

**PRELIMINARY DRAINAGE &
SERVICING INVESTIGATION BRIEF**

ALL SAINTS ANGLICAN CHURCH SEVERANCE

**TOWN OF COLLINGWOOD
COUNTY OF SIMCOE**

PREPARED FOR:

ALL SAINTS ANGLICAN CHURCH

PREPARED BY:

**C.F. CROZIER & ASSOCIATES INC.
70 HURON STREET, SUITE 100
COLLINGWOOD, ON L9Y 4L4**

OCTOBER 2025

CFCA FILE NO. 2960-7554

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1.0 Introduction

CF Crozier & Associates Inc. (Crozier) has been retained by All Saints Anglican Church (Client) to prepare a Preliminary Drainage & Servicing Investigation Brief to support the Zoning By-Law Amendment (ZBA) for lands located at 401 Raglan Street in the Town of Collingwood (Town), within Simcoe County (County). The All-Saints Cemetery property covers an area of approximately 8.56ha. The ZBA will support the Client's intention to facilitate the severance of approximately 5.26 ha of the eastern portion of the property from Community Services (CS zone) to Industrial Park (M5) zone. These eastern lands will henceforth be referred to as the Subject Lands. The Investigation Brief will provide a high-level assessment of the Subject Lands' development potential from a servicing and stormwater management perspective.

2.0 Background & Site Description

The Subject Lands currently consist of heavily wooded areas and an informal trail running from Ron Emo Road to the south. The Subject Lands are bound by Ron Emo Road to the north and Sanford Fleming Dr. to the east. The existing cemetery lies to the west. Using Simcoe County GIS Mapping, the Site drains to the north towards Ron Emo Road at a 1.3% slope based on the existing topography. Using the AgMaps GIS tool, the predominant soil type identified for the site is Sargent Gravelly Sandy Loam, belonging to hydrologic soil group A.

A development concept plan was not prepared for this Investigation Brief, as the ultimate use is not currently known, and will be subject to future Site Plan Approval. However, the surrounding businesses can help inform the likely development on the Subject Lands. Businesses along Sanford Fleming Drive include an event venue, equipment suppliers, contractors, offices and automotive yards. On Ron Emo Road, there is a large warehouse space to the north. Given that the Subject Lands will be re-zoned to the Industrial Park M-5 designation, the Collingwood Zoning By-law 2010-040 describes a variety of potential uses for the Subject Lands, including warehouses and light industrial uses. The proposed development for the Subject Lands will need to be determined at the Site Plan Application stage and will adhere to the M-5 zone designation.

3.0 Proposed Servicing Strategy

3.1 Existing Sanitary Services

3.1.1 Collingwood Wastewater Treatment Plant

Sanitary servicing for the Subject Lands will be achieved via connection to the Town of Collingwood Wastewater Treatment Plant (CWWTP) and sanitary system. Per the 2024 Year End: Water and Wastewater Uncommitted Hydraulic Reserve Capacity Update Staff Report IN2025-05 dated February 24th, 2025, the hydraulic reserve capacity is 7,048 m³/day. The uncommitted hydraulic reserve capacity of the CWWTP is approximately 4,522 m³/day. A Municipal Class Environmental Assessment is anticipated through 2025, with the goal of increasing the operating capacity of the CWWTP. Design is slated for 2027-2028 with construction beginning in 2029. It is assumed that wastewater allocation will be provided for the proposed development through future Site Plan Approval.

3.1.2 Existing Sanitary System

As-built drawings of Raglan Street, Ron Emo Road, and Sanford Fleming Drive were received from the Town to determine the existing sanitary infrastructure nearby the Subject Lands. There is an existing 300mm diameter PVC sanitary sewer along Ron Emo Road, that flows east and connects to a

manhole near the intersection at Sandford Fleming Drive. This manhole also accepts sanitary flows from further east along Sandford Fleming Drive. Based on the Collingwood Water and Sanitary Sewer Systems Final Master Plan (Cole, 2019), sanitary flows drain north along Sandford Fleming Drive and through an easement towards Macdonald Road, before ultimately draining to the Clair Street Pumping Station. The sewage is then pumped to the CWWTP.

There are two existing sanitary manholes on Ron Emo Drive north of the subject lands: SAN MH1A and SAN MH2A. These are identified on PP1-G-2287 Plan and Profile Ron Emo Street Municipal Servicing (Greenland Consulting Engineers, October 2009).

3.2 Proposed Sanitary Services

The Subject Lands will be serviced by a 200mm diameter sanitary sewer pipe connection to the existing sanitary sewer on Ron Emo Street. The location will be confirmed when a development concept plan is made available at Site Plan Application.

The Town of Collingwood Development Standards (2022) and the MECP Design Guidelines for Sewage Works (2008) were used to determine the future sanitary design flows for the Subject Lands. The sanitary flows for the of the Subject Development was determined using the following design parameters:

• Light Industrial Flow Rate	35 m ³ /ha-day
• Developed Site Area	5.26 ha
• Building Coverage (50% total site area)	2.63 ha
• Infiltration	0.23 L/s/ha

Based on these design parameters, the estimated peak sanitary flow from the Subject Lands will be 6.0 L/sec. This peak flow can be used to confirm the downstream capacity through the Town's sanitary model. Refer to sanitary demand calculations in **Appendix A**.

3.3 Existing Water Services

3.3.1 Raymond A. Barker Treatment Plant

Water servicing for the Subject Development will be achieved through connection to the Raymond A. Barker Water Treatment Plant and water distribution system. Per the 2024 Year End: Water and Wastewater Uncommitted Hydraulic Reserve Capacity Update Staff Report IN2025-05 dated February 24th, 2025, the hydraulic reserve capacity is 1,379 m³/day. Allocation will be granted as part of Site Plan Approval in accordance with the Town's Servicing Capacity Allocation Policy (SCAP).

3.3.2 Existing Water System

A review of as-built drawings provided by the Town show an existing 300mm diameter watermain along Ron Emo Road. According to the Collingwood Water and Sanitary Sewer Systems Final Master Plan (Cole, 2019), this 300mm diameter watermain connects to 300mm diameter watermain on Raglan Street and Stanford Fleming Drive. There are existing fire hydrants along Ron Emo Street that are assumed to provide sufficient firefighting flows for the area.

3.4 Proposed Water Servicing

Water servicing to the Subject Development will be supplied by a 200mm diameter watermain connection to the existing 300 mm diameter watermain on Ron Emo Road. Refer to **Figure 1** for the location of proposed and existing watermain.

To estimate the proposed water demands for the Subject Development, Town of Collingwood Development Standards (2022), and the MECP Design Guidelines for Drinking Water Systems (2008) were referenced to determine the average, maximum day and peak hour water demands generated by the future development.

