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Site Servicing and Stormwater Management Report

MAPLE LEAF HOMES

1055 KLONDIKE ROAD – ORR RIDGE

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared for:

Maple Leaf Homes

Prepared By:

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Novatech File: 117034 Report Ref: R-2020-013



March 12, 2021

City of Ottawa Planning, Infrastructure and Economic Development Department Planning Services Branch 110 Laurier Ave. West, 4th Floor Ottawa, Ontario K1P 1J1

Attention: Mark Young, Planner

Reference: 1055 Klondike Road – Orr Ridge Site Servicing and Stormwater Management Report Novatech File No.: 117034

Novatech has prepared this Site Servicing and Stormwater Management Report on behalf of Maple Leaf Homes for 1055 Klondike Road – Orr Ridge.

The report outlines the detailed sanitary, water, and storm servicing / stormwater management for the proposed subdivision.

Should you have any questions or comments, please do not hesitate to contact us.

Sincerely,

NOVATECH

1 Mh

Lucas Wilson, P.Eng. Project Coordinator

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1.0 INTRODUCTION

Novatech has been retained by Maple Leaf Homes to prepare a Site Servicing and Stormwater Management Report for 1055 Klondike Road – Orr Ridge in North Kanata, Ottawa.

This report outlines the servicing and proposed storm drainage and stormwater management strategy for the site.

1.1 Background

The proposed development is located within the Kanata North Community west of the intersection of Klondike Road and Sandhill Road. The development is approximately 1.85ha and is bounded by Klondike Road to the south, Shirley's Brook to the west and north, and park lands to the east. Refer to **Figure 1** – Site Location and **Figure 2** – Key Plan.



Figure 1 – Site Location: 1055 Klondike Rd

The proposed development will consist of 46 townhome units and 12 semi-detached units, with a future block containing 53 apartment units. The proposed development is shown in **Figure 2** – Plan of Subdivision.

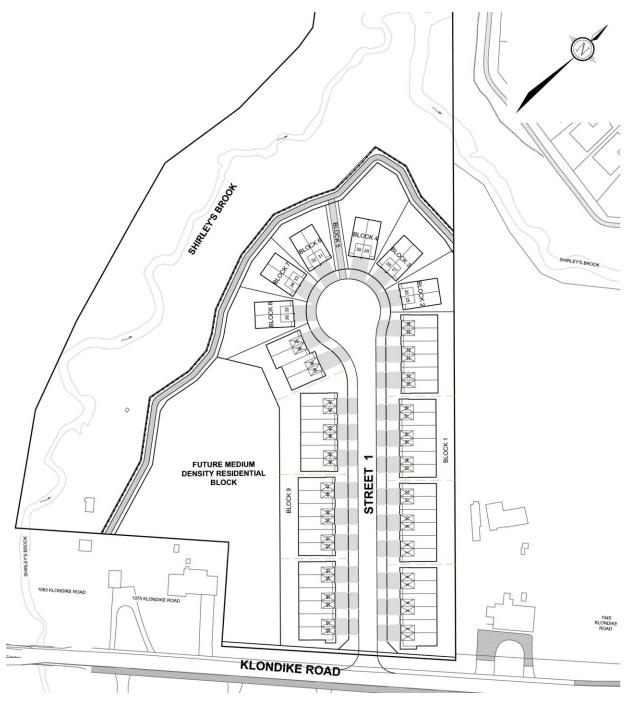


Figure 2 Plan of Subdivision

1.2 Existing / Planned Adjacent Land Uses

The following describes the existing and planned land uses adjacent to the subject site:

North: To the North of 1055 Klondike, Shirley's Brook Separates the Subject Site from Brookside subdivision. The existing Brookside Subdivision consists of Single-Family Homes and Town House units.

East: The lands east of the proposed subdivision are currently vacant with plans for further residential development.

South: Klondike Road, a two-lane urban collector road, bounds the Subject Site to the south. The Subject Site is located between March Road and Sandhill Road on the North Side of Klondike Road.

Southeast: To the Southeast of the Subject Site, across Klondike Road, are Brookside Baptist Church and The Greenwoods Academy.

West: The RioCentre Kanata (832-858 March Road) is located to the west of the Subject Site, separated by Shirley's Brook.

The proposed development is shown on **Figure 3** – Concept Plan. The proposed site will consist of 46 townhouse units, 12 semi-detached units and 53 apartment units within a future medium density block.

1.3 Additional Reports

This report provides information on the considerations and approach by which Novatech has designed and evaluated the proposed servicing for the Maple Leaf Homes Lands. This report should be read in conjunction with the following:

- Maple Leaf Homes Development, 1055 Klondike Road Orr Ridge, Noise Impact Assessment, completed by Novatech, Ref. No.: R-2020-014, dated September 3, 2020.
- Brookside Subdivision Infrastructure Servicing Study, completed by Novatech, Ref. No.: R-2006-071 dated November 2006.
- Shirley's Brook SWM Facility 'C', Detailed Design Report, completed by Novatech, Ref. No.: R-2006-105 dated November 2006.

2.0 EXISTING CONDITIONS

2.1 Topography & Drainage

The proposed site is currently undeveloped and consists of grassed table land and a tree-lined municipal watercourse. Access to the site is currently provided off Klondike Road via a private gravel entrance.

The site gently slopes from the east, westerly towards a ridge running north south down the centre of the site. The ridge drops 4.0m at approximately 17% and then slopes gently towards Shirley's Brook.

The future Block 10 lands slope away from the subdivision westerly towards Shirley's Brook.

2.2 Subsurface Conditions

Gemtec completed three (3) geotechnical investigations in support of the proposed development. The first geotechnical investigation was conducted to provide a preliminary geotechnical investigation and slope stability assessment of the site:

• Preliminary Geotechnical Investigation, Proposed Residential Subdivision, 1055 Klondike Road, Ottawa, Ontario, dated April 13, 2017 (Project: 60616.46).

A second geotechnical investigation was conducted to obtain additional borehole information to provide engineering guidelines and recommendations on the geotechnical design aspects of this project and should be read in conjunction with the preliminary report:

• Geotechnical Investigation, Proposed Residential Subdivision, 1055 Klondike Road, Ottawa Ontario, dated April 4, 2018 (Project: 64153.85).

A third geotechnical investigation was conducted to supplement the existing subsurface information providing additional boreholes to obtain more precise grade raise restrictions within the site:

• Supplemental Geotechnical Investigation, Proposed Residential Development, 1055 Klondike – Ottawa, dated April 10, 2019 (File: 64153.85).

The principal findings of the geotechnical investigations are as follows:

- The work consisted of advancing eleven (11) boreholes to depths ranging from 4.0m to 10.2 m below ground surface.
- The existing soil profile consists of having a layer of topsoil ranging from 0.10m to 0.31m thick. Deposits of grey brown silty sand were encountered at all boreholes ranging from 0.8 to 2.0m thick. Native deposits of weathered, grey brown silt and clay with trace amounts of sand were encountered underlying the sand and silty sand at all locations ranging from 3.0m to 4.6m thick.
- Bedrock is expected to range from 4m-10m below grade.
- Groundwater is expected to range from 2.2m to 6.7m based on observations.
- Within the low-lying area at the bottom of the ridge (existing surface elevation less than 72.0m) there is an estimated grade raise fill restriction of 6.0m. In areas along the midsection of the ridge (existing surface elevation between 72m and 75m) there is an estimated grade raise fill restriction of 4.0m. In areas near the top of the ridge (existing ground elevation between 75m and 78m) a grade fill restriction of 2.0m would apply.

The report provides engineering guidelines based on Gemtec's interpretation of the borehole information and project requirements. Refer to the above-noted report for complete details.

3.0 SANITARY SERVICING

3.1 **Previous Studies**

The Subject Site is located within the Briar Ridge Pump Station catchment area. The Brookside Subdivision Infrastructure Servicing Study, prepared by Novatech, dated November 2006, accounted for sanitary flows from the subject site to outlet to the Klondike Road sanitary sewer and ultimately outletting to the Briar Ridge Pump Station. A sanitary flow of 4.1 L/s was calculated for the area comprising the subject site.

3.2 Existing Sanitary Sewer System for the Subject Lands

Currently, there is an existing 200mm sanitary sewer along Klondike Road with an existing manhole at Sandhill Road located approximately 117m from the site entrance. Flows from the site will be routed through the Klondike Road sewers to the 450mm trunk sanitary sewer within the pump station access road outletting to the Briar Ridge Pump Station.

Septic systems may be encountered on site, in the event a septic system is discovered, it should be decommissioned in accordance with Schedule 10 Decommissioning Requirements for Out-of-Service Septic Systems from the Ottawa Septic System Office (lands to be used for other purposes after decommissioning).

3.3 **Proposed Sanitary Sewer Outlet**

A 200mm sanitary sewer will be installed along Klondike Road connecting the subject site to the existing manhole located at Klondike Road and Sandhill Road. The proposed outlet is consistent with the approved Brookside Infrastructure Servicing Study (Novatech). The proposed sanitary layout can be seen on **Figure 3** below.

3.4 Design Criteria

Sanitary sewers, for the proposed development, are designed based on criteria established by the City of Ottawa in the following documents:

- Section 4.0 of the City of Ottawa Sewer Design Guidelines (October 2012).
- Technical Bulletin ISTB-2018-01 from the City of Ottawa regarding new sanitary design parameters. Design parameters from this technical bulletin will supersede values within the Sewer Design Guidelines (2012).

The resulting design parameters are summarized as follows:

Population Flow = 280 L/capita/day Infiltration = 0.33 L/s/ha Semi-Detached Home = 2.7 persons per unit Townhouse = 2.7 persons per unit Future Block 10 Apartment = 2.1 persons per unit Maximum Residential Peak Factor = 4.0 Harmon Correction Factor = 0.8 Minimum velocity = 0.6m/s Manning's n = 0.013

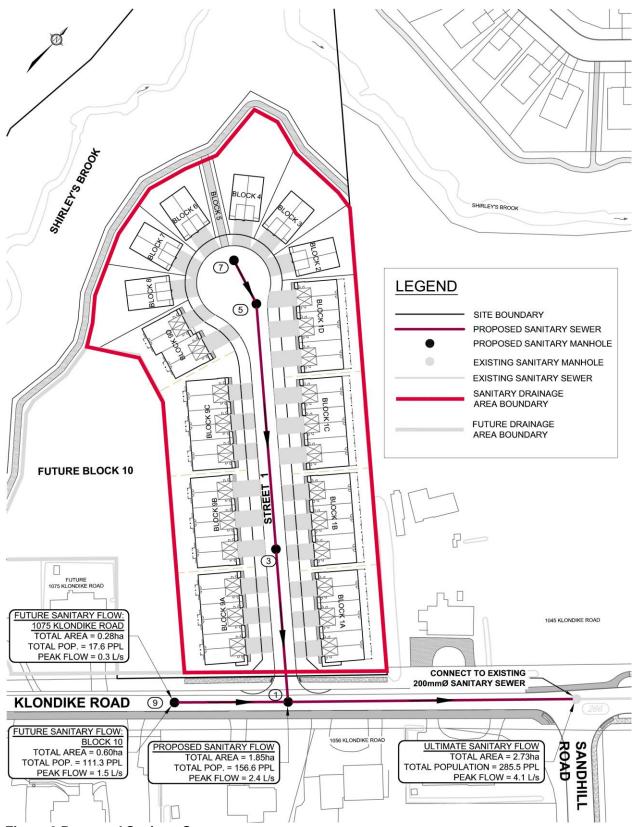


Figure 3 Proposed Sanitary System

3.5 Proposed Sanitary Sewer System

The calculated peak sanitary design flow for the development and future Block 10 is 3.8 L/s. An allowance has been provided for a future development at 1075 Klondike Road, with a unit density of 35 units/ha based on predictions in the Briarridge Sanitary Pumping Station Design Report (Nov. 2000), resulting in an ultimate peak sanitary design flow of 4.1 L/s directed to the Klondike Road sanitary sewer system. For detailed calculations refer to the Sanitary Sewer Design Sheet located in **Appendix B**.

As previously noted, sanitary flows from the site will be directed to an existing 200mm diameter sanitary sewer on Klondike Road at Sandhill Road.

As shown above, the ultimate peak design flow of 4.1 L/s matches the Novatech's Brookside Subdivision Infrastructure Servicing Study value of 4.1 L/s for Area 2. The downstream sanitary sewers within Klondike Road and the Briar Ridge Pump Station Access Road have adequate capacity to accommodate the proposed development as shown in the sanitary design sheet provided in **Appendix B**.

For design sheet, drainage plans and design parameters from the Brookside Infrastructure Servicing Study, refer to excerpts in **Appendix B**.

An HGL analysis of the sanitary sewer was conducted for the proposed development starting at the Briar Ridge Pump Station with an elevation of 67.44 as calculated in the Brookside Subdivision Infrastructure Servicing Study. The HGL analysis concludes the system surcharge is resolved at MH1 located at the outlet of the development on Klondike Road. The sanitary HGL upstream of this location is located within the sewer pipe; we have conservatively assigned the pipe obvert as the HGL value where there are free-flowing conditions. As such, the sanitary HGL under catastrophic failure conditions at the Briar Ridge Pumping Station is calculated as 71.80 at MH1 within Klondike Road; this provides adequate freeboard to the USF of all units within the development. The spreadsheet calculation is attached in **Appendix B**.

4.0 WATERMAIN

4.1 Existing Conditions

The proposed development is located inside the 2W Pressure Zone. An existing 400mm watermain stub is located at the intersections of Klondike Road and Sandhill Road and an existing 300mm watermain runs within Sandhill Road.

4.2 **Proposed Watermain System**

The development will be serviced with a combination of 50mm, 200mm and 400mm pipe with a connection to the existing 400mm diameter watermain at Klondike Road and Sandhill Road and a second connection to the existing 300mm diameter watermain in Sandhill Road. **Figure 4** highlights the proposed works and connection point. All existing watermain boundary conditions were provided by the City of Ottawa and are included in **Appendix C**.

4.3 Design Criteria

Fire flow demands have been calculated as per the Fire Underwriter's Survey (FUS) and are included in **Appendix C**. As per the City of Ottawa's Technical Bulletin ISDTB-2014-02, fire flows may be capped at 167 L/s (10,000 L/min) for townhomes/semi-detached if certain criteria are met. All 4-unit townhome and semi-detached units meet the criteria outlined in the above mentioned Technical Bulletin allowing the capped fire flow of 167 L/s to be used. The 6-unit townhome blocks are above the maximum required area outlined in Technical Bulletin ISDTB-2014-02 allowing fire flows to be capped at 167 L/s. All 6-unit townhomes include a continuous firewall through the center of the block, resulting in a fire flow of 167 L/s. An estimated fire flow of 250 L/s, based on similar Site Plans, will be used for the future apartment block. Watermain analysis was completed based on the following criteria:

Demands:

٠	Semi-Detached Unit Density	2.7 persons/unit
٠	Townhouse Density	2.7 persons/unit
٠	Future Block 10 Apartment Density	2.1 persons/unit
٠	Average Daily Demand	280 L/capita/day
٠	Max. Daily Demand	2.5 x Average Daily Demand
٠	Peak Hour Demand	2.2 x Maximum Daily Demand
٠	Fire Flow Demand	Fire Underwriters Survey
<u>Syster</u>	n Requirements:	
•	Max. Pressure (Unoccupied Areas)	690 kPa (100 psi)
٠	Max. Pressure (Occupied Areas)	552 kPa (80 psi)
٠	Min. Pressure	276 kPa (40 psi) excluding fire flows
٠	Min. Pressure (Fire)	138 kPa (20 psi) including fire flows

Max. Age (Quality)
 192 hours (onsite)

Friction Factors:

Watermain Size	C-Factor
----------------	----------

- 50mm 100
- 200 110

Hydraulic modeling of the Subject Site was completed using EPANET 2.0. EPANET is public domain software capable of modeling municipal water distribution systems by performing simulations of the water movement within a pressurized system. EPANET uses the Hazen-Williams equation to analyze the performance of the proposed watermain and considered the following input parameters: water demand, pipe length, pipe diameter, pipe roughness, and pipe elevation.

4.4 Hydraulic Analysis

A summary of the model results are shown below in **Table 4.1**, **Table 4.2** and **Table 4.3**. Full model results are included in **Appendix C**. Refer to **Figure 4** below for details about the node and pipe network.

Operating Condition	Minimum Pressure
250.87 L/s at NODE1	141.36 kPa (NODE1)

Table 4.2: Summary of Hydraulic Model Results - Peak Hour Demand

Operating Condition	Maximum Pressure	Minimum Pressure
4.775 L/s through system	504.92 kPa (T3)	450.00 kPa (HYD3)

The hydraulic modeling summarized above highlights the maximum and minimum system pressures during Peak Hour conditions, and the minimum system pressures during the Maximum Day + Fire condition. Since the Maximum Day + Fire Flow pressures are above the minimum 140 kPa, and the Peak Hour Pressures onsite fall within the normal operating pressure range (345 kPa to 552 kPa) the proposed development can be adequately serviced.

 Table 4.3: Summary of Hydraulic Model Results – Maximum Pressure Check

Operating Condition	Maximum Pressure	Minimum Pressure	Maximum Age
0.868 L/s through system	547.10 kPa (T3)	515.03 kPa (NODE1)	14.04 Hours (NODE1)

The average day pressures throughout the system are below 552 kPa, therefore pressure reducing valves are not required.

Water retention was analyzed at each node during average day demand. The maximum age throughout the system is within City standards.

A copy of the boundary conditions provided by the City of Ottawa, fire flow calculations, detailed hydraulic analysis results, and watermain layout figure are included in **Appendix C**.

There are no deviations from the City of Ottawa Design Guidelines – Water Distribution (2010).

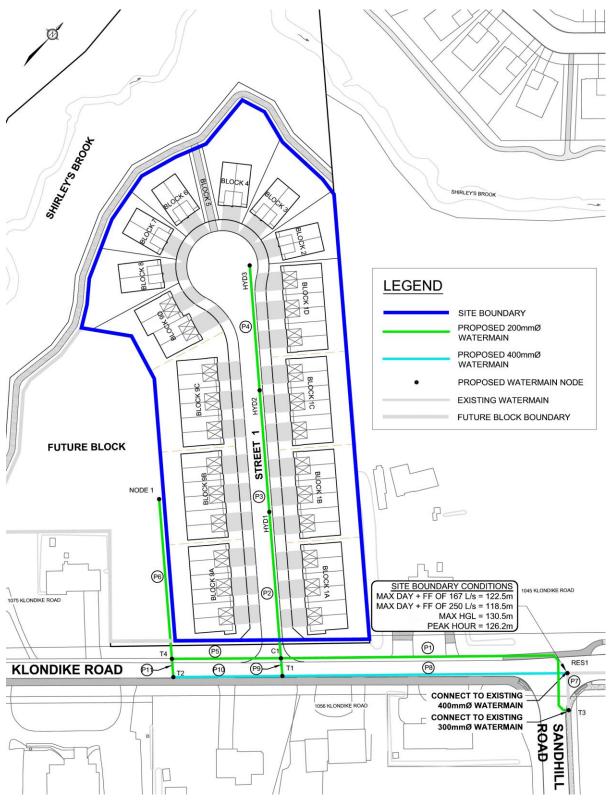


Figure 4 Proposed Watermain Network

5.0 STORM SEWER SYSTEM AND STORMWATER MANAGEMENT

The proposed development will consist of townhouse blocks and semi-detached homes. The townhouse blocks / semi-detached homes will front the proposed Street 1 with a connection to Klondike Road. The Site Plan Block will have a separate entrance to Klondike Road.

The storm drainage and stormwater management systems have been designed in accordance with the City of Ottawa Sewer Design Guidelines (October 2012) and associated Technical Bulletins and will adhere to previously established release rates for this area.

The stormwater management strategy is based on the development of both the subdivision and the Site Plan Block, as they are part of the same property. The future storm servicing and stormwater management design for the Site Plan Block is to adhere to the stormwater management criteria provided in this report (refer to **Section 5.4.4**).

5.1 **Previous Studies**

The proposed development is tributary to the existing storm sewer on Klondike Road, which outlets to Shirley's Brook Stormwater Management (SWM) Facility 'C'. Both the storm sewer and SWM Facility were designed by Novatech (2006), as part of the Brookside Subdivision (formerly Klondike Road Lands). The outlet for SWM Facility 'C' is Shirley's Brook; refer to *Shirley's Brook SWM Facility 'C' Detailed Design Report, prepared by Novatech (November 2006)* provided in **Appendix F**.

The Subject Site (1055 Klondike Road) was included in the overall storm drainage design for SWM Facility 'C'; specifically, Area's C-201 & C-202. Refer to the Drawing 103106-STM1 – SWM Facilities Storm Drainage Area Plan, Brookside Subdivision (Rev. 12), prepared by Novatech (January 16, 2014) provided in **Appendix D**.

The Subject Site includes the proposed Subdivision and Site Plan Block. A comparison of the drainage areas and runoff coefficients is provided in **Table 5.1**.

Parameter	Klondike Road Lands SWMF 'C' (2006)	1055 Klondike Road (proposed conditions)	
Area IDs	C-201 & C-202	part of C-201 & C-202	
Drainage Area	1.96 ha (C-201) 3.07 ha (C-202) 5.03 ha (C-201 + C-202)	1.84 ha (Subdivision) 0.60 ha (Site Plan Block) 2.44 ha (Subject Site)	
Runoff Coef.	0.50 (C-201) 0.50	0.60 (Subdivision) 0.80	
	(C-202) 0.50 (C-201 + C-202)	(Site Plan Block) 0.70 (Subject Site)	

Table 5.1:	Drainage	Area Con	nparison
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5.2 Existing and Proposed Storm Infrastructure

Existing Conditions

Under existing conditions, storm runoff from the site generally flows overland to the main branch of Shirley's Brook along the north side of the site. A small amount of drainage is directed to Klondike Road.

There is an existing 825mm storm sewer on Klondike Road. The existing storm sewer stops at the intersection of Klondike Road and Sandhill Road (existing MH 159).

Proposed Conditions

The existing storm sewer on Klondike Road will be extended 163 m west in order to service both the proposed subdivision and Site Plan Block. A future storm sewer to service the Subject Site and adjacent lands was identified in the Novatech (2006) design. Refer to **Figure 5** for the storm servicing layout.

The storm servicing and stormwater management strategy for the proposed subdivision is provided in two different ways:

- Front Yards and Rear Yards at Blocks 1 & 9 (including the road / ROW) will be serviced via roadside catchbasins / rear-yards catchbasin manholes with inlet control devices (ICDs). A storm sewer within the roadway will collect controlled front yard drainage and foundation drains. A storm sewer within the rear-yards will collect controlled rear-yard drainage. These storm sewers will outlet to the new storm sewer on Klondike Road. The storm sewer on Klondike Road outlets to the existing Shirley's Brook SWM Facility 'C'.
- <u>Rear Yards at Blocks 2 to 8 (including the pathway block)</u> will be serviced via rear yard catchbasins / perforated pipe system. The storm drainage system for these rear yards will consist of 250/300mm perforated pipe surrounded by 50mm dia. clearstone. An outlet will be provided to Shirley's Brook. The flows to Shirley's Brook have been accounted for as part of the major system design; refer to **Section 5.4.3** for further information.

5.3 Stormwater Management Criteria

The storm servicing and stormwater management criteria for the Subject Site is based on City of Ottawa and previously established guidelines.

5.3.1 Stormwater Quality Control Criteria

At the time it was designed, Shirley's Brook SWM Facility 'C' upstream Shirley's Brook was required to provide a *Normal* level of water quality control (70% long-term TSS removal) for the contributing drainage area (26.2 ha, 52% imperviousness), including the Subject Site. The required permanent pool volume was 1,834 m³.

SWM Facility 'C' provides a permanent pool volume of 4,370 m³ (report provided in **Appendix F)**, which exceeds the required volume for an *Enhanced* level of water quality treatment for a contributing drainage area with 55% imperviousness. The required extended detention storage (40 m³/ha) is the same for both *Normal* and *Enhanced* water quality treatment.

The development of the subdivision and Site Plan Block will have a negligible increase in the overall impervious area to SWMF 'C'. As such, no additional water quality controls are required for the Subject Site.

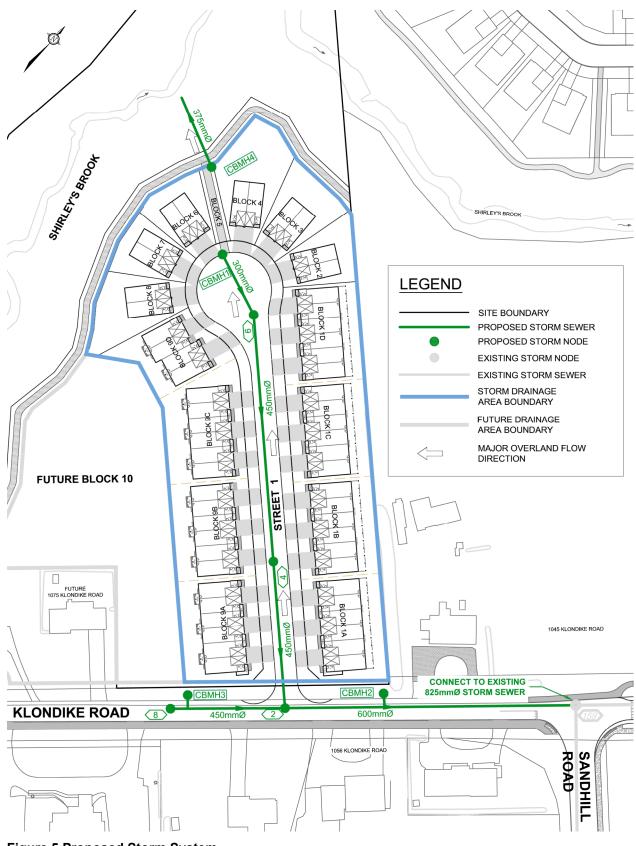


Figure 5 Proposed Storm System

Therefore, SWM Facility 'C' will meet the design requirements for an *Enhanced* level of water quality treatment for the contributing drainage area, including the Subject Site. As such, no additional on-site water quality controls for the Subject Site or modifications to SWM Facility 'C' are required.

5.3.2 Stormwater Quantity Control Criteria

The stormwater quantity control criteria have been established separately for the areas draining to Klondike Road and rear yard areas draining to Shirley's Brook.

Areas Draining to Klondike Road (Allowable Release Rate)

The stormwater management model (SWMHYMO) for the Klondike Road Lands SWMF 'C' assigned the following stormwater management criteria to subcatchments C-201 & C-202, which include the Subject Site:

- Minor system inlet rate = 85 L/s/ha
- Major system storage = $50 \text{ m}^3/\text{ha}$
- After the two above criteria are met, major system overland flow to Shirley's Brook is permitted.

The stormwater quantity control criteria for the proposed subdivision and Site Plan Block are summarized in **Table 5.2** below.

Location	Drainage Area	Allowable Release Rate	Major System Storage	
2006 Criteria -		85 L/s/ha	50 m³/ha	
Portion of C-201	1.67	142.0 L/s	83.5	
Portion of C-202	1.04	88.4 L/s	52	
Subject Site	2.71	230.4 L/s	135.5	

Table 5.2: Stormwater Quantity Control Criteria

The 85 L/s/ha release rate for the 2.71 ha area (Lands included in design of SWMF 'C') corresponds to an allowable minor system peak flow of 230.4 L/s for the Subdivision and Site Plan Block.

Areas Draining to Shirley's Brook

The Klondlike Road Lands SWMF 'C' SWMHYMO model included a DUALHYD to divert minor and major system flows for subcatchments C-201 to C-205. The 100-year model results (3-hour Chicago storm) for major system overland flow to Shirley's Brook is summarized below:

Drainage Area:	14.35 ha	(ADDHYD "C-2")
Major System Overland Flow Subject Site	1.748 m³/s 297.2 L/s	(121.8 L/s/ha)

The Subject Site (2.44 ha) would have an associated 100-year release rate to Shirley's Brook of 297.2 L/s.

For the 2-year and 5-year storm events, the associated release rate to Shirley's Brook will not exceed the pre-development peak flows currently being directed to Shirley's Brook. The current

2-year and 5-year peak flows are 62.7 L/s and 84.5 L/s respectively. Refer to the Pre-Development Flow calculations provided in **Appendix D**.

5.3.3 Minor System (Storm Sewers)

Storm servicing has been provided using a dual-drainage system. Runoff from frequent events will be conveyed by the proposed storm sewers (minor system), while flows from large storm events that exceed the capacity of the minor system will be stored on the surface in road sags, and/or conveyed overland along defined overland flow routes (major system).

Storm Sewer Design Criteria

The following is the storm sewer design criteria [Ottawa Sewer Design Guidelines (Oct. 2012)]:

- Rational Method (Q) = 2.78CIA, where
 - Q = peak flow (L/s)
 - C = runoff coefficient
 - C = (0.70 * %Imp.) + 0.20
 - I = rainfall intensity for a 2-year return period (mm/hr)

 \circ I_{2yr} = 732.951 / [(Tc(min) + 6.199)]^{0.810}

- A = site area (ha)
- Minimum Pipe Size = 250 mm; Minimum / Maximum Full Flow Velocity = 0.8 m/s / 3.0 m/s

The on-site storm sewers are sized to convey peak flows corresponding to a 2-year return period storm event based on the Rational Method. Per the current City of Ottawa Sewer Design Guidelines and associated Technical Bulletins, the proposed storm sewers on Klondike Road (Collector Road) are to be sized for the 5-year return period storm event. Refer to the storm sewer design sheets provided in **Appendix D**.

Inlet Control Devices

Inlet control devices (ICDs) are to be installed within the roadside catchbasins and rear-yard catchbasin manholes for the subdivision. The ICDs have been sized to control minor system peak flows to the Klondike Road storm sewer to the allowable release rate and to ensure that no ponding occurs during the 2-year storm event.

Hydraulic Grade Line

The storm sewers for the proposed subdivision have been designed to ensure the hydraulic grade line (HGL) for a 100-year storm event will provide a minimum 0.30 m clearance from the underside of footing (USF) elevation.

5.3.4 Major System (Overland Flow)

Under post-development conditions, the site will be graded to provide an overland flow path along Street 1. Street 1 has been graded to direct overland flow towards the pathway block, which will outlet to Shirley's Brook. Refer to the Grading Plan (Drawing 117034-GR).

Major System (Overland Flow) Criteria

Runoff from storms that exceed the minor system capacity are to be stored or conveyed overland within the rights-of-way and/or defined drainage easements. The following overland flow criteria has been applied to the design:

Klondike Road Lands SWMF 'C'

- Provide a minimum of 50 m³/ha of major system storage.
- Ensure the 100-year release rate to Shirley's Brook is equal to or less than 121.8 L/s/ha.

Front yards

- Maximum depth of flow (static + dynamic) on local and collector streets shall not exceed 0.35 m during the 100-year event.
- The depth of flow may extend adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event.
- There must be at least 15cm of vertical clearance between the spill elevation on the street and the ground elevation at the building envelope that is in the proximity of the flow route or ponding area.
- Runoff that exceeds the available storage in the right-of-way will be conveyed overland along defined major system flow routes towards the proposed major system outlet (Shirley's Brook).
- The product of the 100-year flow depth (m) on street and flow velocity (m/s) shall not exceed 0.60.

<u>Rear yards</u>

- Maximum depth of flow (static + dynamic) in rear yards shall not exceed 0.30 m during the 100-year event.
- The water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event (i.e. 100-year +20% event).
- Runoff that exceeds the available storage in the rear yards will be conveyed overland along defined major system flow routes towards the proposed major system outlet.
- There must be at least 30 cm of vertical clearance (typical) between the spill elevation in the rear yards and the ground elevation at the building envelope that is in the proximity of the flow route or ponding area.

5.4 Stormwater Management Modeling

A detailed stormwater management model (PCSWMM) model was developed for the proposed subdivision. It includes conceptual information for the Site Plan Block. The model provides estimated minor and major system peak flows, overland flow depths, HGL elevations, and on-site storage requirements. The model is based on the previously established SWM criteria.

5.4.1 PCSWMM Model Parameters

Design Storms

The PCSWMM model includes the following design storms based on the City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (October 2012):

- 3-hour Chicago Storm Distribution (10-minute time step)
- 12-hour SCS Storm Distribution (30-minute time step)

Each storm distribution includes the 2-year, 5-year, 100-year, and 100-year (+20%) return periods.

The 3-hour Chicago storm distribution was determined to be the critical design storm for the proposed development. This is also consistent in the analysis by Novatech (2006), who designed SWM Facility 'C' using the SWMHYMO hydrologic model.

PCSWMM Model Schematics, Output Data and Modeling Files

PCSWMM model schematics and output data for the 100-year 3-hour Chicago storm distribution are provided in **Appendix D**. The PCSWMM modeling files are provided on the enclosed CD.

Table 5.3 provides a summary of the hydrologic modeling parameters (subcatchments).

Area ID	Catchment Area	Runoff Coefficient	Percent Imperviousness	Zero Imperviousness	Equivalent Width	Average Slope	
	(ha)	(%)	(%)	(%)	(m)	(%)	
	Proposed Subdivision						
A-01	0.077	0.50	42.9	95	38.5	3.5	
A-02	0.138	0.70	75.4	40	55.2	4	
A-03	0.051	0.50	43.1	95	25.5	5	
A-04	0.072	0.52	45.8	95	36	4	
A-05	0.293	0.73	79.9	40	117.2	4	
A-06	0.058	0.50	43.1	95	29	5	
A-07	0.079	0.48	40.5	95	52.5	3	
A-08	0.152	0.73	79.6	40	60.8	4	
A-09	0.064	0.52	45.3	95	32	5	
A-10	0.113	0.40	29.2	95	34.4	2.5	
A-11	0.066	0.43	33.3	95	44	5	
A-12	0.024	0.41	29.2	0	9.6	3.5	
A-13	0.107	0.29	12.1	95	30.571	3.5	
A-14	0.053	0.32	17	95	21.2	4	
A-15	0.074	0.53	47.3	95	37	5.5	
A-16	0.361	0.71	79.5	35	90.25	3	
A-17	0.063	0.49	41.3	95	31.5	5	
Subdivision	1.840	0.59	55.7	-	-	-	
	Future Site Plan Block						
A-18	0.600	0.80	85.7	50	200.0	2	
Subject Site	2.440	0.64	63.7	-	-	-	

Table 5.3: Hydrologic Modeling Parameters (subcatchments)

Subcatchment Areas / Runoff Coefficients

- The proposed subdivision has been divided into subcatchments based on the tributary drainage areas to each inlet of the proposed storm sewer system, as shown on the Storm Drainage Area Plan (Drawing 117034-STM2).
- The rooftops have been split in the middle, as the location for roof leaders is unknown. It is recommended that roof leaders outlet to a grass surface; preferably the rear yards, to promote infiltration.
- Weighted runoff coefficients were assigned based on the percent impervious values used in the PCSWMM model. As per the City of Ottawa Sewer Design Guidelines (October 2012), the runoff coefficient is based on the following equation:

C = (% Imp. * 0.7) - 0.2

The Site Plan Block has been assigned a runoff coefficient of 0.80 (86% impervious).

Depression Storage

• The default values for depression storage (1.57 mm impervious / 4.67 mm pervious) have been applied to all catchments.

Subarea Routing

• Subarea routing for all subcatchments has been set to 'direct to outlet'.

Equivalent Width

• The equivalent width parameter for all subcatchments is based on the measured flow length. The front yard areas draining to proposed Street 1 has a 'double loaded' equivalent width parameter.

Outlet Rating Curves for Catchbasins On-Grade

- Inlets for catchbasins on-grade are represented as outlets, with rating curves based on capture / bypass characteristics of standard CB grates.
- The outlet flow rate is 'capped' at the restricted release rate due to the ICD's. The restricted release rate is based on a head value measured from the T/G elevation.

Minor System Conduits (Bend / Exit Losses)

- The minor system network was created in Civil3D and imported into PCSWMM.
- The following exit losses have been inputted into the model. They represent the loss coefficient based on the bend angle, as per the Appendix 6-B in the City of Ottawa Sewer Design Guidelines (October 2012).

Bend Angle	Loss Coefficient
0	0.00
15	0.09
30	0.21
45	0.39
60	0.64
75	0.96
90	1.32

Major System Conduits

- Major system conduits (road network) have been defined using an irregular transect representing an 18 m right-of-way with a 3% crossfall from the centerline of the road to the bottom of curb.
- Junctions at high points have an invert elevation that represents either the bottom of curb or the road centerline, depending on the path of the overland flow route.

Downstream Boundary Condition (Minor System)

- The storm sewer outlet for the proposed development is the existing maintenance hole (MH 159) on Klondike Road.
- Novatech (2006) estimated a 100-year Hydraulic Grade Line (HGL) elevation of 69.73 m at MH 159 on Klondike Road; refer to excerpt provided in Appendix D. This is equivalent to obvert elevation of the outgoing 825mm storm sewer (69.73 m); therefore, it is assumed that this storm sewer does not surcharge during the 100-year storm event. In addition, this HGL elevation is lower than the invert elevation of the outgoing pipe from MH 02 at the end of proposed Street 1 (70.98 m). As such, a 'Normal' outfall condition was used for all model simulations.

Downstream Boundary Condition (Major System)

 Shirley's Brook Flood Plan Mapping Study (November 2017) provides water elevations for the 1:100 year and other return periods flood events. The report estimates a 2-year, 5year and 100-year water elevation at the subject site outlet location of 71.15m, 71.34m and 71.82m respectively; refer to excerpts provided in Appendix D. A 'Fixed' outfall condition was used for the major system outlet to Shirley's Brook (HW1) corresponding to the above noted elevations.

5.4.2 PCSWMM Model Results

Inlet Control Devices (ICDs)

ICDs are provided for catchbasins within the roadway and catchbasin manholes in the rear-yards. The ICD sizes and design flows are provided in **Table 5.4**. The ICDs have been sized to maximize surface storage and not have surface ponding during a 2-year storm event.

Structure	Catchment	ICD Size and Inlet Parameters		2-year	Event	100-year Event		
ID ID		Diameter	T/G – Inv.	Qapproach	Q _{capture}	Qapproach	Qcapture	
		(mm)	(m)	(L/s)	(L/s)	(L/s)	(L/s)	
	Road Catchbasins (In-Sags)							
CB03/04	A-05	102 102	1.40 1.40	50.4	50.4	162.2	55.1	
CBMH01	A-16	127	3.25	61.6	58.8	215.9	62.2	
Road Catchbasins (On-Grade)								
CB01/02	A-02	Tempest LMF Tempest LMF	1.40 1.40	22.5	21.8	65.5	21.8	
CB05/06	A-08	Tempest LMF Tempest LMF	1.40 1.40	26.1	25.1	75.8	26.0	

 Table 5.4: Roadway Inlet Control Device Sizes and Design Flows

*From PCSWMM model, 3-hour Chicago storm distribution.

	ICD Size & Inlet Rate								
Structure ID	ICD Type	T/G	Orifice Invert	100-year Head on Orifice	2-year Orifice Peak Flow*	5-year Orifice Peak Flow*	100-year Orifice Peak Flow*		
		(m)	(m)	(m)	(L/s)	(L/s)	(L/s)		
CBMH02	Tempest LMF	76.96	71.86	3.03	5.0	5.6	6.5		
CBMH03	Tempest LMF	77.80	74.31	3.12	4.6	6.0	6.6		

*From PCSWMM model, 3-hour Chicago storm distribution.

To prevent 2-year ponding at CBMH01 due to $Q_{capture}$ being less than $Q_{approach}$ as shown above in **Table 5.4**, CBMH01 will be installed as a 2400mm diameter structure providing approximately 10.6m³ of underground storage. This will provide sufficient storage to contain the 2-year storm event and prevent any 2-year ponding at the surface.

Both IPEX Tempest LMF (i.e. Vortex ICD's) and MHF (i.e. 102mm & 127mm) ICDs are proposed for the subdivision. Sizing documentation and correspondence is provided in **Appendix D**.

Overland Flow (Major System)

The major system network was evaluated using the PCSWMM model to ensure that the overland flow depths and velocities conform to the City of Ottawa Sewer Design Guidelines (Oct. 2012). The results of the 100-year modeling indicate that the overland flow depths on all streets will be less than 0.35m, the product of depth x velocity will be less than 0.60. The model results for overland flow and at low points are summarized in **Table 5.6**.

	100-year						100-year +20%				
Location	Peak Flow	Velocity	Static Depth	Total Depth (static + dynamic)	Velocity x Depth	Peak Flow	Velocity	Total Depth	Velocity x Depth		
	(L/s)	(m/s)	(m)	(m)	(m²/s)	(L/s)	(m/s)	(m)	(m²/s)		
	Road Catchbasins (In-Sags)										
CB03/04	162.2	0.07	0.07	0.21	0.01	204.7	0.10	0.23	0.02		
CBMH01	215.9	0.12	0.28	0.29	0.03	272.5	0.40	0.33	0.13		
	High Points										
HP01	-	-	-	-	-	-	-	-	-		
HP02	48.4	0.07	-	0.10	<0.01	101.8	0.08	0.13	0.01		
HP03	19.9	1.24	-	0.01	0.01	209.1	3.2	0.02	0.06		

Table 5.6: Overland Flow Results

*From PCSWMM model, 3-hour Chicago storm distribution.

Hydraulic Grade Line

Table 5.7 provides a summary of the 100-year HGL elevations at each storm manhole. The results of this analysis were used to ensure that a minimum freeboard of 0.30m is provided

between the 100-year HGL and the designed underside of footing (USF) elevation; as indicated on the Plan and Profiles (Drawings 117034-PR1 & 117034-PR2).

There is no surcharging within the on-site sewers during both the 100-year and 100-year (+20%). The minimum USF elevations have been set 0.30 m higher than the downstream obvert elevations. Refer to the Grading Plan (117034-GR).

	Pipe / MH Information				HGL Elevation ¹ (m)		Surcharge Above Pipe Obvert		Min. USF
Manhole ID	D/S Pipe Size	D/S Pipe Invert Elev.	D/S Pipe Obvert Elev.	MH T/G Elev.	100yr	100yr (+20%)	100yr	100yr (+20%)	Elev. (m)
	(mm)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	
CBMH01	300	72.89	73.19	76.14	73.12	73.12	0.00	0.00	73.49
MH02	525	71.77	72.30	77.76	72.05	72.05	0.00	0.00	72.60
MH04	450	72.19	72.64	77.42	72.58	72.58	0.00	0.00	72.94
MH06	450	72.60	73.05	76.64	72.90	72.90	0.00	0.00	73.35
MH08	450	72.15	72.60	77.68	72.31	72.32	0.00	0.00	72.90

Table 5.7: 100-year HGL Elevations

*From PCSWMM model, 3-hour Chicago storm distribution.

Comparison of Peak Flows

Table 5.8 provides a comparison of the minor system flows from the proposed development to Klondike Road and major system flows / direct flows to Shirley's Brook.

	Drainage Area		elease Rate ¹ ./s)	100-year Peak Flow ² (L/s)			
Proposed Development	(ha)	Minor System (Klondike Rd.)	Major System (Shirley's Brook)	Minor System (Klondike Rd.)	Major System (Shirley's Brook)	TOTAL	
Subdivision	1.84	179.4	224.1	178.2	274.0	452.2	
Site Plan Block	0.60	51.0	73.1	51.0	0	51.0	
Subject Site	2.44	230.4	297.2	229.2	274.0	503.2	

Table 5.8: Comparison of Peak Flows

⁽¹⁾ Allowable release rate is based on drainage area (2006 SWMF 'C' Report) x 85 L/s/ha (Klondike Rd.) & 121.8 L/s/ha (Shirley's Brook).

⁽²⁾ PCSWMM model results for the 3-hour Chicago storm distribution.

The 100-year minor system peak flow to Klondike Road is controlled to just under the allowable release rate of 230.4 L/s for the proposed subdivision. The total 100-year major system peak flow to Shirley's Brook, from the rear yard perforated pipe system, is also less than the 100-year major system allowable release rate for the Subject Site (121.8 L/s/ha or 297.2 L/s). The 2-year and 5-year major system peak flows to Shirley's Brook of 18.3 L/s and 39.9 L/s respectively, are also less than the pre-development peak flows to Shirley's Brook outlined in **Section 5.3.2** (62.7 L/s and 84.5 L/s).

5.4.3 Rear Yard Perforated Pipes

Drainage from the rear yards / rooftops will be collected with rear yard catchbasins connected to a perforated pipe system. The perforated pipe system will consist of 250mm perforated pipe surrounded by 50mm dia. clearstone. The proposed perforated pipes in the rear yards will promote infiltration. This will mitigate the reduction in groundwater infiltration / recharge resulting from the proposed increase in impervious areas. Infiltration has not been accounted for in the model.

5.4.4 Stormwater Management Requirements for Site Plan Block

The Site Plan Block (0.60 ha) is to adhere to the following stormwater management criteria:

- Minor system inlet rate = 51 L/s
- Major system storage = 81.6 m³
- No major system overland flow to Shirley's Brook during the 100-year storm event.

The development of the Site Plan Block is to not include major system overland flow to Shirley's Brook during the 100-year storm event. The allowable 100-year flow rate to Shirley's Brook for the Subject Site is being used by the proposed subdivision.

6.0 ROADWAYS

6.1 **Proposed Road Infrastructure**

The proposed development will consist of a local roadway with an 18.0m right of way (ROW) to provide access to the townhome and semi-detached units. The access to the medium density block will consist of a private roadway. The proposed cross sections will conform to City of Ottawa Standards.

7.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987). An Erosion and Sediment Control Plan will be prepared as part of the detailed design.

Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site (OPSD 219.110), catch basin inserts under catch basin/maintenance hole lids, heavy duty silt fence barrier (OPSD 219.130), straw bale check dams (OPSD 219.180), rock check dams (219.210 or OPSD 219.211), riprap (OPSS 511), mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent Lands, water bodies or water treatment/conveyance facilities.

It will be the responsibility of the Contractor to submit a detailed construction schedule and appropriate staging, dewatering and erosion and sediment control plans to the Contract Administrator for review and approval prior to the commencement of work. A copy of the City of Ottawa Special Provision F-1005 is included in **Appendix E** which will become part of any contract and which outlines the contractual requirements which includes preparation of a detailed erosion and sediment control plan.

General Erosion and Sediment Control Measures

- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.
- A qualified inspector, provided by the owner, should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.
 - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control Plan.
 - Rock check dams and/or straw bales are to be installed in drainage ditches.
 - Catch basin inserts are to be placed under the grates of all proposed and existing catchbasins and structures.
 - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.
- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.

The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Sanitary Servicing

The analysis of the proposed sanitary servicing confirms the following:

- It is proposed that the development will outlet directly to the 200mm sanitary sewer along Klondike Road at Sandhill Road. The proposed outlet is consistent with the approved Brookside Subdivision Infrastructure Servicing Study (Novatech).
- The proposed development can be serviced with a 200mm sanitary sewer system.
- The total proposed sanitary flow from the subject lands and future blocks is 4.1 L/s, which equals the calculated flows in the Brookside Subdivision Servicing Study (4.1 L/s).
- The proposed and existing sanitary sewers have adequate capacity to accommodate the peak sanitary flow.

<u>Watermain</u>

The analysis of the proposed watermain network confirms the following:

- It is proposed to service the site with 50mm and 200mm pipe with a connection to the existing 400mm diameter watermain at Klondike and Sandhill Road and the 300mm diameter watermain in Sandhill Road.
- The analysis confirms the proposed watermain provides adequate fire protection and domestic service under all operating conditions.
- Distribution mains have been looped by connecting to the existing 300mm and 400mm diameter watermains at Klondike Road and Sandhill Road providing redundant supply and improved circulation and water quality.

Stormwater Management

The following provides a summary of the storm servicing and stormwater management system:

- Proposed storm sewer system will convey stormwater to existing MH 159 on Klondike Road.
 - Storm sewers (minor system) have been designed to convey the uncontrolled 2year peak flow using the Rational Method.
 - Inflows to the minor system will be controlled using inlet control devices (ICDs) to an overall allowable release rate of 230.4 L/s.
 - A minimum clearance of 0.30m is provided between the 100-year hydraulic grade line (HGL) or storm sewer obvert and the designed underside of footing elevations.
- Roads graded in a saw-toothed pattern to provide surface stormwater storage during storm events that exceed the allowable minor system inlet rate.
 - The major overland flow outlet for the site is the pathway block to Shirley's Brook.
 - Ponding depths do not exceed 0.35m for all storms up to and including the 100year event.
- Rear yard drainage at Blocks 2 to 8 will be collected by a perforated pipe system, which will outlet to Shirley's Brook.

Erosion and Sediment control

- Erosion and sediment control measures (i.e. filter fabric, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.
- The Erosion and Sediment Control Plan will ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent lands, water bodies or water treatment/conveyance facilities.

9.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:



Lucas Wilson, P.Eng. Project Coordinator

FOR REVIEW



Mark Bissett, P.Eng. Senior Project Manager

Appendix A Correspondence

Novatech



MEMO

Date: August 12, 2019

To / Destinataire	Laurel McCreight, Planner	
From / Expéditeur	Ghislaine Miliu, Project Manager, Infrastructure Approvals	
Subject / Objet	Pre-Application Consultation 1055 Klondike and Ward No. 4, Councillor Jenna Sudds, the proposal is to develop a residential subdivision consisting of semi-detached dwellings, and low-rise apartment dwellings. One main internal street is proposed, with a separate entrance to the apartment block.	File No. PC2019-0204

Please note the following information regarding the engineering design submission for the above noted site:

- 1. The Servicing Study Guidelines for Development Applications are available at the following address: <u>https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#servicing-study-guidelines-development-applications</u>
- 2. Servicing and site works shall be in accordance with the following documents:
 - ⇒ Ottawa Sewer Design Guidelines (October 2012)
 - ⇒ Ottawa Design Guidelines Water Distribution (2010)
 - ⇒ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
 - ⇒ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
 - ⇒ City of Ottawa Environmental Noise Control Guidelines (January, 2016)



- ⇒ City of Ottawa Park and Pathway Development Manual (2012)
- ⇒ City of Ottawa Accessibility Design Standards (2012)
- ⇒ Ottawa Standard Tender Documents (latest version)
- ⇒ Ontario Provincial Standards for Roads & Public Works (2013)
- Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at <u>InformationCentre@ottawa.ca</u> or by phone at (613) 580-2424 x.44455).
- 4. The proposed site will require extension of all services (water, sanitary and stormwater).
- 5. The Stormwater Management Criteria, for the subject site, is to be based on the following:
 - i. There is currently no storm sewer on Klondike Road directly in front of the 1055 Klondike Property. There is a storm sewer manhole / system at the intersection of Klondike Road and Sandhill Road conveying flow to a ditch upstream of "Pond C".
 - ii. Based on both the Shirley's Brook Floodplain Analysis and SWM Report (Klondike Road Development Lands, prepared by Novatech, May 2006) and the Shirley's Brook SWM Facility "C" Detailed Design Report (prepared by Novatech, 2006), it appears that Pond "C" was sized to service the 1055 Klondike parcel. Please demonstrate that the existing storm sewer and pond have capacity to service this proposed development (quantity and quality control).
 - iii. Barring any additional SWM requirements from the MVCA (please see the note below), refer to the SWM design criteria in the Shirley's Brook SWM Facility "C" Detailed Design Report (prepared by Novatech, 2006) for the proposed development area (including rear yards):
 - Minor system allowable release rate of 85 L/s/ha;
 - Onsite major system storage of 50 m3 / ha (please see the note below);



• ICDs will be installed in the roadway catchbasins to ensure flow into the storm sewer system does not exceed the 5-year runoff rates; and

• HGL for 100-year event must have at least 0.3 m freeboard to the underside of footings.

NOTE: that MVCA is reviewing the SWM design criteria provided in the Shirley's Brook SWM Facility "C" Detailed Design Report (prepared by Novatech, 2006). The MVCA may require further stormwater management requirements be imposed on lands draining to Shirley's Brook (for example, this may include additional onsite major system storage volume, potentially requiring collection and storage of all runoff for storm events up to and including the 100-year return period). Please contact the MVCA to confirm all SWM design criteria (ESC, quality and quantity control).

- iv. IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
- v. A calculated time of concentration (Cannot be less than 10 minutes).
- vi. Flows to the storm sewer in excess of the 5-year storm release rate, must be detained on site (please confirm with MVCA whether the onsite major system storage is 50 m3 / ha, or whether storage volume must be provided to attenuate all runoff up to and including the 100-year event).
- vii. SWM calculations using modified rational method is acceptable however, if a combination of surface storage (roof or at-grade / parking lot) is proposed in addition to sub-surface / cistern storage then the consultant is reminded to either:
 - (a) use a dynamic computer model; or
 - (b) use modified rational method:
 - 1. assuming an average release rate of 50% peak flow rate for a cistern / sub-surface storage facility.
 - 2. provide calculations for each storage facility /area (roof vs subsurface storage) with respect to its attributing drainage area; and



- 3. where storage facilities are inline (or in series), please add the upstream peak release rate to the downstream storage facilities modified rational method calculator.
- Please note that there is a Special Area Development Charge for the subject site.
 Please refer to the current Development Charge attached (By-Law No. 2019 163). Note that this is the Charge for 2019 and may change over time.
- 7. Deep Services (Storm, Sanitary & Water Supply)
 - *i.* Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.
 - *ii.* Connections to trunk sewers and easement sewers are typically not permitted.
 - iii. Provide information on the monitoring manhole requirements should be located in an accessible location on private property near the property line (i.e. Not in a parking area).
 - iv. Review provision of a high-level sewer.
 - v. Provide information on the type of connection permitted

Sewer connections to be made above the springline of the sewermain as per:

- *a.* Std Dwg S11.1 for flexible main sewers *connections made using approved tee or wye fittings.*
- *b.* Std Dwg S11 (For rigid main sewers) *lateral must be less that 50% the diameter of the sewermain,*
- *c.* Std Dwg S11.2 (for rigid main sewers using bell end insert method) for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,
- *d.* Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the



sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

- e. No submerged outlet connections.
- 8. As per Section 4.3.1 of the Water Design Guidelines: "Service areas with a basic day demand greater than 50 m³/day (about 50 homes) shall be connected with a minimum of two feedermains to avoid the creation of a vulnerable service area. Distribution mains shall be looped whenever possible to provide redundant supply and improved circulation and water quality."

Based on the proposed sub-division the site requires two watermain feeds. Linking the existing watermain stubs on Klondike Road (from March Road) to Sandhill Road.

Note: one connection to the existing watermain stub on Klondike at the intersection of Sandhill will not be accepted.

- 9. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
 - i. Location of service
 - ii. Type of development and the amount of fire flow required (as per FUS, 1999).
 - iii. Average daily demand: ____ l/s.
 - iv. Maximum daily demand: ____l/s.
 - v. Maximum hourly daily demand: _____ l/s.
- 10. The applicant will need to confirm with the City whether sufficient capacity is available in the local sanitary sewer on Sandhill or Klondike to accommodate flows generated from the subject site.

Please note that residual capacity at the Briaridge PS is a constraint. A study is currently underway to increase the rated capacity at the station from 55 l/s to 175 l/s. The project to increase capacity is likely a few years away (target date 2021-2022). Note that an EA is not required as part of scope of work for this upgrade.



Planning, Infrastructure and Economic Development Department Services de la planification, de l'infrastructure et du développement économique

11. MOECC ECA Requirements

An MOECC Environmental Compliance Approval will be required for the proposed development due to new services and roads. Please contact Ontario Ministry of the Environment and Climate Change, Ottawa District Office to arrange a pre-submission consultation:

For residential applications: Charlie Primeau

(613) 521-3450, ext. 251

Charlie.Primeau@ontario.ca

Note that the typically the Public Consultation performed as part of the ESA process is submitted as part of the application for the ECA. Please confirm this with the MOECC Ottawa District Office as part of the pre-submission consultation.

12. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x 28699 or by email at <u>ghislaine.miliu@ottawa.ca</u>.

Conservation Partners Partenaires de conservation

Mississippi Valley Office de protection Conservation Authority de la nature de la vallée Mississippi OFFICE DE PROTECTION DE LA NATURE DE LA VALLÉE RIDEAU CONSERVATION AUTHORITY



File Number: PKNSH-63

December 12, 2019

Mark Young City of Ottawa Planning & Growth Management 110 Laurier Avenue West, 4th Floor Ottawa, ON K1P 1J1

Dear Mr. Young:

Re: Plan of Subdivision and Zoning By-law Amendment D07-16-19-0024 & D02-02-19-0115 1055 Klondike Road, City of Ottawa

The staff of Mississippi Valley Conservation Authority (MVCA) has reviewed the above noted plan of subdivision and zoning by-law amendment applications for concerns related to natural heritage and natural hazards for the subject property and surrounding lands. The scope of the natural heritage review includes wetlands, watercourses and significant valleylands, while the focus of the natural hazards review includes flood plain, unstable slopes and unstable soils. MVCA has also reviewed the proposed stormwater management for the development, with a focus on water quality.

The following comments are offered for your consideration:

Summary of Proposal

The application summary indicates that the applicant proposes to construct 12 semi-detached dwellings and 46 townhouses on a 4.5 ha parcel. Future plans include an apartment building. Additional planning approvals will be required prior to the development of the apartment buildings.

Property Overview

The property is presently generally undeveloped table land with a plateau in the middle of the site. Existing runoff is conveyed as sheet flow to the west and northeast to Shirley's Brook.

Natural Heritage and Environmental Impact Statement

The main natural heritage feature in proximity to the subject lands is Shirley's Brook, which flows adjacent to the western and northern portion of the subject lands.

Mississippi Valley Conservation Authority (MVCA) has been circulated the following in support of the development:

• "1055 Klondike Road, Environmental Impact Statement and Tree Conservation Report" prepared by Bowfin Environmental Consulting Inc., September 2018.

Environmental Impact Statement

Site visits were conducted between April and August 2018 and included assessments of tree cavities, turtle habitat, fish habitat, vegetation communities and species at risk.

Wetlands and Watercourses

The western and the northern edges of the property are bounded by Shirley's Brook. This is a permanent watercourse that supports cool-warm water fish habitat. As there are no proposed alterations to the channel or the banks of the creek, it was agreed in pre-consultation with MVCA that the fish population would not need to be sampled.

Species at Risk (SAR)

Only one turtle, a dead red-eared slider (an exotic species), was observed along Shirley's Brook. The watercourse and corridor are considered Category 2 Blanding's Turtle habitat due to Blanding's Turtle observations to the north of the property. As such the Blanding's Turtle habitat within the Shirley's Brook corridor will be protected with a 30 m setback from the top of bank and installation of turtle exclusion fencing along the edge of the setback. A 6 m wide recreational path corridor is proposed within the buffer that will connect to the City of Ottawa park north of the property. This pathway will be in the portion of the buffer directly adjacent to the subdivision properties and predominantly outside of the erosion hazard limit.

Mitigation and Compensation

The EIS/TCR lists several mitigation measures that should be incorporated into the project design. Of note, it recommends that the recreational "pathway be constructed out of woodchips or other material that will help discourage turtles from nesting (gravel pathways should be avoided)." The Shirley's Brook Combined Setback Limits drawing (Novatech, July 2019) indicates a stone dust path.

Summary

"All of the impacts can be mitigated through the use of common mitigation measure and no residual negative impacts to the natural environment are anticipated as a result of the development."

MVCA Review and Recommendations

MVCA has reviewed the above documents and is in support of the recommended mitigation and compensation measures. MVCA also recommends the following:

Landscaping plan:

- Natural areas to be retained are to be isolated by sturdy construction fencing or similar barrier at least 1 m in height during construction in order to ensure their retention.
- Disturbed areas should be replanted with locally grown native species. Use of invasive non-native plant material should be discouraged.

Natural Hazards

All development is proposed outside of any identified Natural Hazards and outside the 30 m setback as outlined in the Shirley's Brook Combined Setback Limits Figure DSK-3, July 24, 2019.

The following report was reviewed by Mississippi Valley Conservation Authority (MVCA) engineering staff:

• Slope Stability Assessment and Meander Belt Setback Proposed Residential Subdivision (July 2019) prepared by Gemtec Consulting Engineers and Scientists.

Slope Stability/Meander Belt

The requisite hazard for setting the Regulation Limit under Ontario Regulation 153/06 along Shirley's Brook for the west development boundary is the stable slope line and for the north boundary the meander belt erosion hazard. In determining the Regulation Limit, the standard default values recommended by the Province for defining the stable slope line and meander belt limit were used.

To address the slope stability issues, Gemtec staff reviewed four cross-sections along the west side of the property.

The slope stability analyses indicated that for three of the four cross-sections reviewed, the existing slopes in their current configurations are considered stable, with factors of between 1.7 and 3.0. For the fifth cross-section (factor of safety of the existing slope 1.4) the stable slope allowance was calculated to be an additional 1.25 m beyond the crest of the existing slope. For the cross-section locations that were determined to be stable in their existing configuration, an 8 m toe erosion allowance was added to the east of the existing crest of the slope to define the erosion hazard limit. The 8 m toe erosion allowance is the applicable allowance for clays and clay-silt soils, where there is evidence of active erosion, as documented in the *Technical Guide River and Stream Systems: Erosion Hazard Limit* prepared by the Minister of Natural Resources and Forestry (Table 3). Although the MVCA, in previous comments, had suggested that the toe erosion allowance should be used to define the toe of the slope before completing stable slope calculations, the method of adding it to the stable slope line is supported in the City of Ottawa's *Slope Stability Guidelines for Development Applications*.

For the fifth cross-section location (cross-section A-A), the erosion hazard limit consists of the stable slope line (1.25 m beyond the crest of the existing slope) plus the 8 m toe erosion allowance plus the 6 erosion access allowance. The erosion access allowance was not added to the locations where the existing slope was determined to be stable, in its existing configuration, (factor of safety greater than 1.5) under the rationalization that the purposes of implementing the access allowance are not required if the slope is

considered stable. The erosion hazard limit for the subject site is shown on the Shirley's Brook Combined Setback Limits Figure DSK-3 included in the submission.

For the northern section of the subject side, the factor of safety of the existing slope was calculated as 4.2. Therefore, the erosion hazard limit was established as a 27.5 m setback from Shirley's Brook which is half of the 55 m meander belt width calculated in the *Kanata North Community Design Plan – Environmental Management Plan Report* (June 2016) (Figure 3.18).

The delineation of meander belt and the north section of the property is acceptable as outlined on the combined setbacks Plan DSK -3, July 24, 2019

Floodplain

The floodplain is confined within the 30 m setback and no floodproofing requirements are recommended for this development.

Stormwater Management

The following report was reviewed by Mississippi Valley Conservation Authority engineering staff:

• 1055 Klondike – Maple Leaf Homes Site Serviceability and Stormwater Management Report (July 2019) prepared by Novatech Engineers, Planners and Landscape Architects

Post-development runoff from the subject site is tributary to the existing storm sewer on Klondike Road and the existing stormwater management (SWM) facility at the corner of Klondike Road and March Valley Road (Facility 'C'). This SWM facility outlets to Shirley's Brook upstream (west) of March Valley Road. Runoff from the subject site was included in the design of the Facility 'C' SWM facility and the storm sewer on Klondike Road assuming:

- A maximum minor system inlet rate of 85L/s/ha (minor system peak flow of 207.4 L/s for the 2.44 ha site);
- Major system storage of 50 m3/ha; and
- After the above two criteria are exceeded, major system flow is conveyed overland to Shirley's Brook.

