



PRELIMINARY FUNCTIONAL SERVICING REPORT

SPRING CREEK ESTATES Town of Fort Erie December 2021

INTRODUCTION

The purpose of this report is to address the servicing needs for the proposed residential subdivision development located within the community of Douglastown in the Town of Fort Erie. The subject lands are located west of Black Creek Road, east of Netherby Road, south of Baker Road and are bound to the south by the Queen Elizabeth Way and Netherby Road off-ramp. The subject lands were included as a future low/medium density residential development in the March 2016 Douglastown-Black Creek Secondary Plan, prepared by the Town of Fort Erie.

The subject lands will consist of approximately 129 mixed residential dwellings (single family, semi-detached, and townhouse) and two higher density residential blocks (Blocks 74 and 75) which may contain a mix of apartment and townhouse residential units. The subject lands will include associated asphalt roadways, concrete curb, catch basins, storm sewers, sanitary sewers, and watermains.

The objectives of this study are as follows:

1. Identify domestic and fire protection water servicing needs for the site;
2. Identify sanitary servicing needs for the site;
3. Identify stormwater management needs for the site; and,
4. Establish property requirements for the stormwater management facility for the Draft Plan of Subdivision.

WATER SERVICING

There is an existing 250mm diameter watermain located on Black Creek Road. It is proposed to connect new watermains for the subject lands to this existing 250mm diameter watermain at each proposed intersection. The new watermains will be extended within the site to provide a looped watermain system for domestic water supply and fire protection for the 129 proposed dwellings (387 persons) in the subdivision lands. Blocks 74 and 75 will provide water service for the respective 52 and 250 person populations with individual water services connected to the existing 250mm diameter watermain on Black Creek Road.



There are four existing municipal fire hydrants located on Black Creek Road along the subject land's frontage. It is proposed to construct additional municipal fire hydrants within the subject lands to provide fire protection for all proposed dwellings. The locations of the proposed hydrants will be determined as part of the detailed engineering design for the site.

A preliminary Water Distribution Plan (DWG#: 20174-WDP) has been provided for reference.

SANITARY SERVICING

There are two existing 250mm diameter sanitary sewers flowing easterly on Westbrook Avenue and Lawrence Avenue which receive sanitary flows from existing sanitary sewers ranging from 200mm to 250mm diameter on Black Creek Road. The existing sanitary sewers on Westbrook Avenue and Lawrence Avenue ultimately convey sanitary flows to the Regional Douglastown Sewage Pumping Station.

As shown on the accompanying Sanitary Servicing Plan (DWG#: 20174-SAN), it is proposed to split the sanitary sewer flows from the subject lands between the Westbrook Avenue and Lawrence Avenue sanitary sewers. The southern portion of the subject lands (area A1) will be conveyed to the existing 250mm diameter sanitary sewer on Westbrook Avenue and the remaining portion of the subject lands (area A2, A3, and A4) will be conveyed to the existing 250mm diameter sanitary sewer on Lawrence Avenue.

Area A1 comprises an approximate population of 96 persons in a drainage area of approximately 1.81 hectares, and will produce a peak sanitary flow of approximately 1.93 L/s to the receiving sanitary sewers on Westbrook Avenue. The proposed flow of 1.93 L/s utilizes approximately 5.9% of the total capacity in the receiving 250mm diameter sanitary sewers, assuming the minimum slope of 0.28%. Therefore, there is expected to be adequate capacity in the receiving Westbrook Avenue sanitary sewers to service the subject lands.

Areas A2, A3, and A4 will comprise a total approximate population of 593 persons in a total drainage area of approximately 5.85 hectares, and will produce a peak sanitary flow of approximately 10.94 L/s to the receiving sanitary sewers on Lawrence Avenue. The proposed flow of 10.94 L/s utilizes approximately 33.3% of the total capacity in the receiving 250mm diameter sanitary sewers, assuming the minimum slope of 0.28%. Therefore, there is expected to be adequate capacity in the receiving Lawrence Avenue sanitary sewers to service the subject lands.



STORMWATER MANAGEMENT

The following will serve as a preliminary summary of the stormwater management requirements and the preliminary stormwater management plan for the subject lands.

There are currently no storm sewers located on Black Creek Road, existing stormwater flows are conveyed through a series of existing roadside ditches and drainage culverts to ultimately outlet to Black Creek.

As shown on the accompanying Storm Servicing Plan (DWG#: 20174-STM), it is proposed to capture and convey the stormwater flows generated within the subject lands and on Black Creek Road to the proposed stormwater management facility located at the southern limit of the subject lands. It is then proposed to discharge the captured stormwater flows to a section of Black Creek, located downstream of the adjacent Queen Elizabeth Way (QEW) MTO corridor, with a new stormwater outlet between #3390 and #3396 River Trail.

