STORMWATER MANAGEMENT PLAN

CAISTORVILLE SUBDIVISION

CAISTORVILLE
TOWNSHIP OF WEST LINCOLN

Prepared for:

DEHAAN HOMES INC.
204 CANBORO ROAD, P.O. BOX 142
RIDGEVILLE, ON
L0S 1M0

Prepared by:

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

October 2026

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Study Area 1
1.2 Objectives 1
1.3 Existing & Proposed Conditions 3

2.0 STORMWATER MANAGEMENT CRITERIA 3

3.0 STORMWATER ANALYSIS 4
3.1 Design Storms 4
3.2 Existing Conditions 5
3.3 Proposed Conditions 8

4.0 STORMWATER MANAGEMENT PLAN 12
4.1 Quantity Assessment 12
4.2 Quality Assessment 12

5.0 STORMWATER MANAGEMENT FACILITY MAINTENANCE 13
5.1 Internal Roadside Ditches & Central Swale 13

6.0 CONCLUSIONS AND RECOMMENDATIONS 14

LIST OF TABLES

Table 1. Rainfall Data 4

Table 2. Hydrologic Parameters for Existing Conditions 5

Table 3. Hydrologic Parameters for Future Conditions 8

Table 4. Peak Stormwater Flows at Outlet A 9

Table 5. Roadside Ditch Stormwater Characteristics 13

LIST OF FIGURES

Figure 1. Site Location Plan 2

Figure 2. Existing Stormwater Drainage Area Plan 6

Figure 3 Schematic of Existing Hydrologic Modelling 7

Figure 4. Proposed Stormwater Drainage Area Plan 10

Figure 5. Schematic of Future Hydrologic Modelling 11

APPENDICES

Appendix A Weighted Percent Impervious Calculation Sheet

Appendix B MIDUSS Output Files

REFERENCES

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

STORMWATER MANAGEMENT PLAN

CAISTORVILLE SUBDIVISION

TOWNSHIP OF WEST LINCOLN

1.0 INTRODUCTION

1.1 Study Area

The proposed residential development is located immediately south of the Caistorville Settlement Area, in the Township of West Lincoln, as part of Lot 20, Concession 1, Township of Caistor. As shown on the enclosed Site Location Plan (Figure 1), the subject lands are situated south of York Road (Regional Road #9), west of Caistorville Road (Regional Road #2), and north of the Indian Line road allowance. The proposed development will include two site entrances onto Caistorville Road (Regional Road #2). This Stormwater Management Plan has been prepared to obtain approvals as part of the Draft Plan of Subdivision process.

The overall property is approximately 36 hectares in area and is currently vacant, with the majority being used for agricultural purposes. The proposed development area comprises approximately 7.4 hectares and fronts Caistorville Road (Regional Road #2).

1.2 Objectives

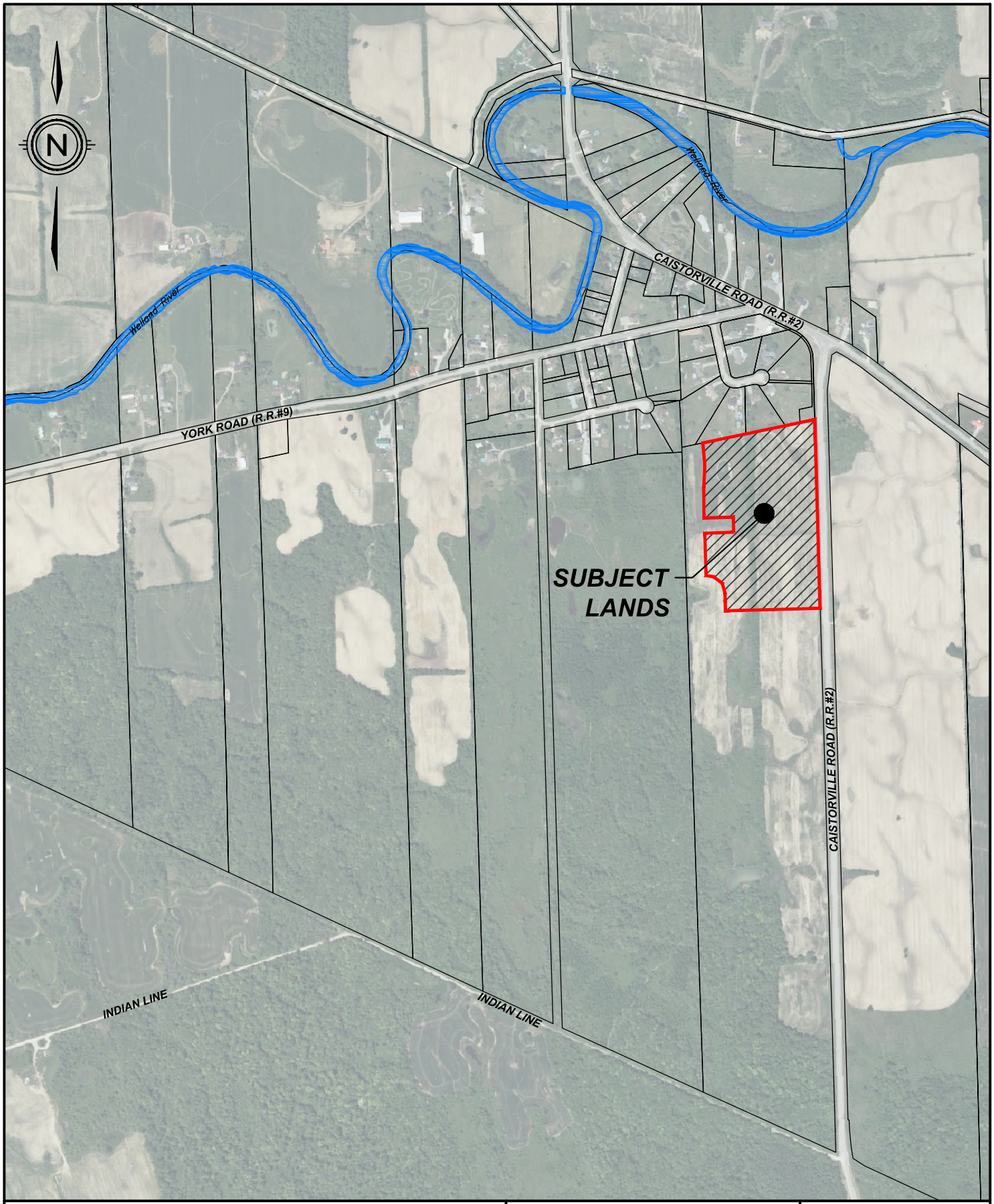
The objectives of this study are as follows:

1. Establish specific criteria for the management of stormwater from this site.

2. Determine the impact of development on the stormwater peak flow & volume from this site.

3. Investigate alternatives for controlling the quantity and quality of stormwater from this site.

4. Establish a Stormwater Management Plan to provide the necessary quantity and quality controls for flows discharging from the development.



UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

CAISTORVILLE SUBDIVISION

TOWNSHIP OF WEST LINCOLN

SITE LOCATION PLAN

DATE	2026-09-02
SCALE	N.T.S.
REF No.	22255
DWG No.	FIGURE 1

1.3 Existing & Proposed Conditions

a) Existing Conditions

The subject site is undeveloped and historically, it has been used for agricultural purposes. The property is surrounded by existing single-detached residential properties to the north and Provincially Significant Wetlands (PSW) along the southern and western boundaries. A tributary watercourse of the Welland River traverses the site west to east, discharging through an existing 750mm diameter culvert located on Caistorville Road (R.R.#2).

The existing drainage areas contributing to this stormwater management plan consist primarily of the property, as well as external lands to the west and south. Stormwater from these areas is conveyed overland to the tributary, which direct the stormwater flows eastward through the existing 750mm culvert at Caistorville Road. From there, the tributary continues flowing east before ultimately discharging to the Welland River, located approximately one kilometre downstream.

b) Proposed Conditions

The proposed development consists of 16 rural single-detached residential units. As there are no municipal sanitary sewers or watermains in proximity to the site, each dwelling will be serviced by a private septic system and individual potable water supply.

The development will include asphalt-paved roadways with roadside ditches in addition to a central swale designed to convey stormwater runoff generated by the site to the existing tributary watercourse. The flows will ultimately discharge through the existing 750mm diameter culvert on Caistorville Road (identified as Outlet A). The proposed Stormwater Management Plan evaluates the site under fully developed conditions and outlines the required measures to manage stormwater quantity and quality in accordance with applicable guidelines.

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 outstanding policies from various agencies (Township of West Lincoln, Regional Municipality of Niagara, NPCA, and the Ministry of Environment, Conservation and Parks (MECP)) the following site-specific considerations were identified:

- The drainage areas of the proposed development direct the stormwater to a tributary of Welland River, identified by the Ministry of Natural Resources as a Type 2 Fish Habitat. The site outlet is approximately 1,150 metres to the confluence with the Welland River, and with 3 other tributaries. Based on this Fish Habitat classification, the corresponding MECP level or protection for stormwater management from the proposed development will be Normal.

