UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

June 3, 2025

MEMO

RE: **Spring Creek Heights Land Swap (SWM)**
Township of West Lincoln

The developers of Spring Creek Heights have agreed to swap lands as indicated on thee enclosed Severance Concept Plan. The lands will be developed for both residential and industrial land uses. Appended to this memo is the Spring Creek Heights Land Swap Overall Stormwater Management Plan. The results of the SWM report are as follows:

1. Each individual development involved in the land swap, must provide quantity controls for the 5 year storm event, such that the combined flow entering the Skyway Road storm sewers do not exceed the capacity of the storm sewers.

2. Quantity controls are not required for the major storm events due to the location of the subject lands within the overall watershed for Twenty Mile Creek. Therefore, detaining future peak stormwater flows on site will delay the stormwater peak from the site to match with the greater stormwater peak of from the upstream lands within the Twenty Mile Creek watershed.

3. Each development is required to provide stormwater quality controls to Enhanced Protection Levels (80% TSS removal) in accordance with MECP guidelines prior to outletting to Twenty Mile Creek.

It is proposed to extend the storm sewer on Skyway Road within the site through an easement as shown on the Proposed Servicing Plan appended to this report. The proposed storm sewer will service the proposed industrial developments and will extend to the southern limits of Al Schuttens Industrial Development. At the time the SWM report was completed, the intention was to extend the storm sewer to Al Schuttens Residential Development at the north limits of the subject lands. This option was the most feasible option for servicing the proposed residential development, since the existing SWM Facility in the Station Meadows development was at capacity, and a new storm sewer would have to be constructed on Van Woudenberg Way from Hornak Road to Station Street (Regional Road 14). Following the pre-consultation submission/meeting, the Town has indicated that the owner of the Station Meadows development (Peter Budd) intends to increase the capacity of the SWM pond. However, at this time we do not have the required information from Peter Budd, to determine the feasibility of having the proposed residential subdivision outlet to the Station Meadows Storm Sewers.

Therefore, until it is confirmed that the Station Meadows storm sewers and SWM facility has capacity to receive flows from Al Schuttens Residential Development, the proposed SWM plan will allocate capacity within the proposed storm sewer that will extend within the subject lands from Skyway Road as proposed in the attached SWM plan.

Respectfully submitted,

Zach Barber, E.I.T.
June 5, 2025.

PRELIMINARY STORMWATER MANAGEMENT PLAN

SPRING CREEK HEIGHTS LAND SWAP

TOWNSHIP OF WEST LINCOLN

Prepared by:

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

April 2025

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

REFERENCES

1. Stormwater Management Planning and Design Manual
Ontario Ministry of Environment (March 2003)

2. Master Servicing Plan – Smithville Industrial Park (1994, rev.1996) by Philips Planning and Engineering Ltd.

STORMWATER MANAGEMENT PLAN

SPRING CREEK HEIGHTS LAND SWAP

TOWNSHIP OF WEST LINCOLN

1.0 INTRODUCTION

1.1 Study Area

Stanpac Inc. and Allan Schutten have come to an agreement to swap lands as indicated on Figure 1 below. All properties involved in this land swap will be referred to as the subject lands hence fourth. The subject lands are located southeast of Regional Road 14 (Station Street), south of Spring Creek Road, north of Thompson Road and Clifford Street and north of CPKC Hamilton Subdivision (Railway Lands). The subject lands are divided into three separate properties the central property is known municipally as 346 Station Street, the southern and northern properties do not have a municipal address. As part of the land swap Allan Schutten will retain the lands located at the northwestern portion of the subject lands these lands will hence fourth be referenced as the Spring Creek Lands as shown on Figure 1 below. It is planned to develop a portion of the Spring Creek Lands as residential and the other portion as industrial. Stanpac Inc. will retain the lands located at the northeastern portion of the subject lands adjacent to there existing property at 2790 Spring Creek Road. Stanpac intends to develop these lands as industrial.

As part of the land swap John Calvin Christian School has agreed to sell a portion of their lands to Stanpac Inc. As shown in Figure 1, these lands include everything from the southern limits of the subject lands where it fronts the Railway Lands and will be bound by the existing track and field facility to the west and the existing properties fronting Clifford Street to the east. Stanpac Inc intends to develop these lands as industrial.

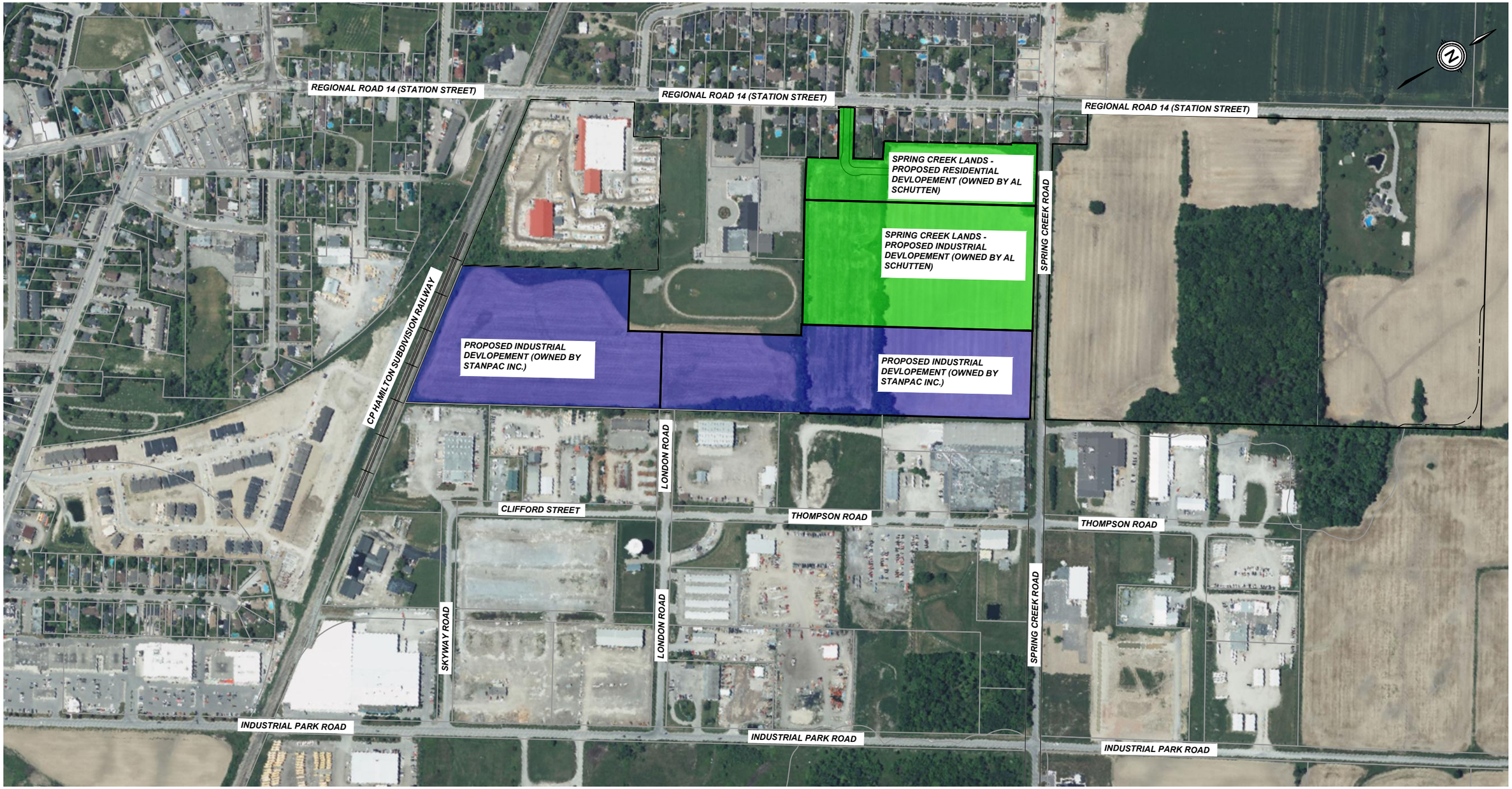
All properties within the approximately 18 ha subject lands will include associated asphalt road, concrete curb, catch basins, storm sewers, sanitary sewers and watermain. The drainage areas contributing to this stormwater management plan consist primarily of the subject lands.

