

37 King Street

Functional Servicing and Stormwater Management Report

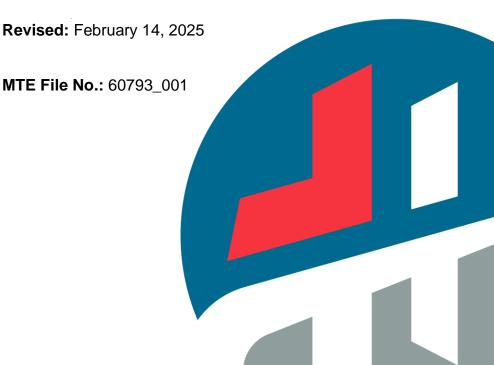
Project Location:

37 King Street Georgetown, Halton Hills, ON

Prepared for: Habitat for Humanity Halton-Mississauga 1800 Appleby Line, Unit 10 Burlington, ON L7L 6A1

Prepared by:

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Engineers, Scientists, Surveyors.



Contents

1.0	Introduction	.1
1.1	Overview	.1
1.2	Background Information	.1
1.3	Geotechnical Investigation	.3
2.0	Stormwater Management	.3
2.1	Stormwater Management Criteria	.3
2.	1.1 Quantity Control	.3
2.	1.2 Quality Control	.3
2.	1.3 Water Balance	.3
2.2	Existing Conditions	.3
2.3	Proposed Conditions	.5
2.4	Proposed Quantity Control	.8
2.5	Proposed Water Quality Control1	0
2.6	Sediment and Erosion Control1	0
2.7	Water Balance Analysis1	1
3.0	Sanitary Sewer Servicing1	4
3.1	Existing Conditions1	4
3.2	Sanitary Demands1	4
3.3	Proposed Sanitary Servicing Plan and Capacity Analysis	5
4.0	Domestic and Fire Water Supply Servicing1	5
4.1	Existing Condition1	5
4.2	Domestic Water Demands1	6
4.3	Fire Flow Demands1	6
4.4	Proposed Water Servicing Plan and Analysis1	6
5.0	Conclusions and Recommendations1	7
Figure		
	 1 – Location Plan 2 – Pre-Development Catchment Areas Figure 	
	3 – Post Development Catchment Areas Figure	
	4 – Credit Valley Recharge Map1	

Tables

Table 2.1 – Existing Conditions Catchment Areas & Allowable Release Rates	5
Table 2.2 – Proposed Conditions Catchment Areas	6
Table 2.3 – Stage-Storage-Discharge Relationship for Catchment 201	8
Table 2.4 – Proposed Condition Site Discharge Rates to King Street and Queen Street	9
Table 2.5 – Proposed Conditions Site Discharge Rates to GO Station	9
Table 2.6 – Proposed Condition Storage Volume Requirements	10
Table 2.7 – Recharge Criteria Summary	12
Table 3.1 – Population Estimate	14
Table 3.2 – Sanitary Sewer Discharge from Site	15
Table 3.3 – Sanitary Connection Height	15
Table 4.1 – Domestic Water Demands	16
Table 4.2 – FUS Fire Flow Requirements	16

Appendices

APPENDIX A	GEOTECHNICAL REPORT
APPENDIX B	STORMWATER MANAGEMENT
APPENDIX C	SANITARY DEMAND CALCULATIONS
APPENDIX D	WATER DEMAND CALCULATIONS

Drawings

MTE Draw	ng No. C1.	.1 Functional	Site Gr	ading Plan 8	& ESC Plai	n Enc	:I.
MTE Drawi	ng No. C1.	.2 Functional	Site Se	ervicing Plan		Enc	:I.

1.0 Introduction

1.1 Overview

MTE Consultants Inc. was retained by Habitat for Humanity Halton-Mississauga to complete a Functional Servicing & Stormwater Management Report as well as a site grading and servicing design for a new 3-storey multiple unit residential building and associated parking located at 37 King Street in Georgetown, Halton Hills. Refer to Figure 1 for the site location. The site is located on a 0.136 ha parcel of land at the northwest corner of King Street and Queen Street. Existing municipal storm sewers, sanitary sewers and watermain services are located within the abutting right-of-ways that will be utilized to service the proposed development.

The functional servicing and stormwater management strategy described in this report will provide additional detailed information on the proposed servicing scheme for the proposed development for a Zoning By-law Amendment (ZBA). The existing site is currently zoned as a Medium Density Residential Two Exception 107 Holding 1 zone, which permits multiple unit and townhouse dwellings up to a maximum of six units. The proposed development comprises of 15 units, and therefore a ZBA will be required. Please refer to the Architectural Site Plan and the enclosed civil drawings prepared by MTE for additional information.

1.2 Background Information

The following documents were referenced in the preparation of this report:

- Ref. 1: Ontario Building Code (2024)
- Ref. 2: Region of Halton Water and Wastewater Linear Design Manual, Contract Specifications, and Standard Drawings (November 2024)
- Ref. 3: *Water Supply for Public Fire Protection*, Fire Underwriters Survey (2020)
- Ref. 4: Terraprobe Preliminary Geotechnical Investigation 37 King Street Georgetown, Ontario (July 2018)
- Ref. 5: *Town of Halton Hills Official Plan* (January 2017)
- Ref. 6: Credit Valley Conservation Stormwater Management Criteria (August 2012)
- Ref. 7: *Design Guidelines for Sewage Works*, Ministry of the Environment and Climate Change (2008)
- Ref 8: *Erosion & Sediment Control Guideline for Urban Construction* (December 2006)
- Ref. 9: *MOE Stormwater Management Planning and Design Manual* (Ministry of Environment, March 2003)



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1.3 Geotechnical Investigation

A geotechnical investigation was prepared by Terraprobe dated July 23, 2018 (Ref.4). Four (4) boreholes were drilled; three (3) at depth 6.6 m and one (1) at depth 21.3 m below surface level. Fill was found to be at varying depths of 1.4 to 2.9 m and was made up of silty sand with intermixed topsoil, gravel and occasional pieces of brick. Below the fill and until the bottom of boreholes was found to be compact silty fine sand. Groundwater was measured at a depth of about 20.5 m below ground surface.

Based on this geotechnical information, a value of 78 has been used for the pervious curve number (CN), falling between Hydrologic Soil Groups B & C for crop and other improved land.

2.0 Stormwater Management

The following sections will describe the proposed stormwater management (SWM) plan for the proposed development.

2.1 Stormwater Management Criteria

Based on the Town of Halton Hills, the following stormwater management (SWM) criteria will be applied to the site:

2.1.1 Quantity Control

Post development peak flows are not to exceed the pre-development levels for storms up to and including the 100-year storm event (Ref. 5).

2.1.2 Quality Control

Enhanced (Level 1) water quality control (80% TSS Removal) is required for all impacted surface runoff prior to discharging to the receiving system (Ref. 9).

2.1.3 Water Balance

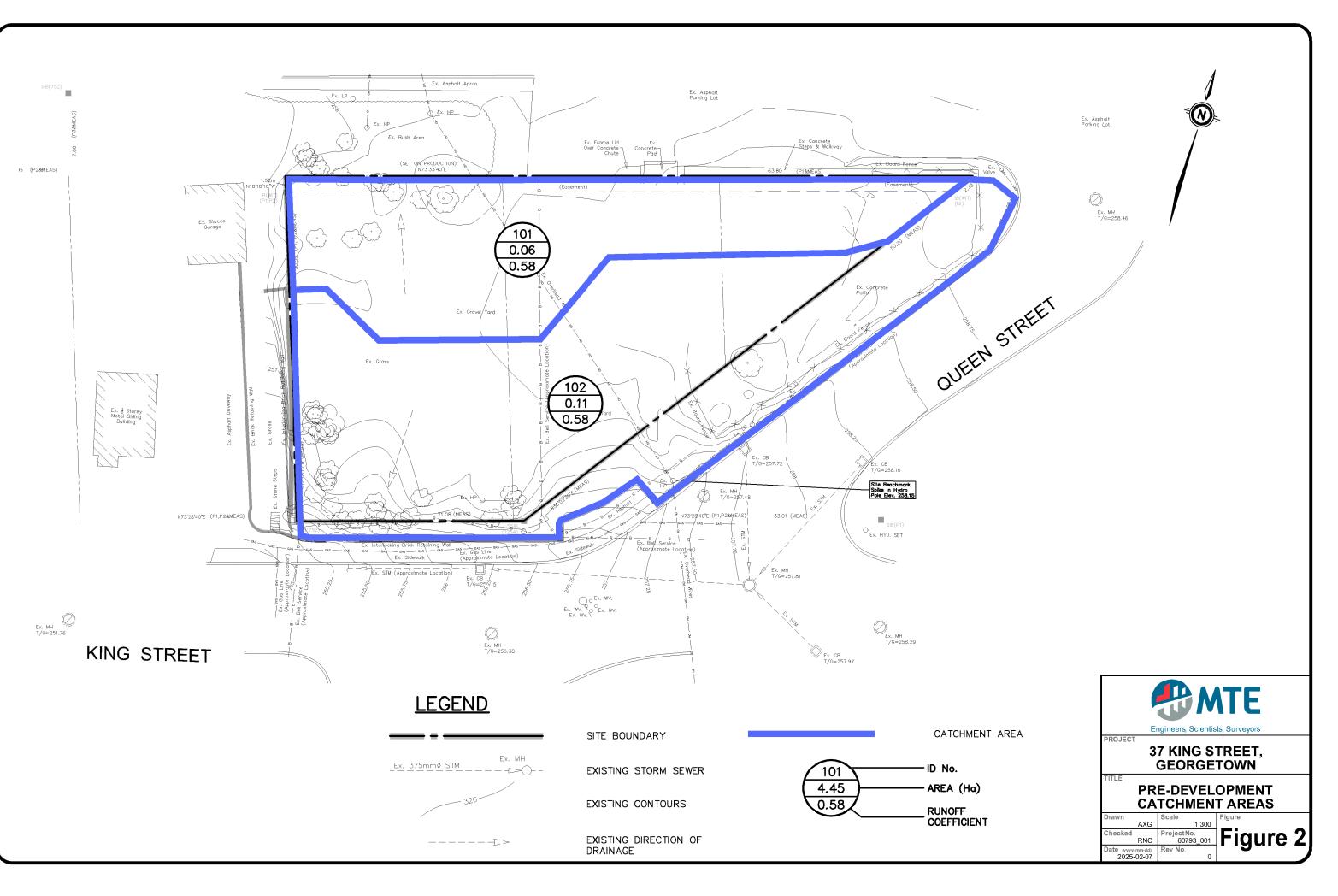
Retain 50% of average annual rainfall depth (capturing 5 mm of each storm event through infiltration, evapotranspiration or rainwater reuse is one means of achieving this requirement).

2.2 Existing Conditions

In the former existing condition, the site was previously occupied by an abandoned two-storey, two-unit residential building with associated concrete walkways and landscaped areas. The existing building was dismantled and removed in Fall/Winter 2019. Catchbasins are available within the Queen Street right-of-way that connect to the existing 300mmØ storm sewer on King Street at a 6.9% slope with a capacity of 266 L/s. The existing property does not have any known on-site stormwater management quantity or quality controls.

Based on the topographic survey by Dolliver Surveying Inc. dated August 26, 2015, the existing condition has been defined by two (2) catchment areas (see Table 2.1 and Figure 2).





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Catchment ID	Description	Area (ha)	Runoff Coefficient ^A	Allowable Release Rate (L/s) ^B	
				2 year storm = 7	
				5 year storm = 10	
101	Building and landscaped areas draining to GO Station parking lot.	0.06	0.58	10 year storm = 11	
101	(uncontrolled)	0.00	0.56	25 year storm = 14	
				50 year storm = 15	
				100 year storm = 17	
	Building, Sidewalk & Landscaped frontage draining to King Street and Queen Street. (uncontrolled)	0.11	0.58	2 year storm = 13	
				5 year storm = 18	
102				10 year storm = 21	
102				25 year storm = 25	
				50 year storm = 28	
				100 year storm = 30	
TOTAL 0.17 ^c 0.58					
	r each catchment area shown in Figure 2				
	^c Total area is shown greater than the site area (0.136 ha) to include areas outside of property line that are				
^B Calculated wi	th Rational method (See Appendix B for outp shown greater than the site area (0.136 ha) t		reas outside of pro	perty line that are	

Table 2.1 – Existing Conditions Catchment Areas & Allowable Release Rates

2.3 Proposed Conditions

In the post development condition the proponent plans to construct a new 3-storey multiple unit residential building complete with paved driveway and parking lot and landscaped areas. The post development condition drainage pattern is delineated by five (5) catchment areas. Table 2.2 provides a brief description of each catchment area as well as the size and the impervious cover associated with each. Figure 3 provides an illustration of the proposed conditions catchment areas.

Catchment 201

Catchment 201 represents the majority of the subject property and is comprised of the paved driveway and parking lot, concrete walkways, building roof, and most of the landscaped areas. All the stormwater runoff within this catchment will be captured by the proposed catch basin manholes and ultimately outlet to the existing 300mmØ storm sewer within the King Street right-of-way. Catchment 201 will be controlled with a 75mm diameter orifice plate downstream of CBMH4.

The site will be graded such that major overland flows (above the 100-year storm) generated within this catchment will be directed to Queen Street. Maximum ponding will be limited to 0.3 m within the driveway and parking areas.

Catchment 202

Catchment 202 represents the southwest perimeter and landscaped area that will drain uncontrolled to King Street and Queen Street due to grading constraints.

Catchment 203

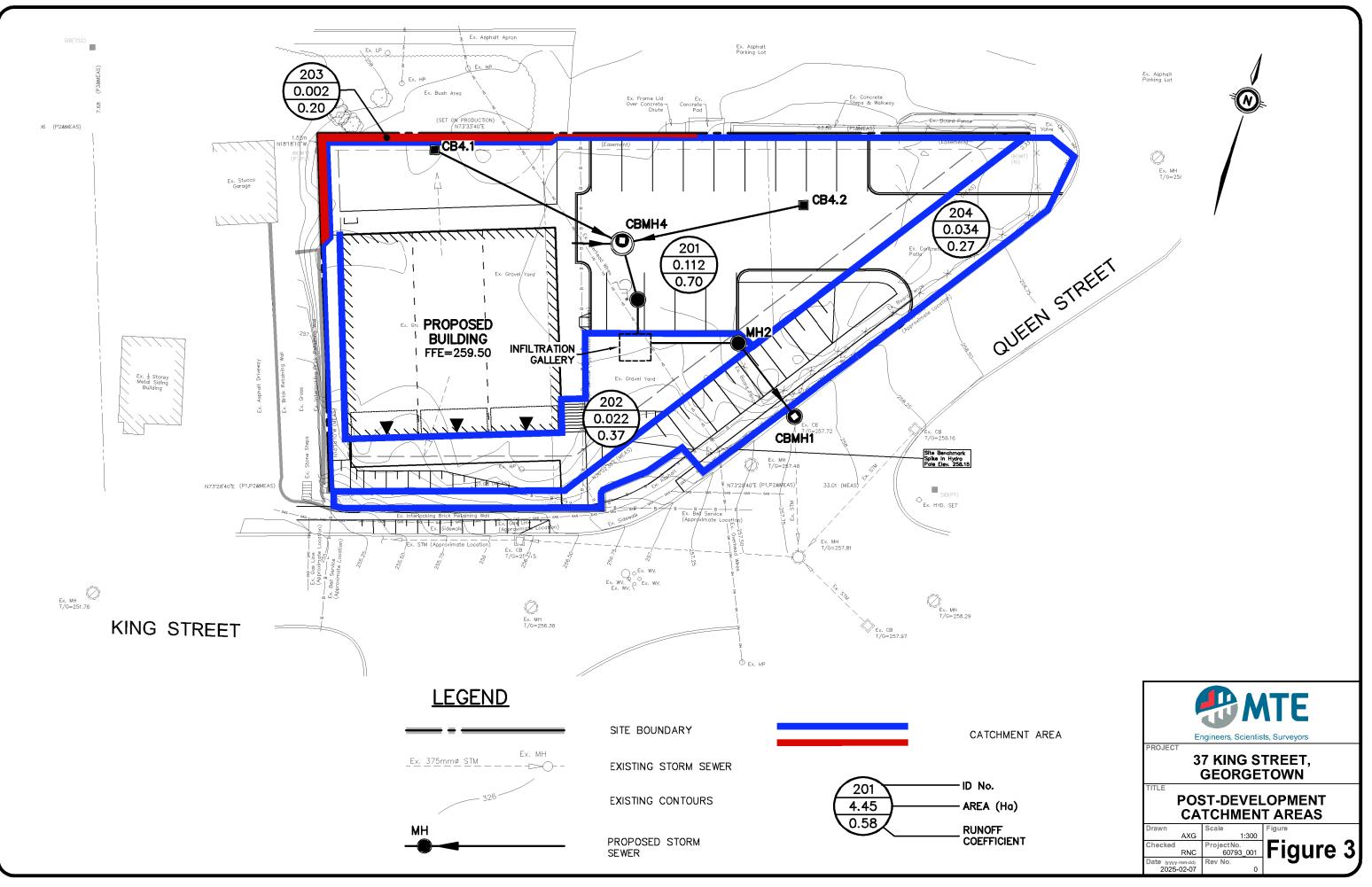
Catchment 203 represents minor perimeter landscaped area at the northwest corner of the site which will continue to drain uncontrolled to the GO parking lot located northwest of the site.

Catchment 204

Catchment 204 represents an external area with proposed works along the south perimeter that will drain uncontrolled to King Street and Queen Street due to grading constraints.

 Table 2.2 – Proposed Conditions Catchment Areas

Catchment ID	Description	Area (ha)	%lmp.	Runoff Coef.
201	Parking lot, sidewalks & landscaped area and building roof draining to King Street. (controlled)	0.112	76	0.73
202	Southwest landscaped perimeter draining to King Street. (uncontrolled)	0.022	24	0.37
203	Landscaped areas draining to GO Station parking lot. (uncontrolled)	0.002	0	0.20
204	External area (uncontrolled)	0.034	21	0.35
	Total	0.170	57	0.60



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2.4 Proposed Quantity Control

As discussed above, discharge from catchment 201 will be controlled via a 75mm diameter orifice plate. The orifice plate will be placed downstream of CBMH4 at an invert elevation of 257.05 m. A total of 30 m³ of storage volume will be provided in the form of underground storage (within the storm sewers and structures) as well as surface ponding within the paved and landscaped areas.

Table 2.3 summarizes the stage-storage-discharge characteristics for catchment 201. This information is used in the hydrologic model.

Elevation (m)	Cumulative Storage Volume (m ³) ^A	Peak Discharge Rate (m ³ /s) ^B	Comments		
254.71	0	0.0000	CL of orifice plate		
257.00	5	0.0187	Underground storage		
258.40	14	0.0237	T/G of Proposed CBMHs		
258.50	19	0.0240	0.10 m of ponding on pavement		
258.60	38	0.0243	0.20 m of ponding on pavement		
^A Volume includes storage in pipes and structures and surface ponding. See Appendix B for more details. ^B from orifice equation $Q = CA (2gH)^{0.5}$ for a 75mmØ orifice					

Table 2.3 – Stage-Storage-Discharge Relationship for Catchment 201

Where: C = 0.63, A=cross-sectional area, g=9.81, H=pressure head

The proposed conditions were assessed using the SWMHYMO hydrologic modeling program developed by J.F. Sabourin & Associates for the 2-year to 100-year Halton Hills 24-hour Chicago Distribution design storms. Appendix B contains detailed hydrologic modeling parameters and input/output printouts for the proposed conditions.

At the time of this report, Town records containing information about the GO Station's ultimate stormwater connection/drainage route to the municipal sewers was not available. To be conservative, catchment 102 will be used for the allowable discharge rate for the site in the proposed condition. Table 2.4 and 2.5 summarize the proposed condition peak discharge rates for the site. A comparison is then made to the allowable release rates for the 2-year to 100-year storm events.

		Proposed	Conditions		
Storm Event	Controlled Site Peak Discharge Rate to King St. Queen St. (Catchment 201) (L/s) ^A	Uncontrolled Site Peak Discharge Rate to King St. and Queen St. (Catchment 202) (L/s) ^A	Uncontrolled External Peak Discharge Rate to ROW (Catchment 204) (L/s) ^A	Total Peak Discharge Rate to King Street and Queen Street (L/s) ^B	Allowable Release Rate (Catchment 102) (L/s) ^c
2-yr	14	2	3	19	13
5-yr	15	4	5	24	18
10-yr	15	5	7	26	21
25-yr	15	6	9	30	25
50-yr	15	7	10	32	28
100-yr	15	8	12	35	30

 Table 2.4 – Proposed Condition Site Discharge Rates to King Street and Queen Street

^A Discharge taken from SYMHYMO Output (see Appendix B)

^B Total Discharge to Queen Street and King Street (Catchment 201+202+204) taken from SYMHYMO Output (see Appendix B)

^c See Table 2.1

Table 2.5 – Proposed Conditions Site Discharge Rates to GO Station

	Proposed Condition	Allowable
Storm Event	Uncontrolled Site Peak Discharge Rate to Go Station (Catchment 203) (L/s) ^A	Release Rate (Catchment 101) (L/s) ^B
2-yr	0	7
5-yr	0.1	10
10-yr	0.1	11
25-yr	0.1	14
50-yr	0.1	15
100-yr	0.1	17
^A Calcula ^B See Ta	ated with Rational method ex. $Q_{5yr} = 2.78$ CiA = 2.78 x 0.2 x 101.51 x 0.002 = 0.1 L/s able 2.1	

Due to orifice sizing restrictions, the site discharge rate to King Street and Queen Street will be marginally over the allowable storm release rates. As mentioned above, the allowable release rate used in the analysis is conservative as we are not including Catchment 101 flows. The small amount of increased flow will have a negligible impact on the downstream storm sewer capacity.

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Table 2.6 summarizes the proposed conditions storage volume requirements for the site.

Storm Event	Storage Volume Required (m ³) ^A	Storage Volume Provided (m ³) ^B				
2-yr	5.8					
5-yr	9.6					
10-yr	12.9					
25-yr	17.4	. 31				
50-yr	22.0					
100-yr	26.5					
^A Storage Volume re	^A Storage Volume required taken from SYMHYMO Output (see Appendix B)					
^B Storage volume w	^B Storage volume within underground storage and surface ponding (see Appendix B)					

 Table 2.6 – Proposed Condition Storage Volume Requirements

2.5 Proposed Water Quality Control

Water quality control for the site will be provided by a Stormceptor oil/grit separator (or approved equivalent) that will be installed at the downstream end of the proposed on-site storm sewer system prior to connecting to the proposed storm sewer on King Street. The following parameters were used to size the oil/grit separator device:

- Upstream Catchment Areas (Area 201) = 0.12 ha
- % Impervious = 76%
- Particle Distribution = Fine
- Target TSS Removal = 80%

The analysis indicates that a Stormceptor EO4 will provide 97% TSS Removal and treats at least 90% of the average annual rainfall. The Stormceptor sizing output information is included in Appendix B.

Stormwater runoff generated from catchment areas 202, 203 and 204 will be draining uncontrolled away from the site. These catchments are comprised of landscaped areas and are therefore considered to be clean.

2.6 Sediment and Erosion Control

The site is located within the Credit Valley Conservation Authority and therefore must adhere to the erosion control criteria (Ref. 6). The site will retain 5 mm of water per event onsite via an underground infiltration gallery tank. The tank is further described in Section 2.7.

During construction, erosion and sedimentation controls will be provided primarily via a sediment control fence to be erected around the perimeter of the construction area wherever runoff has the potential of leaving the site or entering into the storm sewer system.

All proposed on-site catchbasins and catchbasin manholes will be fitted with silt sacks within the structures to mitigate sediment transport during construction. This will minimize the potential for sediments entering into the storm sewer system.

A mud-mat will be constructed at the proposed new driveway access from Queen Street to mitigate the transportation of sediments to the surrounding roads.

All erosion and sediment controls must be inspected and maintained regularly for the full duration of construction until the Engineer or the Town approves removal of the measures. The Contractor shall inspect all erosion and sediment controls weekly and after any rainfall event and rectify any deficiencies immediately. All logs of inspections and modifications must be maintained and shall be available upon request by Town.

2.7 Water Balance Analysis

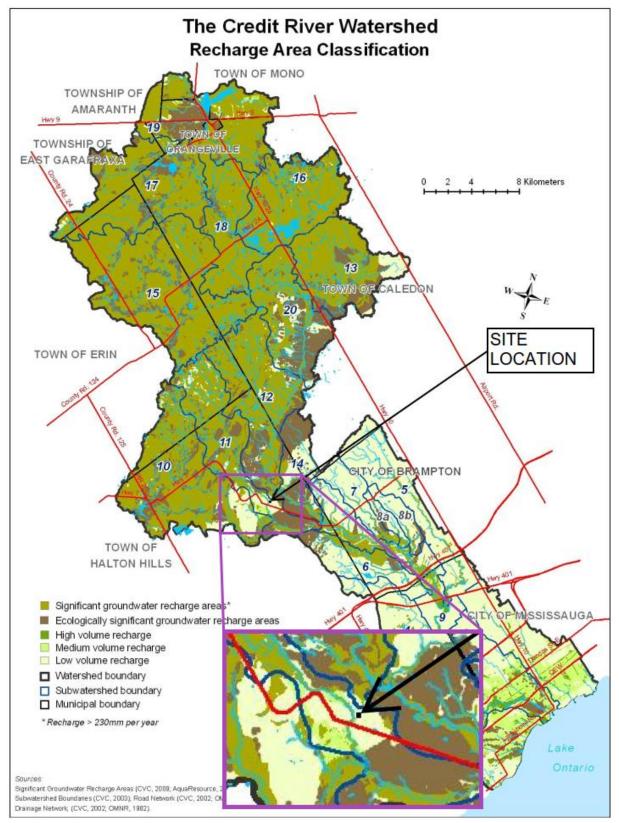
According to Figure 4 (Ref. 6), the site is located within a Low Volume Groundwater Recharge Area (LGRA) in the Credit Valley Conservation Authority (CVC). Table 2.7 below shows the required analysis and criteria for a site located in a LGRA. Although a site specific water balance analysis is not required, a minimum of 3 mm groundwater recharge must be met for each storm event. As the Erosion Control criteria requires 5 mm retention on site, both these criteria will be met via an infiltration tank sized to retain the first 5 mm of rainfall for the site.

Recharge Area Type	Level of Required Analysis	Criteria	
SGRA (Significant Groundwater Recharge Areas)	Site specific water balance		
EGRA (Ecologically Significant Groundwater Recharge Areas)	required to identify pre- development groundwater recharge rates and	Maintain pre-development groundwater recharge rates and appropriate distribution ensuring the protection of	
HGRA (High Volume Groundwater Recharge Areas)	distribution as well as related hydrologic and ecologic	related hydrologic and ecologic functions.	
MGRA (Medium Volume Groundwater Recharge Areas)	functions.		
LGRA (Low Volume Groundwater Recharge Areas)	Site specific water balance not required provided the site does not impact a sensitive ecological feature	A minimum of 3 mm of groundwater recharge per event post-development. Otherwise, the proponent may complete their own water balance to establish a groundwater recharge target	

Table 2.7 – Recharge Criteria Summary

For the site area of 0.135 ha, the volume required to retain the first 5 mm of runoff is 6.75m³. An infiltration gallery with 7 m³ of available storage will be provided. This tank will sit below landscape area east of the proposed building and the overflow (above 7 m³) will flow into the proposed MH2. Refer to servicing drawing C2.2 for details.





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3.0 Sanitary Sewer Servicing

3.1 Existing Conditions

An existing 250mmØ sanitary sewer at 1.6% - 7.0% slope located within the Queen Street rightof-way connects to an existing 250mmØ sanitary sewer at 0.5% - 7.3% slope located within the King Street right-of-way south of the site. The sanitary sewers located on Queen Street and King Street have full flow capacities of 75 L/s and 42 L/s respectively. The sewer on King Street runs from Mountain Rd. N. and eventually connects to the 250mmØ sanitary main on McNabb Street. The invert of the sanitary sewer at the manhole on King Street adjacent to the site is $\pm 253.02m$.

3.2 Sanitary Demands

The anticipated sanitary discharge from the proposed development was estimated using Halton Region's Design Criteria (Ref. 2) and conservative population densities calculated by following the OBC Occupancy Loads (section 3.1.17.1 clause (1)(b)) (Ref. 1). Table 3.1 provides an estimate of the proposed development population using OBC criteria.

Unit Types	Total Number of Units	People per unit ^A	Population (people)	
Townhouse (3 bedrooms)	12	6.0	72	
	Tot	al Population	72	
^A OBC section 3.1.17.1 clause (1)(b) states density to be used is 2 persons per sleeping room, therefore People per Unit = (3 bedrooms) x (2 ppl/bed) = 6.0 (Ref. 1)				

The sanitary sewer discharge rates from the development are summarized in Table 3.2 and detailed calculations can be found in Appendix C.

Table 3.2 – Sanitary Sewer Discharge from Site

Land Use	Area ^A	Population (people) ^B	Average Flow (L/s) ^c	Infiltration Flow (L/s)	Harmon Peaking Factor	Peak Flow + Infiltration (L/s) ^E
Proposed Residential Units	0.1359 ha	72	0.23	0.0388	4.35	1.02
Total Sanitary Demand 1.02						1.02
 ^A Area reflects total site area ^B Population Estimate: see Table 3.1 ^C Average flow based on 275 L/c/day per Halton Region's Design Criteria (Ref.2) ^D Infiltration based on 0.2860 L/s/ha per Halton Region's Design Criteria (Ref.2) Ex. 0.1359 ha *0.2680 L/s/ha = 0.0388 L/s ^E Peak flow = Harmon Peaking Factor (PF) * Average Flow (L/s) + Infiltration Allowance (L/s) per Halton Region's Design Criteria (Ref.2) 						

3.3 Proposed Sanitary Servicing Plan and Capacity Analysis

For the proposed development, all of the sanitary flows will outlet to the existing 250mmØ sanitary sewer on Queen Street.

The calculated flow rates and capacities of the existing sanitary sewers can be seen in Appendix C. The calculated peak flow to the existing sanitary sewer on Queen Street is 1.02L/s. The peak flow represents 1.36% of the existing sewer capacity of 75L/s on Queen. Table 3.3 shows the First Floor Elevations (FFE) and Underside of Footing Elevations (USF) for the units on site. This information was used to confirm sufficient height to drain the sanitary flows by gravity.

Unit (s)	FFE (m)	BFE ^A (m)	USF ^B (m)	Max Sanitary Connection Invert (m)
Block A	259.50	256.50	256.25	256.05
Block B	259.50	256.50	256.25	256.05
Block C	259.50	256.50	256.25	256.05
^A Taken from elevation plans by Chamberlain Architects				
^B USF=BFE-0.25m				

Table 3.3 – Sanitary Connection Height

4.0 Domestic and Fire Water Supply Servicing

4.1 Existing Condition

The existing municipal water distribution system around the site consists of a 300mmØ watermain within the King Street right-of-way and a 150mmØ watermain within the Queen Street right-of-way. The two watermains are connected by a valve chamber where King Street and Queen Street intersect. An existing municipal hydrant is located in front of 45 Queen Street

off the 150mmØ watermain (just south of the subject site). This hydrant is located approximately 43m from the principal entrance of the building. Another existing municipal hydrant is located at the north-east corner of the King Street and Queen Street intersection off the 300mmØ watermain (east of the subject site). Hydrant flow test data for the 150mmØ watermain on Queen Street was completed on October 9th, 2018 by Applied Fire Technology Inc. Please refer to Appendix D for the hydrant flow test results. The existing above hydrant data has been used on a preliminary basis for the purpose of this report and an updated hydrant flow test will be conducted at the time of final design if required.

4.2 Domestic Water Demands

The expected domestic water demand for the proposed development was estimated using Halton Region's Design Criteria (Ref.2). Table 4.1 summarizes the domestic water demand requirements for the Average Day, Maximum Day and Peak Hour demand scenarios and detailed calculations are provided in Appendix D.

Townhouse Water Usage (Residential)				
Population: 72 people (see Table 3.1)				
Average Day Demand:	275 L/c/d x 72 people =	0.23 L/s		
Max. Day Peaking Factor:	2.25			
Peak Hour Peaking Factor	4.0			
Maximum Day Demand:	2.25 x 0.23 l/s =	0.52 L/s		
Peak Hour Demand:	4.0 x 0.23 l/s =	0.92 L/s		

Table 4.1 – Domestic Water Demands

4.3 Fire Flow Demands

Fire flow demands for the proposed development were determined using the methodology outlined in the Fire Underwriters Survey (Ref. 3). The fire demand is summarized in Table 4.2, and detailed calculations are provided in Appendix D.