Water demands for the residential development were determined using the following design parameters:

- Average Industrial Flow Rate (per MECP Sewage Works) 35 m³/ha-day
- Max Day/Peak Hour Factors (per Town Standards) 2.00/4.50

It is estimated that the range of water demands for the Subject Development are as follows:

- Average Day 1.07 L/sec
- Max Day 2.13 L/sec
- Peak Hour 4.79 L/sec

Additional fire hydrants may be required to ensure proper firefighting coverage to the southern limits of the Subject Lands. Fire flow calculations will be completed once a development concept plan is made available.

4.0 Proposed Stormwater Management Strategy

4.1 Stormwater Management Criteria

Stormwater management (SWM) and site drainage for the Subject Lands will proceed in conformance with the standards provided by the Town, Nottawasaga Valley Conservation Authority (NVCA), and Ministry of the Environment, Conservation and Parks (MECP). The following criteria applies to the proposed internal SWM strategy.

- Water Quantity Control
 - Control of the post development peak flows to pre-development levels for all storms up to and including the 100-yr at the proposed outlet.
- Water Quality Control
 - "Enhanced Protection" per MECP and NVCA Guidelines (80% removal of total suspended solids).
- Development Standard
 - Lot grading at 2% optimum.
 - Minor/major drainage system to convey frequent rainfall/runoff events.

The detailed design of quantity and quality controls for the Subject Lands will be completed at Site Plan Application. The following sections describe the existing and proposed drainage conditions, which will be subject to refinement based on any future development concept plans.

4.2 Existing Drainage Conditions

The Subject Lands generally slope towards the north at a gradient of approximately 1-2%. There is an existing roadside ditch along Ron Emo Road that captures runoff from the Subject Lands. The roadside ditch falls east at a 0.5% slope and has a triangular cross section about 0.6m deep with max 3:1 side slopes. Flows are conveyed to twin 450mm diameter CSP culverts at the intersection of Ron Emo Road and Sandford Fleming Drive before flowing to a rock check dam. Stormwater flows are ultimately sent north in a roadside ditch along Sandford Fleming Drive.

Using the Simcoe County GIS mapping tool, the subject lands appear to accept external drainage area from the south. At the site plan application stage, detailed plans will be prepared to demonstrate how existing drainage patterns will be maintained, and external drainage areas will be intercepted and conveyed as required.

4.3 Proposed Drainage Conditions

There is no proposed development concept plan for the Subject Lands. However, in line with the Zoning By-law and for the purposes of this Investigation Brief, it will be assumed that the Subject Lands will be developed to include a warehouse with parking space area.

The Collingwood Zoning By-law establishes the following:

- The maximum lot coverage for M5 zones is 50% of the lot area.
- The minimum landscaped open space is 15% of the lot area.

Based on these values, it is assumed that the proposed percent impervious area will be 85% (which will include both the building footprint and parking) of the developable area and the proposed percent pervious area will be 15% of the developable area. Stormwater flows will be conveyed and discharged to the existing roadside ditch on Ron Emo Road. Proposed grading of the Site will aim to match the surrounding existing grades. Swales/ditches, culverts, and erosion control measures will be used to convey stormwater away from the built form and areas accessed by vehicular and pedestrian traffic. The minor drainage system will consist of storm sewers and catchbasins sized to convey up to the 10-year design storm event, per Town standards. We will maintain minimum and maximum slopes in accordance with the Town engineering requirements. A grading plan will be prepared at Site Plan Application.

4.4 Stormwater Management

4.4.1 Quantity Control

The Subject Lands were delineated as a single catchment with an area of 5.26 ha:

- In the pre-development scenario, the catchment has a runoff coefficient of 0.08. This is based on the Site's flat topography, wooded areas and predominant hydrologic group A soil.
- In the post-development scenario, the catchment has a weighted runoff coefficient of 0.78 based on an 85% impervious area and 15% pervious area.

To complete the hydrologic analysis, the Modified Rational Method was used to determine the required storage to control post-development runoff to the pre-development conditions. The specific IDF coefficients to use for our Site's general area were based on the values provided in the Town of Collingwood's engineering guidelines (2022). While no submission to the NVCA is anticipated, the

following adjustment factors were applied to the catchment composite runoff coefficients to satisfy NVCA guidelines. These adjustments help account for the decrease in perviousness during major storm events.

- 10% added to the 25 year event.
- 20% added to the 50 year event.
- 25% added to the 100 year event.

The amount of storage required to control post development flows to predevelopment flows for the 2-, 5-, 10-, 25-, 50-, and 100-year design storms can be found in **Table 1**:

Table 1: Required Stormwater Storage

Return Period (Years)	Flow Rates (m ³ /s)		
	Pre-development/ Target Flow (m ³ /s)	Post development Uncontrolled Flow (m ³)	Required Storage (m ³)
2	0.09	0.90	859
5	0.12	1.17	1,134
10	0.14	1.36	1,312
25	0.18	1.75	1,694
50	0.22	2.11	2,071
100	0.25	2.42	2,363

Approximately 2,400 m³ of storage will be needed to control pre-development flows up to the 100-year design storm. Note that the above required storage values are a conservative estimate and will be refined when a development concept plan is made available. Stormwater storage can be achieved with underground systems such as stormwater storage tanks or superpipe. While a stormwater management pond may be utilized given that these typically require a minimum drainage area of 5 ha, it may not be the optimal choice given the large footprint required. The design of the control structure and stormwater storage system will be completed at Site Plan Application.

4.4.2 Quality Control

To provide an enhanced level of protection for water quality control and meet NVCA guidelines, an Oil/Grit Separator (OGS) unit is proposed for the Subject Land. The OGS will be located immediately downstream of the control manhole before discharging the treated water to the existing roadside ditch on Ron Emo Road. All stormwater from the controlled impervious areas of the Subject Lands will be routed through the treatment unit. The sizing and selection of Oil/Grit Separator will be completed at the Site Plan Application stage.

5.0 Utilities

The Subject Lands are proposed to be serviced with natural gas, telephone and hydro. We understand these utilities are available in the Ron Emo Street right-of-way adjacent to the Subject Lands as the surrounding properties are currently fully serviced. Based on Google Street-view, it appears that 3-phase electrical service is available on Ron Emo Road. Coordination with the utilities will be undertaken during the detailed design phases to confirm utility design capacity and connection locations.

6.0 CONCLUSIONS

Based on the foregoing, we conclude that the Subject Lands belonging to the All Saints Anglican Church can be adequately serviced.

