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34 Years

Kizell Lands – Fernbank
5618 Hazeldean Road

Concept Servicing Report

Assessment of Adequacy of Public Services and Stormwater Site Management

CONCEPT SERVICING REPORT
ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES AND STORMWATER SITE MANAGEMENT

KIZELL LANDS - FERNBANK
5618 HAZELDEAN ROAD

Prepared By:

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Suite 200, 240 Michael Cowpland Drive
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February 23, 2018

Novatech File: 108195
Ref: R-2016-159

NOVATECH
Engineers, Planners & Landscape Architects

February 23, 2018

City of Ottawa
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

Attention: Ms. Kathy Rygus

Dear Ms. Rygus:

Reference: Concept Servicing Report
Kizell Lands - Fernbank
Our File No.: 108195

Enclosed are four (4) copies of the Concept Servicing Report for the Kizell Lands within the Fernbank Community. The report addresses development servicing for the subject property.

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

Sincerely,

NOVATECH

Mark Bissett, P.Eng.
Senior Project Manager

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1.0 INTRODUCTION

1.1 Background

The Kizell Lands are located within the Fernbank Community between the Abbott Street extension and Hazeldean Road, east of Iber Road. **Figure 1-1** shows the location of the Fernbank Community and the Kizell Lands. The lands will be developed with a mix of residential products (low, medium and high-density), accompanied by commercial, institutional and recreational land uses.

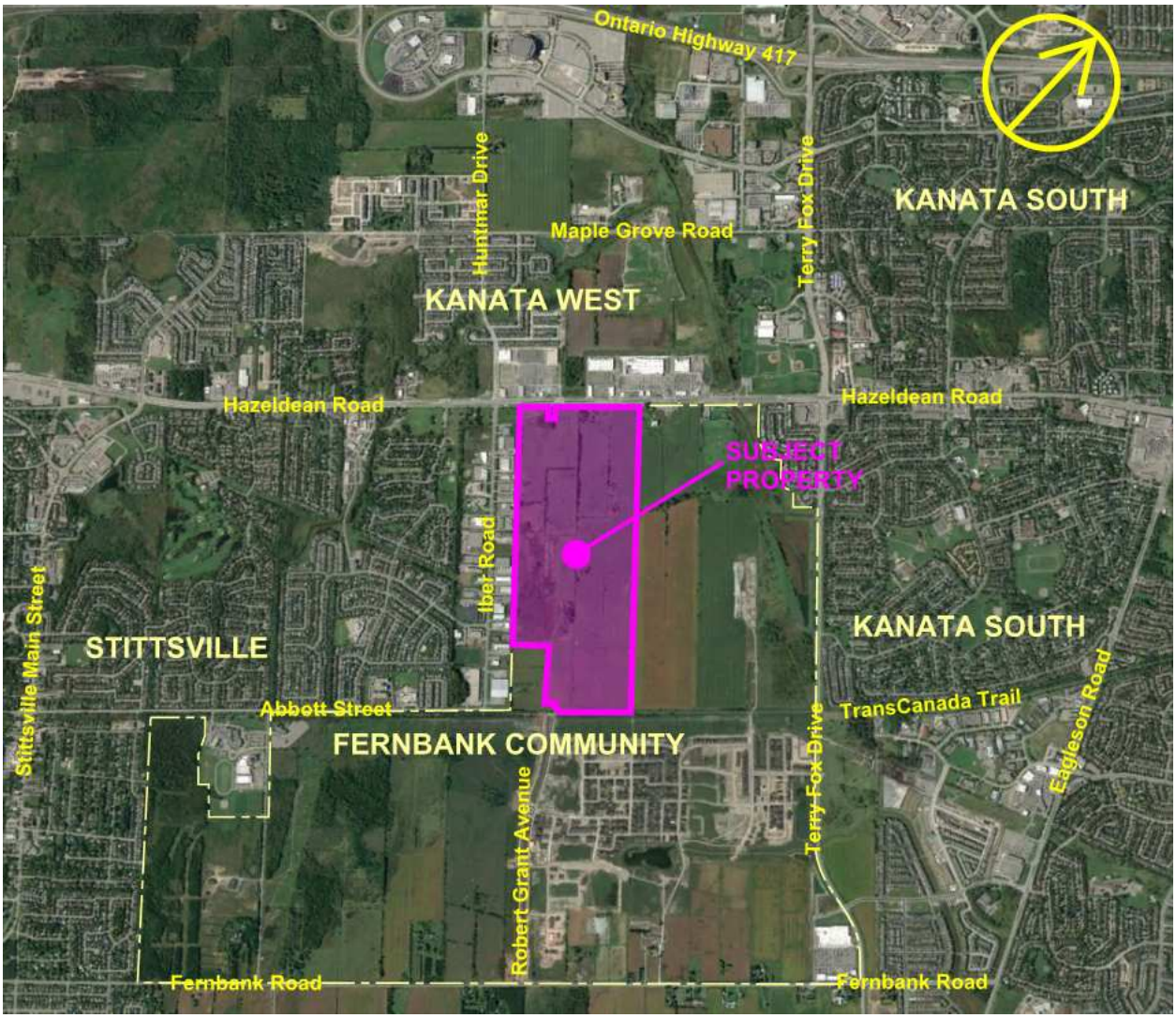

Figure 1-1: Key Plan

The proposed subdivision is approximately 88.67ha and will be bordered by existing industrial lands to the west (Iber Road), the Trans-Canada Trail to the south, future residential lands to the east (Richcraft), and commercial lands to the north (Hazeldean Road).

The subdivision will be comprised of low, medium, and high-density residential dwellings with a planned total of 333 singles, 274 townhouses, and 225 stacked townhouses. Approximately 646 units are proposed within the medium-density blocks (9.92ha), that will be located adjacent the

proposed extension to Robert Grant Avenue. An additional 378 apartment units (680 population) within the high-density block (5.33ha) will be located in proximity to the proposed Robert Grant Avenue. Mixed-Use blocks (9.94ha) are proposed along the existing Hazeldean Road and proposed Robert Grant Avenue, with a Commercial block (0.55ha) located west of the proposed Robert Grant Avenue. A school (3.0ha) will front onto the proposed minor collector along the east boundary of the site. A Park n' Ride facility (1.83ha) is proposed at the corner of the proposed Robert Grant Avenue and Hazeldean Road. The remainder of the site is comprised of Parkland (4.81ha), Open Space (1.67ha), Hydro Corridor (2.70ha), and a SWM Facility (4.32ha). The proposed Land Use Plan is shown in **Figure 2**.

This Concept Servicing Report provides information on the considerations and approach by which Novatech has analyzed the existing site information for the Kizell Lands, and details how the development lands can be adequately serviced while meeting the City requirements and all other pertinent regulations. This study builds upon works completed for the Fernbank Community Design Plan **[1]** prepared by Walker, Nott, Dragicevic Associates Limited, the Fernbank Master Servicing Study **[2]** prepared by Novatech, and the Fernbank Environmental Management Plan also prepared by Novatech **[3]**.

There is ongoing coordination with the landowners to the east who are seeking Draft Plan approval (Richcraft and Metric), and finalizing detail design (Mattamy). Kizell will cost share local infrastructure with Richcraft and Mattamy as part of a private agreement; this may include sewer oversizing, stormwater ponds, roadways, etc.

Major landowners within the Fernbank Community have executed a cost sharing agreement that deals with construction of Robert Grant Avenue, Abbott Street extension, the Fernbank Trunk, and Parkland development; and Kizell is a party to this agreement.

Figure 1-2: Land Use Plan

2.0 TOPOGRAPHY AND GRADING

2.1 Existing Conditions

Based on the topographical survey shown below in **Figure 2-1**, the site generally slopes to the northeast at approximately 0.6%. Steeper grades of up to 15% are locally found near the high-point along the west property boundary. The maximum grade of approximately 107.0 metres on the west property boundary, and a minimum elevation of approximately 99.0 metres in the northeast corner give a total elevation differential of approximately 8.0 metres across the entire site.

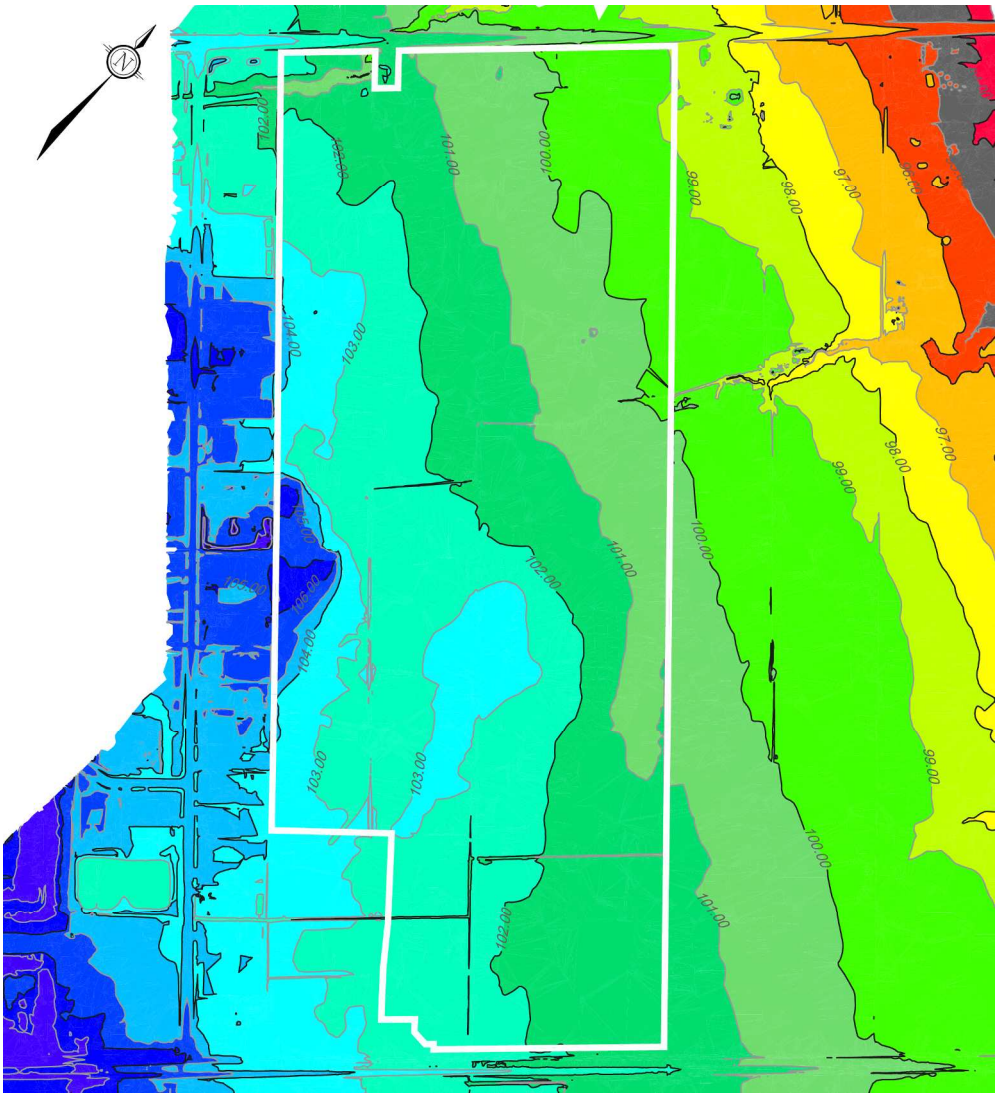

Figure 2-1: Existing Topography

Geotechnical investigations were carried out by Houle Chevrier Engineering **[4]**, and bedrock was encountered in a localized area along the west part of the site, characterized by exposed bedrock and/or bedrock at shallow depth.

2.2 Proposed Conditions

The proposed grading for the Kizell Lands will closely follow the Grading Plan contained in the Fernbank Master Servicing Study **[1]**. Grade raise constraints are shown in **Figure 2-2** and are described as Area 1, 2, and 3. There is no grade raise restrictions within Area 1. The depth of fill material near structures and in garages should be limited to within 1.5 to 2.0 metres for Area 2, and 1.2 to 1.5 metres for Area 3. Additional geotechnical investigations may refine the grade raise limits and boundaries.

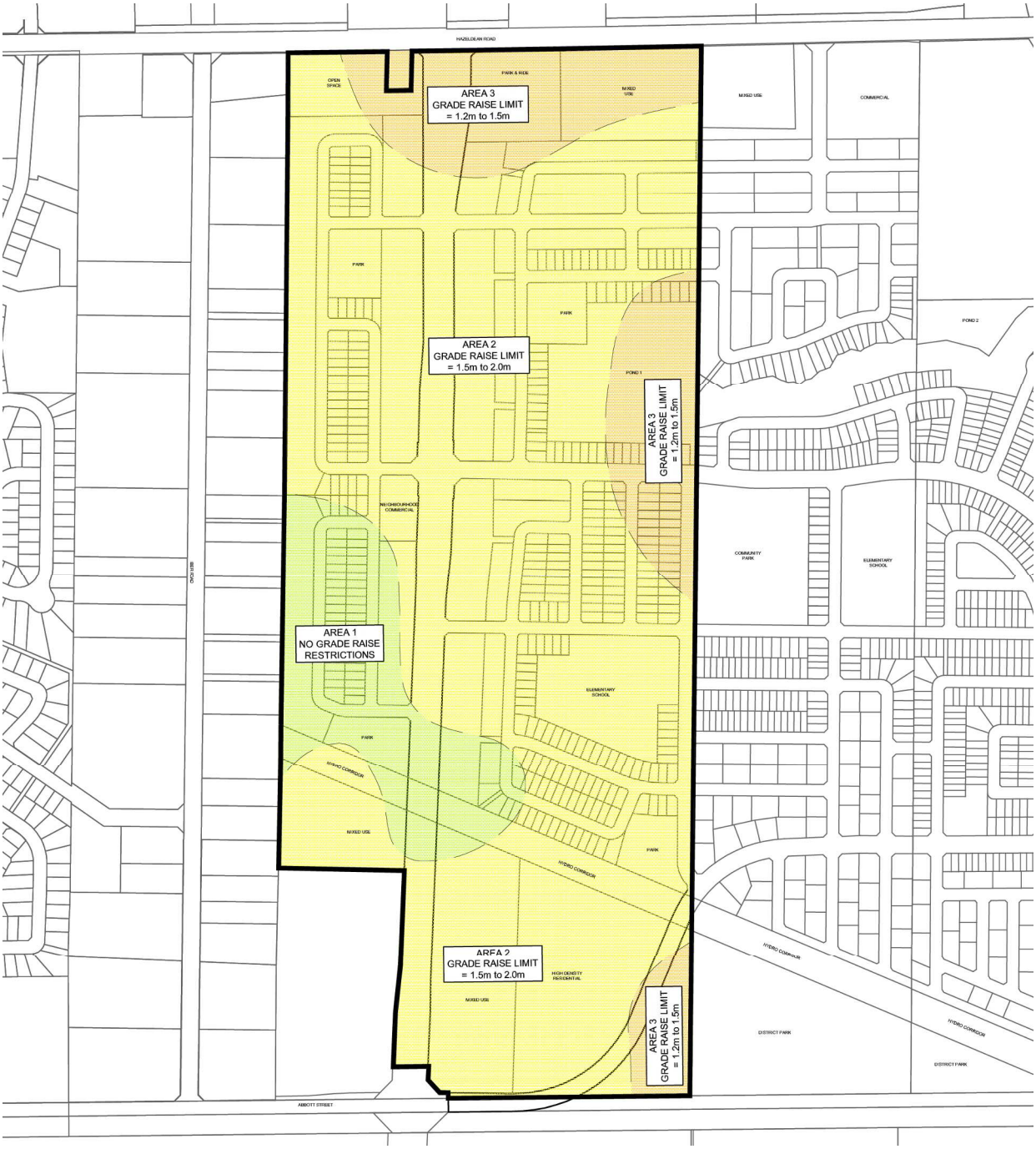

Figure 2-2: Grade Raise Constraints

Existing elevations will be met along Hazeldean Road, the west property boundary (Iber Road), and the Trans Canada Trail. Grading will be coordinated with the proposed development to the east (Richcraft). A high-level grading plan is shown in **Appendix B**.

2.3 Offsite Requirements

Grading will be coordinated with adjacent land owners (Richcraft) to ensure compliance with grade raise restrictions and proper functioning of the major system flow paths.

2.4 Changes from Fernbank Community Design Plan

No significant changes are anticipated to the Grading Plan, as outlined in the approved Fernbank Master Servicing Study.

3.0 ROADWAYS

3.1 Existing Conditions

Currently there is roadway access to the Kizell Lands via Robert Grant Avenue and Hazeldean Road. The 2013 City of Ottawa Transportation Master Plan **[6]** classifies Robert Grant Avenue as a 2-lane Arterial Road, while Terry Fox Drive is classified therein as a 4-lane Arterial Road.

3.2 Proposed Conditions

The Fernbank Transportation Master Plan **[6]** prepared by Delcan, specifies that a North-South Arterial Road is required to serve the Fernbank Community. The existing Arterial Road (Robert Grant Avenue) is to be extended through the development from Abbott Street to Hazeldean Road.

Robert Grant Avenue has been constructed as a 2-lane arterial road between Fernbank Road and Abbott Street, and will continue with the same configuration to Hazeldean Road. It is planned that Robert Grant Avenue will be upgraded to include two vehicle-lanes in both directions with transit lanes in the centre median.

Two east-west major collectors (26m ROW) are planned that will connect to Robert Grant Avenue; these include the Abbott Street Extension and Street 2. The major collectors generally follow the approved alignment from the Fernbank Transportation Master Plan.

There are two minor collectors (22m ROW) planned. The first connects the two major collectors along a north-south axis near the east property line, while the second connects Robert Grant Avenue and Hazeldean Road through the Richcraft property.

All other roads to be constructed are either local roads (18m ROW) or private. Typical cross-sections are contained within the Fernbank Community Design Plan **[1]** and the City of Ottawa Standard Detail Drawings.

Refer to the Transportation Study **[7]**, prepared by Novatech for more detailed analysis of the proposed road network.

3.3 Offsite Requirements

Offsite roadwork may be required at the intersection of Robert Grant and Hazeldean Road.

3.4 Changes from Fernbank Community Design Plan

The roadway network generally follows the Fernbank Transportation Master Plan **[6]**, except for a portion of the north-south minor collector that was omitted east of Pond 1.

4.0 SANITARY SEWERS

4.1 Existing Conditions

Currently, there is no sanitary infrastructure within the Kizell Lands.

The Stittsville Trunk runs parallel to the Trans Canada Trail south of the Kizell Lands, and is a 750mm diameter trunk sewer that flows easterly to the Hazeldean Pump Station.

The Fernbank Trunk is located south of the Kizell Lands within the Hydro One easement corridor, and flows easterly to the Hazeldean Pump Station.

The City of Ottawa recently completed an upgrade to the Hazeldean Pump Station to improve system capacity, reliability, and emergency overflow conditions. The Fernbank Trunk is now connected to the Hazeldean Pump Station.

4.2 Proposed Conditions

Unit and population densities are taken from the Fernbank Community Design Plan **[1]**. All other design parameters are specified in the City of Ottawa Sewer Design Guidelines **[8]**. The peak design flow parameters in **Table 4.1** have been used in the sewer capacity analysis.

Most the sanitary flow from the Kizell Lands will connect into the proposed Stittsville Diversion Trunk, located within Robert Grant Avenue, and will ultimately outlet to the Kanata West Pump Station. The remainder of the sanitary flow is proposed to connect into downstream sewer systems at five different nodes through the adjacent Richcraft Lands. Flow from these five nodes is routed to the Hazeldean Pump Station via the existing Fernbank Trunk. The trunk sewer layout is shown on the Sanitary Drainage Area Plan located in **Appendix B**.

The Stittsville Diversion Trunk is expected to convey approximately 570.7L/s at node SA114 near Hazeldean Road. This is comprised of 493.4L/s diverted from the Stittsville Trunk, and 77.3L/s generated from within the Kizell Lands (approx. 65.3ha).

Five localized areas will drain easterly through the Richcraft Lands to the Hazeldean Pump Station. These are identified as Outlets 2-6 on the Sanitary Drainage Area Plan and have peak design flows of 16.9L/s, 1.8L/s, 1.0L/s, 1.4L/s and 8.3L/s respectively. The sanitary sewer design is being coordinated with the adjacent landowners.

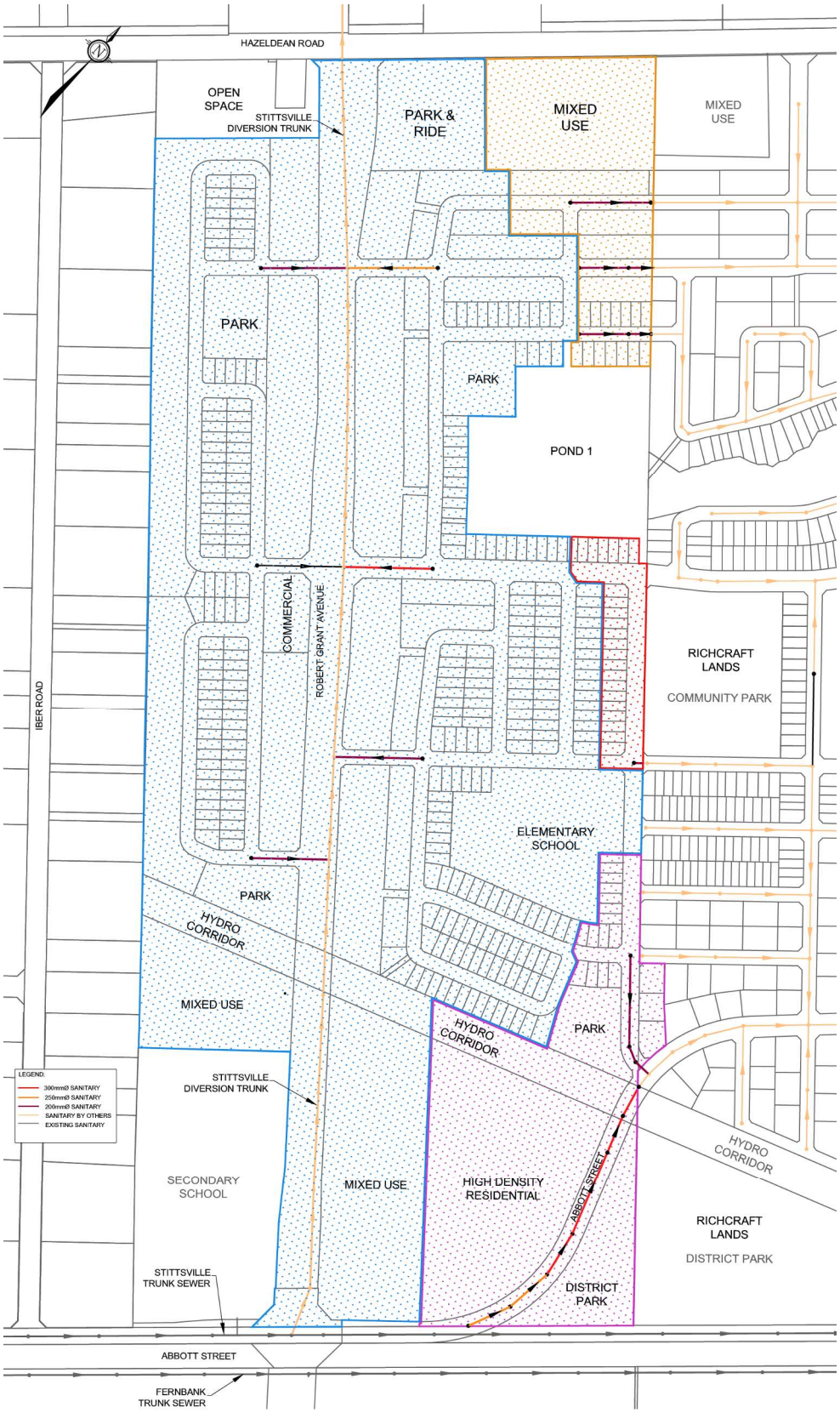

Figure 4-1: Sanitary Sewer Network

Table 4.1: Sanitary Sewer Design Parameters

Parameter	Design Parameter
Single Unit Population	3.4 people/unit
Townhome/Stacked Townhome Unit Population	2.7 people/unit
Stacked Townhome Unit Density	49 Units/net ha
Medium Density/High Density/Mixed Use Unit Population	1.8 people/unit
Medium Density Residential Unit Density	65 Units/net ha
High Density Residential/Mixed Use Unit Density	85 Units/net ha
Residential Flow Rate, Average Daily	350 L/cap/day
Residential Peaking Factor	Harmon Equation (min=2.0, max=4.0)
Commercial & Institutional Flow Rate	50,000 L/day/ha
ICI Peaking Factor	1.5
Infiltration Rate	0.28 L/s/ha
Minimum Pipe Size	250 mm (ICI), 200mm (Res)
Minimum Velocity	0.6 m/s
Maximum Velocity	3.0 m/s

4.3 Offsite Requirements

The Stittsville Diversion Trunk is a city-initiated wastewater project that will route flow from the Stittsville Trunk to the Kanata West Pump Station. The planned sewer alignment runs through the Kizell Lands within the Robert Grant Avenue ROW to Hazeldean Road, then continues through the Kanata West Lands to the Kanata West Pump Station. The Stittsville Diversion Trunk and KWPS must be operational before tributary lands owned by Kizell can be developed.

4.4 Changes from Fernbank Community Design Plan

The Stittsville Diversion Trunk is new infrastructure that was not contemplated at the time of the Fernbank CDP.

5.0 WATER DISTRIBUTION

5.1 Existing Conditions

Figure 5.1 from the Fernbank Environmental Management Plan **[3]** identifies potential well locations within the Fernbank Community. All water wells shall be properly abandoned in accordance with the Ontario Water Resources Act, R.R.O. 1990, Regulation 903, as amended.

A 400mm watermain is located south of the Kizell Lands in an unopened road allowance. To the north, 600mm and 900mm watermains are located in Hazeldean Road, that connect to the Glen Cairn Water Reservoir and Pump Station. A 300mm watermain is located in Iber Road, and connects the above infrastructure. The existing plant is shown on the Water Distribution Plan included in **Appendix B**.

5.2 Proposed Conditions

A planning-level assessment of the water distribution system was completed in Section 8 of the Fernbank Master Servicing Study **[2]**.

The Kizell Lands will be connected to the existing watermain network by way of separate feed points. Two connections are proposed to the existing 400mm diameter main south of the site; one within the intersection of Robert Grant Avenue and Abbott Street, and the other approximately 230m east within the planned extension of Abbott Street. A third watermain connection is proposed to the 900mm diameter watermain within Hazeldean Road at the Robert Grant Avenue intersection. Additional connections will be made through the neighboring lands to the east (Richcraft) that in turn connect to the existing 900mm main in Hazeldean Road, the existing 400mm main in Terry Fox Drive and the existing 400mm main adjacent the Trans Canada Trail. These watermain connections are being coordinated with the adjacent landowners.

In accordance with the Fernbank Master Servicing Study **[2]**, a 300mm watermain is proposed to link the existing off-site distribution system from Hazeldean Road to Abbott Street, and connect with the planned development infrastructure to the east. These larger 300mm pipes serve as the primary conduit to supply the subdivision, and ensure adequate conveyance of domestic water and fire protection. A layout for the 300mm piping system is presented on the Water Distribution Plan, and is attached in **Appendix C**.

We have not shown the network of smaller 150mm and 200mm watermain that is required to supply individual lots and/or blocks. This system of local water infrastructure will be established at detail design of the subdivision, and serves to reinforce the overall supply (network looping).

The watermain boundary conditions below were obtained from the City of Ottawa and has been included in **Appendix A**:

Boundary Condition Hazeldean Connection (900mm feedermain):
Max Day + FF of 167 L/s = 155.6m
Max Day + FF of 217 L/s = 155.6m
Minimum Pressure during Peak Hour = 155.5m
Max Pressure Check = 162.4m

Boundary Condition Abbott Connection (400mm watermain):
Max Day + FF of 167 L/s = 154.5m
Max Day + FF of 217 L/s = 153.6m
Minimum Pressure during Peak Hour = 154.5m
Max Pressure Check = 162.1m

City of Ottawa watermain design criteria and Fernbank Community Design Parameters are outlined in **Table 5.1.**

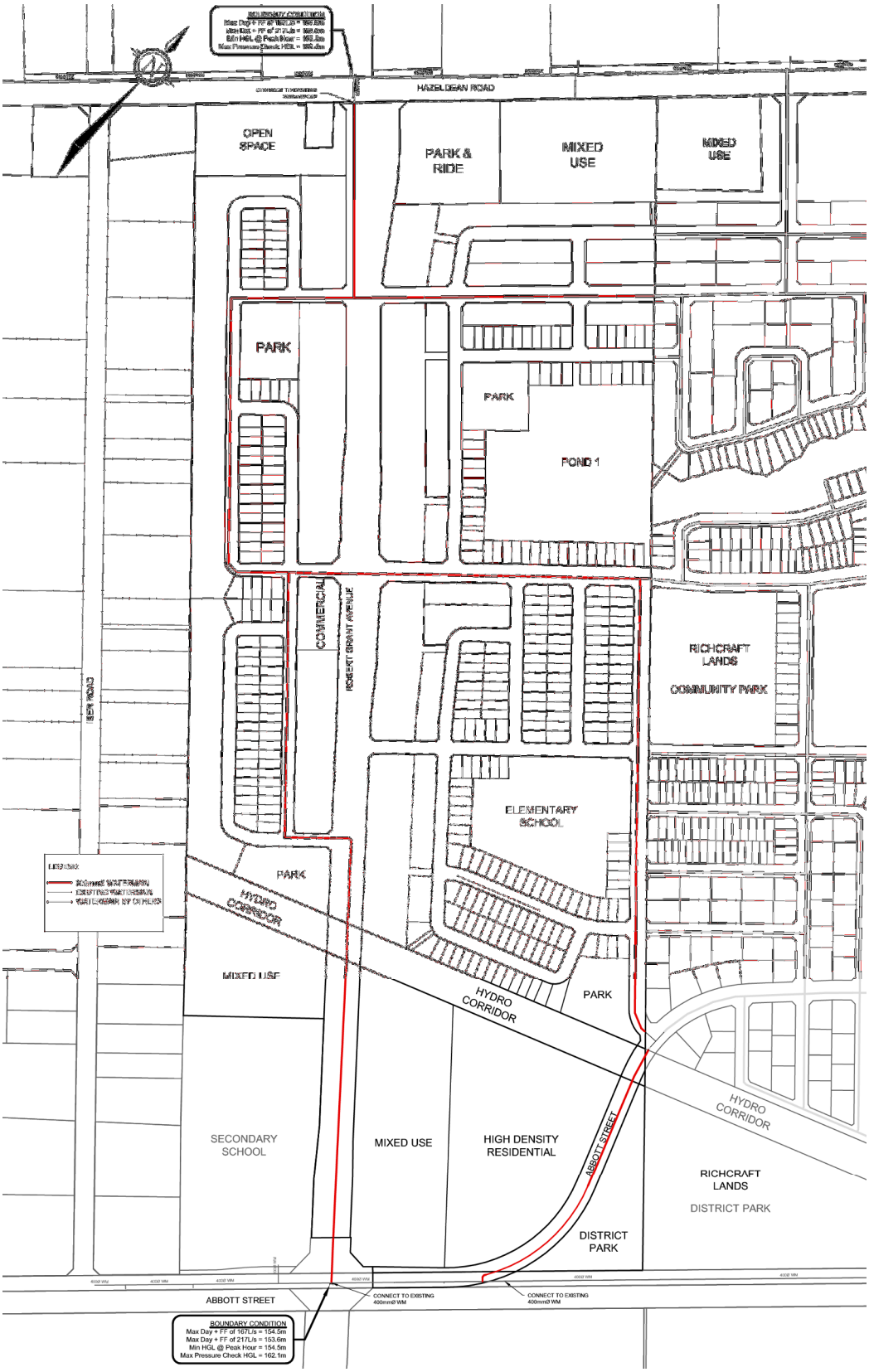

Figure 5-1: Watermain Layout

Table 5.1: Watermain Design Criteria

Design Parameter	Design Criteria
Single Family Home Population	3.4 people/unit
Townhouse/Stacked Townhouse Population	2.7 people/unit
Medium Density/High Density/Mixed Use Population	1.8 people/unit
Stacked Townhouse Density	49 units/ha
Medium Residential Density	65 units/ha
High Residential Density/Mixed Use Density	85 units/ha
Residential Demand	350 L/c/d
Institutional/Commercial Demand	28,000 L/gross ha/day
Maximum Day Demand	2.5 x Average Day
Peak Hour Demand	2.2 x Maximum Day
Institutional/Commercial Max Day	1.5 x Average Day
Institutional/Commercial Peak Hour	1.8 x Maximum Day
Fire Demand (Residential Areas)	167 L/s
Fire Demand (Institutional and Commercial Areas)	217 L/s
Maximum Pressure	690 kPa (100psi) unoccupied areas
Maximum Pressure	552 kPa (80psi) occupied areas outside of ROW
Minimum Pressure	275 kPa (40 psi) except during fire flow
Minimum Pressure (Fire)	140 kPa (20 psi)

In accordance with the City of Ottawa's Technical Bulletin, a fire flow of 167L/s was used for all residential dwelling types, while a fire flow of 217L/s was used for the industrial, commercial, and institutional areas as referenced in the Fernbank Master Servicing Study **[2]**.

The proposed watermain was modeled using EPANET 2. The EPANET model layout is shown in drawing 108195-WTR.

A summary of the model results is shown below in **Table 5.2**, **Table 5.3** and **Table 5.4**. Full model results are included in **Appendix A**.

Table 5.2: Summary of Hydraulic Model Results - Maximum Day + Fire Flow

Operating Condition	Minimum Pressure
223.95 L/s at N6	360.52 kPa (N6)

Table 5.3: Summary of Hydraulic Model Results - Peak Hour Demand

Operating Condition	Maximum Pressure	Minimum Pressure
127.87 L/s through system	577.02 (N9)	488.44 kPa (N1)

Table 5.4: Summary of Hydraulic Model Results – Maximum Pressure Check

Operating Condition	Maximum Pressure	Minimum Pressure
25.68 L/s through system	644.71 kPa (N9)	564.86 kPa (MU1)

Water modelling shows the planned network will meet minimum system pressure requirements during both the fire flow and peak hour design conditions. The maximum pressure check shows modelled system pressures are above 552 kPa (80 psi) throughout the subdivision, therefore pressure reducing valves will be required on all dwellings.

5.3 Offsite Requirements

As specified in the Fernbank Master Servicing Study **[2]**, additional firm pumping capacity at the Glen Cairn Pumping Station and one of the Zone 2W pumping stations might be required to meet additional demands associated with the Fernbank Community. The timing of these upgrades is related to the overall rate of growth in the entire Zone 3W (Kanata and Stittsville area). Growth within the Abbott-Fernbank Lands plays only a small part in determining when these upgrades are required; the City of Ottawa will determine when these water supply upgrades occur. No direct costs associated with the offsite upgrades are attributable to the developer.

To provide watermain looping to the site, it will be necessary for the adjacent Richcraft Lands to the east to be constructed ahead of the Kizell development. The Richcraft development is proceeding in advance of the Kizell Lands and will provide valve closures on the watermains at the property line for future connection and extension of the distribution system.

5.4 Changes from Fernbank Community Design Plan

Changes in the proposed water system are defined as *minor* on page 83 of the Fernbank Master Servicing Study **[1]** and do not require an amendment to the Environmental Assessment since the results do not appreciably change the expected net impacts associated with the project. These changes include:

- Two connections to the existing 400mm diameter watermain running east/west on the south side of the Kizell Lands will be made at the intersection of Robert Grant Avenue and Abbott Street and the other connection 230 metres east. The water distribution links are required for reasons of supply and redundancy; however, there is flexibility in the precise location of the link.

- The 300mm diameter trunk system has been slightly realigned to follow the proposed road network.

6.0 STORMWATER MANAGEMENT

6.1 Existing Drainage Conditions

The Kizell Lands are located at the headwaters of the Carp River West Tributary (part of the Carp River Watershed). There is currently no storm sewer infrastructure servicing the Kizell Lands. Site drainage primarily occurs via overland flow to agricultural ditches. **Figure 6-1** shows the location of the Kizell Lands and the existing watershed boundaries.

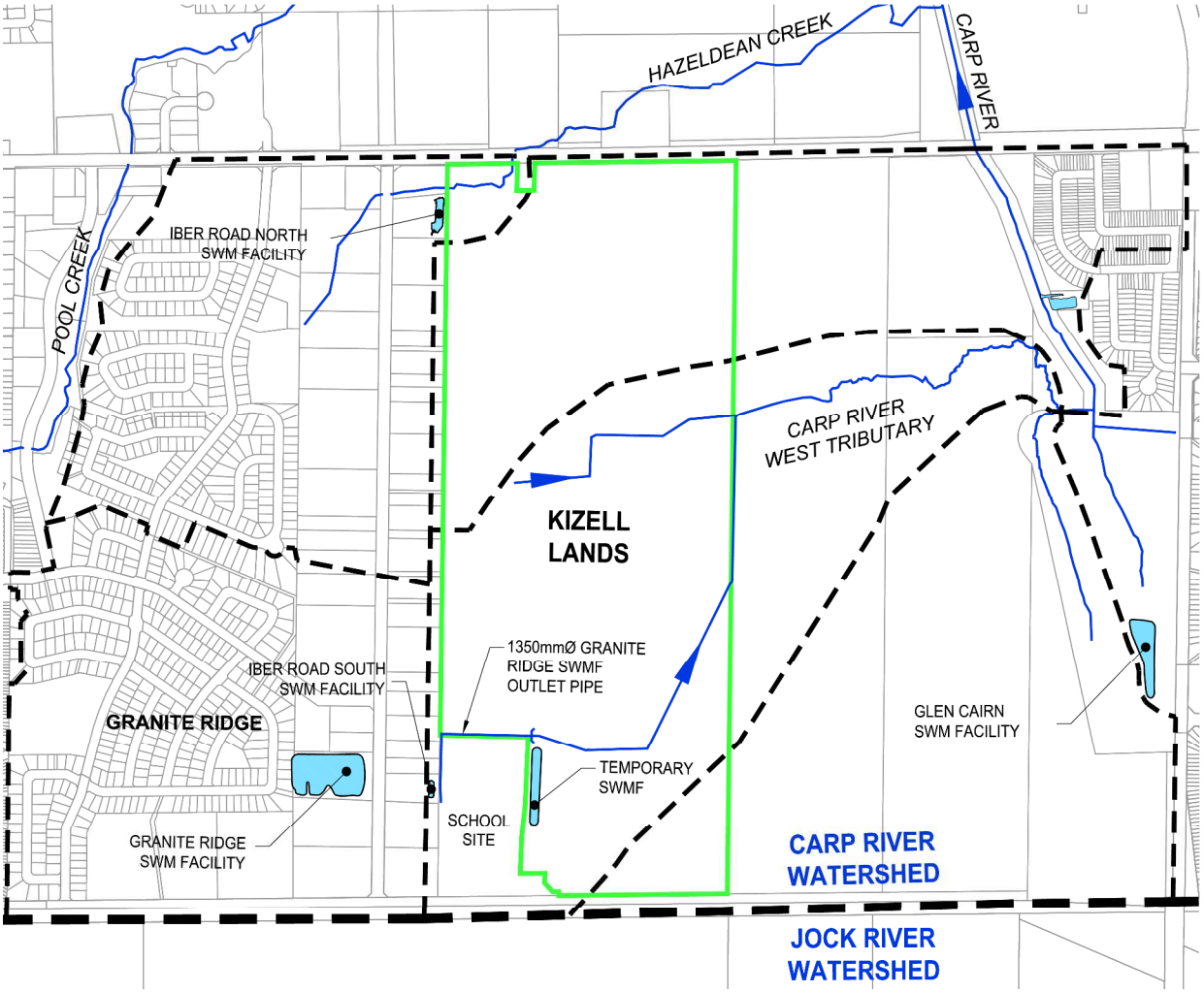

Figure 6-1: Existing Watershed Boundaries

6.1.1 Kizell Lands

Under existing conditions, storm runoff from the southern portion of the Kizell Lands is conveyed by overland flow and open channels to the Carp River West Tributary, which flows east to a confluence with the Carp River just north of the Glen Cairn SWM Facility. As specified in the Fernbank Environmental Management Plan, the Carp River West Tributary has been classified as a tolerant warm water fish community that provides permanent fish habitat.

The Kizell Lands north of the Carp River West Tributary generally slope to the east, towards the Carp River with no defined watercourse.

The Northwest corner of the site is tributary to Hazeldean Creek, which flows east to a confluence with the Carp River approximately 250m north of Hazeldean Road.

Additional information on the existing conditions can be found in the Fernbank Environmental Management Plan **[3]**.

6.1.2 Granite Ridge SWM Facility

The Granite Ridge SWM Facility is located on the west side of Iber Road in Stittsville. This facility provides water quality and quantity control for the Granite Ridge Subdivision, which is south west of the proposed Kizell Lands development.

Under existing conditions, outflows from the Granite Ridge SWM facility are directed through a culvert under Iber Road into an open channel, and into a 1350mm storm sewer running along the north side of the high school site on Abbott Street. This storm sewer discharges into a temporary outlet ditch at the northeast corner of the high school site, which flows northeast to a confluence with the Carp River West Tributary at the eastern limit of the Kizell Lands.

6.1.3 Iber Road

Properties within the Iber Road Business Park are expected to provide on-site water quantity control, matching peak flows to pre-development levels (Simmering & Associates, February 2000). A summary of the required quantity controls outlined in the MOECC Environmental Compliance Approvals for several of the properties on Iber Road have been provided as a part of the Technical Memo included in **Appendix B**. Runoff from the Iber Road Business park is directed to a drainage ditch along the northern boundary of the Business Park and connects to the Granite Ridge SWM facility outlet ditch just east of Iber Road.

6.1.4 High School Site

Drainage works were recently completed in support of a new high school development that involved redirecting outflow from the Granite Ridge SWM Facility around the school site. A temporary SWM facility was constructed to provide water quality and quantity control. Once the Kizell Lands are developed, the temporary pond will be decommissioned and storm runoff from the high school site will be directed to the proposed storm sewers servicing the Kizell lands, with water quality treatment provided by the proposed SWM Facility (Fernbank Pond 1). Quantity control is to be provided on-site for peak flows greater than the 1:5-year post-development peak flows.

6.2 Stormwater Management Criteria

The Kizell Lands are located within the Carp River Subwatershed, and are tributary to the Carp River, which falls under the jurisdiction of the Mississippi Valley Conservation Authority (MVCA). The following stormwater management criteria have been developed based on the criteria in the Fernbank EMP, and requirements of the MVCA and the City of Ottawa Sewer Design Guidelines (October 2012) and Technical Bulletin PIEDTB-2016-01 (September 2016).

6.2.1 Minor System (Storm Sewers)

- Storm sewers are to be designed using the Rational Method as follows:
    - 1:2 year return period for local streets;
    - 1:5 year return period for collector roads;
    - 1:10 year return period for arterial roads;
- Inlet control devices (ICDs) are to be installed in road and rearyard catchbasins to control inflows to the storm sewers;
- Ensure that the 100-year hydraulic grade line in the storm sewer is at least 0.3 m below the underside of footing (USF) elevations for the proposed development.

6.2.2 Major System (Overland Flow)

- Overland flows are to be confined within the right-of-way and/or defined drainage easements for all storms up to and including the 1:100 year event;
- 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;
- Maximum depth of flow on arterial roads shall not overtop the barrier curb and shall leave one lane free of water in each direction.
- 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 to the SWM Facility. 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;
- Although rear yard storage cannot be accounted for in computer modelling, the effect of flow attenuation can be accounted for by assuming a constant slope ditch/swale draining to the street with the following geometry:
    - A minimum slope of 1.5%;
    - A depth ranging between 150mm (min) and 600mm (max); and
    - Maximum side slopes of 3H:1V.
- The product of the 100-year flow depth (m) on street and flow velocity (m/s) shall not exceed 0.60;

6.2.3 Water Quality & Quantity Control

- Provide a *Normal* (70% TSS removal) level of quality control;
- Implement lot level and conveyance Best Management Practices to promote infiltration and treatment of storm runoff;
- Post-development peak flows are not to exceed pre-development peak flows for all storms up to and including the 100-year event.

6.3 Storm Servicing Design

Storm servicing for the subject development will be provided using a dual drainage system: Runoff from frequent events will be conveyed by storm sewers (minor system), while flows from large storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system).

The minor system servicing the Kizell lands is divided into two main trunks with a north and a south inlet to the stormwater management facility. The proposed SWM facility (Pond 1) will serve as the outlet for both the major and minor systems.

6.3.1 Minor System Design

The storm sewers comprising the minor system have been designed in accordance with Technical Bulletin PIEDTB-2016-01 (September 2016). The criteria used to design the storm sewers are summarized in

Design Sheets are in **Appendix A.** The Storm Drainage Area Plan is in **Appendix C**.

Table 6.1 and **Table 6.2.**

Design Sheets are in **Appendix A.** The Storm Drainage Area Plan is in **Appendix C**.

Table 6.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	2 Year Return Period
Collector Roads	5 Year Return Period
Arterial Road	10 Year Return Period
Storm Sewer Design	Rational Method / PCSWMM
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (T_c)	15 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	300 mm

Table 6.2: Runoff Coefficients

Land Use	Runoff Coefficient
Mixed Use	0.80
Park N' Ride	0.80
Arterial Roads	0.90
Schools	0.60
Medium Density / High Density Residential	0.80
Low Density Residential	0.65
Parks	0.40
Hydro Corridor	0.20

Initial Time of Concentration

For conceptual design purposes, the subcatchment areas have been discretized as semi-lumped areas and do not represent each individual sewer section. A 15 minute initial time of concentration has been used to represent the additional travel time through the sewers in the uppermost reaches of the catchments.

At the detailed design stage, the catchment areas will be refined to reflect the areas tributary to each inlet of the sewer system, and the storm sewer design sheets will use an initial time of concentration of 10 minutes.

Inlet Control Devices

Inlet control devices (ICDs) are to be installed in all catchbasins to limit inflows to the minor system capacity (1:2yr local / 1:5yr collector / 1:10yr arterial). ICDs sizes and catchbasin locations will be determined during the detailed design stage.

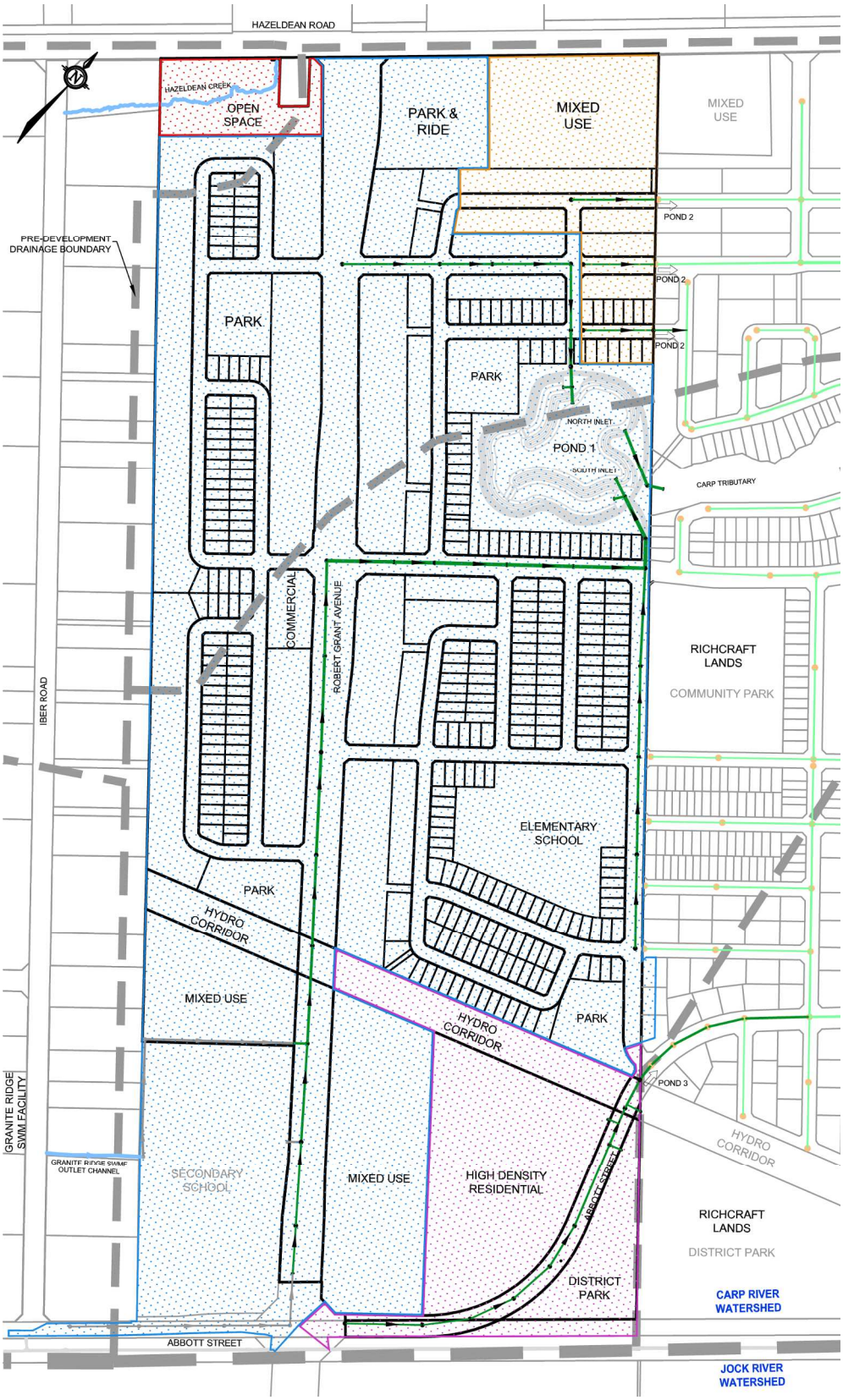

Figure 6-2: Storm Sewer Network

6.3.2 Major System Design

The major system design will conform to the design standards outlined in the Ottawa Sewer Design Guidelines (October 2012) and Technical Bulletin PIEDTB-2016-01 (September 2016). During detailed design, the right-of-way will be graded to provide sufficient storage to contain the major system runoff from storm events exceeding the minor system capacity for all storms up to and including the 100-year design event. The site will be graded to provide an engineered overland flow route for large, infrequent storms, or in the event that the storm sewer system becomes obstructed, with the majority of major system flows routed to Pond 1. There are three drainage areas in the north-eastern corner of the site (P2-21, P2-22, P2-23) where major and minor system flows are tributary to the storm sewers within the adjacent development, which outlet to Pond 2.

Cross-Street Flow

No cross-street flow is permitted for the minor (2-year) storm event, and there is to be only minimal ponding within the roadways. Major system flow from local streets can be conveyed to other local or collector roads, or to a Stormwater Management Facility or watercourse.

Major System Flow Depths

For events exceeding the minor system design storm and up to the 100-year design storm, flow depths in the right of way are to be limited to the maximum water depths outlined in **Table 6.3**.

Table 6.3: Major System Flow Depths

Road Classification	Maximum Water Depth
Local	350mm at edge of pavement
Collector	350mm at edge of pavement
Arterial	No barrier curb overtopping/Flow spread must leave at least one lane free of water in each direction.

6.3.3 Groundwater Infiltration and Water Balance

As discussed in the Fernbank Environmental Management Plan **[3]**, the hydrogeologic conditions of the Kizell Lands will be altered by the increase in hard surfaces and the increased efficiency of stormwater conveyance. The net result will be a reduction in groundwater infiltration, which can potentially result in a reduction in the groundwater table, reduction of baseflow in watercourses, reduced well capacities and consolidation of the overburden, among other impacts.

The recommended infiltration target is to match pre-development infiltration rates. The water balance analysis in the Fernbank Environmental Management Plan **[3]** indicates that maintaining annual pre-development infiltration should be achievable using infiltration best management practices; the types, locations, and suitability of infiltration BMPs will be dependent on site specific details and land use.

Infiltration Best Management Practices

Infiltration of surface runoff will be accomplished using lot level and conveyance controls. The most suitable practices for groundwater infiltration include:

- Infiltration of runoff captured by rear yard catchbasins;
- Direct roof leaders to rear yard areas;
- Infiltration trenches underlying drainage swales in park areas;
- The use of fine sandy loam topsoil in parks and on residential lawns.

By implementing infiltration Best Management Practices as part of the storm drainage design for the Kizell lands, the impacts of development on the hydrologic cycle can be considerably reduced. Infiltration of clean runoff will also have additional benefits for stormwater management; by reducing the volume of "clean" water conveyed to Pond 1, the performance of Pond 1 will be increased.

6.3.4 SWM Facility – Pond 1

Water quantity control and water quality treatment will be provided by an end-of pipe stormwater management pond, 'Pond 1'. Pond 1 has been sized to control and treat runoff from the Kizell Lands development, including flows from the Granite Ridge SWM facility, and a portion of Iber Road.

6.4 Hydrologic & Hydraulic Modeling

The *City of Ottawa Sewer Design Guidelines* (October 2012) require hydrologic modeling for all dual drainage systems. The performance of the proposed storm drainage system for the Kizell Lands was evaluated using the PCSWMM hydrologic/hydraulic model.

A semi-lumped model of the proposed subdivision storm sewers and Pond 1 was developed using PCSWMM, and has been imported into the Carp River PCSWMM model to evaluate the impact of the proposed development on water levels in the Carp River.

The PCSWMM model is a semi-lumped model that represents both the minor and major system flows from the development. The results of the analysis were used to:

- Simulate major and minor system runoff from the site;
- Determine the storm sewer hydraulic grade line for the 100-year storm event;
- Ensure the stormwater management facility is sufficiently sized to control runoff from the proposed development and the upstream drainage areas.

Additional details on the Carp River PCSWMM model are provided in **Section 6.4.5**. Modeling files are provided on the enclosed CD.

6.4.1 Design Storms

The hydrologic analysis was completed using the following synthetic design storms and historical storms. The IDF parameters used to generate the Chicago design storms were taken from the *Ottawa Design Guidelines - Sewer* (November 2004). The 12-Hour SCS MTO design storms were copied from the provided Carp River PCSWMM model, to ensure consistent results.

3 Hour Chicago Distribution:	*12 Hour MTO SCS Distribution*:
25mm Event (Water Quality)	2-year Event
2-year Event	5-year Event
5-year Event	10-year Event
10-year Event	100-year Event
100-year Event	

The 3-hour Chicago distribution generated the highest peak flows on a per-subcatchment basis, however the 12-hour SCS storm (MTO distribution) generated higher HGL elevations. Thus, both storm distributions were used for the design and analysis of the storm drainage system.

6.4.2 Storm Drainage Areas

The site has been divided into subcatchments based on the proposed land use and roadway design. The catchment areas shown on the Storm Drainage Area Plan **108195-STM** (**Appendix C)** correspond to the areas used in the Storm Sewer Design Sheet (**Appendix A**).

6.4.3 Model Parameters

The hydrologic parameters for each subcatchment were developed based on the Land Use Plan (**Figure 2**) and the Storm Drainage Area Plan (**108195-STM**). An overview of the modeling parameters is provided in **Table 6.4**.

Table 6.4: PCSWMM Model Parameters

Area ID	Area (ha)	Runoff Coeff. (C)	Percent Impervious (%)	No Depression (%)	Curve Number (CN)	Equivalent Width (m)	Average Slope (%)
DEL Lands Catchment Areas							
P1-01	1.25	0.82	89%	0%	80.5	400	0.35
P1-02	0.47	0.90	100%	0%	80.5	95	0.35
P1-03a	6.01	0.68	69%	50%	80.5	330	0.50
P1-03b	2.63	0.68	69%	50%	80.5	590*	0.50
P1-04a	2.38	0.81	87%	50%	80.5	535*	0.50
P1-04b	2.07	0.81	87%	50%	80.5	465*	0.50
P1-04c	0.96	0.90	100%	0%	80.5	208	0.33
P1-05	1.61	0.50	43%	0%	80.5	250	0.30
P1-06	3.49	0.62	60%	50%	80.5	600	0.45
P1-07	1.65	0.90	100%	0%	80.5	340	0.40
P1-08	9.55	0.69	70%	50%	80.5	1800	0.45
P1-09	1.66	0.84	91%	0%	80.5	250	0.32

Area ID	Area (ha)	Runoff Coeff. (C)	Percent Impervious (%)	No Depression (%)	Curve Number (CN)	Equivalent Width (m)	Average Slope (%)
P1-10	1.89	0.70	71%	50%	80.5	350	0.20
P1-11	4.70	0.70	71%	50%	80.5	750	0.35
P1-12	2.28	0.65	64%	50%	80.5	580	0.25
P1-13	8.08	0.65	64%	50%	80.5	1400	0.35
P1-14	3.28	0.60	57%	50%	80.5	250	0.25
P1-15	2.44	0.65	64%	10%	80.5	550	0.13
P1-16	5.76	0.66	66%	50%	80.5	1000	0.20
P1-17	2.42	0.88	97%	0%	80.5	370	0.50
P1-18	3.04	0.78	83%	10%	80.5	680*	0.25
P1-19	1.49	0.65	64%	50%	80.5	230	0.13
P1-20	4.70	0.65	64%	50%	80.5	700	0.22
P1-25_POND1	4.29	0.76	80%	0%	80.5	250	0.10
TOTAL:	**78.10**						
Off-Site Catchment Areas							
CS254_1	47.20	0.51	44%	25%	85.0	500	0.70
CS254_2	18.12	0.45	36%	25%	87.0	500	0.50
CS252	10.45	0.59	56%	25%	87.0	210	0.50

**Where detailed street information is not available, a width value of 225m per ha has been used.*

Major System Storage

Since the major system has not yet been designed, the subcatchment areas are not based on a detailed grading plan. Major system storage is represented in the PCSWMM model using storage nodes. The required storage volumes are based on containing the runoff from the 100-year event within road sags (max depth of 0.35m) with no cascading overland flow. The release rates from the storage nodes have been established as follows:

- Local Roads, up to the 2-year peak flow from the subcatchment flow uncontrolled to the storm sewers, storage is provided for larger storm events;
- Collector Roads, up to the 5-year peak flow from the subcatchment flow uncontrolled to the storm sewers, storage is provided for larger storm events;
- Arterial Roads, up to the 10-year peak flow from the subcatchment flow uncontrolled to the storm sewers, storage is provided for larger storm events;

As the project is only at the Draft Plan stage, detailed lot-level grading information is not yet available. The PCSWMM model is set up with the main trunk sewers, as outlined in the storm sewer design sheet.

