Appendix R

Bronte Green Subdivision/ Region Headquarter Lands

J.F. Sabourin and Associates Inc.

November 2018

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WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

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November 28, 2018

David Schaeffer Engineering Limited
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Attention: **Mr. David Schaeffer, P.Eng.**

Subject: **Bronte Green Subdivision / Region Headquarter Lands** *our file: 1051-12*

As requested by your orifice, we have evaluated, based on the provided information as described below, the required volumes and release rates for a proposed 1.009 ha commercial development block and for an existing Stormwater Management (SWM) facility on the Region Headquarter lands.

Through the settlement process, it was determined that Bronte Green would acquire approximately 1.45 ha of land from the Regional of Halton Headquarters, north-west of the Regional of Halton South Operations Centre. These lands under existing conditions are used by the Regional Works Department for staff parking and equipment/resource storage, and are treated for enhanced quality control and 25 mm and 2- to 100-year quantity control by a wetland SWM facility. The wetland treats a total drainage area of approximately 5.75 ha under existing conditions and outlets to Bronte Creek via a pipe and swale through the Regional of Halton South Operations Centre. This existing pond design is as per the May 2001 *SWM Report, South Operations Centre* by Totten Sims Hubicki Associates (TSH).

Under proposed conditions, approximately 0.527 ha of the existing drainage area to the Region Pond acquired by Bronte Green will be reconstructed as Streets B and K of the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be directed to the proposed Bronte Green SWM Pond for treatment before discharging to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road. Refer to the June 2017 *SWM Report for the Bronte Green Subdivision* and the June 2017 *Design Brief for the SWM Pond for the Bronte Green Subdivision* for further details.

The storage available in the existing Region Pond will be reduced by the development of Streets B and K. Furthermore, the remaining 0.921 ha of the existing drainage area to the Region Pond acquired by Bronte Green will be reconstructed at a higher percent imperviousness as a commercial block, along with 0.088 ha of external land within the Bronte Green subdivision. Note that the 0.088 ha of external land is undeveloped and drains uncontrolled to Bronte Creek under existing conditions.

Under proposed conditions, it is proposed that the full 1.009 ha commercial block drain either to the Region Pond (Scenario 1) or to the outlet pipe of the Region Pond (Scenario 2). On-site storage on the commercial lands is proposed to ensure that proposed conditions outflows from the modified Region SWM Pond under Scenario 1, or from the modified Region SWM Pond and commercial block under Scenario 2, will not exceed target outflows as defined in the May 2001 *SWM Report, South Operations Centre*. Modifications are also proposed to the outlet controls of the Region SWM Pond to meet quality and quantity targets based on the reduced storage available, and to maximize use of storage up to the existing 100-year pond level of 124.55 m documented in the May 2001 *SWM Report, South Operations Centre*. Refer to Figure 1 for the proposed conditions drainage areas.

HYDROLOGIC MODELLING

The design of the existing Region Pond was evaluated in the May 2001 *SWM Report, South Operations Centre* using the OTTHYMO program, the 25 mm 3-hour Chicago design storm, and the 2-, 5-, 25- and 100-year 4-hour Chicago design storms. Proposed conditions have been assessed using the comparable SWMHYMO program, with the same rainfall events for consistency. Modelling parameters consistent with the May 2001 *SWM Report, South Operations Centre* modelling have also been used for consistency, as summarized below:

- Infiltration modelled based on the SCS Method and a modified Curve Number (CN) of 78 (consistent with an urban grassed area in fair condition with Soil Group D);
- Initial abstraction values of 2 mm for impervious area and 5 mm for pervious area;
- Manning's n values of 0.013 for impervious area and 0.250 for pervious area;
- Slopes of 2% for both pervious and impervious area; and
- The method used in the May 2001 analysis to calculate length parameters LGI and LGP are unclear, therefore LGP was set to a typical 40 m and LGI was calculated as $[\text{Area} / 1.5]^{0.5}$.

Percent imperviousness values of the remaining existing drainage areas to the Region Pond, including the pond block itself, were measured based on the site plan provided by DSEL and shown in Figure 1. The pond was modelled under free outfall conditions in accordance with the May 2001 *SWM Report, South Operations Centre*. Percent imperviousness for the commercial block was calculated based on a runoff coefficient (C) of 0.90 provided by DSEL, where C = 0.7 x imperviousness ratio + 0.2. The stage-storage-outflow relationship for the Region Pond was modelled based on stage-storage information provided by DSEL and the orifice equation. Refer to Attachment A for SWMHYMO model input and output files.

QUALITY CONTROL

An enhanced protection level (80% long-term suspended solids removal) will be provided for quality control in the Region SWM pond in accordance with Ministry of the Environment (MOE) standards.

The permanent pool has been verified in accordance with the requirements of Table 3.2 in the March 2003 Ministry of the Environment Stormwater Management Planning (SWMP) and Design Manual. Based on a 4.751 ha drainage area with an average imperviousness of 88%, under the more critical Scenario 1, a minimum of 104.00 m^3/ha of permanent pool volume must be provided. The required permanent pool storage volume is calculated as follows:

$$(144.00\ m^3/ha - 40.00\ m^3/ha) \times 4.751\ ha = 494\ m^3$$

The modified facility will have a permanent pool volume of 500 m^3, which exceeds the required volume. In accordance with the SWMP Design Manual, the pond should have a permanent pool depth between 0.15 m and 0.30 m. The existing facility has been designed with a permanent pool depth of 0.30 m at an elevation of 123.40 m, with a 1.0 m depth in the forebay.

The quality control volume is based on a volume of 40 m^3/ha. The required quality control volume for the 4.751 ha drainage area, again for the more critical Scenario 1, is calculated as follows:

$$40\ m^3/ha \times 4.751\ ha = 190\ m^3$$

The quality control volume is contained within the extended detention volume of the modified pond at an elevation of 123.529 m. The extended detention volume of the pond is 1043 m^3 at an elevation of 124.00 m. It

was found that, based on standard MOE equations, the drawdown time of the extended detention volume in the modified facility is 22.25 hours based on the existing 120 mm circular quality control orifice at an elevation of 123.40 m. This drawdown time is less than the 24 to 48 hours recommended by Ministry of the Environment guidelines. It is therefore proposed that the existing quality control orifice be replaced by a 100 mm circular orifice at an invert of 123.40 m under both Scenarios 1 and 2. The extended detention component has a drawdown time of 32.0 hours based on the revised quality control orifice, which is between 24 to 48 hours in accordance with Ministry of the Environment guidelines. Drawdown time calculations are presented in Attachment B for Scenario 1 and Attachment C for Scenario 2.

Note that the quality control orifice is set at an invert of 123.40 m in the outlet pipe of a 600 mm x 600 mm ditch inlet catchbasin, where the grate is set at a 2H:1V slope with a bottom elevation of 123.40 m. This outlet pipe then connects to a second 600 mm x 1200 mm ditch inlet catchbasin, where the grate is set at a 2H:1V slope with a bottom elevation equal to the extended detention elevation of 124.00 m. The quantity control orifice is set at an invert of 123.40 m in the outlet pipe of this second ditch inlet catchbasin.

Under Scenario 2, quality control for the 1.009 ha commercial block draining directly to the outlet pipe of the Region Pond will be provided by an oil-and-grit separator. An oil-and-grit sizing report for the commercial lands is presented in Attachment E.

QUANTITY CONTROL

Under existing conditions, quantity control for the Region Pond is provided by a 240 mm circular orifice at an invert of 123.40 m.

Under Scenario 1, it is proposed that the outlet structure be modified such that the quality and quantity control orifices operate in parallel rather than in series as described above. It is also proposed that the existing quantity control orifice be replaced with a 350 mm circular orifice at an invert of 124.00 m, in order to maximize outflow from the pond up to the allowable release rates, thereby minimizing the amount of storage required in the upstream commercial block.

The 100-year pond level will be 124.496 m under these conditions; less than the existing conditions 100-year pond level of 124.55 m. Refer to Attachment B for the revised stage-storage-outflow relationship. The Scenario 1 Region Pond operating characteristics and required on-site storage in the commercial block are summarized in Table 1A below.

Table 1A: Summary of SWM Pond Operating Characteristics (Scenario 1)

Pond Component	Pond Inflow (m^3/s)	Lower Elevation (m)	Upper Elevation (m)	Allowable Outflow [1] (m^3/s)	Pond Outflow (m^3/s)	Pond Volume [2] (m^3)	Commercial Outflow (m^3/s)	Commercial Volume (m^3)
Permanent Pool	N/A	122.400	123.400	N/A	N/A	500	N/A	N/A
Quality Control	N/A	123.400	123.529	N/A	0.006	190	N/A	N/A
Extended Detention	N/A	123.529	124.000	N/A	0.016	1043	N/A	N/A
25mm/3hr Chicago	0.207	123.400	123.827	0.020	0.014	699	0.006	197
2yr/4hr Chicago	0.689	123.827	124.042	0.040	0.030	1132	0.009	297
5yr/4hr Chicago	1.000	124.042	124.122	0.070	0.056	1308	0.022	335
25yr/4hr Chicago	1.440	124.122	124.293	0.127	0.112	1700	0.055	402
100yr/4hr Chicago	1.955	124.293	124.496	0.206	0.171	2212	0.105	500

[1] Refer to Tables B-7 and B-8 of Attachment B for target release rates.
[2] Volumes are active storage only for all pond components except the permanent pool.

Similarly, under Scenario 2, it is proposed that the outlet structure be modified such that the quality and quantity control orifices operate in parallel rather than in series as described above. It is also proposed that the existing quantity control orifice be replaced with a 200 mm circular orifice at an invert of 124.00 m, in order to minimize outflow from the pond, thereby minimizing the amount of storage required in the commercial block to meet the combined allowable release rates. The 100-year pond level will be 124.495 m under these conditions; less than the existing conditions 100-year pond level of 124.55 m. Refer to Attachment C for the revised stage-storage-outflow relationship. The Scenario 2 Region Pond operating characteristics and required on-site storage in the commercial block are summarized in Table 1B below.

Table 1B: Summary of SWM Pond Operating Characteristics (Scenario 2)

Pond Component	Pond Inflow (m^3/s)	Lower Elevation (m)	Upper Elevation (m)	Allowable Outflow [1] (m^3/s)	Pond Outflow (m^3/s)	Pond Volume [2] (m^3)	Commercial Outflow (m^3/s)	Commercial Volume (m^3)
Permanent Pool	N/A	122.400	123.400	N/A	N/A	500	N/A	N/A
Quality Control	N/A	123.400	123.529	N/A	0.005	150	N/A	N/A
Extended Detention	N/A	123.529	124.000	N/A	0.016	1043	N/A	N/A
25mm/3hr Chicago	0.207	123.400	123.810	0.020	0.013	667	0.006	197
2yr/4hr Chicago	0.689	123.810	124.020	0.040	0.019	1086	0.009	297
5yr/4hr Chicago	1.000	124.020	124.117	0.070	0.034	1296	0.022	335
25yr/4hr Chicago	1.440	124.117	124.298	0.127	0.057	1710	0.055	402
100yr/4hr Chicago	1.955	124.298	124.495	0.206	0.076	2211	0.105	500

[1] Refer to Tables C-7 and C-8 of Attachment C for target release rates.
[2] Volumes are active storage only for all pond components except the permanent pool.

The above results show that the provided release rates do not exceed the target release rates for the 25 mm and 2- to 100-year storms. The maximum 100-year pond level is at an active storage depth of 1.10 m, and has more than a 0.3 m freeboard to the top of bank at 126.25 m.

In the event of a blockage or a storm greater than the 100-year storm, the existing pond has a 3.0 m wide emergency spillway at an elevation of 125.00 m. However, the road elevations proposed along Streets B and K cut off this avenue for emergency relief, and as such it is proposed that an 855 m x 1345 mm elliptical culvert be installed at an invert of 124.85 m, above the 100-year pond level, for emergency overflow. Even assuming this emergency overflow is blocked, note that the Regional pond level is 125.292 m under Scenario 1 and 125.578 m under Scenario 2, and is contained within the pond.

INTERIM CONDITIONS

Note that under interim conditions, the commercial block is to be re-grassed, and will continue to drain through the Region Pond. With the proposed changes to the pond outlet controls described above for Scenario 1, the SWMHYMO modelling in Attachment A has confirmed that the interim release rates will not exceed the target release rates, and the 100-year pond level will not exceed the existing 124.55 m.

To be clear, under interim conditions the outlet of the regional pond is to be modified to what is proposed for Scenario 1 only, not Scenario 2.

FOREBAY SIZING

The proposed SWM pond has been equipped with a sediment forebay with a length to width ratio of approximately 2.67:1, which exceeds the minimum 2:1 ratio specified in the SWMP Design Manual. Furthermore, the forebay area is 15% of the permanent pool area, and does not exceed one-third of the

permanent pool area as required by the SWMP Design Manual.

Calculations for the minimum dispersion length, settling length and the average velocity are presented in Attachment B for Scenario 1 and Attachment C for Scenario 2. The forebay sizing is sufficient to meet settling and dispersion criteria. Note that the average forebay velocity slightly exceeds the 0.15 m/s specified by the MOE; however, this can be addressed with reasonable erosion control measures in the forebay. Please note that the dispersion and average velocity calculations were performed using the total 5-year inflow to the pond, in accordance with the May 2001 *SWM Report, South Operations Centre*.

STORMWATER CONVEYANCE

Under existing conditions, excess major system flows are stored in surface ponding or are conveyed overland to the Region pond. However, the road elevations proposed along Streets B and K cut off this avenue for emergency relief, and as such it is proposed that two 100-year intakes be installed on the remaining existing Region lands. Refer to Calculation Sheet 3 of Attachment D for the infrastructure required to safely capture the 100-year flows at these locations, even under 50% blockage of catchbasin grates, where applicable.

The 100-year flows from these Region lands, and controlled 100-year flows from the commercial block under Scenario 1, are then conveyed to the forebay of the Region pond via two 750 mm diameter circular concrete pipes at 0.30% slope. The combined capacity of these pipes is approximately 2.74 m^3/s when the hydraulic gradeline at the upstream end of the pipe reaches ground level, based on the Ministry of Transportation culvert nomographs presented in Attachment D. This capacity is greater than the maximum 100-year flows to the pipes of 1.823 m^3/s under Scenario 1 and 1.756 m^3/s under Scenario 2.

Note that the controlled flows from the commercial block will be conveyed to the two 750 mm diameter pond inlet pipes under Scenario 1, or to the pond outlet pipe under Scenario 2, via a 375 mm diameter circular PVC pipe at 0.50% slope. The full flow capacity of this pipe is 0.124 m^3/s, as calculated using Manning's equation; greater than the maximum 100-year storm outflow from the commercial block of 0.105 m^3/s under Scenarios 1 and 2.

The pond outlet pipe to the swale through the Regional of Halton South Operations Centre is a 525 mm diameter circular concrete pipe at 0.3% slope, with a full flow capacity of 0.236 m^3/s as calculated using Manning's equation. The capacity of this pipe is greater than the 100-year storm outflow of 0.171 m^3/s under Scenario 1 and 0.181 m^3/s under Scenario 2.

Note that the Region Pond and the outlet swale through the Regional of Halton South Operations Centre will be planted in accordance with Conservation Halton's Landscaping and Tree Preservation Guidelines. The swale will be revegetated with native seed mix and lined with Terrafix S100B or approved equivalent.

Yours truly,
J.F. Sabourin and Associates Inc.

Laura Pipkins, P.Eng.

cc: J.F. Sabourin, M.Eng, P.Eng.
Director of Water Resources Projects

Attachment A: SWMHYMO Input and Output Files

Attachment B: Pond Controls and Forebay Sizing Calculations (Scenario 1)

Attachment C: Pond Controls and Forebay Sizing Calculations (Scenario 2)

Attachment D: 100-Year Intake and Culvert Calculations

Attachment E: Oil-and-Grit Separator Report (November 2018, Forterra)

ATTACHMENT

A

SWMHYMO Input and Output Files

JFSA Water Resources and Environmental Consultants

```
00001> 20    Metric units / ID numbers OFF
00002> *#*****************************************************************************
00003> *#  SWMHYMO  / INPUT DATA FILE
00004> *#*****************************************************************************
00005> *#  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00006> *#  Date         : 2017/03/15
00007> *#  Modeller     : [JB]
00008> *#  Updated      : 2017/04/20 [LP]
00009> *#  Updated      : 2017/04/27 [LP]
00010> *#  Company      : JFSAinc.
00011> *#  License #    : 2549237
00012> *#*****************************************************************************
00013> *# Halton 25 mm 3-Hour Chicago Design Storm
00014> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00015> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[001]
00016> *%                   ["25MM03.stm"] <--storm filename, one per line for NSTORM time
00017> *%-----------------|-------------------------------------------------------|
00018> READ STORM          STORM_FILENAME=["storm.001"]
00019> *%-----------------|-------------------------------------------------------|
00020> *#############################################################################
00021> *# PROPOSED CONDITIONS
00022> *#############################################################################
00023> *#
00024> *# An existing Stormwater Management (SWM) Pond on the Region of Halton South
00025> *# Operations Centre site treats approximately 5.75 ha of the site for enhanced
00026> *# quality and 2- to 100-year quantity control before ultimately discharging to
00027> *# Bronte Creek, via a pipe through the Region lands. The existing pond design
00028> *# is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00029> *# Hubicki Associates (TSH).
00030> *#
00031> *# A 1.009 ha commercial block is to be developed as part of the Bronte Green
00032> *# subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00033> *# Creek under existing conditions. The remaining 0.921 ha is a parking lot
00034> *# on the Region lands, draining to the Region pond under existing conditions.
00035> *# Under proposed conditions, the full 1.009 ha commercial block will drain to
00036> *# the Region Pond.
00037> *#
00038> *# Additionally, under proposed conditions, approximately 0.527 ha of the existing
00039> *# drainage area to the Region Pond will be re-constructed as Streets B and K of
00040> *# the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00041> *# directed to the proposed Bronte Green Pond for SWM treatment before discharging
00042> *# to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00043> *# Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00044> *# April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00045> *# for further details.
00046> *#
00047> *# The storage available in the existing Region SWM Pond will be reduced by the
00048> *# development of Streets B and K. On-site storage on the commercial lands is
00049> *# proposed to ensure that proposed conditions outflows from the modified
00050> *# Region SWM Pond will not exceed target outflows, as defined in the May 2001
00051> *# "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00052> *# methods / parameters and SWM requirements consistent with the May 2001 TSH
00053> *# SWM Report have been used to evaluate the performance of the Region SWM Pond
00054> *# under proposed conditions.
00055> *%-----------------|-------------------------------------------------------|
00056> *# Proposed Commercial Block
00057> CALIB STANDHYD      NHYD=["Comm1"], DT=[1](min), AREA=[1.009](ha),
00058>                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00059>                     SCS Procedure: CN=[78],
00060>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00061>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00062>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00063>                                        LGI=[82](m), MNI=[0.013], SCI=[0](min),
00064>                     RAINFALL=[ ,  ,  -1](mm/hr)
00065> *%-----------------|-------------------------------------------------------|
00066> *# Region Pond Block - Modified by Development of Streets B and K
00067> CALIB STANDHYD      NHYD=["Pond1"], DT=[1](min), AREA=[0.442](ha),
00068>                     XIMP=[0.37], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
00069>                     SCS Procedure: CN=[78],
00070>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00071>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00072>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00073>                                        LGI=[54](m), MNI=[0.013], SCI=[0](min),
00074>                     RAINFALL=[ ,  ,  -1](mm/hr)
00075> *%-----------------|-------------------------------------------------------|
00076> *# Existing Region Lands Tributary to Region Pond
00077> *# 100-year capture point 1
00078> CALIB STANDHYD      NHYD=["RL1"], DT=[1](min), AREA=[0.654](ha),
00079>                     XIMP=[0.90], TIMP=[0.90], DWF=[0](cms), LOSS=[2],
00080>                     SCS Procedure: CN=[78],
00081>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00082>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00083>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00084>                                        LGI=[66](m), MNI=[0.013], SCI=[0](min),
00085>                     RAINFALL=[ ,  ,  -1](mm/hr)
00086> *%-----------------|-------------------------------------------------------|
00087> *# Existing Region Lands Tributary to Region Pond
00088> *#  100-year capture point 2
00089> CALIB STANDHYD      NHYD=["RL2"], DT=[1](min), AREA=[2.646](ha),
```

```
00090>                     XIMP=[0.92], TIMP=[0.92], DWF=[0](cms), LOSS=[2],
00091>                     SCS Procedure: CN=[78],
00092>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00093>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00094>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00095>                                        LGI=[133](m), MNI=[0.013], SCI=[0](min),
00096>                     RAINFALL=[ ,  ,  -1](mm/hr)
00097> *%-----------------|-------------------------------------------------------------|
00098> *# On-Site Storage on Proposed Commercial Block
00099> ROUTE RESERVOIR     NHYDout=["Cout"], NHYDin=["Comm1"]
00100>                     RDT=[1](min),
00101>                           TABLE of ( OUTFLOW-STORAGE ) values
00102>                                      (cms) - (ha-m)
00103>                                    [     0 ,  0    ]
00104>                                    [ 0.009 , 0.031 ]
00105>                                    [ 0.105 , 0.050 ]
00106>                                    [   -1  , -1    ]  (max twenty pts)
00107>                   NHYDovf=["Covf"] ,
00108> *%-----------------|-------------------------------------------------------------|
00109> *# Flow in Twin 750 mm Diameter Inlet Pipes
00110> ADD HYD             NHYDsum=["Pipe"], NHYDs to add=["RL1","RL2","Cout","Covf"]
00111> *%-----------------|-------------------------------------------------------------|
00112> *# Total Inflow to Region Pond
00113> ADD HYD             NHYDsum=["Pin"], NHYDs to add=["Pond1","RL1","RL2","Cout",
00114>                     "Covf"]
00115> *%-----------------|-------------------------------------------------------------|
00116> *# Region Pond - Modified by Development of Streets B and K
00117> *# Modified stage-storage relationship as provided by DSEL
00118> *# Outlet controls, operating under free outfall conditions, as per  May 2001
00119> *# "SWM Report, South Operations Centre" by TSH.
00120> *# Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00121> *# Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00122> ROUTE RESERVOIR     NHYDout=["Pout"], NHYDin=["Pin"],
00123>                     RDT=[1](min),
00124>                           TABLE of ( OUTFLOW-STORAGE ) values
00125>                                      (cms) - (ha-m)
00126>                                    [     0 ,  0    ]
00127>                                    [ 0.005 , 0.014 ]
00128>                                    [ 0.008 , 0.030 ]
00129>                                    [ 0.011 , 0.046 ]
00130>                                    [ 0.014 , 0.074 ]
00131>                                    [ 0.016 , 0.104 ]
00132>                                    [ 0.065 , 0.137 ]
00133>                                    [ 0.115 , 0.172 ]
00134>                                    [ 0.160 , 0.209 ]
00135>                                    [ 0.195 , 0.249 ]
00136>                                    [ 0.225 , 0.292 ]
00137>                                    [ 0.251 , 0.337 ]
00138>                                    [ 0.267 , 0.369 ]
00139>                                    [ 0.296 , 0.426 ]
00140>                                    [ 0.323 , 0.495 ]
00141>                                    [ 0.347 , 0.564 ]
00142>                                    [ 0.370 , 0.635 ]
00143>                                    [ 0.391 , 0.707 ]
00144>                                    [ 0.417 , 0.799 ]
00145>                                    [   -1  , -1    ]  (max twenty pts)
00146>                   NHYDovf=["Povf"] ,
00147> *%-----------------|-------------------------------------------------------------|
00148> ******************************************************************************
00149> *# Halton 2-Year 4-Hour Chicago Design Storm
00150> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00151> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[102]
00152> *%                   ["C002Y4hr.stm"] <--storm filename, one per line for NSTORM time
00153> *%-----------------|-------------------------------------------------------------|
00154> *# Halton 5-Year 4-Hour Chicago Design Storm
00155> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00156> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[105]
00157> *%                   ["C005Y4hr.stm"] <--storm filename, one per line for NSTORM time
00158> *%-----------------|-------------------------------------------------------------|
00159> *# Halton 25-Year 4-Hour Chicago Design Storm
00160> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00161> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[125]
00162> *%                   ["C025Y4hr.stm"] <--storm filename, one per line for NSTORM time
00163> *%-----------------|-------------------------------------------------------------|
00164> *# Halton 100-Year 4-Hour Chicago Design Storm
00165> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00166> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[199]
00167> *%                   ["C100Y4hr.stm"] <--storm filename, one per line for NSTORM time
00168> *%-----------------|-------------------------------------------------------------|
00169> *# Hurricane Hazel (Regional Event)
00170> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[999]
00171> *%                   ["hazel-10.stm"] <--storm filename, one per line for NSTORM time
00172> *%-----------------|-------------------------------------------------------------|
00173> FINISH
00174>
```

```
  ================================================================================================
 SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   5555   =========
 S       W W W   MM MM   H   H    Y Y    MM MM   O   O          2     0   0   11   5
 SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O          2     0   0   11   5      Ver 5.500
     S    W W    M   M   H   H     Y     M   M   O   O        222     0   0   11   555    FEB  2015
 SSSSS    W W    M   M   H   H     Y     M   M    OOO         2       0   0   11      5   =========
                                                             2       0   0   11      5   # 2549237
       StormWater Management HYdrologic Model                 222     000    11   555    =========

 ************************************************************************************************
 ************************************  SWMHYMO Ver 5.500  ***********************************
 ******************  A single event and continuous hydrologic simulation model  *****************
 ******************     based on the principles of HYMO and its successors      *****************
 ******************               OTTHYMO-83 and OTTHYMO-89.                    *****************
 ************************************************************************************************
 ****************** Distributed by:  J.F. Sabourin and Associates Inc.          *****************
 ******************                  Ottawa,  Ontario: (613) 836-3884           *****************
 ******************                  Gatineau, Quebec: (819) 243-6858           *****************
 ******************                  E-Mail: swmhymo@jfsa.Com                   *****************
 ************************************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 ++++++++++++++++++ Licensed user: JFSAinc.                                    ++++++++++++++++++
 ++++++++++++++++++                Ottawa               SERIAL#:2549237        ++++++++++++++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ************************************************************************************************
 ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             ******************
 ******************           Maximum value for ID numbers  :     11             ******************
 ******************           Max. number of rainfall points: 105408             ******************
 ******************           Max. number of flow points    : 105408             ******************
 ************************************************************************************************


 *******************************   S U M M A R Y   O U T P U T   *******************************
 ************************************************************************************************
 *                  RUN DATE: 2017-04-27     TIME: 23:46:44     RUN COUNTER: 000634                *
 ************************************************************************************************
 * Input   file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D1.dat        *
 * Output  file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D1.out        *
 * Summary file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D1.sum        *
 * User comments:                                                                               *
 * 1:_____________________________________________________________________________________________*
 * 2:_____________________________________________________________________________________________*
 * 3:_____________________________________________________________________________________________*
 ************************************************************************************************


#*****************************************************************************
#  SWMHYMO  / INPUT DATA FILE
#*****************************************************************************
#  Project Name: [Halton Region Lands]    Project Number: [1051-12]
#  Date         : 2017/03/15
#  Modeller     : [JB]
#  Updated      : 2017/04/20 [LP]
#  Updated      : 2017/04/27 [LP]
#  Company      : JFSAinc.
#  License #    : 2549237
#*****************************************************************************
# Halton 25 mm 3-Hour Chicago Design Storm
# As Per May 2001 "SWM Report, South Operations Centre" by TSH
 RUN#:COMMAND#
R0001:C00001-----------------------------------------------------------------------------------------
     START
       [TZERO =    .00 hrs on        0]
       [METOUT=   2    (1=imperial, 2=metric output)]
       [NSTORM=   1 ]
       [NRUN  = 0001 ]
R0001:C00002-----------------------------------------------------------------------------------------
     READ STORM
       Filename = storm.001
       Comment  = Toronto Bloor St 25mm storm (3 hr) (as Per TSMA)
       [SDT=10.00:SDUR=   3.00:PTOT=  25.00]
##############################################################################
# PROPOSED CONDITIONS
##############################################################################
#
# An existing Stormwater Management (SWM) Pond on the Region of Halton South
# Operations Centre site treats approximately 5.75 ha of the site for enhanced
# quality and 2- to 100-year quantity control before ultimately discharging to
# Bronte Creek, via a pipe through the Region lands. The existing pond design
# is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
# Hubicki Associates (TSH).
#
# A 1.009 ha commercial block is to be developed as part of the Bronte Green
# subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
# Creek under existing conditions. The remaining 0.921 ha is a parking lot
# on the Region lands, draining to the Region pond under existing conditions.
```

```
00090> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00091> # the Region Pond.
00092> #
00093> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00094> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00095> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00096> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00097> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00098> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00099> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00100> # for further details.
00101> #
00102> # The storage available in the existing Region SWM Pond will be reduced by the
00103> # development of Streets B and K. On-site storage on the commercial lands is
00104> # proposed to ensure that proposed conditions outflows from the modified
00105> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00106> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00107> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00108> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00109> # under proposed conditions.
00110> # Proposed Commercial Block
00111> R0001:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00112>     CALIB STANDHYD        1.0 01:Comm1          1.01     .064 No_date    1:10   22.82 .913     .000
00113>       [XIMP=.99:TIMP=.99]
00114>       [LOSS= 2 :CN= 78.0]
00115>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00116>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00117> # Region Pond Block - Modified by Development of Streets B and K
00118> R0001:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00119>     CALIB STANDHYD        1.0 01:Pond1           .44     .011 No_date    1:10   11.26 .450     .000
00120>       [XIMP=.37:TIMP=.37]
00121>       [LOSS= 2 :CN= 78.0]
00122>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00123>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00124> # Existing Region Lands Tributary to Region Pond
00125> # 100-year capture point 1
00126> R0001:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00127>     CALIB STANDHYD        1.0 01:RL1             .65     .038 No_date    1:10   21.14 .845     .000
00128>       [XIMP=.90:TIMP=.90]
00129>       [LOSS= 2 :CN= 78.0]
00130>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00131>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00132> # Existing Region Lands Tributary to Region Pond
00133> #  100-year capture point 2
00134> R0001:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00135>     CALIB STANDHYD        1.0 01:RL2            2.65     .154 No_date    1:10   21.51 .860     .000
00136>       [XIMP=.92:TIMP=.92]
00137>       [LOSS= 2 :CN= 78.0]
00138>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00139>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00140> # On-Site Storage on Proposed Commercial Block
00141> R0001:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00142>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .064 No_date    1:10   22.82  n/a     .000
00143>                 out <=    1.0 01:Cout           1.01     .006 No_date    2:22   22.81  n/a     .000
00144>           overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00145>      {MxStoUsed=.1974E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00146> # Flow in Twin 750 mm Diameter Inlet Pipes
00147> R0001:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00148>     ADD HYD               1.0 02:RL1             .65     .038 No_date    1:10   21.14  n/a     .000
00149>                     +     1.0 02:RL2            2.65     .154 No_date    1:10   21.51  n/a     .000
00150>                     +     1.0 02:Cout           1.01     .006 No_date    2:22   22.81  n/a     .000
00151>                     +     1.0 02:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00152>                   SUM=    1.0 01:Pipe           4.31     .196 No_date    1:10   21.76  n/a     .000
00153> # Total Inflow to Region Pond
00154> R0001:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00155>     ADD HYD               1.0 02:Pond1           .44     .011 No_date    1:10   11.26  n/a     .000
00156>                     +     1.0 02:RL1             .65     .038 No_date    1:10   21.14  n/a     .000
00157>                     +     1.0 02:RL2            2.65     .154 No_date    1:10   21.51  n/a     .000
00158>                     +     1.0 02:Cout           1.01     .006 No_date    2:22   22.81  n/a     .000
00159>                     +     1.0 02:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00160>                   SUM=    1.0 01:Pin            4.75     .207 No_date    1:10   20.78  n/a     .000
00161> # Region Pond - Modified by Development of Streets B and K
00162> # Modified stage-storage relationship as provided by DSEL
00163> # Outlet controls, operating under free outfall conditions, as per  May 2001
00164> # "SWM Report, South Operations Centre" by TSH.
00165> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00166> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00167> R0001:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00168>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75     .207 No_date    1:10   20.78  n/a     .000
00169>                 out <=    1.0 01:Pout           4.75     .014 No_date    2:53   20.78  n/a     .000
00170>           overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00171>      {MxStoUsed=.6985E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00172> # Halton 2-Year 4-Hour Chicago Design Storm
00173> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00174>   ** END OF RUN :  101
00175>
00176> ************************************************************************************************
00177>
00178>
```

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00179>
00180>
00181>
00182>  RUN#:COMMAND#
00183> R0102:C00001-------------------------------------------------------------------------------------------
00184>       START
00185>        [TZERO =    .00 hrs on        0]
00186>        [METOUT=   2    (1=imperial, 2=metric output)]
00187>        [NSTORM=   1 ]
00188>        [NRUN  = 0102 ]
00189> #*****************************************************************************
00190> #  SWMHYMO  / INPUT DATA FILE
00191> #*****************************************************************************
00192> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00193> #  Date        : 2017/03/15
00194> #  Modeller    : [JB]
00195> #  Updated     : 2017/04/20 [LP]
00196> #  Updated     : 2017/04/27 [LP]
00197> #  Company     : JFSAinc.
00198> #  License #   : 2549237
00199> #*****************************************************************************
00200> # Halton 25 mm 3-Hour Chicago Design Storm
00201> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00202> R0102:C00002-------------------------------------------------------------------------------------------
00203>       READ STORM
00204>        Filename = storm.001
00205>        Comment  = 2-Year 4 Hour Chicago Storm (Per TSHA)
00206>        [SDT=10.00:SDUR=   4.00:PTOT=  39.24]
00207> ###############################################################################
00208> # PROPOSED CONDITIONS
00209> ###############################################################################
00210> #
00211> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00212> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00213> # quality and 2- to 100-year quantity control before ultimately discharging to
00214> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00215> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00216> # Hubicki Associates (TSH).
00217> #
00218> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00219> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00220> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00221> # on the Region lands, draining to the Region pond under existing conditions.
00222> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00223> # the Region Pond.
00224> #
00225> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00226> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00227> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00228> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00229> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00230> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00231> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00232> # for further details.
00233> #
00234> # The storage available in the existing Region SWM Pond will be reduced by the
00235> # development of Streets B and K. On-site storage on the commercial lands is
00236> # proposed to ensure that proposed conditions outflows from the modified
00237> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00238> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00239> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00240> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00241> # under proposed conditions.
00242> # Proposed Commercial Block
00243> R0102:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00244>     CALIB STANDHYD        1.0 01:Comm1          1.01     .217 No_date    1:30   36.97 .942     .000
00245>       [XIMP=.99:TIMP=.99]
00246>       [LOSS= 2 :CN= 78.0]
00247>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00248>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00249> # Region Pond Block - Modified by Development of Streets B and K
00250> R0102:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00251>     CALIB STANDHYD        1.0 01:Pond1           .44     .038 No_date    1:30   20.75 .529     .000
00252>       [XIMP=.37:TIMP=.37]
00253>       [LOSS= 2 :CN= 78.0]
00254>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00255>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00256> # Existing Region Lands Tributary to Region Pond
00257> # 100-year capture point 1
00258> R0102:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00259>     CALIB STANDHYD        1.0 01:RL1             .65     .129 No_date    1:30   34.62 .882     .000
00260>       [XIMP=.90:TIMP=.90]
00261>       [LOSS= 2 :CN= 78.0]
00262>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00263>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00264> # Existing Region Lands Tributary to Region Pond
00265> #  100-year capture point 2
00266> R0102:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00267>     CALIB STANDHYD        1.0 01:RL2            2.65     .518 No_date    1:30   35.14 .896     .000
```

```
00268>       [XIMP=.92:TIMP=.92]
00269>       [LOSS= 2 :CN= 78.0]
00270>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00271>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00272> # On-Site Storage on Proposed Commercial Block
00273> R0102:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00274>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .217 No_date    1:30   36.97  n/a     .000
00275>                 out <=    1.0 01:Cout           1.01     .009 No_date    4:00   36.97  n/a     .000
00276>           overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00277>      {MxStoUsed=.2968E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00278> # Flow in Twin 750 mm Diameter Inlet Pipes
00279> R0102:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00280>     ADD HYD               1.0 02:RL1             .65     .129 No_date    1:30   34.62  n/a     .000
00281>                     +     1.0 02:RL2            2.65     .518 No_date    1:30   35.14  n/a     .000
00282>                     +     1.0 02:Cout           1.01     .009 No_date    4:00   36.97  n/a     .000
00283>                     +     1.0 02:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00284>                 SUM=     1.0 01:Pipe           4.31     .651 No_date    1:30   35.49  n/a     .000
00285> # Total Inflow to Region Pond
00286> R0102:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00287>     ADD HYD               1.0 02:Pond1           .44     .038 No_date    1:30   20.75  n/a     .000
00288>                     +     1.0 02:RL1             .65     .129 No_date    1:30   34.62  n/a     .000
00289>                     +     1.0 02:RL2            2.65     .518 No_date    1:30   35.14  n/a     .000
00290>                     +     1.0 02:Cout           1.01     .009 No_date    4:00   36.97  n/a     .000
00291>                     +     1.0 02:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00292>                 SUM=     1.0 01:Pin            4.75     .689 No_date    1:30   34.12  n/a     .000
00293> # Region Pond - Modified by Development of Streets B and K
00294> # Modified stage-storage relationship as provided by DSEL
00295> # Outlet controls, operating under free outfall conditions, as per  May 2001
00296> # "SWM Report, South Operations Centre" by TSH.
00297> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00298> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00299> R0102:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00300>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75     .689 No_date    1:30   34.12  n/a     .000
00301>                 out <=    1.0 01:Pout           4.75     .030 No_date    4:02   34.12  n/a     .000
00302>           overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00303>      {MxStoUsed=.1132E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00304> # Halton 2-Year 4-Hour Chicago Design Storm
00305> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00306> # Halton 5-Year 4-Hour Chicago Design Storm
00307> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00308>   ** END OF RUN :  104
00309>
00310> ****************************************************************************************************
00311>
00312>
00313>
00314>
00315>
00316>  RUN#:COMMAND#
00317> R0105:C00001----------------------------------------------------------------------------------------
00318>      START
00319>       [TZERO =    .00 hrs on        0]
00320>       [METOUT=   2    (1=imperial, 2=metric output)]
00321>       [NSTORM=   1 ]
00322>       [NRUN  = 0105 ]
00323> #*****************************************************************************
00324> #  SWMHYMO  / INPUT DATA FILE
00325> #*****************************************************************************
00326> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00327> #  Date         : 2017/03/15
00328> #  Modeller     : [JB]
00329> #  Updated      : 2017/04/20 [LP]
00330> #  Updated      : 2017/04/27 [LP]
00331> #  Company      : JFSAinc.
00332> #  License #    : 2549237
00333> #*****************************************************************************
00334> # Halton 25 mm 3-Hour Chicago Design Storm
00335> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00336> R0105:C00002----------------------------------------------------------------------------------------
00337>      READ STORM
00338>       Filename = storm.001
00339>       Comment  = 5-Year 4 Hour Chicago Storm (Per TSHA)
00340>       [SDT=10.00:SDUR=   4.00:PTOT=  48.45]
00341> ###############################################################################
00342> # PROPOSED CONDITIONS
00343> ###############################################################################
00344> #
00345> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00346> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00347> # quality and 2- to 100-year quantity control before ultimately discharging to
00348> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00349> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00350> # Hubicki Associates (TSH).
00351> #
00352> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00353> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00354> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00355> # on the Region lands, draining to the Region pond under existing conditions.
00356> # Under proposed conditions, the full 1.009 ha commercial block will drain to
```