1. Access to the Subject Lands will be provided by an entrance with a connection to Ron Emo Road.
2. Water servicing can be achieved with a 200mm diameter watermain connection to the existing 300 mm diameter watermain on Ron Emo Street.
3. Sanitary servicing can be achieved with a 300mm diameter sanitary sewer connection to the existing 300 mm diameter sanitary sewer on Ron Emo Street
4. Water servicing and sanitary servicing allocation is assumed to be available and will need to be confirmed with the Town.
5. Existing topography has indicated that the Subject Lands drain towards the roadside ditch on Ron Emo Road. In the post development condition, existing drainage patterns will be maintained and runoff from the Subject Lands will be controlled to pre-development flows before discharging to the roadside ditch.
6. The required stormwater storage to control pre-development flows up to the 100-year design storm is approximately 2,400m³. This value is conservative. The design of the stormwater system will be completed at Site Plan Application.
7. An Oil/Grit Separator is proposed to service the Subject Lands and is adequate to provide water quality control. The sizing and selection of Oil/Grit Separator will be completed at Site Plan Application.

Based on the above conclusions, we recommend the approval of the Zoning By-law Amendment for the severance of the property at 401 Raglan Street, from the perspective of functional servicing and stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



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Project Engineer

C.F. CROZIER & ASSOCIATES INC.



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Engineering Intern

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APPENDIX A

Water and Sanitary Servicing Demand Calculations

All Saints Anglican Church - ZBA

Developed Site Area 5.26 ha

Number of Residential Units and Land Usage

1) Ground Floor Industrial Area (50% Lot Coverage) **26,300 m²**

Unit Sewage flows

Commercial (per MOE Design Guidelines for Sewage Works, 2008) 28 m³/ha-day

Light Industrial (per MOE Design Guidelines for Water Works, 2008) 35 m³/ha-day

Infiltration (per TOC Engineering Standards, 2024) 0.23 L/s/ha

Total Design Sewage Flows

Infiltration/Inflow Residential 1.21 L/sec

Average Daily Industrial Flow 1.07 L/sec

Residential Peak Factor (Harmon Formula) 4.50

Total Peak Daily Flow 6.00 L/sec

All Saints Anglican Church - ZBA

Developed Site Area 5.26 ha

Number of Residential Units and Land Usage1) Ground Floor Industrial Area (50% Lot Coverage) **26,300 m²****Domestic Water Design Flows**Commercial (Per TOM Engineering Standards, 2024) 28 m³/ha-dayLight Industrial (per MOE Design Guidelines for Water Works, 2008) 35 m³/ha-day**Total Domestic Water Design Flows**

Average Daily Industrial Flow 1.07 L/sec

Max Day Peak Factor (per MOE Design Guidelines for Water Works, 2008) 2.00

Max Day Demand Flow **2.13** L/sec

Peak Hour Factor (per MOE Design Guidelines for Water Works, 2008) 4.50

Peak Hour Flow **4.79** L/sec

APPENDIX B

Stormwater Management Calculations



Project Name: All Saints Anglican Church
 Project Number: 2960-7554
 Date: 2025-10-06
 By: RDM

D.A. NAME PRE-1
D.A. AREA (ha) 5.26

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-1

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Sargent Gravelly Sandy Loam	SGL	A	100	5.26
				0
				0
Total Area				5.26

Impervious Landuses Present:													
		Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils		Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
SGL			98		98		98		98	0	98	0	0
	0		98		98		98		98		98	0	0
	0		98		98		98		98		98	0	0
	0		98		98		98		98		98	0	0
Subtotal		0		0		0		0		0			

Pervious Landuses Present:													
		Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils		Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
SGL		5.26	32	0	38	0	38	0.00	49	0	62	5.26	168.32
	0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
	0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
	0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal		5.26		0.00		0.00		0.00		0.00			

		Composite Area Calculations		Total Pervious Area		Total Impervious Area		% Impervious		Composite Curve #		5.26	
												0.00	
												0.00%	
												32.0	
												5.26	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient							
Landuse	IA (mm)	Area (ha)	A * IA	Sargent Gravelly		0		0		0	
				RC	Area	RC	Area	RC	Area	RC	Area
Woodland	10	5.26	52.6	0.08	5.26		0		0		0
Meadow	8	0.00	0.00	0.10	0.00		0		0		0
Wetland	16	0.00	0.00	0.05	0.00		0		0		0
Lawn	5	0.00	0.00	0.10	0.00		0		0		0
Cultivated	7	0.00	0.00	0.22	0.00		0		0		0
Impervious	2	0.00	0	0.90	0.00		0		0		0
Composite		5.26	10.00	Composite Runoff Coefficient							
				0.08							

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	V/S ^{0.5}	Velocity (m/s)	Tc (hr)	Tp (hr)	TOTAL Tp (hr)	Tc (hr)	Tp (hr)	Tc (hr)	Tp (hr)
SHEET	135.89	13.5	9.9%	0.6	0.19	0.20	0.13	0.13	0.07	0.05	0.30	0.20

Appropriate calculated time to peak: **0.20** Appropriate Method: **Airport**



Project Name: All Saints Anglican Church
 Project Number: 2960-7554
 Date: 2025-10-06
 By: RDM

D.A. NAME POST-1
 D.A. AREA (ha) 5.26

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment POST-1

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Sargent Gravelly Sandy Loam	SGL	A	100	5.26
				0
				0
Total Area Check				5.26

Impervious Landuses Present:												
Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
SGL	1.84	98		98		98	2.63	98		98	4.47	438
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Ar	1.84		0		0.00		2.63		0			

Pervious Landuses Present:												
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
SGL	0	32	0	38	0	50	0.79	49	0	62	0.79	38.71
0	0		0		0		0.00		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Ar	0		0		0		0.79		0			

	Pervious Area Calculations		Total Pervious Area		0.79	
			Composite Pervious Curve #		49.0	
	Impervious Area Calculations		Total Directly Connected Area		1.84	
			Total Indirectly Connected Area		2.63	
			Total Impervious Area		4.47	
			% X imp		35.0	
		% T imp		85.0		
Total Area Check					5.26	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.79	3.95
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	190	0.25
Impervious	2.0	2	187	0.013

Modified Rational Method Storage Sizing

Peak Flow

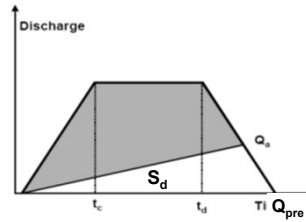
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T+B)^c$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	78.28
Return Period	2yr		
Time of Concentration (min)	10		
Coeff A	807.44		
Coeff B	6.75		
Coeff C	0.828		
Runoff Coeff (Unadjusted)*	0.08	Flow (m³/s)	0.09
Runoff Coefficient (Adjusted)	0.08		
Area (ha)	5.26		

*Woodlands w/ 0%-5% slope, open sand loam

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	78.28
Return Period	2yr		
Time of Concentration (min)	10		
Coeff A	807.44		
Coeff B	6.75		
Coeff C	0.828		
Runoff Coeff (unadjusted)*	0.78	Uncont. Flow (m³/s)	0.90
Runoff Coefficient (Adjusted)	0.78		
Area (ha)	5.26		

*weighted average

Post Development RC			
	Area	RC	A*RC
Impervious	4.47	0.90	4.02
Pervious	0.79	0.10	0.08
	Weighted RC		0.78

