STORMWATER MANAGEMENT REPORT

PROPOSED 3-PLEX

12 VICTORIA AVENUE WEST (CREDITON)

Municipality of South Huron, County of Huron

BOS Engineering & Environmental Services Inc.
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Prepared: March 21, 2025

1. Introduction

An existing 2 storey Triplex exists at 12 Victoria Ave West (Crediton) in the Municipality of South Huron. The 0.11 Hectare property is on the North side of Victoria Ave. The existing Triplex is to remain, and the construction of a new Triplex building (18.0m x 8.5m) is being proposed to the North of the existing building.

MTE Surveyors have surveyed the lot line orientations and dimensions. BOS Engineering & Environmental Services Inc. (BOS) has surveyed spot elevations and acquired all necessary information in order to create a development plan for both stormwater and sanitary servicing of the lot.

The entire property drains towards the Northeast corner of the lot.

BOS Engineering and Environmental Services Inc. (BOS) undertook a stormwater assessment of the property. The purpose was to provide drainage of the site in accordance with municipal requirements. It was also necessary to provide temporary on-site storage of appropriate storm water detention volumes to control water quality and to limit peak flows from the site to the 5-year predevelopment condition.

The stormwater management system requirements are summarized in this report and on Drawing S-1 in Appendix B.

2. Procedure

The procedure included the following steps:

1. Create base plan with site elevation survey and develop elevation contours and drainage directions.
2. Prepare site/servicing plan with building footprints and servicing assumptions and locations.
3. Assess local rainfall Intensity Duration and Frequency (IDF) data (MTO)
4. Calculate peak 5-year pre-development flows using the “Rational Method”
5. Size outflow structure, piping and slopes
6. Estimate required detention storage volume using the “Modified Rational Method”
7. Design of proposed ponding areas, grades and swales relating to construction.
8. Preparation of report and drawing.

3. Findings

Table 1 in Appendix A identifies the IDF curve as georeferenced from Ministry of Transportation Ontario for the Crediton area.

Table 2 in Appendix A identifies the lot area as 1063 m^2. Based on cover factors, the lumped runoff coefficient was calculated to be 0.65.

As calculated in Table 3, the maximum grade differential across the site is approximately 0.20m over 64m toward the northeast. The 5-year pre-development flow is 3.66 L/s which requires a 36 mm diameter orifice to regulate the flow and a 150mm diameter outlet pipe at 1.0% minimum slope.

From Tables 4 & 5 in Appendix A, the volume of required storage for the 5 year and 100-year post-development storms respectively are 11.0 m^3 and 22.8 m^3.

The available storage is rectangular as identified on the servicing plan in Appendix B with a ponding volume of approximately 32.5 m^3.

Hence, the ponding area is sufficient to store the entire difference between the 5-year post-development and predevelopment storms. It will also store 100% of the difference between the 100 year post-development storm and the 5-year pre-development storm.

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5. Stormwater Management Plan

The proposed stormwater management system provides peak flow attenuation for the 5-year post-development flow and the 100-year post development flow. All excess runoff can be stored on the site based on controlled flow to the 5-year pre-development flowrate.

As a residential lot, the development is not expected to have significant water quality impacts. Much of the site runoff will be through grassed swales. However, the period of construction will require disturbance of soil and possible erosion and silt runoff. Therefore, installation and maintenance of temporary silt control measures is recommended during construction, as outlined on the drawing notes. It is recommended that the outlet structure and ponding area is constructed first and that the catch basins be covered with geotextile until potential silt movement is no longer a threat at this site.

Respectfully Submitted,

BOS Engineering and Environmental Services Inc.