The required major system storage volumes are provided in **Section 6.4.4 "Model Results"** - refer to **Table** 6.7.

Runoff Coefficient/ Impervious Values

Impervious (%IMP) values for each subcatchment area were calculated based on the Runoff Coefficients (see **Table 6.2**) noted on the Storm Drainage Area Plan (**108195-STM**) using the equation:

$$\%IMP = \frac{(C - 0.2)}{0.7}$$

Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments.

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

Residential rooftops are assumed to provide no depression storage and all rainfall is converted to runoff. The percentage of rooftop area to total impervious area is represented by the 'no depression storage' column in **Table 6.4**.

Curve Number

The Carp River Watershed PCSWMM model uses an SCS Curve Number of 80.5. Thus, all subcatchments within the Kizell Lands have been given a curve number value of 80.5, to remain consistent with the Carp River Watershed model.

Equivalent Width

'Equivalent Width' refers to the width of the sub-catchment flow path. This parameter is calculated as described in the *Sewer Design Guidelines, October 2012, Section 5.4.5.6*. For areas where detailed roadway information is available, the total length of the street segment, multiplied by 2 (in areas where there is to be development on both sides of the street) has been used. In areas where detailed roadway information is not available, such as in the mixed-use development blocks, a value of 225m per ha has been used. These areas have been indicated in the model parameter table with an asterisk (*).

Upstream Areas

The proposed Kizell Lands development must maintain a storm outlet for the Granite Ridge SWM facility. The existing 1350mm storm sewer north of the high school site at Abbott Street will connect to the proposed storm sewer system, and will serve as the outlet for the Granite Ridge SWM facility and a portion of the industrial area on the east side of Iber Road.

The outflows from the upstream SWM facilities will have already been treated, but will be routed through the Kizell storm sewers to Pond 1. For SWM facilities in series, the MOE recommends that the downstream pond (Pond 1) be designed to provide 80 m^3/ha extended detention storage, double the standard 40 m^3/ha required for a single facility.

Fernbank Pond 1

Refer to **Section 7.0** for additional details on the design of Fernbank Pond 1, including the stage-storage-discharge curves used in the PCSWMM model.

Modeling Files / Schematic

The PCSWMM model schematics are provided in **Appendix B**. Digital copies of the modeling files and model output for all storm events are provided on the enclosed CD.

6.4.4 Model Results

The results of the PCSWMM model are summarized in the following sections.

Peak Flows

The proposed SWM facility has been designed to control post-development peak flows in the Carp River West Tributary to pre-development levels. The pre-development peak flows for the 12-hour SCS distribution are taken from Table 8-2 of the Fernbank EMP. A comparison of pre- vs. post-development peak flows is provided in **Table 6.5**.

Table 6.5: Pre vs. Post-Development Peak Flows to Carp River West Tributary (m^3/s)

Storm Distribution->	12hr SCS Distribution			
Return Period->	**2yr**	**5yr**	**10yr**	**100yr**
Pre-Development	1.71	2.67	3.32	5.43
Post-Development	1.19	2.01	2.61	4.70

Hydraulic Grade Line

The PCSWMM model was used to evaluate the 100-year hydraulic grade line (HGL) elevations within the proposed storm sewers. As the design is only at the draft plan stage, underside of footing (USF) elevations have not yet been determined. The HGL analysis will need to be revised at the detailed design stage to reflect the controlled inflows at each inlet to the storm sewers.

The model indicates that there will be some surcharging of the sewers during the 100-year event. While the 3-hour Chicago distribution generates higher peak flows, the 12-hour SCS MTO distribution generates larger runoff volumes. Consequently, the 12-hour SCS MTO distribution also generates the highest HGL elevations due to backwater from the 100-year water level in the proposed SWM facility.

The storm sewer sizes and elevations have been adjusted where possible to maintain a 100-year HGL within approximately 0.30 m above the pipe obvert.

Table 6.6: 100-year HGL Elevations

Manhole ID	MH Invert Elevation (m)	T/G Elevation (m)	Outlet Pipe Obvert (m)	HGL Elevation (MTO SCS) (m)	WL Above Obvert (MTO SCS) (m)	HGL Elevation (Chicago) (m)	WL Above Obvert (Chicago) (m)
P1-101 (STM)	97.65	100.80	99.45	99.48	0.00	99.35	-0.13
P1-103 (STM)	97.70	100.83	99.54	99.80	0.23	99.72	0.15
P1-105 (STM)	97.78	101.51	99.80	99.96	0.36	99.89	0.29
P1-107 (STM)	98.35	101.67	99.70	100.06	0.34	100.01	0.29
P1-109 (STM)	98.46	101.84	99.81	100.12	0.29	100.09	0.26
P1-111 (STM)	98.79	102.06	99.99	100.33	0.33	100.33	0.33

Manhole ID	MH Invert Elevation (m)	T/G Elevation (m)	Outlet Pipe Obvert (m)	HGL Elevation (MTO SCS) (m)	WL Above Obvert (MTO SCS) (m)	HGL Elevation (Chicago) (m)	WL Above Obvert (Chicago) (m)
P1-113 (STM)	99.17	102.30	100.22	100.58	0.34	100.59	0.35
P1-147 (STM)	97.98	101.82	99.89	100.21	0.32	100.16	0.27
P1-153 (STM)	98.10	102.12	99.97	100.34	0.37	100.26	0.29
P1-165 (STM)	98.23	102.43	100.06	100.45	0.39	100.35	0.29
P1-169 (STM)	98.31	102.61	100.11	100.52	0.41	100.41	0.30
P1-171 (STM)	98.44	102.51	100.25	100.61	0.36	100.50	0.25
P1-173 (STM)	99.43	103.07	100.47	100.66	0.17	100.57	0.08
P1-203 (STM)	98.67	103.15	100.47	100.94	0.44	100.82	0.32
P1-205 (STM)	98.91	103.66	100.71	101.09	0.35	100.99	0.25
P1-207 (STM)	99.16	103.17	100.96	101.29	0.30	101.16	0.17
P1-209 (STM)	100.43	103.50	101.18	101.53	0.34	101.40	0.21
P1-215 (STM)	99.59	102.78	101.27	101.51	0.24	101.32	0.05
P1-215a(STM)	101.06	103.39	101.52	101.91	0.39	101.64	0.12
P1-217 (STM)	99.89	103.31	101.82	101.77	0.20	101.52	-0.05
P1-219 (STM)	100.64	103.45	101.84	101.91	0.06	101.71	-0.14
P1-221 (STM)	100.69	102.42	101.44	101.71	0.26	101.51	0.06
P1-221a(STM)	99.72	102.75	101.37	101.64	0.24	101.42	0.02
P1-301 (STM)	97.70	101.25	99.04	99.39	0.35	99.19	0.15
P1-303 (STM)	97.73	101.29	99.07	99.39	0.32	99.19	0.12
P1-305 (STM)	97.79	101.36	99.13	99.40	0.27	99.25	0.12
P1-307 (STM)	98.48	101.56	99.32	99.65	0.33	99.56	0.24
P1-317 (STM)	97.91	101.44	99.26	99.42	0.14	99.36	0.08
P1-319 (STM)	98.12	101.57	99.47	99.83	0.34	99.83	0.34
P1-321 (STM)	98.22	101.65	99.57	100.02	0.43	100.02	0.43
P1-323 (STM)	98.89	101.72	99.72	100.27	0.54	100.30	0.57
P1-327 (STM)	98.82	102.05	99.87	100.16	0.27	100.18	0.29
P1-337 (STM)	99.34	102.84	100.17	100.54	0.36	100.57	0.39
P1-349 (STM)	101.62	103.80	102.22	102.25	0.02	102.28	0.05
P1-351 (STM)	101.35	103.76	102.12	101.95	-0.16	101.98	-0.13
P1-EX. 501 (STM)	101.18	104.04	102.53	102.69	0.14	102.44	-0.11
P1-EX. 502 (STM)	101.12	103.98	102.47	102.58	0.09	102.36	-0.13
P1-EX. 503 (STM)	100.87	103.75	102.22	102.18	-0.06	102.00	-0.24
P1-EX. 504 (STM)	100.63	103.49	101.98	101.95	-0.05	101.80	-0.20

Note that there are some manhole locations where the 100-year HGL elevation exceeds 0.30m above the pipe obvert. During the detailed design stage, pipe sizes and building elevations will be adjusted accordingly to ensure the 100-year HGL will be at least 0.30m below the design USF elevations.

Major System Storage

The storage required in the right-of-way has been evaluated on a per-hectare basis for each subcatchment. Refer to **Table 6.7**.

Table 6.7: Major System Storage

Drainage Area ID	Area (ha)	Storage Required		
		Area (m2)	Total Volume (m3)	Per Hectare Volume (m^3/ha)
P1-01	1.25	315	56	45
P1-01	0.47	140	25	53
P1-03a	6.01	3325	501	83
P1-03b	2.63	1850	324	123
P1-04a	2.38	2050	359	151
P1-04b	2.07	1550	272	131
P1-04c	0.96	250	44	46
P1-05	1.61	215	38	24
P1-06	3.49	1750	307	88
P1-07	1.65	425	75	45
P1-08	9.55	5400	946	99
P1-09	1.66	385	68	41
P1-10	1.89	1100	193	102
P1-11	4.7	2750	482	103
P1-12	2.28	1250	219	96
P1-13	8.08	4200	736	91
P1-14	3.28	1575	276	84
P1-15	2.44	1310	230	94
P1-16	5.76	3300	578	100
P1-17	2.42	750	132	54
P1-18	3.04	1400	246	81
P1-19	1.49	450	79	53
P1-20	4.7	2550	447	95

There is a relatively wide range of major system storage requirements. Some areas, primarily those designated for mixed use development, may require up to 150m^3/ha in order to fully contain the 100-year event.

The required major system storage volumes are generally larger than the values documented in the Fernbank MSS. However, Technical Bulletin PIEDTB-2016-01 (September 2016) has

increased the allowable ponding depths in the right-of-way from 0.30m to 0.35m, which represents a significant increase in the maximum storage volumes that can be provided.

The major system storage volumes will be reassessed at the detailed design stage to ensure the appropriate major system storage is provided.

6.4.5 Carp River Watershed PCSWMM Model

The City has developed a PCSWMM model of the Carp River subwatershed and indicated that all new development within the watershed is to be represented in this model to confirm that the cumulative impacts of development are accounted for and that the proposed stormwater management strategies will have no adverse impact on water levels in the Carp River.

To determine what effect the proposed Kizell Lands development will have on the downstream Carp River, the Kizell Lands PCSWMM model was integrated into the Carp River Watershed PCSWMM model provided by the City, following the protocol outlined in the *City of Ottawa Carp River PCSWMM Model Documentation*.

After discussions with City staff, there have been some revisions made to some of the subcatchment area parameters upstream and downstream of the Kizell subdivision. Please refer to the technical memorandum included in **Appendix B**, which outlines these changes.

The results of the analysis indicate that the proposed development will not have an adverse effect on the downstream watercourses, as the outflows from Pond 1 are to be controlled to match existing flows into the Carp River West Tributary.

6.4.6 Runoff Volumes and Downstream Impacts

When the Fernbank EMP was written, it was assumed that the Kizell Lands would have an average imperviousness of 56%. The current plans for the proposed residential development have an average imperviousness of 70%. The Fernbank EMP states the following: *"The recommended areas for SWM blocks have been oversized to allow for flexibility in the configuration of the SWM facilities, as well as to allow provide flexibility for expansion of the SWM facilities to account for any intensification of development from the current land use plan."* (Page 88 Section 9.0, Fernbank EMP, Novatech, June 2009).

Pond 1

The conceptual design for the Pond 1 SWM facility (refer to drawing **108195-SWM**) accounts for the increase in runoff resulting from the increased impervious area, and will control flows to the allowable release rates as outlined in the Fernbank EMP. The pond forebay sizing has also been adjusted from the original concept to account for the increase in imperviousness, to ensure that the 70% TSS water quality requirement is being met.

Runoff Volumes

In terms of the runoff volume, the Fernbank EMP outlines the following criteria: *"Increases in runoff volumes resulting from development are not to exceed an additional 40,000m^3 above existing conditions for the 100-year event."*

To determine the magnitude and impact of additional runoff volume directed to the Carp River West Tributary due to the increased impervious area of the Kizell lands, the SWMHYMO model submitted as a part of the Fernbank EMP was updated with a % impervious (TIMP) value of 0.70, up from the original 0.56. Results are as follows:

Table 6.8: 100-year Runoff Volume Comparison

Development Condition	100yr Runoff Volume (m3)				
	Pond 1	Pond 2	Pond 3	Total	Increase
Pre-Development	112,700	17,900	51,300	181,900	-
Post-Development (no BMPs, 56% IMP)	122,100	20,000	68,400	210,500	28,600
Post-Development (with BMPs, 56% IMP)	120,200	19,500	68,500	208,200	26,300
Post-Development (no BMPs, 70% IMP)	126,800	20,000	68,400	215,200	33,300
Post-Development (with BMPs, 70% IMP)	124,100	19,500	68,500	212,100	30,200

The Fernbank EMP states that "Increases in runoff volume resulting from development are not to exceed an additional 40,000m^3 above existing conditions for the 100-year event." As shown in the above table, the increase in impervious area does result in an increase to the runoff volume directed to the Carp River. However, the increase is well within the allowable overall increase for the Fernbank Community.

Continuous Modeling (Erosion Assessment)

To determine if there would be a negative impact to the downstream channel morphology, the continuous SWMHYMO model submitted as a part of the Fernbank EMP was updated with a % impervious (TIMP) value of 0.70, up from the original 0.56. Results are as follows:

Table 6.9: Erosion Threshold Exceedance Comparison

# of Hours Exceeding Critical Flow Threshold for Erosion ***% of Total Annual Flow above Erosion Threshold***						
Location	**Year**					
	1974	**1979**	**1981**	**1986**	**1995**	**1997**
Critical Flow = 1.70 m3/s (C12)						
Carp River West Tributary @ Monitoring Location C12 (Downstream of SWMF P1)						
Pre-Development	0 hrs *0%*	7 hrs *0.10%*	12 hrs *0.20%*	6 hrs *0.10%*	16 hrs *0.30%*	0 hrs *0%*
Post-Development (no BMPs, 56% IMP)	0 hrs *0%*	6 hrs *0.10%*	10 hrs *0.20%*	4 hrs *0.10%*	15 hrs *0.30%*	0 hrs *0%*
Post-Development (no BMPs, 70% IMP)	0 hrs *0%*	6 hrs *0.10%*	11 hrs *0.20%*	5 hrs *0.10%*	16 hrs *0.30%*	0 hrs *0%*

As shown in the above table, there should be little to no increase in impact to the downstream channel morphology due to the increased impervious area.

7.0 STORMWATER MANAGEMENT FACILITY

The proposed SWM facility has been sized to provide water quality and quantity control for a total tributary drainage area of 77.9 ha from the Kizell Lands, plus an additional 75.8 ha from the upstream Granite Ridge SWM Facility and Iber Road. The design of the SWM facility is shown on Drawing **108195-SWM**.

7.1 Design Criteria

The proposed SWM facility has been designed to meet the following criteria:

- Provide a *Normal* level of water quality control (70% long-term TSS removal);
- Provide quantity control storage to limit post-development flows into the Carp River West Tributary to 4.75 m^3/s for all storms up to and including the 100-year event;
- The SWM facility will have side slopes of 3:1 (H:V) or shallower;
- The forebays have been sized to provide sufficient storage for 10-years of sediment accumulation;
- A sediment storage area for each forebay (two in total) have been provided within the SWM block to allow for storage and drying of material removed during maintenance/ cleanout;
- Guardrails conforming to City standards are to be installed at the inlet and outlet structures of the SWM facility;
- Infiltration tests are to be performed on the native material to determine whether a liner will be required.

7.2 Pathways/ SWM Facility Access

Access to the inlet and outlet structures and the sediment storage area will be provided by the proposed service road / pathway that runs around the perimeter of the pond. Two accesses to the pond block will be provided as shown on Drawing **108195-SWM**.

7.3 Geotechnical (Pond Liner)

It is recommended that the base and the sidewalls of the SWM facility be inspected by a geotechnical consultant to confirm the requirement for a geotechnical liner. The thickness of the pond liner (if required) would be designed to be outside the limits of the design grades of the SWM facility and would have no impact on the storage volume of the pond.

7.4 Inlet Structures

The north and south inlets to the SWM facility have been designed with flow splitters consisting of a low-flow pipe to direct runoff from smaller storm events into the forebays, and a high flow pipe to direct peak flows from larger storm events directly into the main cell of the pond. The low-flow and high-flow pipes are to be separated by a weir structure within the connecting manhole.

The SWM Facility inlet structures will consist of the following:

- North Inlet:
    - 1350 mm pipe outletting to the north forebay, sized for the flows from the 25mm water quality event;
    - 1340 x 2100 mm pipe outletting to the main cell of the pond.
    - Flow splitter weir (crest elevation = 98.55 m)
- South Inlet:
    - 1800 mm pipe outletting to the north forebay, sized for the flows from the 25mm water quality event;
    - 1800 mm pipe outletting to the main cell of the pond.
    - Flow splitter weir (crest elevation = 98.86 m)

A plunge pool will be placed at each inlet to prevent scour and erosion. The plunge pool and the banks of the forebay near the inlet will be lined with riprap as per City of Ottawa standards.

7.5 Sediment Forebays/ Permanent Pool

The sediment forebays and permanent pool have been designed in accordance with the *MOE SWM Planning and Design Manual* (March 2003). Supporting calculations are provided in **Appendix B**.

Forebays

The north forebay will have a length of approximately 75 m, and the south forebay will have a length of approximately 85 m. Submerged riprap berms set 0.10 m below the normal water level will separate the forebays from the main cell of the pond.

Annual sediment loading to the SWM facility from the upstream drainage area has been estimate at approximately 145.2 m^3/year (see design calculations in **Appendix B**). Each forebay has been designed to allow for a minimum of 10 years of sediment accumulation:

- The north forebay will have an estimated sediment loading rate of approximately 34 m^3/year. This corresponds to a sediment volume of 340 m^3 over a period of 10 years. The north forebay provides a sediment storage volume of approximately 1,160 m^3 at the top of the submerged berm separating the forebay and the main cell.
- The south forebay will have an estimated sediment loading rate of approximately 111 m^3/year. This corresponds to a sediment volume of 1,110 m^3 over a period of 10 years. The south forebay provides a sediment storage volume of approximately 3,500 m^3 at the top of the submerged berm separating the forebay and the main cell.

Permanent Pool

The upstream drainage area from the Kizell Lands to the SWM facility (approximately 77.93 ha) has an average imperviousness of 71%. For a *Normal* level of protection (70% long-term TSS removal), the required permanent pool volume is approximately 6,700 m^3.

The conceptual design of the SWM pond is governed primarily by the active storage component. The permanent pool volume provided by the conceptual design (21,800 m^3) is based on the pond footprint at the normal water level, and grading down to a permanent pool depth of 1.5m. At the detailed design stage, the pond configuration will be revised to ensure the permanent pool is not significantly over-sized.

7.6 SWM Facility Outlet Structure

Outflows from the SWM facility will be routed through an outlet control structure before discharging to a 1950 mm storm sewer which will outlet to the Carp River West Tributary. Refer to **Appendix B** for the supporting outlet sizing calculations and to Drawing **108195-SWM**.

7.6.1 Extended Detention

Extended detention will be provided for the first 6,290m^3 (6,234m^3 required) of active storage to allow for settling of suspended sediment in the pond. Extended detention outflows will be conveyed to the outlet structure via a 450mm reverse slope pipe with an invert of 96.25m at the bottom of the SWM facility and an invert of 97.75m (normal water level) at the connection to the outlet structure. The extended detention volume will be released over a period of approximately 40 hours through a 220mm slide-in orifice plate installed in the weir within the outlet structure.

7.6.2 Quantity Control

Flows that exceed the extended detention storage volume will outlet through a multi-stage weir within the outlet structure.

7.6.3 Overflow Spillway

The proposed SWM facility has been sized to provide sufficient storage for storms up to and including the 100-year event. An overflow spillway has been provided in case the outlet storm sewer is obstructed or an extreme event (greater than the 100-year event) generates runoff exceeding the maximum available storage in the SWM facility. The overflow spillway will have a crest elevation of 99.80m and will direct overflows into the Carp River West Tributary.

7.7 Stage-Storage-Discharge Table

Based on the proposed SWM facility design, the calculated stage-storage-discharge table is as follows:

Table 7.1: Pond 1 Stage-Storage-Discharge Table

Service Level	Elevation (m)	Stage (m)	Total Volume (m^3)	Active Volume (m^3)	Discharge (L/s)
Bottom	96.15	-	0		
NWL	97.65	0.00	22298	0	0
	97.75	0.10	23254	956	0
	97.85	0.20	25037	2739	31
	97.95	0.30	26863	4565	45
Ex. Det.	98.10	0.45	27794	5496	92

Service Level	Elevation (m)	Stage (m)	Total Volume (m^3)	Active Volume (m^3)	Discharge (L/s)
	98.05	0.40	28736	6438	55
	98.15	0.50	30663	8365	153
	98.25	0.60	32637	10339	320
	98.35	0.70	34658	12360	529
	98.45	0.80	36736	14438	770
2-year	98.57	0.92	38863	16565	1090
	98.65	1.00	41057	18759	1320
	98.75	1.10	43332	21034	1622
5-year	98.80	1.15	45619	23321	1778
	98.90	1.25	47933	25635	2100
	99.00	1.35	50287	27989	2431
	99.10	1.45	52672	30374	2772
	99.20	1.55	55070	32772	3154
	99.30	1.65	57507	35209	3654
100-year	99.40	1.75	58737	36439	4217
Overflow	99.70	2.05	66025	43727	8564

Note that the discharge rate has been calculated based on the orifice and weir calculations, and is less than the peak flow measured from the outlet in the PCSWMM model.

7.8 Carp River West Tributary

The SWM facility will outlet to the existing Carp River West Tributary at the northern end of the site. As per the Fernbank EMP, the upper reach of the tributary is not considered a "naturalized" channel, and will be re-graded to accommodate the proposed SWM facility outlet. There is an existing perched culvert downstream of the planned Pond 1 outlet that was identified in the EMP for removal to facilitate the movement of aquatic species. The Carp River West Tributary is classified as a tolerant warm-water fish community (Type 3 Community), based on the *Carp River Watershed/Subwatershed Study*. Temperature mitigation is required within Pond 1 and along the Tributary, with the goal of ensuring that the temperature of discharged stormwater does not exceed 25°C (22°C preferred). Temperature mitigation is commonly achieved through tree plantings (shade), pond layout and orientation, and bottom-draw techniques. The re-graded section of the Carp River West Tributary will be reinstated with plantings and may incorporate other natural channel features (specifics to be determined at the detailed design stage). Sections of open channel upstream of Pond 1 will be abandoned in conjunction with urbanization, all in accordance with recommendations from the EMP.

7.9 Decommissioning/Abandonment of Existing Facilities

The temporary SWM facility for the high school site is located within the Robert Grant Avenue right-of-way. Decommissioning of the facility will occur in conjunction with construction of Robert Grant Avenue northerly to Hazeldean Road. The storage and treatment function of the temporary facility will be replaced by Pond 1, with conveyance by new storm sewers.

The upper reach of the Carp River West Tributary provides agricultural drainage, and an outlet for the Granite Ridge SWM Facility and High School upstream of Pond 1. Construction sequencing of decommissioning commences with the construction of Pond 1 to operational conditions (vegetated) including the outlet to Carp Tributary. The trunk storm sewer system within Robert Grant Avenue must be installed connecting the Granite Ridge Diversion Pipe to Pond 1. The trunk storm sewer system must then be extended, with connections to outlet from both Abbott Street and the High School Site storm sewers (including by-pass pumping). Decommissioning of the temporary SWM Facility and reinstatement of ground surface to be completed once connections are made. The open channels will be progressively abandoned in conjunction with development of the lands, and in accordance with the Fernbank Environmental Management Plan (see **Figure 7** for construction sequencing details). The MVCA's regulatory jurisdiction extends into the planned development and any alterations of the tributary and entombment requires written authorization from MVCA pursuant to Ontario Regulation 153/06 ("Development, Interference with Wetlands and Alterations to Shorelines and Watercourses").

Compensation planting and environmental work for the planned channel entombment will be completed in accordance with the EMP, and coordinated with the MVCA.

7.10 Changes from Fernbank Community Design Plan

To prevent major system drainage from crossing Robert Grant Avenue, the Fernbank CDP proposed two dry ponds on the Kizell Lands. The intent was for major system flow to be conveyed overland to the dry ponds during heavy rainfall events, for temporary storage. Policy changes outlined in Technical Bulletin PIEDTB-2016-01 (September 2016) with respect to stormwater design have increased the permitted ponding depths within ROW's leading to an increase in available surface storage. The consequence of this design change is that the dry ponds are no longer required, as the major and minor system is now locally contained.

The overall percent impervious for the subdivision has increased from the 56% outlined in the EMP to 70%. Refer to **Section 6.4.6** for details of the impact this change will have on the downstream watercourses.

8.0 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). Detailed plans will be provided at the detailed design stage.

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), filter fabric or 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), turbidity curtain (OPSD 219.260), dewatering trap (OPSD 219.240), temporary water passage system (OPSD 221.030), 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.

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 should conduct daily visits during construction to ensure that the contractor is working in accord 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.
    - Straw bale barriers are to be installed in drainage ditches
    - 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.

A list of Best Management Practices, recommended by the Mississippi Valley Conservation Authority, for the development are provided below:

- Natural areas to be retained are to be isolated by sturdy construction fencing or similar barrier at least 1.0m in height during construction in order to ensure their retention.
- Construction equipment will remain within the areas of active construction and will not cross the sediment control measures.
- Following construction, bare soils will be re-seeded to reduce surface erosion.
- Erosion and sediment control measures will be in place for the duration of construction and until the site is re-vegetated. Erosion and sediment control measures should be maintained in good condition for the duration of construction. These measures should be removed at the completion of construction once the site has stabilized.
- Disturbed areas should be replanted with locally grown native species.
- No woody vegetation should be removed between April 15th and August 15th unless a breeding bird survey is conducted.
- Should any species at risk be discovered and/or should any species at risk or their habitat be potentially impacted by on site activities, the Ministry of Natural Resources and Forestry (MNRF) should be contacted immediately and activities should be modified to avoid impacts until further direction is provided by MNRF.

9.0 NOISE

The City of Ottawa is concerned with noise from aircraft, roads, railways and Transitways as expressed in Section 4.8.8 of the Official Plan. These policies are supported by the Environmental Noise Control Guidelines **[10]** which is a technical document that outlines the specific sound level criteria.

The proposed Arterial Road, Hazeldean Road, Abbott Street and the Major/Minor Collectors are all classified as potential noise sources that must be analyzed at the detailed design stage. The Plan of Subdivision has been configured to mitigate noise levels to the extent practical using planning-based strategies. Dwellings adjacent the Arterial Road will likely have an architectural and acoustic façade facing the high-traffic roadway, and an outdoor amenity area shielded behind the super-structure of each apartment block.

Despite the preceding land use measures, a detailed noise study will be undertaken in conjunction with the Plan of Subdivision and Site Plan applications. Specific noise mitigation measures will be analyzed and submitted at that time, including such measures as noise attenuation barriers, acoustic residential glazing, etc.

10.0 UTILITIES

The development will be serviced by Hydro Ottawa, Bell Canada, Enbridge Gas and Rogers Cablevision (as required); services will be constructed as per the City and Utility standards.

Discussions with the various utility companies have confirmed that there is adequate infrastructure in the vicinity to supply the Fernbank Community as it grows. Ongoing coordination during the development approvals process will be required to ensure that utilities are in place when development proceeds.

As stated in the Fernbank Master Servicing Study, the utility firms have requested they are kept apprised throughout the development process, but no additional investigation or analysis is warranted until detail design is initiated.

11.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the preceding, the report conclusions are summarized below:

1) The servicing design generally conforms to the conclusions and recommendations outlined in the Fernbank Master Servicing Study and the Fernbank Environmental Management Plan both of which were approved by Council on June 24, 2009.
2) There is adequate capacity in the existing and planned infrastructure (sanitary, storm and water) to accommodate servicing from the Kizell Lands.
3) The proposed grading design generally follows the existing topographic contours. Grading will be coordinated with neighbouring land owners.
4) The Stittsville Diversion Trunk and Kanata West Pump Station (sanitary) must be operational for servicing of the Kizell Lands.
5) The Glen Cairn Pumping Station will be upgraded by the City of Ottawa as-and-when required based on overall growth rates within in the entire Zone 3W Area.
6) Pond 1 is required to provide quality and quantity control of stormwater runoff. Ponds 2 & 3 will be constructed by others, and will service a portion of the Kizell Lands.
7) A Noise Study is required in conjunction with the detail design of the development.
8) Hydro, Gas, Bell and Cablevision have infrastructure nearby to service the proposed development.

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

Prepared By:

NOVATECH

Michael Petepiece, P.Eng.
Project Manager

Prepared By:

Mark Bissett, P.Eng.
Project Manager

References

1 “Fernbank Community Design Plan, Walker, Nott, Dragicevic Associates Ltd. [June 24, 2009]

2 “Fernbank Master Servicing Study”, Novatech Engineering Consultants Ltd. [June 24, 2009]

3 “Fernbank Environmental Management Plan”, Novatech Engineering Consultants Ltd. [June 24, 2009]

4 “Preliminary Geotechnical Assessment Kizell Lands, 5618 Hazeldean Road, Ottawa, Ontario”, Houle Chevrier Engineering [August 25, 2016]

5 “Transportation Master Plan”, City of Ottawa [November 2013]

6 “Fernbank Transportation Master Plan”, Delcan [June 24, 2009]

7 “Kizell Lands - Community Transportation Study / Transportation Impact Study”, Novatech [Report No. 2016-161, November 2016]

8 “Sewer Design Guidelines”, Department of Public Works and Services, City of Ottawa [October 2012]

9 “Standard Tender Documents, Material Specifications and Standard Detail Drawings” City of Ottawa, Department of Infrastructure Services and Community Sustainability [March, 2014]

10 “City of Ottawa Environmental Noise Control Guidelines, Planning and Growth Management Department” City of Ottawa [January, 2016]

11 “Granite Ridge Subdivision Stormwater Site Management Plan and Summary of Calculations” Simmering & Associates Ltd. [February, 2000]

Appendix A: Sewer Design Sheets and Water Modelling

Storm Sewer Design Sheet (Rational Method)
Sanitary Sewer Design Sheets
Watermain Boundary Conditions
Watermain Modelling

Fernbank Community - Kizell Lands: Storm Sewer Design Sheet (Rational Method)

LOCATION			AREA											FLOW							Total Peak Flow (Q)	PROPOSED SEWER							
Location	From Node	To Node	Park N' Ride	Arterial Road ROW	Abbott Street ROW	Mixed Use	High Density / Medium Block	Low Density	Schools	Park	Hydro Corridor	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 2yr	5yr	10yr	Peak Flow		Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.90	0.76	0.80	0.80	0.65	0.60	0.40	0.20	(ha)								(L/s)		Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
POND 1 North Inlet																													
P1-16	337	327					1.66	3.30		0.80		5.76	0.66	10.54	10.54	15.00	61.77			651.3									
												0.00		0.00	0.00	15.00				0.0	**651.3**	CONC	825	0.30	97.0	820.2	1.49	1.09	79.4%
												0.00		0.00	0.00	15.00				0.0									
P1-17	327	321										0.00		0.00	10.54	16.09	59.31			625.4									
								0.20				0.20	0.65	0.36	0.36	16.09		80.2		29.0	**1176.0**	CONC	1350	0.25	120.0	2784.1	1.88	1.06	42.2%
				2.22								2.22	0.90	5.55	5.55	16.09			93.9	521.6									
P1-18	323	321	1.84				0.70	0.50				3.04	0.78	6.55	6.55	15.00	61.77			404.7									
												0.00		0.00	0.00	15.00				0.0	**404.7**	CONC	900	0.20	71.2	844.6	1.29	0.92	47.9%
												0.00		0.00	0.00	15.00				0.0									
P1-19	321	317										0.00		0.00	17.10	17.15	57.12			976.6									
								1.49				1.49	0.65	2.69	3.05	17.15		77.2		235.8	**1714.3**	CONC	1350	0.15	161.8	2156.5	1.46	1.85	79.5%
												0.00		0.00	5.55	17.15			90.4	502.0									
	317	305										0.00		0.00	17.10	19.00	53.70			918.2									
												0.00		0.00	3.05	19.00		72.5		221.5	**1611.2**	CONC	1650	0.15	81.5	3682.6	1.67	0.81	43.8%
												0.00		0.00	5.55	19.00			84.9	471.5									
P1-20	307	305					1.48	2.41		0.81		4.70	0.65	8.55	8.55	15.00	61.77			527.9									
												0.00		0.00	0.00	15.00				0.0	**527.9**	CONC	825	0.20	81.7	669.7	1.21	1.12	78.8%
												0.00		0.00	0.00	15.00				0.0									
	305	301										0.00		0.00	25.64	19.81	52.34			1342.2									
												0.00		0.00	3.05	19.81		70.7		215.8	**2017.3**	CONC	1650	0.10	76.4	3006.9	1.36	0.93	67.1%
												0.00		0.00	5.55	19.81			82.7	459.4									
TOTAL			**1.84**	**2.22**	**0.00**	**0.00**	**3.84**	**7.90**	**0.00**	**1.61**	**0.00**	**17.41**	**0.71**		**34.25**	**20.75**					**115.9**	**L/s/ha**								

Q = 2.78 AIR

WHERE : Q = PEAK FLOW IN LITRES PER SECOND (L/s)
A = AREA IN HECTARES (ha)
I = RAINFALL INTENSITY IN MILLIMETERS PER HOUR (mm/hr)
R = WEIGHTED RUNOFF COEFFICIENT

Q = (1/n) A R^(2/3)So^(1/2)

WHERE :
Q = CAPACITY (L/s)
n = MANNING COEFFICIENT OF ROUGHNESS (0.013)
A = FLOW AREA (m^2)

Project: Kizell Lands (108195)
Designed: LRW
Checked: MAB
Date: February 23 2018

NOVATECH
Engineers, Planners & Landscape Architects

Fernbank Community - Kizell Lands: Storm Sewer Design Sheet (Rational Method)

LOCATION			AREA											FLOW								PROPOSED SEWER							
Location	From Node	To Node	Park N' Ride	Arterial Road ROW	Abbott Street ROW	Mixed Use	High Density / Medium Block	Low Density	Schools	Park	Hydro Corridor	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr)			Peak Flow	Total Peak Flow (Q) (L/s)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
																	2yr	5yr	10yr			Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
			0.80	0.90	0.76	0.80	0.80	0.65	0.60	0.40	0.20	(ha)								(L/s)									
POND 1 South Outlet																													
P1-1	Abbott	351										0.00		0.00	0.00	15.00				0.0	**258.2**	CONC	600	0.20	121.9	286.5	0.98	2.07	90.1%
					0.70							0.70	0.76	1.48	1.48	15.00		83.6		123.6									
				0.55								0.55	0.90	1.38	1.38	15.00			97.85	134.7									
P1-2	351	219										0.00		0.00	0.00	17.07				0.0	**345.8**	CONC	750	0.25	104.1	580.7	1.27	1.36	59.5%
												0.00		0.00	1.48	17.07		77.4		114.5									
				0.47								0.47	0.90	1.18	2.55	17.07			90.63	231.3									
P1-3	219	217				2.63			6.01			8.64	0.66	15.87	15.87	18.43	54.70			868.3									
												0.00		0.00	1.48	18.43		73.9		109.3	**1325.9**	CONC	1200	0.25	120.0	2033.7	1.74	1.15	65.2%
				0.59								0.59	0.90	1.48	4.03	18.43			86.49	348.4									
Granite Ridge/Industrial Park																					**2483.0**								
P1-4	217	215				4.45						4.45	0.80	9.90	25.77	19.58	52.72			1358.5									
												0.00		0.00	1.48	19.58		71.2		105.3	**4359.5**	CONC	1650	0.25	120.0	4754.3	2.15	0.93	91.7%
				0.37								0.37	0.90	0.93	4.95	19.58			83.3	412.7									
P1-5	215	207									0.93	0.93	0.20	0.52	26.29	20.51	51.23			1346.6									
												0.00		0.00	1.48	20.51		69.2		102.3	**4470.4**	CONC	1650	0.25	112.9	4754.3	2.15	0.87	94.0%
				0.68								0.68	0.90	1.70	6.66	20.51			80.92	538.6									
P1-6	209	207					0.57	2.11		0.81		3.49	0.62	5.98	5.98	15.00	61.77			369.4									
												0.00		0.00	0.00	15.00				0.0	**369.4**	CONC	750	0.30	74.1	636.1	1.39	0.89	58.1%
												0.00		0.00	0.00	15.00				0.0									
P1-7	207	171										0.00		0.00	32.27	21.38	49.91			1610.5									
												0.00		0.00	1.48	21.38		67.4		99.6	**5042.9**	CONC	1800	0.20	246.7	5362.9	2.04	2.01	94.0%
				1.65								1.65	0.90	4.13	10.78	21.38			78.81	849.8									
P1-8	173	171				0.55	2.07	6.93				9.55	0.69	18.35	18.35	15.00	61.77			1133.4									
												0.00		0.00	0.00	15.00				0.0	**1133.4**	CONC	1050	0.30	79.8	1560.3	1.75	0.76	72.6%
												0.00		0.00	0.00	15.00				0.0									
P1-9	171	165										0.00	0.00	0.00	50.62	23.40	47.14			2386.1									
								0.37				0.37	0.65	0.67	2.15	23.40		63.6		136.5	**6047.7**	CONC	2400	0.10	132.9	8166.8	1.75	1.27	74.1%
				1.29								1.29	0.90	3.23	14.01	23.40			74.4	1042.1									
P1-10	165	153					0.64	0.66				1.30	0.72	2.62	53.23	24.66	45.57			2425.7									
								0.59				0.59	0.65	1.07	3.21	24.66		61.4		197.4	**6113.0**	CONC	2400	0.10	88.8	8166.8	1.75	0.85	74.9%
												0.00		0.00	14.01	24.66			71.86	1006.9									
P1-11	153	147					1.30	2.94				4.24	0.70	8.20	61.44	25.51	44.58			2738.8									
								0.46				0.46	0.65	0.83	4.04	25.51		60.1		243.1	**6449.6**	CONC	2400	0.10	82.0	8166.8	1.75	0.78	79.0%
												0.00		0.00	14.01	25.51			70.28	984.8									
P1-12	147	105						1.73				1.73	0.65	3.13	64.56	26.29	43.71			2822.0									
								0.55				0.55	0.65	0.99	5.04	26.29		58.9		296.8	**6567.1**	CONC	2400	0.10	87.1	8166.8	1.75	0.83	80.4%
												0.00		0.00	14.01	26.29			68.89	965.3									
P1-13	113	111					1.51	4.82		0.80		7.13	0.65	12.96	12.96	15.00	61.77			800.4									
								0.95				0.95	0.65	1.72	1.72	15.00		83.56		143.4	**943.8**	CONC	1050	0.20	116.7	1274.0	1.43	1.36	74.1%
												0.00	0.00	0.00	0.00	15.00				0.0									
P1-14	111	109							3.04			3.04	0.60	5.07	18.03	16.36	58.72			1058.7									
								0.24				0.24	0.65	0.43	2.15	16.36		79.39		170.7	**1229.4**	CONC	1200	0.15	120.1	1575.3	1.35	1.48	78.0%
												0.00	0.00	0.00	0.00	16.36				0.0									
P1-15	109	105						1.26				1.26	0.65	2.28	20.31	17.85	55.77			1132.5									
								1.18				1.18	0.65	2.13	4.28	17.85		75.36		322.7	**1455.2**	CONC	1500	0.10	233.3	2332.0	1.28	3.04	62.4%
												0.00	0.00	0.00	0.00	17.85				0.0									
Pond 1	105	101										0.00		0.00	84.87	27.12	42.82			3634.4									
												0.00		0.00	9.32	27.12		57.7		537.9	**7600.8**	CONC	1800x 3000	0.10	80.8	9301.6	1.81	0.75	81.7%
												0.00		0.00	14.01	27.12			67.5	945.5									
TOTAL			**0.00**	**5.60**	**0.70**	**7.63**	**6.09**	**24.79**	**9.05**	**1.61**	**0.93**	**56.40**	**0.69**		**108.20**	**27.87**					**134.8**	**L/s/ha**								

Q = 2.78 AIR

WHERE : Q = PEAK FLOW IN LITRES PER SECOND (L/s)
A = AREA IN HECTARES (ha)
I = RAINFALL INTENSITY IN MILLIMETERS PER HOUR (mm/hr)
R = WEIGHTED RUNOFF COEFFICIENT

Q = (1/n) A R^(2/3)So^(1/2)

WHERE : Q = CAPACITY (L/s)
n = MANNING COEFFICIENT OF ROUGHNESS (0.013)
A = FLOW AREA (m^2)

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2018.02.23
PROVINCE OF ONTARIO

Project: Kizell Lands (108195)
Designed: LRW
Checked: MAB
Date: February 23 2018

NOVATECH
Engineers, Planners & Landscape Architects

Fernbank Community - Kizell Lands: Storm Sewer Design Sheet (Rational Method)

LOCATION			AREA										FLOW							Total Peak Flow (Q)	PROPOSED SEWER							
Location	From Node	To Node	Park N' Ride	Arterial Road ROW	Abbott Street ROW	Mixed Use	High Density / Medium Block	Low Density	Schools	Park	Hydro Corridor	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 2yr	5yr	10yr	Peak Flow		Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.90	0.70	0.80	0.80	0.65	0.60	0.40	0.20	(ha)								(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
POND 2																													
P2-21	401	R219				2.90		1.93				4.83	0.74	9.94	9.94	15.00	61.77			613.8	**613.8**	CONC	825	0.40	107.1	947.1	1.72	1.04	64.8%
												0.00		0.00	0.00	15.00				0.0									
												0.00		0.00	0.00	15.00				0.0									
P2-22	503	501										0.00		0.00	0.00	15.00				0.0	**114.8**	PVC	375	1.00	88.2	182.9	1.60	0.92	62.7%
								0.76				0.76	0.65	1.37	1.37	15.00		83.56		114.8									
												0.00		0.00	0.00	15.00				0.0									
P2-23	603	601						0.71				0.71	0.65	1.28	1.28	15.00	61.77			79.2	**79.2**	PVC	375	1.00	86.7	182.9	1.60	0.90	43.3%
												0.00		0.00	0.00	15.00				0.0									
												0.00		0.00	0.00	15.00				0.0									
POND 3																													
P3-24	409	425					5.30			1.63	1.76	8.69	0.60	14.58	14.58	15.00	61.77			900.5	**1160.2**	CONC	1050	0.50	39.3	2014.4	2.25	0.29	57.6%
					1.56			0.04				1.60	0.70	3.11	3.11	15.00		83.6		259.7									
												0.00		0.00	0.00	15.00				0.0									

Q = 2.78 AIR

WHERE : Q = PEAK FLOW IN LITRES PER SECOND (L/s)
A = AREA IN HECTARES (ha)
I = RAINFALL INTENSITY IN MILLIMETERS PER HOUR (mm/hr)
R = WEIGHTED RUNOFF COEFFICIENT

Q = (1/n) A R^(2/3)So^(1/2)

WHERE :

Q = CAPACITY (L/s)
n = MANNING COEFFICIENT OF ROUGHNESS (0.013)
A = FLOW AREA (m^2)

Project: Kizell Lands (108195)
Designed: LRW
Checked: MAB
Date: February 23 2018

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2018.02.23
PROVINCE OF ONTARIO

FERNBANK COMMUNITY - KIZELL LANDS
SANITARY SEWER DESIGN SHEET

AREA			RESIDENTIAL															ICI				INFILTRATION				PIPE					
			SINGLES		TOWNS		STACKED TOWNS		MEDIUM DENISTY		HIGH DENSITY		MIXED USE		TOTAL																
ID	From	To	Units	Pop.	Units	Pop.	Area	Pop.	Area	Pop.	Units	Pop.	Net Area (ha)	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	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 (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
Outlet 1																															
Stittsville Diversion Trunk																									493.4						
	SA100	SA101		0.0		0.0								0.0	0.0	0	4.0	0.0			0.00	0.0	0.00	0.00	0.0	493.4	900	0.38	62	1164.2	1.77	42.4%
A1-1	SA101	SA102		0.0		0.0								0.0	0.0	0.0	4.0	0.0			0.00	0.0	0.94	0.94	0.3	493.7	975	0.16	120	935.2	1.21	52.8%
A1-2	SA102	SA104		0.0		0.0							2.60	219.0	219.0	219.0	4.0	3.5	1.17		1.17	1.0	3.71	4.65	1.3	499.3	975	0.16	240	935.2	1.21	53.4%
A1-3	SA104	SA106a		0.0		0.0							4.47	376.0	376.0	595.0	3.9	9.5	2.01		3.18	2.8	6.76	11.41	3.2	508.8	975	0.16	167	935.2	1.21	54.4%
A1-4	222	SA106a	19	64.6		0.0	0.88	116.4	0.64	74.9				0.0	255.9	255.9	4.0	4.1		0.80	0.80	0.7	3.74	3.74	1.0	5.9	200	0.35	96	20.2	0.62	29.1%
A1-5	SA106a	SA107a		0.0		0.0								0.0	0.0	850.9	3.8	13.3			3.98	3.5	0.56	15.71	4.4	514.5	975	0.16	126	935.2	1.21	55.0%
A1-6	212	SA107a	76	258.4	36	97.2			1.51	176.7				0.0	532.3	532.3	4.0	8.5		0.81	0.81	0.7	7.08	7.08	2.0	11.2	200	0.35	109	20.2	0.62	55.4%
A1-7	SA107a	SA108		0.0		0.0								0.0	0.0	1383.2	3.7	20.8			4.79	4.2	1.17	23.96	6.7	525.0	975	0.16	234	935.2	1.21	56.1%
A1-8	148	SA108	68	231.2		0.0	2.26	299.0	2.11	246.9				0.0	478.1	478.1	4.0	7.7	0.55		0.55	0.5	9.63	9.63	2.7	10.9	250	0.35	106	36.7	0.72	29.7%
A1-9	190	SA108	74	251.6	44	118.8			1.30	152.1				0.0	522.5	522.5	4.0	8.4		3.04	3.04	2.6	10.65	10.65	3.0	14.0	300	0.20	109	45.1	0.62	31.1%
A1-10	SA108	SA112		0.0		0.0								0.0	0.0	2383.7	3.5	34.0			8.38	7.3	1.78	46.02	12.9	547.6	975	0.16	367	935.2	1.21	58.6%
A1-11	112	SA112	16	54.4		0.0	1.50	198.5	1.55	181.4				0.0	434.2	434.2	4.0	7.0		0.80	0.80	0.7	5.51	5.51	1.5	9.3	200	0.80	106	30.6	0.94	30.3%
A1-12	120	SA112	28	95.2	127	342.9			2.81	328.8				0.0	766.9	766.9	3.9	12.0		0.81	0.81	0.7	9.36	9.36	2.6	15.4	250	0.25	111	31.0	0.61	49.5%
A1-13	SA112	SA114		0.0		0.0								0.0	0.0	3584.8	3.4	49.0			9.99	8.7	1.66	62.55	17.5	568.6	975	0.16	241	935.2	1.21	60.8%
A1-14	SA114	SA115		0.0		0.0								0.0	0.0	3584.81	3.4	49.0		1.83	11.82	10.3	1.83	64.38	18.0	570.7	975	0.24	92	1145.4	1.49	49.8%
Outlet 2																															
A2-1, A2-2	R20	R19	15	51.0	15	40.5						680		0.0	772	772	3.9	12.1		1.64	1.64	1.4	11.93	11.93	3.3	16.9	300	0.50	43	71.3	0.98	23.6%
Outlet 3																															
A3-1	404	R30	23	78.2		0.0								0.0	78.2	78.2	4.0	1.3			0.00	0.0	1.74	1.74	0.5	1.8	200	0.35	11	20.2	0.62	8.7%
Outlet 4																															
A4-1	502	504	14	47.6		0.0								0.0	47.6	47.6	4.0	0.8			0.00	0.0	0.73	0.73	0.2	1.0	200	0.65	27	27.6	0.85	3.5%
Outlet 5																															
A5-1	602	RCAP1		0.0	26	70.2								0.0	70.2	70.2	4.0	1.1			0.00	0.0	0.76	0.76	0.2	1.4	200	0.75	29	29.6	0.91	4.6%
Outlet 6																															
A6-1	700	702		0.0	48	129.6								0.0	129.6	129.6	4.0	2.1			0.00	0.0	1.39	1.39	0.4	2.5	200	0.35	99	20.2	0.62	12.3%
A6-1	702	R41		0.0		0.0							2.86	241.0	241.0	370.6	4.0	6.0	1.29		1.29	1.1	2.86	4.25	1.2	8.3	250	0.35	3	36.7	0.72	22.6%

Design Parameters:

Avg Flow/Person =	350	l/day
Comm./Inst. Flow =	50000	l/ha/day
Infiltration =	0.28	l/s/ha
Pipe Friction n =	0.013	
Residential Peaking Factor = Harmon Equation (max 4, min 2)		
Peaking Factor Comm./Inst. =	1.5	

Population Density:

	ppl/unit	units/net ha
Mixed Use/HDR	1.80	85
Singles	3.40	
Towns	2.70	
Stacked Towns	2.70	49
Medium Density	1.80	65

Project: Kizell Lands (108195)
Designed: LRW
Checked: MAB
Date: February 23, 2018

Lucas Wilson

From: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Sent: September-29-16 8:30 AM
To: Lucas Wilson
Subject: FW: Fernbank Community - Kizell Lands: WM Boundary Conditions

Lucas,

Here are the requested boundary conditions:

Hazeldean Connection (900mm feedermain):
PKHR = 155.5m
MAX HGL = 162.4m
MXDY+Fire (167 L/s) = 155.6m
MXDY+Fire (217 L/s) = 155.6m

Abbott Street Connection (400mm watermain):
PKHR = 154.5m
MAX HGL = 162.1m
MXDY+Fire (167 L/s) = 154.5m
MXDY+Fire (217 L/s) = 153.6m

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.

From: Lucas Wilson [mailto:l.wilson@novatech-eng.com]
Sent: September 26, 2016 1:44 PM
To: Surprenant, Eric
Subject: Fernbank Community - Kizell Lands: WM Boundary Conditions

Eric,

Not sure who will be assigned to this project but I thought I'd start with you. I'm looking for boundary conditions to complete a hydraulic analysis in support of Draft Plan Submission.
The site is located north of Fernbank Crossing, between Abbott Street and Hazeldean. I've included a drawing which highlights the connections at Hazeldean and Abbott Street within the extended Robert Grant ROW. I've also attached the projected water demand for the Concept Site. Please let me know if you require additional information.

