FUNCTIONAL SERVICING & STORMWATER IMPLEMENTATION REPORT

THE MYRIAD GROUP

GEORGIAN GLEN SUBDIVISION
TOWN OF THE BLUE MOUNTAINS

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
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1.0 INTRODUCTION

CF Crozier & Associates Inc. (CFCA) has been retained by The Myriad Group to support the Draft Plan renewal application for the Georgian Glen residential subdivision, located in the Town of The Blue Mountains.

CFCA previously assisted the Sorichetti Development Group Inc. to complete the detailed engineering design for the proposed Subdivision, and is the Engineer of Record for the Development. The 12.3 ha (30 acre) property is legally described as Part of Lot 28, Concession 7, Town of The Blue Mountains, County of Grey. Located in Camperdown (see Figure 1), the property is bounded by privately held lands to the west, the Georgian Trail and Woodland Park Road to the northeast and County Road 40 to the southeast.

The original plan of subdivision, prepared by Malone Given Parsons (2004) consisted of 44 single family lots, 16 town house units, a stormwater management facility, public open space and future residential areas. The development was Draft Approved in 2005, and a Pre-Servicing Agreement was executed in 2007. Servicing of 37 units ("Phase 1"; all of Street A and a portion of Street B) was completed in 2008 by Arnott Construction, including installation of sanitary sewers, storm sewers, watermains, electrical distribution system including street lights, a stormwater management pond, base asphalt and curb. A Subdivision Agreement was never executed, and the site and infrastructure have sat dormant, leading to lapse of Draft Plan Approval for the subdivision. A copy of the Draft Plan Conditions has been included in Appendix A.

CFCA completed a due diligence investigation of the condition of the existing servicing systems and roadways within the subdivision, and issued a corresponding report in November 2016. The results of the investigation indicated that the condition of the infrastructure was acceptable, and would only require minor repair or maintenance works. A copy of the report is provided in Appendix B.

A new Draft Plan for the subdivision was prepared by Innovative Planning Solutions in December 2016. The Draft Plan of Subdivision is reflected in Figure 2, and features 54 single residential lots, a stormwater management facility and public open space.

This report has been prepared in accordance with the following reports and provincial documents:

- "Craigleith Camperdown Subwatershed Study" prepared by Gore and Storrie, 1993.
- "Stormwater Management Report for Sorichetti Development Corporation Inc.", prepared by R.J. Burnside, January 2003.
- "Stormwater Management Planning and Design Manual", prepared by Ministry of Environment, March 2003.
- "Stormwater Implementation Report", prepared by C.F. Crozier & Associates, May 2004.
- "Stormwater Management Facility Operation & Maintenance Manual", prepared by C.F. Crozier & Associates, June 2007.
- "Engineering Standards" prepared by Town of The Blue Mountains, April 2009.

As such, this document is an update to the 2004 Stormwater Implementation Report prepared by CFCA and reflects the net reduction in subdivision density and provides commentary on the servicing and stormwater management strategies for the subdivision. The Conclusions in this report are essentially unchanged, save and except for Sections 6.0 – 9.0 that have been included to comment on the roads, sanitary system, water system and utilities for the development.

2.0 BACKGROUND

2.1 Municipal Servicing

The property was subject to an Ontario Municipal Board Hearing concerning development within the Camperdown Service Area of the Town of The Blue Mountains. By way of the Board Order 0690 issued May 28, 2003, the subject lands were redesignated per OPA133, rezoned and draft approved.

The Town of The Blue Mountains engaged an outside consultant to undertake the detailed design and implementation of trunk sanitary and water reservoir infrastructure that was required for the servicing of Camperdown Service Area. The works were constructed and commissioned in 2006.

The Grey Sauble Conservation Authority (GSCA) provided their clearance for the subdivision in 2004. A Certificate of Approval (CoA) for the internal sanitary sewers, storm sewers and watermains was issued by the Ministry of Environment in December 2004. A CoA for the Stormwater Management Facility was issued in January 2005. In May 2007, the Ministry of Transportation (MTO) issued a Building and Land Use (BLU) Permit for the development. A copy of these documents can be found in Appendix A.

Street A and a portion of Street B were fully serviced by way urban roads with municipal sanitary sewer, watermains and storm sewers under the auspices of a Pre-servicing Agreement. The watermain and sanitary sewer are not currently connected to the municipal system, and will be connected upon execution of a Subdivision Agreement.

2.2 Stormwater Management

The majority of the site is located within a 270 ha catchment tributary to Georgian Bay. (This area is outside the limits of the Craigleith Camperdown Subwatershed Study). The location of the site in relation to the external areas is reflected in Figure 3. A relatively small portion of the site in the north east corner falls outside of the 270 ha catchment noted above. This small area (approximately 2 ha) is tributary to Subwatershed 34 (per the Craigleith Camperdown Subwatershed Study) via the existing County Road 40 ditch and cross culvert at Highway 26. This is reflected in Figure 4.

With the exception of several acres in the central portion of the subject lands, the property was forested. Soils across the property consist of Tecumseth sand (60%) and Wiarton silt (40%) belonging to hydrologic soil groups AB and BC respectively (Soil Survey of Grey County, 1954).

Peto MacCallum Limited undertook a site specific geotechnical investigation on the subject lands in 2004 to confirm the soil and water table conditions and to provide recommendations with respect to site servicing.

The reader is directed to the stormwater management report prepared by Burnside (January 2003) for a complete description of existing drainage conditions, and the Peto MacCallum geotechnical report for site soil conditions in Appendices C and D, respectively.

Burnside (2003) also computed peak flow rates at several flow nodal points in analyzing the existing storm drainage conditions. The nodal points were referenced as follows:

- Outlet A – northeast corner of site tributary to Subwatershed 34
- Outlet B – northwest corner of site contained within 270 ha drainage shed
- Outlet C – existing culvert crossing Highway 26 located 500 m west of site north of the Georgian Trail at downstream limit of 270 ha drainage shed.

Table 1 summarizes the pre-development peak flows rates (Burnside, 2003) for the full range of design rainfall events (2 year to 100 year) using rainfall data sourced from Owen Sound and the 24 hour Kieffer Chu (Chicago) rainfall distribution at the flow nodal locations.

Table 1: Pre-development Peak Flow Rates

Return Period (Years)	Peak Flow (m^3/s) [1.]		
	Outlet A	Outlet B	Outlet C
2	0.02	0.11	0.74
5	0.04	0.19	1.31
10	0.05	0.27	1.74
25	0.07	0.36	2.34
100	0.10	0.55	3.30

Note: 1. Peak flow rates rounded to the nearest 0.01 m3/s

The Burnside report established the need for a stormwater management (SWM) end-of-pipe facility consisting of an extended detention wet pond within the subject property. The SWM facility for the subdivision was constructed concurrently with the site servicing works.

Section 3.0 speaks to design elements of the SWM pond, as well as site design issues regarding the storm sewer system, overland flow routes and construction erosion and sediment control for the new Draft Plan.

3.0 STORMWATER DESIGN CRITERIA

Stormwater management for the proposed development must comply with the policies and standards of the various agencies including:

- Town of The Blue Mountains
- Ministry of Environment
- Niagara Escarpment Commission
- Grey Sauble Conservation Authority.

Other agencies such as Department of Fisheries and Oceans are not expected to become involved in this project as there are no fisheries issues on-site.

The design criteria are summarized and discussed below.

1. Subdivision Standards (Town of The Blue Mountains, 2009)
   - Urban cross section complete with mountable curb
   - Storm sewer of 5 year capacity
   - Lot grading swales at 2% (minimum)

2. Water Quantity Control
   - "Post to Pre" control of peak flow rates

3. Water Quality Control
   - "Enhanced" treatment level

4. Erosion Control
   - 15 m setback from existing ditch along south property line
   - 24 hour extended detention of runoff from short duration event

3.1 Subdivision Standards

The storm sewer drainage plan is reflected on Figure 5 (a reduced-sized copy of the engineering drawing). The figure shows the storm sewer contained within the municipal road allowance of Streets A and B discharging to the SWM facility. The storm sewer design chart is provided in Appendix E, and it presents the 5 year sewer design. An update to the design sheet is not warranted, since the runoff coefficient used for all catchments (regardless of single detached residences or townhomes) is 0.35. An imperviousness level of 30% was selected for the site based on the original Draft Plan. Due to a net reduction in units, this imperviousness was considered acceptable for the new Draft Plan. Any change in flows from the subdivision would be nominal, and as such there is residual capacity within the storm sewer network.

Streets A and B comply with the Town of The Blue Mountains urban road cross section.

The overland flow route is also reflected on Figure 5 which generally follows the alignment of Streets A and B. Overland flow will be directed into the SWM facility at the emergency access road.

3.2 Water Quantity (Peak Flow) Control

Burnside (2003) concluded that water quantity control by way of attenuating post-development peak flow rates to pre-development levels ("post to pre control") was not warranted for the subject development.

In 2004, CFCA reviewed this matter, and incorporated the full build out scenario for the subdivision into the post-development hydrologic modeling. A sensitivity analysis was completed on peak flow rates occurring at Outlets B and C based on controlled and uncontrolled drainage conditions.

The hydrograph timing and specifically the lagging of the "time to peak" of the large upstream hydrograph behind that of the downstream site hydrograph led CFCA to observe the following:

i. Post-development peak flow rates occurring at Outlet C are insensitive to on-site peak flow control within the subdivision.

ii. Post-development peak flow rates occurring at Outlet C will be relatively unchanged over pre-development rates with or without on-site control within the subdivision. Regardless of whether on-site control is implemented or not, peak flows occurring at Outlet C increase less than 1% from pre-development rates.

iii. Post-development peak flow rates generated from the site (occurring at Outlet B) will exceed pre-development rates by approximately 60% if on-site quantity control is not implemented within the SWM pond.

iv. Post-development peak flow rates generated from the site (occurring at Outlet B) can be reduced over by 80% below pre-development levels by incorporating peak flow control into the SWM pond (in addition to the water quality control).

As a result of the sensitivity analysis, CFCA recommended that quantity controls be incorporated into the operation of the SWM facility to attenuate the site peak flow rates to pre-development levels.

3.3 Water Quality Control

Given the ultimate receiver of drainage from the subject lands is Georgian Bay, "enhanced" water quality treatment has been implemented for the development.

A wet pond, complete with extended detention, serves as the end-of-pipe water quality treatment. This is consistent with the recommendations of Burnside (2003).

Per the sizing guidelines of MOE (2003), permanent pool storage must meet 100m^3/ha, while extended detention must be a minimum of 40 m^3/ha (see Appendix E).

Based on development drainage area contributing to the pond of 11.3 ha, the following minimum design parameters are required of the wet pond:

- Permanent Pool 1130 m^3
- Extended Detention (quality only) 452 m^3

3.4 Erosion Control

Erosion control was provided in the design of the wet pond in the form of extended detention. It should be noted that the required extended detention volume is taken as the greater of the water quality extended detention volume or the erosion control volume.

An erosion assessment was completed per the guidelines outlined by the MOE (2003). The Simplified Design Approach was applicable given the size of the development area (less than 20 ha) and the geomorphic screening of the receiving system (Appendix E).

Applying a conservative "directly-connected" impervious ratio of 15%, SCS hydrologic soil group AB and no source controls, the storage volume requirement is 100 m^3/ha. Given the site drainage area contributing to Outlet B of 11.3 ha, this leads to a total storage volume of 1130 m^3.

Since this value is greater than the extended detention volume required for water quality control, it will govern the extended detention sizing for the wet pond.

The 1130 m^3 of extended detention is to be drawn down over a 24 to 48 hour period typically. For design purposes, the hydraulic outlet control was sized for approximately 36 hour draw-down.

4.0 POND OPERATING CHARACTERISTICS

The following sections summarize key design elements of the SWM facility. The pertinent water levels within the SWM facility can be found in Table 2 below.

Table 2: SWM Pond Operating Elevations

Rainfall Event	HWL [1.] (m)
Bottom	182.5
Permanent Pool	184.0
25mm	184.3
Extended Detention	184.5
2 yr	184.6
5 yr	184.8
10 yr	185.0
25 yr	185.1
100 yr	185.2

Note: 1. High water level (HWL) rounded to the nearest 0.1 m

4.1 Pond Grading

The wet pond design incorporated terraced grading and side slopes per the recommendations of the Stormwater Management Planning and Design Manual (MOE, 2003).

The grading of the pond is shown on Figure 6 (a reduced-sized copy of the full sized engineering drawing).

4.2 Storage Volumes

The active design storage volume above the permanent pool is 4600 m^3 to elevation 185.5 m. Based on the peak flow analysis (see Section 4.3), this volume meets and exceeds the minimum requirements for flood storage.

The permanent pool storage volume is 1900 m^3. This meets the minimum water quality volume requirement of 1130 m^3. The maximum depth of the permanent pool is 1.5 meters. The 1900 m^3 of storage permanent pool includes approximately 350 m^3 of storage within the sediment forebay. The extended detention elevation is at 184.5 (0.5m above permanent pool), with 1200m^3 of volume provided to meet the erosion control criteria.

Contained in Appendix E is the stage storage relationship of the pond and the stage discharge relationship for the outlet structure.

4.3 Peak Flow Control

The original hydrologic modeling (Burnside, 2003) was modified to reflect the post-development drainage conditions of the site per the detailed engineering design. The revised hydrologic output files are found in Appendix F. The modeling was used to determine the volume of active storage required to attenuate post-development site flows to pre-development rates (i.e. quantity control).

Peak flow control for the 2 year, 5 year, 10 year, 25 year, and 100 year rainfall events is achieved. Tables 3 and 4 summarize the pre-development and post-development peak flow rates at Outlets A and B respectively. Pre-development peak flow rates are respected in all instances.

Table 3: Peak Flow Summary at Outlet A

Return Period (Years)	Peak Flow (m^3/s) [1]		
	Pre-Development	Post-Development	Difference
2	0.02	0.01	-50%
5	0.04	0.02	-50%
10	0.05	0.03	-40%
25	0.07	0.04	-42%
100	0.10	0.05	-50%

Note: 1. Peak flow rates rounded to the nearest 0.01 m^3/s

Table 4: Peak Flow Summary Outlet B

Return Period (Years)	Peak Flow (m^3/s) [1]		
	Pre-Development	Post-Development	Difference
2	0.11	0.03	-73%
5	0.19	0.04	-79%
10	0.27	0.05	-81%
25	0.36	0.12	-67%
100	0.55	0.28	-49%

Note: 1. Peak flow rates rounded to the nearest 0.01 m^3/s

4.4 Outlet Configuration

An 1800 mm diameter manhole contains the hydraulic controls for the SWM pond. The extended detention is provided by a 110 mm diameter orifice connected to a reverse sloping pipe. Higher flows are conveyed to the control manhole by way of a double ditch inlet catchbasin connected to the manhole by a 450 mm dia. sewer. Flow is conveyed from the 1800 mm dia. manhole via a 525 mm dia. storm sewer, outletting to the open space block.

An emergency spillway has also been incorporated into the pond design, consisting of gabion mattress treated with topsoil and seed.

Engineering details are shown on Figure 6. Supporting hydraulic calculations are found in Appendix E.

4.5 Hydraulic Summary

The hydraulic operation of the SWM pond is summarized in Table 5 for all design storm events and a 25 mm short duration event.

Table 5:SWM Pond Hydraulic Operating Characteristics

Rainfall Event	Peak Inflow [1.] (m^3/s)	Peak Outflow [1.] (m^3/s)	Storage [2.] (m^3)	HWL [3.] (m)
25mm	0.32	0.01	750	184.3
2 yr	0.51	0.02	1400	184.6
5 yr	0.76	0.02	2250	184.8
10 yr	0.92	0.03	2850	185.0
25 yr	1.15	0.10	3100	185.1
100 yr	1.67	0.24	3650	185.2

Note: 1. Peak flow rates rounded to the nearest 0.01 m^3/s
2. Storage volumes rounded to the nearest 50 m^3
3. High water level (HWL) rounded to the nearest 0.1 m

As shown on Table 5, the SWM facility effectively attenuates peak flows. Approximately 0.3 meters of freeboard is available between the 100 year design high water level and the invert of the emergency spillway which introduces a reasonable factor of safety.

4.6 Maintenance

A sediment forebay has been incorporated into the SWM pond immediately downstream of the inlet storm sewer. The forebay is equipped with a non erodable overflow weir to the elevation of the extended detention (184.5).

A landscaping plan (prepared by John Bell in February 2009) was submitted for the SWM facility. A "Stormwater Management Facility Operation & Maintenance Manual" was prepared for the development in June 2007 by CFCA. A copy of the document has been included as Appendix G.

It is possible to access all reaches of the SWM facility for maintenance purposes. A 6 m access road is provided along the south limit of the pond block. Access to the control manhole has also been incorporated into the design.

Following assumption of the subdivision by the Town of The Blue Mountains, maintenance of the SWM facility will rest with the municipality. This will consist of annual debris clean-up, grass mowing and periodic inspections. The frequency of sediment removal from the forebay is subject to the road sanding practices of the Town. Sediment depths should be monitored annually with removal after accumulations reach 50% of the total depth of the forebay (MOE, 2003). This is likely after 5 to 10 years of operations.

Prior to assumption, all maintenance will rest with the Developer.

5.0 SITE GRADING

Lot grading has been prepared to minimize disturbance to the existing grades on the proposed lots as much as possible. Most lot line swales will be at 2% or greater. Swales, which are designed less than 2%, will allow for the retention of mature trees on the respective lots beyond the limits of the building envelopes.

Generally, lot grading will be completed by the individual builders per detailed site grading plans for individual lots and it will be necessary to obtain approval of each plan from the Town Building Department. These individual lot grading plans should generally comply with the overall grading plans prepared by CFCA.

The grading of the site is intended to match pre-development drainage patterns as much as possible. Lot line swales, which are directed toward the open space areas, will be fanned out to promote sheet flow.

External drainage is presently conveyed along the south property line within an existing ditch. The ditch deviates from the property line in the vicinity of Lot 19, draining in an easterly direction before completely dissipating in the area of the SWM pond.

The original Developer and consulting team reviewed the ditch in the field on September 11, 2003 with staff of the Niagara Escarpment Commission, Grey Sauble Conservation Authority, County of Grey and municipality. It was agreed at the meeting that the external flow would be allowed to continue to drain along the property line to an outlet within Block 42 (Open Space) containing the existing wetland pocket.

6.0 ROAD STANDARD

The looped internal roadway and entrance within the property will be municipally owned and maintained. Access to the site will be via the existing 20 m frontage onto Grey Road 40 along the east property line.

While municipal precedence does exist for the use of a single access for a development of this nature, it is considered good engineering design practice to include a second access for emergency purposes. Consequently, the subject concept plan reflects a future road connection at the north end of Street B. From this location, direct connection can be made to Woodland Park Road.

The typical road section for the development will consist of a 20 m public road allowance containing an 8.5 m wide paved asphalt platform complete with curb and gutter, sanitary sewers, storm sewers, watermain, utilities and streetlights.

Our office has prepared a Traffic Opinion Letter examining the trip generation and the impact on boundary road network of the new Draft Plan as compared with the previously approved Draft Plan.

An Environmental Assessment (EA) is currently being finalized for the Intersection of Highway 26 and Grey County Road 40. A Notice of Completion has been issued, and the Town of The Blue Mountains is awaiting comments from stakeholders and the Ontario Ministry of Transportation.

7.0 SANITARY SERVICING

7.1 Background

The subject development is located within the Camperdown Service Area that flows to the Thornbury Waste Water Treatment Plan (WWTP), located on Peel Street in Thornbury. The WWTP is currently operating at 51% of its average daily flow rated capacity (2015 TOBM Water & Wastewater Capacity Assessment).

An existing 250mm sanitary sewer stub is located in proximity to the subject lands at the intersection of Woodland Park Road and Highway 26, off of the trunk sanitary sewer on Highway 26. The trunk sewer follows the alignment of Highway 26 and drains via gravity to the Lake Shore Road Pump Station, from where sewage is pumped to the Thornbury WWTP.

7.2 Sanitary Servicing Strategy

Sanitary servicing for the subdivision is provided via a network of local gravity sewers that will connect into the Town's municipal system via the existing 250mm stub located at Woodland Park Road.

The routing of the local sewers generally follows the alignment of the internal roadways at an adequate depth to allow gravity service laterals for each lot in the subdivision. The existing sanitary sewers within the subdivision have been constructed to service lots based on the old Draft Plan, with a temporary sanitary manhole located at the limit of Phase 2 lands to service the future lots. Refer to Figure 7 for layout of site sanitary servicing.

The sanitary design sheet was updated for the new lot fabric per IPS Consulting's Draft Plan. The new flows for the subdivision were calculated to be 4.45 l/s. The flattest section of the sanitary sewer on Street B has a capacity of 32.84 l/s. As such it was determined that the subdivision could be serviced with the existing sanitary design.

8.0 DOMESTIC WATER SERVICING

8.1 Background

Potable water supply for the subject lands will be supplied by the Town of The Blue Mountains municipal system. Similar to the sewage servicing, connection to the existing water distribution system is straightforward and feasible.

A 400mm diameter municipal watermain is located along Woodland Park Road. There is a second existing 400mm diameter municipal watermain located on Grey Road 40 southeast of the subject lands. A connection will be made to each of these watermains to form part of the supply network for the residential development. A "live tap" will be required in order to connect to the existing watermains, since no allowance was made along these existing mains (i.e. stub or tee) for a future connection point.

With these watermains surrounding the property, it will be possible to provide two dedicated connections to the municipal distribution network and "loop" through the Georgian Glen development. The dead-end main on Street B will be internally looped or provided with a blow-off (to be confirmed with Town), as required by

the Municipality and Ministry of Environment and Climate Change (MOECC).

The watermains for the development were originally sized by the Town and their consultants, and the sizing was confirmed by our office in July 2007 (refer to enclosed letter report in Appendix A).

The Town has been working to finalize modeling the existing municipal water distribution system. Upon completion of the municipal water distribution system model, the existing municipal system capacity will be assessed in relation to the development's projected demand, and any required upgrades to the municipal system will be identified.

8.2 Domestic Water Servicing Strategy

Potable water will be provided to the subdivision by way of a 200mm municipal watermain on Street B and a 150mm municipal watermain on Street A following the alignment of the roadways, with two proposed connections to the existing municipal system at County Road 40 and Woodland Park Road, respectively. Fire hydrants have been spaced as required to provide the necessary fire protection. The watermain alignment is reflected on Figure 7.

Due to a proposed reduction in the number of units, a consequent reduction in population within the subdivision can be expected. Based on this, it can be reasonably assumed that the existing watermain design is acceptable and applicable to the new Draft Plan.

Static pressure measurements and a hydrant flow test may need to be undertaken to confirm available fire flows, and will be completed as the development application proceeds.

9.0 UTILITIES

The Georgian Glen development will be serviced with natural gas, telephone, cable TV and hydro. All such utilities are currently available on Woodland Park Road and Grey Road 40, and utilities have been installed in Phase 1 of the subdivision.

10.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment controls will be installed on-site prior to construction of the remaining services. The controls will consist of sediment fence (light and heavy duty), rock check dams and the SWM pond operating as a temporary sediment basin.

The sediment controls have been specified on the engineering drawings and also reflected on Figure 5. Notes pertaining to the maintenance of the erosion and sediment controls are included on the drawing.

11.0 CONCLUSIONS

Based on the foregoing we conclude that the proposed Georgian Glen development can be adequately serviced.

1. The servicing and stormwater management strategy presented herein is consistent with the design completed and approved for previous planning applications for the property.
2. Access to the site will be provided from Grey Road 40 into the proposed development. Provisions for emergency access have been provided at the termination point of Street B in the northwest corner of the property.
3. A Stormwater Management facility has been provided to provide water quantity and quality control for the subject development.
4. The development will be serviced by municipal sanitary sewer. Connection to the existing Municipal sewer system will be made at the existing 200mm sanitary sewer stub located at Woodland Park Road.
5. Domestic water supply will be provided through connections to the existing municipal system at Grey Road 40 and Woodland Park Road. Confirmation of any water system improvements to provide required pressures and flows will be confirmed with the Town as detailed design proceeds.
6. All major utilities are available to service the development.

Therefore, we recommend approval of the Planning Applications for the subject lands from the perspective of engineering services and drainage requirements.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Kevin Morris, P.Eng.
Partner
KM/ad

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APPENDIX A

Georgian Glen Development Permits, Approvals and Conditions

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ATTACHMENT 2

Applicant: **Sorichetti**
File No. **42T-2002-006**
Municipality: **Town of The Blue Mountains**
Location: **Part Lot 28, Concession 7**
Phase 1 16-02-2005

Schedule E-4

Draft Plan of Subdivision Conditions

Plan of Subdivision File No. 42T-2002-006 has been granted DRAFT APPROVAL.

The conditions of final plan approval for registration of this draft Plan of Subdivision are as follows:

No.	Conditions
1.	That this approval applies to the draft plan prepared by Malone Given Parsons Ltd. revised June 21, 2004, showing a total of 24 single detached residential lots (Lots 1-15 and 31-39), and Blocks 42 to 46 for open space and trailways and Block 50 to 56, and Street A and B on Part of Lot 28, Concession 7 (formerly Twp. of Collingwood) in the Town of The Blue Mountains in the County of Grey.
2.	The owner shall pay cash-in-lieu of parkland dedication in accordance with the provisions of the *Planning Act.*
3.	That the owner agrees to satisfy all the requirements, financial and otherwise, of the Town of The Blue Mountains concerning the provision of roads, installation of services and any other financial matter consistent with Minutes of Settlement dated May 2, 2003 between the Town and the Owner and that appropriate provisions be contained in the subdivision agreement.
4.	That prior to final approval, appropriate zoning is in effect for this proposed subdivision, to the satisfaction of the Grey Sauble Conservation Authority and the Niagara Escarpment Commission.
5.	That the street(s) shall be named to the satisfaction of the Town of The Blue Mountains.
6.	That Blocks 52 to 54 be conveyed to the municipality for 0.3 metre reserve
7.	That Blocks 42, to 46 be conveyed to the Town of The Blue Mountains for Open Space. The precise location of the boundaries of Block 42 to 44 shall be surveyed to that satisfaction of the Town in consultation with the Niagara Escarpment Commission and the Grey Sauble Conservation Authority.
8.	That Block 50 be conveyed to the Town of The Blue Mountains for future road purposes.
9.	That Block 51 be conveyed to the Town of The Blue Mountains for emergency access purposes.
10.	That Block 55 and 56 be conveyed to the County of Grey for 0.3 metre reserves.

11. That, in consultation with the Town and the Niagara Escarpment Commission, the Owner shall prepare a recreational trail routing and design plan, and implement same through appropriate language in the subdivision agreement.

12. That the road allowances included in this draft plan shall be shown and dedicated as public highway.

13. That such easements as may be required for servicing, utility or drainage purposes shall be granted to the appropriate authority, including appropriate storm water management facilities, sewer line connections and watermain looping as required, as well as appropriate provisions for maintenance, default and confirmation that construction has occurred in accordance with Town standards.

14. (a) That a subdivision agreement between the owner and the Town of The Blue Mountains shall be entered into and registered against the lands to which it applies.

    (b) In addition to the Subdivision Agreement, and prior to final approval, the Town and the Owner shall enter into a Wetland Buffer Agreement in the form attached hereto that will apply to Lots 36 to 39 and be registered against the lands to which it applies.

15. (a) That prior to final approval, drainage, surface water and stormwater management plans shall be prepared by a professional engineer that will address the means to control erosion, sedimentation and surface water flow within the development lands, both during and after construction to the satisfaction of the municipality in consultation with the Grey Sauble Conservation Authority and the Niagara Escarpment Commission.

    (b) That the subdivision agreement between the owner and the Town of The Blue Mountains contain provisions in wording acceptable to the Town of The Blue Mountains, in consultation with the Niagara Escarpment Commission and the Grey Sauble Conservation Authority that will ensure the implementation of the approved plans. The agreement shall also provide for the Maintenance, default and adequacy of construction provisions with respect to stormwater management facilities. Confirmation that construction has occurred in accordance with Town Standards.

16. That development shall be subject to suitable arrangements for the extension of municipal water and sewer services and the availability of adequate water and sewage allocations in accordance with the servicing provisions of the Beaver Valley Official Plan and Official Plan Amendment 133 and Minutes of Settlement.