Based on the proposed outlet to Black Creek, the following stormwater management criteria have been identified for the subject lands:

- The receiving watercourse (Black Creek) has been classified as Critical Fish Habitat (Type 1) by the Ministry of Natural Resources. Based on this fish habitat classification, the corresponding minimum MECP level of protection for new developments in this watershed will be Enhanced (80% TSS removal).
- Stormwater quantity controls are not considered necessary for the subject lands due to the location of the proposed outlet in the overall watershed for Black Creek.

Based on the above policies and site specific considerations, the following stormwater management criteria have been established for this site.

- Stormwater quality controls are to be provided for stormwater flows generated within the subject lands to Enhanced Protection levels (80% TSS Removal) in accordance to MECP guidelines.
- Stormwater quantity controls are not considered necessary for stormwater flows discharging to Black Creek.
- Downstream erosion protection is to be provided in accordance with MECP guidelines.

It is proposed to construct a stormwater management wet pond facility to provide both the stormwater quality improvements and downstream erosion protection. A preliminary footprint of the proposed wet pond facility and associated drainage area can be found on the accompanying Storm Servicing Plan (DWG#: 20174-STM).



The proposed stormwater management facility will receive and provide controls for the future stormwater flows from the subject lands and a future drainage area to the north along Netherby Road to Baker Road (A1), and external drainage from the Netherby Road off ramp (A2).

To provide stormwater quality improvements to MECP Enhanced levels (80% TSS removal), a wet pond facility servicing a total drainage area of approximately 11.24 hectares with an overall imperviousness of 58% will be required to provide a permanent pool volume of 1,765m³. The preliminary wet pond can provide approximately 1,901m³ of permanent pool storage at a depth of 1.75m. Therefore, there is adequate permanent pool volume to provide 80% TSS removal. Preliminary wet pond calculations can be found in Appendix A for reference.

To provide the required downstream erosion protection, it is required that the proposed wet pond detain the stormwater volume generated during a 25mm design storm event and slowly release the volume over 24 hours. As shown in the calculations in Appendix A, a 1.5 m deep extended detention volume provides 4,482m³ of storage volume and has an associated drawdown time of 37 hours with a two-stage control outlet comprising a 150mm diameter orifice with an invert at the permanent pool elevation and a double ditch inlet structure with a rim elevation at 1.50m above the permanent pool. The 25mm design storm generates a volume of approximately 1,452m³. Therefore, there is adequate extended detention volume to provide the required downstream erosion protection.

Therefore, since the preliminary wet pond design can provide adequate permanent pool and extended detention storage, the proposed stormwater management block (Block 76) is adequately sized for the subject lands.

Major overland flows from the subject lands (in excess of the 5 year design storm event) will be conveyed overland within the proposed roadway system to Black Creek Road and ultimately to Black Creek. As shown on Figure 4 of the previously approved Stormwater Management Plan for River Trail Estates (Phase 2), enclosed in Appendix B, a portion of the subject lands were included within the overall stormwater drainage area for the constructed wetland facility. As part of the detailed stormwater management design, an overland flow route will be designed to convey the major overland flows either directly to Black Creek, south of the subject lands on River Trail, or to the existing wetland facility which also discharges to Black Creek.

Minor and major stormwater flows from the subject lands will discharge to Black Creek downstream of the QEW lands. Therefore, there will be no negative impact on the adjacent MTO controlled lands as a result of the proposed stormwater management plan.



CONCLUSIONS AND RECOMMENDATIONS

Therefore, based on the above comments and design calculations provided for this site, the following summarizes the servicing for this site:

1. The subject lands will be serviced by the existing 250mm diameter watermain on Black Creek Road and will provide both domestic water supply and fire protection.
2. The receiving 250mm diameter sanitary sewers on Westbrook Avenue and Lawrence Avenue are expected to have adequate capacity for the subject lands.
3. Stormwater quantity controls are not considered necessary for the subject lands.
4. Stormwater quality controls can be provided to MECP Enhanced protection levels (80% TSS Removal) by the proposed wet pond facility.
5. Downstream erosion protection can be provided by the proposed wet pond facility.
6. Major overland flows will be ultimately conveyed to Black Creek.
7. Site stormwater flows will outlet downstream of MTO controlled lands (QEW and Netherby Road off ramp).

