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Edward/George Street Residential Development Township of Clearview

PRELIMINARY STORMWATER MANAGEMENT & FUNCTIONAL SERVICING REPORT

2408969 Ontario Inc.

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1 Introduction

Tatham Engineering Limited (Tatham Engineering) has been retained by 2408969 Ontario Inc. to prepare a Preliminary Stormwater Management (SWM) and Functional Servicing Report in support of a concurrent Zoning By-law Amendment and Draft Plan of Subdivision application for a proposed residential development in the village of Creemore, within the Township of Clearview (Township).

This report presents a municipal servicing strategy, covering:

- water supply and distribution;
- sanitary sewage collection;
- drainage and stormwater management;
- grading and landscaping; and
- utility servicing.

1.1 SITE DESCRIPTION & SURROUNDING LAND USE

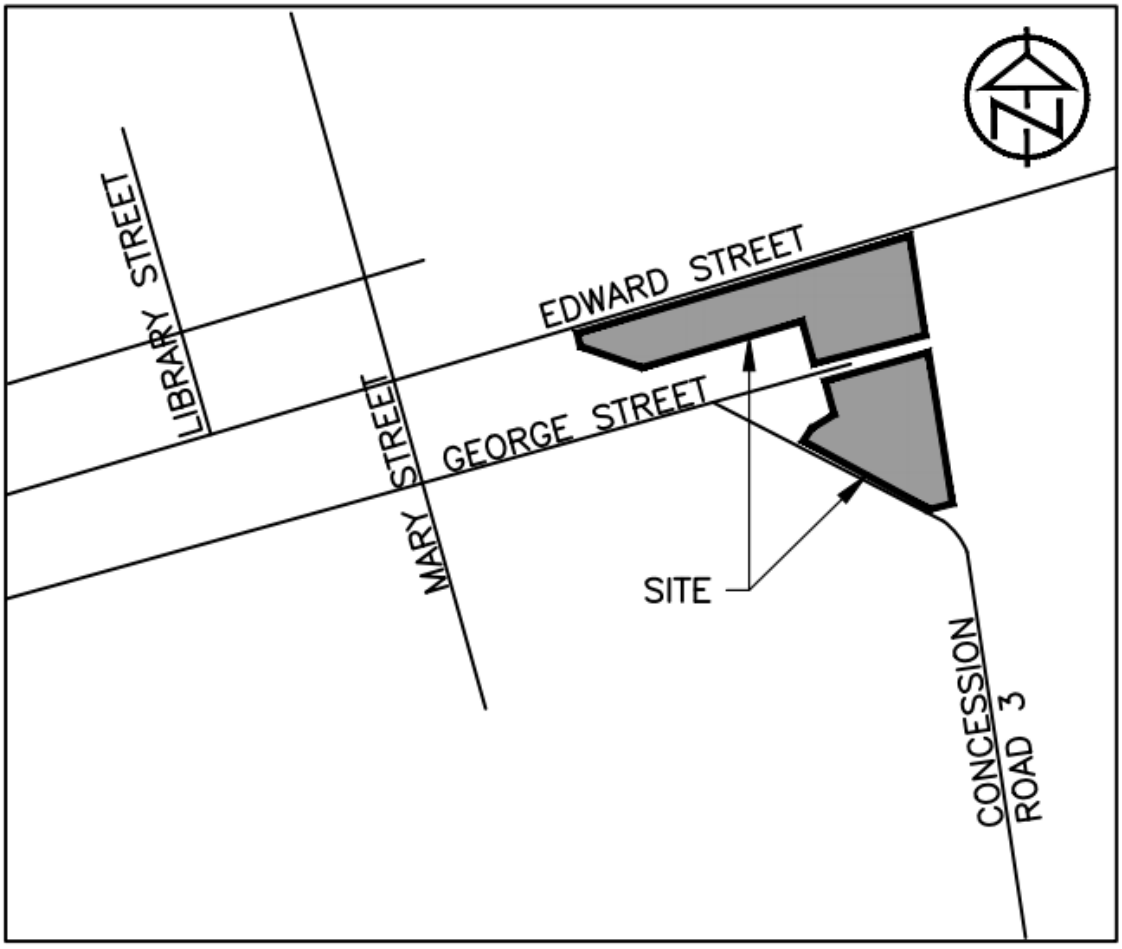
The site is bounded by Edward Street East to the north, existing residential land to the west, undeveloped land to the east, and Concession Road 3 to the south. The site consists of two properties. The north parcel (101 Edward Street) is legally described as Part Lots 35 & 36 S/S of Edward Street, Plan 315 Township of Clearview, County of Simcoe. The south parcel (111 George Street) is legally described as Part Lot 43 S/S of George Street, Plan 138 & 315 Nottawasaga, Part 22 S/S of George Street Plan 138 & 315 Nottawasaga Township of Clearview, County of Simcoe. The location of the site is illustrated on the Site Location Plan (Figure 1).

The site consists of approximately 4.71 ha of mainly undeveloped land. The majority of the land cover is meadows with small pockets of woodland. The site slopes from northwest to southeast at an approximate slope of 1%. Detailed topographic survey of both properties have been completed by Martin W. Knisley, Ontario Land Surveyor.

The site is located within the Nottawasaga Valley Conservation Authority (NVCA) watershed. Mad River, which is located approximately 475 m southwest of the subject property, flows eastward towards the Minesing wetlands where it ultimately discharges into the Nottawasaga River. Due to the site's proximity to Mad River and its associated floodplain, a significant portion of the site is located within NVCA's regulated area.

It should also be noted the site is located within a significant groundwater recharge area (SGWRA) and highly vulnerable aquifer according to Township of Clearview mapping.

Figure 1: Site Location Plan



1.2 PROPOSED DEVELOPMENT

The proposed development is to consist of 32 single family lots, six blocks of medium density townhouses (30 units), an 8.0 m private laneway, sanitary pumping station and a SWM block. The site will be accessed via Edward Street East and George Street. The Draft Plans of Proposed Subdivision are provided in Appendix A.

The development will be serviced by municipal water, sanitary and storm systems. As further described below, a sanitary pumping station is required to service the proposed development.

1.3 OBJECTIVES

The primary objective of this report is to demonstrate the feasibility of the proposed development with respect to water supply and distribution, sanitary sewage conveyance,

drainage, stormwater management (SWM) in support of the proposed zoning amendment and Draft Plan of Subdivision. This will involve an evaluation of existing and future site conditions.

1.4 GUIDELINES & BACKGROUND INFORMATION

This report was prepared recognizing provincial guidelines on water resources and the environment, including the following publications:

- Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Practices Planning and Design Manual, 2003;
- Township of Clearview Engineering Standards, March 2017;
- NVCA Stormwater Technical Guide, 2013; and
- Credit Valley Conservation Authority (CVC) and Toronto and Region Conservation Authority (TRCA) Low Impact Development Stormwater Management Planning and Design Guide, 2010;
- Lake Simcoe Region Conservation Authority (LSRCA) Lake Simcoe Climate Data: A Reference to Support the Completion of Water Balance Assessments, April 2017;
- R.J. Burnside & Associates Limited Community of Creemore, Clearview Township Municipal Class Environmental Assessment (Schedule B), July 2010; and
- R.J. Burnside & Associates Limited Creemore East Master Drainage Plan Report, July 2010.

This report has also been prepared in conjunction with the following site specific reports:

- Cambium Inc. Geotechnical Investigation Report 101 Edward Street & 111 George Street, Creemore, Ontario, May 2019;
- Tatham Engineering Limited Edward/George Street Residential Development Floodplain Hazard Study, May 17, 2019; and
- Tatham Engineering Limited Edward/George Street Residential Development Traffic Impact Brief (letter report), May 17, 2019.

2 Water Supply & Distribution

2.1 WATER SYSTEM

The existing municipal water system in Creemore terminates immediately west of the proposed development, with a 150 mm dia. watermain on located on George Street and a 150 mm dia. watermain on Edward Street. In order to service the proposed development, the watermains will be extended to the site, and will be looped through a proposed servicing block as depicted on Drawing SS-1, appended.

2.2 DOMESTIC WATER DEMANDS

The population for the proposed development is based on 2.34 persons per unit (ppu) for townhouse units; and 3.13 ppu for single family dwellings. Therefore, the estimated population is:

- 30 townhouses units x 2.34 ppu = 70 persons;
- 32 single family units x 3.13 ppu = 100 persons; and
- Total estimated population = 170 people.

Applying a daily demand of 450 L/person/day, the estimated domestic water demands are:

- Average Daily Demand (ADD) = 76,662 L/day = 0.89 L/s;
- Maximum Daily Demand (MDD) = 76,662 L/day x 2.75 (MDD factor) = 210,821 L/day = 2.44 L/s; and
- Peak Hourly Demand (PHD) = 76,662 L/day x 4.13 (PHD factor) = 316,614 L/day = 3.66 L/s.

MDD and PHD factors correspond to the total population as per Table 3-1 of the Ministry of Environment, Conservation & Parks (MECP) *Design Guidelines for Drinking Water Systems.* Detailed water system demand calculations are provided in Appendix B.

2.3 FIRE PROTECTION

Fire fighting water demands have been estimated for both a single family dwelling unit and a townhouse unit using the *Water Supply for Public Fire Protection* (1999) prepared by Fire Underwriters Survey (FUS). Detailed fire flow calculations are provided in Appendix B, and the results are summarized as follows:

- Single Family Unit = 6,000 L/min = 100 L/s; and
- Townhouse Unit = 4,000 L/min = 67 L/s.

As such, the MDD plus fire flow is approximately 102.4 L/s. Adequate operating pressures are expected to be available to meet this demand for the proposed development and will be confirmed with the Township. If required, a fire hydrant flow test will be provided.

3 Sanitary Sewage System

3.1 EXISTING SANITARY SYSTEM

Existing municipal gravity sanitary sewers are provided on Edward Street and George Street east of the subject site. The inverts of these sewers are shallow and are therefore to not provide opportunity to be extended and service the subject site. Through consultation with Township staff and an upstream developer (Alliance Homes), it has been determined a sanitary pumping station (SPS) is to be constructed on the 111 George Street property, and will pump sanitary sewage via a forcemain to the existing waste water treatment plant (additional details provided in Section 3.3, below).

3.2 PROPOSED SANITARY SYSTEM

The proposed development will be serviced by new municipal gravity sewers which will be constructed along George Street, Edward Street and the private laneway (limits of proposed sewers are depicted on Drawing SS-1, appended). The sewers will drain easterly towards a proposed 250 mm dia. sanitary sewer located in the eastern servicing block. This sewer will convey sanitary sewage to the SPS. The proposed sanitary sewer system will also be extended approximately 230 m west along Edward Street beyond the subject site in order to provide service connections to the existing residences which are currently on private septic systems. A sanitary sewer will also be extended along Concession Road 3 to service the four lots as proposed, which will also drain to the proposed SPS. A preliminary sanitary sewer design sheet and catchment area plan is provided in Appendix C.

Through consultation with C.F. Crozier & Associates Consulting Engineers (engineering consultants for the upstream Alliance Homes development), it has been determined the location and proposed sewer grades along Edward Street provide the opportunity for the future Alliance Homes development to drain sanitary sewage to the proposed SPS. As such, the Conceptual Servicing Plan (Drawing SS-1) depicts a sanitary stub on the north side of Edward Street to support this future connection. The sanitary flows from the Alliance Homes Development are also included in the preliminary sanitary design sheet and are noted on the Sanitary Catchment Plan, provided in Appendix C.

3.3 SANITARY DEMANDS

As detailed in the preliminary sanitary design sheet provided in Appendix C, the peak sanitary design flow for the proposed development (A1 + A2 + A3 + A4) is 4.5 L/s. The additional demand from the existing residences on Edward Street (41 persons) is 1.5 L/s, while the demand for the Alliance Homes development (EXT 1) is 22.8 L/s. Therefore, the total sanitary design flow

contributing to the sewer located in the 10.1 m servicing block is 28.6 L/s. The conceptual sewers as depicted on Drawing SS-1 have been sized accordingly.

3.4 SANITARY PUMPING STATION

As mentioned above, in order to provide municipal sanitary services for the proposed development, it has been determined a SPS will be required. As the SPS is intended to service lands in addition to the subject development, it is understood the design and construction of this SPS will be a Township project. As such, the subject development intends to dedicate the SPS block to the Town. As proposed, the SPS block is 0.18 ha in size, and will be accessed from Concession Road 3. Based on the conceptual sanitary servicing plan and the proposed grading, the SPS will be approximately 5.0 m deep. The SPS will pump sanitary sewage via a forcemain approximately 450 m southwest to the existing waste water treatment plant.

It is expected this project will be completed as a Municipal Class Environmental Assessment. As such, additional details have not been provided at this time.

4 Roadways & Transportation

In support of the proposed development, upgrades to Edward Street, George Street and Concession Road 3 will be required. A brief description of these works is provided below.

4.1 EDWARD STREET

Under existing conditions, Edward Street is constructed as a rural cross section along the frontage of the subject site, however to the immediate west the south side of the street has been urbanized with curb and sidewalk. As such, it is expected the south side of the street will be required to be urbanized along the frontage. The road profile is not expected to significantly change, and therefore drainage patterns will remain as per existing conditions. The precise limits and details of the roadworks will be provided at the detailed design stage.

4.2 GEORGE STREET

Under existing conditions, the travelled portion of the George Street road allowance terminates along the frontage of the proposed development. As such, George Street will be extended east to provide access to the proposed development and is expected to be constructed as an urban cross section with sidewalk and curb. The extents to the reconstruction to the west will be determined in consultation with the Township. A turnaround is proposed at the east end of George Street which has been designed to allow a Simcoe County garbage truck to maneuver through the site. Access to one lots will be provided from this turnaround. Additional discussion of the suitability of the turnaround is provided in the Traffic Brief, prepared by Tatham Engineering (provided under separate cover).

4.3 CONCESSION ROAD 3

Under existing conditions, Concession Road 3 is constructed as a rural cross section along the frontage of the site. It should also be noted that the travelled road is not constructed along the center of the rights-of-way (ROW) and encroaches onto the subject lands. This road will be required to be relocated into the ROW in support of the proposed development. It is anticipated this will be completed as a Township capital project and may be completed as part of the drainage improvement works which are further described in Section 6.7.

5 Utilities

The site will be serviced by gas (Enbridge), hydro (Epcor), and telecommunications (Rogers and Bell) located within the proposed ROW, constructed as per Township standards. Under existing conditions, these utilities are located within ROW of Edward and George Street but, will need to be extended west to the limits of the proposed development.

6 Drainage & Stormwater Management

6.1 BACKGROUND INFORMATION

Information relating to existing topography, ground cover and drainage patterns was obtained through a review of relevant background studies, available plans and base mapping.

6.2 EXISTING CONDITIONS

Under existing conditions, the subject property drains via sheet flow in a south-easterly direction at an approximate slope of 1.0% towards the Mad River. The existing site is modelled as Catchment 101 with a total area of 5.05 ha includes a portion of the George Street ROW. The site receives external runoff from neighbouring properties to the west as well as a portion of the George Street ROW. This area is modelled as Catchment 301. These catchments are depicted on Figure DP-1.

Soils in the area are classified as Tioga sand loam (Type A) according to Simcoe County Soils Mapping. This soil classification is consistent with the findings noted in Cambium's geotechnical report for the site. Much of the existing land use is meadow with pockets of pasture and woodlands.

A Visual OTTHYMO (VO5) hydrologic model has been developed to quantify existing condition peak flows for the 2-year through 100-year designs storms for the site. The 4-hour Chicago (CHI) and the 24-hour SCS Type II storm distributions have been applied to the model, utilizing Township IDF data. Detailed model results are provided in Appendix D1, while a summary of the results is provided in Table 1.

Table 1: Existing Conditions Peak Flow Summary

STORM RETURN PERIOD	SITE TOTAL (VO5 NODE #101)		SITE + EXTERNAL AREAS (VO5 NODE #1000)	
	4-HOUR CHICAGO (m^3/s)	24-HOUR SCS (m^3/s)	4-HOUR CHICAGO (m^3/s)	24-HOUR SCS (m^3/s)
2-year	0.01	0.03	0.03	0.05
5-year	0.02	0.05	0.04	0.08
10-year	0.03	0.07	0.05	0.11
25-year	0.04	0.10	0.06	0.15

STORM RETURN PERIOD	SITE TOTAL (VO5 NODE #101)		SITE + EXTERNAL AREAS (VO5 NODE #1000)	
	4-HOUR CHICAGO (m^3/s)	24-HOUR SCS (m^3/s)	4-HOUR CHICAGO (m^3/s)	24-HOUR SCS (m^3/s)
50-year	0.05	0.12	0.07	0.19
100-year	0.05	0.15	0.09	0.22
Timmins	0.18		0.25	
25 mm, 4-hr Chicago	0.01		0.03	

6.3 STORMWATER MANAGEMENT REQUIREMENTS

This preliminary SWM plan is subject to the review and approval of the Township of Clearview and the Nottawasaga Valley Conservation Authority (NVCA). Applicable SWM design criteria for the proposed site development are presented below.

6.3.1 Stormwater Quality Control

Water quality controls must be provided to satisfy the Ministry of the Environment, Conservation and Parks (MECP) *SWM Practices Planning and Design Manual*. Enhanced level water quality protection, which corresponds to 80% long term total suspended solids (TSS) removal, is required.

6.3.2 Stormwater Quantity Control

Post-development peak flow rates must be controlled to pre-development rates to ensure no adverse impacts downstream.

6.3.3 Water Balance and Infiltration

As the proposed site is located within a significant groundwater recharge area (SGWRA), a water balance assessment is required. The SWM plan must provide best efforts to match pre-development annual infiltration volumes by utilizing low-impact-development (LID) infiltration-based controls.

6.3.4 Phosphorous Loading Assessment

In accordance with NVCA requirements, the SWM plan must also provide best efforts with respect to phosphorous removal. An assessment of existing conditions and proposed conditions

phosphorous loading will be provided, and LID controls will be required to mitigate the post-development annual phosphorous loading.

6.3.5 Siltation & Erosion Control

Recommendations for a siltation and erosion control strategy will be provided for implementation during construction.

6.4 PRELIMINARY SWM PLAN

The preliminary SWM plan utilizes a treatment train approach to achieve the required SWM controls from the site. Lot level LID facilities are proposed to achieve water balance and phosphorous removal requirements, a dry SWM pond is proposed for water quantity control, and an oil-grit-separator (OGS) unit is proposed for additional water quality control.

Minor and major storm event runoff will be conveyed through the site via a system swales and storm sewers, ultimately discharging into the dry SWM pond.

The post-development scenario has been modelled as six separate catchments (201, 202, 203, 204, 205 and 206). These catchments are depicted on the Post-Development Catchment Plan (Figure DP-2), provided in Appendix D.

6.4.1 Water Quality

Enhanced level water quality controls (corresponding to 80% TSS removal), are required for the proposed development. Water quality controls will be provided via the treatment train approach which will include CB Shields, an oil grit separator (OGS) unit and the dry pond. The treatment train approach provides a TSS removal of 80.3% for the proposed development, allowing for the uncontrolled areas (203, 204 and 205). It is noted the 10.1 m wide servicing easement has not been included, as it is assumed this area does not require water quality control based on the pervious nature of the land use (grassed channel). The OGS unit has been sized as a STC 6000, which will provide 78% TSS removal for a total area of 3.33 ha (Catchments 201 and 202) with a total imperviousness of 65.7%. The OGS will be located immediately upstream of the SWM pond.