The Facility 'C' SWM facility was designed assuming the subject site developed at an imperviousness value of 52%. Considering the proposed imperviousness value of 55% for the subject site, the permanent pool volume in the facility exceeds the storage required to provide enhanced water quality control for the tributary drainage area.

A conceptual PCSWMM model was assembled for the subject site including the medium density block. With this model, the 1:100 year hydraulic grade line in the storm sewer and the minor and major system peak flow rates were reviewed to confirm that the above noted criteria can be addressed. This analysis confirmed that the minor system peak flow criteria can be addressed, however, due to the limited road area (only Street 1) the available surface storage achievable on the subdivision area (townhouses and semi-detached residential portion) is only 51.6 m³. Therefore, the design of the medium density block will have to provide a total storage of 70.4 m³ to achieve the required 50 m³/ha major system storage

criteria for the entire site. Depending on the timing of the development of the overall site, to achieve this total storage a temporary dry pond may be required on the medium density block. It is stated in the report that the grading design and available storage will be confirmed during detailed design stage of the development.

It is also stated in the report that the implementation of best management practices (BMPs) and low impact development (LID) measures, to reduce the impacts of the proposed development on the hydrologic cycle and mitigate the reduction in groundwater infiltration/recharge, will be reviewed during the detailed design stage.

Summary

The analysis and the level of detail provided in the submissions is sufficient for MVCA engineering staff to be satisfied that the proposed subdivision layout as proposed can be designed to meet the required criteria. The detailed design of the subdivision and the SWM and drainage system should address the documented criteria and include the implementation of LID measures.

Conclusion

Thank you for providing the Conservation Authority the opportunity to review this proposal. We trust these comments will meet your requirements at this stage in the review process. Please keep MVCA apprised of the status of these applications, including any decisions that may be made. We would appreciate the opportunity to provide input on any draft conditions relating to the stormwater management for the plan of subdivision application.

Please contact the undersigned with any questions that may arise.

Regards,

Matt his

Matt Craig Manager of Planning and Regulations

Appendix B

Sanitary Design Sheets & Excerpts from Relevant Reports

1055 Klondike Road - Orr Ridge: Sanitary Sewer Design Sheet

AF	REA					_	R	ESIDENTIAL								ICI				INF	LTRATIC	ON				F	PIPE		
			Sir	ngles	Semi-De					т	OTAL																		
ID	From	То	Units	Pop.	Units	Pop.		Future 1075 Klondike Rd Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Light Industrial Area (ha)	Accum. Area (ha)	Peak Factor	Commercial Area (ha)	Institutional Area (ha)	Accum. Area (ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	Total Flow (I/s)	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q _{full} (%)
1055 Klondi	ke Road	d Drain	age Area	S																									
A1-1	7	5	0	0.0	15	40.5	0.00	0.0	40.5	40.5	3.7	0.5				0.00	0.00	0.00	0.0	0.64	0.64	0.2	0.7	200	0.65	19.9	27.6	0.85	2.5%
A1-2	5	3	0	0.0	29	78.3	0.00	0.0	78.3	118.8	3.6	1.4				0.00	0.00	0.00	0.0	0.80	1.44	0.5	1.9	200	0.50	100.0	24.2	0.75	7.7%
A1-3	3	1	0	0.0	14	37.8	0.00	0.0	37.8	156.6	3.5	1.8				0.00	0.00	0.00	0.0	0.41	1.85	0.6	2.4	200	0.50	62.3	24.2	0.75	10.0%
A2-1, A2-2	9	1	0	0.0	0	0.0	53	10 128.9	128.9	128.9	3.6	1.5				0.00	0.00	0.00	0.0	0.88	0.88	0.3	1.8	200	0.65	46.2	27.6	0.85	6.5%
	1	266	0	0.0	0	0.0	0.00	0.0	0.0	285.5	3.5	3.2				0.00	0.00	0.00	0.0	0.00	2.73	0.9	4.1	200	0.65	117.0	27.6	0.85	14.9%
Off-site Drai	nage A	reas (T	o Briar R	idge Pum	p Station																								
A3-3	266	265	0	0.0	57	153.9	0.00	0.0	153.9	439.4	3.4	4.8				0.00	0.00	0.00	0.0	2.47	5.20	1.7	6.6	200	0.32	91.0	19.4	0.60	33.9%
A3-4	265	264	0	0.0	0	0.0	0.00	0.0	0.0	439.4	3.4	4.8				0.00	2.21	2.21	1.1	2.21	7.41	2.4	8.4	200	0.32	120.0	19.4	0.60	43.2%
A3-5	264	206	0	0.0	107	288.9	0.00	0.0	288.9	728.3	3.3	7.8				0.00	0.00	2.21	1.1	3.99	11.40	3.8	12.6	250	0.24	306.3	30.4	0.60	41.6%
A3-1, A3-2, A3-6	206	205	201	683.4	392	1058.4	0.00	0.0	1741.8	2470.1	3.0	24.1				9.02	0.00	11.23	5.5	37.33	48.73	16.1	45.6	450	0.20	52.5	133.0	0.81	34.3%
A3-7, A3-8	205	204	0	0.0	0	0.0	0.00	0.0	0.0	2470.1	3.0	24.1	5.4	5.4	4.7	0.00	0.00	11.23	15.7	5.40	54.13	17.9	57.7	450	0.20	79.7	133.0	0.81	43.4%
	204	203	0	0.0	0	0.0	0.00	0.0	0.0	2470.1	3.0	24.1		5.4	4.7	0.00	0.00	11.23	15.7	0.00	54.13	17.9	57.7	450	0.20	79.7	133.0	0.81	43.4%
	203	202	0	0.0	0	0.0	0.00	0.0	0.0	2470.1	3.0	24.1	7.9	13.3	3.9	0.00	0.00	11.23	26.5	7.90	62.03	20.5	71.0	450	0.26	90.0	151.7	0.92	46.8%
	202	201	0	0.0	0	0.0	0.00	0.0	0.0	2470.1	3.0	24.1		13.3	3.9	0.00	0.00	11.23	26.5	0.00	62.03	20.5	71.0	450	0.25	270.0	148.7	0.91	47.8%
	201	PS	0	0.0	0	0.0	0.00	0.0	0.0	2470.1	3.0	24.1		13.3	3.9	0.00	0.00	11.23	26.5	0.00	62.03	20.5	71.0	450	0.15	21.6	115.2	0.70	61.7%
Design Para Avg Flow/Pei Comm./Inst.	rson = Flow =		28000	l/day l/ha/day								Population [ppl/unit	units/ha											Projec	t: 1055 Klo	ndike Road	Desi	ge (117034) igned: LRW ecked: MAB
Light Industri Infiltration = Pipe Friction Residential F	n =		0.013	l/ha/day l/s/ha Equation	(max 4, m	nin 2)					e 1075 K	oartment Unit Iondike Road Single Semi / Town	1.8 3.4	35													Da	ate: Februa	ary 18, 2021
Peaking Fact	or Com	nm./Inst.	1.5	-																									





BROOKSIDE SUBDIVISION SANITARY SEWER DESIGN SHEET

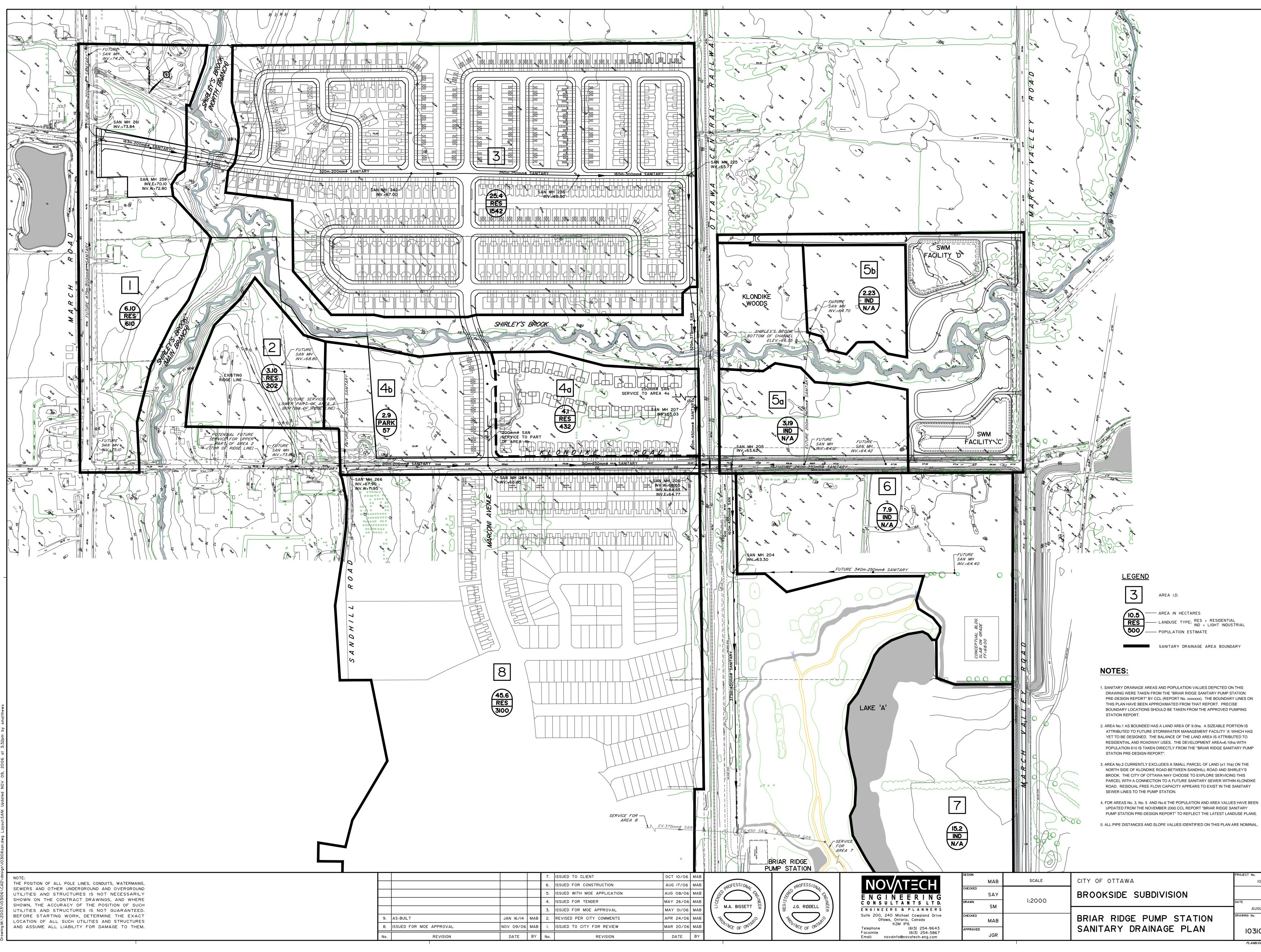
LOCA	TION			RESID	ENTIAL A	AREA	AND PO	OPULATI	ION			IND			INST	ICI		NFILTR	ATION	FLOW			·····	PIP			
Street	From	То	Area	Dwe	llings	Pop.	Cum	ulative	Peak	Peak	Area	Accu.	Peak	Area	Accu.	Peak	Total	Accu.	Infiltration	Total	Length	Dia	Dia	Slope	Velocity	Capacity	Ratio
00000	Node	Node		SFH	ТН		Area	Pop.	Factor	Flow		Area	Factor		Area	Flow	Area	Area	Flow	Flow		Act	Nom		(Full)	(Full)	Q/Qfull
	11000	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(ha)				(ha)	•		(l/s)	(ha)	(ha)		(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)	(mm)	(%)	(m/s)	(I/s)	(%)
																_											
Area 1 - March Roa	d																										
	Offsite	MH 261	6.10			610	6.10	610.0	3.93	9.7							6.1	6.1	1.7	11.4	00.0	000	200	0.33	0.61	19.6	58%
	MH 261	MH 260	0.19				6.29	610.0	3.93								0.2		1.8	11.5 11.5	92.0 71.0	203 203		1.13	1.12	36.3	32%
	MH 260	MH 259	0.17				6.46	610.0	3.93								0.2	6.5 6.6	1.8	11.6	54.4	203	1		0.64	20.8	56%
	MH 259	MH 258	0.13				6.59	610.0	3.93	9.7							0.1	0.0	1.0	11.0		200	200	0.07	0.01		
Area 3 - Brookside	Subdivisi	on														_								0.05	1.00	50.4	000/
	· · · · · · · · · · · · · · · · · · ·	MH 256	0.24	3		10.2	6.83	620.2	3.92	9.9							0.2	6.8	1.9	11.8	42.6	203	200	2.35	1.62	52.4	22%
							0.15		1.00							_	0.5	0.5	0.1	0.5	54.7	203	200	2.00	1.49	48.3	1%
Windance Cres	MH 249	MH 257	0.47	7		23.8 17.0	0.47	23.8 40.8					-				0.4			0.9	51.5	203			0.95	31.0	3%
	MH 257	MH 256	0.37	5		17.0	0.04	+0.0	4.00	0.7																	
Maxwell Bridge Rd	MH 256	MH 255	0.60	9		30.6	8.27	691.6	3.90	10.9							0.6		2.3	13.2	80.5	203		1.11	1.11	36.0	37%
	MH 255	MH 250	0.38	6		20.4	8.65	712	3.89	11.2	:						0.4	8.7	2.4	13.6	56.4	203	200	1.35	1.22	39.7	34%
		111054	0.44	7		23.8	0.44	23.8	4.00	0.4							0.4	0.4	0.1	0.5	52.0	203	200	0.90	1.00	32.4	2%
Pendra Way	MH 246 MH 254	MH 254 MH 253	0.44	2		6.8	0.44	30.6									0.2		0.2	0.7	11.5	203	200		0.82	26.7	3%
	MH 253	MH 252	0.00			0.0	0.66	30.6									0.0	0.7	0.2	0.7	35.2	203			0.80	25.8	3%
	MH 252	MH 251	0.11	1		3.4	0.77	34.0	4.00	0.6	5						0.1	0.8	0.2	0.8	10.6	203			0.86	27.8 26.5	3% 5%
	MH 251	MH 250	0.54	9		30.6	1.20	61.2	4.00	1.0	Y						0.5	1.2	0.3	1.3	67.8	203	200	0.60	0.82	20.0	5%
Maxwell Bridge Rd	MH 250	MH 242	0.42	6		20.4	10.27	793.6	3.86	12.4							0.4	10.3	2.9	15.3	82.0	203	200	0.80	0.94	30.6	50%
Windance Cres	MH 249	MH 248	0.15	2		6.8	0.15	6.8	4.00	0.1		-			-	-	0.2	0.2	0.0	0.2	20.2	203			1.05	34.2	0%
Windance cres	MH 248	MH 247	0.23	2		6.8	0.38	13.6									0.2	0.4	0.1	0.3	13.1	203			1.60	51.8	1%
	MH 247	MH 246	0.49	6		20.4	0.87	34.0									0.5	1		0.8	81.5	203			1.80 1.15	58.2 37.4	1% 5%
	MH 246	MH 245	0.94	14		47.6	1.81	81.6									0.9			1.8 2.0	123.0 11.2	203 203			0.63	20.5	10%
	MH 245	MH 244	0.20		3	8.1	2.01	89.7 103.2	+								0.2		0.6		29.8	203			0.61	19.9	11%
	MH 244 MH 243	MH 243 MH 242	0.18	7		13.5 56.2	2.19					-					0.8	-			108.0	203		0.32	0.60	19.3	16%
	11111243	11111242	0.73	,	12	00.L	2.00	110.0																	0.75	00.0	100/
Maxwell Bridge Rd	MH 242	MH 240	0.39	5		17.0	13.46	956.5	3.81	14.8	3						0.4	13.5	3.8	18.5	82.0	254	250	0.38	0.75	38.2	49%
Celtic Ridge Cres	MH 233	MH 241	0.63		20	54.0	0.63	54.0	4.00	0.9	,		-				0.6	0.6	0.2	1.1	73.3	203	8 200	0.33	0.61	19.6	5%
Cellic Hidge Cres	MH 241	MH 240	0.45		13	35.1	1.08	89.1									0.5	1.1	0.3	1.7	63.7	203	3 200	1.21	1.16	37.6	5%
										10							0.4	14.9	4.2	20.6	82.0	254	250	0.24	0.60	30.4	68%
Maxwell Bridge Rd	MH 240	MH 238	0.40		9	24.3	14.94	1069.9	3.78	16.4	·						0.4	14.9	4.2	20.0	02.0	2.54	200	0.24	0.00	00.1	
Celtic Ridge Cres	MH 233	MH 232	0.19		3	8.1	0.19	8.1	4.00	0.1		-					0.2	0.2	0.1	0.2	12.4	203	3 200	0.65	0.85	27.6	
Cellic Huge Cres	MH 232	MH 231	0.46		12	32.4	0.65				7						0.5	0.7	0.2	0.8	73.3	203	3 200	0.40	0.67	21.6	4%
																	0.4	0.4	0.1	0.6	82.1	203	3 200	0.33	0.61	19.6	3%
Celtic Ridge Cres	MH 230	MH 231	0.41		11	29.7	0.41	29.7	4.00	0.5	2						0.4	0.4	0.1	0.0	02.1	200	200	0.00	0.01		
Braecreek Ave	MH 231	MH 239	0.92		28	75.6	1.98	145.8	4.00	2.4	1		-				0.9	2.0	0.6	2.9	120.0	203			0.61	19.6	
Diacorcol Ave	MH 239	MH 238	0.02		4	10.8	2.15		-								0.2	2.2	0.6	3.1	27.4	203	3 200	1.82	1.42	46.1	7%
								1001 -		10							0.4	17.5	4.9	24.0	82.0	254	1 250	0.24	0.60	30.4	79%
Maxwell Bridge Rd	MH 238	MH 236	0.42		13	35.1	17.51	1261.6	3.73	3 19.	<u> </u>						0.4	17.5	4.9	24.0	02.0	2.04	, 200	0.24	0.00	00.4	
Fordell Ave	MH 230	MH 237	0.86		30	81.0	0.86	81.0	4.00) 1.3	3						0.9	0.9	0.2	1.6	110.0	203	3 200	0.32	0.60	19.3	
I OIGEILAVE		MH 237	0.80		6	16.2	1.09										0.2		0.3	1.9	39.1	203	3 200	2.30	1.60	51.8	4%
			1							1																	

BROOKSIDE SUBDIVISION SANITARY SEWER DESIGN SHEET

	ATION		1	BESID	ENTIAL	AREA		PULAT	ION			IND		1	INST	ICI	1	NFILTRA	ATION	FLOW				PIF	'E		
Street	From	То	Area		llings	Pop.	Cum		Peak	Peak	Area	Accu.	Peak	Area	Accu.	Peak	Total	Accu.	Infiltration	Total	Length	Dia	Dia	Slope	Velocity	Capacity	Ratio
Sileei	Node	Node	Alea	SFH	TH	i op.	Area	Pop.	Factor				Factor		Area		-	Area	Flow	Flow		Act	Nom		(Full)	(Full)	Q/Qfull
	Noue	Noue	(ha)				(ha)	. op.	. abtor	(l/s)	(ha)	(ha)		(ha)	(ha)	(l/s)	(ha)	(ha)	(I/s)	(l/s)	(m)	(mm)	(mm)	(%)	(m/s)	(l/s)	(%)
Maxwell Bridge Rd	MH 236	MH 234	0.39		12	32.4	18.99	1391.2	3.70	+ <u>`</u>							0.4	19.0	5.3	26.2	82.0	305	300	0.24	0.68	49.4	53%
																	0.0	0.0	0.2	1.6	120.0	203	200	0.33	0.61	19.6	8%
Arncliffe Ave	MH 229	MH 235	0.87		30		0.87	81.0		1.3							0.9	0.9	0.2	1.0	29.3	203			1.80	58.2	3%
	MH 235	MH 234	0.22		6	16.2	1.09	97.2	4.00	1.6			-				0.2	1.1	0.0	1.0	20.0	200					
Maxwell Bridge Rd	MH 234	MH 225	0.26		6	16.2	20.34	1504.6	3.68	22.4							0.3	20.3	5.7	28.1	79.8	305	300	0.25	0.69	50.4	56%
Celtic Ridge Cres	MH 230	MH 229	0.43		12	32.4	0.43	32.4	4.00	0.5							0.4	0.4	0.1	0.6	81.9	203			0.60	19.3	3%
generation of the second se	MH 229	MH 228	0.38		11	29.7	0.81	62.1	4.00	1.0							0.4	0.8	0.2	1.2	70.3	203			0.61	19.6	6%
	MH 228	MH 227	0.10		0	0.0	0.91	62.1	4.00	1.0							0.1	0.9	0.3	1.3	12.3	203			0.61	19.6	6%
	MH 227	MH 226	0.46		13		1.37	97.2									0.5	1.4	0.4	2.0	97.0	203			0.60	19.3 33.1	10% 7%
	MH 226	MH 225	0.21		5	13.5	1.58	110.7	4.00	1.8				-		-	0.2	1.6	0.4	2.2	43.7	203	200	0.94	1.02	33.1	1 70
Celtic Ridge Cres	MH 225	MH 224	0.58		12	32.4	22.50	1647.7	3.65	24.4							0.6		6.3	30.7	97.5	381			0.72	81.7	38%
	MH 224	MH 209	0.22		4		22.72	1658.5	3.65	24.5							0.2	22.7	6.4	30.9	66.5	381	375	0.20	0.72	81.7	38%
Streamside Cres	MH 217	MH 218	0.26	2		6.8	0.26	6.8	4.00	0.1							0.3	0.3	0.1	0.2	12.4	203	200	1.00	1.05	34.2	1%
Streamside Cres	MH 218	MH 219	0.96	20		68.0	1.22	74.8									1.0	1.2	0.3	1.6	120.0	203			0.94	30.6	5%
	MH 219	MH 220	0.62	11		37.4	1.84	112.2	4.00	1.8							0.6		0.5	2.3	77.8	203			0.60	19.3	12%
Glenbrae Ave	MH 220	MH 221	0.96		28	75.6	2.80	187.8	4.00	3.0							1.0	2.8	0.8	3.8	118.9	203			0.60	19.3	20%
	MH 221	MH 222	1.04		33		3.84	276.9									1.0	3.8	1.1	5.6	119.0	203			0.60	19.3 21.3	29% 27%
	MH 222	MH 223	0.20		3		4.04	285.0		1							0.2	4.0	1.1	5.7 6.0	12.9 72.9	203 203			0.61	19.6	
	MH 223	MH 210	0.22		4	10.8	4.26	295.8	4.00	4.8							0.2	4.3	1.2	0.0	12.5	200	200	0.00	0.01	10.0	
Streamside Cres	MH 217	MH 216	0.37	5		17.0	0.37	17.0	4.00	0.3							0.4		0.1	0.4	40.1	203			0.85	27.6	1%
	MH 216	MH 215	0.17	2		6.8	0.54	23.8	4.00	0.4							0.2	0.5	0.2	0.5	13.6	203			0.85	27.6	2%
	MH 215	MH 214	0.17	2		6.8	0.71	30.6									0.2	0.7	0.2	0.7	31.6	203			0.75	24.2 32.4	3% 6%
	MH 214	MH 213	1.02			61.2	1.73	91.8									1.0	1.7	0.5	2.0 2.5	119.0 56.5	203 203			0.60	19.3	13%
	MH 213	MH 212	0.50			23.8	2.23	115.6									0.5	2.2 3.3	0.6	3.7	124.9	203			0.60	19.3	19%
Celtic Ridge Cres	MH 212 MH 211	MH 211 MH 210	1.04 0.94	16 16		54.4 54.4	3.27 4.21	170.0 224.4									0.9	4.2	1.2	4.8	122.0				0.61	19.6	
Celtic Ridge Cres	MH 210	MH 209	0.58	11		37.4	9.05	557.6	3.95	8.9							0.6	9.1	2.5	11.5	80.9	203	200	0.75	0.91	29.6	39%
								00101	0.55	010							0.1	31.8	8.9	40.8	50.3	381	375	0.20	0.72	81.7	50%
Easement	MH 209 MH 208	MH 208 MH 207	0.06				31.83 32.07	2216.1 2216.1		31.9							0.1		9.0	40.8	111.6				0.72		
Area 4a - Phase 2	MH 273	MH 272	0.57		9	24.3	0.57	24.3	4.00	0.4							0.6	0.6	0.2	0.6	66.0	203	200	0.65	0.85	27.6	2%
	MH 272	MH 271	0.92		16			67.5					+				0.9		0.4	1.5	90.2	203	200	0.40	0.67	21.6	
	MH 271	MH 270	1.06		19	+		118.8									1.1	2.6	0.7	2.6	113.0	203			0.67	21.6	
	MH 270	MH 207	0.00		0	0.0	2.55	118.8	4.00	1.9	1						0.0	2.6	0.7	2.6	16.0	254	250	0.32	0.69	35.1	8%
Easement	MH 207	MH 206	0.22			0.0	34.84	2240.4	3.55	32.2	!						0.2	34.8	9.8	41.9	100.0	457	450	0.20	0.81	132.9	32%
Area 2										+		+															
	Area 2	MH 266	3.10			202	3.10	202.0	4.00	3.3							. 3.1	3.1	0.9	4.1	-	203	3 200	0.32	0.60	19.3	21%
Klondike Road & A	Area 4b																				00.7	000	000	0.00	0.00	10.2	220/
	MH 266	MH 265	0.24				3.34	202.0	4.00	3.3		4		-		_	0.2	3.3	0.9	4.2	93.7	203	3 200	0.32	0.60	19.3	22%
	Park	MH 265	1.89				1.89	0.0	4.00	0.0							1.9	1.9	0.5	0.5	13.0	203	3 200	0.32	0.60	19.3	3%
		MH OCA	0.01				5.54	202.0	4.00	3.3							0.3	5.5	1.6	4.8	120.0	203	3 200	0.32	0.60	19.3	25%
	MH 265	MH 264	0.31	1	1	L	5.54	202.0	4.00	3.3	<u>'</u>			1	<u> </u>		1 0.3	5.5	1.0	1 4.0	L.20.0			1 9.02	0.00		h

BROOKSIDE SUBDIVISION SANITARY SEWER DESIGN SHEET

LOCA	TION			RESID	ENTIAL	AREA	AND P	OPULAT	ION			IND			INST	ICI	1	NFILTR	ATION	FLOW				PIP			
Street	From	То	Area	Dwe	llings	Pop.	Cum	ulative	Peak	Peak	Area	Accu.	Peak	Area	Accu.	Peak	Total	Accu.	Infiltration	Total	Length	Dia	Dia	Slope	Velocity	Capacity	Ratio
onoor	Node	Node		SFH	ТН		Area	Pop.	Factor	Flow		Area	Factor		Area	Flow	Area	Area	Flow	Flow		Act	Nom		(Full)	(Full)	Q/Qfull
	neae	11000	(ha)				(ha)			(l/s)	(ha)	(ha)		(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)	(mm)	(%)	(m/s)	(I/s)	(%)
			(na)				(1100)			((111)																
Marconi Ave	MH 269	MH 268	0.14		3	8.1	0.14	8.1	4.00	0.1							0.1	0.1	0.0	0.2	21.3	203	1	1.00	1.05	34.2	0%
	MH 268	MH 267	0.11		2	5.4	0.25	13.5	4.00	0.2							0.1	0.3	0.1	0.3	26.6	203		0.56	0.79	25.6	
	MH 267	MH 264	0.95		26	70.2	1.20	83.7	4.00	1.4							1.0	1.2	0.3	1.7	120.0	203	200	0.67	0.86	28.0	6%
																											050/
	MH 264	MH 263	0.78		20	commences in the second s			4.00							_	0.8	7.5		7.6	100.0	254	250	0.24	0.60	30.4	25% 30%
	MH 263	MH 262	0.91		27	72.9			1								0.9			9.0	88.3	254 254		0.24	0.60	30.4 30.4	
	MH 262	MH 206	0.95		29	78.3	9.38	490.9	3.98	7.9						_	1.0	9.4	2.6	10.5	118.0	254	250	0.24	0.60	30.4	30%
			0.40				44.00	2731.3	3.48	00 F							0.1	44.3	12.4	50.9	52.5	457	450	0.20	0.81	132.9	38%
	MH 206	MH 205	0.10			0.0	44.32	2/31.3	3.40	30.5							0.1	44.0	12.4	00.0	02.0				0.01		
Area 5a & 5b (KRP)	- Klondik	e Boad																									
Alea Sa & SD (KHF)	Area 5	MH 205									5.4	5.4	4.7			10.3	5.4	5.4	1.5	11.8	-	254	250	0.25	0.61	31.0	38%
	7 11 0 4 0	ini i ii o o																									
Briar Ridge Pump S	Station Ac	cess Road	+ Area 6	(KRP)																							
	MH 205							2731.3	3.48			5.4				10.3			13.9	62.7	79.7	457		0.20	0.81	132.9	47%
	MH 204	MH 203					44.32	2731.3	3.48	38.5		5.4	4.7			10.3	0.0	49.7	13.9	62.7	79.7	457	450	0.20	0.81	132.9	47%
	1.1															-	70	70	0.0	10.0	-	254	250	0.25	0.61	31.0	53%
	Area 6	MH 203									7.9	7.9	4.4			14.1	7.9	7.9	2.2	16.3	-	204	250	0.25	0.01	51.0	55%
							44.00	2731.3	3.48	20 E		13.3	3.9			21.0	0.0	57.6	16.1	75.6	90.0	457	450	0.26	0.92	151.6	50%
		MH 202 MH 201B						2731.3	3.48			13.3				21.0	0.0			75.6	95.0	457	450	0.26	0.92	151.6	50%
		MH 2018					44.32			38.5		13.3			akaan	21.0	0.0			75.6	85.0	457		0.25	0.91	148.6	51%
								2731.3	3.48			13.3				21.0	0.0		16.1	75.6	90.0	457	450	0.25	0.91	148.6	51%
	MH 201A							2731.3				13.3				21.0	0.0		16.1	75.6	21.6	457			0.70	115.1	66%
	MH 201	PS					44.32	2/31.3	3.40	36.5		13.3	3.9			21.0	0.0	57.0	10.1	70.0	21.0	101	100	0110			
Area 7 (KRP - Ex. G	olf Cours	a)																									
Alea / (KRF - LX. G	Ex. MH										15.2	15.2	3.9			24.0	15.2	15.2	4.3	28.3							
	CA. IIII	10							~																		
Area 8 (Claridge La	nds)																										
	Ex. MH	PS	45.57			3100	45.57	3100.0	3.43	43.1							45.6	45.6	12.8	55.8							
																				117.0							
Pump Station (Area	s 1-8)						89.89	5831.3	3.18	75.2		28.5	3.4			39.3	0.0	118.4	33.1	147.6							
					DECI		RAMET	EDS		1 .	L			L		Deci	aned:	MAB		I	PBOJEC	PROJECT:				L	
Average Deily Flow			350			L/cap/c		Industria	I Poak E	actor-	nor M)F grapt			242411		gneu.	WITD .				HOJECT: rookside Subdivision					
Average Daily Flow= Comm/Inst Flow=			50000			L/ha/da		Extraneo			0.28 L/		•	0.28	L/s/ha												
Industrial Flow=			35000			L/ha/da		Minimum			0.60 m			0.60		Cher	ked:	JGR			CLIENT:						
Max Res Peak Facto	r		4.00			L/na/ut	~ y	Manning		,	0.013	-		0.01							Klondike Developments Inc						
Comm/Inst Peak Fac			1.50						,							Dwa	Refer	rence:	103106-SA	N1		Rionaike Developments inc					
Communist reak Fac	=		1.50													1			103106-SA		Date:	A	00.000	-7			



103106-0 AUGUST 2005 RAWING No. 103106-SANI PLANBI.DWG - 1000mmX707mm

BRIAR RIDGE PUMP STATION

HYDRAULIC GRADE LINE ANALYSIS

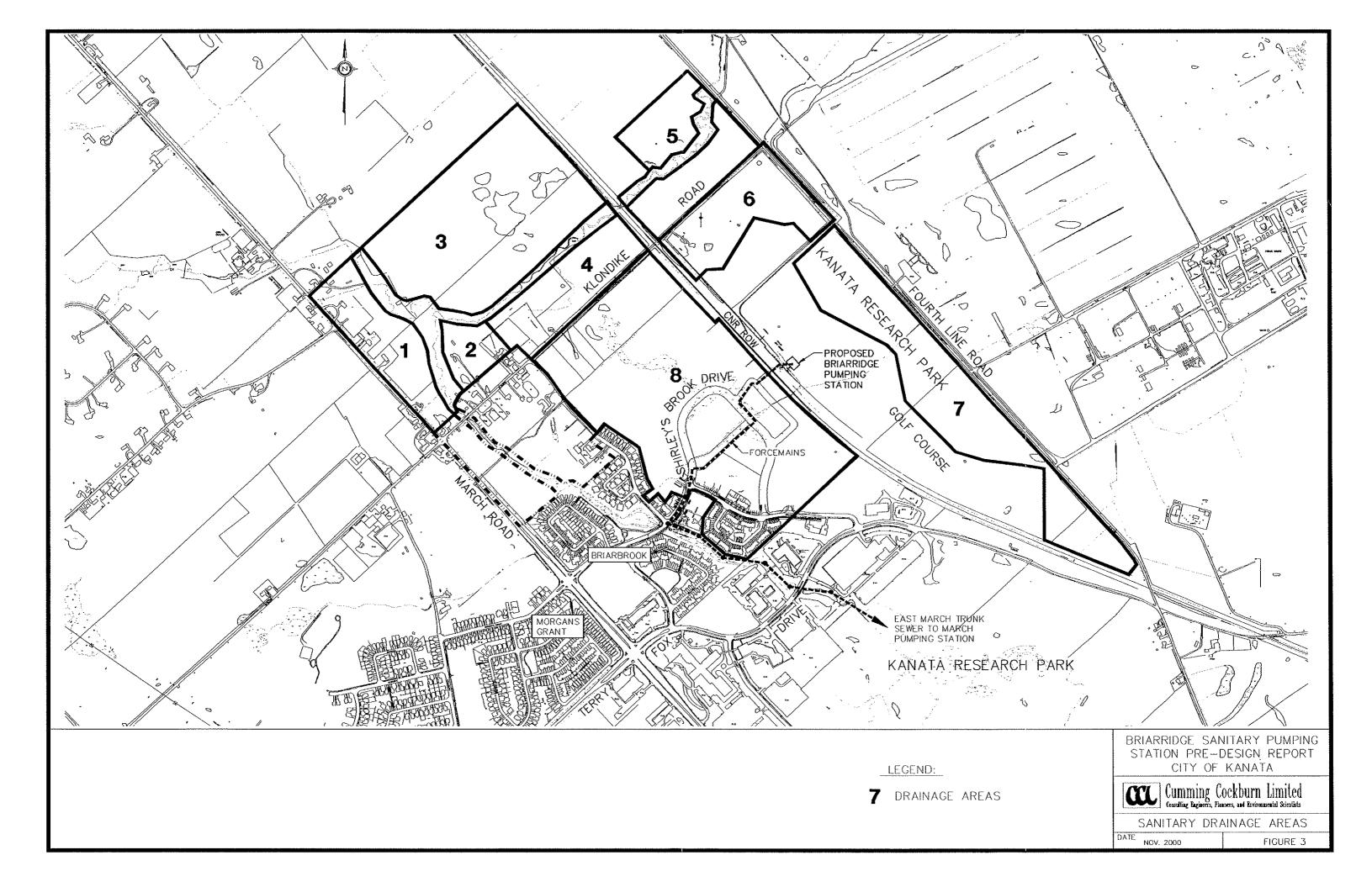
This spreadsheet uses the Darcy-Weisbach equation to calculate hydraulic losses throuh a pipe network with a specified flow rate. Minor losses are accounted for including both pipe bend losses and structure losses. The spreadsheet returns the upstream hydraulic grade line if surcharged or the pipe obvert if free flow conditions exist. The HGL slope is calculated and the minimum USF elevation must be at least +0.30m above the HGL.

BROOKSIDE SUBDIVISION - SANITARY SEWER DESIGN

LOCATION	MAN	HOLE		VERT VATION	GROUND ELEVATION	COVER	PIPE F	PARAMETERS	TOTAL FLOW	Q _{cap}	Q _{in} /		СОМРИТ	ATIONAL C	OLUMNS		HEAD LOSS	SURCHARGE		HGL		PIPE	MIN. USF			Ма	nhole Lo	oss				
LOOAHON	U/S	D/S	U/S	D/S	U/S	U/S	Dia	Length 'n'	(m ³ /s)	(m³/s)	Q_{cap}	Pipe		Friction	Velocity		HL	U/S	U/S	D/S	SLOPE	SLOPE	U/S	Di	iameters (m	m)	Bend			ļ		HL _{MH}
			(m)	(m)	(m)	(m)	(mm)	(m)	(11.75)			Area (m ²)	L/D	Factor (f)	V (m/s)	V²/2g	(m)	(m)	(m)	(m)	(%)	(%)	(m)	U/S MH	Pipe In	Pipe Out	Angle	Ko	CD	K _b	K _{tot}	(m)
BRIAR RIDO	GE SEW	ER																	67.44	<- OUTL	ET											
	MH 201A	MH 201	62.61	62.38	69.05	5.990	450	90.00 0.013	0.071	0.150	0.47	0.164	200	0.02747	0.43	0.01	0.05	4.43	67.49	67.44	0.06	0.26	67.79	1200	450	450	0	0.267	1.00	0.00	0.267	0.003
	MH 201B	MH 201A	62.82	62.61	68.80	5.530	450	85.00 0.013	0.071	0.148	0.48	0.164	189	0.02747	0.43	0.01	0.05	4.28	67.55	67.49	0.06	0.25	67.85	1200	450	450	0	0.267	1.00	0.00	0.267	0.003
	MH 202	MH 201B	63.07	62.82	68.90	5.380	450	95.00 0.013	0.071	0.153	0.47	0.164	211	0.02747	0.43	0.01	0.06	4.08	67.60	67.55	0.06	0.26	67.90	1200	450	450	0	0.267	1.00	0.00	0.267	0.003
	MH 203	MH 202	63.30	63.07	68.95	5.200	450	90.00 0.013	0.071	0.150	0.47	0.164	200	0.02747	0.43	0.01	0.05	3.91	67.66	67.60	0.06	0.26	67.96	1200	450	450	0	0.267	1.00	0.00	0.267	0.003
	MH 204	MH 203	63.60	63.30	69.00	4.950	450	79.70 0.013	0.057	0.182	0.31	0.164	177	0.02747	0.35	0.01	0.03	3.64	67.69	67.66	0.04	0.38	67.99	1200	450	450	0	0.267	1.00	0.00	0.267	0.002
	MH 205	MH 204	63.90	63.60	70.10	5.750	450	79.70 0.013	0.057	0.182	0.31	0.164	177	0.02747	0.35	0.01	0.04	3.38	67.73	67.69	0.05	0.38	68.03	1200	450	450	90	0.267	1.00	1.32	1.587	0.010
KLONDIKE	ROAD																															
	MH 206	MH 205	64.77	64.70	70.24	5.020	450	35.90 0.013	0.045	0.131	0.34	0.164	80	0.02747	0.27	0.00	0.01	2.53	67.75	67.73	0.040	0.19	68.05	1200	450	450	90	0.267	1.00	1.32	1.587	0.006
	MH 262	MH 206	66.24	65.86	70.18	3.740	200	120.00 0.013	0.012	0.019	0.62	0.032	600	0.03600	0.37	0.01	0.15	1.46	67.90	67.75	0.13	0.32	68.20	1200	200	200	0	0.600	1.00	0.00	0.600	0.004
	MH 263	MH 262	66.52	66.24	70.43	3.710	200	120.00 0.013	0.012	0.017	0.73	0.032	600	0.03600	0.37	0.01	0.15	1.34	68.06	67.90	0.13	0.23	68.36	1200	200	200	0	0.600	1.00	0.00	0.600	0.004
	MH 264	MH 263	66.84	66.52	70.38	3.340	200	68.30 0.013	0.012	0.023	0.51	0.032	342	0.03600	0.37	0.01	0.10	1.11	68.15	68.06	0.15	0.47	68.45	1200	200	200	90	0.600	1.00	1.32	1.920	0.013
	MH 265	MH 264	67.56	66.84	71.84	4.080	200	120.00 0.013	0.008	0.027	0.30	0.032	600	0.03600	0.25	0.00	0.07	0.46	68.22	68.15	0.06	0.60	68.52	1200	200	200	0	0.600	1.00	0.00	0.600	0.002
	MH 266	MH 265	67.85	67.56	74.78	6.730	200	93.70 0.013	0.006	0.019	0.32	0.032	469	0.03600	0.19	0.00	0.03	0.20	68.25	68.22	0.03	0.31	68.55	1200	200	200	0	0.600	1.00	0.00	0.600	0.001
	MH 1	MH 266	71.60	70.43	77.76	5.960	200	117.00 0.013	0.004	0.034	0.12	0.032	585	0.03600	0.12	0.00	0.02	0.00	71.80	70.63	1.00	1.00	72.10	1200	200	200	0	0.600	1.00	0.00	0.600	0.000
STREET 1																																
	MH 3	MH1	72.81	71.66	77.45	4.440	200	62.30 0.013	0.003	0.046	0.06	0.032	312	0.03600	0.09	0.00	0.01	0.00	73.01	71.86	1.85	1.85	73.31	1200	200	200	90	0.600	1.00	1.32	1.920	0.001
	MH 5	МНЗ	73.47	72.82	76.59	2.920	200	100.00 0.013	0.002	0.028	0.07	0.032	500	0.03600	0.06	0.00	0.00	0.00	73.67	73.02	0.65	0.65	73.97	1200	200	200	0	0.600	1.00	0.00	0.600	0.000
	MH 7	MH5	73.64	73.50	76.29	2.450	200	21.90 0.013	0.001	0.027	0.04	0.032	110	0.03600	0.03	0.00	0.00	0.00	73.84	73.70	0.64	0.64	74.14	1200	200	200	45	0.600	1.00	0.40	1.000	0.000
						DESIGN F	PARAMET	ERS							Designed:	LRW			PROJE	CT:												
Average Daily F	low=	280	L/cap/da	y	Industrial Peak Fa	ctor= per M	OE graph		HGL=Majo	or + Minor L	osses								1055 Kl	ondike Ro	ad - Orr R	idge										
Comm/Inst Flow	v=	28000	L/ha/day		Extraneous Flow=		0.33 L	L/s/ha	Major Los	s= Pipe Frid	tion (Dar	cy-Weisbach)																			
Industrial Flow=		35000	L/ha/day		Minimum Velocity	=	0.60 r	m/s	Minor Los	s= Head los	s correct	ion for flow th	nrough M	H, changes	Checked:	MAB			CLIENT	:												
Max Res Peak F		4.00			Manning's n=		0.013			e, and pipe									Maple L	eaf Home	S											
Comm Peak Fa		1.50							Friction Fa	ctor= 8g/c/	2, where	c=(1/n)*(D/4)^1/6																			
Indst Peak Fact	or=	1.50													Dwg. Refere	ence:	117034-S	AN	Date: Se	eptember	3, 2020											



		Bend	d Coefficients
<u>0</u>	<u>45</u>	<u>90</u>	<bend (in="" degrees)<="" th=""></bend>
0.00	0.29	1.02	900 mm pipe or greater (benching)
0.00	0.40	1.32	825 mm pipe or smaller (300 mm sump)



Appendix C

Watermain Boundary Conditions, FUS Calculations, & Modelling Results

Lucas Wilson

From:	Surprenant, Eric <eric.surprenant@ottawa.ca></eric.surprenant@ottawa.ca>
Sent:	Thursday, January 9, 2020 11:07 AM
То:	Lucas Wilson
Subject:	FW: 1055 Klondike Road - Boundary Conditions
Attachments:	KlondikeWatermain.pdf; 1055 Klondike Road _Boundary Conditions_09Jan2020.docx
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Lucas,

As indicated by Gabrielle, the proponent will need to construct the 406 mm on Klondike (refer to attached PDF). Please find attached the requested updated boundary conditions.

Thanks

Eric Surprenant, C.E.T. / 613 580-2424 ext.:27794 Project Manager, Infrastructure Approvals

Development Review Suburban Services Branch Planning, Infrastructure and Economic Development Dept.

Gestionaire de projets, Approbation de l'infrastructure Examen des demandes d'aménagement (Services Suburbains Ouest) Services de la planification, de l'infrastructure et du développement économique

City of Ottawa | Ville d'Ottawa

613.580.2424 ext./poste 27794 ottawa.ca/planning / ottawa.ca/urbanisme

From: Lucas Wilson <<u>l.wilson@novatech-eng.com</u>>
Sent: December 19, 2019 3:27 PM
To: Surprenant, Eric <<u>Eric.Surprenant@ottawa.ca</u>>
Subject: FW: 1055 Klondike Road - Boundary Conditions

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Eric,

Just sent an updated boundary condition request to Gabrielle and got directed to send engineering requests to you.

As stated below, the water demands for 1055 Klondike Road have changed slightly since our last boundary conditions and have been asked to get updated ones. Hopefully all the information is provided below but let me know if you need anything else.

Thanks, Lucas Wilson, P.Eng., Project Coordinator | Engineering

NOVATECH

Engineers, Planners & Landscape Architects | 200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6 **Office** 613.254.9643 x282 | **Fax** 613.254.5867 | **Email** <u>l.wilson@novatech-eng.com</u> *The information contained in this email message is confidential and is for exclusive use of the addressee.*

From: Lucas Wilson
Sent: Thursday, December 19, 2019 3:22 PM
To: 'Schaeffer, Gabrielle' <gabrielle.schaeffer@Ottawa.ca
Subject: RE: 1055 Klondike Road - Boundary Conditions</pre>

Good Afternoon Gabrielle,

Since the development water demands have changed since the original boundary conditions were provided, we are looking for updated boundary conditions in the same locations as provided previously (Klondike and Sandhill, Klondike and March Road). There are now 12 semi-detached units and 46 townhome units proposed within the development with a future condo block. Water demands are as follows:

Average Day Demand: 0.834L/s Max Day Demand: 2.085L/s Peak Hour Demand: 4.588L/s

Residential fire flow for semis and towns is 167L/s and a fire flow of 250L/s for the condo block.

Please let me know if you need anything else.

Thanks, Lucas Wilson, P.Eng., Project Coordinator | Engineering

NOVATECH

Engineers, Planners & Landscape Architects | 200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6 **Office** 613.254.9643 x282 | **Fax** 613.254.5867 | **Email** <u>l.wilson@novatech-eng.com</u> *The information contained in this email message is confidential and is for exclusive use of the addressee.*

From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: Friday, February 2, 2018 10:00 AM
To: Lucas Wilson <l.wilson@novatech-eng.com>
Cc: Mark Bissett <m.bissett@novatech-eng.com>
Subject: RE: 1055 Klondike Road - Boundary Conditions

Hi Lucas,

Please find the attached boundary conditions. Just as a reminder I want to mention that the applicant is to connect the watermains along Klondike Road (stub near March Rd. to stub near Sandhill) and 2 connections to this watermain is required from the proposed development.

Regards, Gabrielle

From: Lucas Wilson [mailto:l.wilson@novatech-eng.com] Sent: Tuesday, January 30, 2018 9:29 AM To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca> Cc: Mark Bissett <<u>m.bissett@novatech-eng.com</u>> Subject: 1055 Klondike Road - Boundary Conditions

Gabrielle,

We are looking for boundary conditions for a residential development consisting of approximately 12 singles and 72 towns. The boundary condition is located at the intersection of Sandhill Road and Klondike Road with connection to the existing 400mm watermain (see attached figure).

Water demands are as follows: Average Day Demand: 0.953L/s Max Day Demand: 2.382L/s Peak Hour Demand: 5.240L/s

Residential fire flow for singles and towns are being capped at 167L/s. Since this is for Draft Plan Approval, we do not have detailed lot layouts at this time so there may be condos replacing some townhouse units therefore an additional fire flow of 250L/s is anticipated for potential condo blocks. Fire Flow (singles, towns): 167L/s Fire Flow (condos): 250L/s (based on past experience with similar condo blocks)

I have attached PDF's of the water demand as well as a location map for your review.

Let me know if you need any additional information.

Thanks, Lucas Wilson, P.Eng., Project Coordinator | Engineering

NOVATECH

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Engineers, Planners & Landscape Architects | 200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6 **Office** 613.254.9643 x282 | **Fax** 613.254.5867 | **Email** <u>l.wilson@novatech-eng.com</u> *The information contained in this email message is confidential and is for exclusive use of the addressee.*

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Boundary Conditions for 1055 Klondike Road

Provided Information: Date Provided: Jan 9, 2020

Oceanorie .	Dem	and
Scenario	L/min	L/s
Average Daily Demand	50	0.83
Maximum Daily Demand	125	2.09
Peak Hour	275	4.59
Fire Flow Demand #1	10,020	167.00
Fire Flow Demand #2	15,000	250.00

Location:



Results:

Connection 1 - March Road

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	130.5	76.8
Peak Hour	126.1	70.5
Max Day plus Fire 1	123.3	66.5
Max Day plus Fire 2	120.1	62.0

¹ Ground Elevation = 76.5m

Connection 2 - Sandhill Road

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	130.5	79.1
Peak Hour	126.2	72.8
Max Day plus Fire 1	122.5	67.7
Max Day plus Fire 2	118.5	61.9

¹ Ground Elevation = 74.9m

Notes:

1. Construct a 406 mm watermain on Klondike Road from March Road to Sandhill Road.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

As per 1999 Fire Underwriter's Survey Guidelines

L

Novatech Project #: 117034 Project Name: 1055 Klondike Road Date: 26/07/2019 Input By: Lucas Wilson Reviewed By: Mark Bissett

Building Description: Semi-Detached Wood frame



L

Total Fire

Step			Input		Value Used	Flow
						(L/min)
		Base Fire Flo	w			
	Construction Ma	terial		Mult	iplier	
	Coefficient	Wood frame	Yes	1.5		
1	related to type	Ordinary construction		1		
-	of construction	Non-combustible construction		0.8	1.5	
	C	Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
	Floor Area					
		Building Footprint (m ²)	205			
2	Α	Number of Floors/Storeys	2			
2		Area of structure considered (m ²)			410	
	F	Base fire flow without reductions				7,000
	E E	$F = 220 C (A)^{0.5}$				7,000
		Reductions or Surc	harges			
	Occupancy haza	rd reduction or surcharge		Reduction	/Surcharge	
		Non-combustible		-25%		
3		Limited combustible	Yes	-15%		
•	(1)	Combustible		0%	-15%	5,950
		Free burning		15%		
		Rapid burning		25%		
	Sprinkler Reduct	tion		Redu	iction	
		Adequately Designed System (NFPA 13)		-30%		
4	(2)	Standard Water Supply		-10%		0
	(2)	Fully Supervised System		-10%		U
			Curr	ulative Total	0%	
	Exposure Surcha	arge (cumulative %)			Surcharge	
		North Side	0 - 3 m		25%	
5		East Side	20.1 - 30 m		10%	
5	(3)	South Side	0 - 3 m		25%	3,570
		West Side	> 45.1m		0%	
			Curr	ulative Total	60%	
		Results				
		Total Required Fire Flow, rounded to nea	rest 1000L/min)	L/min	10,000
6	(1) + (2) + (3)	$(2.000 \downarrow \text{min} \neq \text{Eiro Elouir} \neq 45.000 \downarrow \text{min})$		or	L/s	167
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	USGPM	2,642
_		Required Duration of Fire Flow (hours)			Hours	2
7	Storage Volume	Required Volume of Fire Flow (m ³)			m ³	1200
		· · · · · · · · · · · · · · · · · · ·				

As per 1999 Fire Underwriter's Survey Guidelines

Novatech Project #: 117034 Project Name: 1055 Klondike Road Date: 26/07/2019 Input By: Lucas Wilson Reviewed By: Mark Bissett



Building Description: 4-Unit Townhouse Block Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
		Base Fire Flo	w		ł	
	Construction Ma	terial		Mult	iplier	
	Coefficient	Wood frame	Yes	1.5		
1	related to type	Ordinary construction		1		
	of construction	Non-combustible construction		0.8	1.5	
	С	Modified Fire resistive construction (2 hrs)		0.6		
	F I	Fire resistive construction (> 3 hrs)		0.6		
	Floor Area		075			
		Building Footprint (m ²)	375 2			
2	Α	Number of Floors/Storeys	2			
-		Area of structure considered (m ²)			750	
	F	Base fire flow without reductions				9,000
	_	$F = 220 C (A)^{0.5}$				
		Reductions or Surc	harges			
	Occupancy haza	rd reduction or surcharge		Reduction	/Surcharge	
		Non-combustible		-25%		
3		Limited combustible	Yes	-15%		
•	(1)	Combustible		0%	-15%	7,650
		Free burning		15%		
		Rapid burning		25%		
	Sprinkler Reduct	ion		Redu	ction	
		Adequately Designed System (NFPA 13)		-30%		
4	(2)	Standard Water Supply		-10%		0
	(2)	Fully Supervised System		-10%		U
			Cun	nulative Total	0%	
	Exposure Surcha	arge (cumulative %)			Surcharge	
		North Side	30.1- 45 m		5%	
5		East Side	3.1 - 10 m		20%	
5	(3)	South Side	20.1 - 30 m		10%	4,590
		West Side	0 - 3 m		25%	
			Cum	nulative Total	60%	
		Results				
		Total Required Fire Flow, rounded to nea	rest 1000L/mir	ı	L/min	12,000
6	(1) + (2) + (3)	(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	200
		(2,000 Limit < 1 if e 1 low < 43,000 Limit)		or	USGPM	3,170
_		Required Duration of Fire Flow (hours)			Hours	2.5
7	Storage Volume	Required Volume of Fire Flow (m ³)			m ³	1800

As per 1999 Fire Underwriter's Survey Guidelines

Novatech Project #: 117034 Project Name: 1055 Klondike Road Date: 26/07/2019 Input By: Lucas Wilson Reviewed By: Mark Bissett



Building Description: 6-Unit Townhouse Block with Firewall

Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
		Base Fire Flo	w			
	Construction Ma	terial		Mult	iplier	
	Coefficient	Wood frame	Yes	1.5		
1	related to type	Ordinary construction		1		
	of construction	Non-combustible construction		0.8	1.5	
	С	Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
	Floor Area	2				
		Building Footprint (m ²)	312			
2	Α	Number of Floors/Storeys	2			
2		Area of structure considered (m ²)			624	
	F	Base fire flow without reductions				8,000
	•	$F = 220 C (A)^{0.5}$				0,000
		Reductions or Surc	charges			
	Occupancy haza	rd reduction or surcharge		Reduction	Surcharge	
		Non-combustible		-25%		
3		Limited combustible	Yes	-15%		
·	(1)	Combustible		0%	-15%	6,800
		Free burning		15%		
		Rapid burning		25%		
	Sprinkler Reduct			Redu	ction	
		Adequately Designed System (NFPA 13)		-30%		
4	(2)	Standard Water Supply		-10%		0
	(2)	Fully Supervised System		-10%		U
			Cum	ulative Total	0%	
	Exposure Surcha	arge (cumulative %)			Surcharge	
		North Side	2Hr Fire Wall		10%	
5		East Side	30.1- 45 m		5%	
5	(3)	South Side	0 - 3 m		25%	3,060
		West Side	30.1- 45 m		5%	
			Cum	ulative Total	45%	
		Results				
		Total Required Fire Flow, rounded to nea	rest 1000L/mi	n	L/min	10,000
6	(1) + (2) + (3)	(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	167
		(2,000 L/IIIII > 1 IIE 1 10W > 45,000 L/IIIII)		or	USGPM	2,642
7	Storage Volume	Required Duration of Fire Flow (hours)			Hours	2
	Latorade Volume	Required Volume of Fire Flow (m ³)			m ³	1200

As per 1999 Fire Underwriter's Survey Guidelines

Novatech Project #: 117034 Project Name: 1055 Klondike Road Date: 26/07/2019 Input By: Lucas Wilson Reviewed By: Mark Bissett **NOVATECH** Engineers, Planners & Landscape Architects

Building Description: Condo Block Wood frame

Step			Input		Value Used	Total Fire Flow
			•			(L/min)
		Base Fire Flor	W			
	Construction Ma	terial		Mult	iplier	
	Coefficient	Wood frame	Yes	1.5		
1	related to type	Ordinary construction		1		
	of construction	Non-combustible construction		0.8	1.5	
	С	Modified Fire resistive construction (2 hrs)		0.6		
	_	Fire resistive construction (> 3 hrs)		0.6		
	Floor Area		405			
		Building Footprint (m ²)	485			
2	Α	Number of Floors/Storeys	3			
-		Area of structure considered (m ²)			1,455	
	F	Base fire flow without reductions				13,000
	•	$F = 220 C (A)^{0.5}$				10,000
		Reductions or Surc	harges			
	Occupancy haza	rd reduction or surcharge		Reduction	/Surcharge	
		Non-combustible		-25%		
3		Limited combustible	Yes	-15%		
-	(1)	Combustible		0%	-15%	11,050
		Free burning		15%		
		Rapid burning		25%		
	Sprinkler Reduct		-	Redu	iction	
		Adequately Designed System (NFPA 13)		-30%		
4	(2)	Standard Water Supply		-10%		0
	(2)	Fully Supervised System		-10%		U
			Cum	nulative Total	0%	
	Exposure Surcha	arge (cumulative %)			Surcharge	
		North Side	10.1 - 20 m		15%	
5		East Side	10.1 - 20 m		15%	
5	(3)	South Side	> 45.1m		0%	3,868
		West Side	30.1- 45 m		5%	
			Cum	nulative Total	35%	
		Results				
		Total Required Fire Flow, rounded to near	rest 1000L/mir	1	L/min	15,000
6	(1) + (2) + (3)	(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	250
		(2,000 L/MIN < FILE FIOW < 45,000 L/MIN)		or	USGPM	3,963
7		Required Duration of Fire Flow (hours)			Hours	3
7	Storage Volume	Required Volume of Fire Flow (m ³)			m ³	2700

1055 KLONDIKE ROAD - ORR RIDGE Water Demand									
	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)			
Semi-Detached	N/A	12	32	0.105	0.263	0.578			
Towns	N/A	46	124	0.403	1.006	2.214			
Future Medium Density Block:									
Residential Unit	N/A	53	111	0.361	0.902	1.984			
Total	0.00	111	268	0.868	2.170	4.775			

Water Demand Parameters

Semi-Detached	2.7	ppl/unit
Towns	2.7	ppl/unit
Future Block 10 Apartment Unit	2.1	ppl/unit
Residential Demand	280	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Residential Fire Flow	167/250	L/s

1055 Klondike Road - Orr Ridge: Watermain Demand

Node	Semi-Detached	Towns	Future Block 10 Apartment Unit	Total Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
C1				0	0.000	0.000	0.000	N/A
HYD1		24		65	0.210	0.525	1.155	167
HYD2		12		32	0.105	0.263	0.578	167
HYD3	12	10		59	0.193	0.481	1.059	167
NODE1			53	111	0.361	0.902	1.984	250
T1				0	0.000	0.000	0.000	N/A
T2				0	0.000	0.000	0.000	N/A
Т3				0	0.000	0.000	0.000	N/A
T4				0	0.000	0.000	0.000	N/A
Total	12	46	53	268	0.868	2.170	4.775	
Water Demand Pa	rameters							
Semi-Detached		2.7	ppl/unit		Residential Max D	Day	2.5	x Avg Day
Towns		2.7	ppl/unit		Residential Peak	Hour	2.2	x Max Day
Future Block 10 Ap	artment Unit	2.1	ppl/unit		Residential Fire F	low	167	L/s
Residential Deman	d	280	L/c/day		Condo Fire Flow		250	L/s



Network Table - Nodes - (P	Peak Hour)						
	Elevation	Demand	Head	Pressure	Pressure	Pressure	
Node ID	m	LPS	m	m	kPa	psi	
Junc C1	77.7	0	126.2	48.49	475.69	68.99	
Junc HYD1	77.32	1.15	126.19	48.87	479.41	69.53	
Junc HYD2	77.03	0.58	126.19	49.16	460.00	66.72	
Junc HYD3	76.4	1.06	126.19	49.79	450.00	65.27	
Junc NODE1	78	1.91	126.2	48.2	472.84	68.58	
Junc T1	77.74	0	126.2	48.46	475.39	68.95	
Junc T2	77.76	0	126.2	48.44	475.20	68.92	
Junc T3	74.73	0	126.2	51.47	504.92	73.23	
Junc T4	77.7	0	126.2	48.5	475.79	69.01	
Resvr RES1	126.2	-4.7	126.2	0	0.00	0.00	
Network Table - Links - (Pe	eak Hour)						
	Length	Diameter	Roughness	Flow	Velocity	Headloss	Friction
Link ID	m	mm	•	LPS	m/s	m/km	Factor
Pipe P1	142	204	110	0.72	0.02	0.01	0.051
Pipe P2	62	204	110	2.79	0.09	0.08	0.042
Pipe P3	52	204	110	1.64	0.05	0.03	0.045
Pipe P4	51	204	110	1.06	0.03	0.01	0.048
Pipe P5	46	204	110	0.03	0.00	0.00	0.000
Pipe P6	95	204	110	-1.91	0.06	0.04	0.044
Pipe P7	16	300	120	0.72	0.01	0.00	0.033
Pipe P8	121	400	120	-3.98	0.03	0.00	0.037
Pipe P9	8	204	110	2.10	0.06	0.04	0.043
Pipe P10	46	400	120	1.88	0.01	0.00	0.042
Pipe P11	8	204	110	1.88	0.06	0.04	0.044



Network Table - Nodes	- (Max Pressure Chec	:k)					
	Elevation	Demand	Head	Pressure	Pressure	Pressure	Age
Node ID	m	LPS	m	m	kPa	psi	Hours
Junc C1	77.71	0	130.5	52.79	517.87	75.11	7.58
Junc HYD1	77.32	0.21	130.5	53.18	521.70	75.67	8.69
Junc HYD2	77.03	0.1	130.5	53.47	524.54	76.08	10.26
Junc HYD3	76.4	0.19	130.5	54.1	530.72	76.97	12.67
Junc NODE1	78	0.35	130.5	52.5	515.03	74.70	14.04
Junc T1	77.74	0	130.5	52.76	517.58	75.07	5.82
Junc T2	77.76	0	130.5	52.74	517.38	75.04	10.53
Junc T3	74.73	0	130.5	55.77	547.10	79.35	2.34
Junc T4	77.7	0	130.5	52.8	517.97	75.12	11.59
Resvr RES1	130.5	-0.85	130.5	0	0.00	0.00	0
Network Table - Links -	(Max Pressure Check	<)					
	Length	Diameter	Roughness	Flow	Velocity	Headloss	Friction
Link ID	m	mm		LPS	m/s	m/km	Factor
Pipe P1	142	204	110	0.13	0.00	0.00	0.065
Pipe P2	62	204	110	0.51	0.02	0.00	0.055
Pipe P3	52	204	110	0.30	0.01	0.00	0.052
Pipe P4	51	204	110	0.19	0.01	0.00	0.063
Pipe P5	46	204	110	0.00	0.00	0.00	0.000
Pipe P6	95	204	110	-0.35	0.01	0.00	0.056
Pipe P7	16	300	120	0.13	0.00	0.00	0.000
Pipe P8	121	400	120	0.72	0.01	0.00	0.055
Pipe P9	8	204	110	0.38	0.01	0.00	0.037
Pipe P10	46	400	120	0.34	0.00	0.00	0.000
Pipe P11	8	204	110	0.34	0.01	0.00	0.044