A. W. Bos P. Eng.

Encls/
- Appendix A – Calculations – Tables 1, 2, 3, 4, & 5

- Drawing S-1 (Larger Copy Accompanying)

APPENDIX A – Calculations

TABLE 1 - IDF CURVE DATA -Crediton ON

Based on geo-referenced MTO IDF Curves (2010)

	Rainfall Intensity (mm/hr)	
Time (min)	***5 yr***	***100 yr***
5	174.9	291.4
10	107.8	179.5
15	81.2	135.2
30	50.0	83.3
60	30.8	51.3
120	19.0	31.6
360	8.8	14.7
720	5.4	9.0
1440	3.3	5.6

TABLE 2 : C- Factor Weighting and Areas

PRE-DEVELOPMENT			
Runoff Coefficient (C_g):		0.25	unitless
Total Area (m^2):		1063	m^2
Total Area (ha):		0.11	ha
POST-DEVELOPMENT			
Grass Area (A_{g1}):		408	m^2
Grass Runoff Coefficient (C_g):		0.25	unitless
Impervious (ie.Asphalt,Building,Concrete) Area (A_{i1}):		655	m^2
Impervious Runoff Coefficient (C_i):		0.90	unitless
Gravel Area (A_{gr1}):		0	m^2
Gravel Runoff Coefficient (C_{gr}):		0.70	unitless
Weighted Runoff Coefficient (C1):	$C_1=(A_{g1}*C_g+A_{gr1}*C_{gr}+A_{i1}*C_i)/(A_{g1}+A_{gr1}+A_{i1})$	0.65	unitless
Total Area (m^2):		1063	m^2
Total Area (ha):		0.11	ha

TABLE 3 - PREDEVELOPMENT FLOW REQUIREMENTS (5-YR) or available outflow

Using the 5-year return data from Table 1

COMPOSITE AREA - PRE DEVELOPMENT (C =0.25)

Runoff Coefficient = 0.25 for predevelopment

DURATION	*INTENSITY (mm/hr)*	*QPRE A x C(COMPOSITE) (ha)*	*QPRE A x C x I (L/s)*
5	174.9	0.027	*13.22*
10	107.8	0.027	*8.15*
15	81.2	0.027	*6.14*
30	50.0	0.027	*3.78*
32.5	48.4	0.027	*3.66*
60	30.8	0.027	*2.33*
120	19.0	0.027	*0.67*
360	8.8	0.027	*0.67*
720	5.4	0.027	*0.41*
1440	3.3	0.027	*0.25*

TIME OF CONCENTRATION Using FAA Method

$Tc=1.8\ (1.1 - C)\ L^{0.5}\ S^{-0.333}$

L (longest flow path) =	*210*	*ft*	*64 m*
C =	*0.25*		*(Predevelopment Condition)*
Slope =	*0.003*		*Slope = (0.20 m over 64m)*
tc =	*32.5*	*min.*	

THEREFORE ASSUME DURATION = 32.5 min. THEN PREDEVELOPMENT 5-YEAR FLOW =3.66 L/s
OUTFLOW WILL BE RESTRICTED TO 3.58 L/using a 36 mm dia. Orifice as per calculation below:

PROPOSED RESTRICTION - Orifice on outlet of new STM CBMH 1

Cd =	0.6 unitless	
Dia. =	1.42 in	(36 mm)
Area =	1.6 in^2	
Area =	0.01 ft^2	
g =	32.17	
H =	5.71 ft	(254.30 - 252.56) = 1.74 m
Q =	0.13 ft^3/s	
Q =	0.004 m^3/s	
Q =	3.58 L/s	

Manning's Formula for Outlet Pipe Size:

Diameter:	*0.150*	*m*
Slope:	*1.000*	*%*
Mannings "n" :	*0.012*	*unitless*
X-sectional Area (A):	*0.018*	*m^2*
Wetted Perimeter (P):	*0.471*	*m*
Hydraulic Radius (R):	*0.038*	*m*
Flow Capacity (Q=1/nA(R^0.667)(S^0.5)):	***0.016***	*m^3/s*
Flow Capacity:	***16.5***	*L/s*

Therefore a 150mm diameter PVC outlet @ min. 1.0% slope will exceed orifice flow for predevelopment flowrate.