Target Flow (m³/s)	0.09
--------------------	------

REQUIRED STORAGE VOLUME:	858.9
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Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{Uncont}	S _d
min	mm/hr	sec	m³/s	m³
0	166.13	0	1.908	-27.7
1	148.17	60	1.702	71.7
2	134.01	120	1.539	151.5
3	122.52	180	1.408	217.4
4	113.01	240	1.298	272.8
5	104.98	300	1.206	320.3
6	98.12	360	1.127	361.5
7	92.17	420	1.059	397.7
8	86.97	480	0.999	429.7
9	82.37	540	0.946	458.4
10	78.28	600	0.899	484.2
15	63.05	900	0.724	582.7
20	53.12	1200	0.610	649.3
25	46.10	1500	0.530	697.5
30	40.84	1800	0.469	733.8
35	36.75	2100	0.422	762.0
40	33.46	2400	0.384	784.2
45	30.76	2700	0.353	801.9
50	28.50	3000	0.327	816.2
55	26.57	3300	0.305	827.6
60	24.92	3600	0.286	836.7
65	23.47	3900	0.270	843.9
70	22.20	4200	0.255	849.6
75	21.07	4500	0.242	853.8
80	20.06	4800	0.230	856.9
85	19.15	5100	0.220	858.9

Modified Rational Method Storage Sizing

Peak Flow

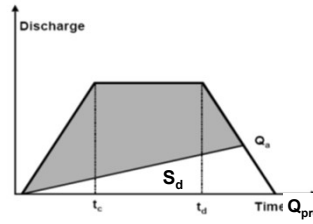
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T+B)^C$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	102.27
Return Period	5 yr		
Time of Concentration (min)	10		
Coeff A	1135.4		
Coeff B	7.5		
Coeff C	0.841		
Runoff Coeff (Unadjusted)	0.08	Flow (m³/s)	0.12
Runoff Coefficient (Adjusted)	0.08		
Area (ha)	5.26		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	102.27
Return Period	5 yr		
Time of Concentration (min)	10		
Coeff A	1135.4		
Coeff B	7.5		
Coeff C	0.841		
Runoff Coeff (unadjusted)	0.78	Uncont. Flow (m³/s)	1.17
Runoff Coefficient (Adjusted)	0.78		
Area (ha)	5.26		

Target Flow (m³/s)	0.12
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REQUIRED STORAGE VOLUME:	1133.8
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Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{uncont}	S _d
min	mm/hr	sec	m³/s	m³
0	208.56	0	2.396	-36.2
1	187.72	60	2.156	89.6
2	170.96	120	1.964	192.3
3	157.16	180	1.805	278.0
4	145.58	240	1.672	350.8
5	135.72	300	1.559	413.5
6	127.21	360	1.461	468.3
7	119.79	420	1.376	516.5
8	113.26	480	1.301	559.5
9	107.46	540	1.234	597.9
10	102.27	600	1.175	632.6
15	82.79	900	0.951	765.6
20	69.93	1200	0.803	855.6
25	60.77	1500	0.698	920.6
30	53.88	1800	0.619	969.4
35	48.49	2100	0.557	1007.2
40	44.16	2400	0.507	1036.8
45	40.60	2700	0.466	1060.4
50	37.61	3000	0.432	1079.2
55	35.06	3300	0.403	1094.2
60	32.86	3600	0.378	1106.0
65	30.95	3900	0.356	1115.3
70	29.26	4200	0.336	1122.5
75	27.76	4500	0.319	1127.8
80	26.42	4800	0.303	1131.4
85	25.21	5100	0.290	1133.8

Modified Rational Method Storage Sizing

Peak Flow

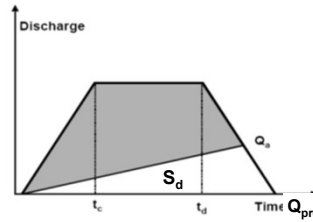
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T+B)^C$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	118.36
Return Period	10 yr		
Time of Concentration (min)	10		
Coeff A	1387		
Coeff B	7.97		
Coeff C	0.852		
Runoff Coeff (Unadjusted)	0.08	Flow (m³/s)	0.14
Runoff Coefficient (Adjusted)	0.08		
Area (ha)	5.26		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	118.36
Return Period	10 yr		
Time of Concentration (min)	10		
Coeff A	1387		
Coeff B	7.97		
Coeff C	0.852		
Runoff Coeff (unadjusted)	0.78	Uncont. Flow (m³/s)	1.36
Runoff Coefficient (Adjusted)	0.78		
Area (ha)	5.26		

Target Flow (m³/s)	0.14
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REQUIRED STORAGE VOLUME:	1312.0
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Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{uncont}	S _d
min	mm/hr	sec	m³/s	m³
0	236.61	0	2.718	-41.8
1	213.94	60	2.458	101.4
2	195.52	120	2.246	219.3
3	180.23	180	2.070	318.3
4	167.32	240	1.922	402.7
5	156.26	300	1.795	475.8
6	146.68	360	1.685	539.7
7	138.29	420	1.589	596.1
8	130.88	480	1.503	646.4
9	124.28	540	1.428	691.4
10	118.36	600	1.360	732.1
15	96.02	900	1.103	888.2
20	81.19	1200	0.933	993.7
25	70.57	1500	0.811	1069.7
30	62.57	1800	0.719	1126.6
35	56.31	2100	0.647	1170.3
40	51.27	2400	0.589	1204.5
45	47.12	2700	0.541	1231.4
50	43.63	3000	0.501	1252.8
55	40.66	3300	0.467	1269.6
60	38.10	3600	0.438	1282.9
65	35.87	3900	0.412	1293.1
70	33.90	4200	0.389	1300.8
75	32.15	4500	0.369	1306.3
80	30.58	4800	0.351	1310.0
85	29.18	5100	0.335	1312.0

Modified Rational Method Storage Sizing

Peak Flow

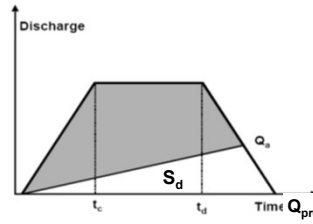
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T+B)^C$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	138.40
Return Period	25 yr		
Time of Concentration (min)	10		
Coeff A	1676.2		
Coeff B	8.3		
Coeff C	0.858		
Runoff Coeff (Unadjusted)	0.08	Flow (m³/s)	0.18
Runoff Coefficient (Adjusted)	0.09		
Area (ha)	5.26		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	138.40
Return Period	25 yr		
Time of Concentration (min)	10		
Coeff A	1676.2		
Coeff B	8.3		
Coeff C	0.858		
Runoff Coeff (unadjusted)	0.78	Uncont. Flow (m³/s)	1.75
Runoff Coefficient (Adjusted)	0.86		
Area (ha)	5.26		

