sand and silt loam based on the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA) AgMaps database.

The Site is located within the jurisdiction of the Grand River Conservation Authority (GRCA) and is located within the Grand River sub-watershed, which ultimately drains to Lake Erie. A drainage divide is present across the southern portion of the Property that splits approximately 3.46 ha and 11.78 ha of the 15.24 ha drainage area to Hawkesville Road and the wetland complex, respectively. The wetland complex bordering the north side of the Property has an existing drain (the Northside Drive Municipal Drain), which flows through the sensitive wetland feature towards a natural watercourse that discharges through Arthur Street to Municipal Drain No. 11.

To evaluate the impacts of the proposed development on the hydrological function of the sensitive wetland feature, five (5) assessment points were selected. Two (2) assessment points were placed along the upstream boundary of the sensitive wetland feature at intersections with a small tributary and the Northside Drive Municipal Drain. One (1)

assessment point was placed along the downstream boundary of the sensitive wetland feature at the intersection with the Northside Drive Municipal Drain and an additional assessment point was placed prior to the confluence of the Northside Drive Municipal Drain with the natural watercourse that eventually becomes Municipal Drain No. 11. The last assessment point was placed at the intersection of Municipal Drain No. 11 and Arthur Street. These assessment points were used to evaluate the changes in drainage area and surplus contributing to the sensitive wetland feature.

3.2 Post-development conditions

Under post-development conditions, the proposed development will consist of single detached and street townhouse residential units, parkland blocks, a multi-residential block, and roadways. Additionally, two SWM ponds including a wet pond and a dry pond have been incorporated into the SWM design to manage excess surface runoff resulting from the proposed development. The wet pond will collect runoff from an approximate drainage area (including the Property and external lands) of 13.40 ha and will discharge towards Northside Drive which will outlet directly towards Municipal Drain No.11. The dry pond will collect runoff from an approximate drainage area (including the Property and external lands) of 5.02 ha and will outlet into the existing Northside Drive Municipal Drain. These areas are based on the "Development Concept" prepared by GSP Group (GSP). The remainder of the Property, approximately 1.39 ha and 0.45 ha, will drain towards Hawkesville Road and the northern woodlot, respectively. GHD understands that any changes to the Site Plan would require the post-development (uncontrolled and controlled) condition scenarios of the water balance assessment to be revised.

A land use breakdown of the pre- and post-development (uncontrolled and controlled) conditions is provided below in Table 1.

Table 1 Land use breakdown of the pre- and post-development condition areas

Assessment points	AP-1		AP-2		AP-3		AP-4		AP-5	
Land use	Area (ha)	Total percent area (%)	Area (ha)	Total percent area (%)	Area (ha)	Area (ha)	Area (ha)	Total percent area (%)	Area (ha)	Total percent area (%)
Pre-development										
Agricultural/rural land	9.55	62.3	1.35	89.7	10.92	58.6	17.33	53.7	136.29	81.0
Built-up pervious area	4.30	28.0	-	-	4.30	23.1	4.30	13.3	8.11	4.8
Forested area (FOD5-1, FOC4, CUT1, deciduous and coniferous forest)	0.50	3.3	0.16	10.3	1.65	8.9	2.50	7.7	7.21	4.3
Roadways	-	-	-	-	-	-	-	-	2.60	1.5
Duckweed floating-leaved shallow aquatic (SAF1-3)	-	-	-	-	-	-	-	-	0.02	_[1]
Built-up impervious area	0.98	6.4	-	-	0.99	5.3	0.99	3.1	3.70	2.2
Swamp maple organic deciduous swamp (SWD6-3)	(2 m ²)	_[1]	(0.2 m ²)	_[1]	0.56	3.0	0.60	1.9	0.60	0.4
White cedar-hardwood organic mixed swamp (SWM4-1)	-	-	(5 m ²)	_[1]	0.20	1.1	6.55	20.3	9.78	5.8
Total Site area:	15.33	100	1.51	100	18.62	100	32.27	100	168.31	100
Post-development										
Agricultural/rural land	0.001	_[1]	-	-	0.01	0.1	4.69	22.2	123.64	72.6
Built-up pervious area	1.02	15.4	-	-	1.02	11.8	1.02	4.8	4.84	2.8
Forested area (FOD5-1, FOC4, CUT1, deciduous and coniferous forest)	0.45	6.9	0.10	45.3	1.55	18.0	2.34	11.1	7.06	4.1
Roadways	-	-	-	-	-	-	-	-	2.60	1.5
Duckweed floating-leaved shallow aquatic (SAF1-3)	-	-	-	-	-	-	-	-	0.02	_[1]
Built-up impervious area	0.09	1.4	-	-	0.09	1.0	0.09	0.4	2.80	1.6

Assessment points	AP-1		AP-2		AP-3		AP-4		AP-5	
Land use	Area (ha)	Total percent area (%)	Area (ha)	Total percent area (%)	Area (ha)	Area (ha)	Area (ha)	Total percent area (%)	Area (ha)	Total percent area (%)
Swamp maple organic deciduous swamp (SWD6-3)	(2 m ²)	└[1]	-	-	0.57	6.5	0.60	2.8	0.60	0.4
White cedar-hardwood organic mixed swamp (SWM4-1)	-	-	-	-	0.19	2.2	6.53	31.0	9.77	5.7
Externally draining property to development - Agricultural land	0.04	0.5	-	-	0.04	0.5	0.04	0.2	0.96	0.6
Externally draining property to development - Built-up pervious	2.13	32.3	-	-	2.13	24.7	2.13	10.1	2.39	1.4
Externally draining property to development - Built-up impervious/proposed people care centre	0.57	8.6	-	-	0.56	6.6	0.57	2.7	1.33	0.8
Proposed development - Pervious areas	0.61	9.6	0.08	35.6	0.70	8.1	0.97	4.6	4.41	2.6
Proposed development - SWM pond berms	0.16	1.9	-	-	0.16	1.9	0.16	0.8	0.67	0.4
Proposed development - Paved areas	1.25	18.9	0.04	19.1	1.30	15.1	1.57	7.4	7.21	4.2
Proposed development - Roofed areas	0.25	3.7	-	-	0.25	2.9	0.32	1.5	1.58	0.9
Proposed development - Dry pond	0.05	0.7	-	-	0.05	0.6	0.05	0.2	0.05	└[1]
Proposed development - Wet pond	-	-	-	-	-	-	-	-	0.26	0.2
Total Site area	6.62	100	0.22	100	8.62	100	21.08	100	170.19	100

Notes:

1. Percentages less than 0.1% will be deemed negligible.

4. Surface water balance

4.1 Methodology

The feature-based water balance assessment was conducted based on the standard methodology described in the document titled “Hydrogeological Assessment Submissions, Conservation Authority Guidelines for Development Applications (June 2013)” authored by the Lake Simcoe Region Conservation Authority (LSRCA). The standardized water balance approach is to utilize the “Meteorological Service Data Analysis and Archive Division of Environment Canada (EC)” to provide monthly water balance summaries for different soil-water holding capacities.

Water holding capacity (WHC)

The maximum soil storage is quantified as the water holding capacity (WHC), which is defined based on a combination of land use and soil type, as presented in Table 3.1 of the MOE SWM Manual (MOE, 2003). The WHC represents the total amount of water that can be stored in the soil capillaries and is defined as the water content between the field capacity and wilting point (the practical maximum and minimum soil water content, respectively). WHC values typically range from approximately 10 millimetres (mm) for bedrock and impervious areas to 400 mm for mature forest over silt loam.

Climate data

The water balance assessment presented herein is based on meteorological data from the Environment and Climate Change Canada (ECCC) Thornthwaite and Mather water budget from a composite of stations including Elora RCS (Climate ID: 6142286) and Elora Automatic Climate Station (Climate ID: 614B2H4) over a period of 38 years from 1986 to 2023. These stations are located approximately 16 kilometres (km) northeast of the Site. Missing observations are substituted with records from nearby stations. The ECCC data is presented in Table A1 in Appendix A.

Model approach

The results from EC water balance model presents the following monthly output: temperature (mean), precipitation, rainfall, snowmelt, potential evapotranspiration (PET), actual evapotranspiration (AET), and water surplus (WS) for each of the years in the historic record, as well as average monthly values over the entire record. The model is used to estimate the soil storage (water) surplus based on a provided soil water holding capacities.

The Thornthwaite and Mather (1957) method is used to calculate the potential and actual amounts of evapotranspiration and water surplus. The calculations are performed on a daily basis and consists of daily precipitation (rainfall and snowmelt) and temperature data to estimate evapotranspiration (ET), soil-water storage, and water surplus. The EC water balance model utilizes a daily timestep developed by the Meteorological Service of Canada (MSC), as daily data allows for more accurate modelling of snowmelt and snow storage, which are of particular importance in a cold weather/winter climate (Johnstone and Louie, 1983).

The water balance calculations are based on the following equation:

$$P = S + ET + WS$$

Where:

P = precipitation

S = change in soil water storage

ET = evapotranspiration

WS = water surplus (surface runoff and infiltration)

Precipitation (P) is either rain or snow depending on the mean daily temperature. Evapotranspiration (ET) refers to the water that is lost to the atmosphere due to evaporation from soil or water and due to transpiration from plants and trees. The Thornthwaite and Mather (1957) methodology estimates AET based on the following condition: 1) AET equals PET when there is enough water available within the soil storage (water holding capacity) to meet the evapotranspiration demand, otherwise, 2) AET equals the amount of water that is available for evapotranspiration.

The water surplus (WS) is the difference between P and AET and is calculated when the water holding capacity of the soil storage is exceeded. The WS represents the total water available in each month to runoff as surface overland flow or infiltrate to the ground and recharge the groundwater table. The average annual water surplus is separated into infiltration and runoff based on an infiltration factor. The infiltration factor is presented in Table 3.1 of MOE (2003). Site-specific infiltration factors are estimated based on aggregating the infiltration factors for topography, surficial soil type, and vegetative cover factors (land use).

4.2 Catchment delineation

The “Watershed Delineation Tool” in PCSWMM was used to delineate the subcatchment areas for pre-and post-development conditions as shown on Figures 2 and 3, respectively. GHD understands that no existing topographic survey exists of the wetland (beyond the survey points completed by NRSI for a portion of the wetland boundary) and therefore has relied on the available LiDAR data and surveyed point-shots of key features. Land uses under pre- and post-development conditions were taken from desktop delineation using aerial imagery, the “Development Concept” prepared by GSP, ELC mapping data provided by the NRSI, and the Southern Ontario Land Resource Information System (SOLRIS) 3.0.

Assessment point 1 (AP-1)

Assessment point 1 (AP-1) is located downstream of the daylighting point of Northside Drive Municipal Drain at an intersection between the edge of the sensitive wetland feature and Northside Drive Municipal Drain. The subcatchment for this assessment point is approximately 15.33 ha in size and the majority of this catchment sits within the area proposed for development. The subcatchment is predominantly agricultural lands and residential property, with areas of forest and swamp/wetland. The proposed development will reduce the size of the subcatchment, diverting the majority of the area of existing surface runoff to the proposed SWM facilities. It is at this assessment point where the most hydrological changes to the sensitive wetland feature and Northside Drive Municipal Drain are expected to occur.

Assessment point 2 (AP-2)

AP-2 is located at an intersection between the edge of the sensitive wetland feature and a small tributary to Northside Drive Municipal Drain. The existing subcatchment area is approximately 1.51 ha and is predominantly forest and agricultural land. The proposed development will reduce the catchment area for AP-2 as the majority of the area of existing surface runoff will be diverted to the proposed SWM facilities.

Assessment point 3 (AP-3)

AP-3 is located at the second and last intersection between the edge of the sensitive wetland feature and Northside Drive Municipal Drain, directly downstream of the confluence of the AP-1 and AP-2 channels. The subcatchment for this assessment point is approximately 18.62 ha and the majority of this catchment sits within the area proposed for development. The subcatchment contains the previously mentioned land uses for AP-1 and AP-2, as well as the sensitive wetland feature. The proposed development will reduce the size of the subcatchment, diverting the majority of the area of existing surface runoff to the proposed SWM facilities.

Assessment point 4 (AP-4)

AP-4 is located at the confluence of Northside Drive Municipal Drain and the natural watercourse located at the north end of the wetland complex. The subcatchment for AP-4 is approximately 32.26 ha and contains the previously

mentioned subcatchments. The subcatchment is predominately forest, agricultural land, and residential properties. The proposed development will reduce the size of the subcatchment, diverting the majority of the area of existing surface runoff to the proposed SWM facilities.

Assessment point 5 (AP-5)

AP-5 is located at the downstream outlet of the wetland complex at the intersection of Arthur Street and the beginning of Municipal Drain No. 11. The subcatchment for AP-5 is approximately 168.31 ha and contains the previously mentioned subcatchments. The subcatchment is predominately forest, agricultural land, and residential properties. The proposed development will increase the size of the subcatchment due to the proposed drainage plan for the Site.

4.3 Surface water balance parameters

The surficial soils are primarily glaciolacustrine-derived silty to clayey till, modern alluvial deposits, and sandy deposits (i.e., fine sand and silt loam) within the Site and surrounding areas, based on OMAFRA's AgMaps. Silt loam was assumed to be the post-development conditions soil type for the proposed development landscaped areas to promote drainage. Available topography for the Site can be classified as rolling to hilly land with an average slope between 3.8 to 28 m/km. The maximum soil storage was quantified using a WHC based on guidelines provided in Table 3.1 of MOE (2003). The infiltration factors and WHCs for the pre-development and post-development land uses, Site-specific topography, surficial soil type, and vegetative cover factors are presented in Table A2 in Appendix A.

The water balance analysis was developed under the following assumptions:

- WHCs were chosen based on Table 3.1 of MOE (2003) corresponding to the clay loam soil type, pre- and post-development (uncontrolled and controlled) condition land uses for the feature-based water balance.
- For the imperious areas, a value of 2 and 10 mm was chosen to represent the WHC values for roofed and paved areas, respectively. The 2 mm WHC was chosen for roofed areas as minimal depression storage is available on sloped roofs. The 10 mm WHC was chosen for paved areas due to the presence of depressions throughout the surface which could hold runoff.
- For the wet pond, a value for annual lake evaporation to represent the wet pond was obtained from the lake evaporation climate normals for Waterloo Wellington ECCC Meteorological Station between 1981 to 2010 (690 mm/year). A null infiltration factor was chosen due to the presence of standing water throughout the majority of the year.
- For the dry pond, a null infiltration factor was chosen due to the presence of an impermeable liner to limit groundwater seepage.
- Net surplus was estimated by multiplying the estimated monthly surplus for the assumed WHC by the associated drainage area. AET and surplus values were obtained from the composite meteorological data from the Elora Automatic Climate Station and Elora RCS WWTP ECCC Meteorological Stations based on the WHC assigned to each land use area.
- Runoff was calculated as the difference between surplus and infiltration.

4.4 Surface water balance results

An average annual water balance was carried out on a feature-specific basis. The results for the pre-development and post-development (uncontrolled and controlled) conditions are presented in this section.

4.4.1 Pre-development conditions

Based on the results of the assessment, the average annual pre-development water balance was estimated on a feature-specific basis as summarized in Table 2, and as detailed in Tables A3.1 to A3.5 in Appendix A.

Table 2 Pre-development average annual water balance results – feature-based

Assessment point	Area (ha)	Average annual volume m ³ /yr ^[1]				
		Precipitation (P)	Evapotranspiration (ET)	Surplus (S)	Infiltration (I)	Runoff (R)
AP-1	15.33	137,350	83,195	54,040	28,025	26,015
AP-2	1.51	13,555	8,530	4,990	2,695	2,295
AP-3	18.62	166,855	102,235	64,375	34,205	30,170
AP-4	32.27	289,090	180,620	107,775	59,995	47,780
AP-5	168.31	1,508,070	932,670	573,245	304,360	268,885

Notes:

1. Volumes are rounded for reporting purposes

4.4.2 Post-development (uncontrolled) conditions

Based on the results of the assessment, the average annual post-development (uncontrolled) water balances were estimated on a feature-specific basis as summarized in Table 3, and as detailed in Tables A4.1 to A4.5 in Appendix A.

Table 3 Post-development (uncontrolled) average annual water balance results – feature-based

Assessment point	Area (ha)	Average annual volume m ³ /yr ^[1]				
		Precipitation (P)	Evapotranspiration (ET)	Surplus (S)	Infiltration (I)	Runoff (R)
AP-1	6.62	59,275	34,200	24,950	8,090	16,860
AP-2	0.22	2,010	1,200	795	390	405
AP-3	8.62	77,240	45,970	31,060	11,955	19,105
AP-4	21.08	188,885	116,860	71,380	35,735	35,645
AP-5	170.52	1,527,890	934,575	591,135	290,480	300,655

Notes:

1. Volumes are rounded for reporting purposes

4.4.3 Post-development (controlled) conditions

SWM facility - Wet pond runoff diversion

Under post-development (controlled) conditions, an orifice outlet structure from the wet pond is proposed to be incorporated into the wet pond design to divert additional stormwater runoff towards the sensitive wetland feature to meet pre-development conditions. The proposed outlet structure is designed to discharge towards AP-2 and would be activated at a certain elevation within the wet pond. A continuous hydrological model of the SWM facility was prepared by WalterFedy to quantify the discharge volumes to the sensitive wetland feature over a 20-year period (2005 – 2024) utilizing meteorological data from the Elora RCS Environment Canada Climate Station. Per the hydrological model, the proposed orifice outlet structure would divert approximately 27% of the total average annual runoff controlled within the wet pond over the 20-year record towards the sensitive wetland feature. For the purposes of this water balance assessment, the monthly diverted runoff percentages provided by WalterFedy will be assigned to the wet pond discharge resulting in a diversion of 12,140 m³ of annual runoff. A breakdown of the controlled runoff volumes for both SWM facilities as well as the diverted runoff volume from the wet pond is detailed in Table A5.1 and Table A5.2 in Appendix A, respectively.

Based on the results of the assessment, the average annual post-development (controlled) water balances were estimated on a feature-specific basis as summarized in Table 3.

Table 4 Post-development (controlled) average annual water balance results – feature-based

Assessment point	Area (ha)	Average annual volume m ³ /yr ^[1]				
		Precipitation (P)	Evapotranspiration (ET)	Surplus (S)	Infiltration (I)	Runoff (R)
AP-1	6.62	59,275	34,200	24,950	8,090	16,860
AP-2	0.22	2,010	1,200	12,935	390	12,545
AP-3	8.62	77,240	45,970	43,200	11,955	31,245
AP-4	21.08	188,885	116,860	83,520	35,735	47,785
AP-5	170.52	1,527,890	934,575	591,135	290,480	300,655

Notes:

1. Volumes are rounded for reporting purposes

4.5 Summary of water balance results

A summary of the annual water balance assessment considering surplus, infiltration, and runoff for the pre-development and post-development (uncontrolled and controlled) conditions is summarized in Table 5 and Table 9 for AP-1 to AP-5, respectively, and as detailed in Table A6 in Appendix A.

Table 5 Summary of average annual water balance results – AP-1

Scenario	Area (ha)	Average annual volume					
		Surplus (S)		Infiltration (I)		Runoff (R)	
		m ³ /yr	mm/yr	m ³ /yr	mm/yr	m ³ /yr	mm/yr
Pre-development	15.33	54,040	353	28,025	183	26,015	170
Post-development (uncontrolled / controlled)	6.62	24,950	377	8,090	122	16,860	255
Pre- to post-development difference							
Absolute difference	(8.71)	(29,090)	(190)	(19,935)	(130)	(9,155)	(60)
Percent difference	-57%	-54%		-71%		-35%	

Notes:

1. Volumes are rounded for reporting purposes
2. Absolute difference is averaged over the pre-development area

Under post-development (uncontrolled) conditions, surplus to AP-1 is anticipated to decrease by 54% representing a decrease in evapotranspiration due to changes in land use and a reduction in total catchment area. Direct infiltration and runoff are anticipated to decrease by 19,935 m³/year (130 mm/year) and 9,155 m³/year (60 mm/year), respectively, due to an increase in impervious area directed towards AP-1 as well as a loss in catchment area.

Under post-development (controlled) conditions, surplus, infiltration, and runoff to AP-1 will remain the same as no LID measures will be implemented due to the presence of high groundwater levels across the Site. Runoff volumes discharged from the dry pond to AP-1 will be attenuated to mitigate potential flooding and erosion concerns to Northside Drive Municipal Drain.

Table 6 Summary of average annual water balance results – AP-2

Scenario	Area (ha)	Average annual volume					
		Surplus (S)		Infiltration (I)		Runoff (R)	
		m³/yr	mm/yr	m³/yr	mm/yr	m³/yr	mm/yr
Pre-development	1.51	4,990	330	2,695	178	2,295	152
Post-development (uncontrolled)	0.22	795	354	390	174	405	180
Post-development (controlled)	0.22	12,935	5,758	390	174	12,545	5,584
Pre- to post-development difference							
Absolute difference	(1.29)	7,945	526	(2,305)	(152)	10,250	678
Percent difference	-85%	159%		-86%		447%	

Notes:

1. Volumes are rounded for reporting purposes
2. Absolute difference is averaged over the pre-development area

Under post-development (uncontrolled) conditions, surplus to AP-2 is anticipated to decrease by 84% representing a decrease in evapotranspiration due to changes in land use and a reduction in total catchment area. Direct infiltration and runoff are anticipated to decrease by 2,305 m³/year (152 mm/year) and 1,890 m³/year (125 mm/year), respectively, due to a loss in catchment area.

Under post-development (controlled) conditions, infiltration to AP-2 will remain the same as the catchment area only includes portions of the buffer zone within the Site and no LIDs are planned to be implemented due to the presence of high groundwater levels across the Site. Direct surplus and runoff to AP-2 is anticipated to increase by 7,945 m³/year (526 mm/year) and 10,250 m³/year (678 mm/year), respectively, due to the proposed orifice outlet system from the wet pond. Runoff volumes discharged from the wet pond to AP-2 will be attenuated to mitigate potential erosion concerns to Northside Drive Municipal Drain.

Table 7 Summary of average annual water balance results – AP-3

Scenario	Area (ha)	Average annual volume					
		Surplus (S)		Infiltration (I)		Runoff (R)	
		m³/yr	mm/a	m³/yr	mm/a	m³/yr	mm/yr
Pre-development	18.62	64,375	346	34,205	184	30,170	162
Post-development (uncontrolled)	8.62	31,060	360	11,955	139	19,105	222
Post-development (controlled)	8.62	43,200	501	11,955	139	31,245	362
Pre- to post- development difference							
Absolute difference	(10.00)	(21,175)	(113)	(22,250)	(119)	1,075	6
Percent difference	-54%	-33%		-65%		4%	

Notes:

1. Volumes are rounded for reporting purposes
2. Absolute difference is averaged over the pre-development area

Under post-development (uncontrolled) conditions, surplus to AP-3 is anticipated to decrease by 52% representing a decrease in evapotranspiration due to changes in land use and a reduction in total catchment area. Direct infiltration

and runoff are anticipated to decrease by 22,250 m³/year (119 mm/year) and 11,065 m³/year (59 mm/year), respectively, due to an increase in impervious area as well as a loss in catchment area.

Under post-development (controlled) conditions, infiltration to AP-3 will remain the same as the catchment area only includes portions of the buffer zone within the Site and no LIDs are planned to be implemented due to the presence of high groundwater levels across the Site. Direct surplus to AP-3 is anticipated to decrease by 21,175 m³/year (113 mm/year) while runoff is anticipated to increase by 1,075 m³/year (6 mm/year) due to the proposed orifice outlet system from the wet pond. Runoff volumes discharged from the wet and dry ponds to AP-3 will be attenuated to mitigate potential erosion concerns to Northside Drive Municipal Drain.

Table 8 Summary of average annual water balance results – AP-4

Scenario	Area (ha)	Average annual volume					
		Surplus (S)		Infiltration (I)		Runoff (R)	
		m ³ /a	mm/a	m ³ /a	mm/a	m ³ /a	mm/a
Pre-development	32.27	107,775	334	59,995	186	47,780	148
Post-development (uncontrolled)	21.08	71,380	339	35,735	170	35,645	169
Post-development (controlled)	21.08	83,520	396	35,735	170	47,785	227
Pre- to post- development difference							
Absolute difference	(11.18)	(24,255)	(75)	(24,260)	(75)	5	0.02
Percent difference	-35%	-23%		-40%		0.01%	

Notes:

1. Volumes are rounded for reporting purposes
2. Absolute difference is averaged over the pre-development area

Under post-development (uncontrolled) conditions, surplus to AP-4 is anticipated to decrease by 34% representing a decrease in evapotranspiration due to changes in land use and a reduction in total catchment area. Direct infiltration and runoff are anticipated to decrease by 24,260 m³/year (75 mm/year) and 12,135 m³/year (38 mm/year), respectively, due to an increase in impervious area as well as a loss in catchment area.

Under post-development (controlled) conditions, infiltration to AP-4 will remain the same as the catchment area only includes portions of the buffer zone within the Site and no LIDs are planned to be implemented due to the presence of high groundwater levels across the Site. Direct surplus to AP-4 is anticipated to decrease by 24,255 m³/year (75 mm/year) and runoff is anticipated to increase by 5 m³/year (0.02 mm/year) due to the proposed orifice outlet system from the wet pond. Runoff volumes discharged from the wet and dry ponds to AP-4 will be attenuated to mitigate potential erosion concerns to Northside Drive Municipal Drain.

Table 9 Summary of average annual water balance results – AP-5

Scenario	Area (ha)	Average annual volume					
		Surplus (S)		Infiltration (I)		Runoff (R)	
		m ³ /a	mm/a	m ³ /a	mm/a	m ³ /a	mm/a
Pre-development	168.31	573,245	341	304,360	181	268,885	160
Post-development (uncontrolled / controlled)	170.52	591,135	347	290,480	170	300,655	176
Pre- to post- development difference							
Absolute difference	2.21	17,890	11	(13,880)	(8)	31,770	19
Percent difference	1%	3%		-5%		12%	

Notes:

1. Volumes are rounded for reporting purposes
2. Absolute difference is averaged over the pre-development area

Under post-development (uncontrolled) conditions, surplus to AP-5 is anticipated to increase by 3% representing an increase in evapotranspiration due to changes in land use and a slight increase in total catchment area. Direct infiltration is anticipated to decrease by 13,880 m³/year (8 mm/year) due to an increase in impervious area. Direct runoff is anticipated to increase by 31,770 m³/year (19 mm/year) due to an increase in impervious area as well as an increase in catchment area.

Under post-development (controlled) conditions, surplus, infiltration, and runoff to AP-5 will remain the same as no LID measures will be implemented due to the presence of high groundwater levels across the Site. Runoff volumes discharged from the wet pond to AP-5 will be attenuated to mitigate potential erosion concerns to Municipal Drain No. 11.

Summary

Overall, the results of the water balance analysis predict a decrease in average monthly infiltration and an increase in average monthly runoff to the sensitive wetland feature (i.e., AP-3). The decrease in infiltration can be attributed to the change in land use on the Site, however, the slow release of runoff from the dry and wet ponds to the sensitive wetland feature will allow for additional infiltration within the wetland complex. The increase in runoff to the sensitive wetland feature can be attributed to the diversion of 27% of the total annual runoff controlled within the wet pond to the wetland complex.

Additionally, the results of the water balance analysis predict a decrease in average monthly infiltration and runoff to the woodlot (AP-4) which can be attributed to the change in land use on the Site as well as the decrease in catchment area. The contribution area of overland flow to the woodlot area west of Northside Drive Municipal Drain is expected to decrease by 1.18 ha (9%), compared to pre-development conditions, however, negligible impacts to overland flow are expected due to the increased imperviousness of the proposed development area within the catchment. Changes to the Municipal Drain No. 11 catchment (AP-5) can be deemed as negligible as the catchment is only increasing by 1% with surplus increasing by 3%.

5. Assessment of the sensitive wetland features hydroperiod

5.1 Wetland water level monitoring

To understand baseline conditions, GHD initiated a surface water monitoring program in March 2024 to be conducted over a monitoring period of one (1) year to ensure seasonal data is collected (i.e., spring, summer, fall, and winter). To characterise the hydroperiods of the sensitive wetland feature, GHD established one (1) monitoring location within the feature as well as four (4) additional monitoring locations within the surrounding wetland complex as shown on Figure 4. For the purpose of this assessment, only the monitoring location (i.e., Wetland SG/MP) within the feature was assessed.

At this monitoring location, a staff gauge and mini piezometer were installed to measure discrete surface water and shallow groundwater levels, respectively, in conjunction with continuous measurements of water level and temperature recorded by non-vented pressure transducers at 15-minute intervals. Due to logger issues, the mini piezometer data was unable to be processed at this time.

The continuous and manual surface water level hydrograph for the Wetland SG relative to local precipitation is presented in Appendix B. As depicted in the hydrograph, surface water levels were observed within the sensitive wetland feature throughout the spring with water levels going dry shortly after the start of May. Throughout the remainder of the monitoring period to date, surface water levels showed defined responses to large precipitation events. Based on the monitoring data to date for the water levels within the sensitive wetland feature, it can be inferred

that the hydroperiod of the sensitive wetland feature falls within the spring months of the year (March to May) before becoming dry for the remainder of the year to date.

5.2 Water balance

Under post-development (uncontrolled) conditions, the sensitive wetland feature (i.e., AP-3) was estimated to experience a runoff deficit of 11,065 m³/year (59 mm/year). Table 10 below shows a breakdown of the monthly runoff volumes to the sensitive wetland feature to characterize the potential changes to its hydroperiods under post-development (uncontrolled and controlled) conditions.

Table 10 Summary of average monthly runoff volumes to sensitive wetland feature

Scenario	Area		Average monthly runoff volume to sensitive wetland feature (AP-3)							
	Pre-development	Post-development	Pre-development		Post-development (uncontrolled)		Post-development (controlled)		Change from pre-development*	
	ha		m ³ /a	mm/a	m ³ /a	mm/a	m ³ /a	mm/a	m ³ /a	mm/a
January	18.62	8.62	3,590	19	2,200	26	3,555	41	(35)	(0.2)
February			3,670	20	2,170	25	3,490	40	(180)	(1)
March			7,905	42	4,640	54	7,385	86	(520)	(3)
April			4,825	26	2,825	33	4,455	52	(370)	(2)
May			1,205	6	675	8	1,035	12	(170)	(1)
June			700	4	395	5	595	7	(105)	(1)
July			270	1	140	2	200	2	(70)	(0.4)
August			290	2	195	2	310	4	20	0.1
September			730	4	605	7	1,030	12	300	2
October			1,150	6	1,130	13	2,080	24	930	5
November			2,705	15	2,095	24	3,715	43	1,010	5
December			3,130	17	2,035	24	3,395	39	265	1
Total	18.62	8.62	30,170	162	19,105	222	31,245	362	1,075	6

*Red shaded areas indicate the assumed hydroperiods of the sensitive wetland feature.