Network Table - Nodes - (Fire Flow Summary)

Fire	Flow	Minimum Pressure				
Node	Flow (L/s)	Pressure (kPa)	Pressure (PSI)	Node		
HYD1	167	329.91	47.85	HYD2		
HYD2	167	260.75	37.82	HYD3		
HYD3	167	250.25	36.30	HYD3		
NODE1	250	141.36	20.50	NODE1		



Network Table - Nodes	(Max Day + FF 'HYD1')					
	Elevation	Demand	Head	Pressure	Pressure	Pressure	
Node ID	m	LPS	m	m	kPa	psi	
Junc C1	77.71	0	121.63	43.92	430.86	62.49	
Junc HYD1	77.32	95.53	112.3	34.98	343.15	49.77	
Junc HYD2	77.03	72.26	110.66	33.63	329.91	47.85	
Junc HYD3	76.4	0.48	110.66	34.26	336.09	48.75	
Junc NODE1	78	0.87	122.01	44.01	431.74	62.62	
Junc T1	77.74	0	122.09	44.35	435.07	63.10	
Junc T2	77.76	0	122.08	44.32	434.78	63.06	
Junc T3	74.73	0	122.49	47.76	468.53	67.95	
Junc T4	77.7	0	122.01	44.31	434.68	63.05	
Resvr RES1	122.5	-169.14	122.5	0	0.00	0.00	
Network Table - Links	(Max Day + FF 'HYD1')						
Network Table - Links	(Max Day + FF 'HYD1') Length	Diameter	Roughness	Flow	Velocity	Headloss	Friction
Network Table - Links			Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
	Length	Diameter	Roughness 110		•		
Link ID	Length m	Diameter mm	Ū	LPS	m/s	m/km	Factor
Link ID Pipe P1	Length m 142	Diameter mm 204	110	LPS 29.63	m/s 0.91	m/km 6.02	Factor 0.029
Link ID Pipe P1 Pipe P2	Length m 142 62	Diameter mm 204 204	110 110	LPS 29.63 168.27	m/s 0.91 5.15	m/km 6.02 150.22	Factor 0.029 0.023
Link ID Pipe P1 Pipe P2 Pipe P3	Length m 142 62 52	Diameter mm 204 204 204 204	110 110 110	LPS 29.63 168.27 72.74	m/s 0.91 5.15 2.23	m/km 6.02 150.22 31.78	Factor 0.029 0.023 0.026
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4	Length m 142 62 52 51	Diameter mm 204 204 204 204 204	110 110 110 110 110	LPS 29.63 168.27 72.74 0.48	m/s 0.91 5.15 2.23 0.01	m/km 6.02 150.22 31.78 0.00	Factor 0.029 0.023 0.026 0.054
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5	Length m 142 62 52 51 46	Diameter mm 204 204 204 204 204 204	110 110 110 110 110 110	LPS 29.63 168.27 72.74 0.48 -35.05	m/s 0.91 5.15 2.23 0.01 1.07	m/km 6.02 150.22 31.78 0.00 8.22	Factor 0.029 0.023 0.026 0.054 0.029
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P3 Pipe P5 Pipe P6	Length m 142 62 52 51 46 75	Diameter mm 204 204 204 204 204 204 204	110 110 110 110 110 110	LPS 29.63 168.27 72.74 0.48 -35.05 -0.87	m/s 0.91 5.15 2.23 0.01 1.07 0.03	m/km 6.02 150.22 31.78 0.00 8.22 0.01	Factor 0.029 0.023 0.026 0.054 0.029 0.049
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5 Pipe P6 Pipe P7	Length m 142 62 52 51 46 75 16	Diameter mm 204 204 204 204 204 204 204 300	110 110 110 110 110 110 110 120	LPS 29.63 168.27 72.74 0.48 -35.05 -0.87 29.63	m/s 0.91 5.15 2.23 0.01 1.07 0.03 0.42	m/km 6.02 150.22 31.78 0.00 8.22 0.01 0.78	Factor 0.029 0.023 0.026 0.054 0.029 0.049 0.026
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5 Pipe P6 Pipe P7 Pipe P8	Length m 142 62 52 51 46 75 16 121	Diameter mm 204 204 204 204 204 204 300 400	110 110 110 110 110 110 120 120	LPS 29.63 168.27 72.74 0.48 -35.05 -0.87 29.63 139.51	m/s 0.91 5.15 2.23 0.01 1.07 0.03 0.42 1.11	m/km 6.02 150.22 31.78 0.00 8.22 0.01 0.78 3.40	Factor 0.029 0.023 0.026 0.054 0.029 0.049 0.026 0.022



Network Table - Nodes (N	/lax Day + FF 'HYD2')					
	Elevation	Demand	Head	Pressure	Pressure	Pressure	
Node ID	m	LPS	m	m	kPa	psi	
Junc C1	77.71	0	121.63	43.92	430.86	62.49	
Junc HYD1	77.32	0.52	112.3	34.98	343.15	49.77	
Junc HYD2	77.03	95.26	104.6	27.57	270.46	39.23	
Junc HYD3	76.4	72.48	102.98	26.58	260.75	37.82	
Junc NODE1	78	0.87	122.01	44.01	431.74	62.62	
Junc T1	77.74	0	122.09	44.35	435.07	63.10	
Junc T2	77.76	0	122.08	44.32	434.78	63.06	
Junc T3	74.73	0	122.49	47.76	468.53	67.95	
Junc T4	77.7	0	122.01	44.31	434.68	63.05	
Resvr RES1	122.5	-169.14	122.5	0	0.00	0.00	
Network Table - Links (Ma	ax Day + FF 'HYD2')						
Network Table - Links (Ma	ax Day + FF 'HYD2') Length	Diameter	Roughness	Flow	Velocity	Headloss	Friction
Network Table - Links (Ma	• •		Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
	Length	Diameter	Roughness 110				
Link ID	Length m	Diameter mm	U U	LPS	m/s	m/km	Factor
Link ID Pipe P1	Length m 142	Diameter mm 204	110	LPS 29.63	m/s 0.91	m/km 6.02	Factor 0.029
Link ID Pipe P1 Pipe P2	Length m 142 62	Diameter mm 204 204	110 110	LPS 29.63 168.27	m/s 0.91 5.15	m/km 6.02 150.22	Factor 0.029 0.023
Link ID Pipe P1 Pipe P2 Pipe P3	Length m 142 62 52	Diameter mm 204 204 204	110 110 110	LPS 29.63 168.27 167.74	m/s 0.91 5.15 5.13	m/km 6.02 150.22 149.35	Factor 0.029 0.023 0.023
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4	Length m 142 62 52 51	Diameter mm 204 204 204 204 204	110 110 110 110 110	LPS 29.63 168.27 167.74 72.48	m/s 0.91 5.15 5.13 2.22	m/km 6.02 150.22 149.35 31.57	Factor 0.029 0.023 0.023 0.026
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5	Length m 142 62 52 51 46	Diameter mm 204 204 204 204 204 204	110 110 110 110 110 110	LPS 29.63 168.27 167.74 72.48 -35.05	m/s 0.91 5.15 5.13 2.22 1.07	m/km 6.02 150.22 149.35 31.57 8.22	Factor 0.029 0.023 0.023 0.026 0.029
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P3 Pipe P5 Pipe P6	Length m 142 62 52 51 46 75	Diameter mm 204 204 204 204 204 204 204	110 110 110 110 110 110 110	LPS 29.63 168.27 167.74 72.48 -35.05 -0.87	m/s 0.91 5.15 5.13 2.22 1.07 0.03	m/km 6.02 150.22 149.35 31.57 8.22 0.01	Factor 0.029 0.023 0.023 0.026 0.029 0.049
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P3 Pipe P5 Pipe P5 Pipe P6 Pipe P7	Length m 142 62 52 51 46 75 16	Diameter mm 204 204 204 204 204 204 204 300	110 110 110 110 110 110 110 120	LPS 29.63 168.27 167.74 72.48 -35.05 -0.87 29.63	m/s 0.91 5.15 5.13 2.22 1.07 0.03 0.42	m/km 6.02 150.22 149.35 31.57 8.22 0.01 0.78	Factor 0.029 0.023 0.023 0.026 0.029 0.049 0.026
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5 Pipe P6 Pipe P7 Pipe P8	Length m 142 62 52 51 46 75 16 16 121	Diameter mm 204 204 204 204 204 204 300 400	110 110 110 110 110 110 120 120	LPS 29.63 168.27 167.74 72.48 -35.05 -0.87 29.63 139.51	m/s 0.91 5.15 5.13 2.22 1.07 0.03 0.42 1.11	m/km 6.02 150.22 149.35 31.57 8.22 0.01 0.78 3.40	Factor 0.029 0.023 0.023 0.026 0.029 0.049 0.026 0.022



Network Table - Nodes (N	/lax Day + FF 'HYD3')					
	Elevation	Demand	Head	Pressure	Pressure	Pressure	
Node ID	m	LPS	m	m	kPa	psi	
Junc C1	77.71	0	121.63	43.92	430.86	62.49	
Junc HYD1	77.32	0.52	112.3	34.98	343.15	49.77	
Junc HYD2	77.03	72.26	104.6	27.57	270.46	39.23	
Junc HYD3	76.4	95.48	101.91	25.51	250.25	36.30	
Junc NODE1	78	0.87	122.01	44.01	431.74	62.62	
Junc T1	77.74	0	122.09	44.35	435.07	63.10	
Junc T2	77.76	0	122.08	44.32	434.78	63.06	
Junc T3	74.73	0	122.49	47.76	468.53	67.95	
Junc T4	77.7	0	122.01	44.31	434.68	63.05	
Resvr RES1	122.5	-169.14	122.5	0	0.00	0.00	
Network Table - Links (Ma	ax Day + FF 'HYD3')						
Network Table - Links (Ma	ax Day + FF 'HYD3') Length	Diameter	Roughness	Flow	Velocity	Headloss	Friction
Network Table - Links (Ma	• •		Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
	Length	Diameter	Roughness 110				
Link ID	Length m	Diameter mm	Ū	LPS	m/s	m/km	Factor
Link ID Pipe P1	Length m 142	Diameter mm 204	110	LPS 29.63	m/s 0.91	m/km 6.02	Factor 0.029
Link ID Pipe P1 Pipe P2	Length m 142 62	Diameter mm 204 204	110 110	LPS 29.63 168.27	m/s 0.91 5.15	m/km 6.02 150.22	Factor 0.029 0.023
Link ID Pipe P1 Pipe P2 Pipe P3	Length m 142 62 52	Diameter mm 204 204 204 204	110 110 110	LPS 29.63 168.27 167.74	m/s 0.91 5.15 5.13	m/km 6.02 150.22 149.35	Factor 0.029 0.023 0.023
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4	Length m 142 62 52 51	Diameter mm 204 204 204 204 204	110 110 110 110 110	LPS 29.63 168.27 167.74 95.48	m/s 0.91 5.15 5.13 2.92	m/km 6.02 150.22 149.35 52.60	Factor 0.029 0.023 0.023 0.025
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5	Length m 142 62 52 51 46	Diameter mm 204 204 204 204 204 204	110 110 110 110 110 110	LPS 29.63 168.27 167.74 95.48 -35.05	m/s 0.91 5.15 5.13 2.92 1.07	m/km 6.02 150.22 149.35 52.60 8.22	Factor 0.029 0.023 0.023 0.025 0.029
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P3 Pipe P5 Pipe P6	Length m 142 62 52 51 46 75	Diameter mm 204 204 204 204 204 204 204	110 110 110 110 110 110 110	LPS 29.63 168.27 167.74 95.48 -35.05 -0.87	m/s 0.91 5.15 5.13 2.92 1.07 0.03	m/km 6.02 150.22 149.35 52.60 8.22 0.01	Factor 0.029 0.023 0.023 0.025 0.029 0.049
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P3 Pipe P5 Pipe P5 Pipe P6 Pipe P7	Length m 142 62 52 51 46 75 16	Diameter mm 204 204 204 204 204 204 204 300	110 110 110 110 110 110 110 120	LPS 29.63 168.27 167.74 95.48 -35.05 -0.87 29.63	m/s 0.91 5.15 5.13 2.92 1.07 0.03 0.42	m/km 6.02 150.22 149.35 52.60 8.22 0.01 0.78	Factor 0.029 0.023 0.023 0.025 0.029 0.049 0.026
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5 Pipe P6 Pipe P7 Pipe P8	Length m 142 62 52 51 46 75 16 16 121	Diameter mm 204 204 204 204 204 204 300 400	110 110 110 110 110 110 120 120	LPS 29.63 168.27 167.74 95.48 -35.05 -0.87 29.63 139.51	m/s 0.91 5.15 5.13 2.92 1.07 0.03 0.42 1.11	m/km 6.02 150.22 149.35 52.60 8.22 0.01 0.78 3.40	Factor 0.029 0.023 0.023 0.025 0.029 0.049 0.026 0.022

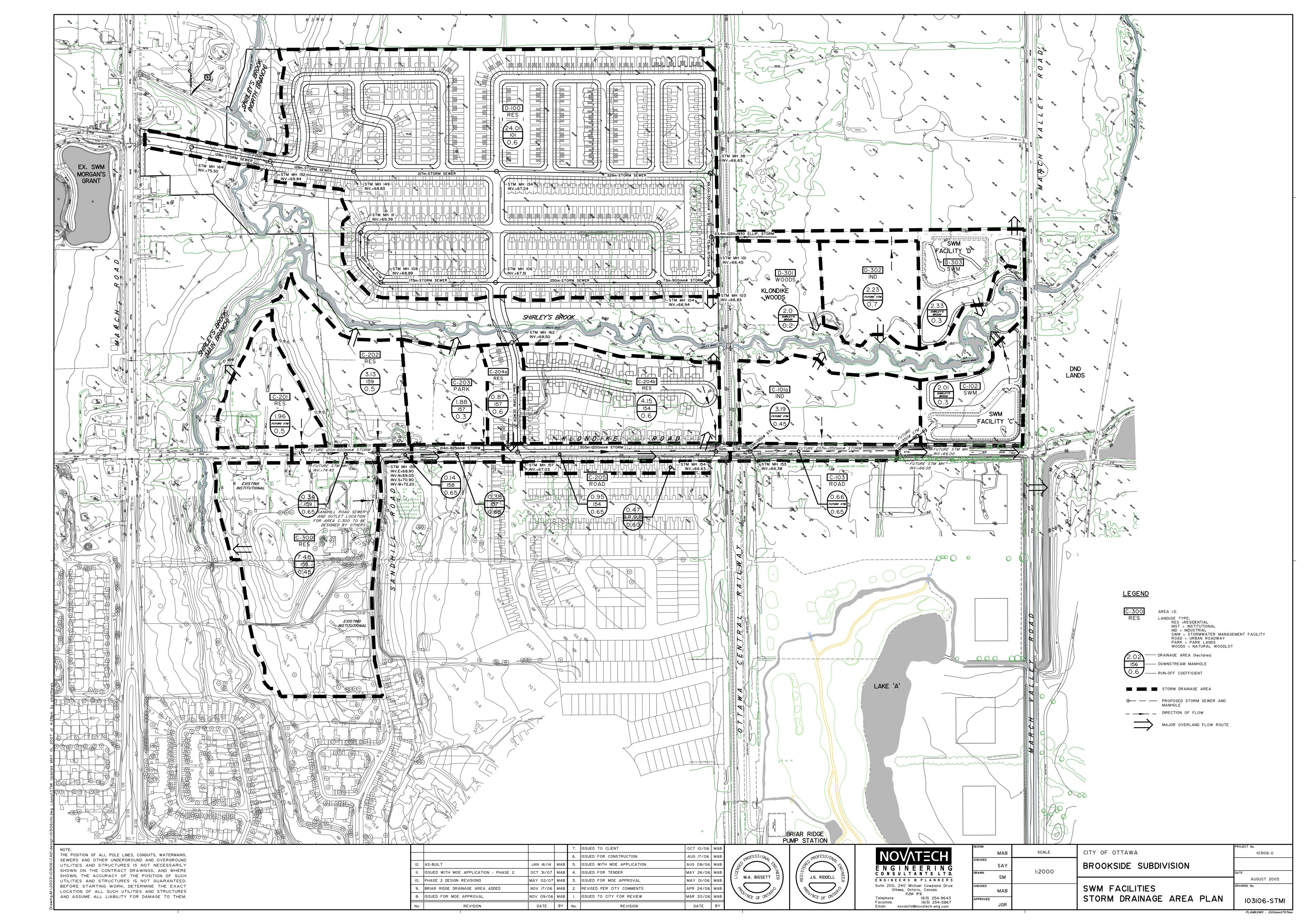


Network Table - Nodes (M	lax Day + FF 'Node1	')					
	Elevation	Demand	Head	Pressure	Pressure	Pressure	
Node ID	m	LPS	m	m	kPa	psi	
Junc C1	77.71	0	117.47	39.76	390.05	56.57	
Junc HYD1	77.32	0.52	117.47	40.15	393.87	57.13	
Junc HYD2	77.03	0.26	117.46	40.43	396.62	57.52	
Junc HYD3	76.4	0.48	117.46	41.06	402.80	58.42	
Junc NODE1	78	250.87	92.41	14.41	141.36	20.50	
Junc T1	77.74	0	117.55	39.81	390.54	56.64	
Junc T2	77.76	0	117.3	39.54	387.89	56.26	
Junc T3	74.73	0	118.49	43.76	429.29	62.26	
Junc T4	77.7	0	116.01	38.31	375.82	54.51	
Resvr RES1	118.5	-252.14	118.5	0	0.00	0.00	
Network Table - Links (Ma	ax Day + FF 'Node1')					
Network Table - Links (Ma	x Day + FF 'Node1' Length) Diameter	Roughness	Flow	Velocity	Headloss	Friction
Network Table - Links (Ma		•	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
· ·	Length	Diameter	Roughness 110				
Link ID	Length m	Diameter mm	U U	LPS	m/s	m/km	Factor
Link ID Pipe P1	Length m 142	Diameter mm 204	110	LPS 32.54	m/s 1.00	m/km 7.16	Factor 0.029
Link ID Pipe P1 Pipe P2	Length m 142 62	Diameter mm 204 204	110 110	LPS 32.54 1.27	m/s 1.00 0.04	m/km 7.16 0.02	Factor 0.029 0.047
Link ID Pipe P1 Pipe P2 Pipe P3	Length m 142 62 52	Diameter mm 204 204 204 204	110 110 110	LPS 32.54 1.27 0.74	m/s 1.00 0.04 0.02	m/km 7.16 0.02 0.01	Factor 0.029 0.047 0.050
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4	Length m 142 62 52 51	Diameter mm 204 204 204 204 204	110 110 110 110	LPS 32.54 1.27 0.74 0.48	m/s 1.00 0.04 0.02 0.01	m/km 7.16 0.02 0.01 0.00	Factor 0.029 0.047 0.050 0.054
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5	Length m 142 62 52 51 46	Diameter mm 204 204 204 204 204 204	110 110 110 110 110 110	LPS 32.54 1.27 0.74 0.48 72.38	m/s 1.00 0.04 0.02 0.01 2.21	m/km 7.16 0.02 0.01 0.00 31.49	Factor 0.029 0.047 0.050 0.054 0.026
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P3 Pipe P5 Pipe P6	Length m 142 62 52 51 46 75	Diameter mm 204 204 204 204 204 204 204	110 110 110 110 110 110 110	LPS 32.54 1.27 0.74 0.48 72.38 -250.87	m/s 1.00 0.04 0.02 0.01 2.21 7.68	m/km 7.16 0.02 0.01 0.00 31.49 314.73	Factor 0.029 0.047 0.050 0.054 0.026 0.021
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5 Pipe P6 Pipe P7	Length m 142 62 52 51 46 75 16	Diameter mm 204 204 204 204 204 204 204 300	110 110 110 110 110 110 110 120	LPS 32.54 1.27 0.74 0.48 72.38 -250.87 32.54	m/s 1.00 0.04 0.02 0.01 2.21 7.68 0.46	m/km 7.16 0.02 0.01 0.00 31.49 314.73 0.93	Factor 0.029 0.047 0.050 0.054 0.026 0.021 0.026
Link ID Pipe P1 Pipe P2 Pipe P3 Pipe P4 Pipe P5 Pipe P6 Pipe P7 Pipe P8	Length m 142 62 52 51 46 75 16 16 121	Diameter mm 204 204 204 204 204 204 204 300 400	110 110 110 110 110 110 120 120	LPS 32.54 1.27 0.74 0.48 72.38 -250.87 32.54 219.60	m/s 1.00 0.04 0.02 0.01 2.21 7.68 0.46 1.75	m/km 7.16 0.02 0.01 0.00 31.49 314.73 0.93 7.88	Factor 0.029 0.047 0.050 0.054 0.026 0.021 0.026 0.020



Appendix D

STM Design Sheets, SWM Excerpts & PCSWMM Modelling Info



STORM SEWER: HYDRAULIC GRADE LINE ANALYSIS (100-YEAR EVENT - ULTIMATE CONDITION)

This spreadsheet uses the Darcy-Weisbach equation to calculate hydraulic losses through a pipe network with a specified flow rate. Minor losses are accounted for including both pipe bend losses and structure losses. The spreadsheet returns the upstream hydraulic grade line if surcharged, or the pipe obvert if free flow conditions exist. The slope of the HGL is calculated and the minimum USF elevations can be established +0.30m above the HGL. The theoretical 100-year event storm sewer peak flows will be controlled to the actual 5-year flow rates using various roadway inlet controls within CBs. Additional flows will be directed using overland flow routes. The Ultimate Condition accounts for the entire drainage areas flowing through the completed storm sewer network.

LOCATION	МА	NHOLE	INV ELEV		GROUND ELEVATION	COVER	PIPE	PARAME	TERS	TOTAL FLOW	Q _{cap}	Q _{in} /	co	OMPUT	ATIONAL C	OLUMNS		HEAD LOSS	SURCHARGE		HGL		PIPE SLOPE	MIN. USF ELEVATION
	Upstream	Downstream	U/S	D/S	Upstream	Upstream	Dia	Length	'n'	(m ³ /s)	(m³/s)	Q _{cap}	Pipe		Friction	-		HL	Upstream	U/S	D/S	SLOPE	(%)	Upstream
			(m)	(m)	(m)	(m)	(mm)	(m)		(m /s)			Area (m ²)	L/D	Factor (f)	V (m/s)	V ² /2g	(m)	(m)	(m)	(m)	(%)		(m)
KLONDIK	KLONDIKE ROAD																			67.57	<- OUTLE	T TO PON	ID	
	FUT.MH C	OUTLET	65.93	65.90	67.95	0.670	1350	13.80	0.013	1.714	2.596	0.66	1.478	10	0.01905	1.16	0.07	0.05	0.34	67.62	67.57	0.35	0.14	67.92
	FUT.MH B	FUT.MH C	66.02	65.93	68.55	1.180	1350	51.00	0.013	1.738	2.339	0.74	1.478	38	0.01905	1.18	0.07	0.09	0.34	67.71	67.62	0.17	0.13	68.01
	FUT.MH A	FUT.MH B	66.24	66.05	68.87	1.280	1350	117.00	0.013	1.797	2.244	0.80	1.478	87	0.01905	1.22	0.08	0.14	0.26	67.85	67.71	0.12	0.13	68.15
	MH 153	FUT.MH A	66.40	66.24	70.01	2.260	1350	108.50	0.013	1.447	2.138	0.68	1.478	80	0.01905	0.98	0.05	0.09	0.19	67.94	67.85	0.08	0.13	68.24
	MH 154	MH 153	66.63	66.55	70.18	2.350	1200	39.90	0.013	1.441	1.821	0.79	1.167	33	0.01981	1.23	0.08	0.07	0.17	68.00	67.94	0.17	0.20	68.30
PHASE2																								
	MH 163	MH 154	66.97	66.90	70.25	2.380	900	65.0	0.013	0.180	0.620	0.29	0.657	72	0.02181	0.27	0.00	0.01	0.14	68.01	68.00	0.01	0.11	68.31
	MH 164	MH 163	67.33	67.27	69.82	1.890	600	41.5	0.013	0.159	0.244	0.65	0.292	69	0.02496	0.54	0.02	0.04	0.12	68.05	68.01	0.09	0.14	68.35
	MH 165	MH 164	67.59	67.41	70.15	2.035	525	110.0	0.013	0.161	0.181	0.89	0.223	210	0.02610	0.72	0.03	0.15	0.09	68.20	68.05	0.14	0.16	68.50
	MH 166	MH 165	67.87	67.67	70.50	2.180	450	90.3	0.013	0.126	0.140	0.90	0.164	201	0.02747	0.77	0.03	0.19	0.08	68.40	68.20	0.21	0.22	68.70
	MH 167	MH 166	68.25	68.02	70.50	1.950	300	66.4	0.013	0.045	0.059	0.75	0.073	221	0.03145	0.61	0.02	0.13	0.00	68.55	68.40	0.23	0.35	68.85
KLONDIK	E ROAD																							
	MH 155	MH 154	66.78	66.63	70.12	2.140	1200	117.00	0.013	1.335	1.456	0.92	1.167	98	0.01981	1.14	0.07	0.14	0.17	68.15	68.00	0.11	0.13	68.45
	MH 156	MH 155	66.90	66.78	70.39	2.290	1200	91.30	0.013	1.279	1.475	0.87	1.167	76	0.01981	1.10	0.06	0.10	0.15	68.25	68.15	0.11	0.13	68.55
	MH 157	MH 156	67.03	66.90	70.29	2.060	1200	97.00	0.013	1.214	1.489	0.82	1.167	81	0.01981	1.04	0.06	0.10	0.12	68.35	68.25	0.10	0.13	68.65
MARCON	I AVENUE																							
	MH 160	MH 157	68.08	67.78	70.64	2.110	450	120.00	0.013	0.129	0.149	0.87	0.164	267	0.02747	0.79	0.03	0.28	0.10	68.63	68.35	0.23	0.25	68.93
	MH 161	MH 160	68.35	68.23	70.87	2.220	300	23.90	0.013	0.023	0.071	0.32	0.073	80	0.03145	0.32	0.01	0.01	0.00	68.65	68.63	0.10	0.50	68.95
	MH 162	MH 161	68.50	68.38	71.50	2.700	300	24.60	0.013	0.000	0.070	0.00	0.073	82	0.03145	0.00	0.00	0.00	0.00	68.80	68.68	0.49	0.49	69.10
KLONDIK	E ROAD																							
	MH 158	MH 157	68.30	67.40	71.78	2.655	825	120.00	0.013	1.064	1.297	0.82	0.552	145	0.02245	1.93	0.19	0.66	0.00	69.13	68.35	0.65	0.75	69.43
	MH 159	MH 158	68.90	68.30	74.79	5.065	825	94.00	0.013	0.932	1.196	0.78	0.552	114	0.02245	1.69	0.15	0.40	0.00	69.73	69.13	0.64	0.64	70.03
TER LEVE	EL at Outle	et = 67.57m																						



EXISTING CONDITIONS

Existing Catchment Parameters

		Areas (ha)		Runoff C		
Catchment ID	Total	Hard Surfaces (C=0.90)	Soft Surfaces (C=0.20)	C _{avg}	C _{100yr} ¹	%Imperv.
Area Flowing East (EXT-01)	1.330	0.000	1.330	0.20	0.25	0.0%
Area Flowing West (EXT-02)	1.110	0.000	1.110	0.20	0.25	0.0%
TOTAL	2.440	0.000	2.440	0.20	0.25	0.0%

¹ Runoff coefficient increases by 25%, up to a maximum value of 1.00, for the 100-year event.

Time-of-Concentration (Tc) - Airport Method

Area ID	C _{avg}	Slope (%)	Length (m)	Tc (min)
Area Flowing East (EXT-01)	0.20	9.50	200	20
Area Flowing West (EXT-02)	0.20	0.80	100	32

Pre-Development Peak Flows

Catchment ID	Rainfall Inter	nsity (mm/hr) ¹	Peak Flows (L/s)				
Catchinent ID	2-year	5-year	2-year	5-year			
Area Flowing East (EXT-01)	52.45	70.83	38.8	52.4			
Area Flowing West (EXT-02)	38.68	52.07	23.9	32.1			
TOTAL	-	-	62.7	84.5			

*Allowable 100-year release rate to river = 297.2 L/s.

Notes:

Rainfall Intensity based on City of Ottawa Sewer Design Guidelines (Oct. 2012)

- 100 year Intensity = 1735.688 / (Tc + 6.014)^{0.820}

- 5 year Intensity = 998.071 / (Tc + 6.053)^{0.814}

- 2 year Intensity = $732.951 / (Tc + 6.199)^{0.810}$

Q(peak flow) = 2.78 x C x I x A

- C is the runoff coefficient

- I is the rainfall intensity

- A is the total drainage area

STORM SEWER DESIGN SHEET

(Manle Leaf Homes)

										Maple Leaf H		D							N(JV		EC	H
																		En	gineers	, Planners	s & Lands	cape Ar	chitects
	LOCATION			AR	EA (ha)					FLOW				TOTAL FLOW				SEV	VER DA	ATA			
Street	Catchment ID	From	То	Area	С	AC In	div A	ccum	Time of	-	•	Rainfall Intensity			Dia. (m)	Dia.	Туре	Slope	Length	Capacity		Time	
		Manhole	Manhole	(ha)	(ha) 2.7	3 AC 2.7	78 AC 0	Concentration	2 Year (mm/hr)	5 Year (mm/hr)	10 Year (mm/hr)	(L/s)	Flow, Q (L/s)	Actual	(mm)		(%)	(m)	(L/s)	(m/s)	(min)	Q/Q full
				0.361	0.76 (0.763	10.00	76.81			58.6										
Street 1	A-16	CBMH1	6		(0.000	<u>10.00</u> 10.00					58.6	0.305	300	PVC	0.50	27.4	71.3	0.98	0.47	82%
				0.445	0.76	.34 0.		1.703	10.47	75.06			127.8										
Street 1	A-05, A-08	6	4	01110	(000 0	0.000	10.47					127.8	0.457	450	Conc	0.40	100.0	188.0	1.14	1.46	68%
					(0.000	10.47														
Street 1	A-02	4	2	0.138	0.73 (1.983	11.92 11.92	70.13			139.1	120.1	139.1 0.457	450	Conc	0.45	59.3	199.4	1.21	0.81	70%
Sileet	A-02	4	2					0.000	11.92					139.1		450	CONC	0.45	59.5	199.4		0.01	10%
Block 10 / 1075	A-01, A-04, A-07, A-18,			1.090	0.73 (.80 2.	212 2	2.212	10.00	76.81			169.9					0.50 46.					
Klondike Road	A-01, A-04, A-07, A-18, A-20	8	2			.00 0.	000 0	0.000	10.00					169.9	0.457	450 Conc	Conc		46.2	210.2	1.28	0.60	81%
					(.00 0.	000 0	0.000	10.00											<u> </u>			
				0.040		10 0				07.00													
Klondike Road	A-03, A-06, A-09, A-15,	2	EXMH159	0.310	0.51 0			4.635 0.641	12.74 12.74	67.68	91.66		313.7 58.8	372.5	0.610	600	Conc	0.68	117.1	527.9	1.81	1.08	71%
Nonuike Noau	A-17, A-19	2	EXMITT55	0.355				0.000	12.74		91.00		50.0	572.5	0.010	000	Conc	0.00	117.1	521.5	1.01	1.00	7170
									13.82														
Q = 2.78 AIC, where											Consul	tant:						N	lovatec	h			
Q = Peak Flow in Litre	es per Second (L/s)										Date):						Mar	rch 5, 20)21			
A = Area in hectares ((ha)										Design	By:						Luc	as Wils	on			
I = Rainfall Intensity (r	Rainfall Intensity (mm/hr), 5 year stormDwg. Reference:Che							Checke	d By:														
C = Runoff Coefficient	t										Maple Leaf	Homes				117	7034-STM				MA	В	

Q = 2.78 AIC, where	Consultant:	
Q = Peak Flow in Litres per Second (L/s)	Date:	
A = Area in hectares (ha)	Design By:	
I = Rainfall Intensity (mm/hr), 5 year storm	Client:	
C = Runoff Coefficient	Maple Leaf Homes	

Legend:

Indicates 100 Year intensity for storm sewers *

10.00

10.00

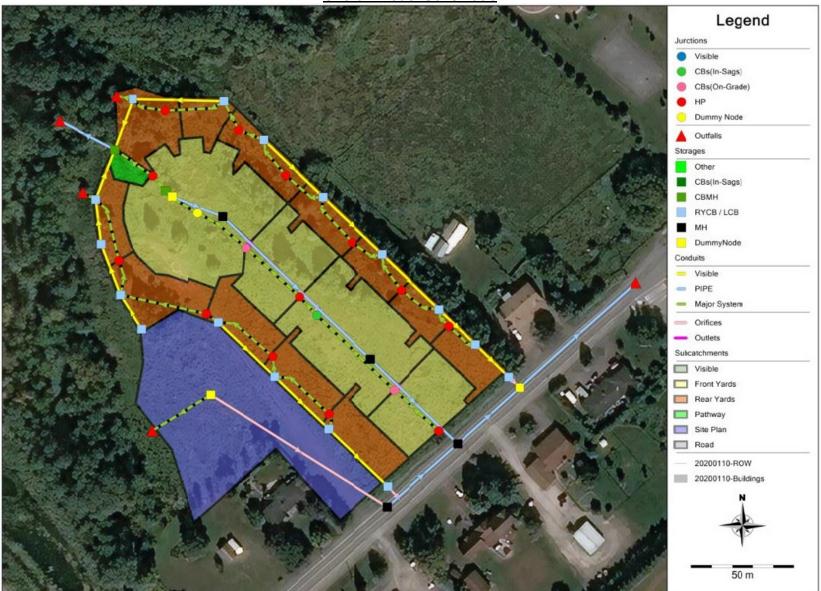
Storm sewers designed to the 2 year event (without ponding) for local roads Storm sewers designed to the 5 year event (without ponding) for collector roads Storm sewers designed to the 10 year event (without ponding) for arterial roads 10.00





1055 Klondike – Maple Leaf Homes (117034) PCSWMM Model Schematic

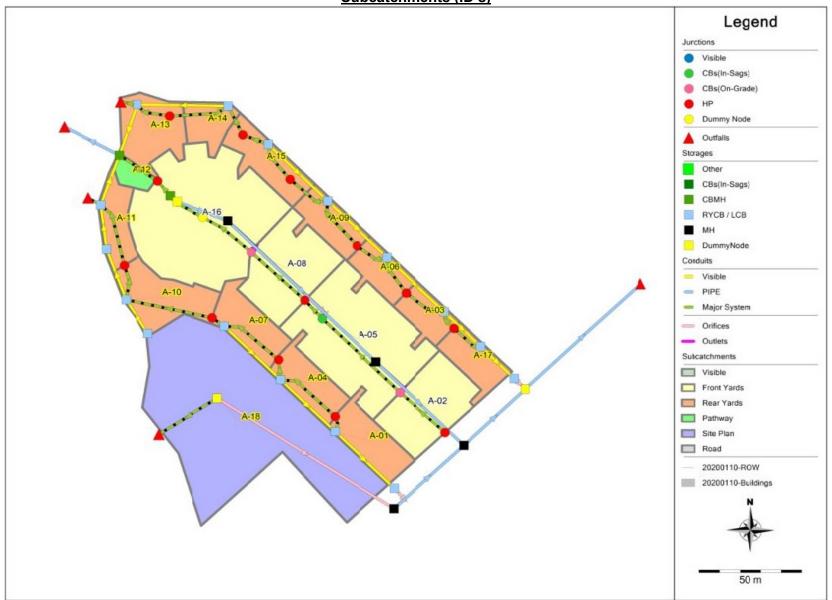




1055 Klondike – Maple Leaf Homes (117034) PCSWMM Model Schematic

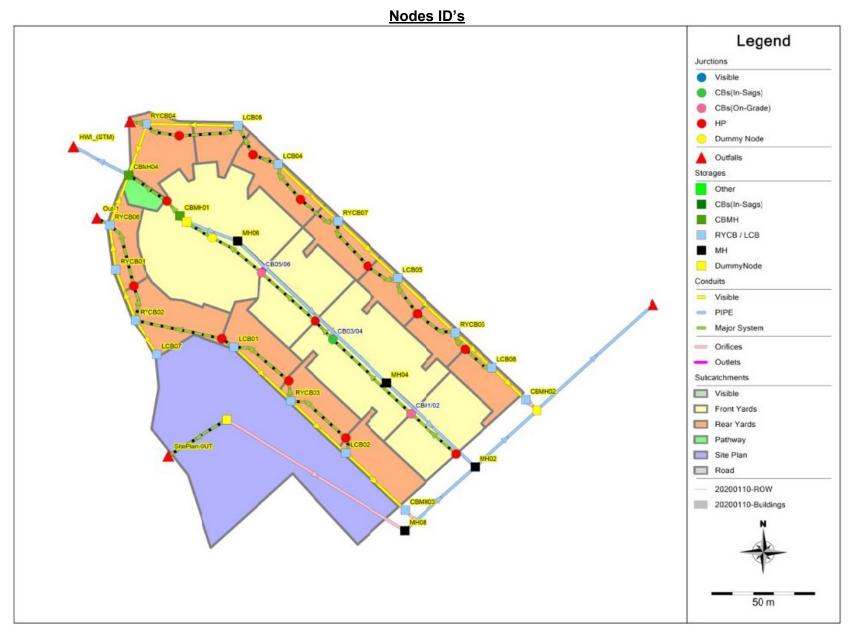






1055 Klondike – Maple Leaf Homes (117034) PCSWMM Model Schematic





NOV	ΛΤΞϹΗ
Engineers, Planner	s & Landscape Architect

EPA STORM WATER MANAGEMENT	MODEL - VERSION	5.1 (Build 5.1.015)
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M:\2017\117034\CAD\Design\117034-GP.dwg

 Number of rain gages
 1

 Number of subcatchments
 18

 Number of nodes
 47

 Number of links
 60

 Number of jolutants
 0

 Number of land uses
 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
Raingage	C3hr-100yr	INTENSITY	10 min.

Subcatchment Summary

Name	Area	Width	*	%Slope Rain Gage	Outlet	
A-01	0.08	38.50	42.90	3.5000 Raingage	LCB02	
A-02	0.14	55.20	75.40	4.0000 Raingage	CB01/02	
A-03	0.05	25.50	43.10	5.0000 Raingage	RYCB05	
A-04	0.07	36.00	45.80	4.0000 Raingage	RYCB03	
A-05	0.29	117.20	79.90	4.0000 Raingage	CB03/04	
A-06	0.06	29.00	43.10	5.0000 Raingage	LCB05	
A-07	0.08	39.50	40.50	3.0000 Raingage	LCB01	
A-08	0.15	60.80	79.60	4.0000 Raingage	CB05/06	
A-09	0.06	32.00	45.30	5.0000 Raingage	RYCB07	
A-10	0.11	45.20	29.20	2.5000 Raingage	RYCB02	
A-11	0.07	44.00	33.30	5.0000 Raingage	RYCB01	
A-12	0.02	9.60	29.20	3.5000 Raingage	CBMH04	
A-13	0.11	30.57	12.10	3.5000 Raingage	RYCB04	
A-14	0.05	21.20	17.00	4.0000 Raingage	LCB06	
A-15	0.07	37.00	47.30	5.5000 Raingage	LCB04	
A-16	0.36	90.25	79.50	3.0000 Raingage	CBMH01	
A-17	0.06	31.50	41.30	5.0000 Raingage	LCB08	
A-18	0.60	200.00	85.70	2.0000 Raingage	Site_Plan_CB	

Node Summary ******

Name	Туре		Depth	Area	
	JUNCTION				
CB03/04	JUNCTION	75.62	2.40	0.0	
CB05/06	JUNCTION	76.73	1.00	0.0	
D01	JUNCTION	76.70	1.00	0.0	
HP01	JUNCTION	77.79	1.00	0.0	
HP02	JUNCTION	77.09	1.00	0.0	
HP-03	JUNCTION	76.42	1.00	0.0	
HP-LCB01	JUNCTION	77.03	1.00	0.0	
HP-LCB02	JUNCTION	77.53	1.00	0.0	
HP-LCB04	JUNCTION	74.00	1.00	0.0	
HP-LCB05	JUNCTION	74.70	1.00	0.0	
HP-LCB06	JUNCTION	73.77	1.00	0.0	
HP-LCB08	JUNCTION	75.56	1.00	0.0	
HP-RYCB02	JUNCTION	76.71	1.00	0.0	
HP-RYCB03	JUNCTION	77.44	1.00	0.0	
HP-RYCB05	JUNCTION	75.00	1.00	0.0	
HP-RYCB07	JUNCTION	74.33	1.00	0.0	
EX-MH159	OUTFALL	70.98	0.60	0.0	
HW1_(STM)	OUTFALL	70.79	0.38	0.0	
Out-1	OUTFALL	76.56	1.00	0.0	
Out-3	OUTFALL	73.47	1.00	0.0	
SitePlan-OUT	OUTFALL	78.30	1.00	0.0	
CBMH01	STORAGE	72.89	4.25	0.0	

CBMH01-Dummy	STORAGE	72.89	3.25	0.0
CBMH02	STORAGE	71.86	5.10	0.0
CBMH02-Dummy	STORAGE	71.49	5.41	0.0
CBMH03	STORAGE	74.31	3.49	0.0
CBMH04	STORAGE	70.94	5.40	0.0
LCB01	STORAGE	75.43	2.40	0.0
LCB02	STORAGE	74.69	3.64	0.0
LCB04	STORAGE	72.75	2.00	0.0
LCB05	STORAGE	72.35	3.15	0.0
LCB06	STORAGE	71.90	2.58	0.0
LCB07	STORAGE	75.18	2.40	0.0
LCB08	STORAGE	72.05	4.31	0.0
MH02	STORAGE	71.77	5.99	0.0
MH04	STORAGE	72.19	5.23	0.0
MH06	STORAGE	72.60	4.04	0.0
MH08	STORAGE	72.15	5.53	0.0
RYCB01	STORAGE	74.72	2.73	0.0
RYCB02	STORAGE	74.94	2.59	0.0
RYCB03	STORAGE	75.09	3.03	0.0
RYCB04	STORAGE	71.34	2.94	0.0
RYCB05	STORAGE	72.19	3.61	0.0
RYCB06	STORAGE	74.42	2.96	0.0
RYCB07	STORAGE	72.55	2.58	0.0
Site_Plan_CB	STORAGE	76.60	2.40	0.0

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Link Summary *****

Name	From Node	To Node	Туре	Length	%Slope Ro	ughness
1	Site Plan CB	SitePlan-OUT	CONDUIT	5.0	-6.0108	0.0150
1_(104)_(1)_(STM)		EX-MH159	CONDUIT	76.3	0.6684	0.0130
1_(104)_(STM)	MH02	CBMH02-Dummy	CONDUIT	40.8	0.6863	0.0130
1_(11)_(STM)	MH04	MH02	CONDUIT	59.3	0.4555	0.0130
1_(131)_(STM)	CBMH01-Dummy	MH06	CONDUIT	27.4	0.5115	0.0130
1_(135)_(STM)	HP-03	CBMH04	CONDUIT	3.0	38.5872	0.0150
1_(87)_(STM)	CBMH04	HW1_(STM)	CONDUIT	30.5	0.4918	0.0130
1_(9)_(STM)	MH06	MH04	CONDUIT	100.0	0.4000	0.0130
2	LCB08	HP-LCB08	CONDUIT	3.0	-6.6815	0.0350
3	CBMH01	HP-03	CONDUIT	3.0	-9.3743	0.0150
4	HP-LCB08	RYCB05	CONDUIT	3.0	26.1876	0.0350
4_1	CB05/06	D01	CONDUIT	3.0	1.0001	0.2500
4 2	D01	CBMH01	CONDUIT	3.0	19.0006	0.2500
5	HP02	CB05/06	CONDUIT	35.3	1.0199	0.2500
6	CB03/04	HP02	CONDUIT	12.4	-0.5645	0.2500
7	CB01/02	CB03/04	CONDUIT	52.4	0.9542	0.2500
8	HP01	CB01/02	CONDUIT	29.5	0.9153	0.2500
HP-LCB01-RYCB02	HP-LCB01	RYCB02	CONDUIT	3.0	16.9031	0.0350
HP-LCB02-RYCB03	HP-LCB02	RYCB03	CONDUIT	3.0	13.7961	0.0350
HP-LCB04-LCB06	HP-LCB04	LCB06	CONDUIT	3.0	17.5997	0.0350
HP-LCB05-RYCB07	HP-LCB05	RYCB07	CONDUIT	3.0	19.3525	0.0350
HP-LCB06-RYCB04	HP-LCB06	RYCB04	CONDUIT	3.0	16.5557	0.0350
HP-RYCB02-RYCB06	HP-RYCB02	RYCB06	CONDUIT	3.0	11.0672	0.0350
HP-RYCB03-LCB01	HP-RYCB03	LCB01	CONDUIT	3.0	20.7672	0.0350
HP-RYCB05-LCB05	HP-RYCB05	LCB05	CONDUIT	3.0	16.9031	0.0350
HP-RYCB07-LCB04	HP-RYCB07	LCB04	CONDUIT	3.0	19.7051	0.0350
LCB01-HP	LCB01	HP-LCB01	CONDUIT	3.0	-6.6815	0.0350
LCB01-LCB02	LCB01	RYCB03	CONDUIT	34.0	1.0001	0.0130
LCB02-HP	LCB02	HP-LCB02	CONDUIT	3.0	-6.6815	0.0350
LCB02-RYCB03	RYCB03	LCB02	CONDUIT	40.4	0.9901	0.0130
LCB04-HP	LCB04	HP-LCB04	CONDUIT	3.0	-8.3624	0.0350
LCB04-LCB08	LCB04	RYCB07	CONDUIT	39.4	0.5076	0.0130
LCB05-HP	LCB05	HP-LCB05	CONDUIT	3.0	-6.6815	0.0350
LCB05-RYCB05	LCB05	RYCB05	CONDUIT	32.8	0.4878	0.0130
LCB06-HP	LCB06	HP-LCB06	CONDUIT	3.0	-9.7122	0.0350
LCB06-RYCB04	LCB06	RYCB04	CONDUIT	49.5	1.0102	0.0130
LCB07-RYCB02	LCB07	RYCB02	CONDUIT	23.7	1.0127	0.0130
LCB08-CBMH02	LCB08	CBMH02	CONDUIT	27.8	0.5036	0.0150
LCB08-LCB05	RYCB07	LCB05	CONDUIT	39.4	0.5076	0.0130
MH08-MH02	MH08	MH02	CONDUIT	46.2	0.4978	0.0130
RYCB01-RYCB06	RYCB01	RYCB06	CONDUIT	24.9	1.0041	0.0130
RYCB02-HP	RYCB02	HP-RYCB02	CONDUIT	3.0	-6.0108	0.0350
RYCB02-RYCB01	RYCB02	RYCB01	CONDUIT	22.2	0.9910	0.0130
RYCB03-CBMH03	LCB02	CBMH03	CONDUIT	32.9	1.0031	0.0150
RYCB03-HP	RYCB03	HP-RYCB03	CONDUIT	3.0	-10.7279	0.0350
RYCB04-CBMH04	RYCB04	CBMH04	CONDUIT	24.1	0.9959	0.0130
RYCB04-Out-3	RYCB04	Out-3	CONDUIT	3.0	-6.3461	0.0350
RYCB05-HP	RYCB05	HP-RYCB05	CONDUIT	3.0	-6.6815	0.0350
RYCB05-LCB08	RYCB05	LCB08	CONDUIT	28.3	0.4947	0.0150
RYCB06-CBMH04	RYCB06	CBMH04	CONDUIT	23.1	0.9957	0.0130
RYCB06-Out-1	RYCB06	Out-1	CONDUIT	3.0	-6.0108	0.0350

DVODOZ UD	DVGD07	HP-RYCB07 MH06 CBMH02-Dumm CBMH01-Dumm MH08 MH08 MH04 MH04 MH06		NDUIT		3.0 -6.6815 0	0250
CD2_O	CR02/04	HP-RICBU/	00	IFICE		5.0 -0.0815 0	.0350
CB3-0	CB03/04	MUOG	OR	TELCE			
CB4-0 CBMH02_TCD	CBMH02	CBMU02_Dum		TEICE			
CBMH02-ICD	CDMU01	CBMH02-Dulli	iy OR	TELCE			
CBMH3_TCD	CBMH03	CBMH01-Dulla MH08	iy OR	TEICE			
Outlet-1	Site Plan CP	MH08	OR	TEICE			
CB01/02-0	CB01/02	MH04	01	TLET			
CB05/06-0	CB05/06	MH0.6	00	TLET			
******	******						
Cross Section :	Summary						
		Full	Full	Hyd.	Max.	No. of Full	
Conduit	Shape	Depth	Area	Rad.	Width	No. of Full Barrels Flow	
1	RECT_OPEN	1.00	3.00	0.60	3.00	1 34883.83	
1_(104)_(1)_(S	IM) CIRCULAR	0.60	0.28	0.15	0.60	1 502.03	
1_(104)_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	1 508.69	
1_(11)_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1 192.43	
1_(131)_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1 69.16	
1_(135)_(STM)	RECT_OPEN	1.00	3.00	0.60	3.00	1 88384.99	
1_(8/)_(SIM)	CIRCULAR	0.38	0.11	0.09	0.38	1 122.96	
1_(9)_(SIM)	TRADEZOIDAL	1.00	2 20	0.11	6 20	1 15216 10	
2	DECT ODEN	1.00	3.30	0.50	3 00	1 13510.10	
4	TRAPEZOIDAL	1.00	3 30	0.50	6 30	1 30322 01	
4 1	18mROW	1.00	15.42	7.47	18.00	1 23562.63	
4 2	18mROW	1.00	15.42	7.47	18.00	1 102706.27	
5	18mROW	1.00	15.42	7.47	18.00	1 23795.13	
6	18mROW	1.00	15.42	7.47	18.00	1 17703.31	
7	18mROW	1.00	15.42	7.47	18.00	1 23016.65	
8	18mROW	1.00	15.42	7.47	18.00	1 22542.02	
HP-LCB01-RYCB02	2 TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 24360.89	
HP-LCB02-RYCB0	3 TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 22008.41	
HP-LCB04-LCB06	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 24857.83	
HP-LCB05-RYCB0	7 TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 26066.28	
HP-LCBU6-RICBU	A TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 24109.24	
HP-RICBUZ-RICBU	J6 IRAPEZOIDAL	1.00	3.30	0.50	6.30	1 19/11.89	
HP-RICBUS-LCBU.	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 2/002.18	
HP-RICB03-LCB0	1 TRAFEZOIDAL	1.00	3.30	0.50	6.30	1 24300.03	
LCB01-HP	TRAPEZOIDAL	1.00	3 30	0.50	6 30	1 15316 10	
LCB01-LCB02	CIRCULAR	0.25	0.05	0.06	0.25	1 59.47	
LCB02-HP	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 15316.10	
LCB02-RYCB03	CIRCULAR	0.25	0.05	0.06	0.25	1 59.18	
LCB04-HP	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 17134.69	
LCB04-LCB08	CIRCULAR	0.25	0.05	0.06	0.25	1 42.37	
LCB05-HP	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 15316.10	
LCB05-RYCB05	CIRCULAR	0.25	0.05	0.06	0.25	1 41.54	
LCB06-HP	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 18465.79	
LCB06-RYCB04	CIRCULAR	0.25	0.05	0.06	0.25	1 59.77	
LCBU/-RICBUZ	CIRCULAR	0.25	0.05	0.06	0.25	1 59.85	
LCBU8-CBMHUZ	CIRCULAR	0.25	0.05	0.06	0.25	1 42 27	
MUOS_MUO2	CIRCULAR	0.25	0.05	0.00	0.25	1 201 18	
RYCB01-RYCB06	CIRCULAR	0.45	0.10	0.06	0.45	1 59 59	
RYCB02-HP	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 14527.05	
RYCB02-RYCB01	CIRCULAR	0.25	0.05	0.06	0.25	1 59.20	
RYCB03-CBMH03	CIRCULAR	0.25	0.05	0.06	0.25	1 51.62	
RYCB03-HP	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 19407.38	
RYCB04-CBMH04	CIRCULAR	0.25	0.05	0.06	0.25	1 59.35	
RYCB04-Out-3	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 14926.66	
RYCB05-HP	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 15316.10	
RYCB05-LCB08	CIRCULAR	0.25	0.05	0.06	0.25	1 36.25	
RYCB06-CBMH04	CIRCULAR	0.30	0.07	0.07	0.30	1 96.50	
RICBU6-OUT-I	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1 14527.05	
	THAT EDUIDAD	1.00	5.50	0.50	0.50	No. of Barrels Full Flow 1 34883.83 1 502.03 1 502.03 1 502.03 1 69.16 1 88384.99 1 122.96 1 180.33 1 3563.76 1 3252.01 1 2352.01 1 2352.02 1 2352.03 1 2352.04 1 23016.65 1 23016.65 1 23016.65 1 23008.41 24360.89 1 2008.41 1 24360.89 1 2006.52 1 5316.10 1 5316.10 1 59.47 1 5316.10 1 59.47 1 5316.10 1 59.47 1 59.47 1 59.47 1 59.48 1 42.37 1 59.48 1 42.37 1 59.47 1 59.51 1 59.51 1 59.51 1 59.51 1 59.51 1 59.52 1 59.35 1	
*****	**						
Transect Summan	ry						
****	**						
Transect 18mROW Area:	N						
Area. 0 (0.003	0.0076	0.0136	0.0219			
0.0	0.0461	0.0076	0.0758	0.0219			
0.0	1090 0.1260	0.1458	0 1655	0 1862			

	0.3233	0.3466	0.3699	0.3933	0.4166
	0.4399	0.4632	0.4866	0.5099	0.5332
	0.5566	0.5799	0.6032	0.6266	0.6499
	0.6732	0.6966	0.7199	0.7432	0.7666
	0.7899	0.8133	0.8366	0.8599	0.8833
	0.9066	0.9300	0.9533	0.9767	1.0000
Hrad:					
	0.0013	0.0026	0.0039	0.0051	0.0072
	0.0108	0.0163	0.0239	0.0327	0.0427
	0.0539	0.0662	0.0795	0.0938	0.1091
	0.1252	0.1421	0.1639	0.1905	0.2174
	0.2445	0.2718	0.2991	0.3265	0.3538
	0.3812	0.4084	0.4356	0.4627	0.4896
	0.5165	0.5432	0.5698	0.5963	0.6226
	0.6488	0.6749	0.7008	0.7265	0.7521
	0.7776	0.8029	0.8281	0.8531	0.8779
	0.9026	0.9272	0.9516	0.9759	1.0000
Width:					
	0.0728	0.1455	0.2183	0.3006	0.4114
	0.5222	0.5967	0.6350	0.6733	0.7116
	0.7499	0.7882	0.8265	0.8648	0.9031
	0.9414	0.9797	0.9989	0.9989	0.9990
	0.9990	0.9990	0.9991	0.9991	0.9991
	0.9992	0.9992	0.9992	0.9993	0.9993
	0.9994	0.9994	0.9994	0.9995	0.9995
	0.9995	0.9996	0.9996	0.9996	0.9997
	0.9997	0.9997	0.9998	0.9998	0.9998
	0.9999	0.9999	0.9999	1.0000	1.0000

******* NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

***** Analysis Options ***** Flow Units LPS Process Models: Rainfall/Runoff YES RDII NO Snowmelt NO Groundwater NO Flow Routing YES Ponding Allowed YES Water Quality NO Infiltration Method HORTON Flow Routing Method DYNWAVE Surcharge Method EXTRAN Starting Date 07/22/2019 00:00:00
 Stating Date
 07/22/2019 00:00:00

 Ending Date
 07/23/2019 00:00:00

 Antecedent Dry Days
 0.0

 Report Time Step
 00:01:00

 Wet Time Step
 00:01:00

 Wet filme Step
 00:05:00

 Dry Time Step
 00:05:00

 Routing Time Step
 2.00 sec

 Variable Time Step
 YES

 Maximum Trials
 8

 Number of Threads 4 Head Tolerance 0.001500 m

...... Control Actions Taken **********

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

Total Precipitation	0.175	71.667
Evaporation Loss	0.000	0.000
Infiltration Loss	0.038	15.357
Surface Runoff	0.137	55.916
Final Storage	0.001	0.477
Continuity Error (%)	-0.116	
*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr



0.1862

0.3000

0.1269

0.2301

0.1090

0.2077

0.1458

0.2533

0.1655

0.2767

0.000

0.137

0.000

0.000

0.000

0.137

0.000

0.000

0.001

0.001

0.030

0.000

1.366

0.000

0.000

0.002

1.368

0.000

0.000

0.000

0.006

0.006

			NOV
		E	ngineers, Planners & Lar
24.27	32.48	14.97	47.45
32.01	20.94	18.76	39.70
29.56	23.87	18.29	42.16
31.85	20.50	18.92	39.42
40.30	8.67	22.72	31.39
37.43	12.19	22.08	34.27
23.36	33.92	14.45	48.37
9.09	56.23	5.61	61.84
26.07	29.61	16.03	45.64
6.31	60.81	3.95	64.77

***** Node Depth Summary ********

26.74

0.39 290.13 0.904

A-09

A-10

A-11

A-12

A-13

A-14

A-15

A-16

27.69 0.662

0.554

0.588

0.550

0.438

0.478

0.637

39.24

27.94

8.72

28.27

17.50

32.44 0.675

170.67 0.863

0.03

0.04

0.03

0.01

0.03

0.02

0.04

0.22

A-17 0.03

A-18

71.67

71.67

71.67

71.67

71.67

71.67

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71.67

71.67

71.67

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0.00

0.00

0.00

0.00

0.00

0.00

0.00

		Average Depth	Maximum Depth				Reported Max Depth
Node	Type	Meters		Meters			Meters
CB01/02	JUNCTION	0.00	0.10	77.62	0	01:10	0.10
CB03/04	JUNCTION	0.07	1.61	77.23	0	01:10	1.61
CB05/06	JUNCTION	0.00	0.14	76.87	0	01:10	0.14
D01	JUNCTION	0.00	0.08	76.78		01:10	0.08
HP01	JUNCTION	0.00	0.00	77.79	0	00:00	0.00
HP02	JUNCTION	0.01	0.10	77.19	0	01:16	0.10
HP-03	JUNCTION	0.00	0.01	76.43	0	01:14	0.01
HP-LCB01	JUNCTION	0.00	0.08	77.11	0	01:10	0.08
HP-LCB02	JUNCTION	0.00	0.00	77.53	0	00:00	0.00
HP-LCB04	JUNCTION	0.00	0.10	74.10	0	01:10	0.10
HP-LCB05	JUNCTION	0.00	0.02	74.72	0	01:10	0.02
HP-LCB06	JUNCTION	0.00	0.09	73.86	0	01:10	0.08
HP-LCB08	JUNCTION	0.00	0.00	75.56	0	00:00	0.00
HP-RYCB02	JUNCTION	0.00	0.00	76.71	0	00:00	0.00
HP-RYCB03	JUNCTION	0.00	0.00	77.44	0	00:00	0.00
HP-RYCB05	JUNCTION	0.00	0.00	75.00	0	00:00	0.00
HP-RYCB07	JUNCTION	0.00	0.05	74.38	0	01:10	0.05
EX-MH159	OUTFALL	0.03	0.28	71.26	0	01:13	0.28
HW1_(STM)	OUTFALL	1.03	1.03	71.82	0	00:00	1.03
Out-1	OUTFALL	0.00	0.00	76.56	0	00:00	0.00
Out-3	OUTFALL	0.00	0.08	73.55	0	01:10	0.08
SitePlan-OUT	OUTFALL	0.00	0.00	78.30	0	00:00	0.00
CBMH01	STORAGE	0.19	3.54	76.43	0	01:14	3.54
CBMH01-Dummy	STORAGE	0.02	0.23	73.12	0	01:14	0.23
CBMH02	STORAGE	0.31	3.03	74.89	0	01:10	3.01
CBMH02-Dummy	STORAGE	0.03	0.28	71.77	0	01:13	0.28
CBMH03	STORAGE	0.29	3.12	77.43	0	01:10	3.10
CBMH04	STORAGE	0.89	1.60	72.54	0	01:13	1.59
LCB01	STORAGE	0.13	1.73	77.16	0	01:10	1.73
LCB02	STORAGE	0.22	2.74	77.43	0	01:10	2.73
LCB04	STORAGE	0.14	1.40	74.15	0	01:10	1.40
LCB05	STORAGE	0.21	2.37	74.72	0	01:10	2.37
LCB06	STORAGE	0.04	1.99	73.89	0	01:10	1.98
LCB07	STORAGE	0.01	1.13	76.31	0	01:11	1.13
LCB08	STORAGE	0.27	2.84	74.89	0	01:10	2.83
MH02	STORAGE	0.03	0.28	72.05	0	01:14	0.28
MH04	STORAGE	0.03	0.39	72.58	0	01:14	0.39
MH06	STORAGE	0.02	0.30	72.90	0	01:12	0.30
MH08	STORAGE	0.02	0.16	72.31	0	01:11	0.16
RYCB01	STORAGE	0.02	0.98	75.70	0	01:11	0.98
RYCB02	STORAGE	0.02	1.36	76.30		01:10	1.36
RYCB03	STORAGE	0.17	2.29	77.38	0	01:10	2.28
RYCB04	STORAGE	0.51	2.23	73.57	0	01:10	2.22
RYCB05	STORAGE	0.24	2.67	74.86	0	01:10	2.66
RYCB06	STORAGE	0.01	0.34	74.76		01:11	0.34
RYCB07	STORAGE	0.17	1.86	74.41	0	01:10	1.85
RICDU/							

|--|

Node Inflow Summary

Link HP-LCB04-LCB06 (2.59%)
Link HP-LCB01-RYCB02 (1.38%)

Highest Flow Instability Indexes Link CBMH1-O(1) (2)

Dry Weather Inflow

Wet Weather Inflow

Groundwater Inflow

RDII Inflow

External Inflow

External Outflow

Flooding Loss

Evaporation Loss

Exfiltration Loss

Initial Stored Volume

Final Stored Volume

Continuity Error (%)

.....

Highest Continuity Errors

Time-Step Critical Elements

.....