Target Flow (m³/s)	0.18
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REQUIRED STORAGE VOLUME:	1693.6
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Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{uncont}	S _d
min	mm/hr	sec	m³/s	m³
0	272.75	0	3.447	-53.8
1	247.38	60	3.126	128.4
2	226.63	120	2.864	279.1
3	209.31	180	2.645	406.1
4	194.62	240	2.459	514.9
5	182.00	300	2.300	609.2
6	171.02	360	2.161	691.9
7	161.38	420	2.039	765.0
8	152.85	480	1.932	830.3
9	145.24	540	1.835	888.8
10	138.40	600	1.749	941.7
15	112.50	900	1.422	1144.9
20	95.21	1200	1.203	1282.4
25	82.81	1500	1.046	1381.3
30	73.44	1800	0.928	1455.2
35	66.10	2100	0.835	1512.0
40	60.19	2400	0.761	1556.3
45	55.31	2700	0.699	1591.1
50	51.21	3000	0.647	1618.6
55	47.72	3300	0.603	1640.3
60	44.71	3600	0.565	1657.2
65	42.08	3900	0.532	1670.2
70	39.76	4200	0.502	1679.9
75	37.71	4500	0.476	1686.7
80	35.87	4800	0.453	1691.2
85	34.21	5100	0.432	1693.6

Modified Rational Method Storage Sizing

Peak Flow

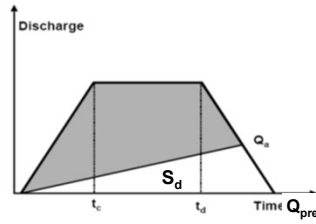
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T+B)^C$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	153.18
Return Period	50 yr		
Time of Concentration (min)	10		
Coeff A	1973.1		
Coeff B	9		
Coeff C	0.868		
Runoff Coeff (Unadjusted)	0.08	Flow (m³/s)	0.22
Runoff Coefficient (Adjusted)	0.10		
Area (ha)	5.26		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	153.18
Return Period	50 yr		
Time of Concentration (min)	10		
Coeff A	1973.1		
Coeff B	9		
Coeff C	0.868		
Runoff Coeff (unadjusted)	0.78	Uncont. Flow (m³/s)	2.11
Runoff Coefficient (Adjusted)	0.94		
Area (ha)	5.26		

Target Flow (m³/s)	0.22
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REQUIRED STORAGE VOLUME:	2071.0
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Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{uncont}	S _d
min	mm/hr	sec	m³/s	m³
0	293.00	0	4.039	-65.0
1	267.39	60	3.686	149.7
2	246.16	120	3.393	329.2
3	228.25	180	3.147	481.9
4	212.93	240	2.935	613.5
5	199.67	300	2.753	728.3
6	188.06	360	2.593	829.4
7	177.82	420	2.451	919.1
8	168.70	480	2.326	999.3
9	160.54	540	2.213	1071.6
10	153.18	600	2.112	1137.0
15	125.06	900	1.724	1389.2
20	106.12	1200	1.463	1560.5
25	92.43	1500	1.274	1683.9
30	82.05	1800	1.131	1776.2
35	73.90	2100	1.019	1846.9
40	67.31	2400	0.928	1902.0
45	61.86	2700	0.853	1945.2
50	57.29	3000	0.790	1979.3
55	53.38	3300	0.736	2006.1
60	50.01	3600	0.689	2026.9
65	47.06	3900	0.649	2042.8
70	44.46	4200	0.613	2054.6
75	42.16	4500	0.581	2062.9
80	40.09	4800	0.553	2068.3
85	38.24	5100	0.527	2071.0

Modified Rational Method Storage Sizing

Peak Flow

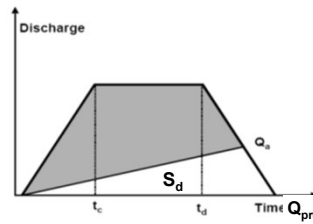
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T + B)^{0.78}$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	168.45
Return Period	100 yr		
Time of Concentration (min)	10		
Coeff A	2193.1		
Coeff B	9.04		
Coeff C	0.871		
Runoff Coeff (Unadjusted)	0.08	Flow (m³/s)	0.25
Runoff Coefficient (Adjusted)	0.10		
Area (ha)	5.26		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	168.45
Return Period	100 yr		
Time of Concentration (min)	10		
Coeff A	2193.1		
Coeff B	9.04		
Coeff C	0.871		
Runoff Coeff (unadjusted)	0.78	Uncont. Flow (m³/s)	2.42
Runoff Coefficient (Adjusted)	0.98		
Area (ha)	5.26		