1.2 Objectives

The objectives of this study are as follows:

1. Establish specific criteria for the management of stormwater from the subject lands.

2. Determine the impact of the developments on the stormwater peak flow & volume from the subject lands.



UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

SPRING CREEK LAND SWAP

TOWNSHIP OF WEST LINCOLN

SITE LOCATION

DATE	2025–04–04
SCALE	1:5000 m
REF No.	.
DWG No.	***FIGURE 1***

1.3 Existing & Proposed Conditions

a) Existing Conditions

Upon review of the "Smithville North" Stormwater Management Master Plan by Philips Planning and Engineering Ltd. it has been determined that the subject lands are divided into two separate watersheds the Northwest Watershed and the Northeast Watershed. Flows from both watersheds ultimately outlet to Twenty Mile Creek.

Stormwater flows from the subject lands located in the Northwest Watershed outlet to Regional Road 14 (Station Street) or to the ditch that runs parallel to the CP Hamilton Subdivision Railway. The stormwater flows from the Northwest watershed then converge on the west side of Regional Road 14 (Station Street) before crossing the CP Hamilton Subdivision Railway through an existing watercourse that is tributary to Twenty Mile Creek and ultimately outlets to Twenty Mile Creek at the south limits of Wade Road.

Stormwater flows from the subject lands in the Northeast watershed either outlet to Clifford Street through London Road or to the CP Hamilton Subdivision Railway through an existing watercourse that starts south of London Road. Overland Flows on Clifford Street continue down Skyway Road to Industrial Park Road and Outlet to Twenty Mile Creek east of the intersection of Industrial Park Road and Regional Road 20 (St. Catharines Street). The stormwater flows that outlet to the CP Hamilton Subdivision Railway cross the railway south of the easement between 2676 Clifford Street and 6254 Skyway Road and continue through a tributary watercourse to Twenty Mile Creek that flows southerly through the Old Town Subdivision to Regional Road 20 (St. Catharines Street) and outlets to Twenty Mile Creek.

There is a 1050mm diameter storm sewer on Skyway Road that begins at the intersection with Clifford Street and flows easterly were it outlets to a 1050mm diameter storm sewer on Industrial Road. The 1050mm diameter storm sewer on industrial road then outlets to a 1500mm diameter storm sewer that crosses the CP Hamilton Subdivision Railway. Minor flows from the subject lands enter the roadside ditches on Clifford Street and then outlets to the storm sewer on Skyway Road through a 900mm HDPE culvert.

Historically, the site has been agricultural land. Based on the Smithville North Master Drainage Plan the soils of this watershed are silty clays and are rated as hydrologic soil group "C".

b) Proposed Conditions

As part of the land swap Allen Schutten's land will be divided into two separate developments. A portion of lands will be residential development. The other portion of Allen Schutten's lands is proposed to be developed as industrial. Stanpac Inc. plans to expand its operations, and therefore both portions of land that Stanpac shall obtain through the land swap will be industrial.

The developments will be constructed with asphalt pavement, concrete curb and gutters, storm sewers, sanitary sewers and watermain.

2.0 STORMWATER MANAGEMENT CRITERIA

New developments are required to provide stormwater management in accordance with provincial and municipal policies including:

- Stormwater Quality Guidelines for New Development (MECP/MNRF, May 1991)
- Stormwater Management Planning and Design Manual (MECP, March 2003)

Based on the comments and outstanding policies from the Town of West Lincoln, Region of Niagara, Niagara Peninsula Conservation Authority (NPCA), and the Ministry of the Environment, Conservation and Parks (MECP), the following site-specific considerations were identified:

- The receiving watercourse (Twenty Mile 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).
- The subject lands are located immediately upstream of Twenty Mile Creek. Since Twenty Mile Creek is an extremely long watercourse that begins in Hamilton and outlets to Lake Ontario through Jordan Harbor, detaining future peak stormwater flows on site will delay the stormwater peak from the site to match with the greater stormwater peak of from the upstream lands within the Twenty Mile Creek watershed. Therefore, stormwater quantity controls are not considered necessary for the subject lands due to the location of the subject lands within the overall watershed for Twenty Mile Creek.
- Minor flows from the subject lands that outlet to the storm sewer system on Skyway Road will be required to be controlled to the capacity of the 1050mm diameter storm sewer.

Based on the above and a review of the site-specific considerations, the following stormwater management criteria have been established for the subject lands:

- Stormwater **quality** controls are to be provided to Enhanced Protection Levels (80% TSS removal) in accordance with MECP guidelines prior to outletting to Twenty Mile Creek.
- Stormwater **quantity** controls are to be provided from the subject lands for the 5 year design storm event to the capacity of the existing 1050mm diameter storm sewer on Skyway Road.
- Stormwater **quantity** controls are not required for major overland flows discharging from the subject lands.

3.0 STORMWATER ANALYSIS

A preliminary stormwater analysis was conducted using Modified Rational Method to assess existing and future peak flows from the proposed development area. Quantity and quality controls are to be provided by each individual development involved in this land swap. Therefore, for the purposes of this analysis the way in which each individual site provides quantity and quality controls will not be determined. Instead, this analysis will determine the maximum allowable stormwater flows for each individual development and the required stormwater storage to achieve these flows.

3.1 Design Storms

The Master Servicing Plan – Smithville Industrial Park (1994, rev 1996) by Philips Planning and Engineering Ltd. and every subsequent development included in the Industrial Park Area used the following design storm hydrographs summarized in table 1. The hydrographs were developed using a Chicago distribution based on the Intensity-Duration-Frequency curves for West Lincoln at the time the Master Servicing Plan was written. Therefore, the following stormwater analysis for the subject lands will continue to use the same IDF values, to remain consistent with the Master Servicing Plan.