Under pre-development conditions, the sensitive wetland feature receives the majority of its yearly runoff volume from late fall to the spring freshet. This observation is in line with the hydroperiods identified in the water level monitoring program results to date as detailed in Section 5.1 above. Under post-development (uncontrolled) conditions, the reduction of runoff volume to the sensitive wetland feature due to catchment loss would greatly impact the duration of the features hydroperiod. However, with the diversion of runoff from the wet pond, under post-development (controlled) conditions, the hydroperiods of the sensitive wetland feature are similar to pre-development conditions.

6. Northside Drive Municipal Drain capacity assessment

Due to the presence of high-groundwater levels across the Site, LID measures such as bioswales and/or infiltration galleries will not be implemented within the Site, therefore, the volume of runoff to the Northside Drive Municipal Drain and the sensitive wetland feature under post-development conditions will remain the same. To mitigate the concerns of flooding within the sensitive wetland feature and erosion to the Northside Drive Municipal Drain, the following design discharge rates were proposed by WalterFedy, as seen in Table 11 below.

Table 11 Summary of design discharge rates for dry and wet ponds

Design storm	Design discharge rates (m ³ /s) *			
	Discharge from wet pond	Discharge from dry pond	Total post-development discharge to woodlot	Pre-development discharge to woodlot
	(A = 13.41 ha)	(A = 5.20 ha)	(A = 18.61 ha)	(A = 22.44 ha)
2-yr	0.212	0.363	0.575	0.967
5-yr	0.293	0.493	0.786	1.337
10-yr	0.386	0.633	1.019	1.707
25-yr	0.472	0.758	1.230	2.025
50-yr	0.562	0.893	1.455	2.361
100-yr	0.653	1.030	1.683	2.697
Regional storm	1.785	1.392	3.177	3.195

*Values provided by WalterFedy

Utilizing survey data of the Northside Drive Municipal drain completed by WalterFedy, as seen on Figure 5, a HEC-RAS analysis was conducted to determine the capacity of the Northside Drive Municipal Drain upstream and downstream of the sensitive wetland feature. Plots of the HEC-RAS channel, cross sections, and results under each design storm are shown in Appendix C.

Based on the HEC-RAS analysis, the Northside Drive Municipal Drain is able to convey a design storm up to 5-yr under pre-development conditions (up to the 100-yr and regional storm events are able to be conveyed within certain cross-sections) to the sensitive wetland feature before ponding within the sensitive wetland feature. As the post-development (controlled) conditions design discharge rates are below pre-development levels, the potential for erosion due to discharging from the dry pond and overspilling from wet pond during the regional storm are no greater than during pre-development conditions.

7. Conclusions and recommendations

A monthly feature-based water balance analysis was completed to assess the impacts of the proposed residential development on the hydrological function of the receiving municipal drain and sensitive wetland feature. The assessment resulted in the following conclusions.

- The results of the analysis predict a decrease in average monthly infiltration to the sensitive wetland feature from AP-1 to AP-3. This decrease can be attributed to a decrease in catchment size and change in land use.
- The results of the analysis predict an increase in average monthly runoff to the sensitive wetland feature from AP-2 to AP-3. This increase can be attributed to the diversion of controlled runoff from the wet pond to the wetland complex.
- The results of the analysis predict a minor decrease in average monthly runoff to the woodlot prior to AP-4. The minor decrease can be attributed to a decrease in catchment size facilitated by the diversion of Site runoff from the wet pond to AP-4 and changes in land use.
- The results of the analysis predict a decrease in average monthly runoff to Municipal Drain No. 11 at AP-5. The increase is contributed to an increase in catchment size facilitated by the diversion of Site runoff from the wet pond to AP-5 and changes in land use.
- The results of the analysis predict minor changes to the hydroperiod of sensitive wetland feature due to diversion of controlled runoff from the wet pond in the proposed development.
- The results of the analysis predict no changes to the hydrological function of the Northside Drive Municipal Drain or Municipal Drain No. 11 due to the proposed development.

8. References

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S4	04	Maxwell Robinson	Sarah Andrew	On File	Sarah Andrew	On File	30 Apr 2025
S4	04	Maxwell Robinson	Sarah Andrew		Sarah Andrew		6 May 2025

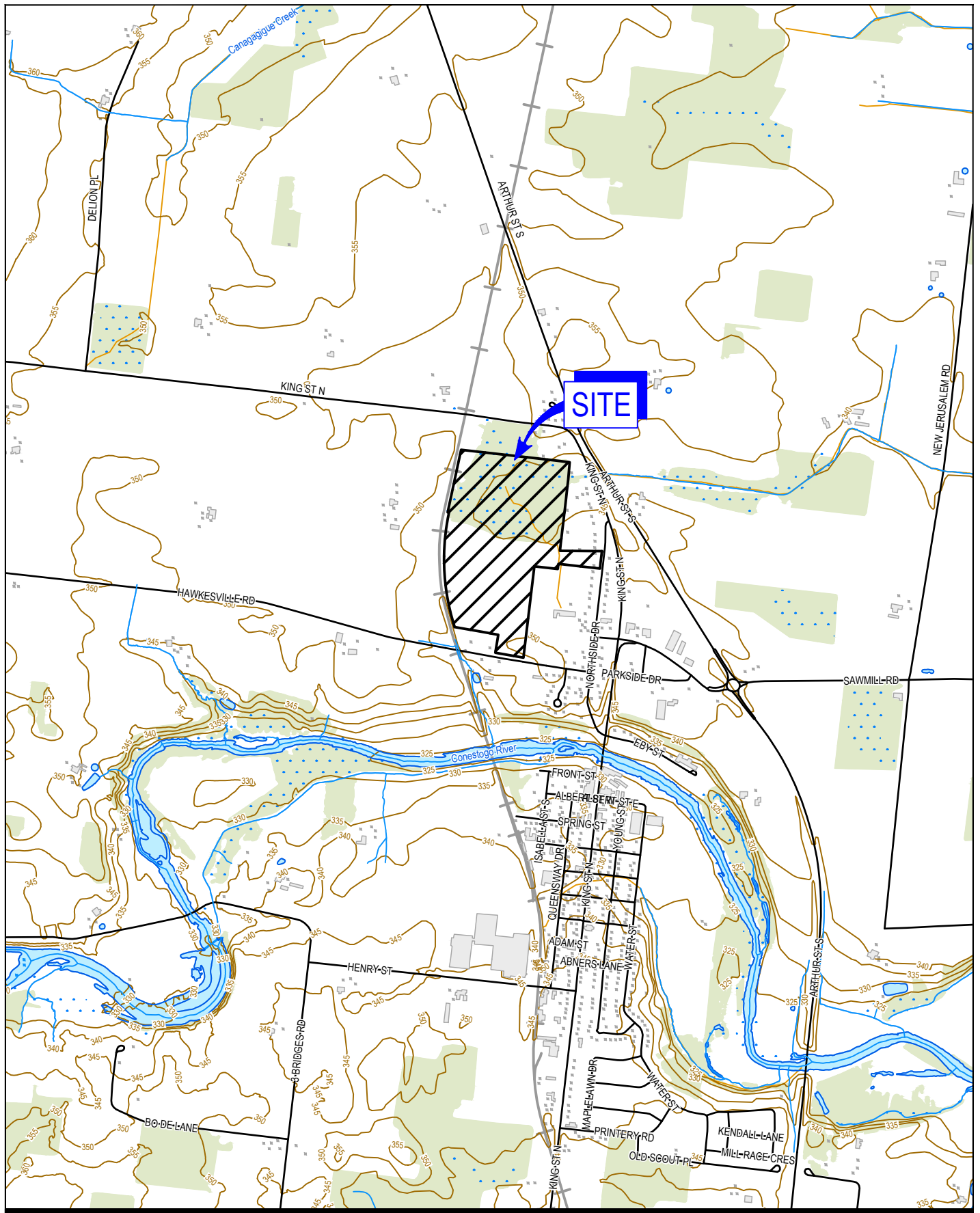
GHD

Contact: Sarah Andrew, Water Resources Engineer | GHD
455 Phillip Street, Unit 100A
Waterloo, Ontario N2L 3X2, Canada
T +1 519 884 0510 | F +1 519 884 0525 | E info-northamerica@ghd.com | [ghd.com](https://www.ghd.com)

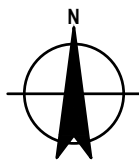
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Figures



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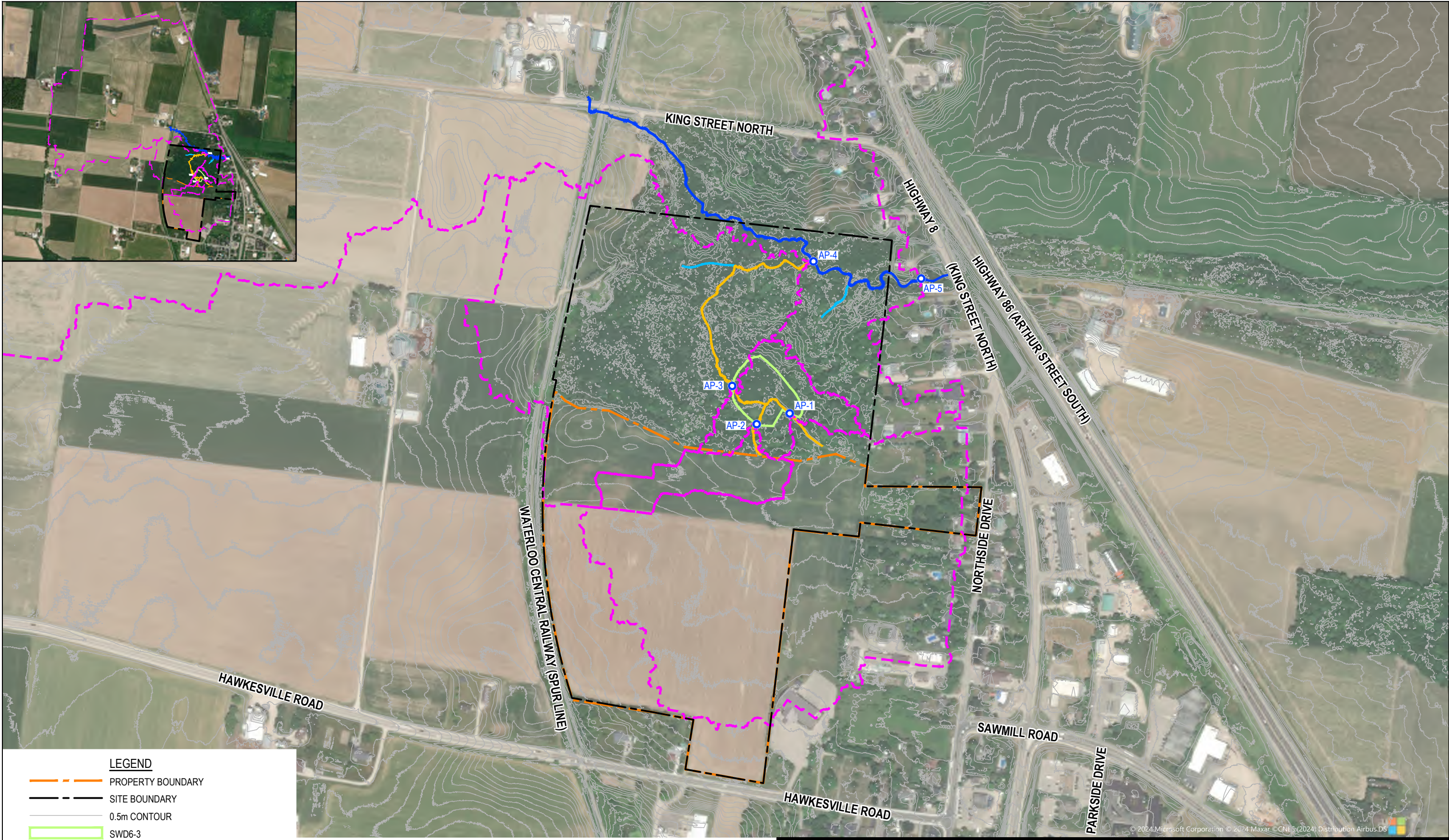


SCHLEGEL URBAN DEVELOPMENTS CORP.
52 HAWKESVILLE ROAD, ST. JACOBS
FEATURE-BASED WATER BALANCE ASSESSMENT

Project No. 12637434
Date May 2025

SITE LOCATION MAP

FIGURE 1



LEGEND

PROPERTY BOUNDARY

SITE BOUNDARY

0.5m CONTOUR

SWD6-3

INTERMITTENT WATERCOURSE

NATURAL WATERCOURSE

NORTH SIDE DRIVE MUNICIPAL DRAIN

PRE-DEVELOPMENT SUB-CATCHMENT

ASSESSMENT POINT

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Coordinate System:
UTM83-17

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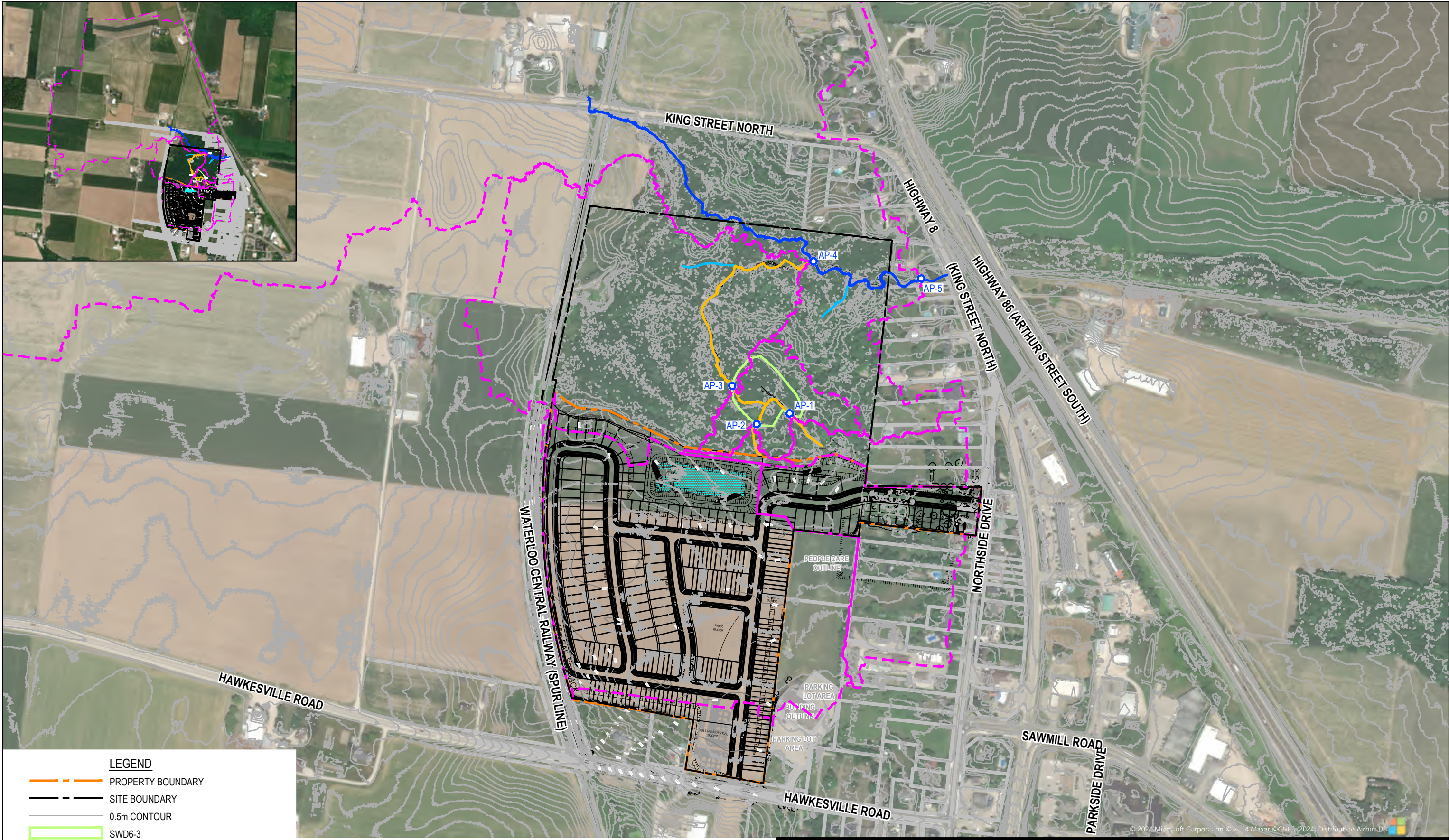
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SCHLEGEL URBAN DEVELOPMENTS CORP.
52 HAWKESVILLE ROAD, ST. JACOBS
FEATURE-BASED WATER BALANCE ASSESSMENT

PRE-DEVELOPMENT DRAINAGE AREAS

Project No. 12637434
Date May 2025

FIGURE 2



LEGEND

- PROPERTY BOUNDARY
- SITE BOUNDARY
- 0.5m CONTOUR
- SWD6-3
- INTERMITTENT WATERCOURSE
- NATURAL WATERCOURSE
- NORTH SIDE DRIVE MUNICIPAL DRAIN
- POST-DEVELOPMENT SUB-CATCHMENT
- ASSESSMENT POINT

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Coordinate System:
UTM83-17

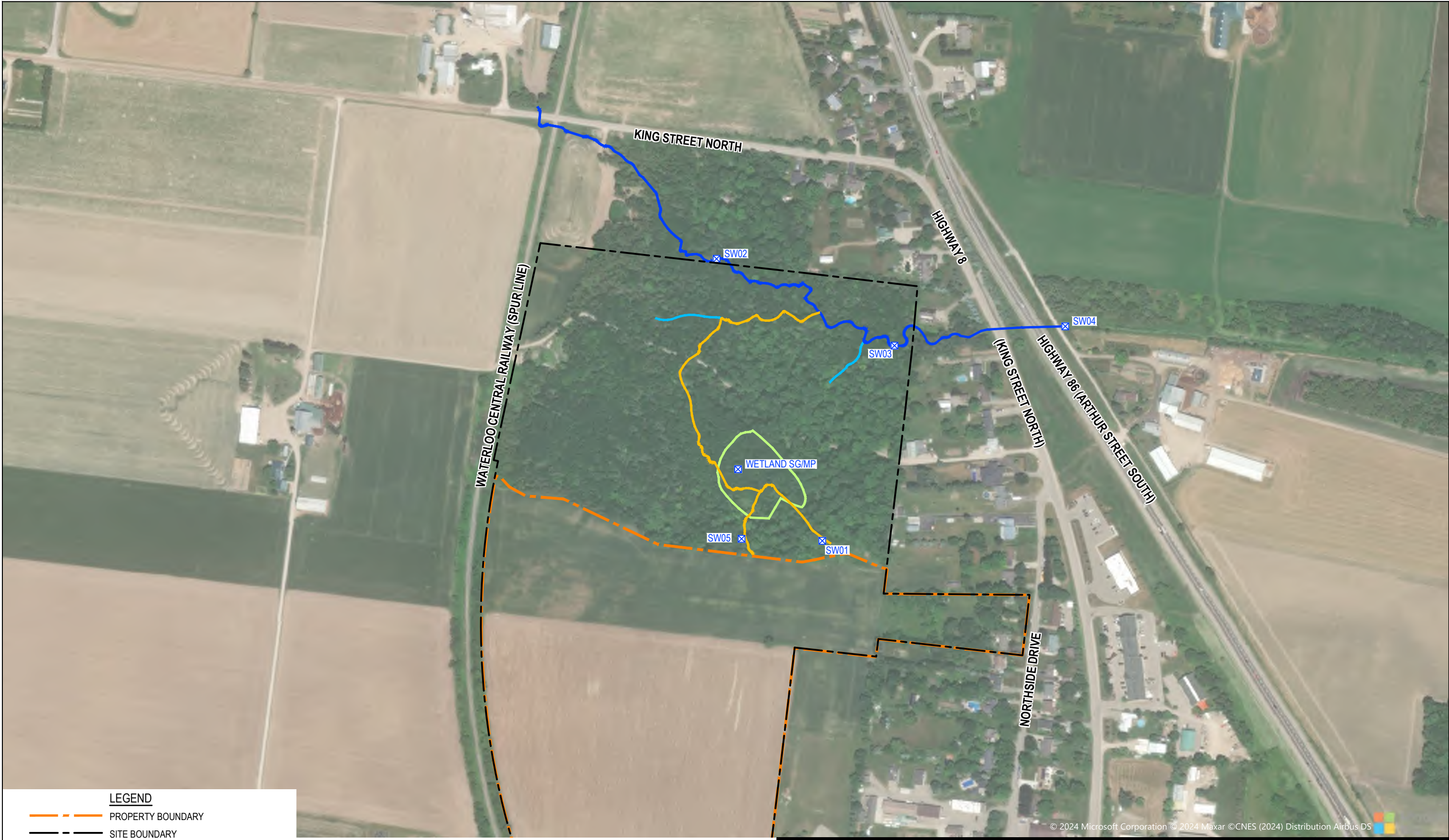


SCHLEGEL URBAN DEVELOPMENTS CORP.
52 HAWKESVILLE ROAD, ST. JACOBS
FEATURE-BASED WATER BALANCE ASSESSMENT

Project No. 12637434
Date May 2025

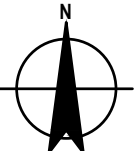
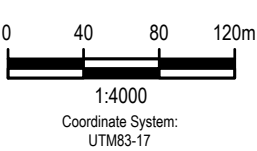
POST-DEVELOPMENT DRAINAGE AREAS

FIGURE 3



LEGEND

- PROPERTY BOUNDARY
- SITE BOUNDARY
- SWD6-3
- INTERMITTENT WATERCOURSE
- NATURAL WATERCOURSE
- NORTH SIDE DRIVE MUNICIPAL DRAIN
- ☒ Surface Water Monitoring location

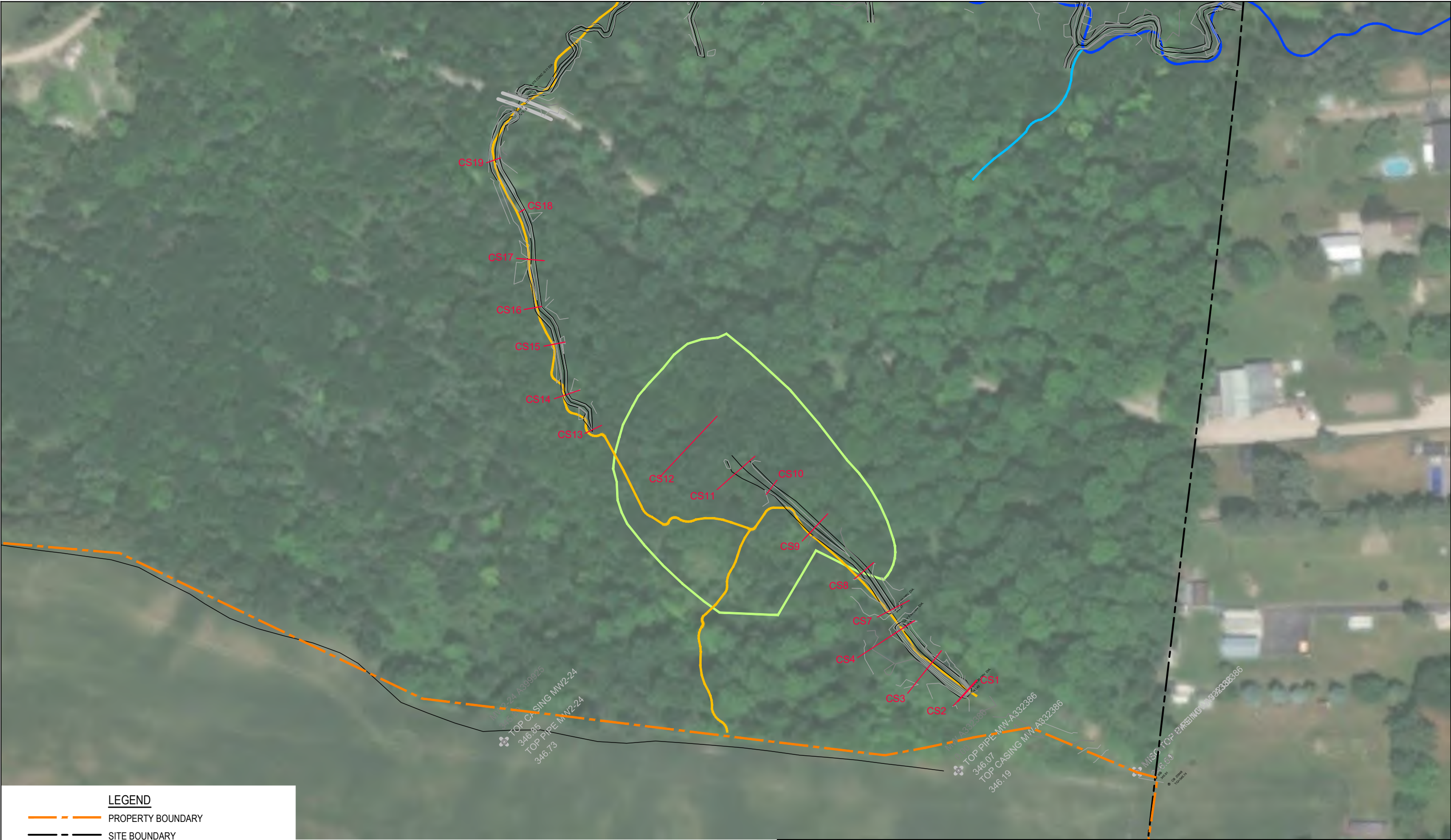


SCHLEGEL URBAN DEVELOPMENTS CORP.
110, 118 AND 122 NORTHSIDE DRIVE, ST. JACOBS
FEATURE-BASED WATER BALANCE ASSESSMENT

**SURFACE WATER MONITORING
LOCATIONS**

Project No. 12637434
Date May 2025

FIGURE 4



LEGEND

PROPERTY BOUNDARY

SITE BOUNDARY

SWD6-3

INTERMITTENT WATERCOURSE

NATURAL WATERCOURSE

NORTH SIDE DRIVE MUNICIPAL DRAIN

CS11

LOCATION OF CROSS-SECTION

0

12.5

25

37.5m

1:1250

Coordinate System:
UTM83-17

SCHLEGEL URBAN DEVELOPMENTS CORP.
110, 118 AND 122 NORTHSIDE DRIVE, ST. JACOBS
FEATURE-BASED WATER BALANCE ASSESSMENT

SURVEY OF NORTHSIDE DRIVE
MUNICIPAL DRAIN

Project No. 12637434
Date May 2025

FIGURE 5

Filename: \\ghdnet\ghd\CAI\Waterloo\Projects\662\12637434\Digital_Design\ACAD\Figures\PRE008\12637434-GHD-00-00-PRE-EN-D105_WA-008.dwg
Plot Date: 05 May 2025 2:59 PM

Data Source: Sub-Catchments generated using PCSWMM based on LIDAR data from "Ontario Digital Terrain Model (Lidar-Derived)". Watercourses and ELC from NRSL.