Table 4.2 – FUS Fire Flow Requirements

Building	Fire Underwriters Survey (FUS) Flow Rate	
Proposed Building	100 L/s (6,000 L/min)	

There will be no sprinkler system in the proposed building and thus no fire department connection. Existing hydrant (located in front of 45 Queen Street) will be located within 90m horizontally from the furthest main entrance of the proposed building.

4.4 Proposed Water Servicing Plan and Analysis

Based on a Maximum Day + Fire demand of 100.52 L/s (0.52 L/s + 100 L/s from Tables 4.1 and 4.2),the resulting residual system pressure is 66 psi, which exceeds the minimum required residual pressure of 20psi (140kPa) required by the OBC (see worksheet in Appendix D). As well, based on the available hydrant flow test results, achieving a minimum domestic operating

pressure of 40psi required by the MECP will not be an issue. At a residual pressure of 20 psi the theoretical flow rate is calculated to be 475 L/s.

5.0 Conclusions and Recommendations

Based on the information provided herein, the development can be constructed to meet the requirements of the Town of Halton Hills, Halton Region, and the Credit Valley Conservation Authority. Therefore, it is concluded and recommended that:

- I. Due to orifice sizing restrictions and using a conservative allowable release rate, the site discharge rate to King Street and Queen Street will be marginally over the allowable storm release rates. The small amount of increased flow will have a negligible impact on the downstream storm sewer capacity.
- II. Peak flows under post development conditions from Catchment 201 will be directed to the proposed storm sewer on site and will be controlled via an orifice plate with sufficient storage provided in the underground structures and via surface ponding, as discussed in Section 2.3 of this report.
- III. The site will be graded such that major overland flows (above the 100-year storm) generated from the site will be directed to the Queen Street and King Street right-of-way.
- IV. Quality control will be provided for the site in the form of an oil-grit separator as discussed in Section 2.5.
- V. Erosion and sediment controls be installed and maintained as described in Section 2.6 in this report.
- VI. An underground infiltration gallery with 7 m³ of storage will be designed to satisfy water recharge requirements.
- VII. The calculated sanitary discharge rate for the site is 1.36% of the capacity of the existing municipal sanitary sewer.
- VIII. The Fire Underwriters Survey (2020) fire flow requirements can be met while maintaining the minimum allowable pressure of 140kPa per OBC 2024, based on the available hydrant flow test results. As well, achieving a minimum operating pressure of 40 psi required by the MECP will not be an issue.
 - IX. The proposed stormwater management plan presented in this report and the site servicing works described in this report are represented on the attached site grading plan (C1.1) and site servicing plan (C1.2).
 - X. The site should be serviced as described in this report.

We trust the information enclosed herein is satisfactory. Should you have any questions please do not hesitate to contact our office.

All of which is respectfully submitted,

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Geotechnical Report





PRELIMINARY **GEOTECHNICAL INVESTIGATION 37 KING STREET GEORGETOWN, ONTARIO**

Prepared For: MTE Consultants Inc. 1016 Sutton Drive, Unit 1A Burlington, Ontario L7L 6B8

> Attention: Mr. Oshin Gharabegian, P. Geo., **Project Manager**

> > File No. 7-18-0031-01 July 23, 2018

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EXECUTIVE SUMMARY

This report presents the results of a preliminary geotechnical investigation carried out on an approximately 0.14 hectare parcel of land located at the northwest corner of Queen Street and King Street in Georgetown, Ontario. The site was undeveloped at the time of the investigation.

It is proposed to redevelop the site for residential use possibly consisting of two storey townhouses with basements with an internal roadway and surface parking.

The results of four boreholes drilled at the site are reported. The boreholes penetrated fill to depths of about 1.4 to 2.9 m below the existing ground. The fill was underlain by a stratum of compact silty fine sand. Ground water was measured at a depth of 20.5m below ground surface in a monitoring well that was constructed in one of the boreholes.

It is considered feasible to support townhouse buildings on conventionally designed spread or strip footings constructed on engineered fill placed during the pre-grading stage, or on the undisturbed silty fine sand that underlies the site. It has been noted that excavations to depths approaching 3m will be required to fully penetrate the fill in some areas of the site.

Buildings foundations supported on engineered fill should be provided with reinforcing designed to minimize the effects of post construction differential settlement.

The results of the boreholes indicate that Seismic Site Classification "D" is appropriate for the subsurface conditions at this site.

A discussion on the geotechnical engineering aspects of the design of underground services, roadway pavements and house foundations has been provided.



TABLE OF CONTENTS

1.0	INTRODUCTION1				
2.0	PRO	CEDURE 1			
3.0	SUB	SURFACE CONDITIONS 2	2		
	3.1 3.2	SOIL CONDITIONS. 2 3.1.1 Fill. 2 3.1.2 Silty Fine Sand. 3 GROUND WATER CONDITIONS 3	3		
4.0	DISC	SUSSION	\$		
	4.1 4.2 4.3 4.4 4.5 4.6 4.7	SITE PRE-GRADING3BUILDING FOUNDATIONS4EARTHQUAKE DESIGN PARAMETERS5EARTH PRESSURE DESIGN CONSIDERATION6SLAB ON GRADE DESIGN PARAMETERS7SITE SERVICING7PAVEMENTS84.7.1Subgrade Preparation84.7.2Pavement Structure9			
5.0	DES	GN CONSIDERATIONS FOR CONSTRUCTABILITY9)		
	5.1 5.2 5.3 5.4	EXCAVATIONS)		
6.0	LIMI	TATIONS AND USE OF REPORT11			

FIGURES

FIGURE 1	SITE LOCATION PLAN
FIGURE 2	BOREHOLE LOCATION PLAN

APPENDICES

APPENDIX A BOREHOLE LOGS



1.0 INTRODUCTION

Terraprobe Inc. was retained by MTE Consultants Inc. (MTE) to carry out a preliminary geotechnical investigation on an approximately 0.14 hectare parcel of land located at the northwest corner of Queen Street and King Street in Georgetown, Ontario as shown on Figure 1. A proposal and cost estimate to carry out the investigation was provided in our letter of February 23, 2018. Authorization to proceed with the work was provided by MTE on March 14, 2018.

The intents of the work were to investigate and report on the subsurface soil and ground water conditions in a series of boreholes drilled at the site and to provide information and advice on the geotechnical engineering aspects of the design of the proposed site redevelopment. The investigation was carried out in conjunction with an Environmental Site Assessment (ESA) being conducted by MTE.

The site consisted of a relatively flat, irregularly shaped parcel of land. There was an old two storey frame building located in the northeast corner of the site and the remainder of the site was clear at the time of the investigation. The existing ground surface on the property was about 1m above the adjacent grades along King Street and up to about 1.6m higher than the grades on the adjacent property to the west. These grade differences were maintained by stone retaining walls along the south and west property boundaries.

It is proposed to redevelop the site for residential use, possibly consisting of two storey townhouses. Precise details on the nature and scale of the development were not available at the time of the investigation.

The intents of the geotechnical investigation were to document the subsurface soil and ground water conditions in a series of boreholes drilled at the site. Geotechnical information and advice has been provided for conceptual design purposes based on the results of the boreholes.

2.0 PROCEDURE

The field work for this investigation was carried out on March 20, 2018, during which time four (4) boreholes were drilled to depths of about 6.6 to 21.3 metres below the existing ground surface (m BGS). The locations of the boreholes are shown on the Borehole Location Plan, Figure 2. The results of the boreholes are shown on the Log of Borehole sheets presented in Appendix A.

The boreholes were drilled using a track mounted power auger supplied and operated by a specialist drilling contractor. The boreholes were advanced using conventional interval augering and sampling techniques. Soil samples were recovered at regular intervals of depth by split barrel sampling in accordance with ASTM D1586.

Ground water observations were made in each borehole during and upon completion of drilling and the boreholes were backfilled with auger cuttings and bentonite sealant. A ground water monitoring well was



constructed in one of the boreholes (MW101-18). As-constructed details on the monitoring well were provided by MTE and are shown on the record of borehole sheet. It was understood that the well was constructed using 50mm diameter PVC well screen and riser pipe protected with an above ground steel casing.

The drilling and sampling was observed throughout by a member of our engineering staff who also logged the boreholes and cared for the samples obtained. MTE arranged for service clearances in advance of the field work, provided the ground surface elevations at the borehole locations and provided the ground water levels in the monitoring well.

All of the samples recovered in the course of the investigation were brought to our Stoney Creek laboratory for further examination and water content determinations. The results of moisture content tests are plotted on the Log of Borehole sheets in Appendix A. No soil chemical analyses were carried out as part of the geotechnical investigation.

3.0 SUBSURFACE CONDITIONS

The subsurface soil and ground water conditions encountered in the boreholes and the results of the field and laboratory testing are shown on the Log of Borehole sheets in Appendix A. A list of abbreviations and symbols are provided to assist in the interpretation of the borehole logs. It should be noted that the boundaries between the strata have been inferred from drilling observations and non-continuous samples. These boundaries generally represent a transition from one soil type to another and should not be inferred to represent exact planes of geological change. The subsurface conditions will vary between and beyond those locations investigated.

3.1 Soil Conditions

The following discussion has been simplified in terms of the major soil strata for the purposes of geotechnical design. In general, the boreholes drilled at the site penetrated fill overlying a stratum of silty fine sand.

3.1.1 Fill

The boreholes penetrated fill to depths of about 1.4 to 2.9m BGS. The fill generally consisted of silty sand with intermixed topsoil, gravel and occasional pieces of brick. The N values determined from the Standard Penetration Testing carried out within the fill ranged from 2 to 56 blows per 0.3m, but were more typically in the range of about 8 to 10 blows per 0.3m inferring a relatively loose state of packing. The in-situ water content of the samples of silty sand fill recovered from the penetration testing ranged from about 5 to 27 percent.



3.1.2 Silty Fine Sand

Silty fine sand was encountered below the fill and to the depths explored in the boreholes. The N values in the silty fine sand were in the range of 10 to 25 blows per 0.3m, with an average N value of about 19 blows per 0.3m inferring a compact relative density. The natural water content of the silty fine sand was in the range of 3 to 6 per cent.

3.2 Ground Water Conditions

All of the boreholes were dry during and on completion of drilling. The ground water level measured in the monitoring well (MW101-18) approximately one week and one month after drilling was at a depth of 20.5m BGS or at elevation 237.3m. These conditions may not necessarily represent stabilized conditions. Fluctuation in the ground water levels will also occur due to seasonal variations and precipitation conditions.

4.0 **DISCUSSION**

The following discussion is based on our interpretation of the factual data obtained during this investigation and is intended for the use of the design engineer only. Comments made regarding the construction aspects are provided only in as much as they may impact on design considerations. Contractors bidding on or undertaking any work at the site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction and make their own interpretation of the factual data as it affects their proposed construction techniques, schedule, equipment capabilities, costs, sequencing and the like.

This report is provided on the assumption that the design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards and guidelines of practice.

It is proposed to redevelop the site for a new townhouse development. Since only conceptual design information was available when this report was undertaken, the information and advice provided in the following discussion must be regarded as preliminary. Further subsurface exploration of the site may be warranted at the final design stage.

4.1 Site Pre-Grading

The grading plan for the site has not yet been developed, however major cutting and/or filling is not expected. Development of the site will typically consist of clearing and grubbing. It is also possible that remnants of former building foundations and underground services may be present on the property and removal of such materials would be best carried out as part of the pre-grading work. Further site investigation possibly by way of test pits, should be carried out in any areas where previous structures were known to exist.



It is noted that fill was encountered to depths of 1.4 to 2.9m below the existing ground surface in the boreholes. As discussed in Section 4.2 of this report, one alternative for supporting the buildings involves the removal of the existing fill and construction of an engineered fill. It is considered preferable that such engineered fill be constructed during the pre-grading stage.

Engineered fill required for supporting building foundations or to achieve the site grading plan must consist of clean earth materials, free of topsoil, rubble, wood, plant materials etc. and at a suitable placement water content to consistently achieve the compaction requirements outlined below. Subject to confirmation during construction, it may be feasible to selectively re-use some of the existing fill as engineered fill. Imported earth for use as engineered fill must meet the corresponding property use standard for the site as established in a Phase 1 ESA, as well as the physical requirements outlined above. Alternatively consideration could be given to using OPSS Granular "B" Type I material from a commercial source.

The engineered fill must be placed and uniformly compacted in 200mm thick lifts to at least 98 percent of standard Proctor maximum dry density. For optimal performance, the placement water content of the fill should be maintained within about 2 percent of the laboratory optimum water content for compaction. The limits of the engineered fill to support buildings can best be determined by the geotechnical engineer during construction. The engineered fill will need to extend a sufficient distance to develop adequate lateral resistance for foundations and pavements.

All aspects of the engineered fill construction including final excavation, material selection, placement and compaction must be verified by the geotechnical engineer. In-situ density testing is required during construction to confirm that each lift has been compacted to the specified degree and that the placement moisture content is within an acceptable range.

4.2 Building Foundations

It is expected that town houses with basements would typically be supported on conventional spread and continuous footings at a nominal depth of about 2m below the finished grade.

The boreholes penetrated fill to depths of about 1.4 to 2.9m with the deepest fill encountered in boreholes 102-18 and 103-18, located on the west side of the property. The fill is not considered competent to support building foundations or slabs on grade. For this reason, it is recommended that the buildings be supported on conventionally designed spread and continuous footings constructed in the native undisturbed silty fine sand or on engineered fill constructed as outlined in Section 4.1 of this report.

Building foundations supported in the native silty fine sand or on engineered fill may be designed using a geotechnical reaction at Serviceability Limit States (SLS) of 150kPa and a factored geotechnical resistance at Ultimate Limit States (ULS) of 225kPa. A minimum footing width of 450 mm is recommended for continuous (strip) footings and a minimum footing width of 900 mm should be



considered for spread footings. Settlements of foundations designed as outlined above are not expected to exceed 25mm.

As indicated above, excavations to depths approaching 3m will be required to fully penetrate the fill in some areas of the site. The state of packing of the fill may be loose in some areas and for this reason, use of "trench and pour' techniques to construct the foundations are not recommended for this site.

It is important that all of the foundation excavations be inspected by a geotechnical engineer to confirm that the fill has been fully penetrated and to identify any preparatory work required prior to placing the footing concrete. Where deeper excavations are required, the footings should be lowered in a series of steps with maximum vertical increments of 600 mm and with a rise to run ratio of 1:2.

The foundation walls for units constructed entirely or partially on engineered fill must consist of reinforced concrete designed to minimize the effects of potential post construction differential settlement.

The subgrade soil that underlies the site is considered frost susceptible. Footing foundations exposed to freezing temperatures must be provided with a minimum of 1.2 metres of earth cover for frost protection or alternative equivalent insulation. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.

4.3 Earthquake Design Parameters

The Ontario Building Code (2012) stipulates the methodology for earthquake design analysis, as set out in Subsection 4.1.8.7. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration and the site classification. The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4A of the Ontario Building Code (2012). The classification is based on the determination of the average shear wave velocity in the top 30 meters of the site stratigraphy, where shear wave velocity (v_s) measurements have been taken. Alternatively, the classification is estimated on the basis of rational analysis of undrained shear strength (s_u) or penetration resistance (N-values).

Based on the results of the boreholes, and provided that the foundations are designed as outlined in Section 4.2 of the report, 'Site Class D', as shown in Table 4.1.8.4.A of the Ontario Building Code (2012) can be considered for the purposes of seismic analysis. Tables 4.1.8.4.B and 4.1.8.4.C. of the Code provide the applicable acceleration and velocity based site coefficients.



4.4 Earth Pressure Design Consideration

Parameter	Definition	Units
φ	internal angle of friction	degrees
γ	bulk unit weight of soil	kN / m ³
Ka	active earth pressure coefficient (Rankin)	dimensionless
Ko	at-rest earth pressure coefficient (Rankin)	dimensionless
K _p	passive earth pressure coefficient (Rankin)	dimensionless

The parameters used in the determination of earth pressures are defined below.

The appropriate values for use in the design of structures subject to unbalanced earth pressures at this site are tabulated as follows:

Stratum/Parameter	φ	Ŷ	Ka	Ko	Kp
Fill – common fill	28	19.0	0.36	0.53	2.77
Compact Granular Fill Granular 'B' (OPSS 1010)	32	21.0	0.31	0.47	3.25
Silty Fine Sand	28	18.5	0.36	0.53	2.77

Walls subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following equation:

	P =	K [γ (h-h _w) + γ 'h _w + q] + γ_w h _w
where,	P = K = h _w = γ = γ' = q =	the horizontal pressure at depth, h (m) the earth pressure coefficient, the depth below the ground water level (m) the bulk unit weight of soil, (kN/m ³) the submerged unit weight of the exterior soil, (γ - 9.8 kN/m ³) the complete surcharge loading (kPa)

Where the wall backfill can be drained effectively to eliminate hydrostatic pressures on the wall, acting in conjunction with the earth pressure, this equation can be simplified to:

$P = K[\gamma h + q]$

Alternatively a hydrostatic pressure equivalent to a ground water level at a depth of 1m below the finished grade should be considered for design purposes.



4.5 Slab on Grade Design Parameters

The lowest basement floor slab can be supported on compact silty sand. The modulus of subgrade reaction appropriate for slab design is 25 MPa/m.

The basement area must be provided with subfloor drainage. Sand and gravel will be exposed at the excavation base. The subgrade must be exposed and assessed by the Geotechnical Engineer to determine the grain size distribution of the subgrade material, so that a geotextile with appropriate filtration properties can be selected. The filtration barrier must be placed continuously over the subgrade before placement of the underfloor drainage layer. Without proper filtration, soil fines may wash into the clear stone, resulting in some loss of ground.

All slabs on grade should be structurally separate from foundation walls and columns. Saw cut control joints should be incorporated into the slabs along column lines and at regular intervals. Interior load bearing walls should not be founded on the slab but on spread footings as outlined above.

4.6 Site Servicing

Prior to constructing underground services, the pre-grading work should be carried out as outlined in Section 4.1 of this report.

It is expected that site services for the development will consist of storm and sanitary sewers and water services with relatively shallow inverts (i.e. $\leq 3m$). On this basis and assuming that the pre-grading work is carried out as outlined in Section 4.1, the excavations for the underground services will penetrate fill. Depending on the design invert elevations, the underground services may be located entirely or partially in the existing fill deposits. Provided no significant grade raises are proposed, and that some post construction settlement is tolerable, consideration could be given to supporting the services in the existing fill. Remedial work may be required in areas where the existing fill is found to be in a very loose condition. The need for and nature of such work can best be determined by the geotechnical engineer during construction, but will likely consist of sub-excavation and replacement of loose fill with well compacted bedding material or unshrinkable backfill.

All excavations must be carried out in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects. In this context, engineered fill and the native underlying soils at the site can be categorized as "Type 3" soils provided that surface water is directed away from open excavations. Unsupported excavations must be cut to an overall inclination of 1 horizontal to 1 vertical or flatter where localized sloughing occurs.

Where workmen must enter an excavation deeper than 1.2 metres the excavation must be suitably sloped and/or braced in accordance with the regulation requirements. The minimum support system requirements for steeper excavations are stipulated in the Act and include provisions for timbering,



shoring and moveable trench boxes. The results of the boreholes indicate that ground water is not likely to be encountered within the range of excavation depths expected.

The bedding material for site services should consist of an approved free draining, well graded granular material such as Granular "A", which is compatible with the size, class, and type of pipe and consistent with local municipal standards as may be applicable. Care will be required to ensure that any loosened or disturbed soil is removed prior to placing pipe bedding. Bedding should be placed and uniformly compacted in 200mm thick lifts to at least 95 percent of standard Proctor maximum dry density.

Provided that the recommended pre-grading work is completed in advance of the site servicing it is expected that the excavated soil from service trenches can be selectively re-used as backfill however any highly organic, excessively wet or frozen soil or any oversized particles should be excluded.

All service trench backfill should be placed in 300mm thick lifts with each lift uniformly compacted to at least 95 percent of standard Proctor Maximum dry density. For best performance and to minimize post construction settlement, the placement water content of the backfill should be maintained with about 2 percent of the laboratory optimum water content for compaction. It may be necessary to condition the backfill to achieve this intent. The upper 1 m of backfill beneath the roadway platform should be uniformly compacted to at least 98 percent of standard Proctor maximum dry density.

4.7 Pavements

4.7.1 Subgrade Preparation

As outlined in Section 4.1 of this report, all highly organic fill and topsoil must be removed and replaced with engineered fill in areas that will be developed as pavements. It should be noted that significant weakening of the subgrade can be expected during wet weather. For this reason it is important that temporary access roads be constructed of an adequate thickness of granular base material to maintain the integrity of the subgrade.

The pavement design recommendations given below are based on the subgrade support capabilities that will be available from the undisturbed subgrade materials or prepared subgrade compacted to a minimum 98 percent Standard Proctor Maximum Dry Density.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures must be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as practically possible when fill is placed and that the natural subgrade is not disturbed and weakened after it is exposed.



4.7.2 Pavement Structure

The following pavement component thicknesses are provided for preliminary design consideration.

Pavement Component	Compaction Requirements	Component Thickness (mm)
Surface Course Asphaltic Concrete HL3 (OPSS 1150)	93% of MRD (OPSS 310)	40
Base Course Asphaltic Concrete HL8 (OPSS 1150)	93% of MRD (OPSS 310)	60
Base Course: Granular "A" (OPSS)	98% Standard Proctor Maximum Dry Density	300

Minimum Asphaltic Concrete Pavement Structure

Some adjustments to the thickness of the granular base component may be required depending on the condition of the subgrade at the time of the pavement construction. The need for such adjustments can be best assessed by the geotechnical engineer during construction. Equivalent Super Pave mixes can be used in place of the Marshall designated mixes shown above.

The control of surface water is an important factor in achieving good pavement life. Grading adjacent to the pavement areas should be designed so that water is not allowed to pond adjacent to the outside edges of the pavement. The subgrade must be free of depressions and sloped (preferably at a minimum grade of two percent) to provide effective drainage toward subgrade drains. Effective drainage of the granular base and subbase materials should be achieved by a network continuous perforated sub-drains and catch basins.

5.0 DESIGN CONSIDERATIONS FOR CONSTRUCTABILITY

5.1 Excavations

Excavations must be carried out in accordance with the Occupational Health and Safety Act, Ontario Regulation 213/91 (as amended), Construction Projects, Part III – Excavations, Sections 222 through 242. These regulations designate four (4) broad classifications of soils for specifying appropriate measures for excavation safety. For practical purposes the soil beneath this site must be categorized a Type 3.

Where workers must enter a trench or excavation the soil must be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects. The regulation stipulates safe slopes of excavation by soil type as follows:



Soil Type	Base of Slope	Steepest Slope Inclination
1	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
2	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	from bottom of trench	1 horizontal to 1 vertical
4	from bottom of trench	3 horizontal to 1 vertical

Minimum support system requirements for steeper excavations are stipulated in Sections 235 through 238 and 241 of the Act and Regulations and include provisions for timbering, shoring and moveable trench boxes.

5.2 Ground Water Control

Ground water levels have been measured at the site at a depth of about 20.5m below the existing ground. On this basis it is unlikely that ground water will be encountered within the range of excavation depths required for the construction of the building foundations or services.

5.3 Site Work

The soil at this site is fine-grained and will become weakened when subjected to traffic when wet. If there is site work carried out during periods of wet weather, then it can be expected that the subgrade will be disturbed unless an adequate granular working surface is provided to protect the integrity of the subgrade soils from construction traffic. Subgrade preparation works cannot be adequately accomplished during wet weather and the project must be scheduled accordingly. The disturbance caused by the traffic can result in the removal of disturbed soil and use of fill material for site restoration or underfloor fill that is not intrinsic to the project requirements. Attempting to build slabs and pavements at this site during wet weather could significantly increase earthworks and pavement costs.

The most severe loading conditions on the subgrade may occur during construction. Consequently, special provisions such as end dumping and forward spreading of earth and aggregate fills, restricted construction lanes, and half-loads during paving and other work are required, especially if construction is carried out during unfavourable weather.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the founding subgrade and concrete must be provided. The soil at this site is highly susceptible to frost damage. Consideration must be given to frost effects, such as heave or softening, on exposed soil surfaces in the context of this particular project development.



5.4 Quality Control

All aspects of the engineered fill construction must be verified by the geotechnical engineer including the final excavation, proof-rolling of the native subgrade, fill selection, placement and compaction. In-situ density testing should be carried out during construction to confirm that each lift has been compacted to the specified degree. Source acceptance testing of materials imported for use as engineered fill must be carried out prior to importation to the site.

The foundation construction must be field reviewed by the geotechnical engineer to confirm that the founding soil exposed is consistent with the intended design bearing resistance. The on-site review of the condition of the foundation soil as the foundations are constructed is an integral part of the geotechnical design function and is required by Section 4.2.2.2 of the Ontario Building Code 2012.

The long term performance of floor slabs and pavements is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as practically possible. The design advice in this report is based on an assessment of the subgrade support capabilities as indicated by the boreholes.

The requirements for fill placement on this project have been stipulated relative to standard Proctor maximum dry density. In situ determinations of density during fill and asphaltic placement on site are required to demonstrate that the specified placement density is achieved. Concrete will be specified in accordance with the requirements of CAN3 - CSA A23.1-14.

6.0 LIMITATIONS AND USE OF REPORT

This investigation has been carried out using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by Terraprobe and other engineering practitioners, working under similar conditions and subject to the time, financial and physical constraints applicable to this project. The discussions and recommendations that have been presented are based on the factual data obtained from this investigation.

It must be recognized that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site have the potential to alter subsurface conditions. In particular, caution should be exercised in the consideration of contractual responsibilities as they relate to control of seepage, disturbance of soils, and frost protection.



The design parameters provided and the engineering advice offered are based on the factual data obtained from this investigation made at the site by Terraprobe and are intended for use by the owner and its retained design consultants for preliminary design consideration. Since the project is still in the preliminary design and planning stage, many aspects of the project relative to the subsurface conditions cannot be anticipated. At such time as the project has advanced to the final design stage, the interpretations made of the subsurface information, the geotechnical design parameters, advice and comments relating to constructability issues and quality control should be reviewed and the report updated.

This report was prepared for the express use of MTE and the present property owner and is not intended for use by others. This report is copyright of Terraprobe Inc., and no part of this report may be reproduced by any means, in any form, without the prior written permission of Terraprobe Inc. MTE and the present owner of the property and are authorized users.

It is recognized that the Town of Georgetown, in its capacity as the planning and building authority under Provincial statues, will make use of and rely upon this report, cognizant of the limitations thereof, both as are expressed and implied.

Terraprobe Inc.

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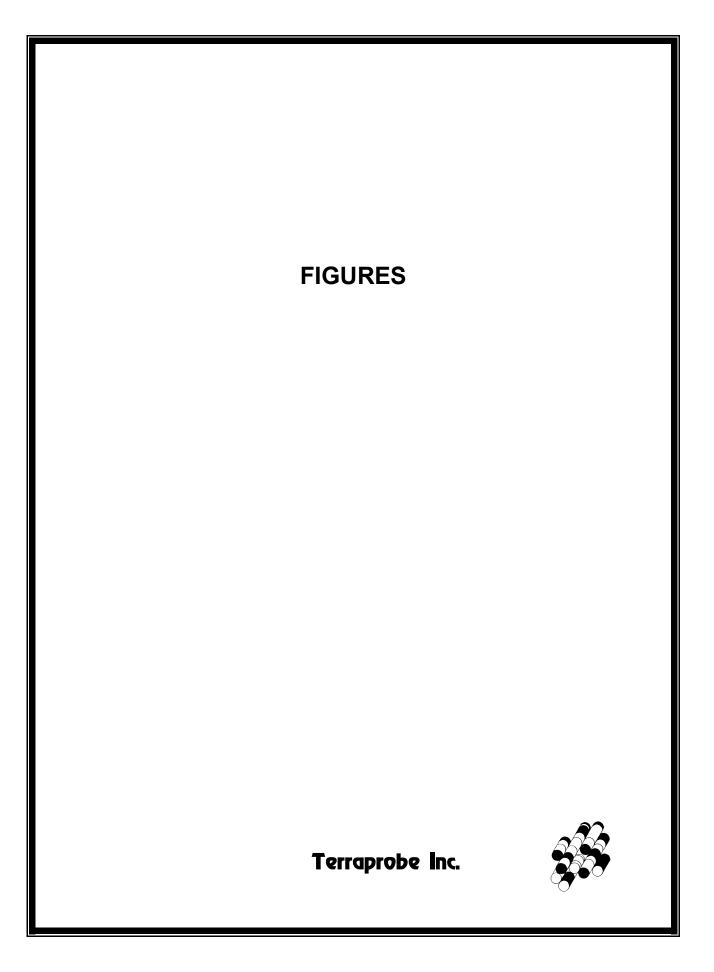
Patrick Cannon, P. Eng., Principal

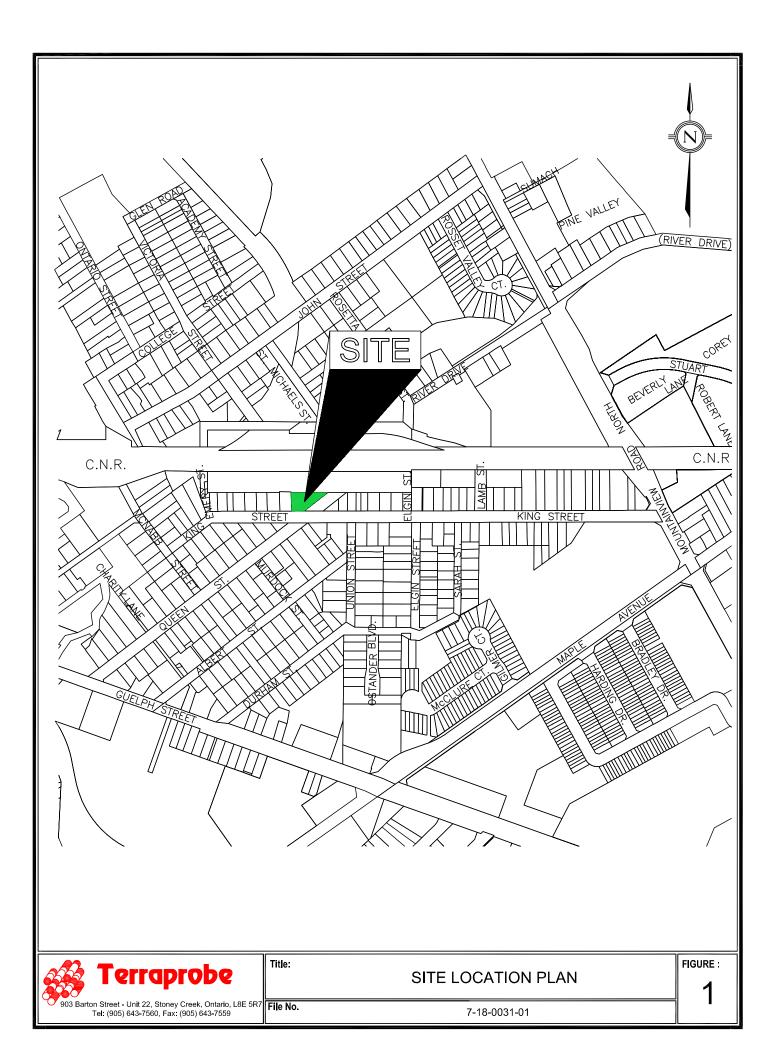
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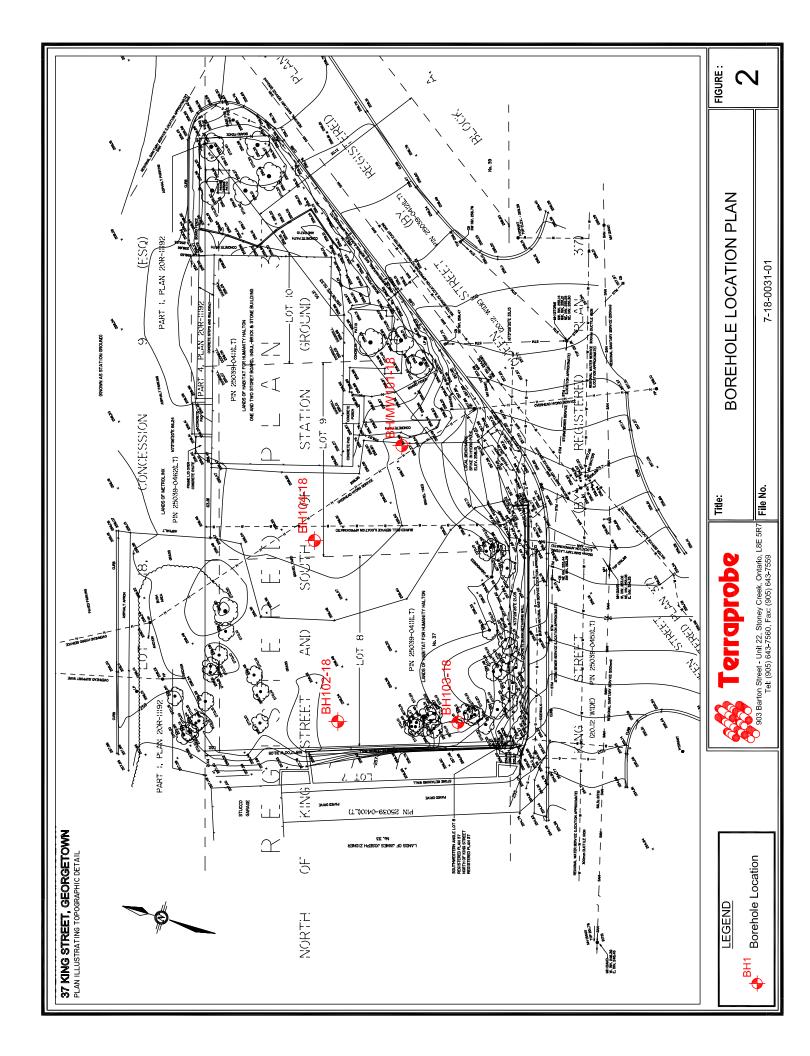
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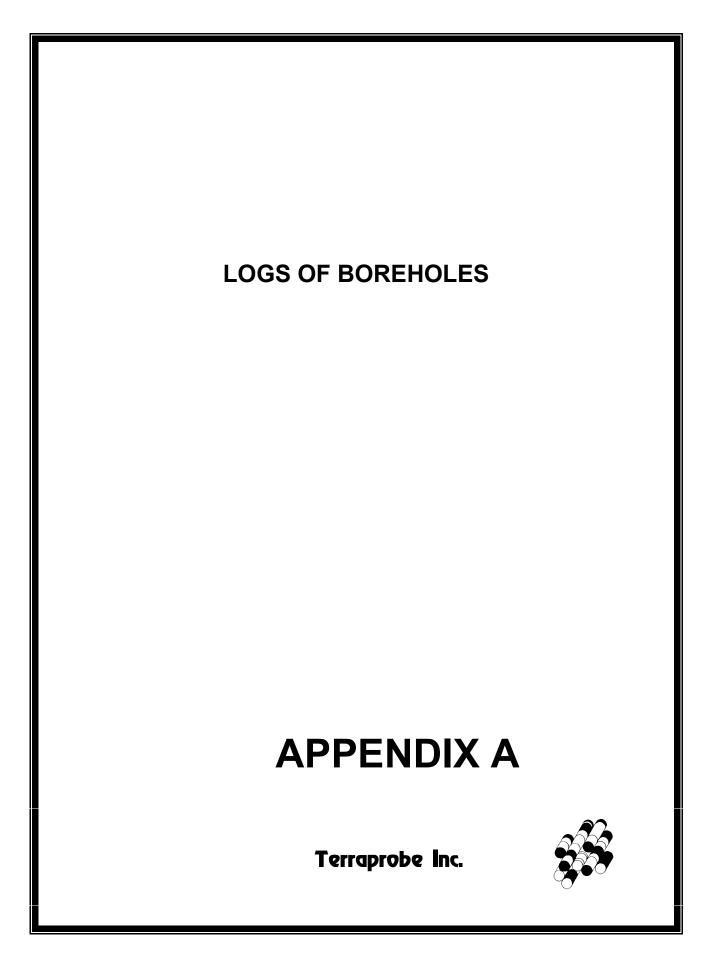


Anthony Felice, P. Eng. Project Manager, Geotechnical











SAMPL	ING METHODS	PENETRATION RESISTANCE
AS CORE DP FV GS	auger sample cored sample direct push field vane grab sample	Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).
SS ST WS	split spoon shelby tube wash sample	Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size

drill rods for a distance of 0.3 m (12 in.)."