Table 1. Rainfall Data

Design Storm (Return Period)	Chicago Distribution Parameters		
	a	b	c
5 Year	1039.20	7.00	0.82
100 Year	2138.00	9.00	0.86

$$Intensity\ (mm/hr) = \frac{a}{(t_d + b)^c}$$

3.2 Existing Conditions

The existing conditions were evaluated to determine the peak stormwater flows prior to the development within the subject lands and surrounding areas that outlet to the Skyway Road storm sewers. The existing drainage areas for the subject lands and the Skyway Road storm sewers are shown in Figure 2. These drainage areas were determined from field investigations and a combination of topographic surveys and topographic information from the Regional Niagara DTM. The subject lands are comprised of Drainage Areas EX3, EX4 EX5, EX6 and part of EX2 and EX7.

Drainage Areas EX1, EX2, EX6 and EX8 outlined in Figure 2 are located within the Northwest Watershed. Drainage Areas EX6 and EX8 outlet to the Railway Lands at Outlet E in the north side ditch and flows westerly to Regional Road 14 (Station Street) at Outlet A. Drainage Areas EX1 and EX2 outlet to Regional Road 14 (Station Street). Stormwater flows on Regional Road 14 (Station Street) flow southerly to Outlet A. All flows from the subject lands located within the Northwest Watershed converge at Outlet A and outlet a tributary to Twenty Mile Creek. This watercourse crosses the CP Hamilton Subdivision Railway at Outlet A and ultimately outlets to Twenty Mile Creek at the south limits of Wade Road.

Drainage Areas EX3, EX4, EX5, and EX7 within the subject lands are located within the Northeast Watershed.

Drainage Area EX3 outlets to an existing stormwater management facility at Outlet B owned by Stanpac at 2748 Thompson Avenue in Drainage Area E1. This facility was designed to control stormwater flows entering the roadside ditch on Thompson Road from Drainage Areas E1 and EX3 to an equivalent runoff coefficient of 0.32.

Drainage Area EX 4 outlets to London Road at Outlet C through Drainage Area E2 to Clifford Street and enters the roadside ditch on Clifford Street. Drainage Area E7 contains the existing Track and Field Facility at John Calvin Christian School. The Track and Field Facility has an underground drainage system that collects minor stormwater flows and outlets to a 6” pipe at the southeast corner of Drainage Area EX7. The 6” pipe outlets to Drainage Area E5 and enters the storm sewer system on Skyway Road through a 900mm diameter culvert. Overland flows from Drainage Area EX7 outlet to Drainage Area EX4 and continue to London Road.

Overland Flows from Drainage Areas EX3, EX4, and EX7 converge on Clifford Street and continue down Skyway Road to Industrial Park Road at Outlet G and Outlet to Twenty Mile Creek east of the intersection of Industrial Park Road and Regional Road 20 (St. Catharines Street).

Drainage Area EX5 outlets to the Railway Lands in the north side ditch at Outlet D and flows easterly to the culvert crossing under Railway Lands between 2676 Clifford Street and 6254 Skyway Road at Outlet F. Then continue through a tributary watercourse to Twenty Mile Creek that flows southerly through the Old Town Subdivision to Regional Road 20 (St. Catharines Street) and outlets to Twenty Mile Creek.

3.3 Skyway Road Storm Sewer

There is an existing 1050mm diameter storm sewer that was built on Skyway Road in 2008. The storm sewer system flows easterly and outlets to the storm sewer on Industrial Park Road which flows southerly to Regional Road 20 (St. Catharines Street) and outlets to Twenty Mile Creek. As shown in Figure 2, drainage areas E1 to E5 and E7 to E9 represent external drainage areas around the subject lands that outlet to the Skyway Road Storm Sewer. The Skyway Road storm sewer system was analysed under existing conditions to determine the capacity of the system, and has been included in Appendix A. The analysis indicates that each property is controlling storm water runoff to an equivalent runoff coefficient of 0.40 excluding drainage area E1 which combined with drainage area EX3 controls to an equivalent runoff coefficient of 0.32.

Currently, 3 drainage areas within the subject lands outlet to the storm sewer on Skyway Road (EX3, EX4 and EX7). Drainage Area EX3 outlets to Stanpac's SWM facility through Drainage Area E1 to the road side ditch on Thompson Road that is flowing southerly and outlets to the Skyway Road Storm sewer system through a 900mm diameter culvert. Drainage Area EX4 outlets to Thompson Road and enters the road side ditch and flows to Clifford Street where it enters the Skyway Road storm sewer through a 900mm diameter culvert. Drainage Area EX7 drains through a 150mm pipe to drainage area E5 and flows easterly to the road side ditch on Clifford Street where it outlets to the Skyway Road storm sewer through a 900mm diameter culvert.

As shown in the analysis of the existing Skyway Road storm sewer system in Appendix A, the storm sewers are currently operating at approximately 85% of its total capacity during the 5 year storm event.

3.4 Station Meadows Detention Wetland

Station Meadows Subdivision is a residential development located on the west side of Regional Road 14 (Station Street) immediately west of the subject lands. Included with the development of Station Meadows is an extended detention wetland. Upon review of the Final Engineering Report for Station Meadows prepared by The Odan/Detech Group Inc. the calculated volume of the pond is 8000m³ which corresponds to a maximum extended detention depth of 1.3m. The highest stage reached in the pond is 1.29m during the 100 year design storm event which correlates to a volume of 7997m³. As summarized in Table 3.1 Post Development Conditions in the Final Engineering Report for Station Meadows, the subject lands existing drainage areas have not been included in the design of the wetland. Flows from the subject lands flow southerly on the east side of Regional Road 14 (Station Street) bypassing the wetland and converge with the outflows from the wetland at Outlet A. Therefore, there is no capacity in the wetland to receive flows from the subject lands.

LEGEND

- **A0** / 0.00 / 0% — DRAINAGE AREA ID # / AREA IN HECTARES / IMPERVIOUSNESS (%)
- EXISTING STORMWATER DRAINAGE AREA
- MAJOR OVERLAND FLOW
- A — STORMWATER OUTLET

REGIONAL ROAD 14 (STATION STREET)

REGIONAL ROAD 14 (STATION STREET)

REGIONAL ROAD 14 (STATION STREET)

SPRING CREEK ROAD

CP HAMILTON SUBDIVISION RAILWAY

LONDON ROAD

CLIFFORD STREET

THOMPSON ROAD

THOMPSON ROAD

SKYWAY ROAD

LONDON ROAD

SPRING CREEK ROAD

INDUSTRIAL PARK ROAD

INDUSTRIAL PARK ROAD

INDUSTRIAL PARK ROAD

EX8	1.53	0.75
EX1	7.75	0.75
EX2	2.40	0.40
EX5	1.27	0.20
EX6	4.09	0.20
EX7	1.51	0.20
EX3	9.42	0.20
EX4	2.34	0.20
E6	3.91	0.40
E5	1.16	0.40
E2	4.08	0.40
E1	4.39	0.44
E7	0.56	0.40
E8	1.35	0.40
E4	2.06	0.40
E3	4.13	0.40
E9	2.64	0.40

A B C D E F G

132.3m-150Ø STM

EX. 132.8m-1050Ø STM @ 0.53%

135.0m-1050Ø STM @ 0.53%

110.0m-1050Ø STM @ 0.55%

136.0m-750Ø STM @ 0.64%

145.0m-750Ø STM @ 0.37%

105.0m-1050Ø STM @ 0.51%

35.0m-1500Ø STM @ 0.71%

N

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

SPRING CREEK LAND SWAP

TOWNSHIP OF WEST LINCOLN

EXISTING STORM DRAINAGE AREAS

DATE	2025-06-04
SCALE	1:5000 m
REF No.	-
DWG No.	FIGURE 2

3.5 Proposed Conditions

As shown on Figure 3 – Proposed Stormwater Drainage Areas, the subject lands will be divided into four separate drainage areas that represent each development involved in the land swap. Since, the exact details of each development are not confirmed a runoff coefficient of 0.75 was assigned to the future residential townhouse development Drainage Area R1. A conservatively assumed runoff coefficient of 0.85 was assigned to the industrial developments Drainage Areas I2, I3 and I4 based on the town's requirement for new developments in Zone D to have a minimum of 30% landscape area.