17. That the Owner shall not construct internal services for the plan prior to entering into a pre-servicing agreement.

18. That the appropriate fees are paid to the Grey Sauble Conservation Authority for the review of the noted reports, as specified in the Authority's planning services agreement with the Town of The Blue Mountains.

19. That prior to final approval, a landscape and tree preservation plan be prepared by the owner for the approval of the Niagara Escarpment Commission and be incorporated into the Subdivision Agreement. The landscape plan will include the trailways, street planting and entrance features (plans for individual lots are not required).

20. That prior to final approval the County is advised, in writing, by the Town of The Blue Mountains how conditions 2 to 19 have been satisfied.

21. That prior to final approval the County is advised, in writing, by the Grey Sauble Conservation Authority how conditions 4,7,15 and 18 have been satisfied.

22. That prior to final approval the County is advised, in writing, by the Niagara Escarpment Commission how conditions 4,7,11,15 and 19 have been satisfied.

23. That prior to final approval a copy of the fully executed subdivision agreement between the Owner and the Town of The Blue Mountains shall be provided to the County of Grey.

24. If final approval is not given to this plan within eight years of the draft approval date, and no extensions have been granted, draft approval shall lapse under Subsection 51(32) of the Planning Act, RSO 1990, as amended. If the owner wishes to request an extension to draft approval, a written explanation along with the applicable application fee and a resolution from the local municipality must be received by the County of Grey Director of Planning prior to the lapsing date. Please note that an updated review of the Plan and revisions to the conditions of approval may be necessary if an extension is to be granted.

25. That the owner provide the County of Grey with a computer disk containing a digitized copy of the Final Plan in a format acceptable to the County of Grey.

NOTES TO DRAFT APPROVAL

1. It is the Owners responsibility to fulfill the conditions of draft approval and to ensure that the required clearance letters are forwarded by the appropriate agencies to the County of Grey, quoting the County file number.

2. An electrical distribution line operating at below 50,000 volts might be located within the area affected by this development or abutting this development.

Section 186 - Proximity - of the Regulations for Construction Projects in the *Occupational Health and Safety Act*, requires that no object be brought closer than 3 meters (10 feet) to the energized conductor It is the Owner s responsibility to be aware, and to make all personnel on site aware, that all equipment and personnel must come no closer than the distance specified in the Act. They should also be aware that the electrical conductors can raise and lower without warning, depending on the electrical demand placed on the line. Warning signs should be posted on the wood poles supporting the conductors stating "DANGER - Overhead Electrical Wires" in all locations where personnel and construction vehicles might come in close proximity to the conductors.

3. Clearances are required from the following agencies:

Town of The Blue Mountains
Municipal Office Box 310
THORNBURY, Ontario NOH 2PO

Grey Sauble Conservation Authority
R.R. # 4
OWEN SOUND, Ontario N4K 5N6

Niagara Escarpment Commission
99 King Street
THORNBURY, Ontario N0H 2P0

4. We suggest you make yourself aware of the following subsections of the Land Titles Act:

a) subsection 143(1) requires all new plans to be registered in a Land Titles system if the land is situated in a land titles division; and

b) subsection 143(2) allows certain exceptions.

5. It is a requirement that the municipality register the subdivision agreement as provided by subsection 51 (26) of the *Planning Act* against the land to which it applies, as notice to prospective purchasers.

6. Inauguration or extension of a piped water supply, a sewage system or a storm drain, is subject to the approval of the Ministry of the Environment under the *Ontario Water Resources Act*, RS0 1990, as amended.

7. All measurements in subdivision final plans must be presented in metric units.

8. The final plan approved by the County must be registered within thirty (30) days or the County may withdraw its approval under subsection 51(21) of the *Planning Act* RSO 1990, as amended.

9. That prior to any alteration or crossing of a watercourse, or works within a fill regulated area, approval must be obtained from the Grey Sauble Conservation Authority.

10. Final approval of the subdivision plans approved by the OMB is given to the County of Grey pursuant to Section 51 (56.1) of the Planning Act.

Owner: **Sorichetti**
File No. **42T-2002-006**
Municipality: **Town of The Blue Mountains**
Location: **Part Lot 28, Concession 7**
Phase 2 May 17, 2007

Schedule E-4

Draft Plan of Subdivision Conditions

Plan of Subdivision File No. 42T-2002-006 has been granted DRAFT APPROVAL.

The conditions of final plan approval for registration of this draft Plan of Subdivision are as follows:

No.	Conditions
1.	That this approval applies to the draft plan prepared by Malone Given Parsons Ltd. revised June 21, 2004, showing a total of 10 single detached residential lots (Lots 16 & 17, 20 to 25, 29 and 30) and Blocks 52-54 on Lot 28, Concession 7 (formerly Twp. of Collingwood) in the Town of The Blue Mountains in the County of Grey.
2.	The owner shall pay cash-in-lieu of parkland dedication in accordance with the provisions of the *Planning Act*.
3.	That the owner agrees to satisfy all the requirements, financial and otherwise, of the Town of The Blue Mountains concerning the provision of roads, installation of services and any other financial matter consistent with Minutes of Settlement dated May 2, 2003 between the Town and the Owner and that appropriate provisions be contained in the subdivision agreement.
4.	That prior to final approval, appropriate zoning is in effect for this proposed subdivision, to the satisfaction of the Grey Sauble Conservation Authority and the Niagara Escarpment Commission.
5.	That Blocks 52-54 abutting lots 16-22, 29 and 30 be lifted and conveyed by the municipality.
6.	That a subdivision agreement between the owner and the Town of The Blue Mountains shall be entered into and registered against the lands to which it applies.
7.	(a) That prior to final approval, drainage, surface water and stormwater management plans shall be prepared by a professional engineer that will address the means to control erosion, sedimentation and surface water flow within the development lands, both during and after construction to the satisfaction of the municipality in consultation with the Grey Sauble Conservation Authority and the Niagara Escarpment Commission. (b) That the subdivision agreement between the owner and the Town of The Blue Mountains contain provisions in wording acceptable to the Town of The Blue

Mountains, in consultation with the Niagara Escarpment Commission and the Grey Sauble Conservation Authority that will ensure the implementation of the approved plans. The agreement shall also provide for the Maintenance, default and adequacy of construction provisions with respect to stormwater management facilities. Confirmation that construction has occurred in accordance with Town Standards.

8. That development shall be subject to suitable arrangements for the extension of municipal water and sewer services and the availability of adequate water and sewage allocations in accordance with the servicing provisions of the Beaver Valley Official Plan and Official Plan Amendment 133 and Minutes of Settlement.

9. That the Owner shall not construct internal services for the plan prior to entering into a pre-servicing agreement.

10. That the appropriate fees are paid to the Grey Sauble Conservation Authority for the review of the noted reports, as specified in the Authority's planning services agreement with the Town of The Blue Mountains .

11. That prior to final approval the County is advised, in writing, by the Town of The Blue Mountains how conditions 2 to 10 have been satisfied.

12. That prior to final approval the County is advised, in writing, by the Grey Sauble Conservation Authority how conditions 4,7 and 10 have been satisfied.

13. That prior to final approval the County is advised, in writing, by the Niagara Escarpment Commission how conditions 4 and 7 have been satisfied.

14. (a) That prior to final approval a copy of the fully executed subdivision agreement between the Owner and the Town of The Blue Mountains shall be provided to the County of Grey.

(b) In addition to the Subdivision Agreement, and prior to final approval, the Town and the Owner shall enter into a Wetland Buffer Agreement in the form attached hereto that will apply to Lot 18 and be registered against the lands to which it applies.

15. If final approval is not given to this plan within eight years of the draft approval date, and no extensions have been granted, draft approval shall lapse under Subsection 51(32) of the Planning Act, RSO 1990, as amended. If the owner wishes to request an extension to draft approval, a written explanation along with the applicable application fee and a resolution from the local municipality must be received by the County of Grey Director of Planning prior to the lapsing date. Please note that an updated review of the Plan and revisions to the conditions of

approval may be necessary if an extension is to be granted.

16. That the owner provide the County of Grey with a computer disk containing a digitized copy of the Final Plan in a format acceptable to the County of Grey.

NOTES TO DRAFT APPROVAL

1. It is the Owners responsibility to fulfill the conditions of draft approval and to ensure that the required clearance letters are forwarded by the appropriate agencies to the County of Grey, quoting the County file number.

2. An electrical distribution line operating at below 50,000 volts might be located within the area affected by this development or abutting this development. Section 186 - Proximity - of the Regulations for Construction Projects in the *Occupational Health and Safety Act*, requires that no object be brought closer than 3 meters (10 feet) to the energized conductor It is the Owner s responsibility to be aware, and to make all personnel on site aware, that all equipment and personnel must come no closer than the distance specified in the Act. They should also be aware that the electrical conductors can raise and lower without warning, depending on the electrical demand placed on the line. Warning signs should be posted on the wood poles supporting the conductors stating "DANGER - Overhead Electrical Wires" in all locations where personnel and construction vehicles might come in close proximity to the conductors.

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   R.R. # 4
   OWEN SOUND, Ontario N4K 5N6

   Niagara Escarpment Commission
   99 King Street
   THORNBURY, Ontario N0H 2P0

4. We suggest you make yourself aware of the following subsections of the Land Titles Act:

   a) subsection 143(1) requires all new plans to be registered in a Land Titles system if the land is situated in a land titles division; and

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6. Inauguration or extension of a piped water supply, a sewage system or a storm drain, is subject to the approval of the Ministry of the Environment under the *Ontario Water Resources Act*, RS0 1990, as amended.

7. All measurements in subdivision final plans must be presented in metric units.

8. The final plan approved by the County must be registered within thirty (30) days or the County may withdraw its approval under subsection 51(21) of the *Planning Act* RSO 1990, as amended.

9. That prior to any alteration or crossing of a watercourse, or works within a fill regulated area, approval must be obtained from the Grey Sauble Conservation Authority.

10. Final approval of the subdivision plans approved by the OMB is given to the County of Grey pursuant to Section 51 (56.1) of the Planning Act.

Applicant: Sorichetti
File No. 42T-2002-006
Municipality: Town of The Blue Mountains
Location: Part Lot 28, Concession 7
Phase 2

Schedule E-4

Draft Plan of Subdivision Conditions

Plan of Subdivision File No. 42T-2002-006 has been granted DRAFT APPROVAL.

The conditions of final plan approval for registration of this draft Plan of Subdivision are as follows:

No. Conditions

1. That this approval applies to the draft plan prepared by Malone Given Parsons Ltd. revised November 18,2003, showing a total of 10 single detached residential lots (Lots 16 & 17, 18 to 23, 29 and 30) and Blocks 52-54 on Lot 28, Concession 7 (formerly Twp. of Collingwood) in the Town of The Blue Mountains in the County of Grey.

2. The owner shall pay cash-in-lieu of parkland dedication in accordance with the provisions of the *Planning Act*.

3. That the owner agrees to satisfy all the requirements, financial and otherwise, of the Town of The Blue Mountains concerning the provision of roads, installation of services and any other financial matter consistent with Minutes of Settlement dated May 2, 2003 between the Town and the Owner and that appropriate provisions be contained in the subdivision agreement.

4. That prior to final approval, appropriate zoning is in effect for this proposed subdivision, to the satisfaction of the Grey Sauble Conservation Authority and the Niagara Escarpment Commission.

5. That Blocks 52-54 abutting lots 16-22, 29 and 30 be lifted and conveyed by the municipality.

6. That a subdivision agreement between the owner and the Town of The Blue Mountains shall be entered into and registered against the lands to which it applies.

7. (a) That prior to final approval, drainage, surface water and stormwater management plans shall be prepared by a professional engineer that will address the means to control erosion, sedimentation and surface water flow within the development lands, both during and after construction to the satisfaction of the municipality in consultation with the Grey Sauble Conservation Authority and the Niagara Escarpment Commission.

   (b) That the subdivision agreement between the owner and the Town of The Blue Mountains contain provisions in wording acceptable to the Town of The Blue

Applicant: Sorichetti
File No. 42T-2002-006
Municipality: Town of The Blue Mountains
Location: Part Lot 28, Concession 7
Phase 2

Mountains, in consultation with the Niagara Escarpment Commission and the Grey Sauble Conservation Authority that will ensure the implementation of the approved plans. The agreement shall also provide for the Maintenance, default and adequacy of construction provisions with respect to stormwater management facilities. Confirmation that construction has occurred in accordance with Town Standards.

8. That development shall be subject to suitable arrangements for the extension of municipal water and sewer services and the availability of adequate water and sewage allocations in accordance with the servicing provisions of the Beaver Valley Official Plan and Official Plan Amendment 133 and Minutes of Settlement.

9. That the Owner shall not construct internal services for the plan prior to entering into a pre-servicing agreement.

10. That the appropriate fees are paid to the Grey Sauble Conservation Authority for the review of the noted reports, as specified in the Authority's planning services agreement with the Town of The Blue Mountains .

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12. That prior to final approval the County is advised, in writing, by the Grey Sauble Conservation Authority how conditions 4,7 and 10 have been satisfied.

13. That prior to final approval the County is advised, in writing, by the Niagara Escarpment Commission how conditions 4 and 7 have been satisfied.

14. That prior to final approval a copy of the fully executed subdivision agreement between the Owner and the Town of The Blue Mountains shall be provided to the County of Grey.

15. If final approval is not given to this plan within eight years of the draft approval date, and no extensions have been granted, draft approval shall lapse under Subsection 51(32) of the Planning Act, RSO 1990, as amended. If the owner wishes to request an extension to draft approval, a written explanation along with the applicable application fee and a resolution from the local municipality must be received by the County of Grey Director of Planning prior to the lapsing date. Please note that an updated review of the Plan and revisions to the conditions of approval may be necessary if an extension is to be granted.

16. That the owner provide the County of Grey with a computer disk containing a digitized copy of the Final Plan in a format acceptable to the County of Grey.

Date

Mrs. Janice McDonald
Director, Planning and Development
The Corporation of the County of Grey
County Administration Building
595 - 9th Avenue East,
Owen Sound, Ontario
N4K 3E3

Dear Ms. McDonald:

Re: Draft Plan 42T-2002-006; Sorichetti/Georgian Glen Subdivision
Town of The Blue Mountains
Clearance of Draft Plan Conditions – Phases 1 and 2

This letter is to convey the Niagara Escarpment Commission's clearance of conditions for the above noted draft plan. The respective conditions and a description of how they have been satisfied are set out below:

Phase 1

Condition 4: Appropriate Zoning is in effect
The Zoning Bylaw (ZBL No. 2006-38) for this site was approved by the OMB on TBD with the support of the Niagara Escarpment Commission, on which basis the Commission is satisfied that appropriate zoning is in effect.

Condition 7: Surveyed Boundaries of Blocks 42 - 44
These boundaries have been surveyed and are shown on the Plan of Subdivision to the satisfaction of the Commission.

Condition 11: Recreational Trail Routing and Design Plan
The owner has submitted this plan. It has been reviewed by the Commission and accepted as appropriate. It is implemented to the Commission's satisfaction in paragraph xx of the Subdivision Agreement between the Town of The Blue Mountains and the owner.

Condition 15: Stormwater Management and related Plans
The owner has submitted these plans in a Stormwater Management Report, prepared by a professional engineer. It has been reviewed by the Commission and accepted as appropriate. It is implemented to the Niagara Escarpment Commission's satisfaction in paragraph xx of the Subdivision Agreement between the Town of The Blue Mountains and the owner.

Condition 19: Landscape and Tree Preservation Plans
The owner has submitted these plans. They have been reviewed by the Commission and accepted as appropriate. They are implemented to the Niagara Escarpment Commission's satisfaction in paragraph xx of the Subdivision Agreement between the Town of The Blue Mountains and the owner.

Phase 2

Condition 4: Appropriate Zoning is in effect
The Zoning Bylaw (ZBL No. 2006-38) for this site was approved by the OMB on TBD with the support of the Niagara Escarpment Commission, on which basis the Commission is satisfied that appropriate zoning is in effect.

Condition 7: Stormwater Management and related Plans
The owner has submitted these plans in a Stormwater Management Plan Report, prepared by a professional engineer. It has been reviewed and accepted as appropriate. It is implemented to the Niagara Escarpment Commission's satisfaction in paragraph xx of the Subdivision Agreement between the Town of The Blue Mountains and the owner.

Please notify the Niagara Escarpment Commission upon final approval of this plan

Yours truly
Etc.

cc J. Genest, Malone Given Parsons Ltd.

Date

Mrs. Janice McDonald
Director, Planning and Development
The Corporation of the County of Grey
County Administration Building
595 - 9th Avenue East,
Owen Sound, Ontario
N4K 3E3

Dear Ms. McDonald:

Re: Draft Plan 42T-2002-006; Sorichetti/Georgian Glen Subdivision
Town of The Blue Mountains
Clearance of Draft Plan Conditions – Phases 1 and 2

This letter is to convey the Grey Sauble Conservation Authority's clearance of conditions for the above noted draft plan. The respective conditions and a description of how they have been satisfied are set out below:

Phase 1

Condition 4: Appropriate Zoning is in effect
The Zoning Bylaw (ZBL No. 2006-38) for this site was approved by the OMB on TBD with the support of the Grey Sauble Conservation Authority, on which basis the Authority is satisfied that appropriate zoning is in effect.

Condition 7: Surveyed Boundaries of Blocks 42 - 44
These boundaries have been surveyed and are shown on the Plan of Subdivision to the satisfaction of the Authority.

Condition 15: Stormwater Management and related Plans
The owner has submitted these plans in a Stormwater Management Plan Report, prepared by a professional engineer. It has been reviewed by the Authority and accepted as appropriate. It is implemented to the Grey Sauble Conservation Authority's satisfaction in paragraph xx of the Subdivision Agreement between the Town of The Blue Mountains and the owner.

Condition 18: Appropriate Fees are Paid
The Authority has been paid the appropriate fees.

Phase 2

Condition 4: Appropriate Zoning is in effect
The Zoning Bylaw (ZBL No. 2006-38) for this site was approved by the OMB on TBD with the support of the Grey Sauble Conservation Authority, on which basis the Authority is satisfied that appropriate zoning is in effect.

Condition 7: Stormwater Management and related Plans
The owner has submitted these plans in a Stormwater Management Plan Report, prepared by a professional engineer. It has been reviewed by the Authority and accepted as appropriate. It is implemented to the Grey Sauble Conservation Authority's satisfaction in paragraph xx of the Subdivision Agreement between the Town of The Blue Mountains and the owner.

Condition 10: Appropriate Fees are Paid
The Authority has been paid the appropriate fees.

Please notify the Grey Sauble Conservation Authority upon final approval of this plan

Yours truly
Etc.

cc J. Genest, Malone Given Parsons Ltd.

GREY SAUBLE CONSERVATION AUTHORITY

R.R. 4, Owen Sound, ON N4K 5N6 · Tel. (519) 376-3076 · Fax (519) 371-0437
Email: gsca@bmts.com · www.greysauble.on.ca

→ 101-2501
→ Kathy
→ IM
→ R. Sorichetti by FAX.
→ A. Troop by FAX.

August 12, 2004

RECEIVED 8/18/04

Mr. John P. Genest, BES, MBA
Malone Givens Parsons Limited
140 Renfrew Drive, Suite 201
Markham, Ontario
L3R 6B3

Dear Mr. Genest:

RE: OMB Case File No. PL020894
Draft Plan of Subdivision 42T-2002-006 & Proposed Zoning By-law
Georgian Glen Subdivision (Sorichetti Development Group Inc.)
Part Lot 28, Conc. 7, Town of the Blue Mountains, formerly Collingwood Township
Our File: P5109

This is to advise that the Grey Sauble Conservation Authority(GSCA) has reviewed the Stormwater Management Report prepared by C.F. Crozier and Associates Inc. May 2004 for the noted development and finds it to be acceptable to address condition 15(a) and 7(a) and of the Draft plan approval for phase one and two respectively.

The general layout of the proposed draft plan of subdivision dated June 21, 2004 is acceptable to the GSCA to address condition 7 of phase 1 draft plan approval.

We agree with the amendments to condition 11 of draft plan approval proposed by the Niagara Escarpment Commission (NEC) in their July 21, 2004 correspondence to the OMB. However, we recommend that the GSCA also be listed as an approval agency within this condition.

We also agree with Item number 3 of the NEC letter and the corresponding Appendix 1. It is our opinion that the provisions outlined in this appendix can be successfully achieved through the implementation of the tree preservation plan through the subdivision agreement and through setbacks within the proposed zoning by-law.

We are also in receipt of an application for permission to alter a waterway for the minor diversion of the watercourse along the north western part of the property. We have reviewed the permit application along with the supporting documentation and concluded that the proposal would not constitute a harmful alteration, disruption or destruction of fish habitat under section 35(1) of Federal Fisheries Act. A permit for these works will be issued by the Conservation Authority.

Rec'd

. . ./2

We also note that as this development was a new subdivision and not circulated through normal channels, the subdivision review fee under our planning services agreement would be applicable to this application. An invoice is provided for the proponent to address condition 18 of draft plan approval. All other fees associated with the review of storm water management reports/alteration permits and environmental impact studies have been paid and there will be no additional fees to review the anticipated tree preservation plan or subdivision agreement. For a full fee schedule please refer to our webpage.

If any questions should arise, please feel free to contact me.

Yours very truly,

Andrew J. Sorensen
Environmental Planner

cc J.R. Mills, Ontario Municipal Board
Marion Plaunt, Niagara Escarpment Commission, Georgetown
Rob Armstrong, Town of The Blue Mountains
Ellen Anderson-Noel, Authority Director
Chris Crozier, C.F. Crozier and Associates
Ron Glenn, County of Grey

→ 101-2501 A.
→ K...
→ ...
→ FAX COPY TO Russ Sorichetti

Ontario's Niagara Escarpment
l'Escarpement du Niagara de l'Ontario

Ontario

Niagara Escarpment Commission
232 Guelph Street
Georgetown ON L7G 4B1
Tel. No. (905) 877-5191 - Fax No. (905) 873-7452

Commission de l'escarpement du Niagara
232, rue Guelph
Georgetown ON L7G 4B1
N° de tel. (905) 877-5191 - Télécopieur (905) 873-7452
www.escarpment.org

October 6, 2004

Mr. C.F. Crozier
C.F. Crozier & Associates Inc.
110 Pine Street
Collingwood, ON L9Y 2N9

Dear Mr. Crozier:

RE: Addendum to Stormwater Implementation Report (October 6, 2004)
Sorichetti
File No. 42T – 2002 - 006
Part Lots 26 and 27, Con. 7
Town of the Blue Mountains

Thank you for your detailed response outlining the points that demonstrate that the function of wetland on the north-west corner will be maintained post-development.

This is to advise that condition 7 (a) of the Draft Plan of Subdivision Conditions (Schedule E-4), with respect to the Niagara Escarpment is thereby fulfilled.

Yours very truly,

Marion Plaunt
Senior Strategic Advisor

c: Rob Armstrong, Town of the Blue Mountains
Ron Glenn, County of Grey
Andy Sorensen, Grey Sauble Conservation Area
Lynne Richardson, NEC

Anne Marie carson

101-2501

From: Chris Crozier

Sent: Wednesday, October 06, 2004 8:55 AM

To: M. E. S. Marion Plaunt (marion.plaunt@mnr.gov.on.ca)

Cc: Kevin Morris; Ian McCutcheon; Anne Marie carson; Rob Armstrong; Russell Sorichetti

Subject: Georgian Glen Subdivision (Sorichetti) Town of the Blue Mountains

Marion,

Thank-you for providing me your comments with respect to the stormwater management report for Georgian Ridge subdivision (Sorichetti) via your voice mail (August 9, 2004), our follow-up teleconference and your follow-up email (August 18). I apologize for the delay to formally respond to you, although I believe my explanation over the phone answered your questions for the most part.

NEC Issue:

To reiterate, you require confirmation that the proposed stormwater management system for the subject development will not adversely impact the wetland in the north west corner of the property. You expressed concern that the reduction in post development peak flow rates expressed in Table 3 of the SWM report suggested to you that the subject wetland may receive significantly less water after the site is developed.

Response:

The design of the stormwater management system for the Georgian Glen Subdivision has been undertaken to ensure the existing wetland in the north west corner of the site continues to receive water in post-development conditions, and thus will not be adversely impacted by the subdivision. This is explained below:

Point 1.

The SWM facility was relocated out of the subject wetland area following revisions to the draft plan requested by the NEC during the OMB mediation process in 2003. The SWM facility will in fact receive substantially all post development drainage from the subdivision after the site is developed. The SWM facility will treat the runoff for quality , quantity and erosion control and then release the water to the existing subject wetland. We have designed an outfall which will ensure the runoff treated by the SWM facility continues to reach the existing wetland in post development conditions.

Point 2:

It is also important to appreciate the relative contribution of flow the actual site provides to this wetland, as compared to that of the total drainage area contributing to the wetland. In fact, the subject wetland presently receives runoff from an external drainage area which exceeds 200 ha. In order to preserve this flow entering the wetland following the development of the subdivision, the existing drainage channel along the south/west property line will be extended into the subject wetland with the proposed grading of the subdivision. This is consistent with the agreement made in the field during the agency field walk(which included NEC) during the mediation process last year. Directing this external flow into the existing wetland is far superior than having it drain to the SWM facility first and then to the wetland, both from a practical engineering perspective and a thermal perspective.

From an overall water budget perspective, the subject wetland receives the majority of its water on an average annual basis from the upstream external drainage area than from the site. In fact, the external drainage area supplies well over 95% of the runoff volume to the wetland on an average annual basis. That is why we designed the site grading to ensure this flow continues to enter the subject wetland.

Point 3:

With respect to Table 3, it reflects changes in the maximum instantaneous peak flow occurring during storm events ranging in frequency from a 1:2 year to a 1:100 year return period. Comparing post development peak flow rates to pre-development rates is industry standard protocol and is a useful tool to confirm the protection of downstream properties from flooding potential of urbanization. Table 3 is not a useful tool to determine how volumes of water may change between pre-development and post development conditions. To understand that change, one must examine the total hydrograph runoff volumes.

Using the 1:2 year storm event (24 hour storm duration of 47 mm rainfall depth), we compared the total runoff volume contributing to the subject wetland for pre-development and post development conditions, based on the hydrologic computer modeling presented in the SWM Report. The subject wetland would receive approximately 31,600 m3 of water under pre-development conditions, and 32,700 m3 of water under post-development conditions, an increase of approximately 3%. This is an expected and reasonable finding, typical of urbanization. The minor increase in runoff volume is attributed to the imperviousness introduced onto the Georgian Ridge subdivision. The increase is small given the minor overall contribution of runoff the subject lands actual provide to the wetland when compared to the external drainage area.

Conclusion

To conclude, we have followed the measures recommended in the pre-consultation process with the agencies to design the SWM for this site. That included relocating the SWM facility to a less sensitive location; directing the treated stormwater back to the wetland; and directing the external drainage area more directly to the subject wetland. With these measures, the water supply to the existing wetland will not be compromised with the development of the subdivision.

We trust this response is satisfactory and with it you will be in a position to "sign-off" with respect to condition of draft approval 15(a) regarding stormwater management. We also wish to advise you that GSCA have issued an approval of the stormwater management system for the development.

Best Regards,

CFC

Christopher Crozier, P.Eng
| CF Crozier & Associates Inc
| 110 Pine Street
| Collingwood Ontario
L9Y 2N9
| tel 705 446 3510 | fax 705 446 3520
| cfcrozier.ca | ccrozier@cfcrozier.ca

Ministry of Transportation

BUILDING AND LAND USE PERMIT

BL-2004-33O-77

ISSUED TO:
Sorichetti Development Group Inc.
1280 Terwillegar Ave, Unit 4
Oshawa, ON L1J 7A5

APPLICANT NAME:
Russell Sorichetti
1280 Terwillegar Ave, Unit 4
Oshawa, ON, L1J 7A5

PURPOSE: to begin construction of a residential subdivision within the property described

PERMIT CONDITIONS:
This permit approves the following work to be undertaken within plan of subdivision 42T-2008-006.
- Site Grading and Servicing.
- Construction of internal roads and a Stormwater Management Facility
- Placement of a Sales Office Trailer on the premises
- Construction of one model home

Please note that an additional MTO Building Permit is required to cover all residential units within a 400m radius of the intersection of Hwy 26 and Grey Rd 40.