Table 2: Water Quality Control Summary

AREA ID	AREA (ha)	CB SHIELD (50% REMOVAL)	OGS UNIT (78% REMOVAL)	DRY POND (60% REMOVAL)	TOTAL TTS REMOVAL %
Controlled Areas					
201	2.46	50	78	60	95.6
202	0.87	50	78	60	95.6

AREA ID	AREA (ha)	CB SHIELD (50% REMOVAL)	OGS UNIT (78% REMOVAL)	DRY POND (60% REMOVAL)	TOTAL TTS REMOVAL %
206	0.97	0	0	60	60
Total	**4.30**				**87.6**
Uncontrolled Areas					
203	0.17	0	0	0	0
204	0.05	0	0	0	0
205	0.18	0	0	0	0
Total	**0.40**				**0**
Site Total	**4.70**				**80.1**

It is noted the proposed infiltration controls for the 32 single family lots which will provide additional water quality controls for the development are not included in these calculations, and, therefore, the results are conservative.

Additional details are provided in Appendix D3.

6.4.2 Water Quantity

In order to ensure pre-development peak flow rates are maintained under post-development conditions, a post-development hydrologic model has been prepared for the site using VO5 hydrologic modelling software. Catchments 201, 202, 206, and external catchment 301 are assumed to be conveyed to the proposed dry SWM pond. Catchments 203, 204, and 205 drain uncontrolled from the site. As such, the pond has been designed to provide overcontrols to account for the uncontrolled drainage areas. Detailed VO5 model results are provided in Appendix D2 and are summarized in Table 3 and Table 4.

Table 3: SWM Facility Summary

STORM RETURN PERIOD	CONTROLLED POND DISCHARGE (m^3/s) VO5 NODE #18		STORAGE VOLUME (m^3)		WATER ELEVATION (m)	
	CHI	SCS	CHI	SCS	CHI	SCS
2-year	0.02	0.04	295	511	251.22	251.34

STORM RETURN PERIOD	CONTROLLED POND DISCHARGE (m^3/s) VO5 NODE #18		STORAGE VOLUME (m^3)		WATER ELEVATION (m)	
	CHI	SCS	CHI	SCS	CHI	SCS
5-year	0.03	0.06	449	779	251.33	251.53
10-year	0.04	0.08	561	971	251.39	251.64
25-year	0.06	0.09	713	1,244	251.48	251.78
50-year	0.07	0.10	833	1,465	251.55	251.90
100-year	0.08	0.11	954	1,690	251.63	252.03

The detention and release rates for the dry SWM pond will be governed by a two staged orifice control, which will be located in a 1.2 m dia. perforated CSP riser. A 75 mm dia. orifice at elevation 251.00 m provides control for frequent storm events, while a 210 mm dia. orifice will control infrequent storm events (refer to Appendix D4 for additional stage-storage-discharge information). An emergency overflow weir will be provided at elevation 252.25 m to provide safe conveyance of the uncontrolled peak regional flow.

The preliminary design of the pond is summarized below:

- bottom of pond = 251.00 m;
- top of pond = 252.50 m;
- 4:1 side slopes;
- looped access road;
- total quantity storage volume of 2,775 m^3 at 252.50 m; and
- minimum freeboard of 0.30 m

It should be noted that the hydrologic model does not account for reduction in post development peak flows due to the proposed infiltration controls, and therefore the SWM pond design is conservative. It is also noted that the base of the proposed SWM pond may require to be lined to avoid groundwater interaction. This will be confirmed at the detailed design stage.

As shown in Table 3, the total peak flow from the site is controlled to pre-development release rates or less for all storm events.

Table 4: Proposed Conditions Peak Flow Summary

STORM RETURN PERIOD	SITE + ALL EXTERNAL AREAS (VO5 NODE #1000)	
	4-HOUR CHICAGO (m^3/s)	24-HOUR SCS (m^3/s)
2-year	0.03 *(0.03)*	0.05 *(0.05)*
5-year	0.04 *(0.04)*	0.07 *(0.08)*
10-year	0.05 *(0.05)*	0.09 *(0.11)*
25-year	0.06 *(0.06)*	0.11 *(0.15)*
50-year	0.07 *(0.07)*	0.12 *(0.19)*
100-year	0.09 *(0.09)*	0.14 *(0.22)*
Timmins*	0.50 *(0.25)*	
25 mm 4-hr Chicago	0.03 *(0.03)*	

Note 1: values in *(italics)* represent pre-development peak flow rates
Note 2: Timmins peak flow referenced in this table is the uncontrolled condition (i.e. no pond)

6.4.3 Extended Detention

Extended detention is provided by detaining the runoff volume from the greater of the 25 mm 4-hour Chicago storm or 40 m^3/ha event for a minimum of 24 hours. The governing volume occurs from the 25 mm 4-hour Chicago storm and is 673.6 m^3. This volume is provided an elevation of 251.45 m. Using the falling head orifice equation, this volume is released over a period of 47.2 hours, and is therefore sufficient. It is noted that previous comments provided with regards to this development requested that an extended detention drawdown time of 48 hours provided. Detailed calculation sheets are provided in Appendix D4.

6.5 WATER BALANCE & INFILTRATION

As the site is located within a highly vulnerable aquifer and a significant groundwater recharge area, and in accordance with the NVCA Stormwater Technical Guide, a preliminary evaluation of the anticipated changes in the annual water balance between pre-development and post-development conditions has been provided. Infiltration controls will be provided to minimize changes to the water balance across the site resulting in a best efforts approach to water balance for the site. The preliminary water balance assessment is summarized below.

6.5.1 Preliminary Water Balance

The entirety of both sites, as well as a portion of the George Street ROW, have been included in the preliminary water balance assessment (total area of 5.05 ha). Infiltration factors from the *Ministry of the Environment and Energy Hydrogeological Technical Information Requirements for Land Development Applications* have been selected based on land cover, slope and soil type.

The pre-development water balance assessment results in a total annual infiltration volume of 14,564 m^3. The post-development water balance assessment (without mitigation) results in a total annual infiltration of 8,617 m^3, corresponding to an annual deficit of 5,947 m^3.

To maintain existing condition infiltration volumes, the site will require Low Impact Development (LID) infiltration controls.

The proposed preliminary LID design consists of lot level controls for all 32 single family residential units. Each lot will be provided with a soakaway pit designed to infiltrate rooftop runoff. For the purpose of this assessment, each dwelling is assumed to be 180 m^2. It is also assumed that ¾ of the rooftop will drain to the soakaway pits, while the remaining ¼ will drain uncontrolled from the lots. Each soakaway pit is to be designed to infiltrate at minimum the 10 mm storm event from the rooftop (1.35 m^3). This results in a total annual infiltration volume of 2,938 m^3. Although not accounted for in these calculations, it is assumed the rooftop runoff from the proposed townhouse units will be discharged at surface and will therefore provide the additional required infiltration volume. During detailed design, this will be included in the detailed water balance calculation. If it is determined additional infiltration is required, additional controls will be incorporated into the development plan at the detailed design stage. Therefore, it is anticipated that pre-development infiltration rates will be maintained under post-development conditions. Additional details are provided in Appendix D5.

6.6 PHOSPHOROUS LOADING ASSESSMENT

A preliminary phosphorous loading assessment has been completed for the site using the loading rates and removal efficiency values from the NVCA's online Phosphorous Loading Tool. At the time of this report, the online tool was not working, and therefore a spreadsheet method has been used. Results are summarized below.

6.6.1 Existing Conditions

Under existing conditions, the site use has been divided into two categories for the purpose of the phosphorus budget calculations. A total of 1.26 ha has been modelled as Forest, with a phosphorous loading rate of 0.06 kg/ha/year, and 3.79 ha has been modelled as Transition with a loading rate of 0.07 kg/ha/year.

Applying these loading rates, the annual pre-development phosphorous load is 0.34 kg.

6.6.2 Future Conditions

For the purpose of this preliminary assessment, the entire 4.32 ha of the site has been modelled as residential, with a phosphorous loading rate of 0.41 kg/ha/year, while the remaining 0.73 ha (SWM block) has been modelled as a transition with a loading rate of 0.07 kg/ha/year.

Applying these loading rates, the annual post-development phosphorous load without mitigation would be 1.82 kg.

Runoff from 4.3 ha of the development (residential and transition land uses) will be conveyed to the dry SWM pond, which has a phosphorous removal rate of 10%. Based on the anticipated infiltration controls required for the site, it is assumed that 20% of the total residential lot area will be conveyed to an infiltration control, with a phosphorous removal rate of 60%. Applying a treatment train approach with the infiltration and dry pond controls, a total removal rate of 64% is achieved. Applying the proposed controls, the total annual post-development phosphorous loading rate is reduced to 1.52 kg. This represents a best efforts approach to reducing phosphorous loading. A summary of the results is provided in Table 5.

Table 5: Phosphorous Loading Summary

SCENARIO	AREA (HA)	PHOSPHORUS LOADING RATE (kg/year/ha)	PHOSPHORUS LOADING (kg/year/ha)
Pre-Development			
Forest	1.26	0.06	0.08
Transition	3.79	0.07	0.27
Total	**5.05**		**0.35**
Post-Development (no mitigation)			
Residential	4.32	0.41	1.77
Transition	0.73	0.07	0.05
Total	**5.05**		**1.82**
Post-Development (with mitigation)			
Residential (controlled – 64% removal efficiency)	0.71	0.41	0.10
Residential (controlled – 10% removal efficiency)	2.86	0.41	1.06

SCENARIO	AREA (HA)	PHOSPHORUS LOADING RATE (kg/year/ha)	PHOSPHORUS LOADING (kg/year/ha)
Transition (controlled – 10% removal efficiency)	0.73	0.07	0.05
Residential (uncontrolled)	0.75	0.41	0.31
Total	**5.05**		**1.52**

6.7 CREEMORE EAST MASTER DRAINAGE PLAN CONFORMANCE

The proposed development is located within the study area of the Creemore East Master Drainage Plan (MDP) Report. This report recommended a number of drainage improvements for East Creemore, none of which have yet been implemented. One of the recommendations from this report, which has direct impact on the proposed development, is to divert flows exceeding the 25-year storm event from the catchment areas upstream of Edward Street, south to 6/7 Sideroad towards the Mad River. Through consultation with the Township, the proposed development will create a 10.1 m servicing block along the eastern property boundary which provides the required area to implement the recommended drainage improvement works. This block will be dedicated to the Township. As specified in the MDP, the drainage improvement work is to include a 1200 mm dia. concrete pipe, as well as an overland flow channel to convey the runoff between Edward Street and Concession Road 3. The conceptual grading and servicing plans provided in this report (Drawings SS-1 and SG-1) depict the feasibility of locating this proposed drainage infrastructure within the servicing block.

It is understood the detailed design of these works will be completed as a Township capital project. As such, it is expected that significant coordination will be required between the Township and representatives from the proposed development throughout the detailed design stages of these projects. We have included relevant excerpts of the MDP in Appendix D6 of this report.

6.8 STORM CONVEYANCE

Minor and major event storm runoff will be conveyed through the development via a combination of storm sewers, channels and overland flow routes. As mentioned above, the majority of the proposed development will be conveyed to the SWM pond. Runoff from the frontages of the lots on Edward Street (Catchment 203) will be conveyed east along Edward Street to the proposed 10.1 m servicing block, and then south through the drainage channel towards Concession Road 3. Runoff from the lands encompassing the 10.1 m servicing block and the proposed SPS (Catchment 205) will also drain uncontrolled via the drainage channel towards

Concession Road 3. Runoff from the frontages of the proposed lots on Concession 3 (Catchment 204) will also drain directly into the future reconstructed Concession Road 3 ditch.

Several critical conveyance locations within the proposed development are summarized below. These locations are noted on Figure STM-1. The 5-year and 100-year peak flows referenced below have been calculated using storm sewer design sheets (rational method) included in Appendix D7.

6.8.1 Critical Location 1 – Rear lot drainage

A rear lot storm sewer/ditch inlet catch basin system and swale for major storm events has been provided within a 6.0 m wide servicing block at the rear of the proposed George Street lots to convey a portion of Catchment 201 to Edward Street. This drainage is conveyed towards George Street, and on to the SWM pond. The 5-year peak flow at this location is 0.16 m^3/s and the 100-year peak flow is 0.27 m^3/s. As the storm sewer is sized for the 5-year peak flow, a total of 0.11 m^3/s (100-year minus the 5-year) will be conveyed overland to George Street.

6.8.2 Critical Location 2 – Conveyance to SWM pond

Runoff from most of the site, as well as the external catchment area to the west, will be conveyed from George Street to the SWM pond through a 6.0 m wide servicing block between lots 24 and 25. A storm sewer sized for the 5-year peak flow (0.47 m^3/s) will be provided. As the 100-year flow in this location is 0.79 m^3/s, the overland flow channel will convey a flow of 0.32 m^3/s (100-year minus the 5-year).

6.8.3 Critical Location 3 – Mad River Regional Spill Flow

As documented in the Floodplain Hazard Study prepared by Tatham Engineering (provided under separate cover), under existing conditions a regional spill flow of 0.47 m^3/s from the Mad River is conveyed through the subject site (111 George Street property). The location of the spill flow is noted on drawing STM-1 as “Critical Location 3”. It is assumed the subject site will be required to convey this flow under proposed conditions. As such, the SWM block has been extended around proposed lot 29 to allow for a drainage channel to convey the spill flow safely through the pond block. A preliminary channel capacity calculation has been provided in Appendix D7 to confirm the feasibility of this concept.

7 Grading

The grading of the proposed development will match to the existing grades along the limits of the developable area and will consider the proposed grades of the reconstructed Edward Street, George Street and Concession Road 3. Retaining walls may be required in select areas. It is not anticipated that retaining walls greater than 1.0 m will be required.

Based on groundwater elevation data for the site provided by Cambium, it is anticipated that groundwater elevations will be a approximately 2.0 m below the proposed building apron grades, which is likely sufficient for typical home construction (i.e. allows for separation between basement slab and groundwater). Architectural plans for individual buildings and confirmation of separation to groundwater will be determined at the detailed design stage.

8 Siltation & Erosion Control Plan

Siltation and erosion controls will be implemented for all construction activities, including earthworks operations, roadway and service construction, paving, building construction and all grading works. Details of the siltation and erosion control plan will be provided at the detailed design stage, however a number of standard practices which will be implemented are summarized as follows:

- heavy duty silt control fences will be erected, prior to commencement of grading operations, to control sediment movement;
- rock check dams will be placed in temporary drainage swales to assist in the settlement of sediment and to reduce the velocity of the water, preventing erosion within the temporary ditch;
- regular inspection of control measures shall be instituted and repairs made as necessary; and
- stone mud mat will be implemented at the construction entrance(s).

It is anticipated the location of the ultimate SWM pond will serve as the location for a temporary sediment pond. A Conceptual Erosion and Sediment Control Plan (Drawing ESC-1) is appended.

9 Conclusions & Recommendations

The proposed subdivision development will consist of 32 of single-family residential lots, 30 townhouse units, a SWM block, and a sanitary pumping station block, located in the Village of Creemore, in the Township of Clearview. A summary of the proposed development is provided below.

9.1 WATER SUPPLY & DISTRIBUTION

Municipal water services will be extended to the site service the proposed development.

9.2 SANITARY SEWAGE COLLECTION SYSTEM

Municipal sanitary services will provided for the proposed development, which will convey sanitary sewage to a proposed pumping station located in the southeast corner of 111 George Street property. Sewage will be pumped via a forcemain to the existing waste water treatment plant.

9.3 DRAINAGE & STORMWATER MANAGEMENT

The proposed SWM plan utilizes a treatment train approach to provide the required SWM controls for the site. Each of the 32 single family lots will be provided with soakaway pits to infiltrate rooftop runoff. An oil grit separator will be provided to ensure water quality controls are achieved. An end-of-pipe dry SWM pond provides storage volumes to control the post-development peak flows to the pre-development rates or less. Overall, pre-development drainage conditions are maintained under post-development scenario.

9.4 GRADING

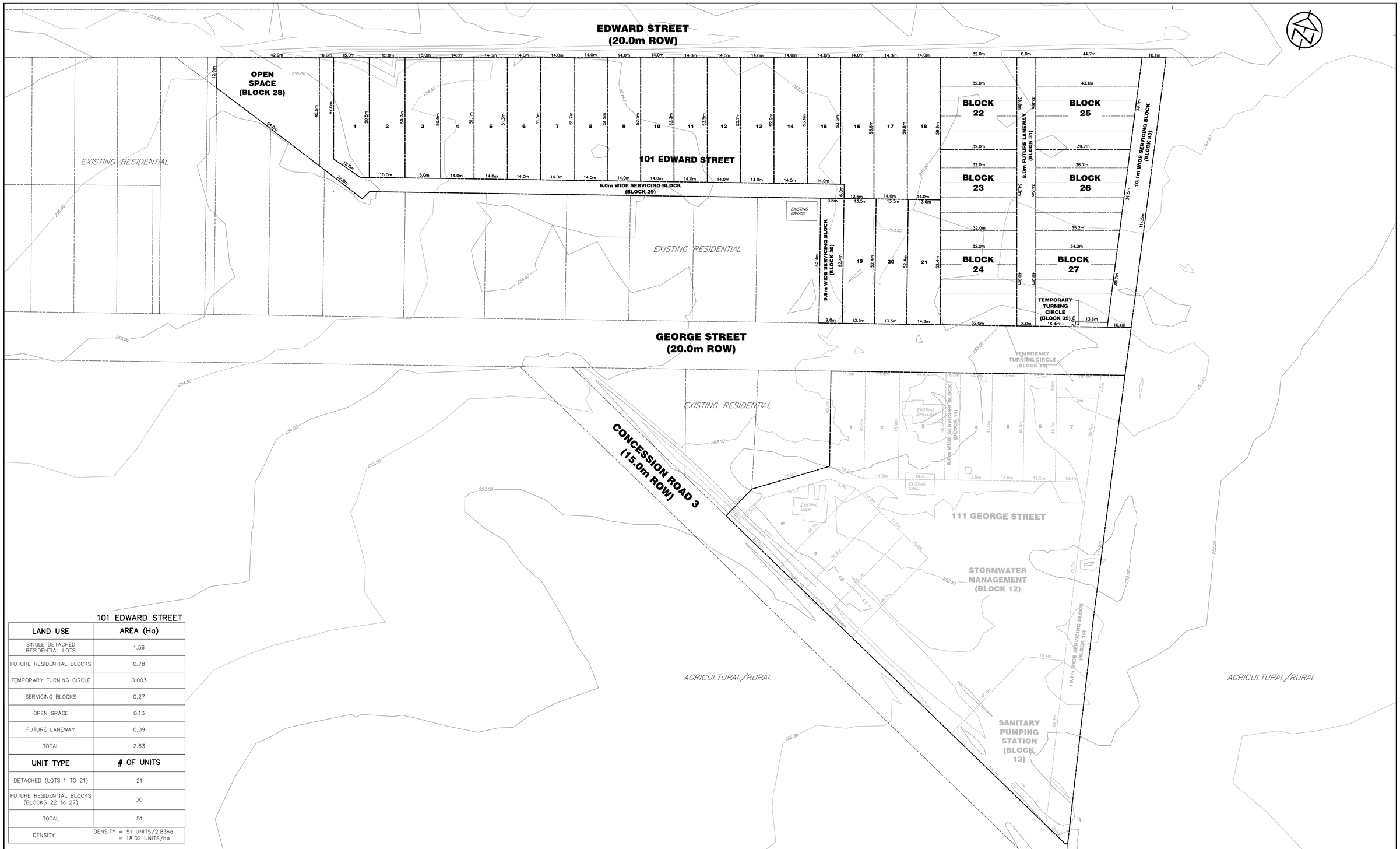
The grading of the proposed development will match the existing grades along the limits of the development area. A number of swales and drainage channels are required to safely convey runoff into the SWM pond from the development.

9.5 UTILITIES

All utilities (electrical, gas, telecommunications) will be available to the site.

This report demonstrates the proposed development can be serviced in a satisfactory manner with regards to municipal infrastructure including domestic and fire water, sanitary sewage, stormwater drainage, grading and utilities. Additional details will be provided at the detailed design stage of the development.