As shown in Figure 3, Drainage Area R1 will direct major overland flows down the proposed roadway to Regional Road 14 (Station Street) to Outlet A. Drainage Areas I2, I3 and I4 will direct major overland flows to the proposed township easement indicated on Figure 3. The township easement will convey all major overland flows from the subject lands to London Road at Outlet C.

It is proposed to extend a storm sewer from the existing manhole at the intersection of Clifford Street and Skyway Road down Clifford Street to the intersection of London Road and Clifford Street. Then west up London Road to the limits of the subject lands where it will extend through a proposed easement within the subject lands to service each development.

Each individual development will have an internal storm sewer system to convey minor storm events and will outlet to the proposed storm sewer extension. It is proposed to have each development provide quantity and quality controls prior to outletting to the proposed storm sewer extension in accordance with the criteria outlined in this report.

LEGEND

- A0 / 0.00 / 0% — DRAINAGE AREA ID #, AREA IN HECTARES, IMPERVIOUSNESS (%)
- PROPOSED STORMWATER DRAINAGE AREA
- MAJOR OVERLAND FLOW
- A — STORMWATER OUTLET

REGIONAL ROAD 14 (STATION STREET)

REGIONAL ROAD 14 (STATION STREET)

REGIONAL ROAD 14 (STATION STREET)

R1 2.34 / 0.75

FUTURE RESIDENTIAL - STORM WATER OUTLET TO

BE CONFIRMED PENDING INFORMATION REGARDING UPGRADES TO THE STATION MEADOWS SWM FACILITY

SPRING CREEK ROAD

PROP. STM SEWER

FUTURE INDUSTRIAL DEVELOPMENT

PROP STM MH INCLUDES QUANTITY AND QUALITY (OGS) SWM

I2 4.98 / 0.85

PROP. STM SEWER

I4 5.13 / 0.85

FUTURE INDUSTRIAL DEVELOPMENT

FUTURE INDUSTRIAL DEVELOPMENT

PROP STM MH INCLUDES QUANTITY AND QUALITY (OGS) SWM

I3 5.41 / 0.85

PROP STM MH INCLUDES QUANTITY AND QUALITY (OGS) SWM

PROP. STM SEWER

LONDON ROAD

CP HAMILTON SUBDIVISION RAILWAY

LIMIT OF PROPOSED WORK

EX. STM MH

CLIFFORD STREET

PROP. STM SEWER

THOMPSON ROAD

SKYWAY ROAD

EX. 132.8m-1050Ø STM @ 0.53%

SPRING CREEK ROAD

THOMPSON ROAD

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

SPRING CREEK LAND SWAP

TOWNSHIP OF WEST LINCOLN

FUTURE STORM DRAINAGE AREAS

DATE	2025-06-04
SCALE	1:5000 m
REF No.	-
DWG No.	FIGURE 3

4.0 STORMWATER MANAGEMENT PLAN

4.1 Quantity Assessment

For the purpose of this submission an approximate allowable outflow and required stormwater storage will be determined for each development using Modified Rational Method, but the exact means in which quantity controls will be provided will be determined during draft plan approval. In order to ensure that the proposed developments do not exceed the capacity of the downstream sewer system, it will be the requirement of the proposed developments to control the 5 year design event to existing conditions. Table 1 below outlines the existing flows and proposed flows from the subject lands that outlet to the Skyway Road storm sewer.

Table 2. Peak Stormwater Flows to Skyway Road Storm Sewer System During 5 Year Design Storm Event

Existing Peak Flow (L/s) (Includes EX3, EX4 and EX7)	Future Uncontrolled Peak Flow (L/s) (Includes R1, I2, I3 and I4)	Total Required Stormwater Storage (m^3) to Control Future Peak Flows to Existing
826.0	4,214.6	3,723.0

As shown in Table 2 the future peak flows that will outlet to the Skyway Road storm sewer are significantly greater than the existing flows. Therefore, quantity controls are required to ensure that peak stormwater flows do not exceed the capacity of the downstream sewer system. A more detailed breakdown of the modified rational method has been included in Appendix B. As stated previously, an approximate allowable outflow and required stormwater storage will be determined for each development involved in the land swap but the exact means in which quantity controls will be provided will be determined in a separate report that shall be submitted with each individual development. It will be required to restrict peak flows from the proposed developments such that the combined peak flow that outlet to the Skyway Road Storm Sewer from the subject lands is equal to 826.0 L/s and the required storage to restrict peak flows to existing levels is 3,723.0 m^3.

In order to determine the allowable flow that each development can outlet to the proposed storm sewer system a percent allocation was assigned to each development based on the developments total area multiplied by its runoff coefficient. Table 2 below outlines the allowable flows that can outlet to the proposed storm sewer based on the percent allocation assigned to each development.

Table 3. Allowable Flows to Proposed Strom Sewer System from each Development				
Area ID	**R1**	**I2**	**I3**	**I4**
Area (Ha)	2.34	4.98	5.41	5.13
Runoff Coefficient	0.75	0.85	0.85	0.85
% Allocation	11.74%	28.32%	30.77%	29.17%
Allowable Flow (L/s)	97.0	233.9	254.1	241.0
Minimum Required Storage (m^3)	437.1	1,054.4	1,145.4	1,086.1

Therefore, as shown in Table 3 above each development has been assigned an allowable peak flow that can outlet to the proposed storm sewer system and an estimated minimum required storage based on its allowable outflow. The combination of all the developments peak flows equals the total allowable peak flow that the subject lands can outlet to the proposed storm sewer system. The exact volume required to achieve the allowable outflow for each development will be confirmed during the design of any SWM facilities.

Included in Appendix B, is the future storm sewer design sheet where the proposed storm sewer that will extend within the subject lands has been sized, based on the allowable flows allocated to each development.

Since, quantity controls are being provided for the 5 year design storm, the peak 100 year design storm flows will also be reduced. Summarized in Table 3 below is summary of the existing peak flows and the future peak flows with the minimum required storm water management from the subject lands and surrounding areas to each outlet identified on Figure 2 and 3 during the 100 year design storm event.