Thanks,
Lucas Wilson | P.Eng.
Project Engineer
NOVATECH

Engineers, Planners & Landscape Architects | 200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6
Office 613.254.9643 x282 | **Fax** 613.254.5867 | **Email** l.wilson@novatech-eng.com

Kizell Lands
Water Demand

	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Singles	N/A	333	1132	4.586	11.466	25.226
Towns	N/A	274	740	2.997	7.492	16.483
Stacked Towns	4.60	225	609	2.465	6.163	13.559
Medium Density Residential	9.94	646	1163	4.711	11.778	25.911
High Density Residential	N/A	378	680	2.756	6.891	15.159
Mixed Use Residential	5.47	465	837	3.390	8.476	18.646
Mixed Use Commercial	4.48	N.A	N/A	1.452	2.178	3.920
Commercial	0.55	N.A	N/A	0.178	0.267	0.481
Schools	3.03	N/A	N/A	0.982	1.473	2.651
Park	4.82	N/A	N/A	1.562	2.343	4.218
Park N' Ride	1.83	N/A	N/A	0.593	0.890	1.601
Total	**34.72**	**2321**	**5161**	**25.673**	**59.416**	**127.856**

Water Demand Parameters

Singles	3.4	ppl/unit		
Towns	2.7	ppl/unit		
Stacked Towns	2.7	ppl/unit	49	units/net ha
Medium Density Residential	1.8	ppl/unit	65	units/net ha
Mixed Use Residential	1.8	ppl/unit	85	units/net ha
Residential Demand	350	L/c/day		
Institutional/Commercial Demand	28000	L/gross ha/day		
Residential Max Day	2.5	x Avg Day		
Residential Peak Hour	2.2	x Max Day		
Institutional/Commercial Max Day	1.5	x Avg Day		
Institutional/Commercial Peak Hour	1.8	x Max Day		
Residential Fire Flow	167	L/s		
Institutional/Commercial Fire Flow	217	L/s		

Fernbank Community - Kizell Lands: Watermain Demand

Node	Singles	Towns	Stacked Towns (ha)	Medium Density Area (ha)	High Density	Mixed Use Area (ha)	Institutional/Commercial Area (ha)	Total Population	Total IC Area (ha)	Average Day Residential Demand (L/s)	Average Day IC Demand (L/s)	Total Average Day Demand (L/s)	Maximum Day Residential Demand (L/s)	Maximum Day IC Demand (L/s)	Total Maximum Day Demand (L/s)	Peak Hour Residential Demand (L/s)	Peak Hour IC Demand (L/s)	Total Peak Hour Demand (L/s)	Fire Flow (L/s)
HD1					378		1.64	680	1.64	2.755	0.531	3.286	6.887	0.797	7.684	15.151	1.435	16.586	217
MU1						4.70		396	2.12	1.602	0.685	2.288	4.005	1.028	5.034	8.812	1.851	10.663	217
MU2						2.38		200	1.07	0.811	0.347	1.158	2.028	0.521	2.549	4.462	0.937	5.399	217
N1	46		1.75	1.31			1.36	541	1.36	2.192	0.441	2.633	5.481	0.661	6.142	12.058	1.190	13.248	167
N2	16		1.27	1.56			0.80	405	0.80	1.640	0.259	1.900	4.101	0.389	4.490	9.022	0.700	9.722	167
N3	29	172		1.74		2.86	0.81	1007	2.10	4.080	0.680	4.760	10.201	1.019	11.220	22.442	1.835	24.276	217
N4	121	82		2.37				910	0.00	3.687	0.000	3.687	9.217	0.000	9.217	20.277	0.000	20.277	167
N5								0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	N/A
N6	80	20		1.51			3.83	503	3.83	2.036	1.241	3.277	5.091	1.862	6.953	11.200	3.351	14.551	217
N7								0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	167
N8								0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	167
N9								0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	N/A
N10								0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	N/A
PR1							1.83	0	1.83	0.000	0.593	0.593	0.000	0.890	0.890	0.000	1.601	1.601	167
T1								0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	N/A
T2	41		1.58	1.45				518	0.00	2.099	0.000	2.099	5.247	0.000	5.247	11.543	0.000	11.543	167
Total	**333**	**274**	**4.6**	**9.94**	**378**	**9.94**	**10.27**	**5160**	**14.74**	**20.903**	**4.778**	**25.681**	**52.257**	**7.167**	**59.424**	**114.966**	**12.900**	**127.867**	

Water Demand Parameters

Singles	3.4	ppl/unit	Residential Max Day	2.5	x Avg Day	
Towns	2.7	ppl/unit	Residential Peak Hour	2.2	x Max Day	
Stacked Towns	132.3	ppl/net ha				
Medium Density Area	117	ppl/net ha	Institutional/Commercial Max Day	1.5	x Avg Day	
Mixed Use Residential	153	ppl/net ha	Institutional/Commercial Peak Hour	1.8	x Max Day	
High Density Residential	1.8	ppl/unit				
Residential Demand	350	L/c/day	Residential Fire Flow	167	L/s	
Institutional/Commercial Demand	28000	L/gross ha/day	Institutional/Commercial Fire Flow	217	L/s	

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes - (Peak Hour)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	16.59	154.34	51.14	501.68	72.76
Junc MU1	104.52	10.66	154.39	49.87	489.22	70.96
Junc MU2	104.15	5.4	154.33	50.18	492.27	71.40
Junc N1	104.5	13.25	154.29	49.79	488.44	70.84
Junc N2	103.44	9.72	154.76	51.32	503.45	73.02
Junc N3	101.79	24.28	155.03	53.24	522.28	75.75
Junc N4	102.48	20.28	154.22	51.74	507.57	73.62
Junc N5	101.94	0	154.26	52.32	513.26	74.44
Junc N6	102.39	14.55	154.22	51.83	508.45	73.74
Junc N7	101.47	0	154.22	52.75	517.48	75.05
Junc N8	100.7	0	155.2	54.5	534.65	77.54
Junc N9	96.68	0	155.5	58.82	577.02	83.69
Junc N10	102.7	0	154.46	51.76	507.77	73.65
Junc PR1	102	1.6	155.41	53.41	523.95	75.99
Junc T1	102.94	0	155.03	52.09	511.00	74.11
Junc T2	103.73	11.54	154.29	50.56	495.99	71.94
Resvr 1	155.5	-69.4	155.5	0	0.00	0.00
Resvr 2	154.5	-58.47	154.5	0	0.00	0.00

Network Table - Links - (Peak Hour)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	25.68	0.37	0.63	0.027
Pipe 2	240	297	120	15.02	0.22	0.23	0.029
Pipe 3	399	297	120	9.62	0.14	0.10	0.031
Pipe 4	216	297	120	3.63	0.05	0.02	0.036
Pipe 5	443	297	120	33.80	0.49	1.05	0.026
Pipe 6	164	297	120	43.52	0.63	1.68	0.025
Pipe 7	242	297	120	-42.04	0.61	1.57	0.025
Pipe 8	52	297	120	-43.64	0.63	1.69	0.025
Pipe 9	576	900	120	-25.76	0.04	0.00	0.031
Pipe 10	260	297	120	-25.76	0.37	0.63	0.027
Pipe 11	139	297	120	-1.48	0.02	0.00	0.041
Pipe 12	216	297	120	18.63	0.27	0.35	0.028
Pipe 13	246	297	120	-1.65	0.02	0.00	0.040
Pipe 14	469	297	120	-1.65	0.02	0.00	0.040
Pipe 15	283	297	120	16.20	0.23	0.27	0.029
Pipe 16	123	297	120	32.79	0.47	0.99	0.026
Pipe 17	173	400	120	-32.79	0.26	0.23	0.027
Pipe 18	472	297	120	-25.76	0.37	0.63	0.027
Pipe 19	147	297	120	-16.20	0.23	0.27	0.029

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes - (Max Pressure Check)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	3.29	162.1	58.9	577.81	83.80
Junc MU1	104.52	2.29	162.1	57.58	564.86	81.93
Junc MU2	104.15	1.16	162.1	57.95	568.49	82.45
Junc N1	104.5	2.63	162.12	57.62	565.25	81.98
Junc N2	103.44	1.9	162.27	58.83	577.12	83.70
Junc N3	101.79	4.76	162.33	60.54	593.90	86.14
Junc N4	102.48	3.69	162.12	59.64	585.07	84.86
Junc N5	101.94	0	162.1	60.16	590.17	85.60
Junc N6	102.39	3.28	162.1	59.71	585.76	84.96
Junc N7	101.47	0	162.11	60.64	594.88	86.28
Junc N8	100.7	0	162.36	61.66	604.88	87.73
Junc N9	96.68	0	162.4	65.72	644.71	93.51
Junc N10	102.7	0	162.1	59.4	582.71	84.52
Junc PR1	102	0.59	162.39	60.39	592.43	85.92
Junc T1	102.94	0	162.33	59.39	582.62	84.50
Junc T2	103.73	2.1	162.13	58.4	572.90	83.09
Resvr 1	162.4	-24.77	162.4	0	0.00	0.00
Resvr 2	162.1	-0.91	162.1	0	0.00	0.00

Network Table - Links - (Max Pressure Check)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	-1.45	0.02	0.00	0.041
Pipe 2	240	297	120	-3.74	0.05	0.02	0.036
Pipe 3	399	297	120	-4.89	0.07	0.03	0.034
Pipe 4	216	297	120	7.53	0.11	0.07	0.032
Pipe 5	443	297	120	17.52	0.25	0.31	0.028
Pipe 6	164	297	120	19.42	0.28	0.38	0.028
Pipe 7	242	297	120	-15.13	0.22	0.24	0.029
Pipe 8	52	297	120	-15.72	0.23	0.25	0.029
Pipe 9	576	900	120	-9.05	0.01	0.00	0.037
Pipe 10	260	297	120	-9.05	0.13	0.09	0.031
Pipe 11	139	297	120	-4.29	0.06	0.02	0.035
Pipe 12	216	297	120	7.89	0.11	0.07	0.032
Pipe 13	246	297	120	4.21	0.06	0.02	0.035
Pipe 14	469	297	120	4.21	0.06	0.02	0.035
Pipe 15	283	297	120	-0.93	0.01	0.00	0.042
Pipe 16	123	297	120	2.36	0.03	0.01	0.038
Pipe 17	173	400	120	-2.36	0.02	0.00	0.038
Pipe 18	472	297	120	-9.05	0.13	0.09	0.031
Pipe 19	147	297	120	0.93	0.01	0.00	0.045

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Network Table - Nodes - (Fire Flow Summary)

Fire Flow		Minimum Pressure		
Node	Flow (L/s)	Pressure (kPa)	Pressure (PSI)	Node
HD1	217	458.13	66.45	HD1
MU1	217	447.53	64.91	MU1
MU2	217	429.68	62.32	MU2
N1	167	451.06	65.42	N1
N2	167	476.86	69.16	N2
N3	217	475.49	68.96	N1
N4	167	464.31	67.34	N4
N6	217	423.69	61.45	N6
N7	167	467.15	67.75	N7
N8	167	487.26	70.67	N1
PR1	167	490.01	71.07	N1/MU1
T2	167	464.50	67.37	N1

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes (Max Day + FF 'HD1')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	224.68	149.9	46.7	458.13	66.45
Junc MU1	104.52	5.03	153.5	48.98	480.49	69.69
Junc MU2	104.15	2.55	153.41	49.26	483.24	70.09
Junc N1	104.5	6.14	153.29	48.79	478.63	69.42
Junc N2	103.44	4.49	154.51	51.07	501.00	72.66
Junc N3	101.79	11.22	155.08	53.29	522.77	75.82
Junc N4	102.48	9.22	152.54	50.06	491.09	71.23
Junc N5	101.94	0	150.45	48.51	475.88	69.02
Junc N6	102.39	6.95	150.74	48.35	474.31	68.79
Junc N7	101.47	0	151.92	50.45	494.91	71.78
Junc N8	100.7	0	155.27	54.57	535.33	77.64
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	152.68	49.98	490.30	71.11
Junc PR1	102	0.89	155.5	53.5	524.84	76.12
Junc T1	102.94	0	155.05	52.11	511.20	74.14
Junc T2	103.73	5.25	153.26	49.53	485.89	70.47
Resvr 1	155.6	-74.36	155.6	0	0.00	0.00
Resvr 2	153.6	-202.07	153.6	0	0.00	0.00

Network Table - Links (Max Day + FF 'HD1')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	24.55	0.35	0.58	0.027
Pipe 2	240	297	120	19.51	0.28	0.38	0.028
Pipe 3	399	297	120	16.96	0.24	0.29	0.028
Pipe 4	216	297	120	-10.82	0.16	0.13	0.030
Pipe 5	443	297	120	57.76	0.83	2.83	0.024
Pipe 6	164	297	120	62.25	0.90	3.25	0.023
Pipe 7	242	297	120	-46.24	0.67	1.88	0.025
Pipe 8	52	297	120	-47.13	0.68	1.94	0.024
Pipe 9	576	900	120	-27.23	0.04	0.00	0.031
Pipe 10	260	297	120	-27.23	0.39	0.70	0.027
Pipe 11	139	297	120	-16.01	0.23	0.26	0.029
Pipe 12	216	297	120	63.33	0.91	3.36	0.023
Pipe 13	246	297	120	54.11	0.78	2.51	0.024
Pipe 14	469	297	120	54.11	0.78	2.51	0.024
Pipe 15	283	297	120	-47.16	0.68	1.95	0.024
Pipe 16	123	297	120	177.52	2.56	22.66	0.020
Pipe 17	173	400	120	-177.52	1.41	5.31	0.021
Pipe 18	472	297	120	-27.23	0.39	0.70	0.027
Pipe 19	147	297	120	47.16	0.68	1.95	0.024

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Network Table - Nodes (Max Day + FF 'MU1')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	153.43	50.23	492.76	71.47
Junc MU1	104.52	222.03	150.14	45.62	447.53	64.91
Junc MU2	104.15	2.55	150.83	46.68	457.93	66.42
Junc N1	104.5	6.14	152.08	47.58	466.76	67.70
Junc N2	103.44	4.49	154.36	50.92	499.53	72.45
Junc N3	101.79	11.22	155.02	53.23	522.19	75.74
Junc N4	102.48	9.22	152.91	50.43	494.72	71.75
Junc N5	101.94	0	153.25	51.31	503.35	73.00
Junc N6	102.39	6.95	153.16	50.77	498.05	72.24
Junc N7	101.47	0	153	51.53	505.51	73.32
Junc N8	100.7	0	155.22	54.52	534.84	77.57
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	153.56	50.86	498.94	72.36
Junc PR1	102	0.89	155.49	53.49	524.74	76.11
Junc T1	102.94	0	154.97	52.03	510.41	74.03
Junc T2	103.73	5.25	152.89	49.16	482.26	69.95
Resvr 1	155.6	-79.47	155.6	0	0.00	0.00
Resvr 2	153.6	-196.95	153.6	0	0.00	0.00

Network Table - Links (Max Day + FF 'MU1')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	163.63	2.36	19.48	0.020
Pipe 2	240	297	120	-58.40	0.84	2.89	0.024
Pipe 3	399	297	120	-60.95	0.88	3.13	0.024
Pipe 4	216	297	120	67.09	0.97	3.74	0.023
Pipe 5	443	297	120	62.87	0.91	3.31	0.023
Pipe 6	164	297	120	67.36	0.97	3.77	0.023
Pipe 7	242	297	120	-49.52	0.71	2.13	0.024
Pipe 8	52	297	120	-50.41	0.73	2.20	0.024
Pipe 9	576	900	120	-29.07	0.05	0.00	0.030
Pipe 10	260	297	120	-29.07	0.42	0.79	0.026
Pipe 11	139	297	120	-17.85	0.26	0.32	0.028
Pipe 12	216	297	120	-9.47	0.14	0.10	0.031
Pipe 13	246	297	120	-18.68	0.27	0.35	0.028
Pipe 14	469	297	120	-18.68	0.27	0.35	0.028
Pipe 15	283	297	120	25.64	0.37	0.63	0.027
Pipe 16	123	297	120	33.32	0.48	1.02	0.026
Pipe 17	173	400	120	-33.32	0.27	0.24	0.027
Pipe 18	472	297	120	-29.07	0.42	0.79	0.026
Pipe 19	147	297	120	-25.64	0.37	0.63	0.027

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Network Table - Nodes (Max Day + FF 'MU2')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	153.28	50.08	491.28	71.25
Junc MU1	104.52	5.03	151.1	46.58	456.95	66.27
Junc MU2	104.15	219.55	147.95	43.8	429.68	62.32
Junc N1	104.5	6.14	150.38	45.88	450.08	65.28
Junc N2	103.44	4.49	153.93	50.49	495.31	71.84
Junc N3	101.79	11.22	154.84	53.05	520.42	75.48
Junc N4	102.48	9.22	151.99	49.51	485.69	70.44
Junc N5	101.94	0	152.89	50.95	499.82	72.49
Junc N6	102.39	6.95	152.68	50.29	493.34	71.55
Junc N7	101.47	0	152.23	50.76	497.96	72.22
Junc N8	100.7	0	155.11	54.41	533.76	77.42
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	153.52	50.82	498.54	72.31
Junc PR1	102	0.89	155.45	53.45	524.34	76.05
Junc T1	102.94	0	154.77	51.83	508.45	73.74
Junc T2	103.73	5.25	151.87	48.14	472.25	68.49
Resvr 1	155.6	-92.02	155.6	0	0.00	0.00
Resvr 2	153.6	-184.41	153.6	0	0.00	0.00

Network Table - Links (Max Day + FF 'MU2')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	137.31	1.98	14.08	0.021
Pipe 2	240	297	120	132.28	1.91	13.14	0.021
Pipe 3	399	297	120	-87.27	1.26	6.08	0.022
Pipe 4	216	297	120	93.41	1.35	6.90	0.022
Pipe 5	443	297	120	75.42	1.09	4.64	0.023
Pipe 6	164	297	120	79.91	1.15	5.17	0.023
Pipe 7	242	297	120	-57.56	0.83	2.81	0.024
Pipe 8	52	297	120	-58.45	0.84	2.90	0.024
Pipe 9	576	900	120	-33.57	0.05	0.00	0.030
Pipe 10	260	297	120	-33.57	0.48	1.04	0.026
Pipe 11	139	297	120	-22.35	0.32	0.49	0.027
Pipe 12	216	297	120	-23.24	0.34	0.52	0.027
Pipe 13	246	297	120	-32.46	0.47	0.97	0.026
Pipe 14	469	297	120	-32.46	0.47	0.97	0.026
Pipe 15	283	297	120	39.41	0.57	1.40	0.025
Pipe 16	123	297	120	47.10	0.68	1.94	0.024
Pipe 17	173	400	120	-47.10	0.37	0.46	0.025
Pipe 18	472	297	120	-33.57	0.48	1.04	0.026
Pipe 19	147	297	120	-39.41	0.57	1.40	0.025

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Network Table - Nodes (Max Day + FF 'N1')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	154.09	50.89	499.23	72.41
Junc MU1	104.52	5.03	153.52	49	480.69	69.72
Junc MU2	104.15	2.55	152.33	48.18	472.65	68.55
Junc N1	104.5	173.14	150.48	45.98	451.06	65.42
Junc N2	103.44	4.49	154.02	50.58	496.19	71.97
Junc N3	101.79	11.22	154.88	53.09	520.81	75.54
Junc N4	102.48	9.22	152.28	49.8	488.54	70.86
Junc N5	101.94	0	153.56	51.62	506.39	73.45
Junc N6	102.39	6.95	153.28	50.89	499.23	72.41
Junc N7	101.47	0	152.63	51.16	501.88	72.79
Junc N8	100.7	0	155.13	54.43	533.96	77.44
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	154.4	51.7	507.18	73.56
Junc PR1	102	0.89	155.46	53.46	524.44	76.06
Junc T1	102.94	0	154.82	51.88	508.94	73.82
Junc T2	103.73	5.25	152.1	48.37	474.51	68.82
Resvr 1	155.6	-89.38	155.6	0	0.00	0.00
Resvr 2	154.5	-137.05	154.5	0	0.00	0.00

Network Table - Links (Max Day + FF 'N1')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	83.02	1.20	5.54	0.023
Pipe 2	240	297	120	77.98	1.13	4.94	0.023
Pipe 3	399	297	120	75.43	1.09	4.64	0.023
Pipe 4	216	297	120	97.71	1.41	7.50	0.022
Pipe 5	443	297	120	72.78	1.05	4.35	0.023
Pipe 6	164	297	120	77.27	1.12	4.85	0.023
Pipe 7	242	297	120	-55.87	0.81	2.66	0.024
Pipe 8	52	297	120	-56.76	0.82	2.74	0.024
Pipe 9	576	900	120	-32.62	0.05	0.00	0.030
Pipe 10	260	297	120	-32.62	0.47	0.98	0.026
Pipe 11	139	297	120	-21.40	0.31	0.45	0.028
Pipe 12	216	297	120	-30.18	0.44	0.85	0.026
Pipe 13	246	297	120	-39.40	0.57	1.39	0.025
Pipe 14	469	297	120	-39.40	0.57	1.39	0.025
Pipe 15	283	297	120	46.35	0.67	1.88	0.025
Pipe 16	123	297	120	54.03	0.78	2.50	0.024
Pipe 17	173	400	120	-54.03	0.43	0.59	0.025
Pipe 18	472	297	120	-32.62	0.47	0.98	0.026
Pipe 19	147	297	120	-46.35	0.67	1.88	0.025

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Network Table - Nodes (Max Day + FF 'N2')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	154.21	51.01	500.41	72.58
Junc MU1	104.52	5.03	154.15	49.63	486.87	70.61
Junc MU2	104.15	2.55	153.77	49.62	486.77	70.60
Junc N1	104.5	6.14	153.2	48.7	477.75	69.29
Junc N2	103.44	171.49	152.05	48.61	476.86	69.16
Junc N3	101.79	11.22	154.08	52.29	512.96	74.40
Junc N4	102.48	9.22	153.07	50.59	496.29	71.98
Junc N5	101.94	0	153.86	51.92	509.34	73.87
Junc N6	102.39	6.95	153.68	51.29	503.15	72.98
Junc N7	101.47	0	153.28	51.81	508.26	73.72
Junc N8	100.7	0	154.62	53.92	528.96	76.72
Junc N9	96.68	0	155.59	58.91	577.91	83.82
Junc N10	102.7	0	154.43	51.73	507.47	73.60
Junc PR1	102	0.89	155.3	53.3	522.87	75.84
Junc T1	102.94	0	153.91	50.97	500.02	72.52
Junc T2	103.73	5.25	152.98	49.25	483.14	70.07
Resvr 1	155.6	-134.38	155.6	0	0.00	0.00
Resvr 2	154.5	-92.05	154.5	0	0.00	0.00

Network Table - Links (Max Day + FF 'N2')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	47.35	0.68	1.96	0.024
Pipe 2	240	297	120	42.31	0.61	1.59	0.025
Pipe 3	399	297	120	39.76	0.57	1.42	0.025
Pipe 4	216	297	120	-33.62	0.49	1.04	0.026
Pipe 5	443	297	120	-49.22	0.71	2.11	0.024
Pipe 6	164	297	120	122.27	1.76	11.36	0.021
Pipe 7	242	297	120	-84.76	1.22	5.76	0.022
Pipe 8	52	297	120	-85.65	1.24	5.88	0.022
Pipe 9	576	900	120	-48.73	0.08	0.01	0.028
Pipe 10	260	297	120	-48.73	0.70	2.07	0.024
Pipe 11	139	297	120	-37.51	0.54	1.27	0.025
Pipe 12	216	297	120	-20.85	0.30	0.43	0.028
Pipe 13	246	297	120	-30.07	0.43	0.85	0.026
Pipe 14	469	297	120	-30.07	0.43	0.85	0.026
Pipe 15	283	297	120	37.02	0.53	1.24	0.025
Pipe 16	123	297	120	44.70	0.65	1.76	0.025
Pipe 17	173	400	120	-44.70	0.36	0.41	0.026
Pipe 18	472	297	120	-48.73	0.70	2.07	0.024
Pipe 19	147	297	120	-37.02	0.53	1.24	0.025

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Network Table - Nodes (Max Day + FF 'N3')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	153.43	50.23	492.76	71.47
Junc MU1	104.52	5.03	153.41	48.89	479.61	69.56
Junc MU2	104.15	2.55	153.23	49.08	481.47	69.83
Junc N1	104.5	6.14	152.97	48.47	475.49	68.96
Junc N2	103.44	4.49	152.63	49.19	482.55	69.99
Junc N3	101.79	228.22	150.65	48.86	479.32	69.52
Junc N4	102.48	9.22	152.9	50.42	494.62	71.74
Junc N5	101.94	0	153.25	51.31	503.35	73.00
Junc N6	102.39	6.95	153.16	50.77	498.05	72.24
Junc N7	101.47	0	152.99	51.52	505.41	73.30
Junc N8	100.7	0	152.4	51.7	507.18	73.56
Junc N9	96.68	0	155.58	58.9	577.81	83.80
Junc N10	102.7	0	153.56	50.86	498.94	72.36
Junc PR1	102	0.89	155.06	53.06	520.52	75.49
Junc T1	102.94	0	152.57	49.63	486.87	70.61
Junc T2	103.73	5.25	152.88	49.15	482.16	69.93
Resvr 1	155.6	-209.26	155.6	0	0.00	0.00
Resvr 2	153.6	-67.16	153.6	0	0.00	0.00

Network Table - Links (Max Day + FF 'N3')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	33.72	0.49	1.05	0.026
Pipe 2	240	297	120	28.68	0.41	0.77	0.026
Pipe 3	399	297	120	26.13	0.38	0.65	0.027
Pipe 4	216	297	120	-19.99	0.29	0.40	0.028
Pipe 5	443	297	120	-24.34	0.35	0.57	0.027
Pipe 6	164	297	120	-19.85	0.29	0.39	0.028
Pipe 7	242	297	120	-116.13	1.68	10.33	0.021
Pipe 8	52	297	120	-117.02	1.69	10.47	0.021
Pipe 9	576	900	120	-92.24	0.14	0.03	0.026
Pipe 10	260	297	120	-92.24	1.33	6.74	0.022
Pipe 11	139	297	120	135.98	1.96	13.83	0.021
Pipe 12	216	297	120	-9.59	0.14	0.10	0.031
Pipe 13	246	297	120	-18.81	0.27	0.35	0.028
Pipe 14	469	297	120	-18.81	0.27	0.35	0.028
Pipe 15	283	297	120	25.76	0.37	0.63	0.027
Pipe 16	123	297	120	33.45	0.48	1.03	0.026
Pipe 17	173	400	120	-33.45	0.27	0.24	0.027
Pipe 18	472	297	120	-92.24	1.33	6.74	0.022
Pipe 19	147	297	120	-25.76	0.37	0.63	0.027

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N4')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	153.73	50.53	495.70	71.90
Junc MU1	104.52	5.03	153.96	49.44	485.01	70.34
Junc MU2	104.15	2.55	153.34	49.19	482.55	69.99
Junc N1	104.5	6.14	152.4	47.9	469.90	68.15
Junc N2	103.44	4.49	153.98	50.54	495.80	71.91
Junc N3	101.79	11.22	154.86	53.07	520.62	75.51
Junc N4	102.48	176.22	149.81	47.33	464.31	67.34
Junc N5	101.94	0	152.64	50.7	497.37	72.14
Junc N6	102.39	6.95	152.07	49.68	487.36	70.69
Junc N7	101.47	0	150.59	49.12	481.87	69.89
Junc N8	100.7	0	155.12	54.42	533.86	77.43
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	154.31	51.61	506.29	73.43
Junc PR1	102	0.89	155.46	53.46	524.44	76.06
Junc T1	102.94	0	154.8	51.86	508.75	73.79
Junc T2	103.73	5.25	152	48.27	473.53	68.68
Resvr 1	155.6	-90.56	155.6	0	0.00	0.00
Resvr 2	154.5	-135.87	154.5	0	0.00	0.00

Network Table - Links (Max Day + FF 'N4')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	59.92	0.86	3.03	0.024
Pipe 2	240	297	120	54.89	0.79	2.58	0.024
Pipe 3	399	297	120	52.34	0.76	2.36	0.024
Pipe 4	216	297	120	-46.19	0.67	1.87	0.025
Pipe 5	443	297	120	73.96	1.07	4.48	0.023
Pipe 6	164	297	120	78.45	1.13	4.99	0.023
Pipe 7	242	297	120	-56.62	0.82	2.73	0.024
Pipe 8	52	297	120	-57.51	0.83	2.81	0.024
Pipe 9	576	900	120	-33.04	0.05	0.00	0.030
Pipe 10	260	297	120	-33.04	0.48	1.01	0.026
Pipe 11	139	297	120	-21.82	0.31	0.47	0.027
Pipe 12	216	297	120	114.91	1.66	10.12	0.021
Pipe 13	246	297	120	-61.31	0.88	3.16	0.024
Pipe 14	469	297	120	-61.31	0.88	3.16	0.024
Pipe 15	283	297	120	68.26	0.99	3.86	0.023
Pipe 16	123	297	120	75.95	1.10	4.70	0.023
Pipe 17	173	400	120	-75.95	0.60	1.10	0.024
Pipe 18	472	297	120	-33.04	0.48	1.01	0.026
Pipe 19	147	297	120	-68.26	0.99	3.86	0.023

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N6')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	151.23	48.03	471.17	68.34
Junc MU1	104.52	5.03	153.25	48.73	478.04	69.33
Junc MU2	104.15	2.55	152.88	48.73	478.04	69.33
Junc N1	104.5	6.14	152.31	47.81	469.02	68.03
Junc N2	103.44	4.49	154.02	50.58	496.19	71.97
Junc N3	101.79	11.22	154.88	53.09	520.81	75.54
Junc N4	102.48	9.22	150.36	47.88	469.70	68.12
Junc N5	101.94	0	147.51	45.57	447.04	64.84
Junc N6	102.39	223.95	145.58	43.19	423.69	61.45
Junc N7	101.47	0	148.72	47.25	463.52	67.23
Junc N8	100.7	0	155.13	54.43	533.96	77.44
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	153.01	50.31	493.54	71.58
Junc PR1	102	0.89	155.46	53.46	524.44	76.06
Junc T1	102.94	0	154.81	51.87	508.84	73.80
Junc T2	103.73	5.25	152.09	48.36	474.41	68.81
Resvr 1	155.6	-89.47	155.6	0	0.00	0.00
Resvr 2	153.6	-186.96	153.6	0	0.00	0.00

Network Table - Links (Max Day + FF 'N6')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	47.18	0.68	1.95	0.024
Pipe 2	240	297	120	42.15	0.61	1.58	0.025
Pipe 3	399	297	120	39.60	0.57	1.41	0.025
Pipe 4	216	297	120	-33.46	0.48	1.03	0.026
Pipe 5	443	297	120	72.87	1.05	4.36	0.023
Pipe 6	164	297	120	77.36	1.12	4.87	0.023
Pipe 7	242	297	120	-55.93	0.81	2.67	0.024
Pipe 8	52	297	120	-56.82	0.82	2.75	0.024
Pipe 9	576	900	120	-32.65	0.05	0.00	0.030
Pipe 10	260	297	120	-32.65	0.47	0.98	0.026
Pipe 11	139	297	120	-21.43	0.31	0.45	0.028
Pipe 12	216	297	120	101.08	1.46	7.98	0.022
Pipe 13	246	297	120	91.86	1.33	6.69	0.022
Pipe 14	469	297	120	91.86	1.33	6.69	0.022
Pipe 15	283	297	120	132.09	1.91	13.11	0.021
Pipe 16	123	297	120	139.78	2.02	14.55	0.021
Pipe 17	173	400	120	-139.78	1.11	3.41	0.022
Pipe 18	472	297	120	-32.65	0.47	0.98	0.026
Pipe 19	147	297	120	-132.09	1.91	13.11	0.021

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N7')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	153.48	50.28	493.25	71.54
Junc MU1	104.52	5.03	154.06	49.54	485.99	70.49
Junc MU2	104.15	2.55	153.57	49.42	484.81	70.32
Junc N1	104.5	6.14	152.83	48.33	474.12	68.76
Junc N2	103.44	4.49	154.2	50.76	497.96	72.22
Junc N3	101.79	11.22	154.95	53.16	521.50	75.64
Junc N4	102.48	9.22	150.77	48.29	473.72	68.71
Junc N5	101.94	0	151.97	50.03	490.79	71.18
Junc N6	102.39	6.95	151.19	48.8	478.73	69.43
Junc N7	101.47	167	149.09	47.62	467.15	67.75
Junc N8	100.7	0	155.18	54.48	534.45	77.52
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	154.25	51.55	505.71	73.35
Junc PR1	102	0.89	155.47	53.47	524.54	76.08
Junc T1	102.94	0	154.9	51.96	509.73	73.93
Junc T2	103.73	5.25	152.53	48.8	478.73	69.43
Resvr 1	155.6	-84.18	155.6	0	0.00	0.00
Resvr 2	154.5	-142.25	154.5	0	0.00	0.00

Network Table - Links (Max Day + FF 'N7')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	53.53	0.77	2.46	0.024
Pipe 2	240	297	120	48.49	0.70	2.05	0.024
Pipe 3	399	297	120	45.94	0.66	1.85	0.025
Pipe 4	216	297	120	-39.80	0.57	1.42	0.025
Pipe 5	443	297	120	67.58	0.98	3.79	0.023
Pipe 6	164	297	120	72.07	1.04	4.27	0.023
Pipe 7	242	297	120	-52.53	0.76	2.38	0.024
Pipe 8	52	297	120	-53.42	0.77	2.45	0.024
Pipe 9	576	900	120	-30.76	0.05	0.00	0.030
Pipe 10	260	297	120	-30.76	0.44	0.88	0.026
Pipe 11	139	297	120	-19.54	0.28	0.38	0.028
Pipe 12	216	297	120	102.14	1.47	8.14	0.022
Pipe 13	246	297	120	92.92	1.34	6.83	0.022
Pipe 14	469	297	120	-74.08	1.07	4.49	0.023
Pipe 16	123	297	120	88.72	1.28	6.27	0.022
Pipe 17	173	400	120	-88.72	0.71	1.47	0.023
Pipe 18	472	297	120	-30.76	0.44	0.88	0.026
Pipe 19	147	297	120	-81.03	1.17	5.30	0.023
Pipe 15	283	297	120	81.03	1.17	5.30	0.023

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N8')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	154.39	51.19	502.17	72.83
Junc MU1	104.52	5.03	154.39	49.87	489.22	70.96
Junc MU2	104.15	2.55	154.3	50.15	491.97	71.35
Junc N1	104.5	6.14	154.17	49.67	487.26	70.67
Junc N2	103.44	4.49	154.11	50.67	497.07	72.09
Junc N3	101.79	11.22	153.33	51.54	505.61	73.33
Junc N4	102.48	9.22	154.14	51.66	506.78	73.50
Junc N5	101.94	0	154.3	52.36	513.65	74.50
Junc N6	102.39	6.95	154.25	51.86	508.75	73.79
Junc N7	101.47	0	154.18	52.71	517.09	75.00
Junc N8	100.7	167	152.22	51.52	505.41	73.30
Junc N9	96.68	0	155.58	58.9	577.81	83.80
Junc N10	102.7	0	154.47	51.77	507.86	73.66
Junc PR1	102	0.89	155.33	53.33	523.17	75.88
Junc T1	102.94	0	154.1	51.16	501.88	72.79
Junc T2	103.73	5.25	154.14	50.41	494.52	71.72
Resvr 1	155.6	-175.14	155.6	0	0.00	0.00
Resvr 2	154.5	-51.29	154.5	0	0.00	0.00

Network Table - Links (Max Day + FF 'N8')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	25.12	0.36	0.61	0.027
Pipe 2	240	297	120	20.09	0.29	0.40	0.028
Pipe 3	399	297	120	17.54	0.25	0.31	0.028
Pipe 4	216	297	120	-11.40	0.16	0.14	0.030
Pipe 5	443	297	120	-8.46	0.12	0.08	0.032
Pipe 6	164	297	120	-3.97	0.06	0.02	0.035
Pipe 7	242	297	120	-79.26	1.14	5.09	0.023
Pipe 8	52	297	120	-80.15	1.16	5.20	0.023
Pipe 9	576	900	120	-94.99	0.15	0.03	0.025
Pipe 10	260	297	120	72.01	1.04	4.26	0.023
Pipe 11	139	297	120	83.23	1.20	5.57	0.023
Pipe 12	216	297	120	-2.31	0.03	0.01	0.038
Pipe 13	246	297	120	-11.52	0.17	0.14	0.030
Pipe 14	469	297	120	-11.52	0.17	0.14	0.030
Pipe 15	283	297	120	18.48	0.27	0.34	0.028
Pipe 16	123	297	120	26.16	0.38	0.65	0.027
Pipe 17	173	400	120	-26.16	0.21	0.15	0.028
Pipe 18	472	297	120	-94.99	1.37	7.12	0.022
Pipe 19	147	297	120	-18.48	0.27	0.34	0.028

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes (Max Day + FF 'PR1')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	154.46	51.26	502.86	72.93
Junc MU1	104.52	5.03	154.47	49.95	490.01	71.07
Junc MU2	104.15	2.55	154.46	50.31	493.54	71.58
Junc N1	104.5	6.14	154.45	49.95	490.01	71.07
Junc N2	103.44	4.49	154.56	51.12	501.49	72.73
Junc N3	101.79	11.22	154.7	52.91	519.05	75.28
Junc N4	102.48	9.22	154.43	51.95	509.63	73.92
Junc N5	101.94	0	154.44	52.5	515.03	74.70
Junc N6	102.39	6.95	154.43	52.04	510.51	74.04
Junc N7	101.47	0	154.43	52.96	519.54	75.35
Junc N8	100.7	0	155.02	54.32	532.88	77.29
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	154.49	51.79	508.06	73.69
Junc PR1	102	167.89	154.61	52.61	516.10	74.85
Junc T1	102.94	0	154.62	51.68	506.98	73.53
Junc T2	103.73	5.25	154.45	50.72	497.56	72.17
Resvr 1	155.6	-198.91	155.6	0	0.00	0.00
Resvr 2	154.5	-27.52	154.5	0	0.00	0.00

Network Table - Links (Max Day + FF 'PR1')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	12.16	0.18	0.16	0.030
Pipe 2	240	297	120	7.13	0.10	0.06	0.032
Pipe 3	399	297	120	4.58	0.07	0.03	0.035
Pipe 4	216	297	120	1.56	0.02	0.00	0.041
Pipe 5	443	297	120	15.31	0.22	0.24	0.029
Pipe 6	164	297	120	19.80	0.29	0.39	0.028
Pipe 7	242	297	120	5.61	0.08	0.04	0.034
Pipe 8	52	297	120	-162.28	2.34	19.19	0.020
Pipe 9	576	900	120	-36.63	0.06	0.01	0.029
Pipe 10	260	297	120	-36.63	0.53	1.22	0.025
Pipe 11	139	297	120	-25.41	0.37	0.62	0.027
Pipe 12	216	297	120	8.50	0.12	0.08	0.032
Pipe 13	246	297	120	-0.72	0.01	0.00	0.045
Pipe 14	469	297	120	-0.72	0.01	0.00	0.046
Pipe 15	283	297	120	7.67	0.11	0.07	0.032
Pipe 16	123	297	120	15.36	0.22	0.24	0.029
Pipe 17	173	400	120	-15.36	0.12	0.06	0.030
Pipe 18	472	297	120	-36.63	0.53	1.22	0.025
Pipe 19	147	297	120	-7.67	0.11	0.07	0.032

Fernbank Community - Kizell Lands: Watermain Analysis

Network Table - Nodes (Max Day + FF 'T2')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HD1	103.2	7.68	153.99	50.79	498.25	72.27
Junc MU1	104.52	5.03	153.83	49.31	483.73	70.16
Junc MU2	104.15	2.55	153.05	48.9	479.71	69.58
Junc N1	104.5	6.14	151.85	47.35	464.50	67.37
Junc N2	103.44	4.49	153.69	50.25	492.95	71.50
Junc N3	101.79	11.22	154.74	52.95	519.44	75.34
Junc N4	102.48	9.22	151.59	49.11	481.77	69.87
Junc N5	101.94	0	153.3	51.36	503.84	73.08
Junc N6	102.39	6.95	152.94	50.55	495.90	71.92
Junc N7	101.47	0	152.05	50.58	496.19	71.97
Junc N8	100.7	0	155.05	54.35	533.17	77.33
Junc N9	96.68	0	155.6	58.92	578.01	83.83
Junc N10	102.7	0	154.37	51.67	506.88	73.52
Junc PR1	102	0.89	155.43	53.43	524.15	76.02
Junc T1	102.94	0	154.66	51.72	507.37	73.59
Junc T2	103.73	172.25	151.32	47.59	466.86	67.71
Resvr 1	155.6	-98.16	155.6	0	0.00	0.00
Resvr 2	154.5	-128.27	154.5	0	0.00	0.00

Network Table - Links (Max Day + FF 'T2')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	178	297	120	67.28	0.97	3.76	0.023
Pipe 2	240	297	120	62.25	0.90	3.25	0.023
Pipe 3	399	297	120	59.70	0.86	3.01	0.024
Pipe 4	216	297	120	-53.56	0.77	2.46	0.024
Pipe 5	443	297	120	81.56	1.18	5.37	0.023
Pipe 6	164	297	120	86.05	1.24	5.93	0.022
Pipe 7	242	297	120	-61.50	0.89	3.18	0.024
Pipe 8	52	297	120	-62.39	0.90	3.27	0.023
Pipe 9	576	900	120	-35.77	0.06	0.01	0.029
Pipe 10	260	297	120	-35.77	0.52	1.17	0.025
Pipe 11	139	297	120	-24.55	0.35	0.58	0.027
Pipe 12	216	297	120	-37.13	0.54	1.25	0.025
Pipe 13	246	297	120	-46.35	0.67	1.88	0.025
Pipe 14	469	297	120	-46.35	0.67	1.88	0.025
Pipe 15	283	297	120	53.30	0.77	2.44	0.024
Pipe 16	123	297	120	60.99	0.88	3.13	0.024
Pipe 17	173	400	120	-60.99	0.49	0.73	0.024
Pipe 18	472	297	120	-35.77	0.52	1.17	0.026
Pipe 19	147	297	120	-53.30	0.77	2.44	0.024

Appendix B: Stormwater Documentation

Technical Memorandum – Carp River PCSWMM Model
PCSWMM Model Schematic
Pond 1 Design Sheet
Chicago Design Storms
SCS Design Storms
100-year Model Output – Kizell Lands only
100-year Model Output – Carp River model – future conditions
100-year Model Output – Carp River model – interim conditions

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: **FEBRUARY 27, 2018**

TO: **LAURENT JOLLIET**

FROM: **KALLIE AULD, P.ENG.**

RE: **KIZELL LANDS AND FERNBANK POND 1:**
INTEGRATION WITH CARP RIVER PCSWMM MODEL (REV. 2)

CC: **MIKE PETEPIECE, P.ENG., MARK BISSETT, P.ENG.**

1.0 BACKGROUND

The City has developed a PCSWMM model of the Carp River subwatershed and indicated that all new development within the watershed is to be represented in this model to confirm that the cumulative impacts of development are accounted for and that the proposed stormwater management strategies will have no adverse impact on water levels in the Carp River.

This technical memorandum provides an overview of how the PCSWMM model for the Kizell Lands and Fernbank Pond 1 has been integrated into the City of Ottawa Carp River PCSWMM model (March, 2017) and changes that have been made to the Carp River model.

2.0 UPSTREAM DRAINAGE AREAS

Existing Conditions

Storm runoff from the Granite Ridge subdivision (47.21 ha) and a portion of the Iber Road industrial area (18.11 ha + 10.45 ha) is tributary to an existing 1350 mm storm sewer. This sewer runs across the existing high school site south of the Kizell Lands, then outlets to an open ditch that conveys flows north across the Kizell Lands to the Carp River West Tributary and ultimately the Carp River.

The design flows used to size the 1350 mm storm sewer were taken from the *Granite Ridge Subdivision Stormwater Site Management Plan and Summary of Calculations* (Simmering & Associates, February 2000). The sewer was sized to accommodate the controlled 100-year peak flow from the upstream drainage area.

Proposed Conditions

As part of the proposed development, the existing storm sewer crossing the High school property will be extended through the Kizell Lands to a new SWM facility (Fernbank Pond 1) that will provide stormwater quality and quantity control for the proposed subdivision. This sewer will also collect storm runoff from a portion of the proposed development.

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

2.1 Model Revisions to Upstream Areas

Several changes have been made to the Carp River PCSWMM models (Existing, Interim, and Future) to better represent the flows from the upstream drainage areas:

Granite Ridge Subdivision:

- Slight changes have been made to area CS254_1 in all PCSWMM models;
- The percent impervious has been updated from 47.2% to 44.2%, based on the impervious surface layer provided by the City;
- No changes have been made to the Subarea Routing method or Percent Routed.

Iber Road:

- Slight changes have been made to areas CS254_2 (Iber West) and CS252 (Iber East) in all PCSWMM models;
- The percent impervious for each area has been updated based on the impervious surface layer provided by the City;
    - The % impervious for area CS254-2 has changed from 40% to 36.1%
    - The % impervious for area CS252 has changed from 66% to 56.4%
- Storage nodes have been added to both areas to represent the average amount of on-site storage outlined in the attached MOECC Environmental Compliance Approvals (**Attachment 1**). Refer to the following tables for details:

Table 1: Iber Road East Storage Volumes (m^3/ha) & Release Rates (L/s)

Area (ha)	Storage Volume (m^3)	Release Rate (L/s)	Storage Volume (m^3/ha)	Release Rate (L/s/ha)
0.27	69	10	257	37
0.43	116	29	270	67
0.59	180	30	305	51
0.52	252	14	484	26
0.69	75	22	109	32
0.38	70	16	184	42
0.97	150	62	155	64
1.13	154	N/A	136	N/A

Table 2: Iber Road West Storage Volumes (m^3/ha) & Release Rates (L/s)

Area (ha)	Storage Volume (m^3)	Release Rate (L/s)	Storage Volume (m^3/ha)	Release Rate (L/s/ha)
0.51	67	16	131	31
1.17	380	37	325	32
0.56	90	62	161	110
1.74	447	125	257	72
0.84	304	79	362	94

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Based on the values outlined in **Tables 1** and **2**, overall storage volumes and release rates were determined:

Table 3: Overall Iber Road On-Site Storage Volumes

Iber Road Area	Total Area (ha)	On-Site Storage			
		Minimum (m^3/ha)	Maximum (m^3/ha)	Average (m^3/ha)	Average Overall (m^3)
Iber Road East	10.45	109	484	237	**2482**
Iber Road West	18.12	131	362	247	**4477**

Table 4: Overall Iber Road Release Rates

Iber Road Area	Total Area (ha)	Release Rate			
		Minimum (L/s/ha)	Maximum (L/s/ha)	Average (L/s/ha)	Average Overall (L/s)
Iber Road East	10.45	26	67	46	**477**
Iber Road West	18.12	31	110	68	**1227**

For area CS254_2 (Iber Road West), the storage node was altered slightly, providing less storage than the average overall volume listed in **Table 3**. This was done to ensure the release rate during the 100-year storm event matched the average overall calculated in **Table 4**. For area CS252 (Iber Road East), the storage provided matches that listed in **Table 3**, and the release rate was adjusted using an orifice to ensure the release rate during the 100-year storm event matched the average overall calculated in **Table 4**.

The revisions to areas CS254_1, CS254_2, and CS252 have reduced the peak flows directed to the existing 1350mm storm sewer, such that they are more representative of existing conditions. Each of the Existing, Interim, Future, and stand-alone Pond 1 model have been updated to reflect these revisions. Model results outlined in the Conceptual Site Servicing and Stormwater Management report, and later in this memo, reflect these changes.

3.0 MODEL DEVELOPMENT & INTEGRATION

A PCSWMM model of the Kizell Lands was developed by Novatech based on the conceptual storm drainage area plan and storm sewer layout. This model was used to evaluate the storage requirements in the proposed SWM facility (Fernbank Pond 1) and the level of service provided by the conceptual major and minor system networks.

The nodes, links, and storage curves used to represent the major and minor drainage system network for the Kizell Lands development have been designed in accordance with City of Ottawa Technical Bulletin PIEDTB-2016-01 (September 2016).

Fernbank Pond 1 will provide stormwater quality and quantity control for the Kizell Lands (77.93 ha), and has been sized to accommodate the controlled outflows from the upstream Granite Ridge SWM Facility and a portion of the Iber Road industrial area – refer to **Drawing 108195-STM.** Additional details on the design of the subdivision are available in the Concept Servicing Report.

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

3.1 Model Integration

The standalone PCSWMM model of the Kizell Lands has been integrated into the Carp River PCSWMM models (interim and future conditions) in accordance with the protocol outlined the *City of Ottawa Carp River PCSWMM Model Documentation*. The updated Carp River models are provided on the attached CD as a part of the *Kizell Lands – Fernbank Concept Servicing Report*.

Carp River - Interim Conditions

The Interim Conditions PCSWMM model has been updated to reflect the proposed design for the Kizell Lands and Fernbank Pond 1. Drainage area 'CS251' was adjusted to be consistent with the storm catchment areas from the standalone PCSWMM model of the Kizell Lands.

Carp River - Future (Ultimate) Conditions

The Future Conditions PCSWMM model has been updated to reflect ultimate development of the Fernbank Lands tributary to the Carp River including Fernbank Ponds 1, 2, and 3. The Future Conditions Carp River PCSWMM model (March 2017) includes the stand alone PCSWMM model for Pond 1 and the latest development plans within the Pond 1 drainage area.

3.2 Model Results

Table 5 (Interim Conditions) and **Table 6** (Future Conditions) provide a comparison of the 100-year water levels and flows along the main Branch of the Carp River between the updated Carp River Models and the original, unedited, models provided by the City in March 2017.

Table 5: 100-year Flows and Water Levels in Carp River (Interim Conditions)

Location on Carp River	PCSWMM Node	Original (March 2017)		Kizell Lands (Feb 2018)	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
West Tributary at Mattamy Lands	CJ251	5.78	95.84	5.61	95.84
Existing West Tributary	CJ201	12.47	94.52	12.94	94.58
Near Pond 2/3 Outfall	CJ200	12.52	94.50	12.48	94.55
Hazeldean Road	CJ199	11.39	94.50	12.64	94.55
Maple Grove Road	CJ172	11.25	94.45	14.81	94.49
Palladium Drive	CJ150	28.55	94.33	30.41	94.37
Highway 417	CJ120	29.24	94.24	31.15	94.28
Feedmill Creek	CJ106	29.88	94.00	31.83	94.02

Table 6: 100-year Flows and Water Levels in Carp River (Future Conditions)

Location on Carp River	PCSWMM Node	Original (March 2017)		Kizell Lands (Feb 2018)	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
West Tributary at Mattamy Lands	CJ251	4.94	94.40	5.14	94.41
Existing West Tributary	CJ201	8.52	94.33	8.50	94.37
Near Pond 2/3 Outfall	CJ200	14.98	94.31	15.09	94.35
Hazeldean Road	CJ199	13.99	94.30	13.89	94.34

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Location on Carp River	PCSWMM Node	Original (March 2017)		Kizell Lands (Feb 2018)	
		Flow (m^3/s)	Water Level (m)	Flow (m^3/s)	Water Level (m)
West Tributary at Mattamy Lands	CJ251	4.94	94.40	5.14	94.41
Maple Grove Road	CJ172	16.63	94.19	16.67	94.21
Palladium Drive	CJ150	52.51	94.15	58.88	94.17
Highway 417	CJ120	32.49	93.97	33.42	94.00
Feedmill Creek	CJ106	44.17	93.68	45.75	93.71

The model results indicate a slight increase in peak flow in the Carp River, as the 100-year release rates for Pond 1 have increased from the March 2017 model. The release rates are generally consistent with the release rates from the SWMHYMO model prepared as part of the Fernbank EMP.

The model results indicate that there will be no substantial change to the modeled 100-year water levels in the Carp River under interim or future development conditions. The PCSWMM model output has been reviewed and any increases in water level are generally less than 0.05m, with one location having an increase of 0.07m under interim conditions. Under ultimate conditions the maximum observed increase is 0.04m.

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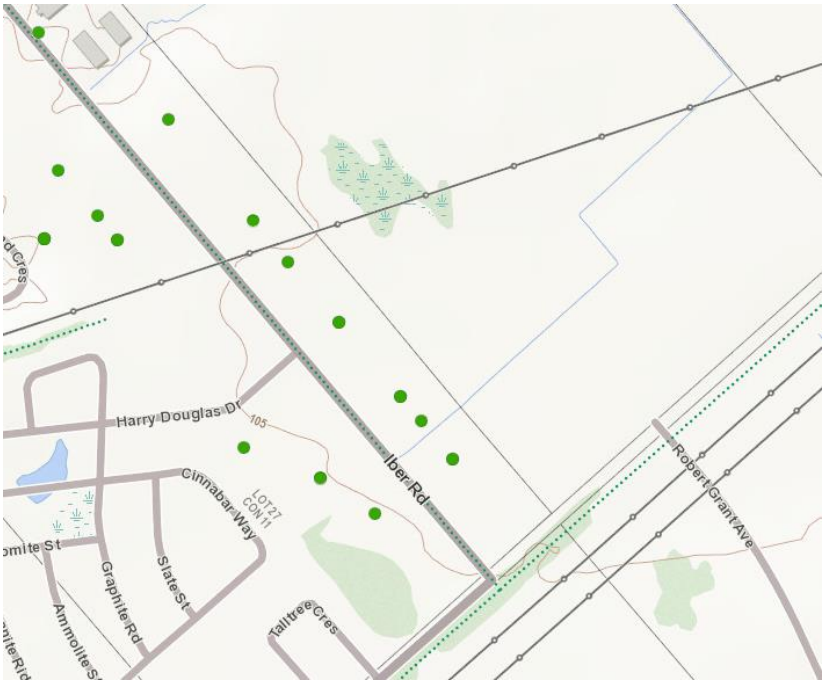
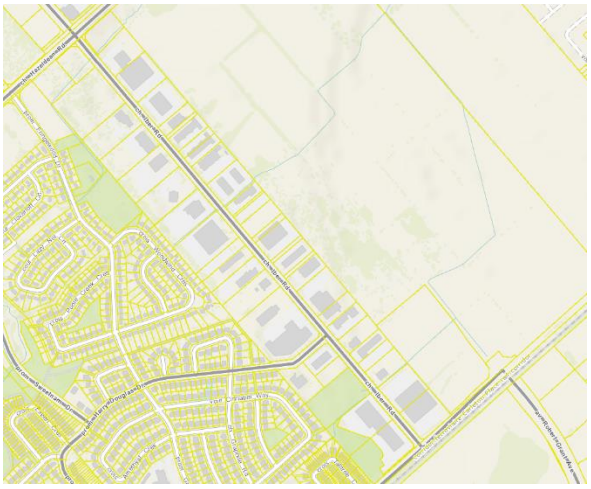
ATTACHMENT 1
Iber Road Industrial (East)
MOE ECA's (SWM)



Access Environment


GeoOttawa

ATTACHMENT 1
Iber Road Industrial (East)
MOE ECA's (SWM)

Summary of MOE ECA's for Iber Road Industrial (from Access Environment Website)

Site Location	MOE ECA #	SWM Strategy	Drainage Area	SWM Storage	Release Rate
East Side of Iber Road					
Block 12, Plan 4M-454 and Part of Blocks 7 & 8, Plan 4M-658	9724-6B9NSK	SWM Pond	0.27 ha	69.3 m^3	10.1 L/s* (Post - 5yr Pre)
		SWM Pond	0.43 ha	116 m^3	28.6 L/s* (Post - 5yr Pre)
149 Iber Rd	0305-78HL9L	SWM Pond	0.59 ha	180 m^3	30.1 L/s
109 Iber Road	8975-A4VL6P	SWM Pond	0.52 ha	235 m^3 (+ 16.9 m^3 of infil)	13.7 L/s (Post - 5yr Pre)
185 Iber Road	8466-5SDK27	SWM pond	0.69 ha	75 m^3	22.3 L/s
Lots 9 and 10, Registered Plan 4M-658	3222-56PSBR	SWM Pond	0.38 ha	70 m^3	16 L/s
		SWM Pond	0.97 ha	150 m^3	62 L/s
139 Iber Road, Lot 5, Part 4/5, Plan 4M-658	1916-5XEMBL	3x SWM Ponds	-	154 m^3	Post - Pre
West Side of Iber Road					
150 Iber Road, Part of Lot 14, Registered Plan 4M-658	1015-6CANY3	Rooftop / Surface Ponding	-	39 m^3 (roof top) + 28 m^3 (surface)	4.6 L/s + 5.0 L/s + 3.9 L/s + 2.3 L/s
164 Iber Road	4789-6KJJT3	Inlet to GR SWM Pond	-	-	-
110 Iber Road	9230-95LSBM	Surface / Underground Storage & SWM Pond	1.17 ha	156 m^3 (surface) + 167 m^3 (underground)+ 57 m^3 (pond)	37 L/s (pond)
86 Harry Douglas Drive (intersection with Iber Road)	0940-5G9JK3	SWM Pond	0.56 ha	90 m^3	61.7 L/s
200 Iber Road	7685-7C8NXM	Rooftop / SWM Pond	-	446.5 m^3	20.48 L/s (rooftop) + 40.5 L/s + 63.8 L/s.
118 Iber Road	9025-6EWRL8	Rooftop / SWM Pond		84 m^3 (rooftop) + 220 m^3 (pond)	8 L/s + 8 L/s + 63 L/s

Please refer to the attached ECA documents.

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 9724-6B9NSK

Campbell Bros. Movers Limited
55 Midpark Crescent
London, Ontario
N6N 1A9

Site Location: Block 12, Plan 4M-454 and Part of Blocks 7 & 8, Plan 4M-658
City of Ottawa

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

a stormwater management system to serve a 0.81 ha site being used for the existing office and warehouse building (moving and storage of furniture) and proposed addition at the above listed location, consisting of the following:

- stormwater management pond (known as North Pond), located in the north-east corner of the site, collecting up to 100-year storm event runoff from an area of 0.27 ha, having a total storage volume of 69.3 m^3 complete with overflow outlet and outlet structure consisting of a 150 mm diameter outflow pipe allowing a maximum discharge of 10.1 L/s (5-year storm event) to the existing drainage swale and eventually to Carp River;
- stormwater management pond (known as South Pond), located in the south-east corner of the site, collecting up to 100-year storm event runoff from an area of 0.43 ha, having a total storage volume of 116 m^3 complete with outlet structure consisting of a 200 mm diameter outflow pipe allowing a maximum discharge of 28.6 L/s (5-year storm event) to the existing drainage swale and eventually to Carp River;
- all other appurtenances essential for proper operation of the aforementioned sewage works;

all in accordance with the applications dated January 9, 2002 and February 24, 2005, including reports entitled "Report for Review by the City of Ottawa and the Mississippi Valley Conservation Authority, Proposed Warehouse and Office Building Campbell Moving Limited, Block 12, Plan 4M-454 and Part of Blocks 7 & 8, Plan 4M-658, Iber Road, Stittsville, Goulbourn, now City of Ottawa" dated February-March, 2001, revised 5/6 April, 2002 and 23 March, 2001 and "Amended Report for Review by the City of Ottawa and the Mississippi Valley Conservation Authority, Phase - II Proposed Addition to Existing Warehouse and Office Building Campbell Moving Limited, Block 12, Plan 4M-454 and Part of Blocks 7 & 8, Plan 4M-658, Iber Road, Stittsville, Goulbourn, now City of Ottawa" dated January 2005, final plans and specifications prepared by H. C. Morash, P.Eng.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "Certificate" means this entire Certificate of Approval document, issued in accordance with Section 53 of the Ontario Water Resources Act, and includes any schedules;

2. "Director" means any Ministry employee appointed by the Minister pursuant to Section 5 of the Ontario Water Resources Act;

3. "Ministry" means the Ontario Ministry of the Environment;

4. "District Manager" means the District Manager of the Ottawa District Office of the Ministry;

5. "Owner" means City of Ottawa and includes its successors and assignees; and

6. "Works" means the sewage works described in the Owner's application, this Certificate and in the supporting documentation referred to herein, to the extent approved by this Certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

1.1 The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater management works do not constitute a safety or health hazard to the general public.

1.2 Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Certificate, the application for approval of the Works and the submitted supporting documents and plans and specifications as submitted.

1.3 Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail:

1.4 The approval granted by this Certificate is based upon a review of the proposed works in the context of its effect on the environment, its process performance and principles of established engineering theory.

1.5 The review did not include a consideration of the architectural, mechanical or structural components of the Works except to the extent necessary to review the works as set out in the above paragraph.

1.6 The Owner shall ensure that, at all times, the Works and related equipment and appurtenances which are installed or used to achieve compliance with this Certificate are properly operated and maintained and meet with the operation and maintenance requirements of the Municipality.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this Certificate will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Certificate.

3. CHANGE OF OWNER

3.1 The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:
(a) change of Owner;
(b) change of address of the Owner;
(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager;
(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager;

3.2 In the event of any change in ownership of the Works, other than a change to a successor Municipality, the Owner shall notify in writing the succeeding owner of the existence of this Certificate, and a copy of such notice shall be forwarded to the District Manager and the Director.

4. CLEANING AND MAINTENANCE

4.1 The Owner shall ensure that sediment, debris and excessive decaying vegetation are removed from the above noted stormwater management ponds at least once a year to prevent the excessive build-up of sediment, debris and/or decaying vegetation to avoid any reduction of capacity of the ponds. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

5. RECORD KEEPING AND REPORTING

5.1 The Owner shall prepare operational manual which should include, but not limited to, frequency and method of clean-out of stormwater management works within six (6) months from the date of issuance of this Certificate of Approval or the commissioning of the Works. The Owner shall keep the operations manual up to date with such revisions as may be required. Upon request, the Owner shall make the manual available for inspection by Ministry personnel and furnish a copy to the Ministry.

5.2 The Owner shall maintain a logbook to record the results of all inspections and any cleaning and maintenance operations undertaken and shall make the logbook available for inspection by the Ministry upon request.

5.3 The Owner shall retain all records related to the monitoring activities required by this Certificate, for a period of three (3) years from the date of their creation, unless otherwise directed in writing by the District Manager.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed because it is not in the public interest for the Director to approve facilities which, by reason of potential health and safety hazards do not generally comply with legal standards or approval requirements falling outside the purview of this Ministry.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the Works are made aware of the Certificate and continue to operate the Works in compliance with it.