Based on the above and the accompanying calculations, there exists adequate municipal servicing for this development. We trust the above comments and enclosed calculations are satisfactory for approval. If you have any questions or require additional information, please do not hesitate to contact our office.

Prepared By:

Brendan Kapteyn, E.I.T.

Reviewed By:

Jason Schooley, P.Eng.

Encl.



**UPPER CANADA
CONSULTANTS**
ENGINEERS / PLANNERS

APPENDICES



**UPPER CANADA
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ENGINEERS / PLANNERS

APPENDIX A

Preliminary Wet Pond Facility Calculations

Upper Canada Consultants
 3-30 Hannover Drive
 St. Catharines, ON, L2W 1A3

PROJECT NAME: SPRING CREEK ESTATES
 PROJECT NO.: 20174

PRELIMINARY WET POND CALCULATIONS

Quality Requirements	Quality Orifice	Outlet Weir	Outflow Pipe Orifice	Overflow Spillway
Drainage Area (ha) = 11.24	Diameter (m) = 0.150	Perimeter Length (m) = 1.20	Diameter (m) = 0.525	Length (m) = 4.00
Enhanced (m ³ /ha) = 197 (@ 58% IMP)	Cd = 0.62	Grate Slope (X:1) = 5	Cd = 0.63	Slopes (X:1) = 2.00
Perm Pool (m ³ /ha) = 157	Invert (m) = 173.30	Inlet Elevation (m) = 174.80	Invert (m) = 173.30	Invert (m) = 176.20
Perm Pool Vol (m ³) = 1,765			Obvert (m) = 173.83	
Required Vol (m ³) = 2,214				
25mm MOE Volume (m ³) = 1,452				MOE Equation 4.11 Drawdown Coefficient 'C2' = 1,419
Water Level Elev. = 173.30 m				MOE Equation 4.11 Drawdown Coefficient 'C3' = 1,924
				MOE Equation 4.11 Drawdown Time (h) = 37

Elevation	Increment Depth (m)	Active Depth (m)	Surface Area (m ²)	Average Surface Area (m ²)	Increment Volume (m ³)	Permanent Volume (m ³)	Active Volume (m ³)	Quality Orifice (m ³ /s)	Ditch Inlet (m ³ /s)	Max Pipe Orifice (m ³ /s)	Overflow Spillway (m ³ /s)	Total Outflow (m ³ /s)	Average Discharge (m ³ /s)
171.55		-1.75	710			0							
	0.75			866	650								
172.30		-1.00	1,022			650							
	0.50			1,135	567								
172.80		-0.50	1,248			1,217							
	0.50			1,368	684								
173.30		0.00	1,488			1,901							
	0.00												
173.30		0.00	1,924				0	0.000	0.000	0.000	0.000	0.000	
	1.50			2,988	4,482								0.029
174.80		1.50	4,053				4,482	0.057	0.000	0.648	0.000	0.057	
	0.50			4,419	2,209								0.450
175.30		2.00	4,785				6,692	0.067	0.723	0.776	0.000	0.776	
	0.90			5,494	4,945								0.751
176.20		2.90	6,203				11,637	0.081	3.390	0.965	0.000	0.965	
	0.10			6,286	629								0.751
176.30		3.00	6,369				12,265	0.083	3.759	0.984	0.223	1.207	