LOT: 28 **CON:** 7 **PT/BLK:** **PLAN:**

GEOGRAPHIC TOWNSHIP: Collingwood Twp.

MUNICIPALITY: Town of Blue Mountains

HWY.: 26

CONTROLLED ACCESS

COUNTY/DIST/REG.: Grey

SIZE OF BLDG.:

DIST. FROM HWY. PROPERTY LINE:

EXPIRY DATE:

FEE: $250.00

*Construction must be started within six(6) months of date of issued or this permit shall be void

THIS PERMIT IS ISSUED UNDER THE AUTHORITY VESTED IN THE MINISTER BY THE PUBLIC TRANSPORTATION AND HIGHWAY IMPROVEMENT ACT AND THE REGULATIONS PURSUANT THERETO AND IS SUBJECT TO THE CONDITIONS ON THE BACK HEREOF

DATED AT: Owen Sound **ON:** May 03, 2007

S. A. Vokes, Field Services Engineer- Owen Sound

Ontario

Ministry of the Environment | Ministère de l'Environnement

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 2059-67FLG2

Sorichetti Development Group Inc.
1280 Terwillegar Avenue, Suite 4
Oshawa, Ontario
L1J 7A5

Site Location: Georgian Glen Subdivision
Part of Lot 28, Concession 7
The Blue Mountains Town, County of Grey, Ontario

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

- ***storm sewers*** to be constructed on Street 'A' and Street 'B';
- ***sanitary sewers*** to be constructed on Street 'A', Street 'B' and extended from Street 'B' to Highway No. 26 crossing the Georgian Trail and Woodland Park Road;

as part of Georgian Glen Subdivision, in the Town of The Blue Mountain, County of Grey;

all in accordance with the application dated October 14, 2004 and received on November 4, 2004, including final plans and specifications prepared by Kevin Morris, C.F. Crozier & Associates Inc.

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 Sorichetti Development Group Inc., 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.

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.

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 December, 2004

THIS CERTIFICATE WAS MAILED
ON Dec. 17, 2004
9c
(Signed)

A. Ahmed

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

RS/

c: District Manager, MOE Barrie District Office and
Owen Sound Area Office
Kevin Morris, C.F. Crozier & Associates Inc. √

Ontario

Ministry of the Environment | Ministère de l'Environnement

CERTIFICATE OF APPROVAL
MUNICIPAL DRINKING WATER SYSTEMS
NUMBER 5031-67MLX7

Sorichetti Development Group Inc.
1280 Terwillegar Avenue, Suite 4
Oshawa, Ontario
L1J 7A5

Site Location: Georgian Glen Subdivision
Part of Lot 28, Concession 7
The Blue Mountains Town,
County of Grey, Ontario

Pursuant to the Safe Drinking Water Act, 2002, S.O. 2002, c. 32, and the regulations made thereunder and subject to the limitations thereof, this approval is issued under Part V of the Safe Drinking Water Act, 2002, S.O. 2002, c. 32 to:

- construct ***watermains*** on Street 'A', Street 'B' and extend from Street 'B' to Woodland Park Road crossing the Georgian Trail, as part of Georgian Glen Subdivision, in the Town of The Blue Mountain, County of Grey;

all in accordance with the application dated October 14, 2004 and received on November 4, including final plans and specifications prepared by Kevin Morris, C.F. Crozier & Associates Inc.

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

(1) In this approval, unless the context otherwise requires, words and phrases shall be given the same meaning as those set out in the *Safe Drinking Water Act, 2002*, S.O.2002, c. 32 and any regulations made in accordance with that act;

(2) In this approval,

2.1 "Certificate" means this entire Certificate of Approval document, issued in accordance with Part V of the *Safe Drinking Water Act, 2002*, and includes the schedules to it, if any, and any applications for approval for which certificates of approval have previously been issued, and supporting information to the applications;

2.2 "Director" means any Ministry employee appointed as Director pursuant to Section 6 of the *Safe Drinking Water Act, 2002*; and

2.3 "Owner" means Sorichetti Development Group Inc., and includes its successors and assignees.

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

TERMS AND CONDITIONS

1. Except as otherwise provided by these conditions the Owner shall design, build, install, operate and maintain the distribution system in accordance with the description given in this Certificate, the application for approval related to municipal drinking water systems and the submitted supporting documents and plans and specifications as listed in this Certificate.

2. 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, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

3. In all matters requiring the interpretation and implementation of this certificate, the conditions of the certificate shall take precedence, followed by the documentation submitted in support of the applications associated with any previously issued certificates of approval for works which are part of the works approved by this certificate.

All or part of this decision may be reviewable in accordance with the provisions of Part X of the SDWA. In accordance with Section 129(1) of the Safe Drinking Water Act, Chapter 32 Statutes of Ontario, 2002, 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 129(2) sets out a procedure upon which the 15 days may be extended by the Tribunal. Section 129(3) of the Safe Drinking Water Act, Chapter 32 Statutes of Ontario, 2002, provides that the Notice requiring the hearing shall state:

1. The aspect of the decision, including the portion of the permit, licence, approval, order or notice of administrative penalty in respect of which the hearing is required; and
2. The grounds for review to be relied on by the person at the hearing.

Except with leave of the Tribunal, a person requiring a hearing in relation to a reviewable decision is not entitled to,
(a) a review of an aspect of the decision other than that stated in the notice requiring the hearing; or
(b) a review of the decision other than on the grounds stated in the notice

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
Part V, *Safe Drinking Water Act*
Ministry of 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 water works are approved under Part V of the Safe Drinking Water Act

DATED AT TORONTO this 13th day of December, 2004

THIS CERTIFICATE WAS MAILED
ON Dec. 17, 2004
DC
(Signed)

A. Ahmed

Aziz Ahmed, P.Eng.
Director
Part V *of the Safe Drinking Water Act, 2002*

RS/

c: District Manager, MOE Barrie District Office and
Owen Sound Area Office
Kevin Morris, C.F. Crozier & Associates Inc. ✓

101-3501/GC/SW/11 (A)

Ministry of the Environment / Ministère de l'Environnement

Ontario

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 9589-68ELV7

RECEIVED
Oct 18 '05

Sorichetti Development Group Inc.
1280 Terwillegar Avenue, No. 4
Oshawa, Ontario
L1J 7A5

Site Location: Georgian Glen Subdivision
Part of Lot 28, Concession 7
Town of The Blue Mountains, County of Grey

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

the establishment of stormwater management works for the collection, transmission, treatment and disposal of stormwater runoff from the 12.3 ha proposed Georgian Glen residential subdivision, to provide "Enhanced" water quality protection and to attenuate post-development peak flows to pre-development levels, for all storm events up to and including the 100 year return storm. Of the 12.3 ha area, drainage from 11.3 ha is directed to the proposed stormwater management facility with the remainder conveyed to the adjacent watershed to the east via an outlet (Outlet A).

External drainage areas contributing flow to an existing wetland in the northwest corner of the site and sharing an outlet (Outlet B) at the northwest corner of the site, and another outlet (Outlet C) a culvert crossing under Highway 26 located 500 m west of the site have been identified. These external flows are routed in their pre-development form in the design calculations, as such any future changes in land use will require re-evaluation of flows. The proposed sewage works consist of the following:

An extended detention wet pond to be used as an end of pipe control to provide the necessary treatment and to restrict post development runoff flow rates. Pond features include:

- a sediment forebay, 350 m^3 volume, 1.5 m deep, receiving stormwater through a 600 mm dia. stormsewer discharging through a concrete headwall. Stormwater is conveyed into the main pool by passing over a gabion mattress lined berm;

- a permanent pool, 1.5 m deep, providing a storage volume of 1900 m^3 (including 350 m^3 within the sediment forebay);

- an extended detention storage provision of 4600 m^3 at a depth of 1.5 m above normal water level, including an erosion control provision of 1200 m^3 at a depth of 0.5 m above normal

water level;

- an outlet assembly consisting of controls located within an 1800 mm diameter control manhole. The extended detention is provided by a 110 mm diameter orifice connected to a 450 mm diameter reverse sloping pipe. Higher flows are conveyed to the control manhole by a double ditch inlet catchbasin connected to the manhole through another 450 mm dia pipe. Discharge from the control manhole is via a 525 mm storm sewer which outlets into the existing wetland area in the northwest corner of the site.

- a 7.0 m wide, gabion mattress lined emergency overflow spillway, with its invert at a 0.3 m freeboard above the 100 year design high water level.

all in accordance with the following submitted supporting documents:

1. Application for Approval of Municipal and Private Sewage Works submitted by Kevin Morris of C. F. Crozier & Associates Inc. received by the Ministry on November 4, 2004 including the reports titled **Stormwater Implementation Report**, dated May 2004, prepared by C. F. Crozier & Associates Inc. and **Stormwater Management Report**, dated January 2003, prepared by R. J. Burnside & Associates Limited;

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 Manager of the Owen Sound Area Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Municipality" means The Town of Blue Mountains, County of Grey;

"Regional Director" means the Regional Director of the Southwestern Region of the Ministry;

"Owner" means Sorichetti Development Group 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 Provisions

(a) 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.

(b) 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*.

(c) 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. 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. Operation and Maintenance

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 build-up and potential overflow of sediment and/or decaying vegetation into the receiving watercourse.

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 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 the *Ministry*.

3. Condition 3 is included as regular removal of sediment from the approved stormwater management works is required to mitigate the impact of sediment 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.

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 January, 2005

THIS CERTIFICATE WAS MAILED
ON Jan. 17, 2005
9c
(Signed)

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

FP/
c: District Manager, MOE Owen Sound
Kevin Morris, C.F. Crozier & Associates Inc. ✓

APPENDIX B

Engineering Due Diligence and Condition Assessment Letter

(CFCA, November 2016)

NOVEMBER 21, 2016

REFER TO FILE: 1251-4397

SENT VIA: EMAIL

The Myriad Group
125 Norfinch Drive
Downsview, ON M3N 1W8

Attention: **Steve Goldenberg & Scott Paris**

RE: **ENGINEERING DUE DILIGENCE & CONDITION ASSESSMENT**
GEORGIAN GLEN RESIDENTIAL SUBDIVISION
TOWN OF THE BLUE MOUNTAINS

Dear Steve & Scott,

Our office was retained to complete a due diligence study of the condition of the existing servicing systems and roadways located in the Georgian Glen residential subdivision in the Town of The Blue Mountains.

This letter and the accompanying memos and preliminary opinions of probable construction costs are intended to provide the partners with a summary of the assessment of the subdivision and to identify any significant issues or concerns with proceeding with development of the subdivision.

1.0 BACKGROUND & DEVELOPMENT OVERVIEW

The original Plan of Subdivision consisted of 39 single family lots, 16 town house units, a stormwater management (SWM) facility, public open space and future residential areas. The Draft Plan of Subdivision was prepared by Malone Given Parsons in 2004. The original developers had executed a Pre-Servicing Agreement with the Town in the summer of 2007 and proceeded to service the lots and construct the roadways in Phase 1 in the fall of 2007. A Subdivision Agreement was never executed, and the site and infrastructure have sat dormant. We further understand that the Draft Plan approval for the development has lapsed.

Crozier prepared the detailed engineering drawings and authored several reports to support the original planning applications and execution of the Pre-Servicing Agreement. These reports included:

- Stormwater Implementation Report (Crozier, 2004);
- Servicing Analysis & Modelling Reports; and
- Stormwater Management Facility O&M Manual (Crozier, 2007).

There were also numerous other documents prepared for the development including a geotechnical report and landscaping drawings.

The latest Draft Plan of Subdivision dated August 30, 2016 was prepared by Innovative Planning Solutions, and this plan is comprised of 56 single family lots of varying frontages. It appears to respect the limits of both the SWM facility and open space blocks.

2.0 CONDITION ASSESSMENT

As part of the due diligence period it is necessary for the potential purchaser to understand the current conditions of the installed infrastructure in Phase 1 and to identify any potential remedial repairs required to allow the systems to be commissioned and operational.

The current servicing systems and facilities installed in Georgian Glen include but are not limited to the following:

- Potable Water Piped Network of mains and individual lot services;
- Sanitary Sewer Collection & Conveyance Network of mainline sewers and individual lot services;
- Storm Sewer Collection & Conveyance Network of mainline sewers and catchbasins;
- Stormwater Management Facility designed to provide water quantity and quality control; and
- Local urban roadways constructed with concrete curb and gutter and base course asphalt.

There is a hydro distribution network installed in the subdivision, but an assessment of this system was not included in this work plan.

Over the past two months a full gamut of in field testing, as per the applicable municipal and provincial standards, has been completed in order to confirm the condition of these systems and any operational constraints that would require repairs and/or replacement to these systems. All field testing was witnessed by Crozier staff, and we have prepared detailed memos documenting all of the results.

The original servicing contractor (Arnott Construction) managed the testing program, and their forces were on-site for a period of two weeks starting October 26th until November

2.1 Summary of Field Testing

The following is a list of testing completed by Arnott and their sub-contractors, and a detailed memo is appended to this letter for each test.

1. Sanitary Sewer System
    a. Deflection Test
    b. Air Test
    c. CCTV Video Inspection
2. Storm Sewer System
    a. Deflection Test
    b. CCTV Video Inspection
3. Water Distribution System
    a. Hydrostatic Pressure Test

Crozier staff also completed a site walk to document and summarize the condition of the existing roadways and concrete curb and gutter, and a separate memo has been prepared for this assessment.

2.2 Results of Field Testing

Overall all of the existing infrastructure systems are in acceptable condition with no significant concerns or issues identified during the field testing program. Detailed notes are provided in each memo, we would offer the following highlights for each servicing system.

A. Sanitary Sewers

i. Minor repairs to manholes to address infiltration.
ii. Further flushing to remove all debris and sediment accumulation.
iii. One section of sewer to be removed and replaced.

B. Storm Sewers

i. Minor repairs to manholes and possibly one sewer joint to address infiltration.
ii. Further flushing to remove all debris and sediment accumulation.

C. Water Distribution

i. No issues or problems identified.

D. Roadways

i. Anticipate some sections of curbing to be removed and replaced due to cracking and chipping. Final length to be confirmed with the Town, but we have allowed for 100 metres in our financial analysis.

3.0 PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

To assist The Myriad Group in making a decision on the economical feasibility of the project we have prepared the three preliminary opinion of servicing construction costs (OPC), which are listed below. These OPC's are appended to this letter, and the estimated cost for each part including a contingency allowance is also listed.

1. Repairs & Remedial Works for Existing Phase 1 Systems = $ 90,000
2. Connect to Municipal Systems (Roads & Undergrounds) for Phase 1 = $ 415,000
3. Servicing of the Future Phase 2 Lands = $ 495,000

4.0 CONCLUSIONS & RECOMMENDATIONS

We trust this report and supporting documentation will provide sufficient information to allow The Myriad Group to finalize their decision to purchase the Georgian Glen subdivision and to proceed with its redevelopment. Post your review we are available to meet to review and discuss the results and costs.

Yours truly,

C.F. CROZIER & ASSOCIATES INC.

Kevin Morris, P.Eng.
Partner
SDW/ad

Enclosures per the following list

1. Overall General Servicing Plan for Georgian Glen
2. Sanitary Sewer Deflection Test Memo dated November 4, 2016
3. Sanitary Sewer Air Test Memo dated November 14, 2016
4. Sanitary Sewer CCTV Video Inspection Memo dated November 16, 2016
5. Storm Sewer Deflection Test Memo dated November 14, 2016
6. Storm Sewer CCTV Video Inspection Memo dated November 16, 2016
7. Water Distribution System Hydrostatic Pressure Test dated November 4, 2016
8. Roadways Field Review Condition Assessment dated November 16, 2016
9. OPC for Repairs & Remedial Works for Existing Phase 1 Systems dated November 21, 2016
10. OPC for External Works to Connect to Municipal Systems dated November 21, 2016
11. OPC for Servicing of the Future Phase 2 Lands dated November 21, 2016

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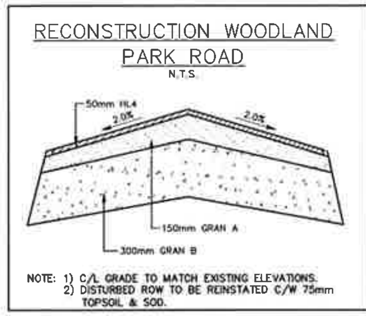
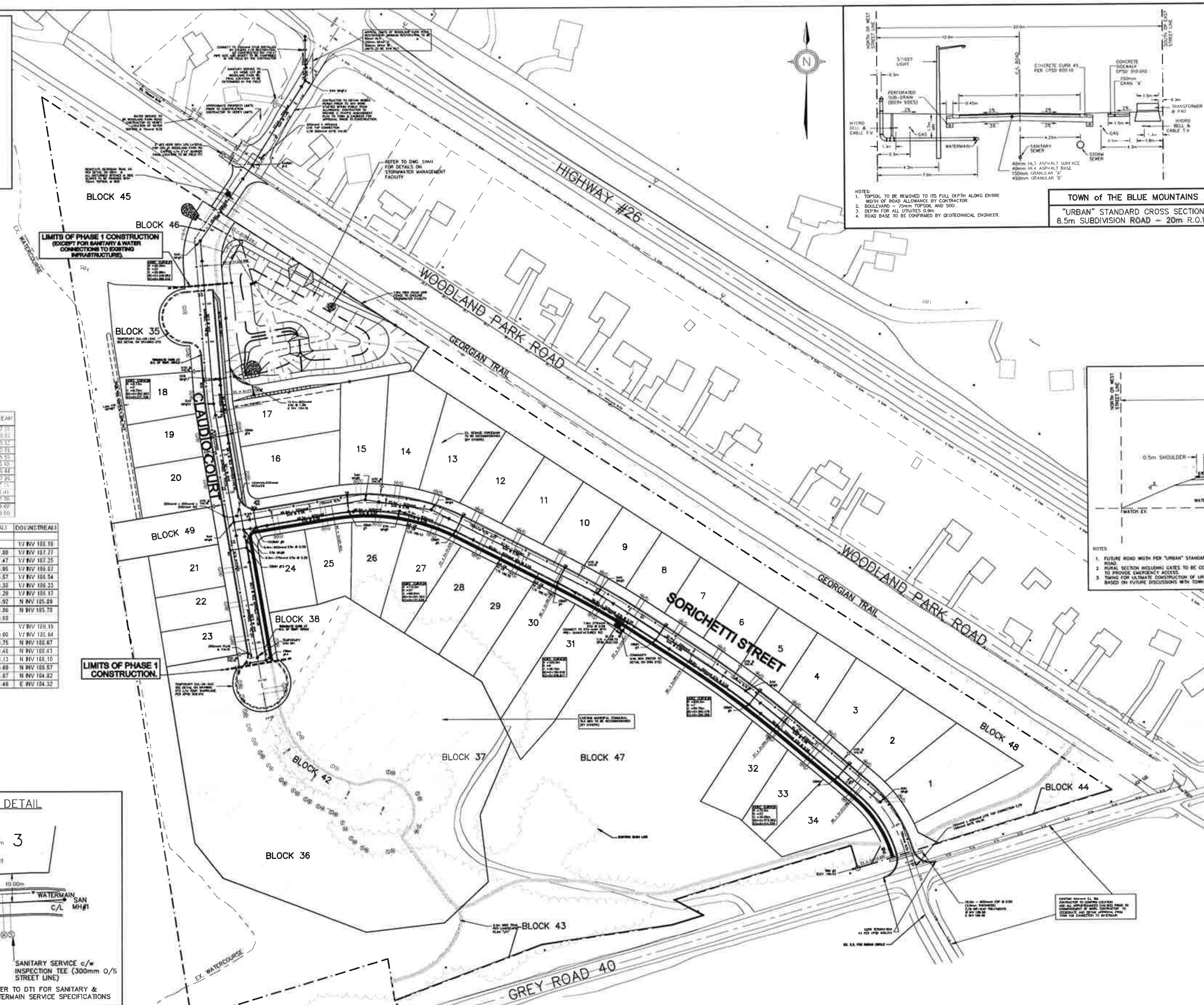
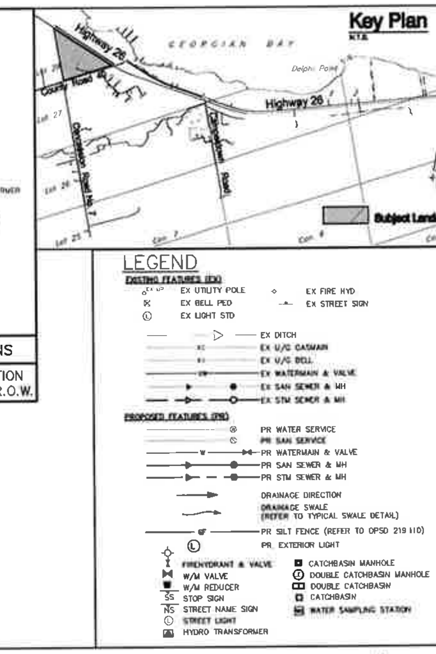
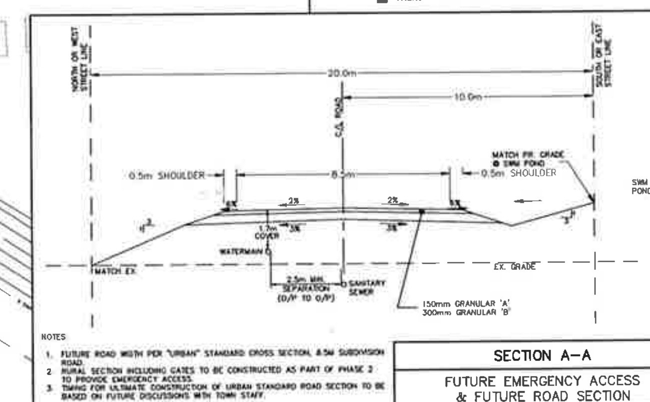



HIGHWAY #26
WOODLAND PARK ROAD
GEORGIAN TRAIL
CLAUDIO COURT
SORICHETTI STREET
GREY ROAD 40
BLOCK 45
BLOCK 46
BLOCK 35
BLOCK 49
BLOCK 38
BLOCK 37
BLOCK 47
BLOCK 42
BLOCK 36
BLOCK 43
BLOCK 44
BLOCK 48
LIMITS OF PHASE 1 CONSTRUCTION (EXCEPT FOR SANITARY & WATER CONNECTIONS TO EXISTING INFRASTRUCTURE).
LIMITS OF PHASE 1 CONSTRUCTION.
EX. WATERCOURSE
"URBAN" STANDARD CROSS SECTION
8.5m SUBDIVISION ROAD – 20m R.O.W.
TOWN of THE BLUE MOUNTAINS

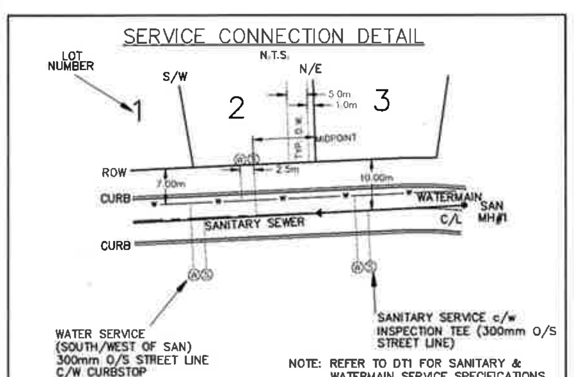


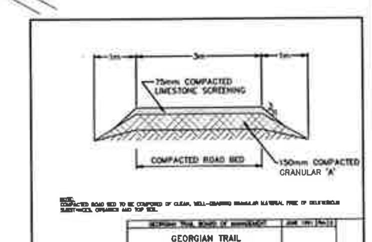


CATCHBASIN INVERT TABLE			
LOCATION	STATION	TYPE	INVERT
STREET 'A'	0+011	DCB	186.40
	0+060	CB	186.70
	0+120	CB	187.00
	0+180	CB	187.35
	0+240	CB	187.80
	0+300	CB	188.20
	0+360	CB	189.50
STREET 'B'	0+040	CB	189.50
	0+080	CB	189.00
	0+130	CB	188.45
	0+190	CB	186.95
	0+250	CB	185.25
	0+280	DCB	184.80

LOCATION	SANITARY MH	OPSD	T/GRATE	UPSTREAM	DOWNSTREAM
STREET 'A'	1	701.010	[illegible]		[illegible]
	2	701.010	[illegible]	[illegible]	[illegible]
	3	701.010	[illegible]	[illegible]	[illegible]
	4	701.010	[illegible]	[illegible]	[illegible]
	5	701.010	[illegible]	[illegible]	[illegible]
	6	701.010	[illegible]	[illegible]	[illegible]
STREET 'B'	7	701.010	[illegible]		[illegible]
	8	701.010	[illegible]	[illegible]	[illegible]
	9	701.010	[illegible]	[illegible]	[illegible]
	10	701.010	[illegible]	[illegible]	[illegible]
	11	701.010	[illegible]	[illegible]	[illegible]
	12	701.010	[illegible]	[illegible]	[illegible]
	13	701.010	[illegible]	[illegible]	[illegible]

LOCATION	STORM MH	TYPE	OPSD	T/GRATE	UPSTREAM	DOWNSTREAM
STREET 'A'	1	CBMH	701.010	189.61		W INV 188.10
	2	CBMH	701.010	189.31	E INV 187.80	W INV 187.77
	3	CBMH	701.010	189.09	E INV 187.47	W INV 187.25
	4	CBMH	701.010	188.71	E INV 186.95	W INV 186.87
	5	CBMH	701.010	188.41	E INV 186.57	W INV 186.54
	6	MH	701.010	188.25	E INV 186.38	W INV 186.33
	7	CBMH	701.010	188.11	E INV 186.20	W INV 186.17
	8	DCBMH	701.010	187.86	E INV 185.92	N INV 185.89
	9	MH	701.011	188.06	E INV 185.86 S INV 186.08	N INV 185.78
STREET 'B'	10	CBMH	701.010	190.70		W INV 189.19
	11	MH	701.010	190.50	E INV 189.00	W INV 188.94
	12	CBMH	701.010	190.30	S INV 188.75	N INV 188.67
	13	MH	701.010	190.10	S INV 188.48	N INV 188.43
	14	CBMH	701.010	189.78	S INV 188.13	N INV 188.10
	15	CBMH	701.010	188.34	S INV 186.60	N INV 186.57
	16	CBMH	701.010	186.75	S INV 184.87	N INV 184.82
	17	DCBMH	701.011	186.30	S INV 184.48	E INV 184.32


SERVICE CONNECTION DETAIL
N.T.S.
LOT NUMBER
S/W
N/E
ROW
CURB
WATERMAIN
SAN MH#1
SANITARY SEWER
C/L
CURB
WATER SERVICE (SOUTH/WEST OF SAN) 300mm O/S STREET LINE C/W CURBSTOP
SANITARY SERVICE c/w INSPECTION TEE (300mm O/S STREET LINE)
NOTE: REFER TO DT1 FOR SANITARY & WATERMAIN SERVICE SPECIFICATIONS



1. This drawing is the exclusive property of C.F. Crozier & Associates Inc. and the reproduction of any part without prior written consent of this office is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.
4. Do not scale the drawings.
5. All existing underground utilities to be verified in the field by the contractor prior to construction.

