TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

105 Queen Street West, Unit 14
Fergus
Ontario N1M 1S6
Tel: (519) 843-3920
Fax: (519) 843-1943
Email: info@tritoneng.on.ca

ORANGEVILLE • FERGUS • GRAVENHURST • HARRISTON

August 16, 2021

County of Wellington
Planning and Development
74 Woolwich Street
Guelph, Ontario
N1H 3T9

ATTENTION: Meagan Ferris,
Manager of Planning and Environment

RE: AUDREY MEADOWS LTD.
COUNTY FILE # OP-2021-02

Dear Meagan,

As requested, we have reviewed our recently submitted Functional Servicing Report and would offer the following to help clarify and address Section 11.2.3 (Servicing Options Assessment) of the Official Plan.

The following options were considered for water and sanitary servicing of this development;

Municipal Servicing:

The closest municipal servicing is in Guelph and are excess of 3 km from the site. Given the size of the development, the costs would be prohibitive. Also, it is very unlikely that Guelph and/or Puslinch Township would agree to the extension of services to the site.

Communal Servicing:

Typically, communal servicing systems are better suitable to a small, high density condominium type developments where distance between units is short thereby keeping costs down. Also, within a condominium structure there exists mechanism to control operation and maintenance of the systems. Utilizing this servicing strategy in the proposed freehold estate residential configuration has several difficulties as follows;

- Will result in higher capital and operational/maintenance servicing costs,
- Potential for operational issues (i.e. water quality, septic sewage) related to the extended pipe residency times and low flows,

- Complexities and logistics of implementing/administering the systems due to multiple separate owners (i.e. agreements, easements, cost sharing),

- The scale of the proposal does not justify communal servicing,

- Typically, the MECP would want the municipality to assume responsibility, or at least agree to assume if required, for these systems to ensure servicing infrastructure is operated/maintained in perpetuity. It is unlikely that Puslinch Township would agree to such an arrangement. The MECP requires the execution of a responsibility agreement with the municipality to backstop communal services. Again, it is unlikely that Puslinch Township would agree to such an arrangement.

Private Services:

Based on the type/size of the development proposed, site conditions and the lack of feasible alternatives, private services including individual wells and septic systems with tertiary treatment is recommended for this development. Background supporting this recommendation is summarized as follows;

1. A Geotechnical Report was prepared by Naylor Engineering Associates Ltd. in 2004 to provide support of the adjacent development which is substantially built. Conclusions from this report noted that conventional in-ground septic systems were viable. (Please see attached report). This report also provided mapping indicating that the Geology is consistent with the new proposed development.

2. Also, we have provided with our Functional Servicing Report a copy of the 2019/2020 Annual Report for the Ground Water and Surface Water Monitoring prepared by Hydrogeology Consulting Services for the adjacent existing development. This report supports the viability of the existing in-ground septic systems addressing the potential adverse impacts to natural features. This monitoring program will also provide background for the proposed development.

3. As noted in our Functional Servicing Report we are proposing that the new development is to be serviced by private individual septic systems with tertiary treatment to improve effluent quality thereby mitigating any potential impacts to groundwater or surface water. The proposed minimum 0.3 ha lots provides for ample room to accommodate the proposed tertiary treatment sanitary systems in compliance with Ontario Building Code regulations.

Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Yours very truly,

TRITON ENGINEERING SERVICES LIMITED

Ray D. Kirtz, P.Eng.

Proposed Residential Development

Audrey Meadows Ltd.

Township of Puslinch

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

June, 2021

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TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

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1.0 Introduction

Triton Engineering Services Limited (TESL) has been retained by Audrey Meadows Ltd. to prepare a Functional Servicing and Stormwater Management Report (FSR) in support of an Official Plan Amendment ("OPA") application and a Zoning By-Law Amendment ("ZBA") application by Audrey Meadows Ltd. to round out/infill a rural settlement in the Township of Puslinch ("Township"). This report is intended to demonstrate the functionality and the conceptual framework for sanitary sewage and water servicing, and storm drainage prior to detailed design that will take place later on in the approval process.

The Applicant, successfully developed the residential property to the south of this parcel. The proposed development would include residential and open space/greenspace uses. The proposed development is located on the north side of the original development with a total property area of approximately 13 ha. The proposed development lands are bounded by an existing residential neighbourhood to the south, a wooded area to the west, agricultural lands to the north, and Victoria Road to the east. See Drawing 01 for the site location and adjacent uses.

The FSR should be read in conjunction with all other technical studies prepared and filed in support of the Planning Act applications.

2.0 Existing Conditions

The majority of the parcel had previously been used for agricultural purposes, with the western and northern boundaries being Environmental Protection lands. The existing subdivision to the south is a 48 lot subdivision, with lots ranging in size from 0.3 to 0.5 ha in size. This subdivision is serviced by private individual wells and private individual septic systems. The development setbacks from natural features have been established and are detailed in the supporting EIS prepared by Lincoln Environmental Consulting Group.

In general, the lands to be developed slope from the highpoint in the north towards the west and south, directing overland flows in both a western and southeastern direction. Geodetic onsite elevations range between 332m to 343m and the site lies within the GRCA watershed.

Geotechnical Investigations and Hydrogeological Investigations undertaken by Naylor Engineering for existing adjacent subdivision have identified that the underlying soils consist of a layer of topsoil over the overburden consisting of topsoil, overlying native deposits of silt, sand, sand and gravel, and glacial till. Stabilized groundwater table occurs at 1 to 6 m below existing grade, and the horizontal hydraulic gradient is from the north to the south. It is anticipated that the conditions of the proposed development area will be similar, however, this will be confirmed with additional geotechnical work as part of detailed design.

3.0 Proposed Land Use

The proposed development consists of approximately 29 residential lots each a minimum 0.3 hectares in size, a stormwater management block and ecological buffers. Roads will be a typical urban configuration utilizing storm sewer and curb/gutter. Private servicing (i.e. wells and septic systems) will be utilized for this development. Drawing 02 – "Proposed Residential Development Concept Plan" provides a general overview of the proposed development. Access to the

development will be provided by an extension of Old Ruby Lane on the south side of the development, and a connection to Victoria Road on the east side of the development.

4.0 Sanitary Servicing

The subdivision is to be serviced by private individual septic systems with tertiary (nitrate) treatment to improve effluent quality. The proposed minimum 0.3 ha lots provides for ample room to accommodate the proposed tertiary treatment sanitary systems in compliance with Ontario Building Code regulations. Preliminary design and confirmation of feasibility will be provided by supporting geotechnical information under separate cover.

5.0 Water Servicing

The subdivision is to be serviced by private individual wells. Preliminary background information and experience with the adjacent development indicates there is sufficient quantity and quality of potable water available to service this proposed development. The proposed 0.3 ha lots provides for ample room to accommodate the proposed well and ensure no interference with existing wells in proximity and proposed wells within the future development itself.

6.0 Stormwater Management and Site Drainage

6.1 Design Criteria

Site drainage and the management of stormwater from the site will comply with the policies and standards of the GRCA, MECP and the Township of Puslinch.

The stormwater management (SWM) strategy is to mitigate potential impacts of the development on the downstream storm drainage system. As such the following SWM criteria are proposed:

- Water Quantity Control of post development flows to pre-development flows up to and including the 100-year event.
- Quality Control: Enhanced treatment (80 percent suspended solids removal) prior to release into the existing municipal outlet.
- Storm sewers within the development designed to collect/convey the 5-year storm.
- Optimal 2% minimum lot grading slopes.
- Road Profile design to convey major overland flow toward the SWM pond with maximum depth of low points no greater than 300mm.
- Sediment and Erosion control measures to be implemented prior to and during construction until the site is established.

6.2 Existing Drainage

The existing drainage patterns for the development were established via topographic survey and are illustrated on Figure 1 - “Pre Development Storm Drainage Area Map”. In general, the lands to be developed currently slope from the north toward the west and south, directing overland flows in both directions as sheet flow. The western flow is directed to a wooded area, while the south

flow is directed to the rear of the existing residential lots and to the Victoria Road ditch.

6.3 Proposed Drainage and SWM Strategy

Approximately 85% of runoff from the site will be conveyed to the proposed SWM Facility (SWMF) at Block B of the proposed development via overland swales, sewer and roads. See Figure 2 - "Post Development Storm Drainage Area Map" for the proposed catchments.

Catchment 201, which includes all roads as well as the lots east of the Old Ruby Lane extension will be conveyed to the SWM facility. The flows from the SWMF will discharge to the Victoria Road ditch.

The remaining lots along the western side of the development will not be directed to the SWMF due to topography constraints. This area will generate runoff that primarily originates from roof tops and landscaped lands. Given this, the SWM strategy will be to provide sheet runoff over the rear of the lots westerly to the wooded area, thereby providing polishing and promoting infiltration.

The overall imperviousness on the proposed development is estimated to be approximately 20%.

Given the configuration of the development (i.e. low density residential) and the suitability of the site for infiltration (i.e. medium/high porosity soils), a SWM strategy which includes lot level and conveyance controls is proposed. A summary of the SWM strategy is provided below:

- Site grading will maintain runoff characteristics to the extent possible.
- Infiltration volumes and distribution will be maintained through the use of soak-a-way pits connected to roof leaders.
- A "treatment train" approach for quality treatment will be provided incorporating grassed swales, filter strips and an end-of-pipe Dry Pond facility.
- The Dry Pond facility is proposed since the minimal runoff volume expected off the site is unlikely to support a wet configuration. An Oil Grit Separator is proposed instead of a standard wet forebay for the same reason.
- Based on the low impervious level of the proposed development, the natural attenuation resulting from the proposed land use change (i.e. row crops to grassed), and the implementation of the lot level and conveyance controls, the need to provide quantity control for this development is minimal. Despite this, a Dry Pond facility is proposed in Block B to provide additional attenuation of peak flows.
- Provide sediment and erosion controls which will contain sediment on site during construction.

The proposed SWM strategy is consistent with the recommendations of the Mill Creek Subwatershed Study and the GRCA.

6.4 Hydrologic Model

A MIDUSS, hydrologic modelling software, was used to estimate runoff peak flow rates and volumes for the 5-year, 25-year and 100-year return period design storms for both existing and preliminary proposed conditions. The hydrologic modelling will be updated subsequent to Draft Plan Approval as part of detailed design once additional details of the development and SWM design are available. The purpose of the current hydrologic model is to determine the storage

requirements and outlet configuration of the SWMF to attenuate the difference in peak flow between proposed and existing conditions, thereby allowing for the preliminary sizing of the SWM Block. Output files detailing the MIDUSS results have been included in Appendix B.

6.5 Quantity Control

The Quantity Control goal for this development is to control proposed conditions (post development) peak flow runoff rates to below existing conditions (pre-development) rates. SWM design details/calculations, in accordance with MECP design guidelines presented in the Stormwater Management Planning and Design Manual (March 2003), are provided in Appendix A.