- Stormwater quantity controls may not be considered necessary, as delaying the discharge of future flows from the proposed development may result in matching the larger upstream peak flows from the upstream external drainage areas (EX 1 and EX 2), potentially increasing the risk of downstream flooding.

- The proposed development is located immediately downstream of a Provincially Significant Wetland (PSW), and shall not negatively impact the PSW.

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

- **Stormwater Quality** controls are to be provided to Normal Protection (70% TSS removal levels) as is required of the proposed Stormwater Management system according to MOE Stormwater Management Planning and Design Manual (March 2003).

- **Stormwater Quantity** controls are not considered necessary.

3.0 STORMWATER ANALYSIS

A stormwater analysis has been conducted as part of the design of the Caistorville Subdivision using the MIDUSS computer modelling program. The analysis includes simulations representing both existing and future conditions to the stormwater outlet. For references, model output files are enclosed in Appendix B.

3.1 Design Storms

Design storm hyetographs were developed using a Chicago distribution based on the Intensity-Duration-Frequency curves for the development area in West Lincoln. Hyetographs for the 25mm, 5 and 100 year events were developed using a 4-hour Chicago distribution. Table 1 summarizes the rainfall data.

Table 1. Rainfall Data

Design Storm (Return Period)	Chicago Distribution Parameters		
	a	b	c
25mm	512.000	6.0	0.800
5 Year	3175.000	20.0	1.000
100 Year	6300.000	15.0	1.000

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

3.2 Existing Conditions

The existing drainage conditions for the overall development consist of four individual drainage areas, all discharging to Outlet A, as illustrated in Figure 2. The external limit of the drainage areas were defined from Provinical LIDAR data and NPCA DTM data. A schematic representation of the existing stormwater modelling conditions is provided in Figure 3.

An existing tributary watercourse to the Welland River traverses the subject site and receives stormwater runoff from drainage areas EX 1, EX 2, and EX 3, ultimately conveying flows to Outlet A. Drainage area EX 4 conveys flows via a roadside ditch to Outlet A. The hydrologic input parameters used in the computer model for existing conditions are summarized in Table 2.

Table 2. Hydrologic Parameters for Existing Conditions

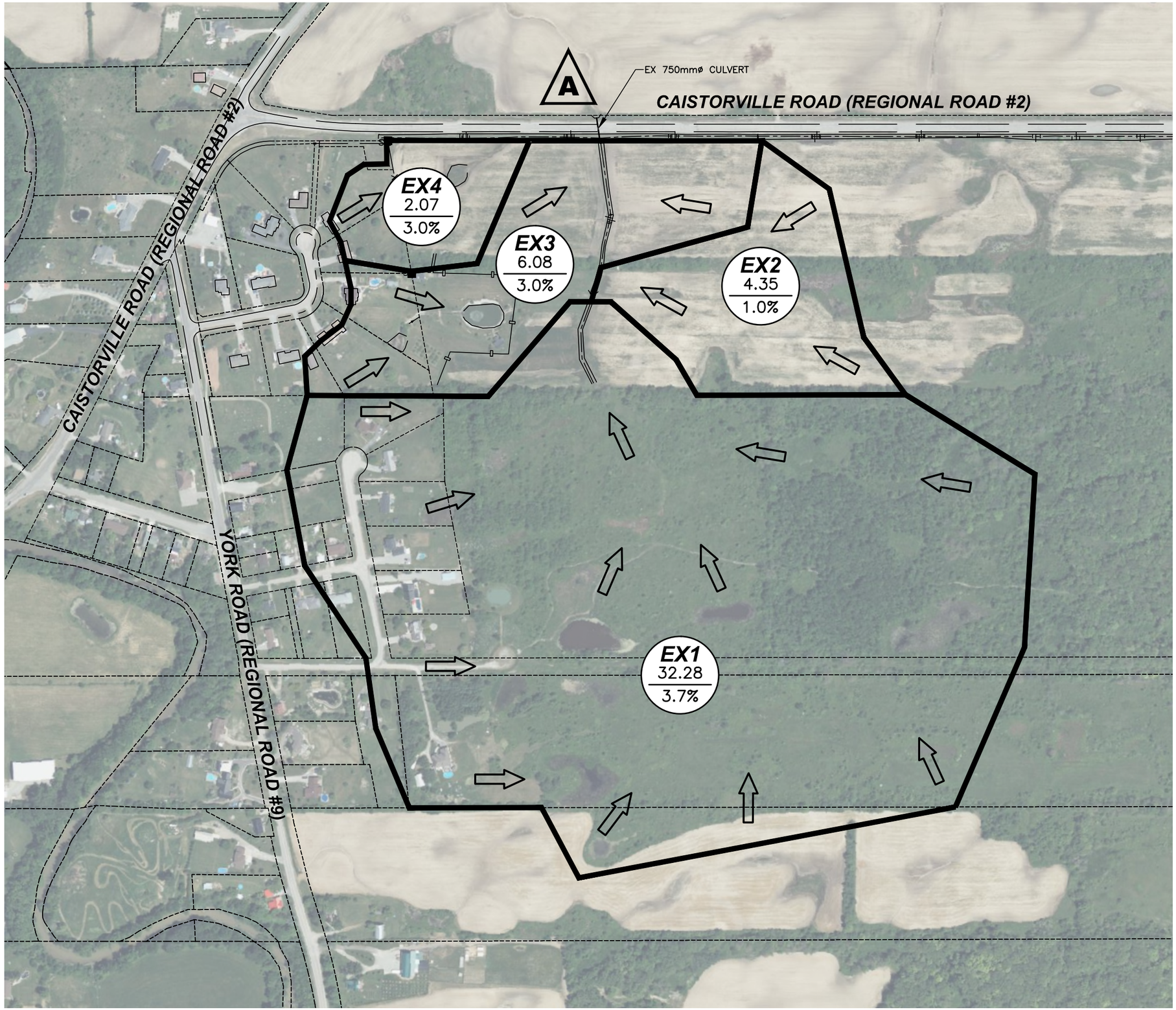
Area No.	Area (ha)	Length (m)	Slope (%)	SCS CN	Percent Impervious
Outlet 'A'					
EX1	32.28	460	2	74	3.7%
EX2	4.35	170	2	74	1.0%
EX3	6.08	200	2	74	3.0%
EX4	2.07	110	2	74	3.0%