Appendices

Appendix A

Monthly Water Balance Results

ECCC Water Budget Data
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023									DC20492
LAT	43.62	WATER HOLDING CAPACITY		2 mm	HEAT INDEX		34.74				
LONG	80.42	LOWER ZONE		1 mm	A		1.05				
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
1-Jan	-6.7	72	28	20	1	1	0	47	41	2	291
1-Feb	-6.6	57	20	25	1	1	0	44	52	2	348
1-Mar	-1.4	62	38	65	9	9	0	94	11	2	410
1-Apr	5.7	76	72	16	32	32	0	56	0	2	487
1-May	12.3	77	77	0	76	64	-13	14	0	1	563
1-Jun	17.5	87	87	0	111	78	-32	10	0	1	649
1-Jul	19.6	85	85	0	126	80	-46	5	0	0	734
1-Aug	18.6	80	80	0	111	73	-38	6	0	0	811
1-Sep	14.8	83	83	0	76	62	-14	20	0	1	890
1-Oct	8.5	79	79	0	39	37	-2	41	0	2	79
1-Nov	2.2	74	64	7	12	12	0	59	3	2	154
1-Dec	-3.3	64	34	15	3	3	0	47	17	2	217
AVE	6.8 TTL	894	747	148	597	452	-145	443			

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023									DC20492
LAT	43.62	WATER HOLDING CAPACITY		10 mm	HEAT INDEX		34.74				
LONG	80.42	LOWER ZONE		6 mm	A		1.05				
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	47	41	10	291
1-Feb	-6.6	57	20	25	1	1	0	44	52	10	348
1-Mar	-1.4	62	38	65	9	9	0	94	11	10	410
1-Apr	5.7	76	72	16	32	32	0	56	0	10	487
1-May	12.3	77	77	0	76	66	-10	14	0	6	563
1-Jun	17.5	87	87	0	111	81	-29	9	0	3	649
1-Jul	19.6	85	85	0	126	82	-45	4	0	2	734
1-Aug	18.6	80	80	0	111	74	-37	6	0	2	811
1-Sep	14.8	83	83	0	76	62	-14	18	0	4	890
1-Oct	8.5	79	79	0	39	38	-1	37	0	8	79
1-Nov	2.2	74	64	7	12	12	0	58	3	10	154
1-Dec	-3.3	64	34	15	3	3	0	47	17	10	217
AVE	6.8 TTL	894	747	148	597	461	-136	434			

ECCC Water Budget Data
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023								DC20492	
LAT	43.62	WATER HOLDING CAPACITY				75 mm		HEAT INDEX		34.74	
LONG	80.42	LOWER ZONE				45 mm		A		1.05	
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	46	41	75	291
1-Feb	-6.6	57	20	25	1	1	0	44	52	75	348
1-Mar	-1.4	62	38	65	9	9	0	94	11	75	410
1-Apr	5.7	76	72	16	32	32	0	56	0	75	487
1-May	12.3	77	77	0	76	76	0	14	0	61	563
1-Jun	17.5	87	87	0	111	105	-6	8	0	35	649
1-Jul	19.6	85	85	0	126	101	-26	3	0	17	734
1-Aug	18.6	80	80	0	111	81	-30	3	0	12	811
1-Sep	14.8	83	83	0	76	64	-13	8	0	24	890
1-Oct	8.5	79	79	0	39	38	-1	16	0	49	79
1-Nov	2.2	74	64	7	12	12	0	39	3	70	154
1-Dec	-3.3	64	34	15	3	3	0	42	17	75	217
AVE	6.8 TTL	894	747	148	597	523	-76	373			

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023								DC20492	
LAT	43.62	WATER HOLDING CAPACITY				100 mm		HEAT INDEX		34.74	
LONG	80.42	LOWER ZONE				60 mm		A		1.05	
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	45	41	100	291
1-Feb	-6.6	57	20	25	1	1	0	44	52	100	348
1-Mar	-1.4	62	38	65	9	9	0	94	11	100	410
1-Apr	5.7	76	72	16	32	32	0	56	0	100	487
1-May	12.3	77	77	0	76	76	0	14	0	86	563
1-Jun	17.5	87	87	0	111	109	-2	8	0	56	649
1-Jul	19.6	85	85	0	126	109	-17	3	0	29	734
1-Aug	18.6	80	80	0	111	86	-26	3	0	20	811
1-Sep	14.8	83	83	0	76	65	-12	7	0	32	890
1-Oct	8.5	79	79	0	39	38	-1	11	0	62	79
1-Nov	2.2	74	64	7	12	12	0	32	3	89	154
1-Dec	-3.3	64	34	15	3	3	0	38	17	98	217
AVE	6.8 TTL	894	747	148	597	541	-58	355			

ECCC Water Budget Data
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023								DC20492	
LAT	43.62	WATER HOLDING CAPACITY		125 mm		HEAT INDEX		34.74			
LONG	80.42	LOWER ZONE		75 mm		A		1.05			
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	43	41	123	291
1-Feb	-6.6	57	20	25	1	1	0	43	52	124	348
1-Mar	-1.4	62	38	65	9	9	0	93	11	125	410
1-Apr	5.7	76	72	16	32	32	0	56	0	125	487
1-May	12.3	77	77	0	76	76	0	14	0	111	563
1-Jun	17.5	87	87	0	111	110	0	8	0	80	649
1-Jul	19.6	85	85	0	126	115	-11	3	0	47	734
1-Aug	18.6	80	80	0	111	90	-21	3	0	33	811
1-Sep	14.8	83	83	0	76	66	-10	7	0	43	890
1-Oct	8.5	79	79	0	39	38	-1	9	0	75	79
1-Nov	2.2	74	64	7	12	12	0	26	3	108	154
1-Dec	-3.3	64	34	15	3	3	0	35	17	120	217
AVE	6.8 TTL	894	747	148	597	553	-43	340			

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023								DC20492	
LAT	43.62	WATER HOLDING CAPACITY		200 mm		HEAT INDEX		34.74			
LONG	80.42	LOWER ZONE		120 mm		A		1.05			
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	37	41	192	291
1-Feb	-6.6	57	20	25	1	1	0	41	52	195	348
1-Mar	-1.4	62	38	65	9	9	0	89	11	200	410
1-Apr	5.7	76	72	16	32	32	0	56	0	200	487
1-May	12.3	77	77	0	76	76	0	14	0	186	563
1-Jun	17.5	87	87	0	111	111	0	8	0	154	649
1-Jul	19.6	85	85	0	126	124	-3	3	0	113	734
1-Aug	18.6	80	80	0	111	102	-10	3	0	87	811
1-Sep	14.8	83	83	0	76	70	-7	7	0	94	890
1-Oct	8.5	79	79	0	39	38	-1	7	0	127	79
1-Nov	2.2	74	64	7	12	12	0	20	3	167	154
1-Dec	-3.3	64	34	15	3	3	0	30	17	184	217
AVE	6.8 TTL	894	747	148	597	579	-21	315			

ECCC Water Budget Data
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023									DC20492
LAT	43.62	WATER HOLDING CAPACITY		250 mm	HEAT INDEX		34.74				
LONG	80.42	LOWER ZONE		150 mm	A		1.05				
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	34	41	239	291
1-Feb	-6.6	57	20	25	1	1	0	40	52	244	348
1-Mar	-1.4	62	38	65	9	9	0	88	11	250	410
1-Apr	5.7	76	72	16	32	32	0	56	0	250	487
1-May	12.3	77	77	0	76	76	0	14	0	236	563
1-Jun	17.5	87	87	0	111	111	0	8	0	204	649
1-Jul	19.6	85	85	0	126	126	-1	3	0	161	734
1-Aug	18.6	80	80	0	111	106	-6	3	0	132	811
1-Sep	14.8	83	83	0	76	72	-4	7	0	136	890
1-Oct	8.5	79	79	0	39	38	-1	7	0	169	79
1-Nov	2.2	74	64	7	12	12	0	19	3	210	154
1-Dec	-3.3	64	34	15	3	3	0	28	17	228	217
AVE	6.8 TTL	894	747	148	597	587	-12	307			

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023									DC20492
LAT	43.62	WATER HOLDING CAPACITY		275 mm	HEAT INDEX		34.74				
LONG	80.42	LOWER ZONE		165 mm	A		1.05				
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	32	41	263	291
1-Feb	-6.6	57	20	25	1	1	0	39	52	268	348
1-Mar	-1.4	62	38	65	9	9	0	87	11	275	410
1-Apr	5.7	76	72	16	32	32	0	56	0	275	487
1-May	12.3	77	77	0	76	76	0	14	0	261	563
1-Jun	17.5	87	87	0	111	111	0	8	0	229	649
1-Jul	19.6	85	85	0	126	126	0	3	0	185	734
1-Aug	18.6	80	80	0	111	107	-4	3	0	155	811
1-Sep	14.8	83	83	0	76	73	-4	7	0	158	890
1-Oct	8.5	79	79	0	39	38	-1	7	0	192	79
1-Nov	2.2	74	64	7	12	12	0	19	3	232	154
1-Dec	-3.3	64	34	15	3	3	0	27	17	251	217
AVE	6.8 TTL	894	747	148	597	589	-9	302			

ECCC Water Budget Data
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023									DC20492
LAT	43.62	WATER HOLDING CAPACITY		280 mm	HEAT INDEX		34.74				
LONG	80.42	LOWER ZONE		168 mm	A		1.05				
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	32	41	268	291
1-Feb	-6.6	57	20	25	1	1	0	39	52	273	348
1-Mar	-1.4	62	38	65	9	9	0	87	11	280	410
1-Apr	5.7	76	72	16	32	32	0	56	0	280	487
1-May	12.3	77	77	0	76	76	0	14	0	266	563
1-Jun	17.5	87	87	0	111	111	0	8	0	234	649
1-Jul	19.6	85	85	0	126	126	0	3	0	190	734
1-Aug	18.6	80	80	0	111	107	-4	3	0	160	811
1-Sep	14.8	83	83	0	76	73	-4	7	0	163	890
1-Oct	8.5	79	79	0	39	38	-1	7	0	196	79
1-Nov	2.2	74	64	7	12	12	0	19	3	237	154
1-Dec	-3.3	64	34	15	3	3	0	27	17	256	217
AVE	6.8 TTL	894	747	148	597	589	-9	302			

Elora Composite		WATER BUDGET MEANS FOR THE PERIOD 1986 - 2023									DC20492
LAT	43.62	WATER HOLDING CAPACITY		400 mm	HEAT INDEX		34.74				
LONG	80.42	LOWER ZONE		240 mm	A		1.05				
DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC
1-Jan	-6.7	72	28	20	1	1	0	29	41	384	291
1-Feb	-6.6	57	20	25	1	1	0	39	52	389	348
1-Mar	-1.4	62	38	65	9	9	0	84	11	398	410
1-Apr	5.7	76	72	16	32	32	0	55	0	399	487
1-May	12.3	77	77	0	76	76	0	14	0	385	563
1-Jun	17.5	87	87	0	111	111	0	8	0	354	649
1-Jul	19.6	85	85	0	126	126	0	3	0	310	734
1-Aug	18.6	80	80	0	111	110	-1	3	0	276	811
1-Sep	14.8	83	83	0	76	75	-1	7	0	277	890
1-Oct	8.5	79	79	0	39	38	-1	7	0	310	79
1-Nov	2.2	74	64	7	12	12	0	19	3	351	154
1-Dec	-3.3	64	34	15	3	3	0	27	17	370	217
AVE	6.8 TTL	894	747	148	597	594	-3	295			

ECCC Water Budget Data
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Waterloo Wellington Station Climate Normals - Lake Evaporation (1981 - 2010)			
DATE	PCPN	LAKE EVAP	PCPN. - LAKE EVAP.
1-Jan	72	0	72
1-Feb	57	0	57
1-Mar	62	0	62
1-Apr	76	0	76
1-May	77	130	-53
1-Jun	87	147	-60
1-Jul	85	152	-67
1-Aug	80	124	-44
1-Sep	83	84	-1
1-Oct	79	53	26
1-Nov	74	0	74
1-Dec	64	0	64
TOTAL	894	690	204

Table A2

Land Type Parameters
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Type	WHC	Type of Land Use	Soil Type (HSG)	Infiltration Factor							Area of Subcatchment (m ²)					
				Topo	Soils	Cover	Total					AP-1	AP-2	AP-3	AP-4	AP-5
							AP-1	AP-2	AP-3	AP-4	AP-5					
Agricultural / Rural Land	200 mm	Moderately Rooted Agriculture	C	0.15	0.20	0.10	0.45					41,236	7,309	48,546	73,681	513,137
	100 mm		A/B	0.15	0.35	0.10	0.60					54,261	6,255	60,666	99,646	849,722
Built-Up Pervious Area	125 mm	Urban Lawns	C	0.15	0.20	0.10	0.45					666	-	666	666	6,966
	75 mm		A/B	0.15	0.35	0.10	0.60					42,295	-	42,295	42,295	74,179
Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)	400 mm	Mature Forests	C	0.15	0.20	0.20	0.55					-	-	29	6,556	33,727
	275 mm		A/B	0.15	0.35	0.20	0.70					4,967	1,556	16,543	18,386	38,414
Roadways	10 mm	Roadways	N/A	0.00	0.00	0.00	0.00					-	-	-	-	25,961
Duckweed Floating-Leaved Shallow Aquatic (SAF1-3)	125 mm	Wetland	C	0.15	0.20	0.10	0.45					-	-	-	-	187
Built-Up Impervious Area	10 mm	Roofs / Driveways	N/A	0.00	0.00	0.00	0.00					9,857	-	9,857	9,857	36,948
Swamp Maple Organic Deciduous Swamp (SWD6-3)	400 mm	Treed Swamp	C	0.15	0.20	0.20	0.55					2	0.1	5,654	6,049	6,049
White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)	400 mm		C	0.15	0.20	0.20	0.55					-	-	53	20,946	47,231
	275 mm		A/B	0.15	0.35	0.20	0.70					-	5	1,908	44,567	50,590
						Total	0.52	0.54	0.54	0.56	0.53	153,285	15,126	186,218	322,650	1,683,110

Table A2

Land Type Parameters
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled & Controlled) Conditions

Type	WHC	Type of Land Use	Soil Type (HSG)	Infiltration Factor							Area of Subcatchment (m ²)					
				Topo	Soils	Cover	Total					AP-1	AP-2	AP-3	AP-4	AP-5
							AP-1	AP-2	AP-3	AP-4	AP-5					
Agricultural / Rural Land	200 mm	Moderately Rooted Agriculture	C	0.15	0.20	0.10	0.45					-	-	-	7,963	447,408
	100 mm		A/B	0.15	0.35	0.10	0.60					14	-	107	38,941	789,017
Built-Up Pervious Area	125 mm	Urban Lawns	C	0.15	0.20	0.10	0.45					156	-	156	156	6,455
	75 mm		A/B	0.15	0.35	0.10	0.60					10,017	-	10,017	10,017	41,900
Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)	400 mm	Mature Forests	C	0.15	0.20	0.20	0.55					-	-	29	6,063	33,234
	275 mm		A/B	0.15	0.35	0.20	0.70					4,534	1,018	15,489	17,332	37,361
Roadways	10 mm	Roadways	N/A	0.00	0.00	0.00	0.00					-	-	-	-	25,961
Duckweed Floating-Leaved Shallow Aquatic (SAF1-3)	125 mm	Wetland	C	0.15	0.20	0.10	0.45					-	-	-	-	187
Built-Up Impervious Area	10 mm	Roofs / Driveways	N/A	0.00	0.00	0.00	0.00					920	-	920	920	28,011
Swamp Maple Organic Deciduous Swamp (SWD6-3)	400 mm	Treed Swamp	C	0.15	0.20	0.20	0.55					2	0.1	5,654	6,049	6,049
White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)	400 mm		C	0.15	0.20	0.20	0.55					-	-	53	20,907	47,192
	275 mm		A/B	0.15	0.35	0.20	0.70					-	-	1,834	44,436	50,459
Externally Draining Property to Development - Agricultural Land	100 mm	Moderately Rooted Agriculture	A/B	0.15	0.35	0.10	0.60					359	-	359	359	9,596
Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center	125 mm	Urban Lawns	C	0.15	0.20	0.10	0.45					21,286	-	21,286	21,286	23,896
	75 mm		A/B	0.15	0.35	0.10	0.60					-	-	-	-	40
Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center	10 mm	Driveways	N/A	0.00	0.00	0.00	0.00					5,723	-	5,723	5,723	13,325
Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center	2 mm	Roofs	N/A	0.00	0.00	0.00	0.00					-	-	-	-	3,298
Proposed Development - Pervious Areas	75 mm	Urban Lawns / Park / Buffer	B	0.15	0.30	0.10	0.55					6,089	798	7,022	9,737	44,118
Proposed Development - SWM Pond Berms	75 mm	Berms	B	0.10	0.30	0.10	0.50					1,585	-	1,585	1,585	6,703
Proposed Development - Paved Areas	10 mm	Driveways / Roads	N/A	0.00	0.00	0.00	0.00					12,547	430	13,050	15,673	72,132
Proposed Development - Roofed Areas	2 mm	Roofs	N/A	0.00	0.00	0.00	0.00					2,454	-	2,454	3,197	15,768
Proposed Development - Dry Pond	75 mm	Urban Lawn / Lined	B	0.00	0.00	0.00	0.00					471	-	471	471	471
Proposed Development - Wet Pond	Precip. - Lake Evap.	Open Aquatic	N/A	0.00	0.00	0.00	0.00					-	-	-	-	2,650
						Total	0.35	0.51	0.42	0.52	0.50	66,155	2,247	86,208	210,813	1,705,230

Table A3.1

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	15.33	ha
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Feature-Based Water Balance Analysis (AP-1)

			Agricultural / Rural Land			Agricultural / Rural Land			Built-Up Pervious Area		
			WHC	200 mm		WHC	100 mm		WHC	125 mm	
			Infiltration Factor	0.45		Infiltration Factor	0.6		Infiltration Factor	0.45	
			Area (m ²)	41,236		Area (m ²)	54,261		Area (m ²)	666	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	37	1,526	1	45	2,442	1	43	29
February	57	1	1	41	1,691	1	44	2,388	1	43	29
March	62	9	9	89	3,670	9	94	5,101	9	93	62
April	76	32	32	56	2,309	32	56	3,039	32	56	37
May	77	76	76	14	577	76	14	760	76	14	9
June	87	111	111	8	330	109	8	434	110	8	5
July	85	126	124	3	124	109	3	163	115	3	2
August	80	111	102	3	124	86	3	163	90	3	2
September	83	76	70	7	289	65	7	380	66	7	5
October	79	39	38	7	289	38	11	597	38	9	6
November	74	12	12	20	825	12	32	1,736	12	26	17
December	64	3	3	30	1,237	3	38	2,062	3	35	23
Total	894	597	579	315	12,989	541	355	19,263	553	340	227

Table A3.1

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	15.33	ha
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Feature-Based Water Balance Analysis (AP-1)

			Built-Up Pervious Area			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Built-Up Impervious Area		
			WHC	75 mm		WHC	275 mm		WHC	10 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.70		Infiltration Factor	0.00	
			Area (m ²)	42,295		Area (m ²)	4,967		Area (m ²)	9,857	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	1,946	1	32	159	1	47	463
February	57	1	1	44	1,861	1	39	194	1	44	434
March	62	9	9	94	3,976	9	87	432	9	94	927
April	76	32	32	56	2,369	32	56	278	32	56	552
May	77	76	76	14	592	76	14	70	66	14	138
June	87	111	105	8	338	111	8	40	81	9	89
July	85	126	101	3	127	126	3	15	82	4	39
August	80	111	81	3	127	107	3	15	74	6	59
September	83	76	64	8	338	73	7	35	62	18	177
October	79	39	38	16	677	38	7	35	38	37	365
November	74	12	12	39	1,650	12	19	94	12	58	572
December	64	3	3	42	1,776	3	27	134	3	47	463
Total	894	597	523	373	15,776	589	302	1,500	461	434	4,278

Table A3.1

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	15.33	ha
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Feature-Based Water Balance Analysis (AP-1)

			Swamp Maple Organic Deciduous Swamp (SWD6-3)							
			WHC	400 mm						
			Infiltration Factor	0.55						
			Area (m ²)	2						
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	29	0.04	11,037	153	6,564	3,443	3,121
February	57	1	1	39	0.1	8,737	153	6,595	3,458	3,137
March	62	9	9	84	0.1	9,504	1,380	14,167	7,428	6,739
April	76	32	32	55	0.1	11,650	4,905	8,584	4,495	4,089
May	77	76	76	14	0.02	11,803	11,551	2,146	1,124	1,022
June	87	111	111	8	0.01	13,336	16,356	1,236	642	594
July	85	126	126	3	0.005	13,029	16,811	470	241	229
August	80	111	110	3	0.005	12,263	13,620	489	241	249
September	83	76	75	7	0.01	12,723	10,138	1,224	587	636
October	79	39	38	7	0.01	12,110	5,825	1,968	921	1,047
November	74	12	12	19	0.03	11,343	1,839	4,894	2,477	2,418
December	64	3	3	27	0.04	9,810	460	5,696	2,964	2,732
Total	894	597	594	295	0.4	137,344	83,191	54,034	28,021	26,013

Table A3.2

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	1.51	ha
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Feature-Based Water Balance Analysis (AP-2)

			Agricultural / Rural Land			Agricultural / Rural Land			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)		
			WHC	200 mm		WHC	100 mm		WHC	275 mm	
			Infiltration Factor	0.45		Infiltration Factor	0.60		Infiltration Factor	0.70	
			Area (m ²)	7,309		Area (m ²)	6,255		Area (m ²)	1,556	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	37	270	1	45	281	1	32	50
February	57	1	1	41	300	1	44	275	1	39	61
March	62	9	9	89	651	9	94	588	9	87	135
April	76	32	32	56	409	32	56	350	32	56	87
May	77	76	76	14	102	76	14	88	76	14	22
June	87	111	111	8	58	109	8	50	111	8	12
July	85	126	124	3	22	109	3	19	126	3	5
August	80	111	102	3	22	86	3	19	107	3	5
September	83	76	70	7	51	65	7	44	73	7	11
October	79	39	38	7	51	38	11	69	38	7	11
November	74	12	12	20	146	12	32	200	12	19	30
December	64	3	3	30	219	3	38	238	3	27	42
Total	894	597	579	315	2,302	541	355	2,221	589	302	470

Table A3.2

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	1.51	ha
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Feature-Based Water Balance Analysis (AP-2)

			Swamp Maple Organic Deciduous Swamp (SWD6-3)			Swamp Maple Organic Deciduous Swamp (SWD6-3)							
			WHC	400 mm		WHC	275 mm						
			Infiltration Factor	0.55		Infiltration Factor	0.70						
			Area (m ²)	0.1		Area (m ²)	5						
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	29	0.004	1	32	0.2	1,089	15	602	326	276
February	57	1	1	39	0.01	1	39	0.2	862	15	636	343	293
March	62	9	9	84	0.01	9	87	0.5	938	136	1,374	741	634
April	76	32	32	55	0.01	32	56	0.3	1,150	484	847	456	391
May	77	76	76	14	0.002	76	14	0.1	1,165	1,150	212	114	98
June	87	111	111	8	0.001	111	8	0.04	1,316	1,666	121	65	56
July	85	126	126	3	0.0004	126	3	0.02	1,286	1,785	45	24	21
August	80	111	110	3	0.0004	107	3	0.02	1,210	1,451	45	24	21
September	83	76	75	7	0.001	73	7	0.04	1,255	1,032	106	57	49
October	79	39	38	7	0.001	38	7	0.04	1,195	575	131	72	59
November	74	12	12	19	0.003	12	19	0.1	1,119	182	376	207	169
December	64	3	3	27	0.004	3	27	0.1	968	45	499	271	228
Total	894	597	594	295	0.04	589	302	2	13,553	8,536	4,995	2,699	2,296

Table A3.3

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	18.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Agricultural / Rural Land			Agricultural / Rural Land			Built-Up Pervious Area		
			WHC	200 mm		WHC	100 mm		WHC	125 mm	
			Infiltration Factor	0.45		Infiltration Factor	0.60		Infiltration Factor	0.45	
			Area (m ²)	48,546		Area (m ²)	60,666		Area (m ²)	666	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	37	1,796	1	45	2,730	1	43	29
February	57	1	1	41	1,990	1	44	2,669	1	43	29
March	62	9	9	89	4,321	9	94	5,703	9	93	62
April	76	32	32	56	2,719	32	56	3,397	32	56	37
May	77	76	76	14	680	76	14	849	76	14	9
June	87	111	111	8	388	109	8	485	110	8	5
July	85	126	124	3	146	109	3	182	115	3	2
August	80	111	102	3	146	86	3	182	90	3	2
September	83	76	70	7	340	65	7	425	66	7	5
October	79	39	38	7	340	38	11	667	38	9	6
November	74	12	12	20	971	12	32	1,941	12	26	17
December	64	3	3	30	1,456	3	38	2,305	3	35	23
Total	894	597	579	315	15,292	541	355	21,537	553	340	227

Table A3.3

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	18.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Built-Up Pervious Area			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)		
			WHC	75 mm		WHC	400 mm		WHC	275 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.55		Infiltration Factor	0.70	
			Area (m ²)	42,295		Area (m ²)	29		Area (m ²)	16,543	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	1,946	1	29	1	1	32	529
February	57	1	1	44	1,861	1	39	1	1	39	645
March	62	9	9	94	3,976	9	84	2	9	87	1,439
April	76	32	32	56	2,369	32	55	2	32	56	926
May	77	76	76	14	592	76	14	0	76	14	232
June	87	111	105	8	338	111	8	0	111	8	132
July	85	126	101	3	127	126	3	0	126	3	50
August	80	111	81	3	127	110	3	0	107	3	50
September	83	76	64	8	338	75	7	0	73	7	116
October	79	39	38	16	677	38	7	0	38	7	116
November	74	12	12	39	1,650	12	19	1	12	19	314
December	64	3	3	42	1,776	3	27	1	3	27	447
Total	894	597	523	373	15,776	594	295	9	589	302	4,996

Table A3.3

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	18.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Built-Up Impervious Area			Swamp Maple Organic Deciduous Swamp (SWD6-3)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)		
			WHC	10 mm		WHC	400 mm		WHC	400 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.55		Infiltration Factor	0.55	
			Area (m ²)	9,857		Area (m ²)	5,654		Area (m ²)	53	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	463	1	29	164	1	29	2
February	57	1	1	44	434	1	39	221	1	39	2
March	62	9	9	94	927	9	84	475	9	84	4
April	76	32	32	56	552	32	55	311	32	55	3
May	77	76	66	14	138	76	14	79	76	14	1
June	87	111	81	9	89	111	8	45	111	8	0
July	85	126	82	4	39	126	3	17	126	3	0
August	80	111	74	6	59	110	3	17	110	3	0
September	83	76	62	18	177	75	7	40	75	7	0
October	79	39	38	37	365	38	7	40	38	7	0
November	74	12	12	58	572	12	19	107	12	19	1
December	64	3	3	47	463	3	27	153	3	27	1
Total	894	597	461	434	4,278	594	295	1,668	594	295	16

Table A3.3

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	18.62	ha
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Feature-Based Water Balance Analysis (AP-3)

White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)	
WHC	275 mm
Infiltration Factor	0.70
Area (m ²)	1,908

Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	32	61	13,408	186	7,720	4,131	3,589
February	57	1	1	39	74	10,614	186	7,926	4,254	3,673
March	62	9	9	87	166	11,546	1,676	17,075	9,168	7,907
April	76	32	32	56	107	14,153	5,959	10,422	5,596	4,826
May	77	76	76	14	27	14,339	14,054	2,607	1,400	1,207
June	87	111	111	8	15	16,201	19,999	1,500	800	700
July	85	126	126	3	6	15,829	20,837	569	300	269
August	80	111	107	3	6	14,897	16,990	588	300	288
September	83	76	73	7	13	15,456	12,481	1,454	725	729
October	79	39	38	7	13	14,711	7,076	2,224	1,075	1,149
November	74	12	12	19	36	13,780	2,235	5,610	2,905	2,706
December	64	3	3	27	52	11,918	559	6,678	3,549	3,129
Total	894	597	589	302	576	166,852	102,237	64,374	34,202	30,171

Table A3.4

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	32.27	ha
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Feature-Based Water Balance Analysis (AP-4)

			Agricultural / Rural Land			Agricultural / Rural Land			Built-Up Pervious Area		
			WHC	200 mm		WHC	100 mm		WHC	125 mm	
			Infiltration Factor	0.45		Infiltration Factor	0.60		Infiltration Factor	0.45	
			Area (m ²)	73,681		Area (m ²)	99,646		Area (m ²)	666	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	37	2,726	1	45	4,484	1	43	29
February	57	1	1	41	3,021	1	44	4,384	1	43	29
March	62	9	9	89	6,558	9	94	9,367	9	93	62
April	76	32	32	56	4,126	32	56	5,580	32	56	37
May	77	76	76	14	1,032	76	14	1,395	76	14	9
June	87	111	111	8	589	109	8	797	110	8	5
July	85	126	124	3	221	109	3	299	115	3	2
August	80	111	102	3	221	86	3	299	90	3	2
September	83	76	70	7	516	65	7	698	66	7	5
October	79	39	38	7	516	38	11	1,096	38	9	6
November	74	12	12	20	1,474	12	32	3,189	12	26	17
December	64	3	3	30	2,210	3	38	3,787	3	35	23
Total	894	597	579	315	23,210	541	355	35,374	553	340	227

Table A3.4

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	32.27	ha
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Feature-Based Water Balance Analysis (AP-4)

			Built-Up Pervious Area			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)		
			WHC	75 mm		WHC	400 mm		WHC	275 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.55		Infiltration Factor	0.70	
			Area (m ²)	42,295		Area (m ²)	6,556		Area (m ²)	18,386	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	1,946	1	29	190	1	32	588
February	57	1	1	44	1,861	1	39	256	1	39	717
March	62	9	9	94	3,976	9	84	551	9	87	1,600
April	76	32	32	56	2,369	32	55	361	32	56	1,030
May	77	76	76	14	592	76	14	92	76	14	257
June	87	111	105	8	338	111	8	52	111	8	147
July	85	126	101	3	127	126	3	20	126	3	55
August	80	111	81	3	127	110	3	20	107	3	55
September	83	76	64	8	338	75	7	46	73	7	129
October	79	39	38	16	677	38	7	46	38	7	129
November	74	12	12	39	1,650	12	19	125	12	19	349
December	64	3	3	42	1,776	3	27	177	3	27	496
Total	894	597	523	373	15,776	594	295	1,934	589	302	5,553

Table A3.4

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	32.27	ha
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Feature-Based Water Balance Analysis (AP-4)

			Built-Up Impervious Area			Swamp Maple Organic Deciduous Swamp (SWD6-3)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)		
			WHC	10 mm		WHC	400 mm		WHC	400 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.55		Infiltration Factor	0.55	
			Area (m ²)	9,857		Area (m ²)	6,049		Area (m ²)	20,946	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	463	1	29	175	1	29	607
February	57	1	1	44	434	1	39	236	1	39	817
March	62	9	9	94	927	9	84	508	9	84	1,759
April	76	32	32	56	552	32	55	333	32	55	1,152
May	77	76	66	14	138	76	14	85	76	14	293
June	87	111	81	9	89	111	8	48	111	8	168
July	85	126	82	4	39	126	3	18	126	3	63
August	80	111	74	6	59	110	3	18	110	3	63
September	83	76	62	18	177	75	7	42	75	7	147
October	79	39	38	37	365	38	7	42	38	7	147
November	74	12	12	58	572	12	19	115	12	19	398
December	64	3	3	47	463	3	27	163	3	27	566
Total	894	597	461	434	4,278	594	295	1,785	594	295	6,179

Table A3.4

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	32.27	ha
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Feature-Based Water Balance Analysis (AP-4)

White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)	
WHC	275 mm
Infiltration Factor	0.70
Area (m ²)	44,567

Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	32	1,426	23,231	323	12,635	7,043	5,593
February	57	1	1	39	1,738	18,391	323	13,492	7,558	5,935
March	62	9	9	87	3,877	20,004	2,904	29,184	16,368	12,816
April	76	32	32	56	2,496	24,521	10,325	18,035	10,125	7,909
May	77	76	76	14	624	24,844	24,423	4,517	2,536	1,981
June	87	111	111	8	357	28,071	35,065	2,591	1,449	1,142
July	85	126	126	3	134	27,425	37,314	978	543	434
August	80	111	107	3	134	25,812	30,727	998	543	454
September	83	76	73	7	312	26,780	22,109	2,409	1,293	1,116
October	79	39	38	7	312	25,489	12,261	3,335	1,736	1,599
November	74	12	12	19	847	23,876	3,872	8,734	4,762	3,973
December	64	3	3	27	1,203	20,650	968	10,866	6,031	4,835
Total	894	597	589	302	13,459	289,094	180,612	107,774	59,989	47,785

Table A3.5

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	168.31	ha
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Feature-Based Water Balance Analysis (AP-5)

			Agricultural / Rural Land			Agricultural / Rural Land			Built-Up Pervious Area		
			WHC	200 mm		WHC	100 mm		WHC	125 mm	
			Infiltration Factor	0.45		Infiltration Factor	0.60		Infiltration Factor	0.45	
			Area (m ²)	513,137		Area (m ²)	849,722		Area (m ²)	6,966	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	37	18,986	1	45	38,237	1	43	300
February	57	1	1	41	21,039	1	44	37,388	1	43	300
March	62	9	9	89	45,669	9	94	79,874	9	93	648
April	76	32	32	56	28,736	32	56	47,584	32	56	390
May	77	76	76	14	7,184	76	14	11,896	76	14	98
June	87	111	111	8	4,105	109	8	6,798	110	8	56
July	85	126	124	3	1,539	109	3	2,549	115	3	21
August	80	111	102	3	1,539	86	3	2,549	90	3	21
September	83	76	70	7	3,592	65	7	5,948	66	7	49
October	79	39	38	7	3,592	38	11	9,347	38	9	63
November	74	12	12	20	10,263	12	32	27,191	12	26	181
December	64	3	3	30	15,394	3	38	32,289	3	35	244
Total	894	597	579	315	161,638	541	355	301,651	553	340	2,368

Table A3.5

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	168.31	ha
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Feature-Based Water Balance Analysis (AP-5)

			Built-Up Pervious Area			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)		
			WHC	75 mm		WHC	400 mm		WHC	275 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.55		Infiltration Factor	0.70	
			Area (m ²)	74,179		Area (m ²)	33,727		Area (m ²)	38,414	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	3,412	1	29	978	1	32	1,229
February	57	1	1	44	3,264	1	39	1,315	1	39	1,498
March	62	9	9	94	6,973	9	84	2,833	9	87	3,342
April	76	32	32	56	4,154	32	55	1,855	32	56	2,151
May	77	76	76	14	1,038	76	14	472	76	14	538
June	87	111	105	8	593	111	8	270	111	8	307
July	85	126	101	3	223	126	3	101	126	3	115
August	80	111	81	3	223	110	3	101	107	3	115
September	83	76	64	8	593	75	7	236	73	7	269
October	79	39	38	16	1,187	38	7	236	38	7	269
November	74	12	12	39	2,893	12	19	641	12	19	730
December	64	3	3	42	3,115	3	27	911	3	27	1,037
Total	894	597	523	373	27,669	594	295	9,949	589	302	11,601