```
00357> # the Region Pond.
00358> #
00359> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00360> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00361> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00362> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00363> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00364> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00365> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00366> # for further details.
00367> #
00368> # The storage available in the existing Region SWM Pond will be reduced by the
00369> # development of Streets B and K. On-site storage on the commercial lands is
00370> # proposed to ensure that proposed conditions outflows from the modified
00371> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00372> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00373> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00374> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00375> # under proposed conditions.
00376> # Proposed Commercial Block
00377> R0105:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00378>     CALIB STANDHYD        1.0 01:Comm1          1.01     .311 No_date    1:30   46.15 .953     .000
00379>       [XIMP=.99:TIMP=.99]
00380>       [LOSS= 2 :CN= 78.0]
00381>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00382>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00383> # Region Pond Block - Modified by Development of Streets B and K
00384> R0105:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00385>     CALIB STANDHYD        1.0 01:Pond1           .44     .056 No_date    1:30   27.52 .568     .000
00386>       [XIMP=.37:TIMP=.37]
00387>       [LOSS= 2 :CN= 78.0]
00388>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00389>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00390> # Existing Region Lands Tributary to Region Pond
00391> # 100-year capture point 1
00392> R0105:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00393>     CALIB STANDHYD        1.0 01:RL1            .65     .185 No_date    1:30   43.44 .897     .000
00394>       [XIMP=.90:TIMP=.90]
00395>       [LOSS= 2 :CN= 78.0]
00396>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00397>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00398> # Existing Region Lands Tributary to Region Pond
00399> #  100-year capture point 2
00400> R0105:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00401>     CALIB STANDHYD        1.0 01:RL2           2.65     .752 No_date    1:30   44.04 .909     .000
00402>       [XIMP=.92:TIMP=.92]
00403>       [LOSS= 2 :CN= 78.0]
00404>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00405>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00406> # On-Site Storage on Proposed Commercial Block
00407> R0105:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00408>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .311 No_date    1:30   46.15  n/a     .000
00409>                 out <=    1.0 01:Cout           1.01     .022 No_date    2:20   46.15  n/a     .000
00410>            overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00411>      {MxStoUsed=.3348E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00412> # Flow in Twin 750 mm Diameter Inlet Pipes
00413> R0105:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00414>     ADD HYD               1.0 02:RL1            .65     .185 No_date    1:30   43.44  n/a     .000
00415>                     +     1.0 02:RL2           2.65     .752 No_date    1:30   44.04  n/a     .000
00416>                     +     1.0 02:Cout          1.01     .022 No_date    2:20   46.15  n/a     .000
00417>                     +     1.0 02:Covf           .00     .000 No_date    0:00     .00  n/a     .000
00418>                   SUM=    1.0 01:Pipe          4.31     .943 No_date    1:30   44.44  n/a     .000
00419> # Total Inflow to Region Pond
00420> R0105:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00421>     ADD HYD               1.0 02:Pond1           .44     .056 No_date    1:30   27.52  n/a     .000
00422>                     +     1.0 02:RL1            .65     .185 No_date    1:30   43.44  n/a     .000
00423>                     +     1.0 02:RL2           2.65     .752 No_date    1:30   44.04  n/a     .000
00424>                     +     1.0 02:Cout          1.01     .022 No_date    2:20   46.15  n/a     .000
00425>                     +     1.0 02:Covf           .00     .000 No_date    0:00     .00  n/a     .000
00426>                   SUM=    1.0 01:Pin           4.75    1.000 No_date    1:30   42.87  n/a     .000
00427> # Region Pond - Modified by Development of Streets B and K
00428> # Modified stage-storage relationship as provided by DSEL
00429> # Outlet controls, operating under free outfall conditions, as per  May 2001
00430> # "SWM Report, South Operations Centre" by TSH.
00431> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00432> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00433> R0105:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00434>     ROUTE RESERVOIR ->    1.0 02:Pin           4.75    1.000 No_date    1:30   42.87  n/a     .000
00435>                 out <=    1.0 01:Pout          4.75     .056 No_date    3:22   42.87  n/a     .000
00436>            overflow <=    1.0 03:Povf           .00     .000 No_date    0:00     .00  n/a     .000
00437>      {MxStoUsed=.1308E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00438> # Halton 2-Year 4-Hour Chicago Design Storm
00439> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00440> # Halton 5-Year 4-Hour Chicago Design Storm
00441> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00442> # Halton 25-Year 4-Hour Chicago Design Storm
00443> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00444>   ** END OF RUN :  124
00445>
```

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00446> ********************************************************************************************************
00447>
00448>
00449>
00450>
00451>
00452>  RUN#:COMMAND#
00453> R0125:C00001-------------------------------------------------------------------------------------------
00454>       START
00455>        [TZERO =    .00 hrs on        0]
00456>        [METOUT=   2    (1=imperial, 2=metric output)]
00457>        [NSTORM=   1 ]
00458>        [NRUN  = 0125 ]
00459> #*****************************************************************************
00460> #  SWMHYMO  / INPUT DATA FILE
00461> #*****************************************************************************
00462> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00463> #  Date         : 2017/03/15
00464> #  Modeller     : [JB]
00465> #  Updated      : 2017/04/20 [LP]
00466> #  Updated      : 2017/04/27 [LP]
00467> #  Company      : JFSAinc.
00468> #  License #    : 2549237
00469> #*****************************************************************************
00470> # Halton 25 mm 3-Hour Chicago Design Storm
00471> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00472> R0125:C00002-------------------------------------------------------------------------------------------
00473>       READ STORM
00474>        Filename = storm.001
00475>        Comment  = 25-Year 4 Hour Chicago Storm (Per TSHA)
00476>        [SDT=10.00:SDUR=   4.00:PTOT=  66.10]
00477> ###############################################################################
00478> # PROPOSED CONDITIONS
00479> ###############################################################################
00480> #
00481> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00482> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00483> # quality and 2- to 100-year quantity control before ultimately discharging to
00484> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00485> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00486> # Hubicki Associates (TSH).
00487> #
00488> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00489> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00490> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00491> # on the Region lands, draining to the Region pond under existing conditions.
00492> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00493> # the Region Pond.
00494> #
00495> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00496> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00497> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00498> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00499> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00500> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00501> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00502> # for further details.
00503> #
00504> # The storage available in the existing Region SWM Pond will be reduced by the
00505> # development of Streets B and K. On-site storage on the commercial lands is
00506> # proposed to ensure that proposed conditions outflows from the modified
00507> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00508> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00509> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00510> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00511> # under proposed conditions.
00512> # Proposed Commercial Block
00513> R0125:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00514>     CALIB STANDHYD        1.0 01:Comm1          1.01     .441 No_date    1:30   63.74 .964     .000
00515>       [XIMP=.99:TIMP=.99]
00516>       [LOSS= 2 :CN= 78.0]
00517>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00518>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00519> # Region Pond Block - Modified by Development of Streets B and K
00520> R0125:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00521>     CALIB STANDHYD        1.0 01:Pond1           .44     .090 No_date    1:30   41.43 .627     .000
00522>       [XIMP=.37:TIMP=.37]
00523>       [LOSS= 2 :CN= 78.0]
00524>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00525>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00526> # Existing Region Lands Tributary to Region Pond
00527> # 100-year capture point 1
00528> R0125:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00529>     CALIB STANDHYD        1.0 01:RL1             .65     .264 No_date    1:30   60.50 .915     .000
00530>       [XIMP=.90:TIMP=.90]
00531>       [LOSS= 2 :CN= 78.0]
00532>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00533>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00534> # Existing Region Lands Tributary to Region Pond
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00535> #  100-year capture point 2
00536> R0125:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00537>     CALIB STANDHYD        1.0 01:RL2            2.65    1.076 No_date    1:30   61.22 .926     .000
00538>       [XIMP=.92:TIMP=.92]
00539>       [LOSS= 2 :CN= 78.0]
00540>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00541>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00542> # On-Site Storage on Proposed Commercial Block
00543> R0125:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00544>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .441 No_date    1:30   63.74  n/a     .000
00545>                 out <=    1.0 01:Cout           1.01     .055 No_date    1:51   63.74  n/a     .000
00546>            overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00547>      {MxStoUsed=.4017E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00548> # Flow in Twin 750 mm Diameter Inlet Pipes
00549> R0125:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00550>     ADD HYD               1.0 02:RL1             .65     .264 No_date    1:30   60.50  n/a     .000
00551>                     +     1.0 02:RL2            2.65    1.076 No_date    1:30   61.22  n/a     .000
00552>                     +     1.0 02:Cout           1.01     .055 No_date    1:51   63.74  n/a     .000
00553>                     +     1.0 02:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00554>                   SUM=    1.0 01:Pipe           4.31    1.351 No_date    1:30   61.70  n/a     .000
00555> # Total Inflow to Region Pond
00556> R0125:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00557>     ADD HYD               1.0 02:Pond1           .44     .090 No_date    1:30   41.43  n/a     .000
00558>                     +     1.0 02:RL1             .65     .264 No_date    1:30   60.50  n/a     .000
00559>                     +     1.0 02:RL2            2.65    1.076 No_date    1:30   61.22  n/a     .000
00560>                     +     1.0 02:Cout           1.01     .055 No_date    1:51   63.74  n/a     .000
00561>                     +     1.0 02:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00562>                   SUM=    1.0 01:Pin            4.75    1.440 No_date    1:30   59.81  n/a     .000
00563> # Region Pond - Modified by Development of Streets B and K
00564> # Modified stage-storage relationship as provided by DSEL
00565> # Outlet controls, operating under free outfall conditions, as per  May 2001
00566> # "SWM Report, South Operations Centre" by TSH.
00567> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00568> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00569> R0125:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00570>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75    1.440 No_date    1:30   59.81  n/a     .000
00571>                 out <=    1.0 01:Pout           4.75     .112 No_date    2:42   59.81  n/a     .000
00572>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00573>      {MxStoUsed=.1700E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00574> # Halton 2-Year 4-Hour Chicago Design Storm
00575> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00576> # Halton 5-Year 4-Hour Chicago Design Storm
00577> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00578> # Halton 25-Year 4-Hour Chicago Design Storm
00579> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00580> # Halton 100-Year 4-Hour Chicago Design Storm
00581> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00582>   ** END OF RUN :  198
00583>
00584> ********************************************************************************************
00585>
00586>
00587>
00588>
00589>
00590>  RUN#:COMMAND#
00591> R0199:C00001------------------------------------------------------------------------------------
00592>      START
00593>       [TZERO =    .00 hrs on        0]
00594>       [METOUT=   2    (1=imperial, 2=metric output)]
00595>       [NSTORM=   1 ]
00596>       [NRUN  = 0199 ]
00597> #*****************************************************************************
00598> #  SWMHYMO  / INPUT DATA FILE
00599> #*****************************************************************************
00600> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00601> #  Date         : 2017/03/15
00602> #  Modeller     : [JB]
00603> #  Updated      : 2017/04/20 [LP]
00604> #  Updated      : 2017/04/27 [LP]
00605> #  Company      : JFSAinc.
00606> #  License #    : 2549237
00607> #*****************************************************************************
00608> # Halton 25 mm 3-Hour Chicago Design Storm
00609> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00610> R0199:C00002------------------------------------------------------------------------------------
00611>      READ STORM
00612>       Filename = storm.001
00613>       Comment  = 100-Year 4 Hour Chicago Storm (Per TSHA)
00614>       [SDT=10.00:SDUR=   4.00:PTOT=  83.74]
00615> ###############################################################################
00616> # PROPOSED CONDITIONS
00617> ###############################################################################
00618> #
00619> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00620> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00621> # quality and 2- to 100-year quantity control before ultimately discharging to
00622> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00623> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
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00624> # Hubicki Associates (TSH).
00625> #
00626> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00627> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00628> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00629> # on the Region lands, draining to the Region pond under existing conditions.
00630> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00631> # the Region Pond.
00632> #
00633> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00634> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00635> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00636> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00637> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00638> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00639> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00640> # for further details.
00641> #
00642> # The storage available in the existing Region SWM Pond will be reduced by the
00643> # development of Streets B and K. On-site storage on the commercial lands is
00644> # proposed to ensure that proposed conditions outflows from the modified
00645> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00646> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00647> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00648> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00649> # under proposed conditions.
00650> # Proposed Commercial Block
00651> R0199:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00652>     CALIB STANDHYD        1.0 01:Comm1          1.01     .572 No_date    1:30   81.33 .971     .000
00653>       [XIMP=.99:TIMP=.99]
00654>       [LOSS= 2 :CN= 78.0]
00655>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00656>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00657> # Region Pond Block - Modified by Development of Streets B and K
00658> R0199:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00659>     CALIB STANDHYD        1.0 01:Pond1           .44     .132 No_date    1:30   56.22 .671     .000
00660>       [XIMP=.37:TIMP=.37]
00661>       [LOSS= 2 :CN= 78.0]
00662>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00663>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00664> # Existing Region Lands Tributary to Region Pond
00665> # 100-year capture point 1
00666> R0199:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00667>     CALIB STANDHYD        1.0 01:RL1             .65     .345 No_date    1:30   77.69 .928     .000
00668>       [XIMP=.90:TIMP=.90]
00669>       [LOSS= 2 :CN= 78.0]
00670>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00671>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00672> # Existing Region Lands Tributary to Region Pond
00673> #  100-year capture point 2
00674> R0199:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00675>     CALIB STANDHYD        1.0 01:RL2            2.65    1.410 No_date    1:30   78.50 .937     .000
00676>       [XIMP=.92:TIMP=.92]
00677>       [LOSS= 2 :CN= 78.0]
00678>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00679>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00680> # On-Site Storage on Proposed Commercial Block
00681> R0199:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00682>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .572 No_date    1:30   81.33  n/a     .000
00683>                 out <=    1.0 01:Cout           1.01     .105 No_date    1:42   81.33  n/a     .000
00684>           overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00685>      {MxStoUsed=.4997E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00686> # Flow in Twin 750 mm Diameter Inlet Pipes
00687> R0199:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00688>     ADD HYD               1.0 02:RL1             .65     .345 No_date    1:30   77.69  n/a     .000
00689>                     +     1.0 02:RL2            2.65    1.410 No_date    1:30   78.50  n/a     .000
00690>                     +     1.0 02:Cout           1.01     .105 No_date    1:42   81.33  n/a     .000
00691>                     +     1.0 02:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00692>                   SUM=    1.0 01:Pipe           4.31    1.823 No_date    1:30   79.04  n/a     .000
00693> # Total Inflow to Region Pond
00694> R0199:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00695>     ADD HYD               1.0 02:Pond1           .44     .132 No_date    1:30   56.22  n/a     .000
00696>                     +     1.0 02:RL1             .65     .345 No_date    1:30   77.69  n/a     .000
00697>                     +     1.0 02:RL2            2.65    1.410 No_date    1:30   78.50  n/a     .000
00698>                     +     1.0 02:Cout           1.01     .105 No_date    1:42   81.33  n/a     .000
00699>                     +     1.0 02:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00700>                   SUM=    1.0 01:Pin            4.75    1.955 No_date    1:30   76.91  n/a     .000
00701> # Region Pond - Modified by Development of Streets B and K
00702> # Modified stage-storage relationship as provided by DSEL
00703> # Outlet controls, operating under free outfall conditions, as per  May 2001
00704> # "SWM Report, South Operations Centre" by TSH.
00705> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00706> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00707> R0199:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00708>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75    1.955 No_date    1:30   76.91  n/a     .000
00709>                 out <=    1.0 01:Pout           4.75     .171 No_date    2:24   76.91  n/a     .000
00710>           overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00711>      {MxStoUsed=.2212E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00712> # Halton 2-Year 4-Hour Chicago Design Storm
```

```
00713> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00714> # Halton 5-Year 4-Hour Chicago Design Storm
00715> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00716> # Halton 25-Year 4-Hour Chicago Design Storm
00717> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00718> # Halton 100-Year 4-Hour Chicago Design Storm
00719> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00720> # Hurricane Hazel (Regional Event)
00721>   ** END OF RUN :  998
00722>
00723> ***************************************************************************************************
00724>
00725>
00726>
00727>
00728>
00729>  RUN#:COMMAND#
00730> R0999:C00001-----------------------------------------------------------------------------------------
00731>       START
00732>         [TZERO =    .00 hrs on        0]
00733>         [METOUT=   2    (1=imperial, 2=metric output)]
00734>         [NSTORM=   1 ]
00735>         [NRUN  = 0999 ]
00736> #*****************************************************************************
00737> #  SWMHYMO  / INPUT DATA FILE
00738> #*****************************************************************************
00739> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00740> #  Date         : 2017/03/15
00741> #  Modeller     : [JB]
00742> #  Updated      : 2017/04/20 [LP]
00743> #  Updated      : 2017/04/27 [LP]
00744> #  Company      : JFSAinc.
00745> #  License #    : 2549237
00746> #*****************************************************************************
00747> # Halton 25 mm 3-Hour Chicago Design Storm
00748> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00749> R0999:C00002-----------------------------------------------------------------------------------------
00750>       READ STORM
00751>         Filename = storm.001
00752>         Comment  = Hurricane Hazel
00753>         [SDT=10.00:SDUR=  48.00:PTOT= 285.08]
00754> ###############################################################################
00755> # PROPOSED CONDITIONS
00756> ###############################################################################
00757> #
00758> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00759> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00760> # quality and 2- to 100-year quantity control before ultimately discharging to
00761> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00762> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00763> # Hubicki Associates (TSH).
00764> #
00765> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00766> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00767> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00768> # on the Region lands, draining to the Region pond under existing conditions.
00769> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00770> # the Region Pond.
00771> #
00772> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00773> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00774> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00775> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00776> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00777> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00778> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00779> # for further details.
00780> #
00781> # The storage available in the existing Region SWM Pond will be reduced by the
00782> # development of Streets B and K. On-site storage on the commercial lands is
00783> # proposed to ensure that proposed conditions outflows from the modified
00784> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00785> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00786> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00787> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00788> # under proposed conditions.
00789> # Proposed Commercial Block
00790> R0999:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00791>     CALIB STANDHYD        1.0 01:Comm1          1.01     .148 No_date   46:00  282.48 .991     .000
00792>       [XIMP=.99:TIMP=.99]
00793>       [LOSS= 2 :CN= 78.0]
00794>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00795>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00796> # Region Pond Block - Modified by Development of Streets B and K
00797> R0999:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00798>     CALIB STANDHYD        1.0 01:Pond1           .44     .062 No_date   46:00  245.25 .860     .000
00799>       [XIMP=.37:TIMP=.37]
00800>       [LOSS= 2 :CN= 78.0]
00801>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
```

```
00802>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00803> # Existing Region Lands Tributary to Region Pond
00804> # 100-year capture point 1
00805> R0999:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00806>     CALIB STANDHYD        1.0 01:RL1             .65     .096 No_date   46:00  277.08 .972     .000
00807>       [XIMP=.90:TIMP=.90]
00808>       [LOSS= 2 :CN= 78.0]
00809>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00810>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00811> # Existing Region Lands Tributary to Region Pond
00812> #  100-year capture point 2
00813> R0999:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00814>     CALIB STANDHYD        1.0 01:RL2            2.65     .387 No_date   46:00  278.28 .976     .000
00815>       [XIMP=.92:TIMP=.92]
00816>       [LOSS= 2 :CN= 78.0]
00817>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00818>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00819> # On-Site Storage on Proposed Commercial Block
00820> R0999:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00821>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .148 No_date   46:00  282.48  n/a     .000
00822>                 out <=    1.0 01:Cout            .98     .105 No_date   45:35  282.48  n/a     .000
00823>           overflow <=    1.0 03:Covf            .03     .043 No_date   46:00  282.48  n/a     .000
00824>      {MxStoUsed=.5000E-01  m3, TotOvfVol=.8005E-02  m3, N-Ovf=    3, TotDurOvf=    1.hrs}
00825> # Flow in Twin 750 mm Diameter Inlet Pipes
00826> R0999:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00827>     ADD HYD               1.0 02:RL1             .65     .096 No_date   46:00  277.08  n/a     .000
00828>                     +     1.0 02:RL2            2.65     .387 No_date   46:00  278.28  n/a     .000
00829>                     +     1.0 02:Cout            .98     .105 No_date   45:35  282.48  n/a     .000
00830>                     +     1.0 02:Covf            .03     .043 No_date   46:00  282.48  n/a     .000
00831>                   SUM=    1.0 01:Pipe           4.31     .631 No_date   46:00  279.08  n/a     .000
00832> # Total Inflow to Region Pond
00833> R0999:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00834>     ADD HYD               1.0 02:Pond1           .44     .062 No_date   46:00  245.25  n/a     .000
00835>                     +     1.0 02:RL1             .65     .096 No_date   46:00  277.08  n/a     .000
00836>                     +     1.0 02:RL2            2.65     .387 No_date   46:00  278.28  n/a     .000
00837>                     +     1.0 02:Cout            .98     .105 No_date   45:35  282.48  n/a     .000
00838>                     +     1.0 02:Covf            .03     .043 No_date   46:00  282.48  n/a     .000
00839>                   SUM=    1.0 01:Pin            4.75     .694 No_date   46:00  275.93  n/a     .000
00840> # Region Pond - Modified by Development of Streets B and K
00841> # Modified stage-storage relationship as provided by DSEL
00842> # Outlet controls, operating under free outfall conditions, as per  May 2001
00843> # "SWM Report, South Operations Centre" by TSH.
00844> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00845> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00846> R0999:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00847>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75     .694 No_date   46:00  275.93  n/a     .000
00848>                 out <=    1.0 01:Pout           4.75     .308 No_date   47:06  275.93  n/a     .000
00849>           overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00850>      {MxStoUsed=.4576E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00851> # Halton 2-Year 4-Hour Chicago Design Storm
00852> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00853> # Halton 5-Year 4-Hour Chicago Design Storm
00854> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00855> # Halton 25-Year 4-Hour Chicago Design Storm
00856> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00857> # Halton 100-Year 4-Hour Chicago Design Storm
00858> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00859> # Hurricane Hazel (Regional Event)
00860> R0999:C00002-------------------------------------------------------------------------------------------
00861>     FINISH
00862> -------------------------------------------------------------------------------------------------------
00863> *******************************************************************************************************
00864>      WARNINGS / ERRORS / NOTES
00865>      -------------------------
00866>    Simulation ended on 2017-04-27     at 23:46:45
00867> =======================================================================================================
00868>
00869>
```

```
00001> 20    Metric units / ID numbers OFF
00002> *#*****************************************************************************
00003> *#  SWMHYMO  / INPUT DATA FILE
00004> *#*****************************************************************************
00005> *#  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00006> *#  Date         : 2017/03/15
00007> *#  Modeller     : [JB]
00008> *#  Updated      : 2017/04/20 [LP]
00009> *#  Updated      : 2017/04/27 [LP]
00010> *#  Company      : JFSAinc.
00011> *#  License #    : 2549237
00012> *#*****************************************************************************
00013> *# Halton 25 mm 3-Hour Chicago Design Storm
00014> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00015> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[001]
00016> *%                   ["25MM03.stm"] <--storm filename, one per line for NSTORM time
00017> *%-----------------|-------------------------------------------------------|
00018> READ STORM          STORM_FILENAME=["storm.001"]
00019> *%-----------------|-------------------------------------------------------|
00020> *#############################################################################
00021> *# PROPOSED CONDITIONS
00022> *#############################################################################
00023> *#
00024> *# An existing Stormwater Management (SWM) Pond on the Region of Halton South
00025> *# Operations Centre site treats approximately 5.75 ha of the site for enhanced
00026> *# quality and 2- to 100-year quantity control before ultimately discharging to
00027> *# Bronte Creek, via a pipe through the Region lands. The existing pond design
00028> *# is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00029> *# Hubicki Associates (TSH).
00030> *#
00031> *# A 1.009 ha commercial block is to be developed as part of the Bronte Green
00032> *# subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00033> *# Creek under existing conditions. The remaining 0.921 ha is a parking lot
00034> *# on the Region lands, draining to the Region pond under existing conditions.
00035> *# Under interim conditions, the full 1.009 ha commercial block will be grassed
00036> *# over (no impervious land) and drain to the Region Pond.
00037> *#
00038> *# Additionally, under proposed conditions, approximately 0.527 ha of the existing
00039> *# drainage area to the Region Pond will be re-constructed as Streets B and K of
00040> *# the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00041> *# directed to the proposed Bronte Green Pond for SWM treatment before discharging
00042> *# to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00043> *# Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00044> *# April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00045> *# for further details.
00046> *#
00047> *# The storage available in the existing Region SWM Pond will be reduced by the
00048> *# development of Streets B and K. The commercial lands will be grassed over under
00049> *# interim conditions to ensure that interim conditions outflows from the modified
00050> *# Region SWM Pond will not exceed target outflows, as defined in the May 2001
00051> *# "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00052> *# methods / parameters and SWM requirements consistent with the May 2001 TSH
00053> *# SWM Report have been used to evaluate the performance of the Region SWM Pond
00054> *# under interim conditions.
00055> *%-----------------|-------------------------------------------------------|
00056> *# Proposed Commercial Block
00057> CALIB STANDHYD      NHYD=["Comm1"], DT=[1](min), AREA=[1.009](ha),
00058>                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00059>                     SCS Procedure: CN=[78],
00060>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00061>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00062>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00063>                                        LGI=[82](m), MNI=[0.013], SCI=[0](min),
00064>                     RAINFALL=[ ,  ,  -1](mm/hr)
00065> *%-----------------|-------------------------------------------------------|
00066> *# Interim Commercial Block
00067> *# CN = 84 -> CN* = 78 urban grassed area in fair condition (Soil Group D)
00068> *# Time to peak calculated as 2/3 of the Bransby Williams time of concentration
00069> *# for a 130 m distance from 129 m elevation to 127 m elevation
00070> CALIB NASHYD        NHYD=["Comm1"], DT=[1]min, AREA=[1.009](ha),
00071>                     DWF=[0](cms),  CN/C=[78], IA=[5](mm),
00072>                     N=[3], TP=[0.08]hrs,
00073>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00074> *%-----------------|-------------------------------------------------------|
00075> *# Region Pond Block - Modified by Development of Streets B and K
00076> CALIB STANDHYD      NHYD=["Pond1"], DT=[1](min), AREA=[0.442](ha),
00077>                     XIMP=[0.37], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
00078>                     SCS Procedure: CN=[78],
00079>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00080>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00081>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00082>                                        LGI=[54](m), MNI=[0.013], SCI=[0](min),
00083>                     RAINFALL=[ ,  ,  -1](mm/hr)
00084> *%-----------------|-------------------------------------------------------|
00085> *# Existing Region Lands Tributary to Region Pond
00086> *# 100-year capture point 1
00087> CALIB STANDHYD      NHYD=["RL1"], DT=[1](min), AREA=[0.654](ha),
00088>                     XIMP=[0.90], TIMP=[0.90], DWF=[0](cms), LOSS=[2],
00089>                     SCS Procedure: CN=[78],
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00090>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00091>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00092>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00093>                                        LGI=[66](m), MNI=[0.013], SCI=[0](min),
00094>                     RAINFALL=[ ,  ,  -1](mm/hr)
00095> *%-----------------|-------------------------------------------------------------|
00096> *# Existing Region Lands Tributary to Region Pond
00097> *# 100-year capture point 2
00098> CALIB STANDHYD      NHYD=["RL2"], DT=[1](min), AREA=[2.646](ha),
00099>                     XIMP=[0.92], TIMP=[0.92], DWF=[0](cms), LOSS=[2],
00100>                     SCS Procedure: CN=[78],
00101>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00102>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00103>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00104>                                        LGI=[133](m), MNI=[0.013], SCI=[0](min),
00105>                     RAINFALL=[ ,  ,  -1](mm/hr)
00106> *%-----------------|-------------------------------------------------------------|
00107> *# Flow in Twin 750 mm Diameter Inlet Pipes
00108> ADD HYD             NHYDsum=["Pipe"], NHYDs to add=["RL1","RL2","Comm1"]
00109> *%-----------------|-------------------------------------------------------------|
00110> *# Total Inflow to Region Pond
00111> ADD HYD             NHYDsum=["Pin"], NHYDs to add=["Pond1","RL1","RL2","Comm1"]
00112> *%-----------------|-------------------------------------------------------------|
00113> *# Region Pond - Modified by Development of Streets B and K
00114> *# Modified stage-storage relationship as provided by DSEL
00115> *# Outlet controls, operating under free outfall conditions, as per  May 2001
00116> *# "SWM Report, South Operations Centre" by TSH.
00117> *# Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00118> *# Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00119> ROUTE RESERVOIR     NHYDout=["Pout"], NHYDin=["Pin"],
00120>                     RDT=[1](min),
00121>                           TABLE of ( OUTFLOW-STORAGE ) values
00122>                                      (cms) - (ha-m)
00123>                                    [     0 ,  0    ]
00124>                                    [ 0.005 , 0.014 ]
00125>                                    [ 0.008 , 0.030 ]
00126>                                    [ 0.011 , 0.046 ]
00127>                                    [ 0.014 , 0.074 ]
00128>                                    [ 0.016 , 0.104 ]
00129>                                    [ 0.065 , 0.137 ]
00130>                                    [ 0.115 , 0.172 ]
00131>                                    [ 0.160 , 0.209 ]
00132>                                    [ 0.195 , 0.249 ]
00133>                                    [ 0.225 , 0.292 ]
00134>                                    [ 0.251 , 0.337 ]
00135>                                    [ 0.267 , 0.369 ]
00136>                                    [ 0.296 , 0.426 ]
00137>                                    [ 0.323 , 0.495 ]
00138>                                    [ 0.347 , 0.564 ]
00139>                                    [ 0.370 , 0.635 ]
00140>                                    [ 0.391 , 0.707 ]
00141>                                    [ 0.417 , 0.799 ]
00142>                                    [   -1  , -1    ]  (max twenty pts)
00143>                    NHYDovf=["Povf"] ,
00144> *%-----------------|-------------------------------------------------------------|
00145> ********************************************************************************
00146> *# Halton 2-Year 4-Hour Chicago Design Storm
00147> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00148> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[102]
00149> *%                   ["C002Y4hr.stm"] <--storm filename, one per line for NSTORM time
00150> *%-----------------|-------------------------------------------------------------|
00151> *# Halton 5-Year 4-Hour Chicago Design Storm
00152> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00153> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[105]
00154> *%                   ["C005Y4hr.stm"] <--storm filename, one per line for NSTORM time
00155> *%-----------------|-------------------------------------------------------------|
00156> *# Halton 25-Year 4-Hour Chicago Design Storm
00157> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00158> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[125]
00159> *%                   ["C025Y4hr.stm"] <--storm filename, one per line for NSTORM time
00160> *%-----------------|-------------------------------------------------------------|
00161> *# Halton 100-Year 4-Hour Chicago Design Storm
00162> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00163> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[199]
00164> *%                   ["C100Y4hr.stm"] <--storm filename, one per line for NSTORM time
00165> *%-----------------|-------------------------------------------------------------|
00166> *# Hurricane Hazel (Regional Event)
00167> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[999]
00168> *%                   ["hazel-10.stm"] <--storm filename, one per line for NSTORM time
00169> *%-----------------|-------------------------------------------------------------|
00170> FINISH
00171>
```

```
00001>  ================================================================================================
00002>
00003>  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   5555   =========
00004>  S       W W W   MM MM   H   H    Y Y    MM MM   O   O          2     0   0   11   5
00005>  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O          2     0   0   11   5      Ver 5.500
00006>      S    W W    M   M   H   H     Y     M   M   O   O        222     0   0   11   555    FEB  2015
00007>  SSSSS    W W    M   M   H   H     Y     M   M    OOO         2       0   0   11      5   =========
00008>                                                               2       0   0   11      5   # 2549237
00009>        StormWater Management HYdrologic Model                  222     000    11   555    =========
00010>
00011>  ************************************************************************************************
00012>  ************************************  SWMHYMO Ver 5.500  *************************************
00013>  ******************  A single event and continuous hydrologic simulation model  ******************
00014>  ******************     based on the principles of HYMO and its successors      ******************
00015>  ******************                OTTHYMO-83 and OTTHYMO-89.                  ******************
00016>  ************************************************************************************************
00017>  ****************** Distributed by:  J.F. Sabourin and Associates Inc.          ******************
00018>  ******************                  Ottawa,  Ontario: (613) 836-3884          ******************
00019>  ******************                  Gatineau, Quebec: (819) 243-6858          ******************
00020>  ******************                  E-Mail: swmhymo@jfsa.Com                  ******************
00021>  ************************************************************************************************
00022>
00023>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  ++++++++++++++++++ Licensed user: JFSAinc.                                  ++++++++++++++++++++
00025>  ++++++++++++++++++                Ottawa               SERIAL#:2549237      ++++++++++++++++++++
00026>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ************************************************************************************************
00029>  ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++           ******************
00030>  ******************           Maximum value for ID numbers  :     11           ******************
00031>  ******************           Max. number of rainfall points: 105408           ******************
00032>  ******************           Max. number of flow points    : 105408           ******************
00033>  ************************************************************************************************
00034>
00035>
00036>  *********************************   S U M M A R Y   O U T P U T   *********************************
00037>  ************************************************************************************************
00038>  *                  RUN DATE: 2017-04-27     TIME: 23:47:38     RUN COUNTER: 000635                *
00039>  ************************************************************************************************
00040>  * Input   file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D1int.dat     *
00041>  * Output  file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D1int.out     *
00042>  * Summary file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D1int.sum     *
00043>  * User comments:                                                                                *
00044>  * 1:_____________________________________________________________________________________________*
00045>  * 2:_____________________________________________________________________________________________*
00046>  * 3:_____________________________________________________________________________________________*
00047>  ************************************************************************************************
00048>
00049>
00050> #*****************************************************************************
00051> #  SWMHYMO  / INPUT DATA FILE
00052> #*****************************************************************************
00053> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00054> #  Date         : 2017/03/15
00055> #  Modeller     : [JB]
00056> #  Updated      : 2017/04/20 [LP]
00057> #  Updated      : 2017/04/27 [LP]
00058> #  Company      : JFSAinc.
00059> #  License #    : 2549237
00060> #*****************************************************************************
00061> # Halton 25 mm 3-Hour Chicago Design Storm
00062> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00063>  RUN#:COMMAND#
00064> R0001:C00001-------------------------------------------------------------------------------------
00065>      START
00066>       [TZERO =    .00 hrs on        0]
00067>       [METOUT=   2    (1=imperial, 2=metric output)]
00068>       [NSTORM=   1 ]
00069>       [NRUN  = 0001 ]
00070> R0001:C00002-------------------------------------------------------------------------------------
00071>      READ STORM
00072>       Filename = storm.001
00073>       Comment  = Toronto Bloor St 25mm storm (3 hr) (as Per TSMA)
00074>       [SDT=10.00:SDUR=   3.00:PTOT=  25.00]
00075> ###############################################################################
00076> # PROPOSED CONDITIONS
00077> ###############################################################################
00078> #
00079> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00080> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00081> # quality and 2- to 100-year quantity control before ultimately discharging to
00082> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00083> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00084> # Hubicki Associates (TSH).
00085> #
00086> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00087> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00088> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00089> # on the Region lands, draining to the Region pond under existing conditions.
```

```
00090> # Under interim conditions, the full 1.009 ha commercial block will be grassed
00091> # over (no impervious land) and drain to the Region Pond.
00092> #
00093> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00094> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00095> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00096> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00097> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00098> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00099> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00100> # for further details.
00101> #
00102> # The storage available in the existing Region SWM Pond will be reduced by the
00103> # development of Streets B and K. The commercial lands will be grassed over under
00104> # interim conditions to ensure that interim conditions outflows from the modified
00105> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00106> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00107> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00108> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00109> # under interim conditions.
00110> # Proposed Commercial Block
00111> R0001:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00112>     CALIB STANDHYD        1.0 01:Comm1          1.01     .064 No_date    1:10   22.82 .913     .000
00113>       [XIMP=.99:TIMP=.99]
00114>       [LOSS= 2 :CN= 78.0]
00115>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00116>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00117> # Interim Commercial Block
00118> # CN = 84 -> CN* = 78 urban grassed area in fair condition (Soil Group D)
00119> # Time to peak calculated as 2/3 of the Bransby Williams time of concentration
00120> # for a 130 m distance from 129 m elevation to 127 m elevation
00121> R0001:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00122>     CALIB NASHYD          1.0 01:Comm1          1.01     .013 No_date    1:21    4.37 .175     .000
00123>       [CN= 78.0: N= 3.00: Tp=  .08]
00124> # Region Pond Block - Modified by Development of Streets B and K
00125> R0001:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00126>     CALIB STANDHYD        1.0 01:Pond1           .44     .011 No_date    1:10   11.26 .450     .000
00127>       [XIMP=.37:TIMP=.37]
00128>       [LOSS= 2 :CN= 78.0]
00129>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00130>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00131> # Existing Region Lands Tributary to Region Pond
00132> # 100-year capture point 1
00133> R0001:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00134>     CALIB STANDHYD        1.0 01:RL1             .65     .038 No_date    1:10   21.14 .845     .000
00135>       [XIMP=.90:TIMP=.90]
00136>       [LOSS= 2 :CN= 78.0]
00137>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00138>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00139> # Existing Region Lands Tributary to Region Pond
00140> # 100-year capture point 2
00141> R0001:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00142>     CALIB STANDHYD        1.0 01:RL2            2.65     .154 No_date    1:10   21.51 .860     .000
00143>       [XIMP=.92:TIMP=.92]
00144>       [LOSS= 2 :CN= 78.0]
00145>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00146>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00147> # Flow in Twin 750 mm Diameter Inlet Pipes
00148> R0001:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00149>     ADD HYD               1.0 02:RL1             .65     .038 No_date    1:10   21.14  n/a     .000
00150>                     +     1.0 02:RL2            2.65     .154 No_date    1:10   21.51  n/a     .000
00151>                     +     1.0 02:Comm1          1.01     .013 No_date    1:21    4.37  n/a     .000
00152>                   SUM=    1.0 01:Pipe           4.31     .204 No_date    1:10   17.44  n/a     .000
00153> # Total Inflow to Region Pond
00154> R0001:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00155>     ADD HYD               1.0 02:Pond1           .44     .011 No_date    1:10   11.26  n/a     .000
00156>                     +     1.0 02:RL1             .65     .038 No_date    1:10   21.14  n/a     .000
00157>                     +     1.0 02:RL2            2.65     .154 No_date    1:10   21.51  n/a     .000
00158>                     +     1.0 02:Comm1          1.01     .013 No_date    1:21    4.37  n/a     .000
00159>                   SUM=    1.0 01:Pin            4.75     .215 No_date    1:10   16.86  n/a     .000
00160> # Region Pond - Modified by Development of Streets B and K
00161> # Modified stage-storage relationship as provided by DSEL
00162> # Outlet controls, operating under free outfall conditions, as per  May 2001
00163> # "SWM Report, South Operations Centre" by TSH.
00164> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00165> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00166> R0001:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00167>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75     .215 No_date    1:10   16.86  n/a     .000
00168>                 out <=    1.0 01:Pout           4.75     .014 No_date    2:40   16.86  n/a     .000
00169>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00170>      {MxStoUsed=.7073E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00171> # Halton 2-Year 4-Hour Chicago Design Storm
00172> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00173>   ** END OF RUN :  101
00174>
00175> ************************************************************************************************
00176>
00177>
00178>
```