Node CB05/06 (-2.56%)

Node CB01/02 (-2.51%)

Routing Time Step Summary			

Minimum Time Step	:	0.22	sec
Average Time Step	:	1.97	sec
Maximum Time Step	:	2.00	sec
Percent in Steady State	:	0.00	
Average Iterations per Step	:	2.00	
Percent Not Converging	:	0.01	
Time Step Frequencies	:		
2.000 - 1.516 sec	:	96.82	4
	:	1.38	dр
1.149 - 0.871 sec	:	1.79	90
0.871 - 0.660 sec	:	0.00	90
0.660 - 0.500 sec	:	0.00	de A

***** Subcatchment Runoff Summary

Total Total Total Total Imperv Perv Total Total Peak Runoff Precip Runon Evap Infil Runoff Runoff Runoff Runoff Runoff Coeff Subcatchment mm mm mm mm mm mm mm 10^6 ltr LPS A-01 71.67 0.00 0.00 25.43 30.76 15.52 46.29 0.04 32.21 0.646 A-02 71.67 0.00 0.00 10.85 53.40 6.80 60.20 65.48 0.840 0.08 A-03 0.03 71.67 0.00 0.00 4.21 30.90 36.60 67.50 25.24 0.942 A-04 71.67 0.00 0.00 24.09 32.84 14.79 47.63 0.03 30.85 0.665 A-05 0.18 140.58 0.867 71.67 0.00 0.00 8.85 56.59 5.57 62.16 A-06 71.67 0.00 0.00 25.26 30.90 15.55 46.46 0.03 24.84 0.648 A-07 71.67 0.00 0.00 26.56 29.04 16.11 45.15 0.04 32.20 0.630 A-08 71.67 0.00 0.00 8.99 56.38 5.65 62.03 72.88 0.09 0.866



Type JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION	65.48 140.58 72.88 0.00 0.00	65.48 162.15 75.75 45.80 0.00	days h 0 0 0	r:min 01:10 01:10 01:10	10^6 ltr 0.083 0.182 0.0942	Inflow Volume 10^6 ltr 0.083 0.201 0.112	Percent -2.449 0.591
JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION	65.48 140.58 72.88 0.00 0.00	65.48 162.15 75.75 45.80 0.00	0 0 0 0	01:10 01:10 01:10	0.083 0.182 0.0942	0.083 0.201 0.112	-2.449 0.591
JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION	140.58 72.88 0.00 0.00	162.15 75.75 45.80 0.00	0 0 0	01:10	0.182	0.201	0.591
JUNCTION JUNCTION JUNCTION JUNCTION JUNCTION	72.88 0.00 0.00	75.75 45.80 0.00	0	01:10	0.0942	0 112	
JUNCTION JUNCTION JUNCTION JUNCTION	0.00	45.80	0	01.10			-2.492
JUNCTION JUNCTION JUNCTION	0.00	0.00		01:10	0	0.0341	-0.789
JUNCTION JUNCTION	0 00		0	00:00	0	0	0.000
JUNCTION		48.42	0	01:11	0	0.0243	18.844
	0.00	19.84	0	01:14	0	0.00787	0.002
JUNCTION	0.00	78.22	0	01:10	0	0.0447	0.005
JUNCTION	0.00	0.00	0	00:00	0	0	0.000
JUNCTION	0.00	114.17	0	01:10	0	0.0831	0.022
JUNCTION	0.00	6.17	0	01:10	0	0.000393	0.223
JUNCTION	0.00	84.56	0	01:10	0	0.0198	0.135
JUNCTION	0.00	0.00	0	00:00	0	0	0.000
JUNCTION	0.00	0.00	0	00:00	0	0	0.000
TUNCTION	0 00	0 00	0	00.00	0	0	0 000
TUNCTION	0.00	0.00	0	00.00	0	0	0.000
TUNCTION	0.00	36.13	0	01.10	0	0 00857	0.000
OUTFALL	0.00	228 20	0	01.13	0	1 1	0.020
OUTFALL	0.00	226.20	n	01.13	0	0 267	0.000
OUTEALL	0.00	220.00	0	00.00	0	0.207	0.000
OUTEALL	0.00	47 44	0	01.10	0	0 00578	0.000
OUTEALL	0.00	4/.44	0	00.00	0	0.005/8	0.000
CTODACE	170.00	0.00	0	00:00	0 000	0 257	0.000
SIUKAGE	1/0.67	215.85	U	01:10	0.223	0.25/	0.152
STURAGE	0.00	62.28	U	01:14	0	U.249	0.002
STURAGE	0.00	13.96	U	01:04	0	0.0731	0.001
STORAGE	0.00	228.20	0	01:13	0	1.1	0.005
STORAGE	0.00	17.17	0	01:06	0	0.0608	0.007
STORAGE	8.72	227.59	0	01:13	0.00946	0.267	-0.000
STORAGE	32.20	78.69	0	01:10	0.0357	0.0609	-0.066
STORAGE	32.21	40.90	0	01:06	0.0356	0.0701	0.052
STORAGE	32.44	114.77	0	01:10	0.0358	0.096	-0.055
STORAGE	24.84	61.18	0	01:10	0.0269	0.076	0.018
STORAGE	17.50	131.02	0	01:10	0.0182	0.101	-0.037
STORAGE	0.00	24.34	0	01:08	0	0.00172	0.394
STORAGE	26.74	30.16	0	01:04	0.0287	0.0816	0.069
STORAGE	0.00	222.07	0	01:14	0	1.02	-0.001
STORAGE	0.00	165.02	0	01:12	0	0.573	-0.215
STORAGE	0.00	143.24	0	01:12	0	0.506	0.212
STORAGE	0.00	57.30	0	01:10	0	0.449	-0.002
STORAGE	27.94	122.69	0	01:10	0.0278	0.117	0.213
STORAGE	39.24	117.08	0	01:10	0.0448	0.0913	0.061
STORAGE	30.85	51.58	0	01:10	0.0343	0.0598	0.006
STORAGE	28 27	155 80	0	01.10	0 0336	0 136	-0.025
STORAGE	25 24	40.83	0	01.10	0 0344	0 0776	0.011
STOPACE	0.00	114 54	0	01.10	0.0011	0 117	-0.003
STORAGE	27 69	85 18	0	01.10	0 0304	0 0845	-0.021
STORAGE	290.13	290.13	o	01:10	0.388	0.388	0.021
* Y							
ged.							
	¥	*	*	¥ *	¥ *	У *	Y

CBMH02	0.000	6	0	0	0.000	59	0	01:10	6.49
CBMH02-Dummy	0.000	1	0	0	0.000	5	0	01:13	228.20
CBMH03	0.000	8	0	0	0.000	89	0	01:10	6.59
CBMH04	0.000	16	0	0	0.000	30	0	01:13	226.58
LCB01	0.000	5	0	0	0.000	72	0	01:10	78.22
LCB02	0.000	6	0	0	0.000	75	0	01:10	28.76
LCB04	0.000	7	0	0	0.000	70	0	01:10	114.17
LCB05	0.000	7	0	0	0.000	75	0	01:10	59.35
LCB06	0.000	2	0	0	0.000	77	0	01:10	129.38
LCB07	0.000	0	0	0	0.000	47	0	01:11	6.41
LCB08	0.000	6	0	0	0.000	66	0	01:10	23.80
MH02	0.000	0	0	0	0.000	5	0	01:14	222.08
MH04	0.000	1	0	0	0.000	8	0	01:14	164.90
MH06	0.000	1	0	0	0.000	7	0	01:12	143.22
MH08	0.000	0	0	0	0.000	3	0	01:11	57.29
RYCB01	0.000	1	0	0	0.000	36	0	01:11	114.54
RYCB02	0.000	1	0	0	0.000	53	0	01:10	104.03
RYCB03	0.000	6	0	0	0.000	76	0	01:10	47.85
RYCB04	0.000	17	0	0	0.000	76	0	01:10	153.16
RYCB05	0.000	7	0	0	0.000	74	0	01:10	37.87
RYCB06	0.000	0	0	0	0.000	12	0	01:11	113.59
RYCB07	0.000	7	0	0	0.000	72	0	01:10	84.16
Site_Plan_CB	0.009	2	0	0	0.161	32	0	01:23	51.01

	Flow	Avg	Max	Total				
	Freq	Flow	Flow	Volume				
Outfall Node	Pont	LPS	LPS	10^6 ltr				
EX-MH159	24.87	63.43	228.20	1.097				
HW1_(STM)	73.40	6.94	226.58	0.267				
Out-1	0.00	0.00	0.00	0.000				
Out-3	0.60	21.52	47.44	0.006				
SitePlan-OUT	0.00	0.00	0.00	0.000				
System	19.77	91.89	494.11	1.369				

***** Link Flow Summary *********

		Maximum			Maximum	Max/	Max/
Link	Type	Flow LPS		irrence	Veloc m/sec	Full Flow	Full Depth
	туре	EF 3					epcn
1	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
1_(104)_(1)_(STM)	CONDUIT	228.20	0	01:13	1.73	0.45	0.47
1_(104)_(STM)	CONDUIT	222.08	0	01:14	1.71	0.44	0.47
1_(11)_(STM)	CONDUIT	164.90		01:15	1.28	0.86	0.75
1_(131)_(STM)	CONDUIT	62.28	0	01:14	1.18	0.90	0.70
1_(135)_(STM)	CONDUIT	19.84	0	01:14	1.24	0.00	0.01
1_(87)_(STM)	CONDUIT	226.58	0	01:13	2.05	1.84	1.00
1_(9)_(STM)	CONDUIT	143.22	0	01:12	1.20	0.79	0.76
2	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
3	CONDUIT	19.84	0	01:14	0.05	0.00	0.15
4	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
4_1	CHANNEL	45.80	0	01:10	0.11	0.00	0.11
4_2	CHANNEL	45.63	0	01:10	0.12	0.00	0.18
5	CHANNEL	23.40	0	01:16	0.06	0.00	0.11
6	CHANNEL	48.42	0	01:11	0.07	0.00	0.15
7	CHANNEL	22.74	0	01:10	0.03	0.00	0.16
8	CHANNEL	0.00	0	00:00	0.00	0.00	0.05
HP-LCB01-RYCB02	CONDUIT	78.20	0	01:10	1.70	0.00	0.08
HP-LCB02-RYCB03	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
HP-LCB04-LCB06	CONDUIT	114.17	0	01:10	1.81	0.00	0.25
HP-LCB05-RYCB07	CONDUIT	6.12	0	01:10	0.06	0.00	0.15
HP-LCB06-RYCB04	CONDUIT	84.55	0	01:10	1.54	0.00	0.19
HP-RYCB02-RYCB06	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
HP-RYCB03-LCB01	CONDUIT	0.00	0	00:00	0.00	0.00	0.16
HP-RYCB05-LCB05	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
HP-RYCB07-LCB04	CONDUIT	36.11	0	01:10	0.16	0.00	0.23
LCB01-HP	CONDUIT	78.22	0	01:10	0.41	0.01	0.21
LCB01-LCB02	CONDUIT	47.85	0	01:10	0.97	0.80	1.00
LCB02-HP	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
LCB02-RYCB03	CONDUIT	21.16	0	01:10	0.51	0.36	1.00

LCB04-HP	CONDUIT	114.17	0	01:10	0.44	0.01	0.25
LCB04-LCB08	CONDUIT	48.16	0	01:10	0.98	1.14	1.00
LCB05-HP	CONDUIT	6.17	0	01:10	0.08	0.00	0.12
LCB05-RYCB05	CONDUIT	37.87	0	01:10	0.77	0.91	1.00
LCB06-HP	CONDUIT	84.56	0	01:10	0.33	0.00	0.25
LCB06-RYCB04	CONDUIT	75.98	0	01:08	1.55	1.27	1.00
LCB07-RYCB02	CONDUIT	24.34	0	01:08	0.55	0.41	1.00
LCB08-CBMH02	CONDUIT	13.96	0	01:04	0.38	0.38	1.00
LCB08-LCB05	CONDUIT	53.35	0	01:10	1.09	1.26	1.00
MH08-MH02	CONDUIT	57.29	0	01:11	1.09	0.28	0.36
RYCB01-RYCB06	CONDUIT	114.54	0	01:10	2.33	1.92	1.00
RYCB02-HP	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
RYCB02-RYCB01	CONDUIT	98.41	0	01:10	2.00	1.66	1.00
RYCB03-CBMH03	CONDUIT	17.17	0	01:06	0.44	0.33	1.00
RYCB03-HP	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
RYCB04-CBMH04	CONDUIT	106.22	0	01:10	2.16	1.79	1.00
RYCB04-Out-3	CONDUIT	47.44	0	01:10	0.29	0.00	0.19
RYCB05-HP	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
RYCB05-LCB08	CONDUIT	16.59	0	01:10	0.38	0.46	1.00
RYCB06-CBMH04	CONDUIT	113.59	0	01:11	1.66	1.18	0.93
RYCB06-Out-1	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
RYCB07-HP	CONDUIT	36.13	0	01:10	0.27	0.00	0.17
CB3-0	ORIFICE	27.54	0	01:10			1.00
CB4-0	ORIFICE	27.54	0	01:10			1.00
CBMH02-ICD	ORIFICE	6.49	0	01:10			1.00
CBMH1-O(1)	ORIFICE	62.28	0	01:14			1.00
CBMH3-ICD	ORIFICE	6.59	0	01:10			1.00
Outlet-1	ORIFICE	51.01	0	01:23			1.00
CB01/02-0	DUMMY	21.80	0	01:01			
CB05/06-0	DUMMY	26.00	0	01:01			

***** Flow Classification Summary

	Adjusted /Actual			Fract	ion of	Time	in Flo	w Clas	s	
							Up	Down		
Conduit	Length	Dry			Crit			Crit	Ltd	Ctrl
1	1.00	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1_(104)_(1)_(STM)	1.00	0.01	0.00	0.00	0.78	0.21		0.00	0.90	0.00
1_(104)_(STM)	1.00	0.01	0.00	0.00	0.85	0.14		0.00	0.94	0.00
1_(11)_(STM)		0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
1_(131)_(STM)	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
1_(135)_(STM)		0.99	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1_(87)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
1_(9)_(STM)	1.00	0.01	0.00	0.00	0.13	0.00	0.00	0.86	0.06	0.00
2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	1.00	0.95	0.03	0.00	0.01	0.00	0.00	0.00	0.94	0.00
4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4_1	1.00	0.01	0.50	0.00	0.49	0.00	0.00	0.00	0.87	0.00
4_2	1.00	0.01	0.00	0.00	0.05	0.00	0.00	0.94	0.03	0.00
5	1.00	0.01	0.04	0.00	0.96	0.00	0.00	0.00	0.02	0.00
6	1.00	0.04	0.00	0.00	0.04	0.00	0.00	0.92	0.00	0.00
7	1.00	0.76	0.00	0.00	0.04	0.00	0.00	0.20	0.02	0.00
8	1.00	0.76	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HP-LCB01-RYCB02	1.00	0.96	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
HP-LCB02-RYCB03	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HP-LCB04-LCB06	1.00	0.95	0.00	0.00	0.01	0.00	0.00	0.04	0.01	0.00
HP-LCB05-RYCB07	1.00	0.98	0.01	0.00	0.01	0.00	0.00	0.00	0.95	0.00
HP-LCB06-RYCB04	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
HP-RYCB02-RYCB06	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HP-RYCB03-LCB01		0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HP-RYCB05-LCB05	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HP-RYCB07-LCB04		0.92	0.06	0.00	0.02	0.00	0.00	0.00	0.95	0.00
LCB01-HP	1.00	0.95	0.01	0.00	0.04	0.00	0.00	0.00	0.93	0.00
LCB01-LCB02	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.12	0.00
LCB02-HP	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LCB02-RYCB03	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.88	0.00
LCB04-HP	1.00	0.92	0.03	0.00	0.05	0.00	0.00	0.00	0.92	0.00
LCB04-LCB08	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.86	0.00
LCB05-HP	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
LCB05-RYCB05	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.13	0.00
LCB06-HP	1.00	0.98	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
LCB06-RYCB04	1.00	0.00	0.74	0.00	0.26	0.00	0.00	0.00	0.98	0.00
LCB07-RYCB02	1.00	0.01	0.94	0.00	0.05	0.00	0.00	0.00	0.95	0.00
LCB08-CBMH02	1.00	0.01	0.00	0.00	0.22	0.00	0.00	0.77	0.01	0.00
LCB08-LCB05	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.84	0.00
MH08-MH02	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
RYCB01-RYCB06	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
KICBUI-KICBU6	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00

RYCB02-HP	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RYCB02-RYCB01	1.00	0.01	0.00	0.00	0.97	0.03	0.00	0.00	0.98	0.00
RYCB03-CBMH03	1.00	0.01	0.00	0.00	0.18	0.00	0.00	0.81	0.03	0.00
RYCB03-HP	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RYCB04-CBMH04	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
RYCB04-Out-3	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
RYCB05-HP	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RYCB05-LCB08	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.81	0.00
RYCB06-CBMH04	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
RYCB06-Out-1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RYCB07-HP	1.00	0.98	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00

****** Conduit Surcharge Summary

Conduit				Hours Above Full Normal Flow	Hours Capacity Limited
1_(87)_(STM)	24.00	24.00	24.00	0.23	0.26
LCB01-LCB02	2.07	2.07	2.42	0.01	0.01
LCB02-RYCB03	2.42	2.42	2.91	0.01	0.01
LCB04-LCB08	2.74	2.74	3.07	0.15	0.01
LCB05-RYCB05	3.49	3.49	3.80	0.01	0.01
LCB06-RYCB04	0.33	0.33	23.83	0.10	0.12
LCB07-RYCB02	0.11	0.11	0.15	0.01	0.01
LCB08-CBMH02	4.13	4.13	4.52	0.01	0.01
LCB08-LCB05	3.07	3.07	3.49	0.09	0.01
RYCB01-RYCB06	0.05	0.16	0.05	0.18	0.05
RYCB02-RYCB01	0.15	0.15	0.16	0.14	0.14
RYCB03-CBMH03	2.91	2.91	3.45	0.01	0.01
RYCB04-CBMH04	24.00	24.00	24.00	0.27	0.29
RYCB05-LCB08	3.80	3.80	4.13	0.01	0.01
RYCB06-CBMH04	0.01	0.04	0.01	0.08	0.01

Analysis begun on: Fri Mar 12 14:14:15 2021 Analysis ended on: Fri Mar 12 14:14:20 2021 Total elapsed time: 00:00:05



(M:\...SWM_C.dat)

SWMF C - Ultimate Development Conditions INPUT

SB.DAT)	Page 1	NOVATECH ENGINEERING CONSULTANTS
ID=[5], NHYD=["C-102"], DT=[5]min, AREA=[0.90](ha),		
03, 2006) **		
SLOPE=[1.0](%), END=-1	1	
<pre>ID=[6], NHYD=["C-103"], DT=[5]min, AREA=[1.20](ha), XIMP=[0.70], TIMP=[0.80], DWF=[0](cms), LOSS=[2], CN=[65],</pre>		
03 (Klondike Road D/S of OCR) 03, 2006) ** 		
MINID=[7], MinNHYD=["Cl01mi"], TMJSTO=[158](cu-m)	1	
<pre>IDin=[1], CINLET=[0.269](cms), NINLET=[1], MAJID=[2], MajNHYD=["C101ma"],</pre>		
ha = 269 L/s a = 158 m3 		
SLOPE=[0.6](%), END=-1		
<pre> ID=[1], NHYD=["C-101"], DT=[5]min, AREA=[3.16](ha),</pre>		
03, 2006) **		
TMJSTO=[718] (cu-m)	1	
<pre>IDin=[6], CINLET=[1.220] (cms), NINLET=[1], MAJID=[7], MajNHYD=["C2maj"], MINID=[6], MioNHYD=["C2mip"]</pre>		
/ha = 718 m3 03, 2006) **		
ure for Area C-2: s/ha = 1220 L/s		
IDsum=[6], NHYD=["C-2"], IDs to add=[1,2,3,4,5]		
SLOPE=[1.0](%), END=-1 (ALL)		
<pre>ID=[5], NHYD=["C-205"], DT=[5]min, AREA=[2.22](ha), XIMP=[0.70], TIMP=[0.80], DWF=[0](cms), LOSS=[2], CN=[65],</pre>		
S of OCR) 03, 2006) **		
SLOPE=[1.0](%), END=-1		
<pre>ID=[4], NHYD=["C-204"], DT=[5]min, AREA=[5.20](ha), XIMP=[0.57], TIMP=[0.64], DWF=[0](cms), LOSS=[2], CN=[65],</pre>		
esidential) 03, 2006) **		
SLOPE=[1.0](%), END=-1		
 ID=[3], NHYD=["C-203"], DT=[5]min, AREA=[1.90](ha), XIMP=[0.24], TIMP=[0.30], DWF=[0](cms), LOSS=[2], CN=[65],		
03, 2006) **		
SLOPE=[1.0](%), END=-1		
<pre>ID=[2], NHYD=["C-202"], DT=[5]min, AREA=[3.07](ha), XIMP=[0.57], TIMP=[0.64], DWF=[0](cms), LOSS=[2], CN=[65],</pre>		
esidential) 03, 2006) **		
SLOPE=[1.5](%), END=-1		
ID=[1], NHYD=["C-201"], DT=[5]min, AREA=[1.96](ha), XIMP=[0.57], TIMP=[0.64], DWF=[0](cms), LOSS=[2], CN=[65],	* FINISH	
sidential) 03, 2006) **	START	TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[4] S100-12.stm
	START	TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[3] C100-3.stm
<pre>MAJID=[2], MajNHYD=["C-3maj"], MINID=[9], MinNHYD=["C-3min"], TMJSTO=[374](cu-m)</pre>	START *	TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[2] C5-3.stm
SLOPE=[1.0](%), END=-1	* %	HYD_FILENAME=["SWMC_IN"] HYD_COMMENT=["Inflow to SWMF C"]
 ID=[1], NHYD=["C-300"], DT=[5]min, AREA=[7.48](ha), XIMP=[0.30], TIMP=[0.37], DWF=[0](cms), LOSS=[2], CN=[65],	*% SAVE HYD	[-1 , -1] (max twenty pts) ID=[10], # OF PCYCLES=[1], ICASEsh=[-1]
/ha = 374 m3 03, 2006) **		[0.160 , 0.5460] [0.262 , 0.7090] [3.000 , 0.7430]
00 sidential)	=	[0.060 , 0.3910] [0.100 , 0.4200]
ULTIMATE CONDITIONS	_	$ \begin{bmatrix} 0.000 \\ 0.000 \\ 0.0000 \end{bmatrix} $ $ \begin{bmatrix} 0.020 \\ 0.1030 \\ 0.1030 \end{bmatrix} $
KLONDIKE ROAD SUBDIVISION		RDT=[5](min), TABLE of (OUTFLOW-STORAGE) values (cms) - (ha-m)
STORM_FILENAME=["storm.001"]	* >5yr Storm: *	Qin=Qout IDout=[1], NHYD=["SWMC OUT"], IDin=[10],
TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1] 25mm-4.stm	* Extended Detenti * Erosion Control:	26.2 ha (not incl. SWMF C) ion: $Q = 29$ L/s max : $Q = 262$ L/s (10 L/s/ha)
Conditions to SWM Facility 'C'	* SWMF C *	
M.Petepiece] OVATECH ENGINEERING CONSULTANTS LTD	ADD HYD *	<pre>IDsum=[10], NHYD=["SWMC_IN"], IDs to add=[5,6,7,8,9]</pre>
		RAINFALL=[, , , ,] (mm/hr), END=-1
	e 1	
	<pre>Shirley's Brook - SNMF C]</pre>	<pre>bhilight & Rook - BMF C) Project Number: (103106) '*</pre>

<pre>** END OF RUN : 1 RUN:COMMAND# 002:0001</pre>	<pre>s on =imperial, wy's Brook - 1006 H ENGINEERI 3 ttions to SW ttions ttions ttion</pre>	0] 2=metric o ************************************	Putput)] Proj Pr	<pre>iect Numbe iect Numbe in, TPRAT= ite_hh:mm- i= 1:10 ite_hh:mm- ite_</pre>	<pre>************************************</pre>
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>s on =imperial, wy's Brook - 006 H ENGINEERI 3 ttions to SW ************************************</pre>	0] 2=metric o SWMF C] MF acility MF Facility Yr-3hr Chi 42,50] AREA 7.48 1=.00002+0 AREA 1.96 AREA 1.96 AREA 1.90 AREA 5.20	Pro: Pro: Pro: NANTS LTD / 'C' 	<pre>in, TPRAT= ate_hh:mm- b 1:10 ate_hh:mm- b 1</pre>	<pre>************************************</pre>
** END OF RUN : 1 RUN:COMMAND# O02:0001	<pre>s on =imperial, 'y's Brook - 1006 H ENGINEERI 3 tions to SW '************************************</pre>	0] 2=metric o SWMF C] M Facility ******** 	Putput)] Proj PanTS LTD 7 'C' .cago (DT=10 m. .cago (DT=10 m. .cogo No_dato .657 No_dato .657 No_dato .000 No_dato .334 No_dato .505 No_dato .505 No_dato .505 No_dato .505 No_dato .143 No_dato .840 No_dato	in, TPRAT= ate_hh:mm- b 1:10 ate_hh:mm- b 0:00 b 0:00 b 0:100 b 1:10 b 0:110 ate_hh:mm- b 1:10 ate_hh:mm- b 1:10 ate_hh:mm- b 1:10 ate_hh:mm- b 1:10	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>s on =imperial, w's Brook - 006 H ENGINEERI 3 tions to SW </pre>	0] 2=metric o SWMF C] M Facility ************************************	Putput)] Pro: Pr	<pre>iect Numbe in, TPRAT= ite_hh:mm- i 1:10 ite</pre>	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>s on =imperial, wy's Brook - 006 H ENGINEERI stions to SW ************************************</pre>	0] 2=metric o SWMF C] M Facility 42.50] 	Putput)] Proj Pro	in, TPRAT= ate_hh:mm- s 1:10 ate_hh:mm- s 1:10 ite_hh:mm- s 1:10 ite_hh:mm- s 1:10 ate_hh:mm- s 1:10	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>s on =imperial, wy's Brook - 1006 H ENGINEERI 3 001 Cottawa: 5 3.000:PTOT= 10:NHYD 01:C-300 02:C-3maj 09:C-3maj 09:C-3maj 09:C-3maj 09:C-3maj 09:C-3maj 09:C-201 10:NHYD 01:C-202 11 11 10:NHYD 01:C-202 11 11 10:NHYD 01:C-202 11 11 11 10:NHYD 11 10:NHYD 11 10:NHYD 11 10:NHYD 11 10:NHYD 11 10:NHYD</pre>	0] 2=metric o SWMF C] M Facility 42.50] 	Putput)] Proj Pro	in, TPRAT= ate_hh:mm- s 1:10 ate_hh:mm- s 1:10 ite_hh:mm- s 1:10 ite_hh:mm- s 1:10 ate_hh:mm- s 1:10	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>:s on =imperial, 'y's Brook - '006 opiece] H ENGINEERI 3 :tions to SW :tions to SW :tions to SW :tions to SW :tions to SW :0112</pre>	0] 2=metric o SWMF C] M Facility 42.50] AREA 7.48 AREA 1.96 AREA 1.96	Putput)] Proj VANTS LTD 7 'C' .cago (DT=10 m: .cago (DT=10 m: .657 No_date .657 No_date .656 No_date .636 No_date .636 No_date .334 No_date	in, TPRAT= in, TPRAT= ite_hh:mm- bi10 ite_hh:mm- bi100 ite_hh:mm- bi110 ite_hh:mm- bi110 ite_hh:mm-	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>s on =imperial, 2006 H ENGINEERI 3 ttions to SW </pre>	0] 2=metric o SWMF C] M Facility 42.50] AREA 7.48 AREA 1.96 AREA 1.96	Putput)] Proj VANTS LTD 7 'C' .cago (DT=10 m: .cago (DT=10 m: .657 No_date .657 No_date .656 No_date .636 No_date .636 No_date .334 No_date	in, TPRAT= in, TPRAT= ite_hh:mm- bi10 ite_hh:mm- bi100 ite_hh:mm- bi110 ite_hh:mm- bi110 ite_hh:mm-	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	s on =imperial, ************************************	0] 2=metric o SWMF C] MG CONSULT M Facility 42.50] AREA 7.48 AREA 7.48 	Pro: Pro: Pro: Pro: Pro: Pro: Pro: Pro:	in, TPRAT= ate_hh:mm- b 1:10 b 1:10 c 0:00 b 1:10 c 1:00 c	<pre>********* ***************************</pre>
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>:s on =imperial, 'y's Brook - 006 ppiece] H ENGINEERI 3 :tions to SW 'tions to</pre>	0] 2=metric o SWMF C] MG CONSULT M Facility 42.50] AREA 7.48 AREA 7.48 	Pro: Pro: Pro: Pro: Pro: Pro: Pro: Pro:	in, TPRAT= ate_hh:mm- b 1:10 b 1:10 c 0:00 b 1:10 c 1:00 c	<pre>********* ***************************</pre>
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>:s on =imperial, 'y's Brook - 006 ppiece] H ENGINEERI 3 :tions to SW :tions to</pre>	0] 2=metric o SWMF C] NG CONSULT M Facility YI-3hr Chi 42.50] AREA 7.48	Proj Proj Proj Proj Proj Proj Proj Proj	in, TPRAT= ate_hh:mm- = 1:10	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	<pre>:s on =imperial, 'y's Brook - 006 ppiece] H ENGINEERI 3 :tions to SW :tions to</pre>	0] 2=metric o SWMF C] NG CONSULT M Facility YI-3hr Chi 42.50] AREA 7.48	Proj Proj Proj Proj Proj Proj Proj Proj	in, TPRAT= ate_hh:mm- = 1:10	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	s on =imperial, 2006 H ENGINEERI 3 ttions to SW Cottawa: 5 3.001;PTOT= 100:HTDP 01:C-300	0] 2=metric o SWMF C] M Facility Yr-3hr Chi 42.50] REE	putput)] Proj NANTS LTD 7 'C' 	ject Numbe in, TPRAT= ate hh:mm-	r: [10310
<pre>** END OF RUN : 1 RUN:COMMAND# 002:0001</pre>	s on =imperial, 1006 piece] H ENGINEERI 3 tions to SW 	0] 2=metric o SWMF C] NG CONSULT M Facility Yr-3hr Chi 42.50]	Proj Proj CANTS LTD 7 'C' .cago (DT=10 m:	ject Numbe	r: [10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	s on =imperial, *y's Brook - 006 006 H ENGINEERI 3 :tions to SW	0] 2=metric o SWMF C] NG CONSULT M Facility	Proj Proj ANTS LTD		r: (10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	s on =imperial, y's Brook - 006 opiace] H ENGINEERI 3 tions to SW	0] 2=metric o SWMF C] NG CONSULT M Facility	Proj Proj ANTS LTD		r: (10310
** END OF RUN : 1 RUN:COMMAND# 002:0001	s on =imperial, ********** y's Brook - 1006	0] 2=metric o ********** SWMF C]	putput)] Proj		*******
** END OF RUN : 1 RUN:COMMAND# 002:0001	s on =imperial, ********** y's Brook - 1006	0] 2=metric o ********** SWMF C]	putput)] Proj		*******
** END OF RUN : 1 RUN:COMMAND# 002:0001	s on =imperial,	0] 2=metric o			*******
** END OF RUN : 1 RUN:COMMAND# 002:0001 START [TZERO = .00 hr [METOUT= 2 (1	rs on	0]			
** END OF RUN : 1 ***********************************					
** END OF RUN : 1	*****	****	******	******	*****
** END OF RUN : 1	****	****	*****	*******	******
** END OF RUN : 1	****	*****	****	******	* * * * * * * * *
** END OF BUY					
fname :M:\2003\103 remark:Inflow to S	106\DATA\CA				
{MxStoUsed=.3270E+0 001:0018 SAVE HYD	00} ID:NHYD	AREA	OPEAK-TpeakDa	ate hh:mm-	R.VR
001:0017 ROUTE RESERVOIR -> [RDT= 5.00] out<-	10:SWMC_I	27.09	1.900 No_date	e 1:40	13.81
(DT= 5.00) SUM=	10:SWMC_I	27.09	1.900 No_date	e 1:40 e 1:40	9.92 13.81
ADD HYD + + +	06:C-103 07:C101mi	1.20 3.16	.130 No_date	e 1:40 e 1:40	18.43
001.0016	TD .NHYD	AREA	QPEAK-TpeakDa .020 No date	ate_hh:mm- e 1:45	R.VR 6.34
DESIGN NASHYD [CN= 80.0: N= 3.00	05:C-102				
[SLP=1.00:DT= 5.00 [LOSS= 2 :CN= 65.0)])]				_
001:0014 * DESIGN STANDHYD	ID:NHYD 06:C-103	AREA	-QPEAK-TpeakDa	ate hh:mm-	R.VR
Major System / Minor System \	02:C101ma 07:C101mi	.00 3.16	.000 No_date .269 No_date	e 0:00 e 1:40	.00 17.63
001:0013 COMPUTE DUALHYD	ID:NHYD 01:C-101	3.16	.317 No_date	e 1:40	17.96
[XIMP=.70:TIMP=.70 [SLP= .60:DT= 5.00)])]		aaci		
001:0012	ID:NHYD	AREA	-QPEAK-TpeakDa	ate hh:mm-	R.VR
Major System / Minor System \	07:C2maj 08:C2min	.00 14.35	.000 No_date 1.166 No_date	e 0:00 e 1:40	.00 15.07
[DT= 5.00] SUM= 001:0011	06:C-2 ID:NHYD	14.35 AREA	I.I66 No_date QPEAK-TpeakDa	e 1:40 ate_hh:mm-	15.0/ R.VR
+	04:C-204 05:C-205	5.20	.070 No_date .428 No_date .235 No_date	e 1:40 e 1:40 e 1:40	8.63 15.54 18.43
ADD HYD	01:C-201	AREA 1.96 3.07	173 No date	■ 1 • 4 0	15 54
[SLP=1.00:DT= 5.00 [LOSS= 2 :CN= 65.0)])]				
	[LOSS= 2 : CN= 65.0 001:0010	[SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 001:0010	[LSP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 001:0010REA ADD HYD 01:C-201 1.96 + 02:C-202 3.07 + 03:C-203 1.90 + 04:C-204 5.20 + 05:C-205 2.22 [DT= 5.00] SUM= 06:C-2 14.35 001:0011DI:NHYDREA COMPUTE DUALHYD 06:C-2 14.35 Major System / 07:CZmaj .00 Minor System / 07:CZmaj .00 Minor System / 07:CZmaj .00 [SIP=.60:DT= 5.00] [LOSS= 2 :CN= 65.0] [LOSS= 2 :CN= 65.0] [Minor System / 07:C101m 3.16 [Minor System / 05:C-102 .000] [LOSS= 2 :CN= 65.0] 001:0015REA * DESIGN NSTANDHYD 05:C-102 .90 [CN= 80.0: N= 3.00] [TD= %.00]	<pre>[SLP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 001:0010QFEAK-TpeakDz ADD HYD 01:C-201 1.96 .173 No_date + 02:C-202 3.07 .261 No_date + 03:C-203 1.90 .070 No_date + 04:C-204 5.20 .228 No_date [DT= 5.00] SUM= 06:C-2 14.35 1.166 No_date Major System / 07:C2maj .00 .000 No_date Major System / 07:C2maj .00 .000 No_date (MjSysSto=.000E+00, ToCtOvfVol=.000E+00, N-Ovf= (001:0012ID:NHYDAREAQFEAK-TpeakDz * DESIGN STANDHYD 01:C-101 3.16 .317 No_date Minor System / 02:C101m 3.16 .317 No_date (MISySSto=.000E+00, ToCtOvfVol=.000DE+00, N-Ovf= (001:0012ID:NHYDAREAQFEAK-TpeakDz * DESIGN STANDHYD 01:C-101 3.16 .317 No_date Minor System / 02:C101m 3.00 .000 No_date (MISySSto=.000E+00, ToCtOvfVol=.000E+00, N-Ovf= (001:0013</pre>	[SLP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 001:0010DTD:NHYDAREAQEEAK-TpeakDate_hh:mm- ADD HYD 01:C-201 1.96 .173 No_date 1:40 + 02:C-202 3.07 .261 No_date 1:40 + 03:C-203 1.90 .070 No_date 1:40 + 03:C-204 5.20 .428 No_date 1:40 [DT= 5.00] SUM= 06:C-2 14.35 1.166 No_date 1:40 001:0011DENHYDAREAQEEAK-TpeakDate_hh:mm- COMPUTE DUALHYD 06:C-2 14.35 1.166 No_date 1:40 Major System / 07:C2maj .00 .000 No_date 0:00 Minor System / 07:C2maj .00 .000 No_date 0:00 Minor System / 08:C2min 14.35 1.166 No_date 1:40 (MjSysSto=.0000E+00, ToCtOvfvol=.0000E+00, N-Ovf= 0, ToCtDurC 001:0012ID:NHYDAREAQEEAK-TpeakDate_hh:mm- * DESIGN STANDHYD 01:C-101 3.16 .317 No_date 1:40 (XIMP=.70:TIMP=.70] [LOSS= 2:CN= 65.0] 01:0013AREAQEEAK-TpeakDate_hh:mm- * DESIGN STANDHYD 01:C-101 3.16 .317 No_date 1:40 (MjSysSto=.2000E+00, ToCtOvfvol=.0000E+00, N-Ovf= 0, ToCtDurC 001:0013

$(M: \...SWM_C.sum)$

SWMF C - Ultimate Development Conditions OUTPUT

+ 04:C-204 5.20 .840 No_date 1:10 28.47 n/a + 05:C-205 2.22 .454 No_date 1:10 33.09 n/a [DT= 5.00] SUM= 06:C-2 14.35 2.276 No_date 1:10 27.76 n/a	003:0012R.VR.C. * DESIGN STANDHYD 01:C-101 3.16 .755 No_date 1:10 56.74 .792
[DT= 5.00] SUM= 06:C-2 14.35 2.276 No_date 1:10 27.76 n/a	[XIMP=.70:TIMP=.70]
002:0011DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 06:C-2 14.35 2.276 No_date 1:10 27.76 n/a	[SLP= .60:DT= 5.00] [LOSS= 2 :CN= 65.0]
Major System / 07:C2maj .00 .000 No date 0:00 .00 n/a Minor System \ 08:C2min 14.35 1.220 No date 1:05 27.79 n/a	003.0013RV -R C
Minor System \ 08:C2min 14.35 1.220 No_date 1:05 2/.79 n/a {MjSysSto=.4711E+03, TotOvfVol=.0000E+00, N-Ovf= 0, TotDurOvf= 0.hrs	COMPUTE DUALHYD 01:C-101 3.16 .755 No_date 1:10 56.74 n/a Major System / 02:C101ma .67 .475 No_date 1:10 56.74 n/a Minor System \ 07:C101mi 2.49 .269 No_date 0:55 57.52 n/a
002:0012ID:NHYDAREAQPEAK-TpeakDate hh:mmR.VR.C. * DESIGN STANDHYD 01:C-101 3.16 .614 No_date 1:10 32.03 .754	Minor System \ 07:C101mi 2.49 .269 No_date 0:55 57.52 n/a {MjSysSto=.1580E+03, TotOvfVol=.3793E+03, N-Ovf= 1, TotDurOvf= 0.hrs
[XIMP=.70:TIMP=.70]	003:0014TD:NHYDAREAOPEAK-TpeakDate hb:mmB.VB.C.
[SLP= .60:DT= 5.00] [LOSS= 2 :CN= 65.0]	* DESIGN STANDHYD 06:C-103 1.20 .313 No_date 1:10 58.86 .821 [XIMP=.70:TIMP=.80]
002.0013	[SLP=1.00:DT= 5.00]
COMPUTE DUALHYD 01:C-101 3.16 .614 No_date 1:10 32.03 n/a Major System / 02:C101ma .05 .047 No_date 1:15 32.03 n/a Mior System / 02:C101mi .01 .269 No_date 1:05 31.82 n/a	[LOSS= 2 :CN= 65.0] 003:0015ID:NHYDAREAQPEAK-TpeakDate hh:mmR.VR.C.
Minor System \ 07:Cl01mi 3.11 .269 No_date 1:15 32.05 n/a	DESIGN NASHYD 05:C-102 .90 .132 No_date 1:10 36.83 .514
<pre>{MjSysSto=.1580E+03, TotOvfVol=.1685E+02, N-Ovf= 1, TotDurOvf= 0.hrs 002:0014ID:NHYDAREAQPEAK-TpeakDate hh:mmR.VR.C.</pre>	[CN= 80.0: N= 3.00] [Tp= .17:DT= 5.00]
* DESIGN STANDHYD 06:C-103 1.20 .248 No_date 1:10 33.09 .778	003:0016TD:NHYDAREAOPEAK-TpeakDate hh:mmB.VB.C.
[XIMP=.70:TIMP=.80] [SLP=1.00:DT= 5.00]	ADD HYD 05:C-102 .90 .132 No_date 1:10 36.83 n/a + 06:C-103 1.20 313 No_date 1:10 58.86 p/a
[LOSS= 2 :CN= 65.0]	ADD HYD 05:C-102 .90 .132 No date 1:10 36.83 n/a + 06:C-103 1.20 .313 No date 1:10 58.86 n/a + 07:C101mi 2.49 .269 No date 0:55 7.52 n/a
002:0015DID:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. DESIGN NASHYD 05:C-102 .90 .058 No_date 1:15 16.09 .379	+ 08:C2min 12.07 1.220 No date 0:55 51.44 n/a + 09:C-3min 7.48 .636 No date 0:55 39.26 n/a
[CN= 80.0: N= 3.00]	[DT= 5.00] SUM= 10:SWMC I 24.14 2.570 No date 1:10 48.12 n/a
<pre>[Tp= .17:DT= 5.00] 002:0016ID:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C.</pre>	003:0017ReAQPEAK-TpeakDate hh:mmR.VR.C. ROUTE RESERVOIR -> 10:SWMC_I 24.14 2.570 No_date 1:10 48.12 n/a
002:0016012:NHDAREAQPEAR-TPEARUATE_INITATION R.V. R.C. ADD HYD 05:C-102 .90 .058 No.date 1:15 16.09 n/a + 06:C-103 1.20 .248 No_date 1:10 33.09 n/a + 07:C101mi 3.11 .269 No_date 1:05 31.82 n/a + 08:C-2min 14.35 1.220 No_date 1:05 37.79 n/a + 09:C-3min 7.48 .636 No_date 1:10 19.55 n/a	[RDT= 5.00] out<- 01:SWMC 0 24.14 2.313 No date 1:40 48.12 n/a
+ 06:C-103 1.20 .248 No_date 1:10 33.09 n/a + 07:C101mi 3.11 269 No_date 1:05 31.82 n/a	{MxStoUsed=.7360E+00} 003:0018ID:NHYDAREAQPEAK-TpeakDate hh:mmR.VR.C.
+ 08:C2min 14.35 1.220 No_date 1:05 27.79 n/a	SAVE HYD 10:SWMC I 24.14 2.570 No date 1:10 48.12 n/a
+ 09:C-3min 7.48 .636 No_date 1:10 19.65 n/a [DT= 5.00] SUM= 10:SWMC I 27.04 2.419 No date 1:10 25.84 n/a	<pre>fname :M:\2003\103106\DATA\CALCUL~1\SWMHYMO\SMWFC~1\SWMC_IN.003 remark:Inflow to SWMF C</pre>
002:0017B.VB.C.	** END OF RUN : 3
ROUTE RESERVOIR -> 10:SWMC_I 27.04 2.419 No_date 1:10 25.84 n/a [RDT= 5.00] out<- 01:SWMC_O 27.04 .184 No_date 2:55 25.84 n/a	*****
{MXStoused=.5850E+00}	
002:0018ID:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. SAVE HYD 10:SWMC_I 27.04 2.419 No_date 1:10 25.84 n/a	
fname :M:\2003\103106\DATA\CALCUL~1\SWMHYMO\SMWFC~1\SWMC_IN.002	
remark:Inflow to SWMF C ** END OF RUN : 2	RUN: COMMAND#
	004:0001
***************************************	START [TZERO = .00 hrs on 0]
	[METOUT= 2 (1=imperial, 2=metric output)]
	[NSTORM= 1] [NRUN = 4]
	#**************************************
RUN:COMMAND# 003:0001	<pre># Project Name: [Shirley's Brook - SWMF C] Project Number: [103106] # Date 05=28=2006</pre>
START	# Date : 05-28-2006 # Modeller : [M.Petepiece]
[TZERO = .00 hrs on 0] [METOUT= 2 (1=imperial, 2=metric output)]	<pre># Company : NOVATECH ENGINEERING CONSULTANTS LTD # License # : 5320763</pre>
[NSTORM= 1]	# Litcense # : 5520765
[NRUN = 3]	<pre># Post-Development Conditions to SWM Facility 'C' #***********************************</pre>
	004:0002
# Date : 05-28-2006	READ STORM
# Date : 05-28-2006 # Modeller : [M.Petepiece] # Company : NOVATECH ENCINEERING CONSULTANTS LTD	READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step)
Date : 05-28-2006	READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00]
<pre># Date : 05-28-2006 # Modeller : [M.Petepiece] # Company : NOVATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # # Post-Development Conditions to SWM Facility 'C'</pre>	READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) (SDT=10.00:SDUR= 12.00:PTOT= 96.00) 004:0003D:NHYDDREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598
<pre># Date : 05-28-2006 # Modeller : [M.Petepiece] # Company : NOVATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # # # # Post-Development Conditions to SWM Facility 'C'</pre>	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr=12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DENHYDREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30:TIMP=.37]</pre>
<pre>bate : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' 003:0002</pre>	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr=12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DINHYDREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30:TIMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0]</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' 003:0002 READ STORM Filename = storm.001	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003REAOPEAK-TpeakDate hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36.598 [XIMP=.30:TIMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:-0004</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' 	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDURe 12.00:PTOT= 96.00] 004:0003REAOPEAK-TpeakDate hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36.598 [XIMP=.30:TIMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:-0004</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' MEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.00:SDUR= 3.00:PTOT= 71.67] 003:0003	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr=12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DINHYD</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' MARD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.00:SDUR= 3.00:TOT= 71.67] 003:0003REAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 .546 [XIMP=.30:TIMP=.37]	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDURe 12.00:PTOT= 96.00] 004:0003REAOPEAK-TpeakDate hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30:TIMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0004ID:NHYDAREAOPEAK-TpeakDate hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Major System / 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System / 02:C-3maj .00 .000 No_date 5:45 57.27 n/a [MjSysSto=.2175EH03, TotOvfvol=.0000E+00, N-ovf= 0, TotDurOvf= 0.hrs 004:0005REAREEA-TPEAKDateAtate hb:mmR VR C</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' Magnetic Comment = storm.001 Comment = city of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.00:SDUR= 3.00:PTOT= 71.67] D03:0003REAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDEYD 01:C-300 7.48 1.076 No_date 1:10 39.16.546	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003REAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XITM=.30:TIMF=.37] [SLP=1.00:DT= 5.00] [LOS= 2 : Come 65.0] 004:0004ID:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Major System / 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System / 09:C-3min 7.48 .636 No_date 5:45 57.27 n/a [MjysStSc=_2175E+03, TotofYO-L000DE+00, N-Ovf= 0.hrs</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' MEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.001:SDUR= 3.00:PTOT= 71.67] 003:0003REAQPEAK-TpeakDate_hh:mmR.VR.C. DESIGN STANDHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 .546 [XIMP=.30:TIMP=.37] [SLP=1.00:DT=.30] [LOSS= 2 :CN= 65.0] 03:0003	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr=12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DINHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP-30:ITMP=.37] [SLP=1.00:DT= 5.00] [LOSS 2 :CN= 65.0] 004:0004DINHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Major System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System \ 02:C-3maj 7.48 .636 No_date 5:45 57.27 n/a (MjSysStc=.2175E+03; TotOvfVol=.000E+00; N-Ovf= 0; TotDurOvf= 0.hrs 004:0005DINHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .331 No_date 6:00 72.71 .757 [XIMP=.57:IIMP=.64] [SLP=1.50:DT= 5.00]</pre>
Date : 05-28-2006 Modeller : [M.Petepjece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' ***********************************	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003REAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [SLP=1.00:DT= 5.00] [SLP=1.00:DT= 5.00] 004:0004DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Major System / 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System / 09:C-3min 7.48 .636 No_date 5:45 57.27 n/a (MjsysStc= 2.175E+03, TotofVfc)= 0.000ENO.N-ovf= 0.hrs 004:0005ID:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .331 No_date 6:00 72.71 .757 [XIMP=.57:TIMP=.64] [SLP=1.50:DT= 5.00]</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' TREAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.00:SDUR= 3.00:PTOT= 71.67] 003:0003REAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 .546 [XIMP=.30:TIMP=.37] [SLD=1.00:DTMP] [LOSS= 2 :CN= 65.0] 103:0004ID:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 n/a Major System / 02:C-3maj .00 .000 No_date 0:05 39.26 n/a	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDURe 12.00:PTOT= 96.00] 004:0003REAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XITM=.30:TIMF=.37] [SLP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0004REAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Minor System / 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System / 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System / 02:C-3maj .00 .000 No-04ate 0:00 .00 n/a Minor System / 02:C-3maj .00 .000 No-04ate 0:00 .00 n/a Minor System / 02:C-3maj .00 .000 No-04ate 0:00 .00 n/a Minor System / 02:C-201 1.96 .331 No_date 6:00 72.71 .757 [XITMP=.57:TIME=.64] [SLP=1.50:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0006ID:NHYDREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 3.07 .512 No_date 6:00 72.71 .757</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' Main Comment = city of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 (SDT=10.00:SDUR= 3.00:FTOT 71.67] 003:0003REAAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDBYD 01:C-300 7.48 1.076 No_date 1:10 39.16 .546 (XIMP=.30:TIMP=.37] (SLP=.1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 003:0004DI:NNYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 n/a Major System / 02:C-3maj .00 .000 No_date 0:05 39.26 n/a (MjSysSto=.3154E+03, TotOrFV0=.000E+00, N-Ovf= 0, TotDurof= 0.hrs 003:0005DI:NHYDDI:NHYDDI:NHYD	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DINHYDREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP30:ITMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0004ID:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. CMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Major System \ 02:C-3min 7.48 .636 No_date 5:45 57.27 n/a {MjSysSto=.2175E+03, TotOvfVol=.0000E+00, N-Ovf= 0, TotDurOvf= 0.hrs 004:0005ID:NHYDREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .331 No_date 6:00 72.71.757 [XIMP=.57:ITMF=.64] [SLP=1.50:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0006ID:NHYDREAQPEAK-TpeakDate_hh:mmR.VR.C.</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5220763 Post-Development Conditions to SWM Facility 'C' ***********************************	READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003REAQPEAK-TpeakDate hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XITMP=.30:TIMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0004
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' MEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT-10.00:SDUR= 3.00:PTOT= 71.67] 003:0003REAAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 5.46 [LOSS= 2 : CN= 65.0] 003:004	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00;SDUR= 12.00;PTOT= 96.00] 004:0003REAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30;TIMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2 : CN= 65.0] 004:0004DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Minor System / 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System / 09:C-3min 7.48 .636 No_date 5:45 57.27 n/a (MjSysStc=.2175E+03, TotorYtOL=.0000E+00, N-Ovf= 0.hrs 004:0005DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .331 No_date 6:00 72.71 .757 [XIMP=.57:TIMP=.64] [SLP=1.50:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0006DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 02:C-202 3.07 .512 No_date 6:00 72.71 .757 [XIMP=.57:TIMP=.64] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0007</pre>
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<pre>Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' MEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.00:SDUR= 3.00:PTOT= 71.67] 003:0003REAAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 5.46 [XIMP=.30:ITMP=.37] [SLF=1.00:DT=5.00] [LOSS= 2 :CN= 65.0] 003:0005DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 n/a Major System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System \ 02:C-3maj .00 .000 No_date 0:55 39.26 n/a (MjSySStor.3154E+03, TotOvfVol=.000E+00, N-Ovf= 0, TotDurOf= 0.hrs 003:0005DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .444 No_date 1:10 51.92 .725 [XIMP=.57:ITMP=.64] [SLP=1.50:DT= 5.00] [LOSS= 2 :CN= 65.0] 003:0006DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 02:C-202 3.07 .664 No_date 1:10 31.92 .725 [XIMP=.57:ITMP=.64] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 003:0007</pre>	<pre>FEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003REAOPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30:INMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0004DINHYDAREAOPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Major System / 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System / 02:C-3maj .00 .000 No_date 5:45 57.27 n/a (MjSysSte=2.175E+03, TotofYoL=.0000E+00, N-Orf= 0.Trs 004:0005DINHYDREAOPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .331 No_date 6:00 72.71 .757 [XIMP=.57:TIMP=.64] [SLP=1.50:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0006</pre>
<pre>b Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C'</pre>	<pre>FEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003REAOPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30:INMP=.37] [SLP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0004DINHYDAREAOPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Major System / 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System / 02:C-3maj .00 .000 No_date 5:45 57.27 n/a (MjSysSte=2.175E+03, TotofYoL=.0000E+00, N-Orf= 0.Trs 004:0005DINHYDREAOPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .331 No_date 6:00 72.71 .757 [XIMP=.57:TIMP=.64] [SLP=1.50:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0006</pre>
<pre>Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' TREAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.00:SDUR= 3.00:PTOT= 71.67] 003:0003DI:NHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 .546 [XIMP=.30:TIMP=.30] [ILOSS 2 :CN= 65.0] 003:0004ID:NHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 n/a Major System / 02:C-3maj .00 .00 No_date 0:00 .00 n/a Minor System / 02:C-3maj .00 .00 No_date 0:00 .00 n/a Minor System / 02:C-3maj .00 .000 No_date 0:01 .00 n/a Minor System / 02:C-3maj .00 .004-07f 0.76tDurOrf= 0.hrs 003:0005DI:NHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .444 No_date 1:10 51.92 .725 [XIMP=.57:TIMP=.64] [SLP=1.00:DT 5.00] [LOSS= 2 :CN= 65.0] 003:0006DI:NHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 02:C-202 3.07 .664 No_date 1:10 51.92 .725 [XIMP=.57:TIMP=.64] [SLP=1.00:DT 5.00] [LOSS= 2 :CN= 65.0] 003:0006DI:NHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 02:C-203 1.90 .247 No_date 1:10 51.92 .725 [XIMP=.57:TIMP=.64] [SLP=1.00:DT 5.00] [LOSS= 2 :CN= 65.0] 003:0006DI:NHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 04:C-204 5.20 1.121 No_date 1:10 51.92 .725 [XIMP=.57:TIMP=.63] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 003:0006DI:NHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 04:C-204 5.20 1.121 No_date 1:10 51.92 .725 [XIMP=.57:TIMP=.64] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 003:0006DI:NHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 04:C-205 2.22 .578 No_date 1:10 51.92 .725 [XIMP=.70:TIMP=.80] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 003:0006</pre>	<pre>FEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003REAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30:INTMF=.37] [SLP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0004</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' TREAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.00:SDUR= 3.00:PTOT= 71.67] 003:003REAAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 n/a Major System \ 09:C-3min 7.48 1.076 No_date 1:10 39.16 n/a Major System \ 09:C-3min 7.48 1.076 No_date 0:55 39.26 n/a (MjSysSto-315&er03) TDVPAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 1.076 No_date 0:55 39.26 n/a Major System \ 09:C-3min 7.48 .636 No_date 0:55 39.26 n/a (MjSysSto-315&er03) TOVFV01= 0.00E+00, N-Ovf= 0, TotDurOf= 0.hrs 003:0005DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .444 No_date 1:10 51.92 .725 [XIMP=.57:TIMP=.64] [SLP=1.50:DT= 5.00] [LOSS= 2:CN= 65.0] 003:0006DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 02:C-202 3.07 .664 No_date 1:10 51.92 .725 [XIMP=.57:TIMP=.64] [SLP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 003:0007DI:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 02:C-203 1.90 .247 No_date 1:10 36.14 .504 [XIMP=.57:TIMP=.64] [SLP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 003:0008	<pre>FEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr=12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' ***********************************	<pre>FEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr=12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' ***********************************	<pre>FEAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr=12hr SCS Type II (10 min time step) (SDT=10.00:SDUE# 12.00:PTOT= 96.00] 004:003BREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 (XIMP=.30:TIMP=.57) [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0006DINHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 7.736 n/a Major System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Minor System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Misor System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Misor System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Misor System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Misor System \ 02:C-3maj .00 .000 No_date 0:00 .00 n/a Misor System \ 02:C-201 1.96 .331 No_date 6:00 72.71 .757 [XIMP=.50:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0007DINHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .220 No_date 6:00 53.69 .559 [XIMP=.57:TIMP=.64] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] 004:0007DINHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 03:C-203 1.90 .220 No_date 6:00 81.18 .846 [XIMP=.50:TIMP=.60] [LOSS= 2 :CN= 65.0] 004:0003DINHYDAREAQFEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 04:C-204 5.20 .865 No_date 6:00 72.71 n/a</pre>
Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' TREAD STORM Filename = storm.001 Comment = City of Ottawa: 100yr-3hr Chicago (10 minute time step - 20 [SDT=10.00:SDUR= 3.00:PTOT= 71.67] 03:003TD:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 1.076 No_date 1:10 39.16 .546 [XIMF=.30:TIMF=.37] [SLF=1.00:DT=5.00] LOSS= 2 :CN= 65.0] 03:0005D:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 1.076 No_date 0:05 39.26 n/a Mijor System \ 09:C-3min 7.48 .636 No_date 0:05 39.26 n/a [MijSystor.3154E+03, TotoVfvol=.0000E+00, N-0vf= 0, TotDurOvf= 0.hrs 003:0005D:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .444 No_date 1:10 51.92 .725 [XIMF=.57:TIMF=.64] [SLF=1.50:DT= 5.00] LOSS= 2 :CN= 65.0] 003:0005D:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-203 1.90 .247 No_date 1:10 36.14 .504 [SLF=1.00:DT= 5.00] LOSS= 2 :CN= 65.0] 003:0007D:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 04:C-203 1.90 .247 No_date 1:10 36.14 .504 [SLF=1.00:DT= 5.00] LOSS= 2 :CN= 65.0] 003:0007	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003REAAOPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Major System / 09:C-3min 7.48 .922 No_date 6:00 57.36 n/a Major System / 09:C-3min 7.48 .922 No_date 0:00 .00 n/a Minor System / 09:C-3min 7.48 .636 No_date 0:00 .00 n/a Minor System / 09:C-3min 7.48 .636 No_date 5:45 .57.27 n/a (MjSysSto-2175E+03, TOCOVFVOL=.0000E+00, N-OVF= 0, TOEDUTOF= 0.hrs 004:0005</pre>
Date : 05-28-2006 Modeller : [M.Petpejace] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SMM Facility 'C' ***********************************	<pre>Fibrame = storm.001 Comment = City of Ottawa: 100yr=12hr SCS Type II (10 min time step) (SDT=10.00:SDUE# 12.00:FTOT= 96.00] 04:003D:NHYDAREAOPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30:TIMP=.30] [LOSS= 2:CN= 65.0] 004:0004D:NHYDAREAOPEAK-TpeakDate_hh:mmR.VR.C. CCMMUTE DUALHYD 01:C-300 7.48 .922 No_date 0:00 .00 n/a Major System (09:C-3min 7.48 .636 No_date 0:00 .00 n/a Minor System (09:C-3min 7.48 .636 No_date 0:00 .00 n/a Minor System (09:C-3min 7.48 .636 No_date 0:00 .00 n/a Minor System (09:C-3min 7.48 .636 No_date 0:00 .01 n/a Minor System (09:C-3min 7.48 .636 No_date 0:00 .01 n/a Minor System (09:C-3min 7.48 .636 No_date 0:00 .01 n/a Minor System (09:C-3min 7.48 .631 No_date 6:00 72.71 .757 [XIMP=.50:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0005REAOPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 01:C-201 1.96 .331 No_date 6:00 72.71 .757 [XIMP=.57:TIMP=.64] [SIP=1.00:DT= 5.00] [LOSS= 2:CN= 65.0] 004:0007</pre>
Date : 05-28-2006 Modeller : [M.Petpejace] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SMM Facility 'C' ***********************************	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DINNYDAREAOPEAK-TpeakDate_himmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a [LOSS=2 :CN= 65.0] 004:0004AREAOPEAK-TpeakDate_himmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a Minor System / 02:C-3maj 7.48 .436 No_date 5:45 57.27 n/a Minor System / 02:C-3maj 7.48 .436 No_date 5:45 57.27 n/a (Mjsystbo-2.175EH03, TotoVEV01= 0000EH00, N-Ovf= 0, TotDurOvf= 0.hrs 004:0005</pre>
<pre>b Date : 05-28-2006 Modeller : [M.Petepiece] Company : NOVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Post-Development Conditions to SWM Facility 'C' </pre>	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DINNYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a [LOSS= 2 :CN= 65.0] 004:0004AREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 7.36 n/a Minor System / 02:C-3maj 7.48 .436 No_date 5:45 57.27 n/a Minor System / 02:C-201 1.96 .331 No_date 5:45 57.27 n/a (Mj9sstor=2.175E+03, TOOVEY01=-000E+00, Novf= 0, Totburovf= 0, O.hrs 004:0005</pre>
<pre># Date : 05-28-2006 # Modeller : [M.Petepiece] # Company :: NOVATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SMM Facility 'C' ***********************************</pre>	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DEXA-TpeakDate_himmR.VR.C. * DESIGN STANDHYD 01:C-300 7.48 .922 No_date 6:00 57.36 .598 [XIMP=.30:TIMP=.37] [SLP=1.00:DT= 5.00] LOSS= 2 :CN= 65.0] 004:0004</pre>
<pre># Date : 05-28-2006 # Modeller : [N.Petepiece] # Company : NOVATECH ENCINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SMM Facility 'C' # 003:0002</pre>	<pre>READ STORM Filename = storm.001 Comment = City of Ottawa: 100yr-12hr SCS Type II (10 min time step) [SDT=10.00:SDUR= 12.00:PTOT= 96.00] 004:0003DINNYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANHYD 01:C-300 7.48 .922 No_date 6:00 57.36 n/a [LOSS= 2 :CN= 65.0] 004:0004AREAQPEAK-TpeakDate_hh:mmR.VR.C. COMPUTE DUALHYD 01:C-300 7.48 .922 No_date 6:00 7.36 n/a Minor System / 02:C-3maj 7.48 .436 No_date 5:45 57.27 n/a Minor System / 02:C-201 1.96 .331 No_date 5:45 57.27 n/a (Mj9sstor=2.175E+03, TOOVEY01=-000E+00, Novf= 0, Totburovf= 0, O.hrs 004:0005</pre>

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NOVATECH ENGINEERING CONSULTANTS LTD

(M:\...SWM_C.sum)

Minor System \ 07:C101mi 2.82 .269 No_date 5:35 78.12 n/a [MjSysSto=.1580E+03, TotOvfVol=.2632E+03, N-Ovf= 1, TotDurOvf= 0.hrs
004:0014D:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. * DESIGN STANDHYD 06:C-103 1.20 .232 No_date 6:00 81.18 .846 [XIMP=.70:TIMP=.80]
[XIMP-, V):IMP-S00] [SLP=1.00:DT 5.00] [LOSS= 2:CN= 65.0]
004:0015D:D:NHYDAREAQPEAK-TpeakDate_hh:mmR.VR.C. DESIGN NASHYD 05:C-102 .90 .129 No date 6:00 56.52 .589
[CN= 80.0: N= 3.00] [Tp= .17:DT= 5.00]
004.0016 ID.NUVD ADEA ODEAK BreekDate hhimm D.V. D.C.
Out Out <thout< th=""> <thout< th=""> <thout< th=""></thout<></thout<></thout<>
+ 08:C2min 13.32 1.220 No_date 5:35 78.12 1/a + 08:C2min 7.48 636 No_date 5:45 77.50 n/a + 09:C=3min 7.48 636 No_date 5:45 77.27 n/a
[DT= 5.00] SUM= 10:SWMC_I 25.72 2.486 No_date 6:00 68.02 n/a 004:0017D:NHYDAREAQPEAK-TpeakDate hh:mmR.VR.C.
ROTTE RESERVOIR -> 10:SWMC_I 25.72 2.486 No_date 6:00 68.02 n/a [RDT= 5.00] out<- 01:SWMC_O 25.72 2.477 No_date 6:10 68.02 n/a
{MxStoUsed=.7391E+00} 004:0018ID:NHYDAREAQPEAK-TpeakDate hh:mmR.VR.C.
SAVE HYD 10:SWMC_I 25.72 2.486 No date 6:00 68.02 n/a fname :M:\2003\103106\DATA\CALCUL~1\SWMHYMO\SMWFC~1\SWMC IN.004
remark:Inflow to SWMF C
FINISH

001:0005 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
001:0006 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 001:0007 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
001:0008 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 001:0009 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
001:0012 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 001:0014 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
002:0003 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 002:0005 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
002:0006 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 002:0007 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
002:0008 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
002:0009 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 002:0012 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
002:0014 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 003:0003 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
003:0005 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 003:0006 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
003:0007 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 003:0008 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
003:0009 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 003:0012 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
003:0014 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 004:0003 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
004:0005 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 004:0006 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
004:0007 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area
Use a smaller DT or a larger area. 004:0008 DESIGN STANDHYD *** WARWING: Storage Coefficient is smaller than DT!
<pre> WARNING: Storage Coefficient is smaller than DT!</pre>
*** WARNING: Storage Coefficient is smaller than DT!