4. Condition 4 is included as regular removal of sediment and excessive decaying vegetation from this approved stormwater management system are required to mitigate the impact of sediment and/or decaying vegetation on the downstream receiving watercourse. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at all times as required by the design.

5. Condition 5 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Certificate, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval Municipal and Private Sewage Works Number 8662-576Q6F issued on February 14, 2002.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;

8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 13th day of April, 2005

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KC/
c: District Manager, MOE Ottawa District Office
Henry Morash, P.Eng.
R. L. Phillips, C.E.T., Program Manager, City of Ottawa

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 0940-5G9JK3

4063767 Canada Inc.
PO Box 11336 Stn H
Nepean, Ontario
K2H 7V1

Site Location: Microzone Complex
86 Harry Douglas Drive
City of Ottawa

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

stormwater management facility to serve a light manufacturing operation at the above location on a site area of approximately 0.8 hectare with discharge of the stormwater to an existing municipal wet pond located south of the site, consisting of the following:

- one (1) catchbasin at the loading ramp for collection of stormwater with discharge via a 150 millimeter diameter pipe to an outlet structure located at a dry pond;

- one (1) rectangular shaped dry pond at the south-east corner of the site having a volumetric capacity of approximately 90 cubic metres at an elevation of 104.25 metre for collection of runoff from approximately 0.56 hectare of the site with a maximum release rate of 61.7 litres/second from the pond achieved during a 100-year storm due to flow restriction from the pond by installation of a 173 millimetre diameter orifice at the outlet structure; and

- all other appurtenances essential for proper operation of the aforementioned sewage works;

all in accordance with the Application for Approval of Industrial Sewage Works dated October 24, 2002 submitted by the Principal, Dynar Architect and Associates Inc., and the Stormwater Management Report for Microzone Complex, Ottawa dated October 12, 2002, prepared by Simmering and Associates Ltd, Ottawa.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Owner" means 4063767 Canada Inc., and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications.

2. OPERATION AND MAINTENANCE

(1) The Owner shall undertake an inspection of the condition of the stormwater management pond, at least six (6) times a year, and undertake any necessary cleaning and maintenance to prevent the excessive buildup of sediment and/or decaying vegetation.

(2) The owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken and shall keep the logbook at the site for inspection by the Ministry.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted.

2. Condition 2 is included to ensure that any buildup of sediment and/or decaying vegetation does not impair the performance of the stormwater management facility.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 11th day of December, 2002

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

AC/
c: District Manager, MOE Ottawa
Douglas Kerr, Simmering & Associates Ltd.

Ontario

Ministry of the Environment **Ministère de l'Environnement**

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 0305-78HL9L
Issue Date: November 28, 2007

The Duncan Group Limited
149 Iber Rd
Ottawa, Ontario
K2S 1E7

Site Location: Sani-Sol
149 Iber Rd
City of Ottawa
K2S 1E7

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

stormwater management facility to serve a new sales and service centre for cleaning products and equipment on a site area covering approximately 0.59 hectares at the above location, consisting of the following:

- one (1) in-line storage pond at the eastern part of the site with a storage capacity of approximately 180 m^3 with 100-millimetre diameter outlet control device installed in a 300-millimetre diameter CSP pipe with a controlled maximum flow rate of 30.1 litres per second for the 100-year return storm; and

- all other appurtenances essential for proper operation of the aforementioned sewage works;

all in accordance with the following documents:

1. Application for Approval of Industrial Sewage Works dated July 29, 2002 and the associated documents submitted by the Owner, The Duncan Group Limited, Stittsville, Ontario.

2. Application for Approval of Industrial Sewage Works submitted by David Duncan of the The Duncan Group Limited, received on September 6, 2007 and all supporting information.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Owner" means The Duncan Group Limited, and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

(2) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(3) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. CHANGE OF OWNER

The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of *Owner*;

(b) change of address of the *Owner*;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager*; and

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager*.

4. OPERATION AND MAINTENANCE.

(1) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments, oil/grit, and/or vegetation

(2) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at 149 Iber Rd, Ottawa, for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works*;

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed; and

(c) the date of each spill within the catchment area, including follow-up actions / remedial measures undertaken.

5. **RECORD KEEPING**

The *Owner* shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this *Certificate*.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the *Works* are constructed in a timely manner so that standards applicable at the time of Approval of the *Works* are still applicable at the time of construction, to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.

4. Condition 4 is included to require that the *Works* be properly operated and maintained such that the environment is protected.

5. Condition 5 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the *Works*.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 3010-5G8HQR issued on November 27, 2002.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 28th day of November, 2007

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KD/
c: District Manager, MOE Ottawa.
Todd Perry, McIntosh Perry Consulting Engineers Ltd.

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 8975-A4VL6P
Issue Date: December 11, 2015

8769028 Canada Inc.
Post Office Box, No. 78013
Ottawa, Ontario
K2E 1B1

Site Location: 109 Iber Road
City of Ottawa

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

establishment of stormwater management works for the industrial warehouse development (approximately 0.61 hectares in area), located at 109 Iber Road within the Carp River watershed in the City of Ottawa. The proposed works will drain to the existing Iber Road ditch which discharges into the Carp River. The works are to provide normal level water quality control and water quantity control attenuating the post-development peak flow from 5-year and 100-year design storms to the 5-year peak flow pre-development rates for 0.52 hectares of the site. The remaining 0.09 hectares, which consists mostly of landscaped areas, will be uncontrolled (drain via sheet flow off of the site). The works consist of the following:

storm sewers collecting stormwater runoff from the proposed warehouse building, parking areas, and landscaped areas and conveying it to a stormwater detention area located at the front of the site;

stormwater management facility (catchment area 0.52 hectares, 85% impervious): - one (1) dry pond located at the front of the property (between the proposed warehouse building and Iber Road) providing 111 m 3 of storage and a maximum release rate of 9.7 L/s under the 5-year storm and 235 m 3 of storage and a maximum release rate of 13.7 L/s under the 100-year storm. The pond is to discharge through an inlet control device to the existing ditch on Iber Road;

stormwater management facility (catchment area 0.52 hectares, 85% impervious): - one (1) clear stone infiltration trench underlying the proposed dry pond providing 16.9 m 3 of storage volume;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document including the application and any supporting documents listed

"Director" means a person appointed by the Minister pursuant to section 5 of the Environmental Protection Act for the purposes of Part II.1 of the Environmental Protection Act;

"District Manager" means the District Manager of the Ottawa office of the Ministry;

"Equivalent" means a substituted product that meets the required quality and performance standards of a named product;

"Ministry" means the ministry of the government of Ontario responsible for the Environmental Protection Act and the Ontario Water Resources Act and includes all officials, employees or other persons acting on its behalf;

"Owner" means 8769028 Canada Inc. and includes their successors and assignees;

"Water Supervisor" means the Water Supervisor of the Ottawa office of the Ministry;

"Works" means the sewage works described in the Owner's application(s) and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the Conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(3) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such Condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(6) The issuance of, and compliance with the Conditions of this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

(1) This Approval will cease to apply to those parts of the Works which have not been constructed within **five (5) years** of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act , R.S.O. 1990, c. B17 shall be included in the notification to the District Manager;

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act , R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

4. OPERATION AND MAINTENANCE

(1) The Owner shall inspect the Works at least **once a year** and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(2) The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's office for inspection by the Ministry. The logbook shall include the following:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. MONITORING AND REPORTING

(1) The Owner shall carry out a monitoring program for the inspection and maintenance of the Works as outlined in this Approval, and shall copy the Water Supervisor on any and all reports related to the operation and maintenance of the Works.

6. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the Works, the Owner shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the Works and/or prevent pollution incidents. The said plan shall include as a minimum, but not limited to:

(a) the name, job title and location (address) of the Owner, person in charge, management or control of the 109 Iber Road site;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the Spill Contingency and Pollution Prevention Plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up companies who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each and every hazardous material which may be transported or stored within the area serviced by the Works;

(g) the means (internal corporate procedures) by which the Spill Contingency and Pollution Prevention Plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the Works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the Spill Contingency and Pollution Prevention Plan, location and date of maintenance/replacement if warranted, including testing and calibration of the equipment; and

(j) the date on which the Spill Contingency and Pollution Prevention Plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place near the reception area on site.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the operation of the facility or to reflect updates in the Municipal By-Laws, or improved Best Management Practices by the Owner.

7. TEMPORARY EROSION AND SEDIMENT CONTROL

(1) The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every **two (2) weeks** and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hour period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly .

(2) The Owner shall maintain records of inspections and maintenance which shall be made available

inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

8. RECORD KEEPING

The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

Schedule "A"

1. Application for Environmental Compliance Approval , dated August 4, 2015 and received on August 17, 2015, submitted by 8769028 Canada Inc.;

2. Storm Water Management Report , dated August 6, 2014, prepared by D. B. Gray Engineering Inc. for 8769028 Canada Inc.;

3. Servicing Brief , dated August 6, 2014, prepared by D. B. Gray Engineering Inc. for 8769028 Canada Inc.; and

4. Engineering Drawings - 14014-C1 – C14 , dated May 23, 2014, prepared by D. B. Gray Engineering Inc. for 8769028 Canada Inc.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that any subsequent Owner of the Works is made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to require that the Works be properly operated and maintained such that the environment is protected.

5. Condition 5 is included to enable the Owner to evaluate and demonstrate the performance of the Works on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works do not cause any impairment of the receiving watercourse.

6. Condition 6 is included to ensure that the Ministry is immediately informed of the occurrence of an emergency or otherwise abnormal situation so that appropriate steps are taken to address the immediate concerns regarding the protection of public health and minimizing environmental damage and to be able to devise an overall abatement strategy to prevent long term degradation and the re-occurrence of the situation.

7. Condition 7 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving

8. Condition 8 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*****
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 11th day of December, 2015

Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

JW/
c: District Manager, MOECC Ottawa District Office

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 1015-6CANY3

Torbram Electric Supply Corporation
25 Van Kirk Drive
Brampton, Ontario
L7A 1A6

Site Location: Torbram Electric
150 Iber Road, Part of Lot 14, Registered Plan 4M-658
Ottawa City, Ontario
K2S 1E7

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

a ***stormwater management facility*** to be constructed to service Torbram Electric warehouse/office development, at 150 Iber Road, Part of Lot 14, Registered Plan 4M-658, in the City of Ottawa, comprising the following:

Storage Component (for the 100 year storm event)
• storage provided on roof top of 39 cubic metres;
• storage provided on surface ponding of 28 cubic metres;

Flow Control (for the 100 year storm event)
• three (3) roof drains, releasing the flow at 4.6 L/s for a water depth of 123 mm;
• one (1) flow control device in catchbasin "CB No.1", rated at 5.0 L/s for a head of 0.65 m;
• one (1) flow control device in catchbasin "CB No.2", rated at 3.9 L/s for a head of 0.66 m; and
• one (1) flow control device in catchbasin "CB No.3", rated at 2.3 L/s for a head of 0.75 m;
discharging to the existing roadside ditches on Iber Road and Harry Douglas Drive;

all in accordance with the application dated March 14, 2005 and received on March 17, 2005, including a Stormwater Management Report, final plans, specifications and other supporting documentation prepared by Simmering & Associates Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

(1) "*Certificate*" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

(2) "*Owner*" means Torbram Electric Supply Corporation, and includes its successors and assignees; and

(3) "*Works*" means the sewage works described in the Owner's application, this Certificate and in the supporting documentation referred to herein, to the extent approved by this Certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. OPERATION AND MAINTENANCE

3.1 The *Owner* shall carry out and maintain an annual inspection and maintenance program on the operation of the stormwater management works in accordance with the manufacturer's recommendation.

3.2 After a two (2) year period, the District Manager of the MOE Ottawa District Office may alter the frequency of inspection of the stormwater management works if he/she is requested to do so by the *Owner* and considers it acceptable upon review of information submitted in support of the request.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is imposed to ensure that the stormwater management works are operated and maintained without any adverse impact on the environment.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;

4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 16th day of May, 2005

Aziz Ahmed, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

NH/
c: District Manager, MOE Ottawa District Office
Scott Taylor, Simmering & Associates Ltd.

Ontario

Ministry of the Environment
Ministère de l'Environnement

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 9230-95LSBM
Issue Date: March 22, 2013

City of Ottawa
100 Constellation Crescent
Ottawa, Ontario
K2G 6J8

Site Location: City of Ottawa Works Garage and Offices Project
110 Iber Road
City of Ottawa
K2S 1E9

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of stormwater management Works to serve the 110 Iber Road site as part of the City of Ottawa Works Garage and Offices Project, in the City of Ottawa, for the collection and disposal of stormwater runoff from a total catchment area of 1.17 ha, to attenuate post-development peak flows to allowable release levels, discharging to the existing roadside ditch located along Iber Road and ultimately to Pool Creek River, for all storm events up to and including the 100-year return storm, consisting of the following:

surface storage provided in the southwest portion of the site, on the 1,200 m 2 parking lot area, having an available storage volume of approx. 156 m 3 and a maximum ponding depth of 0.3 m, discharging to a stormwater storage channel;

underground storage provided in a stormwater storage channel (clear stone storage area), located under the south ramp, having a total available storage volume of 167 m 3 , consisting of a 43 m long, 14.7 m wide and 0.58 m deep layer of 75 mm diameter clear stone surrounded by a geotextile fabric, complete with a 43 m long 150 mm diameter perforated subdrain located at the bottom of the storage area, discharging via a 150 mm diameter perforated outlet pipe to a stormwater management dry pond;

a stormwater management dry pond located in the landscaped area in the southeast portion of the site, adjacent to Iber Road, designed to accommodate up to and including the 100-year return storm runoff from a catchment area of 1.17 ha, having a total active storage volume of 57 m 3 and a maximum ponding depth of 0.5 m, complete with a 150 mm diameter perforated inlet sudrain, a 200 mm diameter inlet pipe, a berm along the east side of the pond and a 150 mm deep layer of 75 mm diameter clear stone on the bottom of the pond, discharging via a 150 mm diameter outlet pipe allowing a maximum discharge of 37 L/s (100-year return storm) to the existing roadside ditch located along Iber Road and ultimately to Pool Creek River;

the design report entitled "Report 110 Iber Road -Stormwater Management Report, Ottawa, Ontario" dated August 10, 2012, final plans and specifications prepared by Morrison Hershfield Limited.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation.

2. "Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the Part II.1 of the Environmental Protection Act;

3. "District Manager" means the District Manager of the Ottawa District Office of the Ministry;

4. "Ministry" means the Ontario Ministry of the Environment;

5. "Owner" means City of Ottawa, and includes its successors and assignees; and

6. "Works" means the sewage works described in the Owner's application, this Approval and in the supporting documentation referred to herein, to the extent approved by this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1.1 The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the Works and the submitted supporting documents and plans and specifications as listed in this Approval.

1.3 Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this Approval are severable. If any requirement of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

been constructed within five (5) years of the date of this Approval.

3. CHANGE OF OWNER

The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act , R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; and

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act , R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

4. SPILL CONTINGENCY PLAN

4.1 Within six (6) months from the issuance of this Approval, the Owner shall implement a spill contingency plan - that is a set of procedures describing how to mitigate the impacts of a spill within the area serviced by the Works. This plan shall include as a minimum:

(i) the name, job title and location (address) of the Owner, person in charge, management or person(s) in control of the facility;

(ii) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(iii) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers), any receiving body(ies) of water that could potentially be significantly impacted by a spill and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(iv) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(v) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(vi) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the Works;

(vii) the means (internal corporate procedures) by which the spill contingency plan is activated;

(viii) a description of the spill response training provided to employees assigned to work in the area serviced by the Works, the date(s) on which the training was provided and by whom;

(ix) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(x) the date on which the contingency plan was prepared and subsequently, amended.

4.2 The spill contingency plan shall be kept in a conspicuous, readily accessible location on-site.

4.3 The spill contingency plan shall be amended from time to time as required by changes in the operation of the facility.

5. OPERATION AND MAINTENANCE

5.1 The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater management Works do not constitute a safety or health hazard to the general public.

5.2 The Owner shall ensure that the design storage volumes are maintained at all times.

5.3 The Owner shall undertake an inspection of the condition of the stormwater management Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the above noted stormwater management Works to prevent the excessive build-up of sediment, debris and/or decaying vegetation to avoid reduction of capacity of the Works. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

5.4 The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's corporate office for inspection by the Ministry. The logbook shall include the following:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the stormwater management Works.

6. RECORD KEEPING

The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which Approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The Condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval of the existence of this Approval.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to ensure that the Owner will implement the Spill Contingency Plan, such that the environment is protected and deterioration, loss, injury or damage to any person(s) or property is prevented.

5. Condition 5 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from this approved stormwater management Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at all times as required by the design. Furthermore, Condition 5 is included to ensure that the stormwater management Works are operated and maintained to function as designed.

6. Condition 6 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*****
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal 's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 22nd day of March, 2013

Sherif Hegazy, P.Eng.
Director
appointed for the purposes of Part II.1 of
the *Environmental Protection Act*

KC/
c: District Manager, MOE Ottawa District Office
Meghan MacSween, P.Eng., Morrison Hershfield Limited

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 8466-5SDK27

Almicnic Holdings Inc.
40 Kenins Crescent
Kanata, Ontario
K2K 3E5

Site Location: 185 Iber Road
Ottawa City,

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

a stormwater management facility to serve an office and warehouse on a site area of approximately 0.69 hectare at the above location, as follows:

- one (1) stormwater management pond at the south-east corner of the site with a total volumetric capacity of over 75 cubic metres for collection of runoff from the site with discharge to an adjacent ditch via a 600 mm high by 600 mm wide V-notched outlet control structure at a maximum rate of 22.3 litres/second; and

- all other appurtenances essential for proper operation of the aforementioned sewage works;

all in accordance with the Application for Approval of Industrial Sewage Works dated July 23, 2003, and the associated documents submitted by the President, Almicnic Holdings Inc., Kanata, Ontario.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Owner" means Almicnic Holdings Inc. and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications.

2. OPERATION AND MAINTENANCE

(1) The Owner shall undertake an inspection of the condition of the stormwater management facility, at least four (4) times a year, and undertake any necessary cleaning and maintenance to prevent the excessive build-up of sediment and/or decaying vegetation.

(2) The owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken and shall keep the logbook at the site for inspection by the Ministry.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted.

2. Condition 2 is included to ensure that any build-up of sediment and/or decaying vegetation does not impair the performance of the stormwater management facility.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 21st day of October, 2003

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

AC/
c: District Manager, MOE Ottawa
Todd Perry, McIntosh Perry Consulting Engineers Ltd.

Ontario

Ministry of the Environment
Ministère de l'Environnement

CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 7685-7C8NXM
Issue Date: March 27, 2008

GML Industrial Fund GP Ltd.
200 Tremblay Rd
Ottawa, Ontario
K1G 3H5

Site Location: 200 Iber Road
200 Iber Rd
Ottawa City

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

a ***stormwater management facility*** to be constructed at 200 Iber Road, in the City of Ottawa, comprising the following:

Storage Component (for the 5 year storm event)
• storage on roof top of approximately 50.5 cubic metres;
• storage in the ditch ponding of approximately 183.1 cubic metres;

Storage Component (for the 100 year storm event)
• storage on roof top of approximately 103.8 cubic metres;
• storage in the ditch ponding of approximately 446.5 cubic metres;

Flow Control
• eleven(11) roof drains, releasing the flow at 20.48 L/s for a maximum depth of 143 mm;
• one (1) 164 mm diameter orifice rated at 40.5 L/s for a head of 0.52 m, discharging to ditch along Iber Road;
• one (1) 215 mm diameter orifice rated at 63.8 L/s for a head of 0.43 m, discharging to ditch along the north property limit;

all in accordance with the application dated August 14, 2007 and received on August 24, 2007, and all supporting documentation and information associated with the application including stormwater management report, final plans and specifications prepared by David McManus Engineering Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

(1) "*Certificate*" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

(2) "*Owner*" means GML Industrial Fund GP Ltd., and includes its successors and assignees; and

(3) "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. OPERATION AND MAINTENANCE

3.1 The *Owner* shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater works do not constitute a safety or health hazard to the general public.

3.2 The *Owner* shall undertake an inspection of the condition of the stormwater management system, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the above noted stormwater management system to prevent the excessive build-up of sediment, debris and/or decaying vegetation to avoid reduction of capacity of the pond. The *Owner* shall also regularly inspect and clean out the inlet to and outlet from the works to ensure that these are not obstructed.

3.3 The *Owner* shall prepare operational manual which should include, but not limited to, frequency and method of clean-out of stormwater management works within six (6) months from the date of issuance of this *Certificate* or the commissioning of the works. The *Owner* shall keep the operations manual up to date with such revisions as may be required. Upon request, the *Owner* shall make the manual available for inspection by *Ministry* personnel and furnish a copy to the *Ministry*.

3.4 The *Owner* shall maintain a logbook to record the results of all inspections and any cleaning and maintenance operations undertaken and shall make the logbook available for inspection by the *Ministry* upon request.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owner* his/her responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3.1 is imposed because it is not in the public interest for the *Director* to approve facilities which, by reason of potential health and safety hazards do not generally comply with legal standards or approval requirements falling outside the purview of this *Ministry*.

4. Condition 3.2 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from this approved stormwater management system are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the works. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at all times as required by the design, and to prevent stormwater impounded in the works from becoming stagnant.

5. Conditions 3.3 and 3.4 are included to ensure that the stormwater management facility is operated and maintained to function as designed.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 27th day of March, 2008

Zafar Bhatti, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

AM/
c: District Manager, MOE Ottawa
Mike Keating, David McManus Engineering Ltd.

Ontario

Ministry of the Environment **Ministère de l'Environnement**

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 9025-6EWRL8

BVS Holdings Ltd.
118 Iber Road
Ottawa, Ontario
K2S 1E9

Site Location: Excelcon Business Centre
118 Iber Road
Ottawa City, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

stormwater management facilities and appurtenances to service Excelcon Business Centre at 118 Iber Road, in the City of Ottawa, comprising the following:

Storage Component (for the 100 year storm event)
• storage in rooftops of approximately 84 cubic metres;
• storage in a swale and on surface ponding of approximately 220 cubic metres;

Flow Control
• roofdrains on the roof top (0.13 ha) of the existing buildings, restricting the release rate at 8 L/s at a maximum depth of 100 mm;
• roofdrains on the rooftop (0.13 ha) of the new buildings, restricting the release rate at 8 L/s at a maximum depth of 100 mm; and
• an 182 mm diameter orifice plate, rated at 63 L/s for a head of 0.83 m, discharging to the existing roadside ditch on Iber Road;

all in accordance with the application dated May 30, 2005 and received on June 14, 2005, and all supporting documentation and information including a design brief revised June 1, 2005, a design brief dated Stage I/1997, final plans and specifications prepared by Capital Engineering Group Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

(1) "*Certificate*" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

(2) "*Owner*" means BVS Holdings Ltd., and includes its successors and assignees; and

(3) "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. OPERATION AND MAINTENANCE

3.1 The *Owner* shall carry out and maintain an annual inspection and maintenance program on the operation of the stormwater management works in accordance with the manufacturer's recommendation.

3.2 After a two (2) year period, the District Manager of the MOE District Office may alter the frequency of inspection of the stormwater management works if he/she is requested to do so by the *Owner* and considers it acceptable upon review of information submitted in support of the request.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is imposed to ensure that the stormwater management works are operated and maintained without any adverse impact on the environment.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 3-1002-97-006 issued on August 26, 1997

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 5th day of August, 2005

Aziz Ahmed, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

NH/
c: District Manager, MOE Ottawa District Office
Andy Naoum, P.Eng., Capital Engineering Group Ltd.

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 3222-56PSBR

Gary's Radiator & Welding Ltd.
323 Coventry Road
Ottawa, Ontario
K1K 3X6

Site Location: Kingdom Auto Parts Warehouse
Lots 9 and 10, Registered Plan 4M-658
City of Ottawa

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

stormwater management system to serve the Kingdom Auto Parts Warehouse, in the City of Ottawa, consisting of the following:

POND A
stormwater management pond (known as Pond A) located adjacent to Iber Road, collecting up to 100-year storm event runoff from an area of 0.38 ha, having a total storage volume of 70 m^3, complete with overflow channel and outlet structure consisting of a 300 mm diameter CSP complete with a 104 mm diameter orifice plate allowing a maximum discharge of 16 L/s (100-year storm event) to the existing ditch along Iber Road and ultimately to Carp River and all other items necessary to have a complete and operable stormwater management system;

POND B
stormwater management pond (known as Pond B) located in the north-east corner of the site, collecting up to 100-year storm event runoff from an area of 0.97 ha, having a total storage volume of 150 m^3, complete with overflow channel and outlet structure consisting of a 300 mm diameter CSP complete with a 200 mm diameter orifice plate allowing a maximum discharge of 62 L/s (100-year storm event) to the existing ditch along the north side of the site and ultimately to Carp River and all other items necessary to have a complete and operable stormwater management system;

STORM SEWER
150 mm diameter storm sewer to serve the loading area, discharging to the existing ditch along the north side of the site and ultimately to Carp River;

all in accordance with the application dated December 13, 2001, including report entitled "Stormwater Management Report, Kingdom Auto Parts Proposed Warehouse, Iber Road, Ottawa, Ontario" dated February 1, 2001, Revised June 21, 2001, prepared by Simmering & Associates Ltd., Consulting Engineers.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Owner" means Gary's Radiator & Welding Ltd.;

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater works do not constitute a safety or health hazard to the general public.

2. The Owner shall ensure that sediment and excessive decaying vegetation are removed from the above noted stormwater

management system at such a frequency as to prevent the excessive buildup and potential overflow of sediment and/or decaying vegetation into the receiving watercourse.

3. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

4. Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed because it is not in the public interest for the Director to approve facilities which, by reason of potential health and safety hazards do not generally comply with legal standards or approval requirements falling outside the purview of this Ministry.

2. Condition 2 is included as regular removal of sediment and excessive decaying vegetation from this approved stormwater management system are required to mitigate the impact of sediment and/or decaying vegetation on the downstream receiving watercourse. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at all times as required by the design.

3. Conditions 3 and 4 are imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. These conditions are also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the**

Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 31st day of January, 2002

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KC/
c: District Manager, MOE Ottawa District Office
Douglas Kerr, E.I.T., Simmering & Associates Ltd.
R. L. Phillips, C.E.T., Program Manager-Ottawa West, City of Ottawa

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 4789-6KJJT3
Notice No. 1
Issue Date: March 12, 2008

154 Iber Road Corp.
204-880 Lady Ellen Pl NOTICE -2
Ottawa, Ontario
K1Z 5L9

Site Location: 164 Iber Road,
The City of Ottawa.

You are hereby notified that I have amended Certificate of Approval No. 4789-6KJJT3 issued on January 27, 2006 for the City of Ottawa, as follows:

- a new 200mm diameter storm sewer inlet to the existing Granite Park Stormwater Management Facility from Pond "B", to be constructed in the City of Ottawa;

all in accordance with the application from Iber Road Corp., dated September 7, 2007, including final plan sketch #1 dated February 12, 2008 and specifications prepared by Scott MacKichan, P.Eng., of Novatech Engineering Consultants Ltd.

This Notice shall constitute part of the approval issued under Certificate of Approval No. 4789-6KJJT3 dated January 27, 2006

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 12th day of March, 2008

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

MN/
c: District Manager, MOE Ottawa
Clerk, the City of Ottawa.
Scott Makichan, P.Eng, Novatech Engineering Consultants Ltd.

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 1916-5XEMBL

3843173 Canada Inc.
93 Hines Road, No. 1
Kanata, Ontario
K2K 2M5

Site Location: L-D Tool and Die
139 Iber Road, Lot 5, Part 4/5, Plan 4M-658
Ottawa City,

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of sewage works for the collection, transmission and disposal of stormwater runoff and to attenuate post-development peak flows to pre-development levels, for all storm events up to and including the 100-year return storm, consisting of the following:

- three (3) stormwater ponds with total ponding volume requirement of approximately 86 cubic metres for the 5-year return storm event and 154 cubic metres for the 100-year return storm event, two of the ponds being equipped with 200 millimetre diameter control discharge pipe and a 250 millimetre diameter control discharge pipe for the third pond;

all in accordance with the Application for Approval of Industrial Sewage Works dated January 7, 2004 and signed by David Tait, President of 3843173 Canada Inc. and all supporting information.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

"Ministry" means the Ontario Ministry of the Environment;

"Owner" means 3843173 Canada Inc. and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

(1) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

(2) Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between

the listed submitted documents, the document bearing the most recent date shall prevail.

2. OPERATION AND MAINTENANCE

(1) The Owner shall undertake an inspection of the condition of the stormwater management ponds, at least once a year, and undertake any necessary cleaning and maintenance to prevent the excessive buildup of sediment and/or decaying vegetation.

(2) The owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken and shall keep the logbook at the site for inspection by the Ministry.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. This condition is included to ensure that any buildup of sediment and/or decaying vegetation does not impair the performance of the stormwater management facility.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 14th day of April, 2004

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KD/
c: District Manager, MOE Ottawa
Neil S. Caldwell, Jp2g Consultants Inc.

Kizell Lands - Fernbank Community
Wet Pond Design Sheet
Project Number: 108195

NOVATECH
Engineers, Planners & Landscape Architects

Pond 1

Pond Inflow Summary

Drainage Areas

Drainage Area to North Forebay	17.41	ha
Drainage Area Imperviousness	73	%
Drainage Area to South Forebay	56.4	ha
Drainage Area Imperviousness	70	%
Total Pond Drainage Area	78.10	ha
Total Area Imperviousness	71.50	%

Refer to Drawing 108195-STM for drainage area delineation

Minor System Inflows

Table 1: Minor System Inflow Summary

Design Storm	Inflow (m^3/s)
15mm	-
25mm	6.372
2-year	7.688
5-year	10.292
10-year	11.163
100-year	13.732

Flows determined from the PCSWMM model

Kizell Lands - Fernbank Community
Wet Pond Design Sheet
Project Number: 108195

NOVATECH
Engineers, Planners & Landscape Architects

Pond 1

Water Quality Design

Water Quality Criteria

Required Treatment Level: **Normal (70%)** *Determined from CA. See correspondence.*

Table 3: Wet Pond Water Quality Requirements (m^3/ha)				
Protection Level	**Imperviousness (%)**			
	35	**55**	**70**	**85**
Enhanced (80%)	140	190	225	250
Normal (70%)	90	110	130	150
Basic (60%)	60	75	85	95

After Table 3.2 of the SWM Planning and Design Manual (MOE, 2003)

Total Minimum Treatment Volume	132	m^3/ha
Minimum Permanent Pool	7185	m^3
Minimum Extended Detention	6248	m^3

80m^3/ha as per MOE requirements for in

Sediment Loading

Maximum Sediment Accumulation Time: 10 years

Table 4: Annual Sediment Loading	
Imperviousness (%)	**Annual Loading (m^3/ha)**
35	0.6
55	1.9
70	2.8
85	3.8

After Table 6.3 of the SWM Planning and Design Manual (MOE, 2003)

North Forebay Sediment Load	36.561	m^3/year	*Taking into account removal efficiency*
	365.61	m^3	*Over the maximum accumulation time*
South Forebay Sediment Load	110.544	m^3/year	
	1105.44	m^3	

Target Water Quality Particle Size: 150 µm

Table 5: Settling Velocity	
Target Particle Size (µm)	**Average Settling Velocity (m/s)**
≤ 20	0.00000254
< 20 x ≤ 40	0.00001300
< 40 x ≤ 60	0.00002540
< 60 x ≤ 130	0.00012700
< 130 x ≤ 400	0.00059267
< 400 x ≤ 4000	0.00550333

After Table 3.3 of the SWM Planning and Design Manual (MOE, 2003)

Kizell Lands - Fernbank Community
Wet Pond Design Sheet
Project Number: 108195

NOVATECH
Engineers, Planners & Landscape Architects

Pond 1

North Forebay Design

Table 6: North Forebay Inflow Summary	
Design Storm	**Inflow (m^3/s)**
15mm	
25mm	1.686
2-year	2.206
5-year	2.814
10-year	3.120
100-year	3.491

Flows determined from the PCSWMM model

Settling Calculation: $Dist = \sqrt{\frac{rQ_P}{V_S}}$

Equation 4.5 of the SWM Planning and Design Manual (MOE, 2003)

Length to width ratio (r):	3.5	:1	
Settling Velocity (V_s):	0.000593	m/s	*Per Table 5*
Peak Water Quality Flow (Q_p)	1.686	m^3/s	*Per Section 3.5 of the SWMP Planning and Design Manual (MOE 1994)*
Dist (Forebay Length):	100	m	

Dispersion/Resuspension Calculation: $Dist = \frac{8Q}{dV_f}$

Equation 4.6 of the SWM Planning and Design Manual (MOE, 2003)

Forebay Velocity, V:	0.5	m/s	*Per Section 4.6.2 of the SWM Planning and Design Manual*
Forebay Depth, D:	1.5	m	*(MOE, 2003)*
Effective Depth, d:	1.04	m	*Forebay Depth - Sediment Accumulation*
Inlet Flow Rate, Q:	1.686	m^3/s	*(Water Quality event)*

Dist (Forebay Length):	17.9872	m
Forebay Length based on d:	26	m

Table 7: North Forebay Characteristics Summary			
Characteristic	**Minimum**	**Provided**	
Length (m)	100	75	
Bottom Width (m)	2.2	6.0	
Top Width (m)	29	15	
L:W Ratio (H:1V)	2	5.0	
Minimum Depth (m)	1.5	1.5	
Approx. Flow Area (m^2)	-	16	*Trapezoidal cross-section assumed*
Average Velocity (m/s)	-	0.11	*Must be less than 0.15m/s*
Approx. Volume (m^3)	-	1181	

Kizell Lands - Fernbank Community
Wet Pond Design Sheet
Project Number: 108195

NOVATECH
Engineers, Planners & Landscape Architects

Pond 1

South Forebay Design

Table 6b: South Forebay Inflow Summary	
Design Storm	**Inflow (m^3/s)**
15mm	
25mm	3.987
2-year	5.239
5-year	7.461
10-year	8.052
100-year	9.500

Flows determined from the PCSWMM model

Settling Calculation: $Dist = \sqrt{\frac{rQ_P}{V_S}}$

Equation 4.5 of the SWM Planning and Design Manual (MOE, 2003)

Length to width ratio (r):	4.5	:1	
Settling Velocity (V_s):	0.000593	m/s	*Per Table 5*
Peak Water Quality Flow (Q_p)	3.987	m^3/s	*Per Section 3.5 of the SWMP Planning and Design Manual (MOE 1994)*
Dist (Forebay Length):	174	m	

Dispersion/Resuspension Calculation: $Dist = \frac{8Q}{dV_f}$

Equation 4.6 of the SWM Planning and Design Manual (MOE, 2003)

Forebay Velocity, V:	0.5	m/s	*Per Section 4.6.2 of the SWM Planning and Design Manual (MOE, 2003)*
Forebay Depth, D:	1.5	m	
Effective Depth, d:	1.06	m	*Forebay Depth - Sediment Accumulation (Water Quality event)*
Inlet Flow Rate, Q:	3.987	m^3/s	

Dist (Forebay Length):	42.53067	m
Effective d Forebay Length:	60	m

Table 7b: South Forebay Characteristics Summary			
Characteristic	**Minimum**	**Provided**	
Length (m)	174	135	
Bottom Width (m)	5.3	14.0	
Top Width (m)	39	23	
L:W Ratio (H:1V)	2	5.9	
Minimum Depth (m)	1.5	1.5	
Approx. Flow Area (m^2)	-	28	*Trapezoidal cross-section assumed*
Average Velocity (m/s)	-	0.14	*Must be less than 0.15m/s*
Approx. Volume (m^3)	-	3746	

Kizell Lands - Fernbank Community
Wet Pond Design Sheet
Project Number: 108195

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Pond 1

Outlet Design

Extended Detention

Drawdown Time: $$t = \frac{2A_p}{CA_o(2g)^{0.5}}(h_1^{0.5} - h_2^{0.5})$$ *Equation 4.10 of the SWM Planning and Design Manual (MOE, 2003)*

Pond Surface Area (A_p):	12553	m^2	
Orifice Diameter:	220	mm	
Orifice Flow Area (A_0):	0.0380	m^2	
Orifice Coefficient (C):	0.61		*Per Section 8.3.8.1 of the OSDG.*
Extended Detention Depth (h):	0.35	m	

Drawdown Time (t)): 40.2 hours

Kizell Lands - Fernbank Community
Wet Pond Design Sheet
Project Number: 108195

NOVATECH
Engineers, Planners & Landscape Architects

Pond 1

Quantity Control

Table 8: Quantity Control Summary

Service Level	Elevation (m)	Stage (m)	Outflow (L/s)					
			ED	Struct. 1	Struct. 2	Struct. 3	Total	Target
NWL	97.65	0	0	0	0	0	0	0
Ex. Det	98.00	0.35	50	0	0	0	50	50
2-year	98.57	0.92	92	998	0	0	1090	1710
5-year	98.80	1.15	105	1673	0	0	1778	2670
100-year	99.40	1.75	132	3694	391	0	4217	4750
Overflow	99.70		143	4758	1231	2432	8564	

Extended Detention Orifice

C	0.61	
Diameter	220	mm
Area	0.0380	m^2
Invert	97.65	m
C/L	97.76	m

Q orifice = C x A x (2 x g x H)^0.5

Structure 1 (Rectangular Weir)

Weir Coefficeint (C)	1.84	
Bottom Width	1.55	m
Bottom of Weir Elevation	98.05	m

Q (m^3/s) = C x (L - 0.2H) x $H^{(3/2)}$

Structure 2 (Rectangular Weir)

Weir Coefficeint (C)	1.84	
Bottom Width	1.75	m
Bottom of Weir Elevation	99.15	m

Q (m^3/s) = C x (L - 0.2H) x $H^{(3/2)}$

Structure 3 (Broad-Crested Weir)

Weir Coefficeint (C)	1.48	
Bottom Width	10.0	m
Bottom of Weir Elevation	99.40	m

Q (m^3/s) = C x L x $H^{(3/2)}$

Kizell Lands - Fernbank Community
Wet Pond Design Sheet
Project Number: 108195

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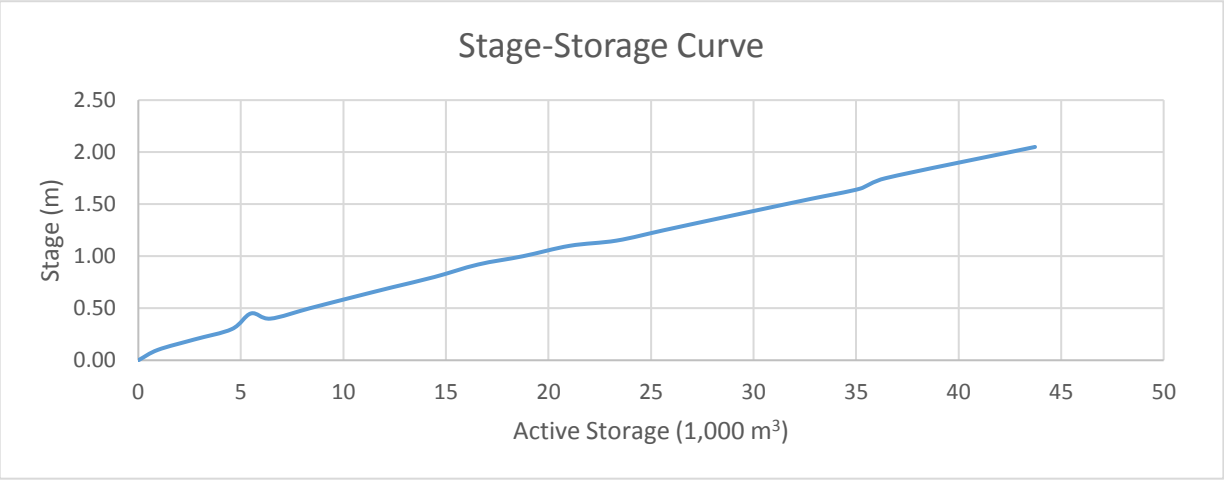
Engineers, Planners & Landscape Architects

Pond 1

Pond Design Summary

Stage-Storage-Discharge Table

Table 9: Stage-Storage-Discharge					
Service Level	**Elevation (m)**	**Stage (m)**	**Total Volume (m^3)**	**Active Volume (m^3)**	**Discharge (m^3/s)**
Bottom	96.15	-	0		
NWL	97.65	0.00	22298	0	0
	97.75	0.10	23254	956	0
	97.85	0.20	25037	2739	31
	97.95	0.30	26863	4565	45
Ex. Det.	98.10	0.45	27794	5496	92
	98.05	0.40	28736	6438	55
	98.15	0.50	30663	8365	153
	98.25	0.60	32637	10339	320
	98.35	0.70	34658	12360	529
	98.45	0.80	36736	14438	770
2-year	98.57	0.92	38863	16565	1090
	98.65	1.00	41057	18759	1320
	98.75	1.10	43332	21034	1622
5-year	98.80	1.15	45619	23321	1778
	98.90	1.25	47933	25635	2100
	99.00	1.35	50287	27989	2431
	99.10	1.45	52672	30374	2772
	99.20	1.55	55070	32772	3154
	99.30	1.65	57507	35209	3654
100-year	99.40	1.75	58737	36439	4217
Overflow	99.70	2.05	66025	43727	8564



Kizell Lands - Fernbank 5618 Hazeldean Road
Overall PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

27/02/2018
PREPARED BY: NOVATECH

Kizell Lands - Fernbank 5618 Hazeldean Road
Overall PCSWMM Model Schematic Interim Conditions

NOVATECH
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27/02/2018
PREPARED BY: NOVATECH

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Kizell Lands - Fernbank 5618 Hazeldean Road
Overall PCSWMM Model Schematic Ultimate Conditions

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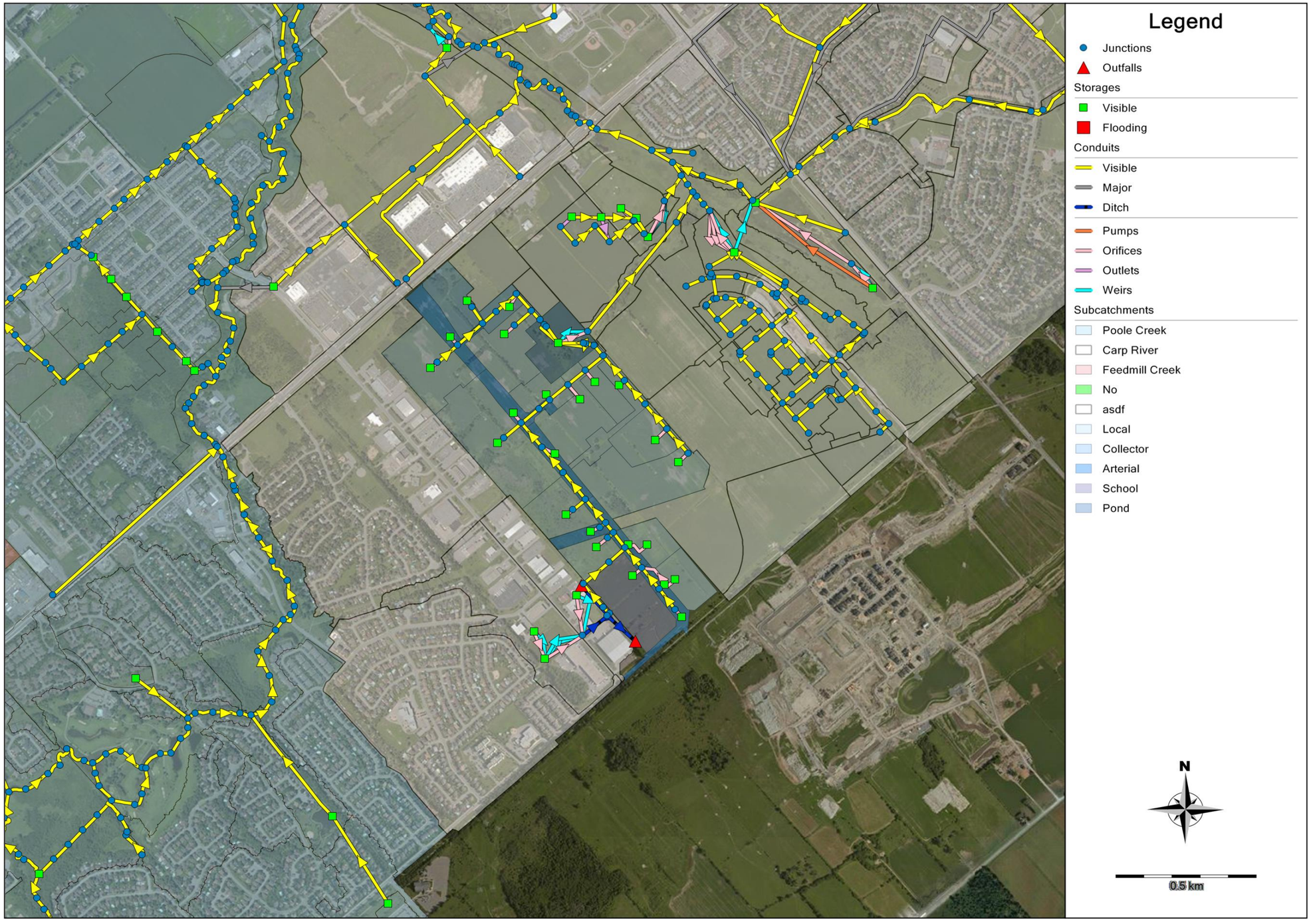

Fernbank Community - Kizell Lands
HGL Elevations

NOVATECH
Engineers, Planners & Landscape Architects

Manhole ID	MH Invert Elevation (m)	T/G Elevation (m)	Outlet pipe invert (m)	Outlet Pipe Diameter (m)	Outlet Pipe Obvert (m)	HGL Elevation (MTO SCS) (m)	WL Above Obvert (MTO SCS) (m)	HGL Elevation (Chicago) (m)	WL Above Obvert (Chicago) (m)
P1-101 (STM)	97.65	100.80	97.65	1829.00	99.48	99.48	0.00	99.35	-0.13
P1-103 (STM)	97.70	100.83	97.74	1829.00	99.57	99.80	0.23	99.72	0.15
P1-105 (STM)	97.78	101.51	98.08	1524.00	99.60	99.96	0.36	99.89	0.29
P1-107 (STM)	98.35	101.67	98.20	1524.00	99.72	100.06	0.34	100.01	0.29
P1-109 (STM)	98.46	101.84	98.31	1524.00	99.83	100.12	0.29	100.09	0.26
P1-111 (STM)	98.79	102.06	98.79	1210.00	100.00	100.33	0.33	100.33	0.33
P1-113 (STM)	99.17	102.30	99.17	1067.00	100.24	100.58	0.34	100.59	0.35
P1-147 (STM)	97.98	101.82	97.93	1956.00	99.89	100.21	0.32	100.16	0.27
P1-153 (STM)	98.10	102.12	98.01	1956.00	99.97	100.34	0.37	100.26	0.29
P1-165 (STM)	98.23	102.43	98.10	1956.00	100.06	100.45	0.39	100.35	0.29
P1-169 (STM)	98.31	102.61	98.15	1956.00	100.11	100.52	0.41	100.41	0.30
P1-171 (STM)	98.44	102.51	98.29	1956.00	100.25	100.61	0.36	100.50	0.25
P1-173 (STM)	99.43	103.07	98.97	1524.00	100.49	100.66	0.17	100.57	0.08
P1-203 (STM)	98.67	103.15	98.67	1829.00	100.50	100.94	0.44	100.82	0.32
P1-205 (STM)	98.91	103.66	98.91	1829.00	100.74	101.09	0.35	100.99	0.25
P1-207 (STM)	99.16	103.17	99.16	1829.00	100.99	101.29	0.30	101.16	0.17
P1-209 (STM)	100.43	103.50	100.43	762.00	101.19	101.53	0.34	101.40	0.21
P1-215 (STM)	99.59	102.78	99.59	1676.00	101.27	101.51	0.24	101.32	0.05
P1-215a (STM)	101.06	103.39	101.06	457.00	101.52	101.91	0.39	101.64	0.12
P1-217 (STM)	99.89	103.31	99.89	1676.00	101.57	101.77	0.20	101.52	-0.05
P1-219 (STM)	100.64	103.45	100.64	1210.00	101.85	101.91	0.06	101.71	-0.14
P1-221 (STM)	100.69	102.42	100.69	762.00	101.45	101.71	0.26	101.51	0.06
P1-221a(STM)	99.72	102.75	99.72	1676.00	101.40	101.64	0.24	101.42	0.02
P1-301 (STM)	97.70	101.25	97.70	1340.00	99.04	99.39	0.35	99.19	0.15
P1-303 (STM)	97.73	101.29	97.73	1340.00	99.07	99.39	0.32	99.19	0.12
P1-305 (STM)	97.79	101.36	97.79	1340.00	99.13	99.40	0.27	99.25	0.12
P1-307 (STM)	98.48	101.56	98.48	838.00	99.32	99.65	0.33	99.56	0.24
P1-317 (STM)	97.91	101.44	97.91	1372.00	99.28	99.42	0.14	99.36	0.08
P1-319 (STM)	98.12	101.57	98.12	1372.00	99.49	99.83	0.34	99.83	0.34
P1-321 (STM)	98.22	101.65	98.22	1372.00	99.59	100.02	0.43	100.02	0.43
P1-323 (STM)	98.89	101.72	98.89	838.00	99.73	100.27	0.54	100.30	0.57