COHESIONLE	SS SOILS	COHESIVE S	OILS		COMPOSITIO	N
Compactness	'N' value	Consistency	'N' value	Undrained Shear Strength (kPa)	Term (e.g)	% by weight
very loose loose compact dense very dense	< 4 4 - 10 10 - 30 30 - 50 > 50	very soft soft firm stiff very stiff hard	< 2 2 - 4 4 - 8 8 - 15 15 - 30 > 30	< 12 12 - 25 25 - 50 50 - 100 100 - 200 > 200	<i>trace</i> silt <i>some</i> silt silt <i>y</i> sand <i>and</i> silt	< 10 10 – 20 20 – 35 > 35

TESTS AND SYMBOLS

МН	mechanical sieve and hydrometer analysis	$\overline{\Sigma}$ $\overline{\Sigma}$	Unstabilized water level 1 st water level measurement
w, w _c	water content		
W_L , LL	liquid limit	$\bar{\mathbf{\Lambda}}$	2 nd water level measurement
w _P , PL	plastic limit	T	Most recent water level measurement
I _P , PI	plasticity index		
k	coefficient of permeability	3.0+	Undrained shear strength from field vane (with sensitivity)
γ	soil unit weight, bulk	C _c	compression index
φ'	internal friction angle	Cv	coefficient of consolidation
C'	effective cohesion	m _v	coefficient of compressibility
Cu	undrained shear strength	е	void ratio

FIELD MOISTURE DESCRIPTIONS

Dan	p refers to a soil sample that does not exhibit any observable pore water from field/hand inspection.
Moi	st refers to a soil sample that exhibits evidence of existing pore water (e.g. sample feels cool, cohesive soil is at plastic limit) but does not have visible pore water
Wet	refers to a soil sample that has visible pore water

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Rig type	e ∶CN	IE 45, track-mounted			1	Drilling	g Method	d : Hollow stem augers	
ê		SOIL PROFILE			SAMPL	ES	e	Penetration Test Values (Blows / 0.3m) Moisture / Plasticity 8 7 Lab Data	
Depth	<u>=lev</u> epth m) 58.5 GI	Description ROUND SURFACE	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	(Biowards) values Moisture / Plasticity 0 0 Lab Data ×Dynamic Cone Moisture / Plasticity 0 <td< td=""><td>(%)</td></td<>	(%)
25	58.3 150	Omm TOPSOIL	<u>x</u> I _z				-		
	0.21	L, silty sand, trace gravel, loose,		1	SS	2	258 -		
-1				2	SS	8	-		
- 2				3	SS	12	257 -		
				4	SS	9	256		
- 3	^{55.6} ^{2.9} SIL	TY FINE SAND, compact, light]		
	bro			5	SS	19	255 -	0	
- 4							-		
							254		
- 5				6	SS	20			
							253 -		
- 6									
. 25	51.9			7	SS	10	252	0	
-	6.6	D OF BOREHOLE					0_		

Borehole was dry and open upon completion of drilling.

file: 7-18-0031-01 37 king street, georgetown gpj

Proj	ject N	No. : 7-18-0031-01	Clie	ent	: N	ITE C	Consul	ants Inc.			Origina	ated by : AF
Date	e sta	rted :March 20, 2018	Pro	ject	t :3	7 Kir	ng Stre	ŧ			Comp	oiled by:AF
She	et No	o. :1 of 1	Location : Georgetown, Ontario								Checked by : PC	
Posit	tion	: E: 587168, N: 4834103 (UTM 17T)				Elevati	ion Datu	: Geodetic				
Rig t	ype	: CME 45, track-mounted					Method	: Hollow stem augers	- 1 1			
Depth Scale (m)	<u>Elev</u> Depth		Graphic Log	Number	SAMP Jobe	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) × Dynamic Cone 1.0 20 30 4.0 Undrained Shear Strength (kPa) O Unconfined + Field V	Moisture / Plasticity Plastic Natural Liquid Limit Water Content Limit ane PL MC LL	Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments GRAIN SIZE GRAIN SIZE DISTRIBUTION (%
ھ 0-0	(m) 258.3	GROUND SURFACE		z		SPT	Elev	 Pocket Penetrometer Lab Va 40 80 120 160 	ne 10 20 30			(MIT) GR SA SI (
-	258 <u>.1</u> 0.2	150mm TOPSOIL FILL, silty sand, with intermixed topsoil and pieces of brick, loose, dark brown		1	SS	7	258 -					
- 1				2	SS	10			Φ			
	25 <u>6.8</u> 1.5	FILL, sand and gravel, with brick fragments, compact to very dense, browr		3	ss	56	257 -		> o			
-2	255.6			4	SS	17	256 -		0			
- 3	2.7	SILTY FINE SAND, compact, light brown					-					
-				5	SS	16	255 -		0			
- 4							254 -					
-				6	SS	25	-		0			
- 5							253 -					
- 6							-					
	251.7		關	7	SS	22	252 -					

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

file: 7-18-0031-01 37 king street, georgetown gpj



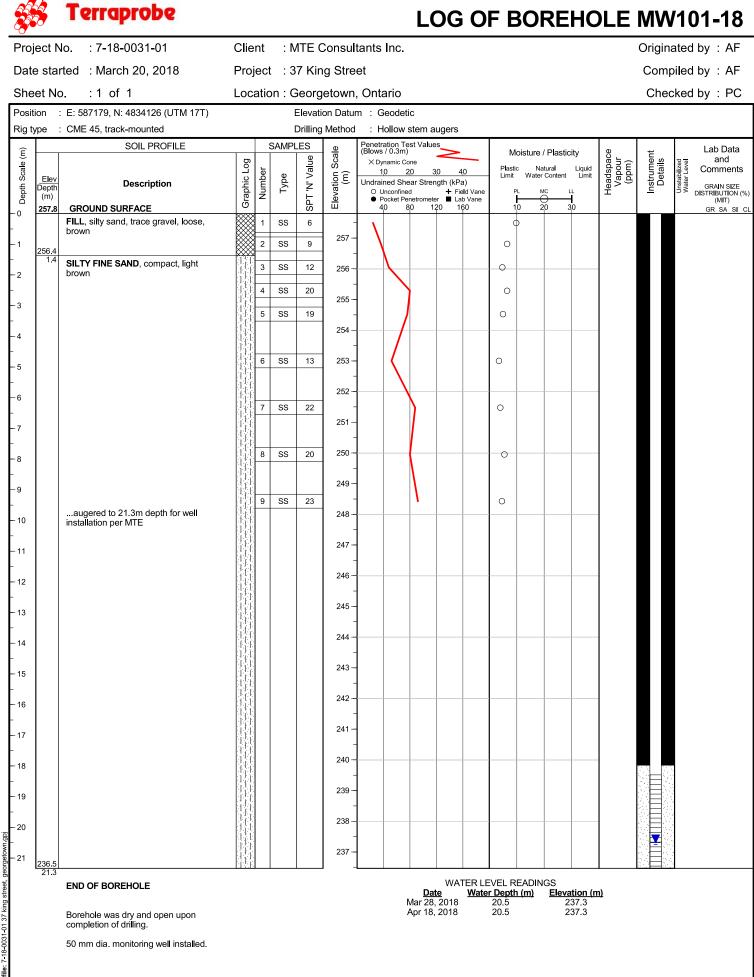
		Terraprobe								L	.00	G	DF	BC	DRI	EHO	LE	10	4-18
Proj	ect N	No. : 7-18-0031-01	Clie	nt	: N	1TE C	Consul	tants In	С.								Origin	ated	by:AF
Date	e sta	rted :March 20, 2018	Pro	ject	: : 3	7 Kir	ng Stre	et									Comp	biled	by:AF
She	et No	o. :1 of 1	Loc	atic	on : G	Georg	jetown	, Ontari	C								Cheo	ked	by:PC
		: E: 587174, N: 4834109 (UTM 17T)						m : Geo											
	/pe	: CME 45, track-mounted SOIL PROFILE			SAMPI		Method		ow stem a										
Oepth Scale (m)	<u>Elev</u> Depth (m) 258.5	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	× Dynam 10 Undrained O Uncor	20 Shear Stre fined t Penetromet	<u>30 4</u> ļ ngth (kPa + Fiel	i) Id Vane o Vane	Plasti Limit F	c Na Water ∾∟ M	/ Plastic tural Content	Liquid Limit	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level D	Lab Data and Comments GRAIN SIZE ISTRIBUTION (%) (MIT) GR SA SI CL
		FILL, silty sand, trace gravel, loose, brown		1	SS	8	258 -						0						
- 1				2	SS	8	-					0							
-2	256.4			3	SS	9	257 -					0							
	2.1	SILTY FINE SAND, compact, light brown		4	SS	15	256 -					-0							
- 3				5	SS	21	- 255 -					0							
- 4								-											
- 5				6	SS	23	254 -					0							
							253 -												
- 6	<u>251.9</u> 6.6			7	SS	20	252					0							

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

file: 7-18-0031-01 37 king street, georgetown gpj





file:



Stormwater Management



C8 STORMWATER MANAGEMENT

All commercial, industrial, institutional, recreational and residential development proposals shall be supported by a Stormwater Management (SWM) report unless waived by the Town through a preconsultation process in accordance with Section G12 of this Plan. The content and scope of the SWM report shall be determined when the development is proposed or through the completion of an EIR where required by an approved Subwatershed Plan.

The SWM Report shall be prepared to the satisfaction of the Town and the appropriate agencies and be prepared in accordance with The Ministry of Environment Stormwater Management Planning and Design Manual, 2003, or its successor, or through the completion of an EIR where required by an approved Subwatershed Study, and shall:

- a) provide recommendations on a stormwater quantity system that ensures that postdevelopment peak flow will not be greater than the pre-development levels for storms up to and including the Regional storm and the 1:100 year storm event;
- b) document the possible impacts of development on watershed flow regimes including their interconnection with groundwater resources;
- c) provide recommendations on how to maintain post-development water quality and improve run-off where appropriate;
- d) document the means by which stormwater volume control will be provided;
- e) determine and describe the necessary site management measures required to be undertaken during construction to mitigate the potential negative impact of development; and,
- f) where applicable, describe how the requirements of the Watershed and/or
 Subwatershed Plan, or EIR will be implemented in the stormwater management plan.

All stormwater management facilities in a Plan of Subdivision shall be placed in an appropriate Environmental Zone in the implementing Zoning By-law to reflect the potential for these lands to be flooded and to ensure that their intended use is recognized. Stormwater management facilities for condominium developments and other large single uses may be privately owned and maintained. Agreements with the Town shall be required as a condition of approval, to provide for their continued maintenance.

Habitat for Humanity 37 King Street, Georgetown, Ontario STORMWATER MANAGEMENT



YDROLOGIC MODELING PARAMETERS

Catchment	Catchment Description	Hydrograph	Area	Perv.	Perv. la		vious (%)		ength (m)		ning "n"		pe (%)	Time to Peak
ID		Method	(ha)	CN	(mm)	TIMP	XIMP	Perv.	Imperv.	Perv.	Imperv.	Perv.	Imperv.	Tp (hrs)
201	Driveway/Parking Lot/ Building Roof	STANDHYD	0.1120	78	5.00	76	76	2.8	9	0.250	0.013	4.4	2	
202	Uncontrolled flow to Queen Street	STANDHYD	0.0220	78	5.00	24	24	3	2	0.25	0.013	20	2	
203	Uncontrolled flow to GO Parking	NASHYD	0.0020	78	5.00	0	0	3.4	0	0.25	0.013	33	0	0.05
204	Uncontrolled external flow to ROW	STANDHYD	0.0343	78	5.00	21	21	4.5	6.5	0.25	0.013	5	2	
TOTAL			0.170			57								

<u>Notes</u>

- Pervious Initial Abstraction (Perv. Ia) = 5.00 mm

- Depression Storage over Impervious areas (DPSI) = 1.0 mm

- CN based on BC Soil Group (Crop and other improved land) per Geotech Report

Habitat for Humanity 37 King Street, Georgetown, Ontario Pre-Development Flows



Design Storm Information

Design storm information used in the hydrologic modeling was based on Chicago Storm distribution Intensity-Duration-Frequency (IDF) equations for the Town of Halton Hills

$$i = a / (t + b)^{c}$$

Where:

i = Rainfall intensity (mm/hr) t = Time of duration (minutes) A,B & C = Constant (see below)

The value of the parameters for the various storm events is provided below:

Constant (A)	2-Yr. ^(B)	5-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
A	586.1	946.46	1173.48	1368.91	1622.45	1777.2
В	6.0	7.0	8.0	8.0	9.0	9.0
С	0.760	0.788	0.794	0.789	0.797	0.795

 Catchment 101
 Existing Site
 0.060
 C = 0.58

 t=
 10 min

^(A) IDF parameters from Std No. 108 - "Intensity-Duration-Frequency, Town of Halton Hills"

^(B) IDF equations used to generate rainfall files with Duration (TD) = 24 hours and Time-to-Peak Ratio (TPR) = 0.333

Storm	2-Yr.	5-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
l (mm/hr)	71.26	101.51	118.25	139.95	155.24	171.05
Allowable Flow (m ³ /s)	0.007	0.010	0.011	0.014	0.015	0.017
Catchment 102	Existing Site	0.110	C = 0.58			

10 min

^(A) IDF parameters from Std No. 108 - "Intensity-Duration-Frequency, Town of Halton Hills"

t=

^(B) IDF equations used to generate rainfall files with Duration (TD) = 24 hours and Time-to-Peak Ratio (TPR) = 0.333

Storm	2-Yr.	5-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
l (mm/hr)	71.26	101.51	118.25	139.95	155.24	171.05
Allowable Flow (m ³ /s)	0.013	0.018	0.021	0.025	0.028	0.030

Time to Peak Calculations - Post-Development Conditions

Time to peak (Tp) values derived from time of concentration (Tc) calculations based on the Airport Method Equation:

$$T_{c} = \frac{3.26 (1.1 - C) L^{0.5}}{S_{W}^{0.33}}$$
 (MTO Drainage Manual Design Chart 1.12)

 T_c = Overland flow time of concentration (min) L = Flow travel length (m) S = Basin slope (%) C = Runoff coefficient

The time to peak values used in the NASHYD command for the proposed conditions hydrologic modeling are shown below.

Catchment	Area	Length	"C"	Slope	Tc	Т	р
ID	(ha)	(m)	0	(m/m)	(min)	(min)	(hrs)
203	0.0020	1	0.20	0.33	4.23	2.83	0.05

Habitat for Humanity 37 King Street, Georgetown, Ontario STORMWATER MANAGEMENT



STAGE-STORAGE-DISCHARGE CALCULATIONS FOR CATCHMENT 201

Outlet Device No. 1 (Quantity) - CBMH4

Туре:	Orifice Plate	
Diameter (mm)	75	
Area (m ²)	0.00442	
Invert Elev. (m)	257.05	(outlet of CBMH4)
C/L Elev. (m)	257.09	
Disch. Coeff. (C _d)	0.63	
Discharge (Q) =	C _d A (2 g H) ^{0.5}	
Number of Orifices:	1	

Elevation	Total Danding Area		Cumulative		Discharge
	Total Ponding Area	Incremental Volume	Volume	Head (H)	(Q)
m	m²	m ³	m³	m	m³/s
257.09	0	0	0	0.00	0.0000
257.45	0	2	2	0.36	0.0074
258.42	0	4	6	1.33	0.0142
258.52	101	5	11	1.43	0.0148
258.62	295	20	31	1.53	0.0153
	257.09 257.45 258.42 258.52	257.09 0 257.45 0 258.42 0 258.52 101	257.09 0 0 257.45 0 2 258.42 0 4 258.52 101 5	257.09000257.45022258.42046258.52101511	257.090000.00257.450220.36258.420461.33258.521015111.43

Habitat for Humanity 37 King Street, Georgetown, Ontario STORMWATER MANAGEMENT



UNDERGROUND STORAGE VOLUME CALCULATIONS FOR CATCHMENT 201

	Sto	rm Sewer	Storage	
Ctorm Couvers	Diameter	Area	Length	Volume
Storm Sewers	(mm)	(m²)	(m)	(m ³)
	250	0.05	35.40	1.7
Total				1.7

			Structure Stor	age		
Structure	Diameter	Area	T/G (HWL)	@258.42	Outlet Invert	Volume @ 258.42
	(mm)	(m ²)	(m)		(m)	(m ³)
CBMH 4	1800	2.5	258.42	258.42	257.05	3.5
CB4.2	600	0.3	258.50	258.42	257.19	0.3
CB4.1	600	0.3	258.45	258.42	257.20	0.3
Total						4.2

Volume at top of

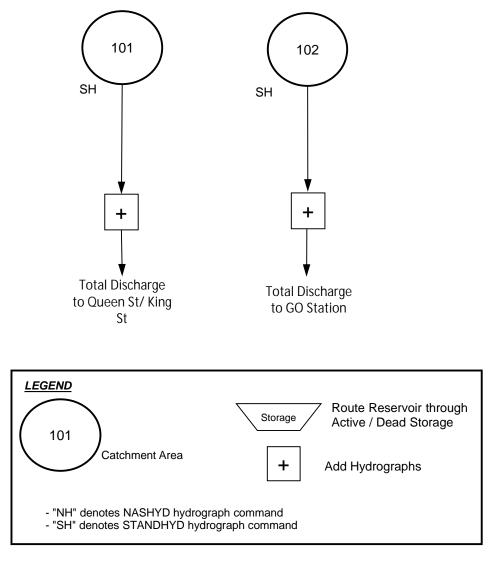
СВМН

Total Underground Volume (Pipes + Structures):

5.9 m³



EXISTING DEVELOPMENT CONDITIONS MODEL SCHEMATIC





PROPOSED DEVELOPMENT CONDITIONS MODEL SCHEMATIC 202 204 201 203 SH NH SH NH Orifice + Total Discharge to GO Overflow Station (Uncontrolled) ¥ Total Discharge to Infiltration Queen Street/King Street (Uncontrolled) Overflow Total Discharge to King Street (Controlled) + Total Discharge to King/Queen Street LEGEND +201 Add Hydrographs Catchment Area - "NH" denotes NASHYD hydrograph command - "SH" denotes STANDHYD hydrograph command

*# Date : *# Modeller :	8412-142 January 2025
*# Company :	MTE Consultants Inc.
*# License # : *#*****************	3053466 ***********************************
START	TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[002] HH_002.STM
* READ STORM	
* *#####################	****
*# *# *#	POST CONDITIONS HYDROLOGIC MODELING
*#	
* %	
via orfice) *	
CALIB STANDHYD	<pre>ID=[1], NHYD=["201"], DT=[1](min), AREA=[0.1122](ha), XIMP=[0.76], TIMP=[0.76], DWF=[0](cms), LOSS=[2],</pre>
	SCS curve number CN=[78], Pervious surfaces: IAper=[5.00](mm), SLPP=[4.4](%), LGP=[2.8](m), MMP=[0.250], SCP=[0](min),
	<pre>Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%), LGI=[7.2](m), MNI=[0.013], SCI=[0](min),</pre>
*§	
	AND ROOF THROUGH ORIFICE WITH SURFACE PONDING
* ROUTE RESERVOIR	<pre>IDout=[2], NHYD=["ORFFLOW-SWM"], IDin=[1], RDT=[1](min),</pre>
	TABLE of (OUTFLOW-STORAGE) values (cms) - (ha-m)
0.0000 0.0000 0.0074 0.0002	
0.0142 0.0006 0.0148 0.0011	
0.0153 0.0031	<pre>-1 -1 (max twenty pts) IDovf=[3], NHYDovf=["ORFFLOW-OVF"]</pre>
*§	*\$
*# CATCHMENT 202	- To streets (uncontrolled)
* CALIB STANDHYD	<pre>ID=[7], NHYD=["202"], DT=[1](min), AREA=[0.022](ha),</pre>
	<pre>XIMD=[0.24], TIMD=[0.24], DWF=[0](cms), LOSS=[2], SCS curve number CN=[78], Pervious surfaces: LAper=[5.00](mm), SLPP=[20.0](%),</pre>
	LGP=[3.0](m), MNP=[0.250], SCP=[0](min), Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.0](%),
	LGI=[2.0](m), MNI=[0.013], SCI=[0](min), RAINFALL=[, , ,](mm/hr) , END=-1
	<pre>IDsum=[8], NHYD=[*SITE*], IDs to add=[7,2,3]</pre>
*% *# CATCHMENT 203	
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*%	<pre>IDsum=[8], NHYD=[*SITE*], IDs to add=[7,2,3] </pre>
*§ CALIB NASHYD *\$ *# CATCHMENT 204 *CALIB STANDHYD *\$ CALIB STANDHYD *\$ CALIB STANDHYD *\$ CALIB STANDHYD *\$ *\$ *UN REMAINING D *START *	<pre>IDsum=[8], NHYD=[*SITE*], IDs to add=[7,2,3] </pre>
*§	<pre>IDsum=[8], NHYD=[*SITE*], IDs to add=[7,2,3] </pre>
*# CATCHMENT 203 *CALIB NASHYD *& CALIB NASHYD *& CALIB STANDHYD *& CALIB STANDHYD *& CALIB STANDHYD *& ** ** ** ** ** ** ** ** **	<pre>IDsum=[8], NHYD=[*SITE*], IDs to add=[7,2,3] </pre>
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<pre>*# CATCHMENT 203 * #CALIB NASHYD * CALIB NASHYD * * CALIB STANDHYD * * CALIB STANDHYD * * CALIB STANDHYD * * * * * * * * * * * * * * * * * * *</pre>	<pre>IDsum=[8], NHYD=[*SITE*], IDs to add=[7,2,3] </pre>
*\$	<pre>IDsum=[8], NHYD=[*SITE*], IDs to add=[7,2,3] </pre>

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002:0004 *# ROUTE PARKING AN *							
ROUTE RESERVOIR		ested routin	ıg time st	iep = 1	.0 min.		
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	(c	ms) (ha.m 000 .0000E+ 007 .2000E- 014 .6000E-	1.) -00	(cms) .015	(ha.m .1100E-	•) 02	
ROUTING RESULT INFLOW >01: (2 OUTFLOW<02: (C OVERFLOW<03: (C	S	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R. (m 46.6		
OUTFLOW<02: (C OVERFLOW<03: (C	RFFLO)	.11	.014	8.017	46.6		
	TOTAL NUMB CUMULATIVE PERCENTAGE	ER OF SIMULA TIME OF OVE OF TIME OVE	ATED OVERF ERFLOWS (ERFLOWING	FLOWS = (hours)= (%)=	.0 .0 72.47	0 0 0	
	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT	ER OF SIMULA TIME OF OVE OF TIME OVE	ATED OVERF SRFLOWS (SRFLOWING DN [Qout/Q DW	FLOWS = (hours)= (%)= Qin](%)= (min)=	.0 .0 72.47	0 0 0 8 0	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S	ER OF SIMULA TIME OF OVE OF TIME OVE W REDUCTIO OF PEAK FLO TORAGE USE	ATED OVERE RFLOWS (RFLOWING DN [Qout/C W 2D (<pre>FLOWS = (hours)= (%)= (min)= (ha.m.)=</pre>	.0 .0 72.47 1.0 .5787E-0	0 0 0 8 0	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S To street	ER OF SIMULA TIME OF OVE OF TIME OVE W REDUCTIO TORAGE USE	ATED OVERE RFLOWS (RFLOWING DN [Qout/(DW ED (<pre>FLOWS = (hours)= (%)= (min)= (ha.m.)=</pre>	.0 .0 72.47 1.0 .5787E-0	0 0 0 3	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PERK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OVE W REDUCTIO TORAGE USE 	ATED OVERH RRFLOWS (IRFLOWING NN [Qout/(W DD (<pre>FLOWS = (%)= (%)= (min)= (ha.m.)=</pre>	.0 .0 72.47 1.0 .5787E-0	0 0 0 3	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OVE W REDUCTIO OF PEAK FLO TORAGE USE 	ATED OVERH RRFLOWS (IRFLOWING NN [Qout/(W DD (<pre>FLOWS = (%)= (%)= (%)= (min)= (ha.m.)= Dir. Conn DUS (i) 12</pre>	.0 .0 72.47 1.0 .5787E-0	0 0 0 3	
CALIB STANDHYD CALIB STANDHYD 07:202 DT= 1.0 Surface Area Dep. Storage Average Slope Length	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OVE W REDUCTIO OF PEAK FLO TORAGE USE 	VIED OVERFICIENTS VIETEOWING VIETEOWING VIETEOWING VIETEOWING 02 24.00 I PERVIC 02 5.0 20.0 3.0 0.0 0.0 0.0 0.0 0.0 0.0	<pre>FLOWS = {hours)= (%)= (%)= (min)= (ha.m.)= Dir. Com DUS (i) 2 0</pre>	.0 .0 72.47 1.0 .5787E-0	0 0 0 3	
CALIB STANDHYD CALIB STANDHYD 07:202 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n	TOTAL NUMB CUMULATIVE PERCENTAGE PERK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OVE W REDUCTIO TORAGE USE 	VIED OVERF IRFLOWING NN [Qout/Q W D .02 24.00 I PERVIC .22.00 5.0 20.0 3.0 2.0 20.0 3.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2	<pre>PLOWS = (hours)= (\$)= (\$)= (min)= hha.m.)= </pre>	.0 .0 72.47 1.0 .5787E-0	0 0 0 3	
CALIB STANDHYD CALIB STANDHYD 07:202 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n	TOTAL NUMB CUMULATIVE PERCENTAGE PERK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OVE W REDUCTIO TORAGE USE 	VIED OVERF IRFLOWING NN [Qout/Q W D .02 24.00 I PERVIC .22.00 5.0 20.0 3.0 2.0 20.0 3.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2	<pre>PLOWS = (hours)= (\$)= (\$)= (min)= hha.m.)= </pre>	.0 .0 72.47 1.0 .5787E-0	0 0 0 3	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OVE W REDUCTIO OF PEAK FLO TORAGE USE (uncontrol (ha)= 1 Imp(%)= IMPERVIOUS .01 1.00 1.00 .013 71.26 1.00 .28 (i 1.00 1.65	<pre>XTED OVERF IRFLOWS (RFLOWING)N [Qout/Q W W DD (24.00 I PERVIC </pre>	<pre>FLOWS = (hours)= (*)= (min)= (ha.m.)= Dir. Cont DUS (i) D0 00 00 00 00 00 00 00 00 00 00 00 00</pre>	.0 .0 72.47 1.0 .5787E-0 	0 0 8 0 3 24.00	
CALIB STANDHYD CALIB STANDHYD 07:202 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. ove Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA 'TIME OF OVE OF TIME OVE W REDUCTIO 'OF PEAK FLO TORAGE USE 	<pre>XTED OVERE RFLOWS (RFLOWING)N [Qout/Q WW c. c. c. c. c. c. c. c. c. c. c. c. c.</pre>	<pre>PLOWS = (%)= (%)= (%)= (%)= (min)= (m</pre>	.0 .0 72.47 1.0 .5787E-0 	0 0 0 3 24.00	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA 'TIME OF OVE OF TIME OVE W REDUCTIO 'OF PEAK FLO TORAGE USE 	<pre>XTED OVERF IRFLOWS (RFLOWING)N [Qout/Q W W DD (24.00 I PERVIC </pre>	<pre>PLOWS = (hours)= (\$)= (min)= (ha.m.)= Dir. Cont DIS (i) 22 00 00 35 (ii) 00 66 00 06 66 78 </pre>	.0 .0 72.47 1.0 .5787E-0 	0 0 8 0 3 24.00 24.00	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PERK FLO TIME SHIFT MAXIMUM S 	<pre>ER OF SIMULA TIME OF OVE OF TIME OF OVE OF TIME OVE OF PEAK FLO TORAGE USE </pre>	VITED OVERE IRFLOWING IRFLOWING IN [Qout/Q W .02 24.00 [PERVIC .1ed) .02 24.00 [PERVIC .22 .20 .21 .02 .2.0 .0.0 .2.0 .0.0 .2.0 .0.0	<pre>PLOWS = (%)= (%)= (%)</pre>	.0 .0 72.47 1.0 .5787E-0 	0 0 8 0 3 24.00 24.00	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	<pre>ER OF SIMULA TIME OF OVE OF TIME OF OVE OF TIME OF OVE OF PEAK FLO TORAGE USE </pre>	VIED OVERE CRFLOWING CRFLOWING NN [Qout/Q WW .02 24.00 I PERVIC .02 24.00 I PERVIC .02 .02 .02 .02 .02 .02 .02 .02	<pre>PLOWS = (%)= (%)= (%)= (%)= (%)= (%)= (%)= (%)</pre>	.0 .0 72.47 1.0 .5787E-0 	0 0 8 0 3 24.00 24.00	
<pre>002:0005</pre>	TOTAL NUMB CUMULATIVE PERCENTAGE PERK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA 'TIME OF OVE 'OF TIME OVE 'OF PEAK FLO 'OF PEAK FLO TORAGE USE 	VIED OVERF IRFLOWING IRFLOWING IRFLOWING IRFLOWING W ID 0 24.00 I PERVIC 0 24.00 I PERVIC 0 24.00 I 0 24.00 I 0 24.00 I 0 24.00 I 0 24.00 I 0 24.00 I 0 24.00 I 0 24.00 I 0 24.00 I 0 20.0 20	<pre>PLOWS = (hours)= (\$)= (\$)= (nin)= ha.m.)= Dir. Com DUS (i) DUS (i) DU DUS (i) DU DU</pre>	.0 .0 72.47 1.0 .5787E-0 	0 0 0 3 24.00 \$ 2 (iii) 3 7 3	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OF OVE OF PEAK FLO TORAGE USE . (ha)= 1 Imp(%)= IMPERVIOUS . (ha)= 1 Imp(%)= IMPERVIOUS . (1) . (2) . (1) . (2) . (1) . (2) . (1) . (2) . (1) . (2) . (<pre>XTED OVERE RFLOWS (RFLOWING) N [Qout/Q D D (1.1ed) .02 24.00 I PERVIC .24.00 I PERVIC .20.0 20.0 20.0 20.0 20.0 20.0 20.0 20</pre>	<pre>PLOWS = (%)= (%)= (%)= (%)= (%)= (%)= (%)= (%)</pre>	.0 .0 72.47 1.0 .5787E-0 	0 0 0 3 24.00 2 (iii) 3 7 3	
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OVE OF PEAK FLO TORAGE USE 	VITED OVERE REFLOWING (REFLOWING (Qout/Q CD (Qout/Q CD (Qout/Q CD (Qout/Q CD (Qout/Q CD (Qout/Q CD (Qout/Q CD (Qout/Q (Q	<pre>PLOWS = (%)=</pre>	.0 .0 .0 .72.47 1.0 .5787E-0 	0 0 0 8 0 3 2 2 4.00 2 4.00 3 7 3 8 8 8 9 	DWF (cms) .000
<pre>002:0005</pre>	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OF OVE OF TIME OF OVE TORAGE USE TORAGE USE (uncontrol (ha)= 1 Imp(%)= IMPERVIOUS (1 100 2.00 0.13 71.26 1.00 1.65 .00 7.90 54.78 55.78 55.78 .98 TED FOR PERV = Dep. Stora .98 TED FOR PERV 	NTED OVERFICIONS (RFLOWS) (RFLOWING (RFLOWING (D) (Q) (D)	PLOWS = (%) = (%) = (%) = (harrows (min) = (harrows (min) = (harrows (min) = (harrows (min) = (min) = (.0 .0 .72.47 1.0 .5787E-0 	0 0 8 8 0 3 24.00 24.00 8 8 7 3 8 8 7 3 8 8 9 15 46.69 0 0	DWF (cms) .000 .000 .000
002:0005	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA 'TIME OF OVE 'OF TIME OF OVE 'OF PEAK FLO TORAGE USE . (ha)= 1 Imp(%)= IMPERVIOUS . (ha)= 1 Imp(%)= IMPERVIOUS . (1) . (2) . (1) . (2) . (1) . (2) . (2)	<pre>XTED OVERE RFLOWING (RFLOWING)N [Qout/Q D D (1ed) .02 24.00 I PERVIC .24.00 I PERVIC .20.0 24.00 I PERVIC .20.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2</pre>	<pre>PLOWS = (hours)= (*)= (*)= (*)= (*)= (*)= (*)= (*)= (*</pre>	.0 .0 .72.47 1.0 .5787E-0 	24.00 8.0 3.2 24.00 8.0 3.3 24.00 8.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	DWF (cms) .000 .000 .000
<pre>D02:0005</pre>	TOTAL NUMB CUMULATIVE PERCENTAGE PEAK FLO TIME SHIFT MAXIMUM S 	ER OF SIMULA TIME OF OVE OF TIME OVE OF PEAK FLO TORAGE USE 	VIED OVERF IRFLOWING IRFLOWING IRFLOWING IRFLOWING W ID (20 24.00 I PERVIC 0 24.00 I PERVIC 0 24.00 I PERVIC 0 24.00 I 24.00 I 25.0 27.2 2	<pre>PLOWS = (hours)= (%)= (%)= (%)= (%)= (%)= (%)= (%)= (%</pre>	.0 .0 72.47 1.0 .5787E-0 	0 0 0 8 0 3 2 4.00 2 4.00 8 7 3 8 8 7 3 8 8 9 15 6 0 0 3 7 3 8 15 4 3 8 15 4 3 8 15 4 3 8 15 4 15 15 15 15 15 15 15 15 15 15 15 15 15	DWF (cms) .000 .000 .000