SWMF C - Ultimate Development Conditions OUTPUT

Use a smaller DT or a larger area. 004:0012 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area. 004:0014 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area. Simulation ended on 2006-10-05 at 09:39:07 ----

TEMPEST Product Submittal Package R1



Date: November 1, 2019

<u>Customer</u>: Novatech

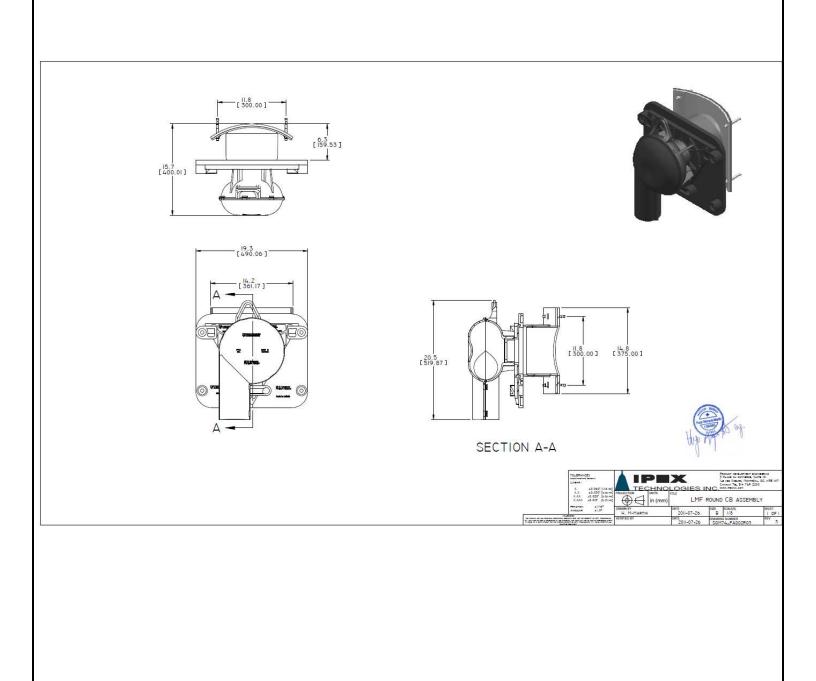
<u>Contact</u>: Conrad Stang

Location: Ottawa

<u>Project Name</u>: Strandherd Drive (Myers)



Tempest LMF ICD Rd Shop Drawing



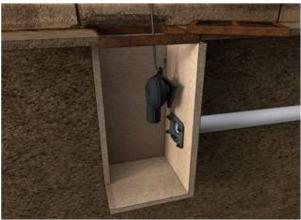


Square CB Installation Notes:

- 1. Materials and tooling verification:
 - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
 - Material: (4) concrete anchor 3/8x3-1/2, (4) washers, (4) nuts
- 2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
- 3. Use an impact drill with a 3/8'' concrete bit to make the four holes at a minimum of 1-1/2'' depth up to 2-1/2''. Clean the concrete dust from the holes.
- 4. Install the anchors (4) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you will hit the anchors with the hammer. Remove the nuts on the ends of the anchors
- 5. Install the wall mounting plate on the anchors and screw the nut in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
- 6. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the LMF device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.



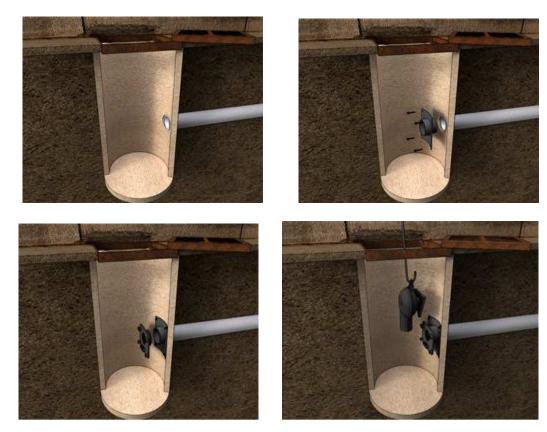






Round CB Installation Notes: (Refer to square install notes above for steps 1, 3, & 4)

- 2. Use spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
- 5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lb-ft). There should be no gap between the CB spigot wall plate and the catch basin wall.
- 6. Apply solvent cement on the hub of the universal mounting plate and the spigot of the spigot CB wall plate. Slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
- 7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered into the mounting plate and has created a seal.



CAUTION/WARNING/DISCLAIM:

- Verify that the inlet(s) pipe(s) is not protruding into the catch basin. If it is, cut it back so that the inlet pipe is flush with the catch basin wall.
- Any required cement in the installation must be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Please refer to the IPEX solvent cement guide to confirm required curing times or attend the IPEX <u>Online Solvent</u> <u>Cement Training Course</u>.
- Call your IPEX representative for more information or if you have any questions about our products.



IPEX TEMPEST Inlet Control Devices Technical Specification

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's must have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.





Mississippi Valley Conservation Authority

Shirley's Brook Flood Plain Mapping Study

April 2017 Draft Final September 2017 Final Report November 2017





500 250 1,000 Meters

	<u> </u>							
Main Branch	Reach 2		12 Hr SCS 2	3.47	72.87	0.54	1.34	0.68
Main Branch	Reach 2		12 Hr SCS 2	3.47	72.56	2.13	1.3	0.64
Main Branch	Reach 2	4851		Culvert				
Main Branch	Reach 2		12 Hr SCS 2	3.47	72.62	1.54	1.3	0.64
Main Branch	Reach 2		12 Hr SCS 2	3.47	72.48	1.18	1.27	0.63
Main Branch	Reach 2		12 Hr SCS 2	3.47	71.96	1.18	1.23	0.54
Main Branch	Reach 2		12 Hr SCS 2	3.47	71.62	0.73	1.1	0.49
Main Branch	Reach 2	4600	12 Hr SCS 2	3.47	71.5	0.8	0.99	0.48
Main Branch	Reach 2	4549	12 Hr SCS 2	3.47	71.16	1.6	0.94	0.46
Main Branch	Reach 2	4509	12 Hr SCS 2	3.47	71.15	0.5	0.85	0.4
Main Branch	Reach 2	4477	12 Hr SCS 2	3.47	71.11	0.66	0.77	0.33
Main Branch	Reach 1	4384	12 Hr SCS 2	6.11	70.65	1.07	23	47.36
Main Branch	Reach 1	4347	12 Hr SCS 2	6.11	70.57	0.8	22.76	47.33
Main Branch	Reach 1	4305	12 Hr SCS 2	6.11	70.5	0.64	22.26	47.28
Main Branch	Reach 1	4254	12 Hr SCS 2	6.11	70.32	1.24	21.98	47.19
Main Branch	Reach 1	4208	12 Hr SCS 2	6.11	70.01	1.72	21.94	47.13
Main Branch	Reach 1	4181	12 Hr SCS 2	6.11	69.46	2.18	21.94	47.12
Main Branch	Reach 1	4056	12 Hr SCS 2	6.11	69.25	0.65	21.44	46.76
Main Branch	Reach 1	4032	12 Hr SCS 2	6.11	69.18	1	21.35	46.6
Main Branch	Reach 1	4013		Culvert				
Main Branch	Reach 1	3987	12 Hr SCS 2	6.11	69.17	1.04	21.35	46.6
Main Branch	Reach 1		12 Hr SCS 2	6.11	69.16	0.53	21.13	46.39
Main Branch	Reach 1		12 Hr SCS 2	6.11	69.01	0.76	19.82	45.3
Main Branch	Reach 1		12 Hr SCS 2	6.11	68.72	1.08	19.06	45.14
Main Branch	Reach 1		12 Hr SCS 2	6.11	68.37	2.12	19.02	45.09
Main Branch	Reach 1	3597		Culvert				
Main Branch	Reach 1		12 Hr SCS 2	6.11	68.15	1.31	19.02	45.09
Main Branch	Reach 1		12 Hr SCS 2	6.24	68.04	1.17	18.98	45.06
Main Branch	Reach 1		12 Hr SCS 2	6.24	67.85	0.61	18.55	44.76
Main Branch	Reach 1		12 Hr SCS 2	6.24	67.68	0.65	18.11	44.31
Main Branch	Reach 1		12 Hr SCS 2	6.24		0.69	17.97	43.55
Main Branch	Reach 1		12 Hr SCS 2	6.24		0.05	17.95	43.07
Main Branch	Reach 1		12 Hr SCS 2	6.24		0.02	17.71	41.79
Main Branch	Reach 1		12 Hr SCS 2	6.24	66.91	0.3	14.5	39.6
Main Branch	Reach 1		12 Hr SCS 2	6.24	66.83	0.9	12.47	39.38
Main Branch	Reach 1	2830		Culvert	00.85	0.9	12.47	39.30
Main Branch	Reach 1		12 Hr SCS 2	6.24	66.64	0.67	12.47	39.38
Main Branch			12 Hr SCS 2					
	Reach 1			7.55		0.56	12.36	35.63
Main Branch	Reach 1		12 Hr SCS 2	7.55		0.58		33.39
Main Branch	Reach 1		12 Hr SCS 2	7.55	66.37	1.52	12.18	30.52
Main Branch	Reach 1	2606		Culvert	66.22	4.04	42.40	20.52
Main Branch	Reach 1		12 Hr SCS 2	7.55		1.04	12.18	30.52
Main Branch	Reach 1		12 Hr SCS 2	7.55		0.63	12.17	30.05
Main Branch	Reach 1		12 Hr SCS 2	7.55		1.48		23.73
Main Branch	Reach 1		12 Hr SCS 2	7.55	65.66	0.69	11.57	20.05
Main Branch	Reach 1		12 Hr SCS 2	7.55		1.16	10.83	19.53
Main Branch	Reach 1	1947	12 Hr SCS 2	7.55	65.17	1.55	10.61	19.15

Main Branch	Reach 2	1077	12 Hr SCS 5	5.61	73.14	0.56	2.32	1.08
Main Branch	Reach 2		12 Hr SCS 5	5.61	73.14	2.5	2.32	1.08
	Reach 2	4851	12 11 303 5		72.75	2.5	2.27	1.02
Main Branch				Culvert	77 77	2.02	2 27	1 02
Main Branch	Reach 2		12 Hr SCS 5	5.61	72.77	2.03	2.27	1.02
Main Branch	Reach 2		12 Hr SCS 5	5.61	72.6	1.51	2.22	1
Main Branch	Reach 2		12 Hr SCS 5	5.61	72.13	1.23	2.16	0.82
Main Branch	Reach 2		12 Hr SCS 5	5.61	71.79	0.91	1.94	0.7
Main Branch	Reach 2		12 Hr SCS 5	5.61	71.65	0.97	1.76	0.69
Main Branch	Reach 2		12 Hr SCS 5	5.61	71.37	1.47	1.66	0.63
Main Branch	Reach 2		12 Hr SCS 5	5.61	71.34	0.61	1.54	0.53
Main Branch	Reach 2		12 Hr SCS 5	5.61	71.29	0.85	1.41	0.44
Main Branch	Reach 1		12 Hr SCS 5	9.9	70.84	1.05	46.4	82.46
Main Branch	Reach 1		12 Hr SCS 5	9.9	70.78	0.83	45.99	82.41
Main Branch	Reach 1		12 Hr SCS 5	9.9	70.7	0.79	45.26	82.34
Main Branch	Reach 1		12 Hr SCS 5	9.9	70.56	1.18	44.81	82.04
Main Branch	Reach 1	4208	12 Hr SCS 5	9.9	70.21	2.11	44.73	81.83
Main Branch	Reach 1	4181	12 Hr SCS 5	9.9	69.65	2.48	44.72	81.81
Main Branch	Reach 1	4056	12 Hr SCS 5	9.9	69.47	0.63	43.94	81.16
Main Branch	Reach 1	4032	12 Hr SCS 5	9.9	69.37	1.34	43.8	80.9
Main Branch	Reach 1	4013		Culvert				
Main Branch	Reach 1	3987	12 Hr SCS 5	9.9	69.35	1.39	43.8	80.9
Main Branch	Reach 1	3959	12 Hr SCS 5	9.9	69.35	0.62	43.49	80.62
Main Branch	Reach 1	3768	12 Hr SCS 5	9.9	69.19	0.82	41.45	79.06
Main Branch	Reach 1	3643	12 Hr SCS 5	9.9	68.93	1.16	40.1	78.77
Main Branch	Reach 1	3616	12 Hr SCS 5	9.9	68.51	2.52	40	78.67
Main Branch	Reach 1	3597		Culvert				
Main Branch	Reach 1	3586	12 Hr SCS 5	9.9	68.3	1.69	40	78.67
Main Branch	Reach 1	3562	12 Hr SCS 5	10.16	68.18	1.39	39.91	78.6
Main Branch	Reach 1	3455	12 Hr SCS 5	10.16	67.97	0.72	38.89	78.18
Main Branch	Reach 1	3346	12 Hr SCS 5	10.16	67.78	0.79	37.76	77.63
Main Branch	Reach 1	3246	12 Hr SCS 5	10.16	67.48	0.8	37.46	76.46
Main Branch	Reach 1	3200	12 Hr SCS 5	10.16	67.27	0.29		75.56
Main Branch	Reach 1	3146	12 Hr SCS 5	10.16	67.26	0.09	36.83	72.75
Main Branch	Reach 1	2938	12 Hr SCS 5	10.16	67.25	0.18	29.24	67.47
Main Branch	Reach 1	2830	12 Hr SCS 5	10.16	67.24	0.22	23.1	66.56
Main Branch	Reach 1	2814		Culvert				
Main Branch	Reach 1		12 Hr SCS 5	10.16	66.76	0.98	23.1	66.56
Main Branch	Reach 1		12 Hr SCS 5	12.12	66.73	0.46		60.2
Main Branch	Reach 1		12 Hr SCS 5	12.12	66.71	0.47	22.31	56.18
Main Branch	Reach 1		12 Hr SCS 5	12.12	66.13	3.16	22.16	52.35
Main Branch	Reach 1	2606		Culvert				
Main Branch	Reach 1		12 Hr SCS 5	12.12	66.4	0.76	22.16	52.35
Main Branch	Reach 1		12 Hr SCS 5	12.12	66.39	0.73		51.7
Main Branch	Reach 1		12 Hr SCS 5	12.12	66.08	1.11	21.58	39.93
Main Branch	Reach 1		12 Hr SCS 5	12.12	65.78	0.8		31.23
Main Branch	Reach 1		12 Hr SCS 5	12.12	65.64	1.15		30.33
Main Branch	Reach 1		12 Hr SCS 5	12.12	65.32	1.13	13.55	29.51
		1947	12 11 363 2	12.12	05.52	1./1	10.09	29.31

Main Branch Reach 2 4877 12 Hr SCS 100 12.82 73.96 0.56 5.2 Main Branch Reach 2 4861 12 Hr SCS 100 12.82 73.6 2.36 5.0 Main Branch Reach 2 4851 Culvert Main Branch Reach 2 4841 12 Hr SCS 100 12.82 73.08 3.36 5.0 Main Branch Reach 2 4817 12 Hr SCS 100 12.82 72.8 2.49 4.5 Main Branch Reach 2 4750 12 Hr SCS 100 12.82 72.47 1.27 4.8 Main Branch Reach 2 4653 12 Hr SCS 100 12.82 72.2 1.15 4.3 Main Branch Reach 2 4600 12 Hr SCS 100 12.82 71.85 1.57 3.6 Main Branch Reach 2 4509 12 Hr SCS 100 12.82 71.85 1.57 3.6 Main Branch Reach 1 4384 12 Hr SCS 100 24.2 71.	04 2.09 04 2.09 04 2.09 06 2.05 03 1.63 03 1.27 08 1.12 09 0.75 09 0.75 06 169.04 07 168.95 05 168.82 04 168.07 05 167.31
Main Branch Reach 2 4851 Culvert Image: Culvert Main Branch Reach 2 4841 12 Hr SCS 100 12.82 73.08 3.36 5.0 Main Branch Reach 2 4817 12 Hr SCS 100 12.82 72.8 2.49 4.9 Main Branch Reach 2 4750 12 Hr SCS 100 12.82 72.2 1.15 4.3 Main Branch Reach 2 4653 12 Hr SCS 100 12.82 72.2 1.15 4.3 Main Branch Reach 2 4600 12 Hr SCS 100 12.82 71.85 1.57 3.6 Main Branch Reach 2 4509 12 Hr SCS 100 12.82 71.85 1.57 3.6 Main Branch Reach 2 4477 12 Hr SCS 100 12.82 71.85 1.57 3.6 Main Branch Reach 1 4384 12 Hr SCS 100 12.82 71.75 1.17 3.1 Main Branch Reach 1 4384 12 Hr SCS 100 24.2 71.26 1.	04 2.09 06 2.05 085 1.63 093 1.27 093 1.27 093 1.27 093 0.75 096 169.04 097 168.95 095 168.82 094 167.31
Main BranchReach 2484112 Hr SCS 10012.8273.083.365.0Main BranchReach 2481712 Hr SCS 10012.8272.82.494.5Main BranchReach 2475012 Hr SCS 10012.8272.471.274.8Main BranchReach 2465312 Hr SCS 10012.8272.21.154.3Main BranchReach 2460012 Hr SCS 10012.8272.061.233.3Main BranchReach 2454912 Hr SCS 10012.8271.851.573.6Main BranchReach 2450912 Hr SCS 10012.8271.851.573.6Main BranchReach 2447712 Hr SCS 10012.8271.751.173.1Main BranchReach 2447712 Hr SCS 10012.8271.751.173.1Main BranchReach 1438412 Hr SCS 10012.8271.751.173.1Main BranchReach 1438412 Hr SCS 10024.271.261.21106.6Main BranchReach 1430512 Hr SCS 10024.270.921.22103.8Main BranchReach 1420812 Hr SCS 10024.270.32.61103.4Main BranchReach 1420812 Hr SCS 10024.270.380.56101.4Main BranchReach 1403212 Hr SCS 10024.270.211.8101.0Main BranchReach 1 <t< td=""><td>06 2.05 35 1.63 34 1.3 93 1.27 58 1.12 55 0.92 9 0.75 56 169.04 37 168.95 55 168.82 34 168.07 55 167.31</td></t<>	06 2.05 35 1.63 34 1.3 93 1.27 58 1.12 55 0.92 9 0.75 56 169.04 37 168.95 55 168.82 34 168.07 55 167.31
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Main BranchReach 2475012 Hr SCS 10012.8272.471.274.8Main BranchReach 2465312 Hr SCS 10012.8272.21.154.3Main BranchReach 2460012 Hr SCS 10012.8272.061.233.9Main BranchReach 2454912 Hr SCS 10012.8271.851.573.6Main BranchReach 2450912 Hr SCS 10012.8271.851.573.6Main BranchReach 2447712 Hr SCS 10012.8271.751.173.4Main BranchReach 2447712 Hr SCS 10012.8271.751.173.4Main BranchReach 1438412 Hr SCS 10024.271.261.21106.6Main BranchReach 1434712 Hr SCS 10024.271.191.13105.8Main BranchReach 1430512 Hr SCS 10024.270.921.2103.8Main BranchReach 1425412 Hr SCS 10024.270.921.2103.8Main BranchReach 1420812 Hr SCS 10024.270.32.61103.4Main BranchReach 1405612 Hr SCS 10024.270.380.56101.4Main BranchReach 1403212 Hr SCS 10024.270.380.56101.4Main BranchReach 1403212 Hr SCS 10024.270.211.8101.0Main BranchReach 1	35 1.63 34 1.3 33 1.27 36 1.12 37 0.92 36 169.04 37 168.95 35 168.82 34 168.07 35 167.31
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EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

Scope of Work

The work under the applicable items includes the preparation, implementation and monitoring of an Erosion and Sediment Control Plan to prevent sediment-laden runoff resulting from the Contractor's construction operations from entering all sewers and watercourses both within and downstream from the Working Area. The plan shall include management and monitoring of water discharged from dewatering operations. The specification is limited to the management of sediment laden water and the management of contaminants such as hydrocarbons and volatile organic compounds present within groundwater at the site shall be managed as described elsewhere in the contract documents.

General

The Contractor acknowledges that surface erosion and sediment runoff resulting from construction operations has potential to cause a detrimental impact to any downstream watercourse, and that all construction operations that may impact upon water quality shall be carried out in a manner that strictly meets the requirements of all applicable legislation and regulations.

Accordingly, the Contractor shall be responsible for determining and conforming to the requirements of the Ontario Ministry of the Environment (MOE), the Ontario Ministry of Natural Resources, the City of Ottawa, applicable Conservation Authorities and any other Governmental Regulatory Agencies (collectively "Regulatory Agencies") having jurisdiction in the Working Area or over any potentially affected watercourses.

Erosion and Sediment Control Plan

Before commencing the Work, the Contractor shall submit to the Contract Administrator six copies of a detailed Erosion and Sediment Control Plan. The ESC Plan will consist of a written description and detailed drawings indicating the on-site activities and measures to be used to control erosion and sediment movement for each step of the Work. The written description shall be signed by, and the drawings shall bear the stamp and signature of a qualified Professional Engineer licensed in Ontario, herein designated as the Engineer of Record (EOR).

The Contractor acknowledges that the scheduling of the implementation of erosion and sediment controls is the key component for successful sediment control. Accordingly, the ESC Plan will contain a detailed schedule which identifies the following:

- Phasing of the steps for the installation of all control measures.
- Inspection, monitoring and maintenance of all control measures during construction.

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EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

• Phasing of the removal and disposal of the control measures.

The Contractor acknowledges that no one measure is likely to be 100% effective for erosion protection and controlling sediment runoff and water discharges from the site. Therefore, where necessary the ESC Plan will implement sequential measures arranged in such a manner so as to mitigate sediment release from construction operations and achieve specific maximum permitted criteria where applicable. Suggested on-site measures may include, but shall not be limited to, the following methods: sediment ponds, filter bags, pump filters, settling tanks, silt fences, straw bales, filter cloths, check dams and/or berms, or other recognized technologies and methods available at the time of construction. Specific measures shall be installed in accordance with the requirements of OPSS 805 where appropriate, or in accordance with manufacturer's recommendations.

Inspection and Monitoring of Mitigation Measures

The Contractor shall be solely responsible for inspecting, monitoring and maintaining the effectiveness of the ESC Plan upon implementation. The Contractor shall submit to the Contract Administrator weekly inspection reports demonstrating the performance of the installed measures, identifying deficiencies and indentifying required maintenance issues. These reports shall be prepared, signed by the EOR and provided to the Contract Administrator within 48 hours of the inspection.

- Maintenance issues are defined as any measure which is not functioning to the satisfaction of the EOR and in the opinion of the EOR may be repaired by the contractor with subsequent re-inspection at the next scheduled EOR site inspection.
- Deficiencies are defined as any measure or lack of measure which has potential to cause an adverse environmental impact at the site given the current/forecasted conditions and schedule of the work.

Maintenance issues which have previously been identified but not adequately corrected shall be considered deficiencies.

Deficiencies shall be immediately corrected. Corrective actions shall be re-inspected and documented by the EOR. Re-inspection reports shall be specific to the deficiency observed and may be written field reports.

EOR monitoring reports submitted shall include:

- The date and time of the inspection and monitoring.
- General description of the mitigating measures being utilized at the site.
- Confirmation as to the effectiveness of the measures inspected.

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EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

- Description of any maintenance issue which requires minor repair, improvement or maintenance.
- Description of any deficiency observed including timeline for correction and reinspection.
- Deficiency re-inspection reports outstanding for the site.

The Contractor shall notify the Contract Administrator in all situations where a regulatory agency has identified deficiencies in erosion/sediment control measures, quality of runoff or quality of water quality discharged from dewatering operation.

Where in the opinion of the Contract Administrator either the proof of performance submitted is or the measures implemented are considered inadequate, the Contractor shall have the EOR review measures in the presence of the Contract Administrator within 24 hours of being notified in writing.

The Contractor shall monitor all weather forecasts and schedule the Work in order to minimize the risk of sediment-laden water from entering any watercourse or sewer system. The ESC Plan shall contain a Contingency Plan to include the provision of additional labour, equipment or materials to install additional control measures, and detail an emergency response plan in case of an accidental event. As such, the Contractor shall have additional control materials on site at all times which are easily accessible and may be implemented at a moment's notice.

Contractor's Responsibilities

The Contractor shall ensure that all workers, including sub-contractors, in the Working Area are aware of the importance of the erosion and sediment control measures and informed of the consequences of the failure to comply with the requirements of all Regulatory Agencies and the specifications detailed herein.

The Contractor shall periodically, and when requested by the Contract Administrator or EOR, clean out accumulated sediment deposits as required at the sediment control devices, including those deposits that may originate from outside the construction area. Accumulated sediment shall be removed in such a manner that prevents the deposition of this material into any sewer or watercourse and avoids damage to the control measure. The sediment shall be removed from the site at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract.

The Contractor shall immediately report to applicable regulatory agencies and the Contract Administrator any accidental discharges of sediment material into either the watercourse or the storm sewer system. Failure to report will be constitute a breach of this specification and the Contractor may also be subject to the penalties imposed by any

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EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

applicable Regulatory Agency. Appropriate response measures, including any repairs to existing control measures or the implementation of additional control measures, shall be carried out by the Contractor without delay.

The sediment control measures shall be removed when, in the opinion of the EOR, the measure(s) is no longer required. No control measure may be permanently removed without prior written authorization from the EOR. All sediment and erosion control measures shall be removed in a manner that avoids the entry of sediment or debris into any sewer or watercourse within or downstream of the Working Area. All accumulated sediment shall be removed from the Working Area at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract. Any seeding and mulching, temporary cover, sodding or original turf cover that is disturbed by the removal of the control measures and accumulated sediment, shall be brought to final grade and restored. Payment for the supply and placing of ground cover at these locations shall be made under the applicable items listed elsewhere in the Contract.

Where, in the opinion of either the Contract Administrator or a Regulatory Agency, any of the terms specified herein have either not been complied with or not performed in a suitable manner, the Contract Administrator or Regulatory Agency has the right to immediately withdraw its permission to continue the work but may renew its permission upon being satisfied that the defaults and/or deficiencies in the performance of this specification by the Contractor have been remedied. No compensation will be made to the Contractor for the withdrawal of permission to do the work resulting from non-compliance with the requirements of this specification and the Regulatory Agencies.

In addition to any other remedy and/or penalty provided by law, where there has been default or non-compliance with any of the terms specified herein and the Contractor refuses to perform or rectify same within forty-eight (48) hours of the receipt of the written demand of the Contract Administrator to do so, the Owner is hereby entitled to enter upon the Working Area and either complete the work in conformity with the Contract or have the work done that it considers necessary to complete the Work to its intended condition, whichever, in the Owner's sole opinion, is the most reasonable course of action. The Contractor and the Owner further agree that the costs incurred for any such work shall be retained by the Owner from monies otherwise due to the Contractor.

Monitoring of Water Quality Impacts and Point Source Discharges

The Contractor shall monitor runoff quality and quantity of water discharged from dewatering operations. The work shall include turbidity monitoring of impacts to watercourses (upstream vs downstream conditions), total suspended solids (TSS) monitoring of point sources such as those from dewatering operations. Discharge shall be in accordance with site specific constraints, regulatory requirements and sewer use bylaw

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EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

requirements. Where no specific criteria has otherwise been identified, the contractor shall meet the following discharge objective.

Source	Objective	Monitoring Frequency (min)
Watercourse Impacts	Downstream turbidity not to exceed upstream levels by greater than 25%	Minimum of daily for first three days of operation Minimum of twice weekly on an ongoing basis Daily for situations where the work is being conducted within 20 metres of a watercourse.
Discharge from Dewatering Operations	TSS maximum level of 25 mg/L	Minimum of daily for first three days of operation Minimum of twice weekly on an ongoing basis

Monitoring frequency to increase where scheduled construction operations have potential to impair water quality.

Mitigation and Action by Contractor Where Monitoring Indicates Water Impacts or Discharges Over Criteria or Objectives

Where site specific criteria or objectives are not attained, the Contractor and/or EOR shall immediately notify applicable regulatory agency of the monitoring results and possible impacts to sewers and watercourses. The Contractor shall implement an Action/Mitigation Plan acceptable to the EOR and applicable regulatory agency prior to continuing or resuming construction activities.

Measurement and Basis of Payment

Item – Erosion and Sediment Control Plan and Monitoring

Payment at the Contract price for the item "Erosion and Sediment Control Plan and Monitoring" shall be full compensation for the preparation and monitoring of the Erosion and Sediment Control Plan.

Payment shall be based upon the following schedule:

- a) 25% upon satisfactory submission and implementation of the ESC Plan; and,
- b) 75% pro-rated into equal payments over the term of the contract.

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EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

This payment schedule may only be modified as agreed upon in writing between the Contractor and the Contract Administrator.

Item – Erosion and Sediment Control Measures

Payment at the Contract price for the item "Erosion and Sediment Control Measures" shall be full compensation for the implementation and maintenance of erosion and sediment control measures required for the site, and shall include all labour, equipment and materials to supply, construct, monitor and maintain all erosion and sediment control measures detailed therein.

Payment shall be based upon the following schedule:

- a) 20% upon satisfactory installation of the control measures;
- b) 70% pro-rated into equal payments over the term of the contract; and,
- c) 10% upon successful completion and removal of the ESC Plan protection measures.

This payment schedule may only be modified as agreed upon in writing between the Contractor and the Contract Administrator.

Warrant: For work which is conducted in close proximity to watercourses or environmentally sensitive areas.

Appendix F

Shirley's Brook SWM Facility 'C' Detailed Design Report Prepared by Novatech (November 2006)

SHIRLEY'S BROOK SWM FACILITY 'C' DETAILED DESIGN REPORT

0.1

Prepared By:

NOVATECH ENGINEERING CONSULTANTS LTD.

Suite 200, 240 Michael Cowpland Drive Ottawa, Ontario K2M 1P6

> Submitted: May 2006 Revised November 2006

Novatech File: 103106-0 City File No: D07-16-04-0014 Ref: R-2006-105



November 9, 2006

City of Ottawa Planning and Growth Management Department Planning and Infrastructure Approvals Branch 110 Laurier Avenue West, 4th Floor Ottawa, Ontario K1P 1J1

Attention: Mr. Stuart Moxley Infrastructure Approvals Officer

Dear Sir:

Reference: Shirley's Brook – SWM Facility 'C' Detailed Design Report Our File No.: 103106

Please find enclosed four (4) copies of the detailed design report for Shirley's Brook SWM Facility 'C'. The report has been amended pursuant to City of Ottawa comments. The facility has been designed in accordance with the criteria established in the *Shirley's Brook Floodplain Analysis & Stormwater Management Report* (NECL, November 2006).

Please do not hesitate to contact us if you have any questions or concerns regarding this report.

Yours truly,

NOVATECH ENGINEERING CONSULTANTS LTD.

Michael Petepiece, P.Eng Project Engineer

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Consulting Engineers & Planners

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Novatech Engineering Consultants Ltd. M:\2003\103106\DATA\Reports\SWMF C Design-R2.doc

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1.0 INTRODUCTION

SWM Facility 'C' is one of three proposed SWM facilities intended to provide stormwater management for the Klondike Road Lands (refer to Figure 1) and will be located on the south shore of Shirley's Brook on the west side of March Valley Road.

The Klondike Road Lands are identified as collection Area W-2 in the City of Ottawa Area-Specific Development Charge Background Study for Individual Stormwater Management Ponds and Drainage Systems (C.N. Watson, June 2004).

SWM Facility 'C' will service a tributary drainage area of approximately 26.2 ha, comprised primarily of low and medium density residential dwellings west of the OCR, and industrial development east of the OCR. The proposed land use plan is shown on Figure 2. The storm drainage area plan is shown on Figure 3.

2.0 KLONDIKE ROAD LANDS TRIBUTARY TO SWMF 'C'

Stormwater management for the Klondike Road Lands has been designed pursuant to the major-minor system concept:

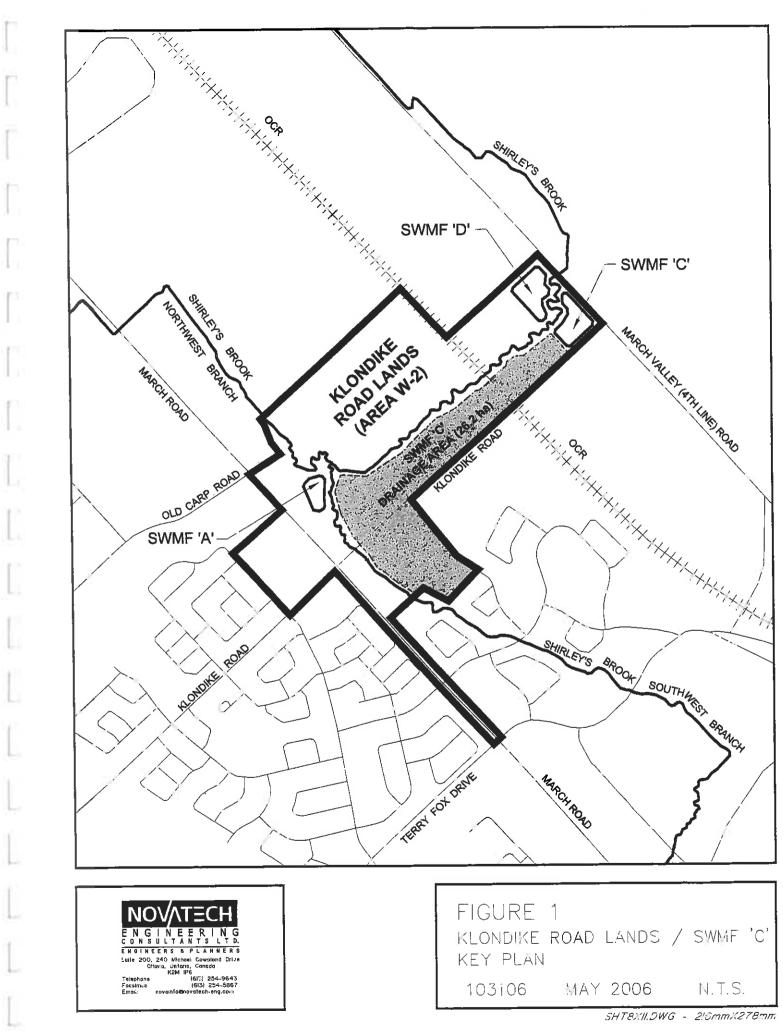
- Storm sewers will capture and convey minor system flows from the upstream drainage area to SWM facility 'C' for quality and quantity control;
- Storage for runoff that that exceeds the capacity of the minor system will be provided in road sags;
- Runoff volumes that exceed the storage provided in road sags will be conveyed overland along defined major system flow routes and outlet directly to Shirley's Brook. The exception is at Klondike Road, where major overland flow east of Area C-103 (refer to Figure 3) will bypass into the inlet channel for the Duck Club Pond.

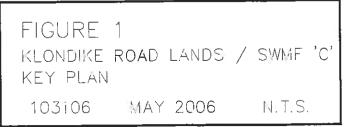
2.1 Minor System

The Klondike Road storm sewers have been designed with the Rational Method using an initial time of concentration of 20 minutes. This assumes a 15 minute initial time of concentration within the residential development blocks, and 5 minutes of travel time within the upstream storm sewers at a velocity of 1 m/s. Storm design sheets are included in Appendix A. The Storm Drainage Area Plan is provided as Figure 3.

The sewers were sized to permit free flow conveyance of the runoff generated from a 5-year design storm. The design criteria used to determine the size of the storm sewers required to service the proposed development are as follows:

Minimum pipe size	=	300 mm diameter
Minimum velocity	=	0.8 m/s
Maximum velocity	=	3.0 m/s



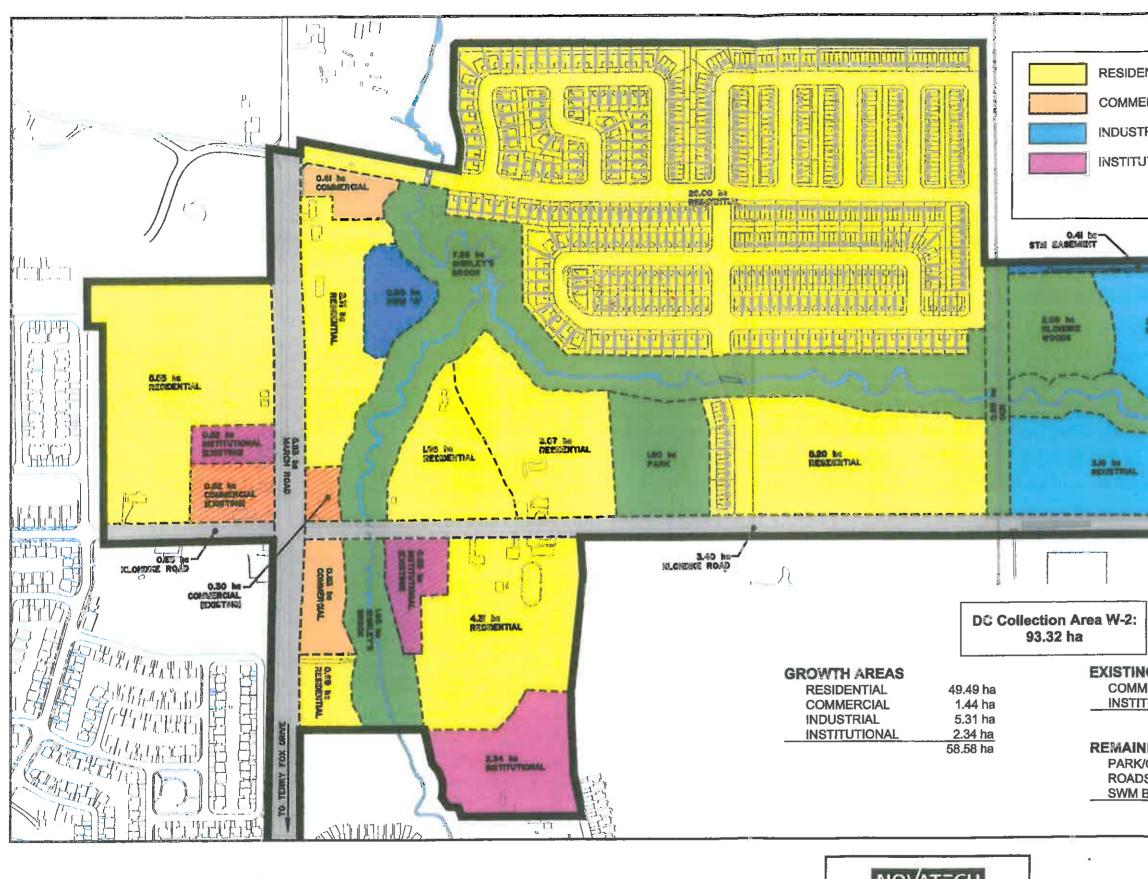


BROOK

SWMF 'C'

MUSCH JAULE LEATHING ROSD

SOUTHWEST BRANCH



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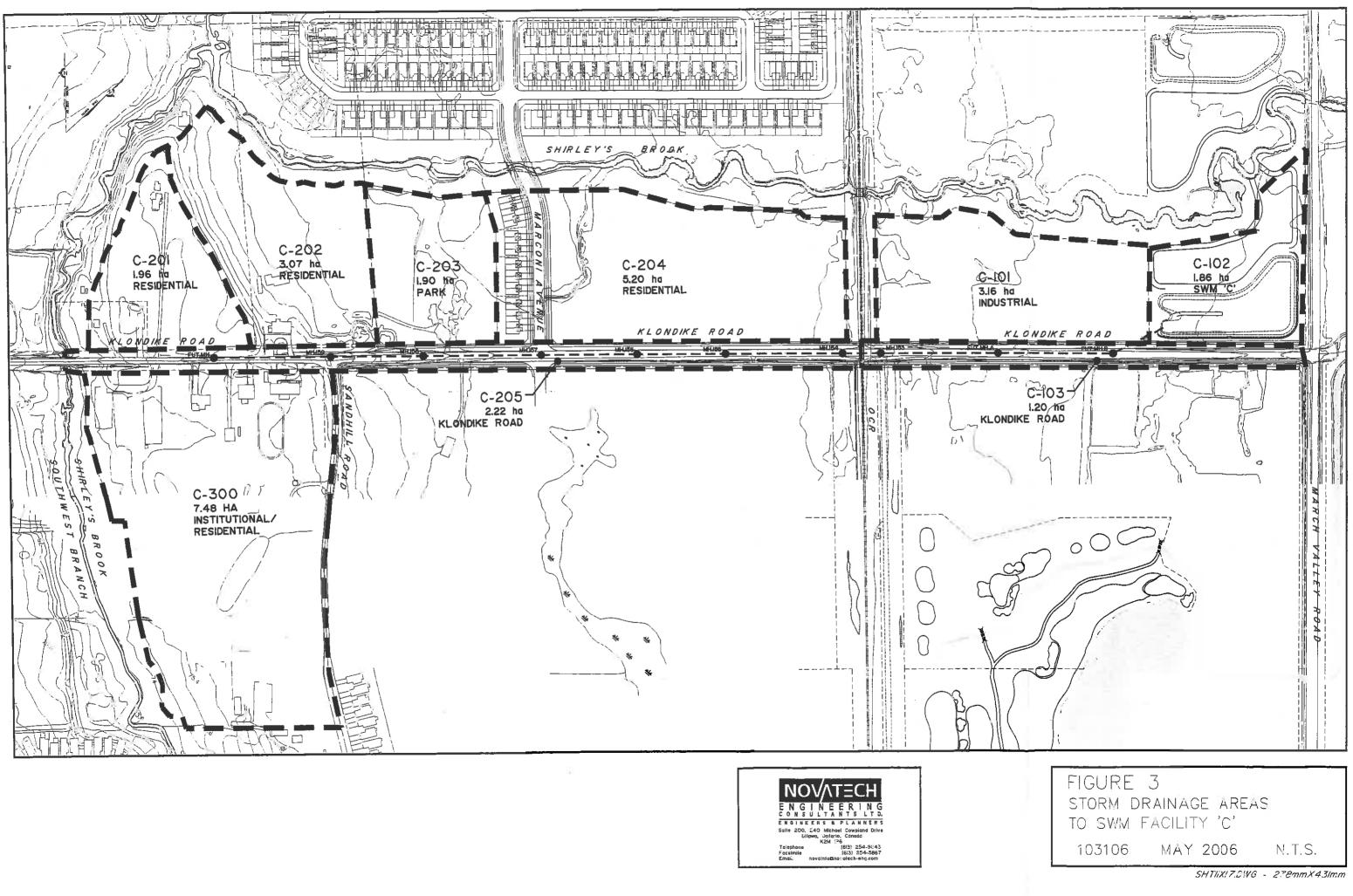
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LEGEND
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MERCIAL EX. INSTITUTIONAL
STRIAL PARK/CPEN SPACE
TUTIONAL SWM
ROAD
2:
ING DEVELOPMENT
MMERCIAL 1.12 ha TITUTIONAL 1.35 ha
2.47 ha INING AREAS RK/OPEN SPACE 17.45 ha ADS 9.78 ha <u>M BLOCKS 5.04 ha</u> 31.77 ha
FIGURE 2 klondike road lands land use plan (area w–2)
103106 APRIL 2006 N.T.S.

SHTIIXI7.DWG - 278mmX43Imm





2.2 Major System

Major system flows will be conveyed overland within the public ROW and outlet into Shirley's Brook. Inlet control devices (ICDs) will be installed in the roadway catch basins to ensure flow into the storm sewer system does not exceed the 5-year runoff rates. Each pair of road catchbasins will be interconnected and will operate as a single inlet. Ponding will be restricted to a maximum depth of 0.30m in the right-of-way.

Major overland flow routes will be designed using open channel principles to ensure that the product of the velocity (m/s) x depth (m) within the right-of-ways does not exceed 0.6.

2.3 Hydraulic Grade Line Analysis

The hydraulic grade line in the Klondike Road storm sewer was calculated for the 1:100 year design event. The HGL elevations will be used in the grading design for the tributary drainage areas to ensure at least 0.30m of freeboard is provided between the design HGL and the underside of footing elevations.

The HGL elevations were calculated under steady-state conditions using the Darcy-Weisbach equation to calculate friction losses in the pipe network for a specified flow rate. Minor losses were accounted for at pipe bends using the Sewer Bend Loss Coefficients Design Chart from the City of Ottawa Sewer Design Guidelines. Additionally, entrance and exit structure losses were accounted for at each manhole. The detailed spreadsheet calculations are provided in Appendix A.

Under ultimate development conditions, the HGL in the Klondike Road Storm sewer was calculated starting from an HGL elevation of 67.57 at the inlet headwall to SWMF 'C'. Under interim development conditions, the HGL was calculated starting from an HGL elevation of 67.57 at the outlet headwall to the temporary drainage ditch just downstream of the OCR rail line. The starting HGL elevations were determined using the EPA SWMM hydraulic model. Additional details on the hydraulic modeling of the SWM facility is provided in Section 5.0.

3.0 HYDROLOGIC MODELING

The SWMHYMO hydrologic model was used to generate runoff hydrographs for the drainage areas tributary to SWM Facility 'C', and then separate the runoff hydrographs into major and minor system flows.

- Inflows to the minor system have been modeled at a maximum capture rate of 85 L/s/ha;
- On-site major system storage has been estimated at 50 m³/ha;
- Major system flows that exceed the on-site storage will be conveyed overland to Shirley's Brook;
- Minor system flows will be conveyed by the Klondike Road storm sewer to SWMF 'C'.

3.1 Subcatchment Data

The modeling parameters used in the SWMHYMO analysis are representative of the proposed development within that subcatchment. Subcatchment areas are shown on Figure 3. SWMHYMO modeling data is provided in Appendix B.

3.2 Design Storms

The performance of the major and minor systems was modeled for the 25mm event, the 1:5 year event and the 1:100 year event using a 3-hour Chicago distribution.

The 3-hour Chicago distribution was used for the subdivision analysis, as short duration/highintensity storms tend to produce higher peak flows from urban areas and are generally the critical events with regard to the design of the stormwater conveyance system.

The IDF parameters used to generate the design storms were taken from the City of Ottawa Sewer Design Guidelines.

3.3 Methodology

The SWMHYMO model was used to calculate the runoff, major and minor system flows, and major system storage for each subcatchment identified on the SWMHYMO Schematic (103106-SWM). The methodology used in the analysis is summarized below.

- 1. SWMHYMO calculates a total runoff hydrograph for a given subcatchment.
- 2. Is peak flow greater than inlet capacity?
 - a. If yes, then calculate major system hydrograph (go to step 3).
 - b. If no, then all flow is captured by minor system.
- 3. Does major system hydrograph volume exceed available storage volume?
 - a. If yes, then calculate overland flow to next downstream subcatchment.
 - b. If no, then all flow eventually enters minor system at inlet.
- 4. Add subcatchment minor system hydrograph (from Step 2b or Step 3b) to total minor system flow.
- 5. Calculate local runoff hydrograph for downstream subcatchment.
- 6. Add overland flow hydrographs from upstream catchments (from Step 3a if any) to local runoff hydrograph.
- 7. Go to step 1.

3.4 Results – Hydrology

The results of the hydrologic analysis are summarized in Table 3.4-1. The minor system hydrographs generated using SWMHYMO were used in the hydraulic analysis of the pond. Additional details on the hydraulic analysis of SWM Facility 'C' are provided in Section 5.0.

Table	3.4-1
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	Minor System Peak Flow (m ³ /s)			
Return Period	Interim Development Conditions (23.0 ha)	Ultimate Development Conditions (26.2 ha)		
25 mm	1.56	1.90		
 1:5 year	2.01	2.42		
1:100 year	2.17	2.57		

4.0 SWM FACILITY 'C' - DESIGN

SWM Facility 'C' has been sized to provide water quality and erosion control for a tributary drainage area of 26.2 ha. Hydrologic modeling of Shirley's Brook has demonstrated that quantity control is not required for storms greater than the 1:5 year event, as major system flows from the development areas will precede the peak flow in Shirley's Brook and will not increase peak flows within Shirley's Brook.

Refer to the *Shirley's Brook Floodplain Analysis & Stormwater Management Report* (NECL, November 2006) for additional details on the hydrologic analysis of Shirley's Brook.

4.1 Design Criteria

The criteria used in the design of SWM Facility 'C' are as follows:

- The SWM Facility will have a permanent pool and extended detention storage sized to provide a *Normal* level of water quality control for the upstream drainage area, as recommended in the *Shirleys Brook and Watts Creek Subwatershed Study*;
- Provide erosion control storage to limit outflows from the pond to a release rate of between 8-14 L/s/ha for the 1:5 year event, as per the Target Flow Rates listed in Table 4 of the Kanata North EMP;
- The forebay will have maximum side slopes of 3:1 (H:V), with a 1.0 m wide safety bench at the normal water level;
- The main cell of the SWM facility will have side slopes of 6:1 (H:V) below the normal water level;
- The active storage portions of the main cell will have maximum side slopes of 4:1;
- The sediment forebay will be sized to provide sufficient storage for 10 years of sediment accumulation;
- The dry pond will provide a net increase in both riparian and total floodplain storage in the reach of Shirley's Brook between the OCR and March Valley Road for all design events (2yr-100yr) to compensate for infilling of the pre-development floodplain through this reach; and
- The pond outlet will be subject to a range of tailwater conditions in Shirley's Brook and must be designed to operate effectively under backwater or submerged conditions for the full range of design events (up to the 1:100 year event).

4.2 Service Road

Access to SWM Facility 'C' will be provided by a 4.0 m wide service road constructed of 150mm of granular 'A' overtop of 300mm of granular 'B' and covered with a minimum of 10cm of seeded topsoil with accesses from March Valley Road and Klondike Road.

4.3 inlet Structure

The inlet to SWM facility 'C' has been designed for both interim and ultimate development conditions. Until such time as Klondike Road is urbanized from the OCR to March Valley Road, the Klondike Road storm sewer will outlet to an open channel running parallel to Klondike Road, which will convey flows from the upstream drainage area to SWM Facility 'C'.

Once Klondike Road is urbanized from the OCR crossing to March Valley Road, the Klondike Road storm sewer will be extended to SWM Facility 'C' and the open channel along Klondike Road will be abandoned.

4.3.1 Permanent SWM Inlet

The permanent inlet to the SWM facility will be a 1350 mm storm pipe connecting the Klondike Road storm sewer to a flow splitter manhole (STM MH 3). This manhole will have two inlets to the SWM facility set at different elevations:

- The first inlet will be an 825 mm pipe that will convey flows from frequent storms (up to the 25 mm event) to the sediment forebay.
- The second inlet will be a 750 mm pipe set 825 mm above the invert of the forebay inlet. This inlet will allow high flows to bypass the sediment forebay and discharge directly to the main cell of SWM Facility 'C'.

Inlet from Klondike Road Storm Sewer:	40m - 1350 m U/S INV	m STM @ 0.13% = 66.06
Inlet to Forebay:	15.8m - 825m U/S INV D/S INV	m STM @ 1.6% = 66.00 = 65.75
Bypass to Main Cell:	8.3m - 750mr U/S INV D/S INV	n STM @ 5.0% = 66.83 = 66.41

The peak inflow to the SWM facility for the 100-year storm event will be 2.57 m³/s. The peak inflow to the SWM facility for the 25mm storm event will be 1.90 m³/s, which represents approximately 74% of the 100-year inflow to SWM facility.

The forebay inlet has been sized to convey the 25mm peak flow to the forebay, and the bypass to the main cell has been sized to convey the balance of the 100-year peak flow (2.57 - $1.90 = 0.670 \text{ m}^3$ /s). The required sizes and elevations of the SWM facility inlets have been determined using the EPA SWMM hydraulic model, as the design head on the structures will vary continuously as water levels in the wet pond and in Shirley's Brook rise and fall. Refer to Section 5.0 for additional details on the hydraulic analysis. Inflow & Pipe Capacity output graphs from EPA SWMM are provided in Appendix B for the 25mm and 100yr events.

4.3.2 Temporary SWM Inlet

Under interim conditions, lands downstream of the OCR will be undeveloped and will sheet drain overland directly to Shirley's Brook. A 240 m open channel running parallel to Klondike Road will convey minor system flows from the drainage area upstream of the OCR to SWM Facility 'C'. A temporary headwall will be installed at the downstream end of the open channel and will be connected to a 1350 mm pipe leading to the flow splitter manhole. Details for the temporary SWM inlet are shown on Drawing 103106-SWM-C2.

4.4 Sediment Forebay

The sediment forebay has been sized using design guidelines provided in the *MOE SWM Planning and Design Manual* (March 2003). A submerged berm set 0.3 m below the normal water level will separate the forebay from the main cell of the pond. The forebay will have a length of 72 m. The outlet from the forebay will consist of a submerged rock check dam.

The upstream drainage area to the SWM Facility (26.2 ha) has an average imperviousness of 52%. For a *Normal* level of protection (70% long-term TSS removal), the required permanent pool volume is approximately 1,830 m³. SWM Facility 'C' will have a permanent pool volume of approximately 4,500 m³, and will consequently provide a sediment removal efficiency of more than 80% (refer to design calculations in Appendix B).

Annual sediment loading to the SWM facility from the upstream drainage area has been estimated at approximately 44.1 m³/yr (see design calculations in Appendix B). If the SWM facility provides a long-term TSS removal rate of 80%, then sediment accumulation can be estimated at 0.80 x 44.1 = 35.3 m^3 /yr.

The forebay has been designed to allow for a minimum of 10 years of sediment accumulation. At a sediment loading rate of 35.3 m³/yr, this corresponds to a sediment volume of 353 m³ over a period of 10 years. The forebay in SWMF 'C' provides a storage volume of approximately 360 m³ at a depth of 0.55 m, and has a total volume of approximately 530 m³ at the top of the submerged berm between the forebay and the main cell.

4.5 SWM Outlet

Outflows from SWMF 'C' will be conveyed by a 450 mm reverse slope pipe to the outlet structure which has been designed to provide both extended detention and erosion control for the tributary drainage area. Refer to Drawings 103106-SWM-C1 and 103106-SWM-C2 for details of the outlet structure.

4.5.1 Extended Detention

Extended detention will be provided for the first 0.40 m of active storage to allow for settling of suspended sediment in the pond. The extended detention volume will be released over a period of 24 hours through a 180 mm orifice with an invert elevation set at the normal water level of 66.05m. The orifice will be inserted into a 250 mm storm pipe embedded in a concrete weir built into the base of the outlet structure. Flows that exceed the extended detention storage volume will spill over the weir crest at an elevation of 66.45, bypassing the extended detention orifice and outflows will instead be regulated by the erosion control outlet.

4.5.2 Erosion Control

The main outlet from the control structure will be a 600 mm pipe equipped with a sluice gate. Under normal operating conditions the sluice gate will be opened to a height of 300 mm (50% open) and will act as an orifice to provide erosion control during storm events that exceed the maximum extended detention storage in the facility. The sluice gate will allow for easy adjustment of the size of the outlet opening and can be closed completely during maintenance of the pond to prevent any backwater from Shirley's Brook from entering the facility.

4.5.3 Overflow Spillway

SWM Facility 'C' has been sized to provide sufficient storage to meet extended detention and erosion control criteria for storms up to the 1:5 year event. Runoff from larger storm events will exceed the maximum storage provided in the facility and the excess runoff will bypass the primary outlet structure and be conveyed by the overflow spillway to the adjacent dry pond. The overflow spillway will be 40 m wide broad crested weir with a crest elevation of 67.25. The spillway has been sized to allow the conveyance of the 100-year peak flow from the SWM facility to Shirley's Brook at a minimal head. Refer to Appendix B for design calculations.

4.6 SWM Facility 'C' Wet Pond

The stage-storage curve for the wet pond component of SWM Facility 'C' is provided in Table 4.6-1. Calculations are provided in Appendix B.

		Volume				
Component	Elevation (m)	Forebay (m ³)	Main Cell (m ³)	Total Volume (m ³)	Active Volume (m ³)	Release Rate * (L/s)
Pond Bottom	65.00	0	0	0	0	-
	65.55	360	1,580	1,940	0	-
Top of Forebay Berm	65.75	530	2,320	2,850	0	-
Normal Water Level	66.05	-	3,570	4,370	0	-
	66.25		5,430	5,430	1,060	23
Extended Detention	66.45	-	6,270	6,270	1,900	39
	66.75	-	8,380	8,380	4,010	275
	67.00	-	10,000	10,000	5,630	378
Erosion Control (1:5 year)	67.25	-	11,720	11,720	7,350	425
	67.50	-	13,540	13,540	9,170	468

Table 4.6-1 SWM Facility 'C' – Wet Pond Stage-Storage Curve

* The release rates listed in Table 4.6-1 represent free outlet conditions. The SWM facility has been modeled using EPA SWMM to account for high tailwater conditions in Shirley's Brook at the SWM facility outlet. Refer to Section 5.0 for additional details.

4.7 SWM Facility 'C' Dry Pond

Floodplain storage lost due to infilling of the floodplain between the OCR culvert and March Valley Road will be fully compensated for within two proposed dry ponds (dry ponds 'C' and 'D') upstream of March Valley Road. These dry ponds have been designed to provide a net increase in both riparian storage and total floodplain storage in this reach above existing conditions for all storm events (2-100 year).

The stage-storage curve for the dry pond component of SWM Facility 'C' is provided in Table 4.7-1. Refer to the *Shirley's Brook Floodplain Analysis & Stormwater Management Report* (NECL, November 2006) for details on the calculation of storage requirements for the proposed dry ponds. The dry ponds are not intended to provide any form of quantity control and will have an unrestricted outlet back into Shirley's Brook.

Component	Elevation (m)	Stage Volume (m ³)	Total Volume (m ³)
Dry Pond Outlet @ Shirley's Brook	65.75	0	0
	66.00	80	80
	66.25	1,110	1,190
	66.50	1,690	2,880
	66.75	1,790	4,670
	67.00	1,900	6,570
	67.25	2,020	8,590

 Table 4.7-1
 SWM Facility 'C' – Dry Pond Stage-Storage Curve

5.0 SWM FACILITY 'C' – HYDRAULIC MODELING

The normal water level in SWM Facility 'C' (NWL=66.05) will be approximately 0.20m above the normal water level in Shirley's Brook (NWL=65.85±) at the SWM facility outlet. However, Shirley's Brook is subject to periodic flooding during the spring freshet and moderate storm events. Consequently, the outlet from SWM facility 'C' will be periodically submerged and will need to operate effectively under a range of tailwater conditions.

5.1 Methodology

The EPA SWMM model was used to perform a dynamic hydraulic analysis of SWM Facility 'C' to confirm the size of the pond and the configuration of the inlet and outlet structures. Inflow hydrographs from the tributary drainage areas (generated using SWMHYMO) were routed through the facility with outflows dependent on varying water surface elevations in Shirley's Brook at the outlet.

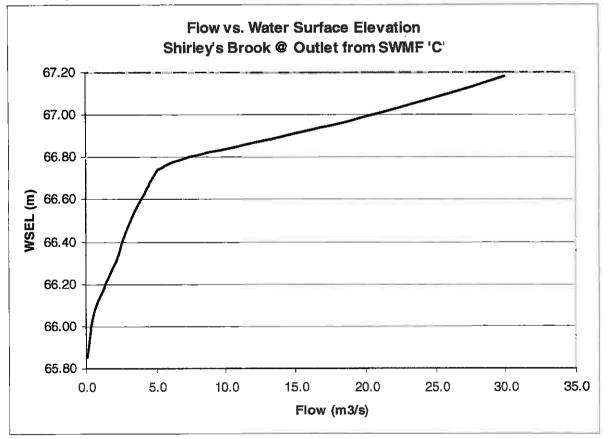
5.1.1 Shirley's Brook Water Levels

Through discussions with the City of Ottawa, MVCA, MNR and DFO, the HEC-RAS model used to establish flood elevations in Shirley's Brook has been updated and modified to reflect post-development conditions in Shirley's Brook between March Road and March Valley Road. Modifications to the model include floodplain infilling, additional culvert crossings and channel improvements.

The design flows used in the original HEC-RAS model were developed by A.J. Robinson in 1988 using the OTTHYMO hydrologic model. The OTTHYMO model has been imported into SWMHYMO and updated to include any additional existing development since the completion of the original model, as well as all known future development in the upstream drainage area.

The updated HEC-RAS model of Shirley's Brook was used to establish a relationship between flow and water surface elevation in Shirley's Brook at the outlet from the SWM facility (refer to Figure 4).

Further details on the hydrologic and hydraulic analysis of Shirley's Brook are provided in the *Shirley's Brook Floodplain Analysis & Stormwater Management Report* (NECL, November 2006).





5.1.2 SWM Facility 'C'

The flow vs. water surface elevation relationship shown by Figure 4 was used to establish a time series of flood levels at the outlet from SWM Facility 'C' for the 25mm, 1:5 year, and 1:100 year storm events.

The stage-storage curve and the inlet and outlet structures for SWM Facility 'C' were input into the EPA SWMM model.