TABLE 4 - FLOW STORAGE REQUIREMENTS (5 -YR)

COMPOSITE AREA - POST DEVELOPMENT (C =0.65)

DURATION (min)	*INTENSITY* (mm/hr)	*QPOST* *A x C(COMPOSITE)* (ha)	*QPOST* *A x C x I (L/s)*	*STORM VOLUME* *(L)*	*OUTFLOW RATE* *(L/s)*	*RELEASE VOLUME* *(L)*	REQUIRED STORAGE *(L)*	REQUIRED STORAGE m^3
5	*174.9*	0.0691	*34*	*10151.9*	3.58	1074	9077.9	9.1
10	*107.8*	0.0691	*21*	*12514.3*	3.58	2148	10366.3	10.4
15	*81.2*	0.0691	*16*	*14139.5*	3.58	3222	10917.5	10.9
30	*50*	0.0691	*10*	*17413.2*	3.58	6444	10969.2	**11.0**
60	*30.8*	0.0691	*6*	*21453.1*	3.58	12888	8565.1	8.6
120	*19*	0.0691	*4*	*26468.1*	3.58	25776	692.1	0.7
360	*8.8*	0.0691	*2*	*36776.7*	3.58	77328	-40551.3	-40.6
720	*5.4*	0.0691	*1*	*45135.0*	3.58	154656	-109521.0	-109.5
1440	*3.3*	0.0691	*1*	*55165.0*	3.58	309312	-254147.0	-254.1

The required storage volume for the 5-year storm is 11.0 m3. *32.5 m^3 is available - SEE DRAWING*

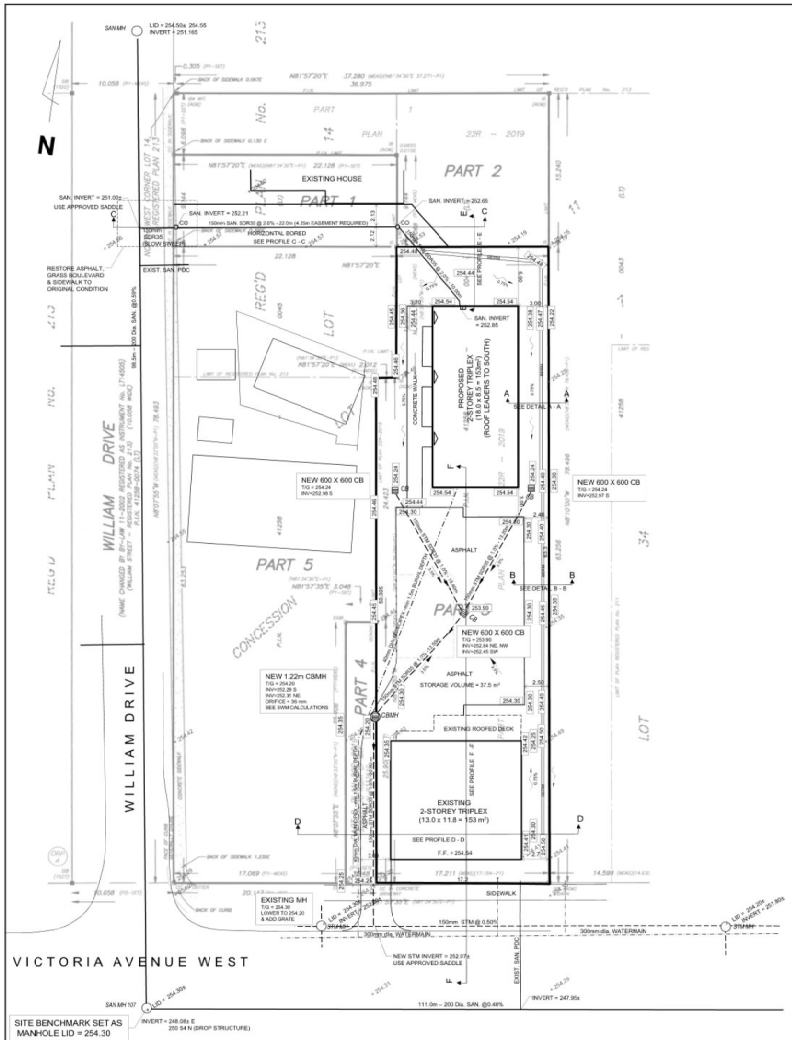
TABLE 5 - FLOW STORAGE REQUIREMENTS (100 -YR)