Table 4. 100 Year Peak Flow Comparison			
Outlet	Existing Peak Flows (L/s)	Future Peak Flows with SWM (L/s)	Percent Change
A	4,149.0	4,893.2	17.9%
B	894.6	0	-100%
C	365.6	5,535.9	1,449.9%
D	120.6	0	-100%
E	388.4	0	-100%
F	863.2	742.6	-14.0%
G	5,499.1	9,238.0	68.0%

As summarized in Table 4 above, it is proposed to redirect flow from the existing SWM facility owned by Stanpac (outlet B), and the Railway Lands (Outlets D, E and F). Major overland flows from Drainage Area R1 will be directed to Regional Road 14 (Station Street) increasing the flows at Outlet A by 17.9%. Major Overland Flows from Drainage Areas I2, I3 and I4 will be directed through the proposed easement to London Road at Outlet C, this will increase the major overland flows at Outlet C by 1,449.9%. The flows from the subject lands that outlet to Outlet C will combine with the external drainage areas outlined in Figure 3, on Thompson Street, Clifford Street, and Skyway Road and outlet to Industrial Park Road (Outlet G) and will increase major overland flows by 68.0%

4.2 Quality Assessment

A separate report will be submitted for each individual development, that will specify how the proposed development will provide quality controls. It is recommended that each development install an oil/grit separator prior to the outlet to the proposed storm sewer.

5.0 SEDIMENT AND EROSION CONTROL

Sediment and erosion controls are required during all construction phases of each development to limit the transport of sediment into the Twenty Mile Creek.

The following additional erosion and sediment controls will also be implemented during construction:

- Install silt control fencing along the limits of construction where overland flows will flow beyond the limits of the development or into downstream watercourse.

- Re-vegetate disturbed areas as soon as possible after grading works have been completed.

- Lot grading and siltation controls plans will be provided with sediment and erosion control measures to the appropriate agencies for approval during the final design stage.

6.0 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. That the stormwater management criteria established in this report be accepted.

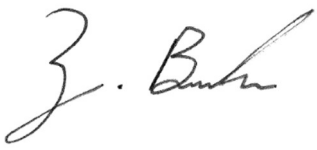
2. Each individual development involved in the land swap, must provide quantity controls for the 5 year storm event, such that the combined flow entering the Skyway Road storm sewers do not exceed the capacity of the storm sewers.

3. Quantity controls are not required for the major storm events due to the location of the subject lands within the overall watershed for Twenty Mile Creek. Therefore, detaining future peak stormwater flows on site will delay the stormwater peak from the site to match with the greater stormwater peak of from the upstream lands within the Twenty Mile Creek watershed.

4. Each development is required to provide stormwater quality controls to Enhanced Protection Levels (80% TSS removal) in accordance with MECP guidelines prior to outletting to Twenty Mile Creek.

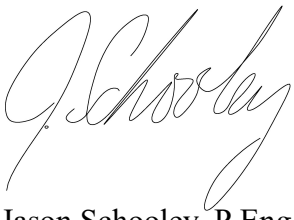
5. That the sediment and erosion control during construction as described in this report be implemented.

Prepared By:



Zach Barber, E.I.T.
April 4, 2025

Reviewed By:



Jason Schooley, P.Eng.

APPENDICES

APPENDIX A

Existing Storm Sewer Analysis

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

RAINFALL PARAMETERS: A = 1039.2
5 YEAR DESIGN STORM EVENT B = 7.0
TOWNSHIP OF WEST LINCOLN C = 0.821

SEWER DESIGN: PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 ACTUAL DIAMETER SIZE FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: TOWNSHIP OF WEST LINCOLN
PROJECT NAME: SPRING CREEK HEIGHTS LAND SWAP
PROJECT NO.: 23171

E X I S T I N G S T O R M S E W E R D E S I G N S H E E T

LOCATION			STORMWATER ANALYSIS								STORM SEWER DESIGN					
DESCRIPTION	**From**	**To**	**Area (A) (hectares)**	**Runoff Coeff. (R)**	**A*R**	**Accumulated A*R**	**Time of Concentration (min)**	**Flow Time (min.)**	**Rainfall Intensity (mm/hr)**	**Peak Flow (L/s)**	**Length (m)**	**Nominal Diameter (mm.)**	**Slope (%)**	**Full Flow Capacity (L/s)**	**Full Flow Velocity (m/s)**	**Percent Full**
E1 + EX3	THOMPSON ROAD		13.81	0.32	4.419	4.419										
EX4	LONDON ROAD		2.34	0.20	0.468	0.468										
E2	LONDON ROAD		4.08	0.40	1.632	6.519										
E3	THOMPSON ROAD		4.13	0.40	1.652	1.652										
E4	CLIFFORD STREET		2.06	0.40	0.824	0.824										
EX7	THROUGH EX4 TO CLIFFORD STREET		1.51	0.20	0.302	0.302										
E5	CLIFFORD STREET		1.16	0.40	0.464	0.464										
Time of Concentration = 15 + (750 m) / (1 m/s) / (60 sec/min)																
E8 (SKYWAY ROAD)	EX MH 1	EX MH 2	1.35	0.40	0.540	10.301	27.50	0.96	56.8	1624.6	133.0	1050	0.53	2074.0	2.3	78.3%
E9 (SKYWAY ROAD)	EX MH 2	EX MH 3	2.64	0.40	1.056	11.357	28.46	0.97	55.5	1751.4	135.0	1050	0.53	2074.0	2.3	84.4%
E7 (SKYWAY ROAD)	EX MH 3	EX MH 6	0.56	0.40	0.224	11.581	29.43	0.17	54.3	1746.8	24.0	1050	0.53	2074.0	2.3	84.2%

APPENDIX B

Modified Rational Method – 5 year
Future Storm Sewer Design Sheet

PEAK STORMWATER FLOWS - 5 YEAR STORM

PROJECT: SPRING CREEK HEIGHTS LAND SWAPE

LOCATION						TIME OF FLOW		STORMWATER ANALYSIS				
DESCRIPTION	**FROM M.H.**	**TO M.H.**	**PIPE LENGTH (m)**	**INCREMENT AREA (hectares)**	**TOTAL AREA (hectares)**	**TO UPPER END (min)**	**IN SECTION (min)**	**RUNOFF COEFF**	**SECTION A X R**	**ACCUMLD A x R**	**RAINFALL INTENSITY (mm/hr)**	**PEAK FLOW (L/s)**
EXISTING CONDITIONS												
SKYWAY ROAD STM SEWER												
EX3	SITE	OUTLET		9.42	9.42	20.00	0.00	0.320	3.014	3.014	69.430	581.4
EX7	SITE	OUTLET		1.51	1.51	15.00	0.00	0.200	0.302	0.302	82.143	68.9
EX4	SITE	OUTLET		2.34	2.34	15.00	0.00	0.200	0.468	0.770	82.143	175.7
ALLOWABLE PEAK OUTFLOW TO SKYWAY ROAD STORM SEWER												**826.0**
FUTURE CONDITIONS												
R1	SITE	OUTLET		2.34	2.34	10.00	0.00	0.750	1.755	1.755	101.508	494.9
I2	SITE	OUTLET		4.98	4.98	10.00	0.00	0.850	4.233	4.233	101.508	1193.6
I3	SITE	OUTLET		5.13	5.13	10.00	0.00	0.850	4.361	4.361	101.508	1229.5
I4	SITE	OUTLET		5.41	5.41	10.00	0.00	0.850	4.599	4.599	101.508	1296.6
PEAK OUTFLOW FROM SUBJECT LANDS TO SKYWAY ROAD STORM SEWER												**4214.6**