GEODETIC BENCHMARKS

BM# 1
SOUTHEAST CORNER OF EXISTING CONCRETE BOX CULVERT (1.8mX 3.7m) LOCATED IMMEDIATELY EAST OF COUNTY ROAD 40 ON HIGHWAY 26.
ELEV. 181.776m

TEMPORARY BENCHMARKS

BM# 2
TOP OF SIB (GEORGIAN GLEN PROPERTY), LOCATED APPROX. 26m WEST OF STREET 'A' & COUNTY ROAD 40 INTERSECTION.
ELEV. 190.430m

Town

No.	Issue / Revision	Date MM/DD/YYYY
0	Issued for Review	05/14/04
1	REVISED AS PER TOWN'S COMMENTS	10/14/04
2	ISSUED FOR APPROVAL	03/20/07
3	REVISED PER TOWN COMMENTS DATED MAY 4, 2007	06/25/07
4	ISSUED FOR APPROVAL	07/16/07
5	ISSUED FOR INCLUSION OF SUBDIVISION AGREEMENT	02/10/09

Engineer

LICENSED PROFESSIONAL ENGINEER — K. A. MORRIS — PROVINCE OF ONTARIO

Project: GEORGIAN GLEN SUBDIVISION
TOWN of THE BLUE MOUNTAINS

Drawing: GENERAL SERVICING PLAN

CF CROZIER & ASSOCIATES INC.
LAND DEVELOPMENT ENGINEERS

Drawn By	I.T.M.	Check By	K.A.M.	Project No	101-2501
Scale	1:1000	Date	05/14/2004	Drawing No	GEN1

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MEMO

DATE	November 4, 2016	FILE NO.	1251-4397
RE	Georgian Glen SDR 35 PVC Sanitary Sewer System: Deflection Testing:		
TO	**File**	CC	
FROM	Austin Spencer		

The deflection test of the sanitary sewer system was completed at Georgian Glen on Friday, October 28, 2016. The test was performed by Arnott Construction and was witnessed by Austin Spencer of C.F. Crozier & Associates (CFCA). Test was performed on the existing PVC sanitary sewers combined with all associated services. All works were installed in 2007 by Arnott Construction, thereby satisfying the waiting period of 30 days after installation as outlined in OPSS 410.

The deflection testing was conducted on the following sewers and their approximate lengths:

1. 234m of 200mm diameter sanitary sewer on Sorichetti Street; and
2. 200m of 200mm diameter sanitary sewer on Claudio Court.

The mandrel used to complete the test was cylindrical in shape with 9 evenly spaced arms. The mandrel contact area must be measured to match or exceed OPSS 410 specifications. The contractor utilized a pre-fabricated mandrel for the specified sanitary sewers.

The mandrel outside diameter was field measured by the CFCA on-site representative. Based on the field measurements the outside diameter of the mandrel met the minimum base inside diameter for testing for the 200mm diameter pipe based on current OPSS specifications. The mandrel testing requirements for the CSA Group® PSM Type Polyvinylchloride SDR 35 gasketed sewer pipe are summarized in the following table:

Nominal Pipe Size (mm)	Base Pipe Diameter (mm)	Adjustment for Deflection 7.5% (mm)	OPSS 410 Mandrel OD requirement (mm)	Field Measured Mandrel OD (mm)
200	196.11	14.7	181.41	181.44

The following observations were made by our office during the deflection testing of the sewer:

Diameter (mm)	From	To	Design Length (m)	Pipe ID (mm)	Comments
Friday, October 28th, 2016					
Georgian Glen					
200	MH1	MH2	64.2	196.11	Mandrel was successfully pulled through the pipe.
	MH2	MH3	27.2	196.11	Mandrel was successfully pulled through the pipe.
	MH3	MH4	43.1	196.11	Mandrel was successfully pulled through the pipe.
	MH4	MH5	78.7	196.11	Mandrel was successfully pulled through the pipe.
	MH5	MH6	20.7	196.11	Mandrel was successfully pulled through the pipe.
	MH6	MH10	27.3	196.11	Mandrel was successfully pulled through the pipe.
	MH10	MH11	86.5	196.11	Mandrel was successfully pulled through the pipe.
	MH6	Temporary MH	86.6	196.11	Mandrel was successfully pulled through the pipe.

Based on field testing, the mandrel was successfully pulled through all PVC sanitary sewers installed as per OPSS 410 specifications.

Regards,

C.F. CROZIER & ASSOCIATES INC.

for Austin Spencer, E.I.T.
AS/jl

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MEMO

DATE November 14, 2016 FILE NO. 1251-4397
RE Georgian Glen Sanitary Sewer System: Low Pressure Air Testing

TO **File** CC
FROM Austin Spencer

The low-pressure air test of the sanitary sewer was completed at Georgian Glen on Monday, October 31, 2016. The test was performed by Arnott Construction and was witnessed by Austin Spencer of C.F. Crozier & Associates (CFCA).

The low-pressure air test was conducted on approximately 608m of 200mm sanitary sewer. All of the sections tested were filled until a constant pressure of 24 kPa was maintained. After the air pressure stabilized for five minutes it was then regulated to maintain a pressure of 20.5 kPa for a minimum time as per Table 1 of OPSS 410, and summarized in the table below.

The installation of all of the air testing equipment and its operation was witnessed by CFCA throughout the test period and found to be satisfactory. The tested portion of sanitary sewer has met the criteria set forth in OPSS 410 (11/2012).

Pressure Test (OPSS 410)

Diameter of Pipe (mm)	From	To	Length (m)	Required Time per OPSS 410.07.16.04.03 (mm:ss)	Measured Pressure Drop (kPa)	Result
200	MH1	MH2	91.3	3:48	0.0	PASS
	MH2	MH3	92.9	3:52	0.0	PASS
	MH3	MH4	97.5	4:03	0.0	PASS
	MH4	MH5	35.0	3:47	0.0	PASS
	MH5	MH6	69.4	3:47	0.0	PASS
	MH6	MH10	63.1	3:47	0.0	PASS
	MH10	MH11	85.8	3:47	0.0	PASS
	MH6	MH Temp	72.5	3:47	0.0	PASS

The sanitary sewer has met the criteria detailed in the original contract documents and OPSS 410 specifications.

Regards,

C.F. CROZIER & ASSOCIATES INC.

Austin Spencer, E.I.T.

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MEMO

DATE November 16, 2016 **FILE NO.** 1251-4397
RE Georgian Glen Sanitary Sewer System: CCTV Video Inspection Review Memo

TO **File** **CC**
FROM Anindita Datta

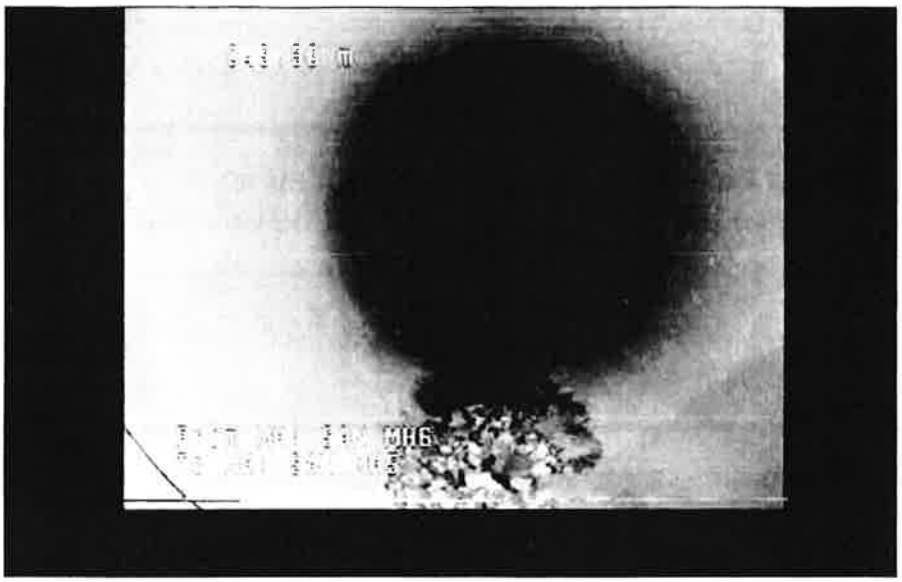
The CCTV video inspection of the sanitary sewer system was completed at Georgian Glen on Monday, October 24, 2016, and Tuesday October 25, 2016. The test was performed by Pipe Vision Inc., on behalf of Arnott Construction Ltd., and was witnessed by Anindita Datta of C.F. Crozier & Associates (CFCA). All CCTV review was completed as per OPSS 409, and all sanitary sewers were flushed prior to the CCTV video review as per OPSS 409.07.01.

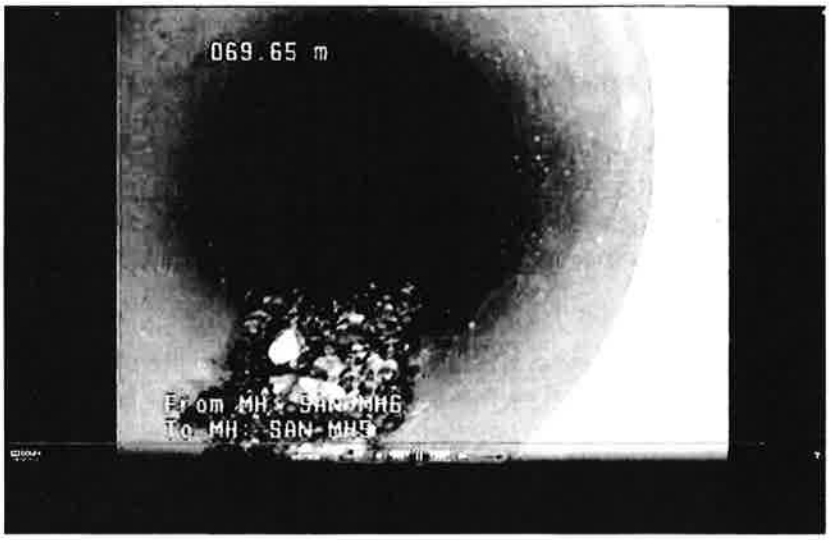
The CCTV video inspection was conducted on 628 m of 200mm diameter PVC sanitary sewers.

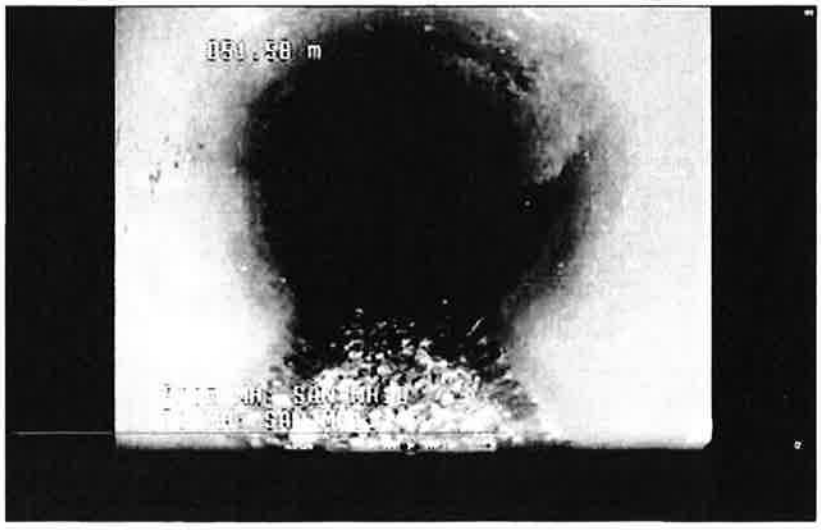
A list of deficiencies with notes and photos for the sanitary sewer system as documented by CFCA during the review of the CCTV videos are presented herein. An allowance for any required additional clean-up or repairs has been included in the preliminary costing analysis completed by CFCA. There were no significant issues or concerns identified based on the video review save for the following items:

1. Sediment and debris was observed in all sanitary services off of the main sewer lines. Additional flushing of sewers and service lines should address this issue.
2. Staining of sewers; no impact on conveyance capacity of sewers.
3. Crack in one section of sanitary sewer. Length to be removed and replaced.
4. Leakage and infiltration noted in several manholes, which will require parging and minor repair works.

Georgian Glen – Sanitary Services

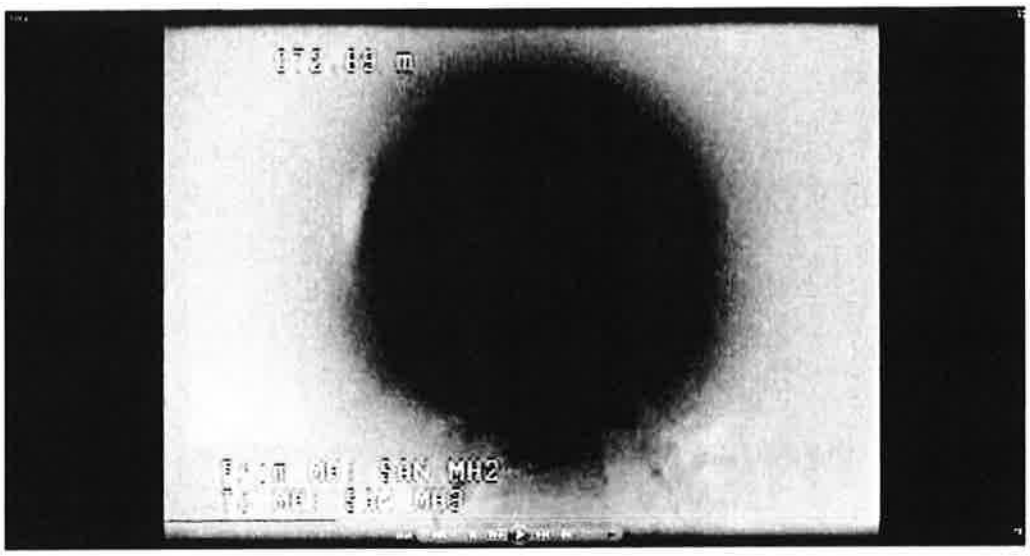


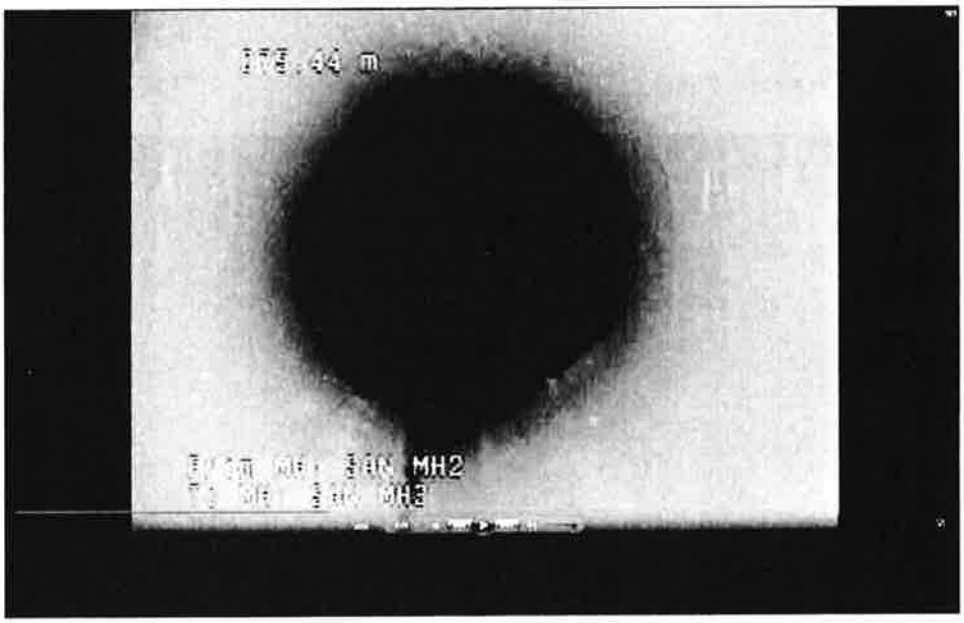




MH2 TO MH3

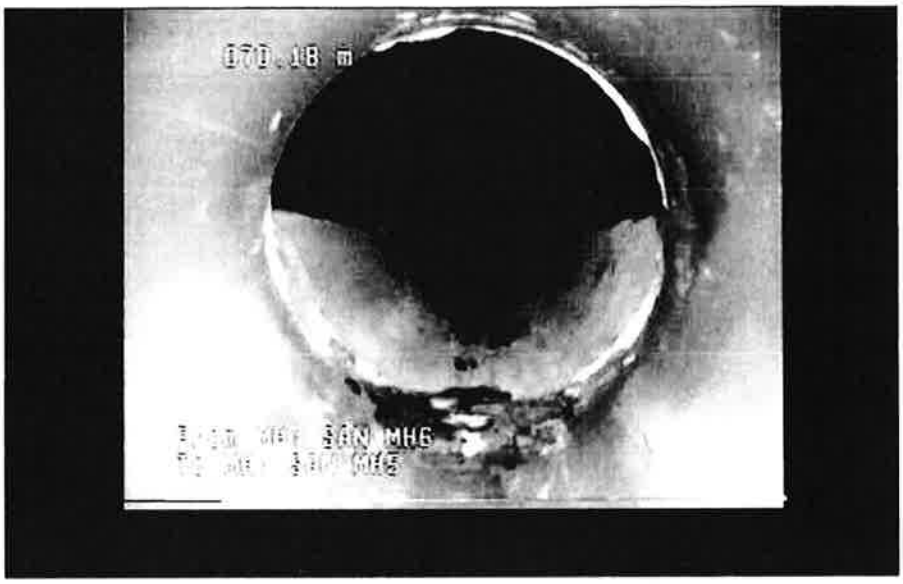
- Ponding observed along entire length of 200mm PVC pipe.
- Deflection observed northwest of station 72.9m in the 200mm PVC pipe.
- Deflection observed approximately at 75.4m in the 200mm PVC pipe, and survey abandoned.





MH6 TO MH5

- Debris observed at entrance to MH5.

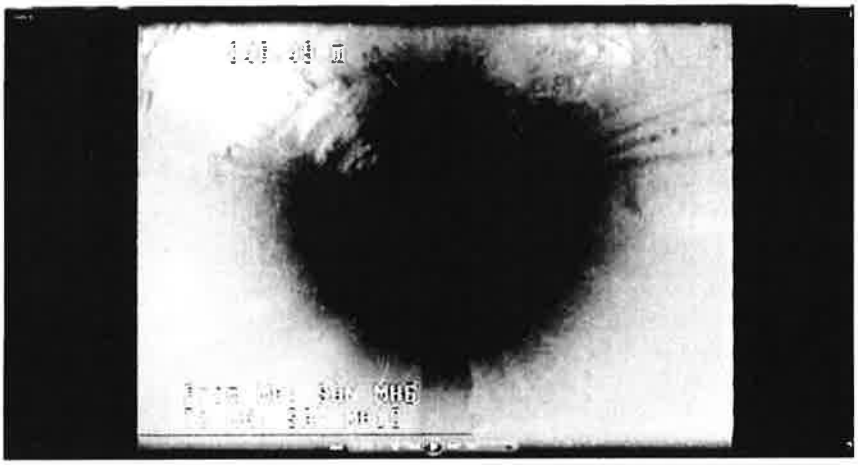


MH6 TO TEMP SAN

- Staining observed at station 25m.

MH6 TO MH10

- Peeling and flaking observed in 200mm PVC pipe at station 46.5m.
- Circumferential crack observed at station 61.4m in 200mm PVC pipe.



MH11 TO STUB

Pipe length is observed to be underwater; survey abandoned.

Yours truly,

C.F. Crozier & Associates Inc.

Anindita Datta

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MEMO

DATE	November 14, 2016	FILE NO.	1251-4397
RE	Georgian Glen SDR 35 PVC Storm Sewer System: Deflection Testing		

TO	**File**	CC	
FROM	Austin Spencer		

The deflection test of the storm sewer system was completed at Georgian Glen on Monday, October 31, 2016. The test was performed by Arnott Construction and was witnessed by Austin Spencer of C.F. Crozier & Associates (CFCA). Test was performed on the existing 300mm and 375mm dia. PVC storm sewers combined with all associated catchbasin leads. All works were installed in 2007 by Arnott Construction, thereby satisfying the waiting period of 30 days after installation as outlined in OPSS 410.

The deflection testing was conducted on the following sewers and their approximate lengths:

1. 119m of 300mm diameter storm sewer on Sorichetti Street;
2. 70m of 375mm diameter sanitary sewer on Claudio Court; and
3. 99m of 300mm diameter catchbasin leads to existing CBMH's and DCBMH's along Sorichetti Street and Claudio Court.

Note: No deflection testing was completed on the concrete storm sewer pipe.

The mandrel used to complete the test was cylindrical in shape with 9 evenly spaced arms. The mandrel contact area must be measured to match or exceed OPSS 410 specifications. The contractor utilized an adjustable mandrel for the specified storm sewers.

The mandrel outside diameter was field measured by the CFCA on-site representative. Based on the field measurements the outside diameter of the mandrel met the minimum base inside diameter for testing for the 300mm and 375mm diameter sewer pipe as per current OPSS specifications. The mandrel testing requirements for the Polyvinylchloride SDR 35 gasketed sewer pipe are summarized in the following table:

Nominal Pipe Size (mm)	Observed Pipe Diameter (mm)	Adjustment for Deflection 7.5% (mm)	OPSS 410 Mandrel OD requirement (mm)	Field Measured Mandrel OD (mm)
300	293	22.0	271.02	275
375	355.6	26.7	328.93	335

The following observations were made by our office during the deflection testing of the sewer:

Diameter (mm)	From	To	Design Length (m)	Pipe ID (mm)	Comments
300	CBMH1	CBMH2	59.8	293	Mandrel was successfully pulled through the pipe.
	CBMH2	CBMH3	59.6	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH1	9.0	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH2	9.0	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH3	9.0	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH4	9.0	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH5	9.0	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH7	9.0	293	Mandrel was successfully pulled through the pipe.
	DCB Lead	DCBMH8	9.0	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH14	9.0	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH15	9.0	293	Mandrel was successfully pulled through the pipe.
	CB Lead	CBMH16	9.0	293	Mandrel was successfully pulled through the pipe.
	DCB Lead	DCBMH17	9.0	293	Mandrel was successfully pulled through the pipe.
375	CBMH14	CBMH15	60.0	355.6	Mandrel was successfully pulled through the pipe
	CBMH15	STM MH9	9.5	355.6	Mandrel was successfully pulled through the pipe

Based on field testing, the mandrel was successfully pulled through all PVC storm sewers installed as per OPSS 410 specifications.

Regards,

C.F. CROZIER & ASSOCIATES INC.

Austin Spencer, E.I.T.
AS/jl

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MEMO

DATE November 16, 2016 **FILE NO.** 1251-4397
RE Georgian Glen Storm Sewer System: CCTV Video Inspection Review Memo

TO **File** **CC**
FROM Anindita Datta

The CCTV video inspection of the storm sewer system was completed at Georgian Glen on Monday, October 31, 2016, and Tuesday, November 8, 2016. The test was performed by Pipe Vision Inc., on behalf of Arnott Construction Ltd., and was witnessed by Anindita Datta of C.F. Crozier & Associates (CFCA). All CCTV review was completed as per OPSS 409, and all storm sewers were flushed prior to the CCTV video review as per OPSS 409.07.01.

The CCTV video inspection was conducted on the following sewers and their approximate lengths:

- 198.9 m of 300mm diameter PVC storm
- 99.9m of 375mm diameter PVC storm
- 8.3m of 450mm diameter Concrete storm
- 87.9m of 525mm diameter Concrete storm
- 257.5m of 600mm diameter Concrete storm

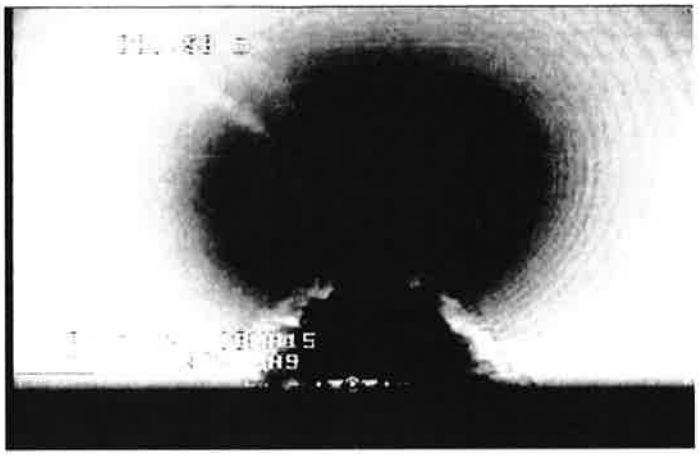
A list of deficiencies with notes and photos for the storm sewer system as documented by CFCA during the review of the CCTV videos are presented herein. An allowance for any required additional clean-up or repairs has been included in the preliminary costing analysis completed by CFCA. There were no significant issues or concerns identified based on the video review save for the following items:

1. Leakage and infiltration noted in several manholes, which will require parging and minor repair works.
2. Debris and silt build-up within several sewer runs. Additional flushing and clean-out should address this issue.
3. Minimal staining of sewers; no impact on conveyance capacity of sewers.
4. Leak/infiltration at one joint in 600mm diameter sewer. May require further investigation and discussions with Town. Provisional allowance for repair in preliminary costing analysis.

Georgian Glen - Storm Sewers

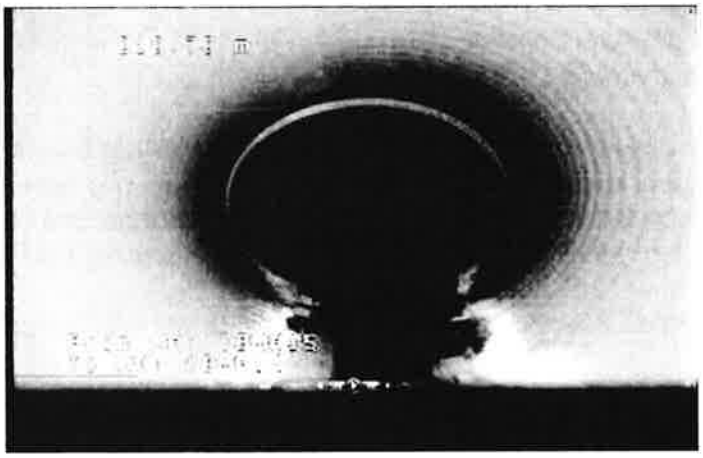
CBMH15 TO MH9

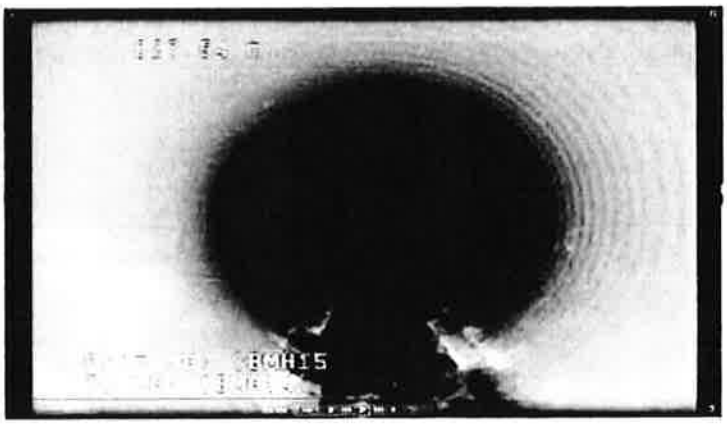
- Ponding was observed along the entire length of the 375mm PVC pipe.

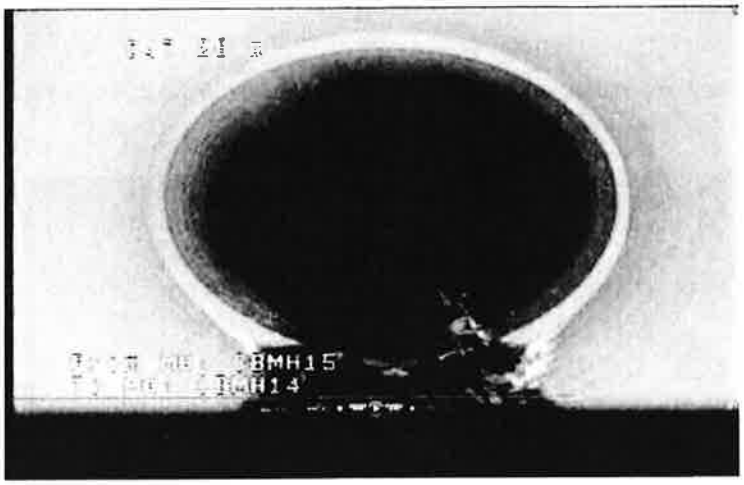


CBMH15 TO CBMH14

- Ponding was observed along the entire length of the 375 mm PVC pipe.
- Debris (not grease) was observed approximately 27.5m and 47.3m south of CBMH15 within the 375mm storm sewer.