Target Flow (m³/s)	0.25
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REQUIRED STORAGE VOLUME:	2362.1
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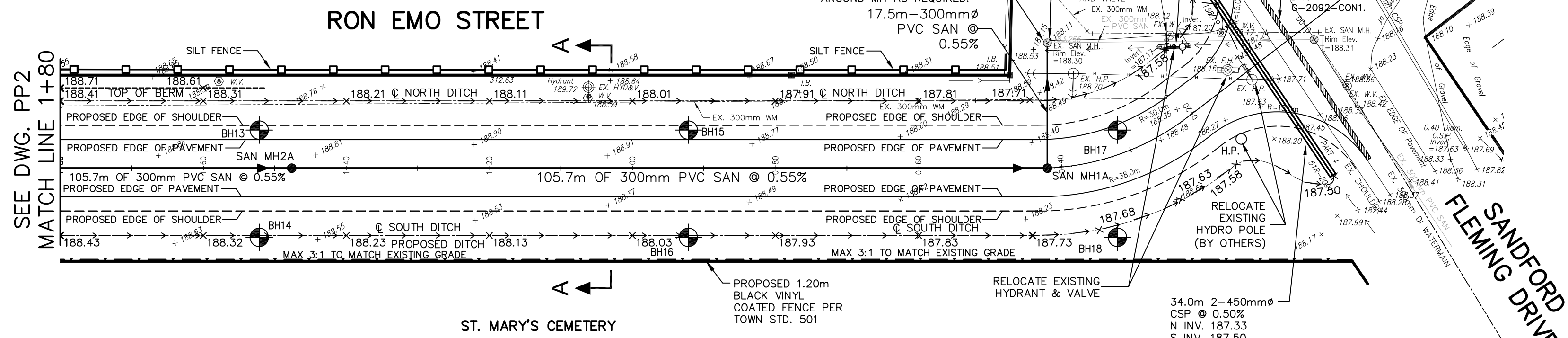
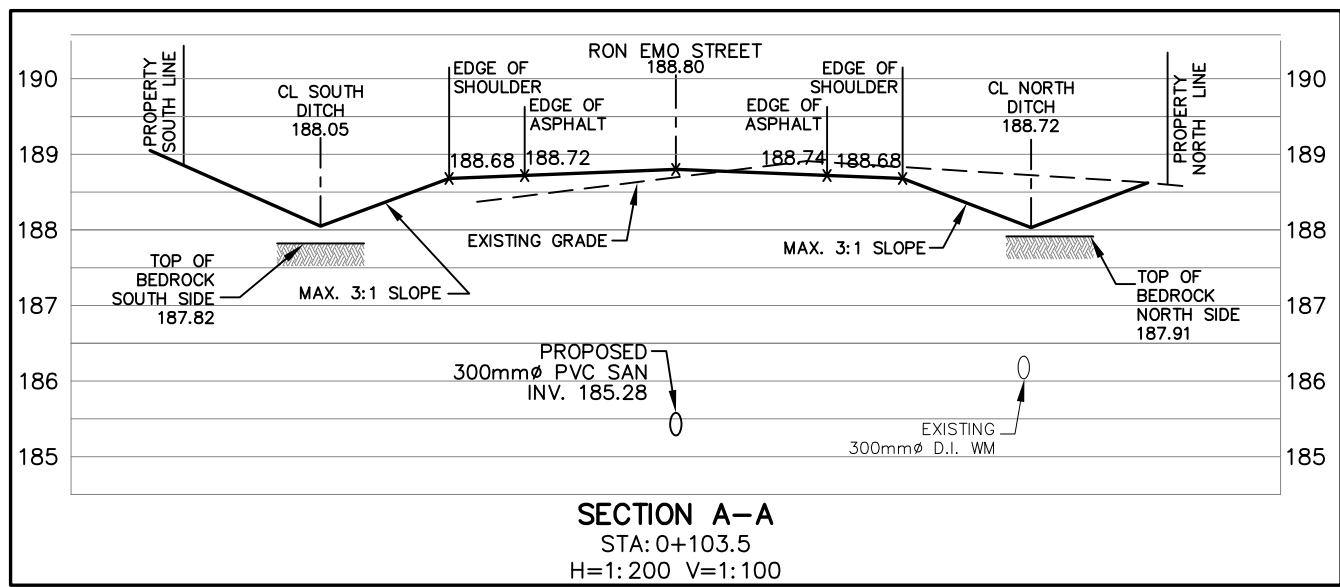
Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{uncont}	S _d
min	mm/hr	sec	m³/s	m³
0	322.28	0	4.628	-74.4
1	294.14	60	4.224	171.6
2	270.79	120	3.888	377.3
3	251.09	180	3.606	552.3
4	234.23	240	3.364	703.1
5	219.64	300	3.154	834.5
6	206.86	360	2.970	950.3
7	195.58	420	2.808	1053.0
8	185.54	480	2.664	1144.9
9	176.55	540	2.535	1227.6
10	168.45	600	2.419	1302.5
15	137.49	900	1.974	1590.8
20	116.62	1200	1.675	1786.4
25	101.55	1500	1.458	1926.9
30	90.13	1800	1.294	2031.9
35	81.15	2100	1.165	2112.1
40	73.89	2400	1.061	2174.4
45	67.90	2700	0.975	2223.2
50	62.86	3000	0.903	2261.5
55	58.57	3300	0.841	2291.5
60	54.85	3600	0.788	2314.7
65	51.61	3900	0.741	2332.2
70	48.76	4200	0.700	2345.1
75	46.22	4500	0.664	2354.1
80	43.95	4800	0.631	2359.6
85	41.91	5100	0.602	2362.1

Town of Collingwood IDF Curves

	2	5	10	25	50	100
A	807.44	1135.4	1387	1676.2	1973.1	2193.1
B	6.75	7.50	7.79	8.30	9.00	9.04
C	0.828	0.841	0.852	0.858	0.868	0.871

APPENDIX C

Supplemental Material

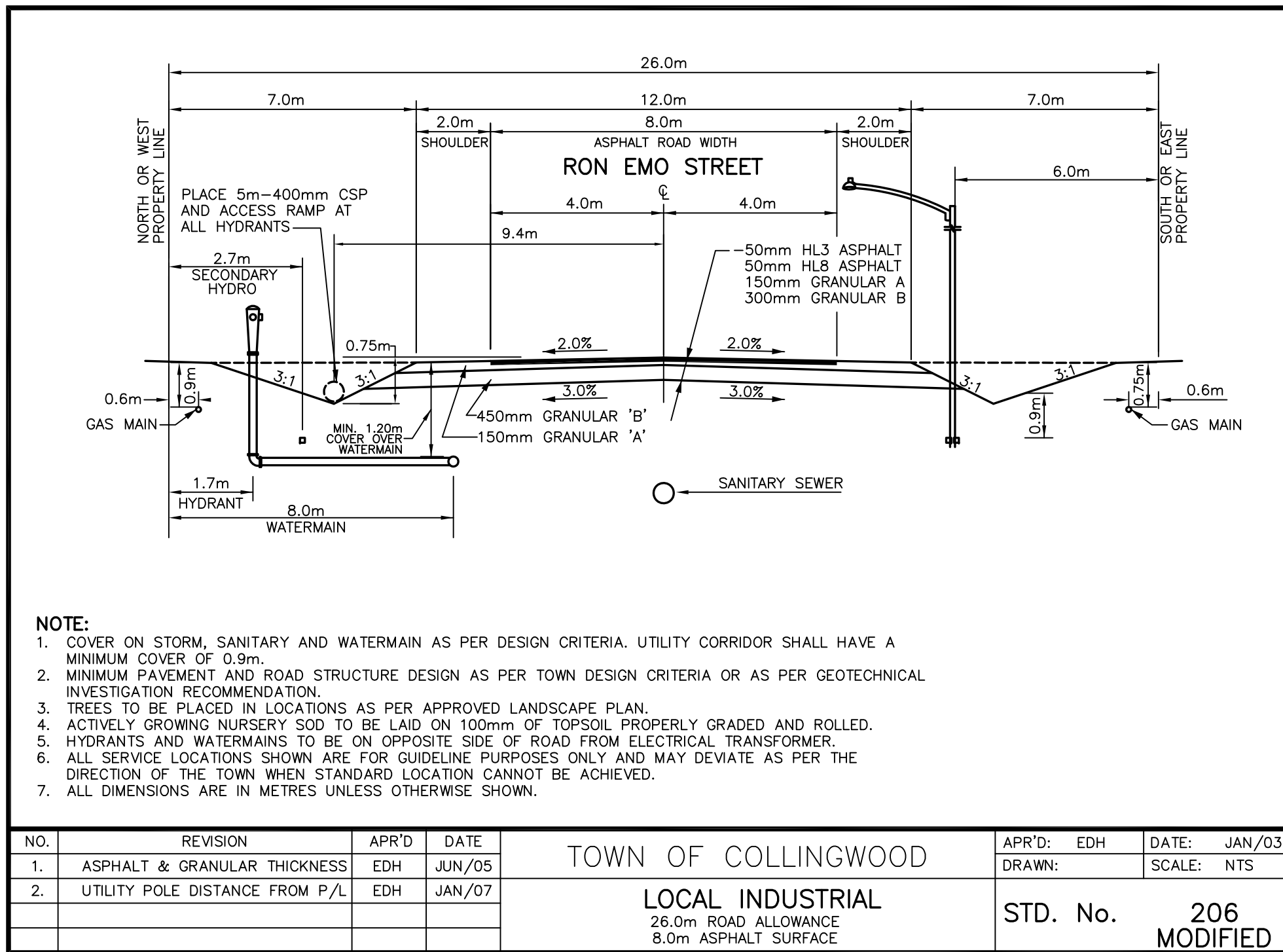


NOTE:
ADJUST VALVES AND
HYDRANT TO SUIT
NEW GRADE

NOTE:
ALL WATER TESTING
AND WATERMAIN
CHLORINATING WILL
BE CONDUCTED BY
OPJ STAFF.