DESIGN BY: **UPPER CANADA CONSULTANTS**
30 HANNOVER DRIVE, UNIT 3
ST. CATHARINES, ON L2W 1A3
DESIGN BY: **Z. BARBER E.I.T.**
DATE: **FEBRUARY 2025**

RAINFALL PARAMETERS:
Time to Upper End = 10 min.
Town of West Lincoln - 5 Year IDF Curve

a = 1039.20 mm/hr
b = 7.00 minutes
c = 0.82

Modified Rational Method (MRM) Required Storage Volume

Project:	SPRING CREEK LANDSWAP, WEST LINCOLN
Project No:	23171
Date:	MARCH 2025
Design By:	Z. Barber, E.I.T.
Description:	STORMWATER MANAGEMENT PLAN

Storm Event: **Town of West Lincoln - 5 Year IDF Curve**

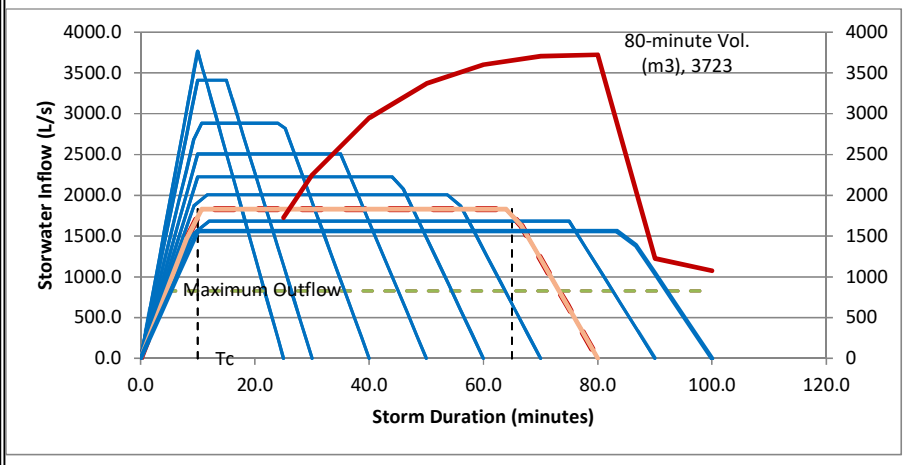
a =	1039.20	mm/hr
b =	7.00	minutes
c =	0.82	

Critical Storm Duration:	80.00	minutes	Tail Multiplier (x1-11.5
Tc From Design:	10.00	minutes	
Storm Tail Time:	65.00	minutes	
Accumulated Area x R (Ha):	14.947		<-- Area x Runoff Coefficient (Sewer Design Sheet)
Peak Rainfall Intensity:	44.05	mm/hr	
Peak Inflow at Tc:	1828.77	L/s	
Maximum Release Rate:	825.97		<-- Outlet Full Flow Capacity (Design Sheet)
Time When Outlet Exceeded:	4.52		

Time (min)	Intensity (mm/hr)	Inflow (L/s)	Outflow (L/s)	Interval Volume (m3)	Total Required Volume (m3)
0.0	0.00	0.00	825.97	-49.6	0.0
2.7	11.75	487.67	825.97	-54.1	0.0
5.3	23.49	975.34	825.97	23.9	23.9
8.0	35.24	1463.01	825.97	101.9	125.8
10.7	44.05	1828.77	825.97	160.4	286.3
13.3	44.05	1828.77	825.97	160.4	446.7
16.0	44.05	1828.77	825.97	160.4	607.2
18.7	44.05	1828.77	825.97	160.4	767.6
21.3	44.05	1828.77	825.97	160.4	928.1
24.0	44.05	1828.77	825.97	160.4	1088.5
26.7	44.05	1828.77	825.97	160.4	1249.0
29.3	44.05	1828.77	825.97	160.4	1409.4
32.0	44.05	1828.77	825.97	160.4	1569.9
34.7	44.05	1828.77	825.97	160.4	1730.3
37.3	44.05	1828.77	825.97	160.4	1890.8
40.0	44.05	1828.77	825.97	160.4	2051.2
42.7	44.05	1828.77	825.97	160.4	2211.7
45.3	44.05	1828.77	825.97	160.4	2372.1
48.0	44.05	1828.77	825.97	160.4	2532.5
50.7	44.05	1828.77	825.97	160.4	2693.0
53.3	44.05	1828.77	825.97	160.4	2853.4
56.0	44.05	1828.77	825.97	160.4	3013.9
58.7	44.05	1828.77	825.97	160.4	3174.3
61.3	44.05	1828.77	825.97	160.4	3334.8
64.0	44.05	1828.77	825.97	160.4	3495.2
66.7	39.15	1625.57	825.97	127.9	3623.2
69.3	31.32	1300.46	825.97	75.9	3699.1
72.0	23.49	975.34	825.97	23.9	***3723.0***
74.7	15.66	650.23	825.97	-28.1	3694.9
77.3	7.83	325.11	825.97	-80.1	3614.7
80.0	0.00	0.00	825.97	-132.2	3482.6

Variable Storm Duration Storage Requirements

Duration	*Max Storage*	*Duration*	*Max Storage*	*Duration*	*Max Storage*
25 Min	1723.2 m3	50 Min	3368.8 m3	80 Min	**3723.0 m3**
30 Min	2248.4 m3	60 Min	3601.4 m3	90 Min	1226.1 m3
40 Min	2949.6 m3	70 Min	3704.5 m3	100 Min	1073.7 m3



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

RAINFALL PARAMETERS: A = 1039.2
5 YEAR DESIGN STORM EVENT B = 7.0
TOWNSHIP OF WEST LINCOLN C = 0.821

SEWER DESIGN: PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 ACTUAL DIAMETER SIZE FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: TOWNSHIP OF WEST LINCOLN
PROJECT NAME: SPRING CREEK HEIGHTS LAND SWAP
PROJECT NO.: 23171