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00179>
00180>
00181>  RUN#:COMMAND#
00182> R0102:C00001-------------------------------------------------------------------------------------------
00183>       START
00184>        [TZERO =    .00 hrs on        0]
00185>        [METOUT=   2    (1=imperial, 2=metric output)]
00186>        [NSTORM=   1 ]
00187>        [NRUN  = 0102 ]
00188> #******************************************************************************
00189> #  SWMHYMO  / INPUT DATA FILE
00190> #******************************************************************************
00191> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00192> #  Date         : 2017/03/15
00193> #  Modeller     : [JB]
00194> #  Updated      : 2017/04/20 [LP]
00195> #  Updated      : 2017/04/27 [LP]
00196> #  Company      : JFSAinc.
00197> #  License #    : 2549237
00198> #******************************************************************************
00199> # Halton 25 mm 3-Hour Chicago Design Storm
00200> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00201> R0102:C00002-------------------------------------------------------------------------------------------
00202>       READ STORM
00203>        Filename = storm.001
00204>        Comment  = 2-Year 4 Hour Chicago Storm (Per TSHA)
00205>        [SDT=10.00:SDUR=   4.00:PTOT=  39.24]
00206> ################################################################################
00207> # PROPOSED CONDITIONS
00208> ################################################################################
00209> #
00210> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00211> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00212> # quality and 2- to 100-year quantity control before ultimately discharging to
00213> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00214> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00215> # Hubicki Associates (TSH).
00216> #
00217> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00218> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00219> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00220> # on the Region lands, draining to the Region pond under existing conditions.
00221> # Under interim conditions, the full 1.009 ha commercial block will be grassed
00222> # over (no impervious land) and drain to the Region Pond.
00223> #
00224> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00225> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00226> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00227> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00228> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00229> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00230> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00231> # for further details.
00232> #
00233> # The storage available in the existing Region SWM Pond will be reduced by the
00234> # development of Streets B and K. The commercial lands will be grassed over under
00235> # interim conditions to ensure that interim conditions outflows from the modified
00236> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00237> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00238> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00239> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00240> # under interim conditions.
00241> # Proposed Commercial Block
00242> R0102:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00243>     CALIB STANDHYD        1.0 01:Comm1          1.01     .217 No_date    1:30   36.97 .942     .000
00244>       [XIMP=.99:TIMP=.99]
00245>       [LOSS= 2 :CN= 78.0]
00246>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00247>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00248> # Interim Commercial Block
00249> # CN = 84 -> CN* = 78 urban grassed area in fair condition (Soil Group D)
00250> # Time to peak calculated as 2/3 of the Bransby Williams time of concentration
00251> # for a 130 m distance from 129 m elevation to 127 m elevation
00252> R0102:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00253>     CALIB NASHYD          1.0 01:Comm1          1.01     .047 No_date    1:32   11.07 .282     .000
00254>       [CN= 78.0: N= 3.00: Tp=  .08]
00255> # Region Pond Block - Modified by Development of Streets B and K
00256> R0102:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00257>     CALIB STANDHYD        1.0 01:Pond1           .44     .038 No_date    1:30   20.75 .529     .000
00258>       [XIMP=.37:TIMP=.37]
00259>       [LOSS= 2 :CN= 78.0]
00260>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00261>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00262> # Existing Region Lands Tributary to Region Pond
00263> # 100-year capture point 1
00264> R0102:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00265>     CALIB STANDHYD        1.0 01:RL1            .65     .129 No_date    1:30   34.62 .882     .000
00266>       [XIMP=.90:TIMP=.90]
00267>       [LOSS= 2 :CN= 78.0]
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00268>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00269>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00270> # Existing Region Lands Tributary to Region Pond
00271> # 100-year capture point 2
00272> R0102:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00273>     CALIB STANDHYD        1.0 01:RL2            2.65     .518 No_date    1:30   35.14 .896     .000
00274>       [XIMP=.92:TIMP=.92]
00275>       [LOSS= 2 :CN= 78.0]
00276>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00277>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00278> # Flow in Twin 750 mm Diameter Inlet Pipes
00279> R0102:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00280>     ADD HYD               1.0 02:RL1             .65     .129 No_date    1:30   34.62  n/a     .000
00281>                     +     1.0 02:RL2            2.65     .518 No_date    1:30   35.14  n/a     .000
00282>                     +     1.0 02:Comm1          1.01     .047 No_date    1:32   11.07  n/a     .000
00283>                   SUM=    1.0 01:Pipe           4.31     .688 No_date    1:30   29.43  n/a     .000
00284> # Total Inflow to Region Pond
00285> R0102:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00286>     ADD HYD               1.0 02:Pond1           .44     .038 No_date    1:30   20.75  n/a     .000
00287>                     +     1.0 02:RL1             .65     .129 No_date    1:30   34.62  n/a     .000
00288>                     +     1.0 02:RL2            2.65     .518 No_date    1:30   35.14  n/a     .000
00289>                     +     1.0 02:Comm1          1.01     .047 No_date    1:32   11.07  n/a     .000
00290>                   SUM=    1.0 01:Pin            4.75     .726 No_date    1:30   28.62  n/a     .000
00291> # Region Pond - Modified by Development of Streets B and K
00292> # Modified stage-storage relationship as provided by DSEL
00293> # Outlet controls, operating under free outfall conditions, as per  May 2001
00294> # "SWM Report, South Operations Centre" by TSH.
00295> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00296> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00297> R0102:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00298>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75     .726 No_date    1:30   28.62  n/a     .000
00299>                  out <=   1.0 01:Pout           4.75     .032 No_date    4:01   28.62  n/a     .000
00300>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00301>      {MxStoUsed=.1146E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00302> # Halton 2-Year 4-Hour Chicago Design Storm
00303> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00304> # Halton 5-Year 4-Hour Chicago Design Storm
00305> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00306>   ** END OF RUN :  104
00307>
00308> ************************************************************************************************
00309>
00310>
00311>
00312>
00313>
00314>  RUN#:COMMAND#
00315> R0105:C00001------------------------------------------------------------------------------------
00316>      START
00317>       [TZERO =    .00 hrs on        0]
00318>       [METOUT=   2    (1=imperial, 2=metric output)]
00319>       [NSTORM=   1 ]
00320>       [NRUN  = 0105 ]
00321> #*****************************************************************************
00322> #  SWMHYMO  / INPUT DATA FILE
00323> #*****************************************************************************
00324> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00325> #  Date         : 2017/03/15
00326> #  Modeller     : [JB]
00327> #  Updated      : 2017/04/20 [LP]
00328> #  Updated      : 2017/04/27 [LP]
00329> #  Company      : JFSAinc.
00330> #  License #    : 2549237
00331> #*****************************************************************************
00332> # Halton 25 mm 3-Hour Chicago Design Storm
00333> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00334> R0105:C00002------------------------------------------------------------------------------------
00335>      READ STORM
00336>       Filename = storm.001
00337>       Comment  = 5-Year 4 Hour Chicago Storm (Per TSHA)
00338>       [SDT=10.00:SDUR=   4.00:PTOT=  48.45]
00339> ###############################################################################
00340> # PROPOSED CONDITIONS
00341> ###############################################################################
00342> #
00343> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00344> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00345> # quality and 2- to 100-year quantity control before ultimately discharging to
00346> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00347> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00348> # Hubicki Associates (TSH).
00349> #
00350> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00351> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00352> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00353> # on the Region lands, draining to the Region pond under existing conditions.
00354> # Under interim conditions, the full 1.009 ha commercial block will be grassed
00355> # over (no impervious land) and drain to the Region Pond.
00356> #
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00357> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00358> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00359> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00360> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00361> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00362> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00363> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00364> # for further details.
00365> #
00366> # The storage available in the existing Region SWM Pond will be reduced by the
00367> # development of Streets B and K. The commercial lands will be grassed over under
00368> # interim conditions to ensure that interim conditions outflows from the modified
00369> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00370> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00371> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00372> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00373> # under interim conditions.
00374> # Proposed Commercial Block
00375> R0105:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00376>     CALIB STANDHYD        1.0 01:Comm1          1.01     .311 No_date    1:30   46.15 .953     .000
00377>       [XIMP=.99:TIMP=.99]
00378>       [LOSS= 2 :CN= 78.0]
00379>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00380>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00381> # Interim Commercial Block
00382> # CN = 84 -> CN* = 78 urban grassed area in fair condition (Soil Group D)
00383> # Time to peak calculated as 2/3 of the Bransby Williams time of concentration
00384> # for a 130 m distance from 129 m elevation to 127 m elevation
00385> R0105:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00386>     CALIB NASHYD          1.0 01:Comm1          1.01     .086 No_date    1:32   16.40 .339     .000
00387>       [CN= 78.0: N= 3.00: Tp=  .08]
00388> # Region Pond Block - Modified by Development of Streets B and K
00389> R0105:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00390>     CALIB STANDHYD        1.0 01:Pond1           .44     .056 No_date    1:30   27.52 .568     .000
00391>       [XIMP=.37:TIMP=.37]
00392>       [LOSS= 2 :CN= 78.0]
00393>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00394>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00395> # Existing Region Lands Tributary to Region Pond
00396> # 100-year capture point 1
00397> R0105:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00398>     CALIB STANDHYD        1.0 01:RL1             .65     .185 No_date    1:30   43.44 .897     .000
00399>       [XIMP=.90:TIMP=.90]
00400>       [LOSS= 2 :CN= 78.0]
00401>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00402>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00403> # Existing Region Lands Tributary to Region Pond
00404> # 100-year capture point 2
00405> R0105:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00406>     CALIB STANDHYD        1.0 01:RL2            2.65     .752 No_date    1:30   44.04 .909     .000
00407>       [XIMP=.92:TIMP=.92]
00408>       [LOSS= 2 :CN= 78.0]
00409>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00410>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00411> # Flow in Twin 750 mm Diameter Inlet Pipes
00412> R0105:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00413>     ADD HYD               1.0 02:RL1             .65     .185 No_date    1:30   43.44  n/a     .000
00414>                     +     1.0 02:RL2            2.65     .752 No_date    1:30   44.04  n/a     .000
00415>                     +     1.0 02:Comm1          1.01     .086 No_date    1:32   16.40  n/a     .000
00416>                   SUM=    1.0 01:Pipe           4.31    1.014 No_date    1:30   37.48  n/a     .000
00417> # Total Inflow to Region Pond
00418> R0105:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00419>     ADD HYD               1.0 02:Pond1           .44     .056 No_date    1:30   27.52  n/a     .000
00420>                     +     1.0 02:RL1             .65     .185 No_date    1:30   43.44  n/a     .000
00421>                     +     1.0 02:RL2            2.65     .752 No_date    1:30   44.04  n/a     .000
00422>                     +     1.0 02:Comm1          1.01     .086 No_date    1:32   16.40  n/a     .000
00423>                   SUM=    1.0 01:Pin            4.75    1.070 No_date    1:30   36.55  n/a     .000
00424> # Region Pond - Modified by Development of Streets B and K
00425> # Modified stage-storage relationship as provided by DSEL
00426> # Outlet controls, operating under free outfall conditions, as per  May 2001
00427> # "SWM Report, South Operations Centre" by TSH.
00428> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00429> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00430> R0105:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00431>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75    1.070 No_date    1:30   36.55  n/a     .000
00432>                  out <=   1.0 01:Pout           4.75     .057 No_date    3:01   36.55  n/a     .000
00433>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00434>      {MxStoUsed=.1313E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00435> # Halton 2-Year 4-Hour Chicago Design Storm
00436> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00437> # Halton 5-Year 4-Hour Chicago Design Storm
00438> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00439> # Halton 25-Year 4-Hour Chicago Design Storm
00440> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00441>   ** END OF RUN :  124
00442>
00443> ************************************************************************************************
00444>
00445>
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00446>
00447>
00448>
00449>  RUN#:COMMAND#
00450> R0125:C00001-------------------------------------------------------------------------------------------
00451>      START
00452>       [TZERO =    .00 hrs on        0]
00453>       [METOUT=   2    (1=imperial, 2=metric output)]
00454>       [NSTORM=   1 ]
00455>       [NRUN  = 0125 ]
00456> #*****************************************************************************
00457> #  SWMHYMO  / INPUT DATA FILE
00458> #*****************************************************************************
00459> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00460> #  Date        : 2017/03/15
00461> #  Modeller    : [JB]
00462> #  Updated     : 2017/04/20 [LP]
00463> #  Updated     : 2017/04/27 [LP]
00464> #  Company     : JFSAinc.
00465> #  License #   : 2549237
00466> #*****************************************************************************
00467> # Halton 25 mm 3-Hour Chicago Design Storm
00468> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00469> R0125:C00002-------------------------------------------------------------------------------------------
00470>      READ STORM
00471>       Filename = storm.001
00472>       Comment  = 25-Year 4 Hour Chicago Storm (Per TSHA)
00473>       [SDT=10.00:SDUR=   4.00:PTOT=  66.10]
00474> ###############################################################################
00475> # PROPOSED CONDITIONS
00476> ###############################################################################
00477> #
00478> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00479> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00480> # quality and 2- to 100-year quantity control before ultimately discharging to
00481> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00482> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00483> # Hubicki Associates (TSH).
00484> #
00485> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00486> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00487> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00488> # on the Region lands, draining to the Region pond under existing conditions.
00489> # Under interim conditions, the full 1.009 ha commercial block will be grassed
00490> # over (no impervious land) and drain to the Region Pond.
00491> #
00492> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00493> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00494> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00495> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00496> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00497> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00498> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00499> # for further details.
00500> #
00501> # The storage available in the existing Region SWM Pond will be reduced by the
00502> # development of Streets B and K. The commercial lands will be grassed over under
00503> # interim conditions to ensure that interim conditions outflows from the modified
00504> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00505> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00506> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00507> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00508> # under interim conditions.
00509> # Proposed Commercial Block
00510> R0125:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00511>     CALIB STANDHYD        1.0 01:Comm1          1.01     .441 No_date    1:30   63.74 .964     .000
00512>       [XIMP=.99:TIMP=.99]
00513>       [LOSS= 2 :CN= 78.0]
00514>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00515>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00516> # Interim Commercial Block
00517> # CN = 84 -> CN* = 78 urban grassed area in fair condition (Soil Group D)
00518> # Time to peak calculated as 2/3 of the Bransby Williams time of concentration
00519> # for a 130 m distance from 129 m elevation to 127 m elevation
00520> R0125:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00521>     CALIB NASHYD          1.0 01:Comm1          1.01     .160 No_date    1:32   28.12 .425     .000
00522>       [CN= 78.0: N= 3.00: Tp=  .08]
00523> # Region Pond Block - Modified by Development of Streets B and K
00524> R0125:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00525>     CALIB STANDHYD        1.0 01:Pond1           .44     .090 No_date    1:30   41.43 .627     .000
00526>       [XIMP=.37:TIMP=.37]
00527>       [LOSS= 2 :CN= 78.0]
00528>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00529>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00530> # Existing Region Lands Tributary to Region Pond
00531> # 100-year capture point 1
00532> R0125:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00533>     CALIB STANDHYD        1.0 01:RL1             .65     .264 No_date    1:30   60.50 .915     .000
00534>       [XIMP=.90:TIMP=.90]
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00535>       [LOSS= 2 :CN= 78.0]
00536>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00537>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00538> # Existing Region Lands Tributary to Region Pond
00539> # 100-year capture point 2
00540> R0125:C00007-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00541>     CALIB STANDHYD        1.0 01:RL2            2.65    1.076 No_date    1:30   61.22 .926     .000
00542>       [XIMP=.92:TIMP=.92]
00543>       [LOSS= 2 :CN= 78.0]
00544>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00545>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00546> # Flow in Twin 750 mm Diameter Inlet Pipes
00547> R0125:C00008-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00548>     ADD HYD               1.0 02:RL1             .65     .264 No_date    1:30   60.50  n/a     .000
00549>                     +     1.0 02:RL2            2.65    1.076 No_date    1:30   61.22  n/a     .000
00550>                     +     1.0 02:Comm1          1.01     .160 No_date    1:32   28.12  n/a     .000
00551>                   SUM=    1.0 01:Pipe           4.31    1.486 No_date    1:30   53.36  n/a     .000
00552> # Total Inflow to Region Pond
00553> R0125:C00009-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00554>     ADD HYD               1.0 02:Pond1           .44     .090 No_date    1:30   41.43  n/a     .000
00555>                     +     1.0 02:RL1             .65     .264 No_date    1:30   60.50  n/a     .000
00556>                     +     1.0 02:RL2            2.65    1.076 No_date    1:30   61.22  n/a     .000
00557>                     +     1.0 02:Comm1          1.01     .160 No_date    1:32   28.12  n/a     .000
00558>                   SUM=    1.0 01:Pin            4.75    1.575 No_date    1:30   52.25  n/a     .000
00559> # Region Pond - Modified by Development of Streets B and K
00560> # Modified stage-storage relationship as provided by DSEL
00561> # Outlet controls, operating under free outfall conditions, as per  May 2001
00562> # "SWM Report, South Operations Centre" by TSH.
00563> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00564> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00565> R0125:C00010-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00566>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75    1.575 No_date    1:30   52.25  n/a     .000
00567>                  out <=   1.0 01:Pout           4.75     .112 No_date    2:25   52.25  n/a     .000
00568>           overflow <=     1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00569>      {MxStoUsed=.1702E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00570> # Halton 2-Year 4-Hour Chicago Design Storm
00571> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00572> # Halton 5-Year 4-Hour Chicago Design Storm
00573> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00574> # Halton 25-Year 4-Hour Chicago Design Storm
00575> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00576> # Halton 100-Year 4-Hour Chicago Design Storm
00577> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00578>   ** END OF RUN :  198
00579>
00580> ****************************************************************************************************
00581>
00582>
00583>
00584>
00585>
00586>  RUN#:COMMAND#
00587> R0199:C00001-----------------------------------------------------------------------------------------
00588>      START
00589>       [TZERO =    .00 hrs on        0]
00590>       [METOUT=   2    (1=imperial, 2=metric output)]
00591>       [NSTORM=   1 ]
00592>       [NRUN  = 0199 ]
00593> #*************************************************************************
00594> #  SWMHYMO  / INPUT DATA FILE
00595> #*************************************************************************
00596> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00597> #  Date         : 2017/03/15
00598> #  Modeller     : [JB]
00599> #  Updated      : 2017/04/20 [LP]
00600> #  Updated      : 2017/04/27 [LP]
00601> #  Company      : JFSAinc.
00602> #  License #    : 2549237
00603> #*************************************************************************
00604> # Halton 25 mm 3-Hour Chicago Design Storm
00605> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00606> R0199:C00002-----------------------------------------------------------------------------------------
00607>      READ STORM
00608>       Filename = storm.001
00609>       Comment  = 100-Year 4 Hour Chicago Storm (Per TSHA)
00610>       [SDT=10.00:SDUR=   4.00:PTOT=  83.74]
00611> ###########################################################################
00612> # PROPOSED CONDITIONS
00613> ###########################################################################
00614> #
00615> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00616> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00617> # quality and 2- to 100-year quantity control before ultimately discharging to
00618> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00619> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00620> # Hubicki Associates (TSH).
00621> #
00622> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00623> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
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00624> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00625> # on the Region lands, draining to the Region pond under existing conditions.
00626> # Under interim conditions, the full 1.009 ha commercial block will be grassed
00627> # over (no impervious land) and drain to the Region Pond.
00628> #
00629> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00630> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00631> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00632> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00633> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00634> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00635> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00636> # for further details.
00637> #
00638> # The storage available in the existing Region SWM Pond will be reduced by the
00639> # development of Streets B and K. The commercial lands will be grassed over under
00640> # interim conditions to ensure that interim conditions outflows from the modified
00641> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00642> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00643> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00644> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00645> # under interim conditions.
00646> # Proposed Commercial Block
00647> R0199:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00648>     CALIB STANDHYD        1.0 01:Comm1          1.01     .572 No_date    1:30   81.33 .971     .000
00649>       [XIMP=.99:TIMP=.99]
00650>       [LOSS= 2 :CN= 78.0]
00651>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00652>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00653> # Interim Commercial Block
00654> # CN = 84 -> CN* = 78 urban grassed area in fair condition (Soil Group D)
00655> # Time to peak calculated as 2/3 of the Bransby Williams time of concentration
00656> # for a 130 m distance from 129 m elevation to 127 m elevation
00657> R0199:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00658>     CALIB NASHYD          1.0 01:Comm1          1.01     .247 No_date    1:32   41.23 .492     .000
00659>       [CN= 78.0: N= 3.00: Tp=  .08]
00660> # Region Pond Block - Modified by Development of Streets B and K
00661> R0199:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00662>     CALIB STANDHYD        1.0 01:Pond1           .44     .132 No_date    1:30   56.22 .671     .000
00663>       [XIMP=.37:TIMP=.37]
00664>       [LOSS= 2 :CN= 78.0]
00665>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00666>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00667> # Existing Region Lands Tributary to Region Pond
00668> # 100-year capture point 1
00669> R0199:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00670>     CALIB STANDHYD        1.0 01:RL1             .65     .345 No_date    1:30   77.69 .928     .000
00671>       [XIMP=.90:TIMP=.90]
00672>       [LOSS= 2 :CN= 78.0]
00673>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00674>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00675> # Existing Region Lands Tributary to Region Pond
00676> # 100-year capture point 2
00677> R0199:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00678>     CALIB STANDHYD        1.0 01:RL2            2.65    1.410 No_date    1:30   78.50 .937     .000
00679>       [XIMP=.92:TIMP=.92]
00680>       [LOSS= 2 :CN= 78.0]
00681>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00682>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00683> # Flow in Twin 750 mm Diameter Inlet Pipes
00684> R0199:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00685>     ADD HYD               1.0 02:RL1             .65     .345 No_date    1:30   77.69  n/a     .000
00686>                      +    1.0 02:RL2            2.65    1.410 No_date    1:30   78.50  n/a     .000
00687>                      +    1.0 02:Comm1          1.01     .247 No_date    1:32   41.23  n/a     .000
00688>                  SUM=     1.0 01:Pipe           4.31    1.983 No_date    1:30   69.65  n/a     .000
00689> # Total Inflow to Region Pond
00690> R0199:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00691>     ADD HYD               1.0 02:Pond1           .44     .132 No_date    1:30   56.22  n/a     .000
00692>                      +    1.0 02:RL1             .65     .345 No_date    1:30   77.69  n/a     .000
00693>                      +    1.0 02:RL2            2.65    1.410 No_date    1:30   78.50  n/a     .000
00694>                      +    1.0 02:Comm1          1.01     .247 No_date    1:32   41.23  n/a     .000
00695>                  SUM=     1.0 01:Pin            4.75    2.115 No_date    1:30   68.40  n/a     .000
00696> # Region Pond - Modified by Development of Streets B and K
00697> # Modified stage-storage relationship as provided by DSEL
00698> # Outlet controls, operating under free outfall conditions, as per  May 2001
00699> # "SWM Report, South Operations Centre" by TSH.
00700> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00701> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00702> R0199:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00703>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75    2.115 No_date    1:30   68.40  n/a     .000
00704>                  out <=   1.0 01:Pout           4.75     .172 No_date    2:12   68.40  n/a     .000
00705>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00706>      {MxStoUsed=.2231E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00707> # Halton 2-Year 4-Hour Chicago Design Storm
00708> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00709> # Halton 5-Year 4-Hour Chicago Design Storm
00710> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00711> # Halton 25-Year 4-Hour Chicago Design Storm
00712> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
```

```
00713> # Halton 100-Year 4-Hour Chicago Design Storm
00714> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00715> # Hurricane Hazel (Regional Event)
00716>   ** END OF RUN :  998
00717>
00718> ************************************************************************************************
00719>
00720>
00721>
00722>
00723>
00724>  RUN#:COMMAND#
00725> R0999:C00001-----------------------------------------------------------------------------------
00726>      START
00727>       [TZERO =    .00 hrs on        0]
00728>       [METOUT=   2    (1=imperial, 2=metric output)]
00729>       [NSTORM=   1 ]
00730>       [NRUN  = 0999 ]
00731> #*****************************************************************************
00732> #  SWMHYMO  / INPUT DATA FILE
00733> #*****************************************************************************
00734> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00735> #  Date         : 2017/03/15
00736> #  Modeller     : [JB]
00737> #  Updated      : 2017/04/20 [LP]
00738> #  Updated      : 2017/04/27 [LP]
00739> #  Company      : JFSAinc.
00740> #  License #    : 2549237
00741> #*****************************************************************************
00742> # Halton 25 mm 3-Hour Chicago Design Storm
00743> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00744> R0999:C00002-----------------------------------------------------------------------------------
00745>      READ STORM
00746>       Filename = storm.001
00747>       Comment  = Hurricane Hazel
00748>       [SDT=10.00:SDUR=  48.00:PTOT= 285.08]
00749> ###############################################################################
00750> # PROPOSED CONDITIONS
00751> ###############################################################################
00752> #
00753> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00754> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00755> # quality and 2- to 100-year quantity control before ultimately discharging to
00756> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00757> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00758> # Hubicki Associates (TSH).
00759> #
00760> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00761> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00762> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00763> # on the Region lands, draining to the Region pond under existing conditions.
00764> # Under interim conditions, the full 1.009 ha commercial block will be grassed
00765> # over (no impervious land) and drain to the Region Pond.
00766> #
00767> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00768> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00769> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00770> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00771> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00772> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00773> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00774> # for further details.
00775> #
00776> # The storage available in the existing Region SWM Pond will be reduced by the
00777> # development of Streets B and K. The commercial lands will be grassed over under
00778> # interim conditions to ensure that interim conditions outflows from the modified
00779> # Region SWM Pond will not exceed target outflows, as defined in the May 2001
00780> # "SWM Report, South Operations Centre" by TSH. Design storms, modelling
00781> # methods / parameters and SWM requirements consistent with the May 2001 TSH
00782> # SWM Report have been used to evaluate the performance of the Region SWM Pond
00783> # under interim conditions.
00784> # Proposed Commercial Block
00785> R0999:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00786>     CALIB STANDHYD        1.0 01:Comm1          1.01     .148 No_date   46:00  282.48 .991     .000
00787>       [XIMP=.99:TIMP=.99]
00788>       [LOSS= 2 :CN= 78.0]
00789>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00790>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00791> # Interim Commercial Block
00792> # CN = 84 -> CN* = 78 urban grassed area in fair condition (Soil Group D)
00793> # Time to peak calculated as 2/3 of the Bransby Williams time of concentration
00794> # for a 130 m distance from 129 m elevation to 127 m elevation
00795> R0999:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00796>     CALIB NASHYD          1.0 01:Comm1          1.01     .140 No_date   46:00  223.03 .782     .000
00797>       [CN= 78.0: N= 3.00: Tp=  .08]
00798> # Region Pond Block - Modified by Development of Streets B and K
00799> R0999:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00800>     CALIB STANDHYD        1.0 01:Pond1           .44     .062 No_date   46:00  245.25 .860     .000
00801>       [XIMP=.37:TIMP=.37]
```

```
00802>       [LOSS= 2 :CN= 78.0]
00803>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00804>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00805> # Existing Region Lands Tributary to Region Pond
00806> # 100-year capture point 1
00807> R0999:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00808>     CALIB STANDHYD        1.0 01:RL1             .65     .096 No_date   46:00  277.08 .972     .000
00809>       [XIMP=.90:TIMP=.90]
00810>       [LOSS= 2 :CN= 78.0]
00811>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00812>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00813> # Existing Region Lands Tributary to Region Pond
00814> # 100-year capture point 2
00815> R0999:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00816>     CALIB STANDHYD        1.0 01:RL2            2.65     .387 No_date   46:00  278.28 .976     .000
00817>       [XIMP=.92:TIMP=.92]
00818>       [LOSS= 2 :CN= 78.0]
00819>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00820>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00821> # Flow in Twin 750 mm Diameter Inlet Pipes
00822> R0999:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00823>     ADD HYD               1.0 02:RL1             .65     .096 No_date   46:00  277.08  n/a     .000
00824>                     +     1.0 02:RL2            2.65     .387 No_date   46:00  278.28  n/a     .000
00825>                     +     1.0 02:Comm1          1.01     .140 No_date   46:00  223.03  n/a     .000
00826>                   SUM=    1.0 01:Pipe           4.31     .623 No_date   46:00  265.16  n/a     .000
00827> # Total Inflow to Region Pond
00828> R0999:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00829>     ADD HYD               1.0 02:Pond1           .44     .062 No_date   46:00  245.25  n/a     .000
00830>                     +     1.0 02:RL1             .65     .096 No_date   46:00  277.08  n/a     .000
00831>                     +     1.0 02:RL2            2.65     .387 No_date   46:00  278.28  n/a     .000
00832>                     +     1.0 02:Comm1          1.01     .140 No_date   46:00  223.03  n/a     .000
00833>                   SUM=    1.0 01:Pin            4.75     .685 No_date   46:00  263.31  n/a     .000
00834> # Region Pond - Modified by Development of Streets B and K
00835> # Modified stage-storage relationship as provided by DSEL
00836> # Outlet controls, operating under free outfall conditions, as per  May 2001
00837> # "SWM Report, South Operations Centre" by TSH.
00838> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00839> # Replace 240 mm quantity orifice at 124.00 m with 400 mm orifice at 124.00 m
00840> R0999:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00841>     ROUTE RESERVOIR ->    1.0 02:Pin            4.75     .685 No_date   46:00  263.31  n/a     .000
00842>                  out <=   1.0 01:Pout           4.75     .309 No_date   47:05  263.30  n/a     .000
00843>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00844>      {MxStoUsed=.4588E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00845> # Halton 2-Year 4-Hour Chicago Design Storm
00846> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00847> # Halton 5-Year 4-Hour Chicago Design Storm
00848> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00849> # Halton 25-Year 4-Hour Chicago Design Storm
00850> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00851> # Halton 100-Year 4-Hour Chicago Design Storm
00852> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00853> # Hurricane Hazel (Regional Event)
00854> R0999:C00002-------------------------------------------------------------------------------------------
00855>     FINISH
00856> -------------------------------------------------------------------------------------------------------
00857> *******************************************************************************************************
00858>      WARNINGS / ERRORS / NOTES
00859>      ------------------------
00860>    Simulation ended on 2017-04-27     at 23:47:39
00861> =======================================================================================================
00862>
00863>
```

```
00001> 20    Metric units / ID numbers OFF
00002> *#*****************************************************************************
00003> *#  SWMHYMO  / INPUT DATA FILE
00004> *#*****************************************************************************
00005> *#  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00006> *#  Date        : 2017/03/15
00007> *#  Modeller    : [JB]
00008> *#  Updated     : 2017/04/20 [LP]
00009> *#  Updated     : 2017/04/27 [LP]
00010> *#  Company     : JFSAinc.
00011> *#  License #   : 2549237
00012> *#*****************************************************************************
00013> *# Halton 25 mm 3-Hour Chicago Design Storm
00014> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00015> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[001]
00016> *%                   ["25MM03.stm"] <--storm filename, one per line for NSTORM time
00017> *%-----------------|-------------------------------------------------------|
00018> READ STORM          STORM_FILENAME=["storm.001"]
00019> *%-----------------|-------------------------------------------------------|
00020> *#############################################################################
00021> *# PROPOSED CONDITIONS
00022> *#############################################################################
00023> *#
00024> *# An existing Stormwater Management (SWM) Pond on the Region of Halton South
00025> *# Operations Centre site treats approximately 5.75 ha of the site for enhanced
00026> *# quality and 2- to 100-year quantity control before ultimately discharging to
00027> *# Bronte Creek, via a pipe through the Region lands. The existing pond design
00028> *# is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00029> *# Hubicki Associates (TSH).
00030> *#
00031> *# A 1.009 ha commercial block is to be developed as part of the Bronte Green
00032> *# subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00033> *# Creek under existing conditions. The remaining 0.921 ha is a parking lot
00034> *# on the Region lands, draining to the Region pond under existing conditions.
00035> *# Under proposed conditions, the full 1.009 ha commercial block will drain to
00036> *# the outlet pipe of the Region Pond.
00037> *#
00038> *# Additionally, under proposed conditions, approximately 0.527 ha of the existing
00039> *# drainage area to the Region Pond will be re-constructed as Streets B and K of
00040> *# the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00041> *# directed to the proposed Bronte Green Pond for SWM treatment before discharging
00042> *# to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00043> *# Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00044> *# April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00045> *# for further details.
00046> *#
00047> *# The storage available in the existing Region SWM Pond will be reduced by the
00048> *# development of Streets B and K. On-site storage on the commercial lands is
00049> *# proposed to ensure that combined proposed conditions outflows from the
00050> *# modified Region SWM Pond and commercial block will not exceed target outflows,
00051> *# as defined in the May 2001 "SWM Report, South Operations Centre" by TSH. Design
00052> *# storms, modelling methods / parameters and SWM requirements consistent with the
00053> *# May 2001 TSH SWM Report have been used to evaluate the performance of the Region
00054> *# SWM Pond under interim conditions.
00055> *%-----------------|-------------------------------------------------------|
00056> *# Proposed Commercial Block
00057> CALIB STANDHYD      NHYD=["Comm1"], DT=[1](min), AREA=[1.009](ha),
00058>                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00059>                     SCS Procedure: CN=[78],
00060>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00061>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00062>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00063>                                        LGI=[82](m), MNI=[0.013], SCI=[0](min),
00064>                     RAINFALL=[ ,  ,  -1](mm/hr)
00065> *%-----------------|-------------------------------------------------------|
00066> *# Region Pond Block - Modified by Development of Streets B and K
00067> CALIB STANDHYD      NHYD=["Pond1"], DT=[1](min), AREA=[0.442](ha),
00068>                     XIMP=[0.37], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
00069>                     SCS Procedure: CN=[78],
00070>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00071>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00072>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00073>                                        LGI=[54](m), MNI=[0.013], SCI=[0](min),
00074>                     RAINFALL=[ ,  ,  -1](mm/hr)
00075> *%-----------------|-------------------------------------------------------|
00076> *# Existing Region Lands Tributary to Region Pond
00077> *# 100-year capture point 1
00078> CALIB STANDHYD      NHYD=["RL1"], DT=[1](min), AREA=[0.654](ha),
00079>                     XIMP=[0.90], TIMP=[0.90], DWF=[0](cms), LOSS=[2],
00080>                     SCS Procedure: CN=[78],
00081>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00082>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00083>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00084>                                        LGI=[66](m), MNI=[0.013], SCI=[0](min),
00085>                     RAINFALL=[ ,  ,  -1](mm/hr)
00086> *%-----------------|-------------------------------------------------------|
00087> *# Existing Region Lands Tributary to Region Pond
00088> *#  100-year capture point 2
00089> CALIB STANDHYD      NHYD=["RL2"], DT=[1](min), AREA=[2.646](ha),
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00090>                     XIMP=[0.92], TIMP=[0.92], DWF=[0](cms), LOSS=[2],
00091>                     SCS Procedure: CN=[78],
00092>                     Pervious   areas: IAper=[5](mm), SLPP=[2](%),
00093>                                       LGP=[40](m), MNP=[0.250], SCP=[0](min),
00094>                     Impervious areas: IAimp=[2](mm), SLPI=[2](%),
00095>                                        LGI=[133](m), MNI=[0.013], SCI=[0](min),
00096>                     RAINFALL=[ ,  ,  -1](mm/hr)
00097> *%-----------------|-------------------------------------------------------------|
00098> *# On-Site Storage on Proposed Commercial Block
00099> ROUTE RESERVOIR     NHYDout=["Cout"], NHYDin=["Comm1"]
00100>                     RDT=[1](min),
00101>                           TABLE of ( OUTFLOW-STORAGE ) values
00102>                                     (cms) - (ha-m)
00103>                                  [     0 ,  0    ]
00104>                                  [ 0.009 , 0.031 ]
00105>                                  [ 0.105 , 0.050 ]
00106>                                  [   -1  , -1    ]  (max twenty pts)
00107>                   NHYDovf=["Covf"] ,
00108> *%-----------------|-------------------------------------------------------------|
00109> *# Flow in Twin 750 mm Diameter Inlet Pipes
00110> ADD HYD            NHYDsum=["Pipe"], NHYDs to add=["RL1","RL2"]
00111> *%-----------------|-------------------------------------------------------------|
00112> *# Total Inflow to Region Pond
00113> ADD HYD            NHYDsum=["Pin"], NHYDs to add=["Pond1","RL1","RL2"]
00114> *%-----------------|-------------------------------------------------------------|
00115> *# Region Pond - Modified by Development of Streets B and K
00116> *# Modified stage-storage relationship as provided by DSEL
00117> *# Outlet controls, operating under free outfall conditions, as per  May 2001
00118> *# "SWM Report, South Operations Centre" by TSH.
00119> *# Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00120> *# Replace 240 mm quantity orifice at 124.00 m with 200 mm orifice at 124.00 m
00121> ROUTE RESERVOIR     NHYDout=["Pout"], NHYDin=["Pin"],
00122>                     RDT=[1](min),
00123>                           TABLE of ( OUTFLOW-STORAGE ) values
00124>                                     (cms) - (ha-m)
00125>                                  [     0 ,  0    ]
00126>                                  [ 0.005 , 0.014 ]
00127>                                  [ 0.008 , 0.030 ]
00128>                                  [ 0.011 , 0.046 ]
00129>                                  [ 0.014 , 0.074 ]
00130>                                  [ 0.016 , 0.104 ]
00131>                                  [ 0.039 , 0.137 ]
00132>                                  [ 0.058 , 0.172 ]
00133>                                  [ 0.073 , 0.209 ]
00134>                                  [ 0.084 , 0.249 ]
00135>                                  [ 0.094 , 0.292 ]
00136>                                  [ 0.103 , 0.337 ]
00137>                                  [ 0.109 , 0.369 ]
00138>                                  [ 0.119 , 0.426 ]
00139>                                  [ 0.128 , 0.495 ]
00140>                                  [ 0.137 , 0.564 ]
00141>                                  [ 0.146 , 0.635 ]
00142>                                  [ 0.153 , 0.707 ]
00143>                                  [ 0.163 , 0.799 ]
00144>                                  [   -1  , -1    ]  (max twenty pts)
00145>                   NHYDovf=["Povf"] ,
00146> *%-----------------|-------------------------------------------------------------|
00147> ***************************************************************************
00148> *# Halton 2-Year 4-Hour Chicago Design Storm
00149> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00150> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[102]
00151> *%                   ["C002Y4hr.stm"] <--storm filename, one per line for NSTORM time
00152> *%-----------------|-------------------------------------------------------------|
00153> *# Halton 5-Year 4-Hour Chicago Design Storm
00154> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00155> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[105]
00156> *%                   ["C005Y4hr.stm"] <--storm filename, one per line for NSTORM time
00157> *%-----------------|-------------------------------------------------------------|
00158> *# Halton 25-Year 4-Hour Chicago Design Storm
00159> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00160> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[125]
00161> *%                   ["C025Y4hr.stm"] <--storm filename, one per line for NSTORM time
00162> *%-----------------|-------------------------------------------------------------|
00163> *# Halton 100-Year 4-Hour Chicago Design Storm
00164> *# As Per May 2001 "SWM Report, South Operations Centre" by TSH
00165> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[199]
00166> *%                   ["C100Y4hr.stm"] <--storm filename, one per line for NSTORM time
00167> *%-----------------|-------------------------------------------------------------|
00168> *# Hurricane Hazel (Regional Event)
00169> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[999]
00170> *%                   ["hazel-10.stm"] <--storm filename, one per line for NSTORM time
00171> *%-----------------|-------------------------------------------------------------|
00172> FINISH
00173>
```