In accordance with the Township of Puslinch Municipal Development Standards, design storm events (2 to 100-year) were generated using a 3-hour Chicago rainfall distribution and were based on the City of Guelph IDF curves. The design storm parameters were extracted from Table 1 of the Guelph Development Engineering Manual (Version 2.0, 2019). The rainfall data was inputted into MIDUSS to generate the 3-hour design storm depths listed in Appendix A. It should be noted that the Guelph IDF parameters produce greater rainfall depths than those generated by the MTO IDF Curve Lookup Tool for the 3-hour design storm. For consistency and to be conservative, only the Guelph 3-hour Chicago storm was modelled, as specified in the Township of Puslinch standards.

As per the Puslinch Development Standards, the SWMF will be designed to also safely convey the Regional (Hazel) event.

MIDUSS hydrologic modeling software was utilized to determine the conceptual pre-development and controlled post-development run-off flow rates for the 5, 25 and 100-year events, as summarized in Table 1. All applicable catchment data, rainfall data, and MIDUSS input parameters for the SCS Infiltration Method of hydrology have been included in Appendix A. Note that the SWMF has not entered detailed design phase, and thus the SWMF configuration and sizing is considered preliminary. Detailed design of the facility will be completed subsequent to Draft Plan Approval. However, it has been conservatively estimated that the SWM Dry Pond will have a bottom area of 1,000m^2 with 4:1 side slopes. This is in accordance with Table 4.8 of the 2003 Stormwater Management Planning and Design Manual.

Table 1 – Peak Outflow Modelling Summary

	Pre-Development (m^3/s)			Post Development (m^3/s)		
Event	**Victoria Road**	**Southwesterly Wetland/Woodland**	**Total**	**Victoria Road**	**Southwesterly Wetland/Woodland**	**Total**
5-Year	0.113	0.113	**0.226**	0.019	0.066	**0.085**
25-Year	0.311	0.305	**0.616**	0.103	0.101	**0.204**
100-Year	0.563	0.544	**1.107**	0.125	0.161	**0.286**
48-Hour Hazel	1.062	0.834	**1.896**	1.566	0.351	**1.917**

Based on the modelling results the SWM facility will require an approximate 2,600 m^3 volume covering an area of 2,200 m^2. This facility can be accommodated within the proposed 0.58 ha

block providing sufficient space for maintenance access and landscaping. It should be noted that this preliminary SWM design provides a significant decrease in post development flow directed to the Victoria Road ditch.

6.6 Quality Control

As per MECP and GRCA requirements, Enhanced Treatment (i.e. 80 percent suspended solids removal) is applicable for development of the site, which will be provided by a treatment train approach including grassed swales, an Oil Grit Separator in lieu of a wet forebay, a Dry Pond facility to provide polishing and settling of solids. Preliminary design has been completed to ensure Block B is large enough to accommodate the eventual SWMF. This design includes a two-stage outlet and an Active Storage volume of at least 939m^3 for quality treatment, in accordance with Table 3.2 of the 2003 SWM Planning and Design Manual. Details are included in Appendix A. The detailed design of the facility will be completed subsequent to Draft Plan Approval.

7.0 Utilities

Utility servicing to the proposed development will consist of natural gas, hydro and communications. Providers of each of these utility services have plant adjacent to the development. Coordination for expanding the services into the development will commence as the development approval process proceeds. Utilities will be constructed in a joint utility trench that follows the road alignment to provide service to each lot within the development.

8.0 Sediment and Erosion Control

Prior to commencing earthworks on the site, silt fence will be erected at strategic locations around the perimeter of the site to contain sediment laden runoff on site. Following rough grading of the site and construction of the storm drainage system, additional controls will be installed to ensure that sediment is contained and erosion minimized.

Controls may include the following:

- Cut-off swales
- Filter berms
- Silt fencing
- Straw bale checks
- Sedimentation basin

A detailed Sediment and Erosion Control Drawing will be completed as part of detailed design once grading details for the development have been finalized.

It is intended to utilize the proposed SWM facility as a sediment basin until the site has been stabilized.

9.0 Conclusions

Based on the information provided within this Functional Servicing Report, we conclude that the Proposed Residential Development can be adequately serviced as outlined in this report. The Summary is as follows:

- The site can be accessed via two entrances; new Victoria Road entrance and a road extension from Old Ruby Lane. Internal roads will be constructed to Township of Pulinch municipal standards for an urban local road on a 20m Right-of-Way.
- Private sanitary treatment systems including tertiary (nitrate) treatment can be adequately accommodated on the proposed large lots. Preliminary geotechnical background information indicates that site conditions are suitable for septic sewage systems.
- Private wells are proposed for water servicing of the development. The lot configurations are sufficient to adequately accommodate a well on each lot. Preliminary hydrogeologic background information indicates that site conditions are suitable to provide adequate potable water for the proposed development.
- The development can be fully serviced with natural gas, hydro, cable and telecommunications.
- Stormwater management controls will be implemented to provide both quality and quantity control, thereby mitigating any potential negative impacts to the existing drainage system. The proposed SWMF Block is sufficient to accommodate the foot print of the proposed facility that will have the capacity to provide Quality treatment and to attenuate post to pre development storm events up to the 100-year event.

Respectfully Submitted By,

TRITON ENGINEERING SERVICES LIMITED

Ray D. Kirtz, P. Eng.

APPENDIX A

Stormwater Management Design Calculations

Design Storm Parameters per Table 1 of the Guelph Development Engineering Manual Version 2.0 (2019)				
Scenario	**a**	**b**	**c**	**3-Hour Depth (mm) (Guelph IDF)**
2-YEAR	743	6	0.7989	34.3
5-YEAR	1593	11	0.8789	47.3
10-YEAR	2221	12	0.9080	56.3
25-YEAR	3158	15	0.9355	68.3
50-YEAR	3886	16	0.9495	77.6
100-YEAR	4688	17	0.9624	87.1

Table 2: Hazel Regional Storm Parameters		
Interval	**Depth (mm)**	**% of 12 Hour**
Hours 1-36	2.028	
Total First 36 Hours	73	
Total Last 12 Hours	212	100
1st hour	6	3
2nd hour	4	2
3rd hour	6	3
4th hour	13	6
5th hour	17	8
6th hour	13	6
7th hour	23	11
8th hour	13	6
9th hour	13	6
10th hour	53	25
11th hour	38	18
12th hour	13	6
Total Full 48 Hours	285	

SCS Infiltration Parameters					
	Impervious Area	Lawn Pervious Area	Row Crops Pervious Area	AMCIII Lawn Pervious Area	AMCIII Row Crops Pervious Area
Soil Type	B	B	B	B	B
SCS Curve No. (CN)	98	61	75	81	88
Manning's 'n'	0.015	0.25	0.35	0.25	0.35
Initial Abstraction (mm)	1.3	16.2	8.5	6.1	3.5
I_a/S Coefficient	0.25	0.10	0.10	0.10	0.10
Storage (mm) (Function of CN)	5.2	162.4	84.7	60.8	35.0

Hydrologic Modelling Parameters				
Catchment I.D.	**Area (ha)**	**% Imp.**	**Flow Length (m)**	**Slope (%)**
Pre-Development Conditions				
101 (Towards Victoria Road)	7.51	0%	269	3%
102 (Towards Southwesterly Woodland/Wetland)	5.46	0%	182	5%
TOTAL	**12.97**	**0%**		
Post-Development Conditions				
201	10.43	20%	90	2%
202	0.17	10%	25	2%
203	1.35	10%	62	2%
204	1.02	10%	79	2%
TOTAL	**12.97**	**18%**		

Water Quality Sizing Criteria, as per Table 3.2 of the SWM Planning and Design Manual (MOE, 2003)	
Service Area	10.43 ha
Catchment Imperviousness	20%
Total Storage Volume (m^3/ha)	90
Total Volume Required (m^3)	939
Extended Detention (m^3/ha)	40
Extended Detention Required (m^3)	939
Permanent Pool Volume Required (m^3)	0

SWMF Assumed Details	
1st Orifice dia (mm)	100
B/Pond and 1st Orifice C/L (m)	331.55
Invert of 1st 300mm Outlet Pipe	331.40
DICB Inlet (m)	332.50
DICB Orifice (mm)	200
DICB Orifice C/L (m)	331.80
Invert of DICB 300mm Outlet Pipe	331.65
Overflow (m)	333.35
Overflow Weir Width (m)	6.00
Overflow Side Slopes (H:1)	3.00
Top of Pond (m)	333.65

Pond Results				
Event	**Maximum Storage Volume Used (m^3)**	**Peak Inflow (m^3/s)**	**Peak Outflow (m^3/s)**	**Ponding Elevation (m)**
5-Year	1,032	0.594	0.019	332.35
25-Year	1,639	0.859	0.102	332.71
100-Year	2,527	1.127	0.124	333.16
48-Hour Hazel	3,211	1.549	1.543	333.54

Peak Outflow Modelling Summary						
	Pre-Development (m^3/s)			**Post Development (m^3/s)**		
Event	**Victoria Road**	**Southwesterly Wetland/Woodland**	**Total**	**Victoria Road**	**Southwesterly Wetland/Woodland**	**Total**
5-Year	0.113	0.113	**0.226**	0.019	0.066	**0.085**
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100-Year	0.563	0.544	**1.107**	0.125	0.161	**0.286**
48-Hour Hazel	1.062	0.834	**1.896**	1.566	0.351	**1.917**

Township of Puslinch
Audrey Meadows Proposed Residential Development
SWM Facility Design Calculations
Dry Pond - Stage-Discharge Relationship

Notes:
Incremental Active Storage has been assumed based on assumed contours
Its been assumed that the pond bottom has 1,000m^2 area, and 4:1 slopes from Bottom/Pond to Top/Pond.
Max 3:1 slopes to be used from Top/Pond to Adjacent Existing Properties