Fernbank Community - Kizell Lands
HGL Elevations

NOVATECH
Engineers, Planners & Landscape Architects

Manhole ID	MH Invert Elevation (m)	T/G Elevation (m)	Outlet pipe invert (m)	Outlet Pipe Diameter (m)	Outlet Pipe Obvert (m)	HGL Elevation (MTO SCS) (m)	WL Above Obvert (MTO SCS) (m)	HGL Elevation (Chicago) (m)	WL Above Obvert (Chicago) (m)
P1-327 (STM)	98.82	102.05	98.82	1067.00	99.89	100.16	0.27	100.18	0.29
P1-337 (STM)	99.34	102.84	99.34	838.00	100.18	100.54	0.36	100.57	0.39
P1-349 (STM)	101.62	103.80	101.62	610.00	102.23	102.25	0.02	102.28	0.05
P1-351 (STM)	101.35	103.76	101.35	762.00	102.11	101.95	-0.16	101.98	-0.13
P1-EX. 501 (STM)	101.18	104.04	101.18	1372.00	102.55	102.69	0.14	102.44	-0.11
P1-EX. 502 (STM)	101.12	103.98	101.12	1372.00	102.49	102.58	0.09	102.36	-0.13
P1-EX. 503 (STM)	100.87	103.75	100.87	1372.00	102.24	102.18	-0.06	102.00	-0.24
P1-EX. 504 (STM)	100.63	103.49	100.63	1372.00	102.00	101.95	-0.05	101.80	-0.20

```
00001> 2
00002> *%=============================================================================|
00003> *%
00004> *%   #####       INPUT FILE FOR CARP RIVER, CITY OF KANATA        #####
00005> *%   #####  FERNBANK CDP: POST-DEVELOPMENT CONDITIONS - MAY 2009  #####
00006> *%   #####       EVENT BASED MODELING (5 MINUTE TIMESTEP)         #####
00007> *%
00008> *%
00009> *%   REFERENCE DRAINAGE AREA PLANS:
00010> *%   -----------------------------
00011> *%   FIGURE 8.1
00012> *%
00013> *%=============================================================================|
00014> *                            EVENT BASED SIMULATION
00015> *%=============================================================================|
00016> START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
00017>                     C25mm-3.stm
00018> *
00019> READ STORM          STORM_FILENAME=["storm.001"]
00020> *%=============================================================================|
00021> DEFAULT VALUES      ICASEdef=[1],  read and print values
00022>                     DEFVAL_FILENAME=["ottawa.def"]
00023> *
00024> COMPUTE API         APII=[20], APIK=[0.9]/day
00025> ****************************************************************************
00026> *% LANDS UPSTREAM OF FERNBANK COMMUNITY (GRANITE RIDGE)
00027> *% ------------------------------------------------
00028> READ HYD            ID=[9],  NHYD=["101-3"],
00029>                     HYD_FILENAME=["H-101-3"]
00030> *%-----------------|-----------------------------------------------------------|
00031> *% FERNBANK COMMUNITY LANDS TO CARP RIVER TRIBUTARY
00032> *% (GLEN CAIRN SWMF OUTLET CHANNEL)
00033> *% ------------------------------------------------
00034> * HEADWATER P1
00035> **************
00036> CONTINUOUS STANDHYD ID=[1], NHYD=["P1"], DT=[5](min), AREA=[77.13](ha),
00037>                     XIMP=[0.45], TIMP=[0.70], DWF=[0](cms), LOSS=[2],
00038>                     SCS curve number CN=[80.5],
00039>                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
00040>                                          LGP=[40](m), MNP=[0.20], SCP=[0](min),
00041>                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
00042>                                          LGI=[1400](m), MNI=[0.013], SCI=[0](min
00043>                     Continuous simulation parameters:
00044>                     IaRECper=[4](hrs),  IaRECimp=[2](hrs),
00045>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00046>                     InterEventTime=[12](hrs),   END=-1
00047> *
00048> COMPUTE DUALHYD     IDin=[1], CINLET=[7.71](cms), NINLET=[1],
00049>                     MAJID=[2], MajNHYD=["P1maj"],
00050>                     MINID=[3], MinNHYD=["P1min"],
00051>                     TMJSTO=[3857](cu-m)
00052> *
00053> CONTINUOUS NASHYD   ID=[4], NHYD=["SWM1"] DT=[5]min, AREA=[4.50](ha),
00054>                     DWF= 0  CN= 90  IA= 9.8  N=2  TP=0.25
00055>                     Continuous simulation parameters:
00056>                     IaRECper=[4](hrs),
00057>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00058>                     InterEventTime=[12](hrs)
00059>                     Baseflow simulation parameters:
00060>                     BaseFlowOption=[1] ,
00061>                     InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
00062>                     VHydCond=[10](mm/hr),   END=-1
00063> *
00064> ADD HYD             IDsum=[1], NHYD=["P1in"], IDs to add=[2,3,4,9]
00065> *
00066> ROUTE RESERVOIR     IDout=[2],   NHYD=["P1out"],  IDin=[1],
00067>                     RDT=[5](min),
00068>                           TABLE of ( OUTFLOW-STORAGE ) values
00069>                                      (cms) -  (ha-m)
00070>                                    [  0.000 , 0.000 ]
00071>                                    [  0.050 , 0.499 ]
00072>                                    [  1.500 , 2.030 ]
00073>                                    [  2.500 , 2.810 ]
00074>                                    [  4.500 , 2.920 ]
00075>                                    [  4.800 , 3.500 ]
00076>                                    [  5.000 , 3.930 ]
00077>                                    [  5.300 , 4.500 ]
00078>                                    [    -1  ,   -1  ]   (max twenty pts)
00079> *
00080> CONTINUOUS NASHYD   ID=[3], NHYD=["CRTRIB"] DT=[5]min, AREA=[3.69](ha),
00081>                     DWF= 0  CN= 82  IA= 9.8  N=2  TP=0.25
00082>                     Continuous simulation parameters:
00083>                     IaRECper=[4](hrs),
00084>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00085>                     InterEventTime=[12](hrs)
00086>                     Baseflow simulation parameters:
00087>                     BaseFlowOption=[1] ,
00088>                     InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
00089>                     VHydCond=[10](mm/hr),   END=-1
00090> *
00091> * CARP RIVER TRIBUTARY AT CARP RIVER
00092> * ---------------------------------
00093> ADD HYD             IDsum=[9], NHYD=["1012NC"], IDs to add=[1,3]
00094> *
00095> ADD HYD             IDsum=[9], NHYD=["101-2"], IDs to add=[2,3]
00096> *
00097> SAVE HYD            ID=[9],   # OF PCYCLES=[1],  ICASEsh=[1]
00098>                     HYD_COMMENT=["Carp Tributary @ Carp River - XP2054"]
00099> *%-----------------|-----------------------------------------------------------|
00100> * FERNBANK COMMUNITY LANDS TO SOUTH TRIBUTARY
00101> * (CHANNEL FLOWING NORTH ADJACENT TO GLEN CAIRN POND)
00102> * -------------------------------------------------
00103> * SOUTH POND P3
00104> * 10yr control
00105> **************
00106> CONTINUOUS STANDHYD ID=[1], NHYD=["P3"], DT=[5](min), AREA=[91.68](ha),
00107>                     XIMP=[0.34], TIMP=[0.43], DWF=[0](cms), LOSS=[2],
00108>                     SCS curve number CN=[80.5],
00109>                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
00110>                                          LGP=[40](m), MNP=[0.20], SCP=[0](min),
00111>                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
00112>                                          LGI=[1400](m), MNI=[0.013], SCI=[0](min
00113>                     Continuous simulation parameters:
00114>                     IaRECper=[4](hrs),  IaRECimp=[2](hrs),
00115>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00116>                     InterEventTime=[12](hrs),   END=-1
00117> *
00118> COMPUTE DUALHYD     IDin=[1], CINLET=[9.17](cms), NINLET=[1],
00119>                     MAJID=[2], MajNHYD=["P3maj"],
00120>                     MINID=[3], MinNHYD=["P3min"],
00121>                     TMJSTO=[4584](cu-m)
00122> *
00123> CONTINUOUS NASHYD   ID=[4], NHYD=["SWM3"] DT=[5]min, AREA=[2.60](ha),
00124>                     DWF= 0  CN= 82  IA= 9.8  N=2  TP=0.25
00125>                     Continuous simulation parameters:
00126>                     IaRECper=[4](hrs),
00127>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00128>                     InterEventTime=[12](hrs)
00129>                     Baseflow simulation parameters:
00130>                     BaseFlowOption=[1] ,
00131>                     InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
00132>                     VHydCond=[10](mm/hr),   END=-1
00133> *
00134> ADD HYD             IDsum=[1], NHYD=["P3in"], IDs to add=[2,3,4]
00135> *
00136> ROUTE RESERVOIR     IDout=[2],   NHYD=["P3out"],  IDin=[1],
00137>                     RDT=[5](min),
00138>                           TABLE of ( OUTFLOW-STORAGE ) values
00139>                                      (cms) - (ha-m)
00140>                                    [  0.000 , 0.000 ]
00141>                                    [  0.050 , 0.427 ]
00142>                                    [  0.300 , 1.568 ]
00143>                                    [  0.800 , 2.120 ]
00144>                                    [  1.750 , 2.905 ]
00145>                                    [    -1  ,   -1  ]  (max twenty pts)
00146>                           IDovf=[3], NHYDovf=["P3OVF"]
00147> *
00148> * SOUTH POND (P3) AT CARP RIVER
00149> * ----------------------------
00150> ADD HYD             IDsum=[8], NHYD=["500"], IDs to add=[2,3]
00151> *
00152> SAVE HYD            ID=[8],   # OF PCYCLES=[1],  ICASEsh=[1]
00153>                     HYD_COMMENT=["South Pond @ Carp River"]
00154> *%-----------------|-----------------------------------------------------------|
00155> * HEC-RAS inflow hydrograph @ 44751
00156> * NODE 2054
00157> * ------------------------------------
00158> *
00159> ADD HYD             IDsum=[10], NHYD=["2054"], IDs to add=[8,9]
00160> *
00161> SAVE HYD            ID=[10],   # OF PCYCLES=[1],  ICASEsh=[1]
00162>                     HYD_COMMENT=["HEC-RAS Inflow Node 2054 / Station 44751"]
00163> *%-----------------|-----------------------------------------------------------|
00164> *% LAND DRAINING TO CARP RIVER @ HAZELDEAN RD (Section 44548)
00165> *% (28/35/36)
00166> *% ---------------------------------------------------------------------
00167> * NORTH POND P2
00168> * 10yr control
00169> **************
00170> CONTINUOUS STANDHYD ID=[1], NHYD=["P2"], DT=[5](min), AREA=[23.14](ha),
00171>                     XIMP=[0.47], TIMP=[0.59], DWF=[0](cms), LOSS=[2],
00172>                     SCS curve number CN=[80.5],
00173>                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
00174>                                          LGP=[40](m), MNP=[0.20], SCP=[0](min),
00175>                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
00176>                                          LGI=[1400](m), MNI=[0.013], SCI=[0](min
00177>                     Continuous simulation parameters:
00178>                     IaRECper=[4](hrs),  IaRECimp=[2](hrs),
00179>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00180>                     InterEventTime=[12](hrs),   END=-1
00181> *
00182> COMPUTE DUALHYD     IDin=[1], CINLET=[2.31](cms), NINLET=[1],
00183>                     MAJID=[2], MajNHYD=["P2maj"],
00184>                     MINID=[3], MinNHYD=["P2min"],
00185>                     TMJSTO=[1157](cu-m)
00186> *
00187> CONTINUOUS NASHYD   ID=[4], NHYD=["SWM2"] DT=[5]min, AREA=[0.99](ha),
00188>                     DWF= 0  CN= 90  IA= 9.8  N=2  TP=0.25
00189>                     Continuous simulation parameters:
00190>                     IaRECper=[4](hrs),
00191>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00192>                     InterEventTime=[12](hrs)
00193>                     Baseflow simulation parameters:
00194>                     BaseFlowOption=[1] ,
00195>                     InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
00196>                     VHydCond=[10](mm/hr),   END=-1
00197> *
00198> ADD HYD             IDsum=[1], NHYD=["P2in"], IDs to add=[2,3,4]
00199> *%-----------------|-----------------------------------------------------------|
00200> ROUTE RESERVOIR     IDout=[2],   NHYD=["P2out"],  IDin=[1],
00201>                     RDT=[5](min),
00202>                           TABLE of ( OUTFLOW-STORAGE ) values
00203>                                      (cms) - (ha-m)
00204>                                    [  0.000 , 0.000 ]
00205>                                    [  0.030 , 0.130 ]
00206>                                    [  0.150 , 0.277 ]
00207>                                    [  0.350 , 0.441 ]
00208>                                    [  0.700 , 0.675 ]
00209>                                    [    -1  ,   -1  ]  (max twenty pts)
00210>                           IDovf=[3], NHYDovf=["P2OVF"]
00211> * -------------------------------------------------
00212> ADD HYD             IDsum=[6], NHYD=["PND2"], IDs to add=[2,3]
00213> *
00214> * NORTH POND (P2) AT CARP RIVER
00215> *
00216> SAVE HYD            ID=[6],   # OF PCYCLES=[1],  ICASEsh=[1]
00217>                     HYD_COMMENT=["POND2-outflow/overflow"]
00218>
00219> *
00220> CONTINUOUS NASHYD   ID=[4], NHYD=["CRFP"] DT=[5]min, AREA=[24.18](ha),
00221>                     DWF= 0  CN= 82  IA= 9.8  N=2  TP=0.50
00222>                     Continuous simulation parameters:
00223>                     IaRECper=[4](hrs),
00224>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00225>                     InterEventTime=[12](hrs)
00226>                     Baseflow simulation parameters:
00227>                     BaseFlowOption=[1] ,
00228>                     InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
00229>                     VHydCond=[10](mm/hr),   END=-1
00230> *
00231> CONTINUOUS STANDHYD ID=[5], NHYD=["28"], DT=[5](min), AREA=[12.5](ha),
00232>                     XIMP=[0.38], TIMP=[0.45], DWF=[0](cms), LOSS=[1],
00233>                     Horton: Fo=[76.2](mm/hr), Fc=[13.2](mm/hr),
00234>                     DCAY=[4](/hr), F=[0](mm),
00235>                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
00236>                     LGP=[205](m), MNP=[0.10], SCP=[0](min),
00237>                     Impervious surfaces:IAimp=[1.57](mm), SLPI=[1.0](%),
00238>                                          LGI=[700](m), MNI=[0.013], SCI=[0](min),
00239>                     Continuous simulation parameters:
00240>                     IaRECper=[4](hrs),  IaRECimp=[2](hrs),
00241>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00242>                     InterEventTime=[12](hrs),   END=-1
00243>
00244> *
00245>
00246> * HEC-RAS inflow hydrograph @ 44548
00247> * NODE 2065
00248> * (INCLUDES 24.18 HA OF CARP RIVER FLOODPLAIN)
00249> * (INCLUDES 12.50 HA OF WEST CREEK MEADOWS)
00250> * ----------------------------------------
00251> ADD HYD             IDsum=[7], NHYD=["2065"], IDs to add=[4,5,6]
00252> *
00253> SAVE HYD            ID=[7],   # OF PCYCLES=[1],  ICASEsh=[1]
00254>                     HYD_COMMENT=["HEC-RAS Inflow Node 2065 / Station 44548"]
00255> *%-----------------|-----------------------------------------------------------|
00256> *% LANDS UPSTREAM OF HAZELDEAN ROAD TRIBUTARY TO HAZELDEAN CREEK
00257> *% (INCLUDES NORTHWEST CORNER OF FERNBANK CDP LANDS)
00258> *% ---------------------------------------------------------------------
00259> CONTINUOUS STANDHYD ID=[5], NHYD=["100-1"], DT=[5](min), AREA=[61.17](ha),
00260>                     XIMP=[0.38], TIMP=[0.45], DWF=[0](cms), LOSS=[1],
00261>                     Horton: Fo=[76.2](mm/hr), Fc=[13.2](mm/hr),
00262>                     DCAY=[4](/hr), F=[0](mm),
00263>                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.8](%),
00264>                     LGP=[1200](m), MNP=[0.10], SCP=[0](min),
00265>                     Impervious surfaces:IAimp=[1.57](mm), SLPI=[0.8](%),
00266>                                          LGI=[1700](m), MNI=[0.013], SCI=[0](min)
00267>                     Continuous simulation parameters:
00268>                     IaRECper=[4](hrs),  IaRECimp=[2](hrs),
00269>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00270>                     InterEventTime=[12](hrs),   END=-1
```

```
00271> *%-----------------|------------------------------------------------------------|
00272> *% LANDS NORTH OF HAZELDEAN ROAD - TO HAZELDEAN CREEK
00273> *% (USED IN MODEL CALIBRATION)
00274> *% ---------------------------------------------------
00275> CONTINUOUS NASHYD   ID=[6], NHYD=["102-1"], DT=[5]min, AREA=[39.8](ha),
00276>                     DWF=[0](cms),  CN/C=[78], IA=[9.8](mm),
00277>                     N=[2], TP=[1.10]hrs
00278>                     Continuous simulation parameters:
00279>                     IaRECper=[4](hrs),
00280>                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
00281>                     InterEventTime=[12](hrs)
00282>                     Baseflow simulation parameters:
00283>                     BaseFlowOption=[1] ,
00284>                     InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
00285>                     VHydCond=[10](mm/hr),   END=-1
00286> *%-----------------|------------------------------------------------------------|
00287> * HEC-RAS inflow hydrograph @ 43966
00288> * (Hazeldean Creek @ Carp River)
00289> * --------------------------------
00290> ADD HYD             IDsum=[10], NHYD=["3894"], IDs to add=[5,6]
00291> *
00292> SAVE HYD            ID=[10],   # OF PCYCLES=[1],  ICASEsh=[1]
00293>                     HYD_COMMENT=["HEC-RAS Inflow Node 3894 / Station 43966"]
00294> *%-----------------|------------------------------------------------------------|
00295> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
00296> *                    S2-24.stm
00297> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
00298> *                    S5-24.stm
00299> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
00300> *                    S10-24.stm
00301> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
00302> *                    S25-24.stm
00303> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
00304> *                    S50-24.stm
00305> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
00306> *                    S100-24.stm
00307> *%-----------------|------------------------------------------------------------|
00308> START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[8]
00309>                     S2-12.stm
00310> START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[9]
00311>                     S5-12.stm
00312> START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[10]
00313>                     S10-12.stm
00314> START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[11]
00315>                     S25-12.stm
00316> START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[12]
00317>                     S50-12.stm
00318> START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[13]
00319>                     S100-12.stm
00320> *%-----------------|------------------------------------------------------------|
00321> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[14]
00322> *                    C2-3.stm
00323> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[15]
00324> *                    C5-3.stm
00325> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[16]
00326> *                    C10-3.stm
00327> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[17]
00328> *                    C25-3.stm
00329> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[18]
00330> *                    C50-3.stm
00331> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[19]
00332> *                    C100-3.stm
00333> *%-----------------|------------------------------------------------------------|
00334> *START              TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[20]
00335> *                    C25mm-3.stm
00336> *%-----------------|------------------------------------------------------------|
00337> FINISH
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```

```
00001> ================================================================================
00002>
00003>   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
00004>   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
00006>       S  W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
00007>   SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9   =========
00008>                                                          9   9  9   9   # 5320763
00009>         StormWater Management HYdrologic Model           999    999    =========
00010>
00011> ********************************************************************************
00012> ***************************** SWMHYMO Ver/4.05  ********************************
00013> *********  A single event and continuous hydrologic simulation model  *********
00014> *********     based on the principles of HYMO and its successors      *********
00015> *********                    OTTHYMO-83 and OTTHYMO-89.                *********
00016> ********************************************************************************
00017> ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
00018> *********                  Ottawa,  Ontario: (613) 836-3884           *********
00019> *********                  Gatineau, Quebec: (819) 243-6858           *********
00020> *********                  E-Mail: swmhymo@jfsa.com                   *********
00021> ********************************************************************************
00022>
00023> +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024> +++++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD         +++++++++
00025> +++++++++                 Nepean               SERIAL#:5320763       +++++++++
00026> +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028> ********************************************************************************
00029> *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
00030> *********           Maximum value for ID numbers  :     10            *********
00031> *********           Max. number of rainfall points:  105408           *********
00032> *********           Max. number of flow points    :  105408           *********
00033> ********************************************************************************
00034>
00035> ***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) *****
00036> *****-------------------------------------------------------------------*****
00037> *****    ID:  Hydrograph IDentification numbers, (1-10).                *****
00038> *****  NHYD:  Hydrograph reference numbers, (6 digits or characters).    *****
00039> *****  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).  *****
00040> ***** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).    *****
00041> ***** TpeakDate_hh:mm is the date and time of the peak flow.              *****
00042> *****  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).       *****
00043> *****  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).       *****
00044> *****    *:  see WARNING or NOTE message printed at end of run.          *****
00045> *****   **:  see  ERROR  message printed at end of run.                  *****
00046> ********************************************************************************
00047> ********************************************************************************
00048>
00049> ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
00050>
00051> ********************************************************************************
00052>
00053> **********************   S U M M A R Y   O U T P U T   **********************
00054> ********************************************************************************
00055> *          DATE: 2017-07-14     TIME: 10:13:41     RUN COUNTER: 000742        *
00056> ********************************************************************************
00057> * Input   filename: M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\CR-DCe.dat  *
00058> * Output  filename: M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\CR-DCe.out  *
00059> * Summary filename: M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\CR-DCe.sum  *
00060> * User comments:                                                            *
00061> * 1:_____________________________________________________________________*
00062> * 2:_____________________________________________________________________*
00063> * 3:_____________________________________________________________________*
00064> ********************************************************************************
00065>
00066>
00067>  RUN:COMMAND#
00068>  001:0001----------------------------------------------------------------------
00069>      START
00070>       [TZERO =    .00 hrs on        0]
00071>       [METOUT=   2    (1=imperial, 2=metric output)]
00072>       [NSTORM=   1 ]
00073>       [NRUN  =   1 ]
00074>  001:0002----------------------------------------------------------------------
00075>      READ STORM
00076>       Filename = storm.001
00077>       Comment  =
00078>       [SDT=10.00:SDUR=   3.00:PTOT=  25.00]
00079>  001:0003----------------------------------------------------------------------
00080>      DEFAULT VALUES
00081>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
00082>       ICASEdv  = 1 (read and print data)
00083>       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
00084>                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
00085>       Horton's infiltration equation parameters:
00086>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
00087>       Parameters for PERVIOUS surfaces in STANDHYD:
00088>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00089>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00090>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00091>       Parameters used in NASHYD:
00092>       [Ia=   4.67 mm] [N= 2.00]
00093>  001:0004----------------------------------------------------------------------
00094>      COMPUTE API
00095>       [APIini= 20.00: APIkdy= .9000: APIkdt= .9993]
00096>       {APImax= 44.55: APIavg= 33.46: APImin= 20.35}
00097>  001:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00098>      READ HYD            09:101-3         69.53     .605 No_date    2:30   14.68
00099>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.001
00100>       Comment  = GRANITE RIDGE AREA 101-3
00101>  001:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00102>      CONTINUOUS STANDHYD01:P1             77.13    3.058 No_date    1:30   18.08
00103>       [XIMP=.45:TIMP=.70]
00104>       [LOSS= 2 :CN= 80.5]
00105>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00106>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00107>       [IaRECimp=   2.00: IaRECper=   4.00]
00108>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
00109>  001:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00110>      COMPUTE DUALHYD    01:P1             77.13    3.058 No_date    1:30   18.08
00111>         Major System /  02:P1maj           .00     .000 No_date    0:00     .00
00112>         Minor System \  03:P1min          77.13    3.058 No_date    1:30   18.08
00113>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00114>  001:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00115>      CONTINUOUS NASHYD  04:SWM1           4.50     .079 No_date    1:35    8.24
00116>       [CN= 90.0: N= 2.00]
00117>       [Tp=  .25:DT= 5.00]
00118>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00119>       [InterEventTime=  12.00]
00120>  001:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00121>      ADD HYD             02:P1maj           .00     .000 No_date    0:00     .00
00122>                        +  03:P1min          77.13    3.058 No_date    1:30   18.08
00123>                        +  04:SWM1            4.50     .079 No_date    1:35    8.24
00124>                        +  09:101-3          69.53     .605 No_date    2:30   14.68
00125>       [DT= 5.00]  SUM=  01:P1in          151.16    3.541 No_date    1:35   16.22
00126>  001:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00127>      ROUTE RESERVOIR -> 01:P1in          151.16    3.541 No_date    1:35   16.22
00128>       [RDT= 5.00] out<- 02:P1out         151.16     .869 No_date    3:30   16.22
00129>      {MxStoUsed=.1364E+01}
00130>  001:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00131>      CONTINUOUS NASHYD  03:CRTRIB          3.69     .045 No_date    1:35    5.93
00132>       [CN= 82.0: N= 2.00]
00133>       [Tp=  .25:DT= 5.00]
00134>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00135>       [InterEventTime=  12.00]
00136>  001:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00137>      ADD HYD             01:P1in          151.16    3.541 No_date    1:35   16.22
00138>                        +  03:CRTRIB         3.69     .045 No_date    1:35    5.93
00139>       [DT= 5.00]  SUM=  09:1012NC         154.85    3.586 No_date    1:35   15.98
00140>  001:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00141>      ADD HYD             02:P1out         151.16     .869 No_date    3:30   16.22
00142>                        +  03:CRTRIB         3.69     .045 No_date    1:35    5.93
00143>       [DT= 5.00]  SUM=  09:101-2          154.85    .875 No_date    3:25   15.98
00144>  001:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00145>      SAVE HYD            09:101-2         154.85    .875 No_date    3:25   15.98
00146>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-2.001
00147>       remark:Carp Tributary @ Carp River - XP2054
00148>  001:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00149>      CONTINUOUS STANDHYD01:P3              91.68    2.593 No_date    1:30   14.61
00150>       [XIMP=.34:TIMP=.43]
00151>       [LOSS= 2 :CN= 80.5]
00152>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00153>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00154>       [IaRECimp=   2.00: IaRECper=   4.00]
00155>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
00156>  001:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00157>      COMPUTE DUALHYD    01:P3             91.68    2.593 No_date    1:30   14.61
00158>         Major System /  02:P3maj           .00     .000 No_date    0:00     .00
00159>         Minor System \  03:P3min          91.68    2.593 No_date    1:30   14.61
00160>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00161>  001:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00162>      CONTINUOUS NASHYD  04:SWM3           2.60     .031 No_date    1:35    5.93
00163>       [CN= 82.0: N= 2.00]
00164>       [Tp=  .25:DT= 5.00]
00165>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00166>       [InterEventTime=  12.00]
00167>  001:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00168>      ADD HYD             02:P3maj           .00     .000 No_date    0:00     .00
00169>                        +  03:P3min          91.68    2.593 No_date    1:30   14.61
00170>                        +  04:SWM3            2.60     .031 No_date    1:35    5.93
00171>       [DT= 5.00]  SUM=  01:P3in          94.28    2.623 No_date    1:30   14.37
00172>  001:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00173>      ROUTE RESERVOIR -> 01:P3in          94.28    2.623 No_date    1:30   14.37
00174>       [RDT= 5.00] out<- 02:P3out         94.28     .212 No_date    3:55   14.37
00175>                 overflow <= 03:P3OVF       .00     .000 No_date    0:00     .00
00176>      {MxStoUsed=.1168E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00177>  001:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00178>      ADD HYD             02:P3out         94.28     .212 No_date    3:55   14.37
00179>                        +  03:P3OVF          .00     .000 No_date    0:00     .00
00180>       [DT= 5.00]  SUM=  08:500           94.28     .212 No_date    3:55   14.37
00181>  001:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00182>      SAVE HYD            08:500           94.28     .212 No_date    3:55   14.37
00183>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-500.001
00184>       remark:South Pond @ Carp River
00185>  001:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00186>      ADD HYD             08:500           94.28     .212 No_date    3:55   14.37
00187>                        +  09:101-2         154.85     .875 No_date    3:25   15.98
00188>       [DT= 5.00]  SUM=  10:2054          249.13    1.084 No_date    3:30   15.37
00189>  001:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00190>      SAVE HYD            10:2054          249.13    1.084 No_date    3:30   15.37
00191>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2054.001
00192>       remark:HEC-RAS Inflow Node 2054 / Station 44751
00193>  001:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00194>      CONTINUOUS STANDHYD01:P2              23.14     .834 No_date    1:30   16.82
00195>       [XIMP=.47:TIMP=.59]
00196>       [LOSS= 2 :CN= 80.5]
00197>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00198>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00199>       [IaRECimp=   2.00: IaRECper=   4.00]
00200>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
00201>  001:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00202>      COMPUTE DUALHYD    01:P2             23.14     .834 No_date    1:30   16.82
00203>         Major System /  02:P2maj           .00     .000 No_date    0:00     .00
00204>         Minor System \  03:P2min          23.14     .834 No_date    1:30   16.82
00205>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00206>  001:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00207>      CONTINUOUS NASHYD  04:SWM2            .99     .017 No_date    1:35    8.24
00208>       [CN= 90.0: N= 2.00]
00209>       [Tp=  .25:DT= 5.00]
00210>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00211>       [InterEventTime=  12.00]
00212>  001:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00213>      ADD HYD             02:P2maj           .00     .000 No_date    0:00     .00
00214>                        +  03:P2min          23.14     .834 No_date    1:30   16.82
00215>                        +  04:SWM2            .99     .017 No_date    1:35    8.24
00216>       [DT= 5.00]  SUM=  01:P2in          24.13     .851 No_date    1:30   16.47
00217>  001:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00218>      ROUTE RESERVOIR -> 01:P2in          24.13     .851 No_date    1:30   16.47
00219>       [RDT= 5.00] out<- 02:P2out         24.13     .164 No_date    3:10   16.47
00220>                 overflow <= 03:P2OVF       .00     .000 No_date    0:00     .00
00221>      {MxStoUsed=.2888E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00222>  001:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00223>      ADD HYD             02:P2out         24.13     .164 No_date    3:10   16.47
00224>                        +  03:P2OVF          .00     .000 No_date    0:00     .00
00225>       [DT= 5.00]  SUM=  06:PND2          24.13     .164 No_date    3:10   16.47
00226>  001:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00227>      SAVE HYD            06:PND2          24.13     .164 No_date    3:10   16.47
00228>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-PND2.001
00229>       remark:POND2-outflow/overflow
00230>  001:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00231>      CONTINUOUS NASHYD  04:CRFP           24.18     .196 No_date    2:00    5.93
00232>       [CN= 82.0: N= 2.00]
00233>       [Tp=  .50:DT= 5.00]
00234>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00235>       [InterEventTime=  12.00]
00236>  001:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00237>      CONTINUOUS STANDHYD05:28             12.50     .519 No_date    1:15   10.12
00238>       [XIMP=.38:TIMP=.45]
00239>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
00240>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
00241>       [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
00242>       [IaRECimp=   2.00: IaRECper=   4.00]
00243>  001:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00244>      ADD HYD             04:CRFP          24.18     .196 No_date    2:00    5.93
00245>                        +  05:28            12.50     .519 No_date    1:15   10.12
00246>                        +  06:PND2          24.13     .164 No_date    3:10   16.47
00247>       [DT= 5.00]  SUM=  07:2065          60.81     .564 No_date    1:15   10.97
00248>  001:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00249>      SAVE HYD            07:2065          60.81     .564 No_date    1:15   10.97
00250>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2065.001
00251>       remark:HEC-RAS Inflow Node 2065 / Station 44548
00252>  001:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00253>      CONTINUOUS STANDHYD05:100-1           61.17    1.610 No_date    1:25   10.12
00254>       [XIMP=.38:TIMP=.45]
00255>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
00256>       [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
00257>       [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
00258>       [IaRECimp=   2.00: IaRECper=   4.00]
00259>  001:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00260>      CONTINUOUS NASHYD  06:102-1          39.80     .165 No_date    3:00    5.00
00261>       [CN= 78.0: N= 2.00]
00262>       [Tp= 1.10:DT= 5.00]
00263>       [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
00264>       [InterEventTime=  12.00]
00265>  001:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00266>      ADD HYD             05:100-1         61.17    1.610 No_date    1:25   10.12
00267>                        +  06:102-1         39.80     .165 No_date    3:00    5.00
00268>       [DT= 5.00]  SUM=  10:3894          100.97    1.631 No_date    1:25    8.10
00269>  001:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00270>      SAVE HYD            10:3894          100.97    1.631 No_date    1:25    8.10
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      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-3894.001
      remark:HEC-RAS Inflow Node 3894 / Station 43966
  ** END OF RUN :   7

 ************************************************************************************



 RUN:COMMAND#
 008:0001----------------------------------------------------------------------------
    START
     [TZERO =    .00 hrs on        0]
     [METOUT=   2    (1=imperial, 2=metric output)]
     [NSTORM=   1 ]
     [NRUN  =   8 ]
 008:0002----------------------------------------------------------------------------
    READ STORM
     Filename = storm.001
     Comment  =
     [SDT=30.00:SDUR=  12.00:PTOT=  42.34]
 008:0003----------------------------------------------------------------------------
    DEFAULT VALUES
     Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
     ICASEdv  = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
     Horton's infiltration equation parameters:
     [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 2.00]
 008:0004----------------------------------------------------------------------------
    COMPUTE API
     [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
     {APImax= 60.24: APIavg= 39.87: APImin= 20.59}
 008:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    READ HYD           09:101-3        69.53    1.068 No_date    7:05   29.55
     Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.008
     Comment  = GRANITE RIDGE AREA 101-3
 008:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS STANDHYD01:P1            77.13    3.984 No_date    6:15   34.42
     [XIMP=.45:TIMP=.70]
     [LOSS= 2 :CN= 80.5]
     [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
     [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
     [IaRECimp=   2.00: IaRECper=   4.00]
     [SMIN= 26.32: SMAX=175.50: SK=1.000]
 008:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    COMPUTE DUALHYD    01:P1            77.13    3.984 No_date    6:15   34.42
       Major System /  02:P1maj          .00     .000 No_date    0:00     .00
       Minor System \  03:P1min         77.13    3.984 No_date    6:15   34.42
     {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS NASHYD  04:SWM1           4.50     .186 No_date    6:10   23.33
     [CN= 90.0: N= 2.00]
     [Tp=  .25:DT= 5.00]
     [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
     [InterEventTime=  12.00]
 008:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            02:P1maj          .00     .000 No_date    0:00     .00
                     +  03:P1min         77.13    3.984 No_date    6:15   34.42
                     +  04:SWM1           4.50     .186 No_date    6:10   23.33
                     +  09:101-3         69.53    1.068 No_date    7:05   29.55
      [DT= 5.00]  SUM=  01:P1in         151.16    4.951 No_date    6:15   31.85
 008:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ROUTE RESERVOIR -> 01:P1in         151.16    4.951 No_date    6:15   31.85
      [RDT= 5.00] out<- 02:P1out       151.16    1.601 No_date    8:10   31.85
     {MxStoUsed=.2109E+01}
 008:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS NASHYD  03:CRTRIB         3.69     .115 No_date    6:10   18.79
     [CN= 82.0: N= 2.00]
     [Tp=  .25:DT= 5.00]
     [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
     [InterEventTime=  12.00]
 008:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            01:P1in         151.16    4.951 No_date    6:15   31.85
                     +  03:CRTRIB         3.69     .115 No_date    6:10   18.79
      [DT= 5.00]  SUM=  09:1012NC       154.85    5.063 No_date    6:15   31.54
 008:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            02:P1out        151.16    1.601 No_date    8:10   31.85
                     +  03:CRTRIB         3.69     .115 No_date    6:10   18.79
      [DT= 5.00]  SUM=  09:101-2        154.85    1.621 No_date    8:05   31.54
 008:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    SAVE HYD           09:101-2        154.85    1.621 No_date    8:05   31.54
     fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-2.008
     remark:Carp Tributary @ Carp River - XP2054
 008:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS STANDHYD01:P3            91.68    3.874 No_date    6:15   29.72
     [XIMP=.34:TIMP=.43]
     [LOSS= 2 :CN= 80.5]
     [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
     [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
     [IaRECimp=   2.00: IaRECper=   4.00]
     [SMIN= 26.32: SMAX=175.50: SK=1.000]
 008:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    COMPUTE DUALHYD    01:P3            91.68    3.874 No_date    6:15   29.72
       Major System /  02:P3maj          .00     .000 No_date    0:00     .00
       Minor System \  03:P3min         91.68    3.874 No_date    6:15   29.72
     {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS NASHYD  04:SWM3           2.60     .081 No_date    6:10   18.79
     [CN= 82.0: N= 2.00]
     [Tp=  .25:DT= 5.00]
     [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
     [InterEventTime=  12.00]
 008:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            02:P3maj          .00     .000 No_date    0:00     .00
                     +  03:P3min         91.68    3.874 No_date    6:15   29.72
                     +  04:SWM3           2.60     .081 No_date    6:10   18.79
      [DT= 5.00]  SUM=  01:P3in         94.28    3.953 No_date    6:15   29.42
 008:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ROUTE RESERVOIR -> 01:P3in         94.28    3.953 No_date    6:15   29.42
      [RDT= 5.00] out<- 02:P3out       94.28     .601 No_date    8:35   29.42
            overflow <= 03:P3OVF          .00     .000 No_date    0:00     .00
     {MxStoUsed=.1900E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            02:P3out        94.28     .601 No_date    8:35   29.42
                     +  03:P3OVF          .00     .000 No_date    0:00     .00
      [DT= 5.00]  SUM=  08:500          94.28     .601 No_date    8:35   29.42
 008:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    SAVE HYD           08:500          94.28     .601 No_date    8:35   29.42
     fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-500.008
     remark:South Pond @ Carp River
 008:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            08:500          94.28     .601 No_date    8:35   29.42
                     +  09:101-2        154.85    1.621 No_date    8:05   31.54
      [DT= 5.00]  SUM=  10:2054         249.13    2.213 No_date    8:15   30.74
 008:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            10:2054         249.13    2.213 No_date    8:15   30.74
     fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2054.008
      remark:HEC-RAS Inflow Node 2054 / Station 44751
 008:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS STANDHYD01:P2            23.14    1.118 No_date    6:15   32.61
     [XIMP=.47:TIMP=.59]
     [LOSS= 2 :CN= 80.5]
     [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
     [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
     [IaRECimp=   2.00: IaRECper=   4.00]
     [SMIN= 26.32: SMAX=175.50: SK=1.000]
 008:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    COMPUTE DUALHYD    01:P2            23.14    1.118 No_date    6:15   32.61
       Major System /  02:P2maj          .00     .000 No_date    0:00     .00
       Minor System \  03:P2min         23.14    1.118 No_date    6:15   32.61
     {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS NASHYD  04:SWM2           .99     .041 No_date    6:10   23.33
     [CN= 90.0: N= 2.00]
     [Tp=  .25:DT= 5.00]
     [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
     [InterEventTime=  12.00]
 008:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            02:P2maj          .00     .000 No_date    0:00     .00
                     +  03:P2min         23.14    1.118 No_date    6:15   32.61
                     +  04:SWM2           .99     .041 No_date    6:10   23.33
      [DT= 5.00]  SUM=  01:P2in         24.13    1.158 No_date    6:15   32.23
 008:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ROUTE RESERVOIR -> 01:P2in         24.13    1.158 No_date    6:15   32.23
      [RDT= 5.00] out<- 02:P2out       24.13     .333 No_date    7:30   32.23
            overflow <= 03:P2OVF          .00     .000 No_date    0:00     .00
     {MxStoUsed=.4269E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            02:P2out        24.13     .333 No_date    7:30   32.23
                     +  03:P2OVF          .00     .000 No_date    0:00     .00
      [DT= 5.00]  SUM=  06:PND2         24.13     .333 No_date    7:30   32.23
 008:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    SAVE HYD           06:PND2         24.13     .333 No_date    7:30   32.23
     fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-PND2.008
     remark:POND2-outflow/overflow
 008:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS NASHYD  04:CRFP          24.18     .494 No_date    6:35   18.79
     [CN= 82.0: N= 2.00]
     [Tp=  .50:DT= 5.00]
     [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
     [InterEventTime=  12.00]
 008:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS STANDHYD05:28            12.50     .445 No_date    6:00   18.26
     [XIMP=.38:TIMP=.45]
     [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
     [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
     [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNP=.010:SCP=   .0]
     [IaRECimp=   2.00: IaRECper=   4.00]
 008:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            04:CRFP          24.18     .494 No_date    6:35   18.79
                     +  05:28            12.50     .445 No_date    6:00   18.26
                     +  06:PND2          24.13     .333 No_date    7:30   32.23
      [DT= 5.00]  SUM=  07:2065         60.81     .912 No_date    6:35   24.01
 008:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    SAVE HYD           07:2065         60.81     .912 No_date    6:35   24.01
     fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2065.008
     remark:HEC-RAS Inflow Node 2065 / Station 44548
 008:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS STANDHYD05:100-1         61.17    1.647 No_date    6:10   18.26
     [XIMP=.38:TIMP=.45]
     [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
     [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
     [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
     [IaRECimp=   2.00: IaRECper=   4.00]
 008:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS NASHYD  06:102-1         39.80     .404 No_date    7:25   16.64
     [CN= 78.0: N= 2.00]
     [Tp= 1.10:DT= 5.00]
     [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
     [InterEventTime=  12.00]
 008:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    ADD HYD            05:100-1        61.17    1.647 No_date    6:10   18.26
                     +  06:102-1        39.80     .404 No_date    7:25   16.64
      [DT= 5.00]  SUM=  10:3894        100.97    1.794 No_date    6:10   17.62
 008:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    SAVE HYD           10:3894         100.97    1.794 No_date    6:10   17.62
     fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-3894.008
     remark:HEC-RAS Inflow Node 3894 / Station 43966
  ** END OF RUN :   8

 ************************************************************************************



 RUN:COMMAND#
 009:0001----------------------------------------------------------------------------
    START
     [TZERO =    .00 hrs on        0]
     [METOUT=   2    (1=imperial, 2=metric output)]
     [NSTORM=   1 ]
     [NRUN  =   9 ]
 009:0002----------------------------------------------------------------------------
    READ STORM
     Filename = storm.001
     Comment  =
     [SDT=30.00:SDUR=  12.00:PTOT=  56.18]
 009:0003----------------------------------------------------------------------------
    DEFAULT VALUES
     Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
     ICASEdv  = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
     Horton's infiltration equation parameters:
     [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 2.00]
 009:0004----------------------------------------------------------------------------
    COMPUTE API
     [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
     {APImax= 73.73: APIavg= 46.81: APImin= 20.80}
 009:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    READ HYD           09:101-3        69.53    1.597 No_date    6:55   42.20
     Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.009
     Comment  = GRANITE RIDGE AREA 101-3
 009:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    CONTINUOUS STANDHYD01:P1            77.13    5.939 No_date    6:10   47.84
     [XIMP=.45:TIMP=.70]
     [LOSS= 2 :CN= 80.5]
     [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
     [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
     [IaRECimp=   2.00: IaRECper=   4.00]
     [SMIN= 26.32: SMAX=175.50: SK=1.000]
 009:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
    COMPUTE DUALHYD    01:P1            77.13    5.939 No_date    6:10   47.84
       Major System /  02:P1maj          .00     .000 No_date    0:00     .00
       Minor System \  03:P1min         77.13    5.939 No_date    6:10   47.84
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00541>      {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00542>  009:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00543>      CONTINUOUS NASHYD  04:SWM1           4.50     .308 No_date    6:05   36.39
00544>       [CN= 90.0: N= 2.00]
00545>       [Tp=  .25:DT= 5.00]
00546>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00547>       [InterEventTime=  12.00]
00548>  009:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00549>      ADD HYD             02:P1maj          .00     .000 No_date    0:00    .00
00550>                        +  03:P1min         77.13    5.939 No_date    6:10   47.84
00551>                        +  04:SWM1           4.50     .308 No_date    6:05   36.39
00552>                        +  09:101-3         69.53    1.597 No_date    6:55   42.20
00553>       [DT= 5.00]  SUM=  01:P1in          151.16    7.448 No_date    6:10   44.91
00554>  009:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00555>      ROUTE RESERVOIR -> 01:P1in          151.16    7.448 No_date    6:10   44.91
00556>       [RDT= 5.00] out<- 02:P1out         151.16    2.758 No_date    7:35   44.91
00557>      {MxStoUsed=.2824E+01}
00558>  009:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00559>      CONTINUOUS NASHYD  03:CRTRIB         3.69     .202 No_date    6:05   30.76
00560>       [CN= 82.0: N= 2.00]
00561>       [Tp=  .25:DT= 5.00]
00562>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00563>       [InterEventTime=  12.00]
00564>  009:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00565>      ADD HYD             01:P1in         151.16    7.448 No_date    6:10   44.91
00566>                        +  03:CRTRIB         3.69     .202 No_date    6:05   30.76
00567>       [DT= 5.00]  SUM=  09:1012NC       154.85    7.649 No_date    6:10   44.57
00568>  009:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00569>      ADD HYD             02:P1out        151.16    2.758 No_date    7:35   44.91
00570>                        +  03:CRTRIB         3.69     .202 No_date    6:05   30.76
00571>       [DT= 5.00]  SUM=  09:101-2        154.85    2.799 No_date    7:35   44.57
00572>  009:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00573>      SAVE HYD            09:101-2        154.85    2.799 No_date    7:35   44.57
00574>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-2.009
00575>       remark:Carp Tributary @ Carp River - XP2054
00576>  009:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00577>      CONTINUOUS STANDHYD01:P3             91.68    6.001 No_date    6:15   42.53
00578>       [XIMP=.34:TIMP=.43]
00579>       [LOSS= 2 :CN= 80.5]
00580>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00581>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00582>       [IaRECimp=   2.00: IaRECper=   4.00]
00583>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
00584>  009:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00585>      COMPUTE DUALHYD     01:P3            91.68    6.001 No_date    6:15   42.53
00586>         Major System /  02:P3maj          .00     .000 No_date    0:00    .00
00587>         Minor System \  03:P3min         91.68    6.001 No_date    6:15   42.53
00588>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00589>  009:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00590>      CONTINUOUS NASHYD  04:SWM3           2.60     .142 No_date    6:05   30.76
00591>       [CN= 82.0: N= 2.00]
00592>       [Tp=  .25:DT= 5.00]
00593>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00594>       [InterEventTime=  12.00]
00595>  009:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00596>      ADD HYD             02:P3maj          .00     .000 No_date    0:00    .00
00597>                        +  03:P3min         91.68    6.001 No_date    6:15   42.53
00598>                        +  04:SWM3           2.60     .142 No_date    6:05   30.76
00599>       [DT= 5.00]  SUM=  01:P3in          94.28    6.141 No_date    6:10   42.21
00600>  009:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00601>      ROUTE RESERVOIR -> 01:P3in          94.28    6.141 No_date    6:10   42.21
00602>       [RDT= 5.00] out<- 02:P3out         94.28    1.267 No_date    7:45   42.21
00603>             overflow <= 03:P3OVF          .00     .000 No_date    0:00    .00
00604>      {MxStoUsed=.2506E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00605>  009:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00606>      ADD HYD             02:P3out          94.28    1.267 No_date    7:45   42.21
00607>                        +  03:P3OVF          .00     .000 No_date    0:00    .00
00608>       [DT= 5.00]  SUM=  08:500           94.28    1.267 No_date    7:45   42.21
00609>  009:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00610>      SAVE HYD            08:500          94.28    1.267 No_date    7:45   42.21
00611>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-500.009
00612>       remark:South Pond @ Carp River
00613>  009:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00614>      ADD HYD             08:500          94.28    1.267 No_date    7:45   42.21
00615>                        +  09:101-2        154.85    2.799 No_date    7:35   44.57
00616>       [DT= 5.00]  SUM=  10:2054         249.13    4.058 No_date    7:35   43.68
00617>  009:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00618>      SAVE HYD            10:2054         249.13    4.058 No_date    7:35   43.68
00619>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2054.009
00620>       remark:HEC-RAS Inflow Node 2054 / Station 44751
00621>  009:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00622>      CONTINUOUS STANDHYD01:P2             23.14    1.688 No_date    6:10   45.75
00623>       [XIMP=.47:TIMP=.59]
00624>       [LOSS= 2 :CN= 80.5]
00625>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00626>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00627>       [IaRECimp=   2.00: IaRECper=   4.00]
00628>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
00629>  009:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00630>      COMPUTE DUALHYD     01:P2            23.14    1.688 No_date    6:10   45.75
00631>         Major System /  02:P2maj          .00     .000 No_date    0:00    .00
00632>         Minor System \  03:P2min         23.14    1.688 No_date    6:10   45.75
00633>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00634>  009:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00635>      CONTINUOUS NASHYD  04:SWM2           .99     .068 No_date    6:05   36.39
00636>       [CN= 90.0: N= 2.00]
00637>       [Tp=  .25:DT= 5.00]
00638>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00639>       [InterEventTime=  12.00]
00640>  009:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00641>      ADD HYD             02:P2maj          .00     .000 No_date    0:00    .00
00642>                        +  03:P2min         23.14    1.688 No_date    6:10   45.75
00643>                        +  04:SWM2           .99     .068 No_date    6:05   36.39
00644>       [DT= 5.00]  SUM=  01:P2in          24.13    1.754 No_date    6:10   45.36
00645>  009:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00646>      ROUTE RESERVOIR -> 01:P2in          24.13    1.754 No_date    6:10   45.36
00647>       [RDT= 5.00] out<- 02:P2out         24.13     .553 No_date    7:15   45.36
00648>             overflow <= 03:P2OVF          .00     .000 No_date    0:00    .00
00649>      {MxStoUsed=.5773E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00650>  009:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00651>      ADD HYD             02:P2out          24.13     .553 No_date    7:15   45.36
00652>                        +  03:P2OVF          .00     .000 No_date    0:00    .00
00653>       [DT= 5.00]  SUM=  06:PND2           24.13     .553 No_date    7:15   45.36
00654>  009:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00655>      SAVE HYD            06:PND2          24.13     .553 No_date    7:15   45.36
00656>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-PND2.009
00657>       remark:POND2-outflow/overflow
00658>  009:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00659>      CONTINUOUS NASHYD  04:CRFP           24.18     .848 No_date    6:30   30.76
00660>       [CN= 82.0: N= 2.00]
00661>       [Tp=  .50:DT= 5.00]
00662>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00663>       [InterEventTime=  12.00]
00664>  009:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00665>      CONTINUOUS STANDHYD05:28             12.50     .716 No_date    6:00   28.27
00666>       [XIMP=.38:TIMP=.45]
00667>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
00668>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
00669>       [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
00670>       [IaRECimp=   2.00: IaRECper=   4.00]
00671>  009:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00672>      ADD HYD             04:CRFP          24.18     .848 No_date    6:30   30.76
00673>                        +  05:28            12.50     .716 No_date    6:00   28.27
00674>                        +  06:PND2          24.13     .553 No_date    7:15   45.36
00675>       [DT= 5.00]  SUM=  07:2065          60.81    1.679 No_date    6:30   36.04
00676>  009:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00677>      SAVE HYD            07:2065          60.81    1.679 No_date    6:30   36.04
00678>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2065.009
00679>       remark:HEC-RAS Inflow Node 2065 / Station 44548
00680>  009:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00681>      CONTINUOUS STANDHYD05:100-1          61.17    2.291 No_date    6:05   28.27
00682>       [XIMP=.38:TIMP=.45]
00683>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
00684>       [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
00685>       [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
00686>       [IaRECimp=   2.00: IaRECper=   4.00]
00687>  009:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00688>      CONTINUOUS NASHYD  06:102-1          39.80     .700 No_date    7:20   27.89
00689>       [CN= 78.0: N= 2.00]
00690>       [Tp= 1.10:DT= 5.00]
00691>       [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
00692>       [InterEventTime=  12.00]
00693>  009:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00694>      ADD HYD             05:100-1         61.17    2.291 No_date    6:05   28.27
00695>                        +  06:102-1         39.80     .700 No_date    7:20   27.89
00696>       [DT= 5.00]  SUM=  10:3894          100.97    2.598 No_date    6:10   28.12
00697>  009:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00698>      SAVE HYD            10:3894          100.97    2.598 No_date    6:10   28.12
00699>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-3894.009
00700>       remark:HEC-RAS Inflow Node 3894 / Station 43966
00701>   ** END OF RUN :   9
00702>
00703> ********************************************************************************
00704>
00705>
00706>
00707>
00708>
00709>  RUN:COMMAND#
00710>  010:0001---------------------------------------------------------------------
00711>      START
00712>       [TZERO =    .00 hrs on       0]
00713>       [METOUT=   2    (1=imperial, 2=metric output)]
00714>       [NSTORM=   1 ]
00715>       [NRUN  =  10 ]
00716>  010:0002---------------------------------------------------------------------
00717>      READ STORM
00718>       Filename = storm.001
00719>       Comment  =
00720>       [SDT=30.00:SDUR=  12.00:PTOT=  65.22]
00721>  010:0003---------------------------------------------------------------------
00722>      DEFAULT VALUES
00723>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
00724>       ICASEdv  = 1 (read and print data)
00725>       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
00726>                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
00727>       Horton's infiltration equation parameters:
00728>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
00729>       Parameters for PERVIOUS surfaces in STANDHYD:
00730>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00731>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00732>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00733>       Parameters used in NASHYD:
00734>       [Ia=   4.67 mm] [N= 2.00]
00735>  010:0004---------------------------------------------------------------------
00736>      COMPUTE API
00737>       [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
00738>       {APImax= 82.54: APIavg= 51.33: APImin= 20.94}
00739>  010:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00740>      READ HYD            09:101-3         69.53    1.944 No_date    6:50   50.67
00741>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.010
00742>       Comment  = GRANITE RIDGE AREA 101-3
00743>  010:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00744>      CONTINUOUS STANDHYD01:P1             77.13    7.405 No_date    6:10   56.69
00745>       [XIMP=.45:TIMP=.70]
00746>       [LOSS= 2 :CN= 80.5]
00747>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00748>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00749>       [IaRECimp=   2.00: IaRECper=   4.00]
00750>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
00751>  010:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00752>      COMPUTE DUALHYD     01:P1            77.13    7.405 No_date    6:10   56.69
00753>         Major System /  02:P1maj          .00     .000 No_date    0:00    .00
00754>         Minor System \  03:P1min         77.13    7.405 No_date    6:10   56.69
00755>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00756>  010:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00757>      CONTINUOUS NASHYD  04:SWM1           4.50     .385 No_date    6:05   45.08
00758>       [CN= 90.0: N= 2.00]
00759>       [Tp=  .25:DT= 5.00]
00760>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00761>       [InterEventTime=  12.00]
00762>  010:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00763>      ADD HYD             02:P1maj          .00     .000 No_date    0:00    .00
00764>                        +  03:P1min         77.13    7.405 No_date    6:10   56.69
00765>                        +  04:SWM1           4.50     .385 No_date    6:05   45.08
00766>                        +  09:101-3         69.53    1.944 No_date    6:50   50.67
00767>       [DT= 5.00]  SUM=  01:P1in          151.16    9.295 No_date    6:10   53.57
00768>  010:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00769>      ROUTE RESERVOIR -> 01:P1in          151.16    9.295 No_date    6:10   53.57
00770>       [RDT= 5.00] out<- 02:P1out         151.16    4.531 No_date    7:05   53.57
00771>      {MxStoUsed=.2981E+01}
00772>  010:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00773>      CONTINUOUS NASHYD  03:CRTRIB         3.69     .262 No_date    6:05   38.93
00774>       [CN= 82.0: N= 2.00]
00775>       [Tp=  .25:DT= 5.00]
00776>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00777>       [InterEventTime=  12.00]
00778>  010:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00779>      ADD HYD             01:P1in         151.16    9.295 No_date    6:10   53.57
00780>                        +  03:CRTRIB         3.69     .262 No_date    6:05   38.93
00781>       [DT= 5.00]  SUM=  09:1012NC       154.85    9.552 No_date    6:10   53.22
00782>  010:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00783>      ADD HYD             02:P1out        151.16    4.531 No_date    7:05   53.57
00784>                        +  03:CRTRIB         3.69     .262 No_date    6:05   38.93
00785>       [DT= 5.00]  SUM=  09:101-2        154.85    4.636 No_date    6:50   53.22
00786>  010:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00787>      SAVE HYD            09:101-2        154.85    4.636 No_date    6:50   53.22
00788>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-2.010
00789>       remark:Carp Tributary @ Carp River - XP2054
00790>  010:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00791>      CONTINUOUS STANDHYD01:P3             91.68    7.415 No_date    6:10   51.08
00792>       [XIMP=.34:TIMP=.43]
00793>       [LOSS= 2 :CN= 80.5]
00794>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00795>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00796>       [IaRECimp=   2.00: IaRECper=   4.00]
00797>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
00798>  010:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00799>      COMPUTE DUALHYD     01:P3            91.68    7.415 No_date    6:10   51.08
00800>         Major System /  02:P3maj          .00     .000 No_date    0:00    .00
00801>         Minor System \  03:P3min         91.68    7.415 No_date    6:10   51.08
00802>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00803>  010:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00804>      CONTINUOUS NASHYD  04:SWM3           2.60     .184 No_date    6:05   38.93
00805>       [CN= 82.0: N= 2.00]
00806>       [Tp=  .25:DT= 5.00]
00807>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00808>       [InterEventTime=  12.00]
00809>  010:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00810>      ADD HYD             02:P3maj          .00     .000 No_date    0:00    .00
```