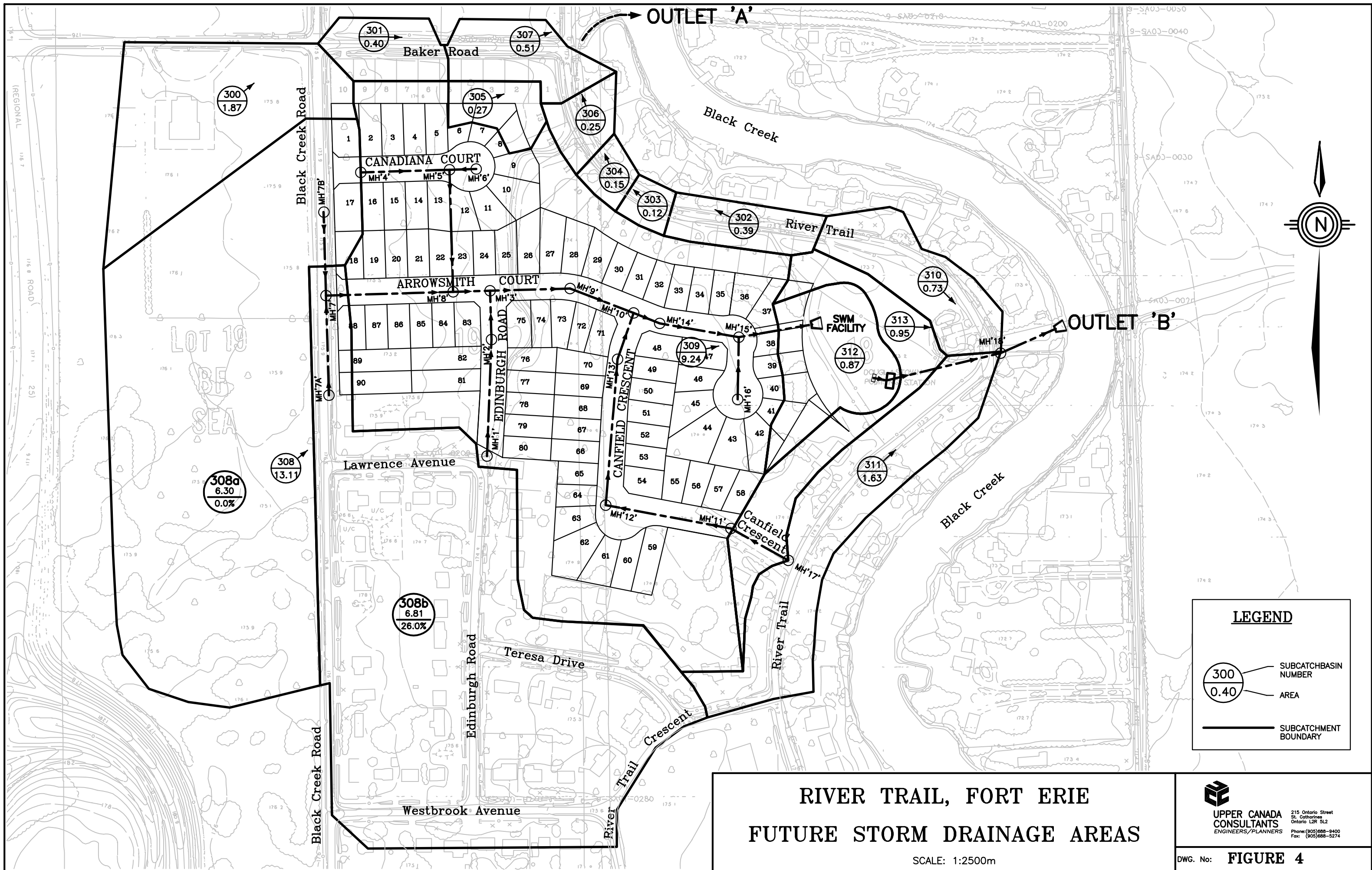
- Notes**
- Quality Orifice flow is the orifice controlling for the 24 hour detention period and uses an orifice formula.
 - Pipe Orifice flow is calculated using an orifice formula on the pipe from the ditch inlet to the outlet and uses the total head on the orifice.
 - Overflow Weir flow is calculated using a trapezoidal weir to convey outflow for less frequent storms through the embankment with an emergency spillway.
 - Total Outflow is calculated by adding the Overflow Spillway with the lowest of Quality Orifice plus Ditch Inlet or Max Pipe Orifice.



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APPENDIX B

River Trail Estates (Phase 2) Stormwater Management Plan – Figure 4



**RIVER TRAIL, FORT ERIE
FUTURE STORM DRAINAGE AREAS**

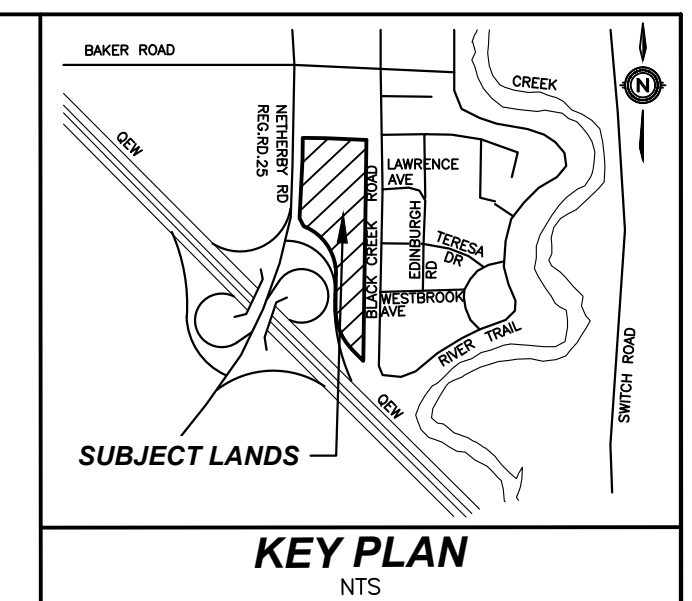
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LEGEND