Table A3.5

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	168.31	ha
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Feature-Based Water Balance Analysis (AP-5)

			Roadways			Duckweed Floating-Leaved Shallow Aquatic (SAF1-3)			Built-Up Impervious Area		
			WHC	10 mm		WHC	125 mm		WHC	10 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.45		Infiltration Factor	0.00	
			Area (m ²)	25,961		Area (m ²)	187		Area (m ²)	36,948	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	1,220	1	43	8	1	47	1,737
February	57	1	1	44	1,142	1	43	8	1	44	1,626
March	62	9	9	94	2,440	9	93	17	9	94	3,473
April	76	32	32	56	1,454	32	56	10	32	56	2,069
May	77	76	66	14	363	76	14	3	66	14	517
June	87	111	81	9	234	110	8	1	81	9	333
July	85	126	82	4	104	115	3	1	82	4	148
August	80	111	74	6	156	90	3	1	74	6	222
September	83	76	62	18	467	66	7	1	62	18	665
October	79	39	38	37	961	38	9	2	38	37	1,367
November	74	12	12	58	1,506	12	26	5	12	58	2,143
December	64	3	3	47	1,220	3	35	7	3	47	1,737
Total	894	597	461	434	11,267	553	340	64	461	434	16,035

Table A3.5

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	168.31	ha
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Feature-Based Water Balance Analysis (AP-5)

			Swamp Maple Organic Deciduous Swamp (SWD6-3)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)		
			WHC	400 mm		WHC	400 mm		WHC	275 mm	
			Infiltration Factor	0.55		Infiltration Factor	0.55		Infiltration Factor	0.70	
			Area (m ²)	6,049		Area (m ²)	47,231		Area (m ²)	50,590	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	29	175	1	29	1,370	1	32	1,619
February	57	1	1	39	236	1	39	1,842	1	39	1,973
March	62	9	9	84	508	9	84	3,967	9	87	4,401
April	76	32	32	55	333	32	55	2,598	32	56	2,833
May	77	76	76	14	85	76	14	661	76	14	708
June	87	111	111	8	48	111	8	378	111	8	405
July	85	126	126	3	18	126	3	142	126	3	152
August	80	111	110	3	18	110	3	142	107	3	152
September	83	76	75	7	42	75	7	331	73	7	354
October	79	39	38	7	42	38	7	331	38	7	354
November	74	12	12	19	115	12	19	897	12	19	961
December	64	3	3	27	163	3	27	1,275	3	27	1,366
Total	894	597	594	295	1,785	594	295	13,933	589	302	15,278

Table A3.5

Pre-Development Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Pre-Development Conditions

Total Area	168.31	ha
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Feature-Based Water Balance Analysis (AP-5)

Month	Precipitation	Potential Evap.	Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(m³)	(m³)	(m³)	(m³)	(m³)
January	72	1	121,184	1,683	69,271	37,053	32,218
February	57	1	95,937	1,683	71,630	38,293	33,337
March	62	9	104,353	15,148	154,146	82,399	71,748
April	76	32	127,916	53,860	94,167	50,275	43,892
May	77	76	129,599	127,287	23,564	12,581	10,983
June	87	111	146,431	182,786	13,528	7,189	6,339
July	85	126	143,064	191,899	5,112	2,696	2,416
August	80	111	134,649	155,818	5,238	2,696	2,542
September	83	76	139,698	113,294	12,548	6,335	6,213
October	79	39	132,966	63,958	17,750	8,737	9,013
November	74	12	124,550	20,197	47,526	24,845	22,680
December	64	3	107,719	5,049	58,758	31,257	27,501
Total	894	597	1,508,066	932,663	573,238	304,356	268,883

Table A4.1

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	6.62	ha
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Feature-Based Water Balance Analysis (AP-1)

			Agricultural / Rural Land			Built-Up Pervious Area			Built-Up Pervious Area		
			WHC	100 mm		WHC	125 mm		WHC	75 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.45		Infiltration Factor	0.60	
			Area (m ²)	14		Area (m ²)	156		Area (m ²)	10,017	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	45	1	1	43	7	1	46	461
February	57	1	1	44	1	1	43	7	1	44	441
March	62	9	9	94	1	9	93	14	9	94	942
April	76	32	32	56	1	32	56	9	32	56	561
May	77	76	76	14	0	76	14	2	76	14	140
June	87	111	109	8	0	110	8	1	105	8	80
July	85	126	109	3	0	115	3	0	101	3	30
August	80	111	86	3	0	90	3	0	81	3	30
September	83	76	65	7	0	66	7	1	64	8	80
October	79	39	38	11	0	38	9	1	38	16	160
November	74	12	12	32	0	12	26	4	12	39	391
December	64	3	3	38	1	3	35	5	3	42	421
Total	894	597	541	355	5	553	340	53	523	373	3,736

Table A4.1

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	6.62	ha
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Feature-Based Water Balance Analysis (AP-1)

			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Built-Up Impervious Area			Swamp Maple Organic Deciduous Swamp (SWD6-3)		
			WHC	400 mm		WHC	10 mm		WHC	400 mm	
			Infiltration Factor	0.70		Infiltration Factor	0.00		Infiltration Factor	0.55	
			Area (m ²)	4,534		Area (m ²)	920		Area (m ²)	2	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	29	131	1	47	43	1	29	0.04
February	57	1	1	39	177	1	44	40	1	39	0.1
March	62	9	9	84	381	9	94	86	9	84	0.1
April	76	32	32	55	249	32	56	52	32	55	0.1
May	77	76	76	14	63	66	14	13	76	14	0.02
June	87	111	111	8	36	81	9	8	111	8	0.01
July	85	126	126	3	14	82	4	4	126	3	0.005
August	80	111	110	3	14	74	6	6	110	3	0.005
September	83	76	75	7	32	62	18	17	75	7	0.01
October	79	39	38	7	32	38	37	34	38	7	0.01
November	74	12	12	19	86	12	58	53	12	19	0.03
December	64	3	3	27	122	3	47	43	3	27	0.04
Total	894	597	594	295	1,337	461	434	399	594	295	0.4

Table A4.1

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	6.62	ha
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Feature-Based Water Balance Analysis (AP-1)

			Externally Draining Property to Development - Agricultural Land			Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center			Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center		
			WHC	100 mm		WHC	125 mm		WHC	10 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.45		Infiltration Factor	0.00	
			Area (m ²)	359		Area (m ²)	21,286		Area (m ²)	5,723	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	45	16	1	43	915	1	47	269
February	57	1	1	44	16	1	43	915	1	44	252
March	62	9	9	94	34	9	93	1,980	9	94	538
April	76	32	32	56	20	32	56	1,192	32	56	320
May	77	76	76	14	5	76	14	298	66	14	80
June	87	111	109	8	3	110	8	170	81	9	52
July	85	126	109	3	1	115	3	64	82	4	23
August	80	111	86	3	1	90	3	64	74	6	34
September	83	76	65	7	3	66	7	149	62	18	103
October	79	39	38	11	4	38	9	192	38	37	212
November	74	12	12	32	11	12	26	553	12	58	332
December	64	3	3	38	14	3	35	745	3	47	269
Total	894	597	541	355	127	553	340	7,237	461	434	2,484

Table A4.1

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	6.62	ha
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Feature-Based Water Balance Analysis (AP-1)

			Proposed Development - Pervious Areas			Proposed Development - SWM Pond Berms			Proposed Development - Paved Areas		
			WHC	75 mm		WHC	75 mm		WHC	10 mm	
			Infiltration Factor	0.55		Infiltration Factor	0.50		Infiltration Factor	0.00	
			Area (m ²)	6,089		Area (m ²)	1,585		Area (m ²)	12,547	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	280	1	46	73	1	47	590
February	57	1	1	44	268	1	44	70	1	44	552
March	62	9	9	94	572	9	94	149	9	94	1,179
April	76	32	32	56	341	32	56	89	32	56	703
May	77	76	76	14	85	76	14	22	66	14	176
June	87	111	105	8	49	105	8	13	81	9	113
July	85	126	101	3	18	101	3	5	82	4	50
August	80	111	81	3	18	81	3	5	74	6	75
September	83	76	64	8	49	64	8	13	62	18	226
October	79	39	38	16	97	38	16	25	38	37	464
November	74	12	12	39	237	12	39	62	12	58	728
December	64	3	3	42	256	3	42	67	3	47	590
Total	894	597	523	373	2,271	523	373	591	461	434	5,445

Table A4.1

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	6.62	ha
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Feature-Based Water Balance Analysis (AP-1)

			Proposed Development - Roofed Areas			Proposed Development - Dry Pond							
			WHC	2 mm		WHC	75 mm						
			Infiltration Factor	0.00		Infiltration Factor	0.00						
			Area (m ²)	2,454		Area (m ²)	471						
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	47	115	1	46	22	4,763	66	2,923	984	1,939
February	57	1	1	44	108	1	44	21	3,771	66	2,867	995	1,871
March	62	9	9	94	231	9	94	44	4,102	595	6,152	2,139	4,013
April	76	32	32	56	137	32	56	26	5,028	2,117	3,700	1,296	2,404
May	77	76	64	14	34	76	14	7	5,094	4,806	926	325	601
June	87	111	78	10	25	105	8	4	5,755	6,555	553	186	368
July	85	126	80	5	12	101	3	1	5,623	6,682	223	70	153
August	80	111	73	6	15	81	3	1	5,292	5,531	263	70	194
September	83	76	62	20	49	64	8	4	5,491	4,284	724	173	552
October	79	39	37	41	101	38	16	8	5,226	2,511	1,330	274	1,056
November	74	12	12	59	145	12	39	18	4,895	794	2,622	714	1,907
December	64	3	3	47	115	3	42	20	4,234	198	2,667	858	1,809
Total	894	597	452	443	1,087	523	373	175	59,275	34,207	24,950	8,083	16,867

Table A4.2

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	0.22	ha
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Feature-Based Water Balance Analysis (AP-2)

			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Proposed Development - Pervious Areas			Proposed Development - Paved Areas		
			WHC	275 mm		WHC	75 mm		WHC	10 mm	
			Infiltration Factor	0.70		Infiltration Factor	0.55		Infiltration Factor	0.00	
			Area (m ²)	1,018		Area (m ²)	798		Area (m ²)	430	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	32	33	1	46	37	1	47	20
February	57	1	1	39	40	1	44	35	1	44	19
March	62	9	9	87	89	9	94	75	9	94	40
April	76	32	32	56	57	32	56	45	32	56	24
May	77	76	76	14	14	76	14	11	66	14	6
June	87	111	111	8	8	105	8	6	81	9	4
July	85	126	126	3	3	101	3	2	82	4	2
August	80	111	107	3	3	81	3	2	74	6	3
September	83	76	73	7	7	64	8	6	62	18	8
October	79	39	38	7	7	38	16	13	38	37	16
November	74	12	12	19	19	12	39	31	12	58	25
December	64	3	3	27	27	3	42	34	3	47	20
Total	894	597	589	302	307	523	373	298	461	434	187

Table A4.2

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	0.22	ha
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Feature-Based Water Balance Analysis (AP-2)

Month	Precipitation	Potential Evap.	Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(m³)	(m³)	(m³)	(m³)	(m³)
January	72	1	162	2	90	43	47
February	57	1	128	2	94	47	47
March	62	9	139	20	204	103	101
April	76	32	171	72	126	65	61
May	77	76	173	166	31	16	15
June	87	111	195	232	18	9	9
July	85	126	191	244	7	3	4
August	80	111	180	205	8	3	5
September	83	76	186	152	21	9	13
October	79	39	177	85	36	12	24
November	74	12	166	27	75	31	45
December	64	3	144	7	81	38	44
Total	894	597	2,013	1,215	792	379	413

Table A4.3

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	8.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Agricultural / Rural Land			Built-Up Pervious Area			Built-Up Pervious Area		
			WHC	100 mm		WHC	125 mm		WHC	75 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.45		Infiltration Factor	0.60	
			Area (m ²)	107		Area (m ²)	156		Area (m ²)	10,017	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	45	5	1	43	7	1	46	461
February	57	1	1	44	5	1	43	7	1	44	441
March	62	9	9	94	10	9	93	14	9	94	942
April	76	32	32	56	6	32	56	9	32	56	561
May	77	76	76	14	2	76	14	2	76	14	140
June	87	111	109	8	1	110	8	1	105	8	80
July	85	126	109	3	0	115	3	0	101	3	30
August	80	111	86	3	0	90	3	0	81	3	30
September	83	76	65	7	1	66	7	1	64	8	80
October	79	39	38	11	1	38	9	1	38	16	160
November	74	12	12	32	3	12	26	4	12	39	391
December	64	3	3	38	4	3	35	5	3	42	421
Total	894	597	541	355	38	553	340	53	523	373	3,736

Table A4.3

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	8.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Built-Up Impervious Area		
			WHC	400 mm		WHC	275 mm		WHC	10 mm	
			Infiltration Factor	0.55		Infiltration Factor	0.70		Infiltration Factor	0.00	
			Area (m ²)	29		Area (m ²)	15,489		Area (m ²)	920	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	29	1	1	32	496	1	47	43
February	57	1	1	39	1	1	39	604	1	44	40
March	62	9	9	84	2	9	87	1,348	9	94	86
April	76	32	32	55	2	32	56	867	32	56	52
May	77	76	76	14	0	76	14	217	66	14	13
June	87	111	111	8	0	111	8	124	81	9	8
July	85	126	126	3	0	126	3	46	82	4	4
August	80	111	110	3	0	107	3	46	74	6	6
September	83	76	75	7	0	73	7	108	62	18	17
October	79	39	38	7	0	38	7	108	38	37	34
November	74	12	12	19	1	12	19	294	12	58	53
December	64	3	3	27	1	3	27	418	3	47	43
Total	894	597	594	295	9	589	302	4,678	461	434	399

Table A4.3

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	8.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Swamp Maple Organic Deciduous Swamp (SWD6-3)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)		
			WHC	400 mm		WHC	400 mm		WHC	275 mm	
			Infiltration Factor	0.55		Infiltration Factor	0.55		Infiltration Factor	0.70	
			Area (m ²)	5,654		Area (m ²)	53		Area (m ²)	1,834	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	29	164	1	29	2	1	32	59
February	57	1	1	39	221	1	39	2	1	39	72
March	62	9	9	84	475	9	84	4	9	87	160
April	76	32	32	55	311	32	55	3	32	56	103
May	77	76	76	14	79	76	14	1	76	14	26
June	87	111	111	8	45	111	8	0	111	8	15
July	85	126	126	3	17	126	3	0	126	3	6
August	80	111	110	3	17	110	3	0	107	3	6
September	83	76	75	7	40	75	7	0	73	7	13
October	79	39	38	7	40	38	7	0	38	7	13
November	74	12	12	19	107	12	19	1	12	19	35
December	64	3	3	27	153	3	27	1	3	27	50
Total	894	597	594	295	1,668	594	295	16	589	302	554

Table A4.3

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	8.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Externally Draining Property to Development - Agricultural Land			Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center			Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center		
			WHC	100 mm		WHC	125 mm		WHC	10 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.45		Infiltration Factor	0.00	
			Area (m ²)	359		Area (m ²)	21,286		Area (m ²)	5,723	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	45	16	1	43	915	1	47	269
February	57	1	1	44	16	1	43	915	1	44	252
March	62	9	9	94	34	9	93	1,980	9	94	538
April	76	32	32	56	20	32	56	1,192	32	56	320
May	77	76	76	14	5	76	14	298	66	14	80
June	87	111	109	8	3	110	8	170	81	9	52
July	85	126	109	3	1	115	3	64	82	4	23
August	80	111	86	3	1	90	3	64	74	6	34
September	83	76	65	7	3	66	7	149	62	18	103
October	79	39	38	11	4	38	9	192	38	37	212
November	74	12	12	32	11	12	26	553	12	58	332
December	64	3	3	38	14	3	35	745	3	47	269
Total	894	597	541	355	127	553	340	7,237	461	434	2,484

Table A4.3

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	8.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Proposed Development - Pervious Areas			Proposed Development - SWM Pond Berms			Proposed Development - Paved Areas		
			WHC	75 mm		WHC	75 mm		WHC	10 mm	
			Infiltration Factor	0.55		Infiltration Factor	0.50		Infiltration Factor	0.00	
			Area (m ²)	7,022		Area (m ²)	1,585		Area (m ²)	13,050	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	323	1	46	73	1	47	613
February	57	1	1	44	309	1	44	70	1	44	574
March	62	9	9	94	660	9	94	149	9	94	1,227
April	76	32	32	56	393	32	56	89	32	56	731
May	77	76	76	14	98	76	14	22	66	14	183
June	87	111	105	8	56	105	8	13	81	9	117
July	85	126	101	3	21	101	3	5	82	4	52
August	80	111	81	3	21	81	3	5	74	6	78
September	83	76	64	8	56	64	8	13	62	18	235
October	79	39	38	16	112	38	16	25	38	37	483
November	74	12	12	39	274	12	39	62	12	58	757
December	64	3	3	42	295	3	42	67	3	47	613
Total	894	597	523	373	2,619	523	373	591	461	434	5,664

Table A4.3

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	8.62	ha
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Feature-Based Water Balance Analysis (AP-3)

			Proposed Development - Roofed Areas			Proposed Development - Dry Pond							
			WHC	2 mm		WHC	75 mm						
			Infiltration Factor	0.00		Infiltration Factor	0.00						
			Area (m ²)	2,454		Area (m ²)	471						
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	47	115	0	72	34	6,207	86	3,595	1,398	2,198
February	57	1	1	44	108	0	57	27	4,914	86	3,663	1,492	2,170
March	62	9	9	94	231	0	62	29	5,345	772	7,888	3,246	4,642
April	76	32	32	56	137	0	76	36	6,552	2,744	4,831	2,006	2,826
May	77	76	64	14	34	130	-53	-25	6,638	6,351	1,175	502	673
June	87	111	78	10	25	147	-60	-28	7,500	8,780	682	287	395
July	85	126	80	5	12	152	-67	-31	7,328	9,186	250	108	143
August	80	111	73	6	15	124	-44	-21	6,897	7,658	303	108	195
September	83	76	62	20	49	84	-1	0	7,155	5,745	867	262	605
October	79	39	37	41	101	53	26	12	6,810	3,280	1,499	368	1,132
November	74	12	12	59	145	0	74	35	6,379	1,029	3,059	966	2,093
December	64	3	3	47	115	0	64	30	5,517	257	3,244	1,209	2,035
Total	894	597	452	443	1,087	690	206	97	77,242	45,972	31,057	11,951	19,106

Table A4.4

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	21.08	ha
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Feature-Based Water Balance Analysis (AP-4)

			Agricultural / Rural Land				Agricultural / Rural Land				Built-Up Pervious Area			
			WHC	200 mm			WHC	100 mm			WHC	125 mm		
			Infiltration Factor	0.45			Infiltration Factor	0.60			Infiltration Factor	0.45		
			Area (m ²)	7,963			Area (m ²)	38,941			Area (m ²)	156		
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus			Actual Evap.	Surplus			Actual Evap.	Surplus		
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)		(mm)	(mm)	(m ³)		(mm)	(mm)	(m ³)	
January	72	1	1	37	295		1	45	1,752		1	43	7	
February	57	1	1	41	326		1	44	1,713		1	43	7	
March	62	9	9	89	709		9	94	3,660		9	93	14	
April	76	32	32	56	446		32	56	2,181		32	56	9	
May	77	76	76	14	111		76	14	545		76	14	2	
June	87	111	111	8	64		109	8	312		110	8	1	
July	85	126	124	3	24		109	3	117		115	3	0	
August	80	111	102	3	24		86	3	117		90	3	0	
September	83	76	70	7	56		65	7	273		66	7	1	
October	79	39	38	7	56		38	11	428		38	9	1	
November	74	12	12	20	159		12	32	1,246		12	26	4	
December	64	3	3	30	239		3	38	1,480		3	35	5	
Total	894	597	579	315	2,508		541	355	13,824		553	340	53	

Table A4.4

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	21.08	ha
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Feature-Based Water Balance Analysis (AP-4)

			Built-Up Pervious Area			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)		
			WHC	75 mm		WHC	400 mm		WHC	275 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.55		Infiltration Factor	0.70	
			Area (m ²)	10,017		Area (m ²)	6,063		Area (m ²)	17,332	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	461	1	29	176	1	32	555
February	57	1	1	44	441	1	39	236	1	39	676
March	62	9	9	94	942	9	84	509	9	87	1,508
April	76	32	32	56	561	32	55	333	32	56	971
May	77	76	76	14	140	76	14	85	76	14	243
June	87	111	105	8	80	111	8	49	111	8	139
July	85	126	101	3	30	126	3	18	126	3	52
August	80	111	81	3	30	110	3	18	107	3	52
September	83	76	64	8	80	75	7	42	73	7	121
October	79	39	38	16	160	38	7	42	38	7	121
November	74	12	12	39	391	12	19	115	12	19	329
December	64	3	3	42	421	3	27	164	3	27	468
Total	894	597	523	373	3,736	594	295	1,789	589	302	5,234

Table A4.4

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	21.08	ha
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Feature-Based Water Balance Analysis (AP-4)

			Built-Up Impervious Area			Swamp Maple Organic Deciduous Swamp (SWD6-3)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)		
			WHC	10 mm		WHC	400 mm		WHC	400 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.55		Infiltration Factor	0.55	
			Area (m ²)	920		Area (m ²)	6,049		Area (m ²)	20,907	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	43	1	29	175	1	29	606
February	57	1	1	44	40	1	39	236	1	39	815
March	62	9	9	94	86	9	84	508	9	84	1,756
April	76	32	32	56	52	32	55	333	32	55	1,150
May	77	76	66	14	13	76	14	85	76	14	293
June	87	111	81	9	8	111	8	48	111	8	167
July	85	126	82	4	4	126	3	18	126	3	63
August	80	111	74	6	6	110	3	18	110	3	63
September	83	76	62	18	17	75	7	42	75	7	146
October	79	39	38	37	34	38	7	42	38	7	146
November	74	12	12	58	53	12	19	115	12	19	397
December	64	3	3	47	43	3	27	163	3	27	564
Total	894	597	461	434	399	594	295	1,785	594	295	6,167

Table A4.4

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	21.08	ha
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Feature-Based Water Balance Analysis (AP-4)

			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)			Externally Draining Property to Development - Agricultural Land			Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center		
			WHC	275 mm		WHC	100 mm		WHC	125 mm	
			Infiltration Factor	0.70		Infiltration Factor	0.60		Infiltration Factor	0.45	
			Area (m ²)	44,436		Area (m ²)	359		Area (m ²)	21,286	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	32	1,422	1	45	16	1	43	915
February	57	1	1	39	1,733	1	44	16	1	43	915
March	62	9	9	87	3,866	9	94	34	9	93	1,980
April	76	32	32	56	2,488	32	56	20	32	56	1,192
May	77	76	76	14	622	76	14	5	76	14	298
June	87	111	111	8	355	109	8	3	110	8	170
July	85	126	126	3	133	109	3	1	115	3	64
August	80	111	107	3	133	86	3	1	90	3	64
September	83	76	73	7	311	65	7	3	66	7	149
October	79	39	38	7	311	38	11	4	38	9	192
November	74	12	12	19	844	12	32	11	12	26	553
December	64	3	3	27	1,200	3	38	14	3	35	745
Total	894	597	589	302	13,420	541	355	127	553	340	7,237

Table A4.4

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	21.08	ha
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Feature-Based Water Balance Analysis (AP-4)

			Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center			Proposed Development - Pervious Areas			Proposed Development - SWM Pond Berms		
			WHC	10 mm		WHC	75 mm		WHC	75 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.55		Infiltration Factor	0.50	
			Area (m ²)	5,723		Area (m ²)	9,737		Area (m ²)	1,585	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	269	1	46	448	1	46	73
February	57	1	1	44	252	1	44	428	1	44	70
March	62	9	9	94	538	9	94	915	9	94	149
April	76	32	32	56	320	32	56	545	32	56	89
May	77	76	66	14	80	76	14	136	76	14	22
June	87	111	81	9	52	105	8	78	105	8	13
July	85	126	82	4	23	101	3	29	101	3	5
August	80	111	74	6	34	81	3	29	81	3	5
September	83	76	62	18	103	64	8	78	64	8	13
October	79	39	38	37	212	38	16	156	38	16	25
November	74	12	12	58	332	12	39	380	12	39	62
December	64	3	3	47	269	3	42	409	3	42	67
Total	894	597	461	434	2,484	523	373	3,632	523	373	591

Table A4.4

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	21.08	ha
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Feature-Based Water Balance Analysis (AP-4)

			Proposed Development - Paved Areas			Proposed Development - Roofed Areas			Proposed Development - Dry Pond		
			WHC	10 mm		WHC	2 mm		WHC	75 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.00		Infiltration Factor	0.00	
			Area (m ²)	15,673		Area (m ²)	3,197		Area (m ²)	471	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	737	1	47	150	1	46	22
February	57	1	1	44	690	1	44	141	1	44	21
March	62	9	9	94	1,473	9	94	301	9	94	44
April	76	32	32	56	878	32	56	179	32	56	26
May	77	76	66	14	219	64	14	45	76	14	7
June	87	111	81	9	141	78	10	32	105	8	4
July	85	126	82	4	63	80	5	16	101	3	1
August	80	111	74	6	94	73	6	19	81	3	1
September	83	76	62	18	282	62	20	64	64	8	4
October	79	39	38	37	580	37	41	131	38	16	8
November	74	12	12	58	909	12	59	189	12	39	18
December	64	3	3	47	737	3	47	150	3	42	20
Total	894	597	461	434	6,802	452	443	1,416	523	373	175

Table A4.4

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	21.08	ha
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Feature-Based Water Balance Analysis (AP-4)

Month	Precipitation	Potential Evap.	Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(m³)	(m³)	(m³)	(m³)	(m³)
January	72	1	15,179	211	8,122	4,078	4,043
February	57	1	12,016	211	8,756	4,529	4,228
March	62	9	13,070	1,897	18,993	9,863	9,130
April	76	32	16,022	6,746	11,772	6,162	5,610
May	77	76	16,233	15,760	2,951	1,545	1,406
June	87	111	18,341	22,394	1,715	883	832
July	85	126	17,919	23,968	661	331	330
August	80	111	16,865	20,014	709	331	378
September	83	76	17,497	14,490	1,785	785	1,000
October	79	39	16,654	8,008	2,650	996	1,655
November	74	12	15,600	2,530	6,109	2,718	3,391
December	64	3	13,492	632	7,157	3,510	3,647
Total	894	597	188,888	116,862	71,380	35,730	35,650

Table A4.5

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	170.52	ha
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Feature-Based Water Balance Analysis (AP-5)

			Agricultural / Rural Land			Agricultural / Rural Land			Built-Up Pervious Area		
			WHC	200 mm		WHC	100 mm		WHC	125 mm	
			Infiltration Factor	0.45		Infiltration Factor	0.60		Infiltration Factor	0.45	
			Area (m ²)	447,408		Area (m ²)	789,017		Area (m ²)	6,455	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	37	16,554	1	45	35,506	1	43	278
February	57	1	1	41	18,344	1	44	34,717	1	43	278
March	62	9	9	89	39,819	9	94	74,168	9	93	600
April	76	32	32	56	25,055	32	56	44,185	32	56	361
May	77	76	76	14	6,264	76	14	11,046	76	14	90
June	87	111	111	8	3,579	109	8	6,312	110	8	52
July	85	126	124	3	1,342	109	3	2,367	115	3	19
August	80	111	102	3	1,342	86	3	2,367	90	3	19
September	83	76	70	7	3,132	65	7	5,523	66	7	45
October	79	39	38	7	3,132	38	11	8,679	38	9	58
November	74	12	12	20	8,948	12	32	25,249	12	26	168
December	64	3	3	30	13,422	3	38	29,983	3	35	226
Total	894	597	579	315	140,934	541	355	280,101	553	340	2,195

Table A4.5

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	170.52	ha
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Feature-Based Water Balance Analysis (AP-5)

			Built-Up Pervious Area			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)			Forested Area (FOD5-1, FOC4, CUT1, Deciduous and Coniferous Forest)		
			WHC	75 mm		WHC	400 mm		WHC	275 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.55		Infiltration Factor	0.70	
			Area (m ²)	41,900		Area (m ²)	33,234		Area (m ²)	37,361	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	1,927	1	29	964	1	32	1,196
February	57	1	1	44	1,844	1	39	1,296	1	39	1,457
March	62	9	9	94	3,939	9	84	2,792	9	87	3,250
April	76	32	32	56	2,346	32	55	1,828	32	56	2,092
May	77	76	76	14	587	76	14	465	76	14	523
June	87	111	105	8	335	111	8	266	111	8	299
July	85	126	101	3	126	126	3	100	126	3	112
August	80	111	81	3	126	110	3	100	107	3	112
September	83	76	64	8	335	75	7	233	73	7	262
October	79	39	38	16	670	38	7	233	38	7	262
November	74	12	12	39	1,634	12	19	631	12	19	710
December	64	3	3	42	1,760	3	27	897	3	27	1,009
Total	894	597	523	373	15,629	594	295	9,804	589	302	11,283

Table A4.5

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	170.52	ha
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Feature-Based Water Balance Analysis (AP-5)

			Roadways			Duckweed Floating-Leaved Shallow Aquatic (SAF1-3)			Built-Up Impervious Area		
			WHC	10 mm		WHC	125 mm		WHC	10 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.45		Infiltration Factor	0.00	
			Area (m ²)	25,961		Area (m ²)	187		Area (m ²)	28,011	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	1,220	1	43	8	1	47	1,317
February	57	1	1	44	1,142	1	43	8	1	44	1,232
March	62	9	9	94	2,440	9	93	17	9	94	2,633
April	76	32	32	56	1,454	32	56	10	32	56	1,569
May	77	76	66	14	363	76	14	3	66	14	392
June	87	111	81	9	234	110	8	1	81	9	252
July	85	126	82	4	104	115	3	1	82	4	112
August	80	111	74	6	156	90	3	1	74	6	168
September	83	76	62	18	467	66	7	1	62	18	504
October	79	39	38	37	961	38	9	2	38	37	1,036
November	74	12	12	58	1,506	12	26	5	12	58	1,625
December	64	3	3	47	1,220	3	35	7	3	47	1,317
Total	894	597	461	434	11,267	553	340	64	461	434	12,157

Table A4.5

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	170.52	ha
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Feature-Based Water Balance Analysis (AP-5)

			Swamp Maple Organic Deciduous Swamp (SWD6-3)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)			White Cedar-Hardwood Organic Mixed Swamp (SWM4-1)		
			WHC	400 mm		WHC	400 mm		WHC	275 mm	
			Infiltration Factor	0.55		Infiltration Factor	0.55		Infiltration Factor	0.70	
			Area (m ²)	6,049		Area (m ²)	47,192		Area (m ²)	50,459	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	29	175	1	29	1,369	1	32	1,615
February	57	1	1	39	236	1	39	1,840	1	39	1,968
March	62	9	9	84	508	9	84	3,964	9	87	4,390
April	76	32	32	55	333	32	55	2,596	32	56	2,826
May	77	76	76	14	85	76	14	661	76	14	706
June	87	111	111	8	48	111	8	378	111	8	404
July	85	126	126	3	18	126	3	142	126	3	151
August	80	111	110	3	18	110	3	142	107	3	151
September	83	76	75	7	42	75	7	330	73	7	353
October	79	39	38	7	42	38	7	330	38	7	353
November	74	12	12	19	115	12	19	897	12	19	959
December	64	3	3	27	163	3	27	1,274	3	27	1,362
Total	894	597	594	295	1,785	594	295	13,922	589	302	15,239