CAISTORVILLE DEHAAN

TOWN OF WEST LINCOLN

EXISTING DRAINAGE AREA PLAN

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

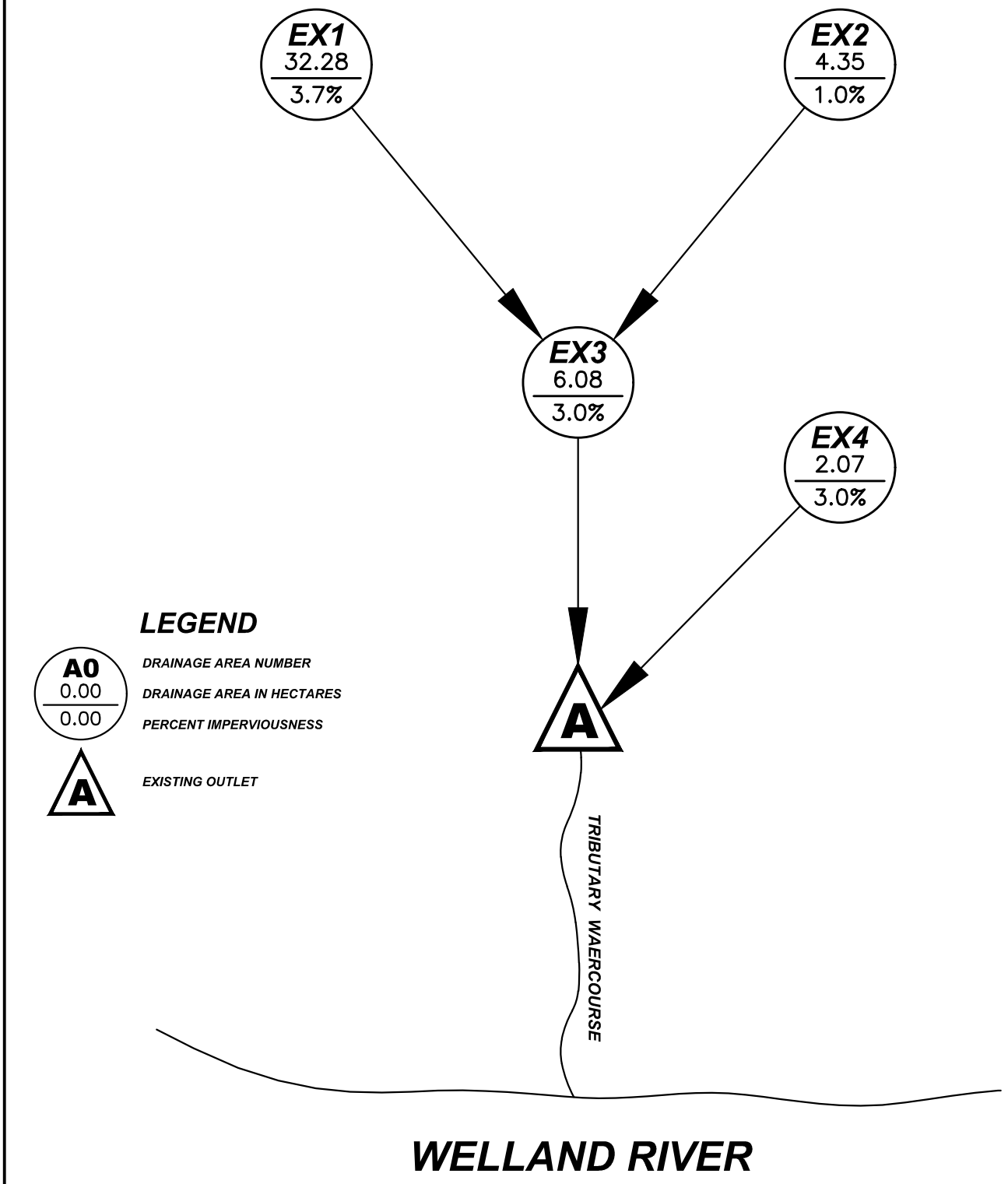


N

LEGEND

A0 / 0.00 / 0.00	DRAINAGE AREA NUMBER / DRAINAGE AREA IN HECTARES / PERCENT IMPERVIOUS
	DRAINAGE AREA BOUNDARY
A	STORMWATER OUTLET
	OVERLAND FLOW ROUTE

FILE No.	22255
DATE	2026–09–02
SCALE	1:4000 m
DWG No.	FIGURE 2



LEGEND

A0
0.00
0.00

DRAINAGE AREA NUMBER

DRAINAGE AREA IN HECTARES

PERCENT IMPERVIOUSNESS

A

EXISTING OUTLET

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

CAISTORVILLE SUBDIVISION
TOWNSHIP OF WEST LINCOLN
SCHEMATIC OF EXISTING HYDROLOGIC MODELLING CONDITIONS

DATE	2026–09–02
SCALE	N.T.S.
REF No.	22255
DWG No.	FIGURE 3

3.3 Proposed Conditions

The future storm drainage conditions and drainage areas for the proposed development, shown in Figure 3, were modelled to establish the stormwater peak flows once development has been completed at the proposed site.

The drainage areas contributing stormwater to Outlet A include the entire development and external areas A10, A20, and A60. It is proposed to construct a roadway culvert as well as a new swale (drainage channel) within the site to direct the future stormwater flows.

The proposed culvert under Street 'A' will direct flows from drainage areas A10, A20, A30, A50 and A60 to the proposed Street 'A' roadside ditches and to the new swale located within drainage area A80. The existing drainage area A20 will flow overland towards drainage area A30, which will convey the stormwater flows to a proposed roadside ditch, then discharging into the proposed new swale (drainage channel). Stormwater flows from area A60 will flow overland into area A50, which will convey flows via the proposed roadside ditch to the proposed new swale (drainage channel). Stormwater flows generated from drainage areas A40 and A70 will be conveyed via the proposed roadside ditches to the proposed swale. Stormwater flows from drainage area A80, in which the proposed swale is located, will flow overland to the proposed new swale. All of the stormwater flows from the previously mentioned drainage areas will be conveyed to the existing outlet via the proposed new swale.

Flows from drainage area A90 will be directed via overland flow and the existing roadside ditch on Caistorville Road (Regional Road #2) towards the existing outlet.

All stormwater flows from the development site are ultimately conveyed and converge with the tributary watercourse before leaving the site. Input parameters for the computer model with the proposed development conditions are shown in Table 2. Impervious Calculations for existing and future conditions are included in Appendix A.

Table 3. Hydrologic Parameters for Future Conditions

Area No.	Area (ha)	Length (m)	Slope (%)	SCS CN	Percent Impervious
Outlet 'A'					
A10	33.5	473	0.56	74	4.00
A20	1.82	110	1.00	74	8.50
A30	1.71	107	0.70	74	19.5
A40	0.43	54	0.73	74	32.8
A50	1.92	113	0.16	74	18.1
A60	3.29	148	0.44	74	1.00
A70	0.43	54	0.10	74	33.3
A80	1.21	90	0.70	74	7.30
A90	0.47	56	0.40	74	5.20

The results of the modelling are shown in Table 4, where the peak stormwater flows were calculated for the 5 and 100 year design storm events to Outlet A for existing and future conditions without stormwater quantity controls. The existing and future stormwater drainage areas shown on Figures 2 and 4 were used to assess the stormwater management plan for this study. Figure 5 outlines the stormwater schematic used to model the future conditions for this development.

Table 4. Peak Stormwater Flows at Outlet A

Design Storm	Existing (L/s)	*Future (L/s)	Percent Change
5 Year	608	498	-22%
100 Year	3,766	2,640	-43%

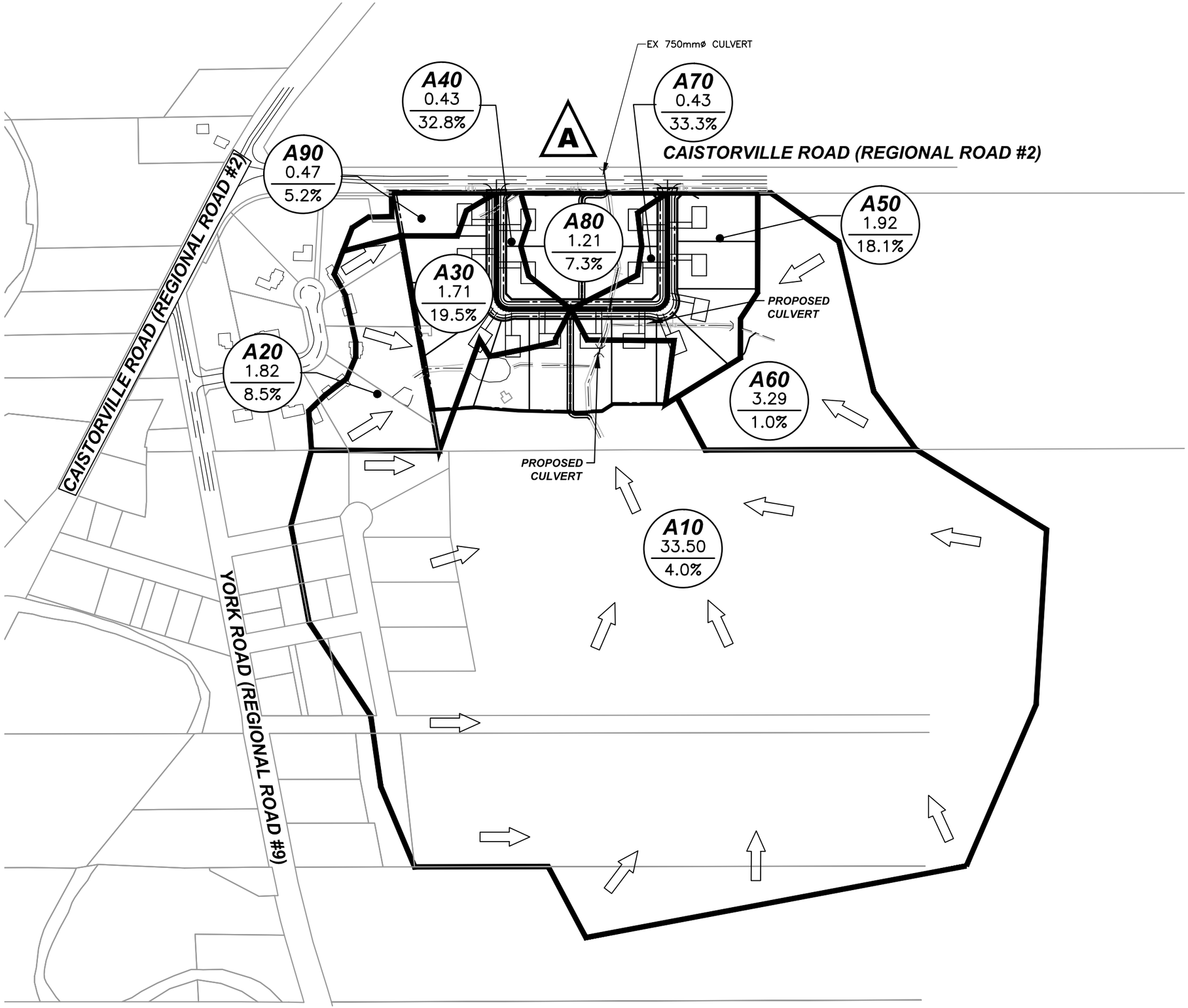
*Note: Future stormwater values depict conditions without stormwater quantity controls

As shown in Table 4 above, peak stormwater flows from the proposed development to Outlet A will be less under future development conditions as outlined in the table above. Therefore, further stormwater quantity controls will not be required for this subdivision development.

