UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

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File: 17147

FUNCTIONAL SERVICING REPORT

Tanner Extension Subdivision (Phase 2)
Pelham
March 2026

INTRODUCTION

Upper Canada Consultants has been retained to undertake and provide a Functional Servicing Report to address the servicing needs and requirements for a 6-unit subdivision at the east limit of Stickles Street in Pelham. The site lands have historically been undeveloped rear yards of single family dwelling lots fronting Line Avenue.

The proposed development site is approximately 0.39 hectares and shall consist of 6 single-detached dwellings. The development will include associated asphalt road, concrete curb, catch basins, storm sewers, sanitary sewers, and watermain.

The objectives of this study are as follows:

1. Identify domestic and fire protection water service needs for the site;
2. Identify sanitary servicing needs for the site; and,
3. Identify stormwater management needs for the site.

WATER SERVICING

A 200mm diameter PVC municipal watermain is located at the west limit of the site on Stickles Street. It is proposed to extend the 200mm diameter watermain easterly on Stickles Street into the development limits to provide domestic supply and fire protection. The watermain will terminate with a blow-off to allow for necessary cleaning practices and ease of future construction.

An existing hydrant is located approximately 40m west of the west development limit. It is expected a subsequent hydrant will be required in order to ensure all dwellings are within suitable distance to a hydrant.

It is expected that the existing municipal watermain system will have sufficient capacity to provide adequate domestic supply and fire protection for the development.

SANITARY SERVICING

A 200mm diameter PVC sanitary sewer is located at the western limit of the development site on Stickles Street. It is proposed to extend the sanitary sewer easterly within the subject property to provide service to the proposed dwellings.

A sanitary analysis was completed of the municipal system downstream of the proposed development site on Tanner Drive as part of the adjacent Tanner Extension (Phase 1) development. The analysis has been updated to include the proposed development and to align with current peak flow rates and standards (Appendix A). The analysis utilizes a residential density of 2.4 persons/unit in accordance with the Niagara Official Plan as well as peak flow rates of 255 L/cap/day and infiltration rates of 0.286L/s/ha in accordance with the Niagara Regional MSPU and MECP Design Criteria for sewers.

The sanitary analysis concludes that the proposed development will discharge a peak flow rate of 0.30 L/s to the downstream municipal sanitary sewer system from 6 residential units and a population of 14 persons. This peak flow has been calculated to occupy a maximum of 34% of the full flow capacity of the modelled downstream sewer system. It is expected that the existing downstream Municipal/Regional sanitary systems will have adequate capacity for the proposed development.

STORMWATER MANAGEMENT PLAN

As part of the site development, the following is a summary of the Stormwater Management Plan. The criteria for this development includes the requirement to confirm the downstream storm sewer system has available capacity for the proposed development and provide quality controls to Normal Protection (70% TSS removal) levels.

Existing Conditions

As part of the Tanner Extension (Phase 1) development, a 600mm diameter storm sewer was constructed on Stickles Street with an upstream drainage area that included the subject development site and further upstream lands at a Runoff Coefficient of 0.45.

Proposed Conditions

The proposed development will extend the existing municipal storm sewer easterly on Stickles Street in order to provide an outlet for stormwater flow from the development site. The storm sewer will be sized to allow future development in the east/northerly adjacent lands. The storm sewer system will be sized to have adequate capacity up to and including the 5 year design storm event.

As the subject site is to be developed with 6 single-detached dwellings, the associated Runoff Coefficient will be 0.40 – lower than the allowable Runoff Coefficient of 0.45 per the original Rittenhouse Road Subdivision and adjacent Tanner Extension (Phase 1) Storm Drainage Area Plans. Therefore, the downstream system will continue to have adequate capacity for the development site. The Tanner Extension Subdivision (Phase 1) FSR has been included in the appendices of this report that includes the originally created downstream stormwater analysis.

During storms greater than the 5 year event, stormwater flows will be directed overland westerly on Stickles Street to Tanner Drive. Flows will continue southerly to Homestead Boulevard and out to Pelham Street before ultimately discharging to Draper's Creek.

Quality controls will be provided by the existing Harold Black Stormwater Management Facility prior to discharging to Draper's Creek as has been previously approved for downstream development. The SWM facility is located south of Quaker Road, north of Foss Road, west of Pelham Street and east of Haist Street and Harold Black Park. The facility provides stormwater quality and quantity controls for the existing stormwater outlet as part of the storm sewer system discussed in this report.

