



File: 24070

FUNCTIONAL SERVICING REPORT

Tintern Estates Subdivision Town of Lincoln October 2024

INTRODUCTION

Upper Canada Consultants has been retained to undertake and provide a Functional Servicing Report to address the servicing needs and requirements for the proposed development known as Tintern Estates Subdivision. The project site is located north-west of the intersection of Tintern Road and Spring Creek Road however and has significant frontage on both streets. The property is bound by Spring Creek to the north-west which includes areas of Provincially Significant Wetland known as the Lower Twenty Mile Creek Wetland Complex. The development area has historically been agricultural lands.

The proposed Tintern Estates Subdivision will result in the development of approximately 4.83 hectares of the property and shall consist of 11 single detached dwelling and associated lots. Six (6) of the lots will front directly onto Spring Creek Road with the remaining lots fronting Tintern Road.

The objectives of this study are as follows:

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

WATER AND SANITARY

As no municipal watermain is located in proximity to the site, each lot will be constructed with a cistern to allow a private water service to supply domestic water.

Similarly, no sanitary sewer is located in proximity to the proposed development. As shown on the Grading Plan (24070-GP), each lot will be constructed with a sewage bed located near the roadway frontage. The septic systems will be designed and constructed by others.

STORMWATER MANAGEMENT PLAN

As part of the site development for the proposed residential development, the following is a summary of the stormwater management plan.



As stated previously, Spring Creek is located immediately north-west of the property limits conveying flows in a generally north-east direction ultimately discharging to Twenty Mile Creek and continuing to Lake Ontario. Under existing conditions, stormwater from the site is directed to three separate outlets: Tintern Road roadside ditch (east), Spring Creek Road roadside ditch (south), Spring Creek (north-west). However, all stormwater flows directed to the roadside ditches very quickly discharge directly to Spring Creek.

Modelling has been completed using the MIDUSS stormwater modelling software to determine peak stormwater flows under existing and future conditions from the site. The modelling has been conducted to ensure sufficient flows are still being provided to the Wetland Area under future conditions and to ensure no impacts will occur to Spring Creek as a result of the proposed Stormwater Management Plan.

Drainage Areas for existing and future conditions have been delineated as outlined in Figure 1 in Appendix A and calculations have been conducted for the 5- and 100-year design storm events. Table 1 below outlines the parameters utilized to complete the MIDUSS modelling. Weighted Impervious Calculations can be found in Appendix A for Drainage Areas 'A10' and 'Site'.

Table 1. Hydrologic Parameters					
Area No.	Area (ha)	Length (m)	Slope (%)	SCS CN	Percent Impervious
EX10	3.70	80	1.5	74	0.1
A10	2.88	70	1.5	74	7.7
SITE	4.83	120	1.5	74	15.4

Peak flows to the Spring Creek Wetland Complex under existing and future conditions from Drainage Area EX10 and A10 respectively are included in Table 2 below.

Table 2. Peak Flows to Wetland			
Design Storm (Return Period)	Existing Flows – 'EX10' (L/s)	Future Flows – 'A10' (L/s)	Percent Change (%)
5 Year	64	55	-14.1%
100 Year	260	217	-16.5%

As shown above, peak stormwater flows conveyed overland via sheet flow to the wetland area will experience minor reductions during all modelled storm events as a result of the proposed Stormwater Management Plan.

The Spring Creek Drainage Study was completed by the Niagara Peninsula Conservation Authority in 2006 and outlines the drainage areas and associated peak stormwater flows at points along Spring Creek. In particular, the study has noted a peak flow rate of 63.21m³/s at an associated elevation of 176.15m during the 100-year design storm event at Station 3689 located just north of the Spring Creek culvert crossing at Spring Creek Road, just west of the development.



Modelling has been completed (Appendix A) using the MIDUSS stormwater modelling software to determine the impact of the proposed development (Drainage Area 'SITE') in regards to total peak stormwater flows discharging to Spring Creek during the 100-year design storm event. The existing and future flows from the development site to Spring Creek are outlined in the table below.