Rating Curve			Volume Estimation			Drawdown		Notes
Elevation (m)	Discharge (m^3/s)	Act. Storage (m^3)	Depth (m)	Volume (m^3) Increment	Accumulated	Increment hours	Accumulated hours	
331.55	0.0000	0.00	0.00	0	0	0.00	0.00	***Bottom of Pond / Outlet Invert***
331.65	0.0066	106.78	0.10	107	107	8.99	8.99	
331.75	0.0093	219.68	0.20	113	220	3.94	12.92	
331.85	0.0114	338.82	0.30	119	339	3.19	16.11	
331.95	0.0132	464.32	0.40	126	464	2.83	18.94	
332.05	0.0148	596.32	0.50	132	596	2.62	21.56	
332.15	0.0162	734.94	0.60	139	735	2.49	24.05	
332.25	0.0175	880.32	0.70	145	880	2.40	26.46	
332.35	0.0187	1032.58	0.80	152	1,033	2.34	28.80	***5-Year Ponding Elevation***
332.45	0.0198	1191.84	0.90	159	1,192	2.30	31.10	
332.55	0.0932	1358.24	1.00	166	1,358	0.82	31.91	
332.65	0.0989	1531.90	1.10	174	1,532	0.50	32.42	
332.75	0.1042	1712.96	1.20	181	1,713	0.50	32.91	***25-Year Ponding Elevation***
332.85	0.1094	1901.54	1.30	189	1,902	0.49	33.40	
332.95	0.1142	2097.76	1.40	196	2,098	0.49	33.89	
333.05	0.1189	2301.76	1.50	204	2,302	0.49	34.38	
333.15	0.1234	2513.66	1.60	212	2,514	0.49	34.86	***100-Year Ponding Elevation***
333.25	0.1278	2733.60	1.70	220	2,734	0.49	35.35	
333.35	0.1320	2961.70	1.80	228	2,962	0.49	35.84	***Overflow weir invert***
333.45	0.4706	3198.08	1.90	236	3,198	0.22	36.05	
333.55	1.1203	3442.88	2.00	245	3,443	0.09	36.14	***Hazel Ponding Elevation***
333.65	2.0074	3696.22	2.10	253	3,696	0.05	36.18	***Top of Pond***

Discharge Calculations						
Elevation (m)	Orifice (m^3/s)	2nd Stage (Orifice) (m^3/s)	Weir (m^3/s)	Total (m^3/s)	Parameters	
331.55	0.0000	0.0000	0.000	0.000	***First Stage***	
331.65	0.0066	0.0000	0.000	0.007	Orifice Invert (m)	331.50
331.75	0.0093	0.0000	0.000	0.009	Orifice C/L Elev (m)	331.55
331.85	0.0114	0.0000	0.000	0.011	Orifice dia (mm)	100
331.95	0.0132	0.0000	0.000	0.013	Orifice Coeff.	0.600
332.05	0.0148	0.0000	0.000	0.015	Pipe dia (mm)	300
332.15	0.0162	0.0000	0.000	0.016	Pipe Invert (m)	331.40
332.25	0.0175	0.0000	0.000	0.017		
332.35	0.0187	0.0000	0.000	0.019	***Second Stage***	
332.45	0.0198	0.0000	0.000	0.020	Inlet Elevation (m)	332.50
332.55	0.0209	0.0723	0.000	0.093	Orifice Invert (m)	331.70
332.65	0.0219	0.0770	0.000	0.099	Orifice C/L Elev (m)	331.80
332.75	0.0229	0.0814	0.000	0.104	Orifice dia (mm)	200
332.85	0.0238	0.0856	0.000	0.109	Orifice Coeff.	0.600
332.95	0.0247	0.0895	0.000	0.114	Pipe dia (mm)	300
333.05	0.0256	0.0933	0.000	0.119	Pipe Invert (m)	331.65
333.15	0.0264	0.0970	0.000	0.123		
333.25	0.0272	0.1005	0.000	0.128	***Overflow***	
333.35	0.0280	0.1039	0.000	0.132	Weir Elev. (m)	333.35
333.45	0.0288	0.1072	0.335	0.471	Weir Coeff.	1.700
333.55	0.0295	0.1105	0.980	1.120	Weir Width (m)	6.000
333.65	0.0302	0.1136	1.864	2.007	Weir Left Side Slope (x:1)	3.000
					Weir Right Side Slope (x:1)	3.000

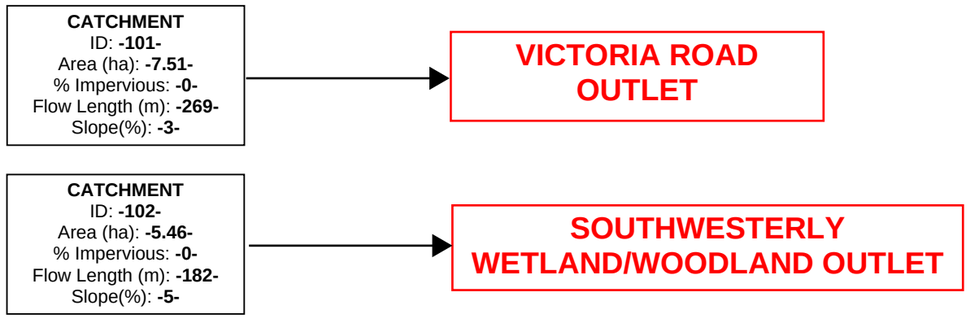
APPENDIX B

MIDUSS Modelling Outputs

- *Modelling Output (Pre-Development)*
- *Modelling Output (Post Development)*

Modelling Output (Pre-Development)

TOWNSHIP OF PUSLINCH
AUDREY MEADOWS LTD.
PROPOSED DEVELOPMENT



PRE-DEVELOPMENT
MODELLING SCHEMATIC

JUNE 2021

A2680

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers
Fergus, Ontario

```
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Output ------------------------------------------------>"
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rev. 473"
"                MIDUSS created
February 7, 2010"
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jkoolhaas"
"                Company                    Triton Engineering
Services Limited"
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"     3000.000   Max. Hydrograph"
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"        0.879   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          139.288    mm/hr"
"             Total depth                 47.265    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Towards Victoria Road"
"        0.000   % Impervious"
"        7.510   Total Area"
"      269.000   Flow length"
"        3.000   Overland Slope"
"        7.510   Pervious Area"
"      269.000   Pervious length"
"        3.000   Pervious slope"
"        0.000   Impervious Area"
"      269.000   Impervious length"
"        3.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
```

```
"        0.258   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.113     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area
"
"             Surface Area           7.510      0.000      7.510
hectare"
"             Time of concentration  77.299     6.548      77.299
minutes"
"             Time to Centroid       193.636    96.082     193.635
minutes"
"             Rainfall depth         47.265     47.265     47.265
mm"
"             Rainfall volume        3549.57    0.00       3549.58
c.m"
"             Rainfall losses        35.074     6.347      35.074
mm"
"             Runoff depth           12.191     40.917     12.191
mm"
"             Runoff volume          915.51     0.00       915.52
c.m"
"             Runoff coefficient     0.258      0.000      0.258
"
"             Maximum flow           0.113      0.000      0.113
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.113     0.113     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.113     0.113     0.113     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Towards Victoria Road"
"             Maximum flow                  0.113    c.m/sec"
"             Hydrograph volume           915.517    c.m"
"                    0.113     0.113     0.113     0.113"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.113     0.000     0.113     0.113"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Towards Southwesterly Wetland/Woodland"
```

```
"        0.000   % Impervious"
"        5.460   Total Area"
"      182.000   Flow length"
"        5.000   Overland Slope"
"        5.460   Pervious Area"
"      182.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"      182.000   Impervious length"
"        5.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.258   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.113     0.000     0.113     0.113 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area
"
"             Surface Area           5.460      0.000      5.460
hectare"
"             Time of concentration  52.458     4.443      52.458
minutes"
"             Time to Centroid       162.958    93.097     162.958
minutes"
"             Rainfall depth         47.265     47.265     47.265
mm"
"             Rainfall volume        2580.65    0.00       2580.65
c.m"
"             Rainfall losses        35.075     6.318      35.075
mm"
"             Runoff depth           12.190     40.947     12.190
mm"
"             Runoff volume          665.58     0.00       665.58
c.m"
"             Runoff coefficient     0.258      0.000      0.258
"
"             Maximum flow           0.113      0.000      0.113
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.113     0.113     0.113     0.113"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.113     0.113     0.113     0.113"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
```

" Towards Southwesterly Wetland/Woodland"
" Maximum flow 0.113 c.m/sec"
" Hydrograph volume 665.583 c.m"
" 0.113 0.113 0.113 0.113"

```
"                MIDUSS
Output ---------------------------------------------->"
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rev. 473"
"                MIDUSS created
February 7, 2010"
"           10   Units used:
ie METRIC"
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jkoolhaas"
"                Company                    Triton Engineering
Services Limited"
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12:23:00 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
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"     3000.000   Max. Hydrograph"
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"            1   Chicago storm"
"     3158.000   Coefficient A"
"       15.000   Constant B"
"        0.936   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          191.557    mm/hr"
"             Total depth                 68.266    mm"
"            6   025hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Towards Victoria Road"
"        0.000   % Impervious"
"        7.510   Total Area"
"      269.000   Flow length"
"        3.000   Overland Slope"
"        7.510   Pervious Area"
"      269.000   Pervious length"
"        3.000   Pervious slope"
"        0.000   Impervious Area"
"      269.000   Impervious length"
"        3.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
```

```
"        0.362   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.311     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area
"
"             Surface Area           7.510      0.000      7.510
hectare"
"             Time of concentration  57.064     5.709      57.064
minutes"
"             Time to Centroid       165.773    93.097     165.773
minutes"
"             Rainfall depth         68.266     68.266     68.266
mm"
"             Rainfall volume        5126.79    0.01       5126.79
c.m"
"             Rainfall losses        43.521     6.473      43.521
mm"
"             Runoff depth           24.745     61.794     24.745
mm"
"             Runoff volume          1858.33    0.00       1858.34
c.m"
"             Runoff coefficient     0.362      0.000      0.362
"
"             Maximum flow           0.311      0.000      0.311
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.311     0.311     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.311     0.311     0.311     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Towards Victoria Road"
"             Maximum flow                  0.311    c.m/sec"
"             Hydrograph volume          1858.339    c.m"
"                    0.311     0.311     0.311     0.311"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.311     0.000     0.311     0.311"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Towards Southwesterly Wetland/Woodland"
```

```
"        0.000   % Impervious"
"        5.460   Total Area"
"      182.000   Flow length"
"        5.000   Overland Slope"
"        5.460   Pervious Area"
"      182.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"      182.000   Impervious length"
"        5.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.363   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.305     0.000     0.311     0.311 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area
"
"             Surface Area           5.460      0.000      5.460
hectare"
"             Time of concentration  38.726     3.874      38.726
minutes"
"             Time to Centroid       142.896    90.583     142.896
minutes"
"             Rainfall depth         68.266     68.266     68.266
mm"
"             Rainfall volume        3727.33    0.00       3727.34
c.m"
"             Rainfall losses        43.519     7.065      43.519
mm"
"             Runoff depth           24.747     61.202     24.747
mm"
"             Runoff volume          1351.18    0.00       1351.18
c.m"
"             Runoff coefficient     0.363      0.000      0.363
"
"             Maximum flow           0.305      0.000      0.305
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.305     0.305     0.311     0.311"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.305     0.305     0.305     0.311"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
```

```
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                    0.305    c.m/sec"
"             Hydrograph volume            1351.180    c.m"
"                     0.305     0.305     0.305     0.305"
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Output ------------------------------------------------>"
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rev. 473"
"                MIDUSS created
February 7, 2010"
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ie METRIC"
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\OfficeData\"
"                Private Development\A2680-AUDREY SUB\Phase 2\SWM
Design\20210607 Rev 1\Modelling\Pre-Development\v1\hazel2"
"                Output filename:                     Hazel pre-
development.out"
"                Licensee name:
jkoolhaas"
"                Company                    Triton Engineering
Services Limited"
"                Date & Time last used:               2021-06-09 at
5:58:15 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"     2880.000   Max. Storm length"
"     5000.000   Max. Hydrograph"
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"     2880.000   Duration"
"      576.000   Rainfall intensity values"
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"                  2.028     2.028     2.028     2.028     2.028"
"                  2.028     2.028     2.028     2.028     2.028"
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"                    2.028     2.028     2.028     2.028     2.028"
"                    2.028     2.028     2.028     2.028     2.028"
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"                    2.028     2.028     2.028     2.028     2.028"
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"                 2.028     2.028     2.028     2.028     2.028"
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"                 6.000     6.000     6.000     6.000     6.000"
"                 6.000     6.000     6.000     6.000     4.000"
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"                 6.000     6.000     6.000    13.000    13.000"
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"                17.000    17.000    17.000    17.000    17.000"
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"                23.000    13.000    13.000    13.000    13.000"
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"                13.000    13.000    13.000    13.000    13.000"
"                53.000    53.000    53.000    53.000    53.000"
"                53.000    53.000    53.000    53.000    53.000"
"                53.000    53.000    38.000    38.000    38.000"
"                38.000    38.000    38.000    38.000    38.000"
"                38.000    38.000    38.000    38.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000"
"             Maximum intensity            53.000    mm/hr"
"             Total depth                 285.008    mm"
"            6   200hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Towards Victoria Road"
"        0.000   % Impervious"
"        7.510   Total Area"
"      269.000   Flow length"
"        3.000   Overland Slope"
```