```
                    +  03:P3min          91.68    7.415 No_date    6:10   51.08
                    +  04:SWM3            2.60     .184 No_date    6:05   38.93
     [DT= 5.00]  SUM=  01:P3in          94.28    7.596 No_date    6:10   50.75
0010:0019----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 01:P3in          94.28    7.596 No_date    6:10   50.75
      [RDT= 5.00] out<- 02:P3out         94.17    1.750 No_date    7:30   50.75
              overflow <= 03:P3OVF         .11     .181 No_date    7:30   50.75
     {MxStoUsed=.2902E+01, TotOvfVol=.5421E-02, N-Ovf=    1, TotDurOvf=    0.hrs
0010:0020----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P3out         94.17    1.750 No_date    7:30   50.75
                    +  03:P3OVF           .11     .181 No_date    7:30   50.75
     [DT= 5.00]  SUM=  08:500           94.28    1.931 No_date    7:30   50.75
0010:0021----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            08:500           94.28    1.931 No_date    7:30   50.75
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-500.010
      remark:South Pond @ Carp River
0010:0022----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             08:500           94.28    1.931 No_date    7:30   50.75
                    +  09:101-2         154.85    4.636 No_date    6:50   53.22
     [DT= 5.00]  SUM=  10:2054          249.13    6.303 No_date    7:20   52.29
0010:0023----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            10:2054          249.13    6.303 No_date    7:20   52.29
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2054.010
      remark:HEC-RAS Inflow Node 2054 / Station 44751
0010:0024----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P2            23.14    2.057 No_date    6:10   54.46
      [XIMP=.47:TIMP=.59]
      [LOSS= 2 :CN= 80.5]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 26.32: SMAX=175.50: SK=1.000]
0010:0025----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD     01:P2            23.14    2.057 No_date    6:10   54.46
       Major System /  02:P2maj           .00     .000 No_date    0:00    .00
       Minor System \  03:P2min          23.14    2.057 No_date    6:10   54.46
     {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
0010:0026----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:SWM2           .99     .085 No_date    6:05   45.08
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
0010:0027----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P2maj           .00     .000 No_date    0:00    .00
                    +  03:P2min          23.14    2.057 No_date    6:10   54.46
                    +  04:SWM2            .99     .085 No_date    6:05   45.08
     [DT= 5.00]  SUM=  01:P2in          24.13    2.140 No_date    6:10   54.07
0010:0028----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 01:P2in          24.13    2.140 No_date    6:10   54.07
      [RDT= 5.00] out<- 02:P2out         24.12     .700 No_date    7:10   54.07
              overflow <= 03:P2OVF         .01     .014 No_date    7:10   54.07
     {MxStoUsed=.6746E+00, TotOvfVol=.4142E-03, N-Ovf=    1, TotDurOvf=    0.hrs
0010:0029----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P2out         24.12     .700 No_date    7:10   54.07
                    +  03:P2OVF           .01     .014 No_date    7:10   54.07
     [DT= 5.00]  SUM=  06:PND2          24.13     .714 No_date    7:10   54.07
0010:0030----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            06:PND2          24.13     .714 No_date    7:10   54.07
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-PND2.010
      remark:POND2-outflow/overflow
0010:0031----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:CRFP           24.18    1.091 No_date    6:30   38.93
      [CN= 82.0: N= 2.00]
      [Tp=  .50:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
0010:0032----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:28            12.50     .955 No_date    6:00   35.23
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
0010:0033----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             04:CRFP          24.18    1.091 No_date    6:30   38.93
                    +  05:28            12.50     .955 No_date    6:00   35.23
                    +  06:PND2          24.13     .714 No_date    7:10   54.07
     [DT= 5.00]  SUM=  07:2065          60.81    2.181 No_date    6:25   44.18
0010:0034----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            07:2065          60.81    2.181 No_date    6:25   44.18
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2065.010
      remark:HEC-RAS Inflow Node 2065 / Station 44548
0010:0035----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:100-1         61.17    2.769 No_date    6:05   35.23
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP=  .80:LGP=1200.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI=  .80:LGI=1700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
0010:0036----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  06:102-1          39.80     .907 No_date    7:15   35.70
      [CN= 78.0: N= 2.00]
      [Tp= 1.10:DT= 5.00]
      [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
      [InterEventTime=  12.00]
0010:0037----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             05:100-1         61.17    2.769 No_date    6:05   35.23
                    +  06:102-1          39.80     .907 No_date    7:15   35.70
     [DT= 5.00]  SUM=  10:3894         100.97    3.201 No_date    6:10   35.41
0010:0038----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            10:3894         100.97    3.201 No_date    6:10   35.41
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-3894.010
      remark:HEC-RAS Inflow Node 3894 / Station 43966
  ** END OF RUN :  10
0010:
 **********************************************************************
0010:
0010:
0010:
0010:
0010:
  RUN:COMMAND#
0011:0001----------------------------------------------------------------------------
     START               [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =  11 ]
0011:0002----------------------------------------------------------------------------
     READ STORM
      Filename = storm.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  77.93]
0011:0003----------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 2.00]
0011:0004----------------------------------------------------------------------------
     COMPUTE API
      [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
      {APImax= 94.94: APIavg= 57.70: APImin= 21.13}
0011:0005----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     READ HYD            09:101-3         69.53    2.449 No_date    6:50   62.74
      Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.011
      Comment  = GRANITE RIDGE AREA 101-3
0011:0006----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P1            77.13    9.247 No_date    6:10   69.19
      [XIMP=.45:TIMP=.70]
      [LOSS= 2 :CN= 80.5]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 26.32: SMAX=175.50: SK=1.000]
0011:0007----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD     01:P1            77.13    9.247 No_date    6:10   69.19
       Major System /  02:P1maj           .00     .000 No_date    0:00    .00
       Minor System \  03:P1min          77.13    7.710 No_date    6:00   69.81
     {MjSysSto=.1518E+04, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
0011:0008----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:SWM1           4.50     .490 No_date    6:05   57.45
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
0011:0009----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P1maj           .00     .000 No_date    0:00    .00
                    +  03:P1min          77.13    7.710 No_date    6:00   69.81
                    +  04:SWM1            4.50     .490 No_date    6:05   57.45
                    +  09:101-3          69.53    2.449 No_date    6:50   62.74
     [DT= 5.00]  SUM=  01:P1in          151.16   10.420 No_date    6:35   66.19
0011:0010----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 01:P1in         151.16   10.420 No_date    6:35   66.19
      [RDT= 5.00] out<- 02:P1out        151.16    4.881 No_date    7:10   66.19
     {MxStoUsed=.3677E+01}
0011:0011----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  03:CRTRIB         3.69     .345 No_date    6:05   50.73
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
0011:0012----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             01:P1in          151.16   10.420 No_date    6:35   66.19
                    +  03:CRTRIB         3.69     .345 No_date    6:05   50.73
     [DT= 5.00]  SUM=  09:1012NC        154.85   10.655 No_date    6:30   65.82
0011:0013----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P1out         151.16    4.881 No_date    7:10   66.19
                    +  03:CRTRIB         3.69     .345 No_date    6:05   50.73
     [DT= 5.00]  SUM=  09:101-2         154.85    4.992 No_date    7:00   65.82
0011:0014----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            09:101-2         154.85    4.992 No_date    7:00   65.82
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-2.011
      remark:Carp Tributary @ Carp River - XP2054
0011:0015----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P3            91.68    9.832 No_date    6:10   63.26
      [XIMP=.34:TIMP=.43]
      [LOSS= 2 :CN= 80.5]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 26.32: SMAX=175.50: SK=1.000]
0011:0016----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD     01:P3            91.68    9.832 No_date    6:10   63.26
       Major System /  02:P3maj           .00     .000 No_date    0:00    .00
       Minor System \  03:P3min          91.68    9.170 No_date    6:05   63.37
     {MjSysSto=.4302E+03, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
0011:0017----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:SWM3           2.60     .243 No_date    6:05   50.73
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
0011:0018----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P3maj           .00     .000 No_date    0:00    .00
                    +  03:P3min          91.68    9.170 No_date    6:05   63.37
                    +  04:SWM3            2.60     .243 No_date    6:05   50.73
     [DT= 5.00]  SUM=  01:P3in          94.28    9.413 No_date    6:05   63.02
0011:0019----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 01:P3in          94.28    9.413 No_date    6:05   63.02
      [RDT= 5.00] out<- 02:P3out         81.81    1.750 No_date    6:35   63.02
              overflow <= 03:P3OVF         12.47    5.181 No_date    6:35   63.02
     {MxStoUsed=.2902E+01, TotOvfVol=.7858E+00, N-Ovf=    2, TotDurOvf=    1.hrs
0011:0020----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P3out         81.81    1.750 No_date    6:35   63.02
                    +  03:P3OVF          12.47    5.181 No_date    6:35   63.02
     [DT= 5.00]  SUM=  08:500           94.28    6.931 No_date    6:35   63.02
0011:0021----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            08:500           94.28    6.931 No_date    6:35   63.02
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-500.011
      remark:South Pond @ Carp River
0011:0022----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             08:500           94.28    6.931 No_date    6:35   63.02
                    +  09:101-2         154.85    4.992 No_date    7:00   65.82
     [DT= 5.00]  SUM=  10:2054          249.13   11.809 No_date    6:35   64.76
0011:0023----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            10:2054          249.13   11.809 No_date    6:35   64.76
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2054.011
      remark:HEC-RAS Inflow Node 2054 / Station 44751
0011:0024----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P2            23.14    2.664 No_date    6:10   66.81
      [XIMP=.47:TIMP=.59]
      [LOSS= 2 :CN= 80.5]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 26.32: SMAX=175.50: SK=1.000]
0011:0025----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD     01:P2            23.14    2.664 No_date    6:10   66.81
       Major System /  02:P2maj           .00     .000 No_date    0:00    .00
       Minor System \  03:P2min          23.14    2.310 No_date    6:00   67.33
     {MjSysSto=.3043E+03, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
0011:0026----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:SWM2            .99     .108 No_date    6:05   57.44
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
0011:0027----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P2maj           .00     .000 No_date    0:00    .00
                    +  03:P2min          23.14    2.310 No_date    6:00   67.33
                    +  04:SWM2            .99     .108 No_date    6:05   57.44
     [DT= 5.00]  SUM=  01:P2in          24.13    2.418 No_date    6:05   66.92
0011:0028----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 01:P2in          24.13    2.418 No_date    6:05   66.92
      [RDT= 5.00] out<- 02:P2out         21.11     .700 No_date    6:30   66.92
              overflow <= 03:P2OVF          3.02    1.689 No_date    6:30   66.92
     {MxStoUsed=.6729E+00, TotOvfVol=.2019E+00, N-Ovf=    2, TotDurOvf=    1.hrs
0011:0029----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P2out         21.11     .700 No_date    6:30   66.92
                    +  03:P2OVF           3.02    1.689 No_date    6:30   66.92
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      [DT= 5.00]  SUM=  06:PND2          24.13    2.389 No_date    6:30   66.92
 011:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            06:PND2          24.13    2.389 No_date    6:30   66.92
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-PND2.011
      remark:POND2-outflow/overflow
 011:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:CRFP          24.18    1.434 No_date    6:30   50.73
      [CN= 82.0: N= 2.00]
      [Tp=  .50:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 011:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:28            12.50    1.331 No_date    6:00   45.43
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 011:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             04:CRFP          24.18    1.434 No_date    6:30   50.73
                       +  05:28            12.50    1.331 No_date    6:00   45.43
                       +  06:PND2          24.13    2.389 No_date    6:30   66.92
      [DT= 5.00]  SUM=  07:2065          60.81    4.500 No_date    6:30   56.06
 011:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            07:2065          60.81    4.500 No_date    6:30   56.06
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2065.011
      remark:HEC-RAS Inflow Node 2065 / Station 44548
 011:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:100-1         61.17    3.498 No_date    6:05   45.43
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 011:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  06:102-1         39.80    1.210 No_date    7:15   47.07
      [CN= 78.0: N= 2.00]
      [Tp= 1.10:DT= 5.00]
      [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
      [InterEventTime=  12.00]
 011:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             05:100-1         61.17    3.498 No_date    6:05   45.43
                       +  06:102-1         39.80    1.210 No_date    7:15   47.07
      [DT= 5.00]  SUM=  10:3894          100.97    4.128 No_date    6:10   46.08
 011:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            10:3894          100.97    4.128 No_date    6:10   46.08
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-3894.011
      remark:HEC-RAS Inflow Node 3894 / Station 43966
  ** END OF RUN :  11
 ************************************************************************************
 RUN:COMMAND#
 012:0001---------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on       0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =  12 ]
 012:0002---------------------------------------------------------------------------
     READ STORM
      Filename = storm.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  84.94]
 012:0003---------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 2.00]
 012:0004---------------------------------------------------------------------------
     COMPUTE API
      [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
      {APImax=101.76: APIavg= 61.20: APImin= 21.23}
 012:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     READ HYD            09:101-3         69.53    2.721 No_date    6:50   69.46
      Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.012
      Comment  = GRANITE RIDGE AREA 101-3
 012:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P1            77.13   10.283 No_date    6:05   76.10
      [XIMP=.45:TIMP=.70]
      [LOSS= 2 :CN= 80.5]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 26.32: SMAX=175.50: SK=1.000]
 012:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    01:P1            77.13   10.283 No_date    6:05   76.10
        Major System /  02:P1maj          .00     .000 No_date    0:00     .00
        Minor System \  03:P1min         77.13    7.710 No_date    5:55   76.85
      {MjSysSto=.2990E+04, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 012:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:SWM1           4.50     .547 No_date    6:05   64.29
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
 012:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P1maj          .00     .000 No_date    0:00     .00
                       +  03:P1min         77.13    7.710 No_date    5:55   76.85
                       +  04:SWM1           4.50     .547 No_date    6:05   64.29
                       +  09:101-3         69.53    2.721 No_date    6:50   69.46
      [DT= 5.00]  SUM=  01:P1in          151.16   10.728 No_date    6:35   73.08
 012:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 01:P1in         151.16   10.728 No_date    6:35   73.08
      [RDT= 5.00] out<- 02:P1out        151.16    5.101 No_date    7:15   73.08
     {MxStoUsed=.4122E+01}
 012:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  03:CRTRIB         3.69     .391 No_date    6:05   57.33
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 012:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             01:P1in          151.16   10.728 No_date    6:35   73.08
                       +  03:CRTRIB         3.69     .391 No_date    6:05   57.33
      [DT= 5.00]  SUM=  09:1012NC        154.85   10.996 No_date    6:30   72.70
 012:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P1out         151.16    5.101 No_date    7:15   73.08
                       +  03:CRTRIB         3.69     .391 No_date    6:05   57.33
      [DT= 5.00]  SUM=  09:101-2         154.85    5.216 No_date    7:00   72.70
 012:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            09:101-2         154.85    5.216 No_date    7:00   72.70
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-2.012
      remark:Carp Tributary @ Carp River - XP2054
 012:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P3            91.68   10.895 No_date    6:10   70.03
      [XIMP=.34:TIMP=.43]
      [LOSS= 2 :CN= 80.5]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 26.32: SMAX=175.50: SK=1.000]
 012:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    01:P3            91.68   10.895 No_date    6:10   70.03
        Major System /  02:P3maj          .00     .000 No_date    0:00     .00
        Minor System \  03:P3min         91.68    9.170 No_date    6:00   70.64
      {MjSysSto=.1690E+04, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 012:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:SWM3           2.60     .276 No_date    6:05   57.33
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 012:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P3maj          .00     .000 No_date    0:00     .00
                       +  03:P3min         91.68    9.170 No_date    6:00   70.64
                       +  04:SWM3           2.60     .276 No_date    6:05   57.33
      [DT= 5.00]  SUM=  01:P3in          94.28    9.446 No_date    6:05   70.28
 012:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 01:P3in         94.28    9.446 No_date    6:05   70.28
      [RDT= 5.00] out<- 02:P3out        75.62    1.750 No_date    6:30   70.27
            overflow <= 03:P3OVF        18.66    7.628 No_date    6:30   70.28
     {MxStoUsed=.2905E+01, TotOvfVol=.1312E+01, N-Ovf=    3, TotDurOvf=    1.hrs
 012:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P3out         75.62    1.750 No_date    6:30   70.27
                       +  03:P3OVF         18.66    7.628 No_date    6:30   70.28
      [DT= 5.00]  SUM=  08:500           94.28    9.378 No_date    6:30   70.28
 012:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            08:500           94.28    9.378 No_date    6:30   70.28
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-500.012
      remark:South Pond @ Carp River
 012:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             08:500           94.28    9.378 No_date    6:30   70.28
                       +  09:101-2        154.85    5.216 No_date    7:00   72.70
      [DT= 5.00]  SUM=  10:2054          249.13   14.403 No_date    6:40   71.78
 012:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            10:2054          249.13   14.403 No_date    6:40   71.78
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2054.012
      remark:HEC-RAS Inflow Node 2054 / Station 44751
 012:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P2            23.14    2.973 No_date    6:05   73.65
      [XIMP=.47:TIMP=.59]
      [LOSS= 2 :CN= 80.5]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 26.32: SMAX=175.50: SK=1.000]
 012:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    01:P2            23.14    2.973 No_date    6:05   73.65
        Major System /  02:P2maj          .00     .000 No_date    0:00     .00
        Minor System \  03:P2min         23.14    2.310 No_date    5:55   74.17
      {MjSysSto=.7113E+03, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 012:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:SWM2            .99     .120 No_date    6:05   64.29
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
 012:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P2maj          .00     .000 No_date    0:00     .00
                       +  03:P2min         23.14    2.310 No_date    5:55   74.17
                       +  04:SWM2            .99     .120 No_date    6:05   64.29
      [DT= 5.00]  SUM=  01:P2in          24.13    2.430 No_date    6:05   73.76
 012:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 01:P2in         24.13    2.430 No_date    6:05   73.76
      [RDT= 5.00] out<- 02:P2out        19.89     .700 No_date    6:25   73.76
            overflow <= 03:P2OVF         4.24    1.706 No_date    6:25   73.76
     {MxStoUsed=.6738E+00, TotOvfVol=.3131E+00, N-Ovf=    2, TotDurOvf=    1.hrs
 012:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P2out         19.89     .700 No_date    6:25   73.76
                       +  03:P2OVF         4.24    1.706 No_date    6:25   73.76
      [DT= 5.00]  SUM=  06:PND2          24.13    2.406 No_date    6:25   73.76
 012:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            06:PND2          24.13    2.406 No_date    6:25   73.76
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-PND2.012
      remark:POND2-outflow/overflow
 012:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:CRFP          24.18    1.623 No_date    6:30   57.33
      [CN= 82.0: N= 2.00]
      [Tp=  .50:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 012:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:28            12.50    1.510 No_date    6:00   50.97
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 012:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             04:CRFP          24.18    1.623 No_date    6:30   57.33
                       +  05:28            12.50    1.510 No_date    6:00   50.97
                       +  06:PND2          24.13    2.406 No_date    6:25   73.76
      [DT= 5.00]  SUM=  07:2065          60.81    4.900 No_date    6:25   62.54
 012:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            07:2065          60.81    4.900 No_date    6:25   62.54
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2065.012
      remark:HEC-RAS Inflow Node 2065 / Station 44548
 012:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:100-1         61.17    4.021 No_date    6:05   50.97
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 012:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  06:102-1         39.80    1.380 No_date    7:15   53.48
      [CN= 78.0: N= 2.00]
      [Tp= 1.10:DT= 5.00]
      [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
      [InterEventTime=  12.00]
 012:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             05:100-1         61.17    4.021 No_date    6:05   50.97
                       +  06:102-1         39.80    1.380 No_date    7:15   53.48
      [DT= 5.00]  SUM=  10:3894          100.97    4.669 No_date    6:05   51.96
 012:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            10:3894          100.97    4.669 No_date    6:05   51.96
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-3894.012
      remark:HEC-RAS Inflow Node 3894 / Station 43966
  ** END OF RUN :  12
 ************************************************************************************
```

```
01351>  RUN:COMMAND#
01352>  013:0001----------------------------------------------------------------------
01353>      START
01354>       [TZERO =    .00 hrs on        0]
01355>       [METOUT=   2    (1=imperial, 2=metric output)]
01356>       [NSTORM=   1 ]
01357>       [NRUN  =  13 ]
01358>  013:0002----------------------------------------------------------------------
01359>      READ STORM
01360>       Filename = storm.001
01361>       Comment  =
01362>       [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
01363>  013:0003----------------------------------------------------------------------
01364>      DEFAULT VALUES
01365>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
01366>       ICASEdv  = 1 (read and print data)
01367>       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
01368>                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
01369>       Horton's infiltration equation parameters:
01370>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
01371>       Parameters for PERVIOUS surfaces in STANDHYD:
01372>       [IAperr=   4.67 mm] [LGP=40.00 m] [MNP= .250]
01373>       Parameters for IMPERVIOUS surfaces in STANDHYD:
01374>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
01375>       Parameters used in NASHYD:
01376>       [Ia=   4.67 mm] [N= 2.00]
01377>  013:0004----------------------------------------------------------------------
01378>      COMPUTE API
01379>       [APIini= 20.00: APIkdy= .9000: APIkdt= .9993]
01380>       {APImax=110.44: APIavg= 66.21: APImin= 20.46}
01381>  013:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01382>      READ HYD          09:101-3          69.53    3.093 No_date    6:45   78.11
01383>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.013
01384>       Comment  = GRANITE RIDGE AREA 101-3
01385>  013:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01386>      CONTINUOUS STANDHYD01:P1             77.13   11.641 No_date    6:05   84.97
01387>       [XIMP=.45:TIMP=.70]
01388>       [LOSS= 2 :CN= 80.5]
01389>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
01390>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
01391>       [IaRECimp=   2.00: IaRECper=   4.00]
01392>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
01393>  013:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01394>      COMPUTE DUALHYD    01:P1             77.13   11.641 No_date    6:05   84.97
01395>         Major System /  02:P1maj           1.75    2.669 No_date    6:15   84.97
01396>         Minor System \  03:P1min          75.38    7.710 No_date    5:55   86.57
01397>       {MjSysSto=.3857E+04, TotOvfVol=.1485E+04, N-Ovf=    1, TotDurOvf=    0.hrs
01398>  013:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01399>      CONTINUOUS NASHYD  04:SWM1           4.50     .619 No_date    6:05   73.10
01400>       [CN= 90.0: N= 2.00]
01401>       [Tp=  .25:DT= 5.00]
01402>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
01403>       [InterEventTime=  12.00]
01404>  013:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01405>      ADD HYD           02:P1maj           1.75    2.669 No_date    6:15   84.97
01406>                      +  03:P1min          75.38    7.710 No_date    5:55   86.57
01407>                      +  04:SWM1            4.50     .619 No_date    6:05   73.10
01408>                      +  09:101-3          69.53    3.093 No_date    6:45   78.11
01409>       [DT= 5.00]  SUM=  01:P1in          151.16   13.658 No_date    6:15   82.26
01410>  013:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01411>      ROUTE RESERVOIR -> 01:P1in          151.16   13.658 No_date    6:15   82.26
01412>   *   [RDT= 5.00] out<- 02:P1out         151.16    5.442 No_date    7:15   82.26
01413>      {MxStoUsed=.4772E+01}
01414>  013:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01415>      CONTINUOUS NASHYD  03:CRTRIB          3.69     .450 No_date    6:05   65.86
01416>       [CN= 82.0: N= 2.00]
01417>       [Tp=  .25:DT= 5.00]
01418>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
01419>       [InterEventTime=  12.00]
01420>  013:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01421>      ADD HYD           01:P1in          151.16   13.658 No_date    6:15   82.26
01422>                      +  03:CRTRIB          3.69     .450 No_date    6:05   65.86
01423>       [DT= 5.00]  SUM=  09:1012NC       154.85   14.069 No_date    6:15   81.87
01424>  013:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01425>      ADD HYD           02:P1out         151.16    5.442 No_date    7:15   82.26
01426>                      +  03:CRTRIB          3.69     .450 No_date    6:05   65.86
01427>       [DT= 5.00]  SUM=  09:101-2         154.85    5.563 No_date    7:05   81.87
01428>  013:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01429>      SAVE HYD          09:101-2         154.85    5.563 No_date    7:05   81.87
01430>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-2.013
01431>       remark:Carp Tributary @ Carp River - XP2054
01432>  013:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01433>      CONTINUOUS STANDHYD01:P3             91.68   12.428 No_date    6:05   78.73
01434>       [XIMP=.34:TIMP=.43]
01435>       [LOSS= 2 :CN= 80.5]
01436>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
01437>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
01438>       [IaRECimp=   2.00: IaRECper=   4.00]
01439>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
01440>  013:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01441>      COMPUTE DUALHYD    01:P3             91.68   12.428 No_date    6:05   78.73
01442>         Major System /  02:P3maj           .00     .000 No_date    0:00     .00
01443>         Minor System \  03:P3min          91.68    9.170 No_date    5:55   79.33
01444>       {MjSysSto=.4136E+04, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
01445>  013:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01446>      CONTINUOUS NASHYD  04:SWM3           2.60     .317 No_date    6:05   65.86
01447>       [CN= 82.0: N= 2.00]
01448>       [Tp=  .25:DT= 5.00]
01449>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
01450>       [InterEventTime=  12.00]
01451>  013:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01452>      ADD HYD           02:P3maj           .00     .000 No_date    0:00     .00
01453>                      +  03:P3min          91.68    9.170 No_date    5:55   79.33
01454>                      +  04:SWM3            2.60     .317 No_date    6:05   65.86
01455>       [DT= 5.00]  SUM=  01:P3in          94.28    9.487 No_date    6:05   78.96
01456>  013:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01457>      ROUTE RESERVOIR -> 01:P3in          94.28    9.487 No_date    6:05   78.96
01458>       [RDT= 5.00] out<- 02:P3out         69.53    1.750 No_date    6:25   78.96
01459>             overflow <= 03:P3OVF         24.75    7.677 No_date    6:25   78.96
01460>      {MxStoUsed=.2904E+01, TotOvfVol=.1954E+01, N-Ovf=    3, TotDurOvf=    1.hrs
01461>  013:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01462>      ADD HYD           02:P3out         69.53    1.750 No_date    6:25   78.96
01463>                      +  03:P3OVF         24.75    7.677 No_date    6:25   78.96
01464>       [DT= 5.00]  SUM=  08:500           94.28    9.427 No_date    6:25   78.96
01465>  013:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01466>      SAVE HYD          08:500           94.28    9.427 No_date    6:25   78.96
01467>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-500.013
01468>       remark:South Pond @ Carp River
01469>  013:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01470>      ADD HYD           08:500           94.28    9.427 No_date    6:25   78.96
01471>                      +  09:101-2         154.85    5.563 No_date    7:05   81.87
01472>       [DT= 5.00]  SUM=  10:2054          249.13   14.759 No_date    6:55   80.76
01473>  013:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01474>      SAVE HYD          10:2054          249.13   14.759 No_date    6:55   80.76
01475>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2054.013
01476>       remark:HEC-RAS Inflow Node 2054 / Station 44751
01477>  013:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01478>      CONTINUOUS STANDHYD01:P2             23.14    3.377 No_date    6:05   82.45
01479>       [XIMP=.47:TIMP=.59]
01480>       [LOSS= 2 :CN= 80.5]
01481>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
01482>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
01483>       [IaRECimp=   2.00: IaRECper=   4.00]
01484>       [SMIN= 26.32: SMAX=175.50: SK=1.000]
01485>  013:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01486>      COMPUTE DUALHYD    01:P2             23.14    3.377 No_date    6:05   82.45
01487>         Major System /  02:P2maj           .28     .408 No_date    6:20   82.45
01488>         Minor System \  03:P2min         22.86    2.310 No_date    5:55   82.67
01489>       {MjSysSto=.1157E+04, TotOvfVol=.2311E+03, N-Ovf=    1, TotDurOvf=    0.hrs
01490>  013:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01491>      CONTINUOUS NASHYD  04:SWM2           .99     .136 No_date    6:05   73.10
01492>       [CN= 90.0: N= 2.00]
01493>       [Tp=  .25:DT= 5.00]
01494>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
01495>       [InterEventTime=  12.00]
01496>  013:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01497>      ADD HYD           02:P2maj           .28     .408 No_date    6:20   82.45
01498>                      +  03:P2min         22.86    2.310 No_date    5:55   82.67
01499>                      +  04:SWM2           .99     .136 No_date    6:05   73.10
01500>       [DT= 5.00]  SUM=  01:P2in          24.13    2.831 No_date    6:20   82.28
01501>  013:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01502>      ROUTE RESERVOIR -> 01:P2in          24.13    2.831 No_date    6:20   82.28
01503>       [RDT= 5.00] out<- 02:P2out         18.58     .700 No_date    6:20   82.28
01504>             overflow <= 03:P2OVF          5.55    2.065 No_date    6:20   82.28
01505>      {MxStoUsed=.6739E+00, TotOvfVol=.4564E+00, N-Ovf=    1, TotDurOvf=    1.hrs
01506>  013:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01507>      ADD HYD           02:P2out         18.58     .700 No_date    6:20   82.28
01508>                      +  03:P2OVF          5.55    2.065 No_date    6:20   82.28
01509>       [DT= 5.00]  SUM=  06:PND2          24.13    2.765 No_date    6:20   82.28
01510>  013:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01511>      SAVE HYD          06:PND2          24.13    2.765 No_date    6:20   82.28
01512>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-PND2.013
01513>       remark:POND2-outflow/overflow
01514>  013:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01515>      CONTINUOUS NASHYD  04:CRFP           24.18    1.865 No_date    6:30   65.86
01516>       [CN= 82.0: N= 2.00]
01517>       [Tp=  .50:DT= 5.00]
01518>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
01519>       [InterEventTime=  12.00]
01520>  013:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01521>      CONTINUOUS STANDHYD05:28            12.50    1.740 No_date    6:00   57.94
01522>       [XIMP=.38:TIMP=.45]
01523>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
01524>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
01525>       [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
01526>       [IaRECimp=   2.00: IaRECper=   4.00]
01527>  013:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01528>      ADD HYD           04:CRFP           24.18    1.865 No_date    6:30   65.86
01529>                      +  05:28            12.50    1.740 No_date    6:00   57.94
01530>                      +  06:PND2          24.13    2.765 No_date    6:20   82.28
01531>       [DT= 5.00]  SUM=  07:2065          60.81    5.780 No_date    6:20   70.75
01532>  013:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01533>      SAVE HYD          07:2065          60.81    5.780 No_date    6:20   70.75
01534>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-2065.013
01535>       remark:HEC-RAS Inflow Node 2065 / Station 44548
01536>  013:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01537>      CONTINUOUS STANDHYD05:100-1          61.17    4.569 No_date    6:05   57.94
01538>       [XIMP=.38:TIMP=.45]
01539>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
01540>       [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
01541>       [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
01542>       [IaRECimp=   2.00: IaRECper=   4.00]
01543>  013:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01544>      CONTINUOUS NASHYD  06:102-1          39.80    1.601 No_date    7:10   61.80
01545>       [CN= 78.0: N= 2.00]
01546>       [Tp= 1.10:DT= 5.00]
01547>       [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
01548>       [InterEventTime=  12.00]
01549>  013:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01550>      ADD HYD           05:100-1          61.17    4.569 No_date    6:05   57.94
01551>                      +  06:102-1          39.80    1.601 No_date    7:10   61.80
01552>       [DT= 5.00]  SUM=  10:3894          100.97    5.351 No_date    6:05   59.46
01553>  013:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01554>      SAVE HYD          10:3894          100.97    5.351 No_date    6:05   59.46
01555>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-3894.013
01556>       remark:HEC-RAS Inflow Node 3894 / Station 43966
01557>  013:0002----------------------------------------------------------------------
01558>       FINISH
01559> ----------------------------------------------------------------------------
01560> ****************************************************************************
01561>      WARNINGS / ERRORS / NOTES
01562>      -------------------------
01563>  013:0010 ROUTE RESERVOIR
01564>        *** WARNING: STORAGE-Q values were extrapolated.
01565>                     Increase curve or use overflow option.
01566>    Simulation ended on 2017-07-14     at 10:13:49
01567> ============================================================================
01568>
01569>
```

```
2
%*=============================================================================|
%*
%*   #####       INPUT FILE FOR CARP RIVER, CITY OF KANATA        #####
%*   #####  FERNBANK CDP: POST-DEVELOPMENT CONDITIONS - MAY 2009  #####
%*                  INCLUDES BEST MANAGEMENT PRACTICES
%*   #####       EVENT BASED MODELING (5 MINUTE TIMESTEP)         #####
%*
%*
%*   REFERENCE DRAINAGE AREA PLANS:
%*   ------------------------------
%*   FIGURE 8.1
%*=============================================================================|
*                           EVENT BASED SIMULATION
%*=============================================================================|
START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
                    C25mm-3.stm

READ STORM          STORM_FILENAME=["storm.001"]
%*=============================================================================|
DEFAULT VALUES      ICASEdef=[1],  read and print values
                    DEFVAL_FILENAME=["ottawa.def"]
*
COMPUTE API         API=[20], APIK=[0.9]/day
**********************************************************************************
%* LANDS UPSTREAM OF FERNBANK COMMUNITY (GRANITE RIDGE)
%* ----------------------------------------------------
READ HYD            ID=[9],  NHYD=["101-3"],
                    HYD_FILENAME=["H-101-3"]
%*-----------------|---------------------------------------------------------|
%* FERNBANK COMMUNITY LANDS TO CARP RIVER TRIBUTARY
%* (GLEN CAIRN SWMF OUTLET CHANNEL)
%* ------------------------------------------------
* HEADWATER P1
* **************
CONTINUOUS STANDHYD ID=[1], NHYD=["P1"], DT=[5](min), AREA=[77.13](ha),
                    XIMP=[0.45], TIMP=[0.70], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[78],
                    Pervious   surfaces: IAper=[5.2](mm), SLPP=[1.0](%),
                                         LGP=[40](m), MNP=[0.20], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                         LGI=[1400](m), MNI=[0.013], SCI=[0](min
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),  IaRECimp=[2](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs),   END=-1
*
*ROUTING OF PERFORATED PIPES
%*-----------------|---------------------------------------------------------|
DIVERT HYD          IDin=[1], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[2,"P1BMP1"/3,"P1STM1"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                                  QIDi      +     QIDii     =     QTOTAL
                         [  0.000     +     0.000     =     0.00    ]
                         [  0.048     +     0.203     =     0.25    ]
                         [  0.095     +     0.405     =     0.50    ]
                         [  0.143     +     0.608     =     0.75    ]
                         [  0.190     +     0.810     =     1.00    ]
                         [  0.285     +     1.215     =     1.50    ]
                         [  0.380     +     1.620     =     2.00    ]
                         [  0.475     +     2.025     =     2.50    ]
                         [  0.570     +     2.430     =     3.00    ]
                         [  0.760     +     3.240     =     4.00    ]
                         [  0.950     +     4.050     =     5.00    ]
                         [  1.140     +     4.860     =     6.00    ]
                         [  1.330     +     5.670     =     7.00    ]       end
*
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"P1BMP2"/5,"P1STM2"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                          QIDi      +     QIDii     =     QTOTAL
                    [ 0.000    +       0.000     =     0.00    ]
                    [ 0.016    +       0.032     =     0.05    ]
                    [  0.031     +     0.064    =      0.10    ]
                    [  0.047     +     0.095     =     0.14    ]
                    [  0.063     +     0.127     =     0.19    ]
                    [  0.094     +     0.191     =     0.29    ]
                    [  0.126     +     0.254     =     0.38    ]
                    [  0.157     +     0.318     =     0.48    ]
                    [  0.189     +     0.381     =     0.57    ]
                    [  0.252     +     0.508     =     0.76    ]
                    [  0.315     +     0.635     =     0.95    ]
                    [  0.378     +     0.762     =     1.14    ]
                    [  0.441     +     0.889     =     1.33    ]       end
*
ROUTE RESERVOIR     IDout=[7],   NHYD=["P1BMP3"],  IDin=[4],
                    RDT=[5](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [  0.0   , 0.0    ]
                                  [  0.005  , 0.0086 ]
                                  [  0.007  , 0.0172 ]
                                  [  0.008  , 0.0258 ]
                                  [  0.009  , 0.0344 ]
                                  [  0.0108 , 0.0430 ]
                                  [   -1    ,  -1    ]  (max twenty pts)
                           IDovf=[8], NHYDovf=["P1STM3"]
%*-----------------|---------------------------------------------------------|
COMPUTE DUALHYD     IDin=[3], CINLET=[7.71](cms), NINLET=[1],
                    MAJID=[1], MajNHYD=["P1maj"],
                    MINID=[2], MinNHYD=["P1min"],
                    TMJSTO=[3857](cu-m)
*
CONTINUOUS NASHYD   ID=[7], NHYD=["SWM1"] DT=[5]min, AREA=[4.50](ha),
                    DWF= 0  CN= 90  IA= 9.8  N=2  TP=0.25
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs)
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] ,
                    InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
                    VHydCond=[10](mm/hr),   END=-1
*
ADD HYD             IDsum=[10], NHYD=["P1in"], IDs to add=[1,2,5,7,8,9]
*
ROUTE RESERVOIR     IDout=[2],   NHYD=["P1SWM"],  IDin=[10],
                    RDT=[5](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [  0.000 , 0.000 ]
                                  [  0.050 , 0.499 ]
                                  [  1.500 , 2.030 ]
                                  [  2.500 , 2.810 ]
                                  [  4.500 , 2.920 ]
                                  [  4.800 , 3.500 ]
                                  [  5.000 , 3.930 ]
                                  [  5.300 , 4.500 ]
                                  [    -1  ,   -1  ](max twenty pts)
*
CONTINUOUS NASHYD   ID=[3], NHYD=["CRTRIB"] DT=[5]min, AREA=[3.69](ha),
                    DWF= 0  CN= 82  IA= 9.8  N=2  TP=0.25
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs)
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] ,
                    InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
                    VHydCond=[10](mm/hr),   END=-1
*
* CARP RIVER TRIBUTARY AT CARP RIVER
* ----------------------------------
ADD HYD             IDsum=[9], NHYD=["B101-2"], IDs to add=[2,3]
*
*SAVE HYD            ID=[9],   # OF PCYCLES=[1],  ICASEsh=[1]
*                    HYD_COMMENT=["Carp Tributary @ Carp River - XP2054"]
%*-----------------|---------------------------------------------------------|
* FERNBANK COMMUNITY LANDS TO SOUTH TRIBUTARY
* (CHANNEL FLOWING NORTH ADJACENT TO GLEN CAIRN POND)
* -------------------------------------------------
* SOUTH POND P3
* 10yr control
* **************
CONTINUOUS STANDHYD ID=[1], NHYD=["P3"], DT=[5](min), AREA=[91.68](ha),
                    XIMP=[0.34], TIMP=[0.43], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[78],
                    Pervious   surfaces: IAper=[5.2](mm), SLPP=[1.0](%),
                                         LGP=[40](m), MNP=[0.20], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                         LGI=[1400](m), MNI=[0.013], SCI=[0](min
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),  IaRECimp=[2](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs),   END=-1
*
*ROUTING OF PERFORATED PIPES
%*-----------------|---------------------------------------------------------|
DIVERT HYD          IDin=[1], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[2,"P3BMP1"/3,"P3STM1"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                        QIDi      +     QIDii     =     QTOTAL
                        [       0.000     +     0.000     =     0.00    ]
                        [       0.065     +     0.194     =     0.25    ]
                        [       0.130     +     0.387     =     0.50    ]
                        [       0.195     +     0.581     =     0.75    ]
                        [       0.260     +     0.774     =     1.00    ]
                        [       0.390     +     1.161     =     1.50    ]
                        [   0.520         +     1.548     =     2.00    ]
                        [       0.650     +     1.935     =     2.50    ]
                        [       0.780     +     2.322     =     3.00    ]
                        [       1.040     +     3.096     =     4.00    ]
                        [       1.300     +     3.870     =     5.00    ]
                        [       1.560     +     4.644     =     6.00    ]
                        [       1.820     +     5.418     =     7.00    ] end
*
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"P3BMP2"/5,"P3STM2"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                          QIDi      +     QIDii     =     QTOTAL
                        [       0.000     +     0.000     =     0.00    ]
                        [       0.022     +     0.043     =     0.07    ]
                        [       0.043     +     0.087     =     0.13    ]
                        [       0.065     +     0.130     =     0.20    ]
                        [       0.086     +     0.174    =      0.26    ]
                        [       0.129     +     0.261     =     0.39    ]
                        [       0.172     +     0.348     =     0.52    ]
                        [       0.215     +     0.435     =     0.65    ]
                        [       0.259     +     0.521     =     0.78    ]
                        [       0.345     +     0.695     =     1.04    ]
                        [       0.431     +     0.869     =     1.30    ]
                        [       0.517     +     1.043     =     1.56    ]
                        [       0.603     +     1.217     =     1.82    ] end
%*-----------------|---------------------------------------------------------|
ROUTE RESERVOIR     IDout=[7],   NHYD=["P3BMP3"],  IDin=[4],
                    RDT=[5](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms)    -      (ha-m)
                                  [  0.000  ,  0.000  ]
                                  [ 0.0054  ,  0.0093 ]
                                  [ 0.0070  ,  0.0186 ]
                                  [ 0.0085  ,  0.0280 ]
                                  [ 0.0101  ,  0.0373 ]
                                  [ 0.0117  ,  0.0466 ]
                                  [   -1    ,   -1    ]
                           IDovf=[8], NHYDovf=["P3STM3"]
%*-----------------|---------------------------------------------------------|
COMPUTE DUALHYD     IDin=[3], CINLET=[5.20](cms), NINLET=[1],
                    MAJID=[1], MajNHYD=["P3maj"],
                    MINID=[2], MinNHYD=["P3min"],
                    TMJSTO=[4250](cu-m)
*
CONTINUOUS NASHYD   ID=[7], NHYD=["SWM3"] DT=[5]min, AREA=[2.60](ha),
                    DWF= 0  CN= 82  IA= 9.8  N=2  TP=0.25
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs)
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] ,
                    InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
                    VHydCond=[10](mm/hr),   END=-1
*
ADD HYD             IDsum=[10], NHYD=["P3in"], IDs to add=[1,2,5,7,8]
*
ROUTE RESERVOIR     IDout=[2],   NHYD=["P3SWM"],  IDin=[10],
                    RDT=[5](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [  0.000 , 0.000 ]
                                  [  0.050 , 0.427 ]
                                  [  0.300 , 1.568 ]
                                  [  0.800 , 2.120 ]
                                  [  1.750 , 2.905 ]
                                  [   -1   ,   -1  ]   (max twenty pts)
                           IDovf=[3], NHYDovf=["P3OVF"]
*
* SOUTH POND (P3) AT CARP RIVER
* -----------------------------
ADD HYD             IDsum=[8], NHYD=["B500"], IDs to add=[2,3]
*
*SAVE HYD            ID=[8],   # OF PCYCLES=[1],  ICASEsh=[1]
*                    HYD_COMMENT=["South Pond @ Carp River"]
%*-----------------|---------------------------------------------------------|
* HEC-RAS inflow hydrograph @ 44751
* NODE 2054
* ---------------------------------
ADD HYD             IDsum=[10], NHYD=["B2054"], IDs to add=[8,9]
*
SAVE HYD            ID=[10],   # OF PCYCLES=[1],  ICASEsh=[1]
                    HYD_COMMENT=["HEC-RAS Inflow Node 2054 / Station 44751"]
%*-----------------|---------------------------------------------------------|
%* LAND DRAINING TO CARP RIVER @ HAZELDEAN RD (Section 44548)
%* (28/35/36)
%* ---------------------------------------------------------------------
* NORTH POND P2
```

```
* 10yr control
***************
CONTINUOUS STANDHYD ID=[1], NHYD=["P2"], DT=[5](min), AREA=[23.14](ha),
                    XIMP=[0.47], TIMP=[0.59], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[78],
                    Pervious   surfaces: IAper=[5.2](mm), SLPP=[1.0](%),
                                         LGP=[40](m), MNP=[0.20], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                         LGI=[1400](m), MNI=[0.013], SCI=[0](min
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),  IaRECimp=[2](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs),   END=-1
*
DIVERT HYD          IDin=[1], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[2,"P2BMP1"/3,"P2STM1"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                                  QIDi       +     QIDii     =     QTOTAL
                        [   0.000     +     0.000     =     0.00    ]
                        [   0.048     +     0.203     =     0.25    ]
                        [   0.095     +     0.405     =     0.50    ]
                        [   0.143     +     0.608     =     0.75    ]
                        [   0.190     +     0.810     =     1.00    ]
                        [   0.285     +     1.215     =     1.50    ]
                        [   0.380     +     1.620     =     2.00    ]
                        [   0.475     +     2.025     =     2.50    ]
                        [   0.570     +     2.430     =     3.00    ]
                        [   0.760     +     3.240     =     4.00    ]
                        [   0.950     +     4.050     =     5.00    ]
                        [   1.140     +     4.860     =     6.00    ]
                        [   1.330     +     5.670     =     7.00    ] end
*
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"P2BMP2"/5,"P2STM2"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                                  QIDi       +     QIDii     =     QTOTAL
                        [  0.000      +     0.000     =     0.00    ]
                        [  0.016      +     0.032     =     0.05    ]
                        [  0.031      +     0.064     =     0.10    ]
                        [  0.047      +     0.095     =     0.14    ]
                        [  0.063      +     0.127     =     0.19    ]
                        [  0.094      +     0.191     =     0.29    ]
                        [  0.126      +     0.254     =     0.38    ]
                        [  0.157      +     0.318     =     0.48    ]
                        [  0.189      +     0.381     =     0.57    ]
                        [  0.252      +     0.508     =     0.76    ]
                        [  0.315      +     0.635     =     0.95    ]
                        [  0.378      +     0.762     =     1.14    ]
                        [  0.441      +     0.889     =     1.33    ] end
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR     IDout=[7],   NHYD=["P2BMP3"],  IDin=[4],
                    RDT=[5](min),
                         TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms)  - (ha-m)
                                  [  0.000  , 0.000  ]
                                  [  0.0015 ,     0.0025 ]
                                  [  0.0019 ,     0.0051 ]
                                  [  0.0023 ,     0.0076 ]
                                  [  0.0027 ,     0.0101 ]
                                  [  0.0032 ,     0.0127 ]
                                  [    -1   ,   -1       ]
                          IDovf=[8], NHYDovf=["P2STM3"]
*%-----------------|-------------------------------------------------------|
COMPUTE DUALHYD     IDin=[3], CINLET=[1.79](cms), NINLET=[1],
                    MAJID=[1], MajNHYD=["P2maj"],
                    MINID=[2], MinNHYD=["P2min"],
                    TMJSTO=[1157](cu-m)
*
CONTINUOUS NASHYD   ID=[7], NHYD=["SWM2"] DT=[5]min, AREA=[0.99](ha),
                    DWF= 0  CN= 90  IA= 9.8  N=2  TP=0.25
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs)
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] ,
                    InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
                    VHydCond=[10](mm/hr),   END=-1
*
ADD HYD             IDsum=[10], NHYD=["P2in"], IDs to add=[1,2,5,7,8]
*
ROUTE RESERVOIR     IDout=[2],   NHYD=["P2out"],  IDin=[10],
                    RDT=[5](min),
                         TABLE of ( OUTFLOW-STORAGE ) values
                         TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [  0.000 , 0.000 ]
                                  [  0.030 , 0.130 ]
                                  [  0.150 , 0.277 ]
                                  [  0.350 , 0.441 ]
                                  [  0.700 , 0.675 ]
                                  [   -1   ,   -1  ] (max twenty pts)
                          IDovf=[3], NHYDovf=["P2OVF"]
*
ADD HYD             IDsum=[6], NHYD=["PND2"], IDs to add=[2,3]
*
CONTINUOUS NASHYD   ID=[4], NHYD=["CRFP"] DT=[5]min, AREA=[24.18](ha),
                    DWF= 0  CN= 82  IA= 9.8  N=2  TP=0.50
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs)
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] ,
                    InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
                    VHydCond=[10](mm/hr),   END=-1
*
CONTINUOUS STANDHYD ID=[5], NHYD=["28"], DT=[5](min), AREA=[12.5](ha),
                    XIMP=[0.38], TIMP=[0.45], DWF=[0](cms), LOSS=[1],
                    Horton: Fo=[76.2](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                    LGP=[205](m), MNP=[0.10], SCP=[0](min),
                    Impervious surfaces:IAimp=[1.57](mm), SLPI=[1.0](%),
                                        LGI=[700](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),  IaRECimp=[2](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs),   END=-1
*
* NORTH POND (P2) AT CARP RIVER
* HEC-RAS inflow hydrograph @ 44548
* NODE 2065
* (INCLUDES 24.18 HA OF CARP RIVER FLOODPLAIN)
* (INCLUDES 12.50 HA OF WEST CREEK MEADOWS)
* ---------------------------------------
ADD HYD             IDsum=[7], NHYD=["B2065"], IDs to add=[4,5,6]
*
SAVE HYD            ID=[7],   # OF PCYCLES=[1],  ICASEsh=[1]
                    HYD_COMMENT=["HEC-RAS Inflow Node 2065 / Station 44548"]
*%-----------------|-------------------------------------------------------|
*% LANDS UPSTREAM OF HAZELDEAN ROAD TRIBUTARY TO HAZELDEAN CREEK
*% (INCLUDES NORTHWEST CORNER OF FERNBANK CDP LANDS)
*% ------------------------------------------------------------
CONTINUOUS STANDHYD ID=[5], NHYD=["100-1"], DT=[5](min), AREA=[61.17](ha),
                    XIMP=[0.38], TIMP=[0.45], DWF=[0](cms), LOSS=[1],
                    Horton: Fo=[76.2](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.8](%),
                    LGP=[1200](m), MNP=[0.10], SCP=[0](min),
                    Impervious surfaces:IAimp=[1.57](mm), SLPI=[0.8](%),
                                        LGI=[1700](m), MNI=[0.013], SCI=[0](min)
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),  IaRECimp=[2](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs),   END=-1
*%-----------------|-------------------------------------------------------|
*% LANDS NORTH OF HAZELDEAN ROAD - TO HAZELDEAN CREEK
*% (USED IN MODEL CALIBRATION)
*% ------------------------------------------------
CONTINUOUS NASHYD   ID=[6], NHYD=["102-1"], DT=[5]min, AREA=[39.8](ha),
                    DWF=[0](cms),  CN/C=[78], IA=[9.8](mm),
                    N=[2], TP=[1.10]hrs
                    Continuous simulation parameters:
                    IaRECper=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[1]/(mm),
                    InterEventTime=[12](hrs)
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] ,
                    InitGWResVol=[0](mm), GWResK=[4](mm/day/mm)
                    VHydCond=[10](mm/hr),   END=-1
*%-----------------|-------------------------------------------------------|
* HEC-RAS inflow hydrograph @ 43966
* (Hazeldean Creek @ Carp River)
* --------------------------------
ADD HYD             IDsum=[10], NHYD=["B3894"], IDs to add=[5,6]
*
SAVE HYD            ID=[10],   # OF PCYCLES=[1],  ICASEsh=[1]
                    HYD_COMMENT=["HEC-RAS Inflow Node 3894 / Station 43966"]
*%-----------------|-------------------------------------------------------|
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*                    S2-24.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*                    S5-24.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*                    S10-24.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*                    S25-24.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*                    S50-24.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
*                    S100-24.stm
*%-----------------|-------------------------------------------------------|
START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[8]
                    S2-12.stm
START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[9]
                    S5-12.stm
START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[10]
                    S10-12.stm
START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[11]
                    S25-12.stm
START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[12]
                    S50-12.stm
START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[13]
                    S100-12.stm
*%-----------------|-------------------------------------------------------|
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[14]
*                    C2-3.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[15]
*                    C5-3.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[16]
*                    C10-3.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[17]
*                    C25-3.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[18]
*                    C50-3.stm
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[19]
*                    C100-3.stm
*%-----------------|-------------------------------------------------------|
*START               TZERO=[0],  METOUT=[2],  NSTORM=[1],  NRUN=[20]
*                    C25mm-3.stm
*%-----------------|-------------------------------------------------------|
FINISH
```

00541>