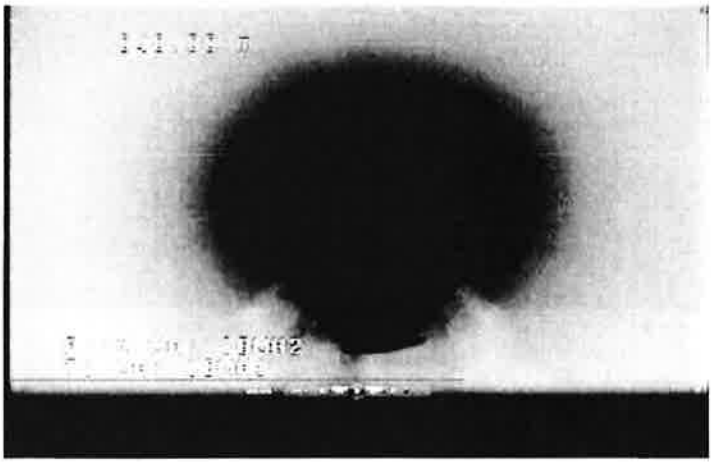


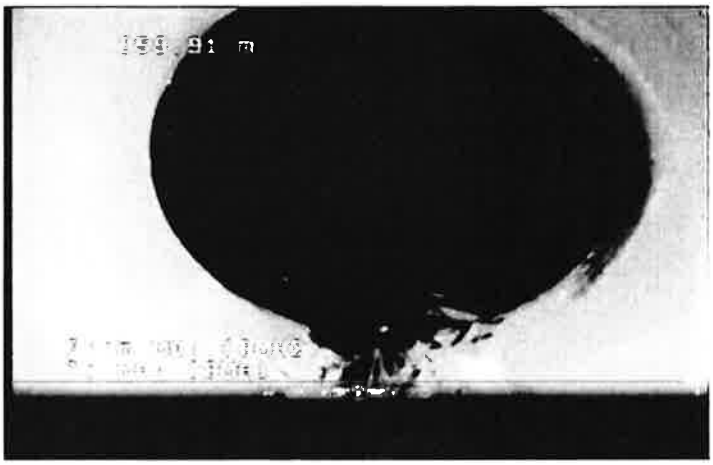
CBMH14 TO STUB

- Debris (silt) was observed approximately 1.5m south of CBMH14 within the 375mm PVC pipe.

CBMH2 TO CBMH1

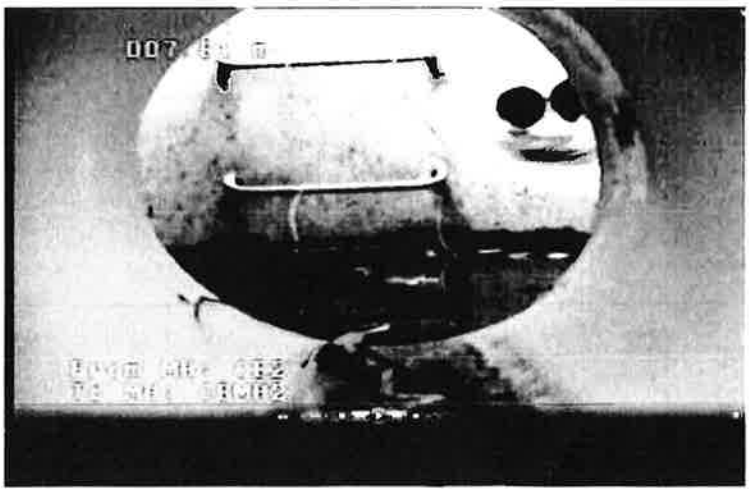
- Debris was observed approximately 40m southwest of CBMH2 in the 300mm PVC pipe.
- Some debris was observed in CBMH1.





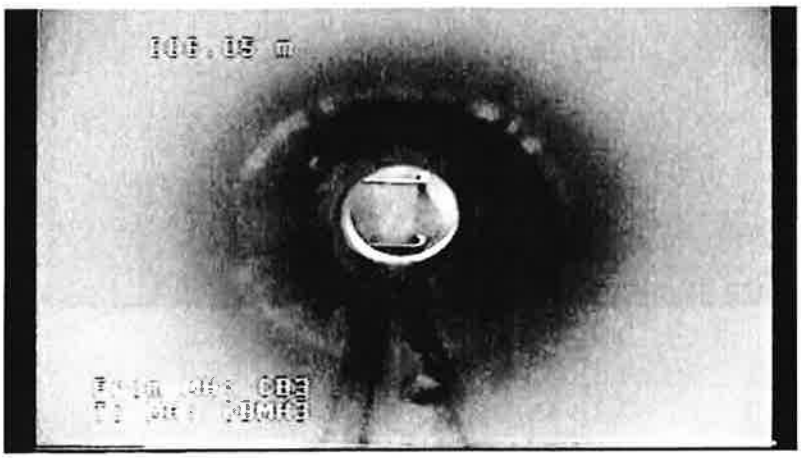
CB2 TO CBMH2

- Light debris was observed approximately 7.8m southeast of CB2 in the 300mm PVC pipe.



CB3 TO CBMH3

- Debris was observed approximately 6.1m southeast of CB3 in the 300mm PVC pipe

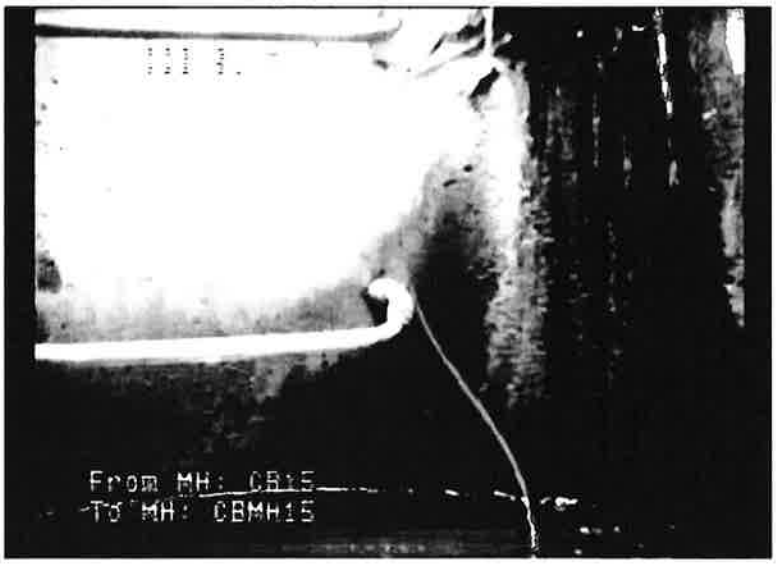


DCB8 TO DCBMH8

- Light debris and silt was observed approximately 2.8m south of DCB8 in the 300mm PVC pipe.
- A leak in DCBMH8 was observed.

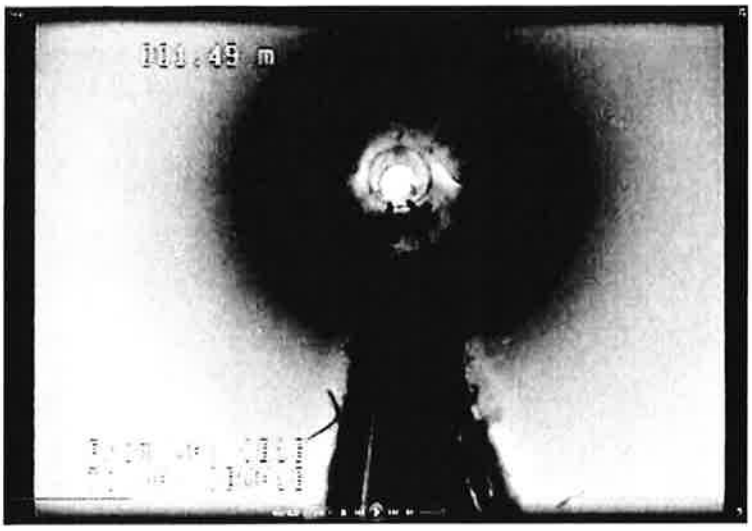
CB15 TO CBMH15

- Water was observed flowing into CBMH15.



CB16 TO DCBMH16

- Ponding and dirt observed along entire length of 300mm PVC pipe.



DICB5 TO CBMH18

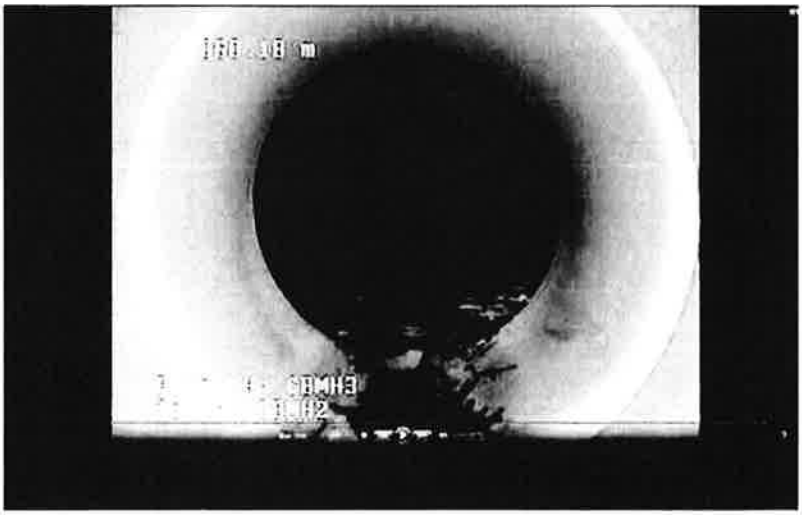
- Ponding observed approximately 5.6m along length of 450mm concrete pipe.

CBMH18 TO OUTFALL

- Debris and backflow observed along entire length of 525mm concrete pipe.
- Animals (tadpole and fish) observed near outfall.

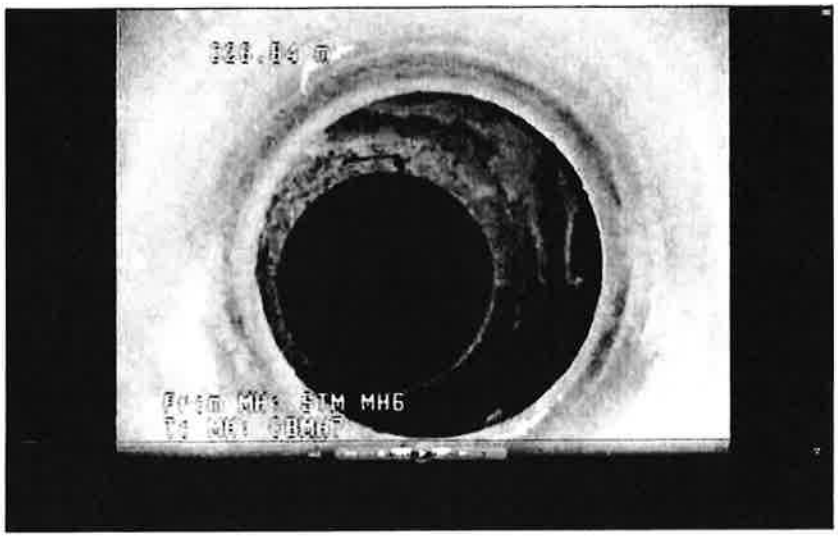
CBMH3 TO CBMH2

- Ponding and debris observed near CBMH2



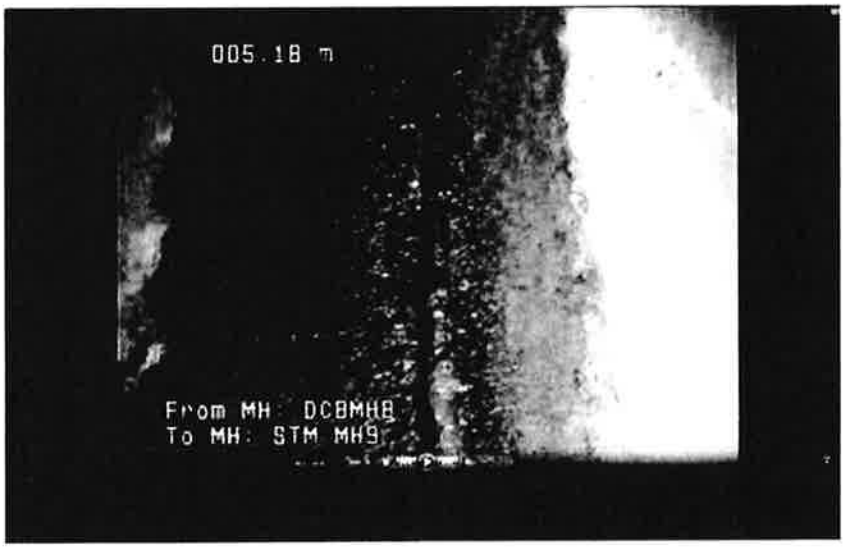
MH6 TO CBMH7

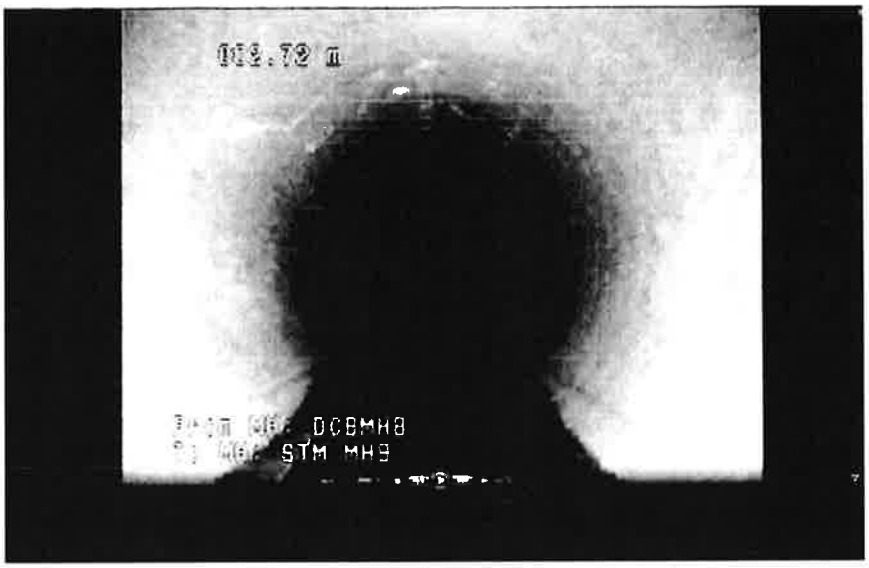
- Observed crack or staining of pipe (upstream face of pipe from CBMH7 to DCBMH8).



DCBMH8 TO MH9

- Joint leak (infiltration) observed approximately 5.18m west of DCBMH8.
- Ponding and water flow observed along entire length of 600mm concrete pipe (light rain conditions).





CBMH16 TO MH9

- Ponding and water flow observed along entire length of 600mm concrete pipe (light rain conditions).

Yours truly,
C.F. Crozier & Associates Inc.

Anindita Datta

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MEMO

DATE November 4, 2016 **FILE NO.** 1251-4397
RE Georgian Glen Water Distribution System: Hydrostatic Test

TO **File** **CC**
FROM Austin Spencer

The hydrostatic testing of the 150mm and 200mm diameter PVC internal watermain system was completed at the Georgian Glen residential subdivision on October 28, 2016. Connections to hydrants (150mm dia.) and water services (19mm dia.) were taken into account for the hydrostatic testing. The test was performed by Arnott Construction and witnessed by Austin Spencer from C.F. Crozier & Associates (CFCA).

Arnott Construction introduced water into the watermain from a plastic water drum. The water used for measurable leakage was contained in a single 208L (55 gallon) water bucket.

Arnott Construction prepared the test the morning of October 27th and elected to utilize the 24-hour absorption period as allowed per OPSS 441.07.24.01. The test section was subjected to continuous test pressure of 1035kpa (150psi) for two hours in general conformance with OPSS 441.

The test results were as follows:

Test Section – All installed watermain within site limits.
Start Time: 8:01 a.m. Finish Time: 10:01 a.m.
Start Pressure: 1048kpa (152psi) Finish Pressure: 1041kpa (151psi)

The total allowable leakage is summarized in the following table:

Allowable Leakage (L/km) as per OPSS 441.07.24.03 and OPSS 441.07.24.02 Table 1	Diameter of Pipe (mm)	Distance (km)	Total Allowable Leakage (L)
0.082	200 (main internal)	0.215	3.53
0.082	150 (main internal)	0.417	5.13
0.082	19 (water services internal)	0.366	0.43
0.082	150 (hydrant services internal)	0.035	0.57
		Total (L):	9.66

To return the watermain pressure to the original testing pressure of 1048kpa, less than 0.85 liters of make-up water was added to the watermain. After the test was completed Arnott Construction opened Lot 30 curb stop to reduce the testing pressure to approximately 50PSI.

The measured leakage did not exceed the allowable leakage and therefore the test section of watermain was found to be in general conformance with the hydrostatic testing requirements of OPSS 441.

Yours truly,
C.F. Crozier & Associates Inc.

for Austin Spencer, E.I.T.

J:\1200\1251-The Myriad Group\4397 - Georgian Glen Res Subdivision\Contract Admin\Field Review\Testing Memos\2016.11 04 Watermain Hydrostatic Test.doc

CROZIER
&ASSOCIATES
Consulting Engineers

The HarbourEdge Building
40 Huron Street, Suite 301
Collingwood, ON L9Y 4R3

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cfcrozier.ca

MEMO

DATE	November 16, 2016	**FILE NO.**	1251-4397
RE	Georgian Glen Roadways: Field Review Condition Assessment		

TO	**File**	**CC**	
FROM	Anindita Datta		

On November 16, 2016, a visual review of the condition of the existing asphalt roadways and concrete curb and gutters was completed by C.F. Crozier & Associates

A list of deficiencies with notes and photos for the roadways as documented by CFCA during the field review are presented herein. An allowance for any required repairs has been included in the preliminary costing analysis completed by CFCA. There were no significant issues or concerns identified based on the field review save for the following items:

1. Minor chipping and cracks along several sections of concrete curbing. Structural integrity of concrete does not appear to be compromised. Town will make final decision on lengths and sections of curbs that require repair and/or replacement.
2. Asphalt patch on Sorichetti Street. Patch is in good condition; no repair warranted.
3. It is possible that the Town may require a formal road condition assessment be completed by a geotechnical consultant prior to acceptance of the completed works.

Georgian Glen – Sorichetti Street

- Asphalt patch adjacent to Lot 31.

- Chipped curb observed along the frontage of lots 33 and 34.
- Crack in curb observed in front of Lots 32 and 33.

Georgian Glen – Claudio Court

- Cracked and chipped curb observed fronting Block 49.

Yours truly,

C.F. Crozier & Associates Inc.

Anindita Datta

J:\1200\1251-The Myriad Group\4397 - Georgian Glen Res. Subdivision\Contract Admin\Field Review\Testing Memos\2016.11.14 Curb and Road Conditions.doc

CROZIER & ASSOCIATES ENGINEERS

Project No.: 1251-4397
File No.: Georgian Glen Subdivision
Date: November 21, 2016

Georgian Glen Subdivision - Condition Assessment Due Diligence
Preliminary Opinion of Probable Costs

Notes:

1) This Opinion of Probable Servicing Costs is preliminary and is based on the Draft Plan of Subdivision prepared by Innovative Planning Solutions (August 2016) and the approved CFCA Engineering Drawings dated Feb. 2009.
2) Estimate of costs for servicing is preliminary, based on an internal review of the site and is subject to change as a result of future detailed design.
3) Estimate does not account for design/review fees and any applicable development charges.
4) An allowance for street lighting and hydro servicing for future phases has been included in this estimate.
5) Repairs or replacement of existing hydro distribution or utility network systems in Phase 1 (if any) are not included as part of this estimate.
6) Costs for the landscaping and recreation amenities (i.e. gazebo, playgrounds, etc.) are not included in this estimate.
7) Construction of roads may vary based on recommendations from qualified geotechnical consultant.
8) Estimate assumes no dewatering; to be confirmed by Geotechnical engineer.
9) Estimate and unit prices based on recent projects completed in 2016 in the south Georgian Bay area, and does not include HST
10) The material enclosed reflects best judgment in light of the information available at the time of preparation. Any use which a third party makes of this information, or any reliance on or decisions made based on it, are the responsibilities of such third parties. C.F. Crozier & Associates Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	TOTAL
	SCHEDULE A - REPAIRS & REMEDIAL WORKS FOR EX. PHASE 1 SYSTEMS				
A1	Road and Curb Repairs (Allowance for 100 metres of re&re of existing curb and 100 square metres of base course asphalt)	1	LS	$ 20,000.00	$ 20,000.00
A2	Storm Sewer Repairs and/or Replacement	1	LS	$ 10,000.00	$ 10,000.00
A3	Sanitary Sewer Repairs and/or Replacement	1	LS	$ 20,000.00	$ 20,000.00
A4	Stormwater Management Facility Clean-out	1	LS	$ 25,000.00	$ 25,000.00
				Sub Total	**$ 75,000.00**
	Construction Contingency Allowance (20%)				$ 15,000.00
	Total Estimated Capital Costs for SCHEDULE A				**$ 90,000.00**

CROZIER & ASSOCIATES ENGINEERS

Project No.: 1251-4397
File No.: Georgian Glen Subdivision
Date: November 21, 2016

Georgian Glen Subdivision - Condition Assessment Due Diligence
Preliminary Opinion of Probable Costs

Notes:

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5) Repairs or replacement of existing hydro distribution or utility network systems in Phase 1 (if any) are not included as part of this estimate.
6) Costs for the landscaping and recreation amenities (i.e. gazebo, playgrounds, etc.) are not included in this estimate.
7) Construction of roads may vary based on recommendations from qualified geotechnical consultant.
8) Estimate assumes no dewatering; to be confirmed by Geotechnical engineer.
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ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	TOTAL
	SCHEDULE B - CONNECT TO MUNICIPAL SYSTEMS (ROADS & UNDERGROUNDS) FOR PHASE 1				
				Paved Road Summary	
	Roadworks	**Width (m)**		**Length (m)**	**Area (m^2)**
	20m Municipal Road c/w curb and gutter	8.5		45	**383**
	Restoration on Woodland Park Road	8.5		100	**850**
B1	Preparation & Fine Grading of subgrade for Roadway & Parking	1520	m^2	$ 2.00	$ 3,040.00
B2	Supply, Place & Compact Road Materials for Connection Road to Woodland Park				
a)	150mm Granular 'A' Road Base	470	m^2	$ 10.00	$ 4,700.00
b)	450mm Granular 'B' Road Sub-base	430	m^2	$ 13.00	$ 5,590.00
c)	50mm Hot Mix HL8 Base Course Asphalt	380	m^2	$ 14.00	$ 5,320.00
d)	40mm Hot Mix HL3 Surface Course Asphalt	380	m^2	$ 12.00	$ 4,560.00
B3	Supply and Place 100mm dia. Subdrain c/w connections	125	m	$ 25.00	$ 3,125.00
B4	Supply and Install Concrete Curb & Gutter	125	m	$ 65.00	$ 8,125.00
B5	Supply, Place & Compact Road Materials for Restoration on Woodland Park				
a)	150mm Granular 'A' Road Base	1050	m^2	$ 10.00	$ 10,500.00
b)	450mm Granular 'B' Road Sub-base	950	m^2	$ 13.00	$ 12,350.00
c)	50mm Hot Mix HL8 Base Course Asphalt	850	m^2	$ 14.00	$ 11,900.00
d)	40mm Hot Mix HL3 Surface Course Asphalt	850	m^2	$ 12.00	$ 10,200.00
B6	Supply, Place & Compact Road Materials for Sorichetti Street & Claudio Court				
a)	40mm Hot Mix HL3 Surface Course Asphalt	5100	m^2	$ 11.00	$ 56,100.00
B7	Supply and Install 200mm dia. Watermain c/w appurtenances & commissioning	60	m	$ 300.00	$ 18,000.00
B8	Locate and Connect to ex. 400mm Ø W/M (via live tap connection) c/w Restoration	2	LS	$ 7,500.00	$ 15,000.00
B9	Supply and Install Services to ex Lots on Woodland Park c/w restoration	1	LS	$ 10,000.00	$ 10,000.00
B10	Supply and Install 200mm dia. Sanitary Sewer c/w connection to ex plug	105	m	$ 200.00	$ 21,000.00
B11	Supply and Install 1200mm dia. Sanitary Manholes	2	ea	$ 8,000.00	$ 16,000.00
B12	Landscaping of SWM Facility	1	LS	$ 50,000.00	$ 50,000.00
B13	Streetscaping of Phase 1 roadways (topsoil & sod)	1	LS	$ 35,000.00	$ 35,000.00
B14	Sidewalks & trail systems in Phase 1	1	LS	$ 45,000.00	$ 45,000.00
				Sub Total	**$ 345,510.00**
	Construction Contingency Allowance (20%)				$ 69,102.00
	Total Estimated Capital Costs for SCHEDULE B				**$ 414,612.00**

CROZIER & ASSOCIATES ENGINEERS

Project No.: 1251-4397
File No.: Georgian Glen Subdivision
Date: November 21, 2016

Georgian Glen Subdivision - Condition Assessment Due Diligence
Preliminary Opinion of Probable Costs

Notes:

1) This Opinion of Probable Servicing Costs is preliminary and is based on the Draft Plan of Subdivision prepared by Innovative Planning Solutions (August 2016) and the approved CFCA Engineering Drawings dated Feb. 2009.
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3) Estimate does not account for design/review fees and any applicable development charges.
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6) Costs for the landscaping and recreation amenities (i.e. gazebo, playgrounds, etc.) are not included in this estimate.
7) Construction of roads may vary based on recommendations from qualified geotechnical consultant.
8) Estimate assumes no dewatering; to be confirmed by Geotechnical engineer.
9) Estimate and unit prices based on recent projects completed in 2016 in the south Georgian Bay area, and does not include HST
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ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	TOTAL
	SCHEDULE C - SERVICING OF FUTURE PHASE 2 LANDS				
				Paved Road Summary	
	Roadworks	**Width (m)**		**Length (m)**	**Area (m^2)**
	20m Municipal Road c/w curb and gutter	8.5		120	**1020**
C1	Preparation & Fine Grading of subgrade for Roadway & Parking	1510	m^2	$ 2.00	$ 3,020.00
C2	Supply, Place & Compact Road Materials				
a)	150mm Granular 'A' Road Base	1510	m^2	$ 10.00	$ 15,100.00
b)	450mm Granular 'B' Road Sub-base	1370	m^2	$ 13.00	$ 17,810.00
c)	50mm Hot Mix HL8 Base Course Asphalt	1220	m^2	$ 14.00	$ 17,080.00
d)	40mm Hot Mix HL3 Surface Course Asphalt	1220	m^2	$ 12.00	$ 14,640.00
C3	Supply and Place 100mm dia. Subdrain c/w connections	295	m	$ 25.00	$ 7,375.00
C4	Supply and Install Concrete Curb & Gutter	295	m	$ 65.00	$ 19,175.00
C5	Supply and Install 200mm dia. Watermain c/w appurtenances & commissioning	135	m	$ 300.00	$ 40,500.00
C6	Supply and Install 19mm Water Services	16	ea	$ 1,500.00	$ 24,000.00
C7	Supply and Install Fire Hydrant c/w valve & lead	1	ea	$ 8,000.00	$ 8,000.00
C8	Supply and Install 200mm dia. Sanitary Sewer c/w connection to existing	115	m	$ 200.00	$ 23,000.00
C9	Supply and Install 1200mm dia. Sanitary Manholes	3	ea	$ 8,000.00	$ 24,000.00
C10	Supply and Install 125mm dia. Sanitary Services	16	ea	$ 1,500.00	$ 24,000.00
C11	Supply and Install Storm Sewers c/w connection to existing				
a)	300mm dia. (including CB leads)	55	m	$ 160.00	$ 8,800.00
b)	375mm dia.	50	m	$ 175.00	$ 8,750.00
C12	Supply and Install storm sewer structures				
a)	1200mm dia. Catch Basin Maintenance Hole	2	ea	$ 8,500.00	$ 17,000.00
b)	1200mm dia. Storm Maintenance Hole	2	ea	$ 8,500.00	$ 17,000.00
c)	Catch Basin c/w standard grate	2	ea	$ 1,500.00	$ 3,000.00
C13	Electrical and Street Lighting Allowance	16	ea	$ 5,000.00	$ 80,000.00
C14	Sediment and Erosion Controls	1	LS	$ 10,000.00	$ 10,000.00
C15	Streetscaping of Phase 2 roadways (topsoil & sod)	1	LS	$ 15,000.00	$ 15,000.00
C16	Sidewalks & trail systems in Phase 2	1	LS	$ 15,000.00	$ 15,000.00
				Sub Total	**$ 412,250.00**
	Construction Contingency Allowance (20%)				$ 82,450.00
	Total Estimated Capital Costs for SCHEDULE C				**$ 494,700.00**

CROZIER & ASSOCIATES ENGINEERS

Project No.: 1251-4397
File No.: Georgian Glen Subdivision
Date: November 21, 2016

Georgian Glen Subdivision - Condition Assessment Due Diligence
Preliminary Opinion of Probable Costs

Notes:

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ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	TOTAL

SUMMARY OF PRELIMINARY OPINION OF PROBABLE COSTS

SCHEDULE A - REPAIRS & REMEDIAL WORKS FOR EX. PHASE 1 SYSTEMS	$	75,000.00
SCHEDULE B - CONNECT TO MUNICIPAL SYSTEMS (ROADS & UNDERGROUNDS) FOR PHASE 1	$	345,510.00
SCHEDULE C - SERVICING OF FUTURE PHASE 2 LANDS	$	412,250.00
Sub Total Schedule A-C	**$**	**832,760.00**
Construction Contingency Allowance (20%)	$	166,552.00
Total Estimated Capital Costs	**$**	**999,312.00**

APPENDIX C

Stormwater Management Report

(R.J. Burnside & Associates Ltd., January 2003)

Stormwater Management Report

Sorichetti Development Group Inc.