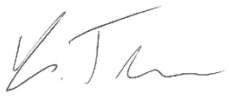
CONCLUSIONS AND RECOMMENDATIONS

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

1. The existing 200mm diameter watermain on Stickles Street will have sufficient capacity to provide both domestic and fire protection water supply.
2. The existing 200mm diameter municipal sanitary sewer on Stickles Street will have adequate capacity for the proposed residential development.
3. The downstream storm sewer system will have adequate capacity for the development. No further peak flow quantity controls will be required.
4. The site extreme stormwater overland route from the road system is west on Stickles Street to Tanner Drive and ultimately to Draper's Creek.
5. Stormwater quality protection will be provided by the downstream Harold Black SWM Facility.

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.

Yours very truly,



Kurt Tiessen, P.Eng.
Revised March 12, 2026
Encl.

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APPENDICES

APPENDIX A

Sanitary Sewer Calculations

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

DESIGN FLOWS

RESIDENTIAL: 255 LITRES/PERSON/DAY (AVERAGE DAILY FLOW)
INFILTRATION RATE: 0.286 L / s / ha (M.O.E FLOW ALLOWANCE IS BETWEEN 0.10 & 0.28 L / s / ha)
POPULATION DENSITY: 2.4 PERSONS / UNIT

SEWER DESIGN

PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: TOWN OF PELHAM
PROJECT : TANNER EXTENSION
PROJECT NO: 17147

SANITARY SEWER DESIGN SHEET

Peaking Factor= $M = 1 + \frac{14}{4 + P^{0.5}}$ Where P = design population in thousands

LOCATION			AREA		POPULATION				ACCUMULATED PEAK FLOW				DESIGN FLOW					
Location and Description	From M.H	To M.H.	Increment (hectares)	Accumulated (hectares)	Number of Units	Population Density (persons/unit)	Population Increment	Total Population Served	Peaking Factor	Flow (L/s)	Infiltration Flow L/s	Total Peak Flow (L/s)	Pipe Diameter (mm)	Pipe Length (m)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Percent Full
					** NOTE: 96 units based on a maximum density of 25 units per hectare per the Town of Pelham Official Plan **													
EX1 - EXTERNAL LANDS	PROP	MH B	1.48	1.48	37	2.4	89	89	4.26	1.12	0.42	1.54	200	1.0	0.40	0.67	21.64	7.1%
A1 - TANNER DRIVE	MH B	MH A	0.14	1.62	4	2.4	10	98	4.25	1.23	0.46	1.70	200	32.0	0.40	0.67	21.64	7.8%
EX2 - EXTERNAL LANDS		PROP	1.94	1.94	49	2.4	118	118	4.22	1.47	0.55	2.02	200	1.0	0.40	0.67	21.64	9.3%
A2 - STICKLES STREET	PROP	MH C	0.30	2.24	6	2.4	14	132	4.21	1.64	0.64	2.28	200	70.0	0.40	0.67	21.64	10.5%
A3 - STICKLES STREET	MH C	MH A	0.64	2.88	12	2.4	29	161	4.18	1.98	0.82	2.81	200	87.8	0.40	0.67	21.64	13.0%
A4 - TANNER DRIVE	MH A	EX MH 3	0.21	4.71	6	2.4	14	274	4.10	3.31	1.35	4.65	200	39.0	0.40	0.67	21.64	21.5%
TANNER DRIVE	EX MH 3	EX MH 2	0.19	4.90	3	3.0	9	283	4.09	3.41	1.40	4.81	200	40.0	0.65	0.85	27.59	17.4%
WILSON CROSSING	*EX MH 1*	*EX MH 2*	*0.59*	*0.59*	*10*	*3.0*	*30*	*30*	*4.35*	*0.39*	*0.17*	*0.55*	*200*	*64.0*	*0.60*	*0.82*	*26.50*	*2.1%*
TANNER DRIVE	EX MH 2	EX MH E	0.18	5.67	3	3.0	9	322	4.07	3.86	1.62	5.48	200	40.0	0.30	0.58	18.74	29.2%
TANNER DRIVE	EX MH E	EX MH C	0.29	5.96	5	3.0	15	337	4.06	4.03	1.70	5.73	200	45.0	0.29	0.57	18.43	31.1%
WILSON CROSSING	*EX MH D*	*EX MH C*	*0.56*	*0.56*	*12*	*3.0*	*36*	*36*	*4.34*	*0.46*	*0.16*	*0.62*	*200*	*73.2*	*0.48*	*0.73*	*23.71*	*2.6%*
TANNER DRIVE	EX MH C	EX MH F	0.58	7.10	8	3.0	24	397	4.02	4.71	2.03	6.74	200	98.6	0.34	0.62	19.95	33.8%
COOPER COURT	*EX MH B*	*EX MH F*	*1.71*	*1.71*	*21*	*3.0*	*63*	*63*	*4.29*	*0.80*	*0.49*	*1.29*	*200*	*70.6*	*0.42*	*0.68*	*22.17*	*5.8%*
TANNER DRIVE	EX MH F	EX MH		8.81				460	3.99	5.42	2.52	7.94	250		0.25	0.61	31.02	25.6%