```
00001>  ================================================================================================
00002>
00003>  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   5555   =========
00004>  S       W W W   MM MM   H   H    Y Y    MM MM   O   O          2     0   0   11   5
00005>  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O          2     0   0   11   5      Ver 5.500
00006>      S    W W    M   M   H   H     Y     M   M   O   O        222     0   0   11   555    FEB  2015
00007>  SSSSS    W W    M   M   H   H     Y     M   M    OOO         2       0   0   11      5   =========
00008>                                                               2       0   0   11      5   # 2549237
00009>        StormWater Management HYdrologic Model                  222     000    11   555    =========
00010>
00011>  ************************************************************************************************
00012>  ************************************  SWMHYMO Ver 5.500  *************************************
00013>  ******************  A single event and continuous hydrologic simulation model  ******************
00014>  ******************     based on the principles of HYMO and its successors      ******************
00015>  ******************                OTTHYMO-83 and OTTHYMO-89.                  ******************
00016>  ************************************************************************************************
00017>  ****************** Distributed by:  J.F. Sabourin and Associates Inc.          ******************
00018>  ******************                  Ottawa,  Ontario: (613) 836-3884          ******************
00019>  ******************                  Gatineau, Quebec: (819) 243-6858          ******************
00020>  ******************                  E-Mail: swmhymo@jfsa.Com                  ******************
00021>  ************************************************************************************************
00022>
00023>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  ++++++++++++++++++ Licensed user: JFSAinc.                                  ++++++++++++++++++++
00025>  ++++++++++++++++++                Ottawa               SERIAL#:2549237       ++++++++++++++++++++
00026>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ************************************************************************************************
00029>  ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ******************
00030>  ******************           Maximum value for ID numbers  :     11            ******************
00031>  ******************           Max. number of rainfall points: 105408            ******************
00032>  ******************           Max. number of flow points    : 105408            ******************
00033>  ************************************************************************************************
00034>
00035>
00036>  *********************************   S U M M A R Y   O U T P U T   *********************************
00037>  ************************************************************************************************
00038>  *                  RUN DATE: 2017-04-28     TIME: 00:07:41     RUN COUNTER: 000639                 *
00039>  ************************************************************************************************
00040>  * Input   file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D2.dat        *
00041>  * Output  file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D2.out        *
00042>  * Summary file: T:\PROJ\1051-12\201704 Subm1\Design\SWMHYMO\201704 Region Lands\RH_D2.sum        *
00043>  * User comments:                                                                               *
00044>  * 1:_____________________________________________________________________________________________*
00045>  * 2:_____________________________________________________________________________________________*
00046>  * 3:_____________________________________________________________________________________________*
00047>  ************************************************************************************************
00048>
00049>
00050> #*****************************************************************************
00051> #  SWMHYMO  / INPUT DATA FILE
00052> #*****************************************************************************
00053> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00054> #  Date         : 2017/03/15
00055> #  Modeller     : [JB]
00056> #  Updated      : 2017/04/20 [LP]
00057> #  Updated      : 2017/04/27 [LP]
00058> #  Company      : JFSAinc.
00059> #  License #    : 2549237
00060> #*****************************************************************************
00061> # Halton 25 mm 3-Hour Chicago Design Storm
00062> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00063>  RUN#:COMMAND#
00064> R0001:C00001-------------------------------------------------------------------------------------
00065>      START
00066>       [TZERO =    .00 hrs on        0]
00067>       [METOUT=   2    (1=imperial, 2=metric output)]
00068>       [NSTORM=   1 ]
00069>       [NRUN  = 0001 ]
00070> R0001:C00002-------------------------------------------------------------------------------------
00071>      READ STORM
00072>       Filename = storm.001
00073>       Comment  = Toronto Bloor St 25mm storm (3 hr) (as Per TSMA)
00074>       [SDT=10.00:SDUR=   3.00:PTOT=  25.00]
00075> ###############################################################################
00076> # PROPOSED CONDITIONS
00077> ###############################################################################
00078> #
00079> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00080> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00081> # quality and 2- to 100-year quantity control before ultimately discharging to
00082> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00083> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00084> # Hubicki Associates (TSH).
00085> #
00086> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00087> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00088> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00089> # on the Region lands, draining to the Region pond under existing conditions.
```

```
00090> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00091> # the outlet pipe of the Region Pond.
00092> #
00093> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00094> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00095> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00096> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00097> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00098> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00099> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00100> # for further details.
00101> #
00102> # The storage available in the existing Region SWM Pond will be reduced by the
00103> # development of Streets B and K. On-site storage on the commercial lands is
00104> # proposed to ensure that combined proposed conditions outflows from the
00105> # modified Region SWM Pond and commercial block will not exceed target outflows,
00106> # as defined in the May 2001 "SWM Report, South Operations Centre" by TSH. Design
00107> # storms, modelling methods / parameters and SWM requirements consistent with the
00108> # May 2001 TSH SWM Report have been used to evaluate the performance of the Region
00109> # SWM Pond under interim conditions.
00110> # Proposed Commercial Block
00111> R0001:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00112>     CALIB STANDHYD        1.0 01:Comm1          1.01     .064 No_date    1:10   22.82 .913     .000
00113>       [XIMP=.99:TIMP=.99]
00114>       [LOSS= 2 :CN= 78.0]
00115>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00116>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00117> # Region Pond Block - Modified by Development of Streets B and K
00118> R0001:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00119>     CALIB STANDHYD        1.0 01:Pond1           .44     .011 No_date    1:10   11.26 .450     .000
00120>       [XIMP=.37:TIMP=.37]
00121>       [LOSS= 2 :CN= 78.0]
00122>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00123>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00124> # Existing Region Lands Tributary to Region Pond
00125> # 100-year capture point 1
00126> R0001:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00127>     CALIB STANDHYD        1.0 01:RL1             .65     .038 No_date    1:10   21.14 .845     .000
00128>       [XIMP=.90:TIMP=.90]
00129>       [LOSS= 2 :CN= 78.0]
00130>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00131>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00132> # Existing Region Lands Tributary to Region Pond
00133> #  100-year capture point 2
00134> R0001:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00135>     CALIB STANDHYD        1.0 01:RL2            2.65     .154 No_date    1:10   21.51 .860     .000
00136>       [XIMP=.92:TIMP=.92]
00137>       [LOSS= 2 :CN= 78.0]
00138>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00139>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00140> # On-Site Storage on Proposed Commercial Block
00141> R0001:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00142>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .064 No_date    1:10   22.82  n/a     .000
00143>                 out <=    1.0 01:Cout           1.01     .006 No_date    2:22   22.81  n/a     .000
00144>            overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00145>      {MxStoUsed=.1974E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00146> # Flow in Twin 750 mm Diameter Inlet Pipes
00147> R0001:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00148>     ADD HYD               1.0 02:RL1             .65     .038 No_date    1:10   21.14  n/a     .000
00149>                     +     1.0 02:RL2            2.65     .154 No_date    1:10   21.51  n/a     .000
00150>                  SUM=     1.0 01:Pipe           3.30     .192 No_date    1:10   21.44  n/a     .000
00151> # Total Inflow to Region Pond
00152> R0001:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00153>     ADD HYD               1.0 02:Pond1           .44     .011 No_date    1:10   11.26  n/a     .000
00154>                     +     1.0 02:RL1             .65     .038 No_date    1:10   21.14  n/a     .000
00155>                     +     1.0 02:RL2            2.65     .154 No_date    1:10   21.51  n/a     .000
00156>                   SUM=    1.0 01:Pin            3.74     .203 No_date    1:10   20.23  n/a     .000
00157> # Region Pond - Modified by Development of Streets B and K
00158> # Modified stage-storage relationship as provided by DSEL
00159> # Outlet controls, operating under free outfall conditions, as per  May 2001
00160> # "SWM Report, South Operations Centre" by TSH.
00161> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00162> # Replace 240 mm quantity orifice at 124.00 m with 200 mm orifice at 124.00 m
00163> R0001:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00164>     ROUTE RESERVOIR ->    1.0 02:Pin            3.74     .203 No_date    1:10   20.23  n/a     .000
00165>                 out <=    1.0 01:Pout           3.74     .013 No_date    2:37   20.23  n/a     .000
00166>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00167>      {MxStoUsed=.6666E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00168> # Halton 2-Year 4-Hour Chicago Design Storm
00169> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00170>   ** END OF RUN :  101
00171>
00172> ************************************************************************************************
00173>
00174>
00175>
00176>
00177>
00178>  RUN#:COMMAND#
```

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00179> R0102:C00001-------------------------------------------------------------------------------------------
00180>      START
00181>       [TZERO =    .00 hrs on        0]
00182>       [METOUT=   2    (1=imperial, 2=metric output)]
00183>       [NSTORM=   1 ]
00184>       [NRUN  = 0102 ]
00185> #*****************************************************************************
00186> #  SWMHYMO  / INPUT DATA FILE
00187> #*****************************************************************************
00188> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00189> #  Date         : 2017/03/15
00190> #  Modeller     : [JB]
00191> #  Updated      : 2017/04/20 [LP]
00192> #  Updated      : 2017/04/27 [LP]
00193> #  Company      : JFSAinc.
00194> #  License #    : 2549237
00195> #*****************************************************************************
00196> # Halton 25 mm 3-Hour Chicago Design Storm
00197> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00198> R0102:C00002-------------------------------------------------------------------------------------------
00199>      READ STORM
00200>       Filename = storm.001
00201>       Comment  = 2-Year 4 Hour Chicago Storm (Per TSHA)
00202>       [SDT=10.00:SDUR=   4.00:PTOT=  39.24]
00203> ###############################################################################
00204> # PROPOSED CONDITIONS
00205> ###############################################################################
00206> #
00207> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00208> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00209> # quality and 2- to 100-year quantity control before ultimately discharging to
00210> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00211> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00212> # Hubicki Associates (TSH).
00213> #
00214> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00215> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00216> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00217> # on the Region lands, draining to the Region pond under existing conditions.
00218> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00219> # the outlet pipe of the Region Pond.
00220> #
00221> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00222> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00223> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00224> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00225> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00226> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00227> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00228> # for further details.
00229> #
00230> # The storage available in the existing Region SWM Pond will be reduced by the
00231> # development of Streets B and K. On-site storage on the commercial lands is
00232> # proposed to ensure that combined proposed conditions outflows from the
00233> # modified Region SWM Pond and commercial block will not exceed target outflows,
00234> # as defined in the May 2001 "SWM Report, South Operations Centre" by TSH. Design
00235> # storms, modelling methods / parameters and SWM requirements consistent with the
00236> # May 2001 TSH SWM Report have been used to evaluate the performance of the Region
00237> # SWM Pond under interim conditions.
00238> # Proposed Commercial Block
00239> R0102:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00240>     CALIB STANDHYD        1.0 01:Comm1          1.01     .217 No_date    1:30   36.97 .942     .000
00241>       [XIMP=.99:TIMP=.99]
00242>       [LOSS= 2 :CN= 78.0]
00243>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00244>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00245> # Region Pond Block - Modified by Development of Streets B and K
00246> R0102:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00247>     CALIB STANDHYD        1.0 01:Pond1           .44     .038 No_date    1:30   20.75 .529     .000
00248>       [XIMP=.37:TIMP=.37]
00249>       [LOSS= 2 :CN= 78.0]
00250>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00251>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00252> # Existing Region Lands Tributary to Region Pond
00253> # 100-year capture point 1
00254> R0102:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00255>     CALIB STANDHYD        1.0 01:RL1             .65     .129 No_date    1:30   34.62 .882     .000
00256>       [XIMP=.90:TIMP=.90]
00257>       [LOSS= 2 :CN= 78.0]
00258>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00259>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00260> # Existing Region Lands Tributary to Region Pond
00261> #  100-year capture point 2
00262> R0102:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00263>     CALIB STANDHYD        1.0 01:RL2            2.65     .518 No_date    1:30   35.14 .896     .000
00264>       [XIMP=.92:TIMP=.92]
00265>       [LOSS= 2 :CN= 78.0]
00266>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00267>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
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00268> # On-Site Storage on Proposed Commercial Block
00269> R0102:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00270>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .217 No_date    1:30   36.97  n/a     .000
00271>                 out <=    1.0 01:Cout           1.01     .009 No_date    4:00   36.97  n/a     .000
00272>            overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00273>      {MxStoUsed=.2968E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00274> # Flow in Twin 750 mm Diameter Inlet Pipes
00275> R0102:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00276>     ADD HYD               1.0 02:RL1             .65     .129 No_date    1:30   34.62  n/a     .000
00277>                     +     1.0 02:RL2            2.65     .518 No_date    1:30   35.14  n/a     .000
00278>                  SUM=     1.0 01:Pipe           3.30     .646 No_date    1:30   35.04  n/a     .000
00279> # Total Inflow to Region Pond
00280> R0102:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00281>     ADD HYD               1.0 02:Pond1           .44     .038 No_date    1:30   20.75  n/a     .000
00282>                     +     1.0 02:RL1             .65     .129 No_date    1:30   34.62  n/a     .000
00283>                     +     1.0 02:RL2            2.65     .518 No_date    1:30   35.14  n/a     .000
00284>                  SUM=     1.0 01:Pin            3.74     .684 No_date    1:30   33.35  n/a     .000
00285> # Region Pond - Modified by Development of Streets B and K
00286> # Modified stage-storage relationship as provided by DSEL
00287> # Outlet controls, operating under free outfall conditions, as per  May 2001
00288> # "SWM Report, South Operations Centre" by TSH.
00289> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00290> # Replace 240 mm quantity orifice at 124.00 m with 200 mm orifice at 124.00 m
00291> R0102:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00292>     ROUTE RESERVOIR ->    1.0 02:Pin            3.74     .684 No_date    1:30   33.35  n/a     .000
00293>                 out <=    1.0 01:Pout           3.74     .019 No_date    4:03   33.35  n/a     .000
00294>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00295>      {MxStoUsed=.1086E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00296> # Halton 2-Year 4-Hour Chicago Design Storm
00297> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00298> # Halton 5-Year 4-Hour Chicago Design Storm
00299> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00300>   ** END OF RUN :  104
00301>
00302> ****************************************************************************************************
00303>
00304>
00305>
00306>
00307>
00308>  RUN#:COMMAND#
00309> R0105:C00001----------------------------------------------------------------------------------------
00310>      START
00311>       [TZERO =    .00 hrs on        0]
00312>       [METOUT=   2    (1=imperial, 2=metric output)]
00313>       [NSTORM=   1 ]
00314>       [NRUN  = 0105 ]
00315> #*************************************************************************
00316> #  SWMHYMO  / INPUT DATA FILE
00317> #*************************************************************************
00318> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00319> #  Date        : 2017/03/15
00320> #  Modeller    : [JB]
00321> #  Updated     : 2017/04/20 [LP]
00322> #  Updated     : 2017/04/27 [LP]
00323> #  Company     : JFSAinc.
00324> #  License #   : 2549237
00325> #*************************************************************************
00326> # Halton 25 mm 3-Hour Chicago Design Storm
00327> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00328> R0105:C00002----------------------------------------------------------------------------------------
00329>      READ STORM
00330>       Filename = storm.001
00331>       Comment  = 5-Year 4 Hour Chicago Storm (Per TSHA)
00332>       [SDT=10.00:SDUR=   4.00:PTOT=  48.45]
00333> ###########################################################################
00334> # PROPOSED CONDITIONS
00335> ###########################################################################
00336> #
00337> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00338> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00339> # quality and 2- to 100-year quantity control before ultimately discharging to
00340> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00341> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00342> # Hubicki Associates (TSH).
00343> #
00344> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00345> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00346> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00347> # on the Region lands, draining to the Region pond under existing conditions.
00348> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00349> # the outlet pipe of the Region Pond.
00350> #
00351> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00352> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00353> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00354> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00355> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00356> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
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00357> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00358> # for further details.
00359> #
00360> # The storage available in the existing Region SWM Pond will be reduced by the
00361> # development of Streets B and K. On-site storage on the commercial lands is
00362> # proposed to ensure that combined proposed conditions outflows from the
00363> # modified Region SWM Pond and commercial block will not exceed target outflows,
00364> # as defined in the May 2001 "SWM Report, South Operations Centre" by TSH. Design
00365> # storms, modelling methods / parameters and SWM requirements consistent with the
00366> # May 2001 TSH SWM Report have been used to evaluate the performance of the Region
00367> # SWM Pond under interim conditions.
00368> # Proposed Commercial Block
00369> R0105:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00370>     CALIB STANDHYD        1.0 01:Comm1          1.01     .311 No_date    1:30   46.15 .953     .000
00371>       [XIMP=.99:TIMP=.99]
00372>       [LOSS= 2 :CN= 78.0]
00373>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00374>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00375> # Region Pond Block - Modified by Development of Streets B and K
00376> R0105:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00377>     CALIB STANDHYD        1.0 01:Pond1           .44     .056 No_date    1:30   27.52 .568     .000
00378>       [XIMP=.37:TIMP=.37]
00379>       [LOSS= 2 :CN= 78.0]
00380>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00381>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00382> # Existing Region Lands Tributary to Region Pond
00383> # 100-year capture point 1
00384> R0105:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00385>     CALIB STANDHYD        1.0 01:RL1             .65     .185 No_date    1:30   43.44 .897     .000
00386>       [XIMP=.90:TIMP=.90]
00387>       [LOSS= 2 :CN= 78.0]
00388>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00389>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00390> # Existing Region Lands Tributary to Region Pond
00391> #  100-year capture point 2
00392> R0105:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00393>     CALIB STANDHYD        1.0 01:RL2            2.65     .752 No_date    1:30   44.04 .909     .000
00394>       [XIMP=.92:TIMP=.92]
00395>       [LOSS= 2 :CN= 78.0]
00396>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00397>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00398> # On-Site Storage on Proposed Commercial Block
00399> R0105:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00400>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .311 No_date    1:30   46.15  n/a     .000
00401>                  out <=    1.0 01:Cout           1.01     .022 No_date    2:20   46.15  n/a     .000
00402>              overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00403>       {MxStoUsed=.3348E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00404> # Flow in Twin 750 mm Diameter Inlet Pipes
00405> R0105:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00406>     ADD HYD               1.0 02:RL1             .65     .185 No_date    1:30   43.44  n/a     .000
00407>                     +     1.0 02:RL2            2.65     .752 No_date    1:30   44.04  n/a     .000
00408>                   SUM=    1.0 01:Pipe           3.30     .937 No_date    1:30   43.92  n/a     .000
00409> # Total Inflow to Region Pond
00410> R0105:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00411>     ADD HYD               1.0 02:Pond1           .44     .056 No_date    1:30   27.52  n/a     .000
00412>                     +     1.0 02:RL1             .65     .185 No_date    1:30   43.44  n/a     .000
00413>                     +     1.0 02:RL2            2.65     .752 No_date    1:30   44.04  n/a     .000
00414>                   SUM=    1.0 01:Pin            3.74     .993 No_date    1:30   41.99  n/a     .000
00415> # Region Pond - Modified by Development of Streets B and K
00416> # Modified stage-storage relationship as provided by DSEL
00417> # Outlet controls, operating under free outfall conditions, as per  May 2001
00418> # "SWM Report, South Operations Centre" by TSH.
00419> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00420> # Replace 240 mm quantity orifice at 124.00 m with 200 mm orifice at 124.00 m
00421> R0105:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00422>     ROUTE RESERVOIR ->    1.0 02:Pin            3.74     .993 No_date    1:30   41.99  n/a     .000
00423>                  out <=    1.0 01:Pout           3.74     .034 No_date    3:53   41.99  n/a     .000
00424>              overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00425>       {MxStoUsed=.1296E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00426> # Halton 2-Year 4-Hour Chicago Design Storm
00427> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00428> # Halton 5-Year 4-Hour Chicago Design Storm
00429> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00430> # Halton 25-Year 4-Hour Chicago Design Storm
00431> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00432>   ** END OF RUN :  124
00433>
00434> ****************************************************************************************************
00435>
00436>
00437>
00438>
00439>
00440>  RUN#:COMMAND#
00441> R0125:C00001-----------------------------------------------------------------------------------------
00442>      START
00443>       [TZERO =    .00 hrs on        0]
00444>       [METOUT=   2    (1=imperial, 2=metric output)]
00445>       [NSTORM=   1 ]
```

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00446>       [NRUN  = 0125 ]
00447> #******************************************************************************
00448> #  SWMHYMO  / INPUT DATA FILE
00449> #******************************************************************************
00450> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00451> #  Date         : 2017/03/15
00452> #  Modeller     : [JB]
00453> #  Updated      : 2017/04/20 [LP]
00454> #  Updated      : 2017/04/27 [LP]
00455> #  Company      : JFSAinc.
00456> #  License #    : 2549237
00457> #******************************************************************************
00458> # Halton 25 mm 3-Hour Chicago Design Storm
00459> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00460> R0125:C00002-------------------------------------------------------------------------------------------
00461>      READ STORM
00462>       Filename = storm.001
00463>       Comment  = 25-Year 4 Hour Chicago Storm (Per TSHA)
00464>       [SDT=10.00:SDUR=   4.00:PTOT=  66.10]
00465> ##############################################################################
00466> # PROPOSED CONDITIONS
00467> ##############################################################################
00468> #
00469> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00470> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00471> # quality and 2- to 100-year quantity control before ultimately discharging to
00472> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00473> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00474> # Hubicki Associates (TSH).
00475> #
00476> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00477> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00478> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00479> # on the Region lands, draining to the Region pond under existing conditions.
00480> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00481> # the outlet pipe of the Region Pond.
00482> #
00483> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00484> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00485> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00486> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00487> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00488> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00489> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00490> # for further details.
00491> #
00492> # The storage available in the existing Region SWM Pond will be reduced by the
00493> # development of Streets B and K. On-site storage on the commercial lands is
00494> # proposed to ensure that combined proposed conditions outflows from the
00495> # modified Region SWM Pond and commercial block will not exceed target outflows,
00496> # as defined in the May 2001 "SWM Report, South Operations Centre" by TSH. Design
00497> # storms, modelling methods / parameters and SWM requirements consistent with the
00498> # May 2001 TSH SWM Report have been used to evaluate the performance of the Region
00499> # SWM Pond under interim conditions.
00500> # Proposed Commercial Block
00501> R0125:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00502>     CALIB STANDHYD        1.0 01:Comm1          1.01     .441 No_date    1:30   63.74 .964     .000
00503>       [XIMP=.99:TIMP=.99]
00504>       [LOSS= 2 :CN= 78.0]
00505>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00506>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00507> # Region Pond Block - Modified by Development of Streets B and K
00508> R0125:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00509>     CALIB STANDHYD        1.0 01:Pond1           .44     .090 No_date    1:30   41.43 .627     .000
00510>       [XIMP=.37:TIMP=.37]
00511>       [LOSS= 2 :CN= 78.0]
00512>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00513>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00514> # Existing Region Lands Tributary to Region Pond
00515> # 100-year capture point 1
00516> R0125:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00517>     CALIB STANDHYD        1.0 01:RL1             .65     .264 No_date    1:30   60.50 .915     .000
00518>       [XIMP=.90:TIMP=.90]
00519>       [LOSS= 2 :CN= 78.0]
00520>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00521>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00522> # Existing Region Lands Tributary to Region Pond
00523> #  100-year capture point 2
00524> R0125:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00525>     CALIB STANDHYD        1.0 01:RL2            2.65    1.076 No_date    1:30   61.22 .926     .000
00526>       [XIMP=.92:TIMP=.92]
00527>       [LOSS= 2 :CN= 78.0]
00528>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00529>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00530> # On-Site Storage on Proposed Commercial Block
00531> R0125:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00532>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .441 No_date    1:30   63.74  n/a     .000
00533>                  out <=   1.0 01:Cout           1.01     .055 No_date    1:51   63.74  n/a     .000
00534>            overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
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00535>      {MxStoUsed=.4017E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00536> # Flow in Twin 750 mm Diameter Inlet Pipes
00537> R0125:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00538>     ADD HYD               1.0 02:RL1             .65     .264 No_date    1:30   60.50  n/a     .000
00539>                     +     1.0 02:RL2            2.65    1.076 No_date    1:30   61.22  n/a     .000
00540>                   SUM=    1.0 01:Pipe           3.30    1.340 No_date    1:30   61.08  n/a     .000
00541> # Total Inflow to Region Pond
00542> R0125:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00543>     ADD HYD               1.0 02:Pond1           .44     .090 No_date    1:30   41.43  n/a     .000
00544>                     +     1.0 02:RL1             .65     .264 No_date    1:30   60.50  n/a     .000
00545>                     +     1.0 02:RL2            2.65    1.076 No_date    1:30   61.22  n/a     .000
00546>                   SUM=    1.0 01:Pin            3.74    1.429 No_date    1:30   58.76  n/a     .000
00547> # Region Pond - Modified by Development of Streets B and K
00548> # Modified stage-storage relationship as provided by DSEL
00549> # Outlet controls, operating under free outfall conditions, as per  May 2001
00550> # "SWM Report, South Operations Centre" by TSH.
00551> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00552> # Replace 240 mm quantity orifice at 124.00 m with 200 mm orifice at 124.00 m
00553> R0125:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00554>     ROUTE RESERVOIR ->    1.0 02:Pin            3.74    1.429 No_date    1:30   58.76  n/a     .000
00555>                  out <=   1.0 01:Pout           3.74     .057 No_date    3:21   58.76  n/a     .000
00556>            overflow <=    1.0 03:Povf           .00     .000 No_date    0:00     .00  n/a     .000
00557>      {MxStoUsed=.1710E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00558> # Halton 2-Year 4-Hour Chicago Design Storm
00559> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00560> # Halton 5-Year 4-Hour Chicago Design Storm
00561> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00562> # Halton 25-Year 4-Hour Chicago Design Storm
00563> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00564> # Halton 100-Year 4-Hour Chicago Design Storm
00565> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00566>   ** END OF RUN :  198
00567>
00568> ****************************************************************************************************
00569>
00570>
00571>
00572>
00573>
00574>  RUN#:COMMAND#
00575> R0199:C00001------------------------------------------------------------------------------------------
00576>      START
00577>       [TZERO =    .00 hrs on        0]
00578>       [METOUT=   2    (1=imperial, 2=metric output)]
00579>       [NSTORM=   1 ]
00580>       [NRUN  = 0199 ]
00581> #*****************************************************************************
00582> #  SWMHYMO  / INPUT DATA FILE
00583> #*****************************************************************************
00584> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00585> #  Date        : 2017/03/15
00586> #  Modeller    : [JB]
00587> #  Updated     : 2017/04/20 [LP]
00588> #  Updated     : 2017/04/27 [LP]
00589> #  Company     : JFSAinc.
00590> #  License #   : 2549237
00591> #*****************************************************************************
00592> # Halton 25 mm 3-Hour Chicago Design Storm
00593> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00594> R0199:C00002------------------------------------------------------------------------------------------
00595>      READ STORM
00596>       Filename = storm.001
00597>       Comment  = 100-Year 4 Hour Chicago Storm (Per TSHA)
00598>       [SDT=10.00:SDUR=   4.00:PTOT=  83.74]
00599> ###############################################################################
00600> # PROPOSED CONDITIONS
00601> ###############################################################################
00602> #
00603> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00604> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00605> # quality and 2- to 100-year quantity control before ultimately discharging to
00606> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00607> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00608> # Hubicki Associates (TSH).
00609> #
00610> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00611> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00612> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00613> # on the Region lands, draining to the Region pond under existing conditions.
00614> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00615> # the outlet pipe of the Region Pond.
00616> #
00617> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00618> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00619> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00620> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00621> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00622> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00623> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
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00624> # for further details.
00625> #
00626> # The storage available in the existing Region SWM Pond will be reduced by the
00627> # development of Streets B and K. On-site storage on the commercial lands is
00628> # proposed to ensure that combined proposed conditions outflows from the
00629> # modified Region SWM Pond and commercial block will not exceed target outflows,
00630> # as defined in the May 2001 "SWM Report, South Operations Centre" by TSH. Design
00631> # storms, modelling methods / parameters and SWM requirements consistent with the
00632> # May 2001 TSH SWM Report have been used to evaluate the performance of the Region
00633> # SWM Pond under interim conditions.
00634> # Proposed Commercial Block
00635> R0199:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00636>     CALIB STANDHYD        1.0 01:Comm1          1.01     .572 No_date    1:30   81.33 .971     .000
00637>       [XIMP=.99:TIMP=.99]
00638>       [LOSS= 2 :CN= 78.0]
00639>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00640>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00641> # Region Pond Block - Modified by Development of Streets B and K
00642> R0199:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00643>     CALIB STANDHYD        1.0 01:Pond1           .44     .132 No_date    1:30   56.22 .671     .000
00644>       [XIMP=.37:TIMP=.37]
00645>       [LOSS= 2 :CN= 78.0]
00646>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00647>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00648> # Existing Region Lands Tributary to Region Pond
00649> # 100-year capture point 1
00650> R0199:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00651>     CALIB STANDHYD        1.0 01:RL1             .65     .345 No_date    1:30   77.69 .928     .000
00652>       [XIMP=.90:TIMP=.90]
00653>       [LOSS= 2 :CN= 78.0]
00654>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00655>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00656> # Existing Region Lands Tributary to Region Pond
00657> #  100-year capture point 2
00658> R0199:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00659>     CALIB STANDHYD        1.0 01:RL2            2.65    1.410 No_date    1:30   78.50 .937     .000
00660>       [XIMP=.92:TIMP=.92]
00661>       [LOSS= 2 :CN= 78.0]
00662>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00663>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00664> # On-Site Storage on Proposed Commercial Block
00665> R0199:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00666>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .572 No_date    1:30   81.33  n/a     .000
00667>                 out <=    1.0 01:Cout           1.01     .105 No_date    1:42   81.33  n/a     .000
00668>           overflow <=    1.0 03:Covf            .00     .000 No_date    0:00     .00  n/a     .000
00669>      {MxStoUsed=.4997E-01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00670> # Flow in Twin 750 mm Diameter Inlet Pipes
00671> R0199:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00672>     ADD HYD               1.0 02:RL1             .65     .345 No_date    1:30   77.69  n/a     .000
00673>                       +     1.0 02:RL2            2.65    1.410 No_date    1:30   78.50  n/a     .000
00674>                   SUM=      1.0 01:Pipe           3.30    1.756 No_date    1:30   78.34  n/a     .000
00675> # Total Inflow to Region Pond
00676> R0199:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00677>     ADD HYD               1.0 02:Pond1           .44     .132 No_date    1:30   56.22  n/a     .000
00678>                       +     1.0 02:RL1             .65     .345 No_date    1:30   77.69  n/a     .000
00679>                       +     1.0 02:RL2            2.65    1.410 No_date    1:30   78.50  n/a     .000
00680>                   SUM=      1.0 01:Pin            3.74    1.887 No_date    1:30   75.72  n/a     .000
00681> # Region Pond - Modified by Development of Streets B and K
00682> # Modified stage-storage relationship as provided by DSEL
00683> # Outlet controls, operating under free outfall conditions, as per  May 2001
00684> # "SWM Report, South Operations Centre" by TSH.
00685> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00686> # Replace 240 mm quantity orifice at 124.00 m with 200 mm orifice at 124.00 m
00687> R0199:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00688>     ROUTE RESERVOIR ->    1.0 02:Pin            3.74    1.887 No_date    1:30   75.72  n/a     .000
00689>                 out <=    1.0 01:Pout           3.74     .076 No_date    2:52   75.72  n/a     .000
00690>           overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00691>      {MxStoUsed=.2211E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00692> # Halton 2-Year 4-Hour Chicago Design Storm
00693> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00694> # Halton 5-Year 4-Hour Chicago Design Storm
00695> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00696> # Halton 25-Year 4-Hour Chicago Design Storm
00697> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00698> # Halton 100-Year 4-Hour Chicago Design Storm
00699> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00700> # Hurricane Hazel (Regional Event)
00701>   ** END OF RUN :  998
00702>
00703> ********************************************************************************************************
00704>
00705>
00706>
00707>
00708>
00709>  RUN#:COMMAND#
00710> R0999:C00001------------------------------------------------------------------------------------------
00711>      START
00712>       [TZERO =    .00 hrs on        0]
```

```
00713>       [METOUT=   2    (1=imperial, 2=metric output)]
00714>       [NSTORM=   1 ]
00715>       [NRUN  = 0999 ]
00716> #*******************************************************************************
00717> #  SWMHYMO  / INPUT DATA FILE
00718> #*******************************************************************************
00719> #  Project Name: [Halton Region Lands]    Project Number: [1051-12]
00720> #  Date         : 2017/03/15
00721> #  Modeller     : [JB]
00722> #  Updated      : 2017/04/20 [LP]
00723> #  Updated      : 2017/04/27 [LP]
00724> #  Company      : JFSAinc.
00725> #  License #    : 2549237
00726> #*******************************************************************************
00727> # Halton 25 mm 3-Hour Chicago Design Storm
00728> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00729> R0999:C00002-------------------------------------------------------------------------------------------
00730>      READ STORM
00731>       Filename = storm.001
00732>       Comment  = Hurricane Hazel
00733>       [SDT=10.00:SDUR=  48.00:PTOT= 285.08]
00734> ###############################################################################
00735> # PROPOSED CONDITIONS
00736> ###############################################################################
00737> #
00738> # An existing Stormwater Management (SWM) Pond on the Region of Halton South
00739> # Operations Centre site treats approximately 5.75 ha of the site for enhanced
00740> # quality and 2- to 100-year quantity control before ultimately discharging to
00741> # Bronte Creek, via a pipe through the Region lands. The existing pond design
00742> # is as per the May 2001 "SWM Report, South Operations Centre" by Totten Sims
00743> # Hubicki Associates (TSH).
00744> #
00745> # A 1.009 ha commercial block is to be developed as part of the Bronte Green
00746> # subdivision. 0.088 ha of the site is undeveloped and draining to Bronte
00747> # Creek under existing conditions. The remaining 0.921 ha is a parking lot
00748> # on the Region lands, draining to the Region pond under existing conditions.
00749> # Under proposed conditions, the full 1.009 ha commercial block will drain to
00750> # the outlet pipe of the Region Pond.
00751> #
00752> # Additionally, under proposed conditions, approximately 0.527 ha of the existing
00753> # drainage area to the Region Pond will be re-constructed as Streets B and K of
00754> # the proposed Bronte Green subdivision, runoff from 0.480 ha of which will be
00755> # directed to the proposed Bronte Green Pond for SWM treatment before discharging
00756> # to Fourteen Mile Creek. The remaining 0.047 ha will drain overland to Bronte Road.
00757> # Refer to the April 2017 "SWM Report for the Bronte Green Subdivision" and the
00758> # April 2017 " Design Brief for the SWM Pond for the Bronte Green Subdivision"
00759> # for further details.
00760> #
00761> # The storage available in the existing Region SWM Pond will be reduced by the
00762> # development of Streets B and K. On-site storage on the commercial lands is
00763> # proposed to ensure that combined proposed conditions outflows from the
00764> # modified Region SWM Pond and commercial block will not exceed target outflows,
00765> # as defined in the May 2001 "SWM Report, South Operations Centre" by TSH. Design
00766> # storms, modelling methods / parameters and SWM requirements consistent with the
00767> # May 2001 TSH SWM Report have been used to evaluate the performance of the Region
00768> # SWM Pond under interim conditions.
00769> # Proposed Commercial Block
00770> R0999:C00003------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00771>     CALIB STANDHYD        1.0 01:Comm1          1.01     .148 No_date   46:00  282.48 .991     .000
00772>       [XIMP=.99:TIMP=.99]
00773>       [LOSS= 2 :CN= 78.0]
00774>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00775>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  82.:MNI=.013:SCI=   .0]
00776> # Region Pond Block - Modified by Development of Streets B and K
00777> R0999:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00778>     CALIB STANDHYD        1.0 01:Pond1           .44     .062 No_date   46:00  245.25 .860     .000
00779>       [XIMP=.37:TIMP=.37]
00780>       [LOSS= 2 :CN= 78.0]
00781>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00782>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  54.:MNI=.013:SCI=   .0]
00783> # Existing Region Lands Tributary to Region Pond
00784> # 100-year capture point 1
00785> R0999:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00786>     CALIB STANDHYD        1.0 01:RL1             .65     .096 No_date   46:00  277.08 .972     .000
00787>       [XIMP=.90:TIMP=.90]
00788>       [LOSS= 2 :CN= 78.0]
00789>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00790>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI=  66.:MNI=.013:SCI=   .0]
00791> # Existing Region Lands Tributary to Region Pond
00792> #  100-year capture point 2
00793> R0999:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00794>     CALIB STANDHYD        1.0 01:RL2            2.65     .387 No_date   46:00  278.28 .976     .000
00795>       [XIMP=.92:TIMP=.92]
00796>       [LOSS= 2 :CN= 78.0]
00797>       [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00798>       [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 133.:MNI=.013:SCI=   .0]
00799> # On-Site Storage on Proposed Commercial Block
00800> R0999:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00801>     ROUTE RESERVOIR ->    1.0 02:Comm1          1.01     .148 No_date   46:00  282.48  n/a     .000
```

```
00802>                out <=    1.0 01:Cout            .98     .105 No_date   45:35  282.48  n/a     .000
00803>           overflow <=    1.0 03:Covf            .03     .043 No_date   46:00  282.48  n/a     .000
00804>      {MxStoUsed=.5000E-01  m3, TotOvfVol=.8005E-02  m3, N-Ovf=    3, TotDurOvf=    1.hrs}
00805> # Flow in Twin 750 mm Diameter Inlet Pipes
00806> R0999:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00807>     ADD HYD              1.0 02:RL1            .65     .096 No_date   46:00  277.08  n/a     .000
00808>                    +     1.0 02:RL2           2.65     .387 No_date   46:00  278.28  n/a     .000
00809>                  SUM=    1.0 01:Pipe          3.30     .483 No_date   46:00  278.04  n/a     .000
00810> # Total Inflow to Region Pond
00811> R0999:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00812>     ADD HYD              1.0 02:Pond1          .44     .062 No_date   46:00  245.25  n/a     .000
00813>                    +     1.0 02:RL1            .65     .096 No_date   46:00  277.08  n/a     .000
00814>                    +     1.0 02:RL2           2.65     .387 No_date   46:00  278.28  n/a     .000
00815>                  SUM=    1.0 01:Pin           3.74     .545 No_date   46:00  274.17  n/a     .000
00816> # Region Pond - Modified by Development of Streets B and K
00817> # Modified stage-storage relationship as provided by DSEL
00818> # Outlet controls, operating under free outfall conditions, as per  May 2001
00819> # "SWM Report, South Operations Centre" by TSH.
00820> # Replace 120 mm quality orifice at 123.40 m with 100 mm orifice at 123.40 m
00821> # Replace 240 mm quantity orifice at 124.00 m with 200 mm orifice at 124.00 m
00822> R0999:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00823>     ROUTE RESERVOIR ->    1.0 02:Pin           3.74     .545 No_date   46:00  274.17  n/a     .000
00824>                out <=    1.0 01:Pout          3.74     .136 No_date   47:42  274.16  n/a     .000
00825>           overflow <=    1.0 03:Povf           .00     .000 No_date    0:00     .00  n/a     .000
00826>      {MxStoUsed=.5551E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00827> # Halton 2-Year 4-Hour Chicago Design Storm
00828> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00829> # Halton 5-Year 4-Hour Chicago Design Storm
00830> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00831> # Halton 25-Year 4-Hour Chicago Design Storm
00832> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00833> # Halton 100-Year 4-Hour Chicago Design Storm
00834> # As Per May 2001 "SWM Report, South Operations Centre" by TSH
00835> # Hurricane Hazel (Regional Event)
00836> R0999:C00002------------------------------------------------------------------------------------------
00837>     FINISH
00838> ------------------------------------------------------------------------------------------------------
00839> ******************************************************************************************************
00840>      WARNINGS / ERRORS / NOTES
00841>      -------------------------
00842>    Simulation ended on 2017-04-28     at 00:07:42
00843> ======================================================================================================
00844>
00845>
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ATTACHMENT

B

Pond Controls and Forebay Sizing Calculations (Scenario 1)

JFSA Water Resources and Environmental Consultants

Table B-1: Criteria for Required Storage Volumes

Pond	Area [1] (ha)	Imperviousness (%)	Storage Volume for Impervious Level [2] (m^3/ha)
N/A	N/A	70	120
SWM Facility	4.751	88	144.00
N/A	N/A	85	140

[1] Refer to Table B-6 of Attachment B for drainage areas to SWM Facility.