CAISTORVILLE DEHAAN

TOWN OF WEST LINCOLN

PROPOSED DRAINAGE AREA PLAN



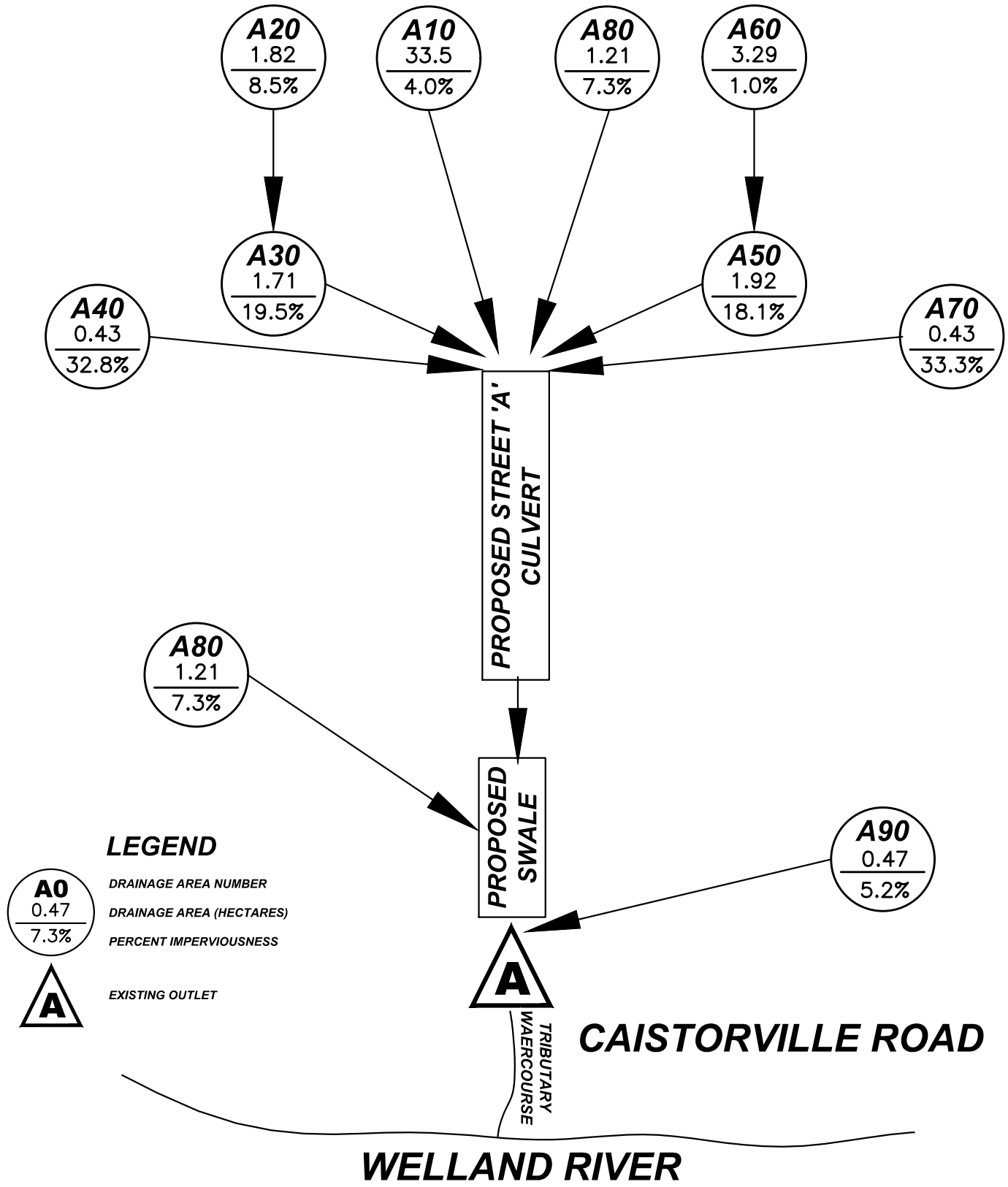
UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

N

LEGEND

A0 / 0.00 / 0.00	DRAINAGE AREA NUMBER / DRAINAGE AREA IN HECTARES / PERCENT IMPERVIOUS
▬	DRAINAGE AREA BOUNDARY
A	STORMWATER OUTLET
⇨	OVERLAND FLOW ROUTE

FILE No.	22255
DATE	2026–09–01
SCALE	1:4000 m
DWG No.	**FIGURE 4**



UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

CAISTORVILLE SUBDIVISION
TOWNSHIP OF WEST LINCOLN
SCHEMATIC OF FUTURE
HYDROLOGIC MODELLING CONDITIONS

DATE	2026-09-01
SCALE	N.T.S.
REF No.	22255
DWG No.	FIGURE 5

4.0 STORMWATER MANAGEMENT PLAN

The proposed development consists of 16 rural single-detached residential units, an access roadway and green areas. The proposed stormwater management plan for the subject site will include the following practices:

a) The proposed grading for these 16 lots is a combination of split and rear to front drainage. All lots drain to the interior road drainage system.

b) Grassed roadside ditches, as well as the proposed new swale (drainage channel) will be employed to achieve water quality objectives for discharge of stormwater to the receiving tributary watercourse to the Welland River, identified by the MNR as a Type 2 Fish Habitat. Normal Water Quality Objectives have been determined by the MOE for this classification of receiver.

c) Additional stormwater management practices being implemented for this development include flatter lot grades, roof water leaders discharging to the surface and grassed rear yard swales.

4.1 Quantity Assessment

As previously mentioned in the conclusions drawn from Table 4, stormwater flows discharging to Outlet A show no increase compared to existing conditions, therefore, quantity controls are not considered necessary.

4.2 Quality Assessment

The Township of West Lincoln as well as the Region of Niagara require the development to provide stormwater quality enhancements prior to discharge from the site. The majority of the development site will consist of rear yards and roof top areas that is considered clean stormwater. The driveways and main roadway area within the site will be the sole significant source of contaminants within the development. It is proposed to utilize the roadside ditches to provide the necessary quality controls for the proposed subdivision.

All stormwater from the roadway and driveways within Drainage Areas A30, A40, A50, and A70 will be directed to the proposed roadside ditches. The ditches will ultimately convey stormwater flows via the proposed new swale (drainage channel) to the existing tributary watercourse prior to discharge from the development area.

The ditches will have a 3:1 side slope to provide the necessary water quality enhancements in accordance with the MECP SWM Planning and Design Manual (2003). Grassed swales designed for water quality treatment should convey peak stormwater flows during a 4-hour, 25mm storm event at a velocity of less than 0.5 m/s.

An analysis of the 25mm storm has been completed to model the expected stormwater characteristics in the proposed roadside ditches and the proposed new swale (drainage channel). Table 5 below outlines the stormwater characteristics of the roadside ditches and new swale (drainage channel) utilized within the MIDUSS modelling.

Table 5. Roadside Ditch Stormwater Characteristics					
Drainage Areas		**Roadside Ditch**			
No.	**Total Area (ha)**	**Slope (%)**	**Depth of Flow (m)**	**Flow Rate (m^3/s)**	**Velocity (m/s)**
A20 + A30	3.5	0.23	0.219	0.043	0.28
A40	0.43	0.45	0.113	0.012	0.26
A50 + A60	5.21	0.49	0.169	0.029	0.35
A70	0.43	0.69	0.105	0.012	0.31
A80	45.52	0.36	0.346	0.183	0.46

As shown in Table 5, velocities within the proposed roadside ditches and new swale (drainage channel) will be less than 0.5m/s. Therefore, the internal roadside ditches (Enhanced Swales) and new swale will provide sufficient quality enhancements for stormwater discharging from this development.

5.0 GRASSED SWALES MAINTENANCE

5.1 Internal Roadside Ditches & Central Swale

For the proposed internal roadside ditches and central swale, very minor maintenance will be required. In order to provide optimal enhancement measures, it is suggested that the swales maintain moderately overgrown conditions. Per the MECP Guidelines, grass should be allowed to grow higher than 75mm to enhance the filtration of suspended solids. Regular trimming (i.e. mowing) of the conveyance swales should not have adverse effects and will ensure the swales are operating as intended. Frequent inspections should be conducted during the first year of operation and annually during spring to ensure a build-up of sediment does not occur.

6.0 CONCLUSIONS AND RECOMMENDATIONS

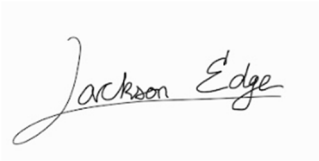
Based on the findings of this study, the following conclusions are offered:

- Stormwater quality controls will be provided by an Enhanced Grassed Swales to Normal Protection (70% TSS Removal) Levels.
- Storm quantity controls are not considered necessary for the subject lands.
- Stormwater flows from the proposed development area will be directed to the tributary watercourse to the Welland River (Outlet A) during all storm events.
- This report was prepared in accordance with the provincial guidelines contained in "Stormwater Management Planning and Design Manual, March 2003".