Table A4.5

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	170.52	ha
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Feature-Based Water Balance Analysis (AP-5)

			Externally Draining Property to Development - Agricultural Land			Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center			Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center		
			WHC	100 mm		WHC	125 mm		WHC	75 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.45		Infiltration Factor	0.60	
			Area (m ²)	9,596		Area (m ²)	23,896		Area (m ²)	40	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	45	432	1	43	1,028	1	46	2
February	57	1	1	44	422	1	43	1,028	1	44	2
March	62	9	9	94	902	9	93	2,222	9	94	4
April	76	32	32	56	537	32	56	1,338	32	56	2
May	77	76	76	14	134	76	14	335	76	14	1
June	87	111	109	8	77	110	8	191	105	8	0
July	85	126	109	3	29	115	3	72	101	3	0
August	80	111	86	3	29	90	3	72	81	3	0
September	83	76	65	7	67	66	7	167	64	8	0
October	79	39	38	11	106	38	9	215	38	16	1
November	74	12	12	32	307	12	26	621	12	39	2
December	64	3	3	38	365	3	35	836	3	42	2
Total	894	597	541	355	3,407	553	340	8,125	523	373	15

Table A4.5

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	170.52	ha
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Feature-Based Water Balance Analysis (AP-5)

			Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center			Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center			Proposed Development - Pervious Areas		
			WHC	10 mm		WHC	2 mm		WHC	75 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.00		Infiltration Factor	0.55	
			Area (m ²)	13,325		Area (m ²)	3,298		Area (m ²)	44,118	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	626	1	47	155	1	46	2,029
February	57	1	1	44	586	1	44	145	1	44	1,941
March	62	9	9	94	1,253	9	94	310	9	94	4,147
April	76	32	32	56	746	32	56	185	32	56	2,471
May	77	76	66	14	187	64	14	46	76	14	618
June	87	111	81	9	120	78	10	33	105	8	353
July	85	126	82	4	53	80	5	16	101	3	132
August	80	111	74	6	80	73	6	20	81	3	132
September	83	76	62	18	240	62	20	66	64	8	353
October	79	39	38	37	493	37	41	135	38	16	706
November	74	12	12	58	773	12	59	195	12	39	1,721
December	64	3	3	47	626	3	47	155	3	42	1,853
Total	894	597	461	434	5,783	452	443	1,461	523	373	16,456

Table A4.5

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	170.52	ha
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Feature-Based Water Balance Analysis (AP-5)

			Proposed Development - SWM Pond Berms			Proposed Development - Paved Areas			Proposed Development - Roofed Areas		
			WHC	75 mm		WHC	10 mm		WHC	2 mm	
			Infiltration Factor	0.50		Infiltration Factor	0.00		Infiltration Factor	0.00	
			Area (m ²)	6,703		Area (m ²)	72,132		Area (m ²)	15,768	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	308	1	47	3,390	1	47	741
February	57	1	1	44	295	1	44	3,174	1	44	694
March	62	9	9	94	630	9	94	6,780	9	94	1,482
April	76	32	32	56	375	32	56	4,039	32	56	883
May	77	76	76	14	94	66	14	1,010	64	14	221
June	87	111	105	8	54	81	9	649	78	10	158
July	85	126	101	3	20	82	4	289	80	5	79
August	80	111	81	3	20	74	6	433	73	6	95
September	83	76	64	8	54	62	18	1,298	62	20	315
October	79	39	38	16	107	38	37	2,669	37	41	646
November	74	12	12	39	261	12	58	4,184	12	59	930
December	64	3	3	42	282	3	47	3,390	3	47	741
Total	894	597	523	373	2,500	461	434	31,305	452	443	6,985

Table A4.5

Post-Development (Uncontrolled / Controlled) Conditions Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Uncontrolled)
Conditions

Total Area	170.52	ha
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Feature-Based Water Balance Analysis (AP-5)

			Proposed Development - Dry Pond				Proposed Development - Wet Pond						
			WHC	75 mm			WHC	Precip. - Lake Evap.					
			Infiltration Factor	0.00			Infiltration Factor	0.00					
			Area (m ²)	471			Area (m ²)	2,650					
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	46	22	0	72	191	122,777	1,703	71,052	35,377	35,674
February	57	1	1	44	21	0	57	151	97,198	1,703	72,820	36,504	36,317
March	62	9	9	94	44	0	62	164	105,724	15,323	156,460	78,543	77,917
April	76	32	32	56	26	0	76	201	129,597	54,483	95,459	47,892	47,568
May	77	76	76	14	7	130	-53	-141	131,303	128,118	23,695	11,985	11,710
June	87	111	105	8	4	147	-60	-159	148,355	182,377	13,639	6,848	6,791
July	85	126	101	3	1	152	-67	-177	144,945	190,778	5,108	2,568	2,540
August	80	111	81	3	1	124	-44	-117	136,418	155,564	5,467	2,568	2,898
September	83	76	64	8	4	84	-1	-3	141,534	114,156	13,790	6,045	7,745
October	79	39	38	16	8	53	26	70	134,713	64,819	20,913	8,412	12,502
November	74	12	12	39	18	0	74	196	126,187	20,431	51,653	23,847	27,806
December	64	3	3	42	20	0	64	170	109,135	5,108	61,079	29,890	31,189
Total	894	597	523	373	175	690	206	546	1,527,886	934,561	591,136	290,480	300,656

Table A5.1

Controlled SWM Pond Discharge Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Controlled)
Conditions - Stormwater Management
Ponds

Total Area	13.40	ha
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Proposed Development to Wet Pond

			Externally Draining Property to Development - Agricultural Land			Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center			Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center		
			WHC	100 mm		WHC	125 mm		WHC	75 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.45		Infiltration Factor	0.60	
			Area (m ²)	9,237		Area (m ²)	40		Area (m ²)	1,724	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	45	416	1	43	2	1	46	79
February	57	1	1	44	406	1	43	2	1	44	76
March	62	9	9	94	868	9	93	4	9	94	162
April	76	32	32	56	517	32	56	2	32	56	97
May	77	76	76	14	129	76	14	1	76	14	24
June	87	111	109	8	74	110	8	0	105	8	14
July	85	126	109	3	28	115	3	0	101	3	5
August	80	111	86	3	28	90	3	0	81	3	5
September	83	76	65	7	65	66	7	0	64	8	14
October	79	39	38	11	102	38	9	0	38	16	28
November	74	12	12	32	296	12	26	1	12	39	67
December	64	3	3	38	351	3	35	1	3	42	72
Total	894	597	541	355	3,279	553	340	14	523	373	643

Table A5.1

Controlled SWM Pond Discharge Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Controlled)
Conditions - Stormwater Management
Ponds

Total Area	13.40	ha
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Proposed Development to Wet Pond

			Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center			Proposed Development - Pervious Areas			Proposed Development - Paved Areas		
			WHC	10 mm		WHC	75 mm		WHC	10 mm	
			Infiltration Factor	0.00		Infiltration Factor	0.55		Infiltration Factor	0.00	
			Area (m ²)	7,602		Area (m ²)	40,386		Area (m ²)	56,459	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	47	357	1	46	1,858	1	47	2,654
February	57	1	1	44	334	1	44	1,777	1	44	2,484
March	62	9	9	94	715	9	94	3,796	9	94	5,307
April	76	32	32	56	426	32	56	2,262	32	56	3,162
May	77	76	66	14	106	76	14	565	66	14	790
June	87	111	81	9	68	105	8	323	81	9	508
July	85	126	82	4	30	101	3	121	82	4	226
August	80	111	74	6	46	81	3	121	74	6	339
September	83	76	62	18	137	64	8	323	62	18	1,016
October	79	39	38	37	281	38	16	646	38	37	2,089
November	74	12	12	58	441	12	39	1,575	12	58	3,275
December	64	3	3	47	357	3	42	1,696	3	47	2,654
Total	894	597	461	434	3,299	523	373	15,064	461	434	24,503

Table A5.1

Controlled SWM Pond Discharge Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Controlled)
Conditions - Stormwater Management
Ponds

Total Area	13.40	ha
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Proposed Development to Wet Pond

			Proposed Development - Roofed Areas			Proposed Development - Wet Pond							
			WHC	2 mm		WHC	Precip. - Lake Evap.						
			Infiltration Factor	0.00		Infiltration Factor	0.00						
			Area (m ²)	15,869		Area (m ²)	2,650						
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	47	746	0	72	191	9,646	131	6,302	1,320	4,982
February	57	1	1	44	698	0	57	151	7,636	131	5,929	1,267	4,661
March	62	9	9	94	1,492	0	62	164	8,306	1,182	12,508	2,708	9,800
April	76	32	32	56	889	0	76	201	10,182	4,202	7,555	1,613	5,942
May	77	76	64	14	222	130	-53	-141	10,315	9,494	1,697	403	1,294
June	87	111	78	10	159	147	-60	-159	11,655	12,249	987	230	757
July	85	126	80	5	79	152	-67	-177	11,387	12,190	312	86	226
August	80	111	73	6	95	124	-44	-117	10,717	10,436	517	86	431
September	83	76	62	20	317	84	-1	-3	11,119	8,476	1,870	225	1,645
October	79	39	37	41	651	53	26	70	10,583	5,114	3,866	433	3,433
November	74	12	12	59	936	0	74	196	9,914	1,576	6,787	1,084	5,702
December	64	3	3	47	746	0	64	170	8,574	394	6,047	1,188	4,860
Total	894	597	452	443	7,030	690	206	546	120,035	65,576	54,379	10,645	43,734

Table A5.1

Controlled SWM Pond Discharge Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Controlled)
Conditions - Stormwater Management
Ponds

Total Area	5.02	ha
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Proposed Development to Dry Pond

			Externally Draining Property to Development - Agricultural Land			Externally Draining Property to Development - Built-Up Pervious / Proposed People Care Center			Externally Draining Property to Development - Built-Up Impervious / Proposed People Care Center		
			WHC	100 mm		WHC	125 mm		WHC	10 mm	
			Infiltration Factor	0.60		Infiltration Factor	0.45		Infiltration Factor	0.00	
			Area (m ²)	359		Area (m ²)	21,286		Area (m ²)	5,723	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	45	16	1	43	915	1	47	269
February	57	1	1	44	16	1	43	915	1	44	252
March	62	9	9	94	34	9	93	1,980	9	94	538
April	76	32	32	56	20	32	56	1,192	32	56	320
May	77	76	76	14	5	76	14	298	66	14	80
June	87	111	109	8	3	110	8	170	81	9	52
July	85	126	109	3	1	115	3	64	82	4	23
August	80	111	86	3	1	90	3	64	74	6	34
September	83	76	65	7	3	66	7	149	62	18	103
October	79	39	38	11	4	38	9	192	38	37	212
November	74	12	12	32	11	12	26	553	12	58	332
December	64	3	3	38	14	3	35	745	3	47	269
Total	894	597	541	355	127	553	340	7,237	461	434	2,484

Table A5.1

Controlled SWM Pond Discharge Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Controlled)
Conditions - Stormwater Management
Ponds

Total Area	5.02	ha
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Proposed Development to Dry Pond

			Proposed Development - Pervious Areas			Proposed Development - Paved Areas			Proposed Development - Roofed Areas		
			WHC	75 mm		WHC	10 mm		WHC	2 mm	
			Infiltration Factor	0.55		Infiltration Factor	0.00		Infiltration Factor	0.00	
			Area (m ²)	7,497		Area (m ²)	12,452		Area (m ²)	2,454	
Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Actual Evap.	Surplus		Actual Evap.	Surplus	
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)	(mm)	(mm)	(m ³)
January	72	1	1	46	345	1	47	585	1	47	115
February	57	1	1	44	330	1	44	548	1	44	108
March	62	9	9	94	705	9	94	1,170	9	94	231
April	76	32	32	56	420	32	56	697	32	56	137
May	77	76	76	14	105	66	14	174	64	14	34
June	87	111	105	8	60	81	9	112	78	10	25
July	85	126	101	3	22	82	4	50	80	5	12
August	80	111	81	3	22	74	6	75	73	6	15
September	83	76	64	8	60	62	18	224	62	20	49
October	79	39	38	16	120	38	37	461	37	41	101
November	74	12	12	39	292	12	58	722	12	59	145
December	64	3	3	42	315	3	47	585	3	47	115
Total	894	597	523	373	2,796	461	434	5,404	452	443	1,087

Table A5.1

Controlled SWM Pond Discharge Water Balance Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Post-Development (Controlled)
Conditions - Stormwater Management
Ponds

Total Area	5.02	ha
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Proposed Development to Dry Pond

Proposed Development - Dry Pond	
WHC	75 mm
Infiltration Factor	0.00
Area (m ²)	471

Month	Precipitation	Potential Evap.	Actual Evap.	Surplus		Precip. Volume	Actual Evap. Volume	Surplus Volume	Infiltration Volume	Surface Runoff Volume
(-)	(mm)	(mm)	(mm)	(mm)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
January	72	1	1	46	22	3,617	50	2,268	611	1,656
February	57	1	1	44	21	2,864	50	2,189	603	1,587
March	62	9	9	94	44	3,115	452	4,701	1,299	3,403
April	76	32	32	56	26	3,818	1,608	2,814	779	2,034
May	77	76	76	14	7	3,869	3,607	703	195	509
June	87	111	105	8	4	4,371	4,881	425	111	314
July	85	126	101	3	1	4,271	4,978	174	42	132
August	80	111	81	3	1	4,019	4,116	213	42	171
September	83	76	64	8	4	4,170	3,217	591	102	490
October	79	39	38	16	8	3,969	1,907	1,096	155	942
November	74	12	12	39	18	3,718	603	2,075	417	1,658
December	64	3	3	42	20	3,215	151	2,063	517	1,546
Total	894	597	523	373	175	45,017	25,620	19,312	4,871	14,440

Post-Development Runoff Diversion - Wet Pond
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

Stormwater Runoff Diversion - Wet Pond

Drainage Area to Wet Pond = 13.40 ha

Month	Wet Pond						
	Total Runoff Controlled in Wet Pond		Monthly Diversion Percentage from Wet Pond ¹	Runoff Directed to Sensitive Wetland Feature (AP-2) ²		Runoff Directed to Northside Drive (AP-5)	
	(mm)	(m ³)	%	(mm)	(m ³)	(mm)	(m ³)
January	37	4,982	27%	10	1,356	27	3,626
February	35	4,661	28%	10	1,318	25	3,344
March	73	9,800	28%	21	2,747	53	7,053
April	44	5,942	27%	12	1,628	32	4,314
May	10	1,294	28%	3	362	7	933
June	6	757	27%	2	203	4	554
July	2	226	26%	0	58	1	168
August	3	431	27%	1	115	2	315
September	12	1,645	26%	3	427	9	1,218
October	26	3,433	28%	7	949	19	2,484
November	43	5,702	28%	12	1,619	30	4,083
December	36	4,860	28%	10	1,358	26	3,502
Total	326	43,734	27%	91	12,141	236	31,594

Notes:

1. The monthly runoff diversion percentage is based on the monthly diversion of stormwater runoff controlled within the Wet Pond per WalterFedy's continuous hydrological model over a 20-year meteorological record.
2. The diverted runoff from the SWM Pond will be directed to the sensitive wetland feature (AP-2) via an outlet structure consisting of an orifice plate and pipe system.

Summary of Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

AP-1												
Month	Details	Area (ha)	Precipitation		Evapotranspiration		Surplus/Deficit		Infiltration		Runoff	
			(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)		
January	Pre-Development Conditions	15.33	11,035	72	155	1	6,565	43	3,445	22	3,120	20
	Post-Development (Uncontrolled) Conditions	6.62	4,765	72	65	1	2,925	44	985	15	1,940	29
	Difference (Pre-Development to Post-Development)	(8.71)	(6,270)	(41)	(90)	(1)	(3,640)	(24)	(2,460)	(16)	(1,180)	(8)
February	Pre-Development Conditions	15.33	8,735	57	155	1	6,595	43	3,460	23	3,135	20
	Post-Development (Uncontrolled) Conditions	6.62	3,770	57	65	1	2,865	43	995	15	1,870	28
	Difference (Pre-Development to Post-Development)	(8.71)	(4,965)	(32)	(90)	(1)	(3,730)	(24)	(2,465)	(16)	(1,265)	(8)
March	Pre-Development Conditions	15.33	9,505	62	1,380	9	14,170	92	7,430	48	6,740	44
	Post-Development (Uncontrolled) Conditions	6.62	4,100	62	595	9	6,150	93	2,140	32	4,010	61
	Difference (Pre-Development to Post-Development)	(8.71)	(5,405)	(35)	(785)	(5)	(8,020)	(52)	(5,290)	(35)	(2,730)	(18)
April	Pre-Development Conditions	15.33	11,650	76	4,905	32	8,585	56	4,495	29	4,090	27
	Post-Development (Uncontrolled) Conditions	6.62	5,030	76	2,115	32	3,700	56	1,295	20	2,405	36
	Difference (Pre-Development to Post-Development)	(8.71)	(6,620)	(43)	(2,790)	(18)	(4,885)	(32)	(3,200)	(21)	(1,685)	(11)
May	Pre-Development Conditions	15.33	11,805	77	11,550	75	2,145	14	1,125	7	1,020	7
	Post-Development (Uncontrolled) Conditions	6.62	5,095	77	4,805	73	925	14	325	5	600	9
	Difference (Pre-Development to Post-Development)	(8.71)	(6,710)	(44)	(6,745)	(44)	(1,220)	(8)	(800)	(5)	(420)	(3)
June	Pre-Development Conditions	15.33	13,335	87	16,355	107	1,235	8	640	4	595	4
	Post-Development (Uncontrolled) Conditions	6.62	5,755	87	6,555	99	555	8	185	3	370	6
	Difference (Pre-Development to Post-Development)	(8.71)	(7,580)	(49)	(9,800)	(64)	(680)	(4)	(455)	(3)	(225)	(1)
July	Pre-Development Conditions	15.33	13,030	85	16,810	110	470	3	240	2	230	2
	Post-Development (Uncontrolled) Conditions	6.62	5,625	85	6,680	101	225	3	70	1	155	2
	Difference (Pre-Development to Post-Development)	(8.71)	(7,405)	(48)	(10,130)	(66)	(245)	(2)	(170)	(1)	(75)	(0)
August	Pre-Development Conditions	15.33	12,265	80	13,620	89	490	3	240	2	250	2
	Post-Development (Uncontrolled) Conditions	6.62	5,290	80	5,530	84	260	4	70	1	190	3
	Difference (Pre-Development to Post-Development)	(8.71)	(6,975)	(46)	(8,090)	(53)	(230)	(2)	(170)	(1)	(60)	(0.4)
September	Pre-Development Conditions	15.33	12,725	83	10,140	66	1,225	8	590	4	635	4
	Post-Development (Uncontrolled) Conditions	6.62	5,490	83	4,285	65	725	11	175	3	550	8
	Difference (Pre-Development to Post-Development)	(8.71)	(7,235)	(47)	(5,855)	(38)	(500)	(3)	(415)	(3)	(85)	(1)
October	Pre-Development Conditions	15.33	12,110	79	5,825	38	1,970	13	920	6	1,050	7
	Post-Development (Uncontrolled) Conditions	6.62	5,225	79	2,510	38	1,330	20	275	4	1,055	16
	Difference (Pre-Development to Post-Development)	(8.71)	(6,885)	(45)	(3,315)	(22)	(640)	(4)	(645)	(4)	5	0
November	Pre-Development Conditions	15.33	11,345	74	1,840	12	4,895	32	2,475	16	2,420	16
	Post-Development (Uncontrolled) Conditions	6.62	4,895	74	795	12	2,620	40	715	11	1,905	29
	Difference (Pre-Development to Post-Development)	(8.71)	(6,450)	(42)	(1,045)	(7)	(2,275)	(15)	(1,760)	(11)	(515)	(3)
December	Pre-Development Conditions	15.33	9,810	64	460	3	5,695	37	2,965	19	2,730	18
	Post-Development (Uncontrolled) Conditions	6.62	4,235	64	200	3	2,670	40	860	13	1,810	27
	Difference (Pre-Development to Post-Development)	(8.71)	(5,575)	(36)	(260)	(2)	(3,025)	(20)	(2,105)	(14)	(920)	(6)
Annual Summary		Area	Precipitation	Evapotranspiration	Surplus/Deficit	Infiltration	Runoff					
Pre-Development Conditions		15.33	137,350	896	83,195	543	54,040	353	28,025	183	26,015	170
Post-Development (Uncontrolled) Conditions		6.62	59,275	896	34,200	517	24,950	377	8,090	122	16,860	255
Additional Runoff Measures												
SWM Pond Runoff Diversion		-	-	-	-	-	-	-	-	-	-	-
Post-Development (Controlled) Conditions		6.62	59,275	896	34,200	517	24,950	377	8,090	122	16,860	255
Pre- to Post- Development Difference												
Post-Development (Controlled) Conditions		(8.71)	(78,075)	(509)	(48,995)	(320)	(29,090)	(190)	(19,935)	(130)	(9,155)	(60)
Percentage Change		-57%		-57%		-59%		-54%		-71%		-35%

Notes:

Values are rounded for reporting purposes.

Positive value for infiltration difference is a surplus and a negative value is a deficit.

Positive value for runoff difference is an increase in runoff and a negative value is a decrease in runoff.

Summary of Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

AP-2												
Month	Details	Area	Precipitation		Evapotranspiration		Surplus/Deficit		Infiltration		Runoff	
		(ha)	(m³)	(mm)	(m³)	(mm)	(m³)	(mm)	(m³)	(mm)	(m³)	(mm)
January	Pre-Development Conditions	1.51	1,090	72	15	1	600	40	325	21	275	18
	Post-Development (Uncontrolled) Conditions	0.22	160	72	-	-	90	40	45	20	45	20
	Difference (Pre-Development to Post-Development)	(1.29)	(930)	(61)	(15)	(1)	(510)	(34)	(280)	(19)	(230)	(15)
February	Pre-Development Conditions	1.51	860	57	15	1	635	42	345	23	290	19
	Post-Development (Uncontrolled) Conditions	0.22	130	57	-	-	95	42	50	22	45	20
	Difference (Pre-Development to Post-Development)	(1.29)	(730)	(48)	(15)	(1)	(540)	(36)	(295)	(20)	(245)	(16)
March	Pre-Development Conditions	1.51	940	62	135	9	1,375	91	740	49	635	42
	Post-Development (Uncontrolled) Conditions	0.22	140	62	20	9	205	91	105	47	100	45
	Difference (Pre-Development to Post-Development)	(1.29)	(800)	(53)	(115)	(8)	(1,170)	(77)	(635)	(42)	(535)	(35)
April	Pre-Development Conditions	1.51	1,150	76	485	32	845	56	455	30	390	26
	Post-Development (Uncontrolled) Conditions	0.22	170	76	70	31	125	56	65	29	60	27
	Difference (Pre-Development to Post-Development)	(1.29)	(980)	(65)	(415)	(27)	(720)	(48)	(390)	(26)	(330)	(22)
May	Pre-Development Conditions	1.51	1,165	77	1,150	76	210	14	110	7	100	7
	Post-Development (Uncontrolled) Conditions	0.22	175	77	165	73	30	13	15	7	15	7
	Difference (Pre-Development to Post-Development)	(1.29)	(990)	(65)	(985)	(65)	(180)	(12)	(95)	(6)	(85)	(6)
June	Pre-Development Conditions	1.51	1,315	87	1,665	110	120	8	65	4	55	4
	Post-Development (Uncontrolled) Conditions	0.22	195	87	230	102	20	9	10	4	10	4
	Difference (Pre-Development to Post-Development)	(1.29)	(1,120)	(74)	(1,435)	(95)	(100)	(7)	(55)	(4)	(45)	(3)
July	Pre-Development Conditions	1.51	1,285	85	1,785	118	45	3	25	2	20	1
	Post-Development (Uncontrolled) Conditions	0.22	190	85	245	109	10	4	5	2	5	2
	Difference (Pre-Development to Post-Development)	(1.29)	(1,095)	(72)	(1,540)	(102)	(35)	(2)	(20)	(1)	(15)	(1)
August	Pre-Development Conditions	1.51	1,210	80	1,450	96	45	3	25	2	20	1
	Post-Development (Uncontrolled) Conditions	0.22	180	80	205	91	10	4	5	2	5	2
	Difference (Pre-Development to Post-Development)	(1.29)	(1,030)	(68)	(1,245)	(82)	(35)	(2)	(20)	(1)	(15)	(1)
September	Pre-Development Conditions	1.51	1,255	83	1,030	68	110	7	60	4	50	3
	Post-Development (Uncontrolled) Conditions	0.22	185	82	150	67	20	9	10	4	10	4
	Difference (Pre-Development to Post-Development)	(1.29)	(1,070)	(71)	(880)	(58)	(90)	(6)	(50)	(3)	(40)	(3)
October	Pre-Development Conditions	1.51	1,195	79	575	38	130	9	70	5	60	4
	Post-Development (Uncontrolled) Conditions	0.22	175	79	85	38	35	16	10	4	25	11
	Difference (Pre-Development to Post-Development)	(1.29)	(1,020)	(67)	(490)	(32)	(95)	(6)	(60)	(4)	(35)	(2)
November	Pre-Development Conditions	1.51	1,120	74	180	12	375	25	205	14	170	11
	Post-Development (Uncontrolled) Conditions	0.22	165	74	25	11	75	33	30	13	45	20
	Difference (Pre-Development to Post-Development)	(1.29)	(955)	(63)	(155)	(10)	(300)	(20)	(175)	(12)	(125)	(8)
December	Pre-Development Conditions	1.51	970	64	45	3	500	33	270	18	230	15
	Post-Development (Uncontrolled) Conditions	0.22	145	65	5	2	80	36	40	18	40	18
	Difference (Pre-Development to Post-Development)	(1.29)	(825)	(55)	(40)	(3)	(420)	(28)	(230)	(15)	(190)	(13)
Annual Summary		Area	Precipitation		Evapotranspiration		Surplus/Deficit		Infiltration		Runoff	
Pre-Development Conditions		1.51	13,555	896	8,530	564	4,990	330	2,695	178	2,295	152
Post-Development (Uncontrolled) Conditions		0.22	2,010	896	1,200	534	795	354	390	174	405	180
Additional Runoff Measures												
SWM Pond Runoff Diversion		-	-	-	-	-	12,140	91	-	-	12,140	91
Post-Development (Controlled) Conditions		0.22	2,010	896	1,200	534	12,935	5,758	390	174	12,545	5,584
Pre- to Post- Development Difference												
Post-Development (Controlled) Conditions		(1.29)	(11,545)	(763)	(7,330)	(485)	7,945	526	(2,305)	(152)	10,250	678
Percentage Change			-85%	-85%	-85%	-86%	159%		-86%		447%	

Notes:

Values are rounded for reporting purposes.

Positive value for infiltration difference is a surplus and a negative value is a deficit.

Positive value for runoff difference is an increase in runoff and a negative value is a decrease in runoff.

Summary of Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

AP-3											
Month	Details	Area	Precipitation		Evapotranspiration		Surplus/Deficit		Infiltration		Runoff
		(ha)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)	(m ³)
January	Pre-Development Conditions	18.62	13,410	72	185	1	7,720	41	4,130	22	3,590
	Post-Development (Uncontrolled) Conditions	8.62	6,205	72	85	1	3,600	42	1,400	16	2,200
	Difference (Pre-Development to Post-Development)	(10.00)	(7,205)	(39)	(100)	(1)	(4,120)	(22)	(2,730)	(15)	(1,390)
February	Pre-Development Conditions	18.62	10,615	57	185	1	7,925	43	4,255	23	3,670
	Post-Development (Uncontrolled) Conditions	8.62	4,915	57	85	1	3,660	42	1,490	17	2,170
	Difference (Pre-Development to Post-Development)	(10.00)	(5,700)	(31)	(100)	(1)	(4,265)	(23)	(2,765)	(15)	(1,500)
March	Pre-Development Conditions	18.62	11,545	62	1,675	9	17,075	92	9,170	49	7,905
	Post-Development (Uncontrolled) Conditions	8.62	5,345	62	770	9	7,890	92	3,250	38	4,640
	Difference (Pre-Development to Post-Development)	(10.00)	(6,200)	(33)	(905)	(5)	(9,185)	(49)	(5,920)	(32)	(3,265)
April	Pre-Development Conditions	18.62	14,155	76	5,960	32	10,420	56	5,595	30	4,825
	Post-Development (Uncontrolled) Conditions	8.62	6,550	76	2,745	32	4,830	56	2,005	23	2,825
	Difference (Pre-Development to Post-Development)	(10.00)	(7,605)	(41)	(3,215)	(17)	(5,590)	(30)	(3,590)	(19)	(2,000)
May	Pre-Development Conditions	18.62	14,340	77	14,055	75	2,605	14	1,400	8	1,205
	Post-Development (Uncontrolled) Conditions	8.62	6,640	77	6,350	74	1,175	14	500	6	675
	Difference (Pre-Development to Post-Development)	(10.00)	(7,700)	(41)	(7,705)	(41)	(1,430)	(8)	(900)	(5)	(530)
June	Pre-Development Conditions	18.62	16,200	87	20,000	107	1,500	8	800	4	700
	Post-Development (Uncontrolled) Conditions	8.62	7,500	87	8,780	102	680	8	285	3	395
	Difference (Pre-Development to Post-Development)	(10.00)	(8,700)	(47)	(11,220)	(60)	(820)	(4)	(515)	(3)	(305)
July	Pre-Development Conditions	18.62	15,830	85	20,835	112	570	3	300	2	270
	Post-Development (Uncontrolled) Conditions	8.62	7,330	85	9,185	107	250	3	110	1	140
	Difference (Pre-Development to Post-Development)	(10.00)	(8,500)	(46)	(11,650)	(63)	(320)	(2)	(190)	(1)	(130)
August	Pre-Development Conditions	18.62	14,895	80	16,990	91	590	3	300	2	290
	Post-Development (Uncontrolled) Conditions	8.62	6,895	80	7,660	89	305	4	110	1	195
	Difference (Pre-Development to Post-Development)	(10.00)	(8,000)	(43)	(9,330)	(50)	(285)	(2)	(190)	(1)	(95)
September	Pre-Development Conditions	18.62	15,455	83	12,480	67	1,455	8	725	4	730
	Post-Development (Uncontrolled) Conditions	8.62	7,155	83	5,745	67	865	10	260	3	605
	Difference (Pre-Development to Post-Development)	(10.00)	(8,300)	(45)	(6,735)	(36)	(590)	(3)	(465)	(2)	(125)
October	Pre-Development Conditions	18.62	14,710	79	7,075	38	2,225	12	1,075	6	1,150
	Post-Development (Uncontrolled) Conditions	8.62	6,810	79	3,280	38	1,500	17	370	4	1,130
	Difference (Pre-Development to Post-Development)	(10.00)	(7,900)	(42)	(3,795)	(20)	(725)	(4)	(705)	(4)	(20)
November	Pre-Development Conditions	18.62	13,780	74	2,235	12	5,610	30	2,905	16	2,705
	Post-Development (Uncontrolled) Conditions	8.62	6,380	74	1,030	12	3,060	35	965	11	2,095
	Difference (Pre-Development to Post-Development)	(10.00)	(7,400)	(40)	(1,205)	(6)	(2,550)	(14)	(1,940)	(10)	(610)
December	Pre-Development Conditions	18.62	11,920	64	560	3	6,680	36	3,550	19	3,130
	Post-Development (Uncontrolled) Conditions	8.62	5,515	64	255	3	3,245	38	1,210	14	2,035
	Difference (Pre-Development to Post-Development)	(10.00)	(6,405)	(34)	(305)	(2)	(3,435)	(18)	(2,340)	(13)	(1,095)
Annual Summary		Area	Precipitation	Evapotranspiration	Surplus/Deficit	Infiltration	Runoff				
Pre-Development Conditions		18.62	166,855	896	102,235	549	64,375	346	34,205	184	30,170
Post-Development (Uncontrolled) Conditions		8.62	77,240	896	45,970	533	31,060	360	11,955	139	19,105
Additional Runoff Measures											
SWM Pond Runoff Diversion		-	-	-	-	-	12,140	141	-	-	12,140
Post-Development (Controlled) Conditions		8.62	77,240	896	45,970	533	43,200	501	11,955	139	31,245
Pre- to Post- Development Difference											
Post-Development (Controlled) Conditions		(10.00)	(89,615)	(481)	(56,265)	(302)	(21,175)	(113)	(22,250)	(119)	1,075
Percentage Change			-54%		-54%		-55%		-33%		-65%
											4%

Notes:

Values are rounded for reporting purposes.