F U T U R E S T O R M S E W E R D E S I G N S H E E T

LOCATION			STORMWATER ANALYSIS								STORM SEWER DESIGN					
DESCRIPTION	**From**	**To**	**Area (A) (hectares)**	**Runoff Coeff. (R)**	**A*R**	**Accumulated A*R**	**Time of Concentration (min)**	**Flow Time (min.)**	**Rainfall Intensity (mm/hr)**	**Peak Flow (L/s)**	**Length (m)**	**Nominal Diameter (mm.)**	**Slope (%)**	**Full Flow Capacity (L/s)**	**Full Flow Velocity (m/s)**	**Percent Full**
PEAK ALLOWABLE 5 YEAR FLOW DISCHARGING FROM SWM FACILITY = 97.0 L/s																
R1	INTERNAL STM SEWER	MH 1					10.00	5.14		97.0	250.0	450	0.20	133.0	0.8	72.9%
	MH 1	MH 2					15.14	1.58		97.0	77.0	450	0.20	133.0	0.8	72.9%
	MH 2	MH 3					16.73	2.53		97.0	123.0	450	0.20	133.0	0.8	72.9%
PEAK ALLOWABLE 5 YEAR FLOW DISCHARGING FROM SWM FACILITY = 233.0 L/s																
I2	INTERNAL STM SEWER	MH 3					10.00	5.81		330.0	370.0	675	0.20	392.2	1.1	84.1%
	MH 3	MH 4					19.26	0.71		330.0	45.0	675	0.20	392.2	1.1	84.1%
PEAK ALLOWABLE 5 YEAR FLOW DISCHARGING FROM SWM FACILITY = 254.0 L/s																
I3	INTERNAL STM SEWER	MH 4					10.00	3.43		584.0	250.0	825	0.20	669.7	1.2	87.2%
	MH 4	MH 5					19.96	2.50		584.0	182.0	825	0.20	669.7	1.2	87.2%
	MH 5	MH 6					22.46	1.41		584.0	103.0	825	0.20	669.7	1.2	87.2%
PEAK ALLOWABLE 5 YEAR FLOW DISCHARGING FROM SWM FACILITY = 241 L/s																
I4	INTERNAL STM SEWER	MH 6					10.00	4.61		825.0	375.0	975	0.20	1045.6	1.4	78.9%
	MH 6	MH 7					23.88	1.76		825.0	143.0	975	0.20	1045.6	1.4	78.9%
	MH 7	EX MH 1					25.63	3.39		825.0	276.0	975	0.20	1045.6	1.4	78.9%
E1	THOMPSON ROAD		4.39	0.32	1.405	1.405										
E2	LONDON ROAD		4.08	0.40	1.632	1.632										
E3	THOMPSON ROAD		4.13	0.40	1.652	1.652										
E4	CLIFFORD STREET		2.06	0.40	0.824	0.824										
E5	CLIFFORD STREET		1.16	0.40	0.464	0.464										
Time of Concentration = 15 + (750 m) / (1 m/s) / (60 sec/min)																
E8 (SKYWAY ROAD)	EX MH 1	EX MH 2	1.35	0.40	0.540	6.517	29.02	0.96	54.8	1816.9	133.0	1050	0.53	2074.0	2.3	87.6%
E9 (SKYWAY ROAD)	EX MH 2	EX MH 3	2.64	0.40	1.056	7.573	29.98	0.97	53.6	1953.1	135.0	1050	0.53	2074.0	2.3	94.2%
E7 (SKYWAY ROAD)	EX MH 3	EX MH 6	0.56	0.40	0.224	7.797	30.95	0.17	52.5	1962.1	24.0	1050	0.53	2074.0	2.3	94.6%

APPENDIX C

100 Year Storm Analysis

PEAK 100 YEAR STORMWATER FLOWS

PROJECT: SPRING CREEK HEIGHTS LAND SWAPE

	LOCATION					TIME OF FLOW		STORMWATER ANALYSIS				
DESCRIPTION	**FROM M.H.**	**TO M.H.**	**PIPE LENGTH (m)**	**INCREMENT AREA (hectares)**	**TOTAL AREA (hectares)**	**TO UPPER END (min)**	**IN SECTION (min)**	**RUNOFF COEFF**	**SECTION A X R**	**ACCUMLD A x R**	**RAINFALL INTENSITY (mm/hr)**	**PEAK FLOW (L/s)**
EXISTING CONDITIONS												
Outlet A												
EX2	SITE	OUTLET		2.40	2.40	10.00	0.00	0.400	0.960	0.960	170.937	455.8
EX6	SITE	OUTLET		4.09	4.09	10.00	0.00	0.200	0.818	0.818	170.937	388.4
EX8	SITE	OUTLET		1.53	1.53	10.00	0.00	0.750	1.148	1.148	170.937	544.9
EX1	SITE	OUTLET		7.75	7.75	10.00	0.00	0.750	5.813	5.813	170.937	2759.9
TOTAL PEAK FLOW AT OUTLET A												**4149.0**
Outlet B												
EX3	SITE	OUTLET		9.42	9.42	10.00	0.00	0.200	1.884	1.884	170.937	894.6
TOTAL PEAK FLOW AT OUTLET B												**894.6**
Outlet C												
EX7	SITE	OUTLET		1.51	1.51	10.00	0.00	0.200	0.302	0.302	170.937	143.4
EX4	SITE	OUTLET		2.34	2.34	10.00	0.00	0.200	0.468	0.468	170.937	222.2
TOTAL PEAK FLOW AT OUTLET C												**365.6**
Outlet D												
EX5	SITE	OUTLET		1.27	1.27	10.00	0.00	0.200	0.254	0.254	170.937	120.6
TOTAL PEAK FLOW AT OUTLET D												**120.6**
Outlet E												
EX6	SITE	OUTLET		4.09	4.09	10.00	0.00	0.200	0.818	0.818	170.937	388.4
TOTAL PEAK FLOW AT OUTLET E												**388.4**
Outlet F												
EX5	SITE	OUTLET		1.27	1.27	10.00	0.00	0.200	0.254	0.254	170.937	120.6
E6	SITE	OUTLET		3.91	3.91	10.00	0.00	0.400	1.564	1.564	170.937	742.6
TOTAL PEAK FLOW AT OUTLET F												**863.2**

PEAK 100 YEAR STORMWATER FLOWS

PROJECT: SPRING CREEK HEIGHTS LAND SWAPE

	LOCATION					TIME OF FLOW		STORMWATER ANALYSIS				
DESCRIPTION	**FROM M.H.**	**TO M.H.**	**PIPE LENGTH (m)**	**INCREMENT AREA (hectares)**	**TOTAL AREA (hectares)**	**TO UPPER END (min)**	**IN SECTION (min)**	**RUNOFF COEFF**	**SECTION A X R**	**ACCUMLD A x R**	**RAINFALL INTENSITY (mm/hr)**	**PEAK FLOW (L/s)**
Outlet G												
EX3+E1	SITE	OUTLET		13.81	13.81	10.00	0.00	0.320	4.419	4.419	170.937	2098.4
EX7	SITE	OUTLET		1.51	1.51	10.00	0.00	0.200	0.302	0.302	170.937	143.4
EX4	SITE	OUTLET		2.34	2.34	10.00	0.00	0.200	0.468	0.468	170.937	222.2
E2	SITE	OUTLET		4.08	4.08	10.00	0.00	0.400	1.632	1.632	170.937	774.9
E3	SITE	OUTLET		4.13	4.13	10.00	0.00	0.400	1.652	1.652	170.937	784.4
E4	SITE	OUTLET		2.06	2.06	10.00	0.00	0.400	0.824	0.824	170.937	391.3
E5	SITE	OUTLET		1.16	1.16	10.00	0.00	0.400	0.464	0.464	170.937	220.3
E7	SITE	OUTLET		0.56	0.56	10.00	0.00	0.400	0.224	0.224	170.937	106.4
E8	SITE	OUTLET		1.35	1.35	10.00	0.00	0.400	0.540	0.540	170.937	256.4
E9	SITE	OUTLET		2.64	2.64	10.00	0.00	0.400	1.056	1.056	170.937	501.4
TOTAL PEAK FLOW AT OUTLET G												**5499.1**
FUTURE CONDITIONS WITHOUT SWM												
Outlet A												
R1 (Uncontrolled)	SITE	OUTLET		2.34	2.34	10.00	0.00	0.750	1.755	1.755	170.937	833.3
EX1	SITE	OUTLET		11.07	11.07	10.00	0.00	0.750	8.303	8.303	170.937	3942.2
EX2	SITE	OUTLET		1.13	1.13	10.00	0.00	0.400	0.452	0.452	170.937	214.6
TOTAL PEAK FLOW AT OUTLET A												**4990.2**
Outlet C												
I2 (Uncontrolled)	SITE	OUTLET		4.98	4.98	10.00	0.00	0.850	4.233	4.233	170.937	2009.9
I3 (Uncontrolled)	SITE	OUTLET		5.41	5.41	10.00	0.00	0.850	4.599	4.599	170.937	2183.5
I4 (Uncontrolled)	SITE	OUTLET		5.13	5.13	10.00	0.00	0.850	4.361	4.361	170.937	2070.5
TOTAL PEAK FLOW AT OUTLET C												**6263.9**
Outlet F												
E6	SITE	OUTLET		3.91	3.91	10.00	0.00	0.400	1.564	1.564	170.937	742.6