Table 1. Stormwater Characteristics					
Design Storm (Return Period)	Tintern Estates Peak Flows (m³/s)			Spring Creek	
	Existing	Future	Difference	Elevation (m)	Flow Rate (m³/s)
100 Year	0.278	0.326	0.048 (+0.08%)	176.15	63.21

As shown above, peak stormwater flows directed to Spring Creek from the proposed development site will increase by 48L/s during the 100-year design storm event. This increase will be split over the three previously noted outlets (roadside ditches and overland flow directly to the creek), and is proportionally 0.08% of the total peak flow experienced within Spring Creek at the site.

From the Drainage Study, the highest upstream reach of the Main-Upper Spring Creek Channel is at Station 19588, located at the Church Road road allowance just south of Sobie Road in Grimsby – approximately 15.9km upstream of the proposed development site. Due to the extreme length within the upstream drainage area, as well as the very minor increase in total peak flows discharging from the site, no adverse effects will occur to Spring Creek or the downstream watercourses as a result of the proposed Stormwater Management Plan.



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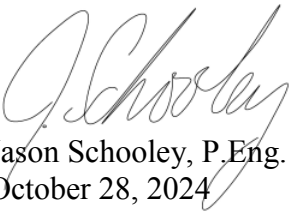
CONCLUSIONS AND RECOMMENDATIONS

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

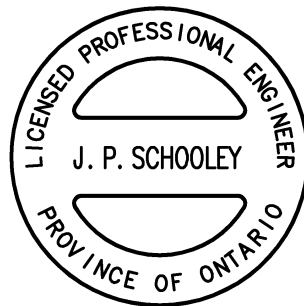
1. Domestic water supply will be provided by individual cisterns for each lot.
2. Private Septic Sewage Systems will provide the necessary sanitary outlet for each lot.
3. Due to the significant flow rate within Spring Creek north-west of the site, stormwater quantity controls will not be required for this development.

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,



Jason Schooley, P.Eng.
October 28, 2024
Encl.