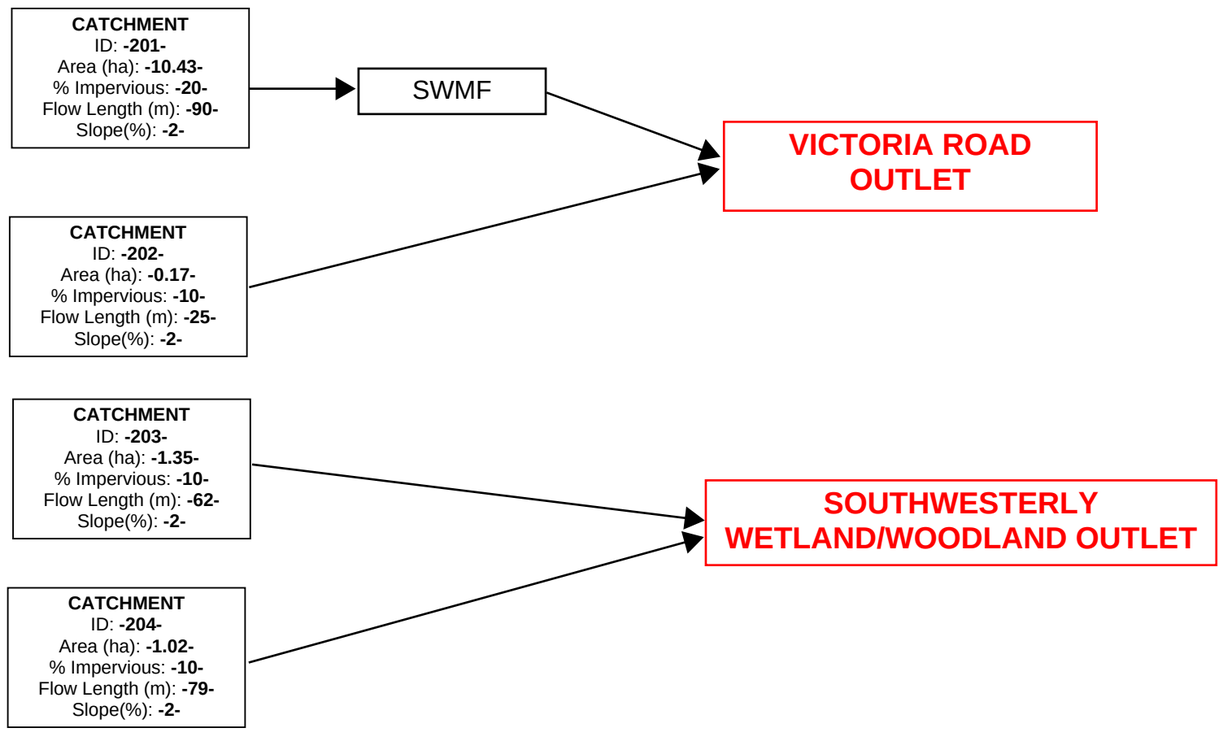
```
"        7.510   Pervious Area"
"      269.000   Pervious length"
"        3.000   Pervious slope"
"        0.000   Impervious Area"
"      269.000   Impervious length"
"        3.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       88.000   Pervious SCS Curve No."
"        0.879   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        3.464   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    1.062     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area
"
"             Surface Area           7.510      0.000      7.510
hectare"
"             Time of concentration  62.936     9.444      62.936
minutes"
"             Time to Centroid       2475.896   2284.384   2475.896
minutes"
"             Rainfall depth         285.008    285.008    285.008
mm"
"             Rainfall volume        2.1404     0.0000     2.1404
ha-m"
"             Rainfall losses        34.371     7.797      34.371
mm"
"             Runoff depth           250.637    277.211    250.637
mm"
"             Runoff volume          1.8823     0.0000     1.8823
ha-m"
"             Runoff coefficient     0.879      0.000      0.879
"
"             Maximum flow           1.062      0.000      1.062
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    1.062     1.062     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    1.062     1.062     1.062     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Towards Victoria Road"
"             Maximum flow                  1.062    c.m/sec"
"             Hydrograph volume         18822.836    c.m"
"                    1.062     1.062     1.062     1.062"
```

```
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     1.062     0.000     1.062     1.062"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Towards Southwesterly Wetland/Woodland"
"        0.000   % Impervious"
"        5.460   Total Area"
"      182.000   Flow length"
"        5.000   Overland Slope"
"        5.460   Pervious Area"
"      182.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"      182.000   Impervious length"
"        5.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       88.000   Pervious SCS Curve No."
"        0.879   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        3.464   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.834     0.000     1.062     1.062 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area
"
"             Surface Area           5.460      0.000      5.460
hectare"
"             Time of concentration  42.711     6.409      42.711
minutes"
"             Time to Centroid       2446.655   2278.533   2446.654
minutes"
"             Rainfall depth         285.008    285.008    285.008
mm"
"             Rainfall volume        1.5561     0.0000     1.5561
ha-m"
"             Rainfall losses        34.346     8.347      34.346
mm"
"             Runoff depth           250.663    276.661    250.663
mm"
"             Runoff volume          1.3686     0.0000     1.3686
ha-m"
"             Runoff coefficient     0.879      0.000      0.879
"
"             Maximum flow           0.834      0.000      0.834
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
```

```
"            4   Add Runoff "
"                    0.834     0.834     1.062     1.062"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.834     0.834     0.834     1.062"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.834    c.m/sec"
"             Hydrograph volume         13686.194    c.m"
"                    0.834     0.834     0.834     0.834"
```

Modelling Output (Post Development)