The above conclusions lead to the following recommendations:

- That the stormwater management criteria established in this report be accepted.
- That the proposed roadside ditches along the roadway be implemented to achieve water objectives described in this report.
- That the proposed central grassed swale be implemented to achieve the water quality objectives described in this report, as well as to lower the flood risk in the development.
- That stormwater quantity controls are not required.

Prepared By:



Jackson Edge, B.Eng.

Reviewed By:



Adam Keane, P.Eng.

APPENDICES

APPENDIX A

Weighted Impervious Calculation Sheet

Weighted Imperviousness Percentage Calculation Worksheet

Project Name:	Caistorville Road (Dehaan)
Project Number:	22255
Date:	April 17, 2024

EX - EXISTING CONDITIONS

EX1	*Footprint*	*% Impervious*	*Effective Impervious Area*
Existing Buildings, Asphalt Road/Parking Areas & Concrete Apron.	6441.6 m^2	100.0% ea	6441.6 m^2
Exisiting Gravel Road, Driveways and Parking Areas	3309.3 m^2	70.0% ea	2316.5 m^2
Landscape/Greenspace	313069.1 m^2	1.0% ea	3130.7 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			11,889 m^2
TOTAL CATCHMENT AREA			322,820 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**3.7 %**
	RUNOFF COEFFICIENT		**0.23**

EX - EXISTING CONDITIONS

EX2	*Footprint*	*% Impervious*	*Effective Impervious Area*
Existing Buildings, Asphalt Road/Parking Areas & Concrete Apron.	0.0 m^2	100.0% ea	0.0 m^2
Landscape/Greenspace	43509.0 m^2	1.0% ea	435.1 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			435 m^2
TOTAL CATCHMENT AREA			43,509 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**1.0 %**
	RUNOFF COEFFICIENT		**0.21**

EX - EXISTING CONDITIONS

EX3	*Footprint*	*% Impervious*	*Effective Impervious Area*
Existing Buildings, Asphalt Road/Parking Areas & Concrete Apron.	1229.6 m^2	100.0% ea	1229.6 m^2
Landscape/Greenspace	59,617 m^2	1.0% ea	596.2 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			1,826 m^2
TOTAL CATCHMENT AREA			60,847 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**3.0 %**
	RUNOFF COEFFICIENT		**0.22**

EX - EXISTING CONDITIONS

EX4	*Footprint*	*% Impervious*	*Effective Impervious Area*
Existing Buildings, Asphalt Road/Parking Areas & Concrete Apron.	426.2 m^2	100.0% ea	426.2 m^2
Landscape/Greenspace	20270.8 m^2	1.0% ea	202.7 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			629 m^2
TOTAL CATCHMENT AREA			20,697 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**3.0 %**
	RUNOFF COEFFICIENT		**0.22**

Weighted Imperviousness Percentage Calculation Worksheet

Project Name:	Caistorville Road (Dehaan)
Project Number:	22255
Date:	September 1, 2026
Person:	Jackson Edge, B.Eng.

PROPOSED CONDITIONS

A10	*Footprint*	*% Impervious*	*Effective Impervious Area*
Existing Buildings, Asphalt Road/Parking Areas & Concrete Apron.	8929.0 m^2	100.0% ea	8929.0 m^2
Exisiting Gravel Road, Driveways and Parking Areas	1850.0 m^2	72.0% ea	1332.0 m^2
Landscape/Greenspace	324221.0 m^2	1.0% ea	3242.2 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			13,503 m^2
TOTAL CATCHMENT AREA			335,000 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**4.0 %**
	RUNOFF COEFFICIENT		**0.23**

PROPOSED CONDITIONS

A20	*Footprint*	*% Impervious*	*Effective Impervious Area*
Existing Buildings, Asphalt Road/Parking Areas & Concrete Apron.	1384 m^2	100.0% ea	1384.0 m^2
Landscape/Greenspace	16,816.0 m^2	1.0% ea	168.2 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			1,552 m^2
TOTAL CATCHMENT AREA			18,200 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**8.5 %**
	RUNOFF COEFFICIENT		**0.26**

PROPOSED CONDITIONS

A30	*Footprint*	*% Impervious*	*Effective Impervious Area*
Buildings, Asphalt Road/Parking Areas & Concrete Apron.	2990 m^2	100.0% ea	2990.0 m^2
Proposed Gravel Shoulder	296.0 m^2	72.0% ea	213.1 m^2
Landscape/Greenspace	13814 m^2	1.0% ea	138.1 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			3,341 m^2
TOTAL CATCHMENT AREA			17,100 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**19.5 %**
	RUNOFF COEFFICIENT		**0.34**

PROPOSED CONDITIONS

A40	*Footprint*	*% Impervious*	*Effective Impervious Area*
Buildings, Asphalt Road/Parking Areas & Concrete Apron.	1190 m^2	100.0% ea	1190.0 m^2
Proposed Gravel Shoulder	267.0 m^2	72.0% ea	192.2 m^2
Landscape/Greenspace	2843 m^2	1.0% ea	28.4 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			1,411 m^2
TOTAL CATCHMENT AREA			4,300 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**32.8 %**
	RUNOFF COEFFICIENT		**0.43**

PROPOSED CONDITIONS					
A50	*Footprint*		*% Impervious*		*Effective Impervious Area*
Buildings, Asphalt Road/Parking Areas & Concrete Apron.	3078	m^2	100.0%	ea	3078.0 m^2
Proposed Gravel Shoulder	333.0	m^2	72.0%	ea	239.8 m^2
Landscape/Greenspace	15789	m^2	1.0%	ea	157.9 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS					3,476 m^2
TOTAL CATCHMENT AREA					19,200 m^2
EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS					**18.1 %**
RUNOFF COEFFICIENT					**0.33**

PROPOSED CONDITIONS					
A60	*Footprint*		*% Impervious*		*Effective Impervious Area*
Landscape/Greenspace	32900	m^2	1.0%	ea	329.0 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS					329 m^2
TOTAL CATCHMENT AREA					32,900 m^2
EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS					**1.0 %**
RUNOFF COEFFICIENT					**0.21**

PROPOSED CONDITIONS					
A70	*Footprint*		*% Impervious*		*Effective Impervious Area*
Buildings, Asphalt Road/Parking Areas & Concrete Apron.	1193	m^2	100.0%	ea	1193.0 m^2
Proposed Gravel Shoulder	292.0	m^2	72.0%	ea	210.2 m^2
Landscape/Greenspace	2815	m^2	1.0%	ea	28.2 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS					1,431 m^2
TOTAL CATCHMENT AREA					4,300 m^2
EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS					**33.3 %**
RUNOFF COEFFICIENT					**0.43**

PROPOSED CONDITIONS					
A80	*Footprint*		*% Impervious*		*Effective Impervious Area*
Existing Buildings, Asphalt Road/Parking Areas & Concrete Apron.	756	m^2	100.0%	ea	756.0 m^2
Proposed Gravel Shoulder	20.0	m^2	72.0%	ea	14.4 m^2
Landscape/Greenspace	11324	m^2	1.0%	ea	113.2 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS					884 m^2
TOTAL CATCHMENT AREA					12,100 m^2
EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS					**7.3 %**
RUNOFF COEFFICIENT					**0.25**

PROPOSED CONDITIONS ***A90***	*Footprint*	*% Impervious*	*Effective Impervious Area*
Buildings, Asphalt Road/Parking Areas & Concrete Apron.	198.0 m^2	100.0% ea	198.0 m^2
Landscape/Greenspace	4502.0 m^2	1.0% ea	45.0 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS			243 m^2
TOTAL CATCHMENT AREA			4,700 m^2
	EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS		**5.2 %**
	RUNOFF COEFFICIENT		**0.24**