- 300
0.40 SUBCATCHBASIN NUMBER
- 0.40 AREA
- SUBCATCHMENT BOUNDARY

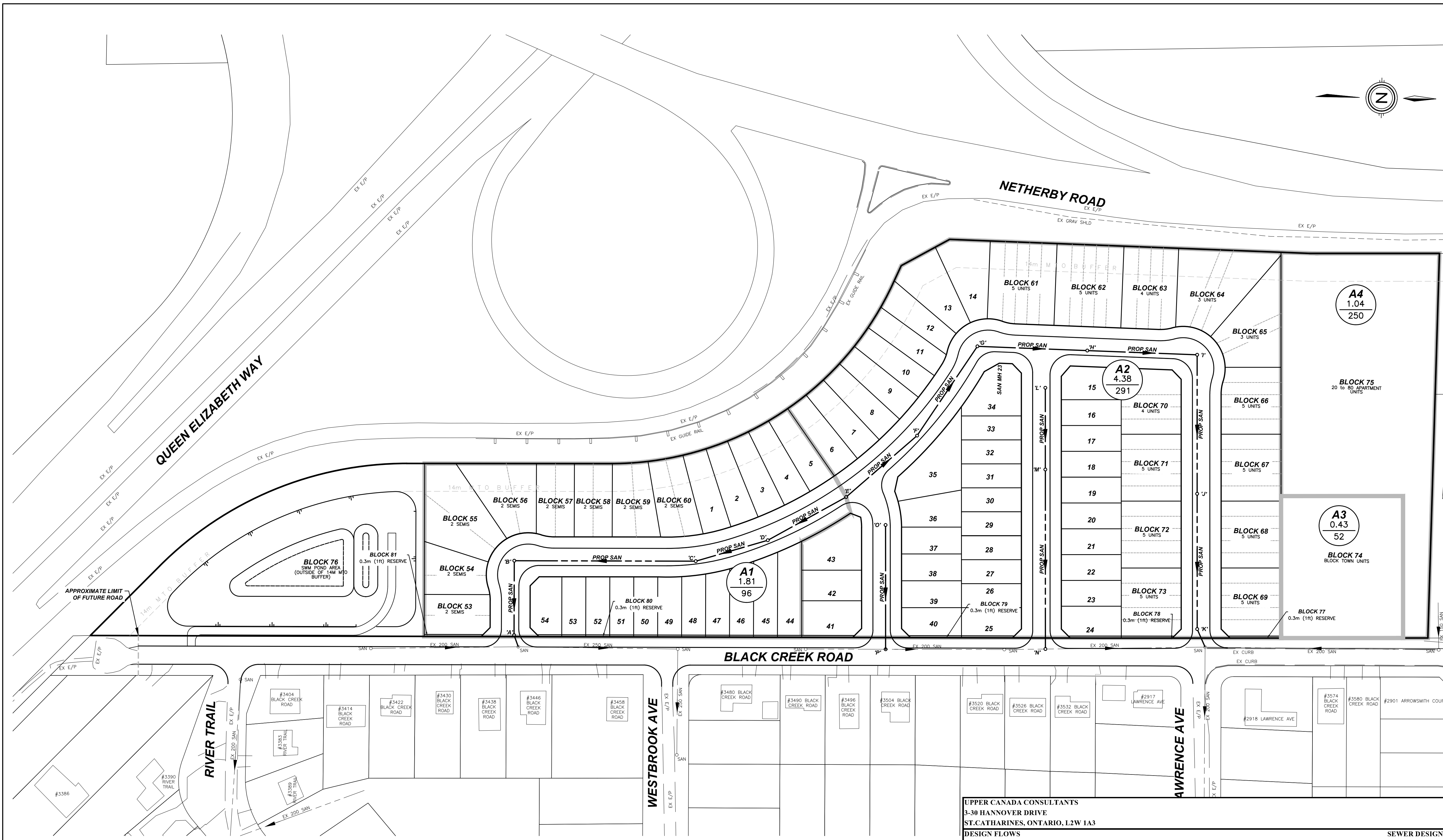
UPPER CANADA CONSULTANTS
ENGINEERS/PLANNERS