APPENDIX B

Tanner Extension Subdivision (Phase 1) – Approved Functional Servicing Report

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FUNCTIONAL SERVICING REPORT

Tanner Extension Subdivision
Pelham
December 2021

INTRODUCTION

This report is to address the servicing needs for the 17 unit single family dwelling development located east of Pelham Street, south of Bacon Lane, west of Line Avenue, and at the north end of Tanner Drive. The site lands have historically been the undeveloped rear yards of the single family swellings fronting Pelham Street and Line Avenue.

The site is approximately 1.0 hectare and shall consist of 17 single family dwellings. The site shall include associated asphalt road, concrete curb, catch basins, storm sewers, sanitary sewers, and watermain.

The objectives of this study are as follows:

1. Identify domestic and fire protection water service needs for the site;
2. Identify sanitary servicing needs for the site; and,
3. Identify stormwater management needs for the site.

WATER SERVICING

There is an existing 200mm diameter PVC watermain located on Tanner Drive, south of the proposed development. It is proposed to extend the 200mm diameter watermain into the site to provide both domestic water supply and fire protection. The internal watermain will be detailed and constructed as part of the future detailed design with the location dictated by the final configuration. The proposed watermain will terminate with blow-offs at the ends of Streets ‘A’ and the proposed Tanner Drive to allow for necessary cleaning practices and ease of future construction.

Fire protection will be provided to the proposed development with municipal fire hydrants located within the development block. The spacing and location shall be identified as part of future detailed design.

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SANITARY SERVICING

The proposed development will outlet to the existing 200mm diameter PVC sanitary sewer on Tanner Drive. It is proposed to extend a 200mm diameter sanitary sewer within the site to provide service for the proposed development as well as potential future development north of the site. The existing downstream sanitary sewer system was sized for the proposed development as well as future development to be completed north of the site.

The existing 200mm diameter sanitary sewer flowing south on Tanner Drive fronting the site has a full flow capacity of 26.5 L/s. Per the Town of Pelham Official Plan, the developable lands north of the proposed site have a maximum density of 25 units per hectare, equivalent to 96 units. Therefore, the combined sanitary outflow from the proposed development and future developable area will have a maximum peak sanitary outflow of 5.96 L/s. Using information provided by the Town of Pelham, the fully developed conditions of the development area discussed in this report will produce a peak sanitary outflow occupying a maximum of 40.7% of the downstream municipal sanitary sewer system. Therefore, the sanitary sewers downstream of the proposed development will have sufficient capacity for the proposed Tanner Extension development and future development as per the Official Plan. The sanitary sewer analysis and design sheet for this site can be found in the Sanitary Sewer Calculation Sheet in Appendix A.

STORMWATER MANAGEMENT PLAN

As part of the site development, the following is a summary of the stormwater management plan. The criteria provided by the Town of Pelham for this development includes the requirement to confirm the downstream storm sewer system has the available capacity for the proposed development and provide quality controls to Normal Protection (70% TSS removal) levels.

Existing Conditions

There is an existing 825mm diameter storm sewer on Tanner Drive conveying flows south to Homestead Boulevard before flowing south on Pelham Street. From there, stormwater flows are directed west on Welland Road to Quaker Road before ultimately outletting to the Harold Black Stormwater Management Facility as part of Draper's Creek.