PEAK FLOW (cms)= .000 (i) TIME TO PEAK (hrs)= 8.000	381 5.00 1.462 11.00 2.601 17.00 1.052 23.00 .697 382 5.17 1.533 11.17 2.486 17.17 1.036 23.17 .691 383 5.33 1.613 11.33 2.381 17.33 1.021 23.33 .685 384 5.50 1.702 11.50 2.285 17.50 1.007 23.50 .679 385 5.67 1.804 11.67 2.198 17.67 .993 23.67 .673
RUNOFF VOLUME (mm)= 21.040 TOTAL RAINFALL (mm)= 55.777 RUNOFF COEFFICIENT = .377	386 5.83 1.921 11.83 2.118 17.83 .979 23.83 .668 387 6.00 2.056 12.00 2.044 18.00 .966 24.00 .662 389
(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.	390 005;0003
*# CATCHMENT 204 - EXTERNAL AREAS uncontrolled	393 *# 394 *# 935 *#
CALIE STANDHYD Area (ha)= .03 03:204 DT=1.00 Total Imp(\$)= 21.00 Dir. Conn.(\$)= 21.00	396 *# 397 *####################################
IMPERVIOUS PERVIOUS (i) Surface Area (ha)= .01 .03	399 * 400 401 CALIE STANDHYD Area (ha)= .11
Dep. Storage (mm)= 1.00 5.00 Average Slope (%)= 2.00 5.00 Length (m)= 6.50 4.50	402 01:201 DT= 1.00 Total Imp(%)= 76.00 Dir. Conn.(%)= 76.00 403
Mannings n = .013 .250 Max.eff.Inten.(mm/hr)= 71.26 27.28	405 Surface Area (ha)= .09 .03 406 Dep. Storage (mm)= 1.00 5.00 407 Average Slope (%)= 2.00 4.40
over (min) 1.00 3.00 Storage Coeff. (min)= .46 (ii) 2.89 (ii) Unit Hyd. Tpeak (min)= 1.00 3.00	408 Length (m)= 7.20 2.80 409 Mannings n = 013 250 410
Unit Hyd. peak (cms) = 1.50 .38 *TOTALS* PEAK FLOW (cms) = .00 .00 .003 (iii)	411 Max.eff.Inten.(mm/hr)= 101.51 49.91 412 over (min) 1.00 2.00 413 Storage Coeff. (min)= -43 (ii) 1.92 (ii)
TIME TO PEAK (hrs)= 7.93 8.00 8.000 RUNOFF VOLUME (mm)= 54.78 21.06 28.142	414 Unit Hyd. Tpeak (min)= 1.00 2.00 415 Unit Hyd. peak (cms)= 1.54 .57
TOTAL RAINFALL (mm)= 55.78 55.777 RUNOFF COEFFICIENT = .98 .38 .505	416 *TOTALS* 417 PEAK FLOW (cms)= .02 .00 .028 (iii) 418 TIME TO PEAK (hrs)= 7.95 8.00 8.000
 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 78.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL 	419 RUNOFF VOLUME (mm)= 72.43 33.43 63.069 420 TOTAL RAINFALL (mm)= 73.43 73.43 73.429 421 RUNOFF COSFFICIENT = .99 .46 .859
THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.	422 423 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: 424 CN* = 78.0 Ia = Dep. Storage (Above)
002:0009	425 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL 426 THAN THE STORAGE COEFFICIENT. 427 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
ADD HYD (PropSite) ID: NHYD AREA QPEAK TPEAK R.V. DWF 	428 429 430 005:0004
ID1 03:204 .03 .003 8.00 28.14 .000 +ID2 08:SITE .13 .016 8.00 43.81 .000	431 *# ROUTE PARKING AND ROOF THROUGH ORIFICE WITH SURFACE PONDING 432 * 433
SUM 06:PropSite .17 .019 8.00 40.62 .000 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.	433 ROUTE RESERVOIR Requested routing time step = 1.0 min. 434 IN>01:(201)
	437 OUTFLOW STORAGE OUTFLOW STORAGE 438 (cms) (ha.m.) (cms) (ha.m.)
00220010	439 .000 .0000E+00 .015 .1100E-02 440 .007 .2000E+03 .015 .3100E-02 441 .014 .6000E-03 .000 .0000E+00
* ** END OF RUN : 4	442 443 ROUTING RESULTS AREA QPEAK TPEAK R.V. 444 (ha) (cms) (hrs) (mm)
	445 INFLOW >01: (201) .11 .028 8.000 63.069 446 OUTFLOW 011 .015 8.017 63.069
	447 OVERFLOW<03: (ORFFLO) .00 .000 .000 .000
	447 OVERFLOM<03: (ORFFLO) .00 .000 .000 448 449 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours)= .00
START Project dir.: Q:\60793_001\SWM\SWMHYMO\	448 449 TOTAL NUMBER OF SIMULATED OVERPLOWS = 0
START Project dir.: Q:\60793_001\SWM\SWMHYMO\ Rainfall dir.: Q:\60793_001\SWM\SWMHYMO\	448 449 449 450 CUMULATIVE TIME OF OVERFLOWS (hours)= 451 PERCENTAGE OF TIME OVERFLOWING (%)= 452 453 454 PEAK FLOW REDUCTION [Qout/Qin](%)= 55 TIME SHIFT OF PEAK FLOW (min)= 1.00
START Project dir.: Q:\60793_001\SWM\SWMHYMO\ TZERO = .00 hrs on 0 METOUT= 2 (output = METRIC) NRUN = 005	448 449 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours)= 00 451 PERCENTAGE OF TIME OVERFLOWING (%)= .00 452 453 453 PEAK FLOW REDUCTION [Qout/Qin](%)= 53.255 454 PEAK FLOW REDUCTION [Qout/Qin](%)= 53.255 455 TIME SHIFT OF PEAK FLOW (min)= 1.00 456 MAXIMUM STORAGE USED (ha.m.)=.9958E-03 457 458
START Project dir.: Q:\60793_001\SWM\SWMHYMO\ Rainfall dir.: Q:\60793_001\SWM\SWMHYMO\ TZERO = .00 hrs on 0 METOUT= 2 (output = METRIC) NRUN = 005 NSTORM= 1 # 1=HH_005.STM	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours)= .00 451 PERCENTAGE OF TIME OVERFLOWING (%)= .00 452 .00 453 PEAK FLOW REDUCTION [Qout/Qin](%)= .53.255 454 PEAK FLOW REDUCTION [Qout/Qin](%)= .00 455 TIME SHIFT OF PEAK FLOW (min)= .00 456 MAXIMUM STORAGE USED (ha.m.)=.9958E-03 457 .005:0005
<pre>START Project dir.: Q:\60793_001\SWM\SWMHYMO\ TZERO = .00 hrs on 0 METOUT= 2 (output = METRIC) NRUN = 005 NSTORM = 1</pre>	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours)= .00 451 PERCENTAGE OF TIME OVERFLOWING (%)= .00 452 .00 453 PEAK FLOW REDUCTION [Qout/Qin](%)= 53.255 454 PEAK FLOW REDUCTION [Qout/Qin](%)= 53.255 455 TIME SHIFT OF PEAK FLOW (min)= 1.00 456 MAXIMUM STORAGE USED (ha.m.)=.9958E-03 457 .005:0005
<pre>START Project dir.: Q:\60793_001\SWM\SWMHYMO\ Rainfall dir.: Q:\60793_001\SWM\SWMHYMO\ TZERO = .00 hrs on 0 METOUT= 2 (output = METRIC) NRUN = 005 NSTORM= 1</pre>	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWING (%) = .00 453 PERCENTAGE OF TIME OVERFLOWING (%) = .00 454 PERK FLOW REDUCTION [Qout/Qin](%) = .53.255 455 TIME SHIFT OF PEAK FLOW (min) = 1.00 456 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 457
<pre>START</pre>	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWING (%) = .00 452 .00 453 PERCENTAGE OF TIME OVERFLOWING (%) = .00 454 PERK FLOW REDUCTION [Qout/Qin](%) = .53.255 455 TIME SHIFT OF PEAK FLOW (min) = 1.00 456 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 457
<pre>START</pre>	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWING (%) = .00 453 PEAK FLOW REDUCTION [Qout/Qin](%) = 53.255 453 PEAK FLOW REDUCTION [Qout/Qin](%) = 53.255 454 PEAK FLOW REDUCTION [Qout/Qin](%) = 53.255 455 TIME SHIFT OF PEAK FLOW (min) = 1.00 456 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 457 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 458
<pre>START</pre>	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWING (%) = .00 453 PERK FLOW REDUCTION [Qout/Qin](%) = .53.255 454 TIME SHIFT OF PEAK FLOW (min) = 1.00 456 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 457
START Project dir.: Q:\60793_001\SWM\SWMHYMO\	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWING (%) = .00 453 PEAK FLOW REDUCTION [Qout/Qin](%) = .53.255 453 TIME SHIFT OF PEAK FLOW (min) = .00 456 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 457
START Project dir.: Q:\60793_001\SWM\SWMHYMO\	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWING (%) = .00 453 PERCENTAGE OF TIME OVERFLOWING (%) = .00 453 PERK FLOW REDUCTION [Qout/Qin](%) = .53.255 455 TIME SHIFT OF PEAK FLOW (min) = 1.00 456 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 457 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 458 O05:0005
START Project dir.: Q:\60793_001\SWM\SWMHYMO\	449 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWING (%) = .00 453 PERK FLOW REDUCTION [Qout/Qin](%) = .53.255 454 TIME SHIFT OF PEAK FLOW (min) = 1.00 455 TIME SHIFT OF PEAK FLOW (min) = 1.00 456 MAXIMUM STORAGE USED (ha.m.) = .9958E-03 457
START Project dir.: Q:\60793_001\SWM\SWMHYMO\	449 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWING (%) = .00 453 PERK FLOW REDUCTION [Qout/Qin](%) = .53.255 454 TIME SHIFT OF PEAK FLOW (min) = 1.00 455 TIME SHIFT OF PEAK FLOW (min) = 1.00 456 MAXIMUM STORAGE USED (ha.m.)=.9958E-03 457 OOS:0005
START Project dir.: 0:\60793_001\SWM\SWMHYMO\	449 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 450 CUMULATIVE TIME OF OVERFLOWING (%)= .00 451 PERCENTAGE OF TIME OVERFLOWING (%)= .00 453 PERCENTAGE OF TIME OVERFLOWING (%)= .00 454 PERCENTAGE OF TIME OVERFLOWING (%)= .00 455 TIME SHIFT OF PEAK FLOW (min)= 1.00 456 MAXIMUM STORAGE USED (ha.m.)=.9958E-03 457 MAXIMUM STORAGE USED (ha.m.)=.9958E-03 458 O05:0005
START Project dir.: Q:\60793_001\SWM\SWMHYMO\	<pre>TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 CUMULATIVE TIME OF OVERFLOWS (hours)= .00 PERCENTAGE OF TIME OVERFLOWING (%)= .00 PERCENTAGE OF TIME OVERFLOWING (%)= .00 MAXIMUM STORAGE USED (ha.m.)= .9558E-03</pre>
<pre>START</pre>	<pre>TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 PERCENTAGE OF TIME OVERFLOWING (%) = .00 PERCENTAGE OF TIME SUBJECTION [Qout/Qin](%) = 53.255 TIME SHIPT OF PEAK FLOW (min) = 1.00 MAXIMUM STORAGE USED (ha.m.) = .995582-03 PEAK FLOW REDUCTION [Qout/Qin](%) = .995582-03 PEAK FLOW REDUCTION [Qout/Qin](%) = .995582-03 PEAK FLOW REDUCTION [Dir. Conn.(%) = .24.00 PERCENTAGE (ha) = .01 .02 PERCENTAGE (ha) = .01 .00 PERCENTAGE (ha) = .00 .00 .00 PERCENTAGE (ha) = .00 .00 .004 (iii) TIME TO FEAK (hrs) = .1.57 .95 PEAK FLOW (cma) = .00 .00 .004 (iii) TIME TO FEAK (hrs) = .2.2 .00 .004 (iii) PERK FLOW (cma) = .00 .00 .004 (iii) TIME TO FEAK (hrs) = .2.3 .33.43 .42.789 TOTALS* PEAK FLOW (cma) = .09 .46 .583 PEAK FLOW (cma) = .3.43 .73.43 .73.429 TOTAL RAINFALL (mm) = .73.43 .73.43 .73.429 TOTAL RAINFALL (mm) = .73.43 .73.43 .73.429 TOTAL RAINFALL (mm) = .73.43 .73.43 .73.429 TOTAL RAINFALL (mm) = .2.9 .46 .583 PEAK FLOW COEFFICIENT = .99 .46 .583 PEAK FLOW THE STORAGE COEFFICIENT. (ii) PEAK FLOW DOES NOT INCLUE BASEFLOW IF ANY. PEAK FLOW THE STORAGE COEFFICIENT. (iii) PEAK FLOW TO SANG STORAGE (ADOVE) (iii) THEN TOR SUBJECTED FOR PERVIOUS LOSSES: CN* = .78.0 I = .Dep. Storage (ADOVE) (iii) THE STEP (DT) SHOULD BASEFLOW IF ANY. PEAK FLOW DOES NOT INCLUE BASEFLOW IF PEAK R.V. DWF ADD HYD (SITE) ID NHYD AREA (QPEAK TPEAK R.V. DWF ADD HYD (SITE) ID NHYD AREA (QPEAK TPEAK R.V. DWF ADD HYD (SITE) ID NHYD AREA (QPEAK TPEAK R.V. DWF CONSTRUCTIONE (Cma) (Cma) PEAK FLOW DOES NOT INCLUE AREA (DPEAK TPEAK R.V. DWF PEAK TOTAL RAINFALL (TA) THEN TO AREA (QPEAK TPEAK R.V. DWF PEAK TOTAL STEAK R.V. DWF PEAK TOTAL ST</pre>
<pre>START Project dir.: Q:\60793_001\SWM\SWMHYMO\</pre>	448 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0 449 CUMULATIVE TIME OF OVERFLOWS (hours)= .00 451 PERCENTAGE OF TIME OVERFLOWING (*)= .00 452 PERCENTAGE OF TIME OVERFLOWING (*)= .00 453 PERC FLOW REDUCTION [Qout/Qin](*)= .00 454 MAXIMUM STORAGE USED (ha.m.)=.9958E-03 455 TIME SHIFT OF PEAK FLOW (min)= .1.00 456 *(CATCHMENT 202 - To streets (uncontrolled) * * 451 (CALLE STANDHYD) 452 Area (ha)= .02 453 (CALLE STANDHYD) 454 107:202 DT=1.00 455 TIME STANDHYD 456 .01 .02 457 Surface Area (ha)= .01 .02 458 .01 .02 459 Average Slope (*)= 1.00 1.00 451 .01 .02 452 Storage Coeff. (min)= .1.00 1.00 453 Storage Coeff. (min)= .2.00 .00 .004 454 Unit Hyd. Tpeak (mm)= .1.00 1.02 455 Storage Coeff. (min)= .2.41 33.43 42.789 456
<pre>START Project dir.: Q:\60793_001\SWM\SWMHYMO\</pre>	100 TOTAL NUMBER OF SIMILATED OVERFLOWS = 0 100 CLUMILATIVE TIME OF OVERFLOWS (hours) = .00 101 PERCENTAGE OF TIME OVERFLOWING (%) = .00 101 OUS10005
<pre>START Project dir.: Q:\60793_001\SWM\SWMHYMO\</pre>	448 TOTAL NUMBER OF SIMILATED OVERFLOWS = 0 449 CUMULATIVE TIME OF OVERFLOWS (hours) = .00 451 PERCENTAGE OF TIME OVERFLOWIG (%) = .00 452 .00 453 PERK FLOW REDUCTION [Qout/Qin](%) = 53.255 454 .01 455 .01 456 .02 457 .01 458 .02 459 .02 451 CALTB STANDEND 452 .02 453 .01 454 .02 455 .01 456 .02 457 .01 458 .02 459 .02 450 .02 451 .02 452 .01 453 .01 454 .02 455 .01 456 .02 457 .00 458 .00 459 .00 450 .00 451 .00 452 .00

CALIB NASHYD 01:203 DT= 1.(Unit Hyd Qpeał			.050				
			i)				
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALI	(hrs)= (mm)=	8.000 33.401					
TOTAL RAINFALI RUNOFF COEFFIC	L (mm)= CIENT =	73.429 .455					
(i) PEAK FLOW	DOES NOT	INCLUDE BAS	SEFLOW IF	ANY.			
05:0008							
# CATCHMENT 204 -		AREAS uncor	ntrolled				
CALIB STANDHYD 03:204 DT= 1.0	00 Tot	a (ha)= al Imp(%)=	.03 21.00	Dir. Cor	in.(%)=	21.00	
Surface Area		IMPERVIOU					
Surface Area Dep. Storage	(mm)=	1.00	5	.00			
Dep. Storage Average Slope Length Mannings n	(m)= =	6.50 .013	4	.50			
Max.eff.Inten.	.(mm/hr)=	101.51	49				
ove Storage Coeff.	er (min) . (min)=	1.00		.00 .31 (ii)			
Unit Hyd. Tpea Unit Hyd. peal	ak (min)= k (cms)=	1.00 1.56	(ii) 2 2	.00 .51	.	~	
			-	.00		5 (iii)	
TIME TO PEAK RUNOFF VOLUME	(hrs)= (mm)=	7.92	8 33	.00	8.00 41.61	9	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALI RUNOFF COEFFIC	L (mm)= CIENT =	73.43 .99	73	.43 .46	73.42 •56		
(i) CN PROCH	EDURE SELE	CTED FOR PE = Dep. Sto					
(ii) TIME STR	EP (DT) SH		ALLER OR E				
(iii) PEAK FLO				F ANY.			
05:0009							
# Total FLOW to Ki				ABELL	(11) II - 17	P. 17	D-MID
ADD HYD (PropSite	e) ID:	NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 03: +ID2 08:	204 SITE =========	.03	.005	8.00 8.00	41.62 59.74	.000
		PropSite					
NOTE: PEAK FLOW	NS DO NOT	INCLUDE BAS	SEFLOWS IF	ANY.			
RUN REMAINING DES	SIGN STORM	S (TOWN OF	HALTON HI	LLS 5 TO	******** 100-YR)	*****	*****
05:0002	SIGN STORM	S (TOWN OF	**************************************	********** LLS 5 TO	********* 100-YR)	******	******
	SIGN STORM	S (TOWN OF	**************************************	********** LLS 5 TO	100-YR)	******	*****
05:0002	SIGN STORM	S (TOWN OF	**************************************	********** LLS 5 TO	********* 100-YR)	******	*****
05:0002	SIGN STORM	S (TOWN OF	**************************************	********** LLS 5 TO	100-YR)	******	*****
05:0002	9 ******	S (TOWN OF	**************************************	********** LLS 5 TO	100-YR)	******	*****
05:0002	9 	S (TOWN OF	HALTON HI	LLS 5 TO	100-YR)	******	*****
05:0002	9 9 – Projec – Rainfa	S (TOWN OF	HALTON HI	LLS 5 TO	100-YR) 	******	*****
05:0002	9 9 	s (TOWN OF 	HALTON HI	LLS 5 TO	100-YR) 	******	*****
05:0002	9 9 	s (TOWN OF 	HALTON HI	LLS 5 TO	100-YR) 	******	*****
05:0002	9 9 Projec Rainfa nrs on itput = ME _010.STM	t dir.: Q: ll dir.: Q: Tric)	HALTON HI 	LLS 5 TO	100-yr)		
05:0002	9 9 	s (TOWN OF t dir.: Q: 11 dir.: Q: TRIC)	HALTON HI	LLS 5 TO	100-ур) 	······	
<pre>>:005:0002</pre>	9 9 	t dir.: Q: ll dir.: Q: TRIC)	HALTON HI	LLS 5 TO	100-ур) 	······	
005:0002	9 9 Projec Rainfa hrs on htput = ME 010.STM 	t dir.: Q: ll dir.: Q: TRIC) R HUMANITY 25	HALTON HI	LLS 5 TO	100-ур) 	······	
<pre>>:005:0002</pre>	9 9 1 Projec Rainfa nrs on itput = ME 010.STM 	t dir.: Q: t dir.: Q: tric) R HUMANITY 25 tants Inc.	HALTON HI :\60793_00 :\60793_00 :\60793_00	LLS 5 TO 	100-YR) HYMO\ HYMO\ yject Num		
05:0002	9 9 Projec Rainfa hrs on htput = ME 010.STM 	t dir.: Q: ll dir.: Q: TRIC) R HUMANITY 25 tants Inc.	HALTON HI :\60793_00 :\60793_00	LLS 5 TO 	100-YR) 		 793_001
05:0002- ** END OF RUN : START TZERO = .000 1 METOUT= 2 (on NRUN = 010 NRUN = 010 NRUN = 1 = 1=HH 10:0002- # Project Name: F # Date : 2 # Company : N # License # : 3 # 10:0002-	9 9 Projec Rainfa nrs on ttput = ME 010.STM HABITAT FO January 20 SASB TTE Consul 3053466	t dir.: Q: t dir.: Q: ll dir.: Q: TRIC) R HUMANITY 25 tants Inc.	HALTON HI :\60793_00 :\60793_00	LLS 5 TO	100-YR) HYMO\ HYMO\ Ject Num		 793_001
05:0002	9 Projec Rainfa hrs on htput = ME 010.STM	t dir.: Q: ll dir.: Q: TRIC) R HUMANITY 25 tants Inc.	HALTON HI :\60793_00 :\60793_00 :\60793_00	LLS 5 TO 	100-YR) 		 793_001
05:0002	9 9 1 Projec Rainfa nrs on utput = ME 	t dir.: Q: dir.: Q: 11 dir.: Q: TRIC) R HUMANITY 25 tants Inc. mame: 10-YF name: 10-YF TIME	HALTON HI .\60793_00 .\60793_00 37 KING S 	1\SWM\SWM T. Prc	100-YR) HYMO\ HYMO\ HYMO\ Jject Num Jject Num TM TM		
005:0002- ** END OF RUN : TZERO = .000 1 METOUT= 2 (on NRUN = 010 NRUN = 010 NRUN = 1 # 1=HH 10:0002- # Project Name: I # Date : 2 Modeller : 2 # Company : N # License # : 3 # **********************************	9 9 1 Projec Rainfa rrs on utput = ME 010.STM 010.STM HABITAT FO January 20 SB MTE Consul SB MTE Consul SG53466 Consul Common RAIN mm/hr 7.73	s (TOWN OF t dir.: Q: 11 dir.: Q: TRIC) R HUMANITY 25 tants Inc. mame: 10-YF ents: 10-YF TIME hrs n	HALTON HI :\60793_00 :\60793_00 37 KING S 37 KING S R Halton H RAIN RAIN RAIN 1 2.604 1	LLS 5 TO 	100-YR) 		**************************************
005:0002	9 9 Projec Rainfa nrs on utput = ME 010.STM 	t dir.: Q: t dir.: Q: 11 dir.: Q: 11 dir.: Q: 0 TRIC) R HUMANITY 25 tants Inc. TIME hrs m 6.17 26.50 13 6.50 13 6.50 13 6.57 14 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 17 15 16 15 15 15 15 15 15 15 15 15 15	HALTON HI +\60793_00 +\60793_00 -\60793_00 	LLS 5 TO 	100-YR) HYMO\ HYMO\ HYMO\ HYMO\ TM TM TM TM TM TM 1101 1 173 1 108 1 108 1 108 1	TIME hrss 8.17 8.33 8.50	RAIN mm/hr 1.107 1.092 1.064
005:0002	9 9 9 1 Projec Rainfa nrs on itput = ME 010.STM 010.ST	t dir.: Q: t dir.: Q: TRIC) TRIC) TRIC, tants Inc. TIME TIME tants 10-YF ents: 10-YF ents: 10-YF	HALTON HI + (60793_00 + (60793_00 + (60793_00 + (60793_00 - (60793_00) - (60793_00 - (60793_00) - (60793_00)	LLS 5 TO 	100-YR) 	TIME hrs 8.17 8.33 8.50 8.63	RAIN mm/hr 1.107 1.092 1.061
005:0002	9 9 Projec Rainfa nrs on utput = ME 010.STM RAIN mm/hr RAIN mm/hr RAIN RAIN RAIN	S (TOWN OF t dir.: Q: 11 dir.: Q: 11 dir.: Q: TRIC) TRIC) tants Inc. tants Inc. tants Inc. TIME hrs n 6.17 2 6.30 2 6.67 3 6.63 3	HALTON HI 	LLS 5 TO 	100-YR) HYMO\ HYMO\ HYMO\ HYMO\ Jject Num TM TM TM TM TM TM TM TM 108 1 173 1 108 1 108 1 989 1 989 1 989 1 989 1	TIME hrs 8.13 8.50 8.67 8.83 9.00 9.17	RAIN mm/hr 1.107 1.051 1.051 1.025
005:0002- ** END OF RUN : TZERO = .000 h METOUT= 2 (on NRTN = 010 NRTN = 010 NSTORM = 1 # 1=HH_ 10:0002- # Modeller : 2 # Modeller : 2 # Modeller : 2 # Modeller : 2 # Modeller : 3 # Company : b # License # : 3 #	9 9 9 1 Projec Rainfa nrs on ttput = ME 010.STM 010	t dir.: Q: t dir.: Q: 11 dir.: Q: 0 TRIC) TRIC) tants Inc. 10-YF ents: 10-YF ents: 10-YF ents: 10-YF 6.33 22 6.63 33 7.00 4 7.35 6 6.73 5 7.50 6	HALTON HI 	LLS 5 TO 	100-YR) HYMO\ HYMO\ HYMO\ HYMO\ Jject Num TM TM PAIN 1 243 1 173 1 047 1 989 1 989 1 985 1 885 1 887 1	TIME hrs 8.17 8.33 8.50 8.67 8.83 9.00 9.17 9.30	RAIN mm/hr 1.07 1.078 1.078 1.051 1.038 1.025 1.038
005:0002	9 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	S (TOWN OF t dir.: Q: t dir.: Q: 11 dir.: Q: 0 TRIC) tants Inc. 	HALTON HI 	LLS 5 TO 	100-YR) HYMO\ HYMO\ HYMO\ HYMO\ TTM TTM TTM TTM TTM TTM TTM TT	TIME hrs 8.17 8.33 9.00 9.33 9.67 9.67 9.80	RAIN mm/hr 1.071 1.072 1.051 1.052 1.013 1.013 1.013 1.025 1.013 1.025 1.013 1.025 1.013 1.025 1.013 1.025 1.013
005:0002	9 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	S (TOWN OF t dir.: Q: t dir.: Q: 11 dir.: Q: 0 TRIC) tants Inc. 	HALTON HI 	LLS 5 TO 	100-YR) HYMO\ HYMO\ HYMO\ HYMO\ TTM TTM TTM TTM TTM TTM TTM TT	TIME hrs 8.17 8.33 9.00 9.33 9.67 9.67 9.80	RAIN mm/hr 1.007 1.092 1.078 1.061 1.032 1.031 1
005:0002	9 9 9 1 Projec Rainfa nrs on titput = ME 010.STM 010.S	s (TOWN OF t dir.: Q: 11 dir.: Q: 0 TRIC) TRIC) R HUMANITY 25 tants Inc. R HUMANITY 25 tants Inc. 10-YF ents: 10-YF ents: 10-YF 7.50 6 6.83 3 7.00 4 7.50 6 6.77 13 7.50 6 7.50 7 7.50 6 7.50 6	HALTON HI 	LLS 5 TO 	100-YR) HYMO\ HYMO\ HYMO\ HYMO\ HYMO\ TM TM TM TM AIN 173 108 1 243 1 173 1 047 1 989 1 989 1 989 1 985 1 847 1 047 1 989 1 047 1 989 1 047 1 989 1 047 2 057 1 057 1 0	TIME hrs 8.17 8.33 8.67 8.67 8.83 9.17 9.33 8.67 8.83 9.17 9.33 0.17 0.33 0.50 0.17	RAIN mm/hr 1.07 1.078 1.078 1.078 1.078 1.078 1.078 1.051 1.038 1.031 1.038 1.031 1.032 1.078 1.032 1.078 1.032 1.031 1.032 1.031 1.032 1.032 1.031 1.032 1.031 1.032 1.031 1.032 1.031 1.032 1.031 1.032 1.031 1.032 1.
005:0002	9 9 9 1 Projec Rainfa nrs on ttput = ME 010.STM 010.ST	t dir.: Q: t dir.: Q: 11 dir.: Q: 0 TRIC) TRIC) TRIC: 12 dir.: Q: 0 TRIC: 13 dir.: Q: 0 TRIC: 14 dir.: Q: 0 0 TRIC: 14 dir.: Q: 0 0 TRIC: 15 dir.: Q: 0 0 TRIC: 10 dir.: Q: 0 0 TRIC: 10 dir.: Q: 0 10 dir.: Q: 0 0 TRIC: 10 dir.: Q: 11 dir.: Q: 0 0 TRIC: 10 dir.: Q: 11 dir.: Q: 0 0 TRIC: 10 dir.: Q: 0 10 dir.: Q: 10 dir.: Q: 1	HALTON HI 	LLS 5 TO 	100-YR) HYMO\ HYMO\ HYMO\ HYMO\ HYMO\ TM TM TM TM CAIN Vhr 319 243 108 1173 109 1173 109 1173 109 1173 109 1173 109 1174 1173 109 1174 1174	TIME hrs 8.33 8.67 8.33 8.67 8.33 8.60 9.17 9.30 9.17 9.30 9.50 9.50 9.50 9.50 9.50 9.50 9.50 9.5	RAIN 793_001 ******* ***************************
<pre>005:0002</pre>	9 9 9 1 Projec Rainfa nrs on titput = ME 010.STM 010.S	t dir.: Q: t dir.: Q: 11 dir.: Q: 11 dir.: Q: 0 TRIC) R HUMANITY 25 tants Inc. TIME hrs m 6.17 2 6.50 3 6.67 3 6.63 3 7.00 4 7.17 5 6.33 2 6.67 13 7.83 2 8.67 13 7.83 2 8.00 116 8.33 22 8.50 11 8.33 2 8.00 11 8.37 4 8.37 7 9.00 12 8.50 11 8.57 12 8.50 11 8.57 12 8.50 12	HALTON HI +ALTON HI 	LLS 5 TO 	100-YR) HYMO\ HYMO\ HYMO\ HYMO\ HYMO\ TTM TTM TTM TTM TTM TTM TTM TT	TIME hrs 8.17 8.30 9.00 9.17 9.30 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.33 9.50 9.17 9.17 9.17 9.17 9.17 9.17 9.17 9.17	RAIN RAIN 1.107 1.073 1.064 1.073 1.064 1.025 1.013 1.013 1.013 1.013 1.013 1.013 1.013 1.013 1.013 1.013 1.013 1.013 1.013 1.025 1.013 1.025 1.013 1.01