TOWNSHIP OF PUSLINCH
AUDREY MEADOWS LTD.
PROPOSED DEVELOPMENT



POST DEVELOPMENT MODELLING SCHEMATIC

JUNE 2021

A2680

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers
Fergus, Ontario

```
"                MIDUSS
Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25
rev. 473"
"                MIDUSS created
February 7, 2010"
"           10   Units used:
ie METRIC"
"                Job folder:                      \\Triton-srv-ferg
\OfficeData\"
"                Private Development\A2680-AUDREY SUB\Phase 2\SWM
Design\20210607 Rev 1\Modelling\Post Development\v2\5-year post devt"
"                Output filename:                  5-year post
develeopment.out"
"                Licensee name:
jkoolhaas"
"                Company                    Triton Engineering
Services Limited"
"                Date & Time last used:               2021-06-14 at
2:36:13 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"     1440.000   Max. Storm length"
"     3000.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"     1593.000   Coefficient A"
"       11.000   Constant B"
"        0.879   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          139.288    mm/hr"
"             Total depth                 47.265    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   No description"
"       10.000   % Impervious"
"        1.350   Total Area"
"       62.000   Flow length"
"        2.000   Overland Slope"
"        1.215   Pervious Area"
"       62.000   Pervious length"
"        2.000   Pervious slope"
"        0.135   Impervious Area"
"       62.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
```

```
"        0.105   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.858   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.037     0.000     0.000     0.000 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area
"
"             Surface Area           1.215      0.135      1.350
hectare"
"             Time of concentration  47.038     3.065      26.139
minutes"
"             Time to Centroid       158.147    91.132     126.296
minutes"
"             Rainfall depth         47.265     47.265     47.265
mm"
"             Rainfall volume        574.27     63.81      638.07
c.m"
"             Rainfall losses        42.290     6.714      38.733
mm"
"             Runoff depth           4.975      40.550     8.532
mm"
"             Runoff volume          60.44      54.74      115.18
c.m"
"             Runoff coefficient     0.105      0.858      0.181
"
"             Maximum flow           0.011      0.037      0.037
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.037     0.037     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.037     0.037     0.037     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.037    c.m/sec"
"             Hydrograph volume           115.183    c.m"
"                    0.037     0.037     0.037     0.037"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.037     0.000     0.037     0.037"
" 33          CATCHMENT 204"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          204   No description"
```

```
"       10.000   % Impervious"
"        1.020   Total Area"
"       79.000   Flow length"
"        2.000   Overland Slope"
"        0.918   Pervious Area"
"       79.000   Pervious length"
"        2.000   Pervious slope"
"        0.102   Impervious Area"
"       79.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.105   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.856   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.029     0.000     0.037     0.037 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area
"
"             Surface Area           0.918      0.102      1.020
hectare"
"             Time of concentration  54.399     3.545      30.263
minutes"
"             Time to Centroid       166.506    91.866     131.081
minutes"
"             Rainfall depth         47.265     47.265     47.265
mm"
"             Rainfall volume        433.89     48.21      482.10
c.m"
"             Rainfall losses        42.289     6.811      38.741
mm"
"             Runoff depth           4.976      40.453     8.523
mm"
"             Runoff volume          45.68      41.26      86.94
c.m"
"             Runoff coefficient     0.105      0.856      0.180
"
"             Maximum flow           0.007      0.028      0.029
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.029     0.029     0.037     0.037"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.029     0.029     0.029     0.037"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
```

```
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.066    c.m/sec"
"             Hydrograph volume           202.123    c.m"
"                     0.029     0.029     0.029     0.066"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.029     0.000     0.029     0.066"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   No description"
"       10.000   % Impervious"
"        0.170   Total Area"
"       25.000   Flow length"
"        2.000   Overland Slope"
"        0.153   Pervious Area"
"       25.000   Pervious length"
"        2.000   Pervious slope"
"        0.017   Impervious Area"
"       25.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.105   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.862   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.005     0.000     0.029     0.066 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area
"
"             Surface Area           0.153      0.017      0.170
hectare"
"             Time of concentration  27.276     1.778      15.123
minutes"
"             Time to Centroid       135.702    89.172     113.525
minutes"
"             Rainfall depth         47.265     47.265     47.265
mm"
"             Rainfall volume        72.31      8.03       80.35
c.m"
"             Rainfall losses        42.292     6.511      38.714
mm"
"             Runoff depth           4.972      40.754     8.551
mm"
"             Runoff volume          7.61       6.93       14.54
c.m"
"             Runoff coefficient     0.105      0.862      0.181
```

```
"
"             Maximum flow           0.002      0.005      0.005
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.005     0.005     0.029     0.066"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.005     0.005     0.005     0.066"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Towards Victoria Road"
"             Maximum flow                  0.005    c.m/sec"
"             Hydrograph volume            14.536    c.m"
"                    0.005     0.005     0.005     0.005"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.005     0.000     0.005     0.005"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   No description"
"       20.000   % Impervious"
"       10.430   Total Area"
"       90.000   Flow length"
"        2.000   Overland Slope"
"        8.344   Pervious Area"
"       90.000   Pervious length"
"        2.000   Pervious slope"
"        2.086   Impervious Area"
"       90.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.105   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.860   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.594     0.000     0.005     0.005 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area
"
"             Surface Area           8.344      2.086      10.430
hectare"
"             Time of concentration  58.825     3.834      21.915
minutes"
"             Time to Centroid       171.536    92.278     118.338
```

```
minutes"
"             Rainfall depth          47.265     47.265     47.265
mm"
"             Rainfall volume         3943.77    985.94     4929.71
c.m"
"             Rainfall losses         42.289     6.636      35.158
mm"
"             Runoff depth            4.976      40.628     12.106
mm"
"             Runoff volume           415.18     847.51     1262.69
c.m"
"             Runoff coefficient      0.105      0.860      0.256
"
"             Maximum flow            0.063      0.590      0.594
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.594     0.594     0.005     0.005"
" 54          POND DESIGN"
"        0.594   Current peak flow    c.m/sec"
"        0.563   Target outflow    c.m/sec"
"       1262.7   Hydrograph volume    c.m"
"         22.    Number of stages"
"        0.000   Minimum water level    metre"
"      335.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"               331.550     0.000     0.000"
"               331.650   0.00660   106.780"
"               331.750   0.00930   219.680"
"               331.850   0.01140   338.820"
"               331.950   0.01320   464.320"
"               332.050   0.01480   596.320"
"               332.150   0.01620   734.940"
"               332.250   0.01750   880.320"
"               332.350   0.01870  1032.580"
"               332.450   0.01980  1191.840"
"               332.550   0.09320  1358.240"
"               332.650   0.09890  1531.900"
"               332.750    0.1042  1712.960"
"               332.850    0.1094  1901.540"
"               332.950    0.1142  2097.760"
"               333.050    0.1189  2301.760"
"               333.150    0.1234  2513.660"
"               333.250    0.1278  2733.600"
"               333.350    0.1320  2961.700"
"               333.450    0.4706  3198.080"
"               333.550     1.120  3442.880"
"               333.650     2.007  3696.220"
"             Peak outflow                  0.019    c.m/sec"
"             Maximum level               332.349    metre"
```

```
"              Maximum storage            1031.515    c.m"
"              Centroidal lag               12.720   hours"
"                   0.594     0.594     0.019     0.005 c.m/sec"
" 40           HYDROGRAPH   Combine    2"
"             6   Combine "
"             2   Node #"
"                 Towards Victoria Road"
"              Maximum flow                  0.019    c.m/sec"
"              Hydrograph volume          1276.797    c.m"
"                      0.594     0.594     0.019     0.019"
```

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Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25
rev. 473"
"                MIDUSS created
February 7, 2010"
"           10   Units used:
ie METRIC"
"                Job folder:                     \\Triton-srv-ferg
\OfficeData\"
"                Private Development\A2680-AUDREY SUB\Phase 2\SWM
Design\20210607 Rev 1\Modelling\Post Development\v2\25-year post devt"
"                Output filename:                25-year post
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"                Licensee name:
jkoolhaas"
"                Company                   Triton Engineering
Services Limited"
"                Date & Time last used:             2021-06-14 at
3:22:53 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"     1440.000   Max. Storm length"
"     3000.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"     3158.000   Coefficient A"
"       15.000   Constant B"
"        0.936   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          191.557    mm/hr"
"             Total depth                 68.266    mm"
"            6   025hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   No description"
"       10.000   % Impervious"
"        1.350   Total Area"
"       62.000   Flow length"
"        2.000   Overland Slope"
"        1.215   Pervious Area"
"       62.000   Pervious length"
"        2.000   Pervious slope"
"        0.135   Impervious Area"
"       62.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
```

```
"        0.185   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.891   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.058     0.000     0.000     0.000 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area
"
"             Surface Area           1.215      0.135      1.350
hectare"
"             Time of concentration  31.552     2.673      21.476
minutes"
"             Time to Centroid       134.906    88.854     118.839
minutes"
"             Rainfall depth         68.266     68.266     68.266
mm"
"             Rainfall volume        829.43     92.16      921.59
c.m"
"             Rainfall losses        55.656     7.449      50.835
mm"
"             Runoff depth           12.611     60.817     17.431
mm"
"             Runoff volume          153.22     82.10      235.32
c.m"
"             Runoff coefficient     0.185      0.891      0.255
"
"             Maximum flow           0.039      0.056      0.058
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.058     0.058     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.058     0.058     0.058     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.058    c.m/sec"
"             Hydrograph volume           235.322    c.m"
"                    0.058     0.058     0.058     0.058"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.058     0.000     0.058     0.058"
" 33          CATCHMENT 204"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          204   No description"
```

```
"       10.000   % Impervious"
"        1.020   Total Area"
"       79.000   Flow length"
"        2.000   Overland Slope"
"        0.918   Pervious Area"
"       79.000   Pervious length"
"        2.000   Pervious slope"
"        0.102   Impervious Area"
"       79.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.185   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.892   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.044     0.000     0.058     0.058 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area
"
"             Surface Area           0.918      0.102      1.020
hectare"
"             Time of concentration  36.489     3.091      24.831
minutes"
"             Time to Centroid       140.501    89.456     122.682
minutes"
"             Rainfall depth         68.266     68.266     68.266
mm"
"             Rainfall volume        626.68     69.63      696.32
c.m"
"             Rainfall losses        55.645     7.350      50.816
mm"
"             Runoff depth           12.621     60.917     17.451
mm"
"             Runoff volume          115.86     62.13      178.00
c.m"
"             Runoff coefficient     0.185      0.892      0.256
"
"             Maximum flow           0.027      0.041      0.044
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.044     0.044     0.058     0.058"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.044     0.044     0.044     0.058"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
```

```
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.101    c.m/sec"
"             Hydrograph volume           413.318    c.m"
"                     0.044     0.044     0.044     0.101"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.044     0.000     0.044     0.101"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   No description"
"       10.000   % Impervious"
"        0.170   Total Area"
"       25.000   Flow length"
"        2.000   Overland Slope"
"        0.153   Pervious Area"
"       25.000   Pervious length"
"        2.000   Pervious slope"
"        0.017   Impervious Area"
"       25.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.185   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.898   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.009     0.000     0.044     0.101 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area
"
"             Surface Area           0.153      0.017      0.170
hectare"
"             Time of concentration  18.296     1.550      12.425
minutes"
"             Time to Centroid       119.840    87.174     108.388
minutes"
"             Rainfall depth         68.266     68.266     68.266
mm"
"             Rainfall volume        104.45     11.61      116.05
c.m"
"             Rainfall losses        55.652     6.981      50.785
mm"
"             Runoff depth           12.614     61.285     17.481
mm"
"             Runoff volume          19.30      10.42      29.72
c.m"
"             Runoff coefficient     0.185      0.898      0.256
```

```
"
"             Maximum flow           0.007      0.008      0.009
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.009     0.009     0.044     0.101"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.009     0.009     0.009     0.101"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Towards Victoria Road"
"             Maximum flow                  0.009    c.m/sec"
"             Hydrograph volume            29.719    c.m"
"                    0.009     0.009     0.009     0.009"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.009     0.000     0.009     0.009"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   No description"
"       20.000   % Impervious"
"       10.430   Total Area"
"       90.000   Flow length"
"        2.000   Overland Slope"
"        8.344   Pervious Area"
"       90.000   Pervious length"
"        2.000   Pervious slope"
"        2.086   Impervious Area"
"       90.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.185   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.893   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.859     0.000     0.009     0.009 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area
"
"             Surface Area           8.344      2.086      10.430
hectare"
"             Time of concentration  39.458     3.342      19.704
minutes"
"             Time to Centroid       143.880    89.830     114.316
```

```
minutes"
"             Rainfall depth         68.266     68.266     68.266
mm"
"             Rainfall volume        5696.14    1424.03    7120.17
c.m"
"             Rainfall losses        55.644     7.307      45.976
mm"
"             Runoff depth           12.623     60.959     22.290
mm"
"             Runoff volume          1053.23    1271.60    2324.83
c.m"
"             Runoff coefficient     0.185      0.893      0.327
"
"             Maximum flow           0.233      0.825      0.859
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.859     0.859     0.009     0.009"
" 54          POND DESIGN"
"         0.859   Current peak flow    c.m/sec"
"         0.563   Target outflow    c.m/sec"
"        2324.8   Hydrograph volume    c.m"
"          22.    Number of stages"
"         0.000   Minimum water level    metre"
"       335.000   Maximum water level    metre"
"         0.000   Starting water level    metre"
"             0   Keep Design Data: 1 = True; 0 = False"
"                   Level Discharge    Volume"
"                 331.550     0.000     0.000"
"                 331.650   0.00660   106.780"
"                 331.750   0.00930   219.680"
"                 331.850   0.01140   338.820"
"                 331.950   0.01320   464.320"
"                 332.050   0.01480   596.320"
"                 332.150   0.01620   734.940"
"                 332.250   0.01750   880.320"
"                 332.350   0.01870  1032.580"
"                 332.450   0.01980  1191.840"
"                 332.550   0.09320  1358.240"
"                 332.650   0.09890  1531.900"
"                 332.750    0.1042  1712.960"
"                 332.850    0.1094  1901.540"
"                 332.950    0.1142  2097.760"
"                 333.050    0.1189  2301.760"
"                 333.150    0.1234  2513.660"
"                 333.250    0.1278  2733.600"
"                 333.350    0.1320  2961.700"
"                 333.450    0.4706  3198.080"
"                 333.550     1.120  3442.880"
"                 333.650     2.007  3696.220"
"             Peak outflow                  0.102    c.m/sec"
"             Maximum level               332.709    metre"
```