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APPENDICES



**UPPER CANADA
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APPENDIX A

**Weighted Impervious Calculation Sheet
MIDUSS Output File**

LEGEND

A0
0.00
0.0%

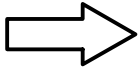
DRAINAGE AREA NUMBER
DRAINAGE AREA IN HECTARES
WEIGHTED IMPERVIOUSNESS



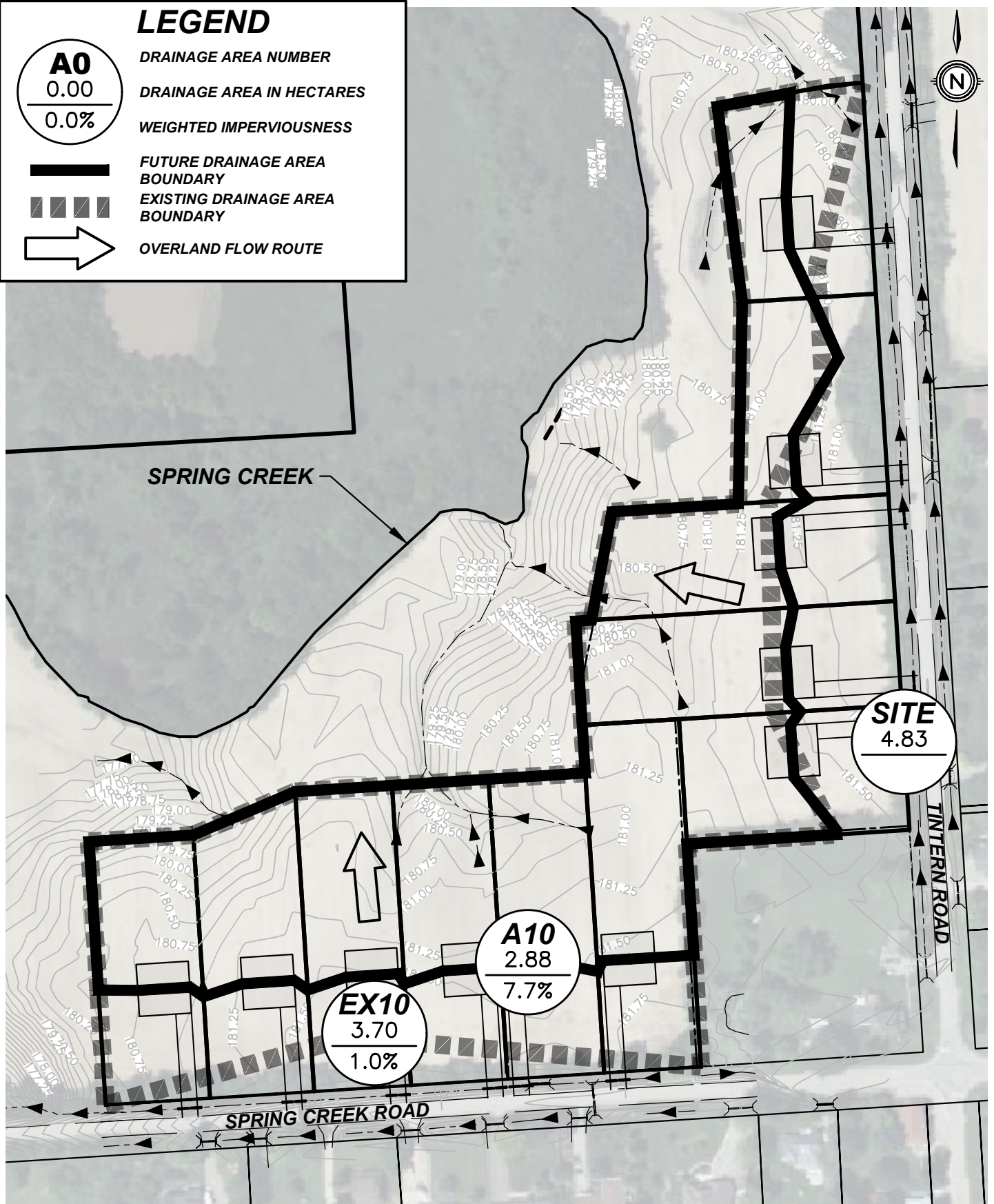
FUTURE DRAINAGE AREA
BOUNDARY



EXISTING DRAINAGE AREA
BOUNDARY



OVERLAND FLOW ROUTE



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TINTERN ESTATES
TOWN OF LINCOLN
OVERALL DRAINAGE AREA PLAN

DATE	2024-10-28
SCALE	1:2000 m
REF No.	24070
DWG No.	FIGURE 1

Weighted Imperviousness Percentage Calculation Worksheet				
Project Name:	TINTERN ESTATES			
Project Number:	24070			
Date:	OCTOBER 2024			
Person:	K.Tiessen			
PROP - ENTIRE SITE				
	Footprint	% Impervious		Effective Impervious Area
Proposed Buildings	4400.0 m ²	100%	ea	4400.0 m ²
Asphalt Driveways	2065.0 m ²	100%	ea	2065.0 m ²
Landscape/Greenspace	35802.5 m ²	0.1%	ea	35.8 m ²
TOTAL CATCHMENT IMPERVIOUS AREAS				6,501 m ²
TOTAL CATCHMENT AREA				42,268 m ²
EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS				15.4 %
A10 - PROPOSED CONDITIONS TO WETLAND				
	Footprint	% Impervious		Effective Impervious Area
Proposed Buildings	2200.0 m ²	100%	ea	2200.0 m ²
Landscape/Greenspace	26644.6 m ²	0.1%	ea	26.6 m ²
TOTAL CATCHMENT IMPERVIOUS AREAS				2,227 m ²
TOTAL CATCHMENT AREA				28,845 m ²
EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS				7.7 %



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Units used are defined by G = 9.810
24 144 10.000 are MAXDT MAXHYD & DTMIN values
Licensee: UPPER CANADA CONSULTANTS

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35 COMMENT
3 line(s) of comment

* 100 YEAR DESIGN STORM *

2 STORM
1 1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
1039.200 Coefficient a
7.000 Constant b (min)
.821 Exponent c
.400 Fraction to peak r
240.000 Duration o 240 min
45.117 mm Total depth

3 IMPERVIOUS
1 Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.015 Manning "n"
98.000 SCS Curve No or C
.100 Ia/S Coefficient
.518 Initial Abstraction