Appendix A: Draft Plan



101 EDWARD STREET

LAND USE	AREA (Ha)
SINGLE DETACHED RESIDENTIAL LOTS	1.56
FUTURE RESIDENTIAL BLOCKS	0.78
TEMPORARY TURNING CIRCLE	0.003
SERVICING BLOCKS	0.27
OPEN SPACE	0.13
FUTURE LANEWAY	0.09
TOTAL	2.83
UNIT TYPE	**# OF UNITS**
DETACHED (LOTS 1 TO 21)	21
FUTURE RESIDENTIAL BLOCKS (BLOCKS 22 to 27)	30
TOTAL	51
DENSITY	DENSITY = 51 UNITS/2.83ha = 18.02 UNITS/ha

DISCLAIMER AND COPYRIGHT

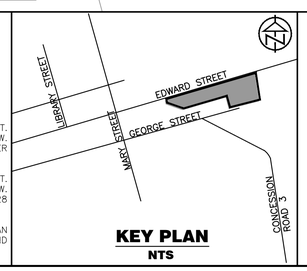
CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

NOTES

LEGAL SURVEY INFORMATION SOUTH OF GEORGE ST. SHOWN ON THIS PLAN PREPARED BY MARTIN W. KNISLEY SEPTEMBER 4, 2018 RECEIVED, SEPTEMBER 18, 2018.

LEGAL SURVEY INFORMATION NORTH OF GEORGE ST. SHOWN ON THIS PLAN PREPARED BY MARTIN W. KNISLEY SEPTEMBER 3, 2005 RECEIVED, APRIL 28 2017

TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN PREPARED BY MARTIN W. KNISLEY AUGUST 2005 AND 2018



KEY PLAN
NTS

0 10 20 30 40
1:750 METRES

DRAFT PLAN OF
PROPOSED SUBDIVISION

PART LOTS 35 & 36 S/S OF EDWARD STREET, PLAN 315, EXCEPT PARTS 5, 6, 7, 8 & 9 51R17775, PART 1 51R30437, PARTS 1 & 2 51R20079

TOWNSHIP OF CLEARVIEW
COUNTY OF SIMCOE
2019

No.	REVISION DESCRIPTION	DATE
1.	FOR SUBMISSION	MAY 14/19

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE — MARTIN W. KNISLEY

OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE LOFT PLANNING TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT THE SAME TO THE TOWNSHIP OF CLEARVIEW AND THE COUNTY OF SIMCOE FOR APPROVAL.

DATE — 2408969 ONTARIO INC.

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT R.S.O. 1990 C.P.13 AS AMENDED

a) AS SHOWN
b) AS SHOWN
c) AS SHOWN
d) AS SHOWN
e) AS SHOWN
f) AS SHOWN
g) AS SHOWN
h) MUNICIPAL WATER SUPPLY
i) AS SHOWN
j)) ALL SERVICES AS REQUIRED (WATER, SANITARY, STORM SEWERS, HYRO, TELEPHONE)
k) NONE

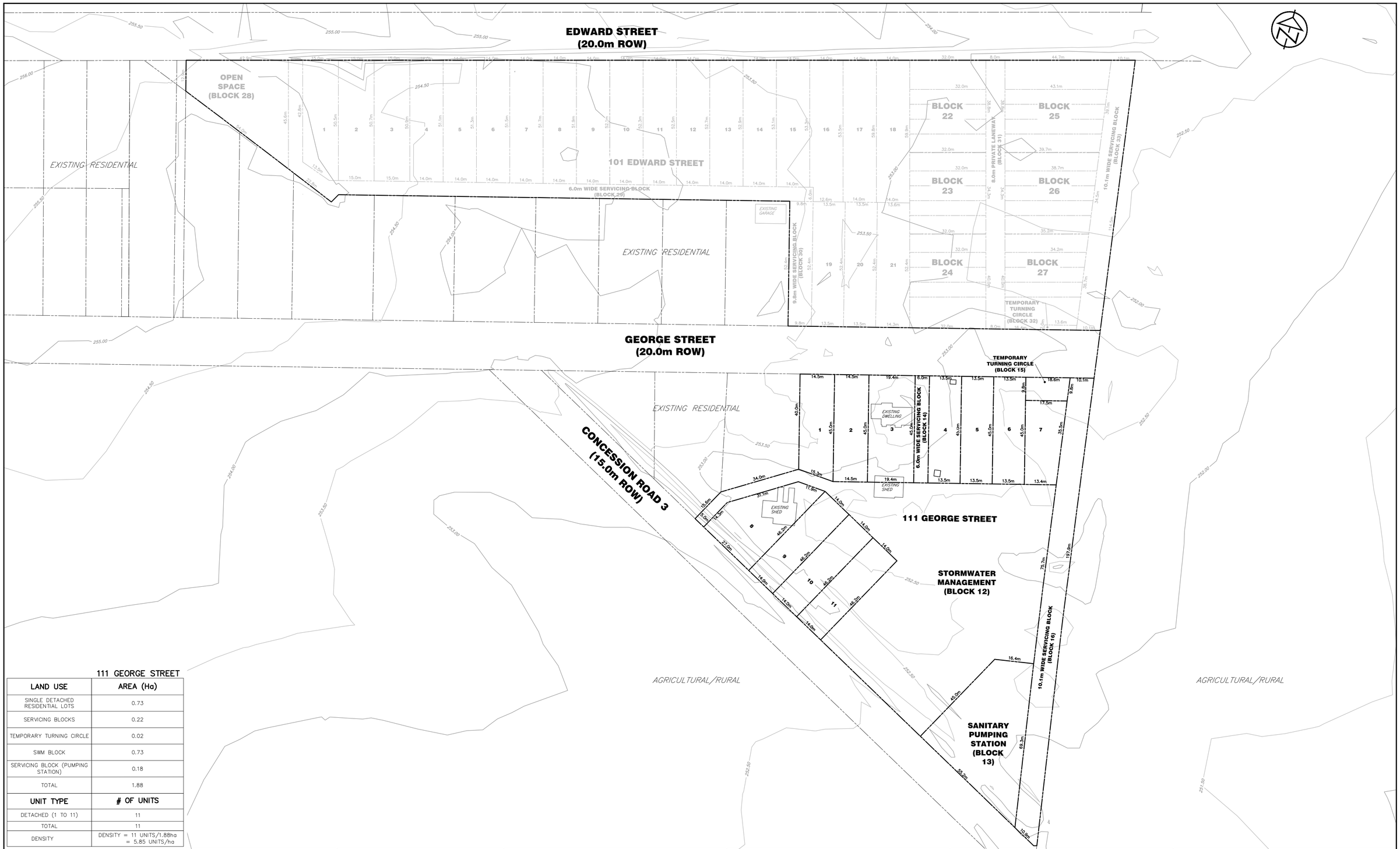
LEGEND

PROPOSED PROPERTY LINES
EXISTING PROPERTY LINES
252.00 EXISTING CONTOURS (0.5m INTERVALS)

LOFT Planning Inc
LAND USE PLANNING | PROJECT MANAGEMENT
T 705.446.1168 | E Kristine@loftplanning.com
TATHAM ENGINEERING

DESIGN: NM	FILE: 418426	DWG: DFT-1
DRAWN: LPB	DATE: MAY 2019	
CHECK: BFS	SCALE: 1:750	

Drawing Name: 418426-DRFT01.dwg, Plotted: May 16, 2019



111 GEORGE STREET

LAND USE	AREA (Ha)
SINGLE DETACHED RESIDENTIAL LOTS	0.73
SERVICING BLOCKS	0.22
TEMPORARY TURNING CIRCLE	0.02
SWM BLOCK	0.73
SERVICING BLOCK (PUMPING STATION)	0.18
TOTAL	1.88
UNIT TYPE	**# OF UNITS**
DETACHED (1 TO 11)	11
TOTAL	11
DENSITY	DENSITY = 11 UNITS/1.88ha = 5.85 UNITS/ha

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

NOTES

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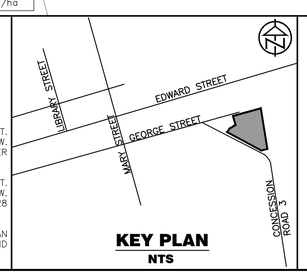
LEGAL SURVEY INFORMATION NORTH OF GEORGE ST. SHOWN ON THIS PLAN PREPARED BY MARTIN W. KNISLEY SEPTEMBER 3, 2005 RECEIVED, APRIL 28 2017

TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN PREPARED BY MARTIN W. KNISLEY AUGUST 2005 AND 2018



KEY PLAN
NTS

0 10 20 30 40
1:750 METERS

DRAFT PLAN OF
PROPOSED SUBDIVISION
PART LOT 43 S/S OF GEORGE STREET, PLAN 138 & 315 NOTTAWASAGA, PART LOT 22 S/S OF GEORGE STREET PLAN 138 & 315 NOTTAWASAGA, EXCEPT PARTS 1 & 2 51R22105
TOWNSHIP OF CLEARVIEW
COUNTY OF SIMCOE
2019

No.	REVISION DESCRIPTION	DATE
1.	FOR SUBMISSION	MAY 14/19

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

MARTIN W. KNISLEY

OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE LOFT PLANNING TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT THE SAME TO THE TOWNSHIP OF CLEARVIEW AND THE COUNTY OF SIMCOE FOR APPROVAL.

NATHAN ASHLEY
AND ARYN ASHLEY

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT R.S.O. 1990 C.P.13 AS AMENDED

a) AS SHOWN
b) AS SHOWN
c) AS SHOWN
d) AS SHOWN
e) AS SHOWN
f) AS SHOWN
g) AS SHOWN
h) MUNICIPAL WATER SUPPLY
i) AS SHOWN
j)) ALL SERVICES AS REQUIRED (WATER, SANITARY, STORM SEWERS, HYRO, TELEPHONE)
k) NONE

LEGEND

PROPOSED PROPERTY LINES
EXISTING PROPERTY LINES
252.00 EXISTING CONTOURS (0.5m INTERVALS)

LOFT Planning Inc
LAND USE PLANNING | PROJECT MANAGEMENT
T 705.446.1168 | E Kristine@loftplanning.com
TATHAM ENGINEERING

DESIGN: NM	FILE: 418426	DWG: DFT-2
DRAWN: LPB	DATE: MAY 2019	
CHECK: BFS	SCALE: 1:750	

Drawing Name: 418426-DRFT02.dwg, Plotted: May 14, 2019

Appendix B:
Water System Calculations

Project:	Edward/George Street Development	Date:	April 29, 2019
File No.:	418426	Designed:	NM
Subject:	Water Demand Calculations	Checked	
Revisions:			

Townhouses

Number of Units =	30	units
Population per Unit =	2.34	ppu
Population =	70	persons
Domestic Water Demand =	450	L/person/day
Average Daily Demand (Residential)=	31,590	L/day
	0.37	L/s

Single Family Residential

Number of Units =	32	units
Population per Unit =	3.13	ppu
Population =	100	persons
Domestic Water Demand =	450	L/person/day
Average Daily Demand (Residential)=	45,072	L/day
	0.52	L/s

Total Average Daily Demand =	76,662	L/day
	0.89	L/s
Maximum Day Factor =	2.75	From MOE Design Guidelines for Drinking Water Systems - Table 3-1
Peak Rate Factor =	4.13	From MOE Design Guidelines for Drinking Water Systems - Table 3-1
Maximum Daily Demand =	210,821	L/day
	2.44	L/s
Peak Hourly Demand =	316,614	L/day
	3.66	L/s

Project:	Edward/George Street Development	Date:	April 29, 2019
File No.:	418426	Designed:	NM
Subject:	Preliminary Fire Flow Calculations	Checked	
Revisions:			

SINGLE FAMILY RESIDENTIAL

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)	
		Framing Material							
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A	
			Ordinary Construction	1					
			Non-combustible construction	0.8					
			Fire resistive construction (< 2 hrs)	0.7					
			Fire resistive construction (> 2 hrs)	0.6					
		Floor Space Area							
2	Type of Housing (if Tow House, enter number of units per TH block)	Type of Housing	Single Family	1		**1**	Units	N/A	
			Townhouse / Apartment- inform # of units	1					
			Other (Comm. Ind., etc.)	1					
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**2**	Storeys	N/A	
3	Floor Area	Largest Floor Area				**185**	m^2	N/A	
		Ground Floor Area = Largest Floor + 25% of 2 immediately adjoining floors	Square Feet (ft2)	0.093	Square metres	278			
			Square Metres (m^2)	1					
			Hectares (ha)	10000					
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (FF= 220 x C x $A^{0.5}$)					L/min	4,000	
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**							
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	N/A	0	(600)
			Limited combustible	-0.15					
			Combustible	0.00					
			Free burning	0.15					
			Rapid burning	0.25					
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	None	0.0	N/A	0	-
			None	0					
5.3	Separation Distance Between Units	Exposure distance between units	North Side	10.1-20	0.15	0.65	m	0	2,210
			East Side	20.1-30	0.2				
			South Side	20.1-30	0.1				
			West Side	3.1-10	0.2				
		Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:						0	6,000
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						0	100
		Required Duration of Fire Flow of 6,000 L/min (hrs):						2	
		Required volume for Fire Flow of 6,000 L/min (m^3):						720	

Project:	Edward/George Street Development	Date:	April 29, 2019
File No.:	418426	Designed:	NM
Subject:	Preliminary Fire Flow Calculations	Checked	
Revisions:			

TOWNHOUSE UNIT

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)	
1	Frame Use for Construction of Unit	**Framing Material**							
		Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A	
			Ordinary Construction	1					
			Non-combustible construction	0.8					
			Fire resistive construction (< 2 hrs)	0.7					
			Fire resistive construction (> 2 hrs)	0.6					
2	Type of Housing (if Tow House, enter number of units per TH block)	**Floor Space Area**							
		Type of Housing	Single Family	1		**1**	Units	N/A	
			Townhouse / Apartment- inform # of units	1					
			Other (Comm. Ind., etc.)	1					
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**2**	Storeys	N/A	
3	Floor Area	Largest Floor Area				**100**	m^2	N/A	
		Ground Floor Area = Largest Floor + 25% of 2 immediately adjoining floors	Square Feet (ft2)	0.093	Square metres	150			
			Square Metres (m^2)	1					
			Hectares (ha)	10000					
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (FF= 220 x C x $A^{0.5}$)					L/min	3,000	
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**							
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	N/A	0	(450)
			Limited combustible	-0.15					
			Combustible	0.00					
			Free burning	0.15					
			Rapid burning	0.25					
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic sprinkler protection	-0.3	None	0.0	N/A	0	-
			None	0					
5.3	Separation Distance Between Units	Exposure distance between units	North Side	10.1-20	0.15	0.75	m	0	1,913
			East Side	20.1-30	0.25				
			South Side	20.1-30	0.15				
			West Side	3.1-10	0.25				
		Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:						0	4,000
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						0	67
		Required Duration of Fire Flow of 4,000 L/min (hrs):						2	
		Required volume for Fire Flow of 4,000 L/min (m^3):						480	

Appendix C:
Sanitary System Calculations

EXT 1

SANMH1

SANMH 2

SAN MH3

SANMH4

EX1
5.0 | 1.03

EDWARD STREET

OPEN SPACE (BLOCK 28)

A1
1.64 | 0.056

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

101 EDWARD STREET

BLOCK 22

BLOCK 25

SANMH13

BLOCK 23

BLOCK 26

SANMH5

A3
0.87 | 0.070

EXT2
2.68 | 0.041

19 20 21

BLOCK 24

BLOCK 27

A2
1.0 | 0.031

SANMH10

SANMH11

SANMH12

SANMH14

SANMH6

GEORGE STREET

CONCESSION ROAD 3

1 2 3 4 5 6 7

111 GEORGE STREET

A4
0.28

8 9 10 11

SANMH7

STORMWATER MANAGEMENT (BLOCK 12)

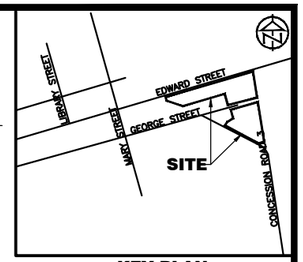
SANMH15

PUMPING STATION (BLOCK 13)

SANMH16

SANITARY FORCEMAIN

KEY PLAN
NTS



LEGEND

A1 — SANITARY CATCHMENT ID

1.64 | 0.056 — POPULATION (1,000s)

AREA (ha)

SANITARY CATCHMENT

SANITARY SEWER

SANITARY MAINTENANCE HOLE

TATHAM ENGINEERING

EDWARD/GEORGE STREET RESIDENTIAL DEVELOPMENT

SANITARY CATCHMENT PLAN

DWG. No. **SAN-1**

SCALE: **1:1,500** | DRAWN: **LPB** | DATE: **MAY/19** | JOB NO. **418426**

Drawing Name: 418426-SAN01.dwg, Plotted: May 17, 2019

SANITARY SEWER DESIGN SHEET

TATHAM ENGINEERING

Development Edward/George Street Development
Municipality - Creemore
Project No. - 418426

Designed By - LPB
Date - May 1, 2019
Revised By -
Date -
Checked - NM

FLOW CRITERIA

LAND USE	AVERAGE FLOW		PEAKING FACTOR	PEAK FLOW	
RESIDENTIAL	450	L/cap/d	HARMON	VARIES	
PPU (MEDIUM DENSITY)	2.34	cap/lot			
PPU (SINGLE FAMILY)	3.13	cap/lot			
INFILTRATION	0.23	L/ha/s	4.00	0.26	L/ha/s

										AVERAGE FLOW			PEAK FLOW			PROPOSED SEWER					
LOCATION OF SECTION	AREA LABEL	FROM UPSTREAM	TO DOWNSTREAM	NUMBER OF UNITS	POPULATION	CUMULATIVE POP.	PEAKING FACTOR	AREA	CUMULATIVE AREA	RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL	LENGTH	DIAMETER	GRADE	FULL FLOW CAP.	FULL FLOW VELOCITY	PEAK FLOW VELOCITY
		MH #	MH #	Ea.	CAP.	CAP.		ha	ha	l/s	l/s	l/s	l/s	l/s	l/s	m	mm	%	l/s	m/s	m/s
Alliance Homes	EXT1			330	1033	1033	4.00	5.00	5.00	5.38	1.15	**6.53**	21.52	1.30	**22.82**	N/A	200	0.50%	**23.19**	0.74	0.74
Prop George Street Lots	A1			18	56	56	4.00	1.64	1.64	0.29	0.38	**0.67**	1.17	0.43	**1.60**	N/A	200	0.50%	**23.19**	0.74	0.41
Ex. Edward Street Lots	EXT2			13	41	41	4.00	2.68	2.68	0.21	0.62	**0.83**	0.85	0.70	**1.54**	N/A	200	0.50%	**23.19**	0.74	0.41
Prop. Townhouse Lots	A3			30	70	70	4.00	0.87	0.87	0.37	0.20	**0.57**	1.46	0.23	**1.69**	N/A	200	0.50%	**23.19**	0.74	0.42
Prop. Edward Street Lots	A2			10	31	31	4.00	1.00	1.00	0.16	0.23	**0.39**	0.65	0.26	**0.91**	N/A	200	0.50%	**23.19**	0.74	0.35
Total to SPS from North						1231	4.00		11.19	6.41	2.57	**8.99**	25.65	2.91	**28.56**	N/A	250	0.50%	**42.05**	0.86	0.86
Prop. CR3 Lots	A4			4	13	13	4.00	0.28	0.28	0.07	0.06	**0.13**	0.26	0.07	**0.33**	N/A	200	1.00%	**32.80**	1.04	0.35

Appendix D: Stormwater Management Calculations

LEGEND

280.0 — EXISTING ELEVATION CONTOURS (0.50 m INTERVALS)