APPENDIX B

MIDUSS Output File

EXISTING CONDITIONS

```
        Output File (4.7) SWM.OUT      opened 2024-05-10  16:54
         Units used are defined by G =    9.810
             24   144    10.000        are MAXDT MAXHYD & DTMIN values
         Licensee: UPPER CANADA CONSULTANTS
 35      COMMENT
        3     line(s) of comment
         CAISTORVILLE ROAD (DEHAAN)
         STORMWATER MANAGEMENT PLAN
         EXISTING CONDITIONS
 14      START
        1     1=Zero; 2=Define
 35      COMMENT
        3     line(s) of comment
         *********************************
         *       5 YEAR DESIGN STORM       *
         *********************************
  2      STORM
             1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
      3175.000     Coefficient  a
        20.000     Constant  b    (min)
         1.000     Exponent  c
          .400     Fraction to peak  r
       240.000     Duration ó  240 min
                  48.845 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
  4      CATCHMENT
         1.000     ID No.ó 99999
        32.280     Area in hectares
       460.000     Length (PERV) metres
         2.000     Gradient (%)
         3.700     Per cent Impervious
       460.000     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
                .405       .000       .000       .000 c.m/s
                .253       .891       .276     C perv/imperv/total
 15      ADD RUNOFF
                .405       .405       .000       .000 c.m/s
  9      ROUTE
          .000     Conduit Length
          .000     No Conduit defined
          .000     Zero lag
          .000     Beta weighting factor
          .000     Routing timestep
             0     No. of sub-reaches
                .405       .405       .405       .000 c.m/s
 17      COMBINE
        1     Junction Node No.
                .405       .405       .405       .405 c.m/s
 14      START
        1     1=Zero; 2=Define
  4      CATCHMENT
         2.000     ID No.ó 99999
         4.350     Area in hectares
       170.000     Length (PERV) metres
         2.000     Gradient (%)
         1.000     Per cent Impervious
       170.000     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
                .088       .000       .405       .405 c.m/s
                .253       .878       .259     C perv/imperv/total
 15      ADD RUNOFF
                .088       .088       .405       .405 c.m/s
```

```
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .088       .088       .088       .405 c.m/s
17     COMBINE
       1     Junction Node No.
              .088       .088       .088       .473 c.m/s
18     CONFLUENCE
       1     Junction Node No.
              .088       .473       .088       .000 c.m/s
 4     CATCHMENT
       3.000     ID No.ó 99999
       6.080     Area in hectares
     200.000     Length (PERV) metres
       2.000     Gradient (%)
       3.000     Per cent Impervious
     200.000     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
              .114       .473       .088       .000 c.m/s
              .253       .873       .271     C perv/imperv/total
15     ADD RUNOFF
              .114       .576       .088       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .114       .576       .576       .000 c.m/s
17     COMBINE
       1     Junction Node No.
              .114       .576       .576       .576 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
       4.000     ID No.ó 99999
       2.070     Area in hectares
     110.000     Length (PERV) metres
       2.000     Gradient (%)
       3.100     Per cent Impervious
     110.000     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
              .051       .000       .576       .576 c.m/s
              .252       .877       .272     C perv/imperv/total
15     ADD RUNOFF
              .051       .051       .576       .576 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .051       .051       .051       .576 c.m/s
17     COMBINE
       1     Junction Node No.
              .051       .051       .051       .608 c.m/s
18     CONFLUENCE
       1     Junction Node No.
              .051       .608       .051       .000 c.m/s
14     START
       1     1=Zero; 2=Define
```

```
35     COMMENT
       3     line(s) of comment
        **********************************
        *      100 YEAR DESIGN STORM      *
        **********************************
 2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    6300.000     Coefficient  a
      15.000     Constant  b    (min)
       1.000     Exponent  c
        .400     Fraction to peak  r
     240.000     Duration ó  240 min
               98.822 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
 4     CATCHMENT
       1.000     ID No.ó 99999
      32.280     Area in hectares
     460.000     Length (PERV) metres
       2.000     Gradient (%)
       3.700     Per cent Impervious
     460.000     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
             2.528       .000       .051       .000 c.m/s
              .456       .924       .473     C perv/imperv/total
15     ADD RUNOFF
             2.528      2.528       .051       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
             2.528      2.528      2.528       .000 c.m/s
17     COMBINE
       1     Junction Node No.
             2.528      2.528      2.528      2.528 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
       2.000     ID No.ó 99999
       4.350     Area in hectares
     170.000     Length (PERV) metres
       2.000     Gradient (%)
       1.000     Per cent Impervious
     170.000     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
              .543       .000      2.528      2.528 c.m/s
              .455       .929       .460     C perv/imperv/total
15     ADD RUNOFF
              .543       .543      2.528      2.528 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .543       .543       .543      2.528 c.m/s
17     COMBINE
       1     Junction Node No.
              .543       .543       .543      2.969 c.m/s
18     CONFLUENCE
       1     Junction Node No.
              .543      2.969       .543       .000 c.m/s
```

```
 4     CATCHMENT
       3.000     ID No.ó 99999
       6.080     Area in hectares
     200.000     Length (PERV) metres
       2.000     Gradient (%)
       3.000     Per cent Impervious
     200.000     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
              .669      2.969       .543       .000 c.m/s
              .456       .927       .470     C perv/imperv/total
15     ADD RUNOFF
              .669      3.585       .543       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .669      3.585      3.585       .000 c.m/s
17     COMBINE
       1     Junction Node No.
              .669      3.585      3.585      3.585 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
       4.000     ID No.ó 99999
       2.070     Area in hectares
     110.000     Length (PERV) metres
       2.000     Gradient (%)
       3.100     Per cent Impervious
     110.000     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
              .291       .000      3.585      3.585 c.m/s
              .455       .933       .469     C perv/imperv/total
15     ADD RUNOFF
              .291       .291      3.585      3.585 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .291       .291       .291      3.585 c.m/s
17     COMBINE
       1     Junction Node No.
              .291       .291       .291      3.766 c.m/s
18     CONFLUENCE
       1     Junction Node No.
              .291      3.766       .291       .000 c.m/s
```