```
"             Maximum storage            1639.343    c.m"
"             Centroidal lag                9.981   hours"
"                  0.859     0.859     0.102     0.009 c.m/sec"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Towards Victoria Road"
"             Maximum flow                  0.103    c.m/sec"
"             Hydrograph volume          2353.675    c.m"
"                      0.859     0.859     0.102     0.103"
```

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Output ------------------------------------------------>"
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rev. 473"
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February 7, 2010"
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devt"
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jkoolhaas"
"                Company                    Triton Engineering
Services Limited"
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" 31          TIME PARAMETERS"
"        5.000   Time Step"
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"     3000.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"     4688.000   Coefficient A"
"       17.000   Constant B"
"        0.962   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          239.354    mm/hr"
"             Total depth                 87.079    mm"
"            6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   No description"
"       10.000   % Impervious"
"        1.350   Total Area"
"       62.000   Flow length"
"        2.000   Overland Slope"
"        1.215   Pervious Area"
"       62.000   Pervious length"
"        2.000   Pervious slope"
"        0.135   Impervious Area"
"       62.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
```

```
"       61.000   Pervious SCS Curve No."
"        0.247   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.912   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.096     0.000     0.000     0.000 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area
"
"             Surface Area           1.215      0.135      1.350
hectare"
"             Time of concentration  24.423     2.436      18.022
minutes"
"             Time to Centroid       125.203    87.659     114.275
minutes"
"             Rainfall depth         87.079     87.079     87.079
mm"
"             Rainfall volume        1058.01    117.56     1175.57
c.m"
"             Rainfall losses        65.586     7.654      59.793
mm"
"             Runoff depth           21.493     79.425     27.286
mm"
"             Runoff volume          261.14     107.22     368.36
c.m"
"             Runoff coefficient     0.247      0.912      0.313
"
"             Maximum flow           0.081      0.073      0.096
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.096     0.096     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.096     0.096     0.096     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.096    c.m/sec"
"             Hydrograph volume           368.361    c.m"
"                    0.096     0.096     0.096     0.096"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.096     0.000     0.096     0.096"
" 33          CATCHMENT 204"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
```

```
"          204   No description"
"       10.000   % Impervious"
"        1.020   Total Area"
"       79.000   Flow length"
"        2.000   Overland Slope"
"        0.918   Pervious Area"
"       79.000   Pervious length"
"        2.000   Pervious slope"
"        0.102   Impervious Area"
"       79.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.247   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.908   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.066     0.000     0.096     0.096 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area
"
"             Surface Area           0.918      0.102      1.020
hectare"
"             Time of concentration  28.244     2.817      20.869
minutes"
"             Time to Centroid       129.681    88.248     117.664
minutes"
"             Rainfall depth         87.079     87.079     87.079
mm"
"             Rainfall volume        799.39     88.82      888.21
c.m"
"             Rainfall losses        65.581     8.037      59.826
mm"
"             Runoff depth           21.499     79.042     27.253
mm"
"             Runoff volume          197.36     80.62      277.98
c.m"
"             Runoff coefficient     0.247      0.908      0.313
"
"             Maximum flow           0.056      0.054      0.066
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.066     0.066     0.096     0.096"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.066     0.066     0.066     0.096"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
```

```
"            1   Node #"
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.161    c.m/sec"
"             Hydrograph volume           646.341    c.m"
"                     0.066     0.066     0.066     0.161"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.066     0.000     0.066     0.161"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   No description"
"       10.000   % Impervious"
"        0.170   Total Area"
"       25.000   Flow length"
"        2.000   Overland Slope"
"        0.153   Pervious Area"
"       25.000   Pervious length"
"        2.000   Pervious slope"
"        0.017   Impervious Area"
"       25.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.247   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.915   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.017     0.000     0.066     0.161 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area
"
"             Surface Area           0.153      0.017      0.170
hectare"
"             Time of concentration  14.162     1.412      10.443
minutes"
"             Time to Centroid       113.179    86.195     105.307
minutes"
"             Rainfall depth         87.079     87.079     87.079
mm"
"             Rainfall volume        133.23     14.80      148.03
c.m"
"             Rainfall losses        65.589     7.419      59.772
mm"
"             Runoff depth           21.491     79.660     27.308
mm"
"             Runoff volume          32.88      13.54      46.42
c.m"
```

```
"             Runoff coefficient     0.247      0.915      0.314
"
"             Maximum flow           0.014      0.010      0.017
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.017     0.017     0.066     0.161"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.017     0.017     0.017     0.161"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Towards Victoria Road"
"             Maximum flow                  0.017    c.m/sec"
"             Hydrograph volume            46.423    c.m"
"                    0.017     0.017     0.017     0.017"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.017     0.000     0.017     0.017"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   No description"
"       20.000   % Impervious"
"       10.430   Total Area"
"       90.000   Flow length"
"        2.000   Overland Slope"
"        8.344   Pervious Area"
"       90.000   Pervious length"
"        2.000   Pervious slope"
"        2.086   Impervious Area"
"       90.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       61.000   Pervious SCS Curve No."
"        0.247   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       16.239   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.909   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    1.127     0.000     0.017     0.017 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area
"
"             Surface Area           8.344      2.086      10.430
hectare"
"             Time of concentration  30.542     3.046      17.366
minutes"
```

```
"             Time to Centroid       132.374    88.578     111.387
minutes"
"             Rainfall depth         87.079     87.079     87.079
mm"
"             Rainfall volume        7265.89    1816.47    9082.36
c.m"
"             Rainfall losses        65.579     7.952      54.054
mm"
"             Runoff depth           21.500     79.127     33.025
mm"
"             Runoff volume          1793.94    1650.60    3444.53
c.m"
"             Runoff coefficient     0.247      0.909      0.379
"
"             Maximum flow           0.485      1.078      1.127
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     1.127     1.127     0.017     0.017"
" 54          POND DESIGN"
"        1.127   Current peak flow    c.m/sec"
"        0.563   Target outflow    c.m/sec"
"       3444.5   Hydrograph volume    c.m"
"          22.   Number of stages"
"        0.000   Minimum water level    metre"
"      335.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"               331.550     0.000     0.000"
"               331.650   0.00660   106.780"
"               331.750   0.00930   219.680"
"               331.850   0.01140   338.820"
"               331.950   0.01320   464.320"
"               332.050   0.01480   596.320"
"               332.150   0.01620   734.940"
"               332.250   0.01750   880.320"
"               332.350   0.01870  1032.580"
"               332.450   0.01980  1191.840"
"               332.550   0.09320  1358.240"
"               332.650   0.09890  1531.900"
"               332.750    0.1042  1712.960"
"               332.850    0.1094  1901.540"
"               332.950    0.1142  2097.760"
"               333.050    0.1189  2301.760"
"               333.150    0.1234  2513.660"
"               333.250    0.1278  2733.600"
"               333.350    0.1320  2961.700"
"               333.450    0.4706  3198.080"
"               333.550     1.120  3442.880"
"               333.650     2.007  3696.220"
"             Peak outflow                 0.124    c.m/sec"
```

```
"             Maximum level               333.156    metre"
"             Maximum storage            2526.598    c.m"
"             Centroidal lag                9.068   hours"
"                  1.127     1.127     0.124     0.017 c.m/sec"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Towards Victoria Road"
"             Maximum flow                  0.125    c.m/sec"
"             Hydrograph volume          3489.934    c.m"
"                    1.127     1.127     0.124     0.125"
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Output ---------------------------------------------->"
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rev. 473"
"                MIDUSS created
February 7, 2010"
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jkoolhaas"
"                Company                   Triton Engineering
Services Limited"
"                Date & Time last used:              2021-06-14 at
2:53:15 PM"
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"        5.000   Time Step"
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"            5   Historic"
"     2880.000   Duration"
"      576.000   Rainfall intensity values"
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"                  2.028     2.028     2.028     2.028     2.028"
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"                  2.028     2.028     2.028     2.028     2.028"
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"                 2.028     2.028     2.028     2.028     2.028"
"                 2.028     2.028     2.028     2.028     2.028"
"                 2.028     2.028     2.028     2.028     2.028"
"                 2.028     2.028     2.028     2.028     2.028"
"                 2.028     2.028     2.028     2.028     2.028"
"                 2.028     2.028     2.028     2.028     2.028"
"                 2.028     2.028     2.028     2.028     2.028"
"                 2.028     2.028     2.028     2.028     2.028"
"                 2.028     2.028     6.000     6.000     6.000"
"                 6.000     6.000     6.000     6.000     6.000"
"                 6.000     6.000     6.000     6.000     4.000"
"                 4.000     4.000     4.000     4.000     4.000"
"                 4.000     4.000     4.000     4.000     4.000"
"                 4.000     6.000     6.000     6.000     6.000"
"                 6.000     6.000     6.000     6.000     6.000"
"                 6.000     6.000     6.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                17.000    17.000    17.000    17.000    17.000"
"                17.000    17.000    17.000    17.000    17.000"
"                17.000    17.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    23.000"
"                23.000    23.000    23.000    23.000    23.000"
"                23.000    23.000    23.000    23.000    23.000"
"                23.000    13.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                53.000    53.000    53.000    53.000    53.000"
"                53.000    53.000    53.000    53.000    53.000"
"                53.000    53.000    38.000    38.000    38.000"
"                38.000    38.000    38.000    38.000    38.000"
"                38.000    38.000    38.000    38.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000    13.000    13.000    13.000    13.000"
"                13.000"
"             Maximum intensity            53.000    mm/hr"
"             Total depth                 285.008    mm"
"            6   200hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   No description"
"       10.000   % Impervious"
"        1.350   Total Area"
"       62.000   Flow length"
"        2.000   Overland Slope"
```

```
"        1.215   Pervious Area"
"       62.000   Pervious length"
"        2.000   Pervious slope"
"        0.135   Impervious Area"
"       62.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.806   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.970   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.200     0.000     0.000     0.000 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area
"
"             Surface Area           1.215      0.135      1.350
hectare"
"             Time of concentration  24.341     4.422      21.992
minutes"
"             Time to Centroid       2475.358   2277.646   2452.047
minutes"
"             Rainfall depth         285.008    285.008    285.008
mm"
"             Rainfall volume        3462.85    384.76     3847.61
c.m"
"             Rainfall losses        55.177     8.544      50.514
mm"
"             Runoff depth           229.831    276.465    234.495
mm"
"             Runoff volume          2792.45    373.23     3165.68
c.m"
"             Runoff coefficient     0.806      0.970      0.823
"
"             Maximum flow           0.180      0.020      0.200
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.200     0.200     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.200     0.200     0.200     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.200    c.m/sec"
"             Hydrograph volume          3165.679    c.m"
"                    0.200     0.200     0.200     0.200"
```

```
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.200     0.000     0.200     0.200"
" 33          CATCHMENT 204"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          204   No description"
"       10.000   % Impervious"
"        1.020   Total Area"
"       79.000   Flow length"
"        2.000   Overland Slope"
"        0.918   Pervious Area"
"       79.000   Pervious length"
"        2.000   Pervious slope"
"        0.102   Impervious Area"
"       79.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.806   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.973   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                     0.152     0.000     0.200     0.200 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area
"
"             Surface Area           0.918      0.102      1.020
hectare"
"             Time of concentration  28.150     5.113      25.425
minutes"
"             Time to Centroid       2480.617   2279.444   2456.823
minutes"
"             Rainfall depth         285.008    285.008    285.008
mm"
"             Rainfall volume        2616.38    290.71     2907.09
c.m"
"             Rainfall losses        55.269     7.653      50.508
mm"
"             Runoff depth           229.739    277.355    234.501
mm"
"             Runoff volume          2109.01    282.90     2391.91
c.m"
"             Runoff coefficient     0.806      0.973      0.823
"
"             Maximum flow           0.137      0.015      0.152
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
```

```
"            4   Add Runoff "
"                    0.152     0.152     0.200     0.200"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.152     0.152     0.152     0.200"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Towards Southwesterly Wetland/Woodland"
"             Maximum flow                  0.351    c.m/sec"
"             Hydrograph volume          5557.586    c.m"
"                    0.152     0.152     0.152     0.351"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.152     0.000     0.152     0.351"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   No description"
"       10.000   % Impervious"
"        0.170   Total Area"
"       25.000   Flow length"
"        2.000   Overland Slope"
"        0.153   Pervious Area"
"       25.000   Pervious length"
"        2.000   Pervious slope"
"        0.017   Impervious Area"
"       25.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.805   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.960   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
"                    0.025     0.000     0.152     0.351 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area
"
"             Surface Area           0.153      0.017      0.170
hectare"
"             Time of concentration  14.114     2.564      12.762
minutes"
"             Time to Centroid       2460.238   2273.963   2438.435
minutes"
"             Rainfall depth         285.008    285.008    285.008
mm"
"             Rainfall volume        436.06     48.45      484.51
```

```
c.m"
"             Rainfall losses        55.619     11.327     51.190
mm"
"             Runoff depth           229.390    273.681    233.819
mm"
"             Runoff volume          350.97     46.53      397.49
c.m"
"             Runoff coefficient     0.805      0.960      0.820
"
"             Maximum flow           0.022      0.003      0.025
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.025     0.025     0.152     0.351"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.025     0.025     0.025     0.351"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Towards Victoria Road"
"             Maximum flow                  0.025    c.m/sec"
"             Hydrograph volume           397.492    c.m"
"                    0.025     0.025     0.025     0.025"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.025     0.000     0.025     0.025"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   No description"
"       20.000   % Impervious"
"       10.430   Total Area"
"       90.000   Flow length"
"        2.000   Overland Slope"
"        8.344   Pervious Area"
"       90.000   Pervious length"
"        2.000   Pervious slope"
"        2.086   Impervious Area"
"       90.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.806   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.970   Impervious Runoff coefficient"
"        0.250   Impervious Ia/S coefficient"
"        1.296   Impervious Initial abstraction"
```

```
"                    1.549     0.000     0.025     0.025 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area
"
"             Surface Area           8.344      2.086      10.430
hectare"
"             Time of concentration  30.440     5.529      24.679
minutes"
"             Time to Centroid       2483.995   2277.432   2436.224
minutes"
"             Rainfall depth         285.008    285.008    285.008
mm"
"             Rainfall volume        2.3781     0.5945     2.9726
ha-m"
"             Rainfall losses        55.183     8.456      45.838
mm"
"             Runoff depth           229.825    276.553    239.171
mm"
"             Runoff volume          1.9177     0.5769     2.4946
ha-m"
"             Runoff coefficient     0.806      0.970      0.839
"
"             Maximum flow           1.243      0.318      1.549
c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    1.549     1.549     0.025     0.025"
" 54          POND DESIGN"
"        1.549   Current peak flow    c.m/sec"
"        0.563   Target outflow    c.m/sec"
"      24945.5   Hydrograph volume    c.m"
"          22.   Number of stages"
"        0.000   Minimum water level    metre"
"      335.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                331.550     0.000     0.000"
"                331.650   0.00660   105.120"
"                331.750   0.00930   215.500"
"                331.850   0.01140   331.250"
"                331.950   0.01320   452.520"
"                332.050   0.01480   579.410"
"                332.150   0.01620   712.080"
"                332.250   0.01750   850.630"
"                332.350   0.01870   995.200"
"                332.450   0.01980  1145.920"
"                332.550   0.03950  1302.920"
"                332.650   0.05420  1466.320"
"                332.750   0.06460  1636.250"
"                332.850   0.07320  1812.840"
"                332.950   0.08070  1996.220"
"                333.050   0.08750  2186.520"
```

```
"                333.150   0.09370  2383.860"
"                333.250   0.09950  2588.370"
"                333.350    0.1050  2800.180"
"                333.450    0.6598  3019.410"
"                333.550     1.704  3246.210"
"                333.650     3.101  3480.680"
"             Peak outflow                  1.543    c.m/sec"
"             Maximum level               333.535    metre"
"             Maximum storage            3211.412    c.m"
"             Centroidal lag               44.012   hours"
"                  1.549     1.549     1.543     0.025 c.m/sec"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Towards Victoria Road"
"             Maximum flow                  1.566    c.m/sec"
"             Hydrograph volume         25346.680    c.m"
"                     1.549     1.549     1.543     1.566"
```