215 Ontario Street
St. Catharines
Ontario L2R 5L2
Phone: (905) 688-9400
Fax: (905) 688-5274



LEGEND

- SAN ○ EX SANITARY MANHOLE
- MH ○ PROP SANITARY MANHOLE
- PLUG □ EX PLUG
- PLUG □ PROP PLUG
- EX SANITARY SEWER
- PROP SANITARY SEWER
- PROP CURB
- PROP DEPRESSED CURB
- AO 0.00 DRAINAGE AREA NUMBER
- 00 DRAINAGE AREA IN HECTARES
- 00 POPULATION
- DRAINAGE AREA BOUNDARY



PRELIMINARY

UPPER CANADA CONSULTANTS
3-30 HANNOVER DRIVE
ST. CATHARINES, ONTARIO, L2W 1A3

DESIGN FLOWS	RESIDENTIAL: 320 LITRES/PERSON/DAY (AVERAGE DAILY FLOW)	SEWER DESIGN	PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
INFILTRATION RATE:	0.18 LITRES/HECTARE (M.O.E FLOW ALLOWANCE IS BETWEEN 0.10 & 0.28 LITRES/HECTARE)	PIPE SIZES:	1.016 IMPERIAL EQUIVALENT FACTOR
		PERCENT FULL:	TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: TOWN OF FORT ERIE
PROJECT: SPRING CREEK ESTATES
PROJECT NO: 20174

PRELIMINARY SANITARY SEWER DESIGN CALCULATIONS

LOCATION	AREA		POPULATION		ACCUMULATED PEAK FLOW				DESIGN FLOW							
	From M.II	To M.II	Increment (hectares)	Accumulated (hectares)	Population Density (persons/hectare)	Population Increment	Total Popln Served	Peaking Factor	Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)	Pipe Diameter (mm)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity	Check Percent Full
A1 - SUBJECT LANDS	SITE	EX MH	1.81	1.81	53	96	96	4.5	1.60	0.33	1.93	200	0.40	0.67	21.6	8.9%
WESTBROOK AVE	EX MH	EX MH		1.81			96	4.5	1.60	0.33	1.93	250	0.28	0.65	32.8	5.9%
A2 - SUBJECT LANDS	SITE	EX MH	4.38	4.38	66	291	291	4.5	4.85	0.79	5.64	200	0.40	0.67	21.6	26.1%
A3 - SUBJECT LANDS	SITE	EX MH	0.43	4.81	121	52	343	4.5	5.72	0.87	6.58	200	0.40	0.67	21.6	30.4%
A4 - SUBJECT LANDS	SITE	EX MH	1.04	5.85	240	250	593	4.5	9.88	1.05	10.94	200	0.40	0.67	21.6	50.5%
LAWRENCE AVE	EX MH	EX MH		5.85			593	4.5	9.88	1.05	10.94	250	0.28	0.65	32.8	33.3%

0	ISSUED FOR REVIEW	2021-12-15	GS
#	REVISION	DATE	INIT

NOTES:

- THE POSITION OF POLE LINES, CONDUITS, WATERMANS, SEWER, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
- PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD. TO VERIFY THE ACCURACY OF THESE PROPERTY LINES, A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.
- ALL CONSTRUCTION MUST COMPLY WITH THE NIAGARA PENINSULA STANDARD CONTRACT DOCUMENT.

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DESIGN: BK
CHECKED BY: JS
APPROVED BY:

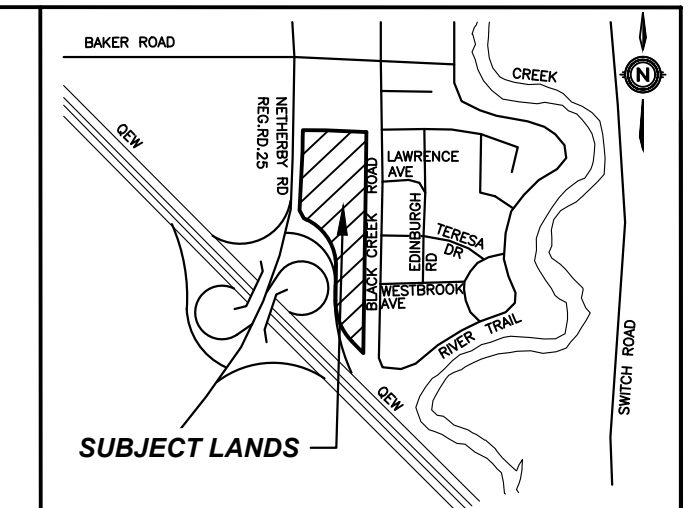
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ONTARIO