[2] Protection Level for Wetland: Enhanced 80% long-term S.S. removal.
SWM Planning & Design Manual, Table 3.2, p.3-10 (March 2003).

Table B-2: Required Storage Volumes for SWM Facility

Pond Component	Required Volume (m^3)	Provided Volume [4] (m^3)	Volume Ratio	Provided Area [5] (m^2)	Provided Elevation (m)
Permanent Pool (PP) [1]	494	500	1.01	1384	123.400
Quality Control [2]	190	190	1.00	N/A	123.529
Extended Detention [3]	190	1043	5.49	N/A	124.000
Forebay (20% PP)	99	N/A	N/A	214	123.400
PP - Forebay	395	N/A	N/A	1170	123.400
			Area Ratio (%) [6] =	15	

[1] Required PP volume based on Table B-1 (144.00 - 40 = 104.00 m^3/ha).

[2] Required quality control volume based on 40 m^3/ha.

[3] Required extended detention volume based on the required quality control volume.

[4] Provided volume based on stage-storage curve and extended detention (refer to Tables B-3 and B-4 of Attachment B).

[5] Based on grading plan provided by DSEL (refer to Figure 2).

[6] As per MOE, Maximum Forebay Area: 33% of Total Permanent Pool.

Table B-3: Extended Detention Parameters for SWM Facility

Permanent Pool Parameters			Quality Orifice Parameters		
Area (C3)	1383.58	m^2	Diameter	0.100	m
Volume	500.27	m^3			
PP Elev	123.400	m	Area	0.008	m^2
QC Elev	123.529	m	Invert	123.400	m
h (m)	0.129	m	C_o	0.62	

Notes:
- C3 is the intercept from the area-depth linear regression.
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- h is the maximum water elevation above the orifice (m).

Table B-4: Extended Detention Drawdown Time for SWM Facility

Elev.	Active Storage			C2	Drawdown Time	Drawdown Time	Flow	Demarkation
(m)	V (m^3)	A (m^2)	depth (m)	(m^2/m)	(h)	(days)	(m^3/s)	Point
123.40	**0.00**	**1383.58**	**0.00**				**0.000**	**PP Elev**
123.45	69.35	1386.81	0.05	65	7.96	0.33	0.002	
123.50	143.64	1485.71	0.10	1021	11.53	0.48	0.005	
123.529	**188.00**	**1520.00**	**0.13**	**1057**	**13.20**	**0.55**	**0.006**	**QC Elev**
123.55	219.83	1544.61	0.15	1074	14.31	0.60	0.007	
123.60	298.97	1603.32	0.20	1099	16.75	0.70	0.008	
123.65	380.00	1662.88	0.25	1117	18.98	0.79	0.010	
123.70	464.17	1707.91	0.30	1081	21.00	0.88	0.011	
123.75	554.61	1825.14	0.35	1262	23.27	0.97	0.012	
123.80	647.43	1871.22	0.40	1219	25.13	1.05	0.013	
123.827	**698.50**	**1897.24**	**0.43**	**1203**	**26.10**	**1.09**	**0.013**	**25 mm**
123.85	742.52	1919.67	0.45	1191	26.93	1.12	0.014	
123.90	840.18	1967.45	0.50	1168	28.67	1.19	0.014	
123.95	940.31	2015.33	0.55	1149	30.37	1.27	0.015	
124.00	**1043.10**	**2064.64**	**0.60**	**1135**	**32.04**	**1.34**	**0.016**	**Ext. Det.**
124.042	**1132.00**	**2106.52**	**0.64**	**1127**	**33.42**	**1.39**	**0.030**	**2-Year**
124.05	1149.98	2114.99	0.65	1125	33.70	1.40	0.032	
124.10	1258.09	2165.43	0.70	1117	35.33	1.47	0.049	
124.122	**1308.00**	**2186.99**	**0.72**	**1112**	**36.05**	**1.50**	**0.056**	**5-Year**
124.15	1369.14	2213.41	0.75	1106	36.92	1.54	0.065	
124.20	1480.86	2261.86	0.80	1098	38.50	1.60	0.082	
124.25	1597.05	2312.87	0.85	1093	40.08	1.67	0.098	
124.293	**1700.00**	**2356.57**	**0.89**	**1089**	**41.44**	**1.73**	**0.112**	**25-Year**
124.30	1715.89	2363.32	0.90	1089	41.65	1.74	0.115	
124.35	1837.49	2414.90	0.95	1086	43.22	1.80	0.131	
124.40	1961.94	2466.39	1.00	1083	44.78	1.87	0.146	
124.45	2089.15	2518.26	1.05	1081	46.34	1.93	0.160	
124.496	**2212.00**	**2567.31**	**1.10**	**1080**	**47.77**	**1.99**	**0.172**	**100-Year**
124.50	2223.10	2571.75	1.10	1080	47.90	2.00	0.173	
124.55	2356.76	2623.71	1.15	1078	49.45	2.06	0.184	

Notes:
C2 is the slope coefficient from the area-depth linear regression.
PP Elev indicates the elevation of the permanent pool.
QC Elev indicates the elevation of the storage volume required by MOE for quality control.
Ext. Det. indicates the elevation of extended detention provided based on the required quality control volume.
25 mm, 2-, 5-, 25- and 100-year 4-hour Chicago storm elevations under free outfall conditions are noted.
Orifice selected to provide a 24 to 48 hour drawdown time in accordance with MOE standards.

Table B-5: Stage-Storage-Outflow Curve for SWM Facility

			Quality Control 1		Quantity Control 1			
			Vertical Circ. Orifice		Vertical Circ. Orifice			
			Dia (m)	0.100	Dia (m)	0.350		
			Area (m^2)	0.008	Area (m^2)	0.096		
			Invert (m)	123.40	Invert (m)	124.00		
			C_o	0.62	C_o	0.62		
			Q @ D	0.005	Q @ D	0.111		
Elevation	Active Sto.	Demarkation	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m^3)	Points	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)	(ha·m)
123.40	**0**	**PP Elev**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
123.45	69		0.050	0.002	0.000	0.000	0.002	0.007
123.50	144		0.100	0.005	0.000	0.000	0.005	0.014
123.529	**188**	**QC Elev**	**0.129**	**0.006**	**0.000**	**0.000**	**0.006**	**0.019**
123.55	220		0.150	0.007	0.000	0.000	0.007	0.022
123.60	299		0.200	0.008	0.000	0.000	0.008	0.030
123.65	380		0.250	0.010	0.000	0.000	0.010	0.038
123.70	464		0.300	0.011	0.000	0.000	0.011	0.046
123.75	555		0.350	0.012	0.000	0.000	0.012	0.055
123.80	647		0.400	0.013	0.000	0.000	0.013	0.065
123.827	**698**	**25 mm**	**0.427**	**0.013**	**0.000**	**0.000**	**0.013**	**0.070**
123.85	743		0.450	0.014	0.000	0.000	0.014	0.074
123.90	840		0.500	0.014	0.000	0.000	0.014	0.084
123.95	940		0.550	0.015	0.000	0.000	0.015	0.094
124.00	**1043**	**Ext. Det.**	**0.600**	**0.016**	**0.000**	**0.000**	**0.016**	**0.104**
124.042	**1132**	**2-Year**	**0.642**	**0.017**	**0.042**	**0.013**	**0.030**	**0.113**
124.05	1150		0.650	0.017	0.050	0.016	0.032	0.115
124.10	1258		0.700	0.017	0.100	0.032	0.049	0.126
124.122	**1308**	**5-Year**	**0.722**	**0.018**	**0.122**	**0.039**	**0.056**	**0.131**
124.15	1369		0.750	0.018	0.150	0.047	0.065	0.137
124.20	1481		0.800	0.019	0.200	0.063	0.082	0.148
124.25	1597		0.850	0.019	0.250	0.079	0.098	0.160
124.293	**1700**	**25-Year**	**0.893**	**0.020**	**0.293**	**0.093**	**0.112**	**0.170**
124.30	1716		0.900	0.020	0.300	0.095	0.115	0.172
124.35	1837		0.950	0.020	0.350	0.111	0.131	0.184
124.40	1962		1.000	0.021	0.400	0.125	0.146	0.196
124.45	2089		1.050	0.022	0.450	0.139	0.160	0.209
124.496	**2212**	**100-Year**	**1.096**	**0.022**	**0.496**	**0.150**	**0.172**	**0.221**
124.50	2223		1.100	0.022	0.500	0.151	0.173	0.222
124.55	2357		1.150	0.023	0.550	0.162	0.184	0.236
124.60	2493		1.200	0.023	0.600	0.172	0.195	0.249
124.65	2628		1.250	0.024	0.650	0.182	0.206	0.263
124.70	2770		1.300	0.024	0.700	0.191	0.216	0.277
124.75	2915		1.350	0.025	0.750	0.200	0.225	0.292
124.80	3063		1.400	0.025	0.800	0.209	0.234	0.306
124.85	**3215**	**Ovf Elev**	**1.450**	**0.026**	**0.850**	**0.217**	**0.243**	**0.321**
124.90	3369		1.500	0.026	0.900	0.225	0.251	0.337
124.95	3532		1.550	0.026	0.950	0.233	0.259	0.353
125.00	3693		1.600	0.027	1.000	0.240	0.267	0.369
125.05	3857		1.650	0.027	1.050	0.247	0.274	0.386
125.10	4021		1.700	0.028	1.100	0.254	0.282	0.402
125.15	4372		1.750	0.028	1.150	0.261	0.289	0.437
125.20	4261		1.800	0.029	1.200	0.268	0.296	0.426
125.25	4431		1.850	0.029	1.250	0.274	0.303	0.443
125.30	4602		1.900	0.029	1.300	0.280	0.310	0.460
125.35	4774		1.950	0.030	1.350	0.286	0.316	0.477
125.40	4946		2.000	0.030	1.400	0.292	0.323	0.495
125.45	5120		2.050	0.031	1.450	0.298	0.329	0.512
125.50	5294		2.100	0.031	1.500	0.304	0.335	0.529
125.55	5469		2.150	0.031	1.550	0.310	0.341	0.547
125.60	5645		2.200	0.032	1.600	0.315	0.347	0.564
125.65	5820		2.250	0.032	1.650	0.321	0.353	0.582
125.70	5998		2.300	0.032	1.700	0.326	0.359	0.600

Table B-5: Stage-Storage-Outflow Curve for SWM Facility

			Quality Control 1		Quantity Control 1			
			Vertical Circ. Orifice		Vertical Circ. Orifice			
			Dia (m)	0.100	Dia (m)	0.350		
			Area (m^2)	0.008	Area (m^2)	0.096		
			Invert (m)	123.40	Invert (m)	124.00		
			C_o	0.62	C_o	0.62		
			Q @ D	0.005	Q @ D	0.111		
Elevation	Active Sto.	Demarkation	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m^3)	Points	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)	(ha·m)
125.75	6175		2.350	0.033	1.750	0.332	0.364	0.618
125.80	6354		2.400	0.033	1.800	0.337	0.370	0.635
125.85	6533		2.450	0.033	1.850	0.342	0.375	0.653
125.90	6713		2.500	0.034	1.900	0.347	0.381	0.671
125.95	6894		2.550	0.034	1.950	0.352	0.386	0.689
126.00	7073		2.600	0.034	2.000	0.357	0.391	0.707
126.05	7254		2.650	0.035	2.050	0.362	0.397	0.725
126.10	7435		2.700	0.035	2.100	0.367	0.402	0.743
126.15	7617		2.750	0.035	2.150	0.371	0.407	0.762
126.20	7801		2.800	0.036	2.200	0.376	0.412	0.780
126.25	**7986**	**Top of Berm**	**2.850**	**0.036**	**2.250**	**0.381**	**0.417**	**0.799**

Notes : PP Elev indicates the elevation of the permanent pool.

QC Elev indicates the elevation of the storage volume required by MOE for quality control.

Ext. Det. indicates the elevation of extended detention provided based on the required quality control volume.

Ovf Elev indicates the elevation of the emergency spillway provided above the 100-year water level.

Top of Berm indicates the elevation at the top of the berm.

25 mm, 2-, 5-, 25- and 100-year 4-hour Chicago storm elevations under free outfall conditions are noted.

Table B-6 : Drainage Area to SWM Facility

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
Comm1	1.009	99	99.891
Pond1	0.442	37	16.354
RL1	0.654	90	58.860
RL2	2.646	92	243.432
Total	**4.751**	**88**	**418.537**

[1] Refer to Figure 1.

Weighted Average Imperviousness = S(Area x Imp) / Total Area = 418.537 / 4.751 = 88 %

Table B-7 : Summary of Total Drainage Area

Land Use [1]	Area (ha)	Imperviousness	Area x Imp.
Drainage to SWM Facility	4.751	88	418.537

[1] Refer to Figure 1.

Weighted Average Imperviousness = S(Area x Imp) / Total Area = 418.537 / 4.751 = 88 %

Table B-8 : Allowable Release Rates for Proposed SWM Facility

Event	Target Release Rate [1] (m^3/s)	Existing Pond Release Rate [1] (m^3/s)
25mm/3hr Chicago	0.020	0.016
2yr/24hr Chicago	0.040	0.030
5yr/24hr Chicago	0.070	0.063
25yr/24hr Chicago	0.127	0.110
100yr/24hr Chicago	0.206	0.129

[1] As per the May 2001 "SWM Report, South Operations Centre" by Totten Sims Hubicki Associates (TSH).

CALCULATION SHEET B-1: CONTROLS

Quality Control 1		
Vertical Circular Orifice		
Diameter	(m)	0.100
A_o	(m^2)	0.008
invert	(m)	123.40
C_o		0.62
100-Yr Water Level	(m)	124.496
Head of Water	(m)	1.096
Q_0	(m^3/s)	0.022

Orifice Equation:

$Q_o = C_o A_o (2gh)^{0.5}$

Not including reverse pipe losses

Q_o *is the orifice flow*

C_o *is the orifice coefficient*

A_o *is the orifice flow area*

g is the gravitational constant

h is the head of water

Quantity Control 1		
Vertical Circular Orifice		
Diameter	(m)	0.350
A_o	(m^2)	0.096
invert	(m)	124.000
C_o		0.62
100-Yr Water Level	(m)	124.496
Head of Water	(m)	0.496
Q_0	(m^3/s)	0.150

Orifice Equation:

$Q_o = C_o A_o (2gh)^{0.5}$

Q_o *is the orifice flow*

C_o *is the orifice coefficient*

A_o *is the orifice flow area*

g is the gravitational constant

h is the head of water

CALCULATION SHEET B-2: FOREBAY SIZING FOR SWM FACILITY

Region SWM Pond
Town of Oakville
Calculation of Forebay Size

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{r\,Q_p}{V_s} \right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:

r =	2.67		(24 m / 9 m)
Q_p =	0.016	m^3/s	(at elevation 124 m)
V_s =	0.0003	m/s	

L_{min} = 11.92 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8\,Q}{d\,V_f}$$

where:
- Q = Inlet flowrate (5-Year, 4-Hour Chicago Storm)
- d = depth of permanent pool in forebay
- V_f = desired final velocity

Input:

Q =	1.000	m^3/s
d =	1.00	m
Vf =	0.5	m/s

L_{min} = 16.00 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required	16.00 m	
Length of Forebay Provided	**24.00 m**	(at elevation 123.4 m)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where:
- Q = Inlet flowrate (5-Year, 4-Hour Chicago Storm)
- d = depth of permanent pool in forebay
- W_{avg} = average width of forebay

Input:

Q =	1.000	m^3/s	
d =	1.00	m	
W_{avg} =	6	m	(3 m bottom, 9 m permanent pool)

V = 0.17 m/s > 0.15 m/s

ATTACHMENT

C

Pond Controls and Forebay Sizing Calculations (Scenario 2)

JFSA Water Resources and Environmental Consultants

Table C-1: Criteria for Required Storage Volumes

Pond	Area [1] (ha)	Imperviousness (%)	Storage Volume for Impervious Level [2] (m^3/ha)
N/A	N/A	70	120
SWM Facility	3.742	85	140.00
N/A	N/A	85	140

[1] Refer to Table B-6 of Attachment B for drainage areas to SWM Facility.

[2] Protection Level for Wetland: Enhanced 80% long-term S.S. removal.
SWM Planning & Design Manual, Table 3.2, p.3-10 (March 2003).

Table C-2: Required Storage Volumes for SWM Facility

Pond Component	Required Volume (m^3)	Provided Volume [4] (m^3)	Volume Ratio	Provided Area [5] (m^2)	Provided Elevation (m)
Permanent Pool (PP) [1]	374	500	1.34	1384	123.400
Quality Control [2]	150	150	1.00	N/A	123.504
Extended Detention [3]	150	1043	6.97	N/A	124.000
Forebay (20% PP)	75	N/A	N/A	214	123.400
PP - Forebay	299	N/A	N/A	1170	123.400
			Area Ratio (%) [6] =	15	

[1] Required PP volume based on Table B-1 (144.00 - 40 = 104.00 m^3/ha).

[2] Required quality control volume based on 40 m^3/ha.

[3] Required extended detention volume based on the required quality control volume.

[4] Provided volume based on stage-storage curve and extended detention (refer to Tables B-3 and B-4 of Attachment B).

[5] Based on grading plan provided by DSEL (refer to Figure 2).

[6] As per MOE, Maximum Forebay Area: 33% of Total Permanent Pool.

Table C-3: Extended Detention Parameters for SWM Facility

Permanent Pool Parameters			Quality Orifice Parameters		
Area (C3)	1383.58	m^2	Diameter	0.100	m
Volume	500.27	m^3			
PP Elev	123.400	m	Area	0.008	m^2
QC Elev	123.504	m	Invert	123.400	m
h (m)	0.104	m	C_o	0.62	

Notes:
- C3 is the intercept from the area-depth linear regression.
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- h is the maximum water elevation above the orifice (m).

Table C-4: Extended Detention Drawdown Time for SWM Facility

Elev.	Active Storage			C2	Drawdown Time	Drawdown Time	Flow	Demarkation
(m)	V (m^3)	A (m^2)	depth (m)	(m^2/m)	(h)	(days)	(m^3/s)	Point
123.40	**0.00**	**1383.58**	**0.00**				**0.000**	**PP Elev**
123.45	69.35	1386.81	0.05	65	7.96	0.33	0.002	
123.50	143.64	1485.71	0.10	1021	11.53	0.48	0.005	
123.504	**150.00**	**1490.62**	**0.10**	**1028**	**11.78**	**0.49**	**0.005**	**QC Elev**
123.55	219.83	1544.61	0.15	1074	14.31	0.60	0.007	
123.60	298.97	1603.32	0.20	1099	16.75	0.70	0.008	
123.65	380.00	1662.88	0.25	1117	18.98	0.79	0.010	
123.70	464.17	1707.91	0.30	1081	21.00	0.88	0.011	
123.75	554.61	1825.14	0.35	1262	23.27	0.97	0.012	
123.80	647.43	1871.22	0.40	1219	25.13	1.05	0.013	
123.810	**666.60**	**1880.98**	**0.41**	**1213**	**25.49**	**1.06**	**0.013**	**25 mm**
123.85	742.52	1919.67	0.45	1191	26.93	1.12	0.014	
123.90	840.18	1967.45	0.50	1168	28.67	1.19	0.014	
123.95	940.31	2015.33	0.55	1149	30.37	1.27	0.015	
124.00	**1043.10**	**2064.64**	**0.60**	**1135**	**32.04**	**1.34**	**0.016**	**Ext. Det.**
124.020	**1086.00**	**2084.85**	**0.62**	**1131**	**32.71**	**1.36**	**0.019**	**2-Year**
124.05	1149.98	2114.99	0.65	1125	33.70	1.40	0.024	
124.10	1258.09	2165.43	0.70	1117	35.33	1.47	0.031	
124.117	**1296.00**	**2181.81**	**0.72**	**1113**	**35.87**	**1.49**	**0.034**	**5-Year**
124.15	1369.14	2213.41	0.75	1106	36.92	1.54	0.039	
124.20	1480.86	2261.86	0.80	1098	38.50	1.60	0.046	
124.25	1597.05	2312.87	0.85	1093	40.08	1.67	0.053	
124.298	**1710.00**	**2360.81**	**0.90**	**1089**	**41.57**	**1.73**	**0.058**	**25-Year**
124.30	1715.89	2363.32	0.90	1089	41.65	1.74	0.058	
124.35	1837.49	2414.90	0.95	1086	43.22	1.80	0.064	
124.40	1961.94	2466.39	1.00	1083	44.78	1.87	0.068	
124.45	2089.15	2518.26	1.05	1081	46.34	1.93	0.073	
124.495	**2211.00**	**2566.92**	**1.10**	**1080**	**47.76**	**1.99**	**0.076**	**100-Year**
124.50	2223.10	2571.75	1.10	1080	47.90	2.00	0.077	
124.55	2356.76	2623.71	1.15	1078	49.45	2.06	0.080	

Notes:
C2 is the slope coefficient from the area-depth linear regression.
PP Elev indicates the elevation of the permanent pool.
QC Elev indicates the elevation of the storage volume required by MOE for quality control.
Ext. Det. indicates the elevation of extended detention provided based on the required quality control volume.
25 mm, 2-, 5-, 25- and 100-year 4-hour Chicago storm elevations under free outfall conditions are noted.
Orifice selected to provide a 24 to 48 hour drawdown time in accordance with MOE standards.

Table C-5: Stage-Storage-Outflow Curve for SWM Facility

			Quality Control 1		Quantity Control 1			
			Vertical Circ. Orifice		Vertical Circ. Orifice			
			Dia (m)	0.100	Dia (m)	0.200		
			Area (m^2)	0.008	Area (m^2)	0.031		
			Invert (m)	123.40	Invert (m)	124.00		
			C_o	0.62	C_o	0.62		
			Q @ D	0.005	Q @ D	0.027		
Elevation	Active Sto.	Demarkation	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m^3)	Points	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)	(ha·m)
123.40	**0**	**PP Elev**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
123.45	69		0.050	0.002	0.000	0.000	0.002	0.007
123.50	144		0.100	0.005	0.000	0.000	0.005	0.014
123.504	**150**	**QC Elev**	**0.104**	**0.005**	**0.000**	**0.000**	**0.005**	**0.015**
123.55	220		0.150	0.007	0.000	0.000	0.007	0.022
123.60	299		0.200	0.008	0.000	0.000	0.008	0.030
123.65	380		0.250	0.010	0.000	0.000	0.010	0.038
123.70	464		0.300	0.011	0.000	0.000	0.011	0.046
123.75	555		0.350	0.012	0.000	0.000	0.012	0.055
123.80	647		0.400	0.013	0.000	0.000	0.013	0.065
123.810	**667**	**25 mm**	**0.410**	**0.013**	**0.000**	**0.000**	**0.013**	**0.067**
123.85	743		0.450	0.014	0.000	0.000	0.014	0.074
123.90	840		0.500	0.014	0.000	0.000	0.014	0.084
123.95	940		0.550	0.015	0.000	0.000	0.015	0.094
124.00	**1043**	**Ext. Det.**	**0.600**	**0.016**	**0.000**	**0.000**	**0.016**	**0.104**
124.020	**1086**	**2-Year**	**0.620**	**0.016**	**0.020**	**0.003**	**0.019**	**0.109**
124.05	1150		0.650	0.017	0.050	0.007	0.024	0.115
124.10	1258		0.700	0.017	0.100	0.014	0.031	0.126
124.117	**1296**	**5-Year**	**0.717**	**0.018**	**0.117**	**0.016**	**0.034**	**0.130**
124.15	1369		0.750	0.018	0.150	0.020	0.039	0.137
124.20	1481		0.800	0.019	0.200	0.027	0.046	0.148
124.25	1597		0.850	0.019	0.250	0.033	0.053	0.160
124.298	**1710**	**25-Year**	**0.898**	**0.020**	**0.298**	**0.038**	**0.058**	**0.171**
124.30	1716		0.900	0.020	0.300	0.039	0.058	0.172
124.35	1837		0.950	0.020	0.350	0.043	0.064	0.184
124.40	1962		1.000	0.021	0.400	0.047	0.068	0.196
124.45	2089		1.050	0.022	0.450	0.051	0.073	0.209
124.495	**2211**	**100-Year**	**1.095**	**0.022**	**0.495**	**0.054**	**0.076**	**0.221**
124.50	2223		1.100	0.022	0.500	0.055	0.077	0.222
124.55	2357		1.150	0.023	0.550	0.058	0.080	0.236
124.60	2493		1.200	0.023	0.600	0.061	0.084	0.249
124.65	2628		1.250	0.024	0.650	0.064	0.088	0.263
124.70	2770		1.300	0.024	0.700	0.067	0.091	0.277
124.75	2915		1.350	0.025	0.750	0.070	0.094	0.292
124.80	3063		1.400	0.025	0.800	0.072	0.097	0.306
124.85	**3215**	**Ovf Elev**	**1.450**	**0.026**	**0.850**	**0.075**	**0.100**	**0.321**
124.90	3369		1.500	0.026	0.900	0.077	0.103	0.337
124.95	3532		1.550	0.026	0.950	0.080	0.106	0.353
125.00	3693		1.600	0.027	1.000	0.082	0.109	0.369
125.05	3857		1.650	0.027	1.050	0.084	0.111	0.386
125.10	4021		1.700	0.028	1.100	0.086	0.114	0.402
125.15	4372		1.750	0.028	1.150	0.088	0.117	0.437
125.20	4261		1.800	0.029	1.200	0.090	0.119	0.426
125.25	4431		1.850	0.029	1.250	0.093	0.121	0.443
125.30	4602		1.900	0.029	1.300	0.095	0.124	0.460
125.35	4774		1.950	0.030	1.350	0.096	0.126	0.477
125.40	4946		2.000	0.030	1.400	0.098	0.128	0.495
125.45	5120		2.050	0.031	1.450	0.100	0.131	0.512
125.50	5294		2.100	0.031	1.500	0.102	0.133	0.529
125.55	5469		2.150	0.031	1.550	0.104	0.135	0.547
125.60	5645		2.200	0.032	1.600	0.106	0.137	0.564
125.65	5820		2.250	0.032	1.650	0.107	0.139	0.582
125.70	5998		2.300	0.032	1.700	0.109	0.141	0.600

Table C-5: Stage-Storage-Outflow Curve for SWM Facility

			Quality Control 1		Quantity Control 1			
			Vertical Circ. Orifice		Vertical Circ. Orifice			
			Dia (m)	0.100	Dia (m)	0.200		
			Area (m^2)	0.008	Area (m^2)	0.031		
			Invert (m)	123.40	Invert (m)	124.00		
			C_o	0.62	C_o	0.62		
			Q @ D	0.005	Q @ D	0.027		
Elevation	Active Sto.	Demarkation Points	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m^3)		(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)	(ha·m)
125.75	6175		2.350	0.033	1.750	0.111	0.144	0.618
125.80	6354		2.400	0.033	1.800	0.112	0.146	0.635
125.85	6533		2.450	0.033	1.850	0.114	0.148	0.653
125.90	6713		2.500	0.034	1.900	0.116	0.150	0.671
125.95	6894		2.550	0.034	1.950	0.117	0.151	0.689
126.00	7073		2.600	0.034	2.000	0.119	0.153	0.707
126.05	7254		2.650	0.035	2.050	0.120	0.155	0.725
126.10	7435		2.700	0.035	2.100	0.122	0.157	0.743
126.15	7617		2.750	0.035	2.150	0.124	0.159	0.762
126.20	7801		2.800	0.036	2.200	0.125	0.161	0.780
126.25	**7986**	**Top of Berm**	**2.850**	**0.036**	**2.250**	**0.127**	**0.163**	**0.799**

Notes : PP Elev indicates the elevation of the permanent pool.
QC Elev indicates the elevation of the storage volume required by MOE for quality control.
Ext. Det. indicates the elevation of extended detention provided based on the required quality control volume.
Ovf Elev indicates the elevation of the emergency spillway provided above the 100-year water level.
Top of Berm indicates the elevation at the top of the berm.
25 mm, 2-, 5-, 25- and 100-year 4-hour Chicago storm elevations under free outfall conditions are noted.

Table C-6 : Drainage Area to SWM Facility

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
Pond1	0.442	37	16.354
RL1	0.654	90	58.860
RL2	2.646	92	243.432
Total	**3.742**	**85**	**318.646**

[1] Refer to Figure 1.

Weighted Average Imperviousness = S(Area x Imp) / Total Area = 318.646 / 3.742 = 85 %

Table C-7 : Summary of Total Drainage Area

Land Use [1]	Area (ha)	Imperviousness	Area x Imp.
Drainage to SWM Facility	3.742	85	318.646

[1] Refer to Figure 1.

Weighted Average Imperviousness = S(Area x Imp) / Total Area = 318.646 / 3.742 = 85 %

Table C-8 : Allowable Release Rates for Proposed SWM Facility

Event	Target Release Rate [1] (m^3/s)	Existing Pond Release Rate [1] (m^3/s)
25mm/3hr Chicago	0.020	0.016
2yr/24hr Chicago	0.040	0.030
5yr/24hr Chicago	0.070	0.063
25yr/24hr Chicago	0.127	0.110
100yr/24hr Chicago	0.206	0.129

[1] As per the May 2001 "SWM Report, South Operations Centre" by Totten Sims Hubicki Associates (TSH).