4.00	1.297 1.342 1 1.391 1	L0.00 4	.368	16.00	1.347	22.00	.853
4.33 4.50	1.443 1 1.500 1	L0.33 3 L0.50 3	8.815 8.592	16.33 16.50	1.303	22.33 22.50	.837 .829
4.83	1.563 1 1.632 1 1.708 1	L0.83 3	3.223	16.83	1.242	22.83	.814
5.17 5.33	1.792 1 1.887 1	L1.17 2 L1.33 2	2.929 2.803	17.17 17.33	1.205 1.187	23.17 23.33	.799 .792
5.50 5.67 5.83	1.993 1 2.114 1 2.253 1 2.414 1	L1.50 2 L1.67 2 L1.83 2	2.584	17.50 17.67 17.83	1.170 1.153 1.137	23.50 23.67 23.83	.785 .779 .772
010:0003							
* ####################################						******	*******
*# == *#	POST CON						
*#####################################							
CALIB STANDHYD 01:201 DT= 1.00) Total	Imp(%)=	76.00			= 76.0	00
Surface Area Dep. Storage	(ha)= (mm)=	09 1.00	IS PER'	VIOUS (i .03 5.00)		
Surface Area Dep. Storage Average Slope Length Mannings n	(%)= (m)=	2.00		4.40 2.80			
Max.eII.inten. over Storage Coeff.	(mm/nr)= (min) (min)=	118.25	(ii)	4.82 2.00 1.74 (ii)		
Max.eff.Inten. oven Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(cms)=	1.00	(ii)	2.00 .61			
					TO	TALS .033 (ii	ii)
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC:	(nrs)= (mm)= (mm)=	7.93 86.10 87.10	4	8.00 3.84 7.10	8 75 87		
						.872	
	3.0 Ia =	Dep. Sto	orage (Al	bove)			
(ii) TIME STEP THAN THE (iii) PEAK FLOW	STORAGE COR	EFFICIENT					
010:0004 *# ROUTE PARKING ANI							
* ROUTE RESERVOIR		ted rout	ing time	step -	1 0 min		
001(01110)	======	OUT	LFOW STO	RAGE TAB	LE ===:		
IN>01:(201) OUT<02:(ORFFLO)							
			CLFOW STOP DRAGE 0				
ROUTING RESULTS	(cms .00 .00 .03	s) (ha 00 .0000 07 .2000 14 .6000 AREA (ha)	A.m.) DE+00 DE-03 DE-03 QPEAK (cms)	(cms .01 .01 .00 TPEA (brs) (ha 5 .1100 5 .3100 0 .0000 K	a.m.) DE-02 DE-02 DE+00 R.V. (mm)	
ROUTING RESULTS	(cms .00 .01 .01	 a) (ha) b) (ha) c) (ha) c) (ha) c) (ha) c) (ha) 	0E-03 0E-03 0E-03 0E-03 0E-03 0E-03	(cms .01 .01 .00 TPEA (hrs 8.00) (ha 5 .1100 5 .3100 0 .0000 K) 0 79 7 79	a.m.) DE-02 DE-02 DE+00 R.V. (mm) 5.962 5.962	
ROUTING RESULTS INFLOW >01: (20 OUTFLOW<02: (05 OVERFLOW<03: (05	(cms .00 .00 .01 .01 .01 .01 .01 .01 .01 .01	 a) (ha) b) 00 000 c) 000 	QPEAK (cms) .003 .000	(cms .01 .01 .00 TPEA (hrs 8.00 8.01 .00) (ha 5 .1100 5 .3100 0 .0000 K) 0 7! 7 7! 0	a.m.) DE-02 DE-02 DE+00 R.V. (mm) 5.962	
ROUTING RESULTS INFLOW >01: (20 OUTFLOW<02: (05 OVERFLOW<03: (05	(cms .00 .00 .01 .01 .01 .01 .01 .01 .01 .01	 a) (ha) b) 00 000 c) 000 	QPEAK (cms) .003 .000	(cms .01 .01 .00 TPEA (hrs 8.00 8.01 .00) (ha 5 .1100 5 .3100 0 .0000 K) 0 7! 7 7! 0	A.m.) DE-02 DE-02 DE+00 R.V. (mm) 5.962 5.962 .000	
ROUTING RESULTS INFLOW >01: (2 OUTFLOW<02: (0 OVERFLOW<03: (0 I	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	 a) (ha b) (ha b) (ha c) (ha) <lic) (ha)<="" li=""> <lic) (ha)<="" li=""> <lic) (ha)<="" li=""> <lic)< td=""><td>A.m.) E+00 E=03 QPEAK (cms) .033 .015 .000 VVERFLOWIN</td><td>(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (%</td><td>) (ha 5 .110(5 .310(0 .000(K) 0 .7! 7 .7! 0 =)=)=</td><td>a.m.) DE-02 DE-02 DE+00 R.V. (mm) 5.962 5.962 .000 0 .00 .00</td><td></td></lic)<></lic)></lic)></lic)>	A.m.) E+00 E=03 QPEAK (cms) .033 .015 .000 VVERFLOWIN	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (%) (ha 5 .110(5 .310(0 .000(K) 0 .7! 7 .7! 0 =)=)=	a.m.) DE-02 DE-02 DE+00 R.V. (mm) 5.962 5.962 .000 0 .00 .00	
ROUTING RESULTS INFLOW >01: (2 OUTFLOW<02: (0 OVERFLOW<03: (0 I I I I	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	 (ha) (00.0000) (000) <	A.m.) EF+00 EF-03 EF-03 QPEAK (cms) .033 .015 .000 JATED OV: VVERFLOWIN SED	(cms .01 .01 .00 TPEA 8.01 8.01 8.01 8.01 (hours NG (% t/Qin](%) (h 5 .1100 5 .3100 0 .0000 K) 0 .7? 7 .7? 0 =)=)=)=)=)=)=)=)=)=)=)=)=)	a.m.) DE-02 DE-02 DE+00 R.V. (rmm) 5.962 5.962 0.000 0 0.00 5.15 1.000 2-02	
ROUTING RESULT INFLOW >01: (20 OUTFLOW<02: (00 OVERPLOW<03: (07 1 1 1 1 1 1 1 1 1 1 1 1 1	(cms .00 .00 .01 .01 .01 .01 .01 .01 .01 .01	 a) (ha) b) (000) c) (000) c) (000) c) (14) <lic) (14)<="" li=""> <lic) (14)<="" li=""> <lic) (14)<="" li=""> <lic) (14)<="" li=""> <</lic)></lic)></lic)></lic)>	L.m.) E+00 E-03 E-03 DE-03 QPEAK (cms) - 000 013 015 000 JLATED OV VVERFLOWSI VVERFLOWSI SED	(cms .01 .01 .00 TPEA 8.01 8.01 8.01 8.01 (hours NG (% t/Qin](%) (h 5 .1100 5 .3100 0 .0000 K) 0 .7? 7 .7? 0 =)=)=)=)=)=)=)=)=)=)=)=)=)	a.m.) DE-02 DE-02 DE+00 R.V. (rmm) 5.962 5.962 0.000 0 0.00 5.15 1.000 E-02	
ROUTING RESULT INFLOW >01: (20 OUTFLOW<02: (0) OVERPLOW<03: (0) 1 1 1 1 1 1 1 1 1 1 1 1 1	(cma .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	 (ha) 00000 2000 2000 44.6000 AREA (ha) 11 11 11 00 REDUCT REDUCT FIME OF DEAK F URAGE U (uncontr 	L.m.) IE+00 IE-03 IE-03 OPEAK (cms) .015 .000 ILATED OV. VVERFLOWI SVERFLOWI SED 	(cms .01 .01 .00 TPEA 8.01 8.01 8.01 8.01 (hours NG (% t/Qin](%) (h 5 .1100 5 .3100 0 .0000 K) 0 .7? 7 .7? 0 =)=)=)=)=)=)=)=)=)=)=)=)=)	a.m.) DE-02 DE-02 DE+00 R.V. (rmm) 5.962 5.962 0.000 0 0.00 5.15 1.000 E-02	
ROUTING RESULTS INFLOW >01: (2 OUTFLOW<02: (0) OVERFLOW<03: (0) I I I I I I I I I I I I I I I I I I I	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 0 .0000 77 .2000 (ha) .11 .11 .00 ROF SIMU REDUCT FITME OF O FF TIME OF PEAKE U UNCONTR (uncontr (ha)= Imp(%)=</pre>	L.m.) DE-00 DE-03 DE-03 OPEAK (cms) .015 .000 NUERFLOWS NUERFLOWS NUERFLOWS SED .02 24.00	(cms 01 01 00 TPEA (hrs 8.00 8.01 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (ha.m.) Dir. C) (ha 5 .1101 5 .3101 0 .0000 K) 0 .0000 K) =)=)=)=)=)=)=)=)=	A.m.) DE-02 DE-02 DE-02 DE-02 DE-00 (mm) 5.962 .000 0 .000 .000 .000 .000 .000 .000	
ROUTING RESULT INFLOW >01: (20 OUTFLOW<02: (0) OVERFLOW<03: (0) 1 1 1 1 1 1 1 1 1 1 1 1 1	(cma .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 00 .0000 77 .2000 44 .6000 (ha) .11 .11 .00 R OF SIMU REDUCT FIME OF OF FIME OF OF FIME OF FIME OF FIME OF FIME OF FIME OF FIME OF FIME OF COMPARIANT (ha)= Imp(%)=</pre>	LATEN E+00 E+03 E+03 E+03 E+03 E+03 E+03 E+03 C+03	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (min (ha.m.) (ha 5 .1101 5 .3101 0 .0000 K) 0 .0000 K) =)=)=)=)=)=)=)=)=	A.m.) DE-02 DE-02 DE-02 DE-02 DE-00 (mm) 5.962 .000 0 .000 .000 .000 .000 .000 .000	
ROUTING RESULT INFLOW >01: (20 OUTFLOW<02: (0) OVERFLOW<03: (0) 1 1 1 1 1 1 1 1 1 1 1 1 1	(cma .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 00 .0000 77 .2000 44 .6000 (ha) .11 .11 .00 R OF SIMU REDUCT FIME OF OF FIME OF OF FIME OF FIME OF FIME OF FIME OF FIME OF FIME OF FIME OF COMPARIANT (ha)= Imp(%)=</pre>	LATEN E+00 E+03 E+03 E+03 E+03 E+03 E+03 E+03 C+03	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (min (ha.m.) (ha 5 .1101 5 .3101 0 .0000 K) 0 .0000 K) =)=)=)=)=)=)=)=)=	A.m.) DE-02 DE-02 DE-02 DE-02 DE-00 (mm) 5.962 .000 0 .000 .000 .000 .000 .000 .000	
ROUTING RESULT INFLOW >01: (20 OUTFLOW<02: (0) OVERFLOW<03: (0) 1 1 1 1 1 1 1 1 1 1 1 1 1	(cma .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 00 .0000 77 .2000 44 .6000 (ha) .11 .11 .00 R OF SIMU REDUCT FIME OF OF FIME OF OF FIME OF FIME OF FIME OF FIME OF FIME OF FIME OF FIME OF COMPARIANT (ha)= Imp(%)=</pre>	L.m.) DE-00 DE-03 DE-03 OPEAK (cms) .015 .000 JLATED OV. VERFLOWS VERFLOWS VERFLOWS VERFLOWS COLOR .02 24.00 JS PER .2	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (min (ha.m.) (ha 5 .1101 5 .3101 0 .0000 K) 0 .0000 K) =)=)=)=)=)=)=)=)=	A.m.) DE-02 DE-02 DE-02 DE-02 DE-00 (mm) 5.962 .000 0 .000 .000 .000 .000 .000 .000	
ROUTING RESULTS INFLOW >01: (20 OUTERLOW<02: (0) OVERFLOW<03: (0) 1 1 1 1 1 1 1 1 1 1 1 1 1	(cme .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>a) (ha 0 .0000 AREA (ha) .11 .11 .00 AREA (ha) .11 .11 .00 AREA (ha) BREDUCT REDUCT FF PEAK F REDUCT (uncontr (ha)= Imp(%)= .01 1.00 2.00 .013 .01 .00 .013</pre>	L.m.) E+00 E+03 E+03 E+03 E+03 C+03	(cms .01 .00 TPEA (hrs (hors (hours) NG (% (min (ha.m. Dir. C VIOUS (i .00 .00 3.00 .250 5.80) (ha 5 .1101 5 .3101 0 .7? 7 .7? 0	A.m.) DE-02 DE-02 DE-02 DE-02 DE-00 (mm) 5.962 .000 0 .000 .000 .000 .000 .000 .000	
ROUTING RESULTS INFLOW >01: (2) OUTFLOW<02: (0) OVERFLOW<03: (0) I I I I I I I I I I I I I	(cme .0(.0) .0] .0] .0] .0] .0] .0] .0] .0] .0] .0]	<pre>s) (ha 00 .0000 77 .2000 44 .6000 AREA (ha) .11 .11 .00 S OF SIMU (TIME OF OF SIMU REDUCT F PEAK F FORAGE U .00 (uncontr (ha)= Imp(%)= .01 1.00 2.00 .013 118.25 1.00 .23 1.00</pre>	L.m.) E+00 E-03 E-03 (cms) . .033 . .015 . .000 JLATED OV. VVERFLOWI SED .020 24.00 JS PER .22 . .02 . .02 . .02 . .02 . .02 . .02 . .02 . .02 . .02 . .04 . .00 .02 . .02 . .02 . .04 . .00 .02 . .02 . .04 . .00 .02 . .04 . .00 .02 . .02 . .04 . .00 .02 . .03 .01 .00 .0	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (min (ha.m.) (ha 5 .1101 5 .3101 0 .7? 7 .7? 0	A.m.) DE-02 DE-02 DE-02 DE-02 DE-00 (mm) 5.962 .000 0 .000 .000 .000 .000 .000 .000	
ROUTING RESULT INFLOW >01: (20 OUTFLOW<02: (00 OVERPLOW<03: (07 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 0 .0000 77 .2000 44 .6000 AREA (ha) .11 .11 .00 S OF SIMU TIME OF OF SIMU OF TIME OF OF TIME OF PEAK F UNCOMPERVIOU .00 .00 .013 118.25 1.00 .23 1.00 .68</pre>	L.m.) IE+00 IE+03 IE-03 OPEAK (cms) . .033 . .015 . .000 ILATED OV. VVERFLOWI SVERFLOWI	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (min (ha.m. Dir. C VIOUS (i .02 5.00 0.00 .250 5.80 1.00 1.01 1.11 (ii	<pre>) (ha 5 .1100 5 .3100 (K) 0</pre>	A.m.) JE-02 JE-02 JE-00 R.V. (rm) 5.962 .962	20
ROUTING RESULT INFLOW >01: (20 OUTFLOW<02: (00 OVERPLOW<03: (07 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 0 .0000 77 .2000 44 .6000 AREA (ha) .11 .11 .00 S OF SIMU TIME OF OF SIMU OF TIME OF OF TIME OF PEAK F UNCOMPERVIOU .00 .00 .013 118.25 1.00 .23 1.00 .68</pre>	L.m.) IE+00 IE+03 IE-03 OPEAK (cms) . .033 . .015 . .000 ILATED OV. VVERFLOWI SVERFLOWI	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (min (ha.m. Dir. C VIOUS (i .02 5.00 0.00 .250 5.80 1.00 1.01 1.11 (ii) (ha 5 .110(5 .310(0 .77) 0 .77 7 .72 0	A.m.) JE-02 JE-02 JE-02 JE-02 JE-02 0 0 0 0 0 0 0 0 0 0 0 0 0	20
ROUTING RESULTS INFLOW >01: (20 OUTFLOW<02: (00 OVERFLOW<03: (01 1 1 1 1 1 1 1 1 1 1 1 1 1	(cms .0(.0) .0] .0] .0] .0] .0] .0] .0] .0] .0] .0]	<pre>s) (ha 0 .0000 77 .2000 44 .6000 AREA (ha) .11 .11 .00 S OF SIMU (TIME OF OF SIMU REDUCT F PEAK F REDUCT F PEAK F REDUCT (uncontr (ha)= Imp(%)= 1.00 .01 1.00 2.00 .01 1.00 1.00 1.00 2.00 0.01 3 1.00 1.68 .00 7.90 86.10 87.10 1.00 87.10 1.00 1.00 1.00 1.00 1.00 1.00 1.00</pre>	L.m.) IE+00 IE-03 IE-03 IE-03 OPEAK (cms) .033 .015 .000 ULATED OV. WVERFLOWS IN VERFLOWS IN COMMISSION .020 .020 .020 .020 .020 .020 .020 .02	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% (min (ha.m. .02 5.00 .00 .250 5.80 1.00 1.11 (ii 1.00 1.01 .00 3.84 .00 3.84 .00 .250 5.80 1.00 1.01 .00 1.01 .00 .250 5.80 1.00 .00 .250 5.80 1.00 .00 .250 5.80 1.00 .00 .250 5.80 1.00 .00 .250 5.80 1.00 .00 .250 5.80 1.00 .00 .250 5.80 .00 .250 5.80 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .250 5.80 .00 .00 .00 .250 5.80 .00 .00 .250 .550 .00 .00 .00 .250 .550 .00 .00 .00 .00 .00 .00 .00 .00) (ha 5 .110(5 .310(0 .77) 0 .77 7 .72 0	A.m.) BE-02 EE-02 EE-00 R.V. (rum) 00 00 00 00 515 1.00 2-02 	20
ROUTING RESULTS INFLOW >01: (20 OUTELOW<02: (00 OVERFLOW<03: (01 1 1 1 1 1 1 1 1 1 1 1 1 1	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>a) (ha 0 .0000 77 .2000 44 .6000 AREA (ha) .11 .11 .00 CF SIMU REDUCT 0 F FIAK F REDUCT 0 F FIAK F UNDERVIOU .00 .00 .013 118.25 1.00 .01 .00 .013 118.25 1.00 .01 .01 .00 .013 116.8 .00 7.90 86.10 87.10 .99 ED FOR PE Dep. FIC D E SMA EM CONTRACTOR .00 .01 .00 .00 .01 .00 .00 .00 .00 .00</pre>	A.m.) IE+00 IE+03 IE-03 IE-03 OPEAK (cms) .033 .015 .000 ILATED OV. VVERFLOWI S	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% /(min (ha.m. .02 5.00 .02 5.00 .02 5.80 1.00 1.01 1.01 .00 8.00 3.84 7.10 .50 0SSES: bove) EQUAL) (ha 5 .110(5 .310(0 .77) 0 .77 7 .72 0	A.m.) BE-02 EE-02 EE-00 R.V. (rum) 00 00 00 00 515 1.00 2-02 	20
ROUTING RESULTS INFLOW >01: (20 OUTFLOW<02: (0) OVERFLOW<03: (0) OVERFLOW<03: (0) 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01</pre>	<pre>s) (ha 0 .0000 77 .2000 AREA (ha) .11 .11 .00 S OF SIMU (TIME OF OF SIMU FITME OF OF FITME OF OF TIME OF OF TIME OF CONTRACTOR (ha)= Imp(%)= Imp(%)= (uncontr (ha)= Imp(%)= 1.00 .01 1.00 2.00 .013 118.25 1.00 1.68 .00 7.90 86.10 87.10 .99 ED FOR PE Dep. Sto. DE SKM. EFFICIENT INCLUDE B</pre>	L.m.) IE+00 IE+03 IE-03 IE-03 QPEAK (cms) .033 .015 .000 JLATED OV. WVERFLOWS .000 VVERFLOWS .000 .000 .000 .000 .000 .000 .000 .0	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (mim (ha.m.) 00 250 5.00 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.00 1.01 1.00 1.0) (ha 5 .1101 5 .3100 0 .0000 K) 0 =)=)=)=)=)=)=)=)=)=	A.m.) JE-02 JE-02 JE-02 JE-02 JE-02 JE-02 .02 .000 0 .0000 .0)0 (i)
ROUTING RESULTS INFLOW >01: (2) OUTFLOW<02: (0) OVERFLOW<03: (0) OVERFLOW<03: (0) I I I I I I I I I I I I I	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 0 .0000 77 .2000 44 .6000 AREA (ha) .11 .11 .00 S OF SIMU TIME OF OF SIMU REDUCT FITIME OF OF FITIME OF OF FITIME OF OF FITIME OF TIME OF OF FIAL (ha)= Imp(%)=U .01 1.00 .00 .01 .00 .01 .00 .01 .00 .01 .00 .01 .00 .00</pre>	A.m.) IE+00 IE+03 IE-03 IE-03 OPEAK (cms) .033 .015 .000 ILATED OV. VVERFLOWI SED .002 24.00 IS PER .02 24.00 IS PER .02 24.00	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (mim (ha.m.) 0.00 .02 5.00 0.00 3.00 .250 5.80 1.00 1.01 1.01 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1) (ha 5 .110 5 .310 0 .000 k))=)=)=)=)=)=)=)=)=	A.m.) JE-02 JE-02 JE-00 R.V. (wm) 0 0 0 0 0 0 0 0 -00 -00 -00	10
ROUTING RESULTS INFLOW >01: (2) OUTFLOW<02: (0) OVERFLOW<03: (0) OVERFLOW<03: (0) I I I I I I I I I I I I I	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 0 .0000 77 .2000 44 .6000 AREA (ha) .11 .11 .00 S OF SIMU TIME OF OF SIMU REDUCT FITIME OF OF FITIME OF OF FITIME OF OF FITIME OF TIME OF OF FIAL (ha)= Imp(%)=U .01 1.00 .00 .01 .00 .01 .00 .01 .00 .01 .00 .01 .00 .00</pre>	A.m.) IE+00 IE+03 IE-03 IE-03 OPEAK (cms) .033 .015 .000 ILATED OV. VVERFLOWI SED .002 24.00 IS PER .02 24.00 IS PER .02 24.00	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (mim (ha.m.) 0.00 .02 5.00 0.00 3.00 .250 5.80 1.00 1.01 1.01 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1) (ha 5 .110 5 .310 0 .000 k))=)=)=)=)=)=)=)=)=	A.m.) JE-02 JE-02 JE-00 R.V. (wm) 0 0 0 0 0 0 0 0 -00 -00 -00	10
ROUTING RESULTS INFLOW >01: (2) OUTFLOW<02: (0) OVERFLOW<03: (0) OVERFLOW<03: (0) I I I I I I I I I I I I I	(cms .00 .01 .01 .01 .01 .01 .01 .01 .01 .01	<pre>s) (ha 0 .0000 77 .2000 44 .6000 AREA (ha) .11 .11 .00 S OF SIMU TIME OF OF SIMU REDUCT FITIME OF OF FITIME OF OF FITIME OF OF FITIME OF TIME OF OF FIAL (ha)= Imp(%)=U .01 1.00 .00 .01 .00 .01 .00 .01 .00 .01 .00 .01 .00 .00</pre>	A.m.) IE+00 IE+03 IE-03 IE-03 OPEAK (cms) .033 .015 .000 ILATED OV. VVERFLOWI SED .002 24.00 IS PER .02 24.00 IS PER .02 24.00	(cms .01 .00 TPEA (hrs 8.00 8.01 .00 ERFLOWS (hours NG (% t/Qin](% (mim (ha.m.) 0.00 .02 5.00 0.00 3.00 .250 5.80 1.00 1.01 1.01 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1.01 1.00 1.01 1) (ha 5 .110 5 .310 0 .000 k))=)=)=)=)=)=)=)=)=	A.m.) JE-02 JE-02 JE-00 R.V. (wm) 0 0 0 0 0 0 0 0 -00 -00 -00	10

)10:0007			
# CATCHMENT 203 - BP	EHIND RETAINING WALL F	LOWING TO GO	
	 Area (ha)= Ia (mm)= 5 U.H. Tp(hrs)=	.00 Curve Numbe	(CN) = 78.00
01.105 21- 1.00	U.H. Tp(hrs)=	.050	ACD (A) = 3.00
Unit Hyd Qpeak			
PEAK FLOW TIME TO PEAK RUNOFF VOLUME	(cms)= .000 (i) (hrs)= 8.000		
RUNOFF VOLUME TOTAL RAINFALL	(mm) = 43.810 (mm) = 87.104		
RUNOFF COEFFICIE			
(i) PEAK FLOW DO	DES NOT INCLUDE BASEFL	OW IF ANY.	
	TERNAL AREAS uncontro		
CALIB STANDHYD	 Area (ha)= Total Imp(%)= 2	.03	
			<pre>%)= 21.00</pre>
Surface Area	(ha)= .01	.03	
Dep. Storage Average Slope	IMPERVIOUS (ha)= .01 (mm)= 1.00 (%)= 2.00 (m)= 6.50 = .013	5.00	
Length Mannings n	(m)= 6.50 = .013	4.50 .250	
over Storage Coeff	(min) 1.00 (min)= 38 (44	2.00	
Unit Hyd. Tpeak	nm/hr)= 118.25 (min) 1.00 (min)= .38 (ii (min)= 1.00 (cms)= 1.58	2.00	
			TOTALS*
PEAK FLOW TIME TO PEAK	(cms)= .00 (hrs)= 7.92 (mm)= 86.10 (mm)= 87.10 ENT = .99	.00 8.00	.007 (iii) 8.000
RUNOFF VOLUME TOTAL RAINFALL	(mm) = 86.10 (mm) = 87.10	43.84 87.10	52.720 87.104
RUNOFF COEFFICIE	ENT = .99	.50	.605
	JRE SELECTED FOR PERVI		
(ii) TIME STEP	.0 Ia = Dep. Storag (DT) SHOULD BE SMALLE		
	STORAGE COEFFICIENT. DOES NOT INCLUDE BASE	FLOW IF ANY.	
	g St (Internal + exter		
ADD HYD (PropSite) 1D: NHYD	(ha) (cms) (PEAK R.V. DWF hrs) (mm) (cms)
	SUM 06:PropSite	.13 .020	8.00 72.36 .000
	-ID2 08:SITE	.13 .020	8.00 72.36 .000
NOTE: PEAK FLOWS	SUM 06:PropSite	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000
NOTE: PEAK FLOWS	SUM 06:PropSite DO NOT INCLUDE BASEPL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS	SUM 06:PropSite	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS	SUM 06:PropSite DO NOT INCLUDE BASEFL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS	SUM 06:PropSite DO NOT INCLUDE BASEFL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS	SUM 06:PropSite DO NOT INCLUDE BASEFL SN STORMS (TOWN OF HAL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS	SUM 06:PropSite DO NOT INCLUDE BASEFL SN STORMS (TOWN OF HAL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS 010:0010	SUM 06:PropSite DO NOT INCLUDE BASEFL SN STORMS (TOWN OF HAL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS 010:0010	SUM 06:PropSite DO NOT INCLUDE BASEFL SN STORMS (TOWN OF HAL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS 010:0010	SUM 06:PropSite DO NOT INCLUDE BASEFL SN STORMS (TOWN OF HAL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS 010:0010	SUM 06:PropSite DO NOT INCLUDE BASEFL NN STORMS (TOWN OF HAL	.13 .020 .17 .026 OWS IF ANY.	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS 010:0010	SUM 06:PropSite DO NOT INCLUDE BASEFL	.13 .020 .17 .026 OWS IF ANY. TON HILLS 5 TO 100	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS 010:0010	SUM 06:PropSite DO NOT INCLUDE BASEFL NN STORMS (TOWN OF HAL	.13 .020 .17 .026 OWS IF ANY. TON HILLS 5 TO 100	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS 010:0010	SUM 06:PropSite DO NOT INCLUDE BASEFL N STORMS (TOWN OF HAL Project dir.: Q:\60 Rainfall dir.: Q:\60	.13 .020 .17 .026 OWS IF ANY. TON HILLS 5 TO 100	8.00 72.36 .000 8.00 68.36 .000
NOTE: PEAK FLOWS 010:0010	SUM 06:PropSite DO NOT INCLUDE BASEFL N STORMS (TOWN OF HAL Project dir.: Q:\60 Rainfall dir.: Q:\60	.13 .020 .17 .026 OWS IF ANY. TON HILLS 5 TO 100	8.00 72.36 .000 8.00 68.36 .000
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	1.458 1.502	9.33	7.645	15.33	1.784	21.33 21.50	1.098
5.05	1.550 1.601	9.67	6.265	15.67	1.720	21.67	1.076
4.17	1.655 1.715	10.17	4.976	16.17	1.634	22.17	1.046
4.50	1.779	10.50	4.396	16.50	1.581	22.50	1.026
4.83	1.926	10.83	3.948	16.83	1.532	22.83	1.008
5.17	2.102 2.206 2.321	11.17	3.590	17.17	1.487	23.17	.999 .990 .981
5.50	2.451 2.599	11.50	3.298 3.171	17.50	1.444 1.424	23.50	.973 .964
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<pre># ROUTE PARKING AN ROUTE RESERVOIR IN>01:(201) OUT<02:(ORFFLO) OUT<02:(ORFFLO) INFLOW >01:(2 OUTFLOW<02:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C) OVERFLOW<03:(C)</pre>	D ROOF THR Requ Requ Court	Rested rou accested rou accested rou UOW ST Timas) (ha) (ha) .11 .11 .11 .11 .00 SER OF SIM C OF TIME W REDUC CO PEAK STORAGE account account	ICE WITH ting tir TLFOW ST ORAGE a.m.) OB+00 OB-03 OE-03 OE-03 OE-03 OE-03 OE-03 OE-03 OE-03 OE-03 OUE-04 OUE-04 OUE-05 OUE-	<pre>H SURFACE ne step = TORAGE TF OUTFI (OUTFI) OUTFI (Cm) (</pre>	<pre>PONDING = 1.0 mi HBLE === .00W ST .00W ST .110 15 .110 15 .110 15 .110 15 .310 000 .000 20K s= .s)= .s)= .s)= .s)= .s)= .s)= .s)= .</pre>	n. VORAGE ia.m.) 102-02 102-02 102-02 102-02 102-02 102-00 R.V. (mm) 3.383 .000 0 .000	
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<pre># ROUTE PARKING AN ROUTE RESERVOIR IN>01:(201) OUT<02:(ORFFLO) NFLOW >01:(2 OUTFLOW-02:(C OUTFLOW-02:(C OUTFLOW-02:(C OUTFLOW-03:(C OUT</pre>	D ROOF THR Requ Requ Control (c Control (c) Control (c) Control (c) Control (c) Control (c) Control (c) REFFLO) TOTAL NUME COMULATIVE PERCENTAGE PERK FLO TOTAL NUME COMULATIVE PERCENTAGE PERK FLO TO Street (m)= (m	<pre>kough orif leasted rou sense ou vious for the sense in the sense</pre>	ICE WITH ting tir TLFOW 57 ORAGE a.m.) 0E+00 0E-03	H SURFACE me step = TORAGE TF OUTFI OUTFI CTF CTF 	<pre>PONDING PONDING 1.0 mi BLE === .00W ST .00W ST .10 15 .110 15 .110 15 .110 15 .310 000 .000 2AK .3) 000 .000 3.= .3) 000 3.= .3) .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3</pre>	<pre>rn.</pre>	
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<pre># ROUTE PARKING AN ROUTE RESERVOIR IN>01:(201) OUT<02:(ORFFLO) OUT<02:(ORFFLO) INFLOW >01:(2 OUTFLOW<02:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03:(C OVERFLOW<03</pre>	D ROOF THR Requ Requ B ==== OUTF (c CUTUE COUTE (c CUTUE COUTE (c CUTUE COUTE	<pre>KOUGH ORIF Lested rou Lested</pre>	ICE WITH ting tir TLFOW ST ORAGE a.m.) 0E+00 0E+03 0E+03 0E+03 0E+03 0E+03 0E+00 0E+00 0E+00 0ULATED (OVERFLOW OVERFLOW TION (QC FLOW USED 	H SURFACE me step = TORAGE TF OUTF OUTF CTF C.C C.C 	<pre>PONDING PONDING 1.0 mi BLE === .00W ST .00W ST .10 15 .110 15 .110 15 .110 15 .310 000 .000 2AK .3) 000 .000 3.= .3) 000 3.= .3) .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3</pre>	<pre>r</pre>	