```
00001> ================================================================================
00002>
00003>   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
00004>   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
00006>       S  W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
00007>   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
00008>                                                          9   9  9   9   # 5320763
00009>         StormWater Management HYdrologic Model            999    999    =========
00010>
00011> ********************************************************************************
00012> ************************** SWMHYMO Ver/4.05  ***************************
00013> *********  A single event and continuous hydrologic simulation model  *********
00014> *********     based on the principles of HYMO and its successors      *********
00015> *********                    OTTHYMO-83 and OTTHYMO-89.                *********
00016> ********************************************************************************
00017> ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
00018> *********                  Ottawa,  Ontario: (613) 836-3884           *********
00019> *********                  Gatineau, Quebec: (819) 243-6858           *********
00020> *********                  E-Mail: swmhymo@jfsa.com                   *********
00021> ********************************************************************************
00022>
00023> +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024> +++++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD         +++++++++
00025> +++++++++                  Nepean               SERIAL#:5320763       +++++++++
00026> +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028> ********************************************************************************
00029> *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
00030> *********           Maximum value for ID numbers  :     10            *********
00031> *********           Max. number of rainfall points: 105408            *********
00032> *********           Max. number of flow points    : 105408            *********
00033> ********************************************************************************
00034>
00035> ***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) *****
00036> *****-------------------------------------------------------------------------*****
00037> *****    ID:  Hydrograph IDentification numbers, (1-10).                  *****
00038> *****  NHYD:  Hydrograph reference numbers, (6 digits or characters).     *****
00039> *****  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).   *****
00040> ***** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).     *****
00041> ***** TpeakDate_hh:mm is the date and time of the peak flow.               *****
00042> *****  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).       *****
00043> *****  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).       *****
00044> *****    *:  see WARNING or NOTE message printed at end of run.          *****
00045> *****   **:  see  ERROR  message printed at end of run.                  *****
00046> ********************************************************************************
00047> ********************************************************************************
00048>
00049> ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
00050>
00051> ********************************************************************************
00052>
00053> **********************   S U M M A R Y   O U T P U T   **********************
00054> ********************************************************************************
00055> *          DATE: 2017-07-14     TIME: 11:39:06      RUN COUNTER: 000744        *
00056> ********************************************************************************
00057> * Input   filename: M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\CR-BMPe5.dat*
00058> * Output  filename: M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\CR-BMPe5.out*
00059> * Summary filename: M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\CR-BMPe5.sum*
00060> * User comments:                                                            *
00061> * 1:_______________________________________________________________________*
00062> * 2:_______________________________________________________________________*
00063> * 3:_______________________________________________________________________*
00064> ********************************************************************************
00065>
00066>
00067>  RUN:COMMAND#
00068>  001:0001----------------------------------------------------------------------
00069>      START
00070>       [TZERO =    .00 hrs on        0]
00071>       [METOUT=   2    (1=imperial, 2=metric output)]
00072>       [NSTORM=   1 ]
00073>       [NRUN  =   1 ]
00074>  001:0002----------------------------------------------------------------------
00075>      READ STORM
00076>       Filename = storm.001
00077>       Comment  =
00078>       [SDT=10.00:SDUR=   3.00:PTOT=  25.00]
00079>  001:0003----------------------------------------------------------------------
00080>      DEFAULT VALUES
00081>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
00082>       ICASEdv  = 1 (read and print data)
00083>       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
00084>                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
00085>       Horton's infiltration equation parameters:
00086>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
00087>       Parameters for PERVIOUS surfaces in STANDHYD:
00088>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00089>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00090>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00091>       Parameters used in NASHYD:
00092>       [Ia=   4.67 mm] [N= 2.00]
00093>  001:0004----------------------------------------------------------------------
00094>      COMPUTE API
00095>       [APIini= 20.00: APIkdy= .9000: APIkdt= .9993]
00096>       {APImax= 44.55: APIavg= 33.46: APImin= 20.35}
00097>  001:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00098>      READ HYD            09:101-3        69.53     .605 No_date    2:30   14.68
00099>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.001
00100>       Comment  = GRANITE RIDGE AREA 101-3
00101>  001:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00102>      CONTINUOUS STANDHYD01:P1             77.13    2.977 No_date    1:30   17.57
00103>       [XIMP=.45:TIMP=.70]
00104>       [LOSS= 2 :CN= 78.0]
00105>       [Pervious    area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00106>       [Impervious  area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00107>       [IaRECimp=   2.00: IaRECper=   4.00]
00108>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00109>  001:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00110>      DIVERT HYD      -> 01:P1             77.13    2.977 No_date    1:30   17.57
00111>            diverted <= 02:P1BMP1         14.67     .566 No_date    1:30   17.57
00112>            diverted <= 03:P1STM1         62.49    2.411 No_date    1:30   17.57
00113>  001:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00114>      DIVERT HYD      -> 02:P1BMP1         14.67     .566 No_date    1:30   17.57
00115>            diverted <= 04:P1BMP2          4.81     .187 No_date    1:30   17.57
00116>            diverted <= 05:P1STM2          9.73     .378 No_date    1:30   17.57
00117>  001:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00118>      ROUTE RESERVOIR -> 04:P1BMP2          4.81     .187 No_date    1:30   17.57
00119>       [RDT= 5.00] out<- 07:P1BMP3          3.10     .011 No_date    1:55   17.57
00120>            overflow <= 08:P1STM3          1.71     .132 No_date    1:55   17.57
00121>     {MxStoUsed=.4299E-01, TotOvfVol=.3001E-01, N-Ovf=    3, TotDurOvf=    2.hrs
00122>  001:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00123>      COMPUTE DUALHYD    03:P1STM1         62.49    2.411 No_date    1:30   17.57
00124>         Major System /  01:P1maj           .00     .000 No_date    0:00     .00
00125>           Minor System \  02:P1min         62.49    2.411 No_date    1:30   17.57
00126>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00127>  001:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00128>      CONTINUOUS NASHYD  07:SWM1           4.50     .079 No_date    1:35    8.24
00129>       [CN= 90.0: N= 2.00]
00130>       [Tp=  .25:DT= 5.00]
00131>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00132>       [InterEventTime=  12.00]
00133>  001:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00134>      ADD HYD             01:P1maj          .00     .000 No_date    0:00     .00
00135>                        +  02:P1min         62.49    2.411 No_date    1:30   17.57
00136>                        +  05:P1STM2         9.73     .378 No_date    1:30   17.57
00137>                        +  07:SWM1           4.50     .079 No_date    1:35    8.24
00138>                        +  08:P1STM3         1.71     .132 No_date    1:55   17.57
00139>                        +  09:101-3         69.53     .605 No_date    2:30   14.68
00140>      [DT= 5.00]  SUM=  10:P1in           147.95    3.262 No_date    1:35   15.93
00141>  001:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00142>      ROUTE RESERVOIR -> 10:P1in           147.95    3.262 No_date    1:35   15.93
00143>       [RDT= 5.00] out<- 02:P1SWM          147.95     .819 No_date    3:30   15.93
00144>       {MxStoUsed=.1311E+01}
00145>  001:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00146>      CONTINUOUS NASHYD  03:CRTRIB          3.69     .045 No_date    1:35    5.93
00147>       [CN= 82.0: N= 2.00]
00148>       [Tp=  .25:DT= 5.00]
00149>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00150>       [InterEventTime=  12.00]
00151>  001:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00152>      ADD HYD             02:P1SWM          147.95     .819 No_date    3:30   15.93
00153>                        +  03:CRTRIB         3.69     .045 No_date    1:35    5.93
00154>      [DT= 5.00]  SUM=  09:B101-2         151.64     .824 No_date    3:30   15.68
00155>  001:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00156>      CONTINUOUS STANDHYD01:P3              91.68    2.507 No_date    1:30   13.96
00157>       [XIMP=.34:TIMP=.43]
00158>       [LOSS= 2 :CN= 78.0]
00159>       [Pervious    area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00160>       [Impervious  area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00161>       [IaRECimp=   2.00: IaRECper=   4.00]
00162>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00163>  001:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00164>      DIVERT HYD      -> 01:P3              91.68    2.507 No_date    1:30   13.96
00165>            diverted <= 02:P3BMP1          23.84     .652 No_date    1:30   13.96
00166>            diverted <= 03:P3STM1          70.98    1.940 No_date    1:30   13.96
00167>  001:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00168>      DIVERT HYD      -> 02:P3BMP1          23.84     .652 No_date    1:30   13.96
00169>            diverted <= 04:P3BMP2           7.84     .216 No_date    1:30   13.96
00170>            diverted <= 05:P3STM2          15.81     .436 No_date    1:30   13.96
00171>  001:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00172>      ROUTE RESERVOIR -> 04:P3BMP2           7.84     .216 No_date    1:30   13.96
00173>       [RDT= 5.00] out<- 07:P3BMP3           4.35     .012 No_date    1:55   13.96
00174>            overflow <= 08:P3STM3           3.49     .168 No_date    1:55   13.96
00175>     {MxStoUsed=.4659E-01, TotOvfVol=.4873E-01, N-Ovf=    3, TotDurOvf=    2.hrs
00176>  001:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00177>      COMPUTE DUALHYD    03:P3STM1         70.98    1.940 No_date    1:30   13.96
00178>         Major System /  01:P3maj           .00     .000 No_date    0:00     .00
00179>           Minor System \  02:P3min         70.98    1.940 No_date    1:30   13.96
00180>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00181>  001:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00182>      CONTINUOUS NASHYD  07:SWM3           2.60     .031 No_date    1:35    5.93
00183>       [CN= 82.0: N= 2.00]
00184>       [Tp=  .25:DT= 5.00]
00185>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00186>       [InterEventTime=  12.00]
00187>  001:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00188>      ADD HYD             01:P3maj          .00     .000 No_date    0:00     .00
00189>                        +  02:P3min         70.98    1.940 No_date    1:30   13.96
00190>                        +  05:P3STM2        15.81     .436 No_date    1:30   13.96
00191>                        +  07:SWM3           2.60     .031 No_date    1:35    5.93
00192>                        +  08:P3STM3         3.49     .168 No_date    1:55   13.96
00193>      [DT= 5.00]  SUM=  10:P3in            92.88    2.407 No_date    1:30   13.74
00194>  001:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00195>      ROUTE RESERVOIR -> 10:P3in           92.88    2.407 No_date    1:30   13.74
00196>       [RDT= 5.00] out<- 02:P3SWM          92.88     .198 No_date    3:55   13.74
00197>            overflow <= 03:P3OVF           .00     .000 No_date    0:00     .00
00198>     {MxStoUsed=.1104E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00199>  001:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00200>      ADD HYD             02:P3SWM          92.88     .198 No_date    3:55   13.74
00201>                        +  03:P3OVF           .00     .000 No_date    0:00     .00
00202>      [DT= 5.00]  SUM=  08:B500            92.88     .198 No_date    3:55   13.74
00203>  001:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00204>      ADD HYD             08:B500          92.88     .198 No_date    3:55   13.74
00205>                        +  09:B101-2       151.64     .824 No_date    3:30   15.68
00206>      [DT= 5.00]  SUM=  10:B2054           244.53    1.020 No_date    3:30   14.94
00207>  001:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00208>      SAVE HYD            10:B2054         244.53    1.020 No_date    3:30   14.94
00209>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2054.001
00210>       remark:HEC-RAS Inflow Node 2054 / Station 44751
00211>  001:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00212>      CONTINUOUS STANDHYD01:P2              23.14     .815 No_date    1:30   16.30
00213>       [XIMP=.47:TIMP=.59]
00214>       [LOSS= 2 :CN= 78.0]
00215>       [Pervious    area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00216>       [Impervious  area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00217>       [IaRECimp=   2.00: IaRECper=   4.00]
00218>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00219>  001:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00220>      DIVERT HYD      -> 01:P2              23.14     .815 No_date    1:30   16.30
00221>            diverted <= 02:P2BMP1           4.42     .155 No_date    1:30   16.30
00222>            diverted <= 03:P2STM1          18.76     .661 No_date    1:30   16.30
00223>  001:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00224>      DIVERT HYD      -> 02:P2BMP1           4.42     .155 No_date    1:30   16.30
00225>            diverted <= 04:P2BMP2           1.43     .052 No_date    1:30   16.30
00226>            diverted <= 05:P2STM2           2.89     .105 No_date    1:30   16.30
00227>  001:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00228>      ROUTE RESERVOIR -> 04:P2BMP2           1.43     .052 No_date    1:30   16.30
00229>       [RDT= 5.00] out<- 07:P2BMP3            .99     .003 No_date    2:00   16.30
00230>            overflow <= 08:P2STM3           .44     .031 No_date    2:00   16.30
00231>     {MxStoUsed=.1270E-01, TotOvfVol=.7103E-02, N-Ovf=    3, TotDurOvf=    2.hrs
00232>  001:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00233>      COMPUTE DUALHYD    03:P2STM1          18.76     .661 No_date    1:30   16.30
00234>         Major System /  01:P2maj           .00     .000 No_date    0:00     .00
00235>           Minor System \  02:P2min         18.76     .661 No_date    1:30   16.30
00236>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00237>  001:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00238>      CONTINUOUS NASHYD  07:SWM2            .99     .017 No_date    1:35    8.24
00239>       [CN= 90.0: N= 2.00]
00240>       [Tp=  .25:DT= 5.00]
00241>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00242>       [InterEventTime=  12.00]
00243>  001:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00244>      ADD HYD             01:P2maj          .00     .000 No_date    0:00     .00
00245>                        +  02:P2min         18.76     .661 No_date    1:30   16.30
00246>                        +  05:P2STM2         2.89     .105 No_date    1:30   16.30
00247>                        +  07:SWM2            .99     .017 No_date    1:35    8.24
00248>                        +  08:P2STM3          .44     .031 No_date    2:00   16.30
00249>      [DT= 5.00]  SUM=  10:P2in            23.08     .783 No_date    1:30   15.96
00250>  001:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00251>      ROUTE RESERVOIR -> 10:P2in           23.08     .783 No_date    1:30   15.96
00252>       [RDT= 5.00] out<- 02:P2out          23.08     .145 No_date    3:15   15.96
00253>            overflow <= 03:P2OVF           .00     .000 No_date    0:00     .00
00254>     {MxStoUsed=.2713E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00255>  001:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00256>      ADD HYD             02:P2out          23.08     .145 No_date    3:15   15.96
00257>                        +  03:P2OVF           .00     .000 No_date    0:00     .00
00258>      [DT= 5.00]  SUM=  06:PND2            23.08     .145 No_date    3:15   15.96
00259>  001:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00260>      CONTINUOUS NASHYD  04:CRFP           24.18     .196 No_date    2:00    5.93
00261>       [CN= 82.0: N= 2.00]
00262>       [Tp=  .50:DT= 5.00]
00263>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00264>       [InterEventTime=  12.00]
00265>  001:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00266>      CONTINUOUS STANDHYD05:28             12.50     .519 No_date    1:15   10.12
00267>       [XIMP=.38:TIMP=.45]
00268>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
00269>       [Pervious    area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
00270>       [Impervious  area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
```

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      [IaRECimp=   2.00: IaRECper=   4.00]
 001:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           04:CRFP          24.18     .196 No_date    2:00    5.93
                     +  05:28            12.50     .519 No_date    1:15   10.12
                     +  06:PND2          23.08     .145 No_date    3:15   15.96
      [DT= 5.00]  SUM=  07:B2065         59.76     .563 No_date    1:15   10.68
 001:0039---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD           07:B2065         59.76     .563 No_date    1:15   10.68
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2065.001
      remark:HEC-RAS Inflow Node 2065 / Station 44548
 001:0040---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:100-1         61.17    1.610 No_date    1:25   10.12
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 001:0041---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  06:102-1         39.80     .165 No_date    3:00    5.00
      [CN= 78.0: N= 2.00]
      [Tp= 1.10:DT= 5.00]
      [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
      [InterEventTime=  12.00]
 001:0042---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           05:100-1         61.17    1.610 No_date    1:25   10.12
                     +  06:102-1         39.80     .165 No_date    3:00    5.00
      [DT= 5.00]  SUM=  10:B3894        100.97    1.631 No_date    1:25    8.10
 001:0043---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD           10:B3894        100.97    1.631 No_date    1:25    8.10
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B3894.001
      remark:HEC-RAS Inflow Node 3894 / Station 43966
  ** END OF RUN :   7
 ************************************************************************************
 RUN:COMMAND#
 008:0001---------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2   (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   8 ]
 008:0002---------------------------------------------------------------------------
     READ STORM
      Filename = storm.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  42.34]
 008:0003---------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 2.00]
 008:0004---------------------------------------------------------------------------
     COMPUTE API
      [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
      [APImax= 60.24: APIavg= 39.87: APImin= 20.59]
 008:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     READ HYD           09:101-3         69.53    1.068 No_date    7:05   29.55
      Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.008
      Comment  = GRANITE RIDGE AREA 101-3
 008:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P1            77.13    3.895 No_date    6:15   33.72
      [XIMP=.45:TIMP=.70]
      [LOSS= 2 :CN= 78.0]
      [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 29.88: SMAX=199.22: SK=1.000]
 008:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     DIVERT HYD      -> 01:P1            77.13    3.895 No_date    6:15   33.72
           diverted <= 02:P1BMP1         14.68     .740 No_date    6:15   33.72
           diverted <= 03:P1STM1         62.50    3.155 No_date    6:15   33.72
 008:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     DIVERT HYD      -> 02:P1BMP1         14.68     .740 No_date    6:15   33.72
           diverted <= 04:P1BMP2          4.79     .245 No_date    6:15   33.72
           diverted <= 05:P1STM2          9.68     .495 No_date    6:15   33.72
 008:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 04:P1BMP2          4.79     .245 No_date    6:15   33.72
      [RDT= 5.00] out<- 07:P1BMP3          2.18     .011 No_date    6:15   33.72
                overflow <= 08:P1STM3      2.61     .233 No_date    6:20   33.72
     {MxStoUsed=.4299E-01, TotOvfVol=.8813E-01, N-Ovf=    3, TotDurOvf=   6.hrs
 008:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    03:P1STM1         62.50    3.155 No_date    6:15   33.72
        Major System /  01:P1maj           .00     .000 No_date    0:00     .00
        Minor System \  02:P1min         62.50    3.155 No_date    6:15   33.72
      {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  07:SWM1           4.50     .186 No_date    6:10   23.33
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
 008:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           01:P1maj           .00     .000 No_date    0:00     .00
                     +  02:P1min         62.50    3.155 No_date    6:15   33.72
                     +  05:P1STM2         9.68     .495 No_date    6:15   33.72
                     +  07:SWM1           4.50     .186 No_date    6:10   23.33
                     +  08:P1STM3         2.61     .233 No_date    6:20   33.72
                     +  09:101-3         69.53    1.068 No_date    7:05   29.55
      [DT= 5.00]  SUM=  10:P1in         148.83    4.847 No_date    6:15   31.46
 008:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 10:P1in         148.83    4.847 No_date    6:15   31.46
      [RDT= 5.00] out<- 02:P1SWM        148.83    1.533 No_date    8:15   31.46
     {MxStoUsed=.2056E+01}
 008:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  03:CRTRIB         3.69     .115 No_date    6:10   18.79
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 008:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           02:P1SWM        148.83    1.533 No_date    8:15   31.46
                     +  03:CRTRIB         3.69     .115 No_date    6:10   18.79
      [DT= 5.00]  SUM=  09:B101-2        152.52    1.552 No_date    8:10   31.15
 008:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P3            91.68    3.720 No_date    6:15   28.71
      [XIMP=.34:TIMP=.43]
      [LOSS= 2 :CN= 78.0]
      [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 29.88: SMAX=199.22: SK=1.000]
 008:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     DIVERT HYD      -> 01:P3            91.68    3.720 No_date    6:15   28.71
           diverted <= 02:P3BMP1         23.84     .967 No_date    6:15   28.71
           diverted <= 03:P3STM1         70.99    2.879 No_date    6:15   28.71
 008:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     DIVERT HYD      -> 02:P3BMP1         23.84     .967 No_date    6:15   28.71
           diverted <= 04:P3BMP2          7.82     .321 No_date    6:15   28.71
           diverted <= 05:P3STM2         15.69     .646 No_date    6:15   28.71
 008:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 04:P3BMP2          7.82     .321 No_date    6:15   28.71
      [RDT= 5.00] out<- 07:P3BMP3          2.82     .012 No_date    6:10   28.71
                overflow <= 08:P3STM3      5.00     .309 No_date    6:20   28.71
     {MxStoUsed=.4658E-01, TotOvfVol=.1436E+00, N-Ovf=    3, TotDurOvf=   6.hrs
 008:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    03:P3STM1         70.99    2.879 No_date    6:15   28.71
        Major System /  01:P3maj           .00     .000 No_date    0:00     .00
        Minor System \  02:P3min         70.99    2.879 No_date    6:15   28.71
      {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  07:SWM3           2.60     .081 No_date    6:10   18.79
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 008:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           01:P3maj           .00     .000 No_date    0:00     .00
                     +  02:P3min         70.99    2.879 No_date    6:15   28.71
                     +  05:P3STM2        15.69     .646 No_date    6:15   28.71
                     +  07:SWM3           2.60     .081 No_date    6:10   18.79
                     +  08:P3STM3         5.00     .309 No_date    6:20   28.71
      [DT= 5.00]  SUM=  10:P3in         94.28    3.907 No_date    6:15   28.44
 008:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 10:P3in         94.28    3.907 No_date    6:15   28.44
      [RDT= 5.00] out<- 02:P3SWM        94.28     .562 No_date    8:45   28.44
                overflow <= 03:P3OVF       .00     .000 No_date    0:00     .00
     {MxStoUsed=.1858E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           02:P3SWM         94.28     .562 No_date    8:45   28.44
                     +  03:P3OVF          .00     .000 No_date    0:00     .00
      [DT= 5.00]  SUM=  08:B500          94.28     .562 No_date    8:45   28.44
 008:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           08:B500          94.28     .562 No_date    8:45   28.44
                     +  09:B101-2       152.52    1.552 No_date    8:10   31.15
      [DT= 5.00]  SUM=  10:B2054        246.81    2.105 No_date    8:20   30.12
 008:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD           10:B2054         246.81    2.105 No_date    8:20   30.12
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2054.008
      remark:HEC-RAS Inflow Node 2054 / Station 44751
 008:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P2            23.14    1.088 No_date    6:15   31.82
      [XIMP=.47:TIMP=.59]
      [LOSS= 2 :CN= 78.0]
      [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 29.88: SMAX=199.22: SK=1.000]
 008:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     DIVERT HYD      -> 01:P2            23.14    1.088 No_date    6:15   31.82
           diverted <= 02:P2BMP1          4.42     .207 No_date    6:15   31.82
           diverted <= 03:P2STM1         18.76     .881 No_date    6:15   31.82
 008:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     DIVERT HYD      -> 02:P2BMP1          4.42     .207 No_date    6:15   31.82
           diverted <= 04:P2BMP2          1.43     .068 No_date    6:15   31.82
           diverted <= 05:P2STM2          2.89     .138 No_date    6:15   31.82
 008:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 04:P2BMP2          1.43     .068 No_date    6:15   31.82
      [RDT= 5.00] out<- 07:P2BMP3           .68     .003 No_date    6:15   31.82
                overflow <= 08:P2STM3       .75     .064 No_date    6:20   31.82
     {MxStoUsed=.1270E-01, TotOvfVol=.2382E-01, N-Ovf=    4, TotDurOvf=   6.hrs
 008:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    03:P2STM1         18.76     .881 No_date    6:15   31.82
        Major System /  01:P2maj           .00     .000 No_date    0:00     .00
        Minor System \  02:P2min         18.76     .881 No_date    6:15   31.82
      {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  07:SWM2            .99     .041 No_date    6:10   23.33
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
 008:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           01:P2maj           .00     .000 No_date    0:00     .00
                     +  02:P2min         18.76     .881 No_date    6:15   31.82
                     +  05:P2STM2         2.89     .138 No_date    6:15   31.82
                     +  07:SWM2            .99     .041 No_date    6:10   23.33
                     +  08:P2STM3          .75     .064 No_date    6:20   31.82
      [DT= 5.00]  SUM=  10:P2in          23.39    1.123 No_date    6:15   31.46
 008:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 10:P2in          23.39    1.123 No_date    6:15   31.46
      [RDT= 5.00] out<- 02:P2out         23.39     .310 No_date    7:30   31.46
                overflow <= 03:P2OVF       .00     .000 No_date    0:00     .00
     {MxStoUsed=.4080E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 008:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           02:P2out         23.39     .310 No_date    7:30   31.46
                     +  03:P2OVF          .00     .000 No_date    0:00     .00
      [DT= 5.00]  SUM=  06:PND2          23.39     .310 No_date    7:30   31.46
 008:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:CRFP          24.18     .494 No_date    6:35   18.79
      [CN= 82.0: N= 2.00]
      [Tp=  .50:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 008:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:28            12.50     .445 No_date    6:00   18.26
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 008:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           04:CRFP          24.18     .494 No_date    6:35   18.79
                     +  05:28            12.50     .445 No_date    6:00   18.26
                     +  06:PND2          23.39     .310 No_date    7:30   31.46
      [DT= 5.00]  SUM=  07:B2065         60.07     .888 No_date    6:35   23.62
 008:0039---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD           07:B2065         60.07     .888 No_date    6:35   23.62
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2065.008
      remark:HEC-RAS Inflow Node 2065 / Station 44548
 008:0040---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:100-1         61.17    1.647 No_date    6:10   18.26
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 008:0041---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  06:102-1         39.80     .404 No_date    7:25   16.64
      [CN= 78.0: N= 2.00]
      [Tp= 1.10:DT= 5.00]
      [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
      [InterEventTime=  12.00]
 008:0042---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD           05:100-1         61.17    1.647 No_date    6:10   18.26
                     +  06:102-1         39.80     .404 No_date    7:25   16.64
      [DT= 5.00]  SUM=  10:B3894        100.97    1.794 No_date    6:10   17.62
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00541>  008:0043--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00542>      SAVE HYD            10:B3894        100.97    1.794 No_date    6:10   17.62
00543>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B3894.008
00544>       remark:HEC-RAS Inflow Node 3894 / Station 43966
00545>    ** END OF RUN :   8
00546>
00547>  ************************************************************************
00548>
00549>
00550>
00551>
00552>
00553>  RUN:COMMAND#
00554>  009:0001--------------------------------------------------------------------------
00555>      START
00556>       [TZERO =    .00 hrs on        0]
00557>       [METOUT=   2    (1=imperial, 2=metric output)]
00558>       [NSTORM=   1 ]
00559>       [NRUN  =   9 ]
00560>  009:0002--------------------------------------------------------------------------
00561>      READ STORM
00562>       Filename = storm.001
00563>       Comment  =
00564>       [SDT=30.00:SDUR=  12.00:PTOT=  56.18]
00565>  009:0003--------------------------------------------------------------------------
00566>      DEFAULT VALUES
00567>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
00568>       ICASEdv  = 1 (read and print data)
00569>       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
00570>                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
00571>      Horton's infiltration equation parameters:
00572>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
00573>       Parameters for PERVIOUS surfaces in STANDHYD:
00574>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00575>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00576>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00577>       Parameters used in NASHYD:
00578>       [Ia=   4.67 mm] [N= 2.00]
00579>  009:0004--------------------------------------------------------------------------
00580>      COMPUTE API
00581>       [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
00582>       {APImax= 73.73: APIavg= 46.81: APImin= 20.80}
00583>  009:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00584>      READ HYD            09:101-3        69.53    1.597 No_date    6:55   42.20
00585>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.009
00586>       Comment  = GRANITE RIDGE AREA 101-3
00587>  009:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00588>      CONTINUOUS STANDHYD01:P1             77.13    5.835 No_date    6:10   47.05
00589>       [XIMP=.45:TIMP=.70]
00590>       [LOSS= 2 :CN= 78.0]
00591>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00592>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00593>       [IaRECimp=   2.00: IaRECper=   4.00]
00594>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00595>  009:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00596>      DIVERT HYD      -> 01:P1             77.13    5.835 No_date    6:10   47.05
00597>             diverted <= 02:P1BMP1         14.68    1.109 No_date    6:10   47.05
00598>             diverted <= 03:P1STM1         62.50    4.727 No_date    6:10   47.05
00599>  009:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00600>      DIVERT HYD      -> 02:P1BMP1         14.68    1.109 No_date    6:10   47.05
00601>             diverted <= 04:P1BMP2          4.80     .368 No_date    6:10   47.05
00602>             diverted <= 05:P1STM2          9.71     .741 No_date    6:10   47.05
00603>  009:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00604>      ROUTE RESERVOIR -> 04:P1BMP2          4.80     .368 No_date    6:10   47.05
00605>       [RDT= 5.00] out<- 07:P1BMP3          1.61     .011 No_date    6:00   47.05
00606>                overflow <= 08:P1STM3       3.19     .354 No_date    6:15   47.05
00607>     {MxStoUsed=.4299E-01, TotOvfVol=.1503E+00, N-Ovf=    3, TotDurOvf=    6.hrs
00608>  009:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00609>      COMPUTE DUALHYD     03:P1STM1        62.50    4.727 No_date    6:10   47.05
00610>        Major System /  01:P1maj            .00     .000 No_date    0:00     .00
00611>        Minor System \  02:P1min          62.50    4.727 No_date    6:10   47.05
00612>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00613>  009:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00614>      CONTINUOUS NASHYD  07:SWM1           4.50     .308 No_date    6:05   36.39
00615>       [CN= 90.0: N= 2.00]
00616>       [Tp=  .25:DT= 5.00]
00617>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00618>       [InterEventTime=  12.00]
00619>  009:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00620>      ADD HYD             01:P1maj             .00     .000 No_date    0:00     .00
00621>                        + 02:P1min          62.50    4.727 No_date    6:10   47.05
00622>                        + 05:P1STM2          9.71     .741 No_date    6:10   47.05
00623>                        + 07:SWM1            4.50     .308 No_date    6:05   36.39
00624>                        + 08:P1STM3          3.19     .354 No_date    6:15   47.05
00625>                        + 09:101-3          69.53    1.597 No_date    6:55   42.20
00626>       [DT= 5.00]  SUM=  10:P1in          149.43    7.329 No_date    6:15   44.47
00627>  009:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00628>      ROUTE RESERVOIR -> 10:P1in          149.43    7.329 No_date    6:15   44.47
00629>       [RDT= 5.00] out<- 02:P1SWM         149.43    2.466 No_date    7:50   44.47
00630>     {MxStoUsed=.2784E+01}
00631>  009:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00632>      CONTINUOUS NASHYD  03:CRTRIB          3.69     .202 No_date    6:05   30.76
00633>       [CN= 82.0: N= 2.00]
00634>       [Tp=  .25:DT= 5.00]
00635>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00636>       [InterEventTime=  12.00]
00637>  009:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00638>      ADD HYD             02:P1SWM         149.43    2.466 No_date    7:50   44.47
00639>                        + 03:CRTRIB          3.69     .202 No_date    6:05   30.76
00640>       [DT= 5.00]  SUM=  09:B101-2        153.12    2.502 No_date    7:45   44.14
00641>  009:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00642>      CONTINUOUS STANDHYD01:P3             91.68    5.804 No_date    6:15   41.32
00643>       [XIMP=.34:TIMP=.43]
00644>       [LOSS= 2 :CN= 78.0]
00645>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00646>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00647>       [IaRECimp=   2.00: IaRECper=   4.00]
00648>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00649>  009:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00650>      DIVERT HYD      -> 01:P3             91.68    5.804 No_date    6:15   41.32
00651>             diverted <= 02:P3BMP1         23.84    1.509 No_date    6:15   41.32
00652>             diverted <= 03:P3STM1         70.98    4.492 No_date    6:15   41.32
00653>  009:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00654>      DIVERT HYD      -> 02:P3BMP1         23.84    1.509 No_date    6:15   41.32
00655>             diverted <= 04:P3BMP2          7.84     .500 No_date    6:15   41.32
00656>             diverted <= 05:P3STM2         15.77    1.009 No_date    6:15   41.32
00657>  009:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00658>      ROUTE RESERVOIR -> 04:P3BMP2          7.84     .500 No_date    6:15   41.32
00659>       [RDT= 5.00] out<- 07:P3BMP3          2.01     .012 No_date    6:00   41.32
00660>                overflow <= 08:P3STM3       5.83     .488 No_date    6:15   41.32
00661>     {MxStoUsed=.4655E-01, TotOvfVol=.2410E+00, N-Ovf=    1, TotDurOvf=    7.hrs
00662>  009:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00663>      COMPUTE DUALHYD     03:P3STM1        70.98    4.492 No_date    6:15   41.32
00664>         Major System /  01:P3maj            .00     .000 No_date    0:00     .00
00665>         Minor System \  02:P3min          70.98    4.492 No_date    6:15   41.32
00666>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00667>  009:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00668>      CONTINUOUS NASHYD  07:SWM3           2.60     .142 No_date    6:05   30.76
00669>       [CN= 82.0: N= 2.00]
00670>       [Tp=  .25:DT= 5.00]
00671>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00672>       [InterEventTime=  12.00]
00673>  009:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00674>      ADD HYD             01:P3maj             .00     .000 No_date    0:00     .00
00675>                        + 02:P3min          70.98    4.492 No_date    6:15   41.32
00676>                        + 05:P3STM2         15.77    1.009 No_date    6:15   41.32
00677>                        + 07:SWM3            2.60     .142 No_date    6:05   30.76
00678>                        + 08:P3STM3          5.83     .488 No_date    6:15   41.32
00679>       [DT= 5.00]  SUM=  10:P3in           95.18    6.124 No_date    6:15   41.03
00680>  009:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00681>      ROUTE RESERVOIR -> 10:P3in           95.18    6.124 No_date    6:15   41.03
00682>       [RDT= 5.00] out<- 02:P3SWM          95.18    1.227 No_date    7:50   41.03
00683>                overflow <= 03:P3OVF          .00     .000 No_date    0:00     .00
00684>     {MxStoUsed=.2473E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00685>  009:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00686>      ADD HYD             02:P3SWM         95.18    1.227 No_date    7:50   41.03
00687>                        + 03:P3OVF            .00     .000 No_date    0:00     .00
00688>       [DT= 5.00]  SUM=  08:B500           95.18    1.227 No_date    7:50   41.03
00689>  009:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00690>      ADD HYD             08:B500          95.18    1.227 No_date    7:50   41.03
00691>                        + 09:B101-2       153.12    2.502 No_date    7:45   44.14
00692>       [DT= 5.00]  SUM=  10:B2054         248.31    3.729 No_date    7:45   42.95
00693>  009:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00694>      SAVE HYD            10:B2054         248.31    3.729 No_date    7:45   42.95
00695>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2054.009
00696>       remark:HEC-RAS Inflow Node 2054 / Station 44751
00697>  009:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00698>      CONTINUOUS STANDHYD01:P2             23.14    1.650 No_date    6:10   44.82
00699>       [XIMP=.47:TIMP=.59]
00700>       [LOSS= 2 :CN= 78.0]
00701>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00702>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00703>       [IaRECimp=   2.00: IaRECper=   4.00]
00704>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00705>  009:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00706>      DIVERT HYD      -> 01:P2             23.14    1.650 No_date    6:10   44.82
00707>             diverted <= 02:P2BMP1          4.41     .314 No_date    6:10   44.82
00708>             diverted <= 03:P2STM1         18.76    1.337 No_date    6:10   44.82
00709>  009:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00710>      DIVERT HYD      -> 02:P2BMP1          4.41     .314 No_date    6:10   44.82
00711>             diverted <= 04:P2BMP2          1.43     .102 No_date    6:10   44.82
00712>             diverted <= 05:P2STM2          2.88     .207 No_date    6:10   44.82
00713>  009:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00714>      ROUTE RESERVOIR -> 04:P2BMP2          1.43     .102 No_date    6:10   44.82
00715>       [RDT= 5.00] out<- 07:P2BMP3           .50     .003 No_date    6:00   44.82
00716>                overflow <= 08:P2STM3        .93     .098 No_date    6:15   44.82
00717>     {MxStoUsed=.1270E-01, TotOvfVol=.4165E-01, N-Ovf=    3, TotDurOvf=    6.hrs
00718>  009:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00719>      COMPUTE DUALHYD     03:P2STM1        18.76    1.337 No_date    6:10   44.82
00720>         Major System /  01:P2maj            .00     .000 No_date    0:00     .00
00721>         Minor System \  02:P2min          18.76    1.337 No_date    6:10   44.82
00722>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00723>  009:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00724>      CONTINUOUS NASHYD  07:SWM2            .99     .068 No_date    6:05   36.39
00725>       [CN= 90.0: N= 2.00]
00726>       [Tp=  .25:DT= 5.00]
00727>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00728>       [InterEventTime=  12.00]
00729>  009:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00730>      ADD HYD             01:P2maj             .00     .000 No_date    0:00     .00
00731>                        + 02:P2min          18.76    1.337 No_date    6:10   44.82
00732>                        + 05:P2STM2          2.88     .207 No_date    6:10   44.82
00733>                        + 07:SWM2             .99     .068 No_date    6:05   36.39
00734>                        + 08:P2STM3           .93     .098 No_date    6:15   44.82
00735>       [DT= 5.00]  SUM=  10:P2in           23.57    1.708 No_date    6:10   44.47
00736>  009:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00737>      ROUTE RESERVOIR -> 10:P2in           23.57    1.708 No_date    6:10   44.47
00738>       [RDT= 5.00] out<- 02:P2out          23.57     .523 No_date    7:15   44.47
00739>                overflow <= 03:P2OVF          .00     .000 No_date    0:00     .00
00740>     {MxStoUsed=.5570E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00741>  009:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00742>      ADD HYD             02:P2out         23.57     .523 No_date    7:15   44.47
00743>                        + 03:P2OVF            .00     .000 No_date    0:00     .00
00744>       [DT= 5.00]  SUM=  06:PND2           23.57     .523 No_date    7:15   44.47
00745>  009:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00746>      CONTINUOUS NASHYD  04:CRFP           24.18     .848 No_date    6:30   30.76
00747>       [CN= 82.0: N= 2.00]
00748>       [Tp=  .50:DT= 5.00]
00749>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00750>       [InterEventTime=  12.00]
00751>  009:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00752>      CONTINUOUS STANDHYD05:28             12.50     .716 No_date    6:00   28.27
00753>       [XIMP=.38:TIMP=.45]
00754>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
00755>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
00756>       [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
00757>       [IaRECimp=   2.00: IaRECper=   4.00]
00758>  009:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00759>      ADD HYD             04:CRFP          24.18     .848 No_date    6:30   30.76
00760>                        + 05:28            12.50     .716 No_date    6:00   28.27
00761>                        + 06:PND2          23.57     .523 No_date    7:15   44.47
00762>       [DT= 5.00]  SUM=  07:B2065          60.25    1.646 No_date    6:30   35.60
00763>  009:0039---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00764>      SAVE HYD            07:B2065         60.25    1.646 No_date    6:30   35.60
00765>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2065.009
00766>       remark:HEC-RAS Inflow Node 2065 / Station 44548
00767>  009:0040---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00768>      CONTINUOUS STANDHYD05:100-1          61.17    2.291 No_date    6:05   28.27
00769>       [XIMP=.38:TIMP=.45]
00770>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
00771>       [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
00772>       [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
00773>       [IaRECimp=   2.00: IaRECper=   4.00]
00774>  009:0041---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00775>      CONTINUOUS NASHYD  06:102-1          39.80     .700 No_date    7:20   27.89
00776>       [CN= 78.0: N= 2.00]
00777>       [Tp= 1.10:DT= 5.00]
00778>       [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
00779>       [InterEventTime=  12.00]
00780>  009:0042---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00781>      ADD HYD             05:100-1         61.17    2.291 No_date    6:05   28.27
00782>                        + 06:102-1         39.80     .700 No_date    7:20   27.89
00783>       [DT= 5.00]  SUM=  10:B3894         100.97    2.598 No_date    6:10   28.12
00784>  009:0043---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00785>      SAVE HYD            10:B3894         100.97    2.598 No_date    6:10   28.12
00786>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B3894.009
00787>       remark:HEC-RAS Inflow Node 3894 / Station 43966
00788>    ** END OF RUN :   9
00789>
00790>  ************************************************************************
00791>
00792>
00793>
00794>
00795>
00796>  RUN:COMMAND#
00797>  010:0001--------------------------------------------------------------------------
00798>      START
00799>       [TZERO =    .00 hrs on        0]
00800>       [METOUT=   2    (1=imperial, 2=metric output)]
00801>       [NSTORM=   1 ]
00802>       [NRUN  =  10 ]
00803>  010:0002--------------------------------------------------------------------------
00804>      READ STORM
00805>       Filename = storm.001
00806>       Comment  =
00807>       [SDT=30.00:SDUR=  12.00:PTOT=  65.22]
00808>  010:0003--------------------------------------------------------------------------
00809>      DEFAULT VALUES
00810>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
```

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00811>       ICASEdv  = 1 (read and print data)
00812>       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
00813>                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
00814>       Horton's infiltration equation parameters:
00815>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
00816>       Parameters for PERVIOUS surfaces in STANDHYD:
00817>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00818>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00819>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00820>       Parameters used in NASHYD:
00821>       [Ia=   4.67 mm] [N= 2.00]
00822>  010:0004----------------------------------------------------------------------------
00823>      COMPUTE API
00824>       [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
00825>       {APImax= 82.54: APIavg= 51.33: APImin= 20.94}
00826>  010:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00827>      READ HYD            09:101-3        69.53    1.944 No_date    6:50   50.67
00828>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.010
00829>       Comment  = GRANITE RIDGE AREA 101-3
00830>  010:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00831>      CONTINUOUS STANDHYD01:P1             77.13    7.297 No_date    6:10   55.85
00832>       [XIMP=.45:TIMP=.70]
00833>       [LOSS= 2 :CN= 78.0]
00834>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00835>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00836>       [IaRECimp=   2.00: IaRECper=   4.00]
00837>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00838>  010:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00839>   *  DIVERT HYD      -> 01:P1             77.13    7.297 No_date    6:10   55.85
00840>              diverted <= 02:P1BMP1        14.67    1.386 No_date    6:10   55.85
00841>              diverted <= 03:P1STM1        62.49    5.910 No_date    6:10   55.85
00842>  010:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00843>   *  DIVERT HYD      -> 02:P1BMP1         14.67    1.386 No_date    6:10   55.85
00844>              diverted <= 04:P1BMP2         4.81     .460 No_date    6:10   55.85
00845>              diverted <= 05:P1STM2         9.73     .927 No_date    6:10   55.85
00846>  010:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00847>      ROUTE RESERVOIR -> 04:P1BMP2          4.81     .460 No_date    6:10   55.85
00848>       [RDT= 5.00] out<- 07:P1BMP3          1.38     .011 No_date    5:55   55.85
00849>              overflow <= 08:P1STM3         3.44     .444 No_date    6:10   55.85
00850>       {MxStoUsed=.4298E-01, TotOvfVol=.1919E+00, N-Ovf=    2, TotDurOvf=    6.hrs
00851>  010:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00852>      COMPUTE DUALHYD    03:P1STM1         62.49    5.910 No_date    6:10   55.85
00853>         Major System /  01:P1maj           .00     .000 No_date    0:00     .00
00854>         Minor System \  02:P1min          62.49    5.910 No_date    6:10   55.85
00855>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00856>  010:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00857>      CONTINUOUS NASHYD  07:SWM1           4.50     .385 No_date    6:05   45.08
00858>       [CN= 90.0: N= 2.00]
00859>       [Tp=  .25:DT= 5.00]
00860>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00861>       [InterEventTime=  12.00]
00862>  010:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00863>      ADD HYD             01:P1maj          .00     .000 No_date    0:00     .00
00864>                        +  02:P1min         62.49    5.910 No_date    6:10   55.85
00865>                        +  05:P1STM2         9.73     .927 No_date    6:10   55.85
00866>                        +  07:SWM1           4.50     .385 No_date    6:05   45.08
00867>                        +  08:P1STM3         3.44     .444 No_date    6:10   55.85
00868>                        +  09:101-3         69.53    1.944 No_date    6:50   50.67
00869>       [DT= 5.00]  SUM=  10:P1in          149.68    9.171 No_date    6:10   53.12
00870>  010:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00871>      ROUTE RESERVOIR -> 10:P1in          149.68    9.171 No_date    6:10   53.12
00872>       [RDT= 5.00] out<- 02:P1SWM         149.68    4.513 No_date    7:05   53.12
00873>      {MxStoUsed=.2947E+01}
00874>  010:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00875>      CONTINUOUS NASHYD  03:CRTRIB          3.69     .262 No_date    6:05   38.93
00876>       [CN= 82.0: N= 2.00]
00877>       [Tp=  .25:DT= 5.00]
00878>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00879>       [InterEventTime=  12.00]
00880>  010:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00881>      ADD HYD             02:P1SWM         149.68    4.513 No_date    7:05   53.12
00882>                        +  03:CRTRIB         3.69     .262 No_date    6:05   38.93
00883>       [DT= 5.00]  SUM=  09:B101-2         153.37    4.617 No_date    6:55   52.77
00884>  010:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00885>      CONTINUOUS STANDHYD01:P3             91.68    7.198 No_date    6:10   49.77
00886>       [XIMP=.34:TIMP=.43]
00887>       [LOSS= 2 :CN= 78.0]
00888>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00889>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00890>       [IaRECimp=   2.00: IaRECper=   4.00]
00891>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00892>  010:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00893>   *  DIVERT HYD      -> 01:P3             91.68    7.198 No_date    6:10   49.77
00894>              diverted <= 02:P3BMP1        23.84    1.871 No_date    6:10   49.77
00895>              diverted <= 03:P3STM1        70.98    5.571 No_date    6:10   49.77
00896>  010:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00897>   *  DIVERT HYD      -> 02:P3BMP1         23.84    1.871 No_date    6:10   49.77
00898>              diverted <= 04:P3BMP2         7.85     .620 No_date    6:10   49.77
00899>              diverted <= 05:P3STM2        15.81    1.251 No_date    6:10   49.77
00900>  010:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00901>      ROUTE RESERVOIR -> 04:P3BMP2          7.85     .620 No_date    6:10   49.77
00902>       [RDT= 5.00] out<- 07:P3BMP3          1.70     .012 No_date    5:50   49.77
00903>              overflow <= 08:P3STM3         6.16     .607 No_date    6:15   49.77
00904>      {MxStoUsed=.4657E-01, TotOvfVol=.3065E+00, N-Ovf=    3, TotDurOvf=    7.hrs
00905>  010:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00906>      COMPUTE DUALHYD    03:P3STM1         70.98    5.571 No_date    6:10   49.77
00907>         Major System /  01:P3maj           .00     .000 No_date    0:00     .00
00908>         Minor System \  02:P3min          70.98    5.200 No_date    6:05   49.86
00909>       {MjSysSto=.2582E+03, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00910>  010:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00911>      CONTINUOUS NASHYD  07:SWM3           2.60     .184 No_date    6:05   38.93
00912>       [CN= 82.0: N= 2.00]
00913>       [Tp=  .25:DT= 5.00]
00914>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00915>       [InterEventTime=  12.00]
00916>  010:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00917>      ADD HYD             01:P3maj          .00     .000 No_date    0:00     .00
00918>                        +  02:P3min         70.98    5.200 No_date    6:05   49.86
00919>                        +  05:P3STM2        15.81    1.251 No_date    6:10   49.77
00920>                        +  07:SWM3           2.60     .184 No_date    6:05   38.93
00921>                        +  08:P3STM3         6.16     .607 No_date    6:15   49.77
00922>       [DT= 5.00]  SUM=  10:P3in          95.54    7.226 No_date    6:15   49.54
00923>  010:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00924>      ROUTE RESERVOIR -> 10:P3in          95.54    7.226 No_date    6:15   49.54
00925>       [RDT= 5.00] out<- 02:P3SWM         95.54    1.724 No_date    7:35   49.54
00926>              overflow <= 03:P3OVF          .00     .000 No_date    0:00     .00
00927>       {MxStoUsed=.2883E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00928>  010:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00929>      ADD HYD             02:P3SWM         95.54    1.724 No_date    7:35   49.54
00930>                        +  03:P3OVF          .00     .000 No_date    0:00     .00
00931>       [DT= 5.00]  SUM=  08:B500            95.54    1.724 No_date    7:35   49.54
00932>  010:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00933>      ADD HYD             08:B500          95.54    1.724 No_date    7:35   49.54
00934>                        +  09:B101-2       153.37    4.617 No_date    6:55   52.77
00935>       [DT= 5.00]  SUM=  10:B2054         248.92    6.248 No_date    7:15   51.53
00936>  010:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00937>      SAVE HYD            10:B2054         248.92    6.248 No_date    7:15   51.53
00938>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2054.010
00939>       remark:HEC-RAS Inflow Node 2054 / Station 44751
00940>  010:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00941>      CONTINUOUS STANDHYD01:P2             23.14    2.016 No_date    6:10   53.46
00942>       [XIMP=.47:TIMP=.59]
00943>       [LOSS= 2 :CN= 78.0]
00944>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
00945>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
00946>       [IaRECimp=   2.00: IaRECper=   4.00]
00947>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
00948>  010:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00949>      DIVERT HYD      -> 01:P2             23.14    2.016 No_date    6:10   53.46
00950>              diverted <= 02:P2BMP1         4.41     .383 No_date    6:10   53.46
00951>              diverted <= 03:P2STM1        18.76    1.633 No_date    6:10   53.46
00952>  010:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00953>      DIVERT HYD      -> 02:P2BMP1          4.41     .383 No_date    6:10   53.46
00954>              diverted <= 04:P2BMP2         1.43     .127 No_date    6:10   53.46
00955>              diverted <= 05:P2STM2         2.89     .256 No_date    6:10   53.46
00956>  010:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00957>      ROUTE RESERVOIR -> 04:P2BMP2          1.43     .127 No_date    6:10   53.46
00958>       [RDT= 5.00] out<- 07:P2BMP3          .42      .003 No_date    5:55   53.46
00959>              overflow <= 08:P2STM3         1.01     .122 No_date    6:15   53.46
00960>      {MxStoUsed=.1270E-01, TotOvfVol=.5386E-01, N-Ovf=    2, TotDurOvf=    6.hrs
00961>  010:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00962>      COMPUTE DUALHYD    03:P2STM1         18.76    1.633 No_date    6:10   53.46
00963>         Major System /  01:P2maj           .00     .000 No_date    0:00     .00
00964>         Minor System \  02:P2min          18.76    1.633 No_date    6:10   53.46
00965>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00966>  010:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00967>      CONTINUOUS NASHYD  07:SWM2           .99     .085 No_date    6:05   45.08
00968>       [CN= 90.0: N= 2.00]
00969>       [Tp=  .25:DT= 5.00]
00970>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
00971>       [InterEventTime=  12.00]
00972>  010:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00973>      ADD HYD             01:P2maj          .00     .000 No_date    0:00     .00
00974>                        +  02:P2min         18.76    1.633 No_date    6:10   53.46
00975>                        +  05:P2STM2         2.89     .256 No_date    6:10   53.46
00976>                        +  07:SWM2           .99     .085 No_date    6:05   45.08
00977>                        +  08:P2STM3         1.01     .122 No_date    6:15   53.46
00978>       [DT= 5.00]  SUM=  10:P2in          23.65    2.093 No_date    6:10   53.11
00979>  010:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00980>      ROUTE RESERVOIR -> 10:P2in          23.65    2.093 No_date    6:10   53.11
00981>       [RDT= 5.00] out<- 02:P2out         23.65     .669 No_date    7:10   53.11
00982>              overflow <= 03:P2OVF          .00     .000 No_date    0:00     .00
00983>       {MxStoUsed=.6545E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
00984>  010:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00985>      ADD HYD             02:P2out         23.65     .669 No_date    7:10   53.11
00986>                        +  03:P2OVF          .00     .000 No_date    0:00     .00
00987>       [DT= 5.00]  SUM=  06:PND2            23.65     .669 No_date    7:10   53.11
00988>  010:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00989>      CONTINUOUS NASHYD  04:CRFP           24.18    1.091 No_date    6:30   38.93
00990>       [CN= 82.0: N= 2.00]
00991>       [Tp=  .50:DT= 5.00]
00992>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
00993>       [InterEventTime=  12.00]
00994>  010:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
00995>      CONTINUOUS STANDHYD05:28             12.50     .955 No_date    6:00   35.23
00996>       [XIMP=.38:TIMP=.45]
00997>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
00998>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
00999>       [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
01000>       [IaRECimp=   2.00: IaRECper=   4.00]
01001>  010:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01002>      ADD HYD             04:CRFP          24.18    1.091 No_date    6:30   38.93
01003>                        +  05:28            12.50     .955 No_date    6:00   35.23
01004>                        +  06:PND2          23.65     .669 No_date    7:10   53.11
01005>       [DT= 5.00]  SUM=  07:B2065           60.33    2.148 No_date    6:25   43.72
01006>  010:0039---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01007>      SAVE HYD            07:B2065         60.33    2.148 No_date    6:25   43.72
01008>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2065.010
01009>       remark:HEC-RAS Inflow Node 2065 / Station 44548
01010>  010:0040---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01011>      CONTINUOUS STANDHYD05:100-1          61.17    2.769 No_date    6:05   35.23
01012>       [XIMP=.38:TIMP=.45]
01013>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
01014>       [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
01015>       [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
01016>       [IaRECimp=   2.00: IaRECper=   4.00]
01017>  010:0041---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01018>      CONTINUOUS NASHYD  06:102-1          39.80     .907 No_date    7:15   35.70
01019>       [CN= 78.0: N= 2.00]
01020>       [Tp= 1.10:DT= 5.00]
01021>       [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
01022>       [InterEventTime=  12.00]
01023>  010:0042---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01024>      ADD HYD             05:100-1         61.17    2.769 No_date    6:05   35.23
01025>                        +  06:102-1         39.80     .907 No_date    7:15   35.70
01026>       [DT= 5.00]  SUM=  10:B3894          100.97    3.201 No_date    6:10   35.41
01027>  010:0043---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01028>      SAVE HYD            10:B3894         100.97    3.201 No_date    6:10   35.41
01029>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B3894.010
01030>       remark:HEC-RAS Inflow Node 3894 / Station 43966
01031>    ** END OF RUN :  10
01032>
01033>  ****************************************************************************
01034>
01035>
01036>
01037>
01038>
01039>  RUN:COMMAND#
01040>  011:0001----------------------------------------------------------------------------
01041>      START
01042>       [TZERO =    .00 hrs on       0]
01043>       [METOUT=   2    (1=imperial, 2=metric output)]
01044>       [NSTORM=   1 ]
01045>       [NRUN  =  11 ]
01046>  011:0002----------------------------------------------------------------------------
01047>      READ STORM
01048>       Filename = storm.001
01049>       Comment  =
01050>       [SDT=30.00:SDUR=  12.00:PTOT=  77.93]
01051>  011:0003----------------------------------------------------------------------------
01052>      DEFAULT VALUES
01053>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
01054>       ICASEdv  = 1 (read and print data)
01055>       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
01056>                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
01057>       Horton's infiltration equation parameters:
01058>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
01059>       Parameters for PERVIOUS surfaces in STANDHYD:
01060>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
01061>       Parameters for IMPERVIOUS surfaces in STANDHYD:
01062>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
01063>       Parameters used in NASHYD:
01064>       [Ia=   4.67 mm] [N= 2.00]
01065>  011:0004----------------------------------------------------------------------------
01066>      COMPUTE API
01067>       [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
01068>       {APImax= 94.94: APIavg= 57.70: APImin= 21.13}
01069>  011:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01070>      READ HYD            09:101-3         69.53    2.449 No_date    6:50   62.74
01071>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.011
01072>       Comment  = GRANITE RIDGE AREA 101-3
01073>  011:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01074>      CONTINUOUS STANDHYD01:P1             77.13    9.137 No_date    6:10   68.30
01075>       [XIMP=.45:TIMP=.70]
01076>       [LOSS= 2 :CN= 78.0]
01077>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
01078>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
01079>       [IaRECimp=   2.00: IaRECper=   4.00]
01080>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
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01081>  011:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01082>   *  DIVERT HYD      -> 01:P1            77.13    9.137 No_date    6:10   68.30
01083>             diverted <= 02:P1BMP1        14.67    1.736 No_date    6:10   68.30
01084>             diverted <= 03:P1STM1        62.49    7.401 No_date    6:10   68.30
01085>  011:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01086>   *  DIVERT HYD      -> 02:P1BMP1        14.67    1.736 No_date    6:10   68.30
01087>             diverted <= 04:P1BMP2         4.82     .576 No_date    6:10   68.30
01088>             diverted <= 05:P1STM2         9.73    1.160 No_date    6:10   68.30
01089>  011:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01090>      ROUTE RESERVOIR -> 04:P1BMP2         4.82     .576 No_date    6:10   68.30
01091>       [RDT= 5.00] out<- 07:P1BMP3         1.15     .011 No_date    5:45   68.30
01092>             overflow <= 08:P1STM3         3.67     .560 No_date    6:10   68.30
01093>      {MxStoUsed=.4298E-01, TotOvfVol=.2507E+00, N-Ovf=    2, TotDurOvf=    7.hrs
01094>  011:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01095>      COMPUTE DUALHYD    03:P1STM1        62.49    7.401 No_date    6:10   68.30
01096>         Major System /  01:P1maj           .00     .000 No_date    0:00     .00
01097>         Minor System \  02:P1min         62.49    7.401 No_date    6:10   68.30
01098>       {MjSysSto=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
01099>  011:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01100>      CONTINUOUS NASHYD  07:SWM1           4.50     .490 No_date    6:05   57.45
01101>       [CN= 90.0: N= 2.00]
01102>       [Tp=  .25:DT= 5.00]
01103>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
01104>       [InterEventTime=  12.00]
01105>  011:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01106>      ADD HYD            01:P1maj           .00     .000 No_date    0:00     .00
01107>                       +  02:P1min         62.49    7.401 No_date    6:10   68.30
01108>                       +  05:P1STM2         9.73    1.160 No_date    6:10   68.30
01109>                       +  07:SWM1           4.50     .490 No_date    6:05   57.45
01110>                       +  08:P1STM3         3.67     .560 No_date    6:10   68.30
01111>                       +  09:101-3         69.53    2.449 No_date    6:50   62.74
01112>       [DT= 5.00]  SUM=  10:P1in          149.92   11.540 No_date    6:10   65.40
01113>  011:0013---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01114>      ROUTE RESERVOIR -> 10:P1in          149.92   11.540 No_date    6:10   65.40
01115>       [RDT= 5.00] out<- 02:P1SWM         149.92    4.810 No_date    7:15   65.40
01116>      {MxStoUsed=.3523E+01}
01117>  011:0014---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01118>      CONTINUOUS NASHYD  03:CRTRIB          3.69     .345 No_date    6:05   50.73
01119>       [CN= 82.0: N= 2.00]
01120>       [Tp=  .25:DT= 5.00]
01121>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
01122>       [InterEventTime=  12.00]
01123>  011:0015---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01124>      ADD HYD            02:P1SWM         149.92    4.810 No_date    7:15   65.40
01125>                       +  03:CRTRIB         3.69     .345 No_date    6:05   50.73
01126>       [DT= 5.00]  SUM=  09:B101-2         153.61    4.918 No_date    7:00   65.05
01127>  011:0016---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01128>      CONTINUOUS STANDHYD01:P3             91.68    9.594 No_date    6:10   61.83
01129>       [XIMP=.34:TIMP=.43]
01130>       [LOSS= 2 :CN= 78.0]
01131>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
01132>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
01133>       [IaRECimp=   2.00: IaRECper=   4.00]
01134>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
01135>  011:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01136>   *  DIVERT HYD      -> 01:P3            91.68    9.594 No_date    6:10   61.83
01137>             diverted <= 02:P3BMP1        23.84    2.494 No_date    6:10   61.83
01138>             diverted <= 03:P3STM1        70.97    7.426 No_date    6:10   61.83
01139>  011:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01140>   *  DIVERT HYD      -> 02:P3BMP1        23.84    2.494 No_date    6:10   61.83
01141>             diverted <= 04:P3BMP2         7.86     .826 No_date    6:10   61.83
01142>             diverted <= 05:P3STM2        15.84    1.668 No_date    6:10   61.83
01143>  011:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01144>      ROUTE RESERVOIR -> 04:P3BMP2         7.86     .826 No_date    6:10   61.83
01145>       [RDT= 5.00] out<- 07:P3BMP3         1.39     .012 No_date    5:40   61.83
01146>             overflow <= 08:P3STM3         6.48     .804 No_date    6:15   61.83
01147>      {MxStoUsed=.4656E-01, TotOvfVol=.4005E+00, N-Ovf=    2, TotDurOvf=    7.hrs
01148>  011:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01149>      COMPUTE DUALHYD    03:P3STM1        70.97    7.426 No_date    6:10   61.83
01150>         Major System /  01:P3maj           .00     .000 No_date    0:00     .00
01151>         Minor System \  02:P3min         70.97    5.200 No_date    5:55   62.28
01152>       {MjSysSto=.3052E+04, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
01153>  011:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01154>      CONTINUOUS NASHYD  07:SWM3           2.60     .243 No_date    6:05   50.73
01155>       [CN= 82.0: N= 2.00]
01156>       [Tp=  .25:DT= 5.00]
01157>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
01158>       [InterEventTime=  12.00]
01159>  011:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01160>      ADD HYD            01:P3maj           .00     .000 No_date    0:00     .00
01161>                       +  02:P3min         70.97    5.200 No_date    5:55   62.28
01162>                       +  05:P3STM2        15.84    1.668 No_date    6:10   61.83
01163>                       +  07:SWM3           2.60     .243 No_date    6:05   50.73
01164>                       +  08:P3STM3         6.48     .804 No_date    6:15   61.83
01165>       [DT= 5.00]  SUM=  10:P3in          95.89    7.908 No_date    6:10   61.86
01166>  011:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01167>      ROUTE RESERVOIR -> 10:P3in          95.89    7.908 No_date    6:10   61.86
01168>       [RDT= 5.00] out<- 02:P3SWM         82.38    1.750 No_date    6:45   61.86
01169>             overflow <= 03:P3OVF         13.51    5.003 No_date    6:45   61.86
01170>      {MxStoUsed=.2903E+01, TotOvfVol=.8360E+00, N-Ovf=    2, TotDurOvf=    1.hrs
01171>  011:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01172>      ADD HYD            02:P3SWM         82.38    1.750 No_date    6:45   61.86
01173>                       +  03:P3OVF         13.51    5.003 No_date    6:45   61.86
01174>       [DT= 5.00]  SUM=  08:B500          95.89    6.753 No_date    6:45   61.86
01175>  011:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01176>      ADD HYD            08:B500          95.89    6.753 No_date    6:45   61.86
01177>                       +  09:B101-2        153.61    4.918 No_date    7:00   65.05
01178>       [DT= 5.00]  SUM=  10:B2054         249.51   11.650 No_date    6:45   63.82
01179>  011:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01180>      SAVE HYD           10:B2054         249.51   11.650 No_date    6:45   63.82
01181>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2054.011
01182>       remark:HEC-RAS Inflow Node 2054 / Station 44751
01183>  011:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01184>      CONTINUOUS STANDHYD01:P2             23.14    2.620 No_date    6:10   65.73
01185>       [XIMP=.47:TIMP=.59]
01186>       [LOSS= 2 :CN= 78.0]
01187>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
01188>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
01189>       [IaRECimp=   2.00: IaRECper=   4.00]
01190>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
01191>  011:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01192>      DIVERT HYD      -> 01:P2            23.14    2.620 No_date    6:10   65.73
01193>             diverted <= 02:P2BMP1         4.41     .498 No_date    6:10   65.73
01194>             diverted <= 03:P2STM1        18.76    2.122 No_date    6:10   65.73
01195>  011:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01196>      DIVERT HYD      -> 02:P2BMP1         4.41     .498 No_date    6:10   65.73
01197>             diverted <= 04:P2BMP2         1.43     .163 No_date    6:10   65.73
01198>             diverted <= 05:P2STM2         2.89     .330 No_date    6:10   65.73
01199>  011:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01200>      ROUTE RESERVOIR -> 04:P2BMP2         1.43     .163 No_date    6:10   65.73
01201>       [RDT= 5.00] out<- 07:P2BMP3          .35     .003 No_date    5:50   65.73
01202>             overflow <= 08:P2STM3         1.08     .159 No_date    6:10   65.73
01203>      {MxStoUsed=.1269E-01, TotOvfVol=.7107E-01, N-Ovf=    2, TotDurOvf=    7.hrs
01204>  011:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01205>      COMPUTE DUALHYD    03:P2STM1        18.76    2.122 No_date    6:10   65.73
01206>         Major System /  01:P2maj           .00     .000 No_date    0:00     .00
01207>         Minor System \  02:P2min         18.76    1.790 No_date    6:00   66.56
01208>       {MjSysSto=.3144E+03, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
01209>  011:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01210>      CONTINUOUS NASHYD  07:SWM2           .99     .108 No_date    6:05   57.44
01211>       [CN= 90.0: N= 2.00]
01212>       [Tp=  .25:DT= 5.00]
01213>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
01214>       [InterEventTime=  12.00]
01215>  011:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01216>      ADD HYD            01:P2maj           .00     .000 No_date    0:00     .00
01217>                       +  02:P2min         18.76    1.790 No_date    6:00   66.56
01218>                       +  05:P2STM2         2.89     .330 No_date    6:10   65.73
01219>                       +  07:SWM2            .99     .108 No_date    6:05   57.44
01220>                       +  08:P2STM3         1.08     .159 No_date    6:10   65.73
01221>       [DT= 5.00]  SUM=  10:P2in          23.72    2.383 No_date    6:10   66.04
01222>  011:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01223>      ROUTE RESERVOIR -> 10:P2in          23.72    2.383 No_date    6:10   66.04
01224>       [RDT= 5.00] out<- 02:P2out         21.06     .700 No_date    6:30   66.04
01225>             overflow <= 03:P2OVF          2.66    1.534 No_date    6:30   66.04
01226>      {MxStoUsed=.6741E+00, TotOvfVol=.1758E+00, N-Ovf=    3, TotDurOvf=    1.hrs
01227>  011:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01228>      ADD HYD            02:P2out         21.06     .700 No_date    6:30   66.04
01229>                       +  03:P2OVF          2.66    1.534 No_date    6:30   66.04
01230>       [DT= 5.00]  SUM=  06:PND2          23.72    2.234 No_date    6:30   66.04
01231>  011:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01232>      CONTINUOUS NASHYD  04:CRFP           24.18    1.434 No_date    6:30   50.73
01233>       [CN= 82.0: N= 2.00]
01234>       [Tp=  .50:DT= 5.00]
01235>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
01236>       [InterEventTime=  12.00]
01237>  011:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01238>      CONTINUOUS STANDHYD05:28             12.50    1.331 No_date    6:00   45.43
01239>       [XIMP=.38:TIMP=.45]
01240>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
01241>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
01242>       [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
01243>       [IaRECimp=   2.00: IaRECper=   4.00]
01244>  011:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01245>      ADD HYD            04:CRFP           24.18    1.434 No_date    6:30   50.73
01246>                       +  05:28             12.50    1.331 No_date    6:00   45.43
01247>                       +  06:PND2           23.72    2.234 No_date    6:30   66.04
01248>       [DT= 5.00]  SUM=  07:B2065          60.40    4.345 No_date    6:30   55.65
01249>  011:0039---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01250>      SAVE HYD           07:B2065          60.40    4.345 No_date    6:30   55.65
01251>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2065.011
01252>       remark:HEC-RAS Inflow Node 2065 / Station 44548
01253>  011:0040---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01254>      CONTINUOUS STANDHYD05:100-1          61.17    3.498 No_date    6:05   45.43
01255>       [XIMP=.38:TIMP=.45]
01256>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
01257>       [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
01258>       [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
01259>       [IaRECimp=   2.00: IaRECper=   4.00]
01260>  011:0041---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01261>      CONTINUOUS NASHYD  06:102-1          39.80    1.210 No_date    7:15   47.07
01262>       [CN= 78.0: N= 2.00]
01263>       [Tp= 1.10:DT= 5.00]
01264>       [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
01265>       [InterEventTime=  12.00]
01266>  011:0042---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01267>      ADD HYD            05:100-1          61.17    3.498 No_date    6:05   45.43
01268>                       +  06:102-1          39.80    1.210 No_date    7:15   47.07
01269>       [DT= 5.00]  SUM=  10:B3894         100.97    4.128 No_date    6:10   46.08
01270>  011:0043---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01271>      SAVE HYD           10:B3894         100.97    4.128 No_date    6:10   46.08
01272>       fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B3894.011
01273>       remark:HEC-RAS Inflow Node 3894 / Station 43966
01274>    ** END OF RUN :  11
01275>
01276>  ********************************************************************************
01277>
01278>
01279>
01280>
01281>
01282>  RUN:COMMAND#
01283>  012:0001---------------------------------------------------------------------------
01284>      START
01285>       [TZERO =    .00 hrs on        0]
01286>       [METOUT=   2    (1=imperial, 2=metric output)]
01287>       [NSTORM=   1 ]
01288>       [NRUN  =  12 ]
01289>  012:0002---------------------------------------------------------------------------
01290>      READ STORM
01291>       Filename = storm.001
01292>       Comment  =
01293>       [SDT=30.00:SDUR=  12.00:PTOT=  84.94]
01294>  012:0003---------------------------------------------------------------------------
01295>      DEFAULT VALUES
01296>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
01297>       ICASEdv  = 1 (read and print data)
01298>       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
01299>                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
01300>       Horton's infiltration equation parameters:
01301>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
01302>       Parameters for PERVIOUS surfaces in STANDHYD:
01303>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
01304>       Parameters for IMPERVIOUS surfaces in STANDHYD:
01305>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
01306>       Parameters used in NASHYD:
01307>       [Ia=   4.67 mm] [N= 2.00]
01308>  012:0004---------------------------------------------------------------------------
01309>      COMPUTE API
01310>       [APIini= 20.00: APIkdy= .9000: APIkdt= .9978]
01311>       {APImax=101.76: APIavg= 61.20: APImin= 21.23}
01312>  012:0005---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01313>      READ HYD           09:101-3          69.53    2.721 No_date    6:50   69.46
01314>       Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.012
01315>       Comment  = GRANITE RIDGE AREA 101-3
01316>  012:0006---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01317>      CONTINUOUS STANDHYD01:P1             77.13   10.168 No_date    6:05   75.19
01318>       [XIMP=.45:TIMP=.70]
01319>       [LOSS= 2 :CN= 78.0]
01320>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
01321>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
01322>       [IaRECimp=   2.00: IaRECper=   4.00]
01323>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
01324>  012:0007---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01325>   *  DIVERT HYD      -> 01:P1            77.13   10.168 No_date    6:05   75.19
01326>             diverted <= 02:P1BMP1        14.66    1.932 No_date    6:05   75.19
01327>             diverted <= 03:P1STM1        62.49    8.236 No_date    6:05   75.19
01328>  012:0008---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01329>   *  DIVERT HYD      -> 02:P1BMP1        14.66    1.932 No_date    6:05   75.19
01330>             diverted <= 04:P1BMP2         4.82     .641 No_date    6:05   75.19
01331>             diverted <= 05:P1STM2         9.74    1.291 No_date    6:05   75.19
01332>  012:0009---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01333>      ROUTE RESERVOIR -> 04:P1BMP2         4.82     .641 No_date    6:05   75.19
01334>       [RDT= 5.00] out<- 07:P1BMP3         1.05     .011 No_date    5:40   75.19
01335>             overflow <= 08:P1STM3         3.77     .625 No_date    6:10   75.19
01336>      {MxStoUsed=.4296E-01, TotOvfVol=.2832E+00, N-Ovf=    2, TotDurOvf=    7.hrs
01337>  012:0010---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01338>      COMPUTE DUALHYD    03:P1STM1        62.49    8.236 No_date    6:05   75.19
01339>         Major System /  01:P1maj           .00     .000 No_date    0:00     .00
01340>         Minor System \  02:P1min         62.49    7.710 No_date    6:00   75.30
01341>       {MjSysSto=.2999E+03, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
01342>  012:0011---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01343>      CONTINUOUS NASHYD  07:SWM1           4.50     .547 No_date    6:05   64.29
01344>       [CN= 90.0: N= 2.00]
01345>       [Tp=  .25:DT= 5.00]
01346>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
01347>       [InterEventTime=  12.00]
01348>  012:0012---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01349>      ADD HYD            01:P1maj           .00     .000 No_date    0:00     .00
01350>                       +  02:P1min         62.49    7.710 No_date    6:00   75.30
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                    +  05:P1STM2          9.74    1.291 No_date    6:05   75.19
                    +  07:SWM1            4.50     .547 No_date    6:05   64.29
                    +  08:P1STM3          3.77     .625 No_date    6:10   75.19
                    +  09:101-3          69.53    2.721 No_date    6:50   69.46
      [DT= 5.00]  SUM=  10:P1in         150.02   12.316 No_date    6:10   72.25
 012:0013----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 10:P1in         150.02   12.316 No_date    6:10   72.25
      [RDT= 5.00] out<- 02:P1SWM        150.02    4.999 No_date    7:15   72.25
     {MxStoUsed=.3929E+01}
 012:0014----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  03:CRTRIB         3.69     .391 No_date    6:05   57.33
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 012:0015----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P1SWM        150.02    4.999 No_date    7:15   72.25
                    +  03:CRTRIB         3.69     .391 No_date    6:05   57.33
      [DT= 5.00]  SUM=  09:B101-2       153.71    5.113 No_date    7:00   71.89
 012:0016----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P3           91.68   10.651 No_date    6:10   68.54
      [XIMP=.34:TIMP=.43]
      [LOSS= 2 :CN= 78.0]
      [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 29.88: SMAX=199.22: SK=1.000]
 012:0017----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
  *  DIVERT HYD      -> 01:P3           91.68   10.651 No_date    6:10   68.54
             diverted <= 02:P3BMP1       23.84    2.769 No_date    6:10   68.54
             diverted <= 03:P3STM1       70.97    8.244 No_date    6:10   68.54
 012:0018----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
  *  DIVERT HYD      -> 02:P3BMP1        23.84    2.769 No_date    6:10   68.54
             diverted <= 04:P3BMP2        7.87     .917 No_date    6:10   68.54
             diverted <= 05:P3STM2       15.85    1.852 No_date    6:10   68.54
 012:0019----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 04:P3BMP2         7.87     .917 No_date    6:10   68.54
      [RDT= 5.00] out<- 07:P3BMP3         1.27     .012 No_date    5:30   68.54
             overflow <= 08:P3STM3        6.60     .904 No_date    6:10   68.54
     {MxStoUsed=.4658E-01, TotOvfVol=.4525E+00, N-Ovf=    2, TotDurOvf=    7.hrs
 012:0020----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    03:P3STM1        70.97    8.244 No_date    6:10   68.54
        Major System /  01:P3maj          .81    1.174 No_date    6:25   68.54
        Minor System \  02:P3min         70.16    5.200 No_date    5:55   69.10
      {MjSysSto=.4250E+04, TotOvfVol=.5554E+03, N-Ovf=    1, TotDurOvf=   0.hrs
 012:0021----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  07:SWM3           2.60     .276 No_date    6:05   57.33
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 012:0022----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             01:P3maj          .81    1.174 No_date    6:25   68.54
                    +  02:P3min         70.16    5.200 No_date    5:55   69.10
                    +  05:P3STM2        15.85    1.852 No_date    6:10   68.54
                    +  07:SWM3           2.60     .276 No_date    6:05   57.33
                    +  08:P3STM3         6.60     .904 No_date    6:10   68.54
      [DT= 5.00]  SUM=  10:P3in         96.03    8.761 No_date    6:25   68.65
 012:0023----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 10:P3in         96.03    8.761 No_date    6:25   68.65
      [RDT= 5.00] out<- 02:P3SWM        76.75    1.750 No_date    6:35   68.65
             overflow <= 03:P3OVF        19.28    5.826 No_date    6:35   68.65
     {MxStoUsed=.2904E+01, TotOvfVol=.1323E+01, N-Ovf=    2, TotDurOvf=    1.hrs
 012:0024----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P3SWM        76.75    1.750 No_date    6:35   68.65
                    +  03:P3OVF         19.28    5.826 No_date    6:35   68.65
      [DT= 5.00]  SUM=  08:B500          96.03    7.576 No_date    6:35   68.65
 012:0025----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             08:B500          96.03    7.576 No_date    6:35   68.65
                    +  09:B101-2        153.71    5.113 No_date    7:00   71.89
      [DT= 5.00]  SUM=  10:B2054        249.74   12.629 No_date    6:35   70.64
 012:0026----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            10:B2054        249.74   12.629 No_date    6:35   70.64
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2054.012
      remark:HEC-RAS Inflow Node 2054 / Station 44751
 012:0027----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P2            23.14    2.926 No_date    6:05   72.54
      [XIMP=.47:TIMP=.59]
      [LOSS= 2 :CN= 78.0]
      [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 29.88: SMAX=199.22: SK=1.000]
 012:0028----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     DIVERT HYD      -> 01:P2            23.14    2.926 No_date    6:05   72.54
             diverted <= 02:P2BMP1         4.41     .556 No_date    6:05   72.54
             diverted <= 03:P2STM1        18.76    2.370 No_date    6:05   72.54
 012:0029----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     DIVERT HYD      -> 02:P2BMP1         4.41     .556 No_date    6:05   72.54
             diverted <= 04:P2BMP2         1.43     .184 No_date    6:05   72.54
             diverted <= 05:P2STM2         2.89     .371 No_date    6:05   72.54
 012:0030----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 04:P2BMP2         1.43     .184 No_date    6:10   72.54
      [RDT= 5.00] out<- 07:P2BMP3          .32     .003 No_date    5:45   72.54
             overflow <= 08:P2STM3        1.11     .179 No_date    6:10   72.54
     {MxStoUsed=.1270E-01, TotOvfVol=.8066E-01, N-Ovf=    1, TotDurOvf=    7.hrs
 012:0031----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    03:P2STM1        18.76    2.370 No_date    6:05   72.54
        Major System /  01:P2maj          .00     .000 No_date    0:00     .00
        Minor System \  02:P2min         18.76    1.790 No_date    5:55   73.43
      {MjSysSto=.6598E+03, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 012:0032----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  07:SWM2           .99     .120 No_date    6:05   64.29
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
 012:0033----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             01:P2maj          .00     .000 No_date    0:00     .00
                    +  02:P2min         18.76    1.790 No_date    5:55   73.43
                    +  05:P2STM2         2.89     .371 No_date    6:05   72.54
                    +  07:SWM2            .99     .120 No_date    6:05   64.29
                    +  08:P2STM3         1.11     .179 No_date    6:10   72.54
      [DT= 5.00]  SUM=  10:P2in         23.75    2.457 No_date    6:05   72.90
 012:0034----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 10:P2in         23.75    2.457 No_date    6:05   72.90
      [RDT= 5.00] out<- 02:P2out        19.82     .700 No_date    6:25   72.90
             overflow <= 03:P2OVF         3.93    1.616 No_date    6:25   72.90
     {MxStoUsed=.6745E+00, TotOvfVol=.2866E+00, N-Ovf=    2, TotDurOvf=    1.hrs
 012:0035----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P2out        19.82     .700 No_date    6:25   72.90
                    +  03:P2OVF          3.93    1.616 No_date    6:25   72.90
      [DT= 5.00]  SUM=  06:PND2          23.75    2.316 No_date    6:25   72.90
 012:0036----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  04:CRFP          24.18    1.623 No_date    6:30   57.33
      [CN= 82.0: N= 2.00]
      [Tp=  .50:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 012:0037----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:28            12.50    1.510 No_date    6:00   50.97
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 012:0038----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             04:CRFP          24.18    1.623 No_date    6:30   57.33
                    +  05:28            12.50    1.510 No_date    6:00   50.97
                    +  06:PND2          23.75    2.316 No_date    6:25   72.90
      [DT= 5.00]  SUM=  07:B2065        60.43    4.810 No_date    6:25   62.13
 012:0039----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            07:B2065        60.43    4.810 No_date    6:25   62.13
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2065.012
      remark:HEC-RAS Inflow Node 2065 / Station 44548
 012:0040----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD05:100-1         61.17    4.021 No_date    6:05   50.97
      [XIMP=.38:TIMP=.45]
      [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
      [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
 012:0041----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  06:102-1         39.80    1.380 No_date    7:15   53.48
      [CN= 78.0: N= 2.00]
      [Tp= 1.10:DT= 5.00]
      [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
      [InterEventTime=  12.00]
 012:0042----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             05:100-1         61.17    4.021 No_date    6:05   50.97
                    +  06:102-1         39.80    1.380 No_date    7:15   53.48
      [DT= 5.00]  SUM=  10:B3894       100.97    4.669 No_date    6:05   51.96
 012:0043----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     SAVE HYD            10:B3894       100.97    4.669 No_date    6:05   51.96
      fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B3894.012
      remark:HEC-RAS Inflow Node 3894 / Station 43966
  ** END OF RUN :  12
 ************************************************************************
 RUN:COMMAND#
 013:0001----------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on       0]
      [METOUT=   2   (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =  13 ]
 013:0002----------------------------------------------------------------------
     READ STORM
      Filename = storm.001
      Comment  =
      [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
 013:0003----------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\ottawa.def
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----|
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 1.66 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 2.00]
 013:0004----------------------------------------------------------------------
     COMPUTE API
      [APIini= 20.00: APIkdy= .9000: APIkdt= .9993]
      {APImax=110.44: APIavg= 66.21: APImin= 20.46}
 013:0005----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     READ HYD            09:101-3         69.53    3.093 No_date    6:45   78.11
      Filename = M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-101-3.013
      Comment  = GRANITE RIDGE AREA 101-3
 013:0006----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P1            77.13   11.525 No_date    6:05   84.03
      [XIMP=.45:TIMP=.70]
      [LOSS= 2 :CN= 78.0]
      [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 29.88: SMAX=199.22: SK=1.000]
 013:0007----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
  *  DIVERT HYD      -> 01:P1            77.13   11.525 No_date    6:05   84.03
             diverted <= 02:P1BMP1        14.66    2.190 No_date    6:05   84.03
             diverted <= 03:P1STM1        62.48    9.336 No_date    6:05   84.03
 013:0008----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
  *  DIVERT HYD      -> 02:P1BMP1        14.66    2.190 No_date    6:05   84.03
             diverted <= 04:P1BMP2         4.82     .726 No_date    6:05   84.03
             diverted <= 05:P1STM2         9.74    1.464 No_date    6:05   84.03
 013:0009----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 04:P1BMP2         4.82     .726 No_date    6:05   84.03
      [RDT= 5.00] out<- 07:P1BMP3          .95     .011 No_date    5:30   84.03
             overflow <= 08:P1STM3        3.87     .709 No_date    6:10   84.03
     {MxStoUsed=.4300E-01, TotOvfVol=.3252E+00, N-Ovf=    2, TotDurOvf=    7.hrs
 013:0010----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     COMPUTE DUALHYD    03:P1STM1        62.48    9.336 No_date    6:05   84.03
        Major System /  01:P1maj          .00     .000 No_date    0:00     .00
        Minor System \  02:P1min         62.48    7.710 No_date    6:00   84.25
      {MjSysSto=.1463E+04, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0011----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  07:SWM1           4.50     .619 No_date    6:05   73.10
      [CN= 90.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
      [InterEventTime=  12.00]
 013:0012----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             01:P1maj          .00     .000 No_date    0:00     .00
                    +  02:P1min         62.48    7.710 No_date    6:00   84.25
                    +  05:P1STM2         9.74    1.464 No_date    6:05   84.03
                    +  07:SWM1           4.50     .619 No_date    6:05   73.10
                    +  08:P1STM3         3.87     .709 No_date    6:10   84.03
                    +  09:101-3         69.53    3.093 No_date    6:45   78.11
      [DT= 5.00]  SUM=  10:P1in         150.13   13.029 No_date    6:10   81.05
 013:0013----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ROUTE RESERVOIR -> 10:P1in         150.13   13.029 No_date    6:10   81.05
  *   [RDT= 5.00] out<- 02:P1SWM        150.13    5.313 No_date    7:20   81.05
     {MxStoUsed=.4526E+01}
 013:0014----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS NASHYD  03:CRTRIB         3.69     .450 No_date    6:05   65.86
      [CN= 82.0: N= 2.00]
      [Tp=  .25:DT= 5.00]
      [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
      [InterEventTime=  12.00]
 013:0015----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     ADD HYD             02:P1SWM        150.13    5.313 No_date    7:20   81.05
                    +  03:CRTRIB         3.69     .450 No_date    6:05   65.86
      [DT= 5.00]  SUM=  09:B101-2       153.82    5.429 No_date    7:05   80.69
 013:0016----------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
     CONTINUOUS STANDHYD01:P3            91.68   12.170 No_date    6:05   77.19
      [XIMP=.34:TIMP=.43]
      [LOSS= 2 :CN= 78.0]
      [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
      [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
      [IaRECimp=   2.00: IaRECper=   4.00]
      [SMIN= 29.88: SMAX=199.22: SK=1.000]
```