The existing Tanner Drive/Homestead Boulevard storm sewer has been constructed in phases through three (3) residential developments: Fonthill Homesteads Subdivision, Tanner Woods Subdivision, and Rittenhouse Estates Subdivision as shown in Figure 1 (Appendix B). The existing storm sewer was designed to accommodate peak stormwater flows from the proposed development area at a runoff coefficient of 0.45 using the City of Welland IDF curves for the 5 year design storm event. The storm sewer design of each development allocated an upstream drainage area to account for potential future development within the vacant lands between Pelham Street, Line Avenue, and Bacon Lane. This report will detail the available capacities within the previously designed storm sewer systems and confirm that the proposed development can outlet to the existing storm sewer on Tanner Drive without quantity controls.

Proposed Conditions

The stormwater management plan for this site requires the future peak flows to be controlled to the allowable peak flows, where the peak flows shall be less than or near to the allowable discharge. The proposed development will continue to outlet to the existing storm sewer on Tanner Drive as previously designed, shown in Figure 2. The proposed storm sewers will be designed to accommodate stormwater flows from the remaining available developable area north/north-west of the development. As the development will be outletting to the existing storm sewer, cost sharing will occur between the proposed development owner, the previous developer for Rittenhouse Estates, as well as the Town of Pelham for the previously constructed downstream sewer system.

STORMWATER ASSESSMENT

The existing storm sewer was designed to accommodate stormwater flows from the proposed development at a runoff coefficient of 0.45. As the proposed development will consist of only single family dwelling lots with a designated park block, the development will not have an overall runoff coefficient larger than 0.45 and aligns with the original design criteria of the downstream storm sewer system. Figure 1 in Appendix B details the various subdivision developments that have constructed lengths of Tanner Drive/Homestead Boulevard storm sewer. The following assessment details the initial design considerations for the storm sewer system compared to the future/proposed conditions outletting into the storm sewer.

The Rittenhouse Estates Subdivision, immediately downstream of the proposed Tanner Extension development, attributed an upstream drainage area of 7.04 hectares at a runoff coefficient of 0.45 to the storm sewer design. The drainage area upstream of the Rittenhouse Estates storm sewers, is not anticipated to exceed 5.9 hectares with a runoff coefficient of 0.45. Therefore, the storm sewers on Tanner Drive as part of the Rittenhouse Estates Subdivision are expected to have capacity for the proposed Tanner Extension development as well as future upstream development.

The Tanner Woods Subdivision attributed an upstream drainage area of 9.82 hectares with a runoff coefficient of 0.45 to the storm sewer design. Utilizing the Future Drainage Area ‘A10’ in Figure 2 (Appendix B), the storm drainage area upstream of the Tanner Woods storm sewer system will not exceed 7.18 hectares with a runoff coefficient 0.45. Therefore, the storm sewers on Tanner Drive as part of the Tanner Woods Subdivision are expected to have capacity for the proposed Tanner Extension development as well as future upstream development.

The Homestead Subdivision storm sewer design attributed an upstream drainage area of 13.40 hectares with a Runoff Coefficient of 0.45 to the storm sewer design outletting to the Welland Road storm sewer system. As shown on Figure 2, the Future Ultimate Storm Drainage Area ‘A10’ conveying flows to the Tanner Drive storm sewer as part of the Homestead Drive subdivision encompasses an area of 13.60 hectares at a runoff coefficient of 0.45. This area includes an overlapped drainage area of 0.33 hectares between Sadler Street and Cooper Court, reducing the Future Upstream Drainage Area to 13.27 hectares, less than the allowable 13.40 hectares. Therefore, the storm sewer system as part of the Fonthill Homestead Subdivision and downstream to the stormwater outlet are expected to have capacity for the proposed Tanner Extension development as well as future upstream development.

During extreme storm events, stormwater flows unable to enter the on-site storm sewer system will be conveyed south down Tanner Drive to Homestead Boulevard and out to Pelham Street before ultimately outletting to Draper's Creek.

Quality controls will be provided by the existing Harold Black Stormwater Management facility prior to outletting to Draper's Creek as has been previously approved for downstream development. The SWM facility is located south of Quaker Road, north of Foss Road, west of Pelham Street and east of Haist Street and Harold Black Park. The facility provides stormwater quality and quantity controls for the existing stormwater outlet as part of the storm sewer system discussed in this report.