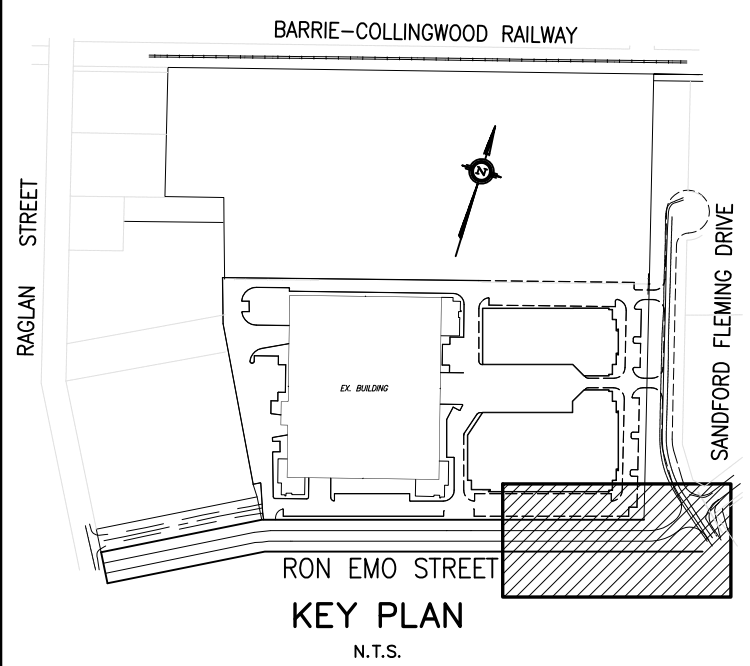
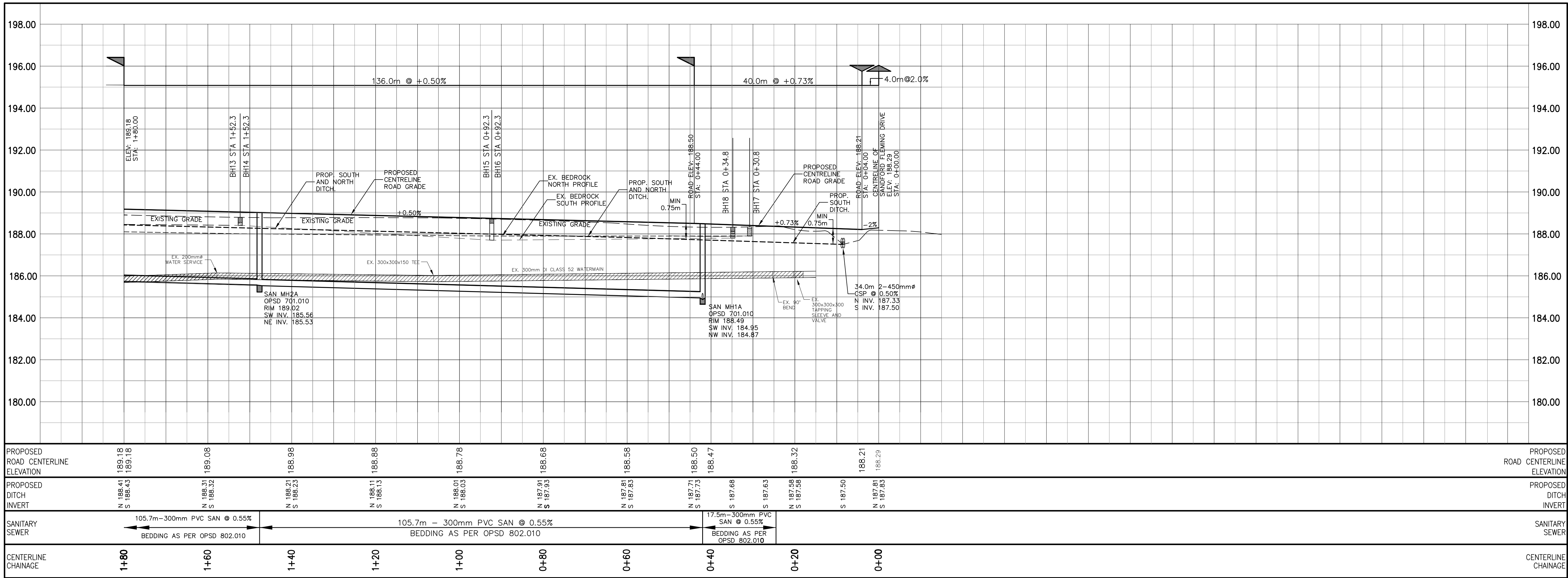
NOTE:
CONTRACTOR TO
REFER TO DRAWING
NO. G-2287-CON1
FOR "TYPICAL
TEMPORARY
CONNECTION FOR
WATERMAINS".

NOTE:
CONTRACTOR TO
MEET ALL
REQUIREMENTS OF
STD. No. 128 (SEE
DWG G-2287-GN1)



- NOTE:
- COVER ON STORM, SANITARY AND WATERMAIN AS PER DESIGN CRITERIA. UTILITY CORRIDOR SHALL HAVE A MINIMUM COVER OF 0.9m.
 - MINIMUM PAVEMENT AND ROAD STRUCTURE DESIGN AS PER TOWN DESIGN CRITERIA OR AS PER GEOTECHNICAL INVESTIGATION RECOMMENDATION.
 - TREES TO BE PLACED IN LOCATIONS AS PER APPROVED LANDSCAPE PLAN.
 - ACTIVELY GROWING NURSERY SOO TO BE LAID ON 100mm OF TOPSOIL PROPERLY GRADED AND ROLLED.
 - HYDRANTS AND WATERMAINS TO BE ON OPPOSITE SIDE OF ROAD FROM ELECTRICAL TRANSFORMER.
 - ALL SERVICE LOCATIONS SHOWN ARE FOR GUIDELINE PURPOSES ONLY AND MAY DEVIATE AS PER THE DIRECTION OF THE TOWN WHEN STANDARD LOCATION CANNOT BE ACHIEVED.
 - ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.