ADD HYD (SITE		rnal site)	00000-0	mpar-	D	P-1-1-			
) ID: NHYD ID1 07:202 ID2 02:0RFFLOW-SW ID3 03:0RFFLOW-OV	AREA (ha)	QPEAK (cms)	(hrs)	R.V. (mm)	DWF (cms)		1146 1147	
+	ID1 07:202 ID2 02:ORFFLOW-SW	.02	.006	8.00	69.56 93.38	.000		1148	
+	-ID3 03:ORFFLOW-OV	.00	.000	.00	.00	.000	**DRY**	1150 1151	
	SUM 08:SITE	.13	.021	8.00	89.48	.000		1152 1153	
NOTE: PEAK FLOWS	DO NOT INCLUDE BASE	FLOWS IF AN	Υ.					1154 1155	
25:0007								1156 1157	
# CATCHMENT 203 - BE	HIND RETAINING WALL	FLOWING TO	GO					1158 1159	
		0.0 01	THE NUT	box ((NI) = 79 (10		1160 1161	
CALIB NASHYD 01:203 DT= 1.00	Ia (mm)=	5.000 #	of Line	ar Res.	(N) = 78.0 (N) = 3.0	00		1162	
		.050						1163 1164	
Unit Hyd Qpeak								1165 1166	
TIME TO PEAK								1167 1168	
RUNOFF VOLUME TOTAL RAINFALL	(mm)= 58.526 (mm)= 105.376							1169 1170	
RUNOFF COEFFICIE	INT = .555							1171 1172	
(i) PEAK FLOW DO	DES NOT INCLUDE BASE	FLOW IF ANY	•					1173 1174	
25:0008								1175 1176	
# CATCHMENT 204 - EX								1170	
	. <u>.</u>							1179	
CALIB STANDHYD 03:204 DT= 1.00	Area (ha)= Total Imp(%)=	.03 21.00 Di	r. Conr	.(%)=	21.00			1180 1181	
	- IMPERVIOUS	PERVIOU	S (i)					1183	050:00 *
Surface Area Dep. Storage Average Slope Length Mannings n	(ha)= .01 (mm)= 1.00	.03 5.00						1185	*##### *#
Average Slope Length	(%)= 2.00 (m)= 6.50	5.00						1186	
Mannings n	= .013	.250						1188	
Max.eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr)= 139.95	85.31						1190	*# CA1
over Storage Coeff.	(min) 1.00 (min)= .35 (2.00 ii) 1.89	(ii)					1192	*
Unit Hyd. Tpeak Unit Hyd. peak	(min)= 1.00 (cms)= 1.60	2.00 •58						1194	CALI 01:2
PEAK FLOW	(cms)= .00	.01		*TOTAL	S* 9 (iii)			1195 1196	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	(hrs)= 7.92 (mm)= 104.37	8.00 58.57		8.00 68.19	0			1197 1198	S D
TOTAL RAINFALL	(mm) = 105.38	105.38		105.37	6 7			1199 1200	2
	IRE SELECTED FOR PER							1201	. 1
 (i) CN FROCEDO CN* = 78. (ii) TIME STEP THAN THE S 									
(iii) PEAK FLOW	DOES NOT INCLODE BA	SEFLOW IF A	NY.					1203 1204 1205 1206	i 1
25:0009	g St (Internal + ext							1207	τ
25:0009- # Total FLOW to King	g St (Internal + ext	ernal)						1207	τ
25:0009- # Total FLOW to King ADD HYD (PropSite	<pre>g St (Internal + ext) ID: NHYD</pre>	ernal) AREA (ba)	QPEAK (cms) .009	TPEAK (hrs) 8.00	R.V. (mm) 68.19	DWF (cms) .000		1207	U F T F T F
25:0009- # Total FLOW to King ADD HYD (PropSite	g St (Internal + ext	ernal) AREA (ba)	QPEAK (cms) .009 .021	TPEAK (hrs) 8.00 8.00	R.V. (mm) 68.19 89.48	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213	F F F F F F F F
25:0009 # Total FLOW to King ADD HYD (PropSite +	<pre>g St (Internal + ext) ID: NHYD</pre>	ernal) AREA (ha) .03 .13	QPEAK (cms) .009 .021	TPEAK (hrs) 8.00 8.00	R.V. (mm) 68.19 89.48	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217	
25:0009 # Total FLOW to King ADD HYD (PropSite +	St (Internal + ext ID: NHYD ID: 03:204 ID2 08:SITE SUM 06:PropSite	ernal) AREA (ha) .13 .17	QPEAK (cms) .009 .021 .030	TPEAK (hrs) 8.00 8.00	R.V. (mm) 68.19 89.48	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219	
25:0009	<pre>y St (Internal + ext) ID: NHYD ID: 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE</pre>	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK (cms) .009 .021 .030 Y.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221	F 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
25:0009- # Total FLOW to King ADD HYD (PropSite + NOTE: PEAK FLOWS 25:0010	<pre>s St (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE</pre>	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK (cms) .009 .021 .030 Y.	TPEAK (hrs) 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223	U 500:000 *# ROL
25:0009- # Total FLOW to King ADD HYD (PropSite , NOTE: PEAK FLOWS 25:0010- RUN REMAINING DESIG	St (Internal + ext ID: NHYD ID: 03:204 ID: 208:SITE SUM 06:PropSite DO NOT INCLUDE BASE N STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 FLOWS IF AN	QPEAK (cms) .009 .021 .030 Y. 	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1218 1229 1220 1221 1222 1223 1223	U F T F T T F T T T T T T T T T T T T T
25:0009- # Total FLOW to King ADD HYD (PropSite + NOTE: PEAK FLOWS 25:0010	<pre>g St (Internal + ext) ID: NHYD ID: 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE ID NOT INCLUDE BASE IN STORMS (TOWN OF H</pre>	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK (cms) .009 .021 .030 Y.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1218 1229 1220 1221 1222 1223 1224 1225 1226 1227	U U U U U U U U U U U U U U U U U U U
25:0009	St (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE N STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK (cms) .009 .021 .030 Y. 	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1228 1229 1220 1221 1222 1225 1226 1227 1228	U U U U U U U U U U U U U U
25:0009	<pre>st (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE IN STORMS (TOWN OF H IN STORMS (TOWN OF H)</pre>	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN 	QPEAK (cms) .021 .030 Y.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1222 1223 1224 1225 1226 1227 1228 1228 1228 1228 1228 1229 1229 1229	050:00 * * *
25:0009- # Total FLOW to King ADD HYD (PropSite • NOTE: PEAK FLOWS 25:0010- RUN REMAINING DESIG 25:0002-	St (Internal + ext ID: NHYD ID: 03:204 ID: 208:SITE SUM 06:PropSite DO NOT INCLUDE BASE	ernal) AREA (ha) .03 .13 FLOWS IF AN	QPEAK (cms) .009 .021 .030 Y. 	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1218 1229 1220 1222 1223 1224 1225 1226 1227 1228 1228 1228 1228 1228 1228 1228	050:00 *# ROU NOUT
25:0009- # Total FLOW to King ADD HYD (PropSite 	St (Internal + ext ID: NHYD ID: 03:204 ID: 03:204 SUM 06:PropSite DO NOT INCLUDE BASE N STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 FLOWS IF AN	QPEAK (cms) .009 .021 .030 Y. 	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1218 1229 1220 1221 1222 1222 1222 1222 1222	050:00 ** ROUI NUI
25:0009- # Total FLOW to King ADD HYD (PropSite , NOTE: PEAK FLOWS 25:0010- RUN REMAINING DESIG 25:0002-	St (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE NN STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK (cms) .002 .030 YY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1218 1220 1221 1222 1222 1225 1226 1227 1228 1229 1229 1229 1229 1229 1229 1229	050:00 *# ROUT IN3 IN3 OUT-
25:0009	St (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE NN STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK (cms) .002 .030 YY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1229 1229 1229 1229 1231 1231 1231	050:00 * * 0000-00 * 1 INS 0000-00
25:0009	St (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE NN STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK (cms) .002 .030 YY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1215 1216 1217 1228 1229 1220 1221 1222 1222 1228 1228 1228 1228	050:00 * * 00 0 00 * 00 0 00 0 00 0 00 0 0
25:0009	St (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE NN STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK (cms) .002 .030 YY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1214 1215 1216 1217 1228 1229 1223 1224 1227 1228 1226 1227 1228 1226 1227 1228 1226 1227 1228 1229 1230 1231 1232 1234 1235 1236 1237 1238 1238 1238 1238 1238 1238 1238 1238	E 050:00 *# ROU * INS 0 000 * 000 * * * *
25:0009	St (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE NN STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN	QPEAK ((ms) .002 .030 YY. 	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1229 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1239 1239 1239 1239 1239 1239 1239	C 050:00 *# ROU NOUT- INN- OUT- OUT- C OV
25:0009	St (Internal + ext) ID: NHYD ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE N STORMS (TOWN OF H	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN 	QPEAK (cms) .001 .030 Y. 	TPEAK (hrs) 8.00 8.00 	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1224 1225 1226 1227 1228 1229 1229 1229 1229 1229 1229 1229	C 050:00 *# ROU OUT- IN- OUT- OUT- OUT-
25:0009	<pre>St (Internal + ext) ID: NHYD ID: 03:204 ID: 06:SITE SUM 06:PropSite DO NOT INCLUDE BASE N STORMS (TOWN OF H STORMS (TOWN OF H Project dir.: Q:\ Rainfall dir.: Q:\</pre>	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN 	QPEAK (cms) .001 .030 Y. 	TPEAK (hrs) 8.00 8.00 	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1222 1229 1229 1229 1229 1229 1229	C U E T F F F F C C C C C C C C C C C C C
25:0009	<pre>St (Internal + ext) ID: NHYD ID: 03:204 ID: 06:SITE SUM 06:PropSite DO NOT INCLUDE BASE N STORMS (TOWN OF H STORMS (TOWN OF H Project dir.: Q:\ Rainfall dir.: Q:\</pre>	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN 	QPEAK (cms) .001 .030 Y. 	TPEAK (hrs) 8.00 8.00 	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1228 1229 1220 1221 1222 1222 1228 1228 1228 1228	E 050:00 * ROUT * 00 * 00 * 00 * 00 * 00 * 00 * 00 * 0
25:0009- # Total FLOW to King ADD HYD (PropSite 	<pre>St (Internal + ext ID: NHYD ID: NHYD ID: 03:204 ID: 03:204 ID: 00:PropSite DO NOT INCLUDE BASE ID: NSTORMS (TOWN OF H ID: 00:PropSite ID: 00:PropSite ID:</pre>	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN 	QPEAK (cms) .001 .030 Y. 	TPEAK (hrs) 8.00 8.00 	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1211 1212 1213 1214 1214 1215 1216 1217 1228 1229 1223 1224 1225 1226 1227 1228 1228 1228 1228 1229 1233 1244 1235 1238 1239 1239 1239 1239 1239 1239 1239 1239	C 050:00 * # ROUT * 00 * 00 * 00 * 00 * 00 * 00 * 00 * 0
25:0009	<pre>St (Internal + ext ID: NHYD ID: 03:204 ID: 03:204 ID: 06:PropSite DO NOT INCLUDE BASE IN STORMS (TOWN OF H IN STORMS (TOWN OF H IN</pre>	ernal) AREA (ha) .03 .13 FLOWS IF AN CALTON HILLS CALTON HILLS 60793_001\S 60793_001\S	QPEAK (cms) .021 .030 Y. 	TPEAK (hrs) 8.00 8.00 	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1245 1246 1247 1246 1247 1246 1246 1247 1246 1247 1246 1247 1246 1247 1246 1247 1246 1247 1246 1247 1247 1255 1255 1255 1255 1255 1255 1255 125	C C C C C C C C C C C C C C C C C C C
25:0009	<pre>St (Internal + ext ID: NHYD ID: 03:204 ID: 03:204 ID: 06:PropSite DO NOT INCLUDE BASE ID: N STORMS (TOWN OF H ID: 05:FORMS (TOWN OF H ID: 05:FORM</pre>	ernal) AREA (ha) .03 .13 FLOWS IF AN ALTON HILLS 60793_001\S 60793_001\S	QPEAK (cms) .001 .0030 Y. 	TPEAK (hrs) 8.00 8.00 8.00 00-YR)	R.V. (rmm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1222 1222 1222 1222	C C C C C C C C C C C C C C C C C C C
25:0009	<pre>st (Internal + ext) ID: NHYD ID: 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE N STORMS (TOWN OF H STORMS (TOWN OF H Project dir.: Q:\ Rainfall dir.: Q:\ s on 0 uut = METRIC) S0.STM</pre>	ernal) AREA (ha) .03 .13 FLOWS IF AN ALTON HILLS 60793_001\S 60793_001\S	QPEAK (cms) .001 .0030 Y. 	TPEAK (hrs) 8.00 8.00 8.00 00-YR)	R.V. (rmm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1227 1222 1222 1222 1222 1222 1222	050:00 * 050:00 * 00 050:00 * 00 00 * 00 00 * 00 00 * 00 00 * * 00 00 * * 00 00 * * 00 00 00 * * * 00 00 * * * 00 00 * * * 00 00 * * * 00 00 * * * 00 00 * * * 00 * * * 00 * * * 00 * * * 00 * * * 00 * * * * * 00 * * * * * * * * * *
25:0009	<pre>St (Internal + ext ID: NHYD ID: 03:204 ID: 03:204 ID: 00:SITE SUM 06:PropSite DO NOT INCLUDE BASE ON STORMS (TOWN OF H STORMS (TOWN O</pre>	ernal) AREA (ha) .03 .13 FLOWS IF AN ALTON HILLS 60793_001\S 60793_001\S	QPEAK (cms) .001 .0030 Y. 	TPEAK (hrs) 8.00 8.00 8.00 00-YR)	R.V. (rmm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1227 1222 1223 1224 1227 1228 1229 1227 1228 1228 1228 1228 1228 1228 1228	COS0:00 * COS0 * COS0:0
25:0009	<pre>St (Internal + ext ID: NHYD ID: 03:204 ID: 03:204 ID: 03:204 ID: 00:FITE SUM 06:PropSite DO NOT INCLUDE BASE ID: 00:FITE ID: 00:FITE</pre>	ernal) AREA (ha) .03 .17 FLOWS IF AN CALTON HILLS CALTON	QPEAK (cms) .021 .030 Y. 	TPEAK (hrs) 8.00 8.00 	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1220 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1245 1246 1247 1248 1246 1247 1248 1246 1247 1248 1248 1248 1249 1249 1240 1241 1241 1241 1241 1241 1241 1241	C C C C C C C C C C C C C C C C C C C
25:0009	<pre>g St (Internal + ext ID: NHYD ID: 03:204 ID: 03:204 ID: 06:PropSite DO NOT INCLUDE BASE ID: N STORMS (TOWN OF H ID: 09:00 ID: 00:Project dir.: 0: N STORMS (TOWN OF H ID: 0: 0:Project dir.: 0: N STORMS (TOWN OF H ID: 0:Project dir.: 0: N STORMS (TOWN OF H ID: 0:Project dir.: 0: N STORMS (TOWN OF H ID: 0:Project dir.: 0:Project dir.: 0: N STORMS (TOWN OF H ID: 0:Project dir.: 0:Project dir.:</pre>	ernal) AREA (ha) .03 .17 FLOWS IF AN 	QPEAK (cms) .021 .030 Y. 	TPEAK (hrs) 8.00 8.00 8.00 9.00 9.00 9.00 9.00 9.00	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1228 1229 1220 1227 1228 1226 1227 1228 1227 1228 1229 1229 1220 1227 1228 1229 1229 1229 1229 1229 1229 1229	050:00 *# ROUT IN 000 050:00 *# ROUT IN 00 00 00 00 00 00 00 00 00 00 00 00 00
25:0009	<pre>st (Internal + ext ID1 03:204 ID1 03:204 ID2 08:SITE SUM 06:PropSite DO NOT INCLUDE BASE IN STORMS (TOWN OF H STORMS (TOWN OF H Rainfall dir.: Q:\ s on 0 Sut = METRIC) SOLT SITAT FOR HUMANITY 3 Wary 2025 Consultants Inc. 33466</pre>	ernal) AREA (ha) .03 .13 .17 FLOWS IF AN 	QPEAK (cms) .001 .030 Y. 	TPEAK (hrs) 8.00 8.00 8.00 (00-YR)	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1228 1220 1221 1222 1222 1222 1227 1228 1226 1227 1227 1228 1229 1229 1229 1229 1229 1229 1229	C C C C C C C C C C C C C C C C C C C
25:0009	<pre>g St (Internal + ext ID1 03:204 ID1 03:204 ID1 03:204 ID1 00:SITE SUM 06:PropSite DO NOT INCLUDE BASE ID1 INCLUDE BASE I</pre>	ernal) AREA (ha) .03 .17 FLOWS IF AN 	QPEAK ((ms) .001 .030 Y. 	TPEAK (hrs) 8.00 8.00 8.00 00-YR)	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1227 1228 1229 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1229 1229 1229 1229 1229 1229	050:00 *# ROU I INSS 0050:00 *# ROU I INSS 0050:00 *# CALL CALL CALL I CALL I CALL I INSS 0050:00 ** CAL I INSS I INSS
25:0009	<pre>St (Internal + ext ID: NHYD ID: 03:204 ID: 03:204 SUM 06:PropSite DO NOT INCLUDE BASE IN STORMS (TOWN OF H STORMS (</pre>	ernal) AREA (ha) .03 .17 FLOWS IF AN 	QPEAK (cms) .003 5 TO 1 	TPEAK (hrs) 8.00 8.00 8.00 00-yR) 	R.V. (mm) 68.19 89.48 85.14	DWF (cms) .000 .000		1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1227 1222 1223 1224 1225 1226 1227 1228 1228 1228 1228 1228 1228 1228	050:00 * ROUT * 050:00 * 050:00 * 00 050:00 * 00 0 0 0 0 0 0 0 0 0 0 0 0

1.00 1.17 1.33 1.50 1.67 1.83 2.00 2.17	1.132 1.155 1.179 1.204 1.230 1.257 1.286	hrs mm/hr 6.17 3.520 6.33 3.830 6.50 4.209 6.67 4.682 6.83 5.292 7.00 6.111 7.17 7.271 7.33 9.051 7.50 12.147 7.67 18.910 7.83 45.332 8.00 155.240 8.17 59.317 8.33 1.950	13.00 13.17 13.33 13.50 13.67 13.83 14.00 14.17	2.680 2.607 2.538 2.473 2.412 2.354 2.298 2.246	19.00 19.17 19.33 19.50 19.67 19.83 20.00	1.483 1.463 1.444 1.426 1.407 1.390 1.373 1.356 1.340 1.324 1.309 1.294 1.280
2.67 2.83 3.00	1.417 1.455 1.495	8.50 21.755 8.67 16.523 8.83 13.360 9.00 11.247 9.17 9.736	14.67 14.83 15.00	2.104 2.061 2.020	20.67 20.83 21.00	1.238 1.225 1.212
3.33 3.50 3.67 3.83	1.584 1.632 1.685 1.741	9.33 8.603 9.50 7.720	15.33 15.50 15.67 15.83	1.943 1.907 1.873 1.840	21.33 21.50 21.67 21.83	1.187 1.175 1.163 1.152
4.17	1.867	10.175.53810.335.18410.504.87710.674.60810.834.36911.004.156	16.17	1.777	22.17 22.33 22.50 22.67 22.83	1.130 1.119 1.109 1.098
5.83	2.412 2.541 2.686 2.851 3.040	11.17 3.965 11.33 3.793 11.50 3.636 11.67 3.493 11.83 3.362	17.17 17.33 17.50 17.67 17.83	1.615 1.591 1.568 1.546 1.524	23.17 23.33 23.50 23.67 23.83	1.059 1.050 1.041 1.032
6.00 	3.260	12.00 3.241	18.00	1.503	24.00	1.023
*# == *# *##############################	######### 00f Aspha		*****	########	******	
CALIB STANDHYD 01:201 DT= 1.00	Area Tota	(ha)= . l Imp(%)= 76. IMPERVIOUS			= 76.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha)= (mm)= (%)= (m)= =	.09 1.00 2.00 7.20 .013	.03 5.00 4.40 2.80 .250	-,		
Max.eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak	<pre>mm/hr)= (min) (min)= (min)=</pre>	155.24 1.00 .36 (ii) 1.00	101.27 1.00 1.48 (i 1.00	i)		
Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms)= (cms)= (hrs)= (mm)= (mm)= EENT =	1.59 .04 8.00 116.76 117.76 .99	.83 .01 8.00 68.95 117.76 .59	8 105 117	0TALS* .044 (iii .000 .289 .764 .894	.)
<pre>(i) CN PROCEE CN* = 78 (ii) TIME STEF</pre>	URE SELEC .0 Ia (DT) SHO STORAGE C	TED FOR PERVIOU = Dep. Storage ULD BE SMALLER DEFFICIENT.	IS LOSSES: (Above) OR EQUAL			
050:0004 *# ROUTE PARKING AND *	ROOF THR					
<pre>ROUTE RESERVOIR IN>01:(201) OUT<02:(ORFFLO)</pre>	- OUTE	ested routing t OUTLFOW LOW STORAGE ms) (ha.m.) 000 .000E+00 007 .2000E-03 014 .6000E-03	STORAGE TA	BLE === OW SI	ORAGE	
ROUTING RESULTS INFLOW >01: (20 OUTFLOW<02: (OR OVERFLOW<03: (OF	11) 2FFLO) 2FFLO)	AREA QPE (ha) (cm .11 .0 .11 .0 .00 .0	CAK TPE hs) (hr 44 8.0 15 8.1 000 .0	AK s) 00 10 67 10 00	R.V. (mm) 15.289 15.289 .000	
T C F	OTAL NUMB UMULATIVE ERCENTAGE	ER OF SIMULATED TIME OF OVERFL OF TIME OVERFL	OVERFLOWS OWS (hour OWING (= s)= %)=	0 .00 .00	
Е Т М	IAXIMUM S	W REDUCTION [OF PEAK FLOW TORAGE USED	(ha.m	.)=.2202	E-02	
050:0005	To street Area Tota	s (uncontrolled	L)			
Surface Area Dep. Storage Average Slope Length Mannings n	(ha)=	IMPERVIOUS				
Max.eff.Inten. over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr)= (min) (min)=	155.24 1.00 .20 (ii)	101.27 1.00 .95 (i 1.00 1.11		TALS*	

PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC:	(cms): (hrs): (mm): (mm): IENT :	= .00 = 7.98 = 116.76 = 117.76 = .99		00 00 95 76 59	.00 8.00 80.42 117.76 .68	9 4		
(i) CN PROCE	DURE SEI	LECTED FOR PE	RVIOUS LOS	SES:				
(ii) TIME STE	P (DT) 3		LLER OR EQ					
THAN THE (iii) PEAK FLO		E COEFFICIENT NOT INCLUDE B		ANY.				
050:0006								
					TPEAK	R.V.	DWF	
		7 • 202	(ha)	(cms)	(hrs)	(mm)	(cms)	
ADD HYD (SITE	+ID2 0	2:ORFFLOW-SW	.11	.015	8.17	105.29	.000	**DR
		8:SITE						
NOTE: PEAK FLOW					0.00	101.21	.000	
NOTE: PEAK PLOW								
050:0007 *# CATCHMENT 203 - 1	BEHIND I						,	
CALIB NASHYD		rea (ha)=	.00	Curve Nu	mber (CN)=78.0)0	
01:203 DT= 1.00	0 Ia U	a (mm)= .H. Tp(hrs)=	5.000 .050	# of Line	ear Res.	(N)= 3.0	10	
Unit Hyd Qpeak	(cms):	.002						
PEAK FLOW	(cms):	= .001 (i = 8.000	.)					
TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL	(hrs): (mm):	= 8.000 = 68.904						
RUNOFF COEFFIC:	IENT :	.585						
(i) PEAK FLOW 1	DOES NO	T INCLUDE BAS	EFLOW IF A	NY.				
050:0008								
*								
CALIB STANDHYD 03:204 DT= 1.00	A:	rea (ha)= otal Imp(%)=	.03 21.00	Dir. Con	n.(%)=	21.00		
		TMDEPUTOU	IS DEDVI	OUS (i)		-		
Surface Area Dep. Storage Average Slope Length Mannings n	(ha): (mm):	= .01 = 1.00	5 FERCUL 5.	03				
Average Slope	(%): (%):	= 2.00	5.	00				
Mannings n	(m):	013	4.	50				
Max.eff.Inten.	(mm/hr):	= 155.24	100.	09				
Max.eff.Inten. ove: Storage Coeff. Unit Hyd. Tpeal	r (min) (min):	1.00 .34	2. (ii) 1.	00 78 (ii)				
Unit Hyd. Tpeal	k (min):	= 1.00	2.	00				
Unit Hyd. peak				60				
PEAK FLOW TIME TO PEAK RUNOFF VOLUME	(cms):	00	-	01	*TOTAL	0 (iii)		
	(nrs): (mm):	= 8.00 = 116.76	8. 68. 117.	95	8.00	5		
TOTAL RAINFALL RUNOFF COEFFIC	(mm): IENT :	= 117.76 = .99	117.		117.76 .67			
(i) CN PROCE								
	P (DT) 3	Ia = Dep. Sto SHOULD BE SMA	LLER OR EQ					
		E COEFFICIENT NOT INCLUDE B		ANY.				
THAN THE								
THAN THE (iii) PEAK FLOW								
THAN THE (iii) PEAK FLOU 050:0009	ng St (:	Internal + ex	ternal)					
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II	Internal + ex D: NHYD	ternal)	OPEAK	TPEAK	R.V.	DWF	
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II ID1 0: +ID2 04	Internal + ex D: NHYD 3:204 8:SITE	AREA (ha) .03 .13	QPEAK (cms) .010 .022	TPEAK (hrs) 8.00 8.00	R.V. (mm) 78.99 101.21	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II ID1 0: +ID2 04	Internal + ex D: NHYD 3:204	AREA (ha) .03 .13	QPEAK (cms) .010 .022	TPEAK (hrs) 8.00 8.00	R.V. (mm) 78.99 101.21	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II ID1 0: +ID2 04 SUM 04	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite	AREA (ha) .03 .13	QPEAK (cms) .010 .022 .032	TPEAK (hrs) 8.00 8.00	R.V. (mm) 78.99 101.21	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II ID1 0: +ID2 00 SUM 00 S DO NO:	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite F INCLUDE BAS	AREA (ha) .03 .13 .17 SEFLOWS IF	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II ID1 0: +ID2 01 SUM 00 S DO NO?	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite T INCLUDE BAS	AREA (ha) .03 .13 .17 SEFLOWS IF	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II ID1 0: +ID2 01 ===== SUM 00 S D0 NO:	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite f INCLUDE BAS	AREA (ha) .03 .13 .17 SEFLOWS IF	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St ()) II ID1 0: +ID2 0: SUM 0: S D0 NO: IGN STOI	Internal + ex D: NHYD 3:204 6:SITE 5:PropSite T INCLUDE BAS	AREA (ha) .03 .13 .17 EEFLOWS IF HALTON HII	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II ID1 0: +ID2 00 SUM 00 S D0 NO? 	Internal + ex D: NHYD 3:204 8:SITE 5:PropSite T INCLUDE BAS	AREA (ha) .03 .13 .17 EEFLOWS IF HALTON HII	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St (:) II ID1 0: +ID2 0: 	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite F INCLUDE BAS	tternal) AREA (ha) .03 .13 .17 EEFLOWS IF HALTON HII	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOX 050:0009	ng St (3) II ID1 0; +ID2 0 SUM 0 S DO NO GN STOI	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite F INCLUDE BAS	ternal) AREA (ha) .13 .17 HEPLOWS IF	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (vm) 78.99 101.21 96.69	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St (3) II ID1 0; +ID2 0 SUM 0 S DO NO GN STOI	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite F INCLUDE BAS	ternal) AREA (ha) .13 .17 HEPLOWS IF	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (vm) 78.99 101.21 96.69	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOX 050:0009	ng St ()) II ID1 0 +ID2 00 +ID2 00 SUM	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite T INCLUDE BAS	tternal) AREA (ha) .03 .13 .17 EEPLOWS IF	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St ()) II ID1 0. +ID2 01 SUM 00 S DO NOC IGN STOI	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite T INCLUDE BAS	tternal) AREA (ha) .03 .13 .17 EEPLOWS IF	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21	DWF (cms) .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St ()) I ID1 0 +ID2 0 SUM 0 S D0 NO S D0 NO IGN STOI	Internal + ex D: NHYD 3:204 8:SITE 5:PropSite T INCLUDE BAS	ternal) AREA (ha) .13 .17 HEPLOWS IF	QPEAK (cmm) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	
THAN THE (iii) PEAK FLOX 050:0009	ng St ()) I ID1 0 +ID2 0 SUM 0 S D0 NO S D0 NO IGN STOI	Internal + ex D: NHYD 3:204 8:SITE 5:PropSite T INCLUDE BAS	ternal) AREA (ha) .13 .17 HEPLOWS IF	QPEAK (cmm) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	
THAN THE (iii) PEAK FLOX 050:0009	ng St ()) I ID1 0 +ID2 0 SUM 0 S D0 NO S D0 NO IGN STOI	Internal + ex D: NHYD 3:204 8:SITE 5:PropSite T INCLUDE BAS	ternal) AREA (ha) .13 .17 HEPLOWS IF	QPEAK (cmm) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St ()) II ID1 0 +ID2 0 SUM 0 S D0 NO IGN STOL	Internal + ex D: NHYD 3:204 8:SITE 5:PropSite T INCLUDE BAS	ternal) AREA (ha) .13 .17 HEPLOWS IF	QPEAK (cmm) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St ()) II ID1 0; +ID2 0; SUM 0; S DO NO; IGN STOI 	Internal + ex D: NHYD 3:204 8:SITE 5:PropSite T INCLUDE BAS	ternal) AREA (ha) .13 .17 HEPLOWS IF	QPEAK (cms) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	
THAN THE (iii) PEAK FLOU 050:0009	ng St ()) I ID1 0 +ID2 0 SUM 0 S D0 NO S D0 NO IGN STOP 	Internal + ex D: NHYD 3:204 8:SITE 6:PropSite F INCLUDE BAS RMS (TOWN OF	<pre>ternal) AREA (ha) .03 .13 .17 HALTON HII</pre>	QPEAK (cmm) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00 100-YR)	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	
THAN THE (iii) PEAK FLOW 050:0009	ng St ()) I ID1 0 +ID2 0 SUM 0 S D0 NO S D0 NO IGN STO 	Internal + ex D: NHYD 3:204 8:SITE 5:PropSite T INCLUDE BAS RMS (TOWN OF RMS (TOWN OF ect dir.: Q: fall dir.: Q: 0	<pre>ternal) AREA (ha) .03 .13 .17 HALTON HII</pre>	QPEAK (cmm) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00 100-YR)	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	
THAN THE (iii) PEAK FLOX 050:0009	ng St ()) I ID1 0 +ID2 0 SUM 0 S D0 NO S D0 NO IGN STO 	Internal + ex D: NHYD 3:204 8:SITE 5:PropSite T INCLUDE BAS RMS (TOWN OF RMS (TOWN OF ect dir.: Q: fall dir.: Q: 0	<pre>ternal) AREA (ha) .03 .13 .17 HALTON HII</pre>	QPEAK (cmm) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00 100-YR)	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	
THAN THE (iii) PEAK FLOW 050:0009	ng St (1) II ID1 0 + ID2 00 SUM 00 S D0 NO S D0 NO - S D0 NO - S D0 - S D0 - Rain: rs on tput = I	Internal + ex D: NHYD 3:204 6:PropSite F INCLUDE BAS RMS (TOWN OF COMMON OF	<pre>ternal) AREA (ha) .03 .13 .17 HALTON HII</pre>	QPEAK (cmm) .010 .022 .032 ANY.	TPEAK (hrs) 8.00 8.00 8.00 100-YR)	R.V. (mm) 78.99 101.21 96.69	DWF (cms) .000 .000 .000	