Inflow hydrographs from the tributary drainage areas were input into the EPA SWMM model and routed through the facility for the 25mm, 1:5 year, and 1:100 year design events.

Separate models were created to represent both interim development conditions and ultimate development conditions:

- Under interim conditions, the inlet to the SWM facility will be from the open channel along Klondike Road. The inflow hydrographs do not include contributions from Area C-101 (KRP Industrial lands), which will be undeveloped and will sheet drain directly to Shirley's Brook.
- Under ultimate development conditions, the inlet to the SWM facility will be a 1350 mm pipe from the Klondike Road storm sewer.

5.2 Results

Once setup was complete, the EPA SWMM model was run to determine the outflows, maximum storage volumes and maximum water surface elevations in the SWM facility for each of the design events. Simulation results are summarized in Table 5.2-1 and illustrated graphically by Figure 5 through 10. Model input and output files are provided in Appendix B.

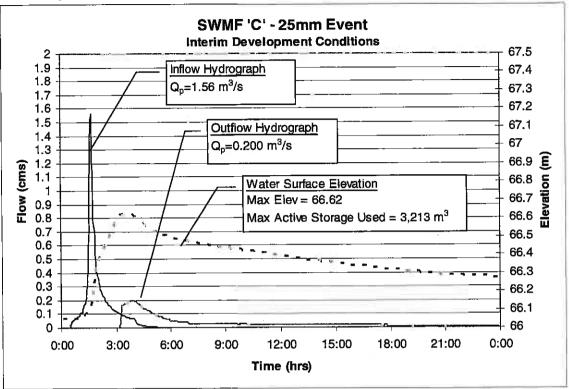
Storm Event	Peak Inflow (m³/s)	Peak Outflow (m ³ /s)	Max Storage (m ³)	Max WSEL (m)	
Interim Conditions		a <u>la a na ny</u> ana ana amin'ny saratra dia mampika	••••••••••••••••••••••••••••••••••••••		
25mm	1.56	0.200	3,213	66.62	
5yr-3hr Chicago	2.01	0.290	5,426	66.97	
100yr-3hr Chicago	2.17	0.420	7,394	67.26	
Ultimate Developme	ent Conditions	· · · · · · · · · · · · · · · · · · ·			
25mm	1.90	0.240	3,584	66.68	
5yr-3hr Chicago	2.42	0.330	5,727	67.02	
100yr-3hr Chicago	2.57	1.890	7,692	67.30	

Table 5.2-1	EPA SWMM	Modeling I	Results -	SWM	Facility 'C'
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The EPA SWMM model results indicate that SWM Facility 'C' will meet the design criteria identified in Section 5.1 for both interim and ultimate development conditions:

- SWM Facility 'C' will provide in excess of 24 hours of extended detention for the 25mm storm event;
- Outflows from SWM Facility 'C' will meet the erosion control target of 8-14 L/s/ha from the Kanata North EMP for the 1:5 year storm event.







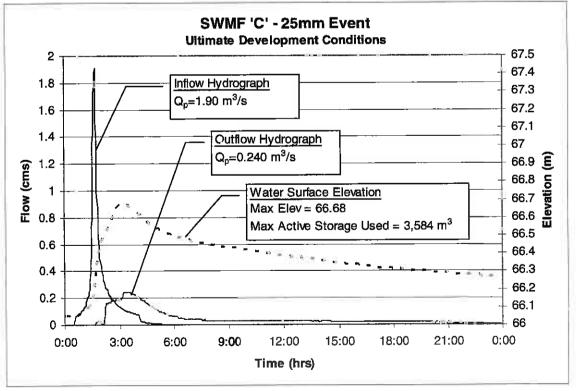
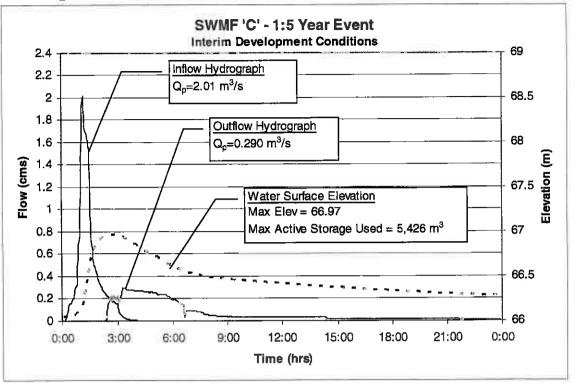


Figure 7





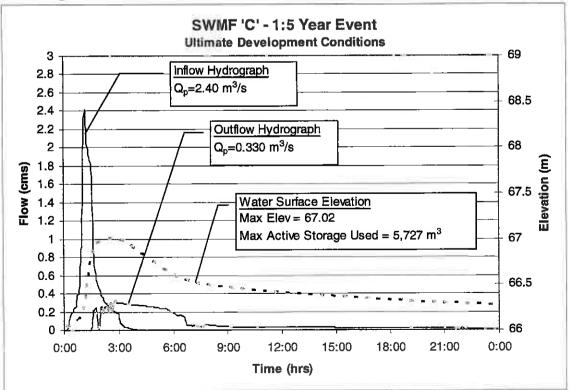
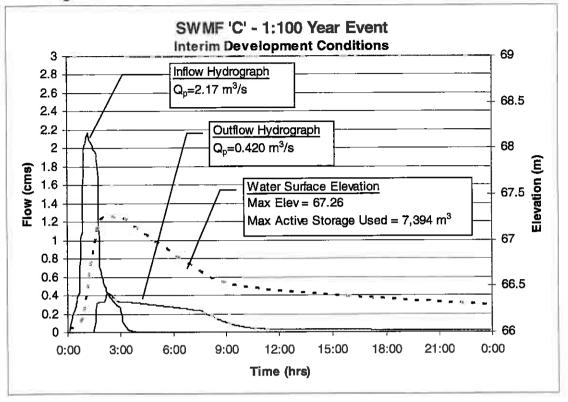
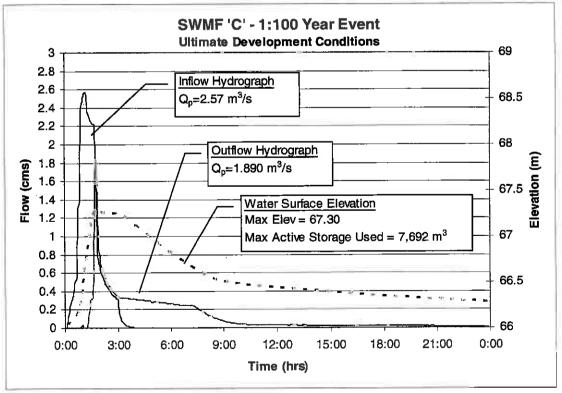


Figure 9







7.0 CONCLUSIONS

The results of the hydrologic and hydraulic modeling indicate that SWM Facility 'C' will meet all applicable stormwater management criteria for the subject lands.

- The storm sewers tributary to SWM facility 'C' will be designed to restrict minor system inflows to 85 L/s/ha.
 - Major system storage will be provided in roadway sags and parking lot areas. 0
 - o The major overland system will be designed to ensure that major system flows are contained within the municipal ROW.
- SWM Facility 'C' will provide an Enhanced level of water quality control (80% long-term TSS removal) for a tributary drainage area of 26.2 ha through extended detention of the first 1,900 m³ of runoff over a period of 24 hours.
- SWM Facility 'C' will have a maximum release rate of 293 L/s during the 1:5 year storm event under ultimate development conditions, which corresponds to a release rate of 11.2 L/s/ha and meets the erosion control target of 8-14 L/s/ha identified in the Kanata North EMP.
- Flows that exceed the maximum storage available in SWM Facility 'C' will spill over into the adjacent dry pond via a 40 m wide overflow spillway with a crest elevation of 67.25.
- The top of bank elevation for SWM Facility 'C' has been established at 67.75, which represents a freeboard of 0.45 m above the 1:100 year ponding elevation of 67.30 under ultimate development conditions.

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PETEPIECE 100079354 No 8,2006

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Prepared by:

Michael Petepiece, P. Eng **Project Engineer**

APPENDIX A

Klondike Road Storm Sewer: Design Sheets

Storm Sewer Design Sheet	(5-Year Event) – Interim Conditions
HGL Design Sheet	(100-Year Event) – Interim Conditions
Storm Sewer Design Sheet	(5-Year Event) – Ultimate Conditions
HGL Design Sheet	(100-Year Event) – Ultimate Conditions

SWM FACILITY 'C' - KLONDIKE ROAD STORM SEWER DESIGN SHEET (5-YEAR EVENT - ULTIMATE CONDITION)

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The spreadsheet uses the Rational Method to calculate theoretical 5-year event storm sewer flows (see peak flow column). The Ultimate Condition accounts for the entire drainage areas flowing through the completed storm sewer network.

	LOC	LOCATION					Are	Area (ha)					FLOW		ľ	-			-"		ATA			
Street Cat	Catchment Dev't	Jev't	From	10	2	-#	#	R=	н Н=	R= R=	Indiv	/ Accum	m Time of		Rainfall Peak Flow	town Dia. (m)	() Dia. (mm)	Type	υ,		Length Capacity Velocity	Velocity	Time of	
			Node	Node	0:30	0.40	0.45 0	0.50 0	0.60 0.0	0.65 0.70	0 2.78 AC	NC 2.78 AC	AC Conc.	c. Intensity	Ity Q (Vs)	Actual	Nominal		(%)	(E)	(I/s)	(m/s)	(m/s) Flow (min)	QQ tull
.		ŀ																				1		
KLONDIKE ROAD	9																-				•			
	C-201	MDH		FUT. MH				1.96			2.72	2.72	20.00	-			_	CONC	0.14		239.5	0.82	0.0	80%
		-	FUT, MH	MH 159					ö	0.34	0.61	3.34		0 70.25	5 234 8			CONC	CONC 1.87	120.0	875.4	3.00	0.67	27%
C2C	C202/C300	MDH	MH 159	MH 158		ŀ	4.48	3.13	Ö	0.14	10.21	1 13.55	5 20.67			9.838		CONC	0.64		1,197.4	2.17	0.72	78%
	C203		MH 158	MH 157	1.88				0	0.38	2.25	15.80		9 67.34	1.041.1	1 0.838	825	CONC	0.75	120.0	1,296.2	2.35	0.85	82%
								_																
MARCONI AVENUE	NUE							_						_			-	_						
	C204a N	MDR	MH 162	MH 161				0	0.19		0.32	0.32	20.00	0 70.25	1	0.305	_	CONC	0.50	24.6	71.3	0.98	0.42	31%
			MH 161	MH 160					0.06		0.10	0.42	20.42	2 69.34	4 289		_	CONC	0.50	23.9	71.3	0.98	0.41	41%
	i	-	MH 160	MH 157					0.62		1.03	1.45	5 20.83	3 68.49	106	0.457	450	CONC	0.25	120.0	148.6	0.91	2.21	67%
				Area C204a				0	.87															
		╞						-																
KLONDIKE ROAD	9							 																
		-	MH 157	MH 156					ö	0.52	0.94	18,19	-	4 64.22			1200	CONC	0.13	97.0	1,465.9	1.26	1.29	80%
			MH 156	MH 155					0.31	31	0.56	3 18.75	5 24.32			6 1.219	1200	CONC		91.3	1,465.9		1.21	79%
			MH 155	MH 154	0.30				ö	0.59	1.32	20.07	-	<u> </u>	5 1,2052	2 1.219		CONC	5 0.13	117.0	1,465.9		1.55	82%
	C204b	MDH	MH 154	MH 153				4	4.15		6.92	┢─	9 27.09	9 57.75		8 1.219	1200	CONC	0.20	39.9	1,818.2	1.56	0.43	86%
	t	ļ	MH 153	FUT.MH A					ö	0.21	0.38	27.37	7 27.52	2 57.15	5 1,564.3	3 1.372	1350	CONC	0.13	108.4	2,006.9	1.36	1.33	78%
	C101a	UN F	UT.MH A	FUT.MH A FUT.MH B		-			ŏ	0.45 3.19	7.02	34.39	9 28.85	55.37	7 1,904 %			CONC	0.13	117.0	2,006.9	1.36	1,44	95%
			UT.MH B	FUT.MH B FUT.MH C				-			0.0	34.39	9 30.28	÷		9 1.372	1350	CONC	0.13	51.0	2,006.9	1.36	0.63	92%
			FUT.MH C	OUTLET				-			0.00	34.39	9 30.91	1 52.85	5 1.8175	5 1.372	1350	CONC	0.14	7.3	2,082.7	1.41	0.09	87%
															_									
									-							-								
							+	+	+							-								
							+		+	+						_								
Definitions:			1			Notes:			-	-			Design:	n: MAB		PROJEC	PROJECT: Brookside Subdivision	le Subdi	vision					
Q=2.78 AIR, where	are					1) Ottawa Rainfali-Intensity Curve	a Rainfi	ali-intera	sity Curv	0			Check	c JGR										
Q=Peak Flow in Litres per Second (Vs)	Litres per	Second	(s/l)			2) Min Pipe Velocity	tpe Velc	colty =0.	=0.80 m/s				Date:	-	June 28, 2006	CLIENT:	Klondike Developments	Develo	oments					
A≂Area in hectares (ha) I≃Hainiall Intensity (mm/lr)	res (ha) ty (mm/lr)					 Tc=15 min (subdivision) 	5 mln (s	ubdivisi	(L							File Ref:	103106-0			Dwg. Reference:	ference:			
	inti-										_													

STORM SEWER DESIGN SHEET (5-YEAR EVENT - INTERIM CONDITION)

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The spreadsheet uses the Rational Method to calculate theoretical 5-year event storm sewer flows (see peak flow column). Interim Condition - Prior to complete construction of Klondike Road, flows will be diverted to Pond 'C' via temporary swale.

	ŗ	LOCATION	N.				A	Area (ha)						FLOW						ŝ	SEWER DATA	ATA			
Street	Catchment Dev't	Dev't	From	£	₽	#	₽	#	#		L L	Indiv A	Accum .		Rainfall	Peak Flow	Dia. (m)	Dia. (mm)	Type	1	Length	Length Capacity Velocity	Velocity	TIme of	
			Node	Node	0:30	0.40	0.45	0.50	0.60	0.65 0	0.70 2.7	2.78 AC 2.	2.78 AC	Conc.	Intensity	Q (16)	Actual	Nominal		(%)	(L)	(I/s)	(m/s)	Flow (min)	a/a full
									┝	┝	-	F													
KLONDIKE ROAD	ROAD																								
	C-201	MDR		FUT. MH				1.96				2.72	2.72	20.00	70.25	1914	0.610	600	CONC	0.14		239.5	0.82	0.00	80%
			FUT. MH	MH 159					F	0.23	3	0.42	3.14	20.00	70.25	9.026	0.610	600	CONC	1.87	120.0	875.4	3.00	0.67	25%
	C202/C300 MDH	MDR	MH 159	MH 158			4.48	3.13		0.24	Ť	10.39	13.53	20.67	68.82	9311	0.638	825	CONC	0.64	94.0	1,197.4	2.17	0.72	78%
	C203	PRK	MH 158	MH 157	1.88					0.39		2.27	15.80	21.39	67.34	1,064.1	0.838	825	CONC	0.75	120.0	1,296.2	2.35	0.85	82%
											-														
MARCONI AVENUE	AVENUE																								
	C204a	MDH	MH 162	MH 161					0.19			0.32	0.32	20.00	70.25	22.3	0.305	300	CONC	0.50	24.6	71.3	0.98	0.42	31%
			MH 161	MH 160					0.06		0	0.10	0.42	20.42	69.34	283	0.305	300	CONC 0.50	0.50	23.9	71.3	0.98	0.41	41%
			MH 160	MH 157					0.62	\mid		1.03	1.45	20.83	68.49	98.4	0.457	450	CONC 0.25	0.25	120.0	148.6	16.0	2.21	67%
											-														
KLONDIKE ROAD	ROAD												T												
			MH 157	MH 156					ĺ	0.52		0.94	18.19	23.04	64.22	1,168.3	1.219	1200	CONC	0.13	0'26	1,465.9	1.26	1.29	80%
			MH 156	MH 155					f	0.31	0	0.56	18.75	24.32	62.00	1,162.6	1.219	1200	CONC	0.13	91.3	1,465.9	1.26	1.21	%84
			MH 155	MH 154	0.30				f	0.59		1.32	20.07	25.54	60.05	1,205.2	1.219	1200	CONC	0.13	117.0	1,465.9	1.26	1.55	82%
	C204b	MOR	MH 154	MH 153					4.15	-	9	6.92	26.99	27.09	57.75	1.558.8	1.219	1200	CONC	0.20	39.9	1,818.2	1.56	0.43	86%
	(see note 4)		MH 153	HEADWALL							3	0.00	26.99	27.52	57.15	1,542.6	1.372	1350	CONC	0.20	32.2	2,489.3	1.68	0.32	62%
									17																
															-										
									+		+														
											+		+												
								-				_	-	-											
Definitions:					Notes:										MAB		PROJECT	PROJECT: Brookside Subdivision	Subdivi	sion					
Q=2.78 AIR, where	1, where				1) Otta	twa Rai	 Ottawa Rainfall-Intensity 		Curve				<u> </u>	u	JGH										
G=Peak Fi	G=Peak Flow in Litres per Second (Vs)	ar Secol	(s/l) pr		2) Min	Pipe V	2) Min Pipe Velocity =0.80	0.80 m/s	្ណា				<u> </u>	Date:	April 17, 2006		CLIENT:	Klondike Developments	Jevelopr	nents					
\=Area in i =Rainfall Ir	A=Area in hectares (ha) I=Rainfall Intensity (mm/lr)	Ē			3) Tc= 4) Indu	:15 min Istrial zc	 Tc=15 min (subdivision) Industrial zone (C-101a) 		area not included	cluded	•						File Ref:	103106-0			Dwg. Reference:	erence:			
R=Runoff Coefficient	cefficient												_												

SWM FACILITY 'C' - KLONDIKE ROAD

STORM SEWER: HYDRAULIC GRADE LINE ANALYSIS (100-YEAR EVENT - ULTIMATE CONDITION)

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The spreadsheet returns the upstream hydraulic grade line if sucharged, or the pipe obvert if free flow conditions exist. The stope of the HGL is calculated and the minimum USF elevations can be established +0.30m above the HGL. This spreadsheet uses the Darry-Weisbach equation to calculate hydraulic losses through a pipe network with a specified flow rate. Minor losses are accounted for including both pipe bend losses and structure losses. The theoretical 100-year event storm server peak flows will be controlled to the actual 5-year flow rates using various roadway injet controls within CBs. Additional flows will be directed using overland flow routes. vark.

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LOCATION		MANHOLE	INVERT ELEVATIO	INVERT ELEVATION	GROUND	COVER	PIPE P.	PIPE PARAMETERS		TOTAL FLOW C	a _{onp} a _{in} /	<u>م</u> ر	COMPU	COMPUTATIONAL COLUMNS	COLUMNS		HEAD LOSS	SURCHARGE		HGL		SLOPE	MIN. USF ELEVATION
		Upstream Downstream	S/n (E)	S/O	Upstream (m)	Upstream (m)	Dia (mm)	(m)	je je	(m ³ /s)	17/S) 4cap	ap Pipe Area (m*)	m) LG	Friction Factor (f)	Vefocity V (m/s)	V-729	Ű. H	Upstream (m)	S/n (L)	D/S (m)	SLOPE (%)	(%)	Upstream (m)
KLONDI	KLONDIKE ROAD								-										87.57	I<- OUTLE	<- OUTLET TO POND	-	
	FUT.MH C	OUTLET	65.93	65.90	67.95	0.670	1350	12.30 0.0	0.013 1.	1.827 2.	2.750 0.66	36 1.478	6	0.01905	1.24	0.08	0.05	0.34	67 62	67.57	D.43	0.24	67.92
	FUT.MH B FUT.MH C	FUT.MH C	66.02	65.93	68.55	1.180	1350	42.30 0.0	0.013 1.	1.843 2.1	2.568 0.72	72 1.478	8 31	0.01905	1.25	0.08	0.09	D.34	A7 71	67.62	0.21	0.21	68.01
	FUT.MH A	FUT.MH B	66.24	66.05	68.87	1.280	1350	117.00 0.0	0.013 1.	1.698 2.2	2.244 0.85	35 1.478	8 87	0.01905	1.28	0.08	0.16	0.28	67.37	67.71	0.13	0.16	68.17
	MH 153	FUT.MH A	66.40	66.24	70.01	2.260	1350	120.00 0.0	0.013 1.	1.564 2.0	2.033 0.77	7 1.478	89 89	0.01905	1.06	0.06	0.11	0.23	67 98	67.87	0.10	0.13	68.28
	MH 154	MH 153	66.63	66.55	70.18	2.350	1200	39.90 D.(0.013 1.	1.559 1.1	1.821 0.86	36 1.167	7 33	0.01981	1.34	0.09	0.08	0.23	F6 06	67.98	0.20	0.20	68.36
	MH 155	MH 154	66.78	66.63	70.12	2.140	1200	117.00 0.0	0.013 1.	1.205 1.4	1.456 0.83	1.167	7 98	0.01981	1.03	0.05	0.12	0.20	64.18	68.06	0.10	0.13	68.48
	MH 156	MH 155	66.30	66.78	70.39	2.290	1200	91.30 0.0	0.013 1.	1.163 1.4	1.475 0.79	1.167	7 76	0.01981	1.00	0.05	0.09	0.16	08 kG	68.18	0.09	0.13	68.56
	MH 157	MH 156	60.78	66.90	70.29	2.060	1200	97.00 0.1	0.013 1.	1.168 1.4	1.489 0.78	78 1.167	7 81	0.01981	1.00	0.05	0.09	0.12	68.35	68.26	0.09	0.13	68.65
																		,					
MARCOL	MARCONI AVENUE													;									
	MH 160	MH 157	68.08	67.78	70.64	2.110	450	120.00 0.0	0.013 0.	0.099 0.1	0.149 0.67	57 0.164	4 267	0.02747	0.60	0.02	0.17	0.00	69.53	68.35	0.15	0.25	68.83
	MH 161	MH 160	68.35	68.23	70.87	2.220	300	23.90 0.0	0.013 0.	0.029 0.0	0.071 0.41	1 0.073	3 80	0.03145	0.40	0.01	0.02	0:00	68.65	68.53	0.50	0.50	68.95
	MH 162	MH 161	68.50	68.38	71.50	2.700	300	24.60 0.0	0.013 0.	0.022 0.0	0.070 0.31	1 0.073	3 82	0.03145	0:30	0.00	0.01	0.00	69.90	68.68	0.49	0.49	69.10
KLONDI	KLONDIKE ROAD																						
	MH 158	MH 157	68.30	67.40	71.78	2.655	825	120.00 0.013		1.064 1.2	1.297 0.82	32 0.552	2 145	0.02245	1.93	0.19	0.66	0.00	66-13	68.35	0.64	0.75	69.43
	MH 159	MH 158	68.90	68.30	74.79	5.065	825	94.00 0.0	0.013 0.	0.931 1.1	1.196 0.78	18 0.552	2 114	0.02245	1.69	0.15	0.40	0.00	82.68	69.13	0.64	0.64	70.03
TER LEV	TER LEVEL at Outlet = 67.39m	t = 67.39m									_												
					DES	DESIGN PARAMETERS	ETERS								Designed: MAB	: MAB			PROJECT:	Ë			
DOWNSTF	REAM WATER	DOWNSTREAM WATER LEVEL at Outlet = 67.57m (EPA SWMM MAX HGL)	a 67.57m	(EPA SWIV	(IM MAX HGL)				ΗG	HGL≂Major + Minor Losses	- Minor Lo	sses							Brooksid	Brookside Subdivision	lon		
HE ICHN F	HEQUENCY =	HE I VHN FREQUENCY = 100 YEARS CONTROLLED TO 5 YEARS	INTHULLE		DH4				MB	or Loss=	HIDB FUC	Major Loss= Pipe Friction (Larcy-Weisoach)	Weisoech	_									
	MINIMUM VELOCITY= 0.80 m/s	80 m/s							din 5	or Loss= . anos la ol	Head lost	Minor Loss= Head loss correction for flow through MH,	for flow thi	rough MH.	Checked: JGR	JGR			CLIENT: Boologial Crains	Gmin			
MIN. HGL (MIN. HGL CLEARANCE - 0.30m	0.30m							말	tion Facto	r= 8g/c^2	Friction Factor= 8g/c^2, where c=(1/n)*(D/4)^1/6	1/n)*(D/4)	1/6									
											I				Dwg. Reference:	srence:			Date: Ju	Date: June 28, 2006	9		

STORM SEWER: HYDRAULIC GRADE LINE ANALYSIS (100-YEAR EVENT - INTERIM CONDITION) SWM FACILITY 'C' - KLONDIKE ROAD

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The spreadsheet returns the upstream hydraulic grade fine if surcharged, or the pipe obvert if free flow conditions exist. The slope of the HGL is calculated and the minimum USF elevations can be established +0.30m above the HGL. This spreadsheet uses the Darcy-Welsbach equation to calculate hydraulic losses through a pipe network with a specified flow rate. Minor losses are accounted for including both pipe bend losses and structure losses. The theoretical 100-year event storm sewer peak flows will be controlled to the actual 5-year flow rates using various roadway inlet controls within CBs. Additional flows will be directed using overland flow routes. Interim Condition - Prior to complete construction of Klondike Road, flows will be diverted to Pond 'C' via temporary swale.

NOLTON	MA	MANHOLE	INVERT	RT TION	GROUND	COVER	PIPEP	PIPE PARAMETERS		FLOW			COM	IPUTATI	COMPUTATIONAL COLUMNS	SNMUS		HEAD SI LOSS SI	SURCHARGE		HGL		SLOPE	MIN. USF ELEVATION
FOCATION	Upstream	Downstream	SIN	D/S	Upstream	Upstream		Length	ĵe	(m ³ /s)	(m³/s) (- 4 -	Pipe	<u> </u>			V*/2a	1	Upstream	S/N	S/O	SLOPE	(%)	Upstream (m)
			<u>(i</u>	Ē	Ē	(w)	(mm)	E)	╢		╢	2		2		. (s/u) /	P	Ê		_		TTO CHER		(m)
KLONDIKE ROAD	E ROAD														-		+			- r			4	
	MH 153	HEADWALL	66.40	66.33	70.01	2.260	1350	32.20 (0.013	1.543	2.596 0	0.59 1	1.478	24 0.	0.01905	1.04	0.06	0.10	0.00	87 26	67.68	0.22	0.22	68.05
	MH 154	MH 153	66.63	66.55	70.18	2.350	1200	39.90	0.013	1.559 1	1.821 0	0.86	1.167	33 0.	0.01981	1.34 0	0.09	0.08	0.00	67 83	67.75	0.20	0.20	68.13
	Γ	MH 154	66.78	66.63	70.12	2.140	1200	117.00 0.013		1.205 1	1.456 0	0.83	1.167	98 0.	0.01981	1.03	0.05	0.12	0.00	37.96	67.83	0.13	0.13	68.28
	MH 156	MH 155	66.90	66.78	70.39	2.290	1200	91.30	0.013	1.163 1	1.475 0	0.79	1.167	76 0.	0.01981	1.00 0	0.05	0.09	0.00	2810	67.98	0.13	0.13	68.40
	MH 157	MH 156	67.03	66.90	70.29	2.060	1200	97.00	0.013	1.168 1	1.489 0	0.78 1	1.167	81 0.	0.01981	1.00	0.05	60:0	0.00	68 23	68.10	0.13	0.13	68.53
									-								-							
MARCONI AVENUE	AVENUE																_							
	MH 160	MH 157	68.08	67.78	70.64	2.110	450	120.00	0.013	0.099	0.149 0	0.67	0.164 2	267 0.	0.02747	0.60 (0.02	0.17	0.00	6B 33	68.23	0.25	0.25	68.83
		MH 160	68.35	68.23	70.87	2.220	300	23.90	0.013	0.029 (0.071 0	0.41	0.073	80	0.03145	0.40 (0.01	0.02	0.00	63 r/5	68.53	0.50	0.50	68.95
		MH 161	68.50	68.38	71.50	2.700	300	24.60	0.013	0.022	0.070	0.31 0	0.073	82 0.	0.03145	0.30 (0.00	0.01	0:00	68 20	68.68	0.49	0.49	69.10
																	-							
KLONDIKE ROAD	E ROAD																							
	MH 158	MH 157	68.30	67.40	71.78	2.655	825	120.00	0.013	1.064	1.297 0	0.82	0.552 1	145 0.	0.02245	1.93 (0.19	0.66	0.00	69 13	68.23	0.75	0.75	69.43
	MH 159	MH 158	68.90	68.30	74.79	5.065	825	94.00	0.013	0.931	1.196 C	0.7B C	0.552 1	114 0.	0.02245	1.69	0.15	0.40	0.00	69.10	69.13	0.64	0.64	70.03
															-+-									
											-	_		-								1		
					DE	DESIGN PARAMETERS	IETERS									Designed: MAB	AB			PROJECT:	Ë			
ī									Ŧ	HGL=Major + Minor Losses	r + Minor	r Losses								Brookside	Brookside Subdivision	lon		
RETURN FR	EQUENCY =	RETURN FREQUENCY = 100 YEARS CONTROLLED TO 5 YEARS	NTROLLEL	0 TO 5 YE	ARS				Σ	lajor Loss	= Plpe Fr	riction (Da	Major Loss= Plpe Friction (Darcy-Welsbach)	ach)						·				
MINIMUM VELOCITY= 0.80 m/s	LOCITY= 0.1	10 m/s							Σ	finor Loes	= Head Ic	oss correc	Minor Loss= Head loss correction for flow through MH,	w through		Checked: JGR	ня			CLIENT:				
DOWNSTRE	AM WATER	DOWNSTREAM WATER LEVEL at Outlet = 67.57m (EPA SWMM MAX HGL)	= 67.57m (EPA SWM	IM MAX HGL)				5	hanges in	pipe size	changes in pipe size, and pipe bends	e bends							Regional Group	Group			
MIN. HGL CLEARANCE = 0.30m	EARANCE :	0.30m							L	nguon Fa.	crot= agv	C'E, WIBN	רומוסו רמנוסו= מקיסיב, שוופום כ≓(ואו) (שי≄)ייוים	ni+j., ita		Dwo. Reference:	iee:			Date: Auc	Date: August 4, 2006	9		
															4	2			1					

APPENDIX B

SWM Facility 'C': Design Calculations & Modeling Files

SWMHYMO Modeling Parameters SWMHYMO Input Files Summary Output Files

SWM Facility Inlet & Outlet Calculations SWM Facility Stage-Storage Curves Forebay Design Calculations EPA SWMM Model Schematics EPA SWMM Model Output EPA SWMM Flow Splitter Model Output (25mm / 100 yr)

Drainage Area		Drainage		dun X	TIMP	Slone (%)	Slone (%) I enoth (m	(mm)	CN	Ê
Nongike & Aujacent Lands (Post-Development)		(trail	Ē			(perv / impiperv / impiperv / imp	perv / imp	perv / imp)		(hrs)
March Road (40m ROW + road widening)	A-MR1	5.83	STANDHY	0.70	0.80	0.4			65	
Commercial / Residential commercial / Residential	A-400	3.62	STANDHY	0.58	0.68	1.0			65	
Commercial / Residential	A-500	1.52	STANDHY	0.58	0.68	1.0			65	
Lands to SWMF 'C'		5								
Future Development (Mixed)	C-300	7.48	STANDHY	0.30	0.37	10			65	
Medium Density Residential		1 96	STANDHY	0.57	0.64	15		6	65	
Medium Density Residential	C-202	307	STANDHY	0.57	0.64	10			65	
Party	1.5	1 90	STANDHY	0.24	0.30	10			65	
Medium Density Residential	÷.,	5.20	STANDHY	0.57	0.64	10			65	
Klondike Road R.O.W U/S OCR		2 22	STANDHY	020	0.80	10		4	65	
Industrial		3.16	STANDHY	0.70	0.70	90		÷	65	
SWMF 'C'	C-102	0.90	NASHYD				× ,		80	0.17
Klondike Road R O W D/S OCR		120	STANDHY	0.70	0.80	1-10			05 	
Low Density Residential		6.70	STANDHY	0.30	0.37	1.0			65	
Medium Density Residential	D-102	7.70	STANDHY	0.57	0.65	1.0			65	
Low/Med Density Residential		9.64	STANDHY	0.40	0.50	1.0			65	
Klondike Woods		2.09	NASHYD						55	0.17
Industrial		2.15	STANDHY	0.70	0.70	0.6			65	
SWMF 'D' & Inlet Channel	D-303	1.40	NASHYD				AN AAT 101 191 491 161 991 991 991 991		80	0.17
Shirley's Brook U/S of Klondike Rd	S-100	1.65								
Shirley's Brook U/S of Marconi Ave		8.40	NASHYD						80	0.17
Shirley's Brook U/S of OCR		3.49								
Shirley's Brook U/S of March Valley Road	S-200	5.67	NASHYD						80	0.17
Area to	Area to SWMF 'C'-	27.1 ha	ę							
			ha (not inc	Inding SW	MF 'C' - u	26.2 ha (not including SWMF 'C' - used in water quality calculations)	r quality ca	Iculations)		
			•							

(M:\...SWM C1.dat)

TZER0=[0.0], METOUT=[2], NGTORM=[1], NRUN=[3] C100-3.stm TZERC=[0.0], METOUT=[2], NSTCRM=[1], NRUN=[4] S100-12.etm

* START

START FINISH

SSSS3 W W M M H H Y Y M M OOO 999 888 == S W W W M M H H H Y Y M M O O 999 888 == SSSS W W W M M H H H Y Y M M O O 993 888 9 S W M M M H H Y M M O O 993 888 9 SSSS W W M M H H Y M M O O 993 888 8 SSSS W W M M H H Y M M OO 993 888 == StormWater Management HYdrologic Model 999 888 ==	
S WWW MI MM H H YY MI MI O O S 9 8 8	
SSSS WWW M H H HANNAH I M M M O O 44 9 9 8 8 8 8	apt. 1958
SSSS WW М М Н Н Ү М М СОО 9588 == 5988#	5320763
StormWater Management HYdrologic Model 999 888 ==	

****** A single event and continuous hydrologic simulation wodel ****** based on the principles of HYNO and its successors	******
******* OTTHYMO-83 and OTTHYMO-89.	******
******* Distributed by: J.F. Sabourin and Associates Inc.	******
******* Ottawa, Ontario: (613) 727-5199 ******* Gatineau, Quelec: (819) 243-6858	*******
******** E-Mail: swmbymo2jfsa.Com	*******

+++++++ Licensed user: MCVATECH ENGINEERING CONSULTANTS LTD	++++++
++++++++++++++++++++++++++++++++++++++	
*****	*******
******** ++++++ PROGRAM AREAY DIMENSIONS ++++++ ******** Maximum value for ID numbers : 10	******
++++++ PROGRAM ARLAY DIMENSIONS ++++++ Maximum value for ID numbers : 10 ******* Max. number of rainfall points: 15000 ******* Max. number of flow points : 15000	*******
********	******
*** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in ST	ART) ***

*** ID: Hydrograph IDantification numbers, (1-10). *** NHYD: Hydrograph reference numbers, (6 digits or characters). *** AREA: Drainage area associated with hydrograph, (ac.) or (ha.) *** QPEAK: Peak flow of simulated hydrograph, (ft ³ /s) or (m ³ /s).	***
*** Tpeakbace_nnimm is the date and time of the peak flow.	
*** R.W.: Runoff Volume of simulated hydrograph, (in) or (mm). *** R.C.: Runoff Coefficient of simulated hydrograph, (ratio).	***
*** *: see WARNING or NOTE massage printed at end of run. *** **: see RRROR message printed at end of run.	***

**************************************	*******
• DATE: 2003-11-09 TIME: 15:15:29 RUN COUNTER: 000480	*
<pre>* Input filename: M:\2003\103105\DATA\CALCUL~1\SWMHYMO\SMWFC~1\SW * Output filename: M:\2003\103106\DATA\CALCUL-1\SWMHYMO\SMWFC-1\SW</pre>	M_C1.da*
* Summary filename: d:\2003\103106\DATA\CALCUL~1,SWIHYMO\8MWFC~1\SW.	1_C1.eu*
* User comments: * 1:	*
* 22	
* 3:	*
* 3:	
***************************************	******
# Project Name: [Shirlev's Brook - SWMF C) Project jumbe:	******
# Project Name: [Shirlev's Brook - SWMF C) Project Number	******
<pre># Project Name: [Shirley's Brook ~ SWMF C} Project Numbe: # Date : 05-27-200% # Modeller : [N.Petepiece] # Modeller : [N.Petepiece] # Company : MOVATECH ZWJINEBRING CONSULTANTS LTD # License # : 53:0763</pre>	******
<pre># Project Name: [Shirley's Brook ~ SWMF C} Project Numbe: # Date : 05-20-2005 # Modeller : [N.Petepice] # Company : MOVATECH ZWJINEREING CONSULTANTS LTD # License # : 530763 # Elevelopment Conditions to SWM Facility 'C'</pre>	******
<pre># Project Name: [Shirley's Brook - SWMF C] Project Numbe: # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWITHEBRING CONSULTANTS IND # License # : 53:0763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIOndike Road not urbanized east of CCR # - KRE Industrial Lands not developed - sheat dr # - KRE Industrial Lands not developed - sheat dr</pre>	r; [103106]
<pre># Project Name: [Shirley's Brook - SWMF C] Project Numbe: # Date : 05-25-2006 # Modeller : [N.Petepiece] # Company : POWATECH ENGINEERING CONSULTANTS LTD # License # : 5510763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - Klondike Road not urbanized east of CCR # . KRF Industrial lands not developed - sheat dr directly to Shirley's Brook.</pre>	r; [103106]
<pre># Project Name: [Shirley's Bopok - SWMF C) Project Number # Date : 05-23-2006 # Modeller : [N.Petepiece] # Company : MOWATECH ENGINEERING CONSULTANTS LTD # License # : 5310763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - Klondike Road not urbanized east of CCR # - KRE Industrial lands not developed - sheat dr # directly to Shirley's Proph.</pre>	r; [103106]
<pre># Project Name: [Shirley's Brook - SWMF C} Project Numbe: # Date : 05-26-2006 # Modeller : [N.Petepiece] # Company : MOVATECE EMPIREMENTS CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIOndike Read not urbanized east of CCR # - KRE Industrial Lands not developed - sheat dr directly to Shirley's Brock. # RUN:COMBAND# 001:0001 START</pre>	r; [103106]
<pre># Project Name: [Shirley's Brook - SWMF C} Project Numbe: # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWINERERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIOmdike Road not urbanized east of CCR # - KRE Industrial lands not developed - sheat dr # directly to Shirley's Brook. # RUN:CO.001 START [TZEK) = .00 hrs on 0] [METOTF 2 (l=imperial, 2=metric catput)]</pre>	r; [103106]
<pre># Project Name: [Shirley's Brook - SWMF C) Project Number # Date : 05-20-2005 # Modeller : [M.Petepiece] # Modeller : [M.Petepiece] # Company : MOVATECH EWITHEBEING CONSULTANTS LTD # License # : 53:0763 # # Dest-Development Conditions to SWM Facility 'C' # Interim conditions - KIGndike Road not urbanized east of CCR # directly to Shirley's Brook. # RUN:COMBAND# 001:0001</pre>	r; [103106]
<pre># Project Name: [Shirley's Brook - SWMF C) Project Number # Date : 05-20-2005 # Modeller : [M.Petepiece] # Company : MOWATECH EWINEBERING CONSULTANTS LTD # License # : 53:0763 # # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIOndike Road not urbanized east of CCR # directly to Shirley's Brook. # RUN:COMBAND# 001:0001</pre>	r; [103106]
<pre># Project Name: [Shirley's Brook - SWMF C) Project Number # Date : 05-20-2005 # Modeller : [M.Petepiece] # Company : MOVATECH EWINEBEING CONSULTANTS LTD # License # : 53:0763 # # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIGNGIKE Road not urbanized east of CCR # directly to Shirley's Brook. # # directly to Shirley's Brook. # RUN:COMBAND# 001:0001</pre>	r; [103106]
<pre># Project Name: [Shirley's Brook - SWMF C] Project Number # Date : 05-25-2005 # Modeller : [M.Petepice] # Modeller : [M.Petepice] # Company : MOWATBCH ZWJINEBERING CONSULTANTS LTD # License # : 5370763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIR Industrial lands not developed - sheat dr # directly to Shirley's Brook. # RUN:COMBAND# 001:0001 START [TZEK) = .00 hrs on 0] [METODT= 2 (leimperial, 2=metric cutput)] [NETODT= 2 (leimperial, 2=metric cutput)] [NETODT= 1] 001:0002 RRMS STOR: RIM: STOR: RIM: STOR: [BIT=10.00:SDUK= 3.00:FTOT= 25.00] 001:0003</pre>	r; [103106] 21n R.VR.C.
<pre># Project Name: [Shirley's Brook - SWMF C} Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWINERERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIOmdike Read not urbanized east of CCR # Constructions - KIOmdike Read not urbanized east of CCR # Constructions - KIOmdike Read not urbanized east of CCR # Constructions - KIOmdike Read not urbanized east of CCR # Constructions - KIOmdike Read not urbanized east of CCR # Constructions - KIOmdike Read not urbanized east of CCR # Constructions - KIOmdike Read not urbanized east of CCR # Constructions - KIOmdike Read not urbanized east of CCR # Constructions - Constructions - KIOMDIKE - Company [METOR: - 1] /[NETOR: - 2] /[NETOR: - 2] /[NETOR</pre>	r; [103106] 21n R.VR.C.
<pre># Project Name: [Shirley's Brook - SWMF C} Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWJINERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIOndike Road not urbanized east of CCR #</pre>	r; [103106] 21n R.VR.C.
<pre># # Project Name: [Shirley's Brook - SWMF C} Project Numbe: # Date : 05-26-2006 # Modeller : [N.Petepiece] # Company : MYVATECH ENGINEERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIR Indistrial lands not developed - sheat dr</pre>	r; [103106] rin tep) R.VR.C. 9.90.397
<pre># # Project Name: [Shirley's Brook - SWMF C} Project Numbe: # Date : 05-26-2006 # Modeller : [N.Petepiece] # Company : MYVATECH ENGINEERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIR Indistrial lands not developed - sheat dr</pre>	r; [103106] rin tep) R.VR.C. 9.90.397
<pre># Project Name: [Shirley's Brook - SWMF C) Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Modeller : [N.Petepiece] # Company : MOVATECH EWITHEBERING CONSULTANTS LTD # License # : 53:0763 # # Dest-Development Conditions to SWM Facility 'C' # Interim conditions - KIG Industrial Lands not developed - sheat dr # directly to Shirley's Brook. # RUN:COMBAND# 001:0001</pre>	r; [103106] r; [103106] tep) R.VR.C. 9.92
<pre># Project Name: [Shirley's Brook - SWMF C) Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Modeller : [N.Petepiece] # Company : MOVATECH EWITHEBERING CONSULTANTS LTD # License # : 53:0763 # # Dest-Development Conditions to SWM Facility 'C' # Interim conditions - KIG Industrial Lands not developed - sheat dr # directly to Shirley's Brook. # RUN:COMBAND# 001:0001</pre>	r; [103106] r; [103106] tep) R.VR.C. 9.91 J.97 N.VR.C. 9.93 n/a .C0 n/a .2.93 n/a
<pre># Project Name: [Shirley's Brook - SMMF C} Project Numbe: # Date : 05-20-2006 Modeller : [N.Petepiece] # Company : MYVATECH EWJIKERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conflicions - KIR Industrial lands not developed - sheat dr # directly to Shirley's Brook. # RUN:CO.#NAND# OO1:0001 START [TZEK.) = .00 hrs on 0] [METORI= 1] /(NRUN = 1] /(NRUN = 1] 001:0002 READ STOR/A Filename = storm.001 Comment = City of Dttaws: 25mm-3hr Chicago (10 minute time s SIGN STANDHY 01:C-300 7.46 .343 No_date 1:10 [XIMP30:TIMP37] [SLP=.00:DTMP 5.00] [LOSS= 2:CN = 5.0] 01:0005ID:NHYDAREAOPEAK-TpeakLate_hhimm- COMPUTE DELLHYD 01:C-300 7.48 .343 No_date 1:10 [MigysSto0000E+00. ToCMFD1=.00:DTMP37] [SLP=.00:DTMP5.10] [LOSS= 2:CN = 65.C] 01:0004ID:NHYDAREAOPEAK-TpeakLate_hhimm- COMPUTE DELLHYD 01:C-300 7.48 .343 No_date 1:10 [MigysSto000E+00. ToCMFD1=.00:DTAE.343 No_date 1:10 [MigysSto000E-00. ToCMFD1=.00:DTA</pre>	r; [103106] r; [103106] tep) R.VR.C. 9.92
<pre># Project Name: [Shirley's Brook - SWMF C} Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWJINERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIOndike Road not urbanized east of CCR #</pre>	tep) R.VR.C. 9.92 .397 R.VR.C. 9.92 .397 P.VR.C. 15.55 .622
<pre># Project Name: [Shirley's Brook - SWMF C] Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWJINERING CONSULTANTS LTD # License # : 53:0763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIR Industrial lands not developed - sheat dr directly to Shirley's Brook. # RUN:COMBAND# OOL:0001</pre>	r; [103106] r; [103106] r; [103106] r; [103106] tep) R.VR.C. 9.93 n/a .03 n/a VI= 0.hrs P.VR.C. 15.55 .622 R.WR.C.
<pre># Project Name: [Shirley's Brook - SWMF C) Project Number # Date : 05-20-2005 # Modeller : [M.Petepiece] # Company : MOVATECH EWINERTING CONSULTANTS LTD # Lidense # : 53:0763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIG Industrial lands not developed - sheat dr # directly to Shirley's Brook. # RUN:COMBAND# 001:0001</pre>	r; [103106] r; [103106] r; [103106] r; [103106] tep) R.VR.C. 9.93 n/a .03 n/a VI= 0.hrs P.VR.C. 15.55 .622 R.WR.C.
<pre># Project Name: [Shirley's Brook - SWMF C] Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWJINERING CONSULTANTS LTD # License # : 53:0763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIR Industrial lands not developed - sheat dr directly to Shirley's Brook. # RUN:COMBAND# OO1:0001</pre>	<pre>r: [103106] r: [103106] r: [103106] rin tep)R.VR.C. 9.93 n/a .C0 n/a .93 n/a vf= 0.hrs.vi .0 n/a .15.55 .622R.WR.C. 15.55 .622R.WR.C.</pre>
<pre># Project Name: [Shirley's Brook - SMMF C} Project Number # Date : 05-20-2005 # Modeller : [N.Peteplece] # Company : MYOATECH EWJIKERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conflicions - KIOndike Read not urbanized east of CCR # . KRK Industrial lands not developed - sheat dr directly to Shirley's Brook. # . KRK Industrial lands not developed - sheat dr # . COMMAND# OO1:0001 START [TZEK) = .00 hrs on 0] [METORI= 1] /[NETORI= 1] /[NETORI= 1] /[NETORI= 1] /[NETORI= 1] 001:0002 RED STORUT 2 (1=imperial, 2=metric catput)] [NETORI= 1] 001:0002 RED STORUT 3.00:FTOT= 25.00] 001:0003 DISHIND 0 1:C-300 7.45 .343 No_date lind INSTORUT 5.00] [LOSS= 2 :CN= 65.0] 001:0004DINNYDAREAOPEAK-TpeakLate_hhimm- DESIGN STANDHYD 01:C-300 7.46 .343 No_date lind Major System (02:C-3mij .00 .000 No_date 0:00 Minor System (02:C-3mij .000 No_date 1:10 [KjSysSteDUINFDID:NHYDAREAOPEAK-TpeakLate_hhimm- COMPTED DULLHYD 01:C-300 7.46 .343 No_date 1:10 [KjSysSteDUINFDID:NHYDAREAOPEAK-TpeakDate_hhimm- COMPTED DULLHYD 01:C-300 7.46 .343 No_date 1:10 [KjSysSteDUINFND</pre>	<pre>r: [103106] r: [103106] r: [103106] rin tep)R.VR.C. 9.93 n/a .C0 n/a .93 n/a vf= 0.hrs.vi .0 n/a .15.55 .622R.WR.C. 15.55 .622R.WR.C.</pre>
<pre># Project Name: [Shirley's Brook - SMMF C} Project Number # Date : 05-26-2005 # Modeller : [N.Petepiece] # Company : MYOATECH EWJIKERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conflicions - KIOndike Read not urbanized east of CCR # . KRK Industrial lands not developed - sheat dr directly to Shirley's Brook. # . KRK Industrial lands not developed - sheat dr directly to Shirley's Brook. # . KRK Industrial Lands not developed - sheat dr # . KRK Industrial Lands not developed - sheat dr # . KRK Industrial Lands not developed - sheat dr # . KRK Industrial Lands not developed - sheat dr # . KRK Industrial Lands not developed - sheat dr #</pre>	<pre>r: [103106] r: [103106] r: [103106] rin tep)R.VR.C. 9.93 n/a .C0 n/a .93 n/a vf= 0.hrs.vi .0 n/a .15.55 .622R.WR.C. 15.55 .622R.WR.C.</pre>
<pre># Project Name: [Shirley's Brook - SWMF C} Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWJIKERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim confitions - KIOndike Read not urbanized east of CCR #</pre>	r: [103106] r: [1
<pre># Project Name: [Shirley's Brook - SWMF C) Project Number # Date : 05-20-2005 # Modeller : [N.Petepiece] # Company : MOVATECH EWITHERING CONSULTANTS LTD # License # : 53:0763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIR Industrial lands not developed - sheat dr directly to Shirley's Brook. # RUN:COMBAND# OOI:0001</pre>	r: [103106] r: [1
<pre># Project Name: [Shirley's Brpok - SWMF C} Project Numbe: # Date : 05-26-2006 # Močeller : [N.Petepiece] # Company : MYUATEGE EWJIKERING CONSULTANTS LTD # License # : 530763 # Post-Development Conditions to SWM Facility 'C' # Interim conditions - KIR Industrial Lands not developed - sheat dr directly to Shirley's Brock. # Company : 00 hrs on 0] [METORN= 1] /(NRUN = 1] 001:0002</pre>	r: [103106] r: [1

[LOGS= 2 :CN= 65.0] ::...= U5.01ID:NHLD------AREA----QFEAK-TpenkDate_hh:mm----R.V.-R.C. ANDHYD 05:C-205 2.22 .252 No date 1:10 18.44 .738 001:0009------* DESIGN STANDHYD -OPEAK-TpeakDate_hh:mm----R.F. .165 No_date 1:10 15.55 .280 No_date 1:10 15.55 .075 No_date 1:10 8.64 001:0010-: NHYD AREA --R.C. 15.55 n/a 15.55 n/a 8.64 n/a 1.96 3.07 1.90 01:C-201 + 02:C-202 + 03:C-203 8.64 n,a 15.55 n/a 18.44 n/a 15.08 n/a ---R.V.-R.C. 15.08 n/a .00 n/a 460 No date 1:10 .460 No_date .252 No_date 1.252 No_date -QPRAK-TpeakDate_ 1.257 No_date .000 No_date 1:10 1:10 _hh:πm 1:10 0:00 15.02 1.220 No date 1:10 n/a 0. TotDurOvf= 0.hrs -QPEAK-TpeakDate_hh:mm----R.V.-R.C. .060 No_date 1:10 10.05 .402 -QPEAK-TpeakDate_hh:mu .022 %j_date 1:20 .060 No_date 1:10 1.220 No_date 1:10 -AREA 001:0014 nn:mm-1:20 1:10 1:10 ADD HYD 05:C-102 + 05:C-103 + 08:C2min 6.35 n/a 10.05 n/a 15.02 n/a .99 1,20 14.35 9.93 n/a 12.85 n/a --R.T.-R.C. 7.48 343 No date 1+10 .343 No_Gale 1.640 No_date -QPELK-TpeakDate 1.640 No_date .042 No_date 23.93 1.10 1:10 _hh:mm--1:10 3:05 12.85 n/a 12.05 n/a 23.93 23.93 1:10 12.85 n/a *********************** RUN: COMMAND# 002:0001-----START START [TERRO = .00 hrs on 0] [METOUT= 2 (1=imperial, 2=metric output)] [NETORM= 1] [NETORM= 1] [NETORM= 2] Project Name: [Shirley's Brook - SWMF C] Project Number: [103106 Date : 05-28-2006 Modeller : [M.Petepiece] Company : NJVATECH ENGINEERING CONSULTANTS LTD License # : 5320763 Project Number: [103106] #
Post-Development Conditions to SWH Facility 'C'
Interim conditions - Klondike Road not urbanized east of OCR
- KRF Industrial lands not developed - sheet drain
disortive to Shirley's Block. directly to Shirley's Blook. CO2:0002-----READ STORM
 Design STANDHYD
 03:C-203
 1.90
 .144
 No_date
 1:10
 17.70
 .416
 -----AREA----QPEAK-TpeakDate_hh:mm----R.U.-R.C. 5.20 .041 No_Gate 1:10 28.47 .670 [XIMP=.57:TIMP=.64] [SLP=1.00:DT= 5.00] 05:C-205 ---R.V.-R.C. 28.45 n'a 28.47 n/. 17.70 n/a 28.47 n/a 33.09 n/a 27.76 n/a -OPEAK-TreakDate_hh:m---OPAK-TLEAKUATE ninew---334 No date 1:10 -566 No date 1:10 -441 No date 1:10 -455 No date 1:10 -2280 No date 1:10 -0PEAK-TLEAKUATE himm--0 280 No date 1:00 1.96 + 02:C-202 1.90 5.20 2.22 .//a ./6 n/a ---R.1.-R.C. 27.76 p' 14.35 -APET 2.260 No_date .000 No_date 1.220 No_date 14.37 1:10 0.00 27.83 n/= 14.35 1:05