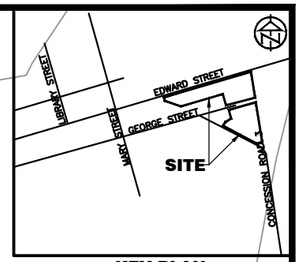
EXISTING CONDITIONS OVERLAND FLOW DIRECTION

PRE-DEVELOPMENT CATCHMENT BOUNDARY

101 — PRE-DEVELOPMENT CATCHMENT ID

5.26 | 59.1 — CN NUMBER / % IMPERVIOUS

PRE-DEVELOPMENT CATCHMENT AREA (Ha)



KEY PLAN
NTS

EDWARD STREET

101 EDWARD STREET

101
5.05 | 40.35

301
1.34 | 25%

111 GEORGE STREET

GEORGE STREET

CONCESSION ROAD 3

TATHAM ENGINEERING

EDWARD/GEORGE STREET RESIDENTIAL DEVELOPMENT

PRE-DEVELOPMENT CATCHMENT PLAN

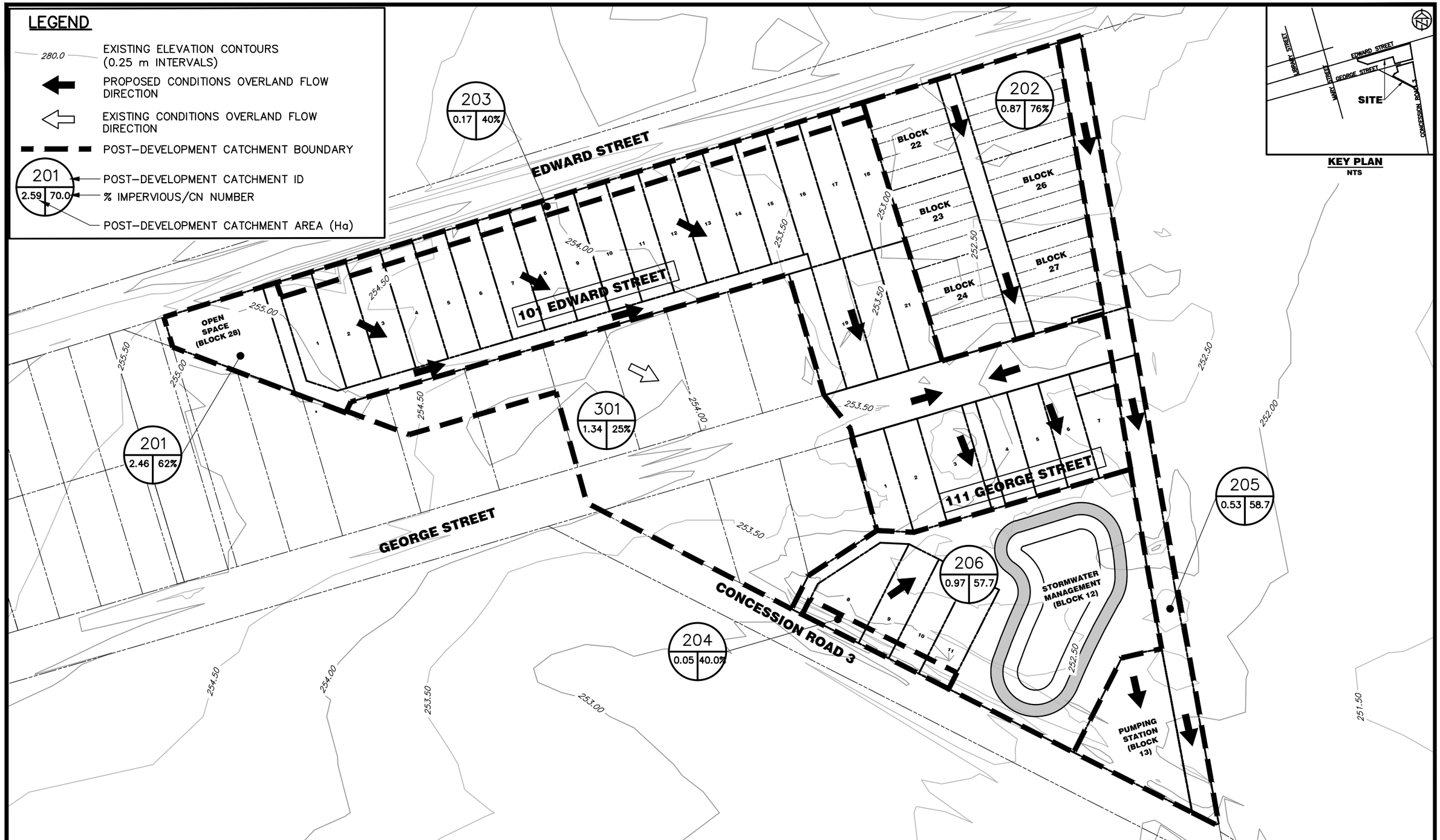
DWG. No. **DP-1**

SCALE: 1:1,500 | DRAWN: LPB | DATE: MAY/19 | JOB NO. 418426

Drawing Name: 418426-DP01.dwg, Plotted: May 15, 2019

LEGEND

- 280.0 — EXISTING ELEVATION CONTOURS (0.25 m INTERVALS)
- PROPOSED CONDITIONS OVERLAND FLOW DIRECTION
- EXISTING CONDITIONS OVERLAND FLOW DIRECTION
- POST–DEVELOPMENT CATCHMENT BOUNDARY
- 201 / 2.59 | 70.0 — POST–DEVELOPMENT CATCHMENT ID / % IMPERVIOUS/CN NUMBER / POST–DEVELOPMENT CATCHMENT AREA (Ha)



KEY PLAN
NTS

TATHAM ENGINEERING

EDWARD/GEORGE STREET RESIDENTIAL DEVELOPMENT

POST-DEVELOPMENT CATCHMENT PLAN

DWG. No. **DP-2**

SCALE: 1:1,500	DRAWN: LPB	DATE: MAY/19	JOB NO. 418426

Drawing Name: 418426–DP02.dwg, Plotted: May 15, 2019

Appendix D1:
Existing Conditions Hydrology

Project:	Edward/George Street Residential Development
File No.:	418426
Date:	2/4/2019
Designed By:	LPB
Checked By:	NM
Subject:	CN Calculator

Edward/George Street Residential Development
CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CONDITIONS

Catchment 101 **Area** 5.050 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
tisl	TIOGA	A	Sand Loam	1	5.05	1	0.253	0.05	32	2.02	0.40	49	2.63	0.52	38	0	0	62	0.152	0.03	100	0	0	50	43.96
				Totals	**5.05**	**1**	**0.2525**	**0.05**		**2.02**	**0.40**		**2.626**	**0.52**		**0**	**0**		**0.15**	**0.03**		**0**	**0**		**44.0**

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	255	m
Minimum Catchment Elevation	251	m
Catchment length	400	m
Catchment Slope	1%	
Catchment Area	5.05	ha
Time of Concentration (Minutes)	**19.39**	
Time of Concentration (Hours)	**0.32**	
Time to Peak (2/3 x Time of Concentration)	**0.22**	

Time to Peak	**0.71 hrs**

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	255	m
Minimum Catchment Elevation	251	m
Catchment length	400	m
Catchment Slope	1%	
Catchment Area	5.05	ha
Time of Concentration (Minutes)	**63.94**	
Time of Concentration (Hours)	**1.07**	
Time to Peak (2/3 x Time of Concentration)	**0.71**	

Time Step (1/5 Tp)	**8.53 mins**

Initial Abstraction	**6.72 mm**

Wetlands	12
Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.12**

Landuse Type	Soil Series				
	tisl	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.119	#N/A	#N/A	#N/A	#N/A

Project:	Edward/George Street Residential Development
File No.:	418426
Date:	2/4/2018
Designed By:	LPB
Checked By:	NM
Subject:	CN Calculator

Edward/George Street Residential Development
CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CONDITIONS

Catchment 301 **Area** 1.34 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
				Type	Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
tisl	TIOGA	A	Sand Loam	1	1.34	1	0	0	32	1.07	0.80	49	0	0.00	38	0	0	62	0.268	0.2	100	0	0	50	59.20
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**1.34**	**1**	**0**	**0**		**1.072**	**0.80**		**0**	**0.00**		**0**	**0**		**0.268**	**0.2**		**0**	**0**		**59.20**

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	255	m
Minimum Catchment Elevation	253.5	m
Catchment length	196	m
Catchment Slope	1%	
Catchment Area	1.34	ha
Time of Concentration (Minutes)	**11.45**	
Time of Concentration (Hours)	**0.19**	
Time to Peak (2/3 x Time of Concentration)	**0.13**	

Time to Peak	**0.46 hrs**

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	255	m
Minimum Catchment Elevation	253.5	m
Catchment length	196	m
Catchment Slope	1%	
Catchment Area	1.34	ha
Time of Concentration (Minutes)	**41.38**	
Time of Concentration (Hours)	**0.69**	
Time to Peak (2/3 x Time of Concentration)	**0.46**	

Time Step (1/5 Tp)	**5.52 mins**

Initial Abstraction	**4.40 mm**

Wetlands	12
Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.27**

Landuse Type	Soil Series				
	tisl	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.27	#N/A	#N/A	#N/A	#N/A

```
       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 05-17-2019                          TIME: 08:17:23

USER:
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Existing Conditions 4 Hour Chicago - 2 Year

```
COMMENTS: _____________________________________________________


  ************************************************
  ** SIMULATION : Run 001 - CHI 2                **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 31.56 mm ]
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.01  2.40   1.77 0.06   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    CHIC STORM                 10.0
    [ Ptot= 31.56 mm ]
*
  *  CALIB STANDHYD       0301  1  2.0    1.34    0.03  1.33   5.77 0.18   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.03  1.33   2.61  n/a   0.000
*
```

```
       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\015d5d56-d468
```

DATE: 05-17-2019 TIME: 08:17:23

USER:

Existing Conditions 4 Hour Chicago - 5 Year

COMMENTS: COMMENTS: _____

```
  ************************************************
  ** SIMULATION : Run 002 - CHI 5                **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 41.72 mm ]
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.02  2.25   3.42 0.08   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    CHIC STORM                 10.0
    [ Ptot= 41.72 mm ]
*
  *  CALIB STANDHYD       0301  1  2.0    1.34    0.04  1.33   8.99 0.22   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.04  1.33   4.59  n/a   0.000
*
================================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 05-17-2019 TIME: 08:17:23

USER:

Existing Conditions 4 Hour Chicago - 10 Year

COMMENTS: _____

  ************************************************
  ** SIMULATION : Run 003 - CHI 10               **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 48.40 mm ]
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.03  2.25   4.76 0.10   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    CHIC STORM                 10.0
    [ Ptot= 48.40 mm ]
```

```
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.05  1.33  11.39 0.24   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.05  1.33   6.15  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 05-17-2019                          TIME: 08:17:23

USER:

                Existing Conditions  4 Hour Chicago - 25 Year
COMMENTS: _____________________________________________________

  ************************************************
  ** SIMULATION : Run 004 - CHI 25               **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.04  2.25   6.75 0.12   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.06  1.33  14.75 0.26   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.06  1.33   8.42  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 05-17-2019                          TIME: 08:17:23

USER:
```

Existing Conditions 4 Hour Chicago - 50 Year

```
COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 005 - CHI 50           **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                10.0
    [ Ptot= 63.27 mm ]
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.05  2.25   8.42 0.13   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    CHIC STORM                10.0
    [ Ptot= 63.27 mm ]
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.07  1.33  17.47 0.28   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.07  1.33  10.32  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 05-17-2019                          TIME: 08:17:23

USER:
```

Existing Conditions 4 Hour Chicago - 100 Year

```
COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 006 - CHI 100          **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                10.0
    [ Ptot= 69.49 mm ]
*
```

```
 ** CALIB NASHYD         0101  1  9.0    5.05    0.06  2.25  10.21 0.15   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    CHIC STORM                 10.0
    [ Ptot= 69.49 mm ]
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.08  1.33  20.29 0.29   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.09  1.33  12.32  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\95e13d91-6c02
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\95e13d91-6c02


DATE: 05-17-2019                          TIME: 08:17:23

USER:

                Existing Conditions 24 Hour SCS - 2 year
COMMENTS: _____________________________________________________

  ************************************************
  ** SIMULATION : Run 007 - SCS 2                **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      -------------------
    READ STORM                 15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.03 12.90   6.07 0.11   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    READ STORM                 15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.03 12.23  13.62 0.25   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.05 12.27   7.65  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
```

```
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\cca78e85-119a
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\cca78e85-119a


DATE: 05-17-2019                          TIME: 08:17:23

USER:

COMMENTS: Existing Conditions 24 Hour SCS - 5 year


  ************************************************
  ** SIMULATION : Run 008 - SCS 5                **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.05 12.90  10.84 0.15   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.06 12.27  21.27 0.30   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.08 12.27  13.03  n/a   0.000
*
==============================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\9be82f24-942c
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\9be82f24-942c


DATE: 05-17-2019                          TIME: 08:17:23

USER:

                    Existing Conditions 24 Hour SCS - 10 year

COMMENTS: _____
```

```
  ***********************************************
  ** SIMULATION : Run 009 - SCS 10               **
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.07 12.90  14.58 0.18   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.08 12.27  26.91 0.32   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.11 12.27  17.16  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\6f158665-b880
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\6f158665-b880


DATE: 05-17-2019                          TIME: 08:17:23

USER:

                Existing Conditions 24 Hour SCS - 25 year
COMMENTS: _____________________________________________________

  ***********************************************
  ** SIMULATION : Run 010 - SCS 25               **
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.10 12.90  19.95 0.20   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
```

```
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.11 12.27  34.70 0.36   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.15 12.27  23.04  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\c5e86159-b10b
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\c5e86159-b10b


DATE: 05-17-2019                          TIME: 08:17:23

USER:

                Existing Conditions 24 Hour SCS - 50 year
COMMENTS: _____________________________________________________

  ************************************************
  ** SIMULATION : Run 011 - SCS 50               **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha    '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.12 12.90  24.39 0.22   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    READ STORM                15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.14 12.27  40.95 0.38   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.19 12.27  27.86  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```

***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
Output filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\5abbbaaa-0095
Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\5abbbaaa-0095

DATE: 05-17-2019 TIME: 08:17:23

USER:

Existing Conditions 24 Hour SCS - 100 year

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : Run 012 - SCS 100              **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.14 12.90  29.04 0.24   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
  *  CALIB STANDHYD       0301  1  2.0    1.34    0.16 12.27  47.34 0.40   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.22 12.27  32.88  n/a   0.000
*
==============================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                    *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\1d553d65-5582
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\1d553d65-5582


DATE: 05-17-2019                          TIME: 08:17:23

USER:
```

Existing Conditions 25 mm 4hour Chicago

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : Run 013 - 25mm4hr              **
```

```
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\55f1fb85-6433-4d3b-84c0-14a
    remark: 25mm4hr
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.01 12.60   2.83 0.07   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    READ STORM                10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\55f1fb85-6433-4d3b-84c0-14a
    remark: 25mm4hr
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.02 12.00   7.88 0.21   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.03 12.00   3.89  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\45a0071e-62aa
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\45a0071e-62aa


DATE: 05-17-2019                          TIME: 08:17:23

USER:

                          Existing Conditions Regional (Timmins)
COMMENTS: ____________________________________________________


  ***********************************************
  ** SIMULATION : Run 14                       **
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\af27d729-a146-45e4-ada6-eb6
    remark: TIMMINS
*
 ** CALIB NASHYD         0101  1  9.0    5.05    0.18  7.35  68.10 0.35   0.000
    [CN=44.0         ]
    [ N = 3.0:Tp 0.71]
*
    READ STORM                15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a6e4bdcf-06af-4d67-b1ff-48b3d89de8f0\af27d729-a146-45e4-ada6-eb6
    remark: TIMMINS
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.09  7.00  97.63 0.51   0.000
```

```
    [I%=10.0:S%= 2.00]
*
    ADD [  0101+  0301]  1000  3  2.0    6.39    0.25  7.20  74.29  n/a   0.000
*
 FINISH

================================================================================================================
```

Appendix D2:
Proposed Conditions Hydrology

Project:	Edward/George Street Residential Development
File No.:	418426
Date:	04-02-2019
Designed By:	LPB
Checked By:	NM
Subject:	Post-Development Land Use

POST DEVELOPMENT LAND-USE BREAKDOWN

Catchment 201

	Total Area (ha)	Total Impervious (TIMP) %	Total Impervious Area (ha)	Directly Connected Impervious (XIMP) %	Total Directly Connected Impervious Area (ha)	Pervious area (ha)	Pervious CN	Pervious IA
Lots	1.85	70%	1.30	10%	0.19	0.56	49	5
Open Space	0.12	5%	0.01	5%	0.01	0.11	49	5
George Street ROW	0.25	80%	0.20	80%	0.20	0.05	49	5
Servicing Block	0.24	5%	0.01	5%	0.01	0.23	49	5
TOTAL	**2.46**	**62%**	**1.51**	**16%**	**0.40**	**0.95**	**28.72**	**5.00**

Catchment 202

	Total Area (ha)	Total Impervious (TIMP) %	Total Impervious Area (ha)	Directly Connected Impervious (XIMP) %	Total Directly Connected Impervious Area (ha)	Pervious area (ha)	Pervious CN	Pervious IA
West Blocks	0.36	80%	0.29	20%	0.07	0.07	49	5
East Blocks	0.42	70%	0.29	20%	0.08	0.13	49	5
Laneway	0.09	90%	0.08	90%	0.08	0.01	49	5
TOTAL	**0.87**	**76%**	**0.66**	**27%**	**0.24**	**0.21**	**49.00**	**5.00**

Catchment 203

	Total Area (ha)	Total Impervious (TIMP) %	Total Impervious Area (ha)	Directly Connected Impervious (XIMP) %	Total Directly Connected Impervious Area (ha)	Pervious area (ha)	Pervious CN	Pervious IA
Lots (Frontages only)	0.17	40%	0.07	50%	0.09	0.10	49	5
TOTAL	**0.17**	**40%**	**0.07**	**50%**	**0.09**	**0.10**	**49.00**	**5.00**

Catchment 204

	Total Area (ha)	Total Impervious (TIMP) %	Total Impervious Area (ha)	Directly Connected Impervious (XIMP) %	Total Directly Connected Impervious Area (ha)	Pervious area (ha)	Pervious CN	Pervious IA
Lots (Frontages only)	0.05	40%	0.02	40%	0.02	0.03	49	5
TOTAL	**0.05**	**40%**	**0.02**	**40%**	**0.02**	**0.03**	**49.00**	**5.00**

Catchment 205 (NASHYD)

	Total Area (ha)	Total Impervious (TIMP) %	Total Impervious Area (ha)	Directly Connected Impervious (XIMP) %	Total Directly Connected Impervious Area (ha)	Pervious area (ha)	Pervious CN	Pervious IA
10.1 m servicing Block	0.35	5%	0.02	5%	0.02	0.33	49	5
SPS	0.18	45%	0.08	25%	0.05	0.10	49	5
TOTAL	**0.53**	**19%**	**0.10**	**12%**	**0.06**	**0.43**	**49.00**	**5.00**

Catchment 206

	Total Area (ha)	Total Impervious (TIMP) %	Total Impervious Area (ha)	Directly Connected Impervious (XIMP) %	Total Directly Connected Impervious Area (ha)	Pervious area (ha)	Pervious CN	Pervious IA
SWM Block	0.73	10%	0.07	20%	0.15	0.66	49	5
Lots	0.24	70%	0.17	0%	0.00	0.07	49	5
TOTAL	**0.97**	**25%**	**0.24**	**15%**	**0.15**	**0.73**	**49.00**	**5.00**