100.0002							
*							
READ STORM	n Com						
TIME		TIME hrs	RAIN mm/hr	TIME	RAIN mm/br	TIME hrs	RAI mm/≻
.17		6.17		12.17	3.500	18.17	
.50		6.50	4.702	12.50	3.279	18.50	1.61
.83	1.246	6.83	5.907 6.817	12.83 13.00	3.086 2.999	18.83 19.00	1.57
1.17 1.33	1.270 1.296 1.322	7.17	8.106 10.082	13.17 13.33	2.917 2.840	18.83 19.00 19.17 19.33	1.53
1.67	1.350 1.379	7.67	13.513 20.998	13.67	2.768 2.699	19.67	1.50 1.48
2.00	1.410 1.442	8.00	171.052	14.00	2.573	19.83 20.00	1.45
2.33	1.476	8.33		14.33	2.459	20.17 20.33 20.50	1.41
2.67	1.549	8.67	18.358	14.67	2.356	20.67	1.38
3.00	1.631 1.676 1.724	9.00		15.00	2.262	20.83 21.00 21.17	1.35
3.33	1.724 1.775 1.829	9.33	9.584	15.33	2.177	21.17 21.33 21.50	1.33
3.67		9.67	7.819	15.67	2.098	21.50	1.30
4.00	2.018	10.00	6.637	16.00	2.025	22.00	1.28
4.33	2.171	10.33	5.787	16.33	1.958	22.33	1.25
4.67	2.352	10.67	5.146 4.880	16.67 16.83	1.896 1.866	22.67 22.83	1.23
5.00 5.17	2.571 2.700	11.00	4.643	17.00	1.838	23.00	1.21
5.33	2.843	11.33	4.239	17.33 17.50	1.783	23.17 23.33 23.50	1.18
5.67	3.400	11.67 11.83	3.905 3.759	17.67 17.83	1.733 1.708	23.67 23.83	1.16
6.00						24.00	
*# *# *# CALIB STANDHYD Ol:201 DT=1.(Aro 0 To	######################################	Landscape	::::::::::::::::::::::::::::::::::::::	ELING ######### aining t		#####
*# *##################################	(ha)= (mm)=	ea (ha tal Imp(% IMPERV	Landscape (1)= .1 (5)= 76.0 7IOUS P 09 00	1 0 Dir. 20 Dir. 20 Dir.	ELING ######### aining t Conn.(%	************	##### REET (
*# *# CALLB STANDHYD O1:201 DT= 1.(Surface Area	(ha)= (mm)= (%)=	ea (ha tal Imp(% IMPERV	<pre>A)= .1 b)= 76.0 VIOUS P 09</pre>	1 0 Dir. PERVIOUS	ELING ######### aining t Conn.(%	************	###### REET (
*# *# CALLE STANDEYD CALLE STANDEYD CALLE STANDEYD Ol:201 DT=1.(Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten.	(mm)= (mm)= (mm)= (mm)=	################## halt and tal Imp(% IMPERV 1. 2. 7. 0 0 171.	<pre>####################################</pre>	1 0 Dir. • area dr: • 0 Dir. • COUS • 03 5.00 4.40 2.80 2.250 117.02	ELING ######### aining t Conn.(%	************	###### REET (
*# *# CALLE STANDEYD CALLE STANDEYD CALLE STANDEYD Ol:201 DT=1.(Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten.	(mm)= (mm)= (mm)= (mm)=	################## halt and tal Imp(% IMPERV 1. 2. 7. 0 0 171.	<pre>####################################</pre>	1 0 Dir. • area dr: • 0 Dir. • COUS • 03 5.00 4.40 2.80 2.250 117.02	ELING ######## aining t Conn.(% (i)	************	###### REET (
*# *# CALIE STANDHYD CALIE STANDHYD 01:201 DT=1.(Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten.ovv Storage Coeff. Unit Hyd. peak	<pre>i######### Roof Aspl (ha)= (mn)= (mn)= ((mn)r)= cr(min) Arco (mn)= ((mn)r)= ((m</pre>	<pre>##################halt and tal Imp(% IMPERV I. 2. 70 171. 1 1. 1.</pre>	<pre>il = 1 il =</pre>	1 0 Dir. • ERVIOUS 5.00 4.40 2.80 117.02 1.00 1.41 (1.00 .86	ELING ######## aining t Conn.(% (i) ii)	:######### o KING ST :)= 76.0	##### REET (
*# *# CALIE STANDHYD CALIE STANDHYD 01:201 DT=1.(Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten.ovv Storage Coeff. Unit Hyd. peak	<pre>i######### Roof Aspl (ha)= (mn)= (mn)= ((mn)r)= cr(min) Arco (mn)= ((mn)r)= ((m</pre>	<pre>##################halt and tal Imp(% IMPERV I. 2. 70 171. 11. 1.</pre>	<pre>il = 1 il =</pre>	1 0 Dir. • ERVIOUS 5.00 4.40 2.80 117.02 1.00 1.41 (1.00 .86	ELING ######## aining t Conn.(% (i) ii)	**************************************	###### REET (
*# *# CALIE STANDHYD CALIE STANDHYD 01:201 DT=1.(Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten.ovv Storage Coeff. Unit Hyd. peak	<pre>i######### Roof Aspl (ha)= (mn)= (mn)= ((mn)r)= cr(min) Arco (mn)= ((mn)r)= ((m</pre>	<pre>##################halt and tal Imp(% IMPERV I. 2. 70 171. 11. 1.</pre>	<pre>il = 1 il =</pre>	1 0 Dir. • ERVIOUS 5.00 4.40 2.80 117.02 1.00 1.41 (1.00 .86	ELING ######## aining t Conn.(% (i) ii)	<pre>WOTALS* .049 (i1 8.000</pre>	###### REET (
*# *# CALLB STANDHYD CALLB STANDHYD CALLB STANDHYD 01:201 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. Storage Coeff. Unit Hyd. Tpeat Unit Hyd. Tpeat Unit Hyd. Tpeat DEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFI	<pre>##########Roof Aspi</pre>	<pre>###############halt and tal Imp(% IMPERV</pre>	<pre>####################################</pre>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING ######## aining t Conn.(% (i) ii) *T	<pre>votals* 0.049 (iii 8.000</pre>	###### REET (
*# *# CALLB STANDHYD CALLB STANDHYD CALLB STANDHYD 01:201 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. ovv Storage Coeff. Unit Hyd. Tped Unit Hyd. Tped PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC (i) CN PROCI CN* = 1 (ii) TIME ST	<pre>i#########Roof Aspi</pre>	<pre>#################halt and tal Imp(% IMPERV I. 2. 7. 0 171. 1. 1. 1. 1. 1. 2. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.</pre>	<pre>####################################</pre>	1 0 Dir. 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING ######### aining t Conn.(% (i) ii) *T 11 13	<pre>""""""""""""""""""""""""""""""""""""</pre>	###### REET (
*# *# CATCHMENT 201 - * CALLB STANDHYD Ol:201 DT= 1.(Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. ovv Storage Coeff. Unit Hyd. Tped Unit Hyd. Tped Unit Hyd. PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALI RUNOFF VOLUME (i) CN PROCI CN* = ' (ii) TIME STI THAN TH	<pre>####################################</pre>	<pre>####################################</pre>	<pre>####################################</pre>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING ######### aining t (i) ii) *T 11 13	<pre>VOTALS* .049 (i1 .041</pre>	###### REET (0
*# *# CATCHMENT 201 - * CALIB STANDHYD CALIB STANDHYD Ol:201 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. Ovv Storage Coeff. Unit Hyd. Tped Unit Hyd. Tped Unit Hyd. Tped Unit Hyd. Tped CONF volUME TOTAL RAINFALL RUNOFF COEFFIC (i) CN PROCI CN* = (ii) TIME STI THAN THH (iii) PEAK FLC 100:0004	<pre>####################################</pre>	<pre>##################halt and tal Imp(% IMPERV I. 2. 7. 0 171. 1. 1. 7. 129. 130. ECTED FOR a = Dep. HOUDE BE COFFFICI OT INCLUE HROUGH OR</pre>	<pre>####################################</pre>	1 0 Dir. 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING ######### aining t Conn.(% (i) ii) *T 11 13 E PONDIN	<pre>WOTALS* 049 (ii 8.000 0.888 .901 .01 .01 .01 .01 .01 .02 .01 .02</pre>	<pre>####### REET (0 </pre>
*# *##################################	<pre>####################################</pre>	ea (ha tal Imp(% IMPERV 1 2. 7, 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	<pre>####################################</pre>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING 	<pre>WOTALS* .049 (ii .049 (ii .049 (ii .000 .901 </pre>	<pre>####### REET (0 </pre>
*# *# CATCHMENT 201 - * CALIB STANDHYD CALIB STANDHYD 01:201 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. ovv Storage Coeff. Unit Hyd. Tped Unit Hyd. Tped Unit Hyd. Peak FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC (i) CN PROCI CN* = 7 (ii) TIME STI THAN THH (iii) PEAK FLO 100:0004	<pre>####################################</pre>	ea (ha tal Imp(% IMPERV 1 2. 7. 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 2. 7. 7. 0 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	<pre>####################################</pre>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING 	<pre>WOTALS* .049 (ii .</pre>	<pre>####### REET (0 </pre>
*# *##################################	<pre>####################################</pre>	ea (ha tal Imp(% IMPERV 1 2. 7. 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 2. 7. 7. 0 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	<pre>####################################</pre>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING 	<pre>WOTALS* .049 (ii .</pre>	###### REET (0
*# *# CATCHMENT 201 - * CALIB STANDHYD CALIB STANDHYD 01:201 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. ovv Storage Coeff. Unit Hyd. Tped Unit Hyd. Tped Unit Hyd. Tped Unit Hyd. Tped PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC (i) CN PEAC (i) TIME STI THAN THH (iii) PEAK FLO 100:0004	<pre>####################################</pre>	ea (ha tal Imp(% IMPERV 1 2. 7. 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 2. 7. 7. 0 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	<pre>####################################</pre>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING 	<pre>WOTALS* .049 (ii .</pre>	###### REET (0
*# *# CATCHMENT 201 - * CALLB STANDHYD CALLB STANDHYD 01:201 DT= 1.(Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. ovv Storage Coeff. Unit Hyd. Tge: Unit Hyd. Tge: Unit Hyd. PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF VOLUME TOTAL RAINFALL RUNOFF VOLUME TOTAL RAINFALL RUNOFF VOLUME TOTAL RAINFALL RUNOFF VOLUME TIME STI THAN THH (iii) PEAK FLO *# ROUTE RESERVOIR *# COUTE RESERVOIR *# ROUTE RESERVOIR ** ROUTING RESULT	<pre>##########Roof Aspl Arr, 0 Arr, 0 Arr, 0 To (ha) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (cmm) = (cmm) = (cmm) = (cmm) = (cmm) = Clenn = Clenn</pre>	ea (ha tal Imp(% IMPERV 1 2. 7. 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 2. 7. 7. 0 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	<pre>####################################</pre>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING 	<pre>WOTALS* .049 (ii .</pre>	###### REET (0
*# *# CATCHMENT 201 - * CALIB STANDHYD CALIB STANDHYD 01:201 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. ovv Storage Coeff. Unit Hyd. Tped Unit Hyd. Tped Unit Hyd. Tped Unit Hyd. Tped PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC (i) CN PEAC (i) TIME STI THAN THH (iii) PEAK FLO 100:0004	<pre>####################################</pre>	ea (ha tal Imp(% IMPERV 1 2. 7. 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 2. 7. 7. 0 0 171. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	<pre>####################################</pre>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	ELING 	<pre>WOTALS* .049 (ii .</pre>	<pre>####### REET (0 </pre>
*# *# CATCHMENT 201 - * * CALLB STANDHYD Ol:201 DT= 1.0 Surface Area Dep. Storage Average Slope Length Mannings n Max.eff.Inten. ovv Storage Coeff. Unit Hyd. peal DEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC (i) CN PROCI CN* = (ii) TIME STT THAN THH (iii) PEAK FLO 100:0004	<pre>######### Roof Aspl Aspl (ha)= (ma)= (ma)= (*)= (ma)= (*)= (ma)= (m</pre>	<pre>####################################</pre>	<pre>####################################</pre>	<pre>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</pre>	ELING Conn.(% (i) ii) •T 11 13 •T •T •T •T •T •T •T •T •T •T	<pre>WOTALS* .049 (ii .</pre>	<pre>####### REET (0 </pre>

		IMPERVIOUS	PERVIO					
Surface Area	(ha)=							
Surface Area Dep. Storage	(mm)=	.01 1.00	5.0	0				
Average Slope	(%)=	1.00	20.0	0				
Length	(m)=	2.00	3.0	0				
Dep. Storage Average Slope Length Mannings n	=	.013	.25	0				
Max.eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr)=	171.05	117.0	2				
over	(min)	1.00	1.0	0				
Storage Coeff.	(min)=	.20 (ii) .9	0 (ii)				
Unit Hyd. Tpeak	(min)=	1.00	1.0	0				
Unit Hyd. peak	(cms)=	1.69	1.1	4	*TOTAL			
DEAK FLOW	(cmg)-	0.0	0	1		8 (iii)		
TIME TO BEAK	(bre)-	7 88	.0	1 0	8.00			
RUNOFF VOLUME	(mm)=	129.89	80.2	3	92.14			
TOTAL RAINFALL	(mm)=	130.89	130.8	9	130.88			
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	ENT =	.99	.6	1	.70	4		
(i) CN PROCED								
CN* = 78	8.0 Ia:	= Dep. Stor	age (Abov	e)				
(ii) TIME STEP				AL				
		OEFFICIENT.						
(iii) PEAK FLOW	I DOES NOT	INCLUDE BA	SEFLOW IF	ANY.				
L00:0006								
*# Total Peak Flow t								
ADD HYD (SITE) ID: 1	NHYD	AREA	QPEAK	TPEAK	R.V.	DWF	
			(ha)	(cms)	(hrs)	(mm)	(cms)	
	ID1 07:2	02	.02	.008	8.00	92.15	.000	
ADD HYD (SITE	+1D2 02:01	RFFLOW-SW	.11	.015	8.18	117.97	.000	
	+103 03:0	KFFLOW-OV		-000	.00	.00	.000	
	=======							-
	SUM 08:S	ITE	.13	.023				=
NOTE: PEAK FLOWS	SUM 08:S	ITE	.13	.023				=
NOTE: PEAK FLOWS	SUM 08:S	ITE NCLUDE BASE	.13 FLOWS IF A	.023 NY.	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S	ITE NCLUDE BASE	.13 FLOWS IF A	.023 NY.	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S	ITE NCLUDE BASE	.13 FLOWS IF A	.023 NY.	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S	ITE NCLUDE BASE	.13 FLOWS IF A	.023 NY.	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S	ITE NCLUDE BASE	.13 EFLOWS IF A	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S	ITE NCLUDE BASE	.13 EFLOWS IF A	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S	ITE NCLUDE BASE	.13 EFLOWS IF A	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S	ITE NCLUDE BASE	.13 EFLOWS IF A	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S: 3 DO NOT II 3 DO NOT II 3 DO NOT II 3 DO NOT II 4 Area 0 Ia U.H.	ITE NCLUDE BASE	.13 EFLOWS IF A	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS 100:0007	SUM 08:S S DO NOT ID BEHIND RET. Area Area J Area U Ia U.H. (cms)=	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002	.13 FLOWS IF A . FLOWING T .00 C 5.000 # .050	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S S DO NOT ID SEHIND RET. Area Area 0 Ia (cms)= (cms)=	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i)	.13 FLOWS IF A . FLOWING T .00 C 5.000 # .050	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S S DO NOT ID SEHIND RET. Area Area 0 Ia (cms)= (cms)=	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i)	.13 FLOWS IF A . FLOWING T .00 C 5.000 # .050	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS CALLB NASHYD 01:203 DT= 1.00 Unit Hyd Qpeak PEAK FLOW TIME TO PEAK RUNOFF VOLUME	SUM 08:S S DO NOT II BEHIND RET. Area) Ia (cms)= (hrs)= (hrs)= (mm)=	ITE NCLUDE BASE (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 80.171	.13 FLOWS IF A . FLOWING T .00 C 5.000 # .050	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S S DO NOT II SEHIND RET. Area Ia U.H. (cms)= (cms)= (hrs)= (mm)=	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 80.171 130.888	.13 FLOWS IF A . FLOWING T .00 C 5.000 # .050	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S S DO NOT II SEHIND RET. Area Ia U.H. (cms)= (cms)= (hrs)= (mm)=	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 80.171 130.888	.13 FLOWS IF A . FLOWING T .00 C 5.000 # .050	.023 NY. 0 GO	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S S DO NOT I SEHIND RET. Area Area Area U.H. (cms)= (cms)= (mm)= (mm)= EENT =	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 80.171 130.888 .613	.13 FLOWS IF A .00 C 5.000 #	.023 NY. O GO urve Nu of Lin	8.00	113.74	.000	
NOTE: PEAK FLOWS	SUM 08:S S DO NOT I SEHIND RET.	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 80.171 130.888 .613 NCLUDE BASE	.13 FLOWS IF A .00 C 5.000 # .050	.023 NY. O GO urve Nu of Lin	8.00	113.74 (N)=78.0 (N)= 3.0	.000 0 0	
NOTE: PEAK FLOWS	SUM 08 S S DO NOT I BEHIND RET. Area Ia (cms)= (cms)= (mm)= (mm)= EENT = DOES NOT I	TTE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 80.171 130.888 .613 NCLUDE BASE	.13 FFLOWS IF A FLOWING T .00 C 5.000 # .050	.023 NY. O GO urve Nu of Lin Y.	8.00	113.74 CN)=76.0 (N)= 3.0	000	
NOTE: PEAK FLOWS	SUM 08 S S DO NOT I SEHIND RET.	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 8.0171 130.888 .613 NCLUDE BASE	.13 FLOWS IF A FLOWING T .00 C 5.000 # .050	.023 NY. O GO urve Nu of Lin Y.	8.00	113.74 CN)=76.0 (N)= 3.0	000	
NOTE: PEAK FLOWS	SUM 08 S S DO NOT I SEHIND RET.	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 8.0171 130.888 .613 NCLUDE BASE	.13 FLOWS IF A FLOWING T .00 C 5.000 # .050	.023 NY. O GO urve Nu of Lin Y.	8.00	113.74 CN)=76.0 (N)= 3.0	000	
NOTE: PEAK FLOWS	SUM 08 S S DO NOT I SEHIND RET.	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 8.0171 130.888 .613 NCLUDE BASE	.13 FLOWS IF A FLOWING T .00 C 5.000 # .050	.023 NY. O GO urve Nu of Lin Y.	8.00	113.74 CN)=76.0 (N)= 3.0	000	
NOTE: PEAK FLOWS	SUM 08 S S DO NOT I SEHIND RET.	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 8.0171 130.888 .613 NCLUDE BASE	.13 FLOWS IF A FLOWING T .00 C 5.000 # .050	.023 NY. O GO urve Nu of Lin Y.	8.00	113.74 CN)=76.0 (N)= 3.0	000	
NOTE: PEAK FLOWS	SUM 08 S S DO NOT I SEHIND RET. 	ITE NCLUDE BASE AINING WALL (ha)= (mm)= Tp(hrs)= .002 .001 (i) 8.000 8.0171 130.888 .613 NCLUDE BASE	.13 FLOWS IF A FLOWING T .00 C 5.000 # .050	.023 NY. O GO urve Nu of Lin Y.	8.00	113.74 CN)=76.0 (N)= 3.0	000	

CALIB STANDHYD 03:204 DT= 1.0	0 Total			Dir. Con	n.(%)=	21.00	
		IMPERVIOUS	S PERVI	LOUS (i)			
Surface Area Dep. Storage Average Slope	(ha)=	.01					
Dep. Storage	(mm) =	1.00	5.				
Average Slope Length	(%)=	2.00	5.				
Length	(m)=	6.50					
Mannings n	=	.013	• 2	250			
Max.eff.Inten.	(mm/hr)=	171.05	115.	.77			
ove	r (min)	1.00	2.	.00			
Storage Coeff.	(min)=	.32	(ii) 1.	.69 (ii)			
Max.eff.Inten. ove Storage Coeff. Unit Hyd. Tpea	k (min)=	1.00	2.	.00			
Unit Hyd. peak	(cms)=	1.62		.62	*TOTAI		
DEAK ELOW	(cmg)-	0.0		01		_S* L2 (iii)	
TIME TO PEAK	(hrs)=	7.92	8	.00	8.00		
RUNOFF VOLUME	(mm)=	129.89	80.	.23	90.65	58	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL	(mm)=	130.89	8 80 130	. 89	130.88	38	
RUNOFF COEFFIC	IENT =	.99		61	.69	93	
(ii) TIME STE	8.0 Ia = P (DT) SHOU STORAGE CC	Dep. Stor JLD BE SMAI DEFFICIENT.	rage (Abo LLER OR EQ •	ove) QUAL			
00:0009 # Total FLOW to Ki	ng St (Inte	ernal + ext	ternal)				
.00:0009 # Total FLOW to Ki	ng St (Inte	ernal + ext	ternal)				
.00:0009 # Total FLOW to Ki	ng St (Inte	ernal + ext HYD 04 TE	ternal) AREA (ha) .03 .13	QPEAK (cms) .012 .023	TPEAK (hrs) 8.00 8.00	R.V. (mm) 90.66 113.74	DWI (cms .00
.00:0009 # Total FLOW to Ki	ng St (Inte	ernal + ext	AREA (ha) .03 .13	QPEAK (cms) .012 .023	TPEAK (hrs) 8.00 8.00	R.V. (mm) 90.66 113.74	DWI (cms .00
00:0009	ng St (Inte ID1 03:20 +ID2 08:SI SUM 06:Pr SD NOT IN	ernal + ext HYD 04 TE copSite NCLUDE BASE	AREA (ha) .03 .13 .17 EFLOWS IF	QPEAK (cms) .012 .023 .035 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 90.66 113.74 109.04	DWF (cms .00 .00
00:0009	ng St (Inte	ernal + ext HYD 04 TE COPSILE RCLUDE BASH	ternal) AREA (ha) .03 .13 .17 EFLOWS IF	QPEAK (cms) .012 .023 .035 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 90.66 113.74 109.04	DWF (cms .00 .00
NOTE: PEAK FLOW 00:0009	ng St (Inte) ID: N ID1 03:20 +ID2 08:SI SUM 06:Pr S DO NOT IN IGN STORMS	ernal + ext HYD 04 TE COPSITE CLUDE BASE (TOWN OF H	AREA (ha) .03 .13 .17 EFLOWS IF	QPEAK (cms) .012 .023 .035 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 90.66 113.74	DWF (cms .00 .00
00:0009	ng St (Inte) ID: N ID1 03:20 +ID2 08:51 SUM 06:Pr SUM 06:Pr IGN STORMS	rrnal + ext HYD M4 TE TOPSite NCLUDE BASI	AREA (ha) .03 .13 .17 EFLOWS IF	QPEAK (cms) .023 .035 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 90.66 113.74 109.04	DWH (cms .00 .00
00:0009	ng St (Inte) ID: N ID1 03:20 +ID2 08:51 SUM 06:Pr SUM 06:Pr IGN STORMS	rrnal + ext HYD M4 TE TOPSite NCLUDE BASI	AREA (ha) .03 .13 .17 EFLOWS IF	QPEAK (cms) .023 .035 ANY.	TPEAK (hrs) 8.00 8.00 8.00	R.V. (mm) 90.66 113.74 109.04	DWI (cma .00 .00
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1654	WARNINGS / ERRORS / NOTES
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1656	Simulation ended on 2025-02-13 at 11:04:37
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The multi-disciplinary nature of successful SWM systems within the context of urban development requires integrated and collaborative design teams with expertise and credentials in the fields of engineering, planning/architecture, hydrogeology, water quality, geomorphology, ecology, fisheries, landscape architecture and others.

2.5 Summary of Stormwater Management Design Criteria

A summary of SWM design criteria is provided in **Table 2-2**. Further information is provided in subsequent sections and their respective appendices.

Stormwater Management Design Criteria	Additional Information / Comments
 FLOODING (Section 3) Post to Pre control of peak flows to the appropriate Watershed Flood Control Criteria as shown in Table 3.1 and on Figure 3.2. For Cooksville Creek watershed, all new, redeveloped, and intensified land developments are required to control post-developed storm runoff rates from all storm events up to the 100-year design storm to the 2-year pre-development condition. For remaining tributaries draining to Lake Ontario refer to Table 3.2 and on and Figure 3.3. Consult CVC staff about requirements for onsite controls to confirm recommendations of earlier studies (i.e. Credit River Water Management Strategy study report (Triton Engineering Services, 1990) and Credit River Flow Management study (Philips Engineering Ltd., 2007) 	 Development defined by latest approved watershed hydrology model Hydrologic study may be required to update approved hydrology for lands beyond current Official Plans Have regard for Natural Hazard and drainage density requirements. Downstream assessment is required for large sites with multiple SWM facilities or developments that will have a potential to dramatically impact downstream areas;
 EROSION (Section 4) At a minimum detain 5 mm on site where conditions do not warrant the detailed analyses described in Section 4.3. If a site drains to a sensitive creek, or a subwatershed study or EIR is required, then the proponent must complete a geomorphologic assessment study to determine the site appropriate erosion threshold (refer to Figure 4-1). For sites with SWM ponds, 25mm-48hr detention may also be required, depending on the results of the erosion assessment. 	 At the subwatershed study or EIR scale, or for sites discharging to sensitive watercourse reaches, detailed erosion analyses are required to establish suitable erosion criteria Consultation with CVC staff is required to establish erosion methodologies and criteria, particularly where more detailed erosion analyses are required per Figure 4-1. Appendix A provides detailed guidance on the evaluation of stormwater management criteria pertaining to erosion

Table 2-2: Summar	v of Stormwater	^r Management	Desian Criteria

Stormwater Management Design Criteria	Additional Information / Comments
 WATER QUALITY (Section 5) Enhanced Level of Protection (80% TSS removal) as per the latest MOE SWMPD Manual is required. Where applicable, water quality controls should be further informed by goals and objectives arising out of applicable subwatershed studies and source water protection plans. To minimize thermal impacts, preventative measures (i.e. LID practices) and mitigation measures should be applied. 	 Refer to CVC/TRCA's LID Guide (2011) for LID design guidance For stormwater management facility design, planting plan and outfall design guidance are provided in Appendix D. Refer to CVC Study Report: Thermal Impacts of Urbanization including Preventative and Mitigation Techniques (2011) Designers should consult with MNR for development adjacent to species at risk or their habitats. Planning for stormwater pollution prevention is essential to achieve stormwater quality targets. Refer to CVC website: <i>www.creditvalleyca.ca</i> for factsheets on pollution prevention opportunities.
 WATER BALANCE (Section 6) For Significant, Ecologically Significant, High and Medium Volume Groundwater Recharge Areas (SGRA, EGRA, HGRA and MGRA), site specific water balance analyses and maintenance of recharge are required. For Low Volume Groundwater Recharge Areas (LGRA), provided the site does not impact a sensitive ecological feature, or require a subwatershed study, or EIR, the proponent has the option to provide a minimum post- development recharge of the first 3 mm for any precipitation event; or complete a site-specific water balance to identify pre-development groundwater recharge rates to be maintained post-development. For natural features (woodlands, wetlands, watercourses) maintain hydrologic regimes and hydroperiods to avoid adverse effects on the features. 	 At the subwatershed study or EIR scale, site specific water balance analyses are required, and maintenance of recharge may be required pending the outcome of the analyses, per Figure 6-1. Regardless of the Recharge Area Type (SGRA, etc.), presence of a sensitive ecological feature that may be impacted by development triggers the need for a site specific water balance analysis and maintenance of recharge, per Section 6.2.2. Planning and design of infiltration facilities must consider soil conditions, depth to water table, and the presence of vulnerable areas such as Wellhead Protection Areas (WHPA's, Appendix B). Consultation with CVC is required to establish water balance methodologies and criteria, particularly for sensitive ecological features where baseline monitoring is necessary to establish appropriate criteria, per Figure 6-2.

It is important to note that the criteria outlined in **Table 2-2** represent a minimum requirement that may be superseded by the results of further studies and local constraints, proponents should consult with CVC staff to confirm the criteria and discuss variances if necessary. In addition, some proposed SWM approaches may address multiple criteria simultaneously. For example, an erosion target of 5mm and a water balance target of 12mm are not cumulative – a site target of 12mm will address both the erosion and water balance criteria.

uses, crossings, etc.). In all cases, proponents should consult with CVC staff to confirm the criteria to be applied. Please refer to **Appendix A** for more information.

4.3 Erosion Control Methodology of Analysis

The overall methodology of defining erosion mitigation practices for a proposed development or project is summarized in **Figure 4-1**, illustrating the minimum 5mm on-site detention requirement where comprehensive studies have not been completed, and where the sensitivity of the receiving watercourses do not warrant a more comprehensive analysis of the erosion potential associated with urban development. In cases where the detailed analysis is required, **Figure 4-1** summarizes the required methodology, with more detailed information provided in **Appendix A**.

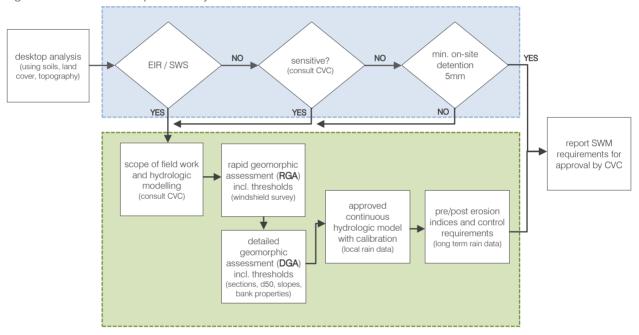


Figure 4-1: Erosion Scope of Analysis

Note: The noted minimum 5 mm detention volume requirements should be above the initial abstraction.

In general the detailed methodology yields the discretization of a watershed into relatively homogeneous river reaches, the rapid assessment of the geomorphic stability of a reach, and determination of the erosion threshold of a watercourse. Together these elements provide the information necessary to compare pre- and post-development scenarios, and define the measures required to effectively mitigate the erosion related impacts of development. Continuous hydrologic modelling, with calibration, is necessary to establish the pre- and post-development erosion indices and associated SWM requirements. Modelling guidance is provided in **Section 2.3** and **Appendix A**.