NOVATECH ENGINEERING CONSULTANTS LTD

(1)S, sSto=.4700E+03							
(1:jS_SSto=.4700E+03 007:0012							
	, TotO.fVol=	.0000E+00), N-07f=	, то	tDurOvf	- 0,	hrs
003:3012 * DESIGN STANDHYD (D:NHYD	-AREA	QPEAK-TD	dite_1	ດ:ໝm-→- າ.າດ	-R.V)	471
[XINP=.30:TIMP=.40]	0:0-105	1.4.	.III NO		1:10	20.02	
[SLP=1.00:DT= 5.00]							
[LOSS= 2 :CN= 65.0]							
002:0013	D:NHYD	-AREA	-OPEAK-TP	eakDate_b	h:ma	-R.VJ	R.C.
DESIGN NASHYD ([CN= 80.0: N= 3.00]	15:C-102	.90	.057 №0	_cace	1:12	TH.03	. 373
[Tp= .17:DT= 5.00]							
001.0014	DANUT	-ARBA	OPEAK TP	eakDate_b	h:m/	-7.71	R.C.
ADD HYD + ((DT≈ 5.00) SUM=	5:C-102	. 90	.057 No	date	1:15	16.09	n/a
+ (6:C-103	1.20	.112 No	_date	1:10	20.02	n/a
+ (18:C2min 19:C-3min	14.35	1.220 NO	_date	1:05	27.83	n a n/a
(DT≈ 5.00) SUM=	OC IN T	23.93	.036 NO	date	1:10	24.44	n/a
FOUTE RESER OIR -> 3	0:C_IN_T	23.93	2.014 No	_date	1:10	24.44	n/a
<pre>FOUTE RESERIOIR -> 2 [RDT= 5.00] out<- (</pre>	1:C_OUT_	23.93	.138 No	_date	3:00	24.44	n/a
IMXSEC J8ed= . 49366+0	/ t						
002:0016	OC IN T	23.93	2.014 No	dentate_n	1:10	24.44	n a
fname :M:\2003\103:	06\DATA\CALC	UL-1\SWM	HYMO' SMWF	C~1\C IN	T.C02		
remark: Inflow to S	MF C - inter	im					
** END OF RUN : 2							
**********************					******	******	
RUN : COMMAND :: 003 : 0001							
בידיג סידי							
TZERO = .00 hr	aon 0	1					
[METOUT= 2 (1	=imperial, 2=	metric o	utput)}				
[NSTORM= 1]	-		-				
[TZERO = .00 hr; [METOUT= 2 (1) [NETORM= 1] [NEUN = 3]							
******	***********	*******	*******	********	******	*******	***
# Project Name: [Shirle	Y'S Brook - S	WMF C]		Project	Numper:	: [1031	06)
# Date : 05-28-2 # Modeller : [N.Pete	JUS Diecel						
<pre># Modeller : [M.Pete # Company : NOVATEC # License # : 532076</pre>	H ENCINEERING	CONSULT	ANTS LTD				
# License # : 532076	3						
#							
# Post-Development Condi							
# Interim conditions - X						-	
	RP Industrial			oped - she	et dra:	in	
# d	irectly to Sh	urrey's	Brook.	********	******	******	***
003:0002							
READ STORM							
Filename = storm.0	01						
Comment = $City$ of	Ottawa: 100	yr-3hr C	hicago (1	LO minute	time st	tep)	
[SDT=10.00:SDUR=	3.00:FTOT=	71.65]					
* DESIGN STANDHYD	ID:NHYD	-AREA	-OPBAK-Tr	peakDate_J	11:10	-215	R.C.
<pre>* DESIGN STANDHYD (XIMP=.30:TIMP=.37</pre>	0110-300	7,48	1.313 NC	_date	1:10	39.14	.540
(SLP=1.00:DT= 5.00							
[LOSS= 2 :CN= 65.0							
000 (004	T15.3010205	-ARBA	-OPEAK-T	peakDate_1	nh:ատ	R.V	R.C.
COMPUTE DUALHYD	01:C-300	7,48	1.313 No		1:10	39.14	n/a
Major System .	02:C-3maj	. 12	.086 No	_date	1:25	39.1:	n/a
COMPUTE DUALHYD Major System / Minor System \ (MjSysStom.3740E+0	09:C-3min	7.36	.636 No	_date _	1:05	39.12	n,a
(MjSysSto=.3740E+0	3, TOLO /IVOL	4518E+C		= 1, T	Durov	I= 0	.nrs
	TO:NHID	2072	ODRAY MY			- 17 9 11 -	
* DESIGN STANDARD	01-C-201	-AREA	-QPEAK-Tr -CPEAK-Tr	peakDate > date	1:10	R.V 51.90	.724
003:0005 * DESIGN STANFHYD [XIMP=.57:TIMP=.64	01:C-201]	-AREA 1.96	-QPEAK-Tr .628 No	peakDate b_date	1:10	R.V 51.90	.724
* DESIGN STANFHYD (XIMP=.57:TIMP=.64 (SLP=1.50:DT= 5.00	1	-AREA 1.96	-OPEAK-TE .628 No	peakDate 5_date	ոհ։mm 1։10	R.V 51.90	.724
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS= 2 :CN= 65.0	1	1.96	.628 No	o_date	1:10	51.90	.724
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS= 2 :CN= 65.0]]]D:NH:D	1.96	.628 No	peakDate_	1:10	51.90	.724
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS= 2 :CN= 65.0 003:0006]]]D:NH:D 02:C-202	1.96	.628 No	peakDate_	1:10	51.90	.724
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS= 2 :CN= 65.0 003:0006]] ID:NH:D 02:C-202]	1.96	.628 No	peakDate_	1:10	51.90	.724
[XIMP=.57:TIMP=.66 [SLP=1.50:DT= 5.00 [LOSS= 2 : CN= 65.0 003:0006]]] [D:NHID 02:C-202]]	1.96	.628 No	peakDate_	1:10	51.90	.724
[XIMP=.57:IIMP=.64 (SLP=1.50:DT= 5.00 [LOSS= 2 : CN= 65.0 003:0006]]]D;NH:D 02;C-202]]]	AREA 3.07	-OPEAR-TE .628 No -OPEAR-TE .925 No	peakDate peakDats p_date	1:10 h:ma 1:10	51.90	.724 C. 724
[XIMP=.57:IIMP=.64 (SLP=1.50:DT= 5.00 [LOSS=2 :CN=65.0 003:0006] D:NH:D 02:C-202] D:NHYD 03:C-203	1.96 AREA 3.07	-OPEAK-TI .628 No -OPEAK-TI .925 No	peakDate peakDats p_date	1:10 hh:mm 1:10 hh:mm	51.90	
[XIMP=.57:IIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2:CN=65.0 03:0006]]] [D:NHID 02:C-202]]]] [D:NHYD 03:C-203]	1.96 AREA 3.07	-OPEAK-TI .628 No -OPEAK-TI .925 No	peakDate peakDats p_date	1:10 hh:mm 1:10 hh:mm	51.90	
[XIMP=.57:IIMP=.64 (SLP=1.50:DT= 5.00 [LOSS=2 :CN=65.0 003:0006]]]]]]]]]]]]]]]]]]]	1.96 AREA 3.07	-OPEAK-TI .628 No -OPEAK-TI .925 No	peakDate peakDats p_date	1:10 hh:mm 1:10 hh:mm	51.90	
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIM=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [XIMP=.24:TIMP=.34	 D:NHID D:NHYD 	1.96 AREA 3.07 AREA 1.90	-OPEAK-TI .925 IC OPEAK-TI .202 No	peakDate b_date b_date peakDate peakDate b_date	1:10 hh:mm 1:10 hh:mm 1:10	R.V. 56.10	
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIM=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [XIMP=.24:TIMP=.34	 D:NHID D:NHYD 	1.96 AREA 3.07 AREA 1.90	-OPEAK-TI .925 IC OPEAK-TI .202 No	peakDate b_date b_date peakDate peakDate b_date	1:10 hh:mm 1:10 hh:mm 1:10	R.V. 56.10	
[XIMP=.57: TIMP=.64 [SLP=1.50: DTP=5.00 [LOSS=2: CR=65.0 03:0006]] [] []]]]]]]]]]]]]]	1.96 AREA 3.07 AREA 1.90	-OPEAK-TI .925 IC OPEAK-TI .202 No	peakDate b_date b_date peakDate peakDate b_date	1:10 hh:mm 1:10 hh:mm 1:10	R.V. 56.10	
[XIMP=.57:IIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 : CR= 65.0 03:0006] [] [] [] [] [] [] [] [] []	1.96 AREA 3.07 AREA 1.90	-OPEAK-TI .925 IC OPEAK-TI .202 No	peakDate b_date b_date peakDate peakDate b_date	1:10 hh:mm 1:10 hh:mm 1:10	R.V. 56.10	
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 : CR= 65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 5.00 [LOSS=2 : CR= 65.0 [LOSS=2 : CR= 65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [LOSS=2 : CN= 65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [XIMP=.57:TIMP=.64 [SLP=1.00:DT= 5.00 [LOSS=2 : CN= 65.0]] D:NH1D 02:C-202]] D:NHYD 03:C-203]] D:NHYD 04:C-204]]	AREA 3.07 AREA 1.90 AREA 5.20	- OPEAK-TI . 628 No . 925 Ho . 925 Ho . 925 No . 202 No . 01 22K-TI 1.548 No	peakDate p_date p_date p_date p_date p_date	h:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:11	R.V 51.90	R.C. .724 R.C. .504 R.C. .724
[XIMP=.57: TIMP=.64 [SLP=1.50: DTP=5.00 [LOSS=2 : CR=65.0 03:0006]]]]]]]]]]]]]	AREA 3.07 AREA 1.90 AREA 5.20 AREA		peakDate o_date peakDate o_date o_date c_date c_date	hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:11	R.Y 51.90 R.Y 56.11 R.V 51.90	
[XIMP=.57: TIMP=.64 [SLP=1.50: DT= 5.00 [LOSS=2 : CR=65.0 [XLP=.57: TIM=.64 [XLP=.57: TIM=.64 [XLP=.57: TIM=.64 [SLP=1.00: DT= 7.00 [LOSS=2 : CR=65.0 [XLP=1.00: DT= 5.00 [LOSS=2 : CR=65.0 [SLP=1.00: DT= 5.00 [XIMP=.57: TIMP=.64 [SLP=1.00: DT= 5.00 [XIMP=.57: TIMP=.5.00 [LOSS=2 : CR=65.0 [OS]: 0009]] D:NHID 02:C-202]] D:NHYD 03:C-203]] ID:NHYD 04:C-204] ID:XHYD D5:C-205	AREA 3.07 AREA 1.90 AREA 5.20 AREA		peakDate o_date peakDate o_date o_date c_date c_date	hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:11	R.Y 51.90 R.Y 56.11 R.V 51.90	
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 : CR= 65.0 [LOSS=2 : CR= 65.0 [XIMP=.57:TIME=.64 [SLP=1.00:DT= 5.00 [LOSS=2 : CR= 65.0 [SLP=1.00:DT= 5.00 [SLP=1.00:DT= 5.00 [SLP=1.00:DT= 5.00 [SLP=1.00:DT= 5.00 [LOSS=2 : CR= 61.0 003:0008- DESIGN STANDIND [XIMP=.57:TIMP=.64 [SLP=1.00:DT= 5.00 [LOSS=2 : CN= 65.0 [SLP=1.00:DT= 5.00 [LOSS=2 : CN= 65.0] [SIMP=.70:TIMP=.64] D:NN1D 02:C-202]] D:NNYD 03:C-203] D:NNYD 04:C-204] D:XNYD 05:C-203]	AREA 3.07 AREA 1.90 AREA 5.20 AREA		peakDate o_date peakDate o_date o_date c_date c_date	hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:11	R.Y 51.90 R.Y 56.11 R.V 51.90	
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CN=65.0 [XIMP=.57:TIMP=.64 [XIMP=.57:TIMP=.64 [XIMP=.57:TIMP=.64 [SLP=1.00:DT= 5.00 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [LOSS=2 :CN=65.0 [COS:0008]] D:NHID 02:C-202]] ID:NHYD 03:C-203] ID:NHYD 04:C-204] ID:NHYD 04:C-204] ID:NHYD 05:C-203]	AREA 3.07 AREA 1.90 AREA 5.20 AREA		peakDate o_date peakDate o_date o_date c_date c_date	hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:11	R.Y 51.90 R.Y 56.11 R.V 51.90	
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [LOSS=2 :CR=65.0 [COS:0009]] D:NH1D 02:C-202]] D:NHYD 03:C-203] 1 D:NHYD 04:C-204] D:XHYD 05:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD	AREA 3.07 AREA 1.90 AREA 5.20 AREA 2.22	QPEAK-TI .925 FC .925 FC .92	peakDate_ 	hi:mm 1:10 hi:mm 1:10 hi:mm 1:10 hi:mm 1:11 l:10	R.V 51.90 R.V 56.10 R.V 51.90 R.V 58.84	R.C. .724 R.C. .504 R.C. .724 F.C. .821 R.C.
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [LOSS=2 :CR=65.0 [COS:0009]] D:NH1D 02:C-202]] D:NHYD 03:C-203] 1 D:NHYD 04:C-204] D:XHYD 05:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD D:Z-205] D:XHZD	AREA 3.07 AREA 1.90 AREA 5.20 AREA 2.22	QPEAK-TI .925 FC .925 FC .92	peakDate_ 	hi:mm 1:10 hi:mm 1:10 hi:mm 1:10 hi:mm 1:11 l:10	R.V 51.90 R.V 56.10 R.V 51.90 R.V 58.84	R.C. .724 R.C. .504 R.C. .724 F.C. .821 R.C.
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [LOSS=2 :CR=65.0 [COS:0009]] D:NH1D 02:C-202]] D:NHYD 03:C-203] 1 D:NHYD 04:C-204] D:XHYD 05:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:Z-205] D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:	AREA 3.07 AREA 1.90 AREA 5.20 AREA 2.22	QPEAK-TI .925 FC .925 FC .92	peakDate_ 	hi:mm 1:10 hi:mm 1:10 hi:mm 1:10 hi:mm 1:11 l:10	R.V 51.90 R.V 56.10 R.V 51.90 R.V 58.84	R.C. .724 R.C. .504 R.C. .724 F.C. .821 R.C.
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [LOSS=2 :CR=65.0 [COS:0009]] D:NH1D 02:C-202]] D:NHYD 03:C-203] 1 D:NHYD 04:C-204] D:XHYD 05:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:Z-205] D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:	AREA 3.07 AREA 1.90 AREA 5.20 AREA 2.22	QPEAK-TI .925 FC .925 FC .92	peakDate_ 	hi:mm 1:10 hi:mm 1:10 hi:mm 1:10 hi:mm 1:11 1:10	R.V 51.90 R.V 56.10 R.V 51.90 R.V 58.84	R.C. .724 R.C. .504 R.C. .724 F.C. .821 R.C.
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [XIMP=.24:TIMP=.34 [SLP=1.00:DT= 5.00 [LOSS=2 :CR=65.0 [COS:0009]] D:NH1D 02:C-202]] D:NHYD 03:C-203] 1 D:NHYD 04:C-204] D:XHYD 05:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-203] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-204] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:C-205] D:XHYD D:Z-205] D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:XHYD D:Z-205] D:	AREA 3.07 AREA 1.90 AREA 5.20 AREA 2.22	QPEAK-TI .925 FC .925 FC .92	peakDate_ 	hi:mm 1:10 hi:mm 1:10 hi:mm 1:10 hi:mm 1:11 1:10	R.V 51.90 R.V 56.10 R.V 51.90 R.V 58.84	R.C. .724 R.C. .504 R.C. .724 F.C. .821 R.C.
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 : CR= 65.0 03:0006]]]]]]]]]]]]]	AREA 3.07 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 1.95 3.07 1.90 5.20 2.22 14.35	QPEAK-TI .925 IC QPEAK-TI .925 IC QPEAK-TI .202 N QPEAK-TI .548 N .292 N QPEAK-TI .535 N .292 N .292 N .292 N .292 N .292 N .293 N	peakDate	hi:ma 1:10 hh:ma 1:10 hh:ma 1:10 hh:ma 1:10 hh:ma 1:10 hh:ma 1:10 hh:ma 1:10 1:10 1:10 1:10	R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 51.90 351.90 351.90 351.90 51.90 51.90	R.C. .724 R.C. .504 F.C. .724 F.C. .821 R.C. .821 R.C. .1/a n/a n/a n/a n/a
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [COSS=2 :CR=65.0 [SLP=1.00:DT= 5.00 [LOSS=2 :CR=65.0 [COSS=2 :CR=65.0] [SLMP=1.00:DT= 5.00 [LCOSS=2 :CR=65.0 [COSS=2 :CR=65.0] [COS=0010]] D:NHID 02:C-202]] D:NHYD 03:C-203] 1 D:NHYD 04:C-204]] D:S:C-203] D:S:C-203] D:NHYD 02:C-203] D:S:C-203 03:C-203 04:C-204 03:C-205 06:C-205 05:C-205 0		QPEAK-TI .925 FC QPEAK-TJ .202 MC QPEAK-TJ .202 MC QPEAK-TJ .355 MC QPEAK-TJ .628 MC .925 MC .225 MC .225 MC .228 MC .228 MC	peakDate	hi:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:11 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hi:mm 1:10	R.V 51.90 R.Y 56.10 R.V 51.90 R.V 58.84 R.V 51.90 51.90 51.90 35.12 51.90 51.90 52.90 	R.C. .724 R.C. .504 F.C. .724 F.C. .821 R.C. .1/a n/a n/a n/a n/a R.C.
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [COSS=2 :CR=65.0 [SLP=1.00:DT= 5.00 [LOSS=2 :CR=65.0 [COSS=2 :CR=65.0] [SLMP=1.00:DT= 5.00 [LCOSS=2 :CR=65.0 [COSS=2 :CR=65.0] [COS=0010]] D:NHID 02:C-202]] D:NHYD 03:C-203] 1 D:NHYD 04:C-204]] D:S:C-203] D:S:C-203] D:NHYD 02:C-203] D:S:C-203 03:C-203 04:C-204 03:C-205 06:C-205 05:C-205 0		QPEAK-TI .925 FC QPEAK-TJ .202 MC QPEAK-TJ .202 MC QPEAK-TJ .355 MC QPEAK-TJ .628 MC .925 MC .225 MC .225 MC .228 MC .228 MC	peakDate	hi:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:11 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hi:mm 1:10	R.V 51.90 R.Y 56.10 R.V 51.90 R.V 58.84 R.V 51.90 51.90 51.90 35.12 51.90 51.90 52.90 	R.C. .724 R.C. .504 F.C. .724 F.C. .821 R.C. .1/a n/a n/a n/a n/a R.C.
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 :CR=65.0 [SLOSS=2 :CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 7.00 [LOSS=2 :CR=65.0 [COSS=2 :CR=65.0 [SLP=1.00:DT= 5.00 [LOSS=2 :CR=65.0 [COSS=2 :CR=65.0] [SLMP=1.00:DT= 5.00 [LCOSS=2 :CR=65.0 [COSS=2 :CR=65.0] [COS=0010]] D:NHID 02:C-202]] D:NHYD 03:C-203] 1 D:NHYD 04:C-204]] D:S:C-203] D:S:C-203] D:NHYD 02:C-203] D:S:C-203 03:C-203 04:C-204 03:C-205 06:C-205 05:C-205 0		QPEAK-TI .925 FC QPEAK-TJ .202 MC QPEAK-TJ .202 MC QPEAK-TJ .355 MC QPEAK-TJ .628 MC .925 MC .225 MC .225 MC .228 MC .228 MC	peakDate	hi:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:11 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hi:mm 1:10	R.V 51.90 R.Y 56.10 R.V 51.90 R.V 58.84 R.V 51.90 51.90 51.90 35.12 51.90 51.90 52.90 	R.C. .724 R.C. .504 F.C. .724 F.C. .821 R.C. .1/a n/a n/a n/a R.C.
[XIMP=.57: TIMP=.64 [SLP=1.50: DT= 5.00 [LOSS=2 : CR= 65.0 03:0006]]]]]]]]]]]]]	-AREA 3.07 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 1.95 3.07 1.90 5.20 2.22 14.35 AREA 14.35 2.59 31.76	QPEAK-TT 	peakDate	1110 110 h:mm 1:10 h:mm 1:10 h:mm 1:10 h:mm 1:10 h:mm 1:10 h:mm 1:10 1:05 1	R.V 51.90 R.V 50.80 	R.C. .724 R.C. .504 F.C. .724 F.C. .821 R.C. .821 R.C. .821 R.C. .1/a n/a n/a n/a n/a n/a n/a n/a n/a
[XIMP=.57:TIMP=.64 (SLP=1.50:DT= 5.00 [LOSS=2 : CR=65.0 003:0006]]] D:NH1D 02:C-202]] D:NHYD 03:C-203]] D:NHYD 04:C-204]] D:NHYD 05:C-203] D:SC-203] D:SC-203 02:C-201 02:C-201 02:C-202 02:C-203 04:C-204 05:C-203 04:C-204 05:C-203 06:C-203 06:C-205 06:C-2 06:C-2 07:CZmaj 09:CTmin 3, TotofeFv01 D:NHYD	-AREA	QPEAK-TI .222 MC QPEAK-TJ .222 MC QPEAK-TJ .222 MC QPEAK-TJ .548 MC QPEAK-TJ .528 MC .225 MC .235 MC	peakDate	11:10 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 1:05	R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 558.84 53.93 R.Y 51.90 R.Y 50.84 R.Y 5	R.C. .724 R.C. .504 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724
[XIMP=.57:TIMP=.64 (SLP=1.50:DT= 5.00 [LOSS=2 : CR=65.0 003:0006]]] D:NH1D 02:C-202]] D:NHYD 03:C-203]] D:NHYD 04:C-204]] D:NHYD 05:C-203] D:SC-203] D:SC-203 02:C-201 02:C-201 02:C-202 02:C-203 04:C-204 05:C-203 04:C-204 05:C-203 06:C-203 06:C-205 06:C-2 06:C-2 07:CZmaj 09:CTmin 3, TotofeFv01 D:NHYD	-AREA	QPEAK-TI .222 MC QPEAK-TJ .222 MC QPEAK-TJ .222 MC QPEAK-TJ .548 MC QPEAK-TJ .528 MC .225 MC .235 MC	peakDate	11:10 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 1:05	R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 558.84 53.93 R.Y 51.90 R.Y 50.84 R.Y 5	R.C. .724 R.C. .504 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724
[XIMP=.57: TIMP=.64 [SLP=1.50: DT= 5.00 [LOSS=2 : CR=65.0 [LOSS=2 : CR=65.0 [SLP=1.00: DT= 7.00 [SLP=1.00: DT= 7.00 [SLP=1.00: DT= 7.00 [LOSS=2 : CR=65.0 [OO3:0007]] D:NHID 02:C-202]] D:NHYD 03:C-203]] ID:NHYD 04:C-203] ID:NHYD 04:C-204] ID:NHYD 05:C-203] ID:NHYD 01:C-201 02:C-203 04:C-204 05:C-203 04:C-204 05:C-203 04:C-205 06:C-205 05:C	-AREA	QPEAK-TI .222 MC QPEAK-TJ .222 MC QPEAK-TJ .222 MC QPEAK-TJ .548 MC QPEAK-TJ .528 MC .225 MC .235 MC	peakDate	11:10 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 1:05	R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 558.84 53.93 R.Y 51.90 R.Y 50.84 R.Y 5	R.C. .724 R.C. .504 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724
[XIMP=.57:TIMP=.64 [SLP=1.50:TMP=.64 [LOSS=2:CR=65.C 003:0006]]]]]]]]]]]]]	-AREA	QPEAK-TI .222 MC QPEAK-TJ .222 MC QPEAK-TJ .222 MC QPEAK-TJ .548 MC QPEAK-TJ .528 MC .225 MC .235 MC	peakDate	11:10 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 hh:mm 1:10 1:05	R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 558.84 53.93 R.Y 51.90 R.Y 50.84 R.Y 5	R.C. .724 R.C. .504 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724 F.C. .724
[XIMP=.57: TIMP=.64 [SLP=1.50: DT= 5.00 [LOSS=2 : CR=65.0 [LOSS=2 : CR=65.0 [LOSS=2 : CR=65.0 [SLP=1.00: DT= 7.00 [SLP=1.00: DT= 7.00 [LOSS=2 : CR=65.0 [COSS=02 : CR=65.0 [SLP=1.00: DT= 5.00 [SLP=1.00: DT= 5.00 [SLP=1.00: DT= 5.00 [SLMP=.100: DT= 5.00 [CIMP=.100: DT= 5.00 [CIMP=.100: DT= 5.00 [CIMP=.100: DT= 5.00 [CIMP=.100: DT= 5.00 [CIMP=.100: DT= 5.00 [CIMP=.100: DT= 5.00] [CIMP=.100: DT= 5.00 [CIMP=.100: DT= 5.00] [CIMP=.100: DT= 5.00] [XIMP=.100: DT= 5]] DI:NHID 02:C-202]] DI:NHYD 03:C-203]] ID:NHYD 04:C-204] ID:NHYD 04:C-204] ID:NHYD 05:C-205] ID:NHYD 02:C-202 02:C-202 02:C-203 02:C-203 04:C-204 05:C-203 04:C-204 05:C-205 06:C-2 10:NHYD 06:C-205 05:C-205	-AREA 3.07 -AREA 3.07 -AREA 5.20 -AREA 2.22 -AREA 1.95 3.07 -AREA 1.95 3.07 1.90 5.20 1.90 1.90 1.90 1.20	QPEAK-TI .925 IC .925 IC .935 IC .93	peakDate	himm	R.V51.90 R.V51.90 R.V51.90 R.V51.90 R.V51.90 51	R.C. .724 R.C. .504 F.C. .821 R.C. .821 R.C. .1/a n/a n/a n/a n/a n/a n/a n/a n/a n/a n
[XIMP=.57: TIMP=.64 [SLP=1.50: DT= 5.00 [LOSS=2 : CR=65.0 [LOSS=2 : CR=65.0 [LOSS=2 : CR=65.0 [XIMP=.57: TIMF=.64 [SLP=1.00: DT= 5.00 [LOSS=2 : CR=65.0 003:0000 * DESIGN STANDHYD [XIMP=.74: TIMP=.34 [SLP=1.00: DT= 5.00 [LOSS=2 : CR=65.0 003:0000 * DESIGN STANDHYD [XIMP=.75: TIMP=.64 [SLP=1.00: DT= 5.00 [LOSS=2 : CR=65.0 003:0010]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 1.96 3.07 1.90 2.22 14.35 2.39 1.76 1.76 1.76 1.70 1.20 	QPEAK-TT 	peakDate	1110 110 h:mo 1:10 h:mo-	R.V 51.90 R.V 50.84 	R.C. .724 R.C. .504 F.C. .724 F.C. .821 R.C. .821 R.C. .821 R.C. .724 F.C. .821 R.C. .554 F.C. .554
[XIMP=.57:TIMP=.64 [SLP=1.50:DT= 5.00 [LOSS=2 : CR= 65.0 [XIMP=.57:TIMP=.64 [XIMP=.57:TIMP=.64 [XIMP=.57:TIMP=.64 [SLP=1.00:DT= 5.00 [LOSS=2 : CR= 65.0 [COS:0007]] D:NHID 02:C-202]] D:NHYD 03:C-203]] ID:NHYD 04:C-204]] ID:NHYD 04:C-203]] ID:NHYD 02:C-203]] ID:NHYD 02:C-204 03:C-204 03:C-204 03:C-204 03:C-204 03:C-204 03:C-204 03:C-204 03:C-205 06:C-2 ID:NHYD 06:C-205 ID:NHYD 06:C-205 ID:NHYD 06:C-203 ID:NHYD 06:C-103 ID:NHYD	AREA 1.96 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 1.96 3.07 1.90 2.22 14.35 2.39 1.76 1.76 1.76 1.70 1.20 	QPEAK-TT 	peakDate	1110 110 h:mo 1:10 h:mo-	R.V 51.90 R.V 50.84 	R.C. .724 R.C. .504 F.C. .724 F.C. .821 R.C. .821 R.C. .821 R.C. .724 F.C. .821 R.C. .554 F.C. .554
[XIMP=.57:TIMP=.64 [SLP=1.50:TIMP=.64 [SLP=1.50:TIMF=.64 [LOSS=2 : CR=65.0 [LOSS=2 : CR=65.0 [XIMP=.57:TIMF=.64 [SLP=1.00:DT= 5.00 [LOSS=2 : CR=65.0 003:0007]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 1.96 3.07 1.90 2.22 14.35 2.39 1.76 1.76 1.76 1.70 1.20 	QPEAK-TT 	peakDate	1110 110 h:mo 1:10 h:mo-	R.V 51.90 R.V 50.84 	R.C. .724 R.C. .504 F.C. .724 F.C. .821 R.C. .821 R.C. .821 R.C. .724 F.C. .821 R.C. .554 F.C. .554
[XIMP=.57:TIMP=.64 [SLP=1.50:TMP=.64 [LOSS=2:CR=65.C 003:0006]]]]]]]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 2.22 AREA 1.96 3.07 1.90 2.22 14.35 AREA 1.27 14.35 AREA 1.20 AREA 90 	QPEAK-TJ .925 IC .925 IC .927 IC .937 IC .93	peakDate	himm	R.V 51.90 R.V 51.90 R.V 56.19 R.V 51.90 R.V 51.90 R.V 51.90 36.12 51.90 50.89 50.89 50.89 50.89 50.22 f= R.Y 33.73 34.73	R.C. .724 R.C. .504 F.C. .724 F.C. .821 F.C. .821 R.C. n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a
[XIMP=.57:TIMP=.64 [SLP=1.50:TMP=.64 [LOSS=2:CR=65.C 003:0006]]]]]]]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 2.22 AREA 1.96 3.07 1.90 2.22 14.35 AREA 1.27 14.35 AREA 1.20 AREA 90 	QPEAK-TJ .925 IC .925 IC .927 IC .937 IC .93	peakDate	himm	R.V 51.90 R.V 51.90 R.V 56.19 R.V 51.90 R.V 51.90 R.V 51.90 36.12 51.90 50.89 50.89 50.89 50.89 50.22 f= R.Y 33.73 34.73	R.C. .724 R.C. .504 F.C. .724 F.C. .821 F.C. .821 R.C. n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a
[XIMP=.57:TIMP=.64 [SLP=1.50:TMP=.64 [LOSS=2:CR=65.C 003:0006]]]]]]]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 2.22 AREA 1.96 3.07 1.90 2.22 14.35 AREA 1.27 14.35 AREA 1.20 AREA 90 	QPEAK-TJ .925 IC .925 IC .927 IC .937 IC .93	peakDate	himm	R.V 51.90 R.V 51.90 R.V 56.19 R.V 51.90 R.V 51.90 R.V 51.90 36.12 51.90 50.89 50.89 50.89 50.89 50.22 f= R.Y 33.73 34.73	R.C. .724 R.C. .504 F.C. .724 F.C. .821 F.C. .821 R.C. n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a
[XIMP=.57:TIMP=.64 [SLP=1.50:TMP=.64 [LOSS=2:CR=65.C 003:0006]]]]]]]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 2.22 AREA 1.96 3.07 1.90 2.22 14.35 AREA 1.27 14.35 AREA 1.20 AREA 90 	QPEAK-TJ .925 IC .925 IC .927 IC .937 IC .93	peakDate	himm	R.V 51.90 R.V 51.90 R.V 56.19 R.V 51.90 R.V 51.90 R.V 51.90 36.12 51.90 50.89 50.89 50.89 50.89 50.22 f= R.Y 33.73 34.73	R.C. .724 R.C. .504 F.C. .724 F.C. .821 F.C. .821 R.C. n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a
[XIMP=.57:TIMP=.64 [SLP=1.50:TMP=.64 [LOSS=2:CR=65.C 003:0006]]]]]]]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 2.22 AREA 2.22 AREA 2.22 AREA 1.96 3.07 1.90 2.22 14.35 AREA 1.27 14.35 AREA 1.20 AREA 90 	QPEAK-TJ .925 IC .925 IC .927 IC .937 IC .93	peakDate	himm	R.V 51.90 R.V 51.90 R.V 56.19 R.V 51.90 R.V 51.90 R.V 51.90 36.12 51.90 50.89 50.89 50.89 50.89 50.22 f= R.Y 33.73 34.73	R.C. .724 R.C. .504 F.C. .724 F.C. .821 F.C. .821 R.C. n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a
[XIMP=.57:TIMP=.64 (SLP=1.50:DT= 5.00 [LOSS=2 : CR= 65.0 003:0006]]] D:NHYD 02:C-202]] D:NHYD 03:C-203]] D:NHYD 05:C-204]] D:NHYD 05:C-203]] D:NHYD 05:C-203 03:C-204 03:C-205 03:C-204 03:C-205 03:C-205 03:C-103 0]]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 5.20 AREA 2.22 AREA 2.22 AREA 1.95 3.07 1.90 2.22 14.35 AREA 1.27 11.76 AREA .90 AREA .90 1.77 7.36 5.1.96 2.22	QPEAK-TI 	peakDate	himm 1:10 hi	R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 	R.C. .724 .724 .724 .724 .724 .724 .724 .72
[XIMP=.57:TIMP=.64 [SLP=1.50:TMP=.64 [LOSS=2:CR=65.C 003:0006]]] D:NHYD 02:C-202]] D:NHYD 03:C-203]] D:NHYD 05:C-204]] D:NHYD 05:C-203]] D:NHYD 05:C-203 03:C-204 03:C-205 03:C-204 03:C-205 03:C-205 03:C-103 0]]]]]]]]]]]]]]	AREA 1.96 AREA 3.07 AREA 5.20 AREA 5.20 AREA 2.22 AREA 2.22 AREA 1.95 3.07 1.90 2.22 14.35 AREA 1.27 11.76 AREA .90 AREA .90 1.77 7.36 5.1.96 2.22	QPEAK-TI 	peakDate	himm 1:10 h:m	R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 R.Y 51.90 	R.C. .724 .724 .724 .724 .724 .724 .724 .72

Shirley's Brook SWMF C (Interim) - Summary Output

		•								
	:	ROUTE RESE	VOIR ->	10:C_IN_T	21.23	2.216 1	No_date	1;10	45.76	n/a
		[LDT= 5.00 (MxStoUsed)	D] out<- =.7337E+0	10:C_IN_T 01:C_OUT_ 0}	21.23	1.524 1	<pre>% date</pre>	1:55	45.75	n/a
1	003:	0016		ID:NHYD 10:C_IN_T	AREA	-QPEAK-7	PpeakDate	hh:P-6	R.VI 45.76	R.C. nío
		fname :M:	2003\103	106\DATA\CAL	COL-1\S₩M	HYMO\SM	WFC~1\C_1	N_T.003		
	**	remark: In: END OF RUN	tio to S	WMF C - inte	L1 0.					
•				**********	********	*******	********	*******	******	***
1	RUN:	COMMAND#								
	004:	01947								
		(TZERO = (METOUT=	.00 hr	s on =imperial, 2	0] =metric c	nitmit)]				
		[NSTORM= [NRUN =	11	-important, a		arbart'				
#	****	*********	*******	**********	********	******	********	********	******	***
#	Pr	oject Name	: [Shirle : 05-28-2	's Brook -	SWMF C]		Projec	t Number	: [10310	06]
Ħ	Mo	te deller mpany	[M.Pete	piece] H ENGINBERIN		-				
#	Li	cense #			G CONSOLI	ANIS DI				
#		t-Developm	ent Condi	tions to SWM	Facility	, 'C'				
#	Int	erim condi	tions - K	londike Road	i not urba	unized ea	ast of CC	R	in	
# #			đ	RP Industria irectly to &	hirley's	Brook.				
#	****	0002		************	********	*******	********	******	*******	***
		READ STORM								
		Filename Comment	- City of	Ottawa: 10	0yr-12hr	SCS T; p	e II (10	min time	step)	
	004 -	[SDT=10.0 0003	0:SDUR=	12.00:PTOT= ID:NHYD	96.00]	-OPEAK-	TueakDate	a bh:mm	R.V	R.C.
	*	DESIGN STA (XIMP=.30	NDHYD	ID:NHYD 01:C-300	7.48	. 922 1	No_date	6:00	57.36	.598
		[SLP=1.00	:DT= 5.00	i						
	004:	[LOSS= 2 0004		TD . NUND	AREA	-OPBAK-	TpeakDate	≥ hh:mm	R.V	R.C.
		COMPUTE DU	ALHYD	01:C-300 02:C-3maj 09:C-3min 13, TotOvfVol	7.48	.922 1	No_date	6:00	57.36	n/a
		Minor S	ystem \	09:C-3min	7.48	.636 1	No_date	5:45	57.27	n/a
	004:	(MjSyaSto .0005	=,2175E+0	ID: NHYD	ARBA	OPEAK-	f= 0. TpeakDate	TotDurOw hh:mm	r£= 0 R.V:	.hrs R.C.
	*	DESIGN STA [XIMP=.57	NDHYD	ID:NHYT	1.96	.331	No_date	6:00	72,71	. 757
		[SLP=1.50	:DT= 5.00	1						
	004:	0006	:CN= 65.0	ID:NHYD	AREA	-OPEAK-	TpeakDate	a hh:mm	R.V	R.C.
	•	DESIGN STA	NDHYD :TIMP=.64	02:C-202	3.07	.512	No_date	6:00	72.71	. 757
		[SLP=1.00	DT= 5.00)]						
	004	[LOSS= 2 0007	:CN= 65.0)] · ID : NHYD	AREA	-OPEAK-	TpeakDate	e bh:mm		R,Ĉ.
	*	DESIGN STA	NDHYD :TIMP=.30	03:C-203	1.90	. 220	No_date	G:00		
		[SLP=1.00	:DT= 5.00	21						
	004	2008	:CN= 65.0	ID:NHYD	AREA	OPEAK-	TpeakDate	e hh:mm	R.V	R.C.
	*	DESIGN STA	NDHYD ':TIMP=,G4	04:C-294	5.20	.865	No_date	6:00	72.71	.757
		[SLP=1.00):DT= 5.00)]						
	004	0009	:CN= 65.0	TD · NHYD	AREA	QPE-K-	TpeakDate	e hh:mm	R.V	R.C.
	*	DESIGN STA	NDHYD :TIMP=.8	05:C-205	2.22	,423	No_date	6:00	81.18	.B46
		(SLP=1.00):DT= 5.00	1						
	004	[LOSS= 2 :0010	:CN= 65.0	ID:NHYD	AREA	OPEAK-	TpeakDat	e hh:mm~-	R."	R.C.
		ADD HYD	+	01:C-201 02:C-202	1.96	.331	No_date	6:00	72.71 72.71	nja n/a
			+	03:0-203	1.90	. 220	No_date	6:00	53.69	n/a
			*	04:C-203 04:C-204 05:C-205 06:C-2	5.20	.865	No_date No_date	6:00	72.71 81.18	n/a n/a
	0.1	[DT= 5.00)] SUM=	06:C-2	14.35	2.352 OPTAK-	No_date	6:00	71.50	n/a
	004	CONFUTE DU	THAD	06:C-2	14.35	2.352	No_date	6:00	71.50	n/a
		Minor S	Bystem / Bystem \	ID:NHYD 06:C-2 07:C2maj 08:C2min	1.03	1.088	No_date No_date	6:00 5:35	71.50 71.50	n,a n,a
	*	DESIGN STA	DYHCIN	ID:NHYD 06:C-103	1.20	.154	ilo_date	6:00	58.19	.006
		[XIMF=.30 [SLP=1.00	:TIFP=.4)))]						
	004	[LOSS= 2	:CN= 65.		AREA	OPERK-	Treskist	e hh∗mm	F.1	R.C.
	004	DESIGN NAS	TYP	05:C-102	.90	. 129	No_date	6:00	56.51	.582
		[Tp= .17	0: N= 3.0 7:DT= 5.0]						
	004	.0017		TD-NHYD	AT. <u>EA</u>	OPEAK-	TpeakDate	e_hh:mm	R.Y	R.C.
		ADD HID	÷	C5:C-103	1.20	.154	No_date	6:0.	58.13	n/a
			÷	05:C-102 C5:C-103 08:C2min 09:C-3min 10:C_IN_T	13.32	1.220	No_date	5:35 5:45	71.50 57.27	n/a n/a
	004	:0015		- TD: NHAD	AREA	UPKAK-	TDEAKDAL	e nn:mm	K. V	R.C.
	004	ROUTE RESI	ERVOIR ->	10:C_IN_T 01:C_OUT_	22.90	2.139	ino_date	6:00	65.57	n/a
	00.1	:0016		-ID:NHYD 10:C_IN_T 3106\DATA\CA	AREA	QPEAK-	TpeakDat	e_lih:mm	R.1	R.C.
		fname :)	:\1903\10	3106 \DATA \CA	LCUL-1\SW	THAMO/SM	WEC~1\C_	IN_T.004	-3.37	**/ 64
		remark: D	nflç⇒to ,	EWMF C - int	eriu					
		FINISH								
	****	*********	********	**********						
		WARNINGS ,								
	001	:0305 DESIG		ND Age Coeffici	ent is em	aller +>	ומח <u>ה</u> די			
			Use	a smaller DT						
	001	:0005 DE210	GN STANDH	נוז <u> </u>						

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(M:\...SWM_C1.sum)

1100 \$ 1 \$ \$ \$	
***	MARKING, Cronfficient is staller than DTI
	WARNING: Storage Coefficient is smaller than DT: Use a smaller DT or a larger area.
	Use a smaller bi of a larger area.
001:0007	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT!
	Use a smaller DT or a larger area.
001:0008	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT!
	Use a smaller DT or a larger area.
001:0005	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT!
	Use a smaller DT or a larger area.
001:0012	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
	Use a smaller DT or a larger area.
002:0003	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT:
	Use a smaller DT or a larger are .
002-0005	DECIGN STANDHYD
112.0005	WARNING: Storage Coefficient is smaller than DT
	Use a smaller DT or a larger area.
000.0006	DESIGN STANDHYD
	WERNING: Storage Coefficient is smaller than DT:
***	Use a smaller DT or a larger area.
002:0007	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT: Use a smaller DT or a larger area.
	Use a smaller DT or a larger trea.
002:0000	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT!
	Use a smaller DT or a larger area.
002:0009	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT1
	Use a smiller DT or a larger area.
002+0012	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT!
	Dae a smaller DT or a larger area.
003:0003	DESIGN STANDHYD
	WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
	Use a smaller bi of a larger area.
003:0005	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT:
	Use a smiller DT or a larger area.
003:0006	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or & larger area.
	Use a smaller DT or a larger area.
003:0007	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DTI
	Use a smaller DT or a larger area.
002.0008	DESIGN STANDHYD
***	WARNING, Storage Coefficient is smaller than DT
	WARNING: Storage Coefficient is smaller than DTI Use a smaller DT or a larger area.
000 0000	DESIGN STANDHYD
003:0005	DESIGN STANDHID
	WARNING: Storage Coefficient is smaller than DT:
	Use a smaller DT or a larger area.
003:0012	DESIGN STANDHYD
***	WANNING: Storage Coefficient is smaller than DT; Use a smaller DT or a larger area.
	Use a smaller DT or a larger area.
004:0003	DESIGN STANDHYD
***	WARHING: Storage Coefficient is smaller than DTI
	Use a smaller DT or a larger area.
004-0005	DESIGN STANDHYD
***	WARNIN3: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
	The a smaller DT or a larger area.
004.0006	DESIGN STANDHYD
004:0005	DESIGN STANDAID
	WARNING: Storage Coefficient is smaller than DT!
	Use a smaller DT or a larger area.
004:0007	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DTI
	Use a smaller DT or a larger area.
004:0008	DESIGN STANDHYD
***	WARNING: Storage Coefficient is smaller than DTI
	Use a smaller DT or a larger area.
004:000	DESIGN STANDHYD
***	WARNING: Storage Cuefficient is smaller than DT:
	Use a smaller DT or a larger area.
004-0013	DESIGN STANDHYD
004:0014	WARNING: Storage Coefficient is smaller than DTI
•*•	Use a smaller DT or a larger area.
o	une a suditer bi of a target dies.
Simula	ation ended on 2006-11-09 at 15:15:30

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TIERD=(0.0], HETOUT=(2), NSTORM=(1), NRUN=(3) CIOD-3:st# TIERD=(0.0), HETOUT=(2), NSTORM=(1), NRUN=[4] SIOD-12.utr

		16
2 Metric units	; ************************************	Brosicn Control * Syr Starm:
	(Shirley's Bropk - SWMF C) Project Number: [103106]	BOUTE RESERVOIT
*# Date : *# Modeller :	[M. Peteolece]	BUVIE ADDERIVEN
*# Compan; : *# License # :	NOVATECH ENGINEERING CONSULTANTS LTD 5320763	
•#	nt Conditions to SWM Facility 'C'	
*#************************************	TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1]	
*	C25mm-3.stm	
READ STORM	STORM_FILENARE=["storm.001"]	
*======================================		527
*	KLONDIKE FOAD SUBDIVISION LANDS TO SWM FACILITY C	29/18 NAD
* •	ULTIMATE CONDITIONS	000295-097777
* Klondike Area C	- 100	*1
* (Institutional/)		
* 7.48 ha ? 50 r	$n_3/h_2 = 374 m_3$	START
DESIGN STANDHYD	ID=[1], NHYD=[°C-300°], DT=[5]min, AREA=[7.48](hs), XIMP=[0.30], TIMP=[0.37], DWF=[0](cas), LOSS=[2], CN=[65],	START
	SLOPE = [1.0] (, $END = -1$	•
COMPUTE DUALHYD	IDin=[1], CINLET=[0.636](cms), NINLET=[1], MAJID=[2], MajNHID=["(-3maj"], MINID=[9], MinNHID=["(-3min"], TMJSTO=[374](cu-m)	FINISH
*		
* Klondike Area C * medium density :	-201	
*		
DESIGN STANDHID	ID=[1], NHID=["C-201"], DT=[5]min, AREA=[1.96](ha), XINP=[0.57], TIMP=[0.64], DWF=[0](cms), LOSS=[2], CN=[65], SLOPE=[1.5](¥), END=-1	
* * Klondike Area C		
* (medium density		
DESIGN STANDHYD	$ \begin{array}{l} ID=\{2\}, \ NHYD=\{"C-2D2"\}, \ DT=\{5\}min, \ AREA=\{3,07\}\ (ba), \\ XIMP=\{0,57\}, \ TIMP=\{0,64\}, \ DWF=\{0\}\ (cms), \ LOSS=\{2\}, \ CN=\{S\}, \\ SLOPRe=\{1,0\}\ (\downarrow), \ END=-1 \end{array} $	
* Klondike Area C * (park)		
DESIGN STANDHYD	ID=[3], NHYD=[*C-203"], DT=[5]min, AREA=[1.90](h.),	
	<pre>XIMP=[0.24], TIMP=[0.30], DWF=[0](cms), LOSS=[2], CN+[0]] SLOPE=[1.0](%), END=-1</pre>	
* * Klondike Area C	- 204	
* (medium density	residential)	
DESIGN STANDHYD	<pre>ID=[4], NHYD=[*C-201*], DT=[5]min, AREA=(5.20](ha), XINP=[0.57], TIMP=[0.64], DWF=[0](cms), LOSS=[2], ZN=[65],</pre>	
8	SLOPE=[1.0](3), END=-1	
* Klondike Area C		
* (Klondike Koad)	U/S of CCR)	
DESIGN STANDHYD	ID=[5], NHTD=[*C-205"], DT=[5]min, AREA=[1.22](ha), XIME=[0,70], TIME=[0.30], DWF=[0](cms), LOSS=[2], CN=[45], SLOPE=[1.0](\$), END=-1	
* Klondike Area C		
ADD HYD	IDsum=[6], NHYD=["C-2"], IDs to add=[1,2,3,4,5]	
* 14.35 ha e .5	rture for Area C-2: L/s/ha = 1220 L/s m3/ha = 718 m3	
*		
COMFUTE DUALHYD	MAJID=[7], MajBHYD=[*C2m4j°], MINID=[2], MinNHYD=[*C2min"],	
** * Klondike Aren C	THJ3070= [718] (cu-m) 	
* (Industrial)		
	$ \begin{array}{l} \label{eq:linear} {\rm ID} = \{1, \ {\rm NNED} = \{2, -102^\circ\}, \ {\rm DT} = \{5, -101^\circ\}, \ {\rm DT} = \{0, -101^\circ\}, \ {\rm DNF} = \{0, -101^\circ\}, \ {\rm LOSS} = \{2\}, \ {\rm CN} = \{5\}, \ {\rm SLOFE} = \{0, 0\}, \ {\rm LOSS} = \{2\}, \ {\rm CN} = \{5\}, \ {\rm SLOFE} = \{0, 0\}, \ {\rm LOSS} = \{1, 0\}, \ {\rm LOSS} $	
* 3.16 ha * 85 L/ * 3.16 ha * 50 m3	/h. = 153 m3	
COMPUTE DUALHYD		
*************	-103 (Klondike Road D/S of CCR)	
* Klondike Area C		
* Klondike Area C	TD = [C] where $[TD = [D] = [T] =$	
* Klondike Area C * DESIGN STANDHYD	ID=[6], NHYD=[*C-103*], LT=[5]min, ARRA=[1.20];ha), XIMP=[0.70], TIMP=[C.80], DWF=[0](cms), LC3S=[2], CN=[65], SLOPE=[1.0](%), END=-1	
 Klondike Area C DESIGN STANDHYD **	ID=[G], NHYD=[*C-103"], LT=[5]min, AREA=[1.20] [ha), XIMP=[0.70], TIMF=[C.80], DWF=[0](Cms), LCSS=[2], CN=[65], SLOPE=[1.0] (b), END=-1	
 Klondike Area C DESIGN STANDHYD *; * Klondike Area C DESIGN NASHYD 	<pre>ID=[6], NHYD=[*C-103"], LT=[5]min, AREA=[1.20] [ha], XIMP=[0.70], TIMP=[C.80], DWF=[0] (cms), LC3S=[2], CN=[65], SLOPE=[1.0] (t), SMD=-1 </pre>	
 Klondike Area C DESIGN STANDHYD *; * Klondike Area C DESIGN NASHYD 	<pre>ID=[6], NHYD=[*C-102"], LT=[5]min, AREA=[1.20] [ha], XIMP=[0,70], TIMP=[C.80], DWF=[0](cms), LC3S=[2], CN=[65], SLOPE=[1.0](%), END=-1 </pre>	
 Klondike Area C DESIGN STANDHYD *; * Klondike Area C DESIGN NASHYD 	<pre>ID=[6], NHYD=[*C-103"], LT=[5]min, AREA=[1.20] [ha], XIMP=[0.70], TIMP=[C.80], DWF=[0] (cms), LC3S=[2], CN=[65], SLOPE=[1.0] (t), SMD=-1 </pre>	
<pre>* Klondike Area C DESIGN STANDHYD * Klondike Area C DESIGN NACHYD * ADD HYD *</pre>	<pre>ID=[d], NHYD=[*C-103"], LT=[5]min, AREA=[1.20] [ha), XTMP=[0,70], TMP=[C.80], DWF=[0](cms), LC3S=[2], CN=[65], SLOPE=[1.0](%), END=-1 </pre>	
<pre>* Klondike Area C DESIGN STANDHYD * Klondike Area C DESIGN NACHYD * ADD HYD * * SWMF C</pre>	<pre>ID=[0], NHYD=[*C-102"], LT=[5]min, AREA=[1.20] [ha), XIMP=[0.70], TMM=F[C.80], DWF=[0](cms), LG3S=[2], CN=[65], SLOPE=[1.0](%), END=-1 </pre>	

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9 9	8 8
StormWater Management HYdrologic Mcdel 999	883
***************************************	*****

****** A single event and continuous hydrologic simulati ******* based on the principles of HYMO and its success	Saors ******
******* OTTHYNO-83 and OTTHYNO-89.	******
******* Distributed by: J.F. Sabourin and Associates Inc.	
******* GLtawa, Ontario: (613; 727-5199	******
******* Gatineau, Quebec: (819) 243-6858 ******* E-Mail: swmbymo@jfsa.Com	******

+++++++++++++++++++++++++++++++++++++++	
++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS L7 +++++++ Nepean SERIAL#:53207	CD ++++++
++++++ Nepean SERLAL#:53207	763 +++++++
***************	*********
***************************************	**********
******* ++++++ PROGRAM ARRAY DIMENSIONS ****++ ******* Maximum value for ID numbers : 10	******
******* Hax. number of rainfall points: 15000	*****
Hax. number of flow points : 15000	******
*** DESCRIPTION SUMPARY TABLE HEADERS (units depend on MET	OUT in START) ***
*** ID: Hidrograph IDentification numbers (1-16)	***
*** IHTD: Hydrograph reference numbers, (6 digits or che *** AREA: Drainage area associated with hydrograph, (ac.	racters). ***
*** QPEAK: Peak flow of simulated hydrograph, (ft^3/s) or	.) or (ha,). *** r (m^3/s). ***
*** TpeakDite hh:mm is the date and time of the peak flow.	***
*** R.7.: Runoff Volume of simulated hydrograph, (in) or *** R.C.: Runoff Coefficient of simulated hydrograph, (i)	(mm). ***
*** R.C.: Runoff Coefficient of simulated hydrograph, (1 *** *: see WAINING or NOTE message printed at end of	run. ***
*** **: see EFROR message printed at end of run.	
************	******
***************************************	********
**************************************	*********
**********	********
* DATE: 2006-10-05 TIME: 09:39:06 RUN COUNTR	R: 000419 *
 Input filename: M:\2003\103106\DATA\CALCUL~1\SWMHYMO\S 	
* Cutput filename: M:\2003\103106\DATA\CALCUL-1\SWMHYMO\5	SMWFC-1\SWNi C.out*
* Summary filename: M:\2003\103106\DATA\CALCUL~1\SWMHYMC\s * User comments:	MWEC-1\SWm C sumt
	AND C-I (DRAL_CIDER
* 1:	*
* 1: * 2:	*
* 1:	
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* 1: * 2: * 3:	······································
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* 1: * 2: * 3:	
<pre>* 1:* 2:* 3:* * 3:* # Pruject Name: [Shirley's Brook - SWMF C] Pro # Date : 05-28-2005 # Modeller : [M.Petepiece] # Company : NOTATECH ENGINEERING CONSULTANTS LTD # License # : 5320763</pre>	
<pre>* 1: * 2: * 3: # Freject Name: [Shirley's Brook - SHMF C] Proj # Date : 05-28-2005 # Modeller : (M.Petepiece] # Company : NOFATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 #</pre>	
<pre>* 1: ? 2: ? 3: # Fruject Name: [Shirley's Brook - SWMF C] Proj # Date : 05-28-2000 # Modeller : [N.Petepiece] # Company : NOWATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN Facility 'C' # Post-Development Fa</pre>	ect Number: [103106]
<pre>1: 2: 3: # Project Name: [Shirley's Brook - SNMF C] Proj # Date : 05-28-200 # Modeller : (M.Petepiece] # Company : NOWATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN Facility 'C' # RUM:COMMAND#</pre>	ect Number: [103106]
<pre>* 1: 2: 3: * 3: # Project Name: [Shirley's Brook - SWMF C] Proj # Date : 05-28-200 # Modeller : [M.Petepiece] # Company : NO/ATECH ENCINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWM: Facility 'C' # Not COMMAND# 001:0001 Encode </pre>	ect Number: [103106]
<pre>* 1: 2: 3: * 3: # Project Name: [Shirley's Brook - SWMF C] Proj # Date : 05-28-200 # Modeller : [M.Petepiece] # Company : NO/ATECH ENCINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWM: Facility 'C' # Not COMMAND# 001:0001 Encode </pre>	ect Number: [103106]
<pre>* 1: 2: 3: * J: * J: * Date : (5.28-200 f * Modeller : (M.Petepiace) # Company : NO/ATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN: Facility 'C' # NON:COMMAND# 001:0001 START [TZERO = .07 hrs on 0] [METOTF = 2 (1=imperial, 2=metric output)]</pre>	ect Number: [103106]
<pre>1:</pre>	ject Number: [103106]
<pre>* 1: 2: 3: # Date : 05-28-200 # Modeller : (M.Petepiece] # Company : NOWATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN: Facility 'C' # NOWATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN: Facility 'C' # NOWATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN: Facility 'C' # NOWATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN: Facility 'C' # NOWATECH ENGINEERING CONSULTANTS LTD # NOWATECH ENGINEERING CONSULTANTS LTD # Intervented Constant Const</pre>	ject Number: [103106]
<pre>* 1: 2: 3: # Drte t Name: [Shirley's Brook - SMMF C] Proj # Date : 05-28-200 # Modeller : (M.Petepiece] # Company : NOWATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN: Facility 'C' # Not-Development Conditions to SWN: Facility 'C' # RUN:COMMAND# 001:0001 START [TZERO = .09 hrs on 0] [METODT= 2 (1=imperial, 2=metric output)] [NETORM= 1] [NETORM= 1] [NETORM= 1] [NETORM= 1] [NETORM= 1] [NETORM= 1] [NETORM= 5001</pre>	ect Number: [103106]
<pre>* 1:* 2:* 3:* * 3:* * Date = (5hirley's Brook - SWMF C) Prof # Date = (05-28-2005 # Company : NOWATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWM Facility 'C' ***********************************</pre>	ect Number: [103106]
<pre>1:</pre>	iect Number: [103106]
<pre>1:</pre>	iect Number: [103106]
<pre>1:</pre>	iect Number: [103106]
<pre>* 1:* 2:* 3:* * 3:* * Date : 05-28-200 - SWMF C] Proj * Date : 05-28-200 + SWMF C] Proj * Modeller : (M.Petepiece] * Company : NOLATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN: Facility 'C' ***********************************</pre>	<pre>sect Number: [103106] sect Number: [103106] sibution - 10 minut ate_bh:numR.VR.C. s</pre>
<pre>* 1:</pre>	ribution - 10 minut ate_hh:mmR.VR.C. 3 1:40 9.92 .397
<pre>* 1:</pre>	ribution - 10 minut ate_hh:mmR.VR.C. 3 1:40 9.92 .397
<pre>* 1:</pre>	ribution - 10 minut ate_hh:mmR.VR.C. 3 1:40 9.92 .397
<pre>* 1:</pre>	ribution - 10 minut tte_hh:mmR.VR.C. : 1:40 9.92 n/a 0:00 .00 n/a 1:40 9.92 n/a 0:00 .00 n/a 1:40 9.92 n/a
<pre>1:</pre>	ribution - 10 minut tte_hh:mmR.VR.C. : 1:40 9.92 n/a 0:00 .00 n/a 1:40 9.92 n/a 0:00 .00 n/a 1:40 9.92 n/a
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<pre>+ 1:</pre>	<pre>cibution = 10 mimi mice h:mmR.VR.C. = 1:40 9.92 n/a 0 00 00 n/a = 0:00 .00 n/a = 1:40 9.92 n/a 0 0.00 .00 n/a = 1:40 9.92 n/a 0 0.00 .00 n/a = 0:00 .00 .00 .00 n/a = 0:00 .00 .00 .00 .00 .00 .00 .00 .00 .0</pre>
<pre>1:</pre>	<pre>cibution = 10 mimi mice h:mmR.VR.C. = 1:40 9.92 n/a 0 00 00 n/a = 0:00 .00 n/a = 1:40 9.92 n/a 0 0.00 .00 n/a = 1:40 9.92 n/a 0 0.00 .00 n/a = 0:00 .00 .00 .00 n/a = 0:00 .00 .00 .00 .00 .00 .00 .00 .00 .0</pre>
<pre> 1: 2: 3: # Date : 05-28-200 # Date : 05-28-200 # Modeller : (M.Petepiace) # Company : NOFATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN Facility 'C' # Tote : (M.Petepiace) # Company : NOFATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN Facility 'C' # Tote : (M.Petepiace) # Company : NOFATECH ENGINEERING CONSULTANTS LTD # License # : 5320763 # Post-Development Conditions to SWN Facility 'C' # Tote : (M.Petepiace) # START [TZERO = .09 hrs on 0] (METOTT = 2 (1=imperial, 2=metric output)] [NETORM= 1] [NETORM = 1] [NETORM= 1</pre>	<pre>cibution = 10 mimi mice h:mmR.VR.C. = 1:40 9.92 n/a 0 00 00 n/a = 0:00 .00 n/a = 1:40 9.92 n/a 0 0.00 .00 n/a = 1:40 9.92 n/a 0 0.00 .00 n/a = 0:00 .00 .00 .00 n/a = 0:00 .00 .00 .00 .00 .00 .00 .00 .00 .0</pre>
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<pre> 1: 2: 4:</pre>	<pre>cibution - 10 minut tre hh:mmR.VR.C. a 1:40 9.92 n/a 0.00 .00 n/a 1:40 9.92 n/a 0.00 .00 n/a 1:40 9.92 n/a 0.140 9.92 n/a 0.140 9.92 n/a 1:40 9.92 n/a 1:40 9.92 n/a 1:40 9.92 n/a 1:40 15.51 .622 ate_hh:mmR.VR.C. a 1:40 15.54 .622 ate_hh:mmR.VR.C.</pre>
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ADD RYD + (DT= 5.00) STM= 001:0011	01:C-201 02:C-202	1.95	.173 No_date	1:40	15.54	n/a n/a
+	03:C-203	1.90	.070 No_date	1:40	3.63	n/e
+	04:C-204	5.20	.428 No_date	1:40	15.54	n/a
* [DT= 5.00] SUM=	05:C-205	14.35	1.166 No date	1:40	15.07	n/a n/a
001:0011	-ID:NHYD	ARE3	QPEAK-TpeakDa	te_hh:mm-	R.V	F.C.
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001:0018 SAVE HYD	-ID:NHYD	AREA	QPEAK-TpeakDa	te_bh:wm	R.V1	R.C.
SAVE HYD	10:SWMC_I	27.09	1.900 No_date	1:40	13.81	n/a
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002:0001 ETART ITERNO 001 INFORT 2 INFORT 2 INFORT 2 INFORMA 1 INFORMA 1 INFORMA 1 INFORMA 2 PROJECT MARE LEMIT Carpan, HOWAT LICENSE 2 3200 POST-DEVELOPMENT CODE COMPANY 10:00:500R PILENARE STORM PILENARE STORM PILENARE STORM PILENARE STORM PILENARE STORM DISIGN STANDARD (MISYSTEM CALL (MISYSTEM CALL (MISYSTEM CALL SUP-150:DTF 5.0 (LOSS 2:CN 55 002:0006	cti cti cti s Erock 2505 2505 cti s Erock 2505 cti s Erock 2505 cti s Erock	0) 2 + etric (2	Proj Proj Proj Proj Proj Proj Proj Proj	<pre>ect Numbra n, TPRAT=0 te_hh:mm 1:10 t:_hh:mm 1:10 t:_hh:mm 1:10 te_hh:mm 1:10 te_hh:mm 1:10 te_hh:mm 1:10</pre>	<pre>c: (1031) 0.4, PealR.TJ 19.73T., V, -I 19.73T., V, -I 20.47R.TI 20.47R.YI 17.70</pre>	x x x x x x x x x x x x x x x x x x x
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(M:\...FU2006B.DAT)