PROPOSED CONDITIONS

```
         Output File (4.7) SWM.OUT      opened 2026-10-14  16:13
         Units used are defined by G =    9.810
             24   144    10.000        are MAXDT MAXHYD & DTMIN values
         Licensee: UPPER CANADA CONSULTANTS
   35    COMMENT
        3     line(s) of comment
         CAISTORVILLE ROAD (DEHAAN)
         STORMWATER MANAGEMENT PLAN
         PROPOSED CONDITIONS WITHOUT SWM
   35    COMMENT
        3     line(s) of comment
         *************************
         *  25mm MOE DESIGN STORM  *
         *************************
    2    STORM
             1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       512.000     Coefficient  a
         6.000     Constant  b    (min)
          .800     Exponent  c
          .450     Fraction to peak  r
       240.000     Duration    240 min
                  25.035 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
    4    CATCHMENT
        20.000     ID No.  99999
         1.820     Area in hectares
       110.000     Length (PERV) metres
         1.000     Gradient (%)
         8.500     Per cent Impervious
       110.000     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
                .015       .000       .000       .000 c.m/s
                .098       .791       .157     C perv/imperv/total
   15    ADD RUNOFF
                .015       .015       .000       .000 c.m/s
    4    CATCHMENT
        30.000     ID No.  99999
         1.710     Area in hectares
       107.000     Length (PERV) metres
          .700     Gradient (%)
        19.500     Per cent Impervious
       107.000     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
                .031       .015       .000       .000 c.m/s
                .098       .798       .235     C perv/imperv/total
   15    ADD RUNOFF
                .031       .046       .000       .000 c.m/s
   11    CHANNEL
          .100     Base Width     =
         3.000     Left  bank slope  1:
         3.000     Right bank slope  1:
          .040     Manning's "n"
         1.500     O/a Depth in metres
          .230     Select Grade in %
         Depth          =      .219 metres
         Velocity       =      .278 m/sec
         Flow Capacity  =     6.644 c.m/s
         Critical depth =      .122 metres
```

```
 9     ROUTE
      72.000     Conduit Length
        .235     Supply X-factor <.5
      194.223    Supply K-lag (sec)
        .500     Beta weighting factor
      200.000    Routing timestep
           1     No. of sub-reaches
              .031       .046       .043       .000 c.m/s
17     COMBINE
       1     Junction Node No.
              .031       .046       .043       .043 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
       40.000     ID No.  99999
         .430     Area in hectares
       54.000     Length (PERV) metres
         .730     Gradient (%)
       32.800     Per cent Impervious
       54.000     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
              .013       .000       .043       .043 c.m/s
              .098       .799       .328     C perv/imperv/total
15     ADD RUNOFF
              .013       .013       .043       .043 c.m/s
11     CHANNEL
        .100     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .040     Manning's "n"
       1.500     O/a Depth in metres
        .450     Select Grade in %
       Depth          =      .113 metres
       Velocity       =      .260 m/sec
       Flow Capacity  =     9.293 c.m/s
       Critical depth =      .068 metres
 9     ROUTE
       70.000     Conduit Length
         .424     Supply X-factor <.5
      201.800     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
           1     No. of sub-reaches
              .013       .013       .012       .043 c.m/s
17     COMBINE
       1     Junction Node No.
              .013       .013       .012       .055 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
       70.000     ID No.  99999
         .430     Area in hectares
       54.000     Length (PERV) metres
         .100     Gradient (%)
       33.300     Per cent Impervious
       54.000     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
              .013       .000       .012       .055 c.m/s
              .098       .807       .334     C perv/imperv/total
15     ADD RUNOFF
              .013       .013       .012       .055 c.m/s
```

```
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .690     Select Grade in %
        Depth          =      .105 metres
        Velocity       =      .307 m/sec
        Flow Capacity  =    11.508 c.m/s
        Critical depth =      .069 metres
  9     ROUTE
       75.000     Conduit Length
         .457     Supply X-factor <.5
      183.160     Supply K-lag (sec)
         .500     Beta weighting factor
      150.000     Routing timestep
            1     No. of sub-reaches
              .013       .013       .012       .055 c.m/s
 17     COMBINE
       1     Junction Node No.
              .013       .013       .012       .067 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
       60.000     ID No.  99999
        3.290     Area in hectares
      148.000     Length (PERV) metres
         .440     Gradient (%)
        1.000     Per cent Impervious
      148.000     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
              .005       .000       .012       .067 c.m/s
              .098       .802       .105     C perv/imperv/total
 15     ADD RUNOFF
              .005       .005       .012       .067 c.m/s
  4     CATCHMENT
       50.000     ID No.  99999
        1.920     Area in hectares
      113.000     Length (PERV) metres
         .160     Gradient (%)
       18.100     Per cent Impervious
      113.000     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
              .032       .005       .012       .067 c.m/s
              .098       .799       .225     C perv/imperv/total
 15     ADD RUNOFF
              .032       .035       .012       .067 c.m/s
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .490     Select Grade in %
        Depth          =      .169 metres
        Velocity       =      .345 m/sec
        Flow Capacity  =     9.698 c.m/s
        Critical depth =      .108 metres
  9     ROUTE
       90.000     Conduit Length
         .422     Supply X-factor <.5
      195.391     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
            1     No. of sub-reaches
              .032       .035       .029       .067 c.m/s
 17     COMBINE
       1     Junction Node No.
              .032       .035       .029       .096 c.m/s
```

```
18     CONFLUENCE
       1     Junction Node No.
             .032       .096       .029       .000 c.m/s
 4     CATCHMENT
      10.000     ID No.  99999
      33.500     Area in hectares
     473.000     Length (PERV) metres
        .560     Gradient (%)
       4.000     Per cent Impervious
     473.000     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
              .086       .096       .029       .000 c.m/s
              .098       .808       .127     C perv/imperv/total
15     ADD RUNOFF
              .086       .174       .029       .000 c.m/s
 4     CATCHMENT
      80.000     ID No.  99999
       1.210     Area in hectares
      90.000     Length (PERV) metres
        .700     Gradient (%)
       7.300     Per cent Impervious
      90.000     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
              .008       .174       .029       .000 c.m/s
              .098       .789       .149     C perv/imperv/total
15     ADD RUNOFF
              .008       .183       .029       .000 c.m/s
11     CHANNEL
        .100     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .040     Manning's "n"
       1.500     O/a Depth in metres
        .360     Select Grade in %
       Depth          =      .346 metres
       Velocity       =      .464 m/sec
       Flow Capacity  =     8.312 c.m/s
       Critical depth =      .221 metres
 9     ROUTE
      65.000     Conduit Length
        .210     Supply X-factor <.5
     105.079     Supply K-lag (sec)
        .500     Beta weighting factor
     150.000     Routing timestep
           1     No. of sub-reaches
              .008       .183       .167       .000 c.m/s
```

```
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       3     line(s) of comment
        **********************************
        *       5 YEAR DESIGN STORM       *
        **********************************
  2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     3175.000     Coefficient  a
       20.000     Constant  b    (min)
        1.000     Exponent  c
         .400     Fraction to peak  r
      240.000     Duration ó  240 min
                 48.845 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
  4     CATCHMENT
       10.000     ID No.ó 99999
       33.500     Area in hectares
      473.000     Length (PERV) metres
         .560     Gradient (%)
        4.000     Per cent Impervious
      473.000     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
               .297       .000       .029       .000 c.m/s
               .253       .892       .278     C perv/imperv/total
 15     ADD RUNOFF
               .297       .297       .029       .000 c.m/s
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .290     Select Grade in %
        Depth          =      .436 metres
        Velocity       =      .483 m/sec
        Flow Capacity  =     7.461 c.m/s
        Critical depth =      .272 metres
  9     ROUTE
      100.000     Conduit Length
         .207     Supply X-factor <.5
      155.201     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
           1     No. of sub-reaches
               .297       .297       .297       .000 c.m/s
 17     COMBINE
       1     Junction Node No.
               .297       .297       .297       .297 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
       20.000     ID No.ó 99999
        1.820     Area in hectares
      110.000     Length (PERV) metres
        1.000     Gradient (%)
        8.500     Per cent Impervious
      110.000     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
               .040       .000       .297       .297 c.m/s
               .252       .878       .305     C perv/imperv/total
 15     ADD RUNOFF
               .040       .040       .297       .297 c.m/s
```

```
 4     CATCHMENT
      30.000     ID No.ó 99999
       1.710     Area in hectares
     107.000     Length (PERV) metres
        .700     Gradient (%)
      19.500     Per cent Impervious
     107.000     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
              .074       .040       .297       .297 c.m/s
              .252       .877       .374     C perv/imperv/total
15     ADD RUNOFF
              .074       .114       .297       .297 c.m/s
11     CHANNEL
        .100     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .040     Manning's "n"
       1.500     O/a Depth in metres
        .230     Select Grade in %
       Depth          =      .314 metres
       Velocity       =      .348 m/sec
       Flow Capacity  =     6.644 c.m/s
       Critical depth =      .181 metres
 9     ROUTE
      72.000     Conduit Length
        .127     Supply X-factor <.5
     155.003     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .074       .114       .110       .297 c.m/s
17     COMBINE
       1     Junction Node No.
              .074       .114       .110       .339 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      40.000     ID No.ó 99999
        .430     Area in hectares
      54.000     Length (PERV) metres
        .730     Gradient (%)
      32.800     Per cent Impervious
      54.000     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
              .032       .000       .110       .339 c.m/s
              .252       .881       .459     C perv/imperv/total
15     ADD RUNOFF
              .032       .032       .110       .339 c.m/s
11     CHANNEL
        .100     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .040     Manning's "n"
       1.500     O/a Depth in metres
        .450     Select Grade in %
       Depth          =      .164 metres
       Velocity       =      .325 m/sec
       Flow Capacity  =     9.293 c.m/s
       Critical depth =      .103 metres
 9     ROUTE
      60.000     Conduit Length
        .376     Supply X-factor <.5
     138.279     Supply K-lag (sec)
        .500     Beta weighting factor
     150.000     Routing timestep
           1     No. of sub-reaches
              .032       .032       .029       .339 c.m/s
17     COMBINE
       1     Junction Node No.
              .032       .032       .029       .359 c.m/s
```

```
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      60.000     ID No.ó 99999
       3.290     Area in hectares
     148.000     Length (PERV) metres
        .440     Gradient (%)
       1.000     Per cent Impervious
     148.000     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
              .050       .000       .029       .359 c.m/s
              .253       .885       .259     C perv/imperv/total
15     ADD RUNOFF
              .050       .050       .029       .359 c.m/s
 4     CATCHMENT
      50.000     ID No.ó 99999
       1.920     Area in hectares
     113.000     Length (PERV) metres
        .160     Gradient (%)
      18.100     Per cent Impervious
     113.000     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
              .075       .050       .029       .359 c.m/s
              .252       .889       .368     C perv/imperv/total
15     ADD RUNOFF
              .075       .090       .029       .359 c.m/s
11     CHANNEL
        .100     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .040     Manning's "n"
       1.500     O/a Depth in metres
        .490     Select Grade in %
       Depth          =      .246 metres
       Velocity       =      .436 m/sec
       Flow Capacity  =     9.698 c.m/s
       Critical depth =      .163 metres
 9     ROUTE