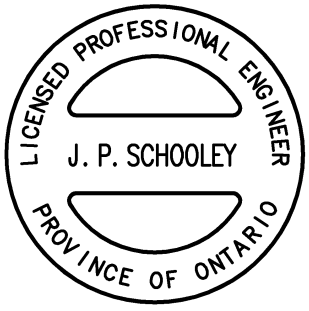
CONCLUSIONS AND RECOMMENDATIONS

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

1. The existing 200mm diameter watermain will have sufficient capacity to provide both domestic and fire protection water supply.
2. The existing 200mm diameter sanitary sewer on Tanner Drive will have adequate capacity for the proposed residential development.
3. The existing storm sewer system downstream of the proposed development has sufficient capacity for the proposed development and expected future upstream development.
4. The site stormwater overland route will convey stormwater flows south on Tanner Drive to Pelham Street before ultimately outletting Draper's Creek.
5. Stormwater quality protection will continue to be provided by the downstream Draper's Creek Stormwater Management Facility.

Based on the above and the accompanying calculations and Drainage Area Plans, 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.

Yours very truly,



Jason Schooley, P.Eng.
December 10, 2021
Encl.

UPPER CANADA CONSULTANTS
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APPENDICES

UPPER CANADA CONSULTANTS
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APPENDIX A

Sanitary Sewer Calculation Sheet

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

DESIGN FLOWS

RESIDENTIAL: 320 LITRES/PERSON/DAY (AVERAGE DAILY FLOW)
INFILTRATION RATE: 0.18 L / s / ha (M.O.E FLOW ALLOWANCE IS BETWEEN 0.10 & 0.28 L / s / ha)
POPULATION DENSITY: 3.0 PERSONS / UNIT

SEWER DESIGN

PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: TOWN OF PELHAM
PROJECT : TANNER EXTENSION
PROJECT NO: 17147

SANITARY SEWER DESIGN SHEET

Peaking Factor= $M = 1 + \frac{14}{4 + P^{0.5}}$ Where P = design population in thousands

LOCATION			AREA		POPULATION				ACCUMULATED PEAK FLOW				DESIGN FLOW					
Location and Description	From M.H	To M.H.	Increment (hectares)	Accumulated (hectares)	Number of Units	Population Density (persons/unit)	Population Increment	Total Population Served	Peaking Factor	Flow (L/s)	Infiltration Flow L/s	Total Peak Flow (L/s)	Pipe Diameter (mm)	Pipe Length (m)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Percent Full
					** NOTE: 96 units based on a maximum density of 25 units per hectare per the Town of Pelham Official Plan **													
FUTURE DEVELOPMENT	FUT	PROP	3.82	3.82	96	3.0	288	288	4.09	4.36	0.69	5.05	200	100.0	0.60	0.82	26.50	19.0%
TANNER EXTENSION	PROP	EX MH 3	0.99	4.81	17	3.0	51	339	4.06	5.09	0.87	5.96	200	100.0	0.60	0.82	26.50	22.5%
TANNER DRIVE	EX MH 3	EX MH 2	0.19	5.00	3	3.0	9	348	4.05	5.22	0.90	6.12	200	40.0	0.65	0.85	27.59	22.2%
WILSON CROSSING	*EX MH 1*	*EX MH 2*	*0.59*	*0.59*	*10*	*3.0*	*30*	*30*	*4.35*	*0.48*	*0.11*	*0.59*	*200*	*64.0*	*0.60*	*0.82*	*26.50*	*2.2%*
TANNER DRIVE	EX MH 2	EX MH E	0.18	5.77	3	3.0	9	387	4.03	5.77	1.04	6.81	200	40.0	0.30	0.58	18.74	36.4%
TANNER DRIVE	EX MH E	EX MH C	0.29	6.06	5	3.0	15	402	4.02	5.99	1.09	7.08	200	45.0	0.29	0.57	18.43	38.4%
WILSON CROSSING	*EX MH D*	*EX MH C*	*0.56*	*0.56*	*12*	*3.0*	*36*	*36*	*4.34*	*0.58*	*0.10*	*0.68*	*200*	*73.2*	*0.48*	*0.73*	*23.71*	*2.9%*
TANNER DRIVE	EX MH C	EX MH F	0.58	7.20	8	3.0	24	462	3.99	6.83	1.30	8.13	200	98.6	0.34	0.62	19.95	40.7%
COOPER COURT	*EX MH B*	*EX MH F*	*1.71*	*1.71*	*21*	*3.0*	*63*	*63*	*4.29*	*1.00*	*0.31*	*1.31*	*200*	*70.6*	*0.42*	*0.68*	*22.17*	*5.9%*
TANNER DRIVE	EX MH F	EX MH		8.91				525	3.96	7.71	1.60	9.31	250		0.25	0.61	31.02	30.0%