Town of The Blue Mountains

January 2003

RJB File No: PG 02 3903

Prepared by:

R.J. Burnside & Associates Limited
Engineers, Hydrogeologists, Environment Consultants
3 Ronell Crescent
Collingwood, Ontario
L9Y 4J6

H:\2002\PG 02 3903\Reports\SWM Report.doc

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STORMWATER MANAGEMENT REPORT
SORICHETTI DEVELOPMENT GROUP INC.
TOWN OF THE BLUE MOUNTAINS
RJB FILE NO: PG 02 3903

1.0 INTRODUCTION

R.J. Burnside & Associates Limited has been retained by the Sorichetti Development Group Inc. to complete a preliminary Stormwater Management Report to investigate the existing and proposed surface drainage issues for the Sorichetti Subdivision. The report is intended to support the draft plan of the subdivision application and has been prepared to a level of detail sufficient for issuance of conditions of draft approval related to stormwater management anticipated from the Grey Sauble Conservation Authority, Town of The Blue Mountains, Ministry of Transportation and the Ministry of the Environment.

The subject lands are located on Part of Lot 28, Concession 7, Town of the Blue Mountains. The subdivision is to consist of 55 detached single family dwellings on approximately 12.3 ha of land. The site is a triangular parcel bounded by the Georgian Trail to the north and by Grey County Road 40 to the east. The general location of the property can be seen in Figure 1.

2.0 Pre-Development Site Conditions

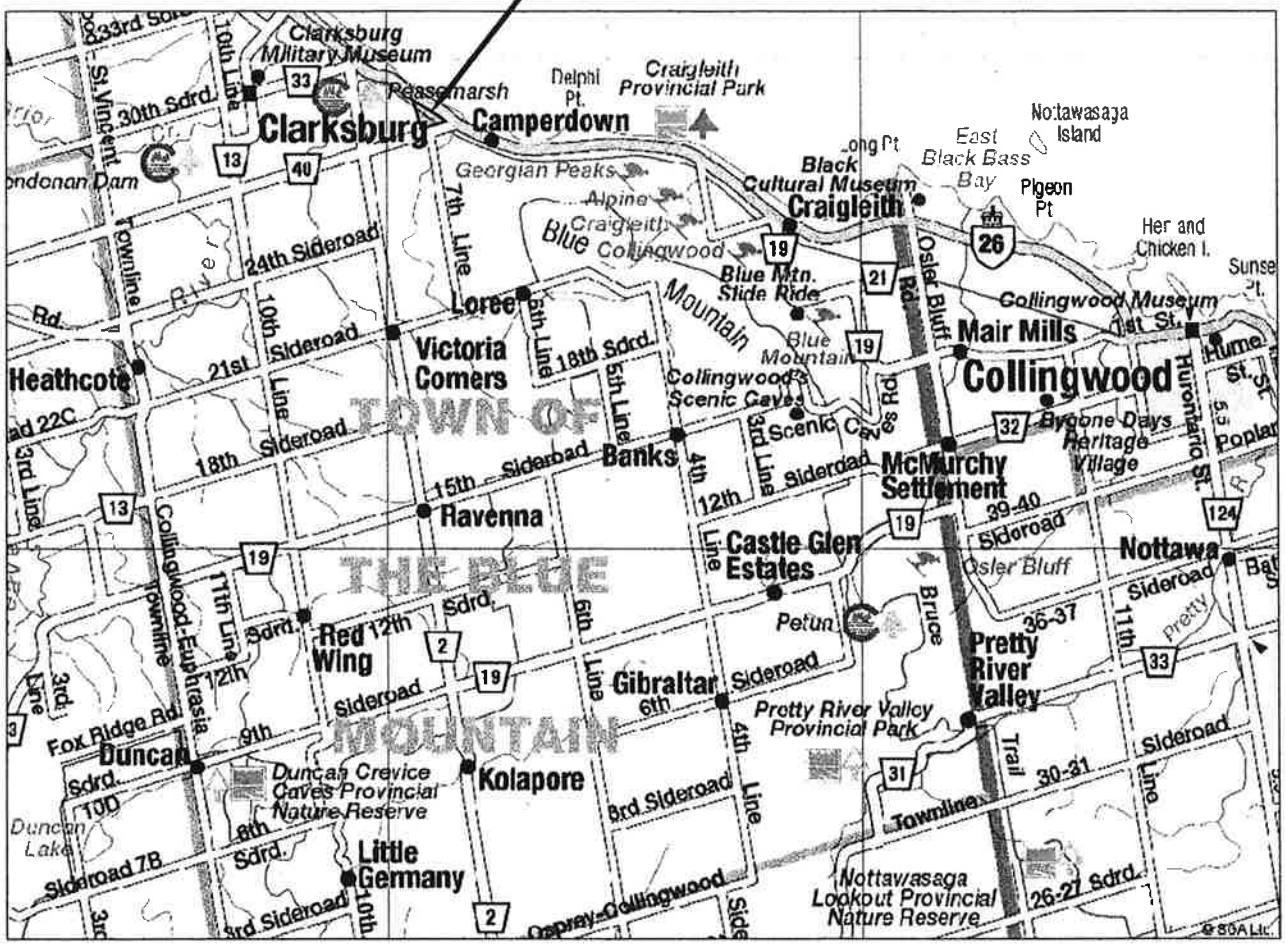
2.1 General

The site is generally forested with the exception of an area in the central portion of the site. At this location, the Town of the Blue Mountains owns and operates a communal leaching bed for the Lakeside Drive development, situated between Highway 26 and the Georgian Bay. It should be noted that this leaching bed will be decommissioned upon the delivery of municipal sanitary services to Camperdown.

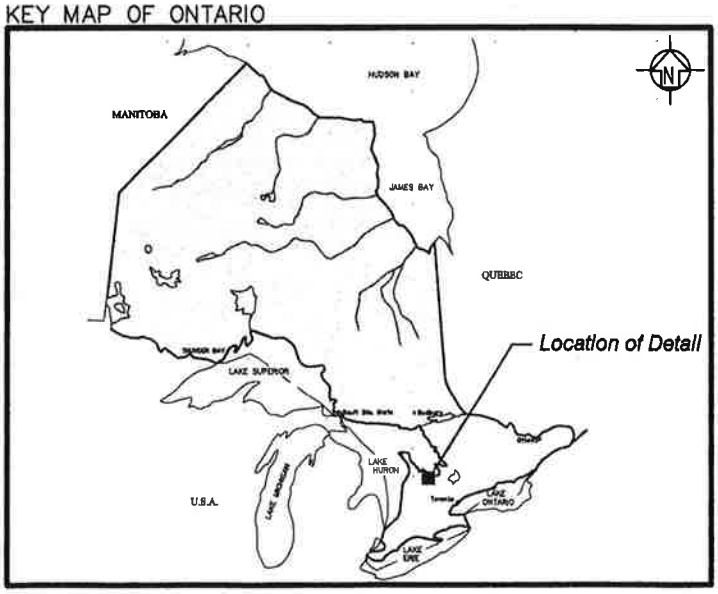
2.2 Soil Conditions

According to the soil survey of Grey County, the site and its contributing catchments are composed of a variety of soil types. The soils in the area are predominately Wiarton loam and Vincent silt clay loam with smaller sections composed of Brookston clay, Wiarton silt loam and Tecumseth sand.

The site's soils were classified as 37.5% Wiarton silt loam and 62.5% Tecumseth sand (See Appendix A). Wiarton silt loam belongs to hydrologic soil group BC and is a medium textured, imperfectly drained soil derived from dolomitic limestone till. Tecumseth sand belongs to soil group AB and is a imperfectly drained. It can be classified as well sorted sandy outwash. The hydrologic soil groups were determined in



KEY MAP OF ONTARIO



SITE LOCATION

SORICHETTI INC.

TOWN of the BLUE MOUNTAINS

R. J. Burnside & Associates Limited
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
GEORGIAN BAY OFFICE, 3 RONELL CRESCENT, COLLINGWOOD, ONTARIO L9Y 4J8
TELEPHONE (705)-446-0615 FAX (705)-446-2369
E-MAIL: collingwood@rjburnside.com

FIGURE 1
NOV. /02

PG 02 3903-FIG1.DWG

accordance with the Ontario Ministry of Transportation's (MTO) soil classification system.

2.3 Existing Drainage Patterns and Systems

The limits of the external drainage areas contributing to the site or the site's outlet was established using 1:10,000 Ontario Base Maps. It was determined that there are three external drainage areas, Catchments 101, 102 and 103 respectively, which share a common outlet with the site. The site has also been delineated into two Catchments (104 and 105), which were delineated using the more detailed topographic information from the draft plan. The two internal drainage areas have different outlets. Catchment 104 discharges from Outlet B while Catchment 105 discharges from Outlet A.

The drainage divides for the external and internal drainage areas are identified in Figures 2 and 3 respectively. Each of the six catchments have distinct drainage features which will be discussed in the following sections.

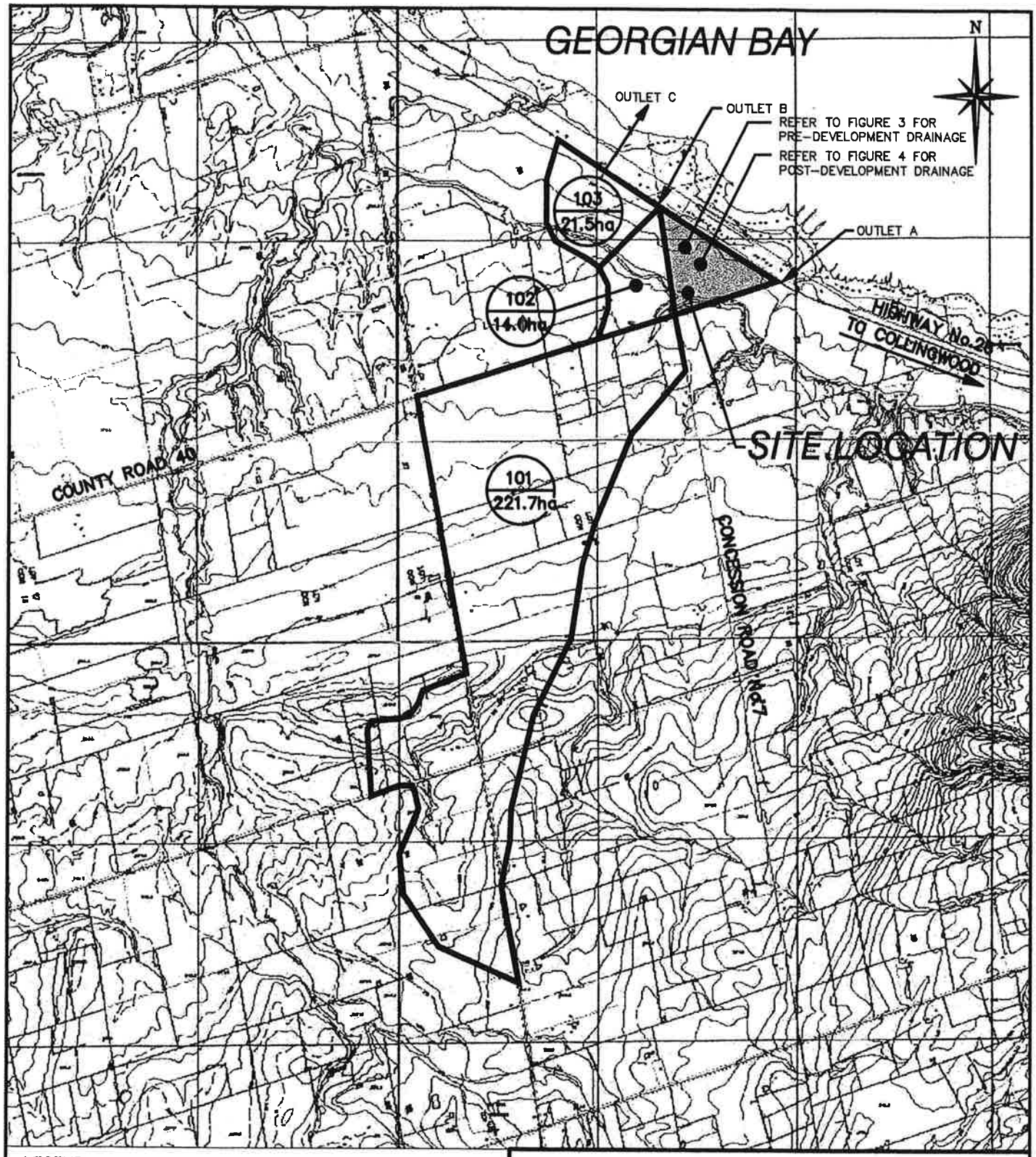
It should be noted that the total area of the internal drainage areas (i.e. 104 and 105) are greater than the area of the site. This is to account for drainage from County Road 40 and the Georgian Trail.

2.3.1 Catchment 101

Sheet flow from the southern portion of Catchment 101 drains into a stream which flows into a forest and dissipates. From this point, roughly half the length of the catchment in the northerly direction, sheet flow drains into the ditch along County Road 40. A cross culvert then conveys the flow under County Road 40 and into the well-defined channel at the south-west corner of Catchment 104. Flow is conveyed through the well-defined channel and is discharged from the north-west corner of Catchment 104 (hereinafter referred to as Outlet B) into the ditch along the south side of the Georgian Trail. It is discharged from the ditch, through a culvert under the Georgian Trail (hereinafter referred to as Outlet C) and then through another culvert under Highway 26 before reaching Georgian Bay.

2.3.2 Catchment 102

In Catchment 102, runoff drains as sheet flow in the northeasterly direction and into the ditch on the south side of the Georgian Trail. Flow is conveyed in the ditch to Outlet C eventually reaching Georgian Bay in a similar manner to that from Catchment 101.



LEGEND

101 / 221.7ha — IDENTIFICATION / AREA

PRE-DEVELOPMENT WATERSHEDS

SORICHETTI INC.

TOWN of the BLUE MOUNTAINS

R. J. Burnside & Associates Limited
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
GEORGIAN BAY OFFICE, 3 RONELL CRESCENT, COLLINGWOOD, ONTARIO L9Y 4J8
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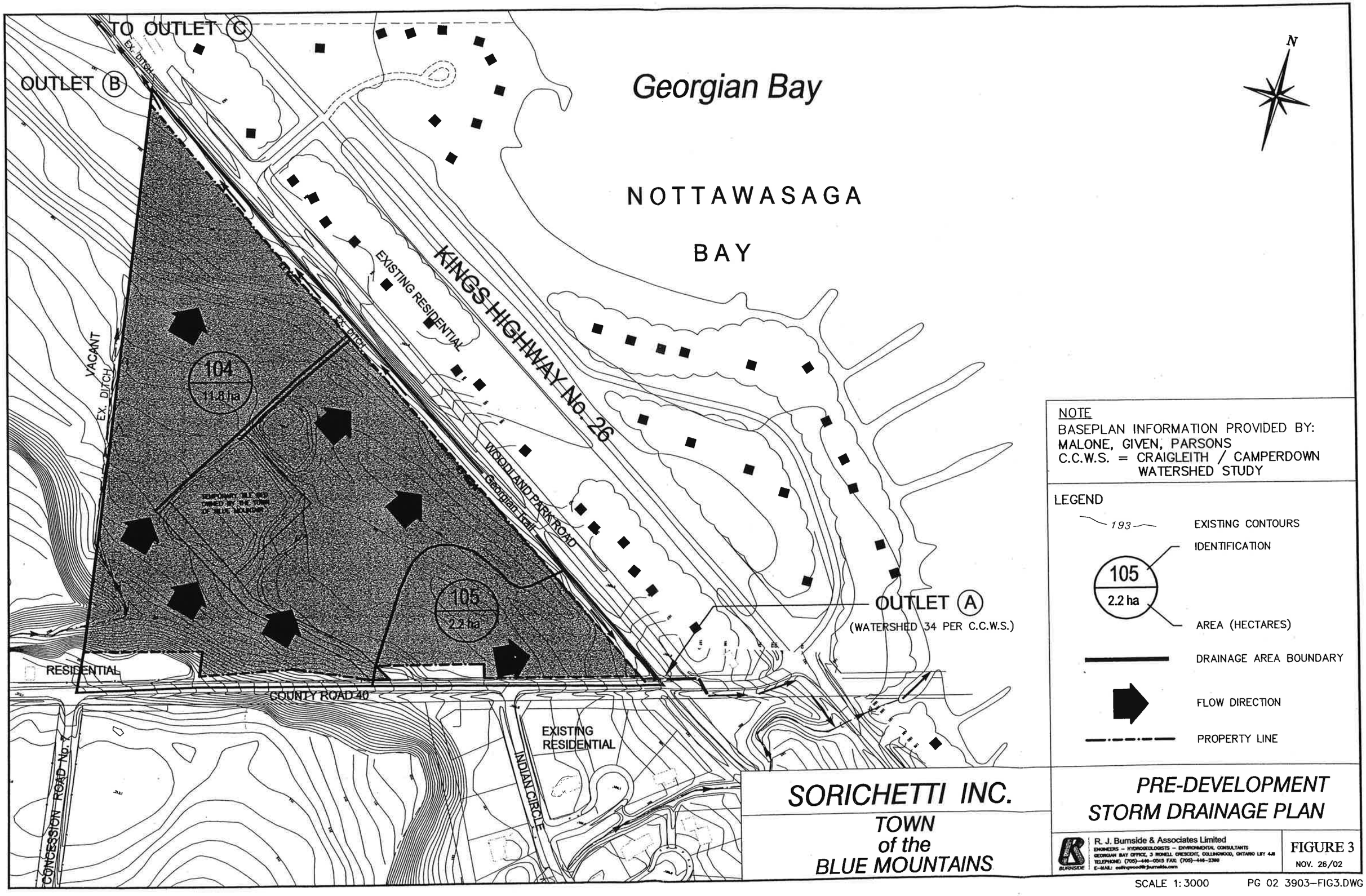
FIGURE 2
NOV. /02

N.T.S. PG 02 3903-FIG2.DWG



NOTE
BASEPLAN INFORMATION PROVIDED BY:
MALONE, GIVEN, PARSONS
C.C.W.S. = CRAIGLEITH / CAMPERDOWN WATERSHED STUDY

LEGEND

- 193 — EXISTING CONTOURS
- 105 / 2.2 ha — IDENTIFICATION / AREA (HECTARES)
- DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- PROPERTY LINE

SORICHETTI INC.

TOWN of the BLUE MOUNTAINS

PRE-DEVELOPMENT STORM DRAINAGE PLAN

R. J. Burnside & Associates Limited
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
GEORGIAN BAY OFFICE, 3 ROWELL CRESCENT, COLLINGWOOD, ONTARIO L9Y 4J8
TELEPHONE (705)-446-0515 FAX (705)-446-2380
E-MAIL: collingwood@rjburnside.com

FIGURE 3
NOV. 26/02

SCALE 1:3000

PG 02 3903-FIG3.DWG

2.3.3 Catchment 103

This drainage area also drains as sheet flow in the northeasterly direction into the ditch along the Georgian Trail to Outlet C, combining with the flow of Catchments 101 and 103.

2.3.4 Catchment 104

Catchment 104 drains in the north-westerly direction via sheet flow and is discharged from Outlet B. Flow is conveyed in the ditch, through Outlet C beneath Highway 26 before being discharged into Georgian Bay. A well-defined channel exists along the southwest property line of the Sorichetti site. It conveys external drainage from Catchment 101 along the property line before dissipating approximately 200 metres south of the Georgian Trail. This external flow (as noted in Section 2.3.1) continues to drain northward before reaching the Georgian Trail.

2.3.5 Catchment 105

Catchment 105 drains via sheet flow toward the northeast corner of the site. It is then discharged from Outlet A, through culverts under the Georgian Trail and County Road 40 before reaching the main watercourse within Watershed 34 (per Craigleith Camperdown Subwatershed Study, GSCA 1993) at Highway 26. From this point, drainage is conveyed beneath Highway 26 and into the Georgian Bay.

2.4 Culvert Capacities

Each of the catchments, as mentioned previously, drain under Highway 26 by means of a culvert. These culverts were surveyed to determine their existing flow capacity.

In accordance with MTO Directive B-100, development of the subject lands must not produce flows that exceed the capacity of the culverts under Highway 26. Culverts beneath Highway 26 are to have a minimum 25 year capacity per Directive B-100. Table 1 shows the capacities of the culverts under Highway 26 which convey the flow from the site's outlets:

Table 1: Highway 26 Culverts

Description	Outlet A	Outlet C
Type	Concrete Box	Concrete Box
Height (m)	2.2	2.4
Width (m)	3.65	4.30
Slope (m/m)	0.0318	0.006
Capacity (m^3/s)	2.71	3.44
Equivalent Return Period (Yr.)	100	100

3.0 DESIGN CRITERIA

The stormwater management design of the proposed development will incorporate the policies and criteria of a number of agencies including Ministry of Environment, Town of the Blue Mountains, Grey Sauble Conservation Authority and Ministry of Transportation.

The Sorichetti site is adjacent to lands studied in the Craigleith Camperdown Subwatershed Study (Gore and Storrie, 1993). In fact, a small portion of the subject lands (Catchment 105) is tributary to Watershed 34 as per the Subwatershed Study. As a result, this study was referenced with respect to stormwater objectives and criteria. The stormwater management design criteria for the development are summarized below:

1. Development Standards (Town of Blue Mountains)
   - urban cross section
   - 5 year storm sewer
   - lot grading at 2% optimum

2. Peak Flow (MTO, GSCA)
   - "post to pre" control for 100 year event

3. Water Quality (GSCA, MOE)
   - Level 1 Control

4. Erosion (GSCA)
   - setback from top of bank
   - 24 hour extended detention for 25 mm event

4.0 POST-DEVELOPMENT CONDITIONS

4.1 General

Post-development drainage patterns on the site will be generally consistent with that of existing conditions. Pre-development catchments 101, 102 and 103 are unchanged by development. The internal drainage area was broken up into four smaller areas: Catchments 2104, 2105, 2106 and 2107 (See Figure 4). Catchments 2104, 2106 and 2107 drain to Outlet B from where they are conveyed to Outlet C. Catchment 2105 drains to Outlet A. Drainage from Catchment 2104 is treated in a stormwater management facility.

The development will consist of 55 detached single-family dwellings. The residential lots will vary between 0.07 to 0.2 hectares and will have a minimum frontage of 18.0 metres. The lots will be fully serviced by municipal water and sanitary sewerage. The internal streets will be constructed as an urban cross section contained within a 20 metre minimum municipal road allowance.

The development will utilize the dual drainage concept of both minor and major flow systems. The storm sewer (minor system) within the development will be designed to convey the 5 year event. Overland flow (major system) in excess of the 5 year event will be contained within the road allowance or within designated drainage easements. The backyards of lots will drain into grassed swales.

The methodology for labeling the post-development watersheds consists of the addition of "2" as a prefix to the pre-development watershed number (eg. pre-development watershed 104 becomes post-development watershed 2104).

4.2 Post-Development Drainage

4.2.1 Catchment 2104

Catchment 2104 is approximately 9.9 ha and consists of Streets A, B and C, Lots 2 to 55, Blocks 56, 57 and 58 (park), the stormwater management pond and a portion of Block 60 (open space). Lots 2 through 17 and Lot 20 will incorporate split drainage, while all other lots are intended to be graded as "back to front" drainage. Post-development drainage generally follows the south-to-north pattern of pre-development. Flow from the lots and roads is conveyed by the major and/or minor system to the stormwater management facility. After being treated in the stormwater management facility, flow is discharged from Outlet B. Preliminary grading and drainage design of the Sorichetti subdivision, which reflects the limits of Catchments 2104, is shown in Figure 4.

4.2.2 Catchment 2105

Catchment 2105 is smaller than the pre-development Catchment 105 due to the fact that Street A intercepts drainage that in pre-development conditions would have been discharged from Outlet A. Catchment 2105 will consist of Lot 1, a portion of Lot 2 and Block 59 (Open Space). Runoff drains as sheet flow to the northeast corner of the catchment. It is discharged from Outlet A, through a culvert under the Georgian Trail, through a culvert under County Road 40 and into the ditch along Highway 26, before crossing Highway 26 and into the Georgian Bay (See Figure 4).

4.2.3 Catchment 2106

Catchment 2106 is composed of open space (Block 60). The area drains via sheet flow into the well-defined channel along the southwest property line. (see Section 2.3.4)

4.2.4 Catchment 2107

Catchment 2107 is composed of rear yards (Lots 3 to 17 and Lot 20) and the south half of the Georgian Trail right of way. The rear lot area drains into the existing ditch along the Georgian Trail, through a proposed cross culvert under Street C, before being discharged from Outlet B (See Figure 4). It should be noted that the culvert under Street C will be sized in the detailed design stage.

Georgian Bay

NOTTAWASAGA BAY

KINGS HIGHWAY No. 26

EXISTING RESIDENTIAL

Existing Pumping Station (approximate location)

Registered Plan 925

WOODLAND PARK ROAD

Georgian Trail

TO OUTLET C

Ex. DITCH

OUTLET B

SWM FACILITY (REFER TO FIGURE 8)

Ex. 183.5

186.0

185.1

187.1

Potential Area for Road Reserve

Lot 28, Con. 8 VACANT

Ex. DITCH

2107 1.4 ha

BLOCK 57 PARK 0.389 ha

182.0

2104 9.9 ha

190.6

190.8

190.0

BLOCK 56 PARK 0.368 ha

BLOCK 60 OPEN SPACE 2.218 ha

193.0

2106 1.8 ha

194.0

150m SWALE @ 1%

240m SWALE @ 1.4%

2105 0.9 ha

BLOCK 59 OPEN SPACE 0.372 ha

DITCH INLET

RESIDENTIAL

(Original Road Allowance Between Lots 27 & 28)

COUNTY ROAD 40

197.2

OUTLET A

EXISTING RESIDENTIAL

Registered Plan 1079

INDIAN CIRCLE

CONCESSION ROAD No. X

STREET 'A'

PROPOSED RESIDENTIAL

GOLF COURSE

N

NOTE
BASEPLAN INFORMATION PROVIDED BY:
MALONE, GIVEN, PARSONS

LEGEND

- 193 — EXISTING CONTOURS
- x 193.0 — PROPOSED GRADE
- 2105 / 0.9 ha — IDENTIFICATION / AREA (HECTARES)
- AREA BOUNDARY
- STORM SEWER
- FLOW DIRECTION
- OVERLAND FLOW ROUTE

SORICHETTI INC.

TOWN of the BLUE MOUNTAINS

POST-DEVELOPMENT STORM DRAINAGE PLAN

R. J. Burnside & Associates Limited
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
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FIGURE 4
NOV. 26/02

SCALE 1:3000 PG 02 3903–FIG4.DWG

N.W.L.	183.5m
H.W.L.	184.8m
E.D.W.L.	184.3m
T/B (min.)	185.3m
PERMANENT POOL	1000m³
ACTIVE STORAGE	2000m³

TO OUTLET C

EX. DITCH

EMERGENCY SPILLWAY

GEORGIAN TRAIL

WOODLAND PARK ROAD

STREET "C"

PROPOSED CULVERT

EX. DITCH

CONTROL STRUCTURE

T/B 185.3

4:1

5:1

HWL 183.5

182.0

181.5

FOREBAY SEDIMENT

H.W. INV. 183.6

185.7

MAINTENANCE ACCESS

186.0

185.7

186.0

186.3

184

185

20

21

SORICHETTI INC.