CALCULATION SHEET C-1: CONTROLS

Quality Control 1		
Vertical Circular Orifice		
Diameter	(m)	0.100
A_o	(m^2)	0.008
invert	(m)	123.40
C_o		0.62
100-Yr Water Level	(m)	124.496
Head of Water	(m)	1.096
Q_0	(m^3/s)	0.022

Orifice Equation:

$Q_o = C_o A_o (2gh)^{0.5}$

Not including reverse pipe losses

Q_o *is the orifice flow*

C_o *is the orifice coefficient*

A_o *is the orifice flow area*

g is the gravitational constant

h is the head of water

Quantity Control 1		
Vertical Circular Orifice		
Diameter	(m)	0.200
A_o	(m^2)	0.031
invert	(m)	124.000
C_o		0.62
100-Yr Water Level	(m)	124.496
Head of Water	(m)	0.496
Q_0	(m^3/s)	0.054

Orifice Equation:

$Q_o = C_o A_o (2gh)^{0.5}$

Q_o *is the orifice flow*

C_o *is the orifice coefficient*

A_o *is the orifice flow area*

g is the gravitational constant

h is the head of water

CALCULATION SHEET C-2: FOREBAY SIZING FOR SWM FACILITY

Region SWM Pond
Town of Oakville
Calculation of Forebay Size

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{r\,Q_p}{V_s}\right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:

r =	2.67		(24 m / 9 m)
Q_p =	0.016	m^3/s	(at elevation 124 m)
V_s =	0.0003	m/s	

L_{min} = 11.92 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8\,Q}{d\,V_f}$$

where:
- Q = Inlet flowrate (5-Year, 4-Hour Chicago Storm)
- d = depth of permanent pool in forebay
- V_f = desired final velocity

Input:

Q =	0.993	m^3/s
d =	1.00	m
Vf =	0.5	m/s

L_{min} = 15.89 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required	15.89 m	
Length of Forebay Provided	**24.00 m**	(at elevation 123.4 m)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where:
- Q = Inlet flowrate (5-Year, 4-Hour Chicago Storm)
- d = depth of permanent pool in forebay
- W_{avg} = average width of forebay

Input:

Q =	0.993	m^3/s	
d =	1.00	m	
W_{avg} =	6	m	(3 m bottom, 9 m permanent pool)

V = 0.17 m/s > 0.15 m/s

ATTACHMENT

D

100-Year Intake and Culvert Calculations

JFSA Water Resources and Environmental Consultants

Calculation Sheet D-1: Required Grate and Lead Pipe at 100-Year Intakes

MAJOR SYSTEM SEGMENT : RL1 (Region Lands)

Max. Depth Above Crown = 0.150 m

Max. Allowable Depth at Gutter = 0.300 m

Type of Grates : DICB OPSD 403.01 (0.6 m x 1.2 m)

$Q_{approach\ 100\text{-}yr\ -\ 5\text{-}yr}$ RL1 = 160 L/s

Scenario: No Blockage

Location	No. of DICBs	Maximum All.Head (m)	Maximum Capture (L/s)	Dia. Of Lead Pipe (m)	Head on Lead Pipe (m)	Capacity of Single Lead Pipe (L/s)	No. of Lead Pipes	Max Flow by Lead Pipe (L/s)	Capacity of All Lead Pipes (L/s)	
S. of Street K	1	0.300	921	600	1.500	1258	1	160	1258	
			921	> 160					1258	> 160

Scenario: 50% Blockage

Location	No. of DICBs	Maximum All.Head (m)	Maximum Capture (L/s)	Dia. Of Lead Pipe (m)	Head on Lead Pipe (m)	Capacity of Single Lead Pipe (L/s)	No. of Lead Pipes	Max Flow by Lead Pipe (L/s)	Capacity of All Lead Pipes (L/s)	
S. of Street K	1	0.300	460	600	1.500	1258	1	160	1258	
			460	> 160					1258	> 160

MAJOR SYSTEM SEGMENT : RL2 (Region Lands)

Max. Depth Above Crown = 0.150 m

Max. Allowable Depth at Gutter = 0.160 m

Type of Grates : DICB OPSD 403.01 (0.6 m x 1.2 m)

$Q_{approach\ 100\text{-}yr\ -\ 5\text{-}yr}$ RL2 = 658 L/s

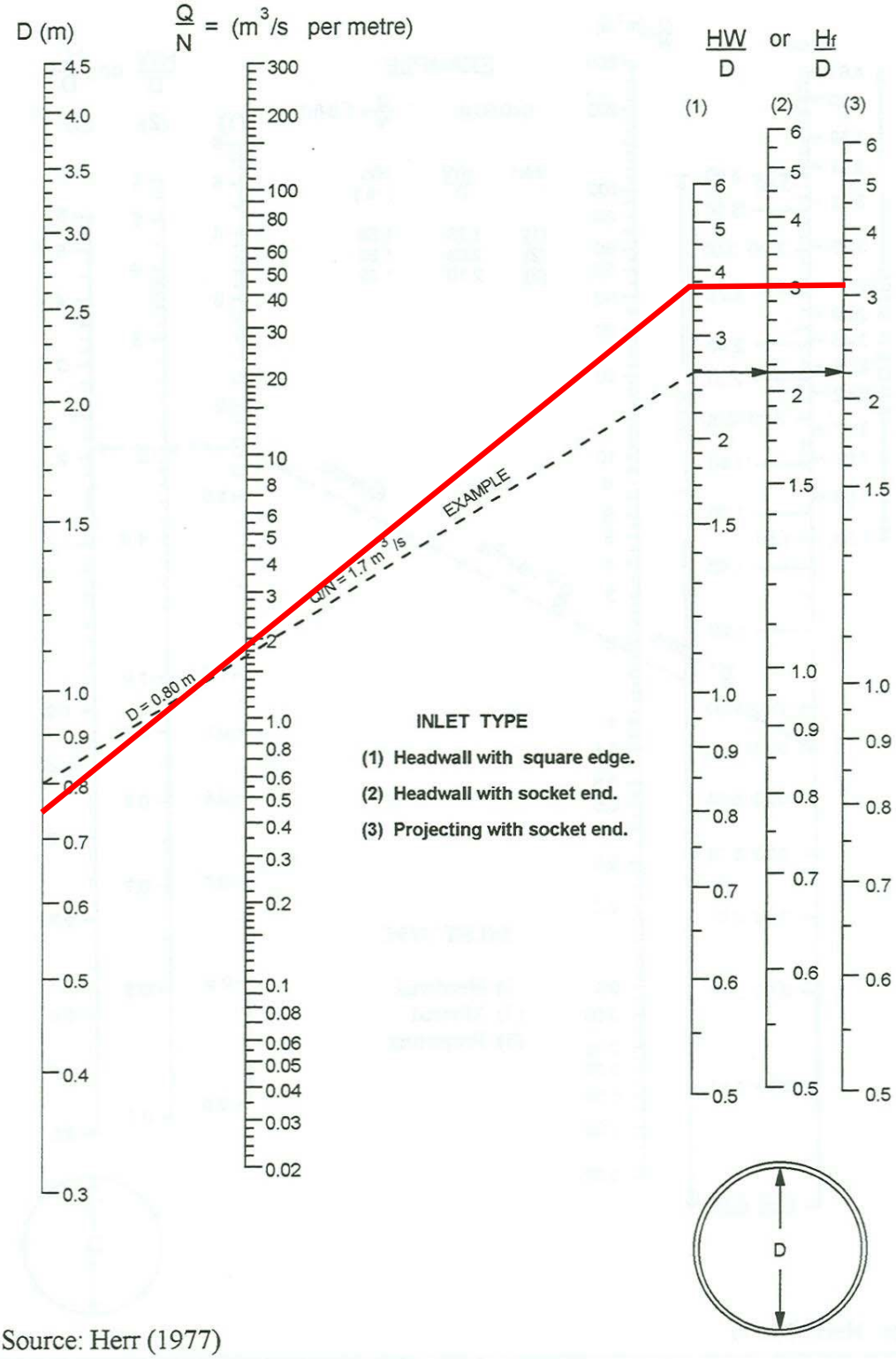
Scenario: No Blockage

Location	No. of DICBs	Maximum All.Head (m)	Maximum Capture (L/s)	Dia. Of Lead Pipe (m)	Head on Lead Pipe (m)	Capacity of Single Lead Pipe (L/s)	No. of Lead Pipes	Max Flow by Lead Pipe (L/s)	Capacity of All Lead Pipes (L/s)	
S. of Street K	2	0.160	1345	525	1.360	917	1	658	917	
			1345	> 658					917	> 658

Scenario: 50% Blockage

Location	No. of DICBs	Maximum All.Head (m)	Maximum Capture (L/s)	Dia. Of Lead Pipe (m)	Head on Lead Pipe (m)	Capacity of Single Lead Pipe (L/s)	No. of Lead Pipes	Max Flow by Lead Pipe (L/s)	Capacity of All Lead Pipes (L/s)	
S. of Street K	2	0.160	672	525	1.360	917	1	658	917	
			672	> 658					917	> 658

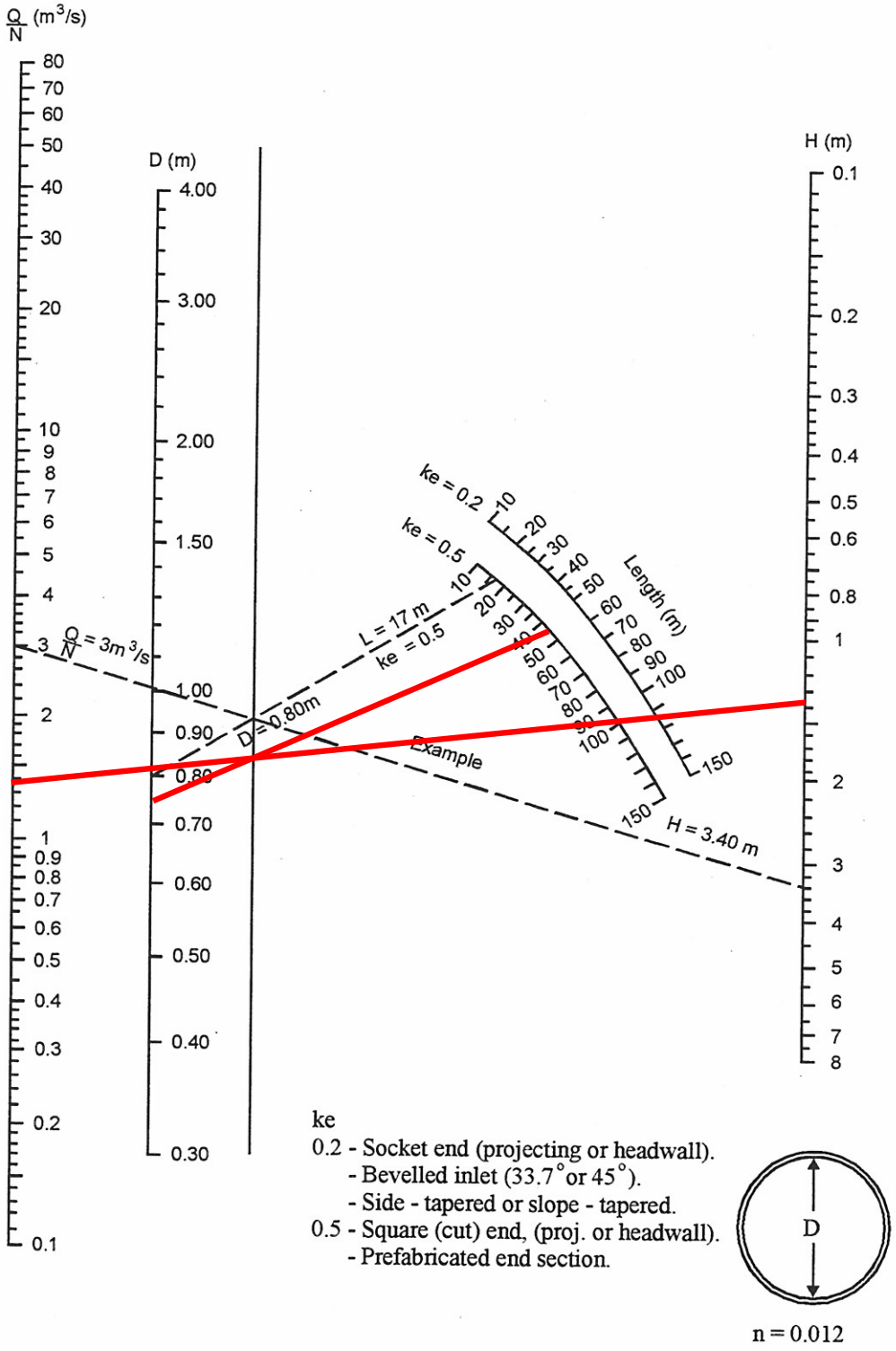
Design Chart 2.31: Inlet Control: Circular Pipes



Source: Herr (1977)

DEPTH TO GROUND LEVEL AT UPSTREAM END OF PIPE = 125.93 m ground level - 123.56 m upstream invert = 2.37 m
HEADWATER DEPTH / HEIGHT = 2.37 m headwater depth / 0.75 m pipe height = 3.16
CAPACITY = 1.85 m^3/s x 2 pipes = 3.70 m^3/s

Design Chart 2.34: Outlet Control: Concrete Circular Pipe/Culvert - Flowing Full



Source: Herr (1977)

DEPTH AT OUTLET = 124.55 m pond level - 123.56 m upstream invert = 0.99 m
DEPTH TO GROUND LEVEL AT UPSTREAM END OF PIPE = 125.93 m ground level - 123.56 m upstream invert = 2.37 m
DIFFERENTIAL HEAD = 1.38 m
HEADWATER DEPTH = 1.38 m differential head + 0.75 m diameter - 45 m length x 0.0035 m/m slope = 1.972 m
(MTO Drainage Management Manual Equation 8.86)
CAPACITY = 1.37 m^3/s x 2 pipes = 2.74 m^3/s

ATTACHMENT

E

Oil-and-Grit Separator Report (November 2018, Forterra)

JFSA Water Resources and Environmental Consultants

Detailed Stormceptor Sizing Report – Aurora

Project Information & Location			
Project Name	Aurora	**Project Number**	-
City	Aurora	**State/ Province**	Ontario
Country	Canada	**Date**	11/16/2018
Designer Information		**EOR Information (optional)**	
Name	Brandon O'Leary	**Name**	Brian Betts
Company	Forterra	**Company**	David Schaeffer Engineering Ltd.
Phone #	905-630-0359	**Phone #**	
Email	brandon.oleary@forterrabp.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	Aurora
Recommended Stormceptor Model	EFO8
TSS Removal (%) Provided	83
PSD	Fine Distribution
RainFall Station	TORONTO CENTRAL

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

EFO Sizing Summary			
EFO Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**	**Standard EFO Hydrocarbon Storage Capacity**
EFO4	65	74	265 L (70 gal)
EFO6	77	88	610 L (160 gal)
EFO8	83	94	1070 L (280 gal)
EFO10	87	96	1670 L (440 gal)
EFO12	90	98	2475 L (655 gal)
Parallel Units / MAX	Custom	Custom	Custom

OVERVIEW

Stormceptor ® EF is a continuation and evolution of the most globally recognized oil-grit separator (OGS) stormwater treatment technology - **Stormceptor ®.** Also known as a hydrodynamic separator, the enhanced flow Stormceptor EF is a high performing oil-grit separator that effectively removes a wide variety of pollutants from stormwater and snowmelt runoff at higher flow rates as compared to the original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention technology and internal bypass ensures sediment is retained during all rainfall events.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	3329
Rainfall Station Name	TORONTO CENTRAL	**Total Rainfall (mm)**	13189.2
Station ID #	0100	**Average Annual Rainfall (mm)**	732.7
Coordinates	43°40'N, 79°20'W	**Total Evaporation (mm)**	1371.3
Elevation (ft)	328	**Total Infiltration (mm)**	0.0
Years of Rainfall Data	18	**Total Rainfall that is Runoff (mm)**	11817.9

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.

ONLINE APPLICATION

Stormceptor EF's internal bypass and patent-pending scour prevention technology has demonstrated very effective retention of pollutants in third-party testing and verification following the Canadian ETV's **Procedure for Laboratory Testing of Oil-Grit Separators.** Sediment scour prevention demonstrated an effluent concentration of less than 10 mg/L for sediment particles ranging from 1 to 1,000 microns, even during peak influent flow rates associated with infrequent high intensity storm events. While Stormceptor EF will capture oil, only the Stormceptor EFO configuration has been third-party tested and verified to retain greater than 99% of captured oil. Based on these verified performance attributes, the most efficient and widely accepted application of Stormceptor EF is an online configuration, which allows all upstream conveyance flows to enter and exit the unit. The online application eliminates the need for costly additional bypass structures, piping and installation expense.

FLOW ENTRANCE OPTIONS

Single Inlet Pipe – A common design which includes one inlet pipe and one outlet pipe. A 90-degree (maximum) bend is also accepted with this configuration.

Inlet Grate – Allows surface runoff to enter the unit from grade. The inlet grate option can also be used in conjunction with one inlet pipe or multiple inlet pipes. A removable flow deflector is added in the Stormceptor EF4/EFO4.

Maximum Pipe Diameter		
Model	Inlet (In/mm)	Outlet (In/mm)
EF4 / EFO4	24 / 610	24 / 610
EF6 / EFO6	36 / 915	36 / 915
EF8/ EFO8	48 / 1220	48 / 1220
EF10/EFO10	72 / 1828	72 / 1828
EF12/EFO12	72 / 1828	72 / 1828

Multiple Inlet Pipe – Allows for multiple inlet pipes of various diameters to enter the unit.

Maximum Pipe Diameter		
Model	Inlet (In/mm)	Outlet (In/mm)
EF4 / EFO4	18 / 457	24 / 610
EF6 / EFO6	30 / 762	36 / 915
EF8/ EFO8	42 / 1067	48 / 1220
EF10/EFO10	60 / 1524	72 / 1828
EF12/EFO12	60 / 1524	72 / 1828

Drainage Area	
Total Area (ha)	1.009
Imperviousness %	100

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

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

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	90.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

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

Site Name	Aurora

Site Details

Drainage Area

Total Area (ha)	1.009
Imperviousness %	100
Oil Spill Capture Volume (L)	

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Surface Characteristics

Width (m)	201.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (lps)	0

Maintenance Frequency

Maintenance Frequency (months) >	12

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	Build Up/ Wash-off

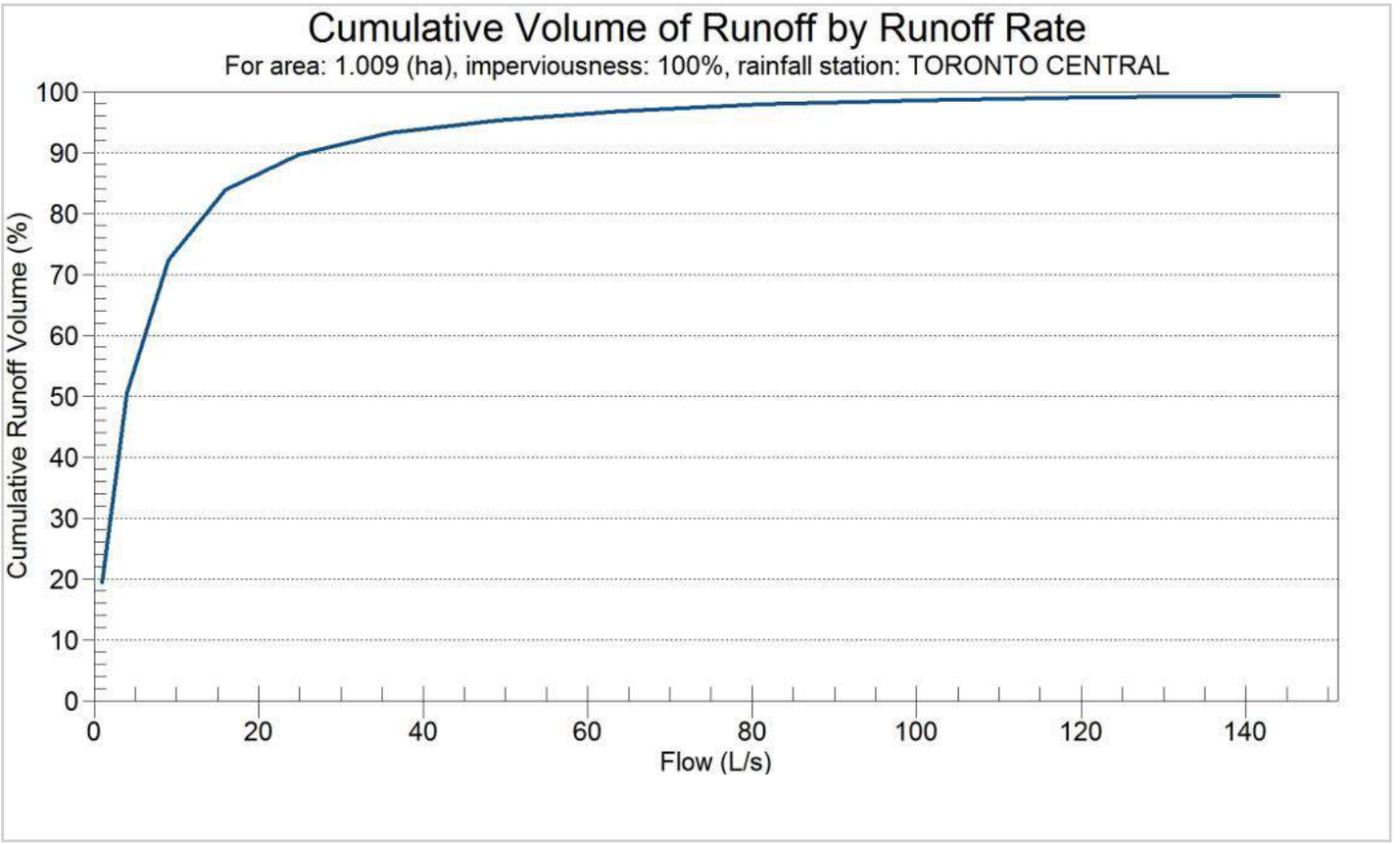
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	125
Exponential Buildup Power	0.40
Exponential Washoff Exponent	0.20

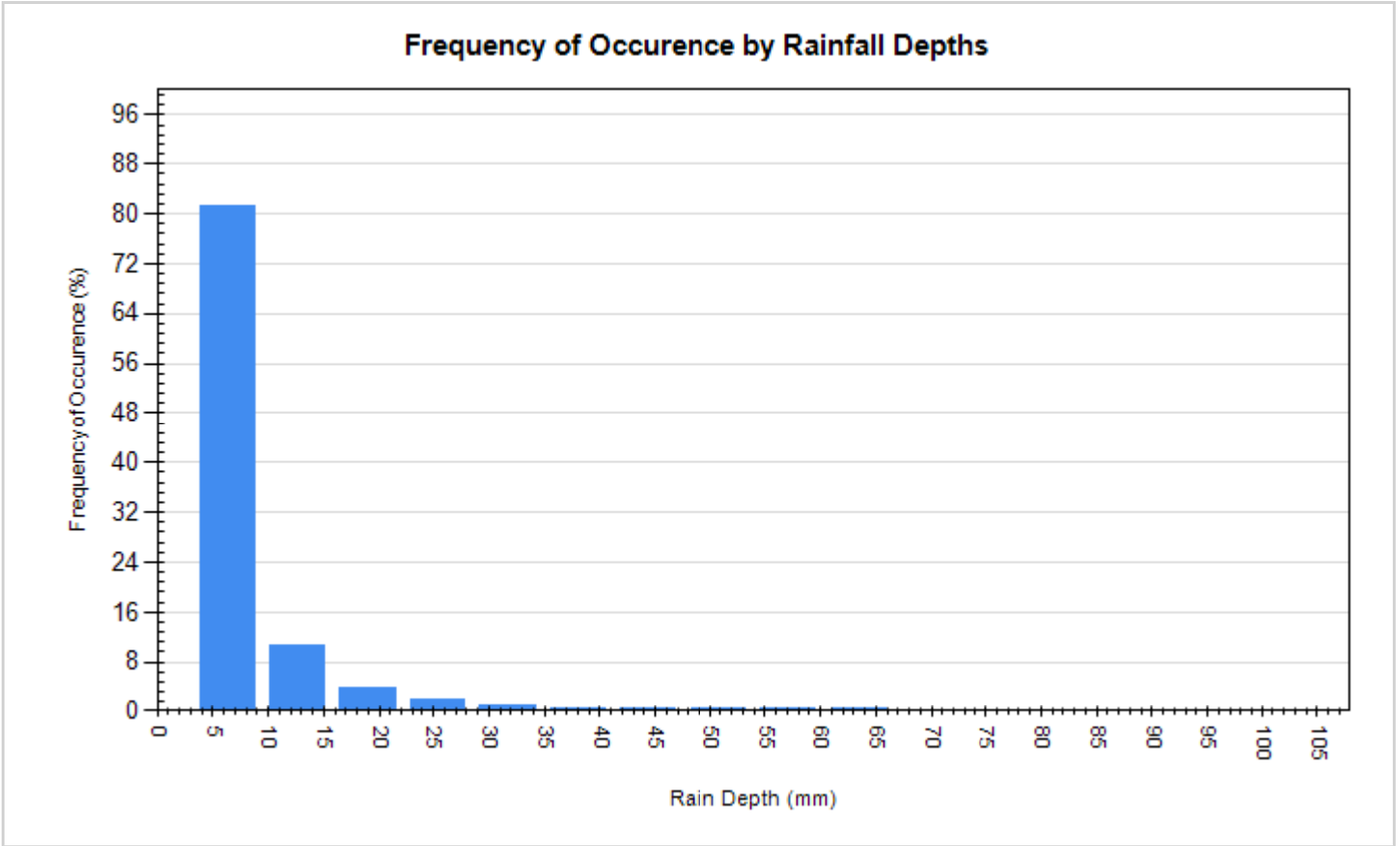
TSS Availability Parameters

Availability Constant A	0.057
Availability Factor B	0.04
Availability Exponent C	1.10
Min. Particle Size Affected by Availability (micron)	400

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	**Runoff Volume (m^3)**	**Volume Over (m^3)**	**Cumulative Runoff Volume (%)**
1	23279	96725	19.4
4	60562	59442	50.5
9	86779	33233	72.3
16	100516	19486	83.8
25	107639	12365	89.7
36	111789	8213	93.2
49	114420	5583	95.3
64	116216	3786	96.8
81	117428	2574	97.9
100	118248	1754	98.5
121	118818	1184	99.0
144	119206	796	99.3
169	119455	547	99.5
196	119554	448	99.6
225	119616	386	99.7
256	119671	331	99.7
289	119723	278	99.8
324	119760	242	99.8
361	119794	208	99.8
400	119829	173	99.9
441	119866	136	99.9
484	119904	98	99.9
529	119945	57	100
576	119982	20	100
625	120002	0	100
676	120002	0	100


Cumulative Volume of Runoff by Runoff Rate
For area: 1.009 (ha), imperviousness: 100%, rainfall station: TORONTO CENTRAL
Cumulative Runoff Volume (%)
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
Flow (L/s)

Rainfall Event Analysis				
Rainfall Depth (mm)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (mm)**	**Percentage of Annual Volume (%)**
6.35	2711	81.4	3900	29.6
12.70	356	10.7	3266	24.8
19.05	127	3.8	1991	15.1
25.40	62	1.9	1346	10.2
31.75	32	1.0	905	6.9
38.10	16	0.5	541	4.1
44.45	8	0.2	334	2.5
50.80	11	0.3	519	3.9
57.15	2	0.1	106	0.8
63.50	2	0.1	120	0.9
69.85	0	0.0	0	0.0
76.20	0	0.0	0	0.0
82.55	1	0.0	77	0.6
88.90	1	0.0	85	0.6
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0



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

Appendix U

Stormwater Management Report for the Bronte Green Subdivision

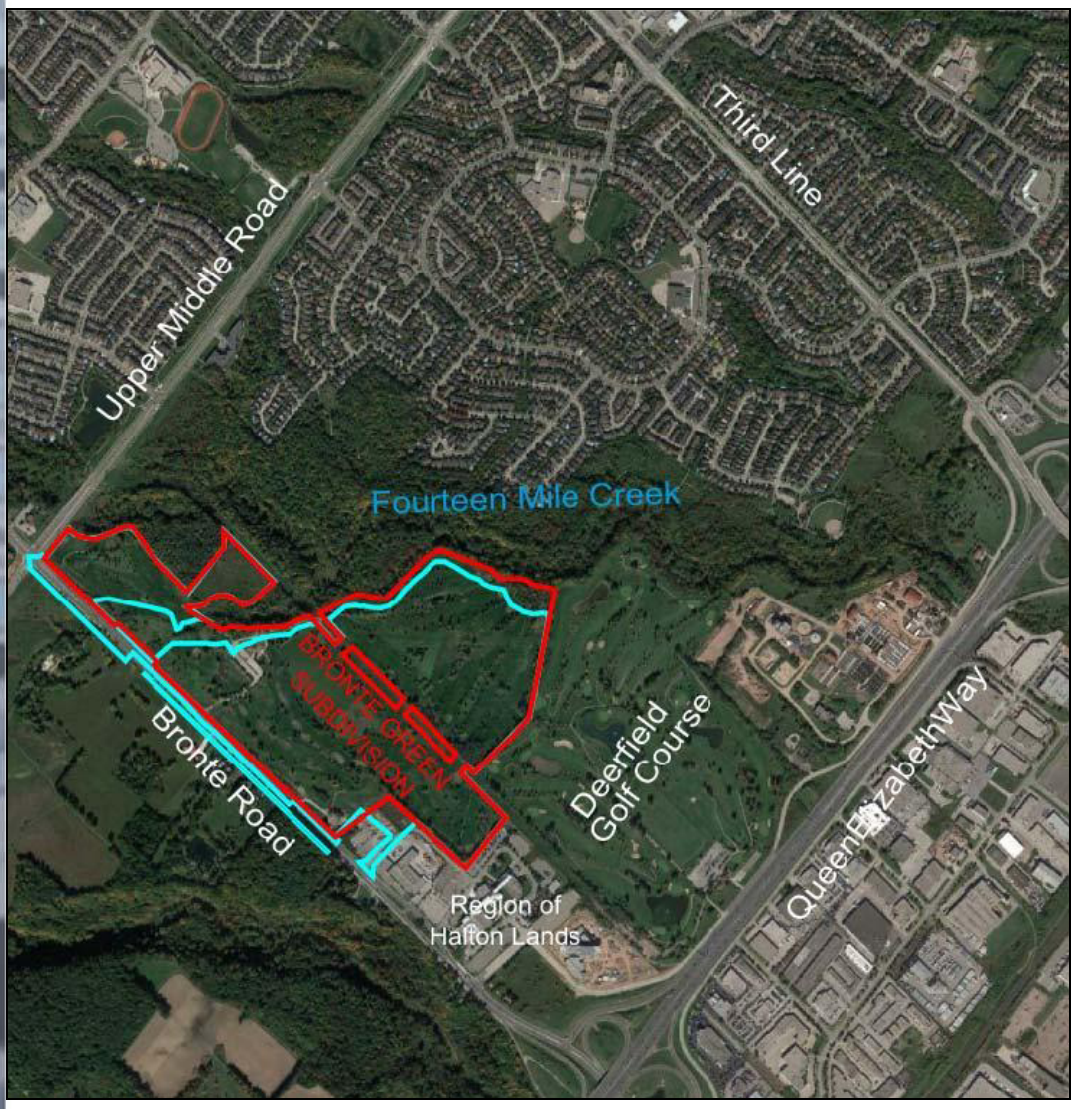
J.F. Sabourin and Associates Inc.

June 2019

Stormwater Management Report for the Bronte Green Subdivision

Town of Oakville

June 2017
Updated June 2019



Prepared for : David Schaeffer Engineering Ltd.

Prepared by : JFSA Water Resources and Environmental Consultants

JFSA Ref. No.: 1051-12

J.F. Sabourin and Associates Inc.
www.jfsa.com

JFSA Water Resources and Environmental Consultants

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Stormwater Management Report for the Bronte Green Subdivision

in the Town of Oakville

June 2017
Updated June 2019

Prepared for :

David Schaeffer Engineering Ltd.

Prepared by :

J.F. Sabourin, M.Eng., P.Eng.

Jonathon Burnett, P.Eng.

Laura Pipkins, P.Eng.

JFSA Ref. No.: 1051-12

Stormwater Management Report for the Bronte Green Subdivision
in the Town of Oakville

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Background: Rationale for Report Update

This report is an update of the June 2019 "Stormwater Management Report for the Bronte Green Subdivision". The previous version of this report has been revised to reflect updated street names for the proposed subdivision. No changes have been made to the modelling or the remainder of the report.

Stormwater Management Report for the Bronte Green Subdivision

in the Town of Oakville
June 2017
Updated June 2019

1 INTRODUCTION AND OBJECTIVES

J.F. Sabourin and Associates Inc. (JFSA) were retained by David Schaeffer Engineering Ltd. (DSEL) to prepare a Stormwater Management (SWM) Plan for the Bronte Green subdivision located within the Town of Oakville. As shown by Figure 1, the proposed development is located east of Bronte Road, south of Upper Middle Road, west of the main branch of Fourteen Mile Creek, and north of Region of Halton Lands, the Deerfield Golf Course, and Queen Elizabeth Way. A tributary of Fourteen Mile Creek passes through the site.

The proposed layout of the proposed subdivision, which has a total drainage area of approximately 55.22 ha, is presented in Figure 2. A simplified drainage plan is presented in Figure 4. The portion of the site north of the tributary is to be treated by two oil-and-grit separators for quality control, and the southern portion of the site is to be treated by a SWM wet pond for quality, erosion and quantity control. Low Impact Development (LID) measures will also be implemented within the development, including; roof leader disconnection, bioswales at the outlets of the oil-and-grit separators, infiltration trenches within two park blocks, an infiltration pit servicing a 1.45 ha portion of external Bronte Road, and infiltration trenches along the trail running along the boundary of the subdivision. Finally, runoff from 2.13 ha of natural lands within the development boundary north of the tributary will drain through a proposed wildlife pond. In response to Conservation Halton comments, the proposed LID measures have been included in the current model. However, as per the March 2017 *Functional Servicing Report for the Bronte Green Subdivision*, the performance of the subdivision has been assessed under a more critical scenario wherein the potential SWM benefits of the wildlife pond are not relied upon, and thus the wildlife pond is not included in the current model.

Approximately 38.21 ha of the subdivision are serviced by the proposed SWM pond, including 2.43 ha of park blocks, a 1.96 ha pond block, a 0.73 ha open space block, 1.86 ha of school blocks, 1.67 ha of residential condominium blocks, and 29.57 ha of residential development. Another 0.48 ha of future external streets Charles Cornwall Avenue and Merton Road on the existing Region of Halton Lands, 0.49 ha of the external hydro corridor, and 0.57 ha of Bronte Road (existing and future expanded) are also tributary to the SWM pond, for a total drainage area of 39.75 ha. Note that overland flow routes on Yellow Rose Circle and Meadowside Path will allow some major system flows from within the subdivision to drain directly to the creek; overland at Yellow Rose Circle, and by capture to the pond outfall pipe at Meadowside Path. Also note that an additional 1.86 ha of Bronte Road may contribute a portion of major system flows to the pond; minor system flows up to the 10-year design storm drain to the creek via separate systems on Bronte Road, and major system flows drain overland to Yellow Rose Circle

and are either captured to the minor system or discharge to the creek via the overland flow route on Yellow Rose Circle.

Approximately 14.32 ha of the subdivision will drain uncontrolled to Fourteen Mile Creek or its tributaries, including a 0.19 ha park block, 2.13 ha of natural lands draining through a proposed wildlife pond, 4.18 ha of residential development (primarily rearyards along the perimeter of the site (including infiltration trenches) and internal roads graded towards Bronte Road and Upper Middle Road) and 6.99 ha of Natural Heritage System lands (including a pedestrian trail) and the creek corridor. Note that runoff from the 2.13 ha of natural lands draining through the proposed wildlife pond is not expected to drain directly to the creek under most design storms, but will instead be stored or infiltrated in the wildlife pond. As noted above, as per the March 2017 *Functional Servicing Report for the Bronte Green Subdivision*, the performance of the subdivision has been assessed under a more critical scenario wherein the potential SWM benefits of the wildlife pond are not relied upon. Note also that the subdivision is divided by 0.91 ha of external hydro corridor blocks; flows from 0.15 ha of the external hydro corridor will drain through a proposed infiltration trench to the creek, and flows from 0.49 ha will drain through a proposed infiltration trench in Park Block 477 to the pond. Flows from the remaining 0.43 ha of the external hydro corridor and 1.27 ha of proposed rearyards will be conveyed to the creek via a clean water pipe connecting to the pond outlet pipe.

Approximately 2.61 ha of the proposed subdivision to the north of the tributary will be treated by two oil-and-grit separators for quality control before discharging to the tributary, including a 1.15 ha residential condominium block and 0.48 ha of residential development to the proposed oil-and-grit separator on Owlsnest Way, and 0.97 ha of future residential development to a future oil-and-grit separator in the condo development to the east of Owlsnest Way. Bioswales at the outlets of the oil-and-grit separators will provide additional quality control benefits to the proposed north parcel.

Finally, the remaining 0.09 ha of the proposed subdivision is part of a commercial block to be treated separately and outlet to the Bronte Creek watershed. The design of the commercial block will be addressed in a separate report.

The purpose of the present study/report is to evaluate the major and minor system flows of the proposed development with respect to the Town of Oakville stormwater management guidelines and to check the adequacy of the proposed pipe sizes to convey the 5-year and the 100-year storm flows from within the development and from external areas. Background documents that were reviewed in preparing this report include the following:

- *Stormwater Management Planning and Design Manual*, Ministry of the Environment, March 2003. *(SWMP Design Manual).*
- *Erosion and Sediment Control Guidelines for Urban Construction*, Conservation Halton et al., December 2006.
- *Development Engineering Procedures and Guidelines Manual*, Town of Oakville, January 2011.

- *Fourteen Mile Creek / McCraney Creek Hydrologic Modelling Update*, AMEC Earth and Environmental, January 23, 2013.
- *Fourteen Mile Creek / McCraney Creek Hydrologic Modelling Update*, AMEC Earth and Environmental, May 17, 2013.
- *Fourteen Mile Creek / McCraney Creek, Flood Management Alternative Assessment*, Town of Oakville, AMEC Earth and Environmental, September 26, 2013.
- *Functional Servicing Report for the Bronte Green Subdivision,* David Schaeffer Engineering Ltd. et. al., March 2017
- *Former Saw-Whet Golf Course Property Updated Environmental Impact Study,* Beacon Environmental Ltd. et. al. March 2017.
- *Design Brief for the Stormwater Management Pond for the Bronte Green Subdivision*, David Schaeffer Engineering Ltd. and J.F. Sabourin and Associates Inc., April 2018.
- *Bronte Green Development / LID Infiltration*, J.F. Sabourin and Associates Inc., April 2018.
- *Bronte Green Development / Flood Protection and Surface Water Balance*, J.F. Sabourin and Associates Inc., April 2018.

PCSWMM was used to model the major and minor systems, to ensure that all of the Town of Oakville's stormwater management requirements are satisfied. The general SWM design criteria and guidelines that are to be met are described in Section 2.

Note that the impact of the preliminary subdivision and pond design on the Fourteen Mile Creek watercourse was evaluated in PCSWMM for the March 2017 *Functional Servicing Report for the Bronte Green Subdivision*, in coordination with Town of Oakville and Conservation Halton reviewers. This analysis will be revisited separate from the current report to confirm that the impact of the detailed design of the subdivision is in conformance with the requirements presented in the March 2017 *Functional Servicing Report for the Bronte Green Subdivision.*

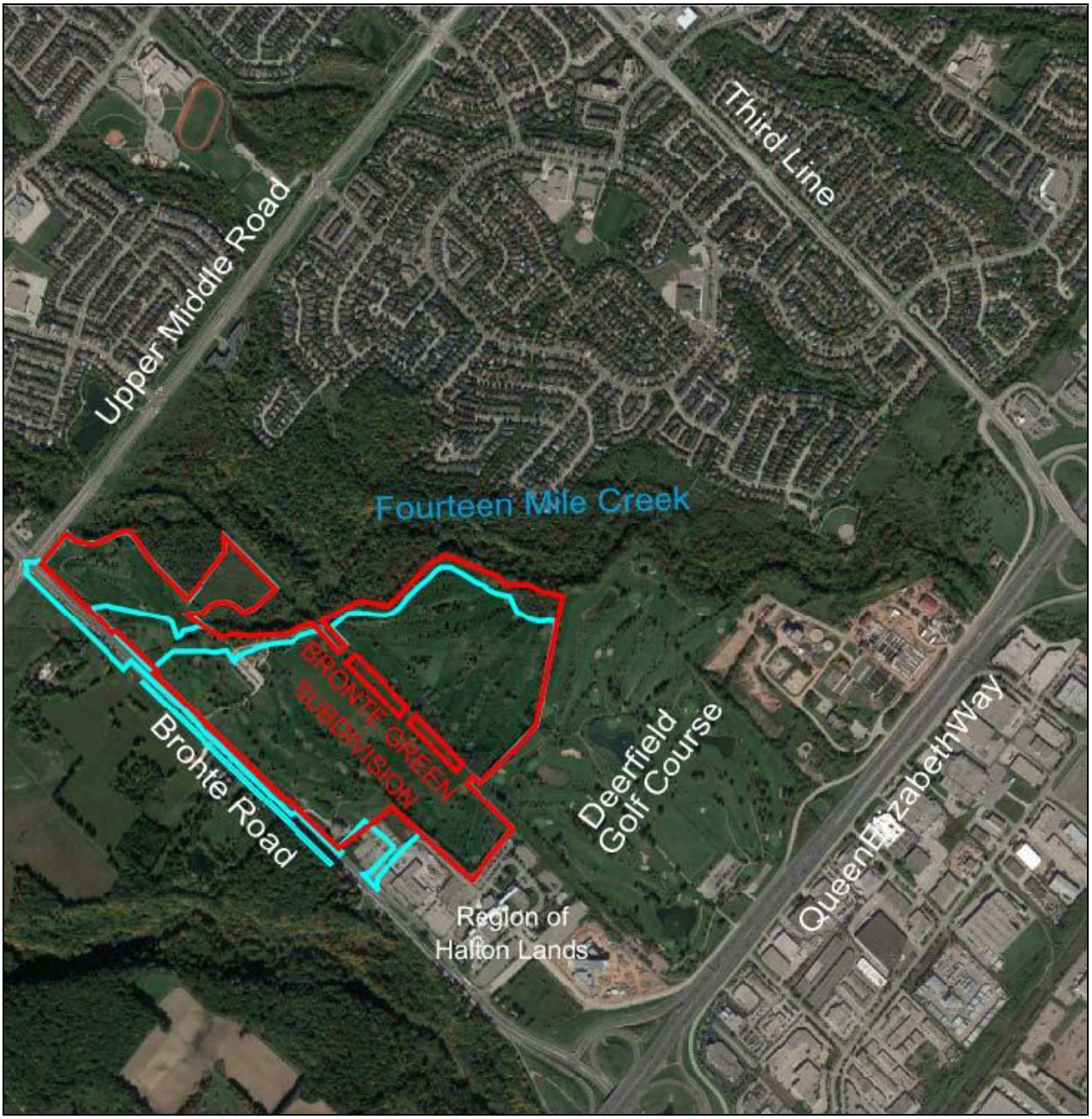

Figure 1: General Location of Subject Site

2 DESIGN CRITERIA AND GUIDELINES

The design criteria and guidelines used for the stormwater management of the subject subdivision are those that were developed in the background documents as well as those provided in the January 2011 Town of Oakville Development Engineering Procedures and Guidelines Manual and generally accepted stormwater management design guidelines.

During the course of the detailed design of the proposed development, it was determined that the average imperviousness of the subdivision is approximately 54%. Including external areas, the average imperviousness of the 39.75 ha drainage area to the pond was estimated at 67%.

A detailed analysis of the proposed dual drainage system was required to confirm that the following general design criteria and guidelines for the minor and major systems would be met.