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

30 Hannover Drive Unit 3
St. Catharines, Ontario
L2W 1A3
Phone: (905) 688-9400
Fax: (905) 688-5274

SPRING CREEK ESTATES
TOWN OF FORT ERIE
SANITARY SERVICING PLAN

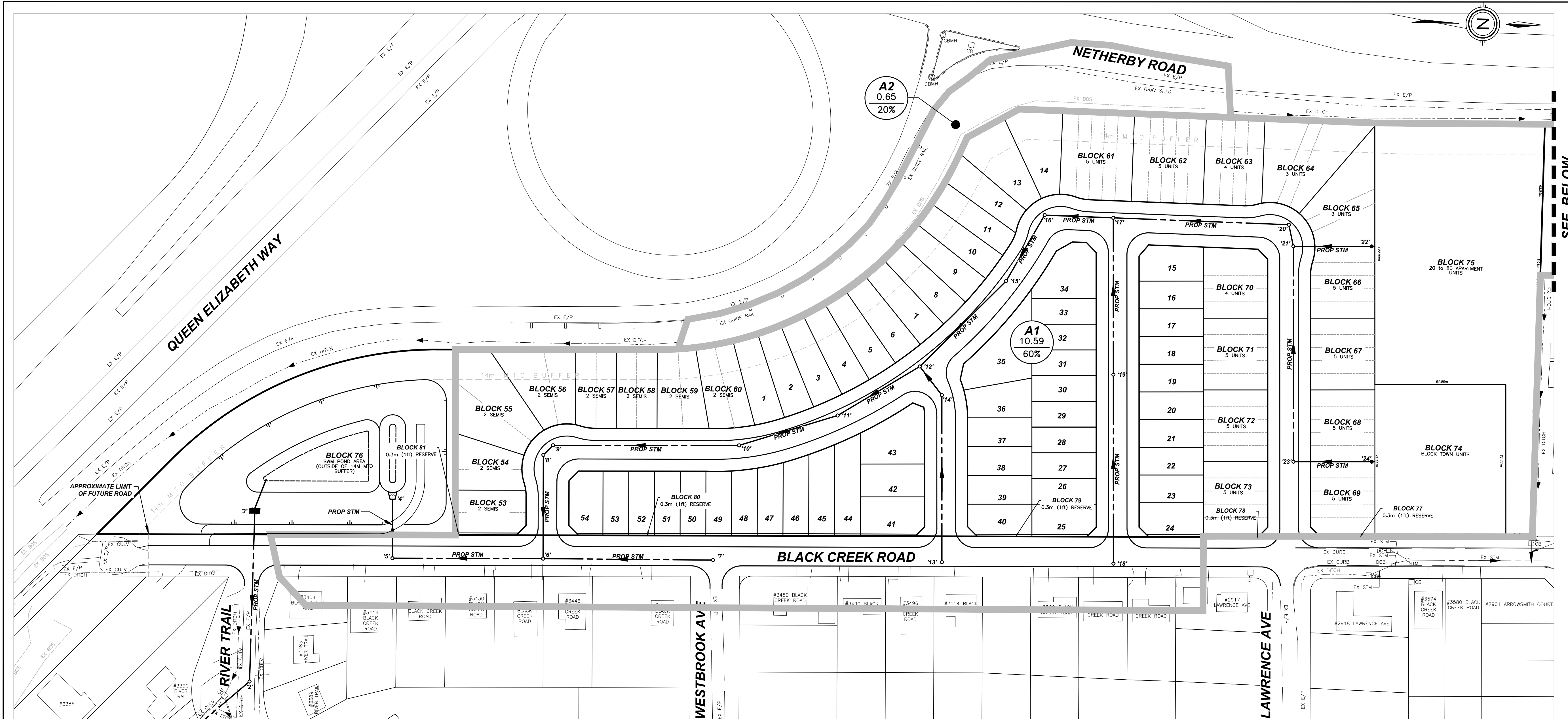
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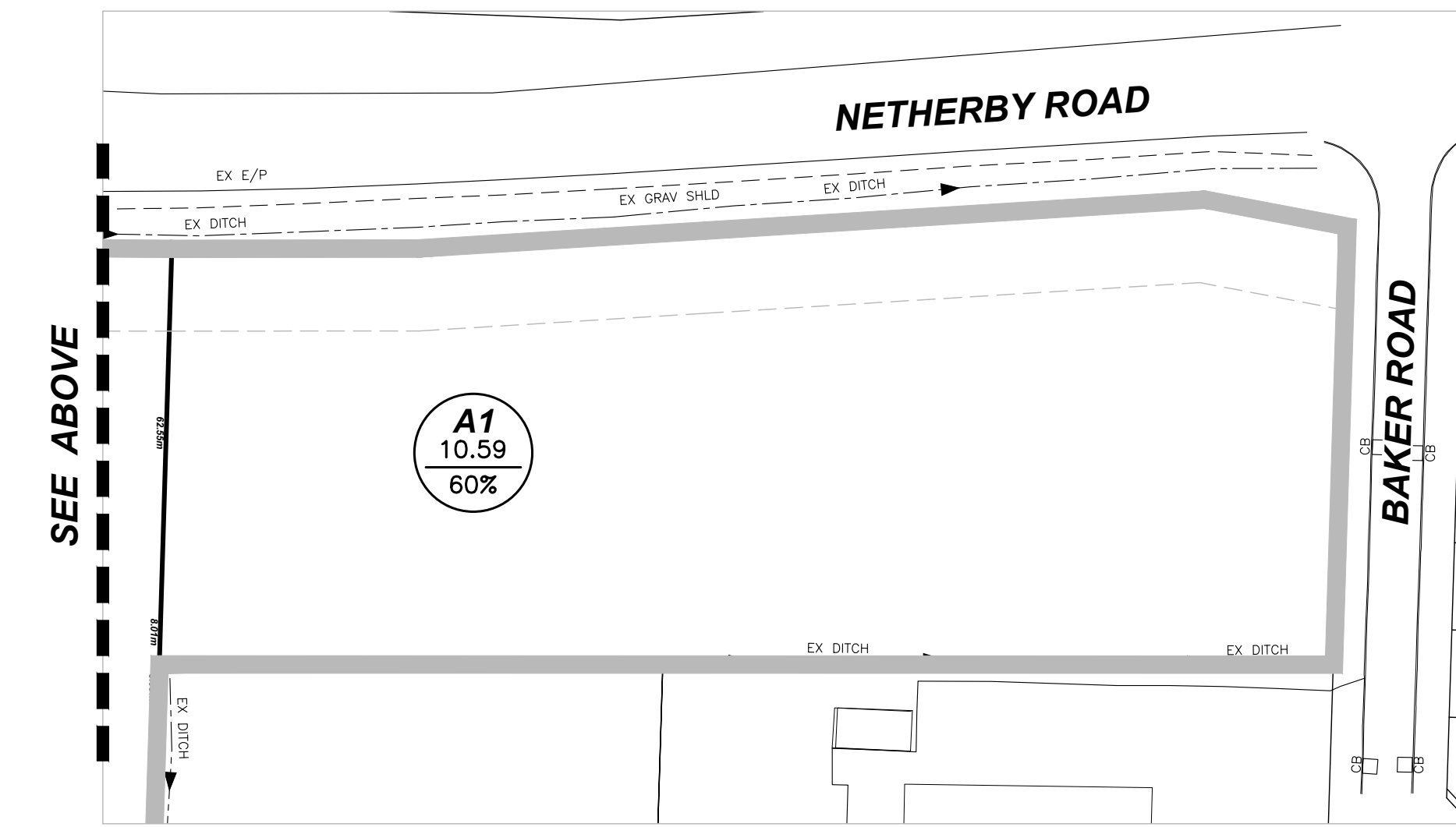
KEY PLAN
NTS