35 COMMENT
1 line(s) of comment
**** EXISTING CONDITIONS ****
4 CATCHMENT
10.000 ID No.ó 99999
3.700 Area in hectares
80.000 Length (PERV) metres
1.500 Gradient (%)
.100 Per cent Impervious
80.000 Length (IMPERV)
.000 %Imp. with Zero Dpth
1 Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250 Manning "n"
74.000 SCS Curve No or C
.100 Ia/S Coefficient
8.924 Initial Abstraction
1 Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
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.231 .873 .232 C perv/imperv/total

27 HYDROGRAPH DISPLAY
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1 line(s) of comment
**** FUTURE CONDITIONS ****
4 CATCHMENT
10.000 ID No.ó 99999
2.880 Area in hectares
70.000 Length (PERV) metres
1.500 Gradient (%)
7.700 Per cent Impervious
70.000 Length (IMPERV)
.000 %Imp. with Zero Dpth
1 Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250 Manning "n"
74.000 SCS Curve No or C
.100 Ia/S Coefficient
8.924 Initial Abstraction
1 Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.055 .000 .000 .000 c.m/s
.231 .873 .281 C perv/imperv/total

14 START
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35 COMMENT
3 line(s) of comment

* 100 YEAR DESIGN STORM *

2 STORM
1 1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
2138.000 Coefficient a
9.000 Constant b (min)
.858 Exponent c
.400 Fraction to peak r
240.000 Duration o 240 min
75.183 mm Total depth

3 IMPERVIOUS
1 Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.015 Manning "n"
98.000 SCS Curve No or C
.100 Ia/S Coefficient
.518 Initial Abstraction

35 COMMENT
3 line(s) of comment

** FLOWS TO WETLAND **

35 COMMENT
1 line(s) of comment
**** EXISTING CONDITIONS ****
4 CATCHMENT

10.000 ID No.ó 99999
3.700 Area in hectares
80.000 Length (PERV) metres
1.500 Gradient (%)
.100 Per cent Impervious
80.000 Length (IMPERV)
.000 %Imp. with Zero Dpth
1 Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250 Manning "n"
74.000 SCS Curve No or C
.100 Ia/S Coefficient
8.924 Initial Abstraction
1 Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.260 .000 .000 .000 c.m/s
.375 .916 .376 C perv/imperv/total

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1 line(s) of comment
**** FUTURE CONDITIONS ****
4 CATCHMENT
10.000 ID No.ó 99999
2.880 Area in hectares
70.000 Length (PERV) metres
1.500 Gradient (%)
7.700 Per cent Impervious
70.000 Length (IMPERV)
.000 %Imp. with Zero Dpth
1 Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250 Manning "n"
74.000 SCS Curve No or C
.100 Ia/S Coefficient
8.924 Initial Abstraction
1 Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.217 .000 .000 .000 c.m/s
.374 .916 .415 C perv/imperv/total

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3 line(s) of comment

** TOTAL FLOWS TO SPRING CREEK **

35 COMMENT
1 line(s) of comment
**** EXISTING CONDITIONS ****
4 CATCHMENT
10.000 ID No.ó 99999
4.830 Area in hectares
120.000 Length (PERV) metres
1.500 Gradient (%)
.100 Per cent Impervious
120.000 Length (IMPERV)
.000 %Imp. with Zero Dpth
1 Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250 Manning "n"
74.000 SCS Curve No or C
.100 Ia/S Coefficient
8.924 Initial Abstraction
1 Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.279 .000 .000 .000 c.m/s
.375 .914 .376 C perv/imperv/total

27 HYDROGRAPH DISPLAY
4 is # of Hyeto/Hydrograph chosen
Volume = .1364699E+04 c.m
35 COMMENT
1 line(s) of comment
**** FUTURE CONDITIONS ****
4 CATCHMENT
10.000 ID No.ó 99999
4.830 Area in hectares
120.000 Length (PERV) metres
1.500 Gradient (%)
15.400 Per cent Impervious
120.000 Length (IMPERV)
.000 %Imp. with Zero Dpth
1 Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250 Manning "n"
74.000 SCS Curve No or C
.100 Ia/S Coefficient
8.924 Initial Abstraction
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.375 .914 .458 C perv/imperv/total

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