```
01621>  013:0017---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01622>   *  DIVERT HYD      -> 01:P3            91.68   12.170 No_date    6:05   77.19
01623>            diverted <= 02:P3BMP1        23.84    3.164 No_date    6:05   77.19
01624>            diverted <= 03:P3STM1        70.97    9.420 No_date    6:05   77.19
01625>  013:0018---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01626>   *  DIVERT HYD      -> 02:P3BMP1        23.84    3.164 No_date    6:05   77.19
01627>            diverted <= 04:P3BMP2         7.87    1.048 No_date    6:05   77.19
01628>            diverted <= 05:P3STM2        15.87    2.116 No_date    6:05   77.19
01629>  013:0019---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01630>      ROUTE RESERVOIR -> 04:P3BMP2         7.87    1.048 No_date    6:05   77.19
01631>       [RDT= 5.00] out<- 07:P3BMP3         1.14     .012 No_date    5:20   77.19
01632>                 overflow <= 08:P3STM3      6.73    1.037 No_date    6:10   77.19
01633>      {MxStoUsed=.4658E-01, TotOvfVol=.5199E+00, N-Ovf=    2, TotDurOvf=    7.hrs
01634>  013:0020---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01635>      COMPUTE DUALHYD    03:P3STM1         70.97    9.420 No_date    6:05   77.19
01636>         Major System /  01:P3maj           4.37    3.595 No_date    6:15   77.19
01637>         Minor System \  02:P3min          66.60    5.200 No_date    5:50   77.97
01638>       {MjSysSto=.4250E+04, TotOvfVol=.3376E+04, N-Ovf=    1, TotDurOvf=    1.hrs
01639>  013:0021---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01640>      CONTINUOUS NASHYD  07:SWM3           2.60     .317 No_date    6:05   65.86
01641>       [CN= 82.0: N= 2.00]
01642>       [Tp=  .25:DT= 5.00]
01643>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
01644>       [InterEventTime=  12.00]
01645>  013:0022---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01646>      ADD HYD            01:P3maj           4.37    3.595 No_date    6:15   77.19
01647>                     +  02:P3min          66.60    5.200 No_date    5:50   77.97
01648>                     +  05:P3STM2         15.87    2.116 No_date    6:05   77.19
01649>                     +  07:SWM3            2.60     .317 No_date    6:05   65.86
01650>                     +  08:P3STM3          6.73    1.037 No_date    6:10   77.19
01651>       [DT= 5.00]  SUM=  10:P3in          96.17   12.063 No_date    6:15   77.42
01652>  013:0023---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01653>      ROUTE RESERVOIR -> 10:P3in          96.17   12.063 No_date    6:15   77.42
01654>       [RDT= 5.00] out<- 02:P3SWM         70.69    1.750 No_date    6:25   77.42
01655>                 overflow <= 03:P3OVF     25.48    8.724 No_date    6:25   77.42
01656>      {MxStoUsed=.2904E+01, TotOvfVol=.1973E+01, N-Ovf=    2, TotDurOvf=    1.hrs
01657>  013:0024---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01658>      ADD HYD            02:P3SWM         70.69    1.750 No_date    6:25   77.42
01659>                     +  03:P3OVF         25.48    8.724 No_date    6:25   77.42
01660>       [DT= 5.00]  SUM=  08:B500          96.17   10.474 No_date    6:25   77.42
01661>  013:0025---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01662>      ADD HYD            08:B500          96.17   10.474 No_date    6:25   77.42
01663>                     +  09:B101-2       153.82    5.429 No_date    7:05   80.69
01664>       [DT= 5.00]  SUM=  10:B2054       249.99   15.617 No_date    6:25   79.43
01665>  013:0026---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01666>      SAVE HYD           10:B3954       249.99   15.617 No_date    6:25   79.43
01667>        fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2054.013
01668>        remark:HEC-RAS Inflow Node 2054 / Station 44751
01669>  013:0027---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01670>      CONTINUOUS STANDHYD01:P2            23.14    3.329 No_date    6:05   81.29
01671>       [XIMP=.47:TIMP=.59]
01672>       [LOSS= 2 :CN= 78.0]
01673>       [Pervious     area: IAper= 5.20:SLPP=1.00:LGP=  40.:MNP=.200:SCP=   .0]
01674>       [Impervious   area: IAimp= 1.57:SLPI= .50:LGI=1400.:MNI=.013:SCI=   .0]
01675>       [IaRECimp=   2.00: IaRECper=   4.00]
01676>       [SMIN= 29.88: SMAX=199.22: SK=1.000]
01677>  013:0028---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01678>      DIVERT HYD      -> 01:P2            23.14    3.329 No_date    6:05   81.29
01679>            diverted <= 02:P2BMP1         4.41     .633 No_date    6:05   81.29
01680>            diverted <= 03:P2STM1        18.76    2.697 No_date    6:05   81.29
01681>  013:0029---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01682>      DIVERT HYD      -> 02:P2BMP1         4.41     .633 No_date    6:05   81.29
01683>            diverted <= 04:P2BMP2         1.44     .210 No_date    6:05   81.29
01684>            diverted <= 05:P2STM2         2.90     .423 No_date    6:05   81.29
01685>  013:0030---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01686>      ROUTE RESERVOIR -> 04:P2BMP2         1.44     .210 No_date    6:05   81.29
01687>       [RDT= 5.00] out<- 07:P2BMP3          .29     .003 No_date    5:35   81.29
01688>                 overflow <= 08:P2STM3     1.15     .205 No_date    6:10   81.29
01689>      {MxStoUsed=.1270E-01, TotOvfVol=.9309E-01, N-Ovf=    2, TotDurOvf=    7.hrs
01690>  013:0031---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01691>      COMPUTE DUALHYD    03:P2STM1         18.76    2.697 No_date    6:05   81.29
01692>         Major System /  01:P2maj           .08     .132 No_date    6:25   81.29
01693>         Minor System \  02:P2min          18.67    1.790 No_date    5:55   82.91
01694>       {MjSysSto=.1157E+04, TotOvfVol=.6610E+02, N-Ovf=    1, TotDurOvf=    0.hrs
01695>  013:0032---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01696>      CONTINUOUS NASHYD  07:SWM2            .99     .136 No_date    6:05   73.10
01697>       [CN= 90.0: N= 2.00]
01698>       [Tp=  .25:DT= 5.00]
01699>       [IaREC= 4.00: SMIN= 12.64: SMAX= 84.28: SK=1.000]
01700>       [InterEventTime=  12.00]
01701>  013:0033---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01702>      ADD HYD            01:P2maj           .08     .132 No_date    6:25   81.29
01703>                     +  02:P2min          18.67    1.790 No_date    5:55   82.91
01704>                     +  05:P2STM2          2.90     .423 No_date    6:05   81.29
01705>                     +  07:SWM2             .99     .136 No_date    6:05   73.10
01706>                     +  08:P2STM3          1.15     .205 No_date    6:10   81.29
01707>       [DT= 5.00]  SUM=  10:P2in          23.79    2.550 No_date    6:05   82.22
01708>  013:0034---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01709>      ROUTE RESERVOIR -> 10:P2in          23.79    2.550 No_date    6:05   82.22
01710>       [RDT= 5.00] out<- 02:P2out         18.22     .700 No_date    6:20   82.22
01711>                 overflow <= 03:P2OVF      5.57    1.793 No_date    6:20   82.22
01712>      {MxStoUsed=.6656E+00, TotOvfVol=.4581E+00, N-Ovf=    1, TotDurOvf=    1.hrs
01713>  013:0035---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01714>      ADD HYD            02:P2out          18.22     .700 No_date    6:20   82.22
01715>                     +  03:P2OVF           5.57    1.793 No_date    6:20   82.22
01716>       [DT= 5.00]  SUM=  06:PND2          23.79    2.493 No_date    6:20   82.22
01717>  013:0036---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01718>      CONTINUOUS NASHYD  04:CRFP          24.18    1.865 No_date    6:30   65.86
01719>       [CN= 82.0: N= 2.00]
01720>       [Tp=  .50:DT= 5.00]
01721>       [IaREC= 4.00: SMIN= 23.09: SMAX=153.94: SK=1.000]
01722>       [InterEventTime=  12.00]
01723>  013:0037---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01724>      CONTINUOUS STANDHYD05:28            12.50    1.740 No_date    6:00   57.94
01725>       [XIMP=.38:TIMP=.45]
01726>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
01727>       [Pervious     area: IAper= 4.67:SLPP=1.00:LGP= 205.:MNP=.100:SCP=   .0]
01728>       [Impervious   area: IAimp= 1.57:SLPI=1.00:LGI= 700.:MNI=.013:SCI=   .0]
01729>       [IaRECimp=   2.00: IaRECper=   4.00]
01730>  013:0038---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01731>      ADD HYD            04:CRFP          24.18    1.865 No_date    6:30   65.86
01732>                     +  05:28            12.50    1.740 No_date    6:00   57.94
01733>                     +  06:PND2          23.79    2.493 No_date    6:20   82.22
01734>       [DT= 5.00]  SUM=  07:B2065         60.47    5.508 No_date    6:20   70.66
01735>  013:0039---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01736>      SAVE HYD           07:B2065         60.47    5.508 No_date    6:20   70.66
01737>        fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B2065.013
01738>        remark:HEC-RAS Inflow Node 2065 / Station 44548
01739>  013:0040---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01740>      CONTINUOUS STANDHYD05:100-1         61.17    4.569 No_date    6:05   57.94
01741>       [XIMP=.38:TIMP=.45]
01742>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.00:  F= .00]
01743>       [Pervious     area: IAper= 4.67:SLPP= .80:LGP=1200.:MNP=.100:SCP=   .0]
01744>       [Impervious   area: IAimp= 1.57:SLPI= .80:LGI=1700.:MNI=.013:SCI=   .0]
01745>       [IaRECimp=   2.00: IaRECper=   4.00]
01746>  013:0041---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01747>      CONTINUOUS NASHYD  06:102-1         39.80    1.601 No_date    7:10   61.80
01748>       [CN= 78.0: N= 2.00]
01749>       [Tp= 1.10:DT= 5.00]
01750>       [IaREC= 4.00: SMIN= 29.88: SMAX=199.22: SK=1.000]
01751>       [InterEventTime=  12.00]
01752>  013:0042---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01753>      ADD HYD            05:100-1         61.17    4.569 No_date    6:05   57.94
01754>                     +  06:102-1         39.80    1.601 No_date    7:10   61.80
01755>       [DT= 5.00]  SUM=  10:B3894        100.97    5.351 No_date    6:05   59.46
01756>  013:0043---------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-
01757>      SAVE HYD           10:B3894        100.97    5.351 No_date    6:05   59.46
01758>        fname :M:\2008\108195\SUBDIV~1\DATA\CALCUL~1\SWMHYMO\H-B3894.013
01759>        remark:HEC-RAS Inflow Node 3894 / Station 43966
01760>  013:0002---------------------------------------------------------------------------
01761>       FINISH
01762>  ---------------------------------------------------------------------------
01763>  ***************************************************************************
01764>       WARNINGS / ERRORS / NOTES
01765>       -------------------------
01766>  010:0007 DIVERT HYD      ->
01767>       *** WARNING: Outflow tables were exceeded.
01768>  010:0008 DIVERT HYD      ->
01769>       *** WARNING: Outflow tables were exceeded.
01770>  010:0017 DIVERT HYD      ->
01771>       *** WARNING: Outflow tables were exceeded.
01772>  010:0018 DIVERT HYD      ->
01773>       *** WARNING: Outflow tables were exceeded.
01774>  011:0007 DIVERT HYD      ->
01775>       *** WARNING: Outflow tables were exceeded.
01776>  011:0008 DIVERT HYD      ->
01777>       *** WARNING: Outflow tables were exceeded.
01778>  011:0017 DIVERT HYD      ->
01779>       *** WARNING: Outflow tables were exceeded.
01780>  011:0018 DIVERT HYD      ->
01781>       *** WARNING: Outflow tables were exceeded.
01782>  012:0007 DIVERT HYD      ->
01783>       *** WARNING: Outflow tables were exceeded.
01784>  012:0008 DIVERT HYD      ->
01785>       *** WARNING: Outflow tables were exceeded.
01786>  012:0017 DIVERT HYD      ->
01787>       *** WARNING: Outflow tables were exceeded.
01788>  012:0018 DIVERT HYD      ->
01789>       *** WARNING: Outflow tables were exceeded.
01790>  013:0007 DIVERT HYD      ->
01791>       *** WARNING: Outflow tables were exceeded.
01792>  013:0008 DIVERT HYD      ->
01793>       *** WARNING: Outflow tables were exceeded.
01794>  013:0013 ROUTE RESERVOIR
01795>       *** WARNING: STORAGE-Q values were extrapolated.
01796>                    Increase curve or use overflow option.
01797>  013:0017 DIVERT HYD      ->
01798>       *** WARNING: Outflow tables were exceeded.
01799>  013:0018 DIVERT HYD      ->
01800>       *** WARNING: Outflow tables were exceeded.
01801>    Simulation ended on 2017-07-14     at 11:39:15
01802>  ===========================================================================
01803>
01804>
```

Kizell Lands - Fernbank 5618 Hazeldean Road
Design Storm Time Series Data
SCS Design Storms - MTO Distribution

NOVATECH
Engineers, Planners & Landscape Architects

S2-12.stm		S5-12.stm		S10-12.stm		S100-12.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr	min	mm/hr
0:00	1.08	0:00	1.44	0:00	1.68	0:00	2.40
0:15	1.08	0:15	1.44	0:15	1.68	0:15	2.40
0:30	1.08	0:30	1.44	0:30	1.68	0:30	2.40
0:45	1.08	0:45	1.44	0:45	1.68	0:45	2.40
1:00	1.08	1:00	1.44	1:00	1.68	1:00	2.40
1:15	1.08	1:15	1.44	1:15	1.68	1:15	2.40
1:30	1.08	1:30	1.44	1:30	1.68	1:30	2.40
1:45	1.08	1:45	1.44	1:45	1.68	1:45	2.40
2:00	1.30	2:00	1.73	2:00	2.02	2:00	2.88
2:15	1.30	2:15	1.73	2:15	2.02	2:15	2.88
2:30	1.30	2:30	1.73	2:30	2.02	2:30	2.88
2:45	1.30	2:45	1.73	2:45	2.02	2:45	2.88
3:00	1.73	3:00	2.30	3:00	2.69	3:00	3.84
3:15	1.73	3:15	2.30	3:15	2.69	3:15	3.84
3:30	1.73	3:30	2.30	3:30	2.69	3:30	3.84
3:45	1.73	3:45	2.30	3:45	2.69	3:45	3.84
4:00	2.59	4:00	3.46	4:00	4.03	4:00	5.76
4:15	2.59	4:15	3.46	4:15	4.03	4:15	5.76
4:30	3.46	4:30	4.61	4:30	5.38	4:30	7.68
4:45	3.46	4:45	4.61	4:45	5.38	4:45	7.68
5:00	5.18	5:00	6.91	5:00	8.06	5:00	11.52
5:15	5.18	5:15	6.91	5:15	8.06	5:15	11.52
5:30	20.74	5:30	27.65	5:30	32.26	5:30	46.08
5:45	57.02	5:45	76.03	5:45	88.70	5:45	126.72
6:00	7.78	6:00	10.37	6:00	12.10	6:00	17.28
6:15	7.78	6:15	10.37	6:15	12.10	6:15	17.28
6:30	3.46	6:30	4.61	6:30	5.38	6:30	7.68
6:45	3.46	6:45	4.61	6:45	5.38	6:45	7.68
7:00	2.59	7:00	3.46	7:00	4.03	7:00	5.76
7:15	2.59	7:15	3.46	7:15	4.03	7:15	5.76
7:30	2.59	7:30	3.46	7:30	4.03	7:30	5.76
7:45	2.59	7:45	3.46	7:45	4.03	7:45	5.76
8:00	1.51	8:00	2.02	8:00	2.35	8:00	3.36
8:15	1.51	8:15	2.02	8:15	2.35	8:15	3.36
8:30	1.51	8:30	2.02	8:30	2.35	8:30	3.36
8:45	1.51	8:45	2.02	8:45	2.35	8:45	3.36
9:00	1.51	9:00	2.02	9:00	2.35	9:00	3.36
9:15	1.51	9:15	2.02	9:15	2.35	9:15	3.36
9:30	1.51	9:30	2.02	9:30	2.35	9:30	3.36
9:45	1.51	9:45	2.02	9:45	2.35	9:45	3.36
10:00	0.86	10:00	1.15	10:00	1.34	10:00	1.92
10:15	0.86	10:15	1.15	10:15	1.34	10:15	1.92
10:30	0.86	10:30	1.15	10:30	1.34	10:30	1.92
10:45	0.86	10:45	1.15	10:45	1.34	10:45	1.92
11:00	0.86	11:00	1.15	11:00	1.34	11:00	1.92
11:15	0.86	11:15	1.15	11:15	1.34	11:15	1.92
11:30	0.86	11:30	1.15	11:30	1.34	11:30	1.92
11:45	0.86	11:45	1.15	11:45	1.34	11:45	1.92
12:00	0.00	12:00	0.00	12:00	0.00	12:00	0.00

Kizell Lands - Fernbank 5618 Hazeldean Road
Design Storm Time Series Data
Chicago Design Storms

NOVATECH
Engineers, Planners & Landscape Architects

C25mm-3.stm	
Duration	Intensity
min	mm/hr
0:00	0
0:10	2.21
0:20	2.75
0:30	3.68
0:40	5.73
0:50	14.29
1:00	60.28
1:10	18.9
1:20	9.7
1:30	6.53
1:40	4.94
1:50	3.99
2:00	3.37
2:10	2.92
2:20	2.58
2:30	2.32
2:40	2.1
2:50	1.93
3:00	1.79

C2-3.stm	
Duration	Intensity
min	mm/hr
0:00	0
0:10	2.81
0:20	3.5
0:30	4.69
0:40	7.3
0:50	18.21
1:00	76.81
1:10	24.08
1:20	12.36
1:30	8.32
1:40	6.3
1:50	5.09
2:00	4.29
2:10	3.72
2:20	3.29
2:30	2.95
2:40	2.68
2:50	2.46
3:00	2.28

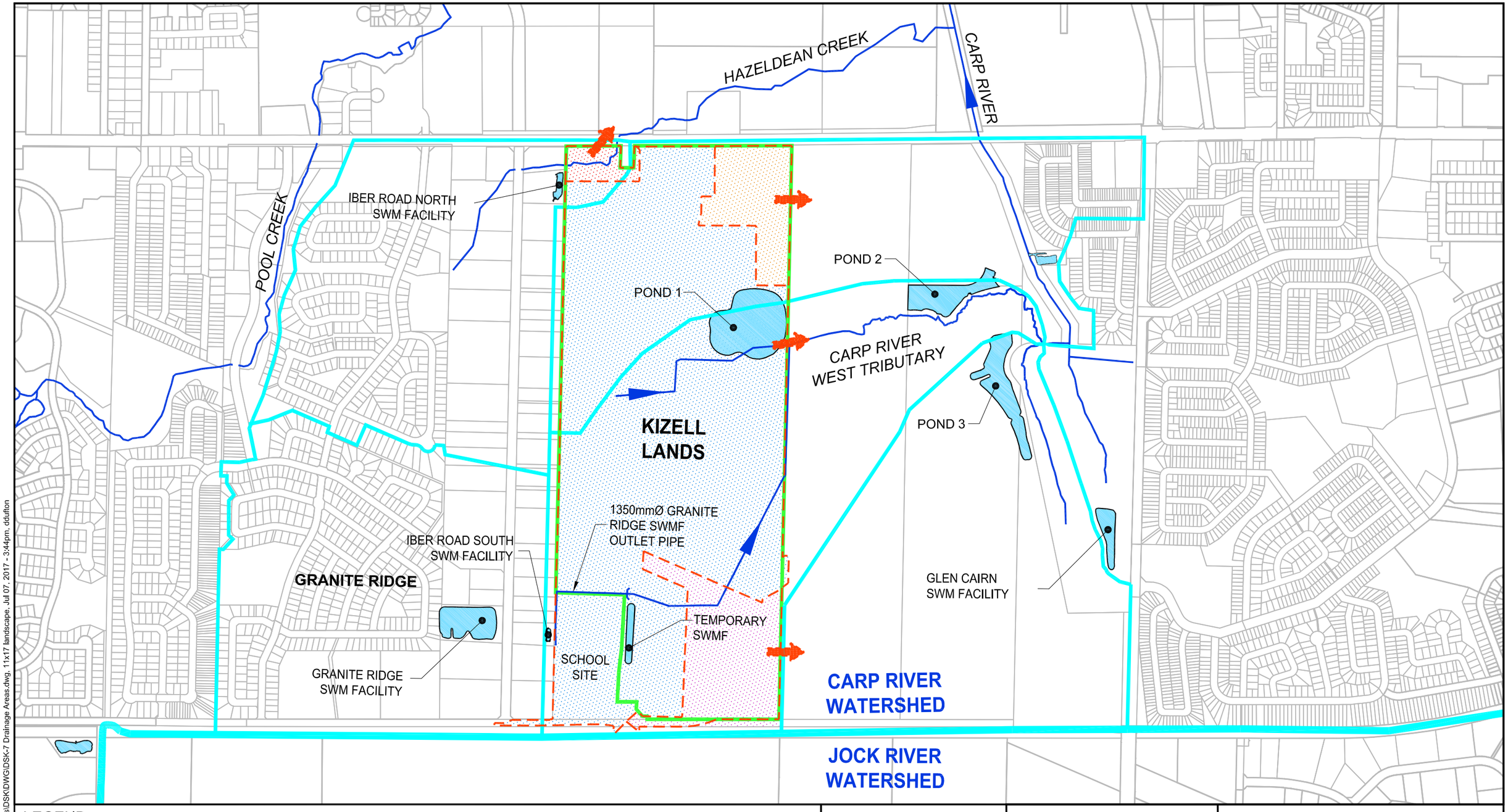
C5-3.stm	
Duration	Intensity
min	mm/hr
0:00	0
0:10	3.68
0:20	4.58
0:30	6.15
0:40	9.61
0:50	24.17
1:00	104.19
1:10	32.04
1:20	16.34
1:30	10.96
1:40	8.29
1:50	6.69
2:00	5.63
2:10	4.87
2:20	4.3
2:30	3.86
2:40	3.51
2:50	3.22
3:00	2.98

C10-3.stm	
Duration	Intensity
min	mm/hr
0:00	0
0:10	4.25
0:20	5.29
0:30	7.11
0:40	11.13
0:50	28.1
1:00	122.14
1:10	37.28
1:20	18.95
1:30	12.7
1:40	9.59
1:50	7.73
2:00	6.5
2:10	5.63
2:20	4.97
2:30	4.46
2:40	4.05
2:50	3.71
3:00	3.43

C100-3.stm	
Duration	Intensity
min	mm/hr
0:00	0
0:10	6.05
0:20	7.54
0:30	10.16
0:40	15.97
0:50	40.65
1:00	178.56
1:10	54.05
1:20	27.32
1:30	18.24
1:40	13.74
1:50	11.06
2:00	9.29
2:10	8.02
2:20	7.08
2:30	6.35
2:40	5.76
2:50	5.28
3:00	4.88

Appendix C: Drawings

Drainage Areas	108195-DSK-7
Master Grading Plan	108195-GR
Water Distribution Plan	108195-WTR
Sanitary Drainage Area Plan	108195-SAN
Storm Drainage Area Plan	108195-STM
Pond 1 - Layout Plan	108195-SWM



LEGEND

- PRE DEVELOPMENT DRAINAGE AREA BOUNDARY
- POST DEVELOPMENT DRAINAGE AREA BOUNDARY
- SITE BOUNDARY
- EXISTING DRAINAGE PATH AND FLOW DIRECTION
- POST DEVELOPMENT FLOW DIRECTION
- DRAINAGE AREA TO POND 1
- DRAINAGE AREA TO POND 2
- DRAINAGE AREA TO POND 3
- DRAINAGE AREA TO HAZELDEAN CREEK

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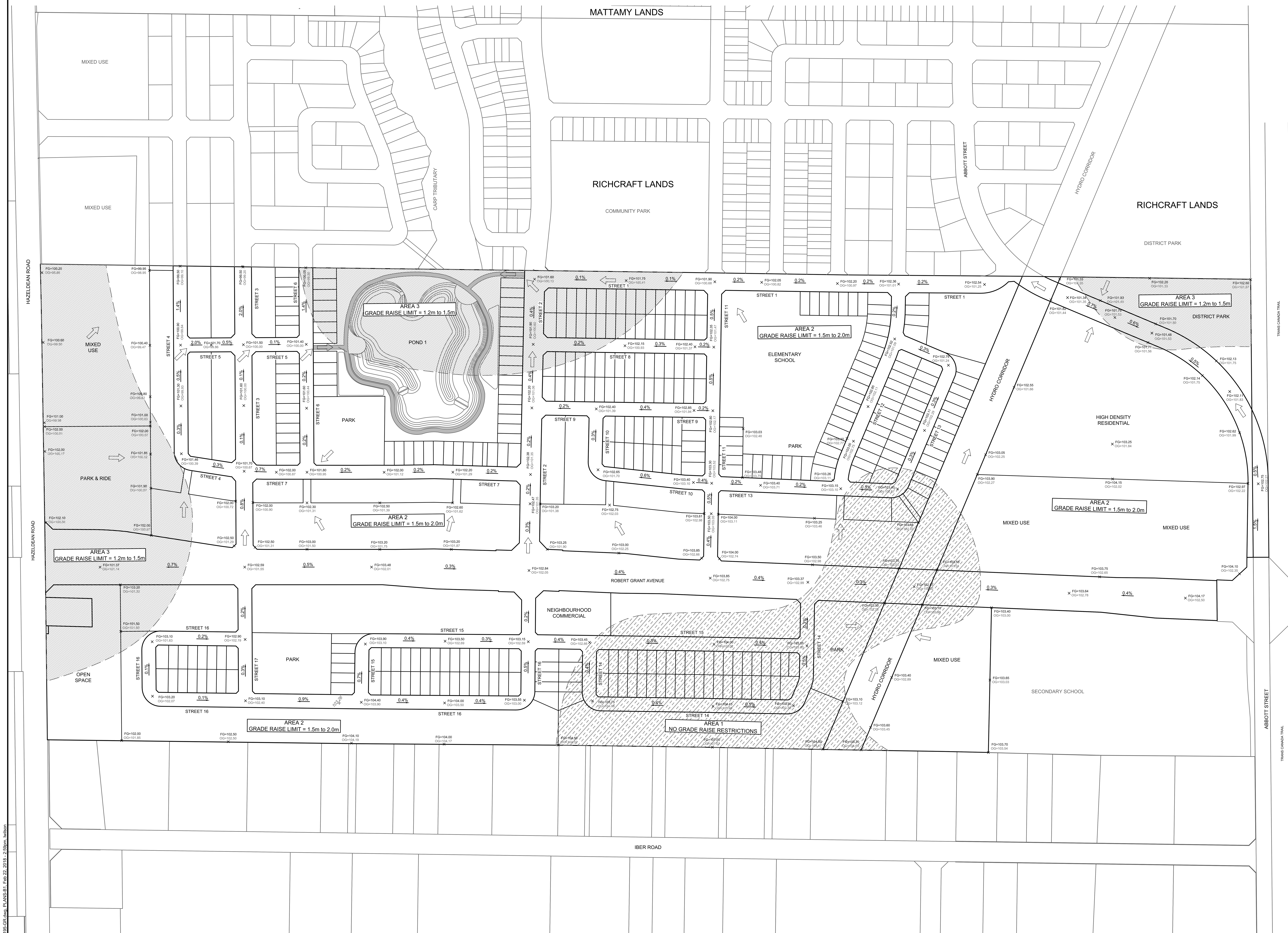
CITY OF OTTAWA
FERNBANK COMMUNITY - KIZELL LANDS

DRAINAGE AREAS

SCALE 1 : 500 (0, 5m, 10m, 20m)
DATE JULY 7, 2017
JOB 108195
FIGURE DSK-7

LEGEND

100 (contour line)	ORIGINAL GROUND CONTOUR AND ELEVATION
× FG=103.09 OG=101.76	FINISHED GROUND ELEVATION ORIGINAL GROUND ELEVATION
0.3% (arrow)	SLOPE AND DIRECTION OF FLOW
(arrow)	MAJOR OVERLAND FLOW DIRECTION
(dashed line)	GRADE RAISE LIMIT BOUNDARY
(hatched)	AREA 1 NO GRADE RAISE RESTRICTIONS
(dotted)	AREA 3 GRADE RAISE LIMIT 1.2m to 1.5m



NOTE:
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No.	REVISION	DATE	BY
3.	DRAFT PLAN RESUBMISSION	FEB 23/18	MAB
2.	REVISED PER CITY COMMENTS	JUL 20/17	MAB
1.	DRAFT PLAN APPLICATION	NOV 9/16	MAB

SCALE 1:2000

DESIGN	LRW
CHECKED	MAB
DRAWN	DTD
CHECKED	MAB
APPROVED	JGR

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LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2018.02.23 PROVINCE OF ONTARIO

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CITY OF OTTAWA
FERNBANK COMMUNITY - KIZELL LANDS

MASTER GRADING PLAN

PROJECT No. 108195
REV REV # 3
DRAWING No. 108195-GRD

PLANB1.DWG - 1000mmx707mm

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1.	DRAFT PLAN APPLICATION	NOV 9/16	MAB

SCALE 1:2000

DESIGN	LRW
CHECKED	MAB
DRAWN	DTD
CHECKED	MAB
APPROVED	JGR

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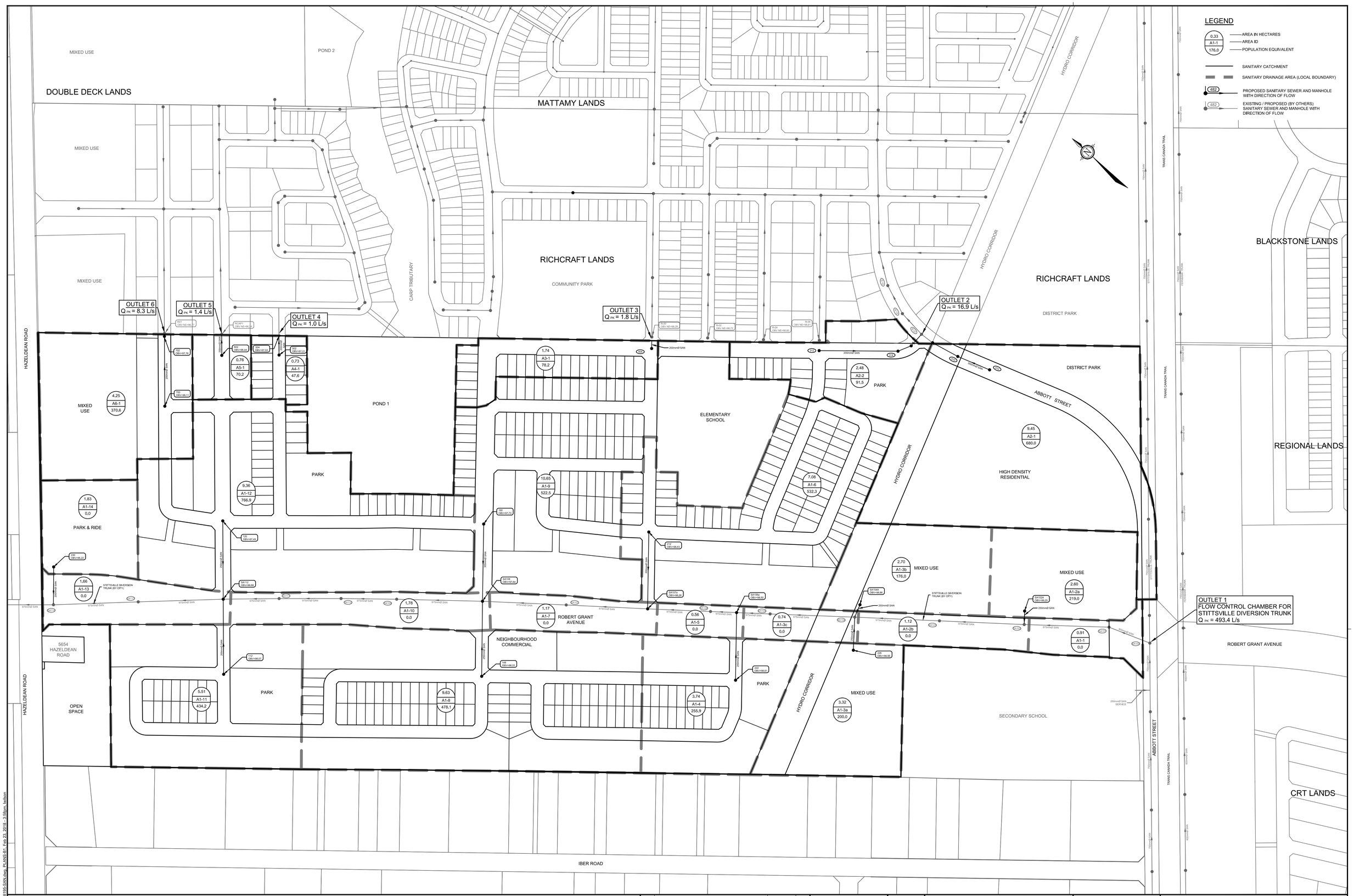
CITY OF OTTAWA
FERNBANK COMMUNITY - KIZELL LANDS

WATER DISTRIBUTION PLAN

PROJECT No. 108195
REV REV # 3
DRAWING No. 108195-WTR

PLANB1.DWG - 1000mmx707mm



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1.	DRAFT PLAN APPLICATION	NOV., 9/16	MAB

SCALE
1:2000
1:2000
0 20 40 60 80

DESIGN LRW
CHECKED MAB
DRAWN DTD
CHECKED MAB
APPROVED JGR

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L. R. WILSON
100160065
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2018.02.23
PROVINCE OF ONTARIO

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CITY OF OTTAWA
FERNBANK COMMUNITY - KIZELL LANDS

SANITARY DRAINAGE AREA PLAN

PROJECT No. 108195
REV REV # 3
DRAWING No. 108195-SAN

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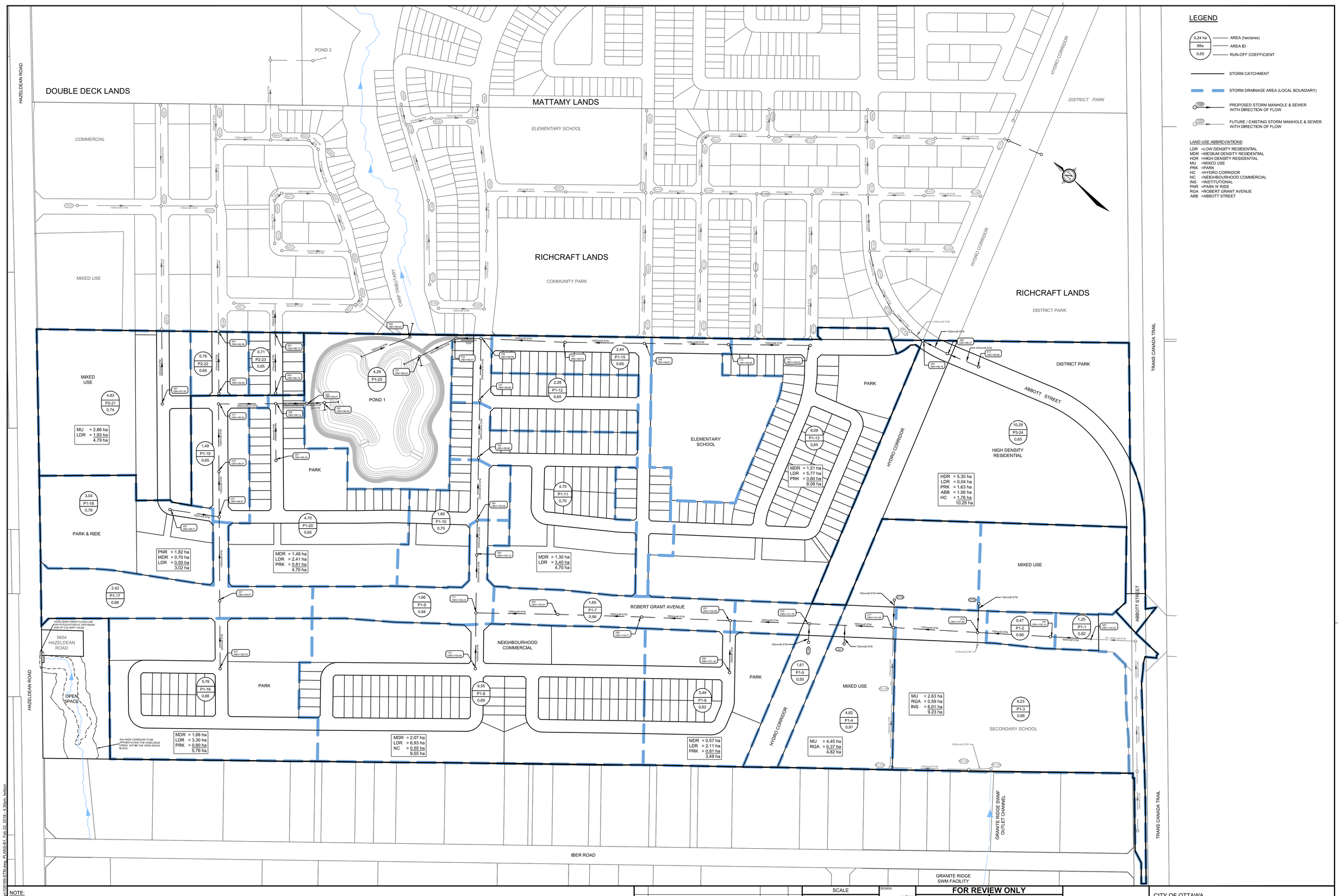
PLANBY.DWG - 1000mmx1075mm



LEGEND

- 0,24 ha / 88a / 0,65 — AREA (hectares) / AREA ID / RUN-OFF COEFFICIENT
- STORM CATCHMENT
- STORM DRAINAGE AREA (LOCAL BOUNDARY)
- PROPOSED STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- FUTURE / EXISTING STORM MANHOLE & SEWER WITH DIRECTION OF FLOW

LAND USE ABBREVIATIONS:

LDR	=LOW DENSITY RESIDENTIAL
MDR	=MEDIUM DENSITY RESIDENTIAL
HDR	=HIGH DENSITY RESIDENTIAL
MU	=MIXED USE
PRK	=PARK
HC	=HYDRO CORRIDOR
NC	=NEIGHBOURHOOD COMMERCIAL
INS	=INSTITUTIONAL
PNR	=PARK N' RIDE
RGA	=ROBERT GRANT AVENUE
ABB	=ABBOTT STREET

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1.	DRAFT PLAN APPLICATION	NOV 9/16	MAB

SCALE 1:2000 (1:2000, 0 20 40 60 80)

DESIGN LRW
CHECKED MAB
DRAWN DTD
CHECKED MAB
APPROVED JGR

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LICENSED PROFESSIONAL ENGINEER — M.A. BISSETT — PROVINCE OF ONTARIO

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CITY OF OTTAWA
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STORM DRAINAGE AREA PLAN

PROJECT No. 108195
REV REV # 3
DRAWING No. 108195-STM

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FILENAME: 108195-STM.dwg

FUTURE RESIDENTIAL (KIZELL)
FUTURE RESIDENTIAL (KIZELL)
SEDIMENT MANAGMENT AREA
FUTURE PARK
SERVICE ROAD
BENCH
FIRST FLUSH OUTLET INV.= 97.69
PLUNGE POOL
20.1m-1650mmØ Ell STM @ 0.04%
TYPICAL ARMOUR STONE RETAINING WALL PER CITY DETAIL L7
OVERFLOW OUTLET INV.= 97.69
OVERFLOW HEADWALL HW-2 C/W RIP-RAP APRON ±450mmØ ROCK, 600mm DEEP
SEDIMENT FOREBAY
SUBMERGED PERMEABLE ROCK CHECK DAM ELEVATION =97.65
OUTLET STRUCTURE BOX MH201 INV. 97.65
POND 1
WATER LEVELS
NWL=97.65
2-YEAR=98.55
5-YEAR=98.85
100-YEAR=99.40
MAIN CELL
OVERFLOW HEADWALL HW-2 C/W RIP-RAP APRON ±450mmØ ROCK, 600mm DEEP
TYPICAL ARMOUR STONE RETAINING WALL PER CITY DETAIL L7
SUBMERGED PERMEABLE ROCK CHECK DAM ELEVATION =97.65
SEDIMENT FOREBAY
MAJOR OVERLAND FLOW ROUTE
OVERFLOW OUTLET INV.= 97.64
FIRST FLUSH OUTLET INV.= 97.64
SERVICE ROAD
SEDIMENT MANAGMENT AREA
FUTURE RESIDENTIAL (KIZELL)
KIZELL LANDS
RICHCRAFT LANDS
FUTURE RESIDENTIAL (RICHCRAFT)
BENCH
FUTURE RESIDENTIAL (RICHCRAFT)
PROTECT EXISTING VEGETATION AS PRACTICAL
POOL & RIFFLE AREAS C/W RIPARIAN PLANTINGS ALONG REGRADED CHANNEL (TYP.)
CARP TRIBUTARY
DEVELOPMENT SETBACK
REMOVE EX. CULVERT
OUTLET PIPE 20.0m-1950mmØ STM @ 0.15%
SHADE TREES FOR THERMAL MITIGATION (TYP.)
TIE INTO EXISTING GROUND (2.5:1 MAX)
TIE INTO EXISTING GROUND (2.5:1 MAX)
SHADE TREES FOR THERMAL MITIGATION (TYP.)
REGRADE EX. CHANNEL @ 0.12% STARTING AT D/S LIMIT OF CULVERT
OVERFLOW HEADWALL HW-2 C/W RIP-RAP APRON ±450mmØ ROCK, 600mm DEEP
DEVELOPMENT SETBACK
EXISTING DITCH TO BE ABANDONED UP STREAM OF POND 1 OUTLET
FUTURE RESIDENTIAL (RICHCRAFT)
FUTURE RESIDENTIAL (RICHCRAFT)
35.8m-1800x3000mm STM @ 0.10%

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SCALE 1:400

DESIGN	MAB
CHECKED	MJP
DRAWN	DTD
CHECKED	MAB
APPROVED	JGR

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CITY OF OTTAWA
FERNBANK COMMUNITY - KIZELL LANDS

STORMWATER MANAGEMENT POND LAYOUT

PROJECT No. 108195
REV: REV # 3
DRAWING No. 108195-SWM

PLANB1.DWG - 1000mmx707mm