TATHAM ENGINEERING

Project:	Edward/George Street Residential Development
File No.:	418426
Date:	2/4/2019
Designed By:	LPB
Checked By:	NM
Subject:	CN Calculator

Edward/George Street Residential Development
CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CONDITIONS

Catchment 205 **Area** 0.530 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
tisl	TIOGA	A	Sand Loam	1	0.53	1	0	0	32	0.43	0.81	49	0.00	0	38	0	0	62	0.10	0.19	100	0	0	50	58.69
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**0.53**	**1**	**0**	**0**		**0.43**	**0.81**		**0**	**0**		**0**	**0**		**0.1007**	**0.19**		**0**	**0**		**58.7**

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	252	m
Minimum Catchment Elevation	251	m
Catchment length	330	m
Catchment Slope	0.3%	
Catchment Area	0.53	ha
Time of Concentration (Minutes)	**25.45**	
Time of Concentration (Hours)	**0.424**	
Time to Peak (2/3 x Time of Concentration)	**0.283**	

Time to Peak	**0.82 hrs**

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	252	m
Minimum Catchment Elevation	251	m
Catchment length	330	m
Catchment Slope	0%	
Catchment Area	0.53	ha
Time of Concentration (Minutes)	**73.64**	
Time of Concentration (Hours)	**1.23**	
Time to Peak (2/3 x Time of Concentration)	**0.82**	

Time Step (1/5 Tp)	**9.82 mins**

Initial Abstraction	**4.43 mm**

Wetlands	12
Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.26**

Landuse Type	Soil Series				
	tisl	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.262	#N/A	#N/A	#N/A	#N/A

TATHAM ENGINEERING

Project:	Edward/George Street Residential Development
File No.:	418426
Date:	2/4/2019
Designed By:	LPB
Checked By:	NM
Subject:	CN Calculator

Edward/George Street Residential Development
CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CONDITIONS

Catchment 206 **Area** 0.830 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
tisl	TIOGA	A	Sand Loam	1	0.83	1	0	0	32	0.69	0.83	49	0.00	0	38	0	0	62	0.14	0.17	100	0	0	50	57.67
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**0.83**	**1**	**0**	**0**		**0.69**	**0.83**		**0**	**0**		**0**	**0**		**0.1411**	**0.17**		**0**	**0**		**57.7**

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	252.45	m
Minimum Catchment Elevation	251.5	m
Catchment length	90	m
Catchment Slope	1.1%	
Catchment Area	0.83	ha
Time of Concentration (Minutes)	**5.17**	
Time of Concentration (Hours)	**0.086**	
Time to Peak (2/3 x Time of Concentration)	**0.057**	

Time to Peak	**0.29 hrs**

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	252.45	m
Minimum Catchment Elevation	251.5	m
Catchment length	90	m
Catchment Slope	1%	
Catchment Area	0.83	ha
Time of Concentration (Minutes)	**25.99**	
Time of Concentration (Hours)	**0.43**	
Time to Peak (2/3 x Time of Concentration)	**0.29**	

Time Step (1/5 Tp)	**3.47 mins**

Initial Abstraction	**4.49 mm**

Wetlands	12
Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.24**

Landuse Type	Soil Series				
	tisl	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.245	#N/A	#N/A	#N/A	#N/A

```
================================================================================================================

       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```


***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
Output filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\383de050-f9be
Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\383de050-f9be

DATE: 05-17-2019 TIME: 08:16:24

USER:

Proposed Conditions 4 Hour Chicago - 2 Year

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : Run 001 - CHI 2                **
  ************************************************
```

W/E	COMMAND	HYD ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
	START @ 0.00 hrs								
	CHIC STORM		10.0						
	[Ptot= 31.56 mm]								
*									
**	CALIB NASHYD	0205	1 10.0	0.53	0.00	2.50	3.58	0.11	0.000
	[CN=58.7]								
	[N = 3.0:Tp 0.82]								
*									
	CHIC STORM		10.0						
	[Ptot= 31.56 mm]								
*									
*	CALIB STANDHYD	0203	1 2.0	0.17	0.01	1.33	13.66	0.43	0.000
	[I%=40.0:S%= 2.00]								
*									
	CHIC STORM		10.0						
	[Ptot= 31.56 mm]								
*									
*	CALIB STANDHYD	0204	1 2.0	0.05	0.00	1.33	13.43	0.43	0.000
	[I%=40.0:S%= 2.00]								
*									
	ADD [0203+ 0204]	0027	3 2.0	0.22	0.02	1.33	13.61	n/a	0.000
*									
	ADD [0027+ 0205]	0027	1 2.0	0.75	0.02	1.33	6.52	n/a	0.000
*									
	CHIC STORM		10.0						
	[Ptot= 31.56 mm]								
*									
*	CALIB STANDHYD	0201	1 2.0	2.46	0.08	1.33	9.73	0.31	0.000
	[I%=16.0:S%= 2.00]								
*									
	CHIC STORM		10.0						
	[Ptot= 31.56 mm]								
*									
*	CALIB STANDHYD	0202	1 2.0	0.87	0.05	1.33	13.84	0.44	0.000
	[I%=27.0:S%= 2.00]								
*									
	ADD [0201+ 0202]	0029	3 2.0	3.33	0.14	1.33	10.80	n/a	0.000
*									
	CHIC STORM		10.0						
	[Ptot= 31.56 mm]								
*									
*	CALIB STANDHYD	0301	1 2.0	1.34	0.03	1.33	5.77	0.18	0.000

```
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.16  1.33   9.36  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 31.56 mm ]
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.03  1.33   6.97 0.22   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.19  1.33   8.95  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.02  3.07   8.89  n/a   0.000
      {ST=  0.03 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.03  1.33   8.61  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\7e46adeb-2954
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\7e46adeb-2954


DATE: 05-17-2019                          TIME: 08:16:24

USER:

                Proposed Conditions 4 Hour Chicago - 5 Year
COMMENTS: _____________________________________________________

  ************************************************
  ** SIMULATION : Run 002 - CHI 5                **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                10.0
    [ Ptot= 41.72 mm ]
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.00  2.33   6.44 0.15   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    CHIC STORM                10.0
    [ Ptot= 41.72 mm ]
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.02  1.33  18.97 0.45   0.000
    [I%=40.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 41.72 mm ]
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01  1.33  18.70 0.45   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.03  1.33  18.91  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.03  1.33  10.10  n/a   0.000
*
    CHIC STORM                10.0
```

```
    [ Ptot= 41.72 mm ]
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.12  1.33  14.74 0.35   0.000
    [I%=16.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 41.72 mm ]
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.08  1.33  20.22 0.48   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.20  1.33  16.17  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 41.72 mm ]
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.04  1.33   8.99 0.22   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.24  1.33  14.11  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 41.72 mm ]
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.04  1.33  10.47 0.25   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.28  1.33  13.48  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.03  3.00  13.42  n/a   0.000
      {ST=  0.04 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.04  2.67  13.03  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\1a2aedef-7d24
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\1a2aedef-7d24


DATE: 05-17-2019                          TIME: 08:16:24

USER:

COMMENTS: Proposed Conditions 4 Hour Chicago - 10 Year
          _____________________________________________


  ************************************************
  ** SIMULATION : Run 003 - CHI 10               **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 48.40 mm ]
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.00  2.33   8.69 0.18   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
```

```
    CHIC STORM                10.0
    [ Ptot= 48.40 mm ]
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.02  1.33  22.62 0.47   0.000
    [I%=40.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 48.40 mm ]
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01  1.33  22.53 0.47   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.03  1.33  22.60  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.03  1.33  12.77  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 48.40 mm ]
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.16  1.33  18.37 0.38   0.000
    [I%=16.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 48.40 mm ]
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.10  1.33  24.73 0.51   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.25  1.33  20.03  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 48.40 mm ]
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.05  1.33  11.39 0.24   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.30  1.33  17.55  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 48.40 mm ]
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.05  1.33  13.03 0.27   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.35  1.33  16.77  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.04  2.93  16.72  n/a   0.000
      {ST=  0.06 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.05  2.67  16.25  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\9bab54e9-c6a8
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\9bab54e9-c6a8


DATE: 05-17-2019                          TIME: 08:16:24

USER:

COMMENTS: Proposed Conditions 4 Hour Chicago - 25 Year
```

```
  ***********************************************
  ** SIMULATION : Run 004 - CHI 25              **
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.01  2.33  11.92 0.21   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.03  1.33  27.45 0.48   0.000
    [I%=40.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01  1.33  27.36 0.48   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.04  1.33  27.43  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.04  1.33  16.47  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.20  1.33  23.33 0.41   0.000
    [I%=16.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.13  1.33  30.76 0.54   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.32  1.33  25.27  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.06  1.33  14.75 0.26   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.38  1.33  22.25  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 56.90 mm ]
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.06  1.33  16.57 0.29   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.44  1.33  21.28  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.05  2.87  21.22  n/a   0.000
      {ST=  0.07 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.06  2.67  20.66  n/a   0.000
*
==============================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```

```
                *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\2b5bb32d-82d1
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\2b5bb32d-82d1

DATE: 05-17-2019                          TIME: 08:16:24

USER:

COMMENTS: Proposed Conditions 4 Hour Chicago - 50 Year

  ************************************************
  ** SIMULATION : Run 005 - CHI 50               **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                    min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      -------------------
    CHIC STORM                 10.0
    [ Ptot= 63.27 mm ]
*
 ** CALIB NASHYD        0205  1 10.0    0.53    0.01  2.33  14.58 0.23   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    CHIC STORM                 10.0
    [ Ptot= 63.27 mm ]
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.03  1.33  31.21 0.49   0.000
    [I%=40.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 63.27 mm ]
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01  1.33  31.12 0.49   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.04  1.33  31.19  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.04  1.33  19.45  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 63.27 mm ]
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.25  1.37  27.27 0.43   0.000
    [I%=16.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 63.27 mm ]
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.15  1.33  35.47 0.56   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.39  1.33  29.41  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 63.27 mm ]
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.07  1.33  17.47 0.28   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.46  1.33  25.99  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 63.27 mm ]
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.07  1.33  19.41 0.31   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.53  1.33  24.86  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.06  2.83  24.80  n/a   0.000
      {ST=  0.08 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.08  2.50  24.17  n/a   0.000
```

```
*
==========================================================================================================

       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\a9d14784-1ccc
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\a9d14784-1ccc


DATE: 05-17-2019                          TIME: 08:16:24

USER:
                    Proposed Conditions 4 Hour Chicago - 100 Year
COMMENTS: _____________________________________________________


  ************************************************
  ** SIMULATION : Run 006 - CHI 100              **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha    '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 69.49 mm ]
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.01  2.33  17.37 0.25   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    CHIC STORM                 10.0
    [ Ptot= 69.49 mm ]
*
  *  CALIB STANDHYD       0203  1  2.0    0.17    0.04  1.33  34.98 0.50   0.000
    [I%=40.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 69.49 mm ]
*
  *  CALIB STANDHYD       0204  1  2.0    0.05    0.01  1.33  34.89 0.50   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.05  1.33  34.96  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.05  1.33  22.53  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 69.49 mm ]
*
  *  CALIB STANDHYD       0201  1  2.0    2.46    0.29  1.37  31.28 0.45   0.000
    [I%=16.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 69.49 mm ]
*
  *  CALIB STANDHYD       0202  1  2.0    0.87    0.17  1.33  40.20 0.58   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.45  1.33  33.61  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 69.49 mm ]
*
```

```
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.08  1.33  20.29 0.29   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.53  1.33  29.79  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 69.49 mm ]
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.08  1.33  22.33 0.32   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.61  1.33  28.50  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.08  2.77  28.45  n/a   0.000
      {ST=  0.10 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.09  2.50  27.75  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\fbc9ace4-4311
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\fbc9ace4-4311


DATE: 05-17-2019                          TIME: 08:16:25

USER:
```

Proposed Conditions 24 Hour SCS - 2 Year

```
COMMENTS: _____________________________________________________


  ************************************************
  ** SIMULATION : Run 007 - 2yr 24hr 15min SCS  **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      -------------------
    READ STORM                15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.01 13.00  10.83 0.20   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.02 12.23  25.86 0.48   0.000
    [I%=40.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.00 12.23  22.10 0.41   0.000
```

```
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.02 12.23  25.01  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.02 12.23  14.99  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.13 12.27  21.68 0.40   0.000
    [I%=16.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.07 12.23  28.77 0.53   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.20 12.27  23.53  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.03 12.23  13.62 0.25   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.23 12.27  20.69  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 54.14 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\7097a990-8b5c-4ee6-98a4-628
    remark: 2yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.03 12.23  15.39 0.28   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.26 12.27  19.78  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.04 13.20  19.72  n/a   0.000
      {ST=  0.05 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.05 13.13  19.16  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\c0eac272-0d95
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\c0eac272-0d95


DATE: 05-17-2019                          TIME: 08:16:25

USER:

COMMENTS: Proposed Conditions 24 Hour SCS - 5 Year
          ____________________________________________________________

  ************************************************
```

```
  ** SIMULATION : Run 008 - 5yr 24hr 15min SCS  **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.01 13.00  18.35 0.26   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.02 12.23  36.26 0.51   0.000
    [I%=40.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01 12.23  34.06 0.48   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.03 12.23  35.76  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.03 12.23  23.46  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.21 12.27  32.66 0.46   0.000
    [I%=16.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.11 12.23  41.81 0.58   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.32 12.27  35.05  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.06 12.27  21.27 0.30   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.37 12.27  31.09  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 71.58 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d8c3cd8d-8c3c-4b04-90b6-35b
    remark: 5yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.05 12.23  23.34 0.33   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.43 12.27  29.76  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.06 13.07  29.70  n/a   0.000
      {ST=  0.08 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.07 13.03  28.97  n/a   0.000
*
==============================================================================================================


       V    V   I    SSSSS  U   U    A    L
```

```
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\2d68de43-958f
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\2d68de43-958f


DATE: 05-17-2019                          TIME: 08:16:24

USER:

                Proposed Conditions 24 Hour SCS - 10 Year
COMMENTS: _____________________________________________________

  ********************************************
  ** SIMULATION : Run 009 - 10yr 24hr 15min SCS **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.01 13.00  24.02 0.29   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.03 12.23  43.47 0.52   0.000
    [I%=40.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01 12.23  40.93 0.49   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.03 12.23  42.89  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.04 12.23  29.56  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.28 12.27  40.47 0.49   0.000
    [I%=16.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.13 12.23  50.87 0.61   0.000
    [I%=27.0:S%= 2.00]
*
```

```
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.41 12.27  43.19  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.08 12.27  26.91 0.32   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.49 12.27  38.52  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 83.03 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\fd55ca06-ab60-4817-ba88-6b9
    remark: 10yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.07 12.27  29.14 0.35   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.56 12.27  36.90  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.08 13.03  36.84  n/a   0.000
      {ST=  0.10 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.09 13.00  35.99  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\3b1c3e5f-1da1
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\3b1c3e5f-1da1


DATE: 05-17-2019                          TIME: 08:16:24

USER:

                Proposed Conditions 24 Hour SCS - 25 Year
COMMENTS: _____________________________________________________


  ************************************************
  ** SIMULATION : Run 010 - 25yr 24hr 15min SCS **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.02 13.00  31.94 0.33   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
```

```
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.03 12.23  53.05 0.54   0.000
    [I%=40.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01 12.23  52.97 0.54   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.04 12.23  53.03  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.05 12.23  38.13  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.36 12.27  50.98 0.52   0.000
    [I%=16.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.16 12.23  62.84 0.64   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.52 12.27  54.08  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.11 12.27  34.70 0.36   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.64 12.27  48.52  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 97.61 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5cfd83de-7857-487f-af6e-dae
    remark: 25yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.09 12.27  37.10 0.38   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.72 12.27  46.56  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.09 13.03  46.50  n/a   0.000
      {ST=  0.12 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.11 13.00  45.52  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\cb12719b-d531
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\cb12719b-d531
```

DATE: 05-17-2019 TIME: 08:16:25

USER:

COMMENTS: Proposed Conditions 24 Hour SCS - 50 Year

```
  ********************************************
  ** SIMULATION : Run 011 - 50yr 24hr 15min SCS **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.02 13.00  38.34 0.35   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                  15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.04 12.23  60.49 0.56   0.000
    [I%=40.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01 12.23  60.42 0.56   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.05 12.23  60.47  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.05 12.23  44.83  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.43 12.27  59.21 0.55   0.000
    [I%=16.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.20 12.23  72.07 0.66   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.62 12.27  62.57  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.14 12.27  40.95 0.38   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.76 12.27  56.36  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=108.54 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\0040ffcf-645a-4f92-8d5f-c0a
    remark: 50yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.11 12.27  43.44 0.40   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.86 12.27  54.14  n/a   0.000
*
```

```
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.10 13.03  54.08  n/a   0.000
      {ST=  0.15 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.12 13.00  53.00  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\771441d6-5874
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\771441d6-5874


DATE: 05-17-2019                          TIME: 08:16:24

USER:

                Proposed Conditions 24 Hour SCS - 100 Year
COMMENTS: _____________________________________________________

  ************************************************
  ** SIMULATION : Run 012 - 100yr 24hr 15min SC **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      -------------------
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.02 13.00  44.90 0.38   0.000
    [CN=58.7        ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.04 12.23  67.95 0.57   0.000
    [I%=40.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.01 12.23  67.88 0.57   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.05 12.23  67.93  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.06 12.23  51.65  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.49 12.27  67.48 0.57   0.000
    [I%=16.0:S%= 2.00]
```

```
*
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.22 12.23  81.25 0.68   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.71 12.27  71.08  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.16 12.27  47.34 0.40   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.87 12.27  64.27  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=119.21 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\d21082fb-bf48-498c-820a-3aa
    remark: 100yr 24hr 15min SCS Type II - Creemore
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.13 12.27  49.91 0.42   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    1.00 12.27  61.80  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.11 13.03  61.74  n/a   0.000
      {ST=  0.17 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.14 13.00  60.55  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\f49cc1ac-86a4
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\f49cc1ac-86a4


DATE: 05-17-2019                          TIME: 08:16:25

USER:

                        Proposed Conditions 25mm 4 Hour Chicago
COMMENTS: _____________________________________________________


  ************************************************
  ** SIMULATION : Run 013 - 25 mm                **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha    '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\a88b1fd8-9dd0-4d38-b14c-4b3
    remark: 25mm4hr
*
```

```
 ** CALIB NASHYD         0205  1 10.0    0.53    0.00 12.83   5.44 0.14   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                 10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\a88b1fd8-9dd0-4d38-b14c-4b3
    remark: 25mm4hr
*
 *  CALIB STANDHYD       0203  1  2.0    0.17    0.01 12.00  17.21 0.45   0.000
    [I%=40.0:S%= 2.00]
*
    READ STORM                 10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\a88b1fd8-9dd0-4d38-b14c-4b3
    remark: 25mm4hr
*
 *  CALIB STANDHYD       0204  1  2.0    0.05    0.00 12.00  13.88 0.36   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.01 12.00  16.45  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.02 12.00   8.67  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\a88b1fd8-9dd0-4d38-b14c-4b3
    remark: 25mm4hr
*
 *  CALIB STANDHYD       0201  1  2.0    2.46    0.08 12.00  13.04 0.34   0.000
    [I%=16.0:S%= 2.00]
*
    READ STORM                 10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\a88b1fd8-9dd0-4d38-b14c-4b3
    remark: 25mm4hr
*
 *  CALIB STANDHYD       0202  1  2.0    0.87    0.05 12.00  18.08 0.47   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.12 12.00  14.36  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\a88b1fd8-9dd0-4d38-b14c-4b3
    remark: 25mm4hr
*
 *  CALIB STANDHYD       0301  1  2.0    1.34    0.02 12.00   7.88 0.21   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.14 12.00  12.50  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 38.43 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\a88b1fd8-9dd0-4d38-b14c-4b3
    remark: 25mm4hr
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.02 12.00   9.28 0.24   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.17 12.00  11.94  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.02 13.10  11.88  n/a   0.000
      {ST=  0.03 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.03 12.00  11.51  n/a   0.000
*
================================================================================================================