      90.000     Conduit Length
        .389     Supply X-factor <.5
     154.661     Supply K-lag (sec)
        .500     Beta weighting factor
     150.000     Routing timestep
           1     No. of sub-reaches
              .075       .090       .081       .359 c.m/s
17     COMBINE
       1     Junction Node No.
              .075       .090       .081       .438 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
       70.000     ID No.ó 99999
         .430     Area in hectares
       54.000     Length (PERV) metres
         .100     Gradient (%)
       33.300     Per cent Impervious
       54.000     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
              .031       .000       .081       .438 c.m/s
              .252       .874       .460     C perv/imperv/total
15     ADD RUNOFF
              .031       .031       .081       .438 c.m/s
```

```
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .690     Select Grade in %
        Depth          =      .149 metres
        Velocity       =      .379 m/sec
        Flow Capacity  =    11.508 c.m/s
        Critical depth =      .101 metres
  9     ROUTE
       75.000     Conduit Length
         .441     Supply X-factor <.5
      148.403     Supply K-lag (sec)
         .500     Beta weighting factor
      150.000     Routing timestep
            1     No. of sub-reaches
              .031       .031       .029       .438 c.m/s
 17     COMBINE
       1     Junction Node No.
              .031       .031       .029       .467 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
       80.000     ID No.ó 99999
        1.210     Area in hectares
       90.000     Length (PERV) metres
         .700     Gradient (%)
        7.300     Per cent Impervious
       90.000     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
              .026       .000       .029       .467 c.m/s
              .252       .878       .298     C perv/imperv/total
 15     ADD RUNOFF
              .026       .026       .029       .467 c.m/s
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .360     Select Grade in %
        Depth          =      .158 metres
        Velocity       =      .284 m/sec
        Flow Capacity  =     8.312 c.m/s
        Critical depth =      .093 metres
  9     ROUTE
       65.000     Conduit Length
         .361     Supply X-factor <.5
      171.400     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
            1     No. of sub-reaches
              .026       .026       .026       .467 c.m/s
 17     COMBINE
       1     Junction Node No.
              .026       .026       .026       .490 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
       90.000     ID No.ó 99999
         .470     Area in hectares
       56.000     Length (PERV) metres
         .400     Gradient (%)
        5.200     Per cent Impervious
       56.000     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
              .011       .000       .026       .490 c.m/s
              .252       .875       .285     C perv/imperv/total
```

```
 15     ADD RUNOFF
              .011       .011       .026       .490 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
           1     No. of sub-reaches
              .011       .011       .011       .490 c.m/s
 17     COMBINE
       1     Junction Node No.
              .011       .011       .011       .498 c.m/s
 18     CONFLUENCE
       1     Junction Node No.
              .011       .498       .011       .000 c.m/s
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .360     Select Grade in %
        Depth          =      .511 metres
        Velocity       =      .596 m/sec
        Flow Capacity  =     8.312 c.m/s
        Critical depth =      .339 metres
  9     ROUTE
       77.000     Conduit Length
         .143     Supply X-factor <.5
       96.865     Supply K-lag (sec)
         .500     Beta weighting factor
      150.000     Routing timestep
           1     No. of sub-reaches
              .011       .498       .486       .000 c.m/s
```

```
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       3     line(s) of comment
        **********************************
        *      100 YEAR DESIGN STORM      *
        **********************************
  2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     6300.000     Coefficient  a
       15.000     Constant  b    (min)
        1.000     Exponent  c
         .400     Fraction to peak  r
      240.000     Duration ó  240 min
                 98.822 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
  4     CATCHMENT
       10.000     ID No.ó 99999
       33.500     Area in hectares
      473.000     Length (PERV) metres
         .560     Gradient (%)
        4.000     Per cent Impervious
      473.000     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
             1.881       .000       .486       .000 c.m/s
              .456       .938       .476     C perv/imperv/total
 15     ADD RUNOFF
             1.881      1.881       .486       .000 c.m/s
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .290     Select Grade in %
        Depth          =      .888 metres
        Velocity       =      .766 m/sec
        Flow Capacity  =     7.461 c.m/s
        Critical depth =      .587 metres
  9     ROUTE
      100.000     Conduit Length
         .000     Supply X-factor <.5
       97.873     Supply K-lag (sec)
         .542     Beta weighting factor
      200.000     Routing timestep
           1     No. of sub-reaches
             1.881      1.881      1.875       .000 c.m/s
 17     COMBINE
       1     Junction Node No.
             1.881      1.881      1.875      1.875 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
       20.000     ID No.ó 99999
        1.820     Area in hectares
      110.000     Length (PERV) metres
        1.000     Gradient (%)
        8.500     Per cent Impervious
      110.000     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
              .239       .000      1.875      1.875 c.m/s
              .456       .932       .496     C perv/imperv/total
 15     ADD RUNOFF
              .239       .239      1.875      1.875 c.m/s
```

```
 4     CATCHMENT
      30.000     ID No.ó 99999
       1.710     Area in hectares
     107.000     Length (PERV) metres
        .700     Gradient (%)
      19.500     Per cent Impervious
     107.000     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
              .221       .239      1.875      1.875 c.m/s
              .455       .929       .548     C perv/imperv/total
15     ADD RUNOFF
              .221       .460      1.875      1.875 c.m/s
11     CHANNEL
        .100     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .040     Manning's "n"
       1.500     O/a Depth in metres
        .230     Select Grade in %
       Depth          =      .541 metres
       Velocity       =      .494 m/sec
       Flow Capacity  =     6.644 c.m/s
       Critical depth =      .327 metres
 9     ROUTE
      72.000     Conduit Length
        .000     Supply X-factor <.5
     109.290     Supply K-lag (sec)
        .571     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .221       .460       .450      1.875 c.m/s
17     COMBINE
       1     Junction Node No.
              .221       .460       .450      2.053 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      40.000     ID No.ó 99999
        .430     Area in hectares
      54.000     Length (PERV) metres
        .730     Gradient (%)
      32.800     Per cent Impervious
      54.000     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
              .090       .000       .450      2.053 c.m/s
              .456       .931       .612     C perv/imperv/total
15     ADD RUNOFF
              .090       .090       .450      2.053 c.m/s
11     CHANNEL
        .100     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .040     Manning's "n"
       1.500     O/a Depth in metres
        .450     Select Grade in %
       Depth          =      .251 metres
       Velocity       =      .423 m/sec
       Flow Capacity  =     9.293 c.m/s
       Critical depth =      .164 metres
 9     ROUTE
      60.000     Conduit Length
        .315     Supply X-factor <.5
     106.330     Supply K-lag (sec)
        .500     Beta weighting factor
     120.000     Routing timestep
           1     No. of sub-reaches
              .090       .090       .087      2.053 c.m/s
17     COMBINE
       1     Junction Node No.
              .090       .090       .087      2.074 c.m/s
```

```
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      60.000     ID No.ó 99999
       3.290     Area in hectares
     148.000     Length (PERV) metres
        .440     Gradient (%)
       1.000     Per cent Impervious
     148.000     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
              .312       .000       .087      2.074 c.m/s
              .456       .927       .461     C perv/imperv/total
15     ADD RUNOFF
              .312       .312       .087      2.074 c.m/s
 4     CATCHMENT
      50.000     ID No.ó 99999
       1.920     Area in hectares
     113.000     Length (PERV) metres
        .160     Gradient (%)
      18.100     Per cent Impervious
     113.000     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
              .215       .312       .087      2.074 c.m/s
              .456       .915       .539     C perv/imperv/total
15     ADD RUNOFF
              .215       .477       .087      2.074 c.m/s
11     CHANNEL
        .100     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .040     Manning's "n"
       1.500     O/a Depth in metres
        .490     Select Grade in %
       Depth          =      .474 metres
       Velocity       =      .662 m/sec
       Flow Capacity  =     9.698 c.m/s
       Critical depth =      .332 metres
 9     ROUTE
      90.000     Conduit Length
        .292     Supply X-factor <.5
     101.966     Supply K-lag (sec)
        .500     Beta weighting factor
     120.000     Routing timestep
           1     No. of sub-reaches
              .215       .477       .458      2.074 c.m/s
17     COMBINE
       1     Junction Node No.
              .215       .477       .458      2.496 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
       70.000     ID No.ó 99999
         .430     Area in hectares
       54.000     Length (PERV) metres
         .100     Gradient (%)
       33.300     Per cent Impervious
       54.000     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
              .078       .000       .458      2.496 c.m/s
              .455       .931       .614     C perv/imperv/total
15     ADD RUNOFF
              .078       .078       .458      2.496 c.m/s
```

```
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .690     Select Grade in %
        Depth          =      .217 metres
        Velocity       =      .478 m/sec
        Flow Capacity  =    11.508 c.m/s
        Critical depth =      .153 metres
  9     ROUTE
       75.000     Conduit Length
         .416     Supply X-factor <.5
      117.618     Supply K-lag (sec)
         .500     Beta weighting factor
      120.000     Routing timestep
            1     No. of sub-reaches
               .078       .078       .077      2.496 c.m/s
 17     COMBINE
        1     Junction Node No.
               .078       .078       .077      2.527 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
       80.000     ID No.ó 99999
        1.210     Area in hectares
       90.000     Length (PERV) metres
         .700     Gradient (%)
        7.300     Per cent Impervious
       90.000     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
               .159       .000       .077      2.527 c.m/s
               .456       .933       .491     C perv/imperv/total
 15     ADD RUNOFF
               .159       .159       .077      2.527 c.m/s
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .360     Select Grade in %
        Depth          =      .328 metres
        Velocity       =      .448 m/sec
        Flow Capacity  =     8.312 c.m/s
        Critical depth =      .209 metres
  9     ROUTE
       65.000     Conduit Length
         .225     Supply X-factor <.5
      108.731     Supply K-lag (sec)
         .500     Beta weighting factor
      150.000     Routing timestep
            1     No. of sub-reaches
               .159       .159       .152      2.527 c.m/s
 17     COMBINE
        1     Junction Node No.
               .159       .159       .152      2.614 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
       90.000     ID No.ó 99999
         .470     Area in hectares
       56.000     Length (PERV) metres
         .400     Gradient (%)
        5.200     Per cent Impervious
       56.000     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
               .065       .000       .152      2.614 c.m/s
               .455       .934       .479     C perv/imperv/total
```

```
 15     ADD RUNOFF
              .065       .065       .152      2.614 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
           1     No. of sub-reaches
              .065       .065       .065      2.614 c.m/s
 17     COMBINE
       1     Junction Node No.
              .065       .065       .065      2.640 c.m/s
 18     CONFLUENCE
       1     Junction Node No.
              .065      2.640       .065       .000 c.m/s
 11     CHANNEL
         .100     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .040     Manning's "n"
        1.500     O/a Depth in metres
         .360     Select Grade in %
        Depth          =      .970 metres
        Velocity       =      .904 m/sec
        Flow Capacity  =     8.312 c.m/s
        Critical depth =      .675 metres
  9     ROUTE
       77.000     Conduit Length
         .000     Supply X-factor <.5
       63.850     Supply K-lag (sec)
         .589     Beta weighting factor
      120.000     Routing timestep
           1     No. of sub-reaches
              .065      2.640      2.629       .000 c.m/s
```