PEAK 100 YEAR STORMWATER FLOWS

PROJECT: SPRING CREEK HEIGHTS LAND SWAPE

LOCATION						TIME OF FLOW		STORMWATER ANALYSIS				
DESCRIPTION	**FROM M.H.**	**TO M.H.**	**PIPE LENGTH (m)**	**INCREMENT AREA (hectares)**	**TOTAL AREA (hectares)**	**TO UPPER END (min)**	**IN SECTION (min)**	**RUNOFF COEFF**	**SECTION A X R**	**ACCUMLD A x R**	**RAINFALL INTENSITY (mm/hr)**	**PEAK FLOW (L/s)**
TOTAL PEAK FLOW AT OUTLET F												**742.6**
Outlet G												
E1	SITE	OUTLET		4.39	4.39	10.00	0.00	0.320	1.405	1.405	170.937	667.0
I2 (Uncontrolled)	SITE	OUTLET		4.98	4.98	10.00	0.00	0.850	4.233	4.233	170.937	2009.9
I3 (Uncontrolled)	SITE	OUTLET		5.41	5.41	10.00	0.00	0.850	4.599	4.599	170.937	2183.5
I4 (Uncontrolled)	SITE	OUTLET		5.13	5.13	10.00	0.00	0.850	4.361	4.361	170.937	2070.5
E2	SITE	OUTLET		4.08	4.08	10.00	0.00	0.400	1.632	1.632	170.937	774.9
E3	SITE	OUTLET		4.13	4.13	10.00	0.00	0.400	1.652	1.652	170.937	784.4
E4	SITE	OUTLET		2.06	2.06	10.00	0.00	0.400	0.824	0.824	170.937	391.3
E5	SITE	OUTLET		1.16	1.16	10.00	0.00	0.400	0.464	0.464	170.937	220.3
E7	SITE	OUTLET		0.56	0.56	10.00	0.00	0.400	0.224	0.224	170.937	106.4
E8	SITE	OUTLET		1.35	1.35	10.00	0.00	0.400	0.540	0.540	170.937	256.4
E9	SITE	OUTLET		2.64	2.64	10.00	0.00	0.400	1.056	1.056	170.937	501.4
TOTAL PEAK FLOW AT OUTLET G												**9966.0**
FUTURE CONDITIONS WITH SWM												
Outlet A												
R1 (Controlled)	SITE	OUTLET		2.34	2.34	10.00	0.00	0.750	1.755	1.755	170.937	736.3
EX1	SITE	OUTLET		11.07	11.07	10.00	0.00	0.750	8.303	8.303	170.937	3942.2
EX2	SITE	OUTLET		1.13	1.13	10.00	0.00	0.400	0.452	0.452	170.937	214.6
TOTAL PEAK FLOW AT OUTLET A												**4893.2**
Outlet C												
I2 (Controlled)	SITE	OUTLET		4.98	4.98	10.00	0.00	0.850	4.233	4.233	170.937	1776.9
I3 (Controlled)	SITE	OUTLET		5.41	5.41	10.00	0.00	0.850	4.599	4.599	170.937	1929.5

PEAK 100 YEAR STORMWATER FLOWS

PROJECT: SPRING CREEK HEIGHTS LAND SWAPE

LOCATION						TIME OF FLOW		STORMWATER ANALYSIS				
DESCRIPTION	**FROM M.H.**	**TO M.H.**	**PIPE LENGTH (m)**	**INCREMENT AREA (hectares)**	**TOTAL AREA (hectares)**	**TO UPPER END (min)**	**IN SECTION (min)**	**RUNOFF COEFF**	**SECTION A X R**	**ACCUMLD A x R**	**RAINFALL INTENSITY (mm/hr)**	**PEAK FLOW (L/s)**
I4 (Controlled)	SITE	OUTLET		5.13	5.13	10.00	0.00	0.850	4.361	4.361	170.937	1829.5
TOTAL PEAK FLOW AT OUTLET C												**5535.9**
Outlet F												
E6	SITE	OUTLET		3.91	3.91	10.00	0.00	0.400	1.564	1.564	170.937	742.6
TOTAL PEAK FLOW AT OUTLET F												**742.6**
Outlet G												
E1	SITE	OUTLET		4.39	4.39	10.00	0.00	0.320	1.405	1.405	170.937	667.0
I2 (Controlled)	SITE	OUTLET		4.98	4.98	10.00	0.00	0.850	4.233	4.233	170.937	1776.9
I3 (Controlled)	SITE	OUTLET		5.41	5.41	10.00	0.00	0.850	4.599	4.599	170.937	1929.5
I4 (Controlled)	SITE	OUTLET		5.13	5.13	10.00	0.00	0.850	4.361	4.361	170.937	1829.5
E2	SITE	OUTLET		4.08	4.08	10.00	0.00	0.400	1.632	1.632	170.937	774.9
E3	SITE	OUTLET		4.13	4.13	10.00	0.00	0.400	1.652	1.652	170.937	784.4
E4	SITE	OUTLET		2.06	2.06	10.00	0.00	0.400	0.824	0.824	170.937	391.3
E5	SITE	OUTLET		1.16	1.16	10.00	0.00	0.400	0.464	0.464	170.937	220.3
E7	SITE	OUTLET		0.56	0.56	10.00	0.00	0.400	0.224	0.224	170.937	106.4
E8	SITE	OUTLET		1.35	1.35	10.00	0.00	0.400	0.540	0.540	170.937	256.4
E9	SITE	OUTLET		2.64	2.64	10.00	0.00	0.400	1.056	1.056	170.937	501.4
TOTAL PEAK FLOW AT OUTLET G												**9238.0**

DESIGN BY: **UPPER CANADA CONSULTANTS**
30 HANNOVER DRIVE, UNIT 3
ST. CATHARINES, ON L2W 1A3
DESIGN BY: **Z. BARBER E.I.T.**
DATE: **FEBRUARY 2025**

RAINFALL PARAMETERS:

Time to Upper End = 10 min.

Township of West Lincoln - 100 Year IDF C

a = 2138.00 mm/hr

b = 9.00 minutes

c = 0.86