Positive value for infiltration difference is a surplus and a negative value is a deficit.

Positive value for runoff difference is an increase in runoff and a negative value is a decrease in runoff.

Summary of Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

AP-4												
Month	Details	Area	Precipitation		Evapotranspiration		Surplus/Deficit		Infiltration		Runoff	
		(ha)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)
January	Pre-Development Conditions	32.27	23,230	72	325	1	12,635	39	7,045	22	5,590	17
	Post-Development (Uncontrolled) Conditions	21.08	15,180	72	210	1	8,120	39	4,080	19	4,040	19
	Difference (Pre-Development to Post-Development)	(11.18)	(8,050)	(25)	(115)	(0.4)	(4,515)	(14)	(2,965)	(9)	(1,550)	(5)
February	Pre-Development Conditions	32.27	18,390	57	325	1	13,490	42	7,560	23	5,930	18
	Post-Development (Uncontrolled) Conditions	21.08	12,015	57	210	1	8,760	42	4,530	21	4,230	20
	Difference (Pre-Development to Post-Development)	(11.18)	(6,375)	(20)	(115)	(0.4)	(4,730)	(15)	(3,030)	(9)	(1,700)	(5)
March	Pre-Development Conditions	32.27	20,005	62	2,905	9	29,185	90	16,370	51	12,815	40
	Post-Development (Uncontrolled) Conditions	21.08	13,070	62	1,895	9	18,995	90	9,865	47	9,130	43
	Difference (Pre-Development to Post-Development)	(11.18)	(6,935)	(21)	(1,010)	(3)	(10,190)	(32)	(6,505)	(20)	(3,685)	(11)
April	Pre-Development Conditions	32.27	24,520	76	10,325	32	18,035	56	10,125	31	7,910	25
	Post-Development (Uncontrolled) Conditions	21.08	16,020	76	6,745	32	11,770	56	6,160	29	5,610	27
	Difference (Pre-Development to Post-Development)	(11.18)	(8,500)	(26)	(3,580)	(11)	(6,265)	(19)	(3,965)	(12)	(2,300)	(7)
May	Pre-Development Conditions	32.27	24,845	77	24,425	76	4,515	14	2,535	8	1,980	6
	Post-Development (Uncontrolled) Conditions	21.08	16,235	77	15,760	75	2,950	14	1,545	7	1,405	7
	Difference (Pre-Development to Post-Development)	(11.18)	(8,610)	(27)	(8,665)	(27)	(1,565)	(5)	(990)	(3)	(575)	(2)
June	Pre-Development Conditions	32.27	28,070	87	35,065	109	2,590	8	1,450	4	1,140	4
	Post-Development (Uncontrolled) Conditions	21.08	18,340	87	22,395	106	1,715	8	885	4	830	4
	Difference (Pre-Development to Post-Development)	(11.18)	(9,730)	(30)	(12,670)	(39)	(875)	(3)	(565)	(2)	(310)	(1)
July	Pre-Development Conditions	32.27	27,425	85	37,315	116	980	3	545	2	435	1
	Post-Development (Uncontrolled) Conditions	21.08	17,920	85	23,970	114	660	3	330	2	330	2
	Difference (Pre-Development to Post-Development)	(11.18)	(9,505)	(29)	(13,345)	(41)	(320)	(0.99)	(215)	(1)	(105)	(0.3)
August	Pre-Development Conditions	32.27	25,810	80	30,725	95	1,000	3	545	2	455	1
	Post-Development (Uncontrolled) Conditions	21.08	16,865	80	20,015	95	710	3	330	2	380	2
	Difference (Pre-Development to Post-Development)	(11.18)	(8,945)	(28)	(10,710)	(33)	(290)	(0.9)	(215)	(1)	(75)	(0.2)
September	Pre-Development Conditions	32.27	26,780	83	22,110	69	2,410	7	1,295	4	1,115	3
	Post-Development (Uncontrolled) Conditions	21.08	17,495	83	14,490	69	1,785	8	785	4	1,000	5
	Difference (Pre-Development to Post-Development)	(11.18)	(9,285)	(29)	(7,620)	(24)	(625)	(2)	(510)	(2)	(115)	(0)
October	Pre-Development Conditions	32.27	25,490	79	12,260	38	3,335	10	1,735	5	1,600	5
	Post-Development (Uncontrolled) Conditions	21.08	16,655	79	8,010	38	2,650	13	995	5	1,655	8
	Difference (Pre-Development to Post-Development)	(11.18)	(8,835)	(27)	(4,250)	(13)	(685)	(2)	(740)	(2)	55	0
November	Pre-Development Conditions	32.27	23,875	74	3,870	12	8,735	27	4,760	15	3,975	12
	Post-Development (Uncontrolled) Conditions	21.08	15,600	74	2,530	12	6,110	29	2,720	13	3,390	16
	Difference (Pre-Development to Post-Development)	(11.18)	(8,275)	(26)	(1,340)	(4)	(2,625)	(8)	(2,040)	(6)	(585)	(2)
December	Pre-Development Conditions	32.27	20,650	64	970	3	10,865	34	6,030	19	4,835	15
	Post-Development (Uncontrolled) Conditions	21.08	13,490	64	630	3	7,155	34	3,510	17	3,645	17
	Difference (Pre-Development to Post-Development)	(11.18)	(7,160)	(22)	(340)	(1)	(3,710)	(11)	(2,520)	(8)	(1,190)	(4)
Annual Summary		Area	Precipitation	Evapotranspiration	Surplus/Deficit	Infiltration	Runoff					
Pre-Development Conditions		32.27	289,090	896	180,620	560	107,775	334	59,995	186	47,780	148
Post-Development (Uncontrolled) Conditions		21.08	188,885	896	116,860	554	71,380	339	35,735	170	35,645	169
Additional Runoff Measures												
SWM Pond Runoff Diversion		-	-	-	-	-	12,140	58	-	-	12,140	58
Post-Development (Controlled) Conditions		21.08	188,885	896	116,860	554	83,520	396	35,735	170	47,785	227
Pre- to Post- Development Difference												
Post-Development (Controlled) Conditions		(11.18)	(100,205)	(311)	(63,760)	(198)	(24,255)	(75)	(24,260)	(75)	5	0.02
Percentage Change		-35%		-35%		-35%		-23%		-40%		0.01%

Notes:

Values are rounded for reporting purposes.

Positive value for infiltration difference is a surplus and a negative value is a deficit.

Positive value for runoff difference is an increase in runoff and a negative value is a decrease in runoff.

Summary of Calculations
Feature-based Water Balance Analysis
52 Hawkesville Road, St. Jacobs, Ontario
Schlegel Urban Developments Corporation

AP-5												
Month	Details	Area	Precipitation		Evapotranspiration		Surplus/Deficit		Infiltration		Runoff	
		(ha)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)	(m ³)	(mm)
January	Pre-Development Conditions	168.31	121,185	72	1,685	1	69,270	41	37,050	22	32,220	19
	Post-Development (Uncontrolled) Conditions	170.52	122,775	72	1,705	1	71,050	42	35,375	21	35,675	21
	Difference (Pre-Development to Post-Development)	2.21	1,590	1	20	0.01	1,780	1	(1,675)	(1)	3,455	2
February	Pre-Development Conditions	168.31	95,935	57	1,685	1	71,630	43	38,295	23	33,335	20
	Post-Development (Uncontrolled) Conditions	170.52	97,200	57	1,705	1	72,820	43	36,505	21	36,315	21
	Difference (Pre-Development to Post-Development)	2.21	1,265	1	20	0.01	1,190	1	(1,790)	(1)	2,980	2
March	Pre-Development Conditions	168.31	104,355	62	15,150	9	154,150	92	82,400	49	71,750	43
	Post-Development (Uncontrolled) Conditions	170.52	105,725	62	15,325	9	156,460	92	78,545	46	77,915	46
	Difference (Pre-Development to Post-Development)	2.21	1,370	1	175	0.1	2,310	1	(3,855)	(2)	6,165	4
April	Pre-Development Conditions	168.31	127,915	76	53,860	32	94,165	56	50,275	30	43,890	26
	Post-Development (Uncontrolled) Conditions	170.52	129,595	76	54,485	32	95,460	56	47,890	28	47,570	28
	Difference (Pre-Development to Post-Development)	2.21	1,680	1	625	0.4	1,295	1	(2,385)	(1)	3,680	2
May	Pre-Development Conditions	168.31	129,600	77	127,285	76	23,565	14	12,580	7	10,985	7
	Post-Development (Uncontrolled) Conditions	170.52	131,305	77	128,120	75	23,695	14	11,985	7	11,710	7
	Difference (Pre-Development to Post-Development)	2.21	1,705	1	835	0.5	130	0.08	(595)	(0.4)	725	0.4
June	Pre-Development Conditions	168.31	146,430	87	182,785	109	13,530	8	7,190	4	6,340	4
	Post-Development (Uncontrolled) Conditions	170.52	148,355	87	182,375	107	13,640	8	6,850	4	6,790	4
	Difference (Pre-Development to Post-Development)	2.21	1,925	1	(410)	(0.24)	110	0.07	(340)	(0.2)	450	0.3
July	Pre-Development Conditions	168.31	143,065	85	191,900	114	5,110	3	2,695	2	2,415	1
	Post-Development (Uncontrolled) Conditions	170.52	144,945	85	190,780	112	5,110	3	2,570	2	2,540	1
	Difference (Pre-Development to Post-Development)	2.21	1,880	1	(1,120)	(0.7)	-	-	(125)	(0.1)	125	0.07
August	Pre-Development Conditions	168.31	134,650	80	155,820	93	5,240	3	2,700	2	2,540	2
	Post-Development (Uncontrolled) Conditions	170.52	136,420	80	155,565	91	5,470	3	2,570	2	2,900	2
	Difference (Pre-Development to Post-Development)	2.21	1,770	1	(255)	(0.15)	230	0.1	(130)	(0.1)	360	0.2
September	Pre-Development Conditions	168.31	139,700	83	113,295	67	12,550	7	6,335	4	6,215	4
	Post-Development (Uncontrolled) Conditions	170.52	141,535	83	114,155	67	13,790	8	6,045	4	7,745	5
	Difference (Pre-Development to Post-Development)	2.21	1,835	1	860	0.5	1,240	1	(290)	(0.2)	1,530	1
October	Pre-Development Conditions	168.31	132,965	79	63,960	38	17,750	11	8,735	5	9,015	5
	Post-Development (Uncontrolled) Conditions	170.52	134,715	79	64,820	38	20,910	12	8,410	5	12,500	7
	Difference (Pre-Development to Post-Development)	2.21	1,750	1	860	0.5	3,160	2	(325)	(0.2)	3,485	2
November	Pre-Development Conditions	168.31	124,550	74	20,195	12	47,525	28	24,845	15	22,680	13
	Post-Development (Uncontrolled) Conditions	170.52	126,185	74	20,430	12	51,650	30	23,845	14	27,805	16
	Difference (Pre-Development to Post-Development)	2.21	1,635	1	235	0.1	4,125	2	(1,000)	(1)	5,125	3
December	Pre-Development Conditions	168.31	107,720	64	5,050	3	58,760	35	31,260	19	27,500	16
	Post-Development (Uncontrolled) Conditions	170.52	109,135	64	5,110	3	61,080	36	29,890	18	31,190	18
	Difference (Pre-Development to Post-Development)	2.21	1,415	1	60	0.04	2,320	1	(1,370)	(1)	3,690	2
Annual Summary		Area	Precipitation		Evapotranspiration		Surplus/Deficit		Infiltration		Runoff	
Pre-Development Conditions		168.31	1,508,070	896	932,670	554	573,245	341	304,360	181	268,885	160
Post-Development (Uncontrolled) Conditions		170.52	1,527,890	896	934,575	548	591,135	347	290,480	170	300,655	176
Additional Runoff Measures												
SWM Pond Runoff Diversion		-	-	-	-	-	-	-	-	-	-	-
Post-Development (Controlled) Conditions		170.52	1,527,890	896	934,575	548	591,135	347	290,480	170	300,655	176
Pre- to Post- Development Difference												
Post-Development (Controlled) Conditions		2.21	19,820	12	1,905	1	17,890	11	(13,880)	(8)	31,770	19
Percentage Change		1%		1%		0.2%		3%		-5%		12%

Notes:

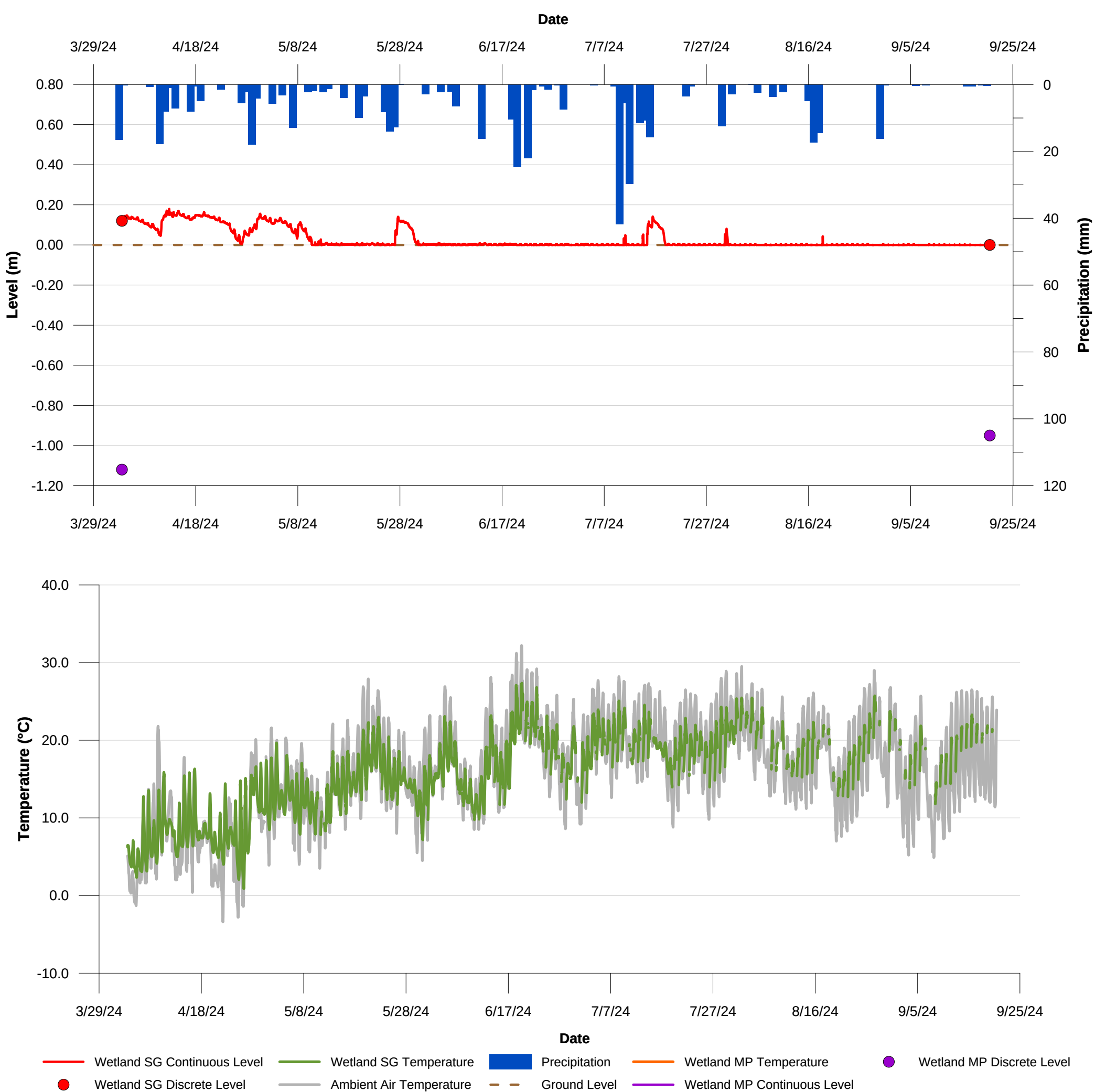
Values are rounded for reporting purposes.

Positive value for infiltration difference is a surplus and a negative value is a deficit.

Positive value for runoff difference is an increase in runoff and a negative value is a decrease in runoff.

Appendix B

Wetland SG Hydrograph



Notes:

- Wetland MP groundwater levels were shifted to provide a visual representation of the water levels relative to Wetland SG. Values below 0.0 m represent the shallow groundwater levels below the substrate surface.
- Continuous groundwater level and temperature data at Wetland MP is unavailable from April 3 - September 20, 2024 due to logger malfunction.
- Gaps in Wetland SG temperature data are due to the logger recording zero water level.
- Precipitation and ambient air temperature data was collected from the Elora RCS Environment Canada Weather Station (Climate ID: 6142286) and supplemented with the Beatrice Environment Canada Weather Station (Climate ID: 6144239).



SCHLEGEL URBAN DEVELOPMENTS CORP.
52 HAWKESVILLE ROAD, ST. JACOBS, ONTARIO
SURFACE WATER MONITORING REPORT

Project No.: 12637434
Date: May 2025

WETLAND SG / MP HYDROGRAPH AND TEMPERATURE DATA

Appendix C

HEC-RAS Outputs

HEC-RAS

Outputs

Northside Drive Municipal Drain Schematic

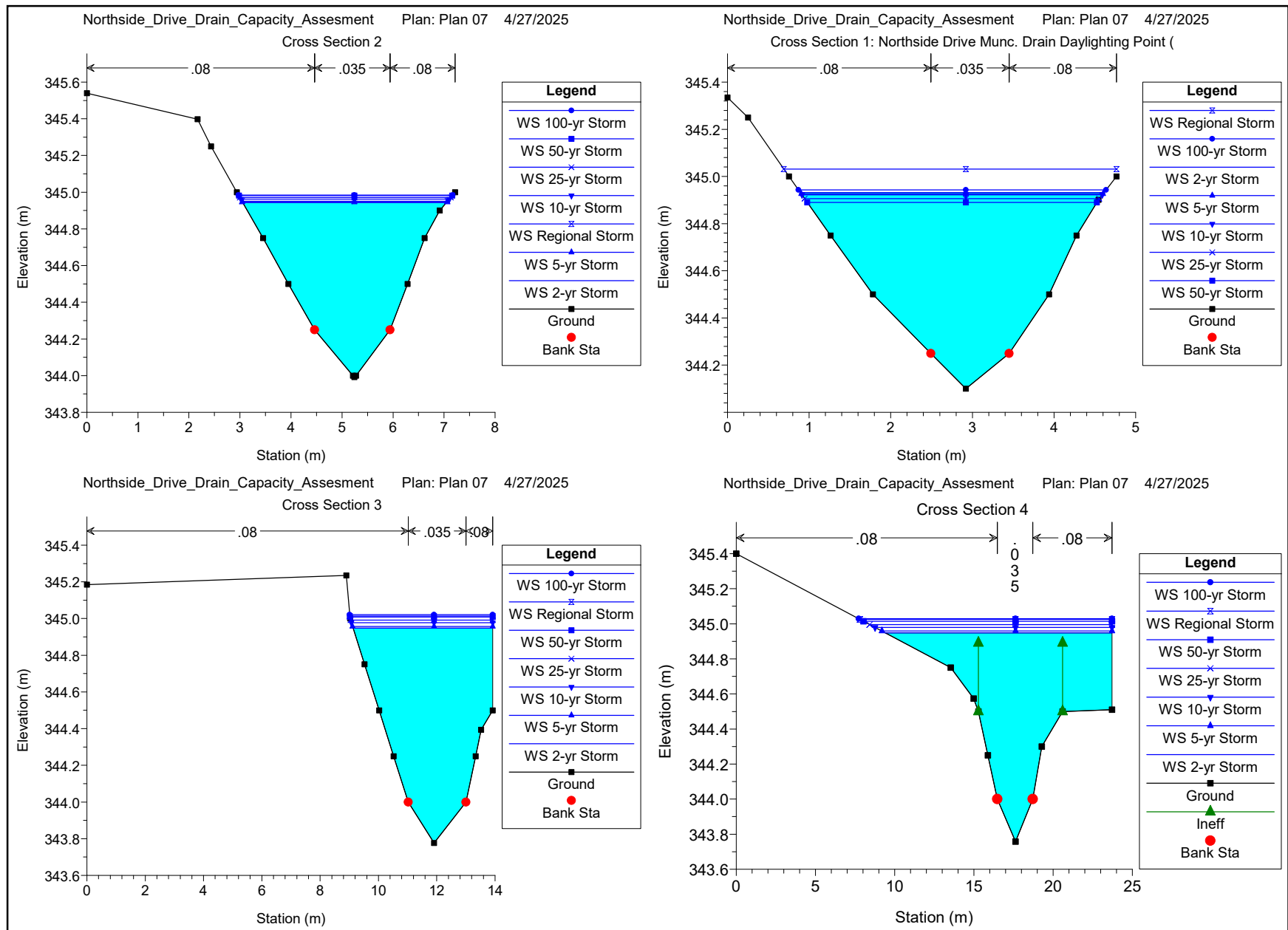


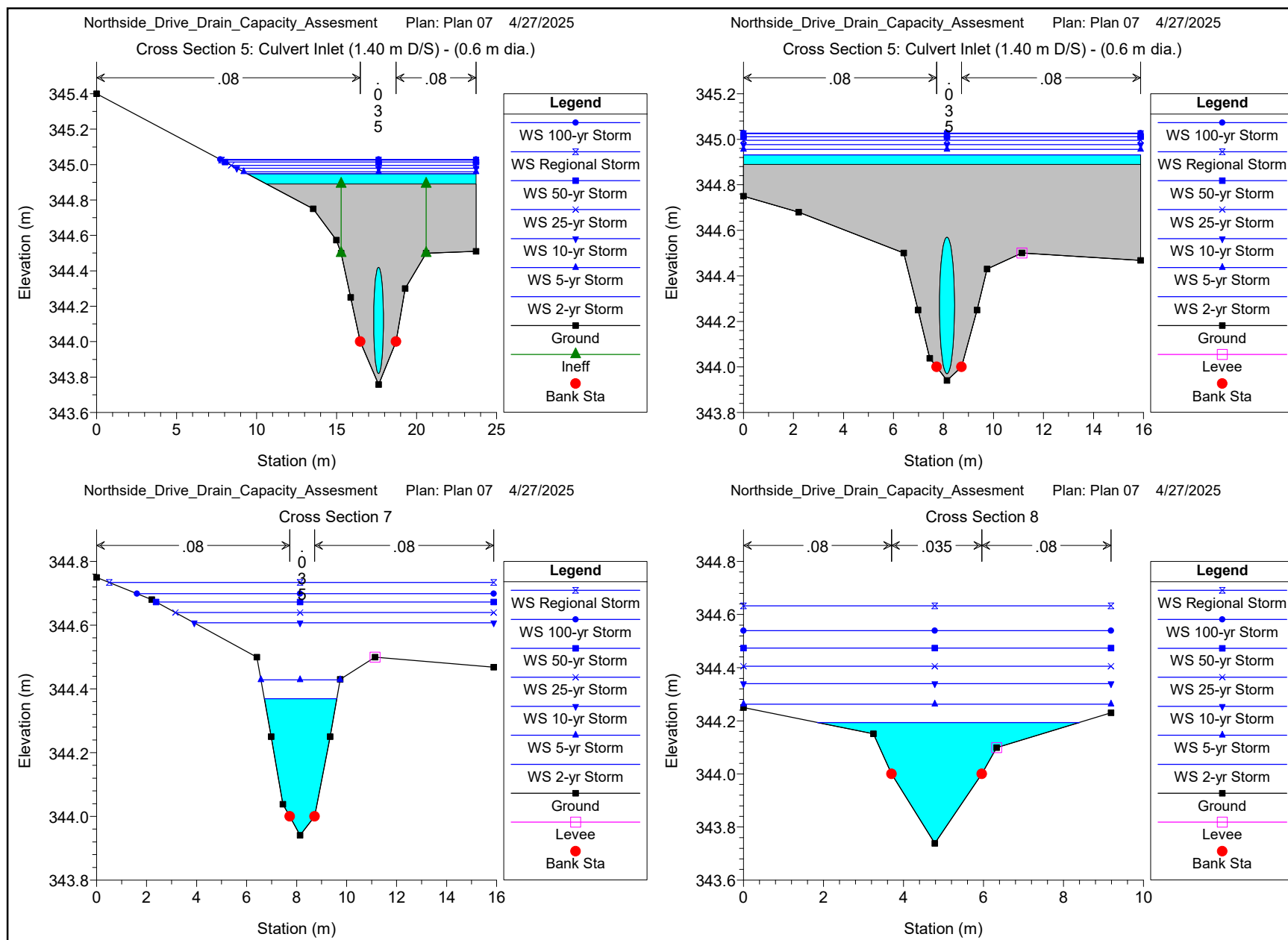
SCHLEGEL URBAN DEVELOPMENTS CORP.
110, 118 AND 122 NORTHSIDE DRIVE, ST. JACOBS
FEATURE-BASED WATER BALANCE ASSESSMENT

HEC-RAS NORTHSIDE DRIVE

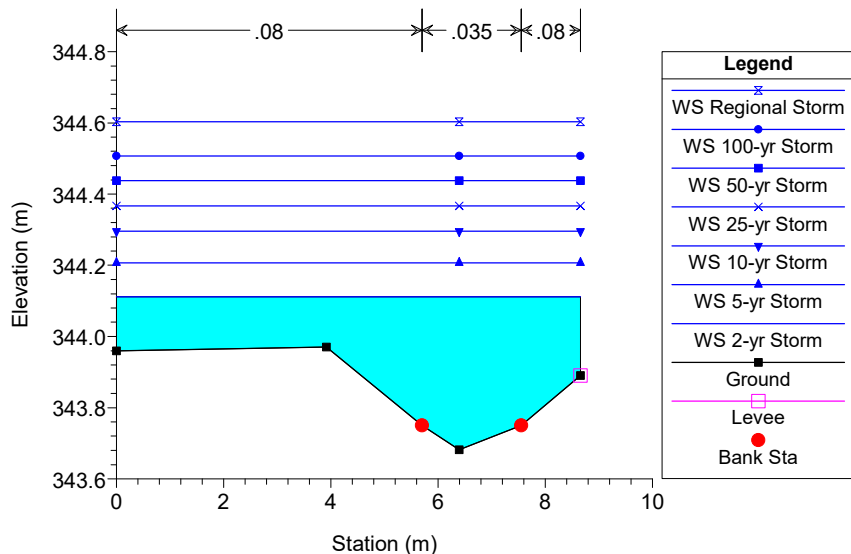
Project No. **12643696**
Revision No. -
Date **Apr. 28, 2025**

Pre- Development Conditions

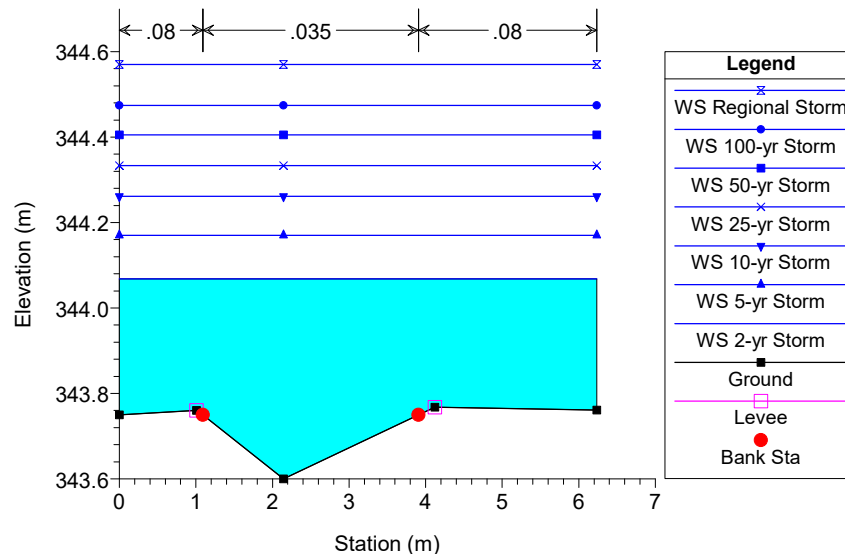




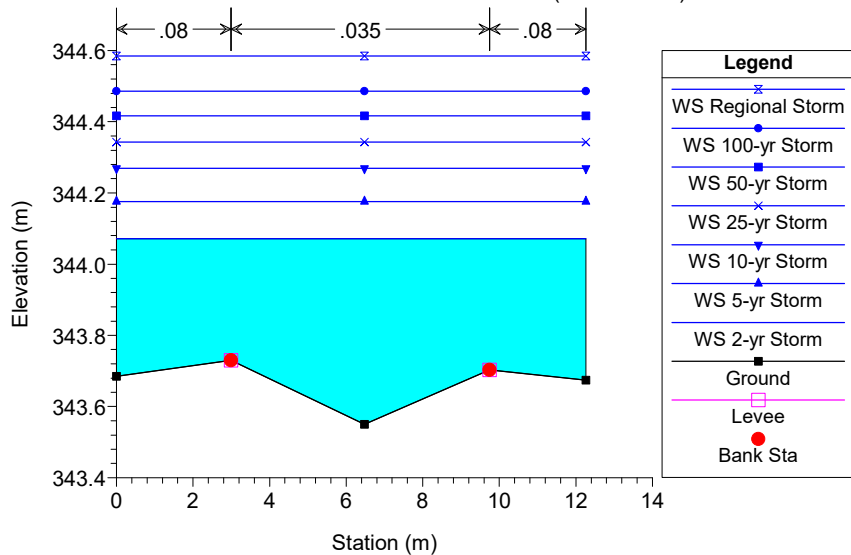
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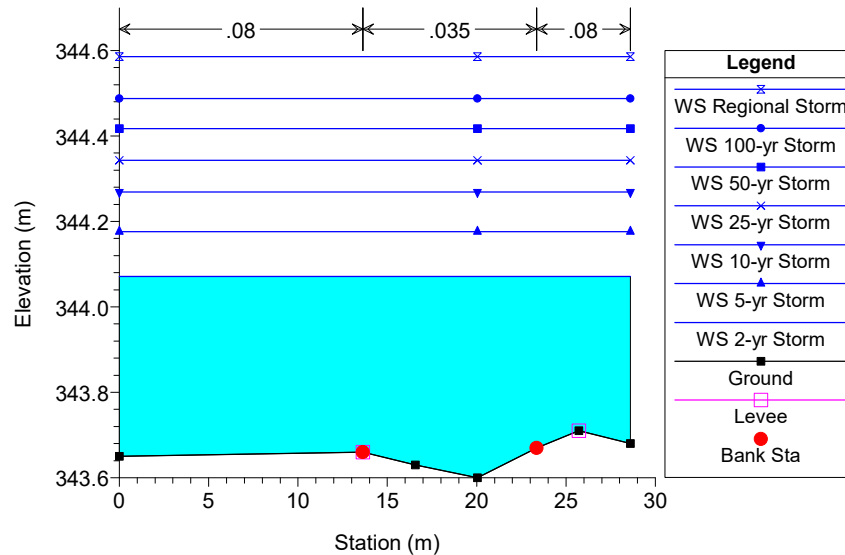
Cross Section 10