LEGEND

CB	EX CATCHBASIN
CB	PROP CATCHBASIN
DCB	EX DOUBLE CATCHBASIN
DCB	PROP DOUBLE CATCHBASIN
CBMH	EX CATCHBASIN MANHOLE
CBMH	PROP CATCHBASIN MANHOLE
STM	EX STORM MANHOLE
STM	PROP STORM MANHOLE
SAN	EX SANITARY MANHOLE
SAN	PROP SANITARY MANHOLE
PLUG	EX PLUG
PLUG	PROP PLUG
---	EX WATERMAIN
---	PROP WATERMAIN
---	PROP CURB
---	PROP DEPRESSED CURB
A0	DRAINAGE AREA NUMBER
0.00	DRAINAGE AREA IN HECTARES
0.0%	PERCENT IMPERVIOUSNESS
---	DRAINAGE AREA BOUNDARY



SEE BELOW



SEE ABOVE

PRELIMINARY

#	REVISION	DATE	INIT
0	ISSUED FOR REVIEW	2021-12-15	GS

NOTES:

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DESIGN	BK
CHECKED BY	JS
APPROVED BY	

FORT ERIE
ONTARIO

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

30 Honover Drive Unit 3
St. Catharines, Ontario
L2W 1A3
Phone: (905) 688-9400
Fax: (905) 688-9274

SPRING CREEK ESTATES
TOWN OF FORT ERIE

STORM SERVICING PLAN

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