TOWN of the BLUE MOUNTAINS

STORMWATER MANAGEMENT POND

R. J. Burnside & Associates Limited
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FIGURE 8
NOV. 26/02

SCALE 1:500

PG 02 3903-FIG8.DWG

5.0 HYDROLOGIC ANALYSIS

5.1 Stormwater Modelling

Hydrologic modelling to determine pre-development and post-development flows was performed using the SWMHYMO software package. SWMHYMO is a successor of the original HYMO program and is similar to OTTHYMO89. The model uses rainfall events to simulate the transformation of rainfall into surface runoff based on topography, soil types and land use.

Catchment 2104 was modelled using the DESIGN STANDHYD command in SWMHYMO in order to account for impervious area. All the other catchments were modelled using the CALIB NASHYD command. The ROUTE RESERVOIR command was used to model the effects of a stormwater management facility. The ROUTE CHANNEL command was used to model the channels that convey the flow.

The SCS curve numbers for the internal and external drainage areas were determined using weighted averages based on soil type and land use. The time to peak was calculated using the Uplands method. See Appendix A for calculations.

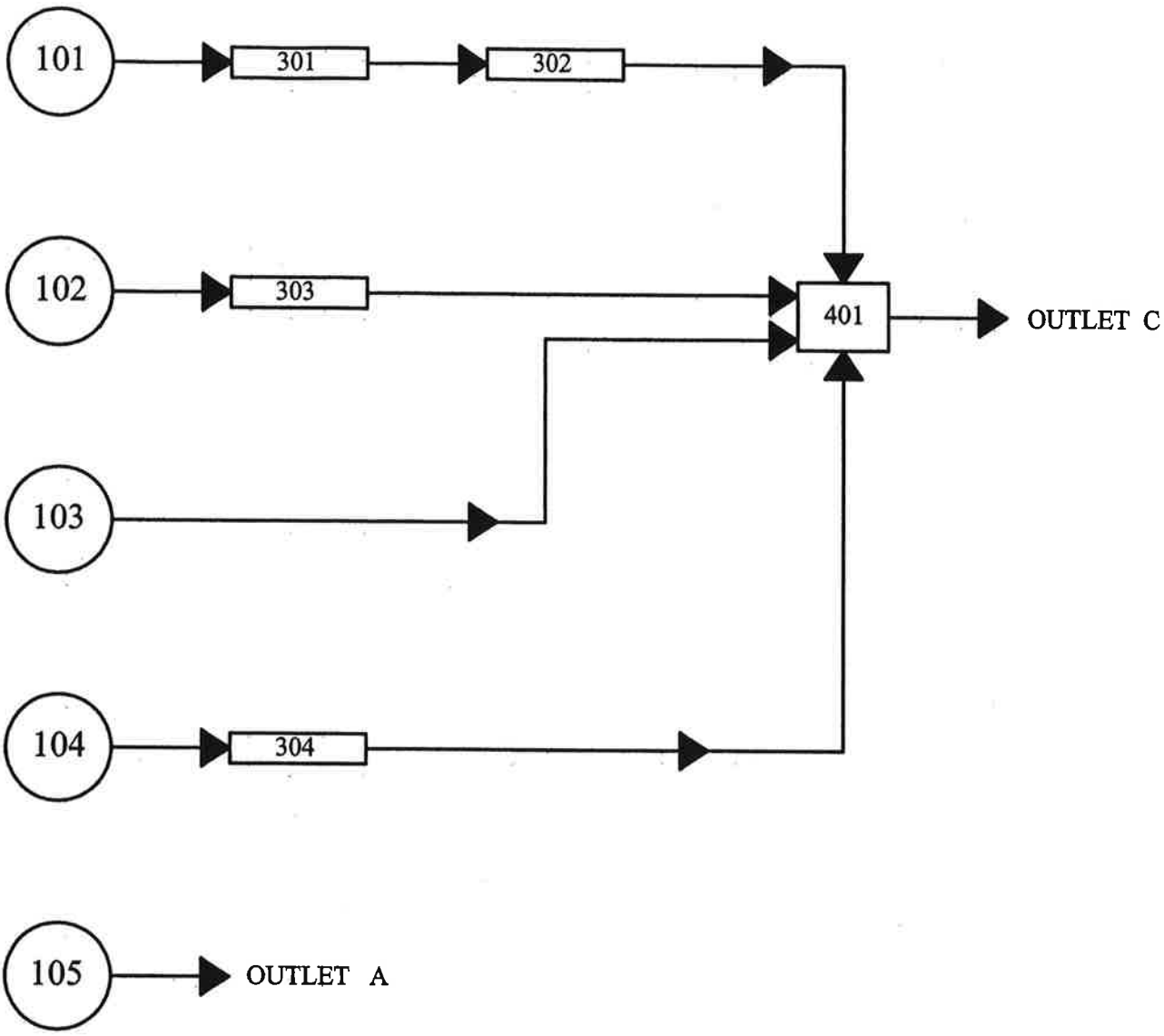
The 24 Hour Chicago storm distribution was used as per requirements of the Ministry of Transportation (MTO, 1997) for land development proposals which contribute drainage to provincial highway systems (ie. the existing culvert beneath Highway 26). Intensity Duration Frequency Curves from the Owen Sound climate station were used for the 2, 5, 10, 25 and 100 events.

5.2 Pre-Development Results

The parameters used in the modelling, as well as pre-development SWMHYMO files, can be found in Appendix A and B respectively. See Figure 5 for the SWMHYMO modelling schematic. Table 2 provides a summary of the pre-development peak flow rates occurring at Outlets A and C.

Table 2: Pre-Development Peak Flows

Pre-Development Peak Flow (m^3/s)		
Storm Event (Yr.)	Outlet A (2.2 ha)	Outlet C (269.1 ha)
2	0.02	0.74
5	0.04	1.31
10	0.05	1.74
25	0.07	2.34
100	0.10	3.30



LEGEND

101 CATCHMENT

401 ADDITION

301 CHANNEL

SORICHETTI INC.

TOWN of the BLUE MOUNTAINS

PRE-DEVELOPMENT MODELLING SCHEMATIC

R. J. Burnside & Associates Limited
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FIGURE 5
NOV. 26/02

PG 02 3903–FIG5.DWG

5.3 Post-Development Results

The parameters used in the post-development modelling as well as the post-development SWMHYMO files are also found in Appendix A and B respectively. Refer to Figure 6 for the SWMHYMO post-development modelling schematic. The post-development peak flow rates occurring at Outlets A and C are summarized in Table 3. For comparison purposes, the pre-development flow rates are also included on the table.

Table 3: Pre-Development and Post-Development Peak Flow Summary

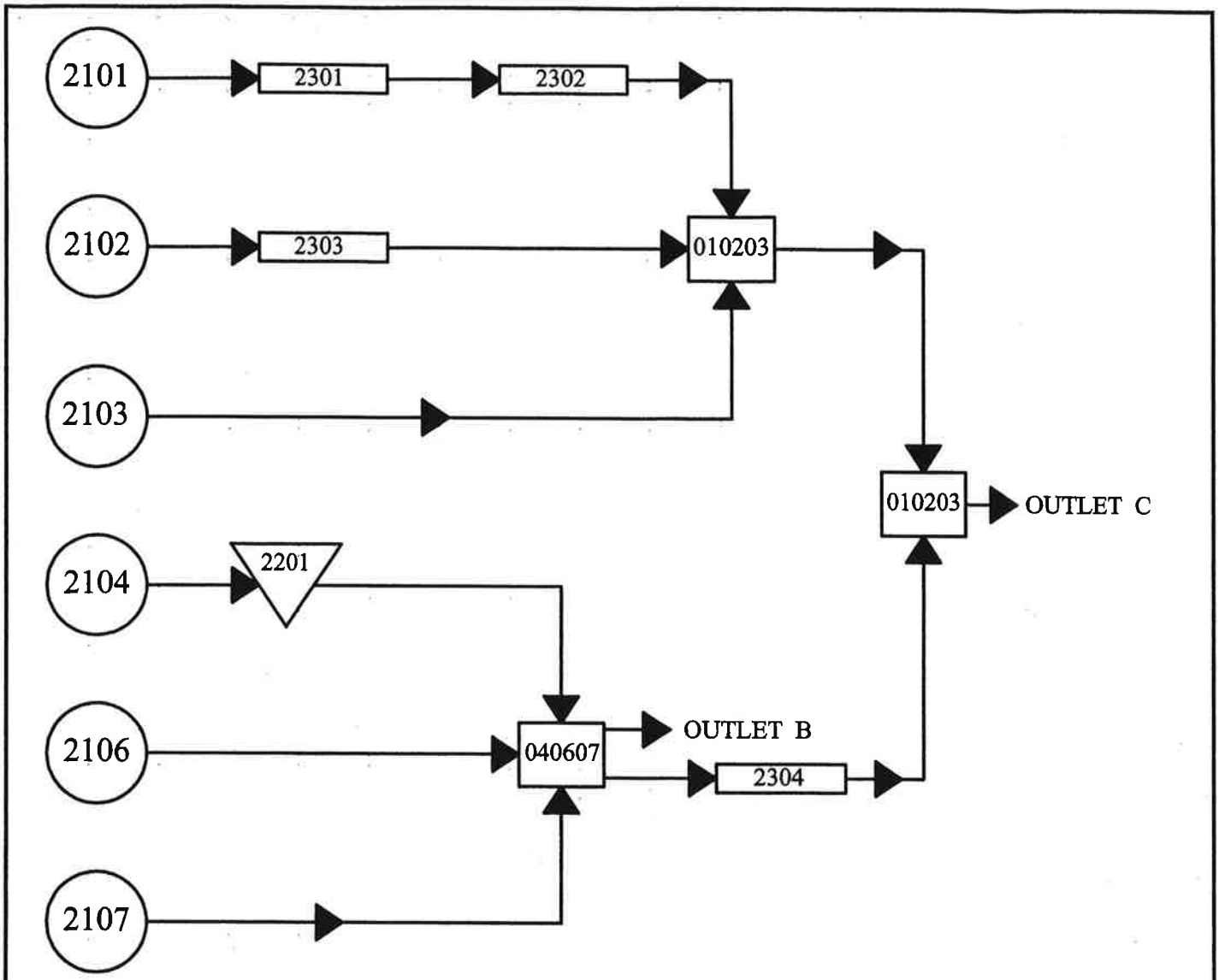
Storm Event (Yr.)	Pre-Development Peak Flow (m^3/s)		Uncontrolled Post-Development Peak Flow (m^3/s)		% Change	
	Outlet A (2.2 ha)	Outlet C (269.1 ha)	Outlet A (0.9 ha)	Outlet C (270.4 ha)	Outlet A	Outlet C
2	0.02	0.74	0.01	0.74	-50	0
5	0.04	1.31	0.01	1.32	-75	+0.8
10	0.05	1.74	0.02	1.74	-60	0
25	0.07	2.34	0.03	2.35	-60	+0.4
100	0.10	3.30	0.04	3.31	-60	+0.3

Table 3 reflects the percentage change in peak flow occurring at Outlets A and C. The peak flow rates at Outlet A are expected to decrease by between 50 – 75%, principally due to the reduced post-development drainage area.

The peak flow rates occurring at Outlet C are relatively unchanged with the development of the Sorichetti site. This is due to the timing of the peaks of the hydrographs which contribute flow to Outlet C. The peak flow rates experienced at Outlet C are dominated by the large external drainage area, Catchment 2101, which is less hydrologically responsive than the Sorichetti site and the downstream external areas (Catchments 2102 and 2103). The peak flow from the Sorichetti site will occur before the peak flow from the much larger Catchment 2101 occurs. As a result, the peak flow of the total hydrograph at Outlet C for Catchments 2101, 2102, 2103 and 2104 combined is only 0.3% higher from pre to post-development (See Table 3). This timing of hydrograph phenomena is graphically illustrated in Figure 7.

One can therefore conclude that attenuation for the purposes of controlling post-development peak flows to pre-development rates is not warranted for the Sorichetti site. Notwithstanding the fact that "post-to-pre" control is not required, a stormwater management facility has been proposed which will provide water quality and erosion control to the subject development.

Burnside also reviewed the capacity of the culverts beneath Highway 26 in the post development modelling exercise. With respect to the Watershed 34 culvert at Highway



LEGEND

2101 CATCHMENT

2201 RESERVOIR

2401 ADDITION

2301 CHANNEL

SORICHETTI INC.

TOWN of the BLUE MOUNTAINS

POST-DEVELOPMENT MODELLING SCHEMATIC

R. J. Burnside & Associates Limited
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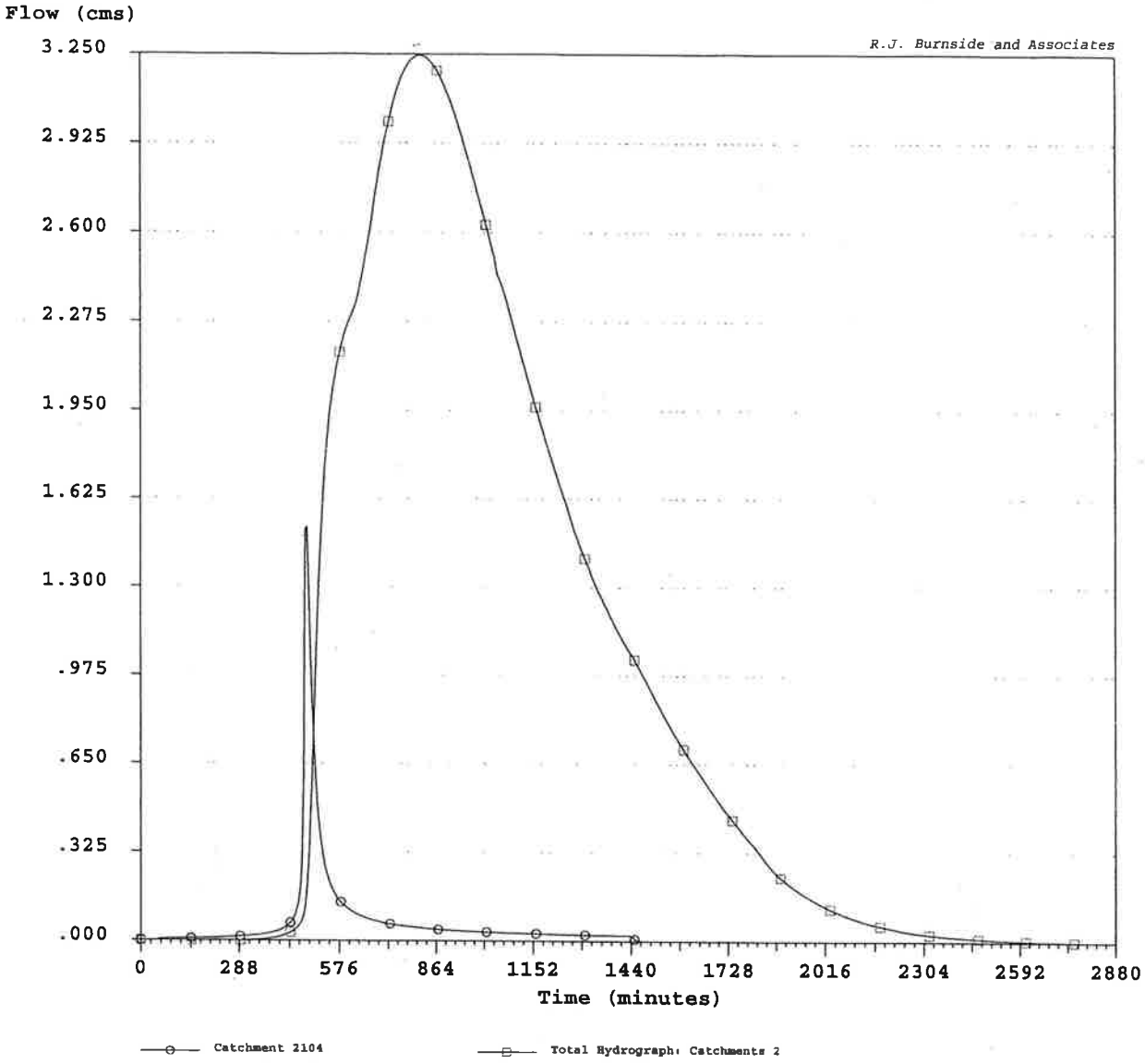
FIGURE 6
NOV. 26/02

PG 02 3903-FIG6.DWG

Figure 7: Timing of Peaks for Catchment 2104 and Catchments 2101, 2102 and 2103



Hydrograph Statistics:

Legend	Filename & Comment	Time Step (min)	Drainage Area (ha)	Peak Flow (cms)	Time to Peak (hrs)	Runoff Volume (mm)	Runoff Volume (cu.m)	Duration of flow (hrs)	Average flow (cms)
—○—	H-2104.001 : Catchment 2104	5.00	9.90	1.522	8.083	63.99	6.335E+03	24.917	0.071
—□—	H-010203.001: Total Hydrograph: Catchments 2101,2102,2103	5.00	257.30	3.245	13.667	51.13	1.316E+05	48.000	0.761

26, its capacity exceeds the anticipated 100 year post-development flow of 2.7 m^3/s which was previously established by Burnside (see Stormwater Management and Water Budget Report for Georgian Bay Club, April 2002). With respect to Outlet C, the existing Highway 26 culvert has a capacity of 3.44 m^3/s (per Table 1), which is in excess of the 100 year peak flow of 3.3 m^3/s. This far exceeds the minimum required 25 year capacity per MTO Directive B-100.

6.0 STORMWATER MANAGEMENT PLAN

The stormwater management plan for the Sorichetti site has been developed to address the three principle design criteria, namely peak flow control, water quality control and erosion control.

6.1 Peak Flow Control

It has been determined that it will not be necessary to provide peak flow control for this site. Flows discharged throughout Outlet A will be reduced by 50 – 75% from the pre-development rates. Due to the timing of peaks, peak flows will remain relatively unchanged at Outlet C. Therefore, flood storage for the purposes of peak flow control is unwarranted for the subject development.

6.2 Water Quality Control

Burnside undertook a preliminary screening of stormwater management practices suitable for the Sorichetti site to achieve Level 1 quality control. The treatment train for water quality will consist of lot level, conveyance and end-of-pipe control.

Lot Level Control

Roof leaders will be disconnected from the storm sewer system and permitted to discharge across pervious surfaces on the residential lot. This will encourage infiltration at source on the site.

Conveyance Control

The Town of Blue Mountains development standards for residential subdivisions of this nature require use of an urban cross section. However, the preliminary grading of the Sorichetti site has been developed to accentuate the use of grass swales along the lot lines with back to front drainage. Furthermore, from its discharge point at Outlet B to Outlet C, runoff from the Sorichetti property will be conveyed within an existing grassed ditch over 500 m long.

End of Pipe Control

The final element to the treatment train approach to stormwater quality control is the use of a wet pond with extended detention. Based on accepted design guidelines (MOE 1994) the pond will have a permanent pool volume of 1000 m^3 and extended detention of approximately 700 m^3. It should be noted that the requirement for extended detention is governed by the erosion control criteria (see Section 6.3). The supporting calculations for the preliminary sizing of the stormwater management facility are found in Appendix A. This includes the preliminary stage/storage relationship.

A preliminary grading plan has been prepared for the stormwater management facility (See Figure 8). Based on the preliminary design, the permanent pool elevation has been established at 183.5 m. A 100 mm diameter orifice will control the discharge from the SWM facility to provide the necessary extended detention. At elevation 184.3 m, flow is discharged from the facility via an overflow control weir. The SWM pond configuration will be finalized in the detailed design.

6.3 Erosion Control

As per the requirements of the GSCA, erosion control must also be provided for a runoff discharge from the subject lands. Based on runoff generated by a 25 mm four hour Chicago storm, approximately 770 m^3 of extended detention is necessary. This runoff is to be detained from between 24 to 48 hours. Supporting calculations are found in Appendix A.

7.0 EROSION SEDIMENT CONTROL DURING CONSTRUCTION

Slopes within the subject lands vary from relatively flat areas in the order of 3% to much steeper slopes along the open space areas. The areas containing the steep slopes will not be developed. In order to mitigate the effects of topsoil stripping and construction over the proposed development area of the site, the following practices are recommended during construction:

- Topsoil stripping should be carefully controlled with stockpiles established well away from the westerly drainage ditch and Georgian Trail ditch.
- Silt fence should be installed around the down gradient edges of the property to collect and treat sheet flow.
- Rock check dams should be installed at intervals along the ditches.
- The stormwater management facility should be utilized as a temporary sediment basin during construction.

By implementing these measures and other good housekeeping approaches during construction, the release of unwanted sediment during construction will be avoided.

8.0 RECOMMENDATIONS AND CONCLUSIONS

Based on the preliminary stormwater management analysis undertaken by Burnside for the subject development, we conclude the following:

- The subject lands drain to two separate outlets (Outlet A and Outlet C).
- With the development of the site, peak flows occurring at Outlets A and C will be at or below the pre-development levels.
- Due to the proximity of the Sorichetti site in relation to the external drainage areas, peak flow control is not warranted for the property.
- Water quality control will be achieved by treatment train approach consisting of lot level, conveyance and end of pipe facility. The end of pipe facility will consist of a wet pond operating with extended detention.
- Construction effects can be mitigated with appropriate erosion sediment control measures installed during the construction phases.

Based on the conclusions noted above, Burnside recommends that Conditions of Draft Approval associated with stormwater management be issued by the respective agencies for the Sorichetti subdivision.

Respectively prepared by:

R.J. BURNSIDE & ASSOCIATES LIMITED

Thomas Dole, B.Sc.Eng.

Christopher Crozier, P.Eng.
Senior Water Resource Engineer

CFC/td
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APPENDIX D

Geotechnical Investigation

(Peto MacCallum Ltd., March 2007)

Peto MacCallum Ltd.
CONSULTING ENGINEERS

June 15, 2007

PML Ref.: 04BF001
Report: 4

Mr. Russell Sorichetti
Sorichetti Development Group Inc.
1280 Terwillegar Avenue
Suite 4
Oshawa, Ontario
L1J 7A5

Dear Mr. Sorichetti

Geotechnical Consultations
Georgian Glen Subdivision
County Road 40 and Woodland Park Road
Town of the Blue Mountains, Ontario

Further to the request from Mr. Ian McCutcheon of C.F. Crozier & Associates Inc., we herein provide comments on drawings provided for the above noted project.

For the above noted project, under C.F. Crozier & Associates Inc. Project Number 101-250, the following drawings, dated May 14, 2004, were provided for our review: PP1, PP2, PP3, GEN1, LG1, LG2, SWM1, DT1 and DT2. A review of these drawings in conjunction with our previous reports for this project, PML Ref.: 04BF001, Report 1, dated March 30, 2004, PML Ref.: 04BF001, Report 2, dated July 30, 2004 and PML Ref.: 04BF001, Report 3, dated July 15, 2005, was conducted. The following comments are provided.

1. Drawing SWM 1 – Detail 'D' makes reference to Granular C Backfill. The backfill should be OPSS Granular B. Also within this detail, Filter Cloth 270R should also be placed between the granular backfill and the armour stone.

2. Drawing SWM1 – A note in the bottom right corner indicates that a clay liner may be required in the pond depending on existing site conditions. It is recommended that test pits be utilized to determine site soil and groundwater conditions at the pond location in order to clarify design requirements prior to construction.

3. Drawing LG1 and LG2 – Each lot has a proposed underside of footing noted. Based on the boreholes the proposed founding elevations appear satisfactory.

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BARRIE, BRAMPTON, HAMILTON, KITCHENER, TORONTO

4. Drawing LG1 and LG2 – Accurate survey control and as built drawings are recommended for areas of engineered fill. As built drawings may help mitigate some of the grading issues encountered with regards to engineered fill limits if there is a long period of time between grading and house construction. It is also noted that if there is a long period of time between the grading and house construction, the upper portion of the engineered fill may become weathered, essentially unsuitable for support of house foundations and thus may require remedial work.

5. Drawing DT1 – Note 12 indicates asphalt is to be compacted to 97% Marshall Density. This note should indicate that asphalt should be compacted to 92 to 96.5% of Maximum Relative Density, in accordance with OPSS 310.

6. In our Report 1, dated March 30, 2004, underfloor drains were recommended. No mention of underfloor drains was observed on the drawings provided.

We trust this report is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

Geofftrey R. White, P.Eng.
Manager Geotechnical and Geoenvironmental Services

GRW:jlb

1 cc: Client (+email)
1 cc: C.F. Crozier & Associates Inc. (+email)
1 cc: PML Barrie
1 cc: PML Toronto

Peto MacCallum Ltd.
CONSULTING ENGINEERS

July 14, 2005

PML Ref.: 04BF001
Report: 3

Mr. Russell Sorichetti
Sorichetti Development Group Inc.
1280 Terwillegar Avenue
Suite 4
Oshawa, Ontario
L1J 7A5

Dear Mr. Sorichetti

Geotechnical Consultations
Georgian Glen Subdivision
County Road 40 and Woodland Park Road
Town of the Blue Mountains, Ontario

Further to the facsimile transmission of July 7, 2005, from Mr. Greg Wild of CF Crozier & Associates Inc., and subsequent telephone conversations with Mr Wild, we present herein the following comments/recommendations regarding assessment/use of on-site material as clay liner material for the wet pool area of the stormwater management pond and as engineered fill to support buildings.

Details of the geotechnical investigation for the project were presented in PML Ref.: 04BF001, Report 1, dated March 30, 2004. A supplementary report was issued July 30, 2004.

Pond Liner

At the time of this report, it is understood the site of the proposed pond is still not accessible to drilling equipment due to heavy vegetation cover/topography. As mentioned in previous correspondence, and as discussed with Mr. Wild, it will be necessary to obtain soil samples from the actual pond area in order to carry out a detailed assessment of requirements.

It is understood construction is scheduled to begin this summer and it is recommended provisions be made to carry out test pits at the pond as soon as possible following grubbing.

In the mean time, the following material and construction specifications for pond liner material are presented for your consideration.

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E-mail: barrie@petomaccallum.com
BARRIE, BRAMPTON, HAMILTON, KITCHENER, TORONTO

1. The material should comprise silty clay having a hydraulic conductivity of less than 1 x 10^{-6} cm/sec.

2. The material should be free of topsoil, organics, roots, frozen or otherwise deleterious material. Any cobbles/boulders (longer than 75 mm) should be removed.

3. The liquid limit of the material should be between about 25 and 45 with a plasticity index of not less than 10 (ideally between 12 and 18).

4. The moisture content of the material at the time of placement should be at or slightly wetter than optimum.

5. The material should be placed in maximum 150 mm thick lifts compacted to a minimum 95% Standard Proctor maximum dry density.

6. The subgrade should be examined by geotechnical personnel from Peto MacCallum Ltd. prior to placing the liner.

7. Earthworks operations should be inspected on a full time basis by Peto MacCallum Ltd. to approve subgrade preparation, ensure satisfactory placement, and compaction techniques and verify the specified degree of compaction is achieved uniformly throughout, as well as to ensure consistency/suitability of the liner material.

Engineered Fill

It is understood some areas will be filled. Fill areas that will support settlement sensitive facilities (utilities, pavement, houses) must be constructed as engineered fill. General guidelines for construction of engineered fill are appended, which should be read in conjunction with the following:

1. Surficial topsoil should be stripped and stockpiled for future landscaping. The topsoil at the borehole locations ranged between 80 and 200 mm. Allowances should be made to account for variations between boreholes and inevitable stripping of some of the underlying mineral soil. Quantities could increase substantially depending on stripping procedures and weather conditions.

2. Ideally, the exposed subgrade should be proofrolled subject to inspection by geotechnical personnel from Peto MacCallum Ltd. Any very loose or deleterious materials encountered during the process should be sub-excavated.