Cross Section 11: End of Munc. Drain (12.31 m D/S)

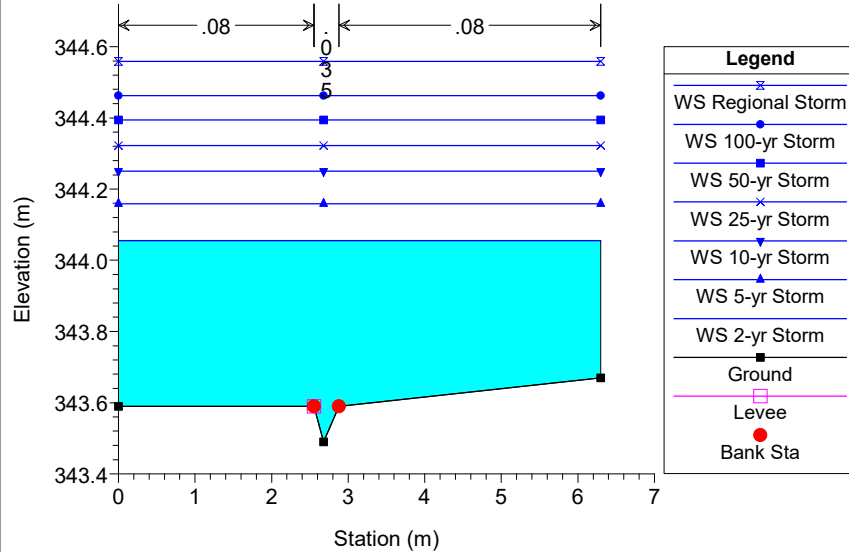


Cross Section 12



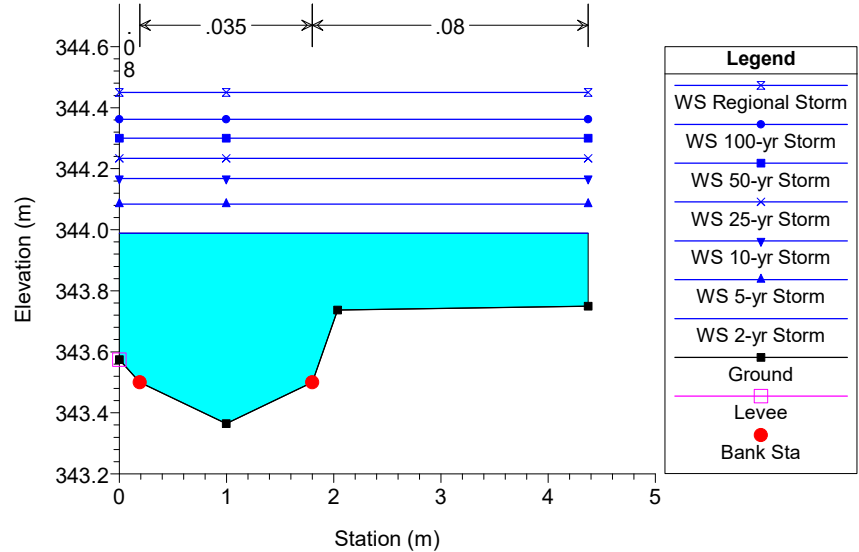
Northside_Drive_Drain_Capacity_Assesment Plan: Plan 07 4/27/2025

Cross Section 13: Beginning of Munc. Drain (33.82 m D/S)



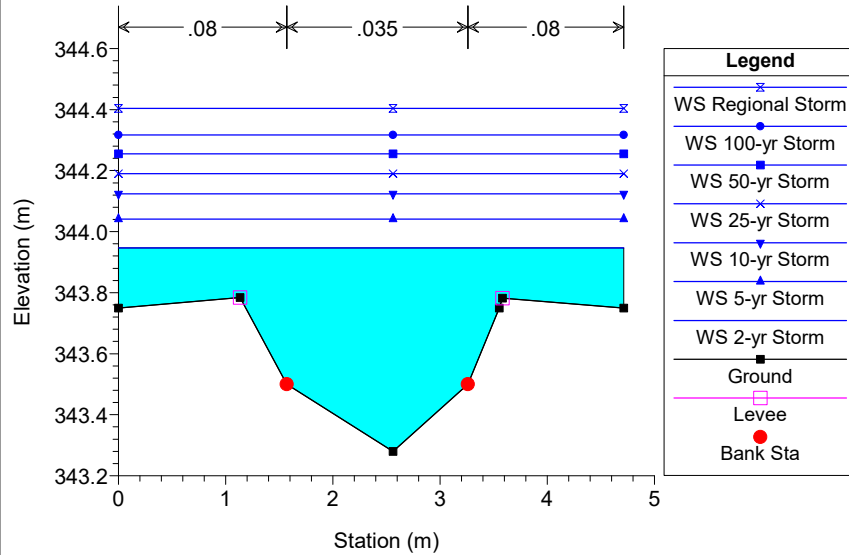
Northside_Drive_Drain_Capacity_Assesment Plan: Plan 07 4/27/2025

Cross Section 14



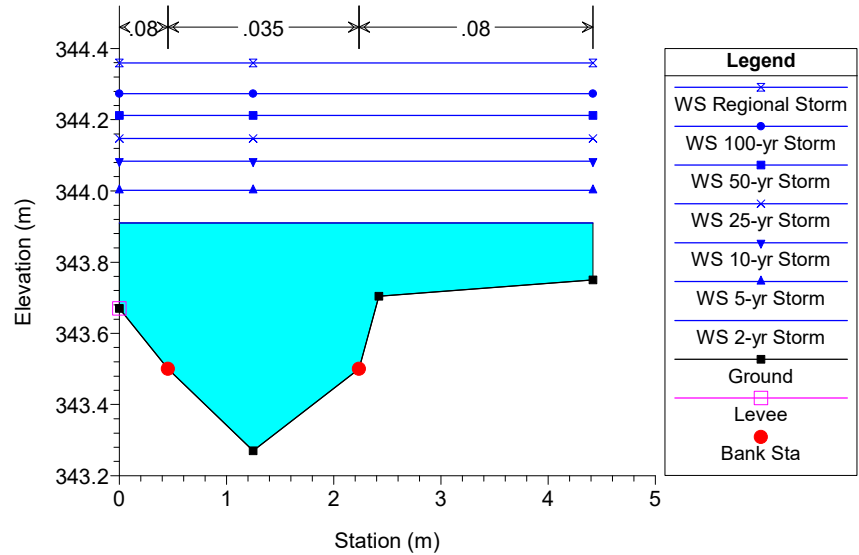
Northside_Drive_Drain_Capacity_Assesment Plan: Plan 07 4/27/2025

Cross Section 15



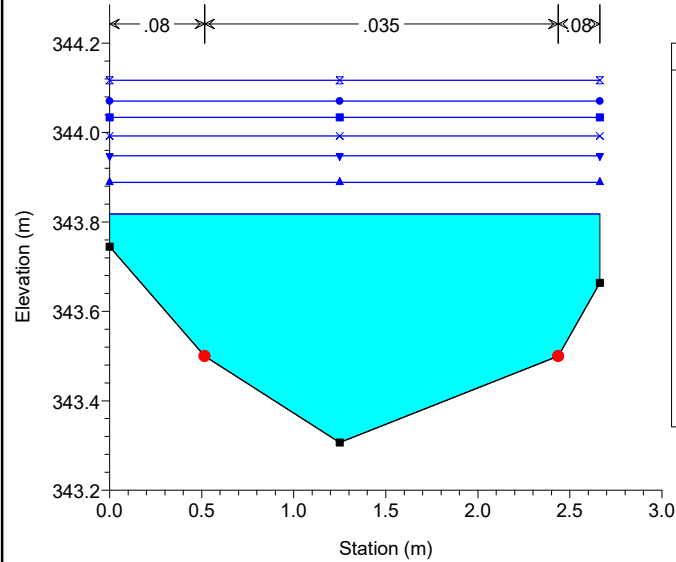
Northside_Drive_Drain_Capacity_Assesment Plan: Plan 07 4/27/2025

Cross Section 16



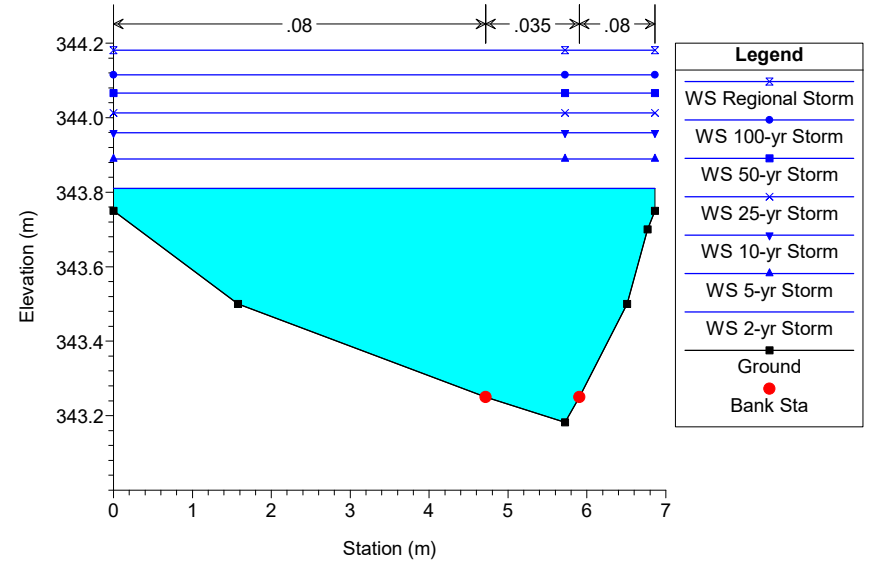
Northside_Drive_Drain_Capacity_Assesment Plan: Plan 07 4/27/2025

Cross Section 17



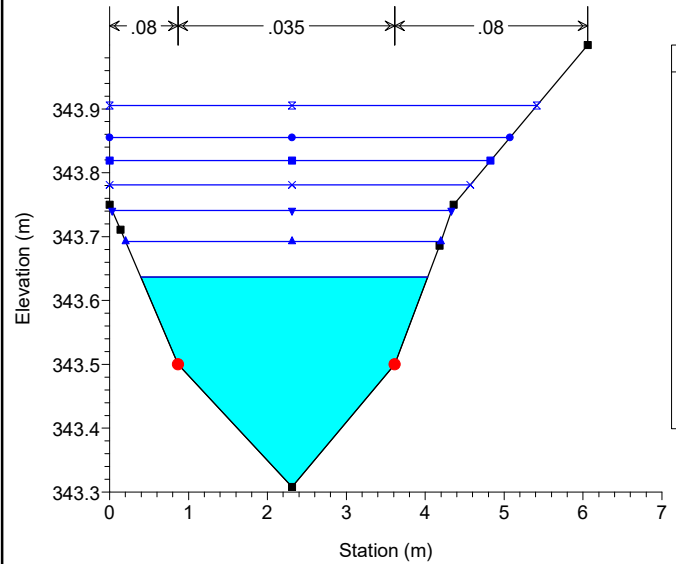
Northside_Drive_Drain_Capacity_Assesment Plan: Plan 07 4/27/2025

Cross Section 18



Northside_Drive_Drain_Capacity_Assesment Plan: Plan 07 4/27/2025

Cross Section 19



HEC-RAS Plan: PreFlow River: Northside Drive Reach: 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
1	21	2-yr Storm	0.97	344.10	344.93		0.99	1.72	3.72	0.36
1	21	5-yr Storm	1.34	344.10	344.93		1.38	1.70	3.69	0.51
1	21	10-yr Storm	1.71	344.10	344.92		1.77	1.68	3.68	0.65
1	21	25-yr Storm	2.03	344.10	344.91	344.83	2.16	1.62	3.61	0.81
1	21	50-yr Storm	2.36	344.10	344.89	344.89	2.59	1.57	3.55	0.98
1	21	100-yr Storm	2.70	344.10	344.94	344.94	2.70	1.76	3.77	0.98
1	21	Regional Storm	3.20	344.10	345.03	345.03	2.77	2.11	4.08	0.96
1	20	2-yr Storm	0.97	343.99	344.94		0.69	2.04	3.99	0.24
1	20	5-yr Storm	1.34	343.99	344.95		0.95	2.06	4.02	0.33
1	20	10-yr Storm	1.71	343.99	344.96		1.18	2.12	4.09	0.41
1	20	25-yr Storm	2.03	343.99	344.97		1.38	2.16	4.13	0.48
1	20	50-yr Storm	2.36	343.99	344.98		1.59	2.20	4.18	0.55
1	20	100-yr Storm	2.70	343.99	344.98		1.81	2.21	4.20	0.62
1	20	Regional Storm	3.20	343.99	344.95	344.87	2.25	2.07	4.03	0.79
1	19	2-yr Storm	0.97	343.78	344.95		0.39	3.59	4.79	0.12
1	19	5-yr Storm	1.34	343.78	344.96		0.54	3.63	4.81	0.17
1	19	10-yr Storm	1.71	343.78	344.98		0.68	3.73	4.85	0.21
1	19	25-yr Storm	2.03	343.78	344.99		0.79	3.80	4.88	0.24
1	19	50-yr Storm	2.36	343.78	345.01		0.90	3.88	4.90	0.27
1	19	100-yr Storm	2.70	343.78	345.02		1.02	3.94	4.91	0.31
1	19	Regional Storm	3.20	343.78	345.01		1.22	3.91	4.90	0.37
1	18	2-yr Storm	0.97	343.76	344.95	344.15	0.29	6.73	14.31	0.09
1	18	5-yr Storm	1.34	343.76	344.96	344.21	0.39	6.88	14.53	0.12
1	18	10-yr Storm	1.71	343.76	344.98	344.27	0.49	7.18	14.96	0.15
1	18	25-yr Storm	2.03	343.76	345.00	344.31	0.57	7.43	15.31	0.17
1	18	50-yr Storm	2.36	343.76	345.01	344.37	0.64	7.71	15.68	0.19
1	18	100-yr Storm	2.70	343.76	345.03	344.41	0.72	7.95	15.99	0.21
1	18	Regional Storm	3.20	343.76	345.02	344.47	0.86	7.88	15.91	0.26
1	17		Culvert							
1	15	2-yr Storm	0.97	343.94	344.37	344.37	1.94	0.78	2.90	0.98
1	15	5-yr Storm	1.34	343.94	344.43	344.43	2.26	0.96	3.16	1.07
1	15	10-yr Storm	1.71	343.94	344.61	344.61	1.78	2.47	11.97	0.71
1	15	25-yr Storm	2.03	343.94	344.64	344.64	1.89	2.87	12.73	0.74
1	15	50-yr Storm	2.36	343.94	344.67	344.67	1.97	3.30	13.50	0.75
1	15	100-yr Storm	2.70	343.94	344.70	344.70	2.07	3.66	14.26	0.77
1	15	Regional Storm	3.20	343.94	344.73	344.73	2.20	4.18	15.37	0.80
1	14	2-yr Storm	0.97	343.74	344.19	344.14	1.27	0.97	6.55	0.71
1	14	5-yr Storm	1.34	343.74	344.26	344.22	1.34	1.53	9.19	0.68
1	14	10-yr Storm	1.71	343.74	344.34	344.28	1.29	2.25	9.19	0.60
1	14	25-yr Storm	2.03	343.74	344.41	344.31	1.25	2.85	9.19	0.55
1	14	50-yr Storm	2.36	343.74	344.47	344.34	1.22	3.47	9.19	0.50
1	14	100-yr Storm	2.70	343.74	344.54	344.36	1.21	4.07	9.19	0.47
1	14	Regional Storm	3.20	343.74	344.63	344.40	1.20	4.94	9.19	0.44
1	13	2-yr Storm	0.97	343.68	344.11	343.96	0.89	2.07	8.65	0.45
1	13	5-yr Storm	1.34	343.68	344.21	343.96	0.89	2.90	8.65	0.41
1	13	10-yr Storm	1.71	343.68	344.30	343.96	0.91	3.67	8.65	0.38
1	13	25-yr Storm	2.03	343.68	344.37	344.12	0.93	4.28	8.65	0.37
1	13	50-yr Storm	2.36	343.68	344.44	344.14	0.95	4.90	8.65	0.36
1	13	100-yr Storm	2.70	343.68	344.51	344.16	0.97	5.49	8.65	0.35
1	13	Regional Storm	3.20	343.68	344.60	344.20	1.00	6.33	8.65	0.34
1	12	2-yr Storm	0.97	343.60	344.07	343.88	0.66	2.15	6.24	0.34
1	12	5-yr Storm	1.34	343.60	344.17	343.92	0.72	2.79	6.24	0.33
1	12	10-yr Storm	1.71	343.60	344.26	343.96	0.77	3.36	6.24	0.32
1	12	25-yr Storm	2.03	343.60	344.33	343.98	0.81	3.81	6.24	0.32
1	12	50-yr Storm	2.36	343.60	344.41	344.02	0.85	4.26	6.24	0.32
1	12	100-yr Storm	2.70	343.60	344.47	344.04	0.89	4.69	6.24	0.32
1	12	Regional Storm	3.20	343.60	344.57	344.08	0.94	5.29	6.24	0.32

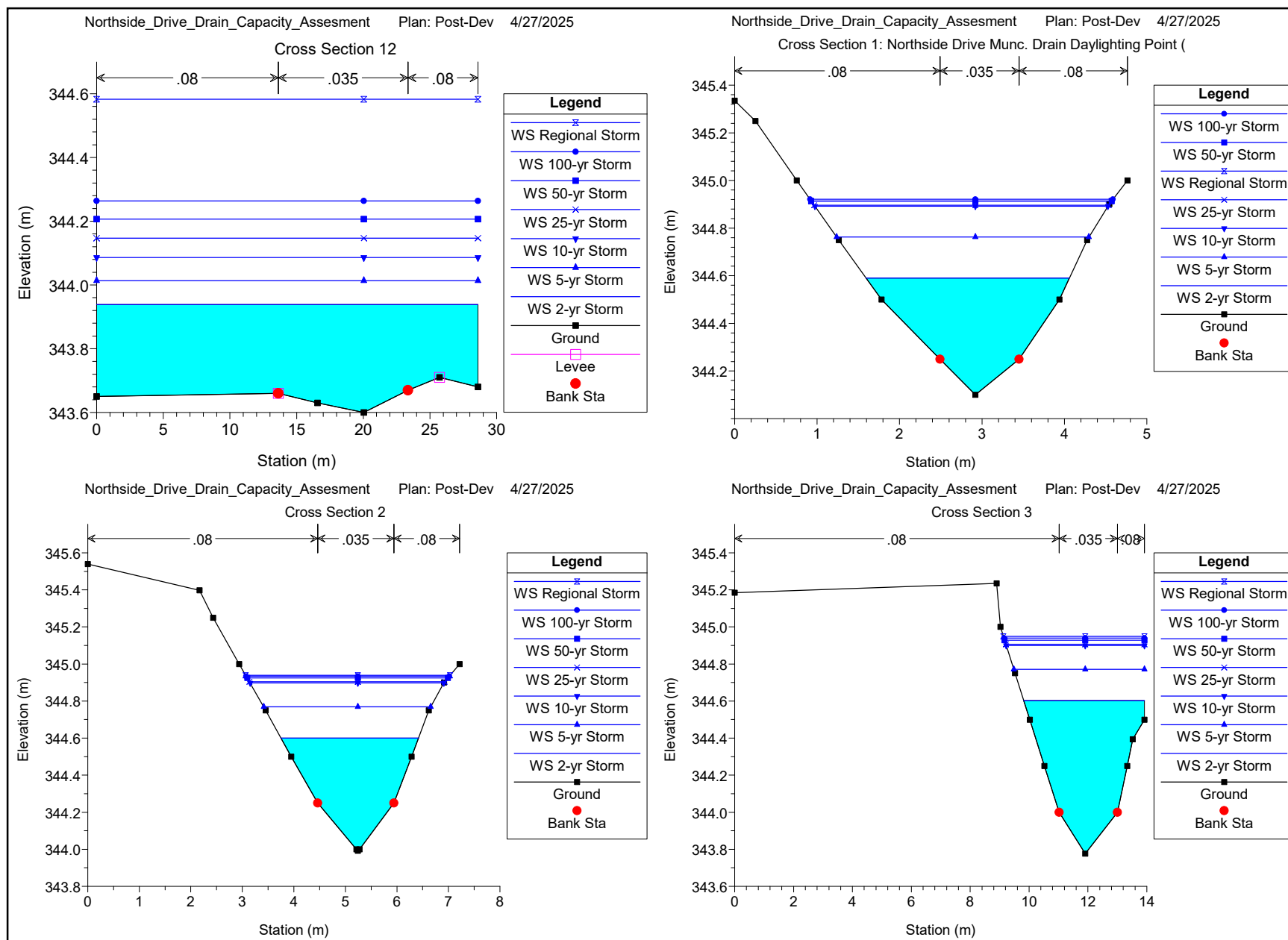
HEC-RAS Plan: PreFlow River: Northside Drive Reach: 1 (Continued)

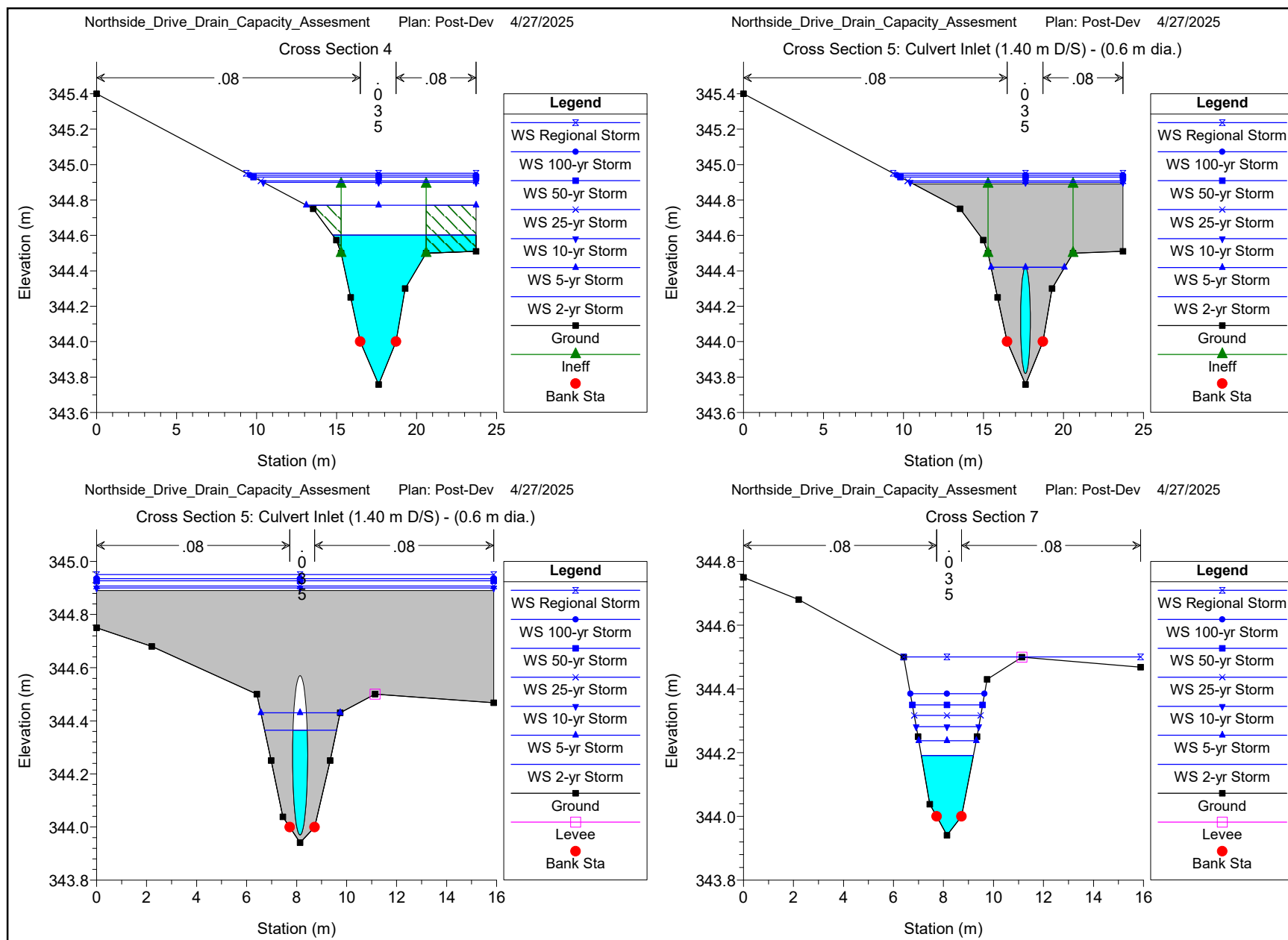
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
1	11	2-yr Storm	0.97	343.55	344.07	343.76	0.26	5.01	12.26	0.13
1	11	5-yr Storm	1.34	343.55	344.18	343.78	0.29	6.29	12.26	0.13
1	11	10-yr Storm	1.71	343.55	344.27	343.80	0.32	7.43	12.26	0.13
1	11	25-yr Storm	2.03	343.55	344.34	343.82	0.33	8.34	12.26	0.13
1	11	50-yr Storm	2.36	343.55	344.42	343.84	0.35	9.24	12.26	0.13
1	11	100-yr Storm	2.70	343.55	344.49	343.86	0.37	10.09	12.26	0.13
1	11	Regional Storm	3.20	343.55	344.58	343.88	0.39	11.30	12.26	0.13
1	10	2-yr Storm	0.97	343.60	344.07	343.71	0.13	11.93	28.60	0.06
1	10	5-yr Storm	1.34	343.60	344.18	343.73	0.15	14.93	28.60	0.06
1	10	10-yr Storm	1.71	343.60	344.27	343.74	0.16	17.60	28.60	0.06
1	10	25-yr Storm	2.03	343.60	344.34	343.75	0.17	19.72	28.60	0.06
1	10	50-yr Storm	2.36	343.60	344.42	343.76	0.18	21.84	28.60	0.06
1	10	100-yr Storm	2.70	343.60	344.49	343.77	0.18	23.84	28.60	0.06
1	10	Regional Storm	3.20	343.60	344.59	343.79	0.20	26.67	28.60	0.06
1	9	2-yr Storm	0.97	343.49	344.06	343.78	0.78	2.81	6.30	0.35
1	9	5-yr Storm	1.34	343.49	344.16	343.81	0.88	3.46	6.30	0.36
1	9	10-yr Storm	1.71	343.49	344.25	343.84	0.97	4.04	6.30	0.37
1	9	25-yr Storm	2.03	343.49	344.32	343.86	1.04	4.49	6.30	0.38
1	9	50-yr Storm	2.36	343.49	344.39	343.89	1.11	4.94	6.30	0.38
1	9	100-yr Storm	2.70	343.49	344.46	343.92	1.18	5.37	6.30	0.39
1	9	Regional Storm	3.20	343.49	344.56	343.95	1.27	5.98	6.30	0.40
1	8	2-yr Storm	0.97	343.37	343.99	343.74	0.90	1.64	4.37	0.39
1	8	5-yr Storm	1.34	343.37	344.08	343.86	1.03	2.06	4.37	0.41
1	8	10-yr Storm	1.71	343.37	344.17	343.91	1.13	2.43	4.37	0.42
1	8	25-yr Storm	2.03	343.37	344.23	343.95	1.21	2.71	4.37	0.43
1	8	50-yr Storm	2.36	343.37	344.30	344.00	1.29	3.00	4.37	0.44
1	8	100-yr Storm	2.70	343.37	344.36	344.03	1.36	3.28	4.37	0.45
1	8	Regional Storm	3.20	343.37	344.45	344.08	1.45	3.66	4.37	0.46
1	7	2-yr Storm	0.97	343.28	343.95	343.72	0.90	1.58	4.71	0.39
1	7	5-yr Storm	1.34	343.28	344.04	343.82	1.02	2.02	4.71	0.40
1	7	10-yr Storm	1.71	343.28	344.12	343.88	1.12	2.42	4.71	0.42
1	7	25-yr Storm	2.03	343.28	344.19	343.92	1.19	2.73	4.71	0.43
1	7	50-yr Storm	2.36	343.28	344.26	343.96	1.27	3.03	4.71	0.44
1	7	100-yr Storm	2.70	343.28	344.32	344.00	1.34	3.33	4.71	0.44
1	7	Regional Storm	3.20	343.28	344.40	344.06	1.43	3.74	4.71	0.45
1	6	2-yr Storm	0.97	343.27	343.91	343.70	0.91	1.51	4.42	0.40
1	6	5-yr Storm	1.34	343.27	344.00	343.79	1.03	1.91	4.42	0.42
1	6	10-yr Storm	1.71	343.27	344.08	343.85	1.14	2.27	4.42	0.43
1	6	25-yr Storm	2.03	343.27	344.15	343.89	1.22	2.56	4.42	0.44
1	6	50-yr Storm	2.36	343.27	344.21	343.93	1.29	2.84	4.42	0.45
1	6	100-yr Storm	2.70	343.27	344.27	343.97	1.36	3.11	4.42	0.46
1	6	Regional Storm	3.20	343.27	344.36	344.03	1.45	3.49	4.42	0.47
1	5	2-yr Storm	0.97	343.31	343.82		1.17	0.95	2.66	0.58
1	5	5-yr Storm	1.34	343.31	343.89		1.37	1.14	2.66	0.63
1	5	10-yr Storm	1.71	343.31	343.95		1.55	1.30	2.66	0.67
1	5	25-yr Storm	2.03	343.31	343.99		1.70	1.41	2.66	0.71
1	5	50-yr Storm	2.36	343.31	344.03		1.85	1.52	2.66	0.74
1	5	100-yr Storm	2.70	343.31	344.07		1.99	1.62	2.66	0.78
1	5	Regional Storm	3.20	343.31	344.12		2.20	1.75	2.66	0.83
1	4	2-yr Storm	0.97	343.18	343.81		0.74	2.69	6.86	0.31
1	4	5-yr Storm	1.34	343.18	343.89		0.86	3.23	6.86	0.33
1	4	10-yr Storm	1.71	343.18	343.96		0.96	3.71	6.86	0.35
1	4	25-yr Storm	2.03	343.18	344.01		1.03	4.08	6.86	0.37
1	4	50-yr Storm	2.36	343.18	344.07		1.11	4.44	6.86	0.38
1	4	100-yr Storm	2.70	343.18	344.11		1.18	4.78	6.86	0.40
1	4	Regional Storm	3.20	343.18	344.18		1.28	5.24	6.86	0.42