       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```

```
                 *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\8f152a70-6774
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\640b6334-0059-4c67-ad63-e78384971b93\8f152a70-6774

DATE: 05-17-2019                          TIME: 08:16:25

USER:

COMMENTS: _____Proposed Conditions Regional (Timmins) Controlled

  ********************************************
  ** SIMULATION : Run 014 - Timmins          **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5422b883-1912-462b-8161-58a
    remark: TIMMINS
*
 ** CALIB NASHYD         0205  1 10.0    0.53    0.03  7.50  96.82 0.50   0.000
    [CN=58.7         ]
    [ N = 3.0:Tp 0.82]
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5422b883-1912-462b-8161-58a
    remark: TIMMINS
*
  *  CALIB STANDHYD       0203  1  2.0    0.17    0.01  7.00 123.66 0.64   0.000
    [I%=40.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5422b883-1912-462b-8161-58a
    remark: TIMMINS
*
  *  CALIB STANDHYD       0204  1  2.0    0.05    0.00  7.00 123.52 0.64   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0203+  0204]  0027  3  2.0    0.22    0.02  7.00 123.63  n/a   0.000
*
    ADD [  0027+  0205]  0027  1  2.0    0.75    0.04  7.00 104.69  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5422b883-1912-462b-8161-58a
    remark: TIMMINS
*
  *  CALIB STANDHYD       0201  1  2.0    2.46    0.22  7.00 129.19 0.67   0.000
    [I%=16.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5422b883-1912-462b-8161-58a
    remark: TIMMINS
*
  *  CALIB STANDHYD       0202  1  2.0    0.87    0.09  7.00 147.89 0.77   0.000
    [I%=27.0:S%= 2.00]
*
    ADD [  0201+  0202]  0029  3  2.0    3.33    0.31  7.00 134.08  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5422b883-1912-462b-8161-58a
    remark: TIMMINS
*
  *  CALIB STANDHYD       0301  1  2.0    1.34    0.09  7.00  97.63 0.51   0.000
    [I%=10.0:S%= 2.00]
*
    ADD [  0029+  0301]  0030  3  2.0    4.67    0.40  7.00 123.62  n/a   0.000
*
    READ STORM                 15.0
```

```
    [ Ptot=193.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\a98550eb-06f9-4007-8cae-d8533aac4eaf\5422b883-1912-462b-8161-58a
    remark: TIMMINS
*
 *  CALIB STANDHYD       0206  1  2.0    0.97    0.07  7.00 100.45 0.52   0.000
    [I%=15.0:S%= 2.00]
*
    ADD [  0206+  0030]  0031  3  2.0    5.64    0.46  7.00 119.63  n/a   0.000
*
    RESRVR [ 2:  0031]   0018  1  2.0    5.64    0.17  9.60 119.58  n/a   0.000
      {ST=  0.29 ha.m }
*
    ADD [  0018+  0027]  1000  3  2.0    6.39    0.20  9.00 117.83  n/a   0.000
*
 FINISH

================================================================================================================
```

Appendix D3:
Water Quality Calculations

TATHAM ENGINEERING	**Project:**	Edward/Creemore Street	**Date:**	5/6/2019	
	File No.:	418426	**Designed By:**	NM	
	Subject:	TSS Calculations	**Checked By:**		

Catchment Area		Area (ha)	Treatment Type CB Shield 50%	OGS Unit 78%	Dry Pond 60%	Total Removal %
Control?	**Area**					
Controlled Area	201	2.46	50%	78%	60%	95.6
Controlled Area	202	0.87	50%	78%	60%	95.6
Controlled Area	206	0.97	0%	0%	60%	60
Uncontrolled Area	203	0.17	0%	0%	0%	0
Uncontrolled Area	204	0.05	0%	0%	0%	0
Uncontrolled Area	205 (SPS only)	0.18	0%	0%	0%	0
Sub-Total		**4.70**				**80.1**

notes

1. Total Area contributing to the OGS unit (Catchment 201 and 202) is 3.33 ha, with % IMP of 65.7%
2. The 10.1 m wide servicing block is assumed to not require water quality controls as is will be grassed

Brief Stormceptor Sizing Report - Edward/George Street Development

Project Information & Location			
Project Name	Edward/George Street Development	**Project Number**	418426
City	Creemore	**State/ Province**	Ontario
Country	Canada	**Date**	5/6/2019
Designer Information		**EOR Information (optional)**	
Name	Nick Millington	**Name**	
Company	Tatham Engineering Limited	**Company**	
Phone #	705-733-9037	**Phone #**	
Email	nmillington@cctatham.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	
Target TSS Removal (%)	77
TSS Removal (%) Provided	78
Recommended Stormceptor Model	STC 6000

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 300	47
STC 750	61
STC 1000	62
STC 1500	63
STC 2000	68
STC 3000	70
STC 4000	75
STC 5000	76
STC 6000	78
STC 9000	83
STC 10000	83
STC 14000	86
StormceptorMAX	Custom

Sizing Details

Drainage Area	
Total Area (ha)	3.33
Imperviousness %	65.7

Rainfall	
Station Name	OWEN SOUND MOE
State/Province	Ontario
Station ID #	6132
Years of Records	40
Latitude	44°35'N
Longitude	80°56'W

Water Quality Objective	
TSS Removal (%)	77.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

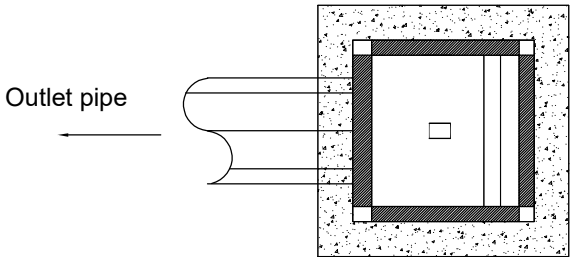
Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

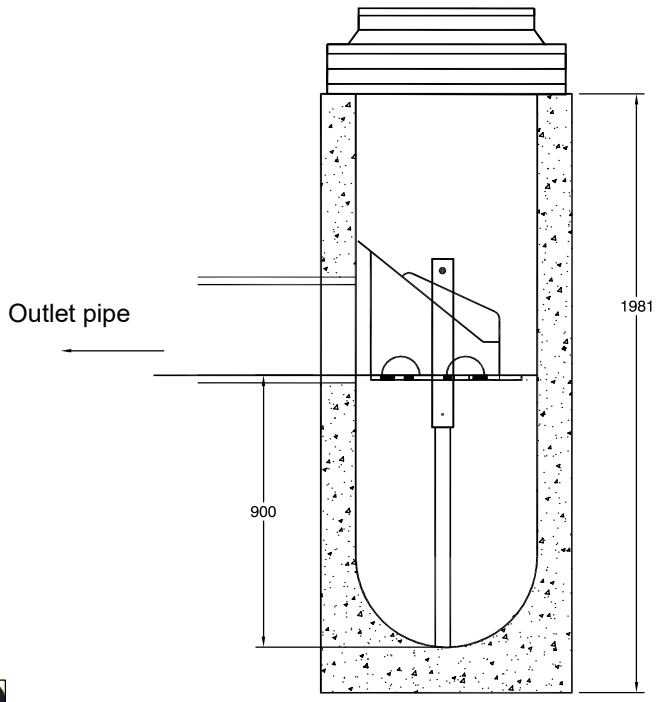
For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

Notes

1. CB Shield can be installed at any time. In a non frozen condition.
2. The **frame and cover MUST BE well aligned** with the catchbasin for proper installation.
3. The catchbasin sump must be clean before installation
4. The grate should be at the same level as the standing water in the sump.



Top view



Profile view

CB Shield (900mm Sump)

Appendix D4:
SWM Pond Calculations

GEORGE/EDWARD STREET RESIDENTIAL DEVELOPMENT
TOWNSHIP OF CLEARVIEW
Volume Table

Active Pool

Side Slope	4 :1
Bottom Elev.	251.00
Top Elev.	252.50
Water Level	N/A (Dry Pond)

Elev.	Depth	Areas		Volumes			
		Area	Avg. Area	Dead	Accum. Dead	Live	Accum. Live
(m)	(m)	(m^2)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)
251.00	0.00	**1300.00**	0.00			0.0	0.0
251.05	0.05	1336.67	1318.33			65.9	65.9
251.10	0.10	1373.33	1355.00			67.8	133.7
251.15	0.15	1410.00	1391.67			69.6	203.3
251.20	0.20	1446.67	1428.33			71.4	274.7
251.25	0.25	1483.33	1465.00			73.3	347.9
251.30	0.30	1520.00	1501.67			75.1	423.0
251.35	0.35	1556.67	1538.33			76.9	499.9
251.40	0.40	1593.33	1575.00			78.8	578.7
251.45	0.45	1630.00	1611.67			80.6	659.3
251.50	0.50	1666.67	1648.33			82.4	741.7
251.55	0.55	1703.33	1685.00			84.3	825.9
251.60	0.60	1740.00	1721.67			86.1	912.0
251.65	0.65	1776.67	1758.33			87.9	999.9
251.70	0.70	1813.33	1795.00			89.8	1089.7
251.75	0.75	1850.00	1831.67			91.6	1181.3
251.80	0.80	1886.67	1868.33			93.4	1274.7
251.85	0.85	1923.33	1905.00			95.3	1369.9
251.90	0.90	1960.00	1941.67			97.1	1467.0
251.95	0.95	1996.67	1978.33			98.9	1565.9
252.00	1.00	2033.33	2015.00			100.8	1666.7
252.05	1.05	2070.00	2051.67			102.6	1769.3
252.10	1.10	2106.67	2088.33			104.4	1873.7
252.15	1.15	2143.33	2125.00			106.3	1979.9
252.20	1.20	2180.00	2161.67			108.1	2088.0
252.25	1.25	2216.67	2198.33			109.9	2197.9
252.30	1.30	2253.33	2235.00			111.8	2309.7
252.35	1.35	2290.00	2271.67			113.6	2423.3
252.40	1.40	2326.67	2308.33			115.4	2538.7
252.45	1.45	2363.33	2345.00			117.3	2655.9
252.50	1.50	**2400.00**	2381.67			119.1	2775.0

GEORGE/EDWARD STREET RESIDENTIAL DEVELOPMENT
TOWNSHIP OF CLEARVIEW

Discharge Table

ORIFICE 1			ORIFICE 2			WEIR CONTROL		
Orifice Plate			200 mm pipe			overflow		
diameter =	75	mm	diameter =	210	mm	Length of Weir	5	m
area =	0.0044	m^2	area =	0.0346	m^2	Weir Sill Elevation	252.20	m
Orifice C =	0.80		Orifice C =	0.80		Weir constant K	1.6	
Invert =	251.00	m	Invert =	251.25	m	Side Slope (H:V)	4	

Q = flow rate (cms)
C = constant
A = area of opening(sq. m)
H = net head on the orifice
g = Acceleration due to gravity

Q = flow rate (cms)
C = constant
A = area of opening(sq
H = net head on the orifice
g = Acceleration due to gravity

Q = K x L x H^1.5

where Q = flow rate (cms)
K = constant
L = length (m)
H = head on the weir (m)

	Orifice 1		Orifice 2		Emergency Spillway		Hydraulic Control	Total Discharge
Water Level	Head	Discharge	Head	Discharge	Head	Discharge		
(m)	(m)	(m^3/s)	(m)	(m3/s)	(m)	(cms)		(cms)
251.00	0.00	0.00	0.00	0.00	0.00	0.00	**orifice**	0.00
251.05	0.01	0.00	0.00	0.00	0.00	0.00	**orifice**	0.00
251.10	0.06	0.00	0.00	0.00	0.00	0.00	**orifice**	0.00
251.15	0.11	0.01	0.00	0.00	0.00	0.00	**orifice**	0.01
251.20	0.16	0.01	0.00	0.00	0.00	0.00	**orifice**	0.01
251.25	0.21	0.01	0.00	0.00	0.00	0.00	**orifice**	0.01
251.30	0.26	0.01	0.00	0.00	0.00	0.00	**orifice**	0.01
251.35	0.31	0.01	0.00	0.00	0.00	0.00	**orifice**	0.01
251.40	0.36	0.01	0.05	0.03	0.00	0.00	**orifice**	0.04
251.45	0.41	0.01	0.10	0.04	0.00	0.00	**orifice**	0.05
251.50	0.46	0.01	0.15	0.05	0.00	0.00	**orifice**	0.06
251.55	0.51	0.01	0.20	0.05	0.00	0.00	**orifice**	0.07
251.60	0.56	0.01	0.25	0.06	0.00	0.00	**orifice**	0.07
251.65	0.61	0.01	0.30	0.07	0.00	0.00	**orifice**	0.08
251.70	0.66	0.01	0.35	0.07	0.00	0.00	**orifice**	0.08
251.75	0.71	0.01	0.40	0.08	0.00	0.00	**orifice**	0.09
251.80	0.76	0.01	0.45	0.08	0.00	0.00	**orifice**	0.10
251.85	0.81	0.01	0.50	0.09	0.00	0.00	**orifice**	0.10
251.90	0.86	0.01	0.55	0.09	0.00	0.00	**orifice**	0.11
251.95	0.91	0.01	0.60	0.09	0.00	0.00	**orifice**	0.11
252.00	0.96	0.02	0.65	0.10	0.00	0.00	**orifice**	0.11
252.05	1.01	0.02	0.70	0.10	0.00	0.00	**orifice**	0.12
252.10	1.06	0.02	0.75	0.11	0.00	0.00	**orifice**	0.12
252.15	1.11	0.02	0.80	0.11	0.00	0.00	**orifice**	0.13
252.20	1.16	0.02	0.85	0.11	0.00	0.00	**orifice**	0.13
252.25	1.21	0.02	0.90	0.12	0.05	0.09	**orifice/weir**	0.23
252.30	1.26	0.02	0.95	0.12	0.10	0.27	**orifice/weir**	0.41
252.35	1.31	0.02	1.00	0.12	0.15	0.52	**orifice/weir**	0.66
252.40	1.36	0.02	1.05	0.13	0.20	0.83	**orifice/weir**	0.97
252.45	1.41	0.02	1.10	0.13	0.25	1.20	**orifice/weir**	1.35
252.50	1.46	0.02	1.15	0.13	0.30	1.63	**orifice/weir**	1.78

GEORGE/EDWARD STREET RESIDENTIAL DEVELOPMENT
TOWNSHIP OF CLEARVIEW
Stage Storage Discharge Table

Water Level (m)	Total Discharge (m^3/s)	Total Storage (ha-m)
251.00	**0.000**	0.0000
251.05	**0.002**	0.0066
251.10	**0.004**	0.0134
251.15	**0.005**	0.0203
251.20	**0.006**	0.0275
251.25	**0.007**	0.0348
251.30	**0.008**	0.0423
251.35	**0.009**	0.0500
251.40	**0.035**	0.0579
251.45	**0.048**	0.0659
251.50	**0.057**	0.0742
251.55	**0.065**	0.0826
251.60	**0.072**	0.0912
251.65	**0.079**	0.1000
251.70	**0.085**	0.1090
251.75	**0.090**	0.1181
251.80	**0.096**	0.1275
251.85	**0.100**	0.1370
251.90	**0.105**	0.1467
251.95	**0.110**	0.1566
252.00	**0.114**	0.1667
252.05	**0.118**	0.1769
252.10	**0.122**	0.1874
252.15	**0.126**	0.1980
252.20	**0.130**	0.2088
252.25	**0.226**	0.2198
252.30	**0.410**	0.2310
252.35	**0.661**	0.2423
252.40	**0.974**	0.2539
252.45	**1.347**	0.2656
252.50	**1.780**	0.2775

GEORGE/EDWARD STREET RESIDENTIAL DEVELOPMENT

DRAWDOWN TIME FOR POND - EXTENDED DETENTION

(Using the falling head orifice equation)

$$t = \frac{2\,A_p}{C\,A_o\,(2g)^{0.5}} \qquad (h_1^{0.5} - h_2^{0.5})$$

		Value			
where t =	drawdown time in seconds				
A_p =	surface area of pond (m^2)	1630	m^2 = Extended Detention level		
C =	discharge coefficient (typically 0.63)	0.63			
A_o =	cross-sectional area of orifice (m^2)	0.004418	m^2 for	75	mm dia
g =	gravitational acceleration constant (9.81 m/s^2)	9.81	m/s^2		
h_1 =	starting water elevation above the orifice (m)	0.412	m	251.45	m
h_2 =	ending water elevation above the orifice (m)	0.000	m	251.00	m

t = 169,834.97 seconds Q = 0.0079 m^3/s

t = 47.18 hours

Appendix D5:
Water Balance

Edward/George Street Residential Development
Township of Clearview
Water Balance Assessment

Historical Rainfall Data

	Total # of Rain Days	Average Annual Precipitation (mm)	Percentage of Total Precip
0mm and above	149.9	**926.5**	100%
25mm and below	144.2	**858.5**	93%
15mm and below	133.5	**770.2**	83%
10mm or below	125.4	**680.7**	73%
8mm or below	115.4	**620.0**	67%
5mm or below	91.5	**490.0**	53%

Data sourced from:

Station Name	BARRIE WPCC
Province	ONTARIO
Latitude	44.38
Longitude	-79.69
Elevation	221
Climate Identifier	6110557
Data Range (years)	1998-2008

From Barrie Creeks Watershed Climate Data Tables

Mean Annual Precipitation	952 mm/yr
Actual Evapotranspiration	540 mm/yr
Precipitation Surplus	412 mm/yr

Source: Lake Simcoe Climate Data: A Reference Document to Support the Completion of Water Balance Assessments

Edward/George Street Development
Township of Clearview
Water Balance Assessment

= user input
= calculated

Water Budget - Pre Development

Catchment Designation	Site		
	A1 Undeveloped	A2 Impervious	Totals
Area (sq.m)	50,500.00	-	50,500.00
Pervious Area (sq.m)	50,500.00	-	50,500.00
Impervious Area (sq.m)	-	0.00	-
Infiltration Factors			
Topography Infiltration Factor	0.15		
Soil Infiltration Factor	0.4		
Land Cover Infiltration Factor	0.15		
MOE Infiltration Factor	0.7		
Runoff Co-efficient (1- MOE Infiltration factor)	0.3		
Actual Runoff Co-efficient	0.3	1	
Actual Infiltration Factor	0.7	0	
Runoff from Impervious Surfaces *		0.8	
Inputs (per Unit Area)			
Precipitation (mm/yr)	952	952	
Run-On (mm/yr)	0	0	
Other Inputs (mm/yr)	0	0	
Total Inputs (mm/yr)	952	952	
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	412.0	761.6	
Net Surplus (mm/yr)	412.0	761.60	
Evapotranspiration (mm/yr)	540.0	190.40	
Infiltration (mm/yr)	288.4	0.0	
Rooftop Infiltration (mm/yr)	0.0	0.0	
Total Infiltration (mm/yr)	288.4	0.0	
Runoff Pervious Areas (mm/yr)	123.6	0.0	
Runoff Impervious Areas (mm/yr)	0.0	761.6	
Total Runoff (mm/yr)	123.6	761.6	
Total Outputs (mm/yr)	952.0	952.0	
Difference (Inputs - Outputs)	0.0	0.0	
Inputs (Volumes)			
Precipitation (cu.m/yr)	48,076.00	-	48,076.00
Run-On (cu.m/yr)	-	-	-
Other Inputs (cu.m/yr)	-	-	-
Total Inputs (cu.m/yr)	48,076.00	-	48,076.00
Outputs (Volumes)			
Precipitation Surplus (cu.m.yr)	20,806.00	-	20,806.00
Net Surplus (cu.m/yr)	20,806.00	-	20,806.00
Evapotranspiration (cu.m/yr)	27,270.00	-	27,270.00
Infiltration (cu.m/yr)	14,564.20	-	14,564.20
Rooftop Infiltration (cu.m/yr)	-	-	-
Total Infiltration (cu.m/yr)	14,564.20	-	14,564.20
Runoff Pervious Areas (cu.m/yr)	6,241.80	-	6,241.80
Runoff Impervious Areas (cu.m/yr)	-	-	-
Total Runoff (cu.m/yr)	6,241.80	-	6,241.80
Total Outputs (mm/yr)	48,076.00	-	48,076.00
Difference (Inputs - Outputs)	-		-