2.1 Minor System

a) Storm sewers on local roads are to be designed to provide a 5-year level of service.

b) Grates for road catchbasins are to be flush type OPSD 400.110, and grates for catchbasins in rear yards, park and open spaces with pedestrian traffic are to be Town of Oakville STD5-2 (beehive grates).

c) Single catchbasins are to be equipped with 250 mm minimum lead pipes and double catchbasins are to be equipped with 300 mm minimum lead pipes.

d) Sump pumps will be provided within residential units where the storm sewer is not sufficiently deep or where the storm sewer will be subject to elevated water levels during infrequent storms.

e) Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.75 m/s and no greater than 4.0 m/s.

2.2 Major System

a) The major system shall be designed with sufficient capacity to allow the excess runoff of a 100-year storm to be conveyed within municipal property.

b) Roof leaders shall be installed to direct the runoff to splash pads and onto grass areas.

c) The maximum water depths on the streets and rear yards should not exceed 0.30 m and should be retained within the right-of-way. A minimum of 0.30 m freeboard is to be provided to building openings. When catchbasins are installed in rear yards, safe overland flow routes are to be provided to allow the release of excess flows from such areas.

d) For arterial roads, the depth of water at the crown shall not exceed 0.15 m.

e) The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.65 m^2/s on all roads.

3 ASSUMPTIONS AND SOURCE OF DATA USED IN THIS STUDY

Sources of information and assumptions made in this study are listed below:

- Stormwater management model: *PCSWMM (version 5.1.011)*
- Minor system design: *1:5 year (see Rational Method in Appendix A)*
- Major system design: *1:100 year*
- Max. flow depth on roads: *0.3 m above gutter*
- PCSWMM model catchment parameters: *2% slope, Manning's n Imp. = 0.013, Manning's n Per. = 0.25, D.Stor.Imp. = 2.5 mm, D.Stor.Per. = 5.0 mm, Imp. area with 0 mm D.Stor. = 25%, Width = based on measured length of overland flow path, up to a maximum length of 150 m*
  Green Ampts infiltration parameters:
  (North Portion) Suction Head = 118.39 mm, Conductivity = 1.00 mm/hr, Initial Deficit = 0.21.
  (Natural Drainage to Wildlife Pond) Suction Head = 50.00 mm, Conductivity = 1.20 mm/hr, Initial Deficit = 0.20.
  (South Portion) Suction Head = 135.81 mm, Conductivity = 0.95 mm/hr, Initial Deficit = 0.21.
  Detailed Area Imperviousness: based on development layout and taken as directly connected in the front lot portion and indirectly connected in rear lot portion of each house.
  Lumped Area Imperviousness: based on runoff coefficient (C) where C = 0.7 x imperviousness ratio + 0.2.
- Design storms: *24-hour Chicago as per Town of Oakville's criteria; peak averaged over 10 minutes.*
- Street catchbasin covers: *OPSD 400.11 (refer to Appendix B for details). In the absence of flow capture curves for OPSD 400.11 covers, flow capture curves are estimated based on OPSD 400.01 covers.*
- Rearyard catchbasin covers: *Town of Oakville STD5-2.*
- Curb and gutter: *OPSD 600.06. In the absence of flow capture curves for OPSD 600.06 curb and gutters, OPSD 600.01 curb and gutters are assumed.*
- Manning's' roughness coefficient: *0.013 for concrete and PVC pipes (free flow).*
- Minor system losses: *Refer to Appendix C for manhole loss coefficients.*
- Extent of major system: *Must be contained within the municipal right-of-way*
- Depth of backyard swales: *As per DSEL's Grading Plan*
- Street and pipe dimensions: *As per DSEL's Plan and Profiles*
- Right-of-way characteristics: *As per DSEL's Details of Roads*

- Downstream HGL: *Free outfall conditions as per Regional flood levels on Fourteen Mile Creek as established in the March 2017 "Functional Servicing Report for the Bronte Green Subdivision".*

4 PROPOSED MINOR AND MAJOR SYSTEM DRAINAGE

The proposed minor and major system drainage routes are shown in plan view in Figures 2 and 3, respectively.

In accordance with the Town of Oakville standards, the minor system has been designed to accommodate the 5-year post development flows from within the site and from external areas. A Rational Method design was conducted by DSEL (refer to Appendix A) in order to estimate minor system flows based on the Town of Oakville IDF relationship and selected runoff coefficients. Note that the minor system capture on the following areas should be limited to the 5-year Rational Method flows as per DSEL's design (estimated below):

Residential Condominium Block 451 (A010DV1, 0.798 ha, C = 0.9) : 228 L/s

Future School / Residential Block 502/503/504 (A032SC1, 0.944 ha, C = 0.8) : 240 L/s

Future School / Residential Block 474/501/502 (A034SC1, 0.912 ha, C = 0.8) : 231 L/s

Residential Condominium Block 452 (A052DV1, 0.871 ha, C = 0.9) : 249 L/s

Park Block 477 + Ext. Hydro Corridor (A058PK1+A058HC1, 2.614 ha, C = 0.4) : 331 L/s

Urban Square Block 475 (A059PK1, 0.302 ha, C = 0.4) : 38 L/s

Open Space Block 500 (A079DV1, 0.729 ha, C = 0.75) : 173 L/s

Residential Condominium Block 444 (A201DV1, 1.148 ha, C = 0.8) : 291 L/s

Excess flows from the area above spill onto the street and are conveyed overland to the SWM pond or appropriate outlet. Note that the Rational Method flows shown above may vary from those calculated by DSEL due to differences in time of concentration.

Note that a 100-year intake is proposed on Saw Whet Boulevard to prevent overland flow from exiting the subdivision to the existing Deerfield Golf Course lands. 100-year intakes are also proposed on Owlsnest Way, and on Walkway Block 491 adjacent to Meadowside Path, to prevent excess major system flows from draining overland to the creek. Note that 100-year excess major system flows on the walkway block are captured to the pond outlet pipe. Refer to

Calculation Sheet 3 of Attachment D for the infrastructure required to safely capture the 100-year flows at these locations, even under 50% blockage of catchbasin grates.

As noted above, the proposed LID measures (bioswales and infiltration pits) have been included in the PCSWMM modelling. These LID measures were included in the model based on storage and outlet dimensions provided by DSEL, with a void ratio of 0.35 for clear stone trenches. Infiltration in the LID measures is estimated as 6 mm/hr based on infiltration tests by R.J. Burnside & Associates. Locations and details of the LID measures are available on the DSEL drawings for the subdivision. The modelling and performances of the LID measures will be presented in a separate memo.

Note that water quality treatment for the northern parcel will be provided by oil-and-grit separators, discharging to bioswales for additional water quality "polishing". Approximately 1.63 ha at 85% imperviousness will drain to the oil-and-grit separator on Owlsnest Way (OGS1). OGS1 is a Jellyfish Filter model JF8-9-2, in accordance with the report presented in Appendix E. Approximately 90% of annual rainfall will be treated by the oil-and-grit separator, with a 2.4 m long weir at an elevation of 127.88 m providing overflow for flows exceeding this level. The elevation of the weir was set based on continuous simulation of flows at this location based on hourly measured rainfall data.

Similarly, approximately 0.97 ha at 69 % imperviousness will drain to the second oil-and-grit separator servicing future development to the east of Owlsnest Way (OGS2). OGS2 is a Jellyfish Filter model JF8-9-2, in accordance with the report presented in Appendix E. Approximately 90% of annual rainfall will be treated by the oil-and-grit separator, with a 0.525 m long weir at an elevation of 127.95 m providing overflow for flows exceeding this level. The elevation of the weir was set based on continuous simulation of flows at this location based on hourly measured rainfall data.

The street segments within the proposed development have been designed using a 'saw tooth' or 'sagged' road profile. The runoff from within these segments will be conveyed to catchbasins located at the lowest point within the street segment. Flows in excess of the catchbasin capture rate will be temporarily stored within the 'sagged' street segments and released slowly to the storm sewers. When the storage on a specific street segment is surpassed, the excess water will flow towards the next downstream street sag, and eventually to the SWM pond or appropriate outlet. It should be noted that the major system would discharge to the pond or the appropriate outlet without flooding any of the properties within the subdivision.

Overland flow routes, with curb cuts, are provided from Saw Whet Boulevard, Charles Cornwall Avenue and Pondside Trail to the SWM pond. Another overland flow route is provided on Bronte Road, where major system flows will spill over the existing curb and onto Yellow Rose Circle. Yellow Rose Circle has the capacity to convey these external major system flows, in addition to the internally generated major system flows, without exceeding 30 cm depth at the gutter. Finally, overland flow routes, with curb cuts, are provided to Fourteen Mile Creek and tributaries from Yellow Rose Circle and Meadowside Path (upstream of the 100-year

intake on Walkway Block 491), and from the future condo development to the east of Owlsnest Way. Refer to Calculation Sheet 2 of Appendix D for the required capacity of these curb cuts and overland flow routes.

The surface runoff collected by rearyard catchbasins are controlled by the lead pipes connecting them to the minor system. There are sixty-eight (68) such catchbasins within the proposed development.

It should be noted that Type A ICDs are to be installed in two catchbasins on Meadowside Path in front of Walkway Block 491 in order to minimize flow captured to the storm sewer system above the 5-year level of service, instead directing the excess major system flows to Fourteen Mile Creek and tributaries. The purpose of these ICDs is to minimize 100-year hydraulic gradeline elevations in the storm sewer at critical rearyard catchbasins, to ensure that the 100-year hydraulic gradeline will not reach ground level and create nuisance ponding at these locations.

The PCSWMM analysis, discussed in the next sections, has demonstrated that the proposed drainage system for the development will have sufficient capacity to control the excess flow during a 100-year storm and safely capture and convey the 5-year flow to the pond.

4.1 Major System and PCSWMM Analysis

The PCSWMM computer program was used to model the major and minor system flows within the proposed development. The PCSWMM model presented in Appendix B was developed based on the information provided in Figures 2 and 3. Three simulations were conducted, one for each of the following rainfall events:

i) A simulation of the 5-year, 24-hour Chicago storm;
ii) A simulation of the 100-year, 24-hour Chicago storm; and
iii) A simulation of the Regional event (Hurricane Hazel).

The models use actual catchbasin capture flow curves, and the inflows are limited by the lead pipe capacities. Note that 250 mm diameter lead pipes were assumed and are required between single catchbasins and the storm sewers, and 300 mm diameter lead pipes were assumed and are required between double or rearyard catchbasins and the storm sewers.

4.2 Minor System and Hydraulic Gradeline Analysis

The minor system analysis was completed using the PCSWMM program based on the peak flows captured during the 5- and 100-year Chicago storms. Since several pipes will potentially surcharge to ground level during a 100-year storm, the PCSWMM model was connected to the surface with artificial “spill pipes” to allow for the excess flow that cannot enter the minor

system to be routed through the major system. These excess flows were reinserted into the major system flow route in PCSWMM at the next downstream segment.
The minor system was analyzed for free outfall conditions at the outlets of the pond and the oil-and-grit separators to Fourteen Mile Creek, based on the Regional water levels simulated in the receiving watercourse per the March 2017 *Functional Servicing Report for the Bronte Green Subdivision*.

Table 1 presents the peak minor system flows obtained with the Rational Method and with the above-mentioned simulations.

Table 1: Comparison of Minor System Flows to the Outlets

Location	5-year Rational Method Flow (m^3/s)	5-Year PCSWMM Flow (m^3/s)	100-Year PCSWMM Flow (m^3/s)
MH 680 to Pond	2.255	3.265	4.815
MH 990 to Pond	1.363	2.274	3.541
MH 514 to MH 403	0.405	0.486	0.776
MH 108 to Pond	0.310	0.229	0.331
MH 1190 to Pond	1.851	2.865	4.316
MH 205 to Creek	0.733	0.412	0.738
MH 809 (Fut. OGS) to Creek	N/A	0.122	0.122
Total [(1)]	6.918	9.653	14.639

[(1)] Total flow taken as summation of peak inflows

Table 1 shows that the 5-year flows simulated with the PCSWMM models are generally higher than the Rational Method flow. This may be partly explained by the difference in the selected time of concentration and the fact that the Rational Method tends to underestimate design peak flows for areas larger than 10 ha.

The PCSWMM simulations have determined that for the selected 5- and 100-year storms, the total minor system peak flows to the outlets would be 9.653 m^3/s and 14.639 m^3/s, respectively. The 100-year flow will surcharge most parts of the minor system; however, for this analysis this is not critical since residential units with basements will be protected by sump pumps.

In order to determine the extent of pipe surcharge, the 100-year water levels generated by the PCSWMM model were compared against ground elevation, represented by the manhole cover elevation. When the computed HGL reached the manhole cover elevations, the excess flow was routed to a downstream PCSWMM road segment, to re-enter the minor system (where capacity allows) in a downstream pipe or proceed along the major system flow route. This situation occurred at eighteen (18) locations within the proposed storm sewer network; these locations may be identified in Table 2 as manholes with freeboards of less than 0 m between the hydraulic gradeline elevation and the manhole cover elevation. Note that the freeboards at these locations do not represent the water depth on the road, as they are based on a system acting under pressure and the minor system flows spilling to ground level will spread out over the road

once they reach the surface. The largest negative freeboard (26.8 cm) is nonetheless less than the maximum allowable water depth of 30 cm at the gutter.

Within the proposed subdivision, the depth of water at the gutter will be retained within the right-of-way and will not exceed the maximum allowable value of 30 cm during the 100-year Chicago Storm (refer to Calculation Sheet 1 of Appendix D, where the calculated maximum was 10.8 cm). Furthermore, it was determined that, for the 100-year storm and for all major system segments, the product of the depth of water (m) at the gutter multiplied by the velocity of flow (m/s) will not exceed the maximum allowable 0.65 m^2/s (refer to Calculation Sheet 1 of Appendix D, where the calculated maximum was 0.099 m^2/s).

Tables 2A and 2B summarize the pipe data and hydraulic simulation results for the 100-year storm and the Regional event, respectively, under free outfall conditions. Note that the flowing full pipe velocities are no less than 0.75 m/s and no greater than 4.0 m/s for all proposed pipes.

Table 2A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour Chicago Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [(1)] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
MH-100	MH-101	127.457	125.217	300	63.9	3.5	0.013	129.602	127.289	2.559	0.181	0.00	0.0	-0.300	0.00	127.457	126.512	2.145
MH-101	MH-90	125.197	124.945	300	36.0	0.7	0.013	127.289	126.628	1.145	0.081	0.02	0.2	1.015	8.25	126.512	126.509	0.777
MH-53	MH-52	127.838	126.568	300	63.5	2.0	0.013	129.830	128.762	1.935	0.137	0.11	0.8	0.474	8.23	128.612	128.286	1.218
MH-809	MH-OGS2	125.602	125.502	250	10.0	1.0	0.013	127.894	127.894	1.211	0.059	0.05	0.9	2.098	8.02	127.950	125.985	-0.056
MH-OGS2	BioSwale-East	125.502	125.500	350	10.0	0.0	0.013	127.894	126.500	0.000	0.000	0.05	N/A	0.133	8.07	125.985	125.950	1.909
MH-1	MH-2	126.055	125.749	375	87.5	0.3	0.013	128.215	128.659	0.939	0.104	0.13	1.3	1.932	8.10	128.362	128.405	-0.147
MH-10	MH-11	124.433	124.349	825	20.8	0.4	0.013	128.476	128.369	1.698	0.908	0.87	1.0	2.758	8.12	128.016	127.962	0.460
MH-105	MH-106	122.171	121.947	525	111.7	0.2	0.013	124.488	124.500	0.890	0.193	0.06	0.3	0.369	8.15	123.065	123.063	1.423
MH-106	MH-107	121.797	121.584	675	70.7	0.3	0.013	124.500	124.854	1.287	0.460	0.35	0.8	0.591	8.17	123.063	123.058	1.437
MH-107	MH-108	121.534	121.464	675	23.6	0.3	0.013	124.854	125.300	1.287	0.460	0.34	0.7	0.849	8.17	123.058	123.057	1.796
MH-108	SFBG-4-5	121.414	121.400	675	10.0	0.1	0.013	125.300	125.300	0.743	0.266	0.33	1.2	0.968	8.17	123.057	123.054	2.243
MH-109	MH-110	126.587	125.387	525	99.7	1.2	0.013	129.548	128.388	2.176	0.471	0.51	1.1	1.867	8.17	128.979	127.558	0.569
MH-11	MH-110	124.299	124.175	825	31.0	0.4	0.013	128.369	128.388	1.698	0.908	1.19	1.3	2.838	8.12	127.962	127.558	0.407
MH-110	MH-111	124.062	123.810	1050	71.8	0.4	0.013	128.388	127.357	1.995	1.727	2.24	1.3	2.446	8.13	127.558	127.138	0.830
MH-111	MH-112	123.790	123.502	1050	71.9	0.4	0.013	127.357	126.761	1.995	1.727	2.50	1.4	2.298	8.15	127.138	126.591	0.219
MH-112	MH-113	123.482	123.174	1050	76.6	0.4	0.013	126.761	125.955	1.995	1.727	2.45	1.4	2.059	8.15	126.591	126.000	0.170
MH-113	MH-114	123.154	122.972	1050	36.4	0.5	0.013	125.955	125.769	2.230	1.931	2.82	1.5	1.796	8.32	126.000	125.607	-0.045
MH-114	MH-115	122.952	122.672	1050	56.0	0.5	0.013	125.769	125.457	2.230	1.931	2.82	1.5	1.605	8.32	125.607	124.973	0.162
MH-115	MH-116	122.492	122.326	1200	55.2	0.3	0.013	125.457	125.149	1.888	2.135	3.12	1.5	1.281	8.30	124.973	124.626	0.484
MH-116	MH-117	122.183	121.952	1350	92.2	0.3	0.013	125.149	125.075	2.042	2.923	3.33	1.1	1.093	8.25	124.626	124.257	0.523
MH-117	MH-118	121.932	121.726	1350	82.1	0.3	0.013	125.075	125.073	1.868	2.674	4.01	1.5	0.975	8.25	124.257	123.832	0.818
MH-118	MH-119	121.706	121.604	1350	34.1	0.3	0.013	125.073	124.777	2.042	2.923	4.23	1.4	0.776	8.23	123.832	123.376	1.241
MH-119	MH-1190	121.604	121.515	1350	29.5	0.3	0.013	124.777	125.300	2.042	2.923	4.32	1.5	0.422	8.23	123.376	123.170	1.401
MH-1190	SFBG-4-5	121.515	121.500	1350	5.0	0.3	0.013	125.300	125.300	2.042	2.923	4.32	1.5	0.305	8.23	123.170	123.054	2.130
MH-12	MH-13	124.946	124.313	525	105.0	0.6	0.013	127.405	127.306	1.542	0.334	0.40	1.2	2.000	8.43	127.471	127.314	-0.066
MH-120	MH-12	125.296	125.021	450	78.3	0.4	0.013	127.503	127.405	1.134	0.180	0.23	1.3	1.876	8.42	127.622	127.471	-0.119
MH-13	MH-111	124.263	124.053	525	35.1	0.6	0.013	127.306	127.357	1.539	0.333	0.48	1.4	2.526	8.32	127.314	127.138	-0.008
MH-14	MH-16	124.529	124.247	450	70.1	0.4	0.013	126.921	126.552	1.137	0.181	0.17	1.0	1.629	8.10	126.608	126.474	0.313
MH-16	MH-17	124.172	124.038	525	33.4	0.4	0.013	126.552	126.359	1.256	0.272	0.25	0.9	1.777	8.38	126.474	126.377	0.078
MH-17	MH-18	123.988	123.876	525	28.1	0.4	0.013	126.359	126.206	1.256	0.272	0.31	1.2	1.864	8.37	126.377	126.242	-0.018
MH-18	MH-19	123.826	123.766	525	14.9	0.4	0.013	126.206	126.123	1.256	0.272	0.38	1.4	1.891	8.37	126.242	126.154	-0.036
MH-19	MH-113	123.691	123.379	600	77.6	0.4	0.013	126.123	125.955	1.377	0.389	0.46	1.2	1.863	8.37	126.154	126.000	-0.031
MH-2	MH-3	125.674	125.324	450	100.0	0.4	0.013	128.659	128.732	1.134	0.180	0.13	0.7	2.281	8.25	128.405	128.382	0.254
MH-20	MH-115	123.257	122.867	450	38.9	1.0	0.013	125.578	125.457	1.793	0.285	0.28	1.0	1.691	8.28	125.398	124.973	0.180
MH-200	MH-201	128.485	128.333	375	38.0	0.4	0.013	130.703	130.796	1.004	0.111	0.00	0.0	-0.339	8.17	128.521	128.516	2.182
MH-201	MH-202	127.958	127.897	750	30.4	0.2	0.013	130.796	130.641	1.127	0.498	0.35	0.7	-0.192	8.17	128.516	128.455	2.280
MH-202	MH-203	127.847	127.818	750	14.5	0.2	0.013	130.641	130.561	1.127	0.498	0.43	0.9	-0.142	8.17	128.455	128.401	2.186
MH-203	MH-204	127.768	127.665	750	51.5	0.2	0.013	130.561	130.233	1.127	0.498	0.43	0.9	-0.117	8.17	128.401	128.179	2.160
MH-204	OGS	127.365	127.305	250	8.0	0.8	0.013	130.233	129.888	1.084	0.053	0.05	1.0	0.564	7.87	128.179	127.501	2.054

Table 2A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour Chicago Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [(1)] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
OGS_Spill	MH-205	127.365	127.230	975	9.0	1.5	0.013	130.258	129.754	3.676	2.745	0.69	0.3	-0.642	8.17	127.698	127.377	2.560
MH-205	BioSwale-West	126.861	126.800	975	30.5	0.2	0.013	129.754	127.800	1.342	1.002	0.74	0.7	-0.459	8.17	127.377	127.257	2.377
MH-21	MH-22	123.547	122.917	375	104.7	0.6	0.013	125.734	125.206	1.230	0.136	0.06	0.4	1.037	8.25	124.959	124.884	0.775
MH-22	MH-117	122.842	122.404	450	72.6	0.6	0.013	125.206	125.075	1.389	0.221	0.24	1.1	1.592	8.20	124.884	124.257	0.322
MH-23	MH-24	123.569	123.439	300	37.0	0.4	0.013	125.647	125.458	0.865	0.061	0.01	0.2	0.142	8.15	124.011	124.008	1.636
MH-24	MH-25	123.389	123.337	300	15.0	0.3	0.013	125.458	125.368	0.749	0.053	0.02	0.3	0.319	8.13	124.008	124.009	1.450
MH-25	MH-26	123.112	122.986	525	36.0	0.4	0.013	125.368	125.312	1.256	0.272	0.08	0.3	0.372	8.15	124.009	123.995	1.359
MH-26	MH-27	122.936	122.703	525	66.5	0.4	0.013	125.312	125.104	1.176	0.255	0.13	0.5	0.534	8.15	123.995	123.962	1.317
MH-27	MH-118	122.628	122.456	600	49.1	0.4	0.013	125.104	125.073	1.373	0.388	0.28	0.7	0.734	8.15	123.962	123.832	1.142
MH-28	MH-29	122.293	122.181	525	56.0	0.2	0.013	124.784	123.979	0.888	0.192	0.04	0.2	0.259	8.18	123.077	123.073	1.707
MH-29	MH-30	122.131	122.059	525	36.0	0.2	0.013	123.979	124.163	0.888	0.192	0.04	0.2	0.417	8.07	123.073	123.070	0.906
MH-3	MH-9	125.244	124.969	525	78.5	0.4	0.013	128.732	128.503	1.256	0.272	0.22	0.8	2.613	8.15	128.382	128.117	0.350
MH-30	MH-106	121.984	121.877	600	53.3	0.2	0.013	124.163	124.500	0.971	0.275	0.13	0.5	0.486	8.23	123.070	123.063	1.093
MH-302	MH-303	114.676	114.561	1500	46.0	0.3	0.013	124.145	123.577	2.191	3.872	1.13	0.3	-0.878	8.35	115.298	115.160	8.847
MH-303	MH-304	114.561	114.505	1500	22.5	0.2	0.013	123.577	122.519	1.789	3.161	1.13	0.4	-0.901	8.37	115.160	115.079	8.417
MH-304	To_J6358.901	114.455	114.300	1500	62.0	0.3	0.013	122.519	124.300	2.191	3.872	1.36	0.3	-0.876	8.20	115.079	114.892	7.440
MH-31	MH-32	123.828	123.273	525	92.5	0.6	0.013	125.869	126.169	1.539	0.333	0.33	1.0	1.622	8.23	125.975	125.680	-0.106
MH-32	MH-62	123.160	122.919	750	120.0	0.2	0.013	126.169	125.787	1.127	0.498	0.71	1.4	1.770	8.25	125.680	125.165	0.489
MH-33	MH-34	124.557	123.993	450	93.9	0.6	0.013	126.637	126.872	1.389	0.221	0.32	1.5	1.760	8.25	126.767	126.254	-0.130
MH-34	MH-61	123.693	123.449	750	121.8	0.2	0.013	126.872	126.166	1.127	0.498	0.69	1.4	1.811	8.25	126.254	125.888	0.618
MH-35	MH-36	125.317	124.922	450	78.8	0.5	0.013	127.548	127.399	1.268	0.202	0.12	0.6	1.332	8.18	127.099	127.168	0.449
MH-36	MH-37	124.847	124.249	525	85.3	0.7	0.013	127.399	126.968	1.663	0.360	0.31	0.9	1.796	8.18	127.168	126.750	0.231
MH-37	MH-60	124.199	123.989	525	29.7	0.7	0.013	126.968	126.766	1.662	0.360	0.43	1.2	2.026	8.22	126.750	126.269	0.218
MH-38	MH-48	127.735	127.681	300	10.0	0.5	0.013	130.279	130.247	0.967	0.068	0.04	0.6	1.365	8.13	129.400	129.402	0.879
MH-39	MH-38	128.279	127.785	300	75.9	0.7	0.013	130.329	130.279	1.145	0.081	0.04	0.5	0.832	8.13	129.411	129.400	0.918
MH-4	MH-5	125.959	125.875	375	21.0	0.4	0.013	128.084	128.230	1.004	0.111	0.23	2.1	1.742	8.40	128.076	128.057	0.008
MH-40	MH-53	128.155	127.534	300	68.8	0.9	0.013	130.342	129.830	1.298	0.092	0.14	1.5	1.352	8.08	129.807	128.612	0.535
MH-400	MH-401	122.000	121.985	750	3.0	0.5	0.013	124.550	124.550	1.782	0.787	0.00	0.0	-0.750	0.00	122.000	115.465	2.550
MH-401	MH-302	114.858	114.676	1500	73.0	0.2	0.013	124.550	124.145	1.789	3.161	1.12	0.4	-0.893	8.35	115.465	115.298	9.085
MH-402	MH-401	119.004	118.986	1050	2.0	0.9	0.013	124.550	124.550	2.992	2.591	0.78	0.3	-0.371	8.22	119.683	115.465	4.867
MH-41	MH-42	128.335	127.879	300	75.9	0.6	0.013	130.407	130.409	1.060	0.075	0.08	1.0	1.159	8.27	129.794	129.774	0.613
MH-41	MH-40	128.304	128.205	300	11.0	0.9	0.013	130.407	130.342	1.298	0.092	0.03	0.3	1.190	8.07	129.794	129.807	0.613
MH-42	MH-43	127.829	127.763	300	10.9	0.6	0.013	130.409	130.295	1.060	0.075	0.08	1.0	1.645	8.27	129.774	129.776	0.635
MH-43	MH-55	127.713	126.701	300	67.3	1.5	0.013	130.295	129.327	1.675	0.118	0.15	1.3	1.763	8.08	129.776	128.451	0.519
MH-44	MH-54	128.209	127.097	300	58.1	1.9	0.013	130.297	129.607	1.886	0.133	0.17	1.3	1.094	8.32	129.603	128.585	0.694
MH-45	MH-50	128.140	127.195	300	69.8	1.4	0.013	130.300	129.546	1.619	0.114	0.11	0.9	0.985	8.08	129.425	129.024	0.875
MH-46	MH-45	128.339	128.190	300	11.0	1.4	0.013	130.431	130.300	1.619	0.114	0.02	0.2	0.786	8.23	129.425	129.425	1.006
MH-46	MH-47	128.376	127.905	300	32.5	1.5	0.013	130.431	130.383	1.675	0.118	0.05	0.4	0.749	8.23	129.425	129.408	1.006
MH-47	MH-48	127.855	127.681	300	11.9	1.5	0.013	130.383	130.247	1.675	0.118	0.05	0.4	1.253	8.23	129.408	129.402	0.975

Table 2A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour Chicago Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [(1)] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
MH-48	MH-51	127.606	126.926	375	67.7	1.0	0.013	130.247	129.264	1.587	0.175	0.16	0.9	1.421	8.23	129.402	128.948	0.845
MH-49	MH-4	126.085	126.009	375	19.0	0.4	0.013	127.980	128.084	1.004	0.111	0.23	2.1	1.623	8.40	128.083	128.076	-0.103
MH-5	MH-7	125.800	125.528	450	68.0	0.4	0.013	128.230	127.928	1.134	0.180	0.23	1.3	1.807	8.40	128.057	128.050	0.173
MH-50	MH-51	127.115	126.921	375	48.4	0.4	0.013	129.546	129.264	1.004	0.111	0.11	0.9	1.534	8.07	129.024	128.948	0.522
MH-51	MH-59	126.846	125.901	450	42.1	2.2	0.013	129.264	128.571	2.659	0.423	0.38	0.9	1.652	8.18	128.948	127.857	0.316
MH-52	MH-110	125.152	124.512	600	39.8	1.6	0.013	128.762	128.388	2.747	0.777	0.65	0.8	2.534	8.20	128.286	127.558	0.476
MH-53	MH-54	127.454	127.022	375	47.9	0.9	0.013	129.830	129.607	1.506	0.166	0.13	0.8	0.783	8.30	128.612	128.585	1.218
MH-54	MH-55	126.947	126.551	450	43.9	0.9	0.013	129.607	129.327	1.701	0.270	0.29	1.1	1.188	8.30	128.585	128.451	1.022
MH-55	MH-59	126.476	125.831	525	42.8	1.5	0.013	129.327	128.571	2.433	0.527	0.48	0.9	1.450	8.07	128.451	127.857	0.876
MH-56	MH-57	122.980	122.851	375	42.7	0.3	0.013	125.027	125.452	0.869	0.096	0.12	1.3	1.030	8.17	124.385	124.162	0.642
MH-57	MH-58	122.776	122.662	450	45.3	0.3	0.013	125.452	125.376	0.982	0.156	0.12	0.8	0.936	8.17	124.162	124.065	1.290
MH-58	MH-66	122.511	122.490	750	8.5	0.2	0.013	125.376	125.358	1.127	0.498	0.55	1.1	0.804	8.07	124.065	124.030	1.311
MH-59	MH-60	125.751	123.951	600	71.9	2.5	0.013	128.571	126.766	3.436	0.971	1.15	1.2	1.506	8.27	127.857	126.269	0.714
MH-6	MH-7	125.655	125.491	375	54.5	0.3	0.013	127.548	127.928	0.869	0.096	0.07	0.7	1.703	8.17	127.733	128.050	-0.185
MH-60	MH-61	123.801	123.449	900	70.5	0.5	0.013	126.766	126.166	2.012	1.280	1.55	1.2	1.568	8.27	126.269	125.888	0.497
MH-61	MH-62	123.299	122.919	1050	76.0	0.5	0.013	126.166	125.787	2.231	1.932	2.40	1.2	1.539	8.23	125.888	125.165	0.278
MH-62	MH-63	122.599	122.418	1350	90.4	0.2	0.013	125.787	125.624	1.669	2.389	3.65	1.5	1.216	8.18	125.165	124.727	0.622
MH-63	MH-65	122.418	122.291	1350	63.2	0.2	0.013	125.624	125.404	1.668	2.387	3.73	1.6	0.959	8.17	124.727	124.347	0.897
MH-65	MH-66	122.291	122.265	1350	12.9	0.2	0.013	125.404	125.358	1.668	2.387	3.73	1.6	0.706	8.17	124.347	124.030	1.057
MH-66	MH-67	122.115	122.059	1500	28.0	0.2	0.013	125.358	125.044	1.789	3.161	4.28	1.4	0.415	8.17	124.030	123.829	1.328
MH-67	MH-68	122.059	122.034	1500	12.5	0.2	0.013	125.044	124.893	1.789	3.161	4.56	1.4	0.270	8.17	123.829	123.617	1.215
MH-68	MH-680	121.384	121.310	1500	37.0	0.2	0.013	124.893	125.300	1.789	3.161	4.82	1.5	0.733	8.17	123.617	123.434	1.276
MH-680	SFBG-4-5	121.310	121.300	1500	5.0	0.2	0.013	125.300	125.300	1.789	3.161	4.82	1.5	0.624	8.17	123.434	123.054	1.866
MH-69	MH-70	123.057	122.459	525	119.0	0.5	0.013	125.306	125.035	1.408	0.305	0.16	0.5	0.205	8.18	123.787	123.677	1.519
MH-7	MH-8	125.378	125.090	600	72.0	0.4	0.013	127.928	128.285	1.373	0.388	0.42	1.1	2.072	8.40	128.050	128.109	-0.122
MH-70	MH-68	122.409	122.359	525	10.1	0.5	0.013	125.035	124.893	1.405	0.304	0.26	0.9	0.743	8.18	123.677	123.617	1.358
MH-72	MH-77	125.149	124.304	375	130.0	0.7	0.013	127.343	126.933	1.328	0.147	0.13	0.9	1.454	8.20	126.978	126.933	0.365
MH-75	MH-78	124.630	123.850	525	130.0	0.6	0.013	126.983	126.542	1.539	0.333	0.40	1.2	1.828	8.32	126.983	126.207	0.000
MH-77	MH-60	124.734	124.326	375	68.0	0.6	0.013	126.933	126.766	1.230	0.136	0.10	0.8	1.824	8.20	126.933	126.269	0.000
MH-77	MH-78	124.154	123.850	525	75.8	0.4	0.013	126.933	126.542	1.258	0.272	0.37	1.4	2.254	8.20	126.933	126.207	0.000
MH-78	MH-92	123.625	123.355	750	67.1	0.4	0.013	126.542	126.224	1.594	0.704	0.75	1.1	1.832	8.23	126.207	125.558	0.335
MH-79	MH-80	124.357	123.925	525	86.5	0.5	0.013	126.693	126.336	1.405	0.304	0.28	0.9	1.814	8.07	126.696	126.260	-0.003
MH-8	MH-9	125.015	124.819	675	48.7	0.4	0.013	128.285	128.503	1.486	0.532	0.48	0.9	2.419	8.40	128.109	128.117	0.176
MH-80	MH-92	123.875	123.580	525	59.0	0.5	0.013	126.336	126.224	1.405	0.304	0.52	1.7	1.860	8.10	126.260	125.558	0.076
MH-800	MH-801	127.894	127.816	300	15.7	0.5	0.013	130.694	130.612	0.967	0.068	0.01	0.2	0.715	8.10	128.909	128.905	1.785
MH-801	MH-802	127.766	127.706	300	12.2	0.5	0.013	130.612	130.531	0.967	0.068	0.01	0.2	0.839	8.10	128.905	128.918	1.707
MH-802	MH-803	127.556	126.936	450	123.7	0.5	0.013	130.531	129.907	1.268	0.202	0.08	0.4	0.912	8.08	128.918	128.818	1.613
MH-803	MH-805	126.886	126.814	450	14.7	0.5	0.013	129.907	129.841	1.268	0.202	0.08	0.4	1.482	8.07	128.818	128.812	1.089
MH-804	MH-805	127.046	126.884	300	32.4	0.5	0.013	130.004	129.841	0.967	0.068	0.01	0.1	1.461	8.07	128.807	128.812	1.197