HEC-RAS Plan: PreFlow River: Northside Drive Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
1	3	2-yr Storm	0.97	343.31	343.64	343.64	1.49	0.70	3.63	0.99
1	3	5-yr Storm	1.34	343.31	343.69	343.69	1.64	0.91	4.00	0.97
1	3	10-yr Storm	1.71	343.31	343.74	343.74	1.77	1.11	4.30	0.97
1	3	25-yr Storm	2.03	343.31	343.78	343.78	1.85	1.29	4.57	0.96
1	3	50-yr Storm	2.36	343.31	343.82	343.82	1.95	1.47	4.83	0.96
1	3	100-yr Storm	2.70	343.31	343.86	343.86	2.03	1.65	5.07	0.96
1	3	Regional Storm	3.20	343.31	343.91	343.91	2.13	1.91	5.41	0.96

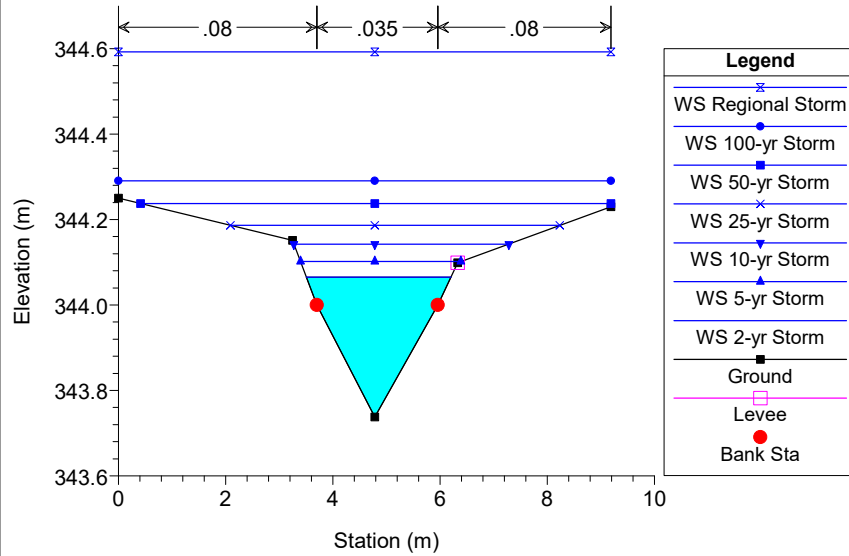
Post- Development Conditions





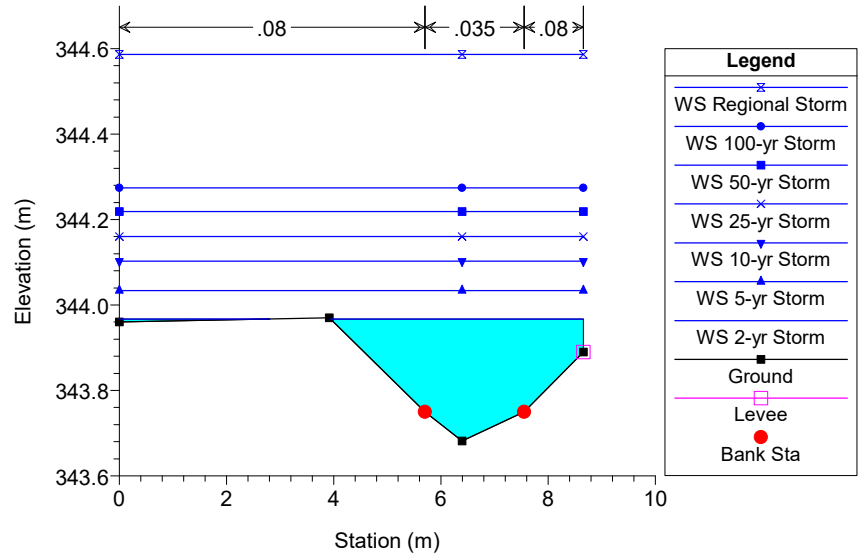
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 8



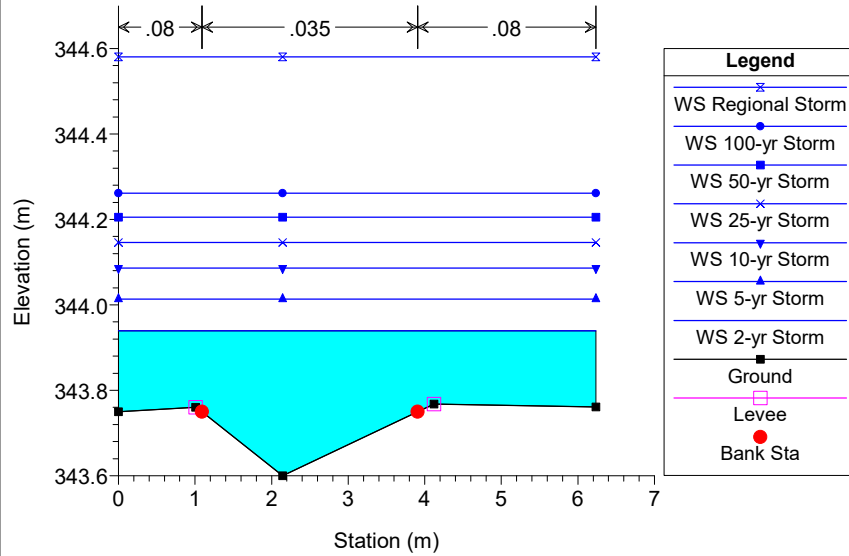
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 9



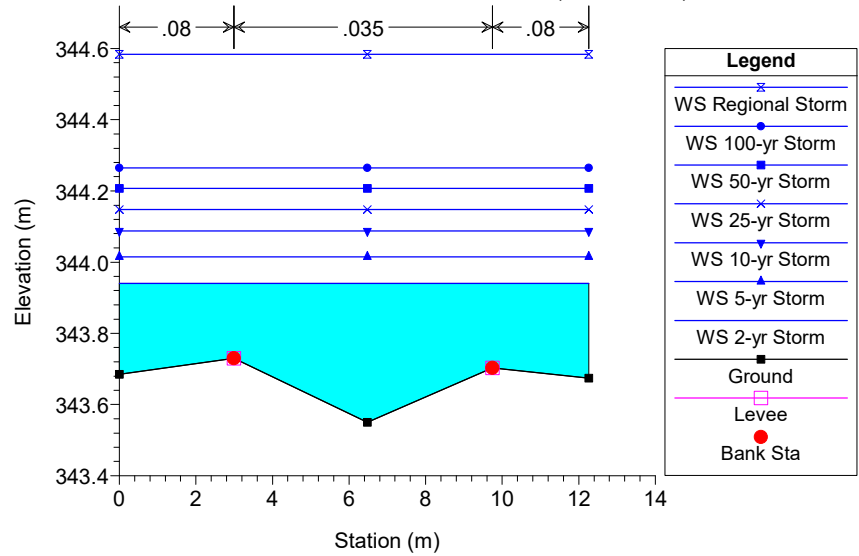
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 10



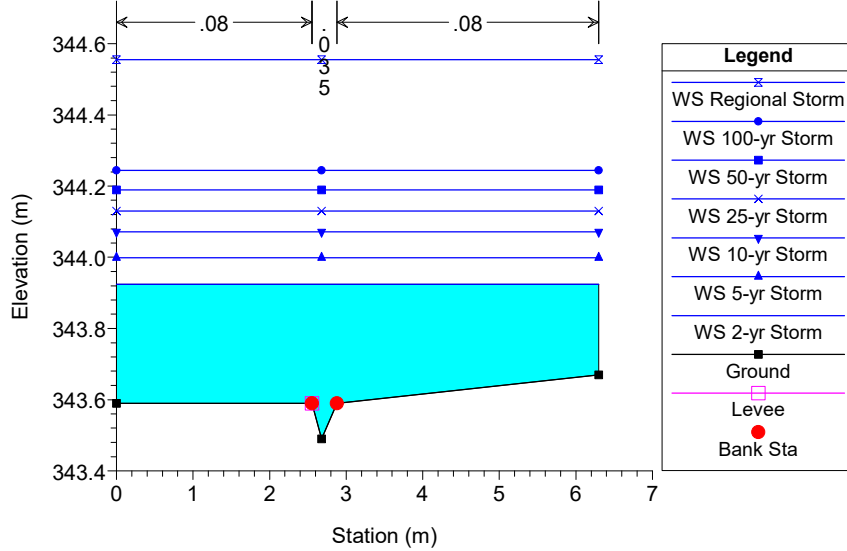
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 11: End of Munc. Drain (12.31 m D/S)



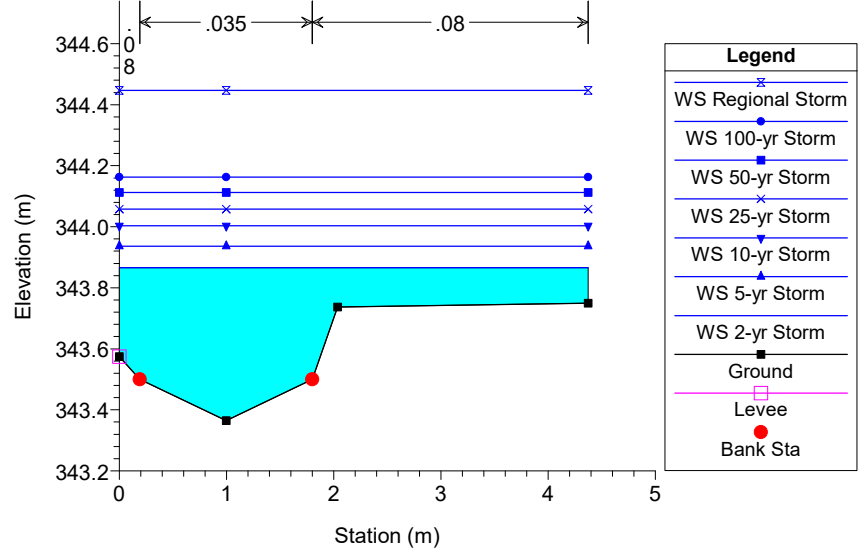
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 13: Beginning of Munc. Drain (33.82 m D/S)



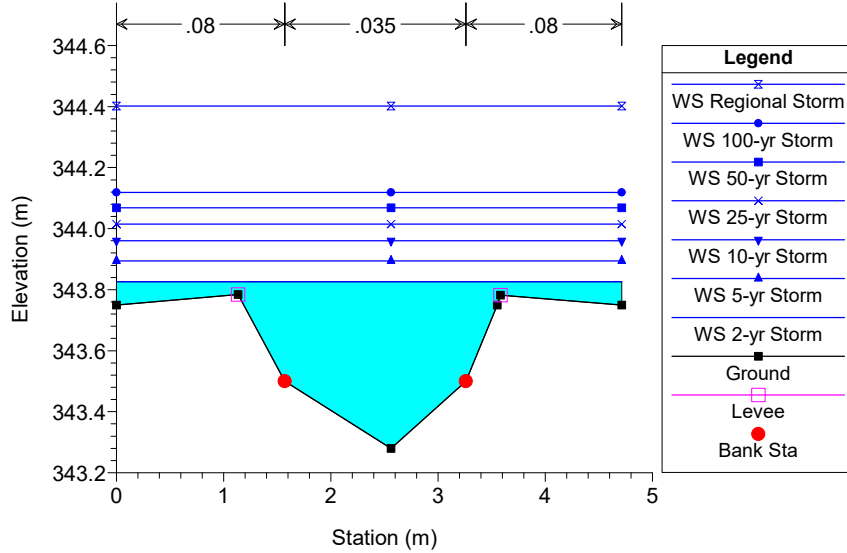
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 14



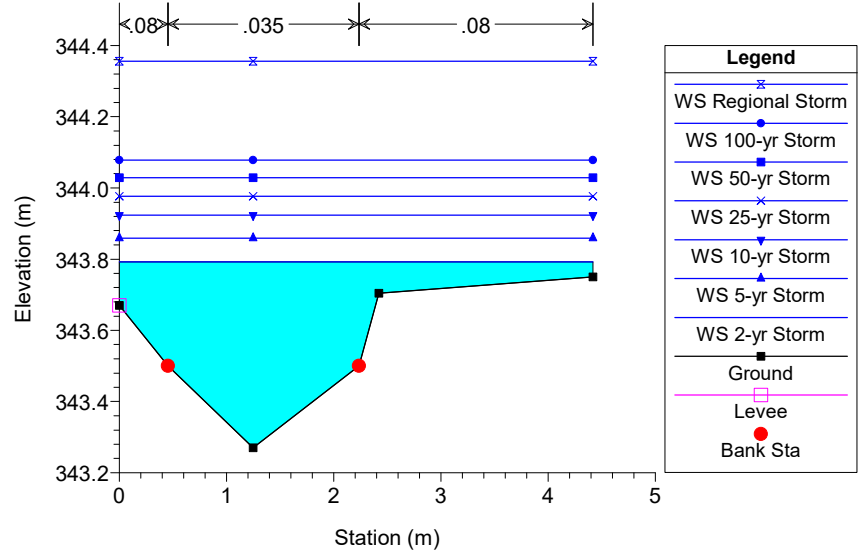
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 15



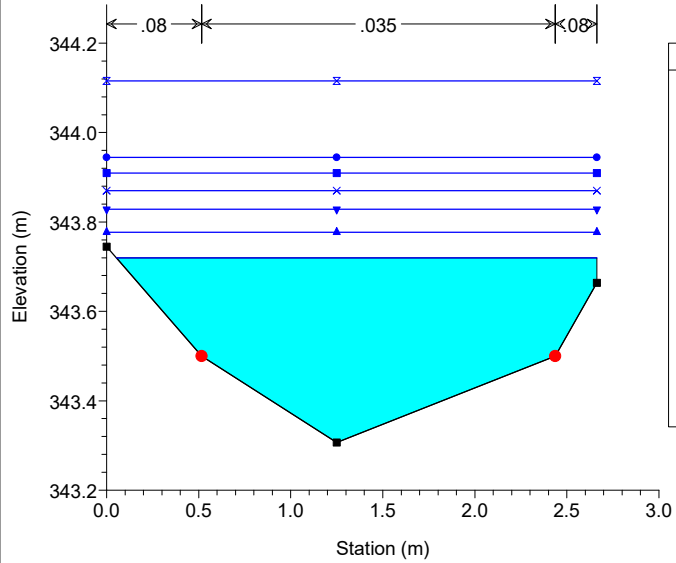
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 16



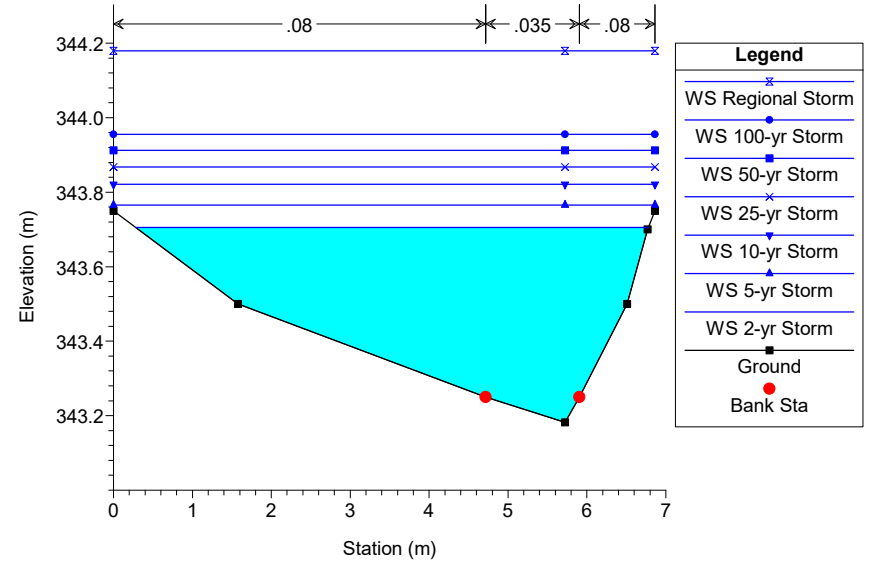
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 17



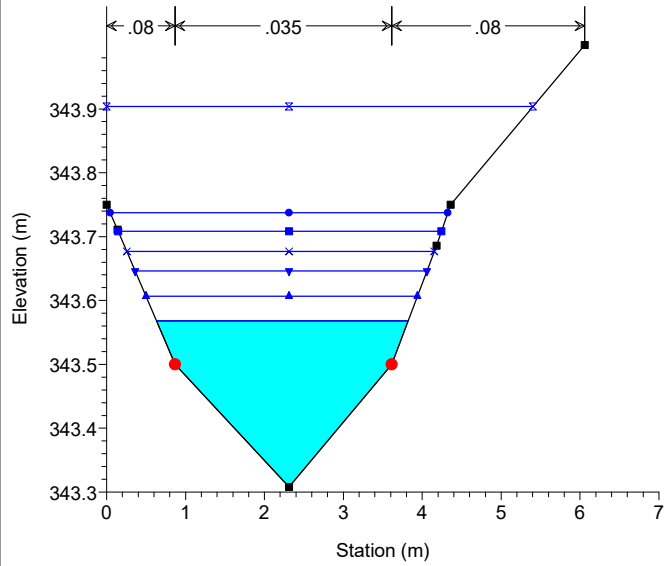
Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 18



Northside_Drain_Capacity_Assesment Plan: Post-Dev 4/27/2025

Cross Section 19



HEC-RAS Plan: PostFlow River: Northside Drive Reach: 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
1	21	2-yr Storm	0.36	344.10	344.59		0.78	0.67	2.47	0.39
1	21	5-yr Storm	0.49	344.10	344.76		0.69	1.15	3.06	0.29
1	21	10-yr Storm	0.63	344.10	344.89		0.69	1.57	3.56	0.26
1	21	25-yr Storm	0.76	344.10	344.90		0.82	1.59	3.57	0.31
1	21	50-yr Storm	0.89	344.10	344.91		0.94	1.66	3.65	0.35
1	21	100-yr Storm	1.03	344.10	344.92		1.07	1.68	3.67	0.40
1	21	Regional Storm	1.39	344.10	344.91		1.47	1.65	3.64	0.55
1	20	2-yr Storm	0.36	343.99	344.60		0.48	0.92	2.67	0.22
1	20	5-yr Storm	0.49	343.99	344.77		0.46	1.42	3.24	0.18
1	20	10-yr Storm	0.63	343.99	344.90		0.48	1.87	3.76	0.17
1	20	25-yr Storm	0.76	343.99	344.90		0.57	1.89	3.79	0.21
1	20	50-yr Storm	0.89	343.99	344.92		0.65	1.97	3.89	0.23
1	20	100-yr Storm	1.03	343.99	344.93		0.74	2.01	3.94	0.26
1	20	Regional Storm	1.39	343.99	344.94		1.00	2.03	3.97	0.35
1	19	2-yr Storm	0.36	343.78	344.60		0.23	2.05	4.10	0.09
1	19	5-yr Storm	0.49	343.78	344.77		0.25	2.77	4.44	0.08
1	19	10-yr Storm	0.63	343.78	344.90		0.27	3.36	4.69	0.09
1	19	25-yr Storm	0.76	343.78	344.91		0.32	3.39	4.71	0.10
1	19	50-yr Storm	0.89	343.78	344.93		0.37	3.50	4.75	0.12
1	19	100-yr Storm	1.03	343.78	344.94		0.42	3.55	4.77	0.13
1	19	Regional Storm	1.39	343.78	344.95		0.57	3.59	4.79	0.18
1	18	2-yr Storm	0.36	343.76	344.60	344.02	0.20	2.56	8.96	0.07
1	18	5-yr Storm	0.49	343.76	344.77	344.05	0.21	3.45	10.62	0.07
1	18	10-yr Storm	0.63	343.76	344.90	344.08	0.20	6.06	13.30	0.06
1	18	25-yr Storm	0.76	343.76	344.91	344.11	0.24	6.16	13.46	0.08
1	18	50-yr Storm	0.89	343.76	344.93	344.13	0.28	6.46	13.92	0.09
1	18	100-yr Storm	1.03	343.76	344.94	344.16	0.31	6.61	14.14	0.10
1	18	Regional Storm	1.39	343.76	344.95	344.22	0.42	6.76	14.36	0.13
1	17		Culvert							
1	15	2-yr Storm	0.36	343.94	344.19	344.19	1.44	0.34	2.08	0.98
1	15	5-yr Storm	0.49	343.94	344.24	344.24	1.58	0.44	2.30	0.98
1	15	10-yr Storm	0.63	343.94	344.28	344.28	1.70	0.55	2.50	0.97
1	15	25-yr Storm	0.76	343.94	344.32	344.32	1.79	0.64	2.66	0.97
1	15	50-yr Storm	0.89	343.94	344.35	344.35	1.90	0.73	2.81	0.98
1	15	100-yr Storm	1.03	343.94	344.39	344.39	1.97	0.83	2.97	0.98
1	15	Regional Storm	1.39	343.94	344.50	344.43	2.07	1.32	9.48	0.91
1	14	2-yr Storm	0.36	343.74	344.06	344.01	0.82	0.46	2.69	0.59
1	14	5-yr Storm	0.49	343.74	344.10	344.04	0.93	0.56	2.99	0.62
1	14	10-yr Storm	0.63	343.74	344.14	344.07	1.01	0.70	4.01	0.61
1	14	25-yr Storm	0.76	343.74	344.19	344.10	1.02	0.92	6.14	0.58
1	14	50-yr Storm	0.89	343.74	344.24	344.13	0.99	1.31	8.78	0.52
1	14	100-yr Storm	1.03	343.74	344.29	344.15	0.92	1.80	9.19	0.45
1	14	Regional Storm	1.39	343.74	344.59	344.24	0.56	4.57	9.19	0.21
1	13	2-yr Storm	0.36	343.68	343.97	343.87	0.65	0.83	7.56	0.41
1	13	5-yr Storm	0.49	343.68	344.03	343.90	0.63	1.40	8.65	0.36
1	13	10-yr Storm	0.63	343.68	344.10	343.93	0.60	2.00	8.65	0.31
1	13	25-yr Storm	0.76	343.68	344.16	343.95	0.58	2.50	8.65	0.28
1	13	50-yr Storm	0.89	343.68	344.22	343.96	0.58	3.00	8.65	0.26
1	13	100-yr Storm	1.03	343.68	344.27	343.96	0.58	3.48	8.65	0.25
1	13	Regional Storm	1.39	343.68	344.59	343.96	0.45	6.19	8.65	0.15
1	12	2-yr Storm	0.36	343.60	343.94	343.80	0.39	1.35	6.24	0.24
1	12	5-yr Storm	0.49	343.60	344.01	343.82	0.40	1.82	6.24	0.22
1	12	10-yr Storm	0.63	343.60	344.09	343.84	0.41	2.27	6.24	0.21
1	12	25-yr Storm	0.76	343.60	344.15	343.86	0.43	2.64	6.24	0.20
1	12	50-yr Storm	0.89	343.60	344.21	343.87	0.45	3.01	6.24	0.20
1	12	100-yr Storm	1.03	343.60	344.26	343.89	0.46	3.36	6.24	0.19
1	12	Regional Storm	1.39	343.60	344.58	343.93	0.40	5.35	6.24	0.14

HEC-RAS Plan: PostFlow River: Northside Drive Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
1	11	2-yr Storm	0.36	343.55	343.94	343.70	0.14	3.40	12.26	0.08
1	11	5-yr Storm	0.49	343.55	344.01	343.71	0.15	4.31	12.26	0.08
1	11	10-yr Storm	0.63	343.55	344.09	343.73	0.16	5.21	12.26	0.08
1	11	25-yr Storm	0.76	343.55	344.15	343.74	0.17	5.95	12.26	0.08
1	11	50-yr Storm	0.89	343.55	344.21	343.75	0.18	6.68	12.26	0.08
1	11	100-yr Storm	1.03	343.55	344.26	343.76	0.19	7.37	12.26	0.08
1	11	Regional Storm	1.39	343.55	344.58	343.79	0.17	11.29	12.26	0.06
1	10	2-yr Storm	0.57	343.60	343.94	343.69	0.11	8.14	28.60	0.07
1	10	5-yr Storm	0.79	343.60	344.01	343.70	0.12	10.29	28.60	0.06
1	10	10-yr Storm	1.02	343.60	344.09	343.72	0.13	12.38	28.60	0.06
1	10	25-yr Storm	1.23	343.60	344.15	343.72	0.14	14.10	28.60	0.06
1	10	50-yr Storm	1.46	343.60	344.21	343.73	0.15	15.81	28.60	0.06
1	10	100-yr Storm	1.68	343.60	344.26	343.74	0.16	17.44	28.60	0.06
1	10	Regional Storm	3.18	343.60	344.58	343.79	0.20	26.56	28.60	0.06
1	9	2-yr Storm	0.57	343.49	343.92	343.73	0.66	1.98	6.30	0.34
1	9	5-yr Storm	0.79	343.49	344.00	343.76	0.73	2.45	6.30	0.34
1	9	10-yr Storm	1.02	343.49	344.07	343.78	0.80	2.91	6.30	0.35
1	9	25-yr Storm	1.23	343.49	344.13	343.80	0.86	3.28	6.30	0.36
1	9	50-yr Storm	1.46	343.49	344.19	343.82	0.91	3.65	6.30	0.36
1	9	100-yr Storm	1.68	343.49	344.24	343.84	0.97	4.00	6.30	0.37
1	9	Regional Storm	3.18	343.49	344.56	343.95	1.26	5.96	6.30	0.40
1	8	2-yr Storm	0.57	343.37	343.87	343.67	0.74	1.10	4.37	0.36
1	8	5-yr Storm	0.79	343.37	343.94	343.72	0.83	1.41	4.37	0.38
1	8	10-yr Storm	1.02	343.37	344.00	343.80	0.92	1.70	4.37	0.39
1	8	25-yr Storm	1.23	343.37	344.06	343.84	0.99	1.94	4.37	0.40
1	8	50-yr Storm	1.46	343.37	344.11	343.88	1.06	2.18	4.37	0.41
1	8	100-yr Storm	1.68	343.37	344.16	343.90	1.12	2.40	4.37	0.42
1	8	Regional Storm	3.18	343.37	344.45	344.09	1.45	3.64	4.37	0.46
1	7	2-yr Storm	0.57	343.28	343.83	343.62	0.74	1.01	4.71	0.36
1	7	5-yr Storm	0.79	343.28	343.89	343.67	0.83	1.34	4.71	0.37
1	7	10-yr Storm	1.02	343.28	343.96	343.72	0.92	1.65	4.71	0.39
1	7	25-yr Storm	1.23	343.28	344.01	343.77	0.99	1.90	4.71	0.40
1	7	50-yr Storm	1.46	343.28	344.07	343.84	1.05	2.15	4.71	0.41
1	7	100-yr Storm	1.68	343.28	344.12	343.88	1.11	2.39	4.71	0.42
1	7	Regional Storm	3.18	343.28	344.40	344.05	1.42	3.72	4.71	0.45
1	6	2-yr Storm	0.57	343.27	343.79	343.61	0.75	0.98	4.42	0.37
1	6	5-yr Storm	0.79	343.27	343.86	343.66	0.84	1.28	4.42	0.39
1	6	10-yr Storm	1.02	343.27	343.92	343.70	0.93	1.56	4.42	0.41
1	6	25-yr Storm	1.23	343.27	343.98	343.77	1.00	1.80	4.42	0.42
1	6	50-yr Storm	1.46	343.27	344.03	343.81	1.07	2.03	4.42	0.43
1	6	100-yr Storm	1.68	343.27	344.08	343.84	1.13	2.25	4.42	0.43
1	6	Regional Storm	3.18	343.27	344.36	344.02	1.45	3.48	4.42	0.47
1	5	2-yr Storm	0.57	343.31	343.72		0.92	0.69	2.61	0.52
1	5	5-yr Storm	0.79	343.31	343.78		1.06	0.84	2.66	0.55
1	5	10-yr Storm	1.02	343.31	343.83		1.20	0.98	2.66	0.59
1	5	25-yr Storm	1.23	343.31	343.87		1.31	1.09	2.66	0.61
1	5	50-yr Storm	1.46	343.31	343.91		1.43	1.19	2.66	0.64
1	5	100-yr Storm	1.68	343.31	343.94		1.54	1.29	2.66	0.67
1	5	Regional Storm	3.18	343.31	344.12		2.20	1.74	2.66	0.83
1	4	2-yr Storm	0.57	343.18	343.71		0.58	1.98	6.50	0.27
1	4	5-yr Storm	0.79	343.18	343.77		0.68	2.38	6.86	0.29
1	4	10-yr Storm	1.02	343.18	343.82		0.76	2.77	6.86	0.31
1	4	25-yr Storm	1.23	343.18	343.87		0.83	3.08	6.86	0.33
1	4	50-yr Storm	1.46	343.18	343.91		0.89	3.39	6.86	0.34
1	4	100-yr Storm	1.68	343.18	343.96		0.95	3.68	6.86	0.35
1	4	Regional Storm	3.18	343.18	344.18		1.28	5.22	6.86	0.42

HEC-RAS Plan: PostFlow River: Northside Drive Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
1	3	2-yr Storm	0.57	343.31	343.57	343.57	1.27	0.47	3.19	1.00
1	3	5-yr Storm	0.79	343.31	343.61	343.61	1.40	0.59	3.44	0.99
1	3	10-yr Storm	1.02	343.31	343.65	343.65	1.50	0.74	3.70	0.97
1	3	25-yr Storm	1.23	343.31	343.68	343.68	1.60	0.85	3.89	0.98
1	3	50-yr Storm	1.46	343.31	343.71	343.71	1.68	0.98	4.10	0.97
1	3	100-yr Storm	1.68	343.31	343.74	343.74	1.76	1.10	4.28	0.97
1	3	Regional Storm	3.18	343.31	343.90	343.90	2.13	1.90	5.40	0.96