Edward/George Street Development
Township of Clearview
Water Balance Assessment

= user input
= calculated

Water Budget - Post Development - No Mitigation

Catchment Designation	Site		
	A1 : Lawn	**A2 : Impervious**	**Totals**
Area (sq.m)	29,880.00	20,620.00	50,500.00
Pervious Area (sq.m)	29,880.00	0	29,880.00
Impervious Area (sq.m)	0	20,620.00	20,620.00
Infiltration Factors			
Topography Infiltration Factor	0.15		
Soil Infiltration Factor	0.4		
Land Cover Infiltration Factor	0.15		
MOE Infiltration Factor	0.7		
Runoff Co-efficient (1- MOE Infiltration factor)	0.3		
Actual Runoff Co-efficient	0.3	1	
Actual Infiltration Factor	0.7	0	
Runoff from Impervious Surfaces *		0.8	
Inputs (per Unit Area)			
Precipitation (mm/yr)	952	952	
Run-On (mm/yr)	0	0	
Other Inputs (mm/yr)	0	0	
Total Inputs (mm/yr)	952	952	
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	412.0	761.6	
Net Surplus (mm/yr)	412.0	761.60	
Evapotranspiration (mm/yr)	540.0	190.40	
Infiltration (mm/yr)	288.4	0.0	
Rooftop Infiltration (mm/yr)	0.0		
Total Infiltration (mm/yr)	288.4	0.0	
Runoff Pervious Areas (mm/yr)	123.6	0.0	
Runoff Impervious Areas (mm/yr)	0.0	761.6	
Total Runoff (mm/yr)	123.6	761.6	
Total Outputs (mm/yr)	952.0	952.0	
Difference (Inputs - Outputs)	0.0	0.0	
Inputs (Volumes)			
Precipitation (cu.m/yr)	28,445.76	19,630.24	48,076.00
Run-On (cu.m/yr)	-		-
Other Inputs (cu.m/yr)	-		-
Total Inputs (cu.m/yr)	28,445.76	19,630.24	48,076.00
Outputs (Volumes)			
Precipitation Surplus (cu.m.yr)	12,310.56	15,704.19	28,014.75
Net Surplus (cu.m/yr)	12,310.56	15,704.19	28,014.75
Evapotranspiration (cu.m/yr)	16,135.20	3,926.05	20,061.25
Infiltration (cu.m/yr)	8,617.39	-	8,617.39
Rooftop Infiltration (cu.m/yr)	-	-	-
Total Infiltration (cu.m/yr)	8,617.39	-	8,617.39
Runoff Pervious Areas (cu.m/yr)	3,693.17	-	3,693.17
Runoff Impervious Areas (cu.m/yr)	-	15,704.19	15,704.19
Total Runoff (cu.m/yr)	3,693.17	15,704.19	19,397.36
Total Outputs (mm/yr)	28,445.76	19,630.24	48,076.00
Difference (Inputs - Outputs)	-	-	-

* Assumes 20% Evaporation (Hydrogeological Assessment Submissions: Conservation Authority Guidelines to Support Development Applications, 2013)

Edward/George Street Development
Township of Clearview
Water Balance Assessment

Infiltration Facility Design Calculations

Block / Site Description:	**Rooftops**		
Total Area:	0.432	ha	(32 rooftops @ 180 m2 each, assumed 75%
Total Impervious Area:	0.43	ha	drains to LID)

Note: Red cell = user input

Average Annual Rainfall (10 mm)

Design Rainfall =	10	mm
Area =	0.43	ha
Single Event Volume =	43.2	cu.m
Provided Storage Volume =	57.6	cu.m
Average Total Yearly Depth (from 10 mm storm events) =	680.0	mm
Yearly Volume =	2,937.60	cu.m
Average Total Yearly Depth =	926.5	mm
Percentage of total yearly rainfall =	73%	

Rainfall Data summary: COB WWTP		
Design Rainfall	10	mm
Average Yearly Depth	680	mm

Average Total Annual Rainfall 926.5 mm

Water Balance Summary

Pre Dev Infiltration (m^3)	**14,564**
Post Dev Infiltration : no mitigation (m^3)	**8,617**
Deficit (m^3)	**5,947**
Deficit (%)	**41%**

Additional Post Dev Infiltration (m^3)	**2,938**
Total Post Dev Infiltration : with mitigation (m^3)	**11,555**

Appendix D6:
Creemore East MDP Excerpts

Table 3: Summary of Eastern Conveyance Ditch Dimensions

Reach	Top Width	Depth of Flow	Bottom Width	3.0m Maintenance Access Required?
Alliance Homes East Easement	6.1	1.2	1.25	Yes, unless adjacent road provided by Alliance
Elizabeth Street to Edward Street	6.1	1.2	1.25	No
Along Edward Street	5.8	1.2	1.00	No
Edward Street to Airport Road Culvert	6.6	1.2	1.80	Yes
Airport Road East ROW to Sideroad 6/7	5.2	1.2	0.40	No

3.5.1.2 Southern Conveyance

The Southern Conveyance originates at the Alliance Homes SWM Pond outlet and the conveyance is provided by a 750mm dia. sewer to Edward Street. East Conveyance drainage from Catchments 4, 3, and 2E above 3.237m^3/s (approximately the 25-year flow) will be diverted at the Edward Street-Concession 3 crossing via an overflow weir and custom ditch inlet catchbasin structure along with the Alliance Homes and the north Alliance Homes external area to a 1200mm dia. concrete storm sewer from Edward Street to Sideroad 6/7 (sized to 1.744m^3/s based on minimum 0.2% grade). The sewer will likely be located along the centreline of the roadway and be fitted with maintenance tees for access.

The Alliance and McIntosh properties (within Catchment 2W) are to be drained down Concession 3 to the Mad River; however, the determination of the exact location of this pipe between Edward Street and Concession 3 will not be finalized under the East Creemore Drainage Study. Once the Municipal Class EA process is complete, the Township will meet with landowners to secure necessary lands or easements to undertake the works.

All remaining subcatchments west of Concession 3 and south of Alliance Homes (Catchments 5, 6, 7) will be conveyed by overland flow to a Concession 3 west ROW ditch and connect to the storm sewer system via a series of ditch inlet catchbasins.

Catchment 8 is proposed to be conveyed to Concession 3 by ditch flow only. The 1200mm dia. storm sewer pipe will be sized to maximize the underground conveyance, with the roadside ditch design to accommodate excess flows. Alignment of the South Conveyance has not been confirmed; however, the Township is in the process of consulting with landowners along Concession 3 to seek sufficient ROW for ditch conveyance. A summary of the Concession 3 ditch dimensions are provided in **Table 4.**

CONVEYANCE 2 (SOUTH OF ALLIANCE + >25-YEAR STORM ALONG CONCESSION 3)

SWM Outlet to Node 6 (Edward Street)

Mannings' Equation			TRAPEZOIDAL CHANNEL	
Flow Depth (m) =	0.850			
Side Slope Ratio (H:V) =	2.0	/1	Top width	4.3
Bed Width (m)=	0.90		Hyd. Rad, 'R'	
Area (m^2)=	2.210		0.470081	m
Wetted Perimeter (m)=	4.701	m	Friction Slope Sf	
Slope (%) =	0.40		0.0040	m/m
Manning 'n' =	0.050		Velocity	
Channel Capacity, Q =	1.690	m3/sec	0.765	m/s

Q100 = 2.582 - 0.932(pond outflow) = 1.650m3/s

Node 6 to Node 7 (George Street)

Mannings' Equation			TRAPEZOIDAL CHANNEL	
Flow Depth (m) =	0.850			
Side Slope Ratio (H:V) =	2.0	/1	Top width	3.6
Bed Width (m)=	0.20		Hyd. Rad, 'R'	
Area (m^2)=	1.615		0.403617	m
Wetted Perimeter (m)=	4.001	m	Friction Slope Sf	
Slope (%) =	0.29		0.0029	m/m
Manning 'n' =	0.050		Velocity	
Channel Capacity, Q =	0.943	m3/sec	0.584	m/s

Q100 = 2.659 - 1.744(pipe) = 0.915m3/s

Node 7 to Node 8 (Sideroad (6/7)

Mannings' Equation			TRAPEZOIDAL CHANNEL	
Flow Depth (m) =	0.850			
Side Slope Ratio (H:V) =	2.0	/1	Top width	3.9
Bed Width (m)=	0.50		Hyd. Rad, 'R'	
Area (m^2)=	1.870		0.434751	m
Wetted Perimeter (m)=	4.301	m	Friction Slope Sf	
Slope (%) =	0.43		0.0043	m/m
Manning 'n' =	0.050		Velocity	
Channel Capacity, Q =	1.405	m3/sec	0.751	m/s

"ND8-" Q100 = 1.393m3/s

Node 8 to Mad River

Mannings' Equation			TRAPEZOIDAL CHANNEL	
Flow Depth (m) =	1.000			
Side Slope Ratio (H:V) =	2.0	/1	Top width	4.85
Bed Width (m)=	0.85		Hyd. Rad, 'R'	
Area (m^2)=	2.850		0.535499	m
Wetted Perimeter (m)=	5.322	m	Friction Slope Sf	
Slope (%) =	0.67		0.0067	m/m
Manning 'n' =	0.050		Velocity	
Channel Capacity, Q =	3.069	m3/sec	1.077	m/s

"ND8+" Q100 = 3.041m3/s

Appendix D7:
Stormwater Conveyance

EDWARD/GEORGE STREET RESIDENTIAL DEVELOPMENT

STORM CATCHMENT PLAN

EDWARD STREET

GEORGE STREET

CONCESSION ROAD 3

STMMH 4 | STMMH 5 | STMMH 6 | STMMH 7 | STMMH 8 | STMMH 9 | STMMH 10 | STMMH3 | STMMH2 | STC 6000

DICB1 | DICB2 | DICB3

HW1

OPEN SPACE (BLOCK 28)

STORMWATER MANAGEMENT (BLOCK 12)

PUMPING STATION (BLOCK 13)

BLOCK 22 | BLOCK 23 | BLOCK 24 | BLOCK 25 | BLOCK 26 | BLOCK 27

A1 1.33 0.45

A2 1.51 0.65

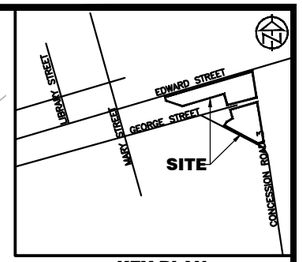
A3 0.32 0.60

A4 0.33 0.40

A5 1.56 0.60

EX1 0.93 0.40

KEY PLAN
NTS



LEGEND

- A1 / 1.33 / 0.45 — STORM SEWER CATCHMENT ID; RUNOFF COEFFICIENT; AREA (ha)
- STORM SEWER CATCHMENT
- STORM SEWER
- STORM SEWER MAINTENANCE HOLE
- DITCH INLET CATCHBASIN

TATHAM ENGINEERING

SCALE: 1:1,500	DRAWN: LPB	DATE: MAY/19	JOB NO. 418426

DWG. No. **STM-1**

Drawing Name: 418426–STM01.dwg, Plotted: May 17, 2019

STORM SEWER DESIGN SHEET #1 - 5 YEAR

Approved:

TATHAM ENGINEERING

IDF Curve Coefficients

Storm	A	B
2 Year	-	-
5 Year	**27.500**	**-0.699**
25 Year	-	-
100 Year	-	-

Manning's Coefficient

CSP	0.024
Conc.	0.013
PVC	0.013

Project Name: Edward Street/ George Street
Project Number: 418426
Municipality: Clearview
Designed By: LPB
Date: May 06 2019
Checked By: NM
Date:
Revision Number:

PHASE	LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	TRIBUTARY AREA - A	RUNOFF COEFFICIENT - C	INDIVIDUAL A x C	CUMULATIVE AREA	CUMULATIVE A x C	TIME OF CONCENTRATION	RAINFALL INTENSITY	PEAK FLOW	MANNING'S ROUGHNESS COEFFICIENT	LENGTH	SLOPE	DIAMETER	FULL FLOW VELOCITY	FULL FLOW CAPACITY	ACTUAL VELOCITY	TIME OF FLOW	CALCULATED PIPE DIAMETER	TIME OF CONCENTRATION
			MH No.	MH No.	ha					min.	mm/hr	cms		m	m/m	mm	m/s	cms	m/s	min	mm	min
1	1	A1	DICB3	STMMH3	1.330	0.45	0.599	1.330	0.599	10.00	96.22	**0.160**	**0.013**	69.0	**0.0050**	**450**	1.27	**0.202**	1.27	0.91	412	10.91
1	1	EX1	STMMH3	STMMH2	0.930	0.40	0.372	2.260	0.971	10.91	90.55	**0.244**	**0.013**	49.7	**0.0050**	**525**	1.40	**0.304**	1.40	0.59	483	11.50
1	1	A2	STMMH2	Pond	1.510	0.65	0.982	3.770	1.952	11.50	87.28	**0.473**	**0.013**	58.0	**0.0050**	**675**	1.66	**0.594**	1.66	0.58	619	12.08

Notes:

STORM SEWER DESIGN SHEET #1 - 100 YEAR

Approved:

TATHAM ENGINEERING

IDF Curve Coefficients

Storm	A	B
2 Year	-	-
5 Year		
25 Year	-	-
100 Year	**45.800**	**-0.699**

Manning's Coefficient

CSP	0.024
Conc.	0.013
PVC	0.013

Project Name: Edward Street/ George Street
Project Number: 418426
Municipality: Clearview
Designed By: LPB
Date: May 06 2019
Checked By: NM
Date:
Revision Number:

PHASE	LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	TRIBUTARY AREA - A	RUNOFF COEFFICIENT - C	INDIVIDUAL A x C	CUMULATIVE AREA	CUMULATIVE A x C	TIME OF CONCENTRATION	RAINFALL INTENSITY	PEAK FLOW	MANNING'S ROUGHNESS COEFFICIENT	LENGTH	SLOPE	DIAMETER	FULL FLOW VELOCITY	FULL FLOW CAPACITY	ACTUAL VELOCITY	TIME OF FLOW	CALCULATED PIPE DIAMETER	TIME OF CONCENTRATION
			MH No.	MH No.	ha					min.	mm/hr	cms		m	m/m	mm	m/s	cms	m/s	min	mm	min
1	1	A1	DICB3	STMMH3	1.330	0.45	0.599	1.330	0.599	10.00	160.25	**0.266**										
1	1	EX1	STMMH3	STMMH2	0.930	0.40	0.372	2.260	0.971	10.91	150.81	**0.407**										
1	1	A2	STMMH2	Pond	1.510	0.65	0.982	3.770	1.952	11.50	145.36	**0.788**										

Notes:

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Saturday, May 4 2019

Regional Spill Channel to Pond

Trapezoidal

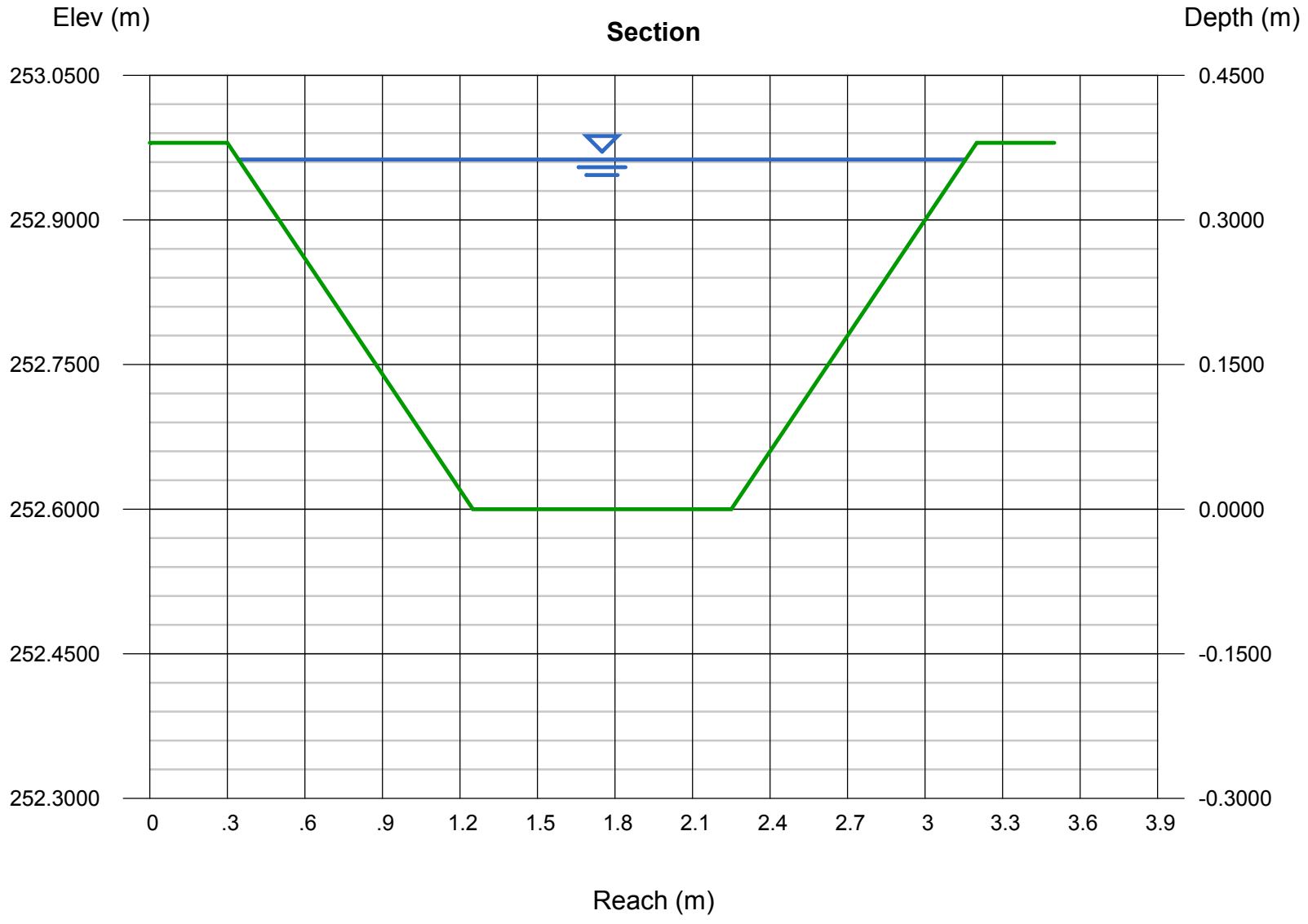
Bottom Width (m)	= 1.0000
Side Slopes (z:1)	= 2.5000, 2.5000
Total Depth (m)	= 0.3800
Invert Elev (m)	= 252.6000
Slope (%)	= 0.4000
N-Value	= 0.035