FIGURES

Figure 1 – Pre Development Storm Drainage Area Map

Figure 2 – Post Development Storm Drainage Area Map

AUDREY MEADOWS LTD.
PROPOSED RESIDENTIAL DEVELOPMENT
PARTS 17,18 & 19, CONCESSION 8
TOWNSHIP OF PUSLINCH

LEGEND:

- 101 / 7.51 / 0 — CATCHMENT ID / CATCHMENT AREA (ha) / PERCENT IMPERVIOUS
- DRAINAGE LIMIT
- SURVEYED DRIPLINE LIMIT
- SURVEYED WETLAND LIMIT
- PROPERTY LIMITS
- LIMIT OF DEVELOPMENT

VICTORIA ROAD SOUTH

101
7.51
0

102
5.46
0

EXISTING RESIDENTIAL DEVELOPMENT

6 5 4 3 2 1

PRE DEVELOPMENT STORM DRAINAGE AREA MAP

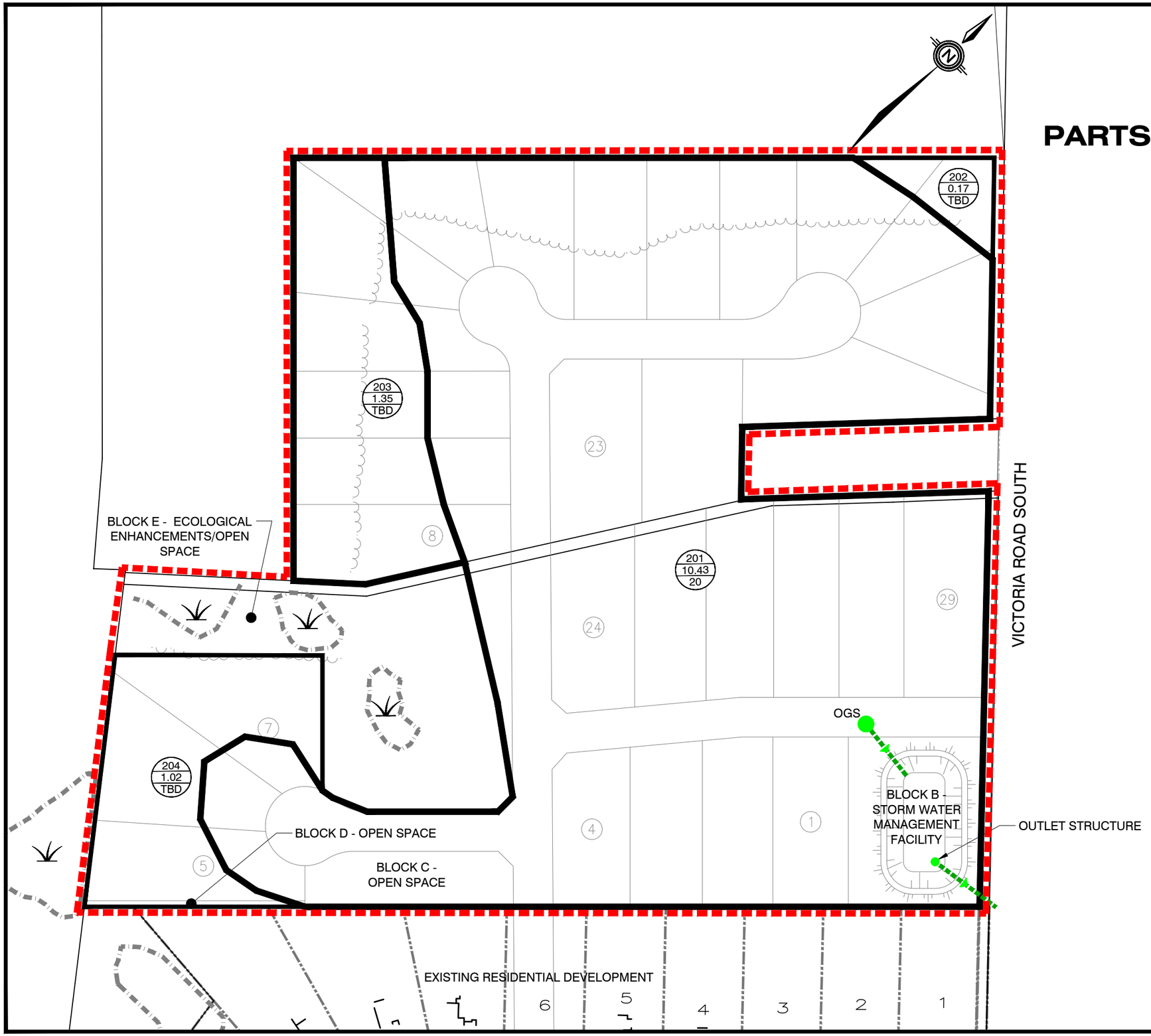
SCALE: 1:2000
JUNE 2021
A2680
Figure 1

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers
Fergus, Ontario

k:\a2680\phase 2\design\sheets\a2680-dom-pre.dwg – 2021-06-16 – cwalsh

ANSI full bleed B (17.00 x 11.00 Inches)