COMPOSITE AREA - POST DEVELOPMENT (C =0.65)

DURATION (min)	*INTENSITY* (mm/hr)	*QPOST* *A x C(COMPOSITE)* (ha)	*QPOST* *A x C x I (L/s)*	*STORM VOLUME* *(L)*	*OUTFLOW RATE* *(L/s)*	*RELEASE VOLUME* *(L)*	REQUIRED STORAGE *(L)*	REQUIRED STORAGE m^3
5	*291.4*	0.0691	*56*	*16914.0*	3.58	1074	15840.0	15.8
10	*179.5*	0.0691	*35*	*20837.8*	3.58	2148	18689.8	18.7
15	*135.2*	0.0691	*26*	*23542.6*	3.58	3222	20320.6	20.3
30	*83.3*	0.0691	*16*	*29010.4*	3.58	6444	22566.4	22.6
60	*51.3*	0.0691	*10*	*35731.9*	3.58	12888	22843.9	**22.8**
120	*31.6*	0.0691	*6*	*44020.6*	3.58	25776	18244.6	18.2
360	*14.7*	0.0691	*3*	*61433.8*	3.58	77328	-15894.2	-15.9
720	*9.0*	0.0691	*2*	*75225.0*	3.58	154656	-79431.0	-79.4
1440	*5.6*	0.0691	*1*	*93613.4*	3.58	309312	-215698.6	-215.7

The required storage volume for the 100-year storm is 22.8 m3. *32.5 m^3 is available - SEE DRAWING*

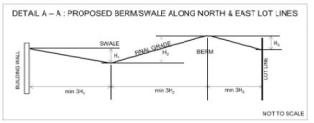
APPENDIX B –
Servicing Plan



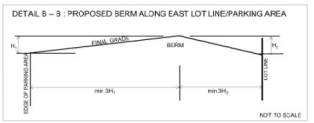
LEGEND

STANDARD CATCHBASIN	MANHOLE/CATCHBASIN MANHOLE
EXISTING ELEVATION (m)	WATER MAIN OR SERVICE
PROPOSED ELEVATION (m)	DRAINAGE DIRECTION OR SWALE
EXISTING PROPERTY BOUNDARY	TEST PIT LOCATION
CLOSED DRAIN	TREES/SHRUBS APPROXIMATE
ROAD CENTRELINE	EXISTING CONTOUR (0.50m INTERVAL)
PROPOSED SEPTIC SYSTEM SAND BASE	UTILITY POLE
CORRUGATED STEEL PIPE	DRY WELL
FIRE HYDRANT	FENCE
WATER VALVE	SWALE
GAS MAIN	CLEANOUT

DETAIL A – A : PROPOSED BERM/SWALE ALONG NORTH & EAST LOT LINES



DETAIL B – B : PROPOSED BERM ALONG EAST LOT LINE/PARKING AREA



LAND USE (m²)

BUILDINGS:	306
ASPHALT AREA:	370
CONCRETE WALKWAYS/DECKS:	70
GRASS:	±37
TOTAL LOT AREA:	**1083**

SCALE – 1 : 200

2 0 4 m

GENERAL NOTES

1. AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION FOR SERVICES OR ANY EXISTING ROAD ALLOWANCE AND EXISTING SERVICES WITHIN AN EXISTING EASEMENT MAINTAINED BY THE MUNICIPALITY. THE DEVELOPER IS TO OBTAIN A PERMIT OR APPROVED WORKS.