Calculations

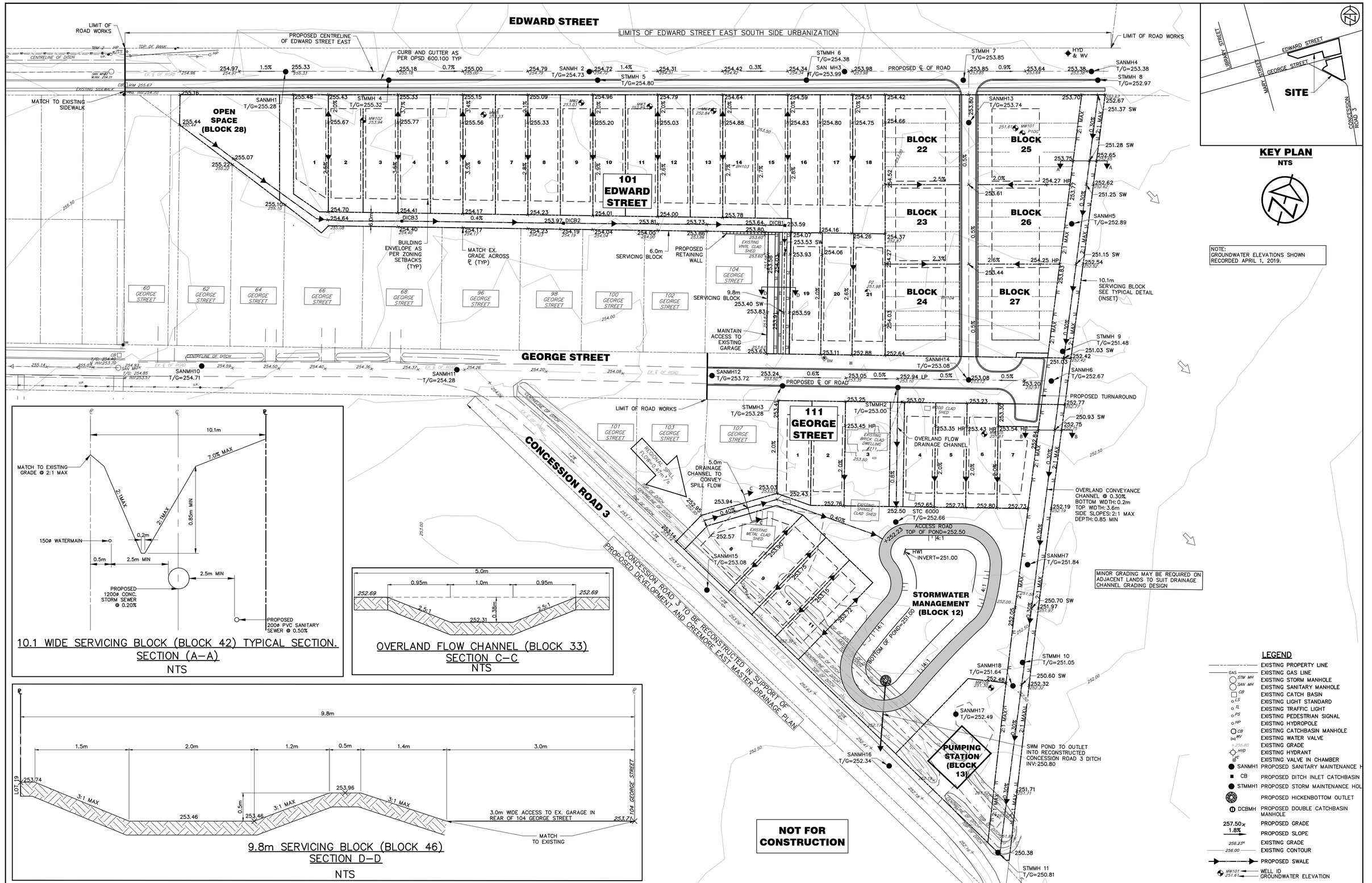
Compute by:	Known Q
Known Q (cms)	= 0.4700

Highlighted

Depth (m)	= 0.3627
Q (cms)	= 0.4700
Area (sqm)	= 0.6916
Velocity (m/s)	= 0.6796
Wetted Perim (m)	= 2.9533
Crit Depth, Yc (m)	= 0.2316
Top Width (m)	= 2.8136
EGL (m)	= 0.3863



Appendix E: Drawings



10.1 WIDE SERVICING BLOCK (BLOCK 42) TYPICAL SECTION.
SECTION (A–A)
NTS

OVERLAND FLOW CHANNEL (BLOCK 33)
SECTION C–C
NTS

9.8m SERVICING BLOCK (BLOCK 46)
SECTION D–D
NTS

NOT FOR CONSTRUCTION

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM1 – ELEVATION 254.32m
TOP OF FIRE HYDRANT ON GEORGE STREET EAST OF CONCESSION ROAD 3.

TBM2 – ELEVATION 259.17
WEST FOUNDATION WALL OF HOUSE#24 ON THE NORTH SIDE OF CAROLINE STREET 90cm FROM THE SW CORNER OF THE BUILDING, 36cm BELOW THE BLOCKS.

NOTES

LEGAL SURVEY INFORMATION SOUTH OF GEORGE ST. SHOWN ON THIS PLAN PREPARED BY MARTIN W. KNISLEY SEPTEMBER 4, 2018. RECEIVED SEPTEMBER 18, 2018.

LEGAL SURVEY INFORMATION NORTH OF GEORGE ST. SHOWN ON THIS PLAN PREPARED BY MARTIN W. KNISLEY SEPTEMBER 3, 2005. RECEIVED APRIL 28, 2017.

TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN PREPARED BY MARTIN W. KNISLEY AUGUST 2005 AND 2018.

No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR DRAFT PLAN APPROVAL	MAY 17/19

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
N. A. MILLINGTON
100190121
May 17/2019
PROVINCE OF ONTARIO

EDWARD/GEORGE STREET RESIDENTIAL DEVELOPMENT

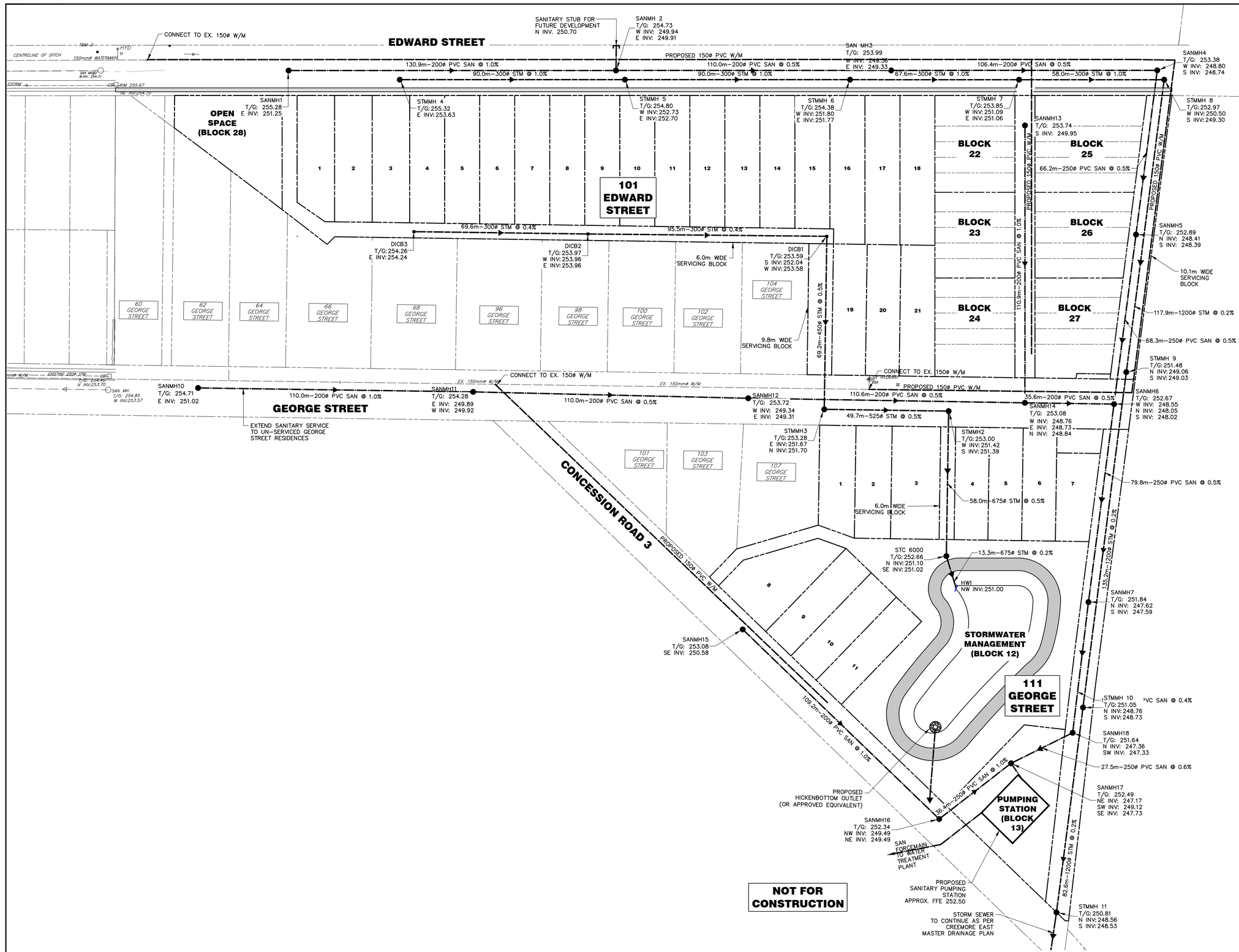
TOWNSHIP OF CLEARVIEW

CONCEPTUAL GRADING PLAN

TATHAM ENGINEERING

DESIGN: NM	FILE: 418426	DWG: SG-1
DRAWN: LPB	DATE: MAY 2019	
CHECK: BFS	SCALE: 1:750	

Drawing Name: 418426–SG01.dwg, Plotted: May 17, 2019



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BENCHMARKS

TBM1 – ELEVATION 254.32m
TOP OF FIRE HYDRANT ON GEORGE STREET EAST OF CONCESSION ROAD 3.

TBM2 – ELEVATION 259.17
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LICENSED PROFESSIONAL ENGINEER
N. A. MILLINGTON
100190121
May 17/2019
PROVINCE OF ONTARIO

EDWARD/GEORGE STREET RESIDENTIAL DEVELOPMENT

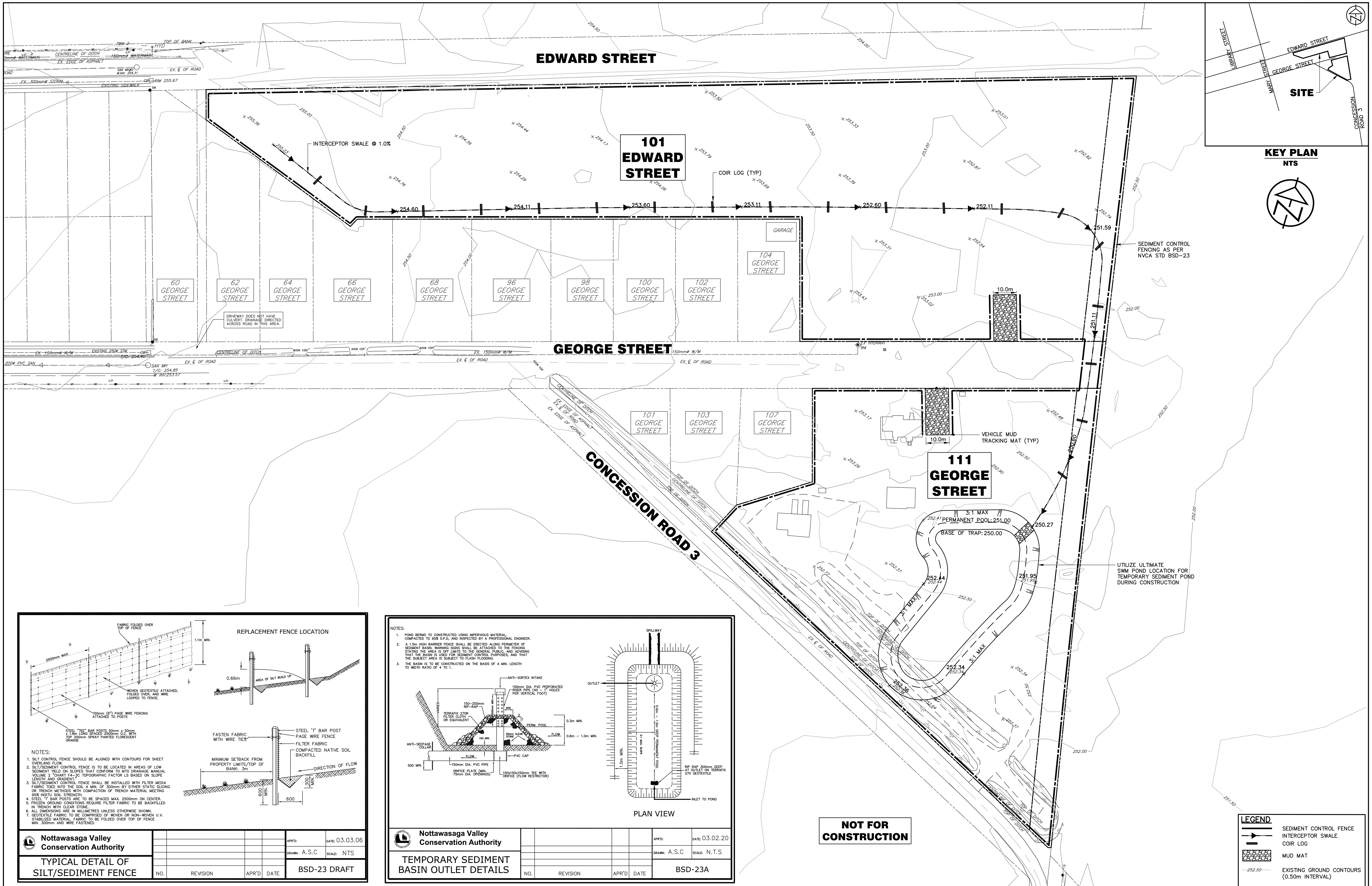
TOWNSHIP OF CLEARVIEW

CONCEPTUAL SERVICING PLAN

TATHAM ENGINEERING

DESIGN: NM	FILE: 418426	DWG: SS-1
DRAWN: LPB	DATE: MAY 2019	
CHECK: BFS	SCALE: 1:750	

Drawing Name: 418426-SS01.dwg, Plotted: May 17, 2019



EDWARD STREET
GEORGE STREET
CONCESSION ROAD 3
101 EDWARD STREET
111 GEORGE STREET
INTERCEPTOR SWALE @ 1.0%
COIR LOG (TYP)
SEDIMENT CONTROL FENCING AS PER NVCA STD BSD-23
VEHICLE MUD TRACKING MAT (TYP)
10.0m
3:1 MAX
PERMANENT POOL: 251.00
BASE OF TRAP: 250.00
UTILIZE ULTIMATE SWM POND LOCATION FOR TEMPORARY SEDIMENT POND DURING CONSTRUCTION
DRIVEWAY DOES NOT HAVE CULVERT. DRAINAGE DIRECTED ACROSS ROAD IN THIS AREA.
60 GEORGE STREET
62 GEORGE STREET
64 GEORGE STREET
66 GEORGE STREET
68 GEORGE STREET
96 GEORGE STREET
98 GEORGE STREET
100 GEORGE STREET
102 GEORGE STREET
104 GEORGE STREET
101 GEORGE STREET
103 GEORGE STREET
107 GEORGE STREET
GARAGE
KEY PLAN
NTS
SITE
LIBRARY STREET
MARY STREET
EDWARD STREET
GEORGE STREET
CONCESSION ROAD 3
NOT FOR CONSTRUCTION
LEGEND
SEDIMENT CONTROL FENCE
INTERCEPTOR SWALE
COIR LOG
MUD MAT
EXISTING GROUND CONTOURS (0.50m INTERVAL)
REPLACEMENT FENCE LOCATION
FABRIC FOLDED OVER TOP OF FENCE
2500mm MAX
WOVEN GEOTEXTILE ATTACHED, FOLDED OVER, AND WIRE LOOPED TO FENCE.
150mm (6") PAGE WIRE FENCING ATTACHED TO POSTS
STEEL "TEE" BAR POSTS 50mm x 50mm x 1.8m LONG SPACED 2500mm O.C. WITH TOP 200mm SPRAY PAINTED FLORESCENT ORANGE
AREA OF SILT BUILD UP
FASTEN FABRIC WITH WIRE TIES
STEEL 'T' BAR POST
PAGE WIRE FENCE
FILTER FABRIC
COMPACTED NATIVE SOIL BACKFILL
MINIMUM SETBACK FROM PROPERTY LIMITS/TOP OF BANK: 3m
DIRECTION OF FLOW
NOTES:
1. SILT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SILT/SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 "CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT."
3. SILT/SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TOED INTO THE SOIL A MIN. OF 300mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% INSITU SOIL STRENGTH.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED MAX. 2500mm ON CENTER.
5. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
7. GEOTEXTILE FABRIC TO BE COMPRISED OF WOVEN OR NON-WOVEN U.V. STABILIZED MATERIAL. FABRIC TO BE FOLDED OVER TOP OF FENCE MIN. 300mm AND WIRE FASTENED.
Nottawasaga Valley Conservation Authority
TYPICAL DETAIL OF SILT/SEDIMENT FENCE
NO. REVISION APR'D DATE
APR'D:
DATE: 03.03.06
DRAWN: A.S.C
SCALE: NTS
BSD-23 DRAFT
NOTES:
1. POND BERMS TO CONSTRUCTED USING IMPERVIOUS MATERIAL, COMPACTED TO 95% S.P.D, AND INSPECTED BY A PROFESSIONAL ENGINEER.
2. A 1.5m HIGH BARRIER FENCE SHALL BE ERECTED ALONG PERIMETER OF SEDIMENT BASIN. WARNING SIGNS SHALL BE ATTACHED TO THE FENCING STATING THE AREA IS OFF LIMITS TO THE GENERAL PUBLIC, AND ADVISING THAT THE BASIN IS USED FOR SEDIMENT CONTROL PURPOSES, AND THAT THE SUBJECT AREA IS SUBJECT TO FLASH FLOODING.
3. THE BASIN IS TO BE CONSTRUCTED ON THE BASIS OF A MIN. LENGTH TO WIDTH RATIO OF 4 TO 1.
ANTI-VORTEX INTAKE
150mm DIA. PVC PERFORATED RISER PIPE (40 - 1" HOLES PER VERTICAL FOOT)
150-200mm RIP-RAP
TERRAFIX 270R FILTER CLOTH OR EQUIVALENT
VARIES
PERM. POOL
FLOW
ANTI-SEEPAGE COLLAR
150mm DIA. PVC PIPE
ORIFICE PLATE (MIN. 75mm DIA. OPENINGS)
PVC CAP
150x150x150mm TEE WITH ORIFICE (FLOW RESTRICTOR)
SPILLWAY
OUTLET
RIP RAP 300mm DEEP AT OUTLET ON TERRAFIX 270 GEOTEXTILE
INLET TO POND
PLAN VIEW
Nottawasaga Valley Conservation Authority
TEMPORARY SEDIMENT BASIN OUTLET DETAILS
NO. REVISION APR'D DATE
APR'D:
DATE: 03.02.20
DRAWN: A.S.C
SCALE: N.T.S
BSD-23A

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N.A. MILLINGTON
100190121
May 17/2019
PROVINCE OF ONTARIO

EDWARD/GEORGE STREET RESIDENTIAL DEVELOPMENT

TOWNSHIP OF CLEARVIEW

CONCEPTUAL EROSION AND SEDIMENT CONTROL PLAN

TATHAM ENGINEERING

DESIGN: NM	FILE: 418426	DWG:
DRAWN: LPB	DATE: MAY 2019	ESC-1
CHECK: BFS	SCALE: 1:750	

Drawing Name: 418426–ESC01.dwg, Plotted: May 17, 2019