NOVATECH ENGINEERING CONSULTANTS LTD

$(M: \backslash \ldots SWM _ C.sum)$

[DT= 5.00] SUM=	06:C-2	11,35	2.276	No_d te	1:10	27.75	n/a
032:0011	ID: NHYD	ALEA	OPEAK-	TpeakDat	e_nn:ma-		R.C.
COMPUTE DUALKYD Major System / ilinor Systew \ {MjSysSto=,4711E-	00:C-2	14.35	2.270	No date	0,00	27.70	n/a
ilinor System	08:C2min	14.35	1.220	No date	1:05	27.75	n/a
MjSysSto=,4711E	+03, TotO.fV	ol=.0000E+	00, N-Ov	f= 0,	TotDur	vf= ().hrs
 DESIGN STANDHYD 	01:C-101	3.16	.614	No_date	1:10	32.03	, 754
(XIMPS, VO:TIMPS.)	701						
[SLP= .60:DT= 5.	00]						
[LOSS= 2 :CN= 65 002:0013	.0]		0073.10			.	
	1D: NH1D	2 16	QPEAR-	No date	2_111:100-	32 62	·R.C.
Major Sister /	02.0101	3.10	047	No date	1,15	32.03	71/2
Minor System \	07.0101mi	3 11	269	No date	1.05	31 82	n/a
COMPUTE DUALHYD Major System / Minor System \ (MjSysSto=.1580E	+03. Totorfy	ol. 16858+	02. N-Ou	f= 1.	TotDurO	vf= (L bre
002:0014	ID: NHYD	AREA	QPEAK-	Tpe^kDat	e hh:mn-	R.V	R.C.
U02:0014 * DESIGN STANDHYD	06:C-103	1.20	.248	No_date	1:10	33.09	. 778
[XIMP=.70:TIMP=.	80]						
[SLP=1.00:DT= 5.							
[LOSS= 2 :CN= 65	.0]						
002:0015	ID: NHYD- ~-	AREA	OPEAK-	TreakDat	e_nn:m!-	R.V	-R.C.
DESIGN NASHYD	05:C~102	.90	. 058	No_date	1:15	10.09	, 379
[CN= 80.0: N= 3.	001						
[Tp= .17:DT= 5.			OPPAK-	Theshold	a bhram-		D C
002:0013	05.C-102	90	058	No date	1.15	16.09	n/a
+	06:C-103	1.20	.248	No date	1:10	33.09	n/a
	07:C101mi	3.11	.269	No date	1:05	31.62	n/a
+	08:C2min	14.35	1.220	No date	1:05	27.79	n, a
+	09:C-3min	7.48	.636	No date	1:10	19.65	n/a
[DT= 5.00] SUM=	10:SWNC_I	27.04	2,419	No_date	1:10	75.84	n/a
02:0017	ID ; NHYD	AREA	QPBAK-	TpeakDat	e_hh:mu-	R.V.	-R.C.
ROUTE RESERVOIR - [RDT= 5.00] out< [MrStoUsed= 5250R	> 10:SWMC_1	27.04	2.419	No_date	1:10	25.84	n/a
[RDT= 5.00] out<	- 01:SWMC_0	27.04	.164	No_date	2:55	25.84	n/a
002:0018 SAVE HYD	ID:NHYD	AREA	OPBAK-	ipeikDat	e_nn:mm-	R.W.	-R.C.
SAVE HYD	LU:SW/C_I	27.04	2,419	NO_date	1:10	25.84	n,a
fname :M:\2003\1		arcor~1/8%	WHATIO/SP	wrc-1\SW	нс_1N.00	2	
remark:Inflow to	SWAF C						
** END OF RUN : 2							
*******	*********	********	*******	*******	*******	*******	****
RUN : COMMAND#							
003:0001	***********		*******			+++++++++++++++++++++++++++++++++++++++	
START							
[TZERO = .00 [METOUT= 2 [NETORM= 1] [NRUN = 3]	hrs on	0]					
[METOUT= 2	(l=imperial,	, 2=metric	catput)]				
[NSTORM= 1]							
[NRUN = 3]							
***********************	**********						
# Project Name: [Shir		- SWMF C]		Proje	ct Numbe	r: [103]	101]
# Date : 05-26	-2001						
# Mcieller : [n.Pe	teriece]						
# Company : NOVAT							
# company . How	ECH ENGINER	ING CONSUL	LTANTS LI	כי			
# License # : 5320	ECH ENGINEE	ING CONSUL	LTANTS LI	נס			
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# # Post-Development Con	ditions to 8	SWN Facilit	y 'C'				
# # Post-Development Con #***********************	ditions to a	SWM Facilit	y 'C'	******			
# Post-Development Con #************************************	ditions to a	SWM Facilit	y 'C'	******			
# Post-Development Con #************************************	ditions to 8	SWM Facilit	y 'C'	******			
# # Post-Development Con #************************************	ditions to 8	SWM Facilit	C'				
# Post-Development Con #************************************	ditions to &	SWM Facilit	Chicago				
# Post-Development Con #************************************	ditions to &	100yr-3hr F= 71,67]	chicago	(10 minu	te time	step - 1	20
# Post-Development Con #************************************	ditions to &	100yr-3hr F= 71,67]	chicago	(10 minu	te time	step - 1	20
# Post-Development Con #************************************	ditions to 8 .001 of Otta::: .3.00:PTOM ID:NHYD 01:C-300	100yr-3hr F= 71,67]	chicago	(10 minu	te time	step - 1	20
# Post-Development Com #003:0002 READ STORM Filename = Storm Comment = City (SDT=10.00:SFUT= 003:0003 * DESIGN STANDHAD (XINP=.30:TIMP=.		100yr-3hr F= 71,67]	chicago	(10 minu	te time	step - 1	20
# Post-Development Con # Post-Development Con READ STORM Filename = storm Comment = City [SDT=10.00.SDUR= 003:0003 " DESIGN STANDHYD [XIMP=.30:TIMP=. [SIP=1.00:DT= 5.	ditions to 8	100yr-3hr F= 71,67]	chicago	(10 minu	te time	step - 1	20
# Post-Development Con # Post-Development Con READ STORM Filename = Storm Comment = City (SDT-10.00.SFUR- 003:0003- * DESIGN STANDHYD (XIMP=.30:TIMP=. (3LP=1.00.ST=5; LOSS=2:CN=55	ditions to 8	100yr-3hr T= 71.67] 	Chicago OPEAK 1.075	(10 minu TpeakDat No_date	te time e_hh:πω- l:10	step - 3 R.V. 39.16	20 -R.C. .546
# Post-Development Con # Post-Development Con #RAD STORM Filename = btorm Comment = City (SDT-10.00.6STUR 003:0003- * DESIGN STANDHYD (XINP=.30:TIMP=. (3LP=1.00.5T=5. [LOSS=2:CN=65]	ditions to 8	100yr-3hr T= 71.67] 	Chicago OPEAK 1.075	(10 minu TpeakDat No_date	te time e_hh:πω- l:10	step - 3 R.V. 39.16	20 -R.C. .546
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# Post-Development Con # Post-Development Con #RAD STORM Filename = btorm Comment = City (SDT-10.00.6STUR 003:0003- * DESIGN STANDHYD (XINP=.30:TIMP=. (3LP=1.00.5T=5. [LOSS=2:CN=65]	ditions to 8	100yr-3hr T= 71.67] 	Chicago OPEAK 1.075	(10 minu TpeakDat No_date	te time e_hh:πω- l:10	step - 3 R.V. 39.16	20 -R.C. .546
# Post-Development Con # Post-Development Con READ STORM Filename = Btorm Comment = City [SDT=10.00.SFUR- 003:0003	ditions to 8 	100yr-3hr T= 71.67 7.48 	Chicago QPEAK 1.076 QPEAK 1.076 .000 .636	(10 minu TpeakDat No_date TpeakDat No_date No_date No_date	te time :e_hh:mi- 1:10 :e_hh:mm- 1:10 0:00 0:55	step - : R.V. 39.16 R.''. 39.16 .00 39.26	20 -R.C. .546 -R.C. n'a n'z
# Post-Development Con # Post-Development Con READ STORM Filename = Storm Comment = City (SDT-10.00.6NUR 003:0003 * DESIGN STANDHYD (XIMP-3.0:TIMP-, (SLP-1.00.6TF S, LOOSE 2:CN= 55 003:0004 COMFUTS DUALHYD Major System / Mijor System - C03:0005	ditions to & 	100yr-3hr 100yr-3hr T= 71.67] 	QPEAK QPEAK 1.076 .000 .636 +00, N-Or OPEAK	(10 minu TpeakDat No_date -TpeakDat No_date No_date No_date o_date o_date o_date	te time .e_hh:ma- 1:10 .:e_hh:mm- 1:10 0:00 0:55 TotDurC .e_hh:mm-	step - 3 R.V. 39.16 39.16 39.26 rf= R.V.	20 -R.C. .546 -R.C. n'a n/a n/a c.hrs -R.C.
# Post-Development Con # Post-Development Con READ STORM Filename = Storm Comment = City (SDT-10.00.6NUR 003:0003 * DESIGN STANDHYD (XIMP-3.0:TIMP-, (SLP-1.00.6TF S, LOOSE 2:CN= 55 003:0004 COMFUTS DUALHYD Major System / Mijor System - C03:0005	ditions to & 	100yr-3hr 100yr-3hr T= 71.67] 	QPEAK QPEAK 1.076 .000 .636 +00, N-Or OPEAK	(10 minu TpeakDat No_date -TpeakDat No_date No_date No_date o_date o_date o_date	te time .e_hh:ma- 1:10 .:e_hh:mm- 1:10 0:00 0:55 TotDurC .e_hh:mm-	step - 3 R.V. 39.16 39.16 39.26 rf= R.V.	20 -R.C. .546 -R.C. n'a n/a n/a c.hrs -R.C.
# Post-Development Con # Post-Development Con READ STORM Filename = Storm Comment = City (SDT=10.00:SUUM * DESIGN STANDHYD IXINF .30:TIMP=. (SLP=1.00:DT = 5. [LOSS = 2 : CN = 65 003:0004	ditions to 8 	100yr-3hr 100yr-3hr T= 71.67] 	QPEAK QPEAK 1.076 .000 .636 +00, N-Or OPEAK	(10 minu TpeakDat No_date -TpeakDat No_date No_date No_date o_date o_date o_date	te time .e_hh:ma- 1:10 .:e_hh:mm- 1:10 0:00 0:55 TotDurC .e_hh:mm-	step - 3 R.V. 39.16 39.16 39.26 rf= R.V.	20 -R.C. .546 -R.C. n'a n/a n/a c.hrs -R.C.
<pre># Post-Development Con # Oo3:0002 READ STORM Pilename = Storm Comment = City (SDP=10.00:SFUR * DESIGN STANDHYD (XIMP=.30:TIMP=. (SLP=1.00:DT=5. COMPUTE DUALHYD Major System / Ilinor System (SJPSStc1544 CO3:0005</pre>	ditions to 8 	100yr-3hr 100yr-3hr T= 71.67] 	QPEAK QPEAK 1.076 .000 .636 +00, N-Or OPEAK	(10 minu TpeakDat No_date -TpeakDat No_date No_date No_date o_date o_date o_date	te time .e_hh:ma- 1:10 .:e_hh:mm- 1:10 0:00 0:55 TotDurC .e_hh:mm-	step - 3 R.V. 39.16 39.16 39.26 rf= R.V.	20 -R.C. .546 -R.C. n'a n/a n/a c.hrs -R.C.
<pre># Post-Development Con # Post-Development Con READ STORM Filename = storm Comment = City (SDT=10.00:SUTM= DISIGN STANDHYD ILOSS= 2 : CN= 65 OO3:0004 COMPUTE DUBLHYD Major System / Hinor System (M 5ysStom -31548 CO3:0005 SDESIGN STANDHYD [XIMP=.3;TITHP=. [SLP=1.50:DIT=5. [LOSS= 2: CN= 65]</pre>	ditions to 8 	100yr-3hr 100yr-3hr T= 71.67 	Chicago QPEAK 1.076 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date No_date	tte time ite time itlo itlo ce_hh:mm- itlo 0:55 TotDurC ce_hh:mm- 1:10	step - : R.V. 39.16 .00 39.26 rrf= R.V. 51.92	20 -R.C. .546 -R.C. n/a n/2 C.hrs -R.C. .725
# Post-Development Com #003:0002	ditions to 8 	<pre>SWE Facilit 1000yr-3hr F= 71.671 </pre>	Chicago QPEAK 1.076 .000 .636 .000, N-Cr QPEAK .444	(10 minu TpeakDat No_date TpeakDat No_date No_date No_date ff= 0, TpeakDat No_date	tte time .e_hh:mn- 1:10 .e_hh:mm- 1:10 0:00 0:55 TotDurC e_hh:mn- 1:10 .e_hh:mn-	step - : R.V. 39.16 .00 39.26 rff R.V. 51.92	-R.C. .546 -R.C. n/a n/a n/a c.hrs -R.C. .725 -R.C.
# Post-Development Con # Post-Development Con READ STORM Filename = Storm Comment = City (SDT=10.00:SUUE- 003:0003	ditions to 8 	<pre>SWE Facilit 1000yr-3hr F= 71.671 </pre>	Chicago QPEAK 1.076 .000 .636 .000, N-Cr QPEAK .444	(10 minu TpeakDat No_date TpeakDat No_date No_date No_date ff= 0, TpeakDat No_date	tte time .e_hh:mn- 1:10 .e_hh:mm- 1:10 0:00 0:55 TotDurC e_hh:mn- 1:10 .e_hh:mn-	step - : R.V. 39.16 .00 39.26 rff R.V. 51.92	-R.C. .546 -R.C. n/a n/a n/a c.hrs -R.C. .725 -R.C.
# Post-Development Com # Post-Development Com READ STORM Filename = Btorm Comment = City [SDT=10.00:SFUR- 003:0003 BISIGN STANDHYD (XIMP=.30:TIMP=. COMFUTS DUALHYD Major System / [Mijor System] (MjSysStc=.3154 CO3:0005 DESIGN STANDHYD [XIMP=.50:DIT= 5. [LOSS= 2 : CN = 65 003:005 DESIGN STANDHYD [XIMP=.57:TIMP=. BISIGN STANDHYD [XIMP=.57:TIMP=.]	ditions to 8 	<pre>SWE Facilit 1000yr-3hr F= 71.671 </pre>	Chicago QPEAK 1.076 .000 .636 .000, N-Cr QPEAK .444	(10 minu TpeakDat No_date TpeakDat No_date No_date No_date ff= 0, TpeakDat No_date	tte time .e_hh:mn- 1:10 .e_hh:mm- 1:10 0:00 0:55 TotDurC e_hh:mn- 1:10 .e_hh:mn-	step - : R.V. 39.16 .00 39.26 rff R.V. 51.92	-R.C. .546 -R.C. n/a n/a n/a c.hrs -R.C. .725 -R.C.
<pre># Post-Development Con # Oo3:0002 READ STORM Filename = Storm Comment = City (SDP=10.00:SUUE DISIGN STANDHYD IXIMP=.30:TIMP=. [GLP=1.00:DT=5. [COSSECTION=55 [COSSECTION=55] [COSS</pre>	ditions to 8 	<pre>SWE Facilit 1000yr-3hr F= 71.671 </pre>	Chicago QPEAK 1.076 .000 .636 .000, N-Cr QPEAK .444	(10 minu TpeakDat No_date TpeakDat No_date No_date No_date ff= 0, TpeakDat No_date	tte time .e_hh:mn- 1:10 .e_hh:mm- 1:10 0:00 0:55 TotDurC e_hh:mn- 1:10 .e_hh:mn-	step - : R.V. 39.16 .00 39.26 rff R.V. 51.92	-R.C. .546 -R.C. n/a n/a n/a c.hrs -R.C. .725 -R.C.
# Post-Development Com # Post-Development Com READ STORM Filename = Storm Comment = City (SDT-10.00.6NUR. 003:0003 * DESIGN STANDHYD (XIMP=.30:TIMP=. (SLP=1.00.6NUR. COMFUTS DUALHYD Major System / Mijor System / (MjSysstor31544 (MjSysstor31544 (MjSysstor31544 (MjSysstor31544) DESIGN STANDHYD [XIMP37:TIMP=. (SLP=1.50:DT= 5. ILOSS= 2:CN= C5 003:0006 * DESIGN STANDHYD [XIMP37:TIMP=. (SLP=1.00:DT= 5. [LOSS= 2:CN= C5]	ditions to 8 	<pre>SWE Facilit 100yr-3hr r= 71.67) 7.48 7.49 7.48 7.49 7.48 7.49 7.48 7.49 7.</pre>	Chicago QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK QPEAK QPEAK	(10 minu TpeakDat No_date No_date No_date No_date ff= 0, TpeakDat No_date	tte time e_hh:mm- 1:10 1:10 0:00 0:55 TotDurc TotDurc no 1:10 1:10 1:10	step - :: R.V. 39.16 R.V. 51.92 3.V. 51.92	-R.C. .546 -R.C. n/a n/a n/a c.hrs -R.C. .725 -R.C.
<pre># Post-Development Con # Oo3:0002</pre>	ditions to 8 	3WW Facilit 100yr-3hr Two 7.45	Chicago QPEAK- 1.076 QPEAK- 1.076 .000 .636 +00, N-O- QPEAK- .634 QPEAK- .654	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date	tte time e hh:mn- 1:10 :e hh:mm- 1:10 0:55 TorDurc :e hh:mm- 1:10 :e hh:mm- 1:10	step - :: R.V. 39.16 .00 39.26 51.92 R.V. 51.92	-R.C. .546 -R.C. .725 -R.C. .725 -R.C.
<pre># Post-Development Con # Oo3:0002 003:0002 Comment = City (SDT-10.00:6FUR. 003:0003 * DESIGN STANDHYD</pre>	ditions to 8 	3WW Facilit 100yr-3hr Two 7.45	Chicago QPEAK- 1.076 QPEAK- 1.076 .000 .636 +00, N-O- QPEAK- .634 QPEAK- .654	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date	tte time e_hh:mm- 1:10 1:10 0:00 0:55 TotDurc TotDurc not h:mm- 1:10 1:10	step - :: R.V. 39.16 .00 39.26 51.92 R.V. 51.92	-R.C. .546 -R.C. .725 -R.C. .725 -R.C.
<pre># Post-Development Con # Oo3:0002 OO3:0002 Pilename = storm Pilename = storm Pilename = storm DISIGN STANDHYD UXIMP=.30:TIMP=. (3LP=1.00:DT=5. COMPUTE DUALHYD Major System \ (MijSysSto=.1542 CO3:0005 DESIGN STANDHYD UXIMP=.50:DT=5. LOSS= 2:CN=65 003:0006 DESIGN STANDHYD UXIMP=.57:TIMP=. (SLP=1.50:DT=5. LOSS= 2:CN=65 003:0006</pre>	ditions to 8 	3WW Facilit 100yr-3hr Two 7.45	Chicago QPEAK- 1.076 QPEAK- 1.076 .000 .636 +00, N-O- QPEAK- .634 QPEAK- .654	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date	tte time e hh:mn- 1:10 :e hh:mm- 1:10 0:55 TorDurc :e hh:mm- 1:10 :e hh:mm- 1:10	step - :: R.V. 39.16 .00 39.26 51.92 R.V. 51.92	-R.C. .546 -R.C. .725 -R.C. .725 -R.C.
<pre># Post-Development Con # Post-Development Con # Comment = City (SDT=10.00:SUTA=0.</pre>	ditions to 8 	3WW Facilit 100yr-3hr Two 7.45	Chicago QPEAK- 1.076 QPEAK- 1.076 .000 .636 +00, N-O- QPEAK- .634 QPEAK- .654	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date	tte time e hh:mn- 1:10 :e hh:mm- 1:10 0:55 TorDurc :e hh:mm- 1:10 :e hh:mm- 1:10	step - :: R.V. 39.16 .00 39.26 51.92 R.V. 51.92	-R.C. .546 -R.C. .725 -R.C. .725 -R.C.
<pre># Post-Development Con # Post-Development Con READ STORM Pilename = storm DISIGN STANDHYD (XIMP=.30.TIMP=. (SLP=1.00.DIT=5. LOSS= 2:CN=65 OO3:0006</pre>	ditions to 8 	<pre>SWN Facilit 1000yr-3hr Fr 71.67] </pre>	Chicago QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK QPEAK QPEAK QPEAK QPEAK QPEAK	(10 minu TpeakDat No_date No_date No_date No_date No_date TpeakLat No_date TpeakDat No_date	tte time e hh:mn- 1:10 :e hh:mm- 1:10 0:05 TorDurC e hh:mm- 1:10 :e hh:mm- 1:10	step - : R.V. 39.16 .00 39.26 .00 39.26 .00 51.92 R.V. 51.92 R.V. 36.14	-R.C. .526 -R.C. .725 -R.C. .725 -R.C. .524
<pre># Post-Development Con # Post-Development Con # Comment = City (SDT=10.00:SUTA= DISIGN STANDHYD ILINE=.30:TIME=. (SLP=1.00:DILHYD COMFUTE DULHYD COMFUTE DULHYD (SINE=.3154E CO3:0005</pre>	ditions to 8 	SWN Facilit 100yr-3hr Two 71.67 	QPEAK QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK QPEAK QPEAK QPEAK 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	tte time e_hh:mn- 1:10 .e_hh:mm- 1:10 0:00 0:55 0:55 0:55 0:55 1:10 .e_hh:mm- 1:10	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .504 -R.C.
<pre># Post-Development Con # Post-Development Con READ STORM Pilename = storm DISIGN STANDHYD (XIMP=.30.TIMP=. (SLP=1.00.DIT=5. LOSS= 2:CN=65 OO3:0006</pre>	ditions to 8 	SWN Facilit 100yr-3hr Two 71.67 	QPEAK QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK QPEAK QPEAK QPEAK 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	tte time e_hh:mn- 1:10 .e_hh:mm- 1:10 0:00 0:55 0:55 0:55 0:55 1:10 .e_hh:mm- 1:10	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .504 -R.C.
<pre># Post-Development Com # Post-Development Com # Comment = City [SDT=10.00:STUR=. COMMENT = City [SDT=10.00:STUR=. [SIP=1.00:STIMP=.] [SIP=1.00:STENE.] [SIP=1.00:STENE.] [SIP=1.00:STENE.] [SIP=1.00:STENE] [SIP=1.00:STENE] [SIP=1.50:STENE] [SIP=1.50:STENE] [SIP=1.50:STENE] [SIP=1.51:STENE] [</pre>	ditions to 8 	SWN Facilit 100yr-3hr Two 71.67 	QPEAK QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK QPEAK QPEAK QPEAK 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	tte time e_hh:mn- 1:10 .e_hh:mm- 1:10 0:00 0:55 0:55 0:55 0:55 1:10 .e_hh:mm- 1:10	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .504 -R.C.
<pre># Post-Development Con # Post-Development Con # Comment = City (SD2+0.00:SUM+ DS3(003</pre>	ditions to 8 	SWN Facilit 100yr-3hr Two 71.67 	QPEAK QPEAK 1.076 QPEAK 1.076 .000 .636 .000 .000 .000 .000 .000 .636 .000 .444 QPEAK .247 QPEAK .247 QPEAK	(10 minu TpeakDat No_date TpeakDat No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	tte time e_hh:mn- 1:10 e_hh:mm- 1:10 0:00 0:55 TotDurc totDurc toth:mm- 1:10 e_hh:mm- 1:10 e_hh:mm- 1:10 :e_hh:mm- 1:10	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725
<pre># Post-Development Con # Post-Development Con # Comment = City [SDT=10.00:STUR=. Comment = City [SDT=10.00:STUR=. [SIP=1.00:STUR=. [SIP=1.00:STENDHYD [SIM STANDHYD [SIM STANDHYD [SIM=.50:TIMP=. [SIP=1.50:DT=5. [COMFUTS DUALHYD [SIM=.57:TIMP=. [SIP=1.50:DT=5. [COS=2:CN=65 [SIM STANDHYD [SIMP=.24:TIMP=. [SIP=1.00:DT=5. [COMS=2:CN=65 [SIM STANDHYD [SIMP=.24:TIMP=. [SIP=1.00:DT=5. [CINS=2:CN=65 [SIM STANDHYD [SIMP=.30:TIMP=. [SIP=1.00:DT=5. [SIMS=2:CN=65 [SIMS] [SIM</pre>	ditions to 8	SWE Facilit 100yr-3hr r= 71.67] 	Chicago QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK QPEAK QPEAK 1.121 OPEAK	(10 minu TpeakDat No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>ite time i.e_hh:mm- 1:10 .e_hh:mm- 1:10 0:55 TorDurC .e_hh:mm- 1:10 .e_hh:nm- 1:10 .e_hh:nm</pre>	step - : R.V. 39.16 .00 39.26 .00 39.26 .00 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92	-R.C. .546 -R.C. .12 -R.C. .725 -R.C. .524 -R.C. .524 -R.C.
<pre># Post-Development Con # Post-Development Con # Comment = City (SDT=10.00:STUR= 003:0002</pre>	ditions to 8 	SWE Facilit 100yr-3hr r= 71.67] 	Chicago QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK .654 QPEAK .247 QPEAK 1.121	(10 minu TpeakDat No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>ite time i.e_hh:mm- 1:10 .e_hh:mm- 1:10 0:55 TorDurC .e_hh:mm- 1:10 .e_hh:nm- 1:10 .e_hh:nm</pre>	step - : R.V. 39.16 .00 39.26 .00 39.26 .00 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92	-R.C. .546 -R.C. .12 -R.C. .725 -R.C. .524 -R.C. .524 -R.C.
<pre># Post-Development Con # Post-Development Con # Comment = City (SDT-10.00.6FUR 003:0003 * DESIGN STANDHYD UXIMP=.30:TIMP=. (SLP=1.00.6FUR 003:0004</pre>	ditions to 8	SWE Facilit 100yr-3hr r= 71.67] 	Chicago QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK .654 QPEAK .247 QPEAK 1.121	(10 minu TpeakDat No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>ite time i.e_hh:mm- 1:10 .e_hh:mm- 1:10 0:55 TorDurC .e_hh:mm- 1:10 .e_hh:nm- 1:10 .e_hh:nm</pre>	step - : R.V. 39.16 .00 39.26 .00 39.26 .00 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92	-R.C. .546 -R.C. .12 -R.C. .725 -R.C. .524 -R.C. .524 -R.C.
<pre># Post-Development Con # Post-Development Con # Comment = City (SDD=10.00:STURP=, SDD=10.00:STURP=, (SLP=1.00:O:STURP=, (SLP=1.00:DT=5, LOSS=2:CN=65 COMPUTE DUALHYD Major System , (MijSysStc=.15A2 CO3:0005</pre>	ditions to 8	SWE Facilit 100yr-3hr r= 71.67] 	Chicago QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK .654 QPEAK .247 QPEAK 1.121	(10 minu TpeakDat No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>ite time i.e_hh:mm- 1:10 .e_hh:mm- 1:10 0:55 TorDurC .e_hh:mm- 1:10 .e_hh:nm- 1:10 .e_hh:nm</pre>	step - : R.V. 39.16 .00 39.26 .00 39.26 .00 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92	-R.C. .546 -R.C. .12 -R.C. .725 -R.C. .524 -R.C. .524 -R.C.
<pre># Post-Development Con # Post-Development Con # Comment = City (SDT-10.00.0FUR 003:0003 * DESIGN STANDHYD</pre>	ditions to 8	<pre>SWE Facilit 100yr-3hr = 71.67) 7.48 </pre>	Chicago OPEAK 1.076 .000 .636 .000, N-O- OPEAK .654 OPEAK .247 OPEAK .573	(10 minu -TpeakDat No_date No_date No_date No_date -TpeakDat No_date -TpeakDat No_date -TpeakDat No_date -TpeakDat No_date	<pre>tte time .e_hh:mn- 1:10 .e_hh:mm- 1:10 0:55 0:55 c_hh:mm- 1:10 .e_hh:mm- 1:10 .e_hh:nm- 1:1</pre>	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .574 -R.C. .574 -R.C. .574
<pre># Post-Development Con # Post-Development Con READ STORM Pilename = Storm Conment = City (SDP=10.00:SFUR= 003:0003 * DESIGN STANDHYD (SIMP=.30:TIMP=. (SLP=1.00:DT=5. (COMPUTE DUALHYD Major System / ILLOSS= 2:CN= 65 003:0005</pre>	ditions to 8	SWN Facilit 100yr-3hr Tr 71.67] 	QPEAK QPEAK 1.076 QPEAK 1.076 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	<pre>tte time te time e_hh:mn- 1:10 e_hh:mm- 1:10 0:00 0:55 TorDurg TorDurg trib trib trib trib trib trib trib trib</pre>	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725 -R.C.
<pre># Post-Development Con # Post-Development Con READ STORM Pilename = Storm Conment = City (SDP=10.00:SFUR= 003:0003 * DESIGN STANDHYD (SIMP=.30:TIMP=. (SLP=1.00:DT=5. (COMPUTE DUALHYD Major System / ILLOSS= 2:CN= 65 003:0005</pre>	ditions to 8	SWN Facilit 100yr-3hr Tr 71.67] 	QPEAK QPEAK 1.076 QPEAK 1.076 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	<pre>tte time te time e_hh:mn- 1:10 e_hh:mm- 1:10 0:00 0:55 TorDurg TorDurg trib trib trib trib trib trib trib trib</pre>	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725 -R.C.
<pre># Post-Development Con # Post-Development Con READ STORM Pilename = Storm Conment = City (SDP=10.00:SFUR= 003:0003 * DESIGN STANDHYD (SIMP=.30:TIMP=. (SLP=1.00:DT=5. (COMPUTE DUALHYD Major System / ILLOSS= 2:CN= 65 003:0005</pre>	ditions to 8	SWN Facilit 100yr-3hr Tr 71.67] 	QPEAK QPEAK 1.076 QPEAK 1.076 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	<pre>tte time te time e_hh:mn- 1:10 e_hh:mm- 1:10 0:00 0:55 TorDurg TorDurg trib trib trib trib trib trib trib trib</pre>	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725 -R.C.
<pre># Post-Development Con # Post-Development Con READ STORM Filename = Storm Conment = City (SDP=10.00:SFUR= 003:0003 * DESIGN STANDHYD (SIMP=.30:TIMP=. (SLP=1.00:DT=5. COMPUTE DUALHYD Major System / ILINOT System (MjSysSto.3154 CO3:0005</pre>	ditions to 8	SWN Facilit 100yr-3hr Tr 71.67] 	QPEAK QPEAK 1.076 QPEAK 1.076 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	<pre>tte time te time e_hh:mn- 1:10 e_hh:mm- 1:10 0:00 0:55 TorDurg TorDurg trib trib trib trib trib trib trib trib</pre>	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725 -R.C.
<pre># Post-Development Con # Post-Development Con READ STORM Filename = Storm Conment = City (SDP=10.00:SFUR= 003:0003 * DESIGN STANDHYD (SIMP=.30:TIMP=. (SLP=1.00:DT=5. COMPUTE DUALHYD Major System / ILINOT System (MjSysSto.3154 CO3:0005</pre>	ditions to 8	SWN Facilit 100yr-3hr Tr 71.67] 	QPEAK QPEAK 1.076 QPEAK 1.076 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	<pre>tte time te time e_hh:mn- 1:10</pre>	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725 -R.C.
<pre># Post-Development Con # Post-Development Con READ STORM Filename = Storm Conment = City (SDP=10.00:SFUR= 003:0003 * DESIGN STANDHYD (SIMP=.30:TIMP=. (SLP=1.00:DT=5. COMPUTE DUALHYD Major System / ILINOT System (MjSysSto.3154 CO3:0005</pre>	ditions to 8	SWN Facilit 100yr-3hr Tr 71.67] 	QPEAK QPEAK 1.076 QPEAK 1.076 	(10 minu TpeakDat No_date No_date No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date	<pre>tte time te time e_hh:mn- 1:10</pre>	step - : R.V. 39.16 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725 -R.C.
<pre># Post-Development Com # Post-Development Com # Comment = City [SDT=10.002 * DESIGN STANDHYD</pre>	ditions to 8	SWE Facilit 100yr-3hr r= 71.67] 7.48 	QPEAK QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK QPEAK QPEAK 573 QPEAK 573 QPEAK 573 QPEAK 573 QPEAK 573 QPEAK 573 QPEAK	(10 minu TpeakDat No_date No_date No_date No_date Mo_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date No_date No_date No_date No_date No_date No_date No_date No_date No_date No_date	<pre></pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .725 -R.C. .725 -R.C. .725 -R.C. .725 -R.C. .725 -R.C. .725 -R.C. .725
<pre># Post-Development Com #************************************</pre>	ditions to 8	<pre>SWE Facilit 100yr-3hr F= 71.67) 7.48 </pre>	Chicago OPEAK 1.076 .000 .636 .000, N-O- OPEAK .654 OPEAK .654 OPEAK .247 OPEAK .573 OPEAK .573 OPEAK .573 .054 .053 .053 .053 .054 .053 .054 .054 .055 .05	(10 minu TpeakDat No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>tte time e_hh:mn- 1:10 e_hh:mm- 1:10 0:55 c_hh:mm- 1:10 e_hh:mm- 1:10 ce_hh:mm- 1:10 ce_hh:</pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. -R.C. n/a n/a n/a n/a c.R.C. .725 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C.
<pre># Post-Development Com # Post-Development Com # Comment = City (SDT-10.00.6FUR. 003:0002</pre>	ditions to 8	<pre>SWE Facilit 100yr-3hr F= 71.67) 7.48 </pre>	Chicago OPEAK 1.076 .000 .636 .000, N-O- OPEAK .654 OPEAK .654 OPEAK .247 OPEAK .573 OPEAK .573 OPEAK .573 .054 .053 .053 .053 .054 .053 .054 .054 .055 .05	(10 minu TpeakDat No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>tte time e_hh:mn- 1:10 e_hh:mm- 1:10 0:55 c_hh:mm- 1:10 e_hh:mm- 1:10 ce_hh:mm- 1:10 ce_hh:</pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. -R.C. n/a n/a n/a n/a c.R.C. .725 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C.
<pre># Post-Development Com # Post-Development Com # Comment = City (SDT-10.00.6FUR. 003:0002</pre>	ditions to 8	<pre>SWE Facilit 100yr-3hr F= 71.67) 7.48 </pre>	Chicago OPEAK 1.076 .000 .636 .000, N-O- OPEAK .654 OPEAK .654 OPEAK .247 OPEAK .573 OPEAK .573 OPEAK .573 .054 .053 .053 .053 .054 .053 .054 .054 .055 .05	(10 minu TpeakDat No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>tte time e_hh:mn- 1:10 e_hh:mm- 1:10 0:55 c_hh:mm- 1:10 e_hh:mm- 1:10 ce_hh:mm- 1:10 ce_hh:</pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. -R.C. n/a n/a n/a n/a c.R.C. .725 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C.
<pre># Post-Development Com # Post-Development Com # Comment = City (SDT-10.00.6FUR. 003:0002</pre>	ditions to 8	<pre>SWE Facilit 100yr-3hr F= 71.67) 7.48 </pre>	Chicago OPEAK 1.076 .000 .636 .000, N-O- OPEAK .654 OPEAK .654 OPEAK .247 OPEAK .573 OPEAK .573 OPEAK .573 .054 .054 .054 .053 .054 .053 .054 .054 .055 .05	(10 minu TpeakDat No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>tte time e_hh:mn- 1:10 e_hh:mm- 1:10 0:55 c_hh:mm- 1:10 e_hh:mm- 1:10 ce_hh:mm- 1:10 ce_hh:</pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. -R.C. n/a n/a n/a n/a c.R.C. .725 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C. .504 -R.C.
<pre># Post-Development Con # Post-Development Con # Comment = City (SDT=10.00:STUMP= Comment = City (SDT=10.00:STUMP= (SLP=1.00:STUMP= COMPUTE DUALHYD Major System (MisysSto=.1542 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.50:DT=5. (SDS=2:CN=65 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.50:DT=5. (SDS=2:CN=65 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.57:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.70:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.7180) (MINO:SYSTEM) (MINO</pre>	ditions to 8	SWN Facilit 100yr-3hr F= 71.671 	QPEAK QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK 	(10 mimu TpeakDat No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>tte time i= hh:mn- 1:10 i= hh:mm- 1:10 0:00 0:55 TorDurch i= hh:mm- 1:10 i=</pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725
<pre># Post-Development Con # Post-Development Con # Comment = City (SDT=10.00:STUMP= Comment = City (SDT=10.00:STUMP= (SLP=1.00:STUMP= COMPUTE DUALHYD Major System (MisysSto=.1542 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.50:DT=5. (SDS=2:CN=65 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.50:DT=5. (SDS=2:CN=65 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.57:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.70:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.7180) (MINO:SYSTEM) (MINO</pre>	ditions to 8	SWN Facilit 100yr-3hr F= 71.671 	QPEAK QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK 	(10 mimu TpeakDat No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>tte time i= hh:mn- 1:10 i= hh:mm- 1:10 0:00 0:55 TorDurch i= hh:mm- 1:10 i=</pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725
<pre># Post-Development Com # Post-Development Com # Comment = City [SDT=10.002 SDTMP=10.001STURP=. COMPUTS DUALHYD Major System] [SIP=1.001DT=5. COMPUTS DUALHYD Major System] [Minor System] [SIP=1.501DT=5. LOSS= 2:CN=65 COMPUTS DUALHYD [XIMP=.37:TIIP=. [SIP=1.501DT=5. LOSS= 2:CN=65 CO3:0006</pre>	ditions to 8	SWN Facilit 100yr-3hr F= 71.671 	QPEAK QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK 	(10 mimu TpeakDat No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>tte time i= hh:mn- 1:10 i= hh:mm- 1:10 0:00 0:55 TorDurch i= hh:mm- 1:10 i=</pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725
<pre># Post-Development Con # Post-Development Con # Comment = City (SDT=10.00:STUMP= Comment = City (SDT=10.00:STUMP= (SLP=1.00:STUMP= COMPUTE DUALHYD Major System (MisysSto=.1542 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.50:DT=5. (SDS=2:CN=65 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.50:DT=5. (SDS=2:CN=65 COMPUTE DUALHYD (XIMP=.57:TINP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.57:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.70:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SLP=1.00:DT=5. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.50:TIMP=. (SDS=2:CN=65 COMSUMP:STANDHYD (XIMP=.7180) (MINO:SYSTEM) (MINO</pre>	ditions to 8	SWN Facilit 100yr-3hr F= 71.671 	QPEAK QPEAK 1.076 QPEAK 1.076 QPEAK QPEAK 	(10 mimu TpeakDat No_date No_date No_date No_date No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date TpeakDat No_date	<pre>tte time i= hh:mn- 1:10 i= hh:mm- 1:10 0:00 0:55 TorDurch i= hh:mm- 1:10 i=</pre>	step - : R.V. 39.16 39.26 R.V. 51.92 R.V. 51.92 R.V. 51.92 R.V. 51.92 	-R.C. .546 -R.C. .546 -R.C. .725 -R.C. .725 -R.C. .504 -R.C. .725

Shirley's Brook SWMF C (Ultimate) - Summary Output

[SLP= .60:DT= 5.00] [LOSS= 2 :CN= 65.0] 003-0013------ID:NHYD-----ALEA----QPEAK-TpeakDate_hh:mm----R.V.-R.C. 003:0013-----ID:NHYD-COMPUTE DUALHYD 01:C-101 M.jOr Szätem / 02:Cl01ma Minor Szätem / 07:Cl01mi (MjSystc=.1580E+03, TotCn:CV01 003:0014-------ID:NHYD------ALEA----QPEAR-TPEARDat 3.10 .755 No_date .67 .475 No_date 2.49 .269 No_date .3793E+03, N-Ovf= 1, 1:10 1:10 0:55 56.74 n/a 56.74 n/a 57.52 n/a 2.=3 .205 NO LEEC 0:55 57.52 J/a .3793E+03, N-Ovf= 1, TotDurGvf= 0.hrs -RREA---QEEAK-TpeakDate_hh:mm---R.W.-R.C. 1.20 .313 No_date 1:10 58.86 .821 DESIGN STANDHYD 06:C-103 * DESIGN STANDHYD 06:C-103 [XI!P=.70:TIIP=.80] [SI.P=1.00:DT= 5.00] [LOSS=2:CN=65.0] 003:0015-------DI:NHYD DESIGN NASHYD 05:C-103 -----ARBA----QPELK-TpeakDate_hh:mm----R.V.-R.C. .90 ,132 Nu_date 1:10 36.83 .514 -R.V.-R.C --R.V.-R.C. 36.03 n/a 58.86 n/a 57.52 n/a 51.44 n/a 39.26 n/a RUN : COMMAND# 004:0001----START TZERO -.00 hrs on 01 (l=imperial, 2=metric output)] [METCUT= 2 [NSTOP'i= 1] INSTOP' i=
 Project Nume:
 [Shirley's Brook - SWAF C]
 Project Number;
 [103106]

 Date
 : 05-28-2006
 [Scieller:
 [M.Petepieci]

 Company :
 NOVATECH ENGINEERING CONSULTANTS LTD

 License # :
 : 5320763
 LEAD STORE SLP=1 00:DT= 5.001 004:0008------REA----QPEAK-TpeakDate_hh:um----R.W.-R.C 04:C-204 DESIGN STANDHYD 5.20 .865 To_date 6:Cu 72.71 .757 [HIMP=.57:TIMP=.64] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 65.0] * DESIG: STANDHYD 05:C-200 -AREI----QNEAK-Tre:kLats_hh:mm----F.W.-R.C. 2.22 .423 No_date 6:00 81.16 .846 [XIMP=.70:TIMP=.80] [SLP=1.00:DT= 5.00] [LOSS= 2 :CN= 55.0] 004:0010-----I ADD HYD 0 65.0] 01:C-201 + 02:C-202 + 03:C-203 + 04:C-204 + 05:C-205 -QPEAK-TpeakDate_hh:mm-.331 No_date 6:00 .512 No_date 6:00 .220 No_date 6:00 --R.¹¹,-R.C. 72.71 n/a 72.71 n/a 53.69 n/. APEA 1.96 3.07 1.90 6:00 6:00 5:00 5.2J 2.22 .865 No_date 72.71 n/a .423 No date 81.18 n'a n/a .v.-r.C. .50 n/a .50 n/a .50 n/a 0.hrs .562 No_data DESIGN STANDHYD 01:C-101 3.16 6:00 78.22 .815 [XIMP=.70:TIMP=.70] [SLP= .60:DT= 5.00] [LOSS= 2 :CN= 65.0] -AREA----QPEAK-TpeakDate_hh:mm----.-R.C .562 No_date .287 No_date 6:00 78.22 n/a 6:00 78.23 n/a 5:35 78.12 n/a 0.hr3 1. TotDurDuf----ARE3-1,2) DPEAK-TreakDite_hh:mm----R.V.-R.C. .232 No_date 6:00 01.18 .846 DESIGN STANDHYD 06:C-103

(M:\...FU2006B.DAT)

NOVATECH ENGINEERING CONSULTANTS LTD

(M:\...SWM_C.sum)

[XIMP=.70:TIMP=.80]
[SLP=1.07:DT= 5.00] [LOSS= 2 :CN= 65.0]
004:0015
[Tp= .17:DT= 5.00]
ADD HYD D5:m100 ADD HYD D5:m100 ADD HYD ADD HYD D5:m20 ADD HYD ADD HYD <th< td=""></th<>
+ 07:Cl0lmi 2.82 .269 No_date 5:35 78.12 n/4 + 08:C2min 73.32 1 220 No_date 5:35 71 50 n/4
$+ 09:C-3\pi \ln 7.48$.636 No date 5:55 7:27 n/s
004:0017
004:0017D:NHYDAREADPEAK-TpeakDate_hhimm ROUTE RESENIOIR 10:SWMC_I 25.72 2.406 No_date 6:00 68.02 n/i [RDT=5.70] out<- 01:SWMC_C 25.72 2.477 N_date 6:10 68.02 n/i
{MxStoUsed=,7391E+00} 004:0018D:NHYDAREAQPEAK-TpeakDate_hh:mmR.VF.C SAVE HYD 10:SMNC_I 25.72 2.486 No_date 6:00 58.02 n/: fname :N:\2003\103106\DNTA\CALCUL-1\SWMHY:KO\SMNFC-1\SWMC_IN.004
remark:Inflow to SWMF C 004:002
PINISH

WARNINGS / ERRCRS / NOTES
001:0005 DESIGN STANDHYD *** WERNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 001:0005 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 001:0007 DESIGN STANDAYD
*** WARPING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area. 001:00(3 DESIGN STANDHID
*** WARNING: Storage Coefficient is smaller than DT: Use a smaller DT or a larger grea, 001:0009 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
001:0012 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT: Use a smaller DT or a larger area.
001:0014 DESIGN STANDHYD *** WARNIN3: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
002:0003 DESIGN STANDHYD *** WARNING: Storage Coefficient is snaller than DT!
Use a smaller DT or a larger area. 002:0005 DESIGN STANDHYD *** WARWING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 002:0006 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 002:0007 DESIGN STANDHYD
*** WAFNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area. 002:0009 DESIGN STANDHTD
*** WARNING: Storage Coefficient is smaller than DT1 Use a smaller DT or a larger area. 002:0005 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area. 002:0012 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smiller than DT: USe a smaller DT or a larger area. 002:0014 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
003:0003 DESIGN STANDAYD *** WARNING: Storage Coefficient is smaller than DT! Dse a smaller DT or a larger area.
003:0005 DESIGN STRNDNYD *** WARUIES: Storage Coefficient is smaller than DT: Dee a smaller DT or 3 larger area.
003:0006 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
003:0007 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DTI
Use a smaller DT or a larger area. 003:0000 DESIGN STANDHYD *** WARNIN3: Storage Coefficient is smaller than DT!
Use a shaller DT or a larger area. 003:0001 DESIGH STANDHYD
*** WARNING: Storage Coefficient is smiller than DT! Use a smaller DT or 2 larger area. 0°3:4012 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT: Use a smaller DT or a larger area. 003:0014 DESIGN STANCEYD
*** WARNING: Storage Coefficient is smaller than DT: Use a smaller DT or a larger arem. 004:0003 DESIGN STANDHYD
*** WARNING: Storage Coefficient is smaller than DT: Use a smaller DT or 1 larger area.
004:00F5 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT; Use a smaller DT or a larger trea.
004:0006 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller then DTI Dsg a smaller DT or a larger area.
004:0007 DESIGN STANDHYD *** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 003:000 DESIGN STANDHYD *** WHRHING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 004:0009 DESIGN STANDHYD *** WANNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area. 004:0012 DESIGN STANDHYD *** WARRING: Storage Coefficient is smaller than DT:
Use a smaller DT or a larger area. 004:0014 DESIGN STANDHID
(M.) BT200CD D10)

Shirley's Brook SWMF C (Ultimate) - Summary Output

•••• WARHTHE: Etorage Coefficient is smaller than DT: Des s emaller D7 er s larger area. Eisulation andwich 2006-10-05 at 09:39:07

(M:\...FU2006B,DAT)

SWMF 'C' - Outlet Strucutre

Head vs. Discharge Curves (for use in EPA SWMM Model)

Outlet Deta	ails								
		EXT	.DET		EROSION CO	ONTROL	OVERFLO	W SPILLWAY	(WEIR)
Dia		180	mm	Dia	600	mm	Length	40	m
inv		66.05	m	Inv	66.05	m	Crest Elev	67.25	7
C/L Elev		66.14		C/L Elev	66.35	m	Weir Coeff:	1.847	,
Area		0.025	m²						
				Slide Gate	Set at Height o	of 300 mm			
				Area	0.141	m²			
Head vs. D)ischar	ae Curve	s						
		3	EXT.DET		EF	ROSION CONTROL		OVERFLOW	SPILLWAY
Elev		Head	Q		Head	Q		Head	Q
(m)		(m)	(m³/s)		(m)	(m³/s)		(m)	(m ³ /s)
6	6.05	0.00	0.000		0.00	0.000		0.00	0
	66.1	0.05	0.007		0.05	0.000		0.00	0
6	56.15	0.10	0.012		0.10	0.000		0.00	0
	66.2	0.15	0.020		0.15	0.000		0.00	C
	36.25	0.20	0.023		0.20	0.000		0.00	0
6	56.35	0.30	0.032		0.30	0.213		0.00	0
6	36.45	0.40	0.039		0.40	0.246		0.00	0 0
6	6.55	0.50	0.045		0.50	0.275		0.00	0
6	56.65	0.60	0.050		0.60	0.301		0.00	0
e	6.75	0.70	0.055		0.70	0.325		0.00	0
6	6.85	0.80	0.059		0.80	0.347	1	0.00	0
6	56.95	0.90	0.063		0.90	0.368		0.00	٥
6	57.05	1.00	0.067		1.00	0.388		0.00	0
6	57.15	1.10	0.070		1.10	0.407		0.00	0
e	57.25	1.20	0.074		1.20	0.425		0.00	0
	67.3	1.25	0.075	1	1.25	0.434		0.05	0.83
	67.5	1.45	0.081		1.45	0.468		0.25	9.24

SWMF 'C' - Inlet Strucutres (refer to EPA SWMM output charts in back of Appendix B) Inlet to Forebay Dia= 825 mm Area= 0.535 m2 Invert Elev = 66.00 Slope = 1.6% Q_{cap} = 1,894 L/s (Manning's)

Q_{25mm} = 1,900 L/s

750 mm 0.442 m2 66.83

Forebay Bypass

Dia =	
Dia = Area = invert Elev =	
invort Elov =	
INVELL FIEV -	

SWM Facility 'C' Design Calculations

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SWMF 'C' - Water Quality Requirements	ty Requirements
Drainage Area	26.2
% Impervious:	0.52
Level 2 protection: Treatment Volume	110 m³/ha
Active Storage:	40 m³/ha 1,048 m³
Perm Pool:	70 m ³ /ha required 1,834 m ³ required 4,370 m ³ provided 167 m ³ /ha provided
Extended Detention:	12.1 L/s average 29 L/s max (2.4 x avg)
 Erosion Control (14 L/s/ha for 5yr storm) 367 L/s	5yr storm) 367 L/s
 Erosion Control (8 L/s/ha for 5yr storm) 210 L/s	jvr storm) 210 L/s

Elevation (m)	Area (m ²)	Stage Volume (m)	Total Volume (m ³)
65.75		•	1
66.00	640	80	80
66.10	3,800	220	300
66.15	6,360	250	550
66.25	6,500	640	1,190
66.50	6,980	1,690	2,880
66.75	7,360	1,790	4,670
67.00	7,840	1,900	6,570
67.25	8,280	2,020	8,590

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	A.			Steen Volum			Total Walnung		
	C	20		IIInin A Afiano		at a the second second second			
Elevation	AI	Forebay	All	Forebay	Main Cell	Forebay	Main Cell	All	Active Volume
(m)	(m)	(m)	(m)	(m)	(m))	(m³)	(m)		(m3)
65.00	2,810	520	0	0	0	0	0	0	
65.55	4,250	790	1,940	360	1,580	360	1,580	1,940	
65.75	4,890	940	910	170	740	530	2,320	2,850	_
66.05	5,222	880	1,520	270	1,250	800	3,570	4,370	
66.25	5,350		1,060		1,060		5,430	5,430	1,060
66.40	5,790		840		840		6,270	6,270	1,900
66.75	6,250		2,110		2,110		8,380	8,380	4,010
67.00	6,690		1,620		1,620		10,000	10,000	5,630
67.25	7,050		1,720		1,720		11,720	11,720	7,350
67.50	7,470		1,820		1,820		13,540	13,540	9,170

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SWM Facility 'C' Design Calculations

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SWMF 'C' - Required Forebay Length		SWMF 'C' - Sediment Loading Estimate	ent Loadin	ıg Estima	ę
Paramétérs:		Table 6.3 - MOE SWM Planning & Design Manual	Planning & I	Design Mar	hual
Length to width ratio of forebay, $r =$	3.0:1	Catchmont	Annual	Wet	Anr
Peak outflow rate during 25 mm storm, $Q_p =$	0.240 m ³ /s (24hr ext. det)	Imperviousness	Loading (kaiha)	Density (ka/m")	
Target particle size ≕	150 mm		0		-
-		35%	0//		
Settling velocity, V _s =	0.0003 m/s	55%	2,300	1,230	
		\$0%	3,495	1,230	
Forebay Settling Length, Dist		96%	4,680	1,230	
rQ.					
$Dist = \sqrt{\frac{V_{c}}{V_{c}}}$		Catchment Area:		26.2 ha	bia
		% Impervious:		52%	
= 49 m		Annual Sediment Loading:	ibu:	2,071 kg/ha/	kg/ha/
12				1.68 m ³ /hav	m³/hav
Check Dispersion Length, Dist ₂				44.1 ^{m3} /уг	т ³ /уг
Desired velocity in forebay, $V_f =$	0.2 m/s				
Inlet flowrate , $Q =$	1.900 m ³ /s	Sediment Removal Efficiency:	clency:	80%	
Depth in forebay, $d =$	1.1 m			35,3 m ³ /yr	m³/yr
80		Sedîment Accumulation:	on:		
$Dist_2 = \frac{2}{dV_f}$		10yrs		353 m ³	°E
≓ 72 m		Volume Provided in Forebay:	orebay:	530 m ^a	"E
Therefore, the dispersion length of 72 m governs the design.	: m governs the design.				

SWMF C Drainage Area: Runoff Coefficient:	26.2 ha 0.6
Estimate Influent TSS Level (max):	250 mg/L
(Long-term average):	150 mg/L
Sediment Density:	1,230 kg/m³
Total Annual Precipitation:	907 mm
Total Annual Rain (ice Free Period):	686 mm
Total Annual Runoff:	142,580 m ³
Runoff during lee-free period:	107,839 m ³
Max Annual TSS Loading:	35,645 kg
(total precipitation)	29.0 m ³ /yr
Max Annuel TSS Loading:	26,960 kg
(precipitation during loe-free period)	21.9 m ³ /yr
Average Annual TSS Loading:	21,387 kg
(total precipitation)	17.4 m ³ lyr
Average Annual TSS Loading:	16,176 kg
(precipitation during loe-free period)	13.2 m²/yr

26.2 ha 52% 2,071 kg/ha/yr 1.68 m³/ha/yr 44.1 m³/yr

72 m

Provided Length:

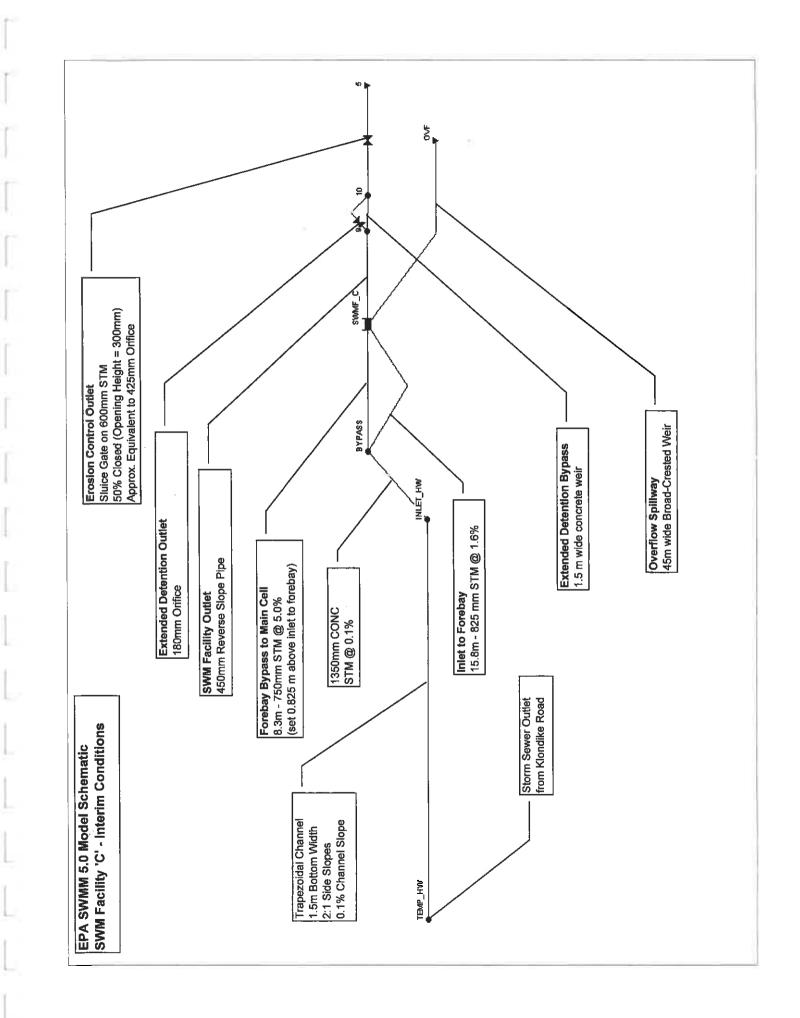
2.8 3.8

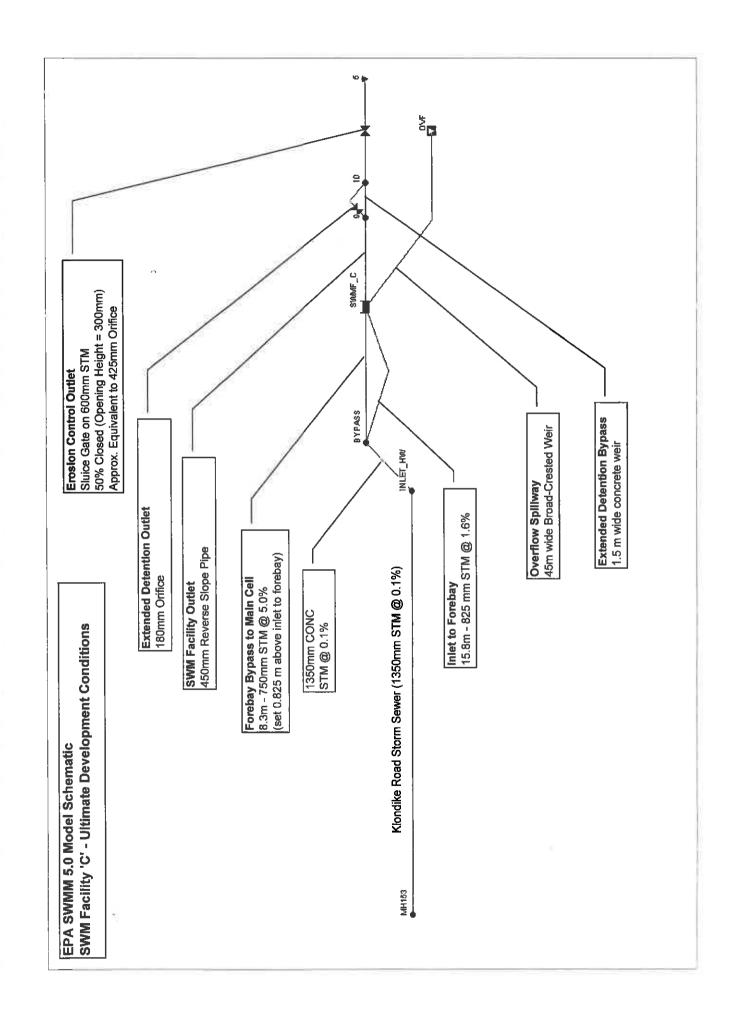
0.6

Anrual Loading (m³/ha)

	23.2 m ³ /yr	10.5 m ³ /yr	
Target 80% TSS Removal:	Max:	Min:	

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SWM Facility 'C' – 25mm Storm Event EPA SWMM Model Summary Output (Ultimate Development Conditions)

******	Volume	Volume
Flow Routing Continuity	hectare-m	Mliters

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.425	4.252
External Outflow	0.308	3.077
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial Stored Volume	0.487	4.874
Final Stored Volume 🔗 🍰 .	0.606	6.057
Continuity Error (%)	-0.078	

Node	Туре	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Occu	of Max rrence hr:min	Total Flooding ha-mm	Total Minutes Flooded
MH153	JUNCTION	0.08	1.04	67.42	0	01:40	0	0
BYPASS	JUNCTION	0.39	0.92	66.92	ŏ	01:41	0 0	ō
INLET HW	JUNCTION	0.35	1.00	67.05	0	01:41	0	0
9 -	JUNCTION	0.47	0.83	66.73	0	03:03	0	0
10	JUNCTION	0.38	0.82	66.72	0	02:50	0	0
5	OUTFALL	0.18	1.00	66.75	0	02:45	0	0
OVF	OUTFALL	0.00	0.00	65.75	0	00:00	0	0
SWMF_C	STORAGE	1.48	1.78	66.68	0	03:09	0	0

Storage Unit	Average	Avg	Maximum	Max	Time of Max	Maximum
	Volume	Pcnt	Volume	Pcnt	Occurrence	Outflow
	1000 m3	Full	1000 m3	Full	days hr:min	CMS
SWMF_C	6.650	42	8.455	53	0 03:09	0.25

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Link	Туре	Maximum Flow CMS	Occu	of Max rrence hr:min	Maximum Velocity m/sec	Length Factor	Max/ Full Flow	Total Minutes Surcharged
10	CONDUIT	0.00	0	00:00	0.00	3.65	0.00	0
20	CONDUIT	1.74	0	01:41	3.71	4.15	0.60	0
21	CONDUIT	1.81	0	01:41	1.67	1.00	0.92	Ō
22	CONDUIT	0.07	0	01:41	0.55	1.52	0.03	Ō
25	CONDUIT	1.85	0	01:40	1.63	1.00	0.93	0
26	CONDUIT	0.27	0	02:45	1.69	1.61	0.31	784
27	CONDUIT	0.28	0	02:51	1.36	1.77	0.45	0
1	ORIFICE	0.04	0	02:10				
2	DUMMY	0.27	0	02:45				

		Fracti	on of	Time i	n Flow	Class		Avg.	Avg.
		Up	Down	Sub	Sup	Up	Down	Froude	Flow
Conduit	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number	Change
10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
20	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.06	0.0000
21	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.05	0.0001
22	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
25	0.00	0.04	0.00	0.96	0.00	0.00	0.00	0.05	0.0001
26	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.12	0.0002
27	0.74	0.00	0.00	0.05	0.00	0.00	0.21	0.15	0.0009

****** Routing Time Step Summary ***** Minimum Time Step 2.84 sec Average Time Step 3.00 sec 3.00 sec Maximum Time Step 6 Percent in Steady State 2 0.00 Average Iterations per Step : 3.10

Analysis begun on: Thu Oct 05 15:07:12 2006 Total elapsed time: 00:00:01

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SWM Facility 'C' - 1:5 year Storm Event EPA SWMM Model Summary Output (Ultimate Development Conditions)

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.007) -----

EPA SWMM 5.0 Model - SWM Facility 'C'

***** Analysis Options ***** Flow Units CMS Flow Routing Method DYNWAVE Starting Date FEB-16-2006 00:00:00 Ending Date FEB-17-2006 00:00:00 Antecedent Dry Days 0.0 Report Time Step 00:05:00 Routing Time Step 3.00 sec

**************************************	Volume hectare-m	Volume Mliters

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.725	7.252
External Outflow	0.609	6.092
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial Stored Volume	0.487	4.874
Final Stored Volume	0.612	6.117
Continuity Error (%)	-0.684	

******* Node Depth Summary *****

Node	Туре	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Occu	of Max rrence hr:min	Total Flooding ha-mm	Total Minutes Flooded
MH153	JUNCTION	0.16	1.31	67.69	0	01:10	0	0
			1.06	67.06	ō	01:31	0	0
BYPASS	JUNCTION	0.48			-		-	-
INLET HW	JUNCTION	0.44	1.17	67.22	0	01:10	0	0
9 -	JUNCTION	0.55	1.39	67.29	D	02:49	0	0
10	JUNCTION	0.47	1.30	67.20	0	02:49	0	0
5	OUTFALL	0.44	1.20	66.95	0	02:20	0	0
OVE	OUTFALL	0.05	1.20	66.95	0	02:20	0	0
SWMF_C	STORAGE	1.57	2.12	67.02	0	02:41	0	0

***** Storage Volume Summary ********

	Average Volume	Avg Pent	Maximum Volume	Max Pcnt	Time of Max Occurrence	Maximum Outflow
Storage Unit	1000 m3	Full	1000 m3	Full	days hr:min	CMS
SWMF_C	7.191	45	10.599	66	0 02:41	0.49

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Link Flow Summary

Link	Туре	Maximum Flow CMS	Occu:	of Max rrence hr:min	Maximum Velocity m/sec	Length Factor	Max/ Full Flow	Total Minutes Surcharged
10	CONDUIT	0.00	0	00:00	0.00	3.65	0.00	ο
20	CONDUIT	1.94	0	01:10	3.94	4.15	0.66	184
21	CONDUIT	2.40	0	01:10	1,91	1,00	1.21	15
22	CONDUIT	0.53	0	01:31	2.02	1.52	0.22	0
25	CONDUIT	2.40	0	01:10	1.75	1.00	1.21	15
26	CONDUIT	0.30	0	02:54	1.91	1.61	0.35	930
27	CONDUIT	1.52	0	01:38	1.44	1.77	2,50	0
1	ORIFICE	0.05	0	01:38				-
2	DUMMY	0.35	0	02:49				

Conduit	Dry	Fracti Up Dry	on of Down Dry	Time i Sub Crit	n Flow Sup Crit	Class Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
10 20 21 22 25 26 27	0.96 0.00 0.00 0.00 0.00 0.00 0.63	0.04 0.00 0.00 0.86 0.01 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.97 1.00 0.14 0.99 1.00 0.18	0.00 0.03 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.18	0.00 0.07 0.04 0.05 0.04 0.21 0.16	0.0000 0.0001 0.0001 0.0000 0.0001 0.0003 0.0078

Average Iterations per Step :

Analysis begun on: Thu Oct 05 15:04:15 2006

3.12

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SWM Facility 'C' - 1:100 year Storm Event EPA SWMM Model Summary Output (Ultimate Development Conditions)

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.007)

EPA SWMM 5.0 Model ~ SWM Facility 'C'

***** Analysis Options Flow Units CMS Flow Routing Method DYNWAVE Starting Date FEB-16-2006 00:00:00 Ending Date FEB-17-2006 00:00:00 Antecedent Dry Days 0.0 Report Time Step 00:05:00 Routing Time Step 3.00 sec

Flow Routing Continuity	hectare-m	Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow,	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow 🗒	1.173	11.734
External Outflow	1.042	10.424
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial Stored Volume	0.487	4.874
Final Stored Volume . 🚎	0.618	6.183
Continuity Error (%) 🗄	0.007	

***** Node Depth Summary

Node	Туре	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Occu	of Max rrence hr:min	Total Flooding ha-mm	Total Minutes Flooded
MH153	JUNCTION	0.26	1.72	68.10	0	01:39	0	0
BYPASS	JUNCTION	0.58	1.57	67.57	0	01:40	ō	õ
INLET HW	JUNCTION	0.54	1.62	67.67	0	01:39	Ō	ō
9 -	JUNCTION	0.48	1.25	67,30	0	01:28	0	Ō
10	JUNCTION	0.40	1.17	67.22	0	01:29	0	Ď
5	OUTFALL	0.72	1.52	67.07	0	02:49	0	Ó
OVF	OUTFALL	0.16	1.27	67.07	0	02:49	0	ō
SWMF_C	STORAGE	1.66	2.40	67.30	0	01:44	0	Ō

***** Storage Volume Summary

Storage Unit	Average	Avg	Maximum	Max	Time of Max	Maximum
	Volume	Pcnt	Volume	Pcnt	Occurrence	Outflow
	1000 m3	Full	1000 m3	Full	days hr:min	CMS
SWMF_C	7.774	49	12.564	79	0 01:44	1.90

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Link	Туре	Maximum Flow CMS	Occu	of Max rrence hr:min	Maximum Velocity m/sec	Length Factor	Max/ Full Flow	Total Minutes Surcharged
10 20 21 22 25 26 27 1 2	CONDUIT CONDUIT CONDUIT CONDUIT CONDUIT CONDUIT ORIFICE DUMMY	1.56 1.94 2.54 0.89 2.56 0.34 0.80 0.04 0.35		01:44 00:58 01:08 01:30 01:10 01:40 01:28 01:28 01:29	1.33 3.88 1.94 2.44 1.81 2.15 1.26	3.44 4.15 1.00 1.52 1.00 1.72 1.77	0.03 0.66 1.29 0.37 1.29 0.36 1.31	0 296 54 0 52 492 0

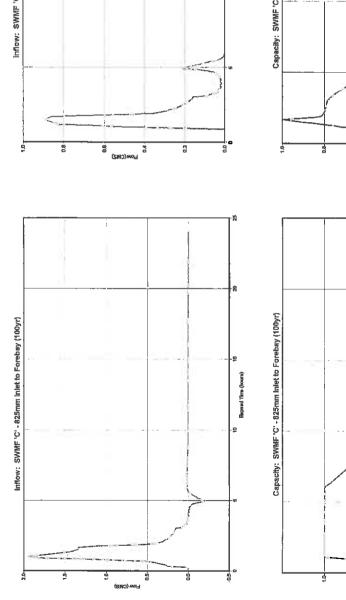
Flow Classification Summary

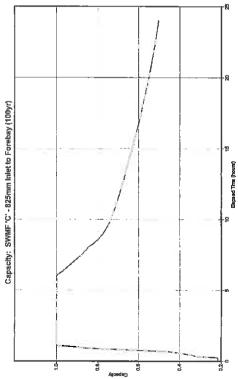
Conduit	Dry	Fracti Up Dry	on of Down Dry	Time i Sub Crit	n Flow Sup Crit	Class Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
10	0.87	0.06	0.00	0.06	0.01	0.00	0.00	0.03	0.0000
20	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.08	0.0001
21	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.05	0.0001
22	0.00	0.78	0.00	0.22	0.01	0.00	0.00	0.06	0.0000
25	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04	0.0000
26	0.00	0.01	0.00	0.92	0.07	0.00	0.00	0.32	0.0001
27	0.55	0.00	0.00	0.27	0.00	0.00	0.18	0.17	0.0043

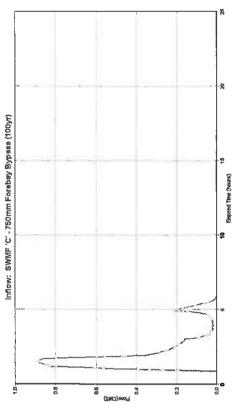
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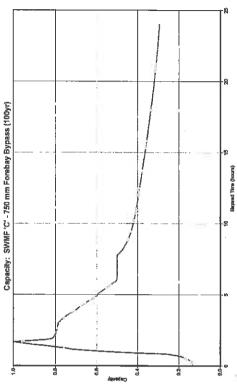
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EPA SWMM Model Output SVMM Facility 'C' Flow Splitter (uttimate development conditions)



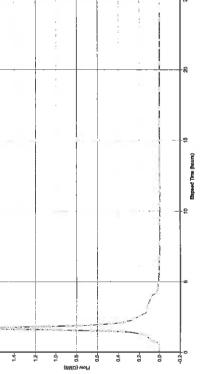


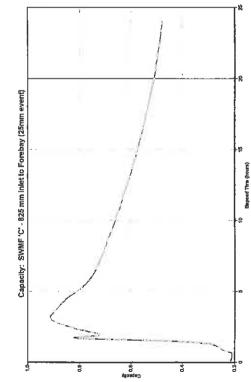


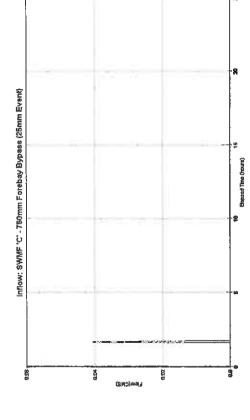


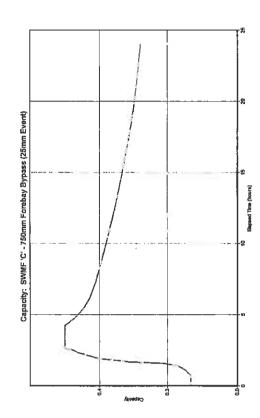












APPENDIX C

Plans:

103106-SWM	Overall Plan
103106-SWM-C1	SWM Pond 'C' - Layout
103106-SWM-C2	SWM Pond 'C' - Sections
103106-GR8	SWM Pond 'C' - Temporary Open Channel