2. THE DEVELOPER SHALL CONSTRUCT TEMPORARY MEASURES TO CONTROL SILT ENTERING THE STORM DRAINAGE SYSTEM TO THE SPECIFICATIONS OUTLINED IN THE GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES PREPARED BY THE MINISTRY OF NATURAL RESOURCES. THESE MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCING ANY CONSTRUCTION FOR THIS DEVELOPMENT PROJECT AND ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION HAS BEEN COMPLETED TO THE SPECIFICATIONS OF THE MUNICIPALITY.

3. ALL WORK SHALL MEET THE MINIMUM STANDARDS AND SPECIFICATIONS OF THE MUNICIPALITY.

4. THE DEVELOPER SHALL HAVE IT'S PROFESSIONAL ENGINEER PROVIDE ADEQUATE INSPECTION DURING CONSTRUCTION AND A CERTIFICATE OF COMPLETION OF WORKS UPON COMPLETION OF ALL WORKS WHICH ARE TO BE ASSUMED BY THE MUNICIPALITY.

5. THE DEVELOPER IS TO MEET ALL THE REQUIREMENTS OF THE OWNERS OF THE UTILITIES ON THIS PLAN AND MUST MAKE SATISFACTORY ARRANGEMENTS WITH THE UTILITY COMPANIES FOR CROSSING THEIR INSTALLATIONS AND FOR PROVIDING ADEQUATE PROTECTION DURING CONSTRUCTION.

6. ALL ORGANIC, UNSTABLE OR UNSUITABLE MATERIALS BENEATH THE ROAD ALLOWANCES OR FOUNDATIONS MUST BE REMOVED AND THESE AREAS BACKFILLED WITH AN APPROVED FILL MATERIAL, ALL TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER.

7. ALL SUBSTITUTIONS MUST BE APPROVED BY THE MUNICIPALITY.

SEDIMENT CONTROL

1. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION.
2. SOD OR SEED ALL BARE SURFACES WITH CNDR No. 1 SEED MIXTURE IMMEDIATELY UPON COMPLETION. ANY AREAS NOT SUBJECT TO ACTIVE CONSTRUCTION AFTER AREA GRADING WILL BE TOPSOILED AND SEEDED AS PER OPSS 573 IMMEDIATELY AFTER COMPLETION OF SUCH GRADING.
3. COVER CATCHBASINS WITH TERRAFIX 270R GEOTEXTILE OR EQUIV. UNTIL SITE IS STABILIZED.
4. ALL COLLECTED SEDIMENT MUST BE DISPOSED OF AT AN APPROVED LOCATION.
5. MINIMIZE AREA DISTURBED DURING CONSTRUCTION. ALL DEWATERING MUST BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN.
6. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION.
7. PREVENT WIND-BLOWN DUST.
8. STRAW BALES TO BE USED IN LOCALIZED AREAS AS SHOWN AND AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION FOR WORKS WHICH ARE IN OR ADJACENT TO FLOODLINES, FILL LINES AND HAZARDOUS SLOPES.
9. STRAW BALES TO BE TERMINATED BY ROUNDING BALES TO CONTAIN AND FILTER RUNOFF.
10. ALL OF THE ABOVE NOTES AND ANY SEDIMENT & EROSION CONTROL MEASURES ARE AT THE MINIMUM TO BE IN ACCORDANCE WITH THE MINISTRY OF NATURAL RESOURCES GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES.

AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION

No.	REVISIONS	DATE	BY
0	PRELIMINARY	24-Jan-25	AWB
1	FOR APPROVAL	11-Mar-25	AWB

BOS Engineering & Environmental Services Inc.
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11-Mar-25

MUNICIPALITY OF
SOUTH HURON

COUNTY OF HURON
ONTARIO, CANADA

Dennis Helder <dennis_helder@outlcok.com>

SERVICING PLAN – 12 VICTORIA AVE. WEST, CREDITION ON

2411-06

SHEET No. S-1

PLAN FILE No.