AUDREY MEADOWS LTD.
PROPOSED RESIDENTIAL DEVELOPMENT
PARTS 17,18 & 19, CONCESSION 8
TOWNSHIP OF PUSLINCH



LEGEND:

- 201 / 10.43 / 20 — CATCHMENT ID / CATCHMENT AREA (ha) / PERCENT IMPERVIOUS
- DRAINAGE LIMIT
- MH-1 — MH-2 — PROPOSED STORM SEWER
- PROPOSED MANHOLE
- DIRECTION OF FLOW
- SURVEYED DRIPLINE LIMIT
- SURVEYED WETLAND LIMIT
- PROPERTY LIMITS
- LIMIT OF DEVELOPMENT

POST DEVELOPMENT STORM DRAINAGE AREA MAP

SCALE: 1:2000
JUNE 2021
A2680
Figure 2

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers
Fergus, Ontario

DRAWINGS

Drawing 01 – Location Plan

Drawing 02 – Proposed Residential Development Concept Plan

CITY OF GUELPH

MALTBY ROAD EAST

LTBY ROAD WEST

GORDON STREET

RC

VICTORIA PARK VALLEY GOLF CLUB

AC

BOYCE DRIVE

HC

CASSINI

RUR

DAYMOND DRIVE

OS

HAMMERSLEY ROAD

BRIDLE PATH SUBDIVISION

BRIDLE PATH

RUR

NE

DEER VIEW DR

FOX RUN DRIVE

RUR

FOX RUN SUBDIVISION

FOX RUN DRIVE

BROCK ROAD NORTH

FOX RUN DRIVE

NE

FOX RUN PHASE 2

WOODED AREA

PROPOSED RESIDENTIAL

OLD RUBY LANE

RUR

CATHRINE CRESCENT

OLD RUBY LANE

ELIZABETH PL

VICTORIA ROAD SOUTH

HC

FD2

UR

FD2

UR

HC

FD2

CMU

NE

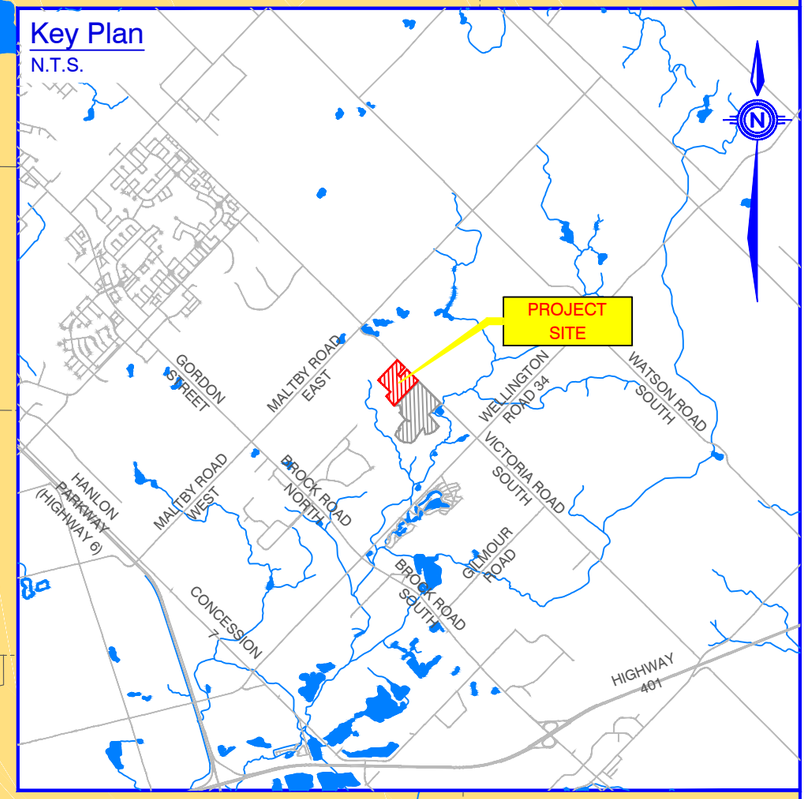
WELLINGTON ROAD 34

MINI LAKES

RUR

Key Plan

N.T.S.



ZONING LEGEND:

A	Agricultural
AC	Agricultural Commercial
CMU	Core Mixed Use
FD	Future Development
HC	Highway Commercial
NE	Natural Environment
OS	Open Space
RC	Resort Commercial
RUR	Rural Residential
UR	Urban Residential

DISCLAIMERS:

1. ALL EXISTING ELEVATIONS & DIMENSIONS TO BE CONFIRMED ON SITE. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE, DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

No	DATE	REVISION	INITIAL

PROPOSED RESIDENTIAL DEVELOPMENT

PARTS 17, 18 & 19, CONCESSION 8
TOWNSHIP OF PUSLINCH

AUDREY MEADOWS LTD.
P.O. BOX 1805
GUELPH, ONTARIO N1H 7A1

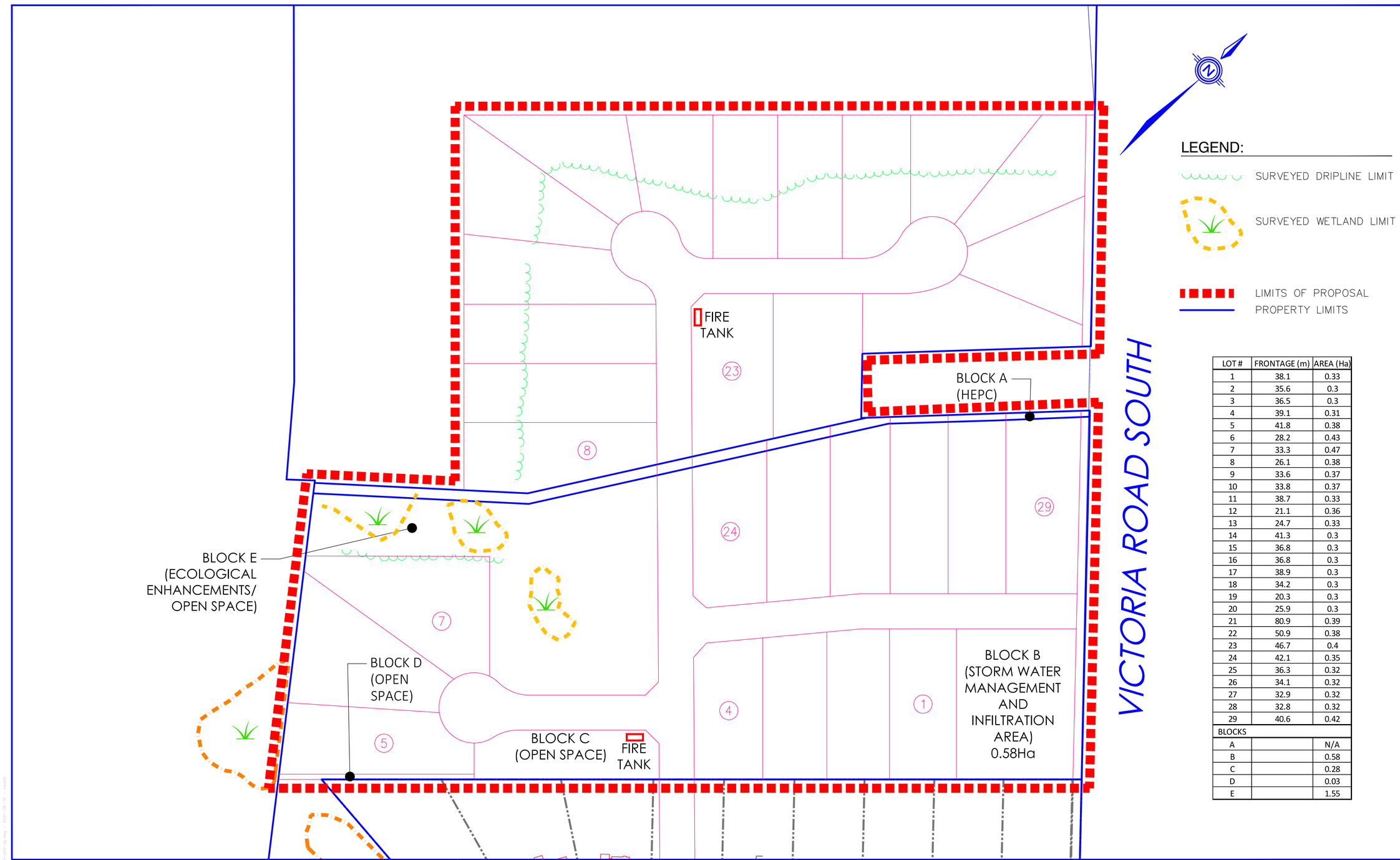
LOCATION PLAN

PROJECT No	A2680
DESIGNED BY:	C.J.D.W.
CHECKED BY:	P.F.Z.
APPROVED BY:	P.F.Z.
DATE:	APRIL 2019

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALE: N.T.S.
UNLESS OTHERWISE SHOWN

DRAWING NUMBER 01



LEGEND:

- SURVEYED DRIPLINE LIMIT
- SURVEYED WETLAND LIMIT
- LIMITS OF PROPOSAL
- PROPERTY LIMITS

LOT #	FRONTAGE (m)	AREA (Ha)
1	38.1	0.33
2	35.6	0.3
3	36.5	0.3
4	39.1	0.31
5	41.8	0.38
6	28.2	0.43
7	33.3	0.47
8	26.1	0.38
9	33.6	0.37
10	33.8	0.37
11	38.7	0.33
12	21.1	0.36
13	24.7	0.33
14	41.3	0.3
15	36.8	0.3
16	36.8	0.3
17	38.9	0.3
18	34.2	0.3
19	20.3	0.3
20	25.9	0.3
21	80.9	0.39
22	50.9	0.38
23	46.7	0.4
24	42.1	0.35
25	36.3	0.32
26	34.1	0.32
27	32.9	0.32
28	32.8	0.32
29	40.6	0.42
BLOCKS		
A		N/A
B		0.58
C		0.28
D		0.03
E		1.55

SOURCES:
1. VEGETATION COMMUNITIES – LINCOLN ENVIRONMENTAL, 2021
2. SURVEYED WETLAND LIMITS & DRIPLINE LIMITS – SAI/TESL, MAY 2021

No	DATE	REVISION	INITIAL

PROPOSED RESIDENTIAL DEVELOPMENT

PARTS 17,18 & 19, CONCESSION 8
TOWNSHIP OF PUSLINCH

AUDREY MEADOWS LTD.
P.O. BOX 1805
GUELPH, ONTARIO N1H 7A1

PROPOSED LOT FABRIC PLAN

PROJECT No A2680

DESIGNED BY: C.J.D.W.
CHECKED BY: P.F.Z.
APPROVED BY: P.F.Z.
DATE: June 2021

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALE: N.T.S.
UNLESS OTHERWISE SHOWN

DRAWING NUMBER 02