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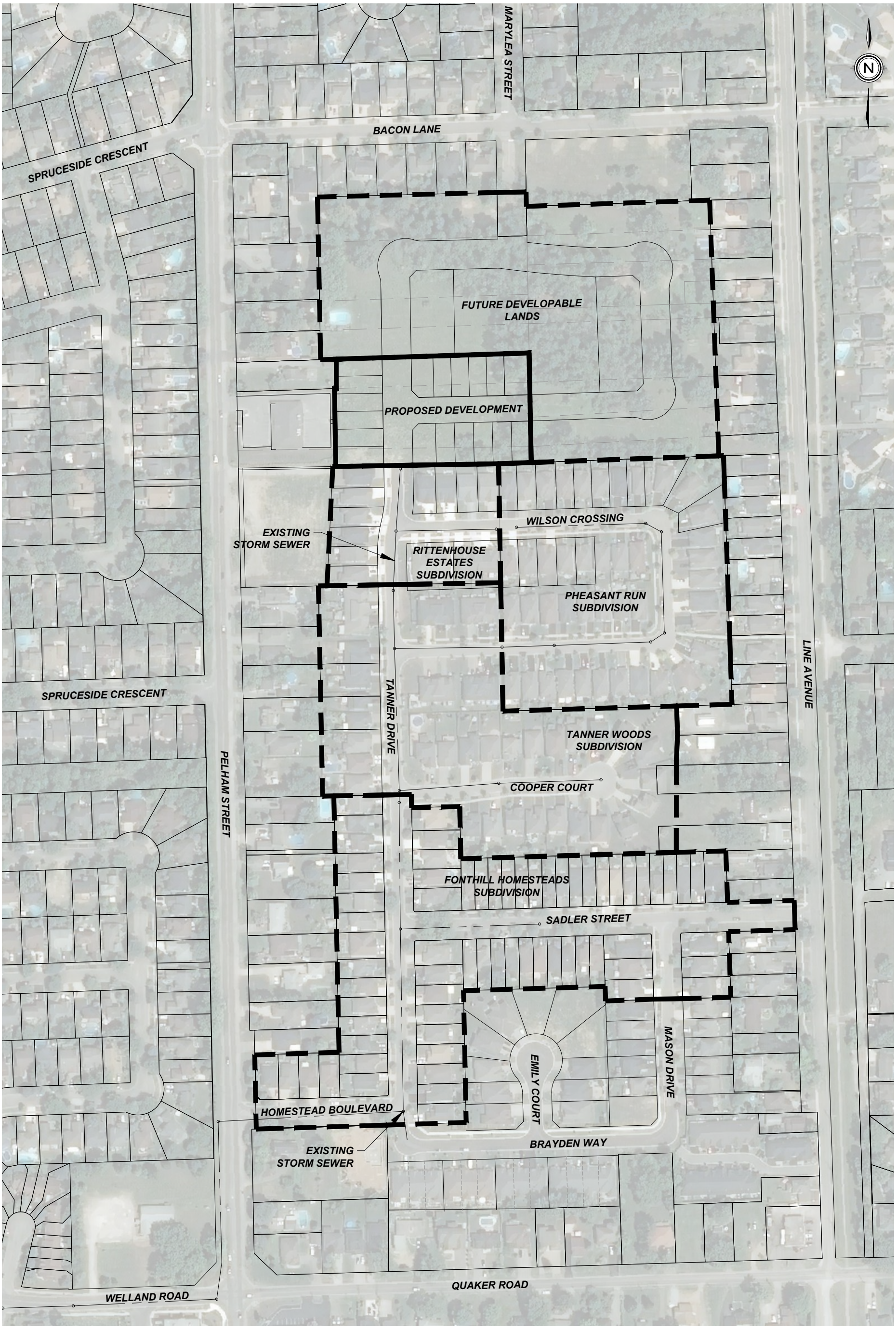
APPENDIX B

Figure 1 - Existing Stormwater Drainage Area Plan
Figure 2 - Proposed Stormwater Drainage Area Plan