Table 2A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour Chicago Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [(1)] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
MH-805	MH-806	126.734	126.609	450	25.1	0.5	0.013	129.841	129.594	1.268	0.202	0.37	1.8	1.628	8.17	128.812	128.392	1.029
MH-806	MH-809	126.559	126.427	450	26.7	0.5	0.013	129.594	127.894	1.268	0.202	0.37	1.8	1.383	8.17	128.392	127.950	1.202
MH-807	MH-808	127.342	126.712	300	63.0	1.0	0.013	130.347	129.658	1.368	0.097	0.02	0.2	0.687	8.08	128.329	128.326	2.018
MH-808	MH-809	126.662	126.572	300	10.0	0.9	0.013	129.658	127.894	1.298	0.092	0.19	2.0	1.364	8.17	128.326	127.950	1.332
OGS_Spill_2	BioSwale-East	125.602	125.500	525	20.4	0.5	0.013	127.894	126.500	1.405	0.304	0.07	0.2	-0.150	8.03	125.977	125.950	1.917
MH-81	MH-82	124.185	124.091	300	23.5	0.4	0.013	126.451	126.313	0.865	0.061	0.02	0.2	1.364	8.10	125.849	125.846	0.602
MH-82	MH-83	123.941	123.761	450	45.0	0.4	0.013	126.313	126.068	1.134	0.180	0.16	0.9	1.455	8.15	125.846	125.724	0.467
MH-83	MH-84	123.711	123.675	450	8.0	0.5	0.013	126.068	126.022	1.268	0.202	0.18	0.9	1.563	8.23	125.724	125.700	0.344
MH-84	MH-85	123.600	123.411	525	41.9	0.5	0.013	126.022	125.804	1.405	0.304	0.24	0.8	1.575	8.23	125.700	125.603	0.322
MH-85	MH-93	123.298	123.062	750	59.1	0.4	0.013	125.804	125.741	1.594	0.704	0.75	1.1	1.555	8.22	125.603	125.218	0.201
MH-87	MH-88	122.538	122.318	450	87.8	0.3	0.013	124.719	125.419	0.982	0.156	0.25	1.6	1.608	8.22	124.596	123.939	0.123
MH-88	MH-89	122.243	122.091	525	75.6	0.2	0.013	125.419	125.037	0.888	0.192	0.31	1.6	1.171	8.13	123.939	123.481	1.480
MH-89	MH-98	122.041	122.017	525	11.8	0.2	0.013	125.037	125.005	0.888	0.192	0.31	1.6	0.915	8.13	123.481	123.379	1.556
MH-9	MH-10	124.744	124.508	750	58.9	0.4	0.013	128.503	128.476	1.594	0.704	0.67	1.0	2.623	8.35	128.117	128.016	0.386
MH-90	MH-91	124.865	124.490	375	37.2	1.0	0.013	126.628	126.439	1.587	0.175	0.22	1.2	1.269	8.12	126.509	126.002	0.119
MH-91	MH-92	124.470	123.430	375	31.9	3.3	0.013	126.439	126.224	2.884	0.319	0.21	0.7	1.157	8.22	126.002	125.558	0.437
MH-92	MH-93	123.130	122.950	975	71.8	0.3	0.013	126.224	125.741	1.503	1.122	1.60	1.4	1.453	8.10	125.558	125.218	0.666
MH-93	MH-94	122.837	122.431	1200	115.5	0.4	0.013	125.741	125.568	2.044	2.312	2.58	1.1	1.181	8.20	125.218	124.750	0.523
MH-94	MH-96	122.431	121.980	1200	128.5	0.4	0.013	125.568	125.301	2.180	2.466	2.95	1.2	1.119	8.20	124.750	124.074	0.818
MH-96	MH-97	121.980	121.816	1200	46.7	0.4	0.013	125.301	125.062	2.180	2.466	2.95	1.2	0.894	8.17	124.074	123.641	1.227
MH-97	MH-98	121.816	121.770	1200	12.4	0.4	0.013	125.062	125.005	2.180	2.466	2.95	1.2	0.625	8.17	123.641	123.379	1.421
MH-98	MH-99	121.603	121.444	1350	26.2	0.6	0.013	125.005	124.783	2.888	4.134	3.54	0.9	0.426	8.17	123.379	123.229	1.626
MH-99	MH-990	121.444	121.339	1350	17.5	0.6	0.013	124.783	125.300	2.888	4.134	3.54	0.9	0.435	8.17	123.229	123.144	1.554
MH-990	SFBG-4-5	121.339	121.300	1350	6.5	0.6	0.013	125.300	125.300	2.888	4.134	3.54	0.9	0.455	8.17	123.144	123.054	2.156
OGS	MH-205	127.225	127.199	300	10.0	0.3	0.013	129.888	129.754	0.749	0.053	0.05	1.0	-0.024	8.18	127.501	127.377	2.387
MH-403	MH-402	119.263	119.229	825	17.1	0.2	0.013	125.300	124.550	1.201	0.642	0.78	1.2	-0.239	8.22	119.849	119.683	5.451
MH-500	MH-501	123.588	123.179	300	54.3	0.8	0.013	127.381	127.109	1.224	0.086	0.07	0.9	0.090	8.17	123.978	123.750	3.403
MH-501	MH-5010	123.093	122.124	375	57.0	1.7	0.013	127.109	124.052	2.070	0.229	0.14	0.6	0.282	8.27	123.750	123.485	3.359
MH-5010	MH-503	122.049	121.884	450	33.0	0.5	0.013	124.052	125.638	1.268	0.202	0.19	0.9	0.986	8.28	123.485	123.291	0.567
MH-502	MH-503	123.470	122.826	375	80.5	0.8	0.013	125.649	125.638	1.420	0.157	0.18	1.1	0.125	8.17	123.970	123.291	1.679
MH-503	MH-505	121.729	120.914	525	81.1	1.0	0.013	125.638	125.358	1.987	0.430	0.53	1.2	1.037	8.18	123.291	121.686	2.347
MH-504	MH-505	121.229	121.139	300	9.0	1.0	0.013	125.540	125.358	1.368	0.097	0.01	0.1	0.156	8.15	121.685	121.686	3.855
MH-505	MH-506	120.764	120.404	675	89.7	0.4	0.013	125.358	125.299	1.486	0.532	0.57	1.1	0.247	8.20	121.686	121.271	3.672
MH-506	MH-507	120.354	120.142	675	52.6	0.4	0.013	125.299	125.027	1.486	0.532	0.58	1.1	0.242	8.22	121.271	120.911	4.028
MH-507	MH-511	120.092	120.040	675	12.9	0.4	0.013	125.027	125.013	1.486	0.532	0.63	1.2	0.144	8.20	120.911	120.796	4.116
MH-508	MH-509	121.768	121.444	300	72.0	0.5	0.013	124.861	125.430	0.967	0.068	0.06	0.8	-0.081	8.18	121.987	121.344	2.874
MH-509	MH-510	120.990	120.802	450	74.7	0.3	0.013	125.430	125.055	0.982	0.156	0.12	0.8	-0.096	8.17	121.344	121.096	4.086
MH-510	MH-511	120.752	120.718	450	13.4	0.3	0.013	125.055	125.013	0.982	0.156	0.15	1.0	-0.106	8.17	121.096	120.796	3.959
MH-511	MH-512	119.890	119.833	825	28.7	0.2	0.013	125.013	124.730	1.201	0.642	0.78	1.2	0.081	8.20	120.796	120.593	4.217

Table 2A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour Chicago Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
MH-512	MH-514	119.703	119.415	825	144.0	0.2	0.013	124.730	124.730	1.201	0.642	0.77	1.2	0.065	8.20	120.593	120.017	4.137
MH-514	MH-403	119.365	119.313	825	25.6	0.2	0.013	124.730	125.300	1.201	0.642	0.78	1.2	-0.173	8.22	120.017	119.849	4.713

Note: [1] A negative surcharge implies that the pipe is not flowing full

Table 2B: Pipe Data and Hydraulic Simulation Results for the Regional Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
MH-100	MH-101	127.457	125.217	300	63.9	3.5	0.013	129.602	127.289	2.559	0.181	0.00	0.0	-0.300	0.00	127.457	125.197	2.145
MH-101	MH-90	125.197	124.945	300	36.0	0.7	0.013	127.289	126.628	1.145	0.081	0.00	0.0	-0.300	0.00	125.197	125.022	2.092
MH-53	MH-52	127.838	126.568	300	63.5	2.0	0.013	129.830	128.762	1.935	0.137	0.00	0.0	-0.526	0.00	127.612	125.464	2.218
MH-809	MH-OGS2	125.602	125.502	250	10.0	1.0	0.013	127.894	127.894	1.211	0.059	0.05	0.9	2.060	45.28	127.912	125.954	-0.018
MH-OGS2	BioSwale-East	125.502	125.500	350	10.0	0.0	0.013	127.894	126.500	0.000	0.000	0.05	N/A	0.102	45.30	125.954	125.920	1.940
MH-1	MH-2	126.055	125.749	375	87.5	0.3	0.013	128.215	128.659	0.939	0.104	0.04	0.4	-0.370	46.17	126.060	125.841	2.155
MH-10	MH-11	124.433	124.349	825	20.8	0.4	0.013	128.476	128.369	1.698	0.908	0.52	0.6	0.321	45.62	125.579	125.544	2.897
MH-105	MH-106	122.171	121.947	525	111.7	0.2	0.013	124.488	124.500	0.890	0.193	0.02	0.1	1.792	45.53	124.488	124.488	0.000
MH-106	MH-107	121.797	121.584	675	70.7	0.3	0.013	124.500	124.854	1.287	0.460	0.15	0.3	2.016	47.22	124.488	124.575	0.012
MH-107	MH-108	121.534	121.464	675	23.6	0.3	0.013	124.854	125.300	1.287	0.460	0.14	0.3	2.366	47.22	124.575	124.618	0.279
MH-108	SFBG-4-5	121.414	121.400	675	10.0	0.1	0.013	125.300	125.300	0.743	0.266	0.14	0.5	2.529	47.22	124.618	124.682	0.682
MH-109	MH-110	126.587	125.387	525	99.7	1.2	0.013	129.548	128.388	2.176	0.471	0.15	0.3	-0.323	45.62	126.789	125.438	2.759
MH-11	MH-110	124.299	124.175	825	31.0	0.4	0.013	128.369	128.388	1.698	0.908	0.55	0.6	0.420	45.62	125.544	125.438	2.825
MH-110	MH-111	124.062	123.810	1050	71.8	0.4	0.013	128.388	127.357	1.995	1.727	0.85	0.5	0.326	45.90	125.438	125.374	2.950
MH-111	MH-112	123.790	123.502	1050	71.9	0.4	0.013	127.357	126.761	1.995	1.727	1.08	0.6	0.534	46.17	125.374	125.265	1.983
MH-112	MH-113	123.482	123.174	1050	76.6	0.4	0.013	126.761	125.955	1.995	1.727	1.09	0.6	0.733	46.17	125.265	125.145	1.496
MH-113	MH-114	123.154	122.972	1050	36.4	0.5	0.013	125.955	125.769	2.230	1.931	1.36	0.7	0.941	46.18	125.145	125.043	0.810
MH-114	MH-115	122.952	122.672	1050	56.0	0.5	0.013	125.769	125.457	2.230	1.931	1.36	0.7	1.041	46.18	125.043	124.914	0.726
MH-115	MH-116	122.492	122.326	1200	55.2	0.3	0.013	125.457	125.149	1.888	2.135	1.41	0.7	1.222	46.17	124.914	124.874	0.543
MH-116	MH-117	122.183	121.952	1350	92.2	0.3	0.013	125.149	125.075	2.042	2.923	1.46	0.5	1.341	46.17	124.874	124.833	0.275
MH-117	MH-118	121.932	121.726	1350	82.1	0.3	0.013	125.075	125.073	1.868	2.674	1.61	0.6	1.551	46.17	124.833	124.791	0.242
MH-118	MH-119	121.706	121.604	1350	34.1	0.3	0.013	125.073	124.777	2.042	2.923	1.68	0.6	1.735	46.17	124.791	124.749	0.282
MH-119	MH-1190	121.604	121.515	1350	29.5	0.3	0.013	124.777	125.300	2.042	2.923	1.72	0.6	1.795	46.17	124.749	124.731	0.028
MH-1190	SFBG-4-5	121.515	121.500	1350	5.0	0.3	0.013	125.300	125.300	2.042	2.923	1.72	0.6	1.866	46.17	124.731	124.682	0.569
MH-12	MH-13	124.946	124.313	525	105.0	0.6	0.013	127.405	127.306	1.542	0.334	0.14	0.4	0.114	45.60	125.585	125.499	1.820
MH-120	MH-12	125.296	125.021	450	78.3	0.4	0.013	127.503	127.405	1.134	0.180	0.04	0.2	-0.149	45.77	125.597	125.585	1.906
MH-13	MH-111	124.263	124.053	525	35.1	0.6	0.013	127.306	127.357	1.539	0.333	0.20	0.6	0.711	45.42	125.499	125.374	1.807
MH-14	MH-16	124.529	124.247	450	70.1	0.4	0.013	126.921	126.552	1.137	0.181	0.08	0.4	0.379	45.78	125.358	125.316	1.563
MH-16	MH-17	124.172	124.038	525	33.4	0.4	0.013	126.552	126.359	1.256	0.272	0.12	0.4	0.619	45.85	125.316	125.292	1.236
MH-17	MH-18	123.988	123.876	525	28.1	0.4	0.013	126.359	126.206	1.256	0.272	0.13	0.5	0.779	45.85	125.292	125.260	1.067
MH-18	MH-19	123.826	123.766	525	14.9	0.4	0.013	126.206	126.123	1.256	0.272	0.16	0.6	0.909	45.85	125.260	125.227	0.946
MH-19	MH-113	123.691	123.379	600	77.6	0.4	0.013	126.123	125.955	1.377	0.389	0.18	0.4	0.936	46.22	125.227	125.145	0.896
MH-2	MH-3	125.674	125.324	450	100.0	0.4	0.013	128.659	128.732	1.134	0.180	0.05	0.2	-0.283	45.98	125.841	125.695	2.818
MH-20	MH-115	123.257	122.867	450	38.9	1.0	0.013	125.578	125.457	1.793	0.285	0.03	0.1	1.216	46.08	124.923	124.914	0.655
MH-200	MH-201	128.485	128.333	375	38.0	0.4	0.013	130.703	130.796	1.004	0.111	0.00	0.0	-0.375	0.00	128.485	128.285	2.218
MH-201	MH-202	127.958	127.897	750	30.4	0.2	0.013	130.796	130.641	1.127	0.498	0.18	0.4	-0.423	46.17	128.285	128.197	2.511
MH-202	MH-203	127.847	127.818	750	14.5	0.2	0.013	130.641	130.561	1.127	0.498	0.19	0.4	-0.400	46.17	128.197	128.146	2.444
MH-203	MH-204	127.768	127.665	750	51.5	0.2	0.013	130.561	130.233	1.127	0.498	0.19	0.4	-0.372	46.17	128.146	127.996	2.415
MH-204	OGS	127.365	127.305	250	8.0	0.8	0.013	130.233	129.888	1.084	0.053	0.05	1.0	0.381	39.50	127.996	127.501	2.237

Table 2B: Pipe Data and Hydraulic Simulation Results for the Regional Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [(1)] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
OGS_Spill	MH-205	127.365	127.230	975	9.0	1.5	0.013	130.258	129.754	3.676	2.745	0.17	0.1	-0.811	46.17	127.529	127.240	2.729
MH-205	BioSwale-West	126.861	126.800	975	30.5	0.2	0.013	129.754	127.800	1.342	1.002	0.22	0.2	-0.596	46.17	127.240	127.226	2.514
MH-21	MH-22	123.547	122.917	375	104.7	0.6	0.013	125.734	125.206	1.230	0.136	0.01	0.1	0.962	47.28	124.884	124.881	0.850
MH-22	MH-117	122.842	122.404	450	72.6	0.6	0.013	125.206	125.075	1.389	0.221	0.08	0.4	1.589	45.65	124.881	124.833	0.325
MH-23	MH-24	123.569	123.439	300	37.0	0.4	0.013	125.647	125.458	0.865	0.061	0.00	0.0	0.955	45.27	124.824	124.813	0.823
MH-24	MH-25	123.389	123.337	300	15.0	0.3	0.013	125.458	125.368	0.749	0.053	0.00	0.0	1.124	45.27	124.813	124.815	0.645
MH-25	MH-26	123.112	122.986	525	36.0	0.4	0.013	125.368	125.312	1.256	0.272	0.03	0.1	1.178	46.17	124.815	124.808	0.553
MH-26	MH-27	122.936	122.703	525	66.5	0.4	0.013	125.312	125.104	1.176	0.255	0.05	0.2	1.347	46.17	124.808	124.802	0.504
MH-27	MH-118	122.628	122.456	600	49.1	0.4	0.013	125.104	125.073	1.373	0.388	0.09	0.2	1.574	45.38	124.802	124.791	0.302
MH-28	MH-29	122.293	122.181	525	56.0	0.2	0.013	124.784	123.979	0.888	0.192	0.04	0.2	1.772	45.48	124.590	124.247	0.194
MH-29	MH-30	122.131	122.059	525	36.0	0.2	0.013	123.979	124.163	0.888	0.192	0.04	0.2	1.591	47.17	124.247	124.328	-0.268
MH-3	MH-9	125.244	124.969	525	78.5	0.4	0.013	128.732	128.503	1.256	0.272	0.10	0.4	-0.074	46.27	125.695	125.654	3.037
MH-30	MH-106	121.984	121.877	600	53.3	0.2	0.013	124.163	124.500	0.971	0.275	0.07	0.2	1.744	47.18	124.328	124.488	-0.165
MH-302	MH-303	114.676	114.561	1500	46.0	0.3	0.013	124.145	123.577	2.191	3.872	3.84	1.0	-0.123	47.18	116.053	115.826	8.092
MH-303	MH-304	114.561	114.505	1500	22.5	0.2	0.013	123.577	122.519	1.789	3.161	3.84	1.2	-0.235	47.18	115.826	115.656	7.751
MH-304	To_J6358.901	114.455	114.300	1500	62.0	0.3	0.013	122.519	124.300	2.191	3.872	4.30	1.1	-0.299	47.18	115.656	115.381	6.863
MH-31	MH-32	123.828	123.273	525	92.5	0.6	0.013	125.869	126.169	1.539	0.333	0.14	0.4	0.654	46.10	125.007	124.927	0.862
MH-32	MH-62	123.160	122.919	750	120.0	0.2	0.013	126.169	125.787	1.127	0.498	0.28	0.6	1.017	46.10	124.927	124.874	1.242
MH-33	MH-34	124.557	123.993	450	93.9	0.6	0.013	126.637	126.872	1.389	0.221	0.14	0.6	0.145	45.50	125.152	124.956	1.485
MH-34	MH-61	123.693	123.449	750	121.8	0.2	0.013	126.872	126.166	1.127	0.498	0.24	0.5	0.513	46.15	124.956	124.922	1.916
MH-35	MH-36	125.317	124.922	450	78.8	0.5	0.013	127.548	127.399	1.268	0.202	0.03	0.1	-0.343	46.12	125.424	125.086	2.124
MH-36	MH-37	124.847	124.249	525	85.3	0.7	0.013	127.399	126.968	1.663	0.360	0.12	0.3	-0.286	46.23	125.086	125.051	2.313
MH-37	MH-60	124.199	123.989	525	29.7	0.7	0.013	126.968	126.766	1.662	0.360	0.17	0.5	0.327	46.22	125.051	124.977	1.917
MH-38	MH-48	127.735	127.681	300	10.0	0.5	0.013	130.279	130.247	0.967	0.068	0.00	0.0	-0.271	45.27	127.764	127.764	2.515
MH-39	MH-38	128.279	127.785	300	75.9	0.7	0.013	130.329	130.279	1.145	0.081	0.00	0.0	-0.300	0.00	128.279	127.764	2.050
MH-4	MH-5	125.959	125.875	375	21.0	0.4	0.013	128.084	128.230	1.004	0.111	0.12	1.1	-0.041	46.17	126.293	126.071	1.791
MH-40	MH-53	128.155	127.534	300	68.8	0.9	0.013	130.342	129.830	1.298	0.092	0.06	0.7	-0.105	45.65	128.350	127.612	1.992
MH-400	MH-401	122.000	121.985	750	3.0	0.5	0.013	124.550	124.550	1.782	0.787	0.72	0.9	0.089	47.17	122.839	116.293	1.711
MH-401	MH-302	114.858	114.676	1500	73.0	0.2	0.013	124.550	124.145	1.789	3.161	3.84	1.2	-0.065	47.18	116.293	116.053	8.257
MH-402	MH-401	119.004	118.986	1050	2.0	0.9	0.013	124.550	124.550	2.992	2.591	0.99	0.4	-0.252	47.18	119.802	116.293	4.748
MH-41	MH-42	128.335	127.879	300	75.9	0.6	0.013	130.407	130.409	1.060	0.075	0.00	0.0	-0.285	45.65	128.350	127.849	2.057
MH-41	MH-40	128.304	128.205	300	11.0	0.9	0.013	130.407	130.342	1.298	0.092	0.00	0.0	-0.254	46.20	128.350	128.350	2.057
MH-42	MH-43	127.829	127.763	300	10.9	0.6	0.013	130.409	130.295	1.060	0.075	0.00	0.0	-0.280	45.27	127.849	127.849	2.560
MH-43	MH-55	127.713	126.701	300	67.3	1.5	0.013	130.295	129.327	1.675	0.118	0.05	0.4	-0.164	46.17	127.849	126.730	2.446
MH-44	MH-54	128.209	127.097	300	58.1	1.9	0.013	130.297	129.607	1.886	0.133	0.06	0.4	-0.157	46.17	128.352	127.154	1.945
MH-45	MH-50	128.140	127.195	300	69.8	1.4	0.013	130.300	129.546	1.619	0.114	0.04	0.3	-0.180	46.17	128.260	127.260	2.040
MH-46	MH-45	128.339	128.190	300	11.0	1.4	0.013	130.431	130.300	1.619	0.114	0.00	0.0	-0.300	0.00	128.339	128.260	2.092
MH-46	MH-47	128.376	127.905	300	32.5	1.5	0.013	130.431	130.383	1.675	0.118	0.00	0.0	-0.337	0.00	128.339	127.855	2.092
MH-47	MH-48	127.855	127.681	300	11.9	1.5	0.013	130.383	130.247	1.675	0.118	0.00	0.0	-0.300	0.00	127.855	127.764	2.528

Table 2B: Pipe Data and Hydraulic Simulation Results for the Regional Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [(1)] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
MH-48	MH-51	127.606	126.926	375	67.7	1.0	0.013	130.247	129.264	1.587	0.175	0.06	0.3	-0.217	45.67	127.764	127.036	2.483
MH-49	MH-4	126.085	126.009	375	19.0	0.4	0.013	127.980	128.084	1.004	0.111	0.12	1.1	-0.036	46.17	126.424	126.293	1.556
MH-5	MH-7	125.800	125.528	450	68.0	0.4	0.013	128.230	127.928	1.134	0.180	0.12	0.7	-0.179	46.17	126.071	125.761	2.159
MH-50	MH-51	127.115	126.921	375	48.4	0.4	0.013	129.546	129.264	1.004	0.111	0.04	0.3	-0.230	46.17	127.260	127.036	2.286
MH-51	MH-59	126.846	125.901	450	42.1	2.2	0.013	129.264	128.571	2.659	0.423	0.13	0.3	-0.260	46.15	127.036	126.015	2.228
MH-52	MH-110	125.152	124.512	600	39.8	1.6	0.013	128.762	128.388	2.747	0.777	0.17	0.2	-0.288	45.63	125.464	125.438	3.298
MH-53	MH-54	127.454	127.022	375	47.9	0.9	0.013	129.830	129.607	1.506	0.166	0.06	0.4	-0.217	45.65	127.612	127.154	2.218
MH-54	MH-55	126.947	126.551	450	43.9	0.9	0.013	129.607	129.327	1.701	0.270	0.12	0.4	-0.243	46.17	127.154	126.730	2.453
MH-55	MH-59	126.476	125.831	525	42.8	1.5	0.013	129.327	128.571	2.433	0.527	0.19	0.4	-0.271	45.52	126.730	126.015	2.597
MH-56	MH-57	122.980	122.851	375	42.7	0.3	0.013	125.027	125.452	0.869	0.096	0.03	0.3	1.469	45.48	124.824	124.806	0.203
MH-57	MH-58	122.776	122.662	450	45.3	0.3	0.013	125.452	125.376	0.982	0.156	0.03	0.2	1.580	45.48	124.806	125.024	0.646
MH-58	MH-66	122.511	122.490	750	8.5	0.2	0.013	125.376	125.358	1.127	0.498	0.45	0.9	1.763	46.08	125.024	124.784	0.352
MH-59	MH-60	125.751	123.951	600	71.9	2.5	0.013	128.571	126.766	3.436	0.971	0.43	0.4	-0.336	46.17	126.015	124.977	2.556
MH-6	MH-7	125.655	125.491	375	54.5	0.3	0.013	127.548	127.928	0.869	0.096	0.02	0.2	-0.257	45.55	125.773	125.761	1.775
MH-60	MH-61	123.801	123.449	900	70.5	0.5	0.013	126.766	126.166	2.012	1.280	0.61	0.5	0.276	46.20	124.977	124.922	1.789
MH-61	MH-62	123.299	122.919	1050	76.0	0.5	0.013	126.166	125.787	2.231	1.932	0.91	0.5	0.573	46.13	124.922	124.874	1.244
MH-62	MH-63	122.599	122.418	1350	90.4	0.2	0.013	125.787	125.624	1.669	2.389	1.29	0.5	0.925	46.13	124.874	124.846	0.913
MH-63	MH-65	122.418	122.291	1350	63.2	0.2	0.013	125.624	125.404	1.668	2.387	1.31	0.5	1.078	46.13	124.846	124.839	0.778
MH-65	MH-66	122.291	122.265	1350	12.9	0.2	0.013	125.404	125.358	1.668	2.387	1.31	0.5	1.198	46.13	124.839	124.784	0.565
MH-66	MH-67	122.115	122.059	1500	28.0	0.2	0.013	125.358	125.044	1.789	3.161	1.76	0.6	1.169	46.13	124.784	124.790	0.574
MH-67	MH-68	122.059	122.034	1500	12.5	0.2	0.013	125.044	124.893	1.789	3.161	1.82	0.6	1.231	46.17	124.790	124.761	0.254
MH-68	MH-680	121.384	121.310	1500	37.0	0.2	0.013	124.893	125.300	1.789	3.161	1.90	0.6	1.877	46.13	124.761	124.748	0.132
MH-680	SFBG-4-5	121.310	121.300	1500	5.0	0.2	0.013	125.300	125.300	1.789	3.161	1.90	0.6	1.938	46.17	124.748	124.682	0.552
MH-69	MH-70	123.057	122.459	525	119.0	0.5	0.013	125.306	125.035	1.408	0.305	0.05	0.2	1.187	45.45	124.769	124.767	0.537
MH-7	MH-8	125.378	125.090	600	72.0	0.4	0.013	127.928	128.285	1.373	0.388	0.22	0.6	-0.217	46.22	125.761	125.701	2.167
MH-70	MH-68	122.409	122.359	525	10.1	0.5	0.013	125.035	124.893	1.405	0.304	0.08	0.2	1.833	45.43	124.767	124.761	0.268
MH-72	MH-77	125.149	124.304	375	130.0	0.7	0.013	127.343	126.933	1.328	0.147	0.06	0.4	-0.210	46.17	125.314	124.988	2.029
MH-75	MH-78	124.630	123.850	525	130.0	0.6	0.013	126.983	126.542	1.539	0.333	0.18	0.5	-0.096	45.87	125.059	124.942	1.924
MH-77	MH-60	124.734	124.326	375	68.0	0.6	0.013	126.933	126.766	1.230	0.136	0.02	0.1	-0.121	47.22	124.988	124.977	1.945
MH-77	MH-78	124.154	123.850	525	75.8	0.4	0.013	126.933	126.542	1.258	0.272	0.14	0.5	0.309	45.52	124.988	124.942	1.945
MH-78	MH-92	123.625	123.355	750	67.1	0.4	0.013	126.542	126.224	1.594	0.704	0.31	0.4	0.567	45.88	124.942	124.895	1.600
MH-79	MH-80	124.357	123.925	525	86.5	0.5	0.013	126.693	126.336	1.405	0.304	0.14	0.5	0.211	45.95	125.093	125.000	1.600
MH-8	MH-9	125.015	124.819	675	48.7	0.4	0.013	128.285	128.503	1.486	0.532	0.26	0.5	0.011	46.23	125.701	125.654	2.584
MH-80	MH-92	123.875	123.580	525	59.0	0.5	0.013	126.336	126.224	1.405	0.304	0.18	0.6	0.600	45.37	125.000	124.895	1.336
MH-800	MH-801	127.894	127.816	300	15.7	0.5	0.013	130.694	130.612	0.967	0.068	0.00	0.0	-0.216	45.92	127.978	127.977	2.716
MH-801	MH-802	127.766	127.706	300	12.2	0.5	0.013	130.612	130.531	0.967	0.068	0.00	0.0	-0.089	45.92	127.977	127.977	2.635
MH-802	MH-803	127.556	126.936	450	123.7	0.5	0.013	130.531	129.907	1.268	0.202	0.03	0.1	-0.029	46.33	127.977	127.973	2.554
MH-803	MH-805	126.886	126.814	450	14.7	0.5	0.013	129.907	129.841	1.268	0.202	0.03	0.1	0.637	46.57	127.973	127.971	1.934
MH-804	MH-805	127.046	126.884	300	32.4	0.5	0.013	130.004	129.841	0.967	0.068	0.00	0.0	0.624	45.55	127.970	127.971	2.034

Table 2B: Pipe Data and Hydraulic Simulation Results for the Regional Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [(1)] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
MH-805	MH-806	126.734	126.609	450	25.1	0.5	0.013	129.841	129.594	1.268	0.202	0.10	0.5	0.787	45.73	127.971	127.946	1.870
MH-806	MH-809	126.559	126.427	450	26.7	0.5	0.013	129.594	127.894	1.268	0.202	0.10	0.5	0.937	45.73	127.946	127.912	1.648
MH-807	MH-808	127.342	126.712	300	63.0	1.0	0.013	130.347	129.658	1.368	0.097	0.01	0.1	0.300	45.75	127.942	127.939	2.405
MH-808	MH-809	126.662	126.572	300	10.0	0.9	0.013	129.658	127.894	1.298	0.092	0.05	0.6	0.977	45.80	127.939	127.912	1.719
OGS_Spill_2	BioSwale-East	125.602	125.500	525	20.4	0.5	0.013	127.894	126.500	1.405	0.304	0.07	0.2	-0.201	45.33	125.926	125.920	1.968
MH-81	MH-82	124.185	124.091	300	23.5	0.4	0.013	126.451	126.313	0.865	0.061	0.00	0.0	0.430	45.62	124.915	124.910	1.536
MH-82	MH-83	123.941	123.761	450	45.0	0.4	0.013	126.313	126.068	1.134	0.180	0.05	0.3	0.519	45.92	124.910	124.903	1.403
MH-83	MH-84	123.711	123.675	450	8.0	0.5	0.013	126.068	126.022	1.268	0.202	0.06	0.3	0.742	45.92	124.903	124.900	1.165
MH-84	MH-85	123.600	123.411	525	41.9	0.5	0.013	126.022	125.804	1.405	0.304	0.09	0.3	0.775	45.87	124.900	124.886	1.122
MH-85	MH-93	123.298	123.062	750	59.1	0.4	0.013	125.804	125.741	1.594	0.704	0.22	0.3	0.838	46.18	124.886	124.864	0.918
MH-87	MH-88	122.538	122.318	450	87.8	0.3	0.013	124.719	125.419	0.982	0.156	0.08	0.5	1.747	45.97	124.735	124.738	-0.016
MH-88	MH-89	122.243	122.091	525	75.6	0.2	0.013	125.419	125.037	0.888	0.192	0.10	0.5	1.970	45.97	124.738	124.739	0.681
MH-89	MH-98	122.041	122.017	525	11.8	0.2	0.013	125.037	125.005	0.888	0.192	0.10	0.5	2.173	45.72	124.739	124.738	0.298
MH-9	MH-10	124.744	124.508	750	58.9	0.4	0.013	128.503	128.476	1.594	0.704	0.41	0.6	0.160	45.67	125.654	125.579	2.849
MH-90	MH-91	124.865	124.490	375	37.2	1.0	0.013	126.628	126.439	1.587	0.175	0.06	0.4	-0.218	45.93	125.022	124.913	1.606
MH-91	MH-92	124.470	123.430	375	31.9	3.3	0.013	126.439	126.224	2.884	0.319	0.06	0.2	0.068	46.15	124.913	124.895	1.526
MH-92	MH-93	123.130	122.950	975	71.8	0.3	0.013	126.224	125.741	1.503	1.122	0.61	0.5	0.790	45.67	124.895	124.864	1.329
MH-93	MH-94	122.837	122.431	1200	115.5	0.4	0.013	125.741	125.568	2.044	2.312	0.92	0.4	0.827	46.17	124.864	124.833	0.877
MH-94	MH-96	122.431	121.980	1200	128.5	0.4	0.013	125.568	125.301	2.180	2.466	1.06	0.4	1.202	46.17	124.833	124.782	0.735
MH-96	MH-97	121.980	121.816	1200	46.7	0.4	0.013	125.301	125.062	2.180	2.466	1.06	0.4	1.602	46.17	124.782	124.755	0.519
MH-97	MH-98	121.816	121.770	1200	12.4	0.4	0.013	125.062	125.005	2.180	2.466	1.06	0.4	1.739	46.17	124.755	124.738	0.307
MH-98	MH-99	121.603	121.444	1350	26.2	0.6	0.013	125.005	124.783	2.888	4.134	1.22	0.3	1.785	45.88	124.738	124.728	0.267
MH-99	MH-990	121.444	121.339	1350	17.5	0.6	0.013	124.783	125.300	2.888	4.134	1.22	0.3	1.934	45.90	124.728	124.722	0.055
MH-990	SFBG-4-5	121.339	121.300	1350	6.5	0.6	0.013	125.300	125.300	2.888	4.134	1.22	0.3	2.033	45.90	124.722	124.682	0.578
OGS	MH-205	127.225	127.199	300	10.0	0.3	0.013	129.888	129.754	0.749	0.053	0.05	1.0	-0.024	44.62	127.501	127.240	2.387
MH-403	MH-402	119.263	119.229	825	17.1	0.2	0.013	125.300	124.550	1.201	0.642	0.30	0.5	-0.278	46.20	119.810	119.802	5.490
MH-500	MH-501	123.588	123.179	300	54.3	0.8	0.013	127.381	127.109	1.224	0.086	0.03	0.3	-0.174	46.17	123.714	123.211	3.667
MH-501	MH-5010	123.093	122.124	375	57.0	1.7	0.013	127.109	124.052	2.070	0.229	0.05	0.2	-0.257	46.17	123.211	122.263	3.898
MH-5010	MH-503	122.049	121.884	450	33.0	0.5	0.013	124.052	125.638	1.268	0.202	0.07	0.4	-0.236	46.17	122.263	122.007	1.789
MH-502	MH-503	123.470	122.826	375	80.5	0.8	0.013	125.649	125.638	1.420	0.157	0.06	0.4	-0.217	46.12	123.628	122.007	2.021
MH-503	MH-505	121.729	120.914	525	81.1	1.0	0.013	125.638	125.358	1.987	0.430	0.20	0.5	-0.247	46.17	122.007	121.069	3.631
MH-504	MH-505	121.229	121.139	300	9.0	1.0	0.013	125.540	125.358	1.368	0.097	0.00	0.0	-0.404	0.00	121.125	121.069	4.415
MH-505	MH-506	120.764	120.404	675	89.7	0.4	0.013	125.358	125.299	1.486	0.532	0.22	0.4	-0.370	46.17	121.069	120.696	4.289
MH-506	MH-507	120.354	120.142	675	52.6	0.4	0.013	125.299	125.027	1.486	0.532	0.23	0.4	-0.333	46.17	120.696	120.429	4.603
MH-507	MH-511	120.092	120.040	675	12.9	0.4	0.013	125.027	125.013	1.486	0.532	0.25	0.5	-0.338	46.17	120.429	120.339	4.598
MH-508	MH-509	121.768	121.444	300	72.0	0.5	0.013	124.861	125.430	0.967	0.068	0.08	1.1	0.075	47.17	122.143	121.278	2.718
MH-509	MH-510	120.990	120.802	450	74.7	0.3	0.013	125.430	125.055	0.982	0.156	0.09	0.6	-0.162	47.17	121.278	121.016	4.152
MH-510	MH-511	120.752	120.718	450	13.4	0.3	0.013	125.055	125.013	0.982	0.156	0.10	0.6	-0.186	47.17	121.016	120.339	4.039
MH-511	MH-512	119.890	119.833	825	28.7	0.2	0.013	125.013	124.730	1.201	0.642	0.30	0.5	-0.376	46.17	120.339	120.138	4.674

Table 2B: Pipe Data and Hydraulic Simulation Results for the Regional Storm (Proposed, Free Outfall Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover (m)
MH-512	MH-514	119.703	119.415	825	144.0	0.2	0.013	124.730	124.730	1.201	0.642	0.30	0.5	-0.390	46.18	120.138	119.837	4.592
MH-514	MH-403	119.365	119.313	825	25.6	0.2	0.013	124.730	125.300	1.201	0.642	0.30	0.5	-0.353	46.20	119.837	119.810	4.893

Note: [1] A negative surcharge implies that the pipe is not flowing full

5 EROSION AND SEDIMENT CONTROL DURING AND AFTER CONSTRUCTION

Silt and erosion control strategies shall be implemented during construction activities in order to minimize the transfer of silt off site. The following measures should be implemented:

i) Silt control fences shall be installed as required in order to prevent the movement of silt off-site during rainfall events.

ii) Construction of a mud mat shall be installed at the site entrance in order to promote self-cleaning of truck tires when leaving the site.

iii) All catchbasins shall be equipped with a crushed stone filter in order to prevent the capture of silt in the storm sewer system.

iv) Regular cleaning of the adjacent roads shall be undertaken during the construction activities.

v) Regular inspection and maintenance of the silt control measures shall be undertaken until the site has been stabilized.

vi) The erosion and sediment control devices shall be removed after the site has been stabilized.

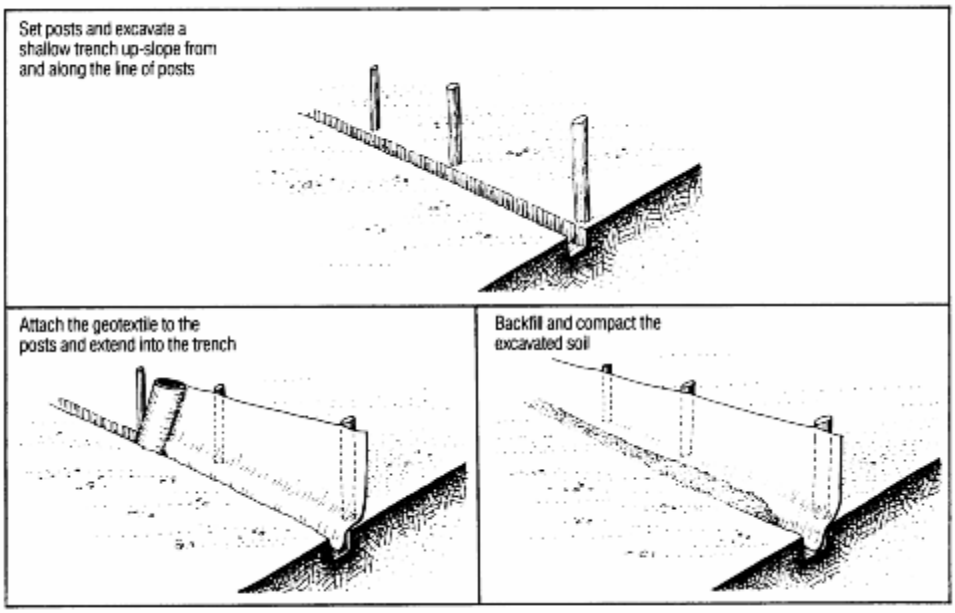

Figure 5: Typical installation of silt fences

Figure 6: Catchbasin with geotextile to protect storm sewer pipes from sediment contamination

6 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The Bronte Green subdivision is located within the Town of Oakville. The 55.22 ha subdivision is located east of Bronte Road, south of Upper Middle Road, west of the main branch of Fourteen Mile Creek, and north of Region of Halton Lands, the Deerfield Golf Course, and Queen Elizabeth Way. A tributary of Fourteen Mile Creek passes through the site.

In accordance with the Town of Oakville design guidelines, the minor system has been designed to accommodate the 5-year post development flows from within the site and from external areas.

The PCSWMM model analyses have determined that the minor system will surcharge in most parts of the system. However, this is not a concern since residential units will be protected with sump pumps where the storm sewer is not sufficiently deep or where the storm sewer will be subject to elevated water levels during infrequent storms.

The 5-year and 100-year storm controlled minor system flows from the proposed development to the outlets will be 9.653 m^3/s and 14.639 m^3/s, respectively.

Within the subdivision, the peak major system flow depths at the gutter do not exceed the prescribed 30 cm for the simulated 100-year storm (refer to Calculation Sheet 1 of Appendix D). Also as required, the ponding depth does not exceed 30 cm in rear yards, public spaces and parking areas. Furthermore, it was determined that for the 100-year storm, the product of the velocity and depth of flow does not exceed the maximum allowable 0.65 m^2/s.

Table 2 summarizes the hydraulic gradeline analysis for the 100-year storm under free outfall conditions. Note that the full pipe velocities are no less than 0.75 m/s and no greater than 4.0 m/s for all proposed pipes.

Recommendations for silt and erosion control strategies to be implemented during construction are presented in Section 5.

In conclusion, the proposed design satisfies all selected design guidelines and requirements.