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THIRD-PARTY TESTING AND VERIFICATION

Stormceptor[®] **EF** and **Stormceptor**[®] **EFO** are the latest evolutions in the Stormceptor[®] oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

► Stormceptor® EF and EFO remove stormwater pollutants through gravity separation and floatation, and feature a patentpending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including highintensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV *Procedure for Laboratory Testing of Oil-Grit Separators* for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle	Percent Less	Particle Size	Percent
Size (µm)	Than	Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5







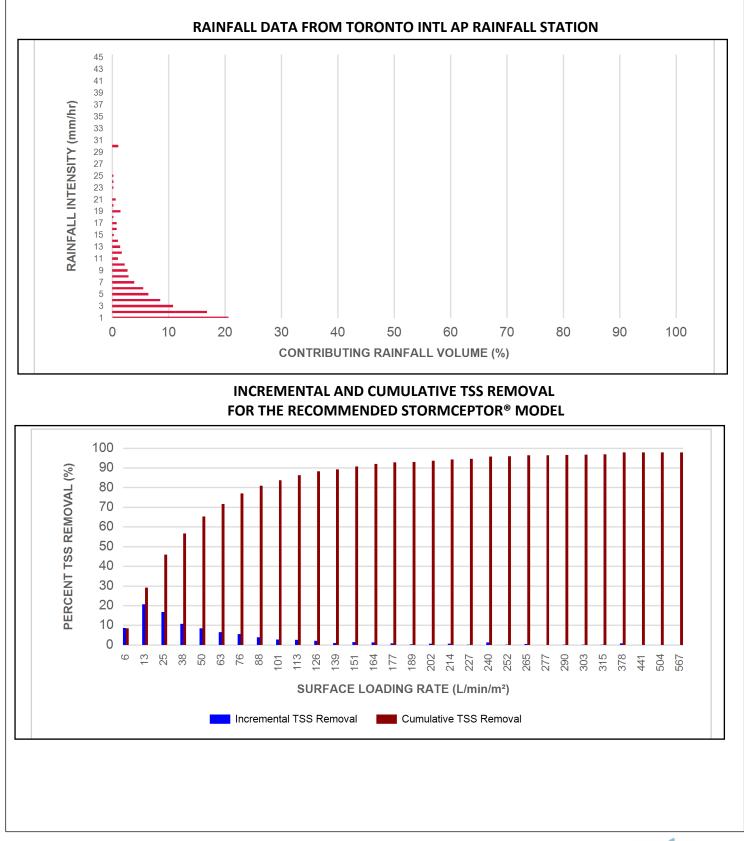
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m ²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	0.13	8.0	6.0	100	8.5	8.5
1.00	20.6	29.1	0.25	15.0	13.0	100	20.6	29.1
2.00	16.8	45.9	0.50	30.0	25.0	100	16.8	45.9
3.00	10.8	56.7	0.76	45.0	38.0	100	10.8	56.7
4.00	8.5	65.2	1.01	61.0	50.0	100	8.5	65.2
5.00	6.4	71.6	1.26	76.0	63.0	100	6.4	71.6
6.00	5.5	77.0	1.51	91.0	76.0	100	5.5	77.0
7.00	3.9	81.0	1.77	106.0	88.0	98	3.9	80.9
8.00	2.9	83.9	2.02	121.0	101.0	96	2.8	83.7
9.00	2.7	86.5	2.27	136.0	113.0	95	2.5	86.2
10.00	2.2	88.7	2.52	151.0	126.0	93	2.0	88.2
11.00	1.0	89.7	2.77	166.0	139.0	92	0.9	89.1
12.00	1.7	91.3	3.03	182.0	151.0	89	1.5	90.6
13.00	1.4	92.8	3.28	197.0	164.0	88	1.3	91.9
14.00	1.0	93.7	3.53	212.0	177.0	87	0.8	92.7
15.00	0.3	94.0	3.78	227.0	189.0	84	0.3	93.0
16.00	0.8	94.8	4.04	242.0	202.0	83	0.7	93.6
17.00	0.8	95.7	4.29	257.0	214.0	83	0.7	94.3
18.00	0.2	95.8	4.54	272.0	227.0	82	0.2	94.5
19.00	1.5	97.3	4.79	288.0	240.0	81	1.2	95.7
20.00	0.2	97.5	5.04	303.0	252.0	81	0.2	95.8
21.00	0.6	98.2	5.30	318.0	265.0	80	0.5	96.3
22.00	0.0	98.2	5.55	333.0	277.0	80	0.0	96.3
23.00	0.2	98.4	5.80	348.0	290.0	79	0.2	96.5
24.00	0.2	98.6	6.05	363.0	303.0	78	0.2	96.7
25.00	0.2	98.9	6.31	378.0	315.0	78	0.2	96.9
30.00	1.1	100.0	7.57	454.0	378.0	75	0.9	97.8
35.00	0.0	100.0	8.83	530.0	441.0	72	0.0	97.8
40.00	0.0	100.0	10.09	605.0	504.0	69	0.0	97.8
45.00	0.0	100.0	11.35	681.0	567.0	66	0.0	97.8
	-	-	Es	timated Ne	t Annual Sedim	ent (TSS) Loa	d Reduction =	98 %

Climate Station ID: 6158731 Years of Rainfall Data: 20



Stormceptor[®]

Stormceptor[®]EF Sizing Report







Maximum Pipe Diameter / Peak Conveyance									
Stormceptor EF / EFO	· · · · Model Dismeter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EF012	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

Stormceptor® EF and EFO feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV Procedure for Laboratory Testing of Oil-Grit Separators, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

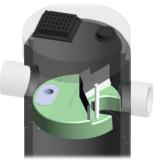
DESIGN FLEXIBILITY

► Stormceptor[®] EF and EFO offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

► While Stormceptor[®] EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor[®] EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid reentrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



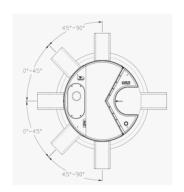












INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

i onutant capacity												
Stormceptor EF / EFO	Moo Diam		Pipe In	(Outlet vert to Floor)	Oil Vo	lume	Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

Pollutant Capacity

*Increased sump depth may be added to increase sediment storage capacity ** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To			
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer			
Third-party verified light liquid capture	Proven performance for fuel/oil hotspot	Regulator, Specifying & Design Engineer			
and retention for EFO version	locations	Site Owner			
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer			
Minimal drop between inlet and outlet	Site installation ease	Contractor			
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner			

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef





STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

- 2.1.1 4 ft (1219 mm) Diameter OGS Units:
 - 5 ft (1524 mm) Diameter OGS Units: 6 ft (1829 mm) Diameter OGS Units: 8 ft (2438 mm) Diameter OGS Units: 10 ft (3048 mm) Diameter OGS Units:

12 ft (3657 mm) Diameter OGS Units:

PART 3 – PERFORMANCE & DESIGN

 $\begin{array}{l} 1.19 \ m^{3} \ sediment \ / \ 265 \ L \ oil \\ 1.95 \ m^{3} \ sediment \ / \ 420 \ L \ oil \\ 3.48 \ m^{3} \ sediment \ / \ 609 \ L \ oil \\ 8.78 \ m^{3} \ sediment \ / \ 1,071 \ L \ oil \\ 17.78 \ m^{3} \ sediment \ / \ 1,673 \ L \ oil \\ 31.23 \ m^{3} \ sediment \ / \ 2,476 \ L \ oil \\ \end{array}$







Stormceptor[®]EF Sizing Report

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m² to 1400 L/min/m², and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m² and 1400 L/min/m² shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m².

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid





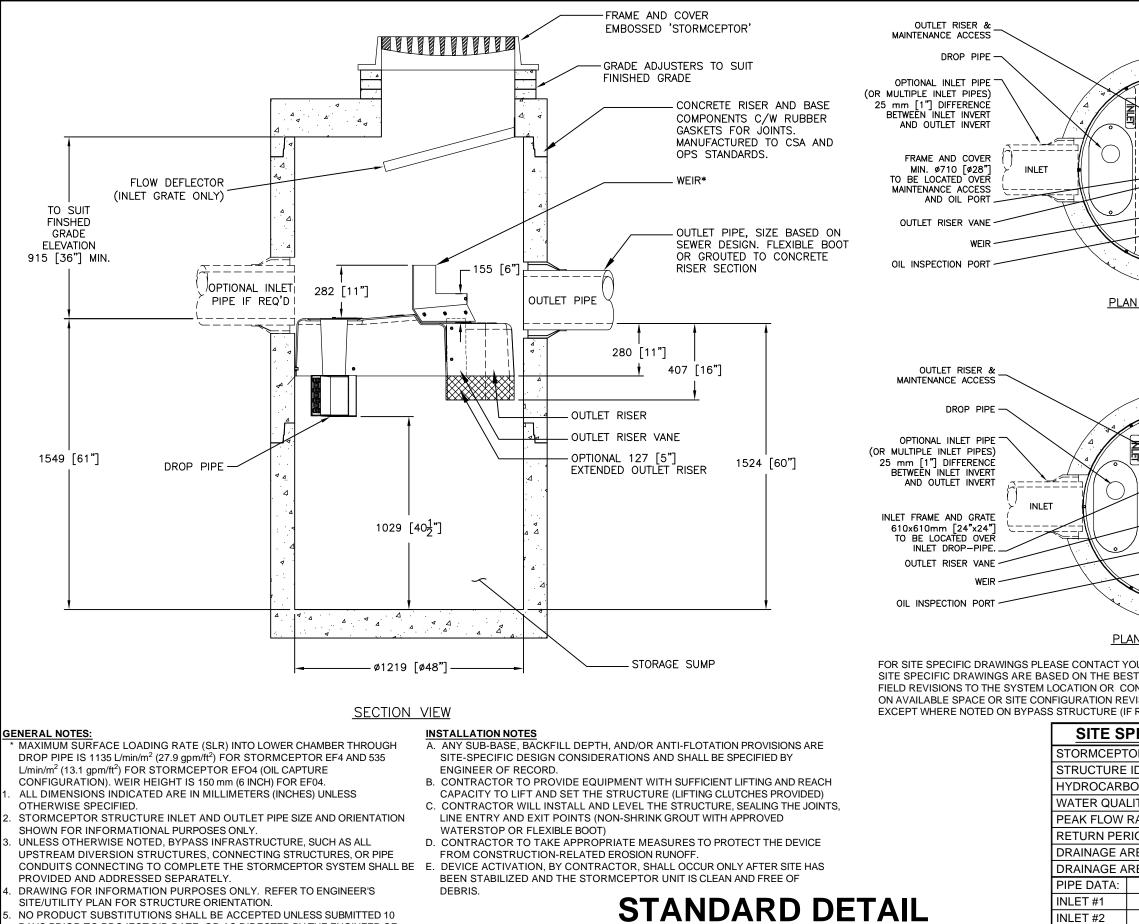


Stormceptor[®] EF Sizing Report

Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This reentrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m² to 2600 L/min/m²) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.





NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

STANDARD DETAIL NOT FOR CONSTRUCTION

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Sanitary Demand Calculations



SHEET 1 of 10

FOR PIPES FLOWING FULL

GRADE	150	mm	200	mm	250	mm	300	mm	375	mm
%	v	Q	v	Q	v	Q	v	Q	v	Q
6.00	2.134	.039	2.585	.084	2.999	.152	3.387	.247	3.930	.448
5.00	1.948	.036	2.359	.077	2.738	.139	3.092	.226	3.587	.409
4.00	1.742	.032	2.110	.068	2.449	.124	2.765	.202	3.209	.366
3.50	1.630	.030	1.974	.064	2.291	.116	2.587	.189	3.002	.342
3.00	1.509	.028	1.828	.059	2.121	.108	2.395	.175	2.779	.317
2.50	1.377	.025	1.668	.054	1.936	.098	2.186	.160	2.537	.289
2.00	1.232	.023	1.492	.048	1.732	.088	1.955	.143	2.269	.259
1.80	1.169	.021	1.416	.046	1.643	.083	1.855	.136	2.153	.246
1.60	1.102	.020	1.335	.043	1.549	.079	1.749	.128	2.029	.231
1.50	1.067	.020	1.292	.042	1.500	.076	1.693	.124	1.965	.224
1.40	1.031	.019	1.248	.041	1.449	.073	1.636	.119	1.898	.216
1.30	0.993	.018	1.203	.039	1.396	.071	1.576	.115	1.829	.209
1.20	0.954	.017	1.156	.038	1.341	.068	1.515	.111	1.758	.200
1.10	0.914	.017	1.107	.036	1.284	.065	1.450	.106	1.683	.192
1.00	0.871	.016	1.056	.034	1.224	.062	1.383	.101	1.604	.183
0.98	0.862	.016	1.045	.034	1.212	.061	1.369	.100	1.588	.181
0.96	0.853	.016	1.034	.034	1.200	.061	1.355	.099	1.572	.179
0.94	0.844	.015	1.023	.033	1.187	.060	1.341	.098	1.556	.177
0.92	0.835	.015	1.012	.033	1.174	.060	1.326	.097	1.539	.176
0.90	0.826	.015	1.001	.033	1.162	.059	1.312	.096	1.522	.174
0.88	0.817	.015	0.990	.032	1.149	.058	1.297	.095	1.505	.172
0.86	0.808	.015	0.979	.032	1.135	.058	1.282	.094	1.488	.170
0.84	0.798	.015	0.967	.031	1.122	.057	1.267	.093	1.470	.168
0.82	0.789	.014	0.956	.031	1.109	.056	1.252	.091	1.453	.166

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

 $1 \text{ m}^3/\text{s} = 1000 \text{ litres per second}$

V = Metre per second

 $Q = Metre^{3}per second$

To obtain V and Q if n = 0.010, multiply values in the table by 1.300 $\,$

n = 0.013

THE REGIONAL MUNICIPALITY OF HALTON	Date FEBRUARY 2001 Rev. NTS
PLANNING AND PUBLIC WORKS DEPARTMENT	
VELOCITY AND DISCHARGE FOR 150mm TO 375mm	DIRECTOR, ENGINEERING SERVICES
CIRCULAR PIPE	REGION STANDARD RH 2000.01

SHEET 2 of 10

FOR PIPES FLOWING FULL

GRADE	150	mm	200	mm	250	mm	300	mm	375	mm
%	V	Q	v	q	V	Q	v	Q	v	Q
0.80	0.779	.014	0.944	.031	1.095	.056	1.237	.090	1.435	.164
0.78	0.769	.014	0.932	.030	1.081	.055	1.221	.089	1.417	.162
0.76	0.759	.014	0.920	.030	1.067	.054	1.205	.088	1.399	.160
0.74	0.749	.014	0.908	.030	1.053	.053	1.189	.087	1.380	.157
0.72	0.739	.014	0.895	.029	1.039	.053	1.173	.086	1.361	.155
0.70	0.729	.013	0.883	.029	1.024	.052	1.157	.084	1.342	.153
0.68	0.718	.013	0.870	.028	1.010	.051	1.140	.083	1.323	.151
0.66	0.706	.013	0.857	.028	0.995	.050	1.123	.082	1.303	.149
0.64	0.697	.013	0.844	.027	0.980	.050	1.106	.081	1.284	.146
0.62	0.686	.013	0.831	.027	0. 9 64	.049	1.089	.080	1.263	.144
0.60	0.675	.012	0.817	.027	0.948	.048	1.071	.078	1.243	.142
0.58	0.663	.012	0.804	.026	0.932	.047	1.053	.077	1.222	.139
0.56	0.652	.012	0.790	.026	0.916	.046	1.035	.076	1.201	.137
0.54	0.640	.012	0.775	.025	0.900	.046	1.016	.074	1.179	.134
0.52	0.628	.012	0.761	.025	0.883	.045	0.997	.073	1.157	.132
0.50	0.616	.011	0.746	.024	0.866	.044	0.978	.071	1.135	.129
0.48	0.603	.011	0.731	.024	0.848	.043	0.958	.070	1.112	.127
0.46	0.591	.011	0.716	.023	0.830	.042	0.938	.068	1.088	.124
0.44	0.578	.011	0.700	.023	0.812	.041	0.917	.067	1.064	.121
0.42	0.565	.010	0.684	.022	0.794	.040	0.896	.065	1.040	.119
0.40	0.551	.010	0.667	.022	0.774	.039	0.874	.064	1.015	.116
0.35	0.515	.009	0.624	.020	0.724	.037	0.818	.060	0.949	.108
0.30	0.477	.009	0.578	.019	0.671	.034	0.757	.055	0.879	.100
0.25	0.436	.008	0.528	.017	0.612	.031	0.691	.050	0.802	.091
0.20	0.390	.007	0.472	.015	0.548	.028	0.618	.045	0.718	.082

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

 $1 \text{ m}^3 \text{/s} = 1000 \text{ litres per second}$

V = Metre per second

n = 0.013

 $Q = Metre^3$ per second

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON	Date FEBRUARY 2001 Rev. NTS
PLANNING AND PUBLIC WORKS DEPARTMENT	APPROVED
VELOCITY AND DISCHARGE FOR 150mm TO 375mm	DIRECTOR, ENGINEERING SERVICES
CIRCULAR PIPE	REGION STANDARD RH 2000.02



DESIGN CRITERIA

B.9. CONNECTIONS FROM MAIN TO STREET LINE

a) Single family and semi-detached dwellings in residential areas shall have a minimum 125 mm diameter street line connection. All other connections shall be a minimum 150 mm in diameter. Where a single service serves two homes, a minimum pipe diameter shall be 150 mm.

Where the diameter of the lateral connection is greater than or equal to half the diameter of the wastewater main, the connection shall be made with a tee-wye or wye connection.

- b) The minimum and maximum cover at property line shall be 2.15 m and 2.75 m respectively. A 2% minimum grade for lateral connections shall be maintained.
- c) In multiple family blocks in residential areas, the lateral connections shall meet the following requirements:

	Slope of	Drain					
Diameter of Drain (mm)	2.0 %	4.0 %					
()	Maximum No. of Fixture Units Per Connection						
125	480	575					
150	840	1000					
200	1920	2300					
250	3500	4200					
300	5600	6700					
375	10000	12000					

TABLE B.9.1 Connection Size and Grade

13

PROPOSED RESIDENTIAL DEVELOPMENT

37 King Street

Georgetown, Halton Hills Project No: 60793_001 Date: February 2025 By: ASB

Total Site Area

Area of towntomes Area of semi-detached homes 0.0246 ha 0.0088 ha

0.1357 ha



$$M = 1 + \frac{14}{4 + p^{0.5}}$$

where:

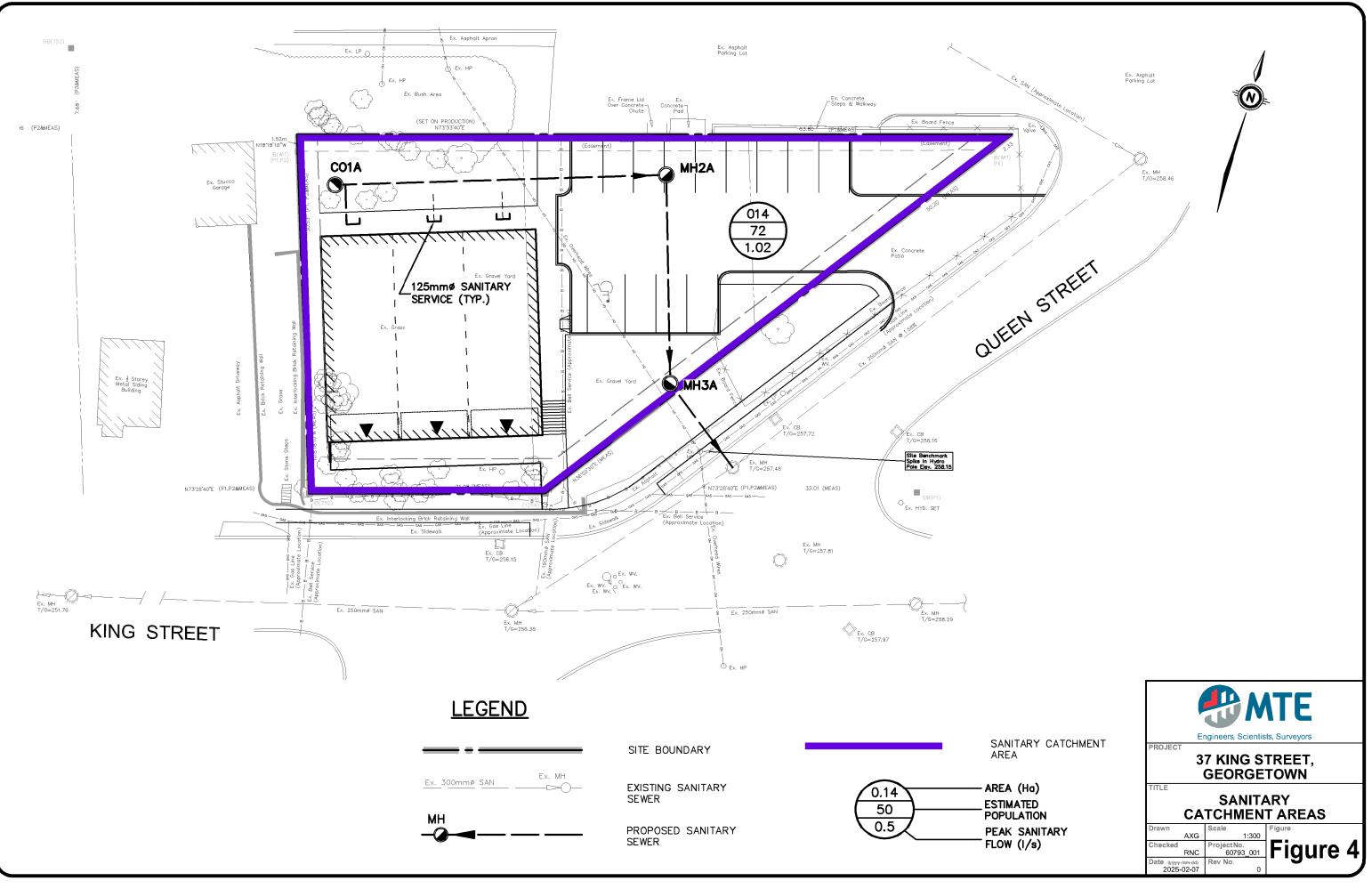
M = ratio of peak flow to average flow P = the tributary equivalent population in thousands

	Design Population	Litres/Capita/ Day ^B	Total Flow (L/day)	Average Dry Weather Flow (L/s)	Harmon Peaking Factor (M)	Peak Flow (L/s)	Peak Flow (m ³ /s)	infiltration allowance ^c	Peak flov (L/s)
Proposed Development Total	12 12	6	72 72	2927	135	72 72		With	
	Number of Blocks	Population Density (ppu) ^A	Population	Equivalent Population Density (ppha)	Peel Region Standard Population Density (ppha)	Worst-Case Population			

^A Population Density based on OBC Section 3.1.17.1, Clause 1(b). 2 persons per bedroom

^BDomestic sewage flows are based upon a unit sewage flow of 275Lpcd according to Halton Design Criteria, Contract Specifications and Standard Drawings Manual

^CInfiltration allowance is 0.000286 m³/s/ha according to Halton Design Criteria, Contract Specifications and Standard Drawings Manual



CAD: P:\P\60793_001\60793_001-F3.

Date: February 14, 2025 - 10:45

PROJECT NO. :

LOCATION:

60793_001

THE REGIONAL MUNICIPALITY OF HALTON SANITARY SEWER DESIGN

0.013 pvc n =

37 King Street, Georgetown Halton Hills, Ontario

	Ν/Δ	NHOLE	LENGTH	TRIBUTARY	AREA (Ha)		TION	AVERAGE	AVERAGE	PEAK	MAX	INFILTRATION	MAX FLOW					VER			PI	IPE	
STREET			(m)	Increment	TOTAL	Increment Res	TOTAL	(L/s)	(L/s)	FACTOR	(L/s)	(L/s)	EXPECT. (L/s)	SIZE (mm)		$\cap (1/s)$	Q (L/s)	V (m/s)	% Full	TVDF	CLASS	REMARKS
	FROM	TO	(11)	Res	TOTAL	Res	TOTAL	Increment	(L/s) Total	TACTOR	(L/ S)	(L/ S)	LAFLUT. (L/S)		3LOFL (10)	Q (L/ S)	Q (L/s) (Full)	FULL FLOW	ACTUAL FLOW	70 T UII	IIFL	CLA33	
On Site	MH3A	MH2A	28.3	0.035		72	72	0.23	0.23	4.28	0.98	0.010	0.991		1.0%	0.99			0.0315	3.02%	PVC		
	MH2A	MH1A	15.8	0.101								0.029	1.020	200	1.0%	1.02	32.80	1.04	0.0325	3.11%	PVC		
	MH1A	Ex Sewer	9.2	0.034								0.000	1.020	200	1.4%	1.02	38.81	1.24	0.0325	2.63%	PVC		
Queen St	EXMH	EXMH	45.5										1.020	250	1.58%	1.02	74.75	1.52	0.0208	1.36%	PVC		
	1																						

DATE:

February 4, 2025

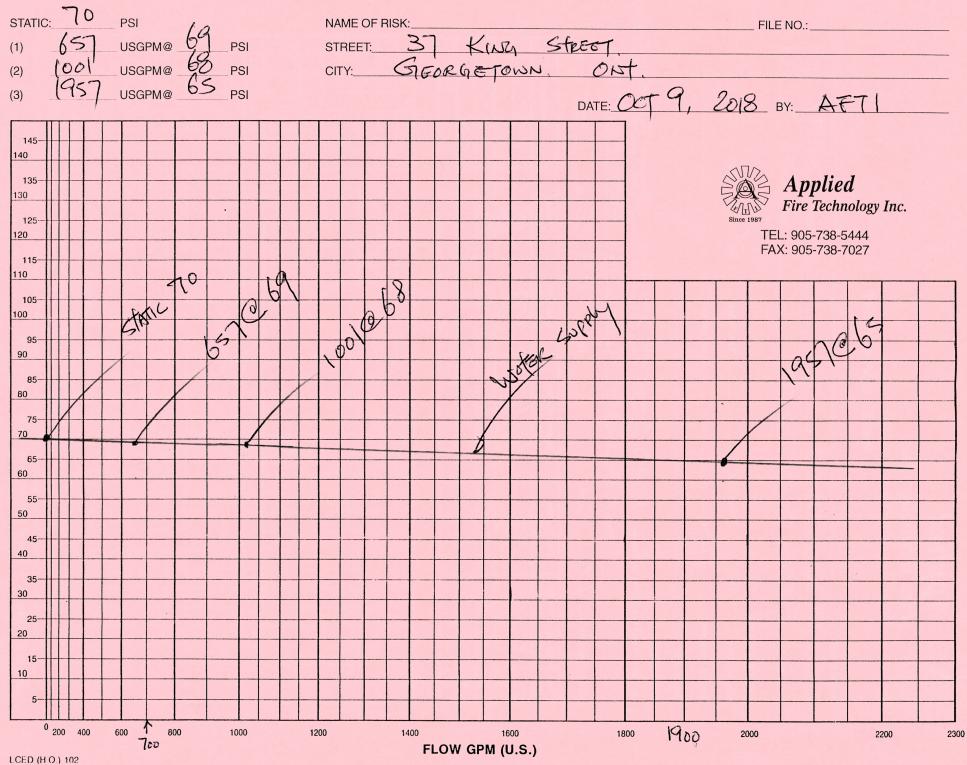
DESIGNED BY: CHECKED BY:

ASB



Water Demand Calculations





PRESSORE 11 P S I

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	nents:						
ocati	OATA: on of test	fire hydran	ts; Residual: .#1	45 CUSENS	st of Ki	NG STRE	ET. GEORGETO
			Flow: .#2	46 QUEEN S	ST. ST MURD	NCK STREET	GEORGETON
tatic	pressure	70	<u>)</u> psi				
Test No.	No. of Outlets	Orifice Size (in.)	Pitot Reading (psi)	Equivalent Flow gpm (U.S.)	Total Flow gpm (U.S.)	Residual Pressure (psi)	Comments
1	1	134	52	657	657	69	0.997
2 3	2	22	43,43	1251.5 2446	1957	63	08
4							0.8
				L			
				1/5		/	
					7	K	ING STREET
							
1			1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	101			
	1 1						
				4			
				157 /			
			/				
			/6				
			Æ		MURDOCK	<u></u>	
			Æ		MURDOCK (-15 E	S T	Sketch by: RW

37 King Street

Georgetown, Halton Hills Project No: 60793_001 Date: February 2025 By: ASB

Water Demand Calculations

Peaking	Peaking Factors ¹ :								
Avg. Day									
Max. Day	2.25								
Peak Hour									



		Residen	tial			Comm	ercial			Final Deman
Unit type	Units (ea)	persons per unit ²	Population (persons)	Demand (L/s)	Floor Area (m ²)	Population Density (m²/person)	Population (persons)	Demand (L/s)		Max Day Demand Qmax.day (L/s)
<u>Residential Units</u> Townhomes	12	6	72	0.2292					0.23	0.52
Totals	12		72	0.23					0.23	0.52

Water	Demand ³
Average Residential Daily Demands	275 L/d/person
	0.0032 L/s/person

	Fire Flow ⁴
Fire Flow (FUS)	7,000 L/min
	117 L/s

Max Day + Fire Fl	ow Demand (FUS)
Qmax.day+fire	117 L/s
	10124.5 m ³ /d

Note 1: Peaking factors based on Halton Design Criteria, Contract Specifications and Standard Drawings Manual Note 2: Population Density based on OBC Section 3.1.17.1, Clause 1(b). 2 persons per bedroom Note 3: Water Demands based on Halton Design Criteria, Contract Specifications and Standard Drawings Manual Note 4: Fire flows from FUS (2020) - See attached worksheet



Peak Hour		
Demand		
Qpeak (L/s)		
0.92		
0.92		

37 King Street Georgetown, Halton Hills Project No: 60793_001 Date: February 2025 By: ASB



FIRE FLOW DEMAND REQUIREMENTS - FIRE UNDERWRITERS SURVEY (FUS GUIDELINES) $F = 220 C \sqrt{A}$

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 2020).

An estimate of the fire flow required is given by the following formula:

where:

F =	the required fire flow in litres per minute
I –	

- C =
- coefficient related to the type of construction = 1.5 for wood frame construction (structure essentially all combustible).

 - = 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
 = 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
 - = 0.6 for fire-resistive construction (fully protected frame, floors, roof)
- Total floor area in square metres A =

Adjustments to the calculated fire flow can be made based on occupancy, sprinkler protection and exposure to other structures. The table below summarizes the adjustments made to the basic fire flow demand.

			(1)	(2)			(3)		(4)	Fi	nal Adjuste	d
	Area "A"	С	Fire Flo	ow "F"	Occupancy		S	prinkler	Ex	posure		Fire Flow	
Building	(m²)		(l/min)	(l/s)	%	Adjusted Fire Flow (L/min)	%	Adjustment (L/min)	%	Adjustment (L/min)	(L/min)	Rounded(L/min)	(L/s)
Townhouse Block	352	1.5	6,000	100.0	-15	5,100	0	0	15	765	5,865	6,000	100

-25%
-15%
No charge
15%
25%

(3) Sprinkler	
40% credit for	r adequately designed system per
NFPA 13. A	dditional 10% if water supply
standard for	both the system and fire department
hose lines.	

(4) Exposure		
0 to 3m	25%	
3.1 to 10m	20%	
10.1 to 20m	15%	
20.1 to 30m	10%	
>30m	0%	



Exposure Calculations

Townhouse Block					
Direction	Distance of closest building % increase				
Ν	none within 30 m	0			
S	none within 30 m	0			
E	none within 30 m	0			
W	14.5	15			
	Total Exposure: 15				

37 King Street

Georgetown, Halton Hills Project No: 60793_001 Date: January 2021 By: AXB **MTE**

File:

Q:\60793_001\WTM\38412-142-Water Calculations - Domestic and FUS Fire Flow.xlsx

CALCULATION OF RESIDU	CALCULATION OF RESIDUAL PRESSURE		
1. Boundary Conditions (Based on Fire Flow Test Results):			
	Metric	Imperial	
P0 - Starting Pressure	49.23 meter of head	70 psi	

P2 - Residual Pressure	46.54 meter of head	66.17 <i>psi</i>	(extrapolated from Hydrant Flow Test)
Required Flow	6031 <i>L/min</i>	1593 U.S. gal/min	(Maximum Day + Fire Flow)

37 King Street

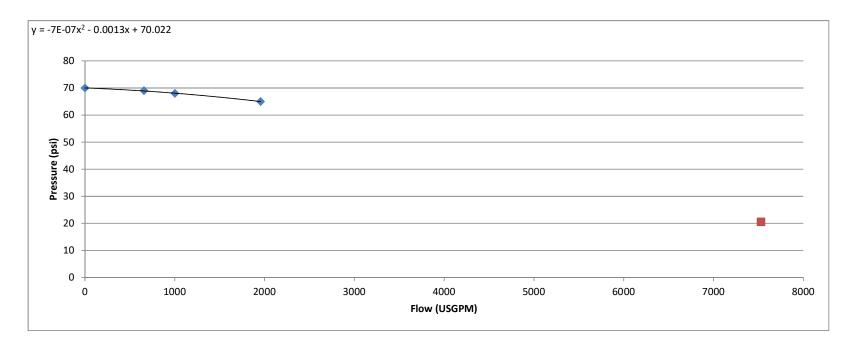
Georgetown, Halton Hills Project No: 38412-142 Date: March 2021 By: LFG



Hydrant Flow Test Results

Flow (USGPM)	Presure (psi)
0	70
657	69
1001	68
1957	65
7529	20

Max Day + Fire Flow Demand (FUS) =	475	L/s
=	7529	US GPM
Residual Pressure=	20.56	psi



MTE