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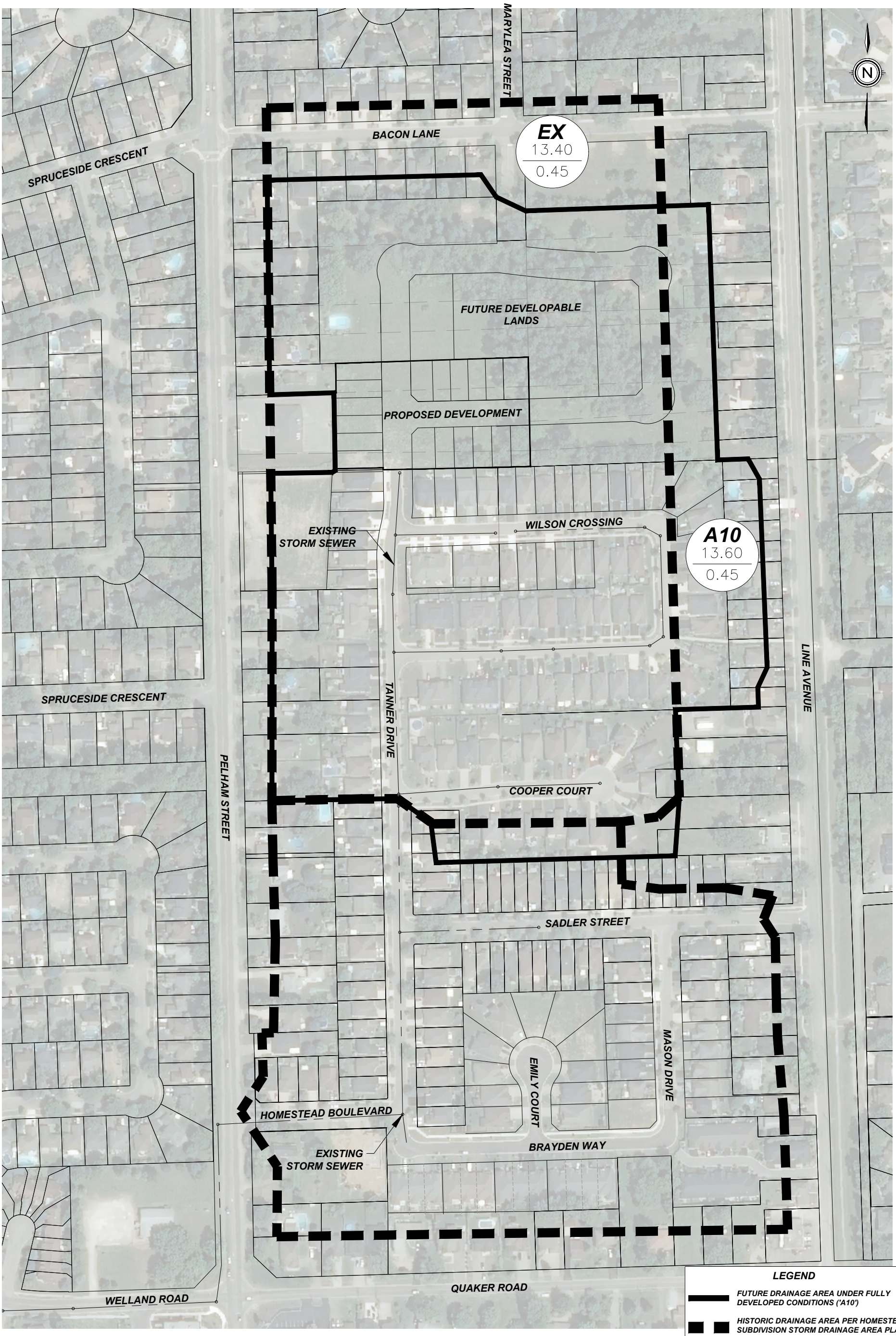
TANNER EXTENSION

TOWN OF PELHAM

EXISTING DEVELOPMENT PLAN

DATE	2021–12–07
SCALE	1:2500 m
REF No.	17147
DWG No.	FIGURE 1

DRAWING FILE: F:\17147\SWM\17147_Tanner Extension_DP_R0_1611 South Pelham_2021.09.27_AV.dwg PLOTTED: Dec 09, 2021 – 1:46pm PLOTTED BY: kurt



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TANNER EXTENSION

TOWN OF PELHAM

OVERALL DRAINAGE AREA PLAN

DATE	2021–12–07
SCALE	1:2500 m
REF No.	**17147**
DWG No.	**FIGURE 2**

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