NO.	REVISION	APR'D	DATE	TOWN OF COLLINGWOOD	APR'D: EDH	DATE: JAN/03
1.	ASPHALT & GRANULAR THICKNESS	EDH	JUN/05	LOCAL INDUSTRIAL	DRAWN:	SCALE: NTS
2.	UTILITY POLE DISTANCE FROM P/L	EDH	JAN/07	26.0m ROAD ALLOWANCE 8.0m ASPHALT SURFACE	STD. No.	206 MODIFIED



LEGEND

EXISTING ELEVATION	+
PROPOSED GRADE ELEVATION	X
DITCH, SWALE, OR GUTTER LINE	-
EXISTING SANITARY MANHOLE	●
PROPOSED SANITARY MANHOLE	○
EXISTING WATER BOX/WATER VALVE	⊕
PROPOSED WATER BOX/WATER VALVE	⊕
PROPOSED HYDRANT AND VALVE	⊕
PROPOSED WATERMAIN	---
PROPOSED SANITARY SEWER	---
EXISTING NORTH BEDROCK PROFILE	---
EXISTING SOUTH BEDROCK PROFILE	---
PROPOSED NORTH DITCH	---
PROPOSED SOUTH DITCH	---
ROCK CHECK DAM	⊕
PROPOSED BORE HOLE LOCATION AND NUMBER	BH11

WATERMAIN MATERIALS:
PIPE:
- CLASS 52 DUCTILE IRON PIPE AS APPROVED BY THE UTILITY.
- PRESSURE CLASS 350 DUCTILE IRON PIPE AS APPROVED BY THE UTILITY.
- MECHANICAL JOINT DUCTILE FITTINGS
AWWA/ANSI C153/A21.53
RESTRAINTS:
- ROLMAC GRIPPER RINGS UP TO 12"
- RESTRAINING GLANDS OVER 12"
SIGMA ONE LOCK
BEDDING:
- PIPE BEDDING AND COVER SHALL BE AS PER OPSS AND OPSD.
THRUST BLOCKS:
- SHALL BE REQUIRED WHERE PIPE IS PLACED IN UNDISTURBED NATIVE SOILS OR WHERE MINIMUM SOIL BEARING CAPACITY EXCEEDS 200 KPA. WHERE SOIL CONDITIONS ARE SUSPECT, PIPE RESTRAINTS SHALL BE USED.

SURVEY INFORMATION
ZUBEK, EMO, PATTEN & THOMSEN LIMITED, O.L.S., 2006
39 STEWART ROAD
COLLINGWOOD, ONTARIO
L9Y 4M7
PHONE: (705) 445-4910
FAX: (705) 445-5866
BEARING
ELEVATIONS HEREON ARE GEODETIC AND ARE REFERRED TO THE GEODETIC MONUMENT No. 71U179 HAVING AN ELEVATION OF 188.485 METRES

NO.	REVISIONS	DATE	BY
1.	ISSUED FOR MOE CERTIFICATE OF APPROVAL AND CHANGE ORDER No. 4	OCT 07/09	J.H.



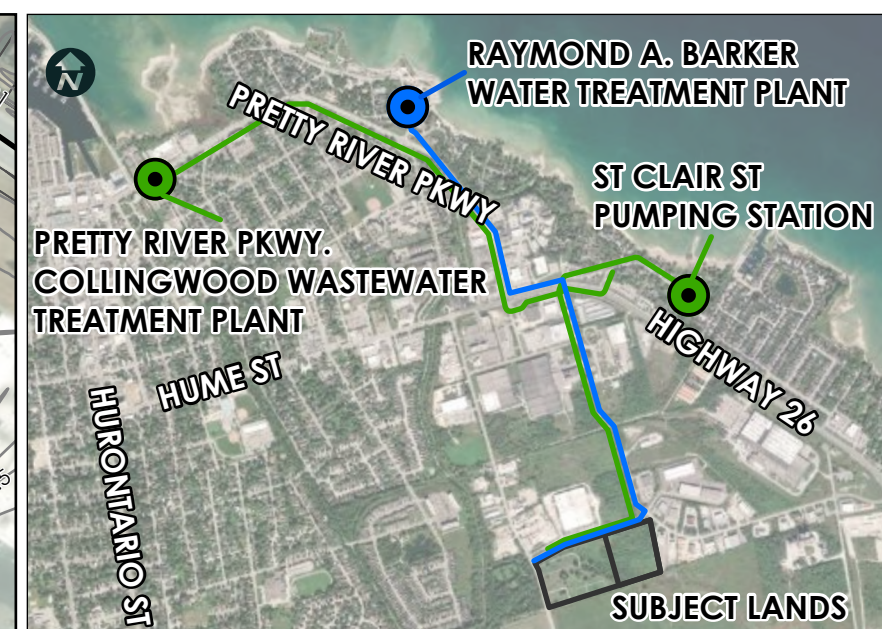
**TOWN OF COLLINGWOOD
COUNTY OF SIMCOE
CONTRACT No. PW2009-10**

**PLAN AND PROFILE
RON EMO STREET
MUNICIPAL SERVING**
STA 0+00 TO 1+80
PART OF THE WEST HALF OF LOT 41, CONCESSION 7



SCALE: H 1:500 V 1:100	PROJECT NO: G-2287
DRAWN BY: B. KLESS	DRAWING NO: PP1
CHECKED BY: J. HARTMAN	
DESIGNED BY: B. KLESS	
DATE: OCT, 2009	

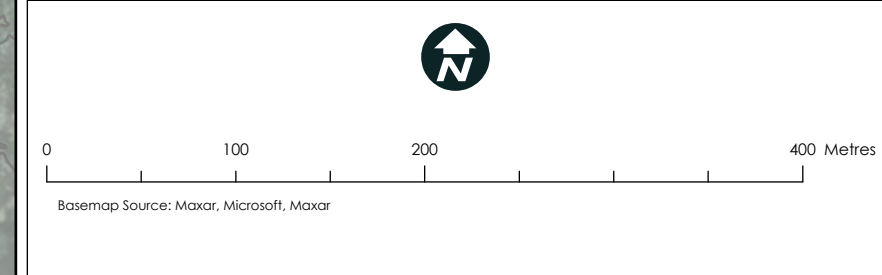
FIGURES



LEGEND

- Ownership Parcel Fabric
- Road
- Subject Lands
- Cemetery Lands
- Watermain
- Sanitary Sewer
- Sanitary Pumping Station (SPS)
- Water Treatment Plant (WTP)
- Contour (0.5m)
- Swale Flow Direction

NOTE: ALL LOCATIONS OF FEATURES ARE APPROXIMATE AND NOT TO BE USED FOR ANY MEASUREMENTS OR CALCULATIONS.



ALL SAINTS ANGLICAN CHURCH SEVERANCE

SITE OVERVIEW & NEARBY
SERVICING CONNECTIONS