3. Following approval of the exposed subgrade, the area can be brought up to the final design level with approved soil, placed in maximum 200 mm thick loose lifts and compacted to minimum 95% Standard Proctor maximum dry density for roadways, and 98% Standard Proctor maximum dry density within building areas. The compacted fill zone should extend at least 3 m beyond the facilities to be supported, then outwards and downwards at no steeper than 1 horizontal to 1 vertical, to intercept the approved subgrade. In general, drier portions of the native sand and silt till materials should be suitable for reuse. Wet sand materials will need some drying. Excessively wet silt or silt till may be too wet to achieve satisfactory compaction.

4. In general, permanent cut and/or fill slopes should not be steeper than 3 horizontal to 1 vertical and should be protected from surface erosion with sodding or by promoting suitable vegetation cover.

5. Earthworks operations should be inspected on a full time basis by Peto MacCallum Ltd. to approve subgrade preparation, ensure satisfactory placement and compaction techniques and verify the specified degree of compaction is achieved uniformly throughout.

We trust this report is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

John F. Wright, BSc.
Senior Project Supervisor

Turney Lee-Bun, P.Eng.
Branch Manager and Manager
Geotechnical and Geoenvironmental Services

JFW/TLB:jlb

1 cc: Client (+fax)
1 cc: CF Crozier & Associates Inc. (+fax)
1 cc: PML Barrie
1 cc: PML Toronto

Peto MacCallum Ltd.
CONSULTING ENGINEERS

November 8, 2004

PML Ref.: 04BF001

Mr. Kevin Morris, P.Eng.
C.F. Crozier & Associates Inc.
110 Pine Street
Collingwood, Ontario
L9Y 2N9

Dear Mr. Morris

Pavement Design
Georgian Glen Subdivision
County Road 40 and Woodland Park Road
Town of The Blue Mountains, Ontario

Thank you for bringing the current Municipal Pavement Standards to our attention.

In this regard, the following would be acceptable:

40 mm HL 3	Asphalt Surface Course
40 mm HL 4	Asphalt Base Course
150 mm	Granular A Base
450 mm	Granular B Subbase

Please do not hesitate to call if you have any questions.

Sincerely

Peto MacCallum Ltd.

Turney Lee-Bun, P.Eng.
Branch Manager

TLB:jlb

1 cc: Addressee (+email)
1 cc: PML Barrie

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Tel: (705) 734-3900 Fax: (705) 734-9911
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BARRIE, BRAMPTON, HAMILTON, KITCHENER, TORONTO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

July 30, 2004

PML Ref.: 04BF001
Report: 2

Mr. Russell Sorichetti
Sorichetti Development Group Inc.
1280 Terwillegar Avenue
Suite 4
Oshawa, Ontario
L1J 7A5

Dear Mr. Sorichetti

Supplementary Geotechnical Report
Georgian Glen Subdivision
County Road 40 and Woodland Park Road
Town of the Blue Mountains, Ontario

Further to the geotechnical Report 1, dated March 30, 2004, an additional borehole (number 7) was completed on May 7, 2004, to provide subsurface information for the southwest portion of the site. The borehole location is shown on the enclosed Drawing, together with a detailed log of the findings.

The borehole has revealed upper topsoil and a thin silty clay layer to 0.6 m depth. Under this, there was a layer of peat, approximately 0.8 m thick. Beneath the peat, there was a saturated sand layer to 2.9 m depth followed by a very dense silt till deposit.

The underlying saturated sand layer and silt till deposit were also identified in the earlier boreholes, however, the peat layer represents an anomolous condition. The saturated sand layer with water level at 0.5 m depth, is consistent with the perched water condition which was encountered in the earlier boreholes.

The comments and recommendations in the earlier Report 1 are applicable to borehole 7, with particular attention given to the impact of the saturated sand layer on excavation and groundwater control requirements. In addition, the peat layer will require subexcavation and replacement with engineered fill depending on final grades, to provide support of road way, services and buildings. It is advisable to excavate a series of test pits to delineate the extent of the peat in relation to road and service corridors and future house locations.

It is understood that houses in this subdivision are likely to be constructed as slab on grade without basements. This concept would be favourable in view of the shallow perched groundwater that exists at the site.

For fill areas under houses, roadways and services, construction to engineered fill standards will be necessary, involving removal of organics and other deleterious materials down to competent native soil, followed by replacement with select soil placed in maximum 200 mm thick lifts compacted to minimum 95% Standard Proctor maximum dry density (98 % under buildings).

19 Churchill Drive, Barrie, Ontario L4N 8Z5
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BARRIE, BRAMPTON, HAMILTON, KITCHENER, TORONTO

Cut areas may encounter shallow perched water, which will necessitate a drainage system under floor slabs and pavements. Such requirements are considered best evaluated following review of actual conditions exposed during construction.

A design bearing capacity of 150 kPa is recommended for foundation design on engineered fill or native inorganic soil, subject to field review.

It is noted that a borehole was originally planned in the proposed SWM pond in the north part of the site, however was not completed as the site was not accessible. This borehole when complete will be presented under separate cover.

We trust this supplementary report is satisfactory. Please do not hesitate to call if you have any questions.

Sincerely

Peto MacCallum Ltd.

Turney Lee-Bun, P.Eng.
Branch Manager

TLB:tc

Enclosures:
Log of Borehole No. 7
Drawing No. 1 -- Borehole Location Plan

Distribution:
1 cc: Sorichetti Development Group Inc. (+fax)
1 cc: C.F. Crozier & Associates Inc. (+fax)
1 cc: PML Barrie
1 cc: PML Toronto

Petro MacCallum Ltd
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 7

PROJECT Residential Subdivision
LOCATION County Rd 40 & Woodland Park Rd, Town of the Blue Mountains **BORING DATE** May 27, 2004
BORING METHOD Continuous Flight Solid Stem Augers

OUR PROJECT NO. 04BF001
ENGINEER TLB
TECHNICIAN RM

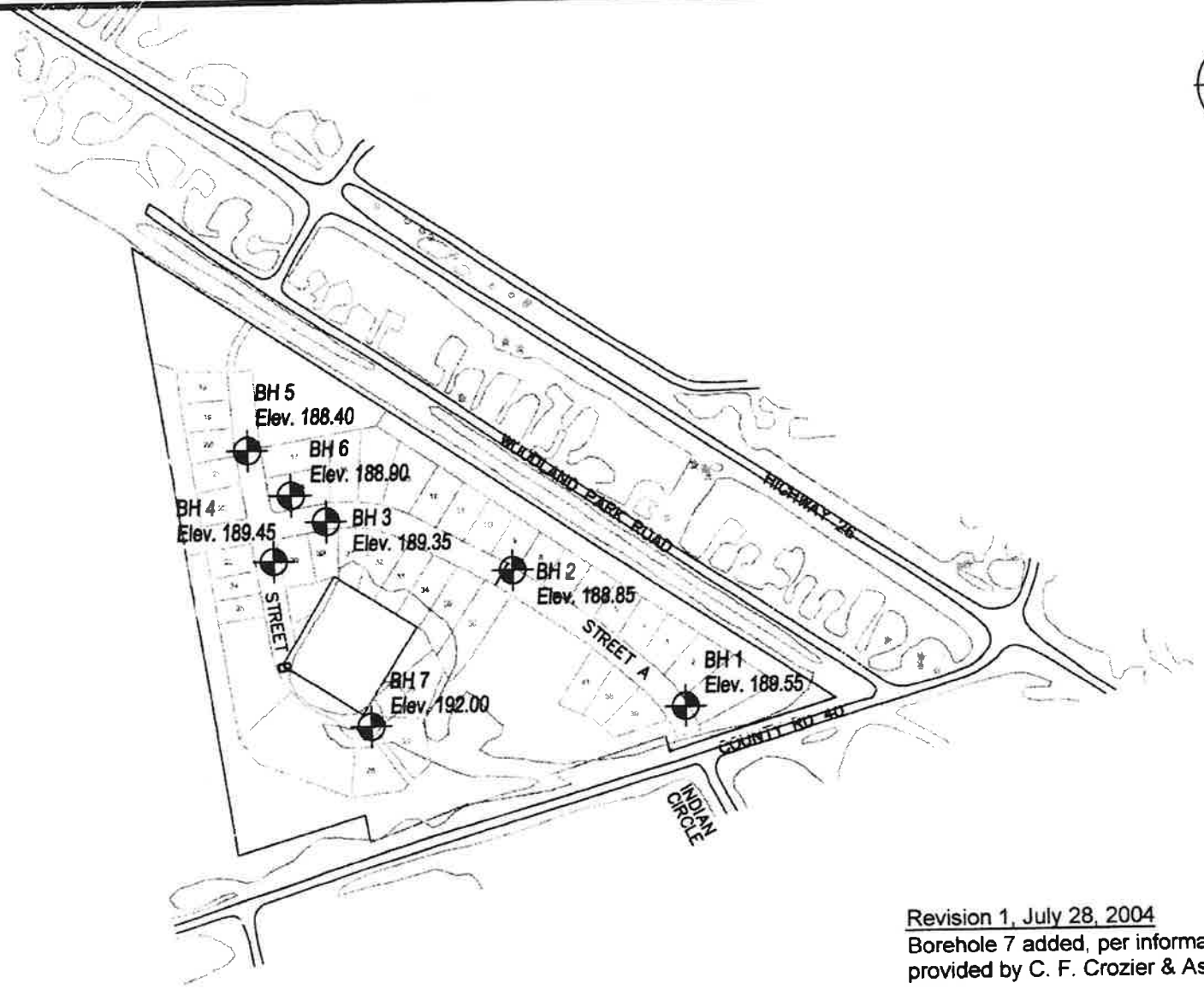
DEPTH in METRES	DESCRIPTION	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GROUND WATER OBSERVATIONS AND REMARKS
	GROUND ELEVATION 192.00					
0.15	TOPSOIL: Black, silty clay					
0.60	CLAY: Brown, silty clay					
	PEAT: Black, with sand inclusions, wet	191	1	SS	3	Free water at 0.6 m after augering to 0.8 m depth
1.40						
1.50	SAND: Compact, grey, fine sand, trace silt, saturated	190	2	SS	22	
			3	SS	40	
2.90		189				
3.00	SILT TILL: Very dense, grey, silt, some sand, trace gravel and clay, damp		4	SS	77	
		188				
4.50						
5.00		187	5	SS	54	
	BOREHOLE TERMINATED AT 5.00 m					Upon completion of augering Free water at 0.5 m Cave at 3.3 m

SHEAR STRENGTH C_u (kPa) ▲ — 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M — 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % — 10 20 30

NOTES

CHECKED BY



Revision 1, July 28, 2004
Borehole 7 added, per information provided by C. F. Crozier & Associates Inc.

LEGEND

BH 1
Elev. 189.55
Borehole 1
Ground Surface Elevation

BOREHOLE LOCATION PLAN

RESIDENTIAL SUBDIVISION
COUNTY ROAD 40 AND WOODLAND PARK ROAD
TOWN OF THE BLUE MOUNTAINS, ONTARIO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DATE	SCALE	JOB NO.	DRAWING NO.
MARCH 2004	1:500	04BF001	1

PetoMacCallum Ltd.
CONSULTING ENGINEERS

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL SUBDIVISION
COUNTY ROAD 40 AND WOODLAND PARK ROAD
TOWN OF THE BLUE MOUNTAINS, ONTARIO

for

SORICHETTI DEVELOPMENT GROUP INC.

PETO MacCALLUM LTD.
19 CHURCHILL DRIVE
BARRIE, ONTARIO
L4N 8Z5
PHONE: (705) 734-3900
FAX: (705) 734-9911
EMAIL: bar@petomac.on.ca

Distribution:
1 cc: Sorichettii Development Group Inc.
1 cc: C.F. Crozier & Associates Inc. (+ fax)
1 cc: PML Barrie
1 cc: PML Toronto

PML Ref.: 04BF001
Report: 1
March, 2004

Peto MacCallum Ltd.
CONSULTING ENGINEERS

March 30, 2004

PML Ref.: 04BF001
Report: 1

Mr. Russell Sorichetti
Sorichetti Development Group Inc.
1280 Terwillegar Avenue
Suite 4
Oshawa, Ontario
L1J 7A5

Dear Mr. Sorichetti

Geotechnical Investigation
Proposed Residential Subdivision
County Road 40 and Woodland Park Road
Town of the Blue Mountains, Ontario

We are pleased to present the results of the geotechnical investigation recently completed at the above noted site. The work was authorized by Mr. R. Sorichetti, in the signed Engineering Services Agreement, dated January 9, 2004.

The subject site is located at the southwest quadrant of County Road 40 and Woodland Park Road, in the Town of the Blue Mountains. The property is some 12 ha (30 acre) in size.

A residential subdivision is proposed comprising 42 single family lots, 2 townhouse blocks and a storm water management (SWM) pond. The site will be fully serviced, involving some 700 m of roadway, and sanitary sewers with inverts expected to be between 2.5 and 5.0 m below existing grade.

The purpose of the investigation was to determine the subsurface conditions at the site, and based on this information, to provide comments and geotechnical engineering recommendations to assist in the planning and design of site servicing, pavements, as well as assessment of the available bearing capacity for house/townhouse foundations.

Investigation Procedures

The fieldwork for this investigation was carried out on February 24, 2004, and consisted of six boreholes drilled to 5.0 to 6.5 m depth, at the locations shown on Drawing 1, appended.

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Please note that it was intended to drill a borehole in the proposed storm water management pond area, as well as in the proposed Cul de Sac. However, due to access, these boreholes were not completed. It is proposed that these boreholes be completed when access is available, at which time a supplementary report will be prepared.

The boreholes were advanced using continuous flight solid stem augers, powered by a track mounted D-50 drill rig, supplied and operated by a specialist drilling contractor working under the full time supervision of a member of our engineering staff.

Representative samples of the overburden were recovered at frequent depth intervals for identification purposes using a conventional split spoon sampler. Standard penetration tests were carried out simultaneously with the sampling operations to assess the strength characteristics of the substrata. Groundwater conditions were closely monitored during the course of the fieldwork.

Horizontal and vertical survey tie ins for the boreholes were provided by C.F. Crozier & Associates Inc.

All recovered soil samples were returned to our laboratory for detailed examination and moisture content determinations.

Summarized Subsurface Conditions

Reference is made to the appended Log of Borehole sheets for details of the subsurface conditions, including soil classifications, inferred stratigraphy, standard penetration test N values, groundwater observations, and the results of laboratory moisture content determinations.

The stratigraphy revealed in the boreholes generally consisted of a topsoil mantle over discontinuous layers of silt or sand, over a major silt till deposit, with underlying silt, sand, sand and gravel. The distribution and characteristics of the various units and groundwater observations are as follows.

Topsoil

An 80 to 250 mm thick topsoil mantle was revealed in the boreholes.

Upper Sand and Silt

A localized 350 to 500 mm thick sand layer was revealed under the topsoil in boreholes 3 and 6.

A discontinuous silt to clayey silt unit was contacted below the topsoil in boreholes 1, 4, and 5, and at 0.45 m depth in boreholes 3. The unit extended down to depths of 1.3 to 2.9 m below existing grade, locally 0.4 m in borehole 1. The material was typically brown and compact, being moist to wet, with moisture contents in the range of 11 to 19%.

Till

A brown to grey till deposit was contacted in all boreholes at depths of 0.2 to 2.9 m, below existing grade. The till comprised very stiff to hard clayey silt, to compact to very dense silt with varying sand and gravel content. Locally, in borehole 2, the material was predominantly silty sand. Saturated sand, or sand and gravel layers were noted within the till. Moisture contents were usually between the 8 and 12%.

Lower Silt, Sand, Sand and Gravel

The till deposit was penetrated at the 1.3 m depth in borehole 2, and near the 4.0 to 5.5 m depth in boreholes 3, 5 and 6. The underlying layers comprised sand or sand and gravel in boreholes 2, 3 and 6, which were damp to moist (moisture content 4 to 8%). In borehole 5, the underlying layer was silt, being wet, with moisture content of about 18%. The various layers were all dense to very dense.

Groundwater

Upon completion of augering, free water was noted in boreholes 1, 2 and 4 at depths of 1.0 to 4.0 m, with wet cave in boreholes 5 and 6 at depths of 6.4 and 3.8 m. No free water was noted in borehole 3, upon completion of augering. These observations are considered to reflect perched water in the upper layers, as well as in the sand/sand and gravel layers within the major till deposit.

Groundwater levels will be subject to seasonal fluctuations.

Engineering Considerations

General

The boreholes have revealed compact to very dense soils, primarily silt till, with discontinuous deposits of silt, sand, and sand and gravel. Groundwater was encountered as a perched condition in the upper layers, as well as within sand/sand and gravel layers within the major till deposit.

The subsurface conditions are considered favourable for development, however, some form of groundwater control would be required locally, during construction. Also, drainage provision will be necessary for house basements.

Trench Excavation and Groundwater Control

It is understood that the proposed sewer invert will be about 2.5 to 5.0 m below existing grade. Based on the boreholes, excavation is expected to encounter primarily silt till, with discontinuous deposits of silt, sand, and sand and gravel.

Excavation may be carried out in open cut using conventional equipment. Harder digging should be expected in the till soils and the presence of boulders (typical of tills) should not be disregarded.

Construction work must be carried out in accordance with the Occupational Health and Safety Act (OHSA) and local regulations. The site soils are compact to very dense. Dense to very dense soils are classified as Type 2 soil requiring trench sidewalls to be constructed at no steeper than 1 horizontal to 1 vertical to within 1.2 m of the base of the excavation. However, where seepage occurs and/or if the soils are only compact, then Type 3 soil conditions will apply.

Perched groundwater occurs locally in the upper soil layers, as well as within sand/sand and gravel layers within the major till deposit. Sump pumping should generally be adequate for groundwater control. However, where extensive saturated granular soils are encountered, it may be necessary to flatten the side slopes in conjunction with granular drainage blankets to minimize erosion/sloughing of sidewalls, or to consider more sophisticated methods such as well points.

It is recommended that a test dig be carried out to permit prospective contractors an opportunity to observe the subsurface conditions likely to be encountered in order to assess excavation and groundwater control requirements.

Pipe Bedding

It is expected that the sewers will typically be founded on the native compact to very dense soils. Standard granular bedding in accordance with OPSS compacted to 95% Standard Proctor maximum dry density should be satisfactory. For flexible pipes, bedding and cover material should comprise OPSS Granular A. For rigid pipes, bedding material should comprise OPSS Granular A, cover material should comprise select native trench backfill free of any oversized material.

In areas where wet subgrade conditions are encountered, it may be necessary to increase the bedding thickness, subject to field review.

The use of clear stone bedding, particularly in areas of wet sand, should be avoided, in view of the potential for fines to migrate into the voids, which could lead to settlement, and loss of pipe support.

Trench Backfill

Backfill in trenches should be placed in maximum 200 mm thick loose lifts compacted to 95% Standard Proctor maximum dry density to minimize post construction settlement in the backfill and pavement structure. Backfill for at least the upper 1 m of trench should be close to optimum moisture content to prevent subgrade stability issues.

Excavated soils are considered generally suitable for reuse as backfill, subject to moisture content control. Local zones of wet soils may be encountered where perched water exists. There may be opportunity for mixing with drier soil, or for "drying out" to render the material suitable for reuse, subject to field controls.

Organic, frozen or otherwise deleterious materials should not be incorporated as trench backfill.

Pavement Design and Construction

Based on the frost susceptible silt and silt till at the site, the following minimum thicknesses are recommended for the road conditions:

Asphaltic Concrete	90 mm
Granular A Base Course	150 mm
Granular B Subbase Course	450 mm

Subgrade preparation should involve removal of excessively wet soil, topsoil and/or other deleterious materials, proofrolling the exposed subgrade to minimum 98% Standard Proctor maximum dry density and replacement with select material as required to achieve the design subgrade elevation.

Imported material for the granular base and subbase should conform to OPS gradation specifications for Granular A and Granular B, and should be compacted to 100% Standard Proctor maximum dry density. Asphaltic concrete should be compacted to a minimum 97% Marshall Density.

The pavement design considers the construction will be carried out during the dry time of the year and the subgrade is stable and not heaving under construction traffic. If wet unstable conditions are encountered, additional granular subbase material may be required.

For the pavement to function properly, it is essential that provisions be made for water to drain out of and not collect in the base material. The incorporation of longitudinal subdrains is recommended in conjunction with crowning of the subgrade and final surface to promote drainage away from the structure. Bedding and cover material for subdrains should comprise OPSS Granular A or B. Manholes/catchbasins should be backfilled with free draining Granular B or equivalent. The catchbasins should be perforated just above the drain level and the holes screened with filter cloth. The above measures will help drain the pavement structure as well as alleviate the problems of differential frost movement between the catchbasins and pavement.

House Foundation

The native soils at the site are competent and are suitable for the use of spread footings to support residential dwellings. A new allowable bearing capacity of at least 150 kPa should be available for design, subject to field review.

Footings subject to frost action should be provided with minimum 1.2 m of earth cover.

Basements would be feasible, subject to the incorporation of perimeter and underfloor drainage systems, in consideration of the random zones of perched groundwater.

Perimeter drainage should be provided through the use of free draining granular backfill or prefabricated drainage board, in conjunction with a weeping tile surrounded with pea gravel, all fully wrapped with synthetic filter fabric.

The underfloor drainage system should comprise minimum 200 mm of clear stone (nominal 20 mm size) with weeping tile at 5 m centres. The subgrade should be fully blanketed with synthetic filter fabric prior to placement of clear stone. A polyethylene sheet vapour barrier should be placed over the stone, particularly where a vapour sensitive floor finish is to be applied.

The weeping tiles should lead to a frost free sump or outlet.

Geotechnical review of the actual subsurface conditions during basement excavation must be carried out to finalize the underfloor drainage requirements.

Geotechnical Review, Construction Inspection and Testing

It is recommended that the design drawings be submitted for review by Peto MacCallum Ltd. prior to finalization, to ensure the design is compatible with the site subsurface conditions and that the recommendations contained in this report are properly interpreted and implemented.

Earthworks operations should be carried out under the supervision of Peto MacCallum Ltd. to approve the subgrade preparation, backfill materials, placement and compaction procedures, and verify the specified degree of compaction is achieved uniformly throughout fill materials.

The comments and recommendations provided in the report are based on the information revealed in the boreholes. Conditions away from and between boreholes may vary, particularly where foundation and/or service trenches exist. Geotechnical review during construction should be ongoing to confirm the subsurface conditions are substantially similar to those encountered in the boreholes, which may otherwise require modifications to the original recommendations.

Closure

We trust this report is complete within our terms of reference, and the information presented is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

Robert Mount, BEng
Project Supervisor

Turney Lee-Bun, P.Eng.
Branch Manager

REGISTERED PROFESSIONAL ENGINEER
T. LEE-BUN
PROVINCE OF ONTARIO

RM/TLB:jlb

Enclosures:
Log of Borehole Nos. 1 to 6
Drawing No. 1 -- Borehole Location Plan

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	TW	Thinwall Open
WS	Washed Sample	TP	Thinwall Piston
SB	Scraper Bucket Sample	OS	Oesterberg Sample
AS	Auger Sample	FS	Foil Sample
CS	Chunk Sample	RC	Rock Core
ST	Slotted Tube Sample		

PH	Sample Advanced Hydraulically
PM	Sample Advanced Manually

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

Peto MacCallum Ltd
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 1

PROJECT Residential Subdivision
LOCATION County Rd 40 & Woodland Park Rd, Town of the Blue Mountains **BORING DATE** February 24, 2004
BORING METHOD Continuous Flight Solid Stem Augers

OUR PROJECT NO. 04BF001
ENGINEER TLB
TECHNICIAN GW

DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	SAMPLES NUMBER	SAMPLES TYPE	BLOWS/0.3m N - VALUES
	GROUND ELEVATION 189.55					
0.10	TOPSOIL: Black, silt, trace sand, moist		189			
0.40	SILT: Brown, silt, trace sand, trace clay, mosit			1	SS	25
1.50	SILT TILL: Very stiff to hard, brown, clayey silt, some sand and gravel, moist		188	2	SS	33
	becoming, grey dense to compact, silt, some sand and gravel, moist		187	3	SS	37
3.00				4	SS	26
4.00	With saturated sand and gravel layer		186			
4.50			185	5	SS	92/250 mm
5.00	BOREHOLE TERMINATED AT 5.00 m					

SHEAR STRENGTH C_u(kPa) ▲ (50, 100, 150, 200)
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M (20, 40, 60, 80)

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % (10, 20, 30)

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering
Free water at 1.0 m
Cave at 3.0 m

NOTES

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Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

PROJECT Residential Subdivision
LOCATION County Rd 40 & Woodland Park Rd, Town of the Blue Mountains **BORING DATE** February 24, 2004
BORING METHOD Continuous Flight Solid Stem Augers

OUR PROJECT NO. 04BF001
ENGINEER TLB
TECHNICIAN GW

DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	SAMPLES NUMBER	SAMPLES TYPE	BLOWS/0.3m N - VALUES	SHEAR STRENGTH C_u(kPa) 50 100 150 200; DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ●; BLOWS/0.3M 20 40 60 80	LIQUID LIMIT W_L; PLASTIC LIMIT W_P; WATER CONTENT W; W_P W W_L; WATER CONTENT % 10 20 30	GROUND WATER OBSERVATIONS AND REMARKS
	GROUND ELEVATION 188.85								
0.20	TOPSOIL: Black, silt , trace sand, moist								
1.30	SAND TILL: Dense, brown, sand, some silt to silty, trace gravel, moist		188	1	SS	43			
1.50	SAND: Very dense, brown, fine sand, trace to some silt, trace gravel, moist		187	2	SS	85/280 mm			
				3	SS	75/290 mm			
3.00			186	4	SS	85/290 mm			
4.50			185						
5.00	BOREHOLE TERMINATED AT 5.00 m		184	5	SS	75/200 mm			Upon completion of augering Free water at 4.0 m Borehole open

NOTES

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Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

PROJECT Residential Subdivision
OUR PROJECT NO. 04BF001
LOCATION County Rd 40 & Woodland Park Rd, Town of the Blue Mountains **BORING DATE** February 24, 2004
ENGINEER TLB
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN GW

DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	SAMPLES NUMBER	SAMPLES TYPE	BLOWS/0.3m N - VALUES
	GROUND ELEVATION 189.35					
0.25	TOPSOIL: Black, silt, trace sand, moist		189			
0.45						
0.80	SAND: Brown, silty sand, with organic inclusions, moist					
	SILT: Mottled brown and grey, clayey silt and silt, moist		188	1	SS	27
1.50	SILT: Very dense, grey, silt, wet, dilatent			2	SS	50
			187	3	SS	68
2.90						
3.00	SILT TILL: Very dense, grey, silt, some sand and gravel, moist		186	4	SS	58
4.00						
	SAND AND GRAVEL: Very dense, brown, fine to coarse sand and gravel, damp		185			
4.50				5	SS	50/140 mm
5.00	BOREHOLE TERMINATED AT 5.00 m					

SHEAR STRENGTH C_u (kPa) ▲ — 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M — 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % — 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering
No free water
Cave at 3.0 m

NOTES

CHECKED BY

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 4

PROJECT Residential Subdivision
LOCATION County Rd 40 & Woodland Park Rd, Town of the Blue Mountains **BORING DATE** February 24, 2004
BORING METHOD Continuous Flight Solid Stem Augers

OUR PROJECT NO. 04BF001
ENGINEER TLB
TECHNICIAN GW

DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m N - VALUES	SHEAR STRENGTH C_u(kPa) 50 100 150 200 ▲ / DYNAMIC CONE PENETRATION × / STANDARD PENETRATION TEST ● BLOWS/0.3M 20 40 60 80	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W (W_P W W_L) WATER CONTENT % 10 20 30	GROUND WATER OBSERVATIONS AND REMARKS
	GROUND ELEVATION 189.45								
0.13	TOPSOIL: Black, silt, trace sand, moist		189						
1.30	SILT: Compact, brown and grey, silt, some clay, trace sand, moist			1	SS	24			
1.50	SILT TILL: Dense to very dense, grey, silt, some sand and gravel, moist		188	2	SS	40			
			187	3	SS	65/290 mm			
2.90	saturated coarse sand layer								
3.00			186	4	SS	77			
4.50			185						
5.00	BOREHOLE TERMINATED AT 5.00 m			5	SS	50/25 mm			Upon completion of augering Free water at 1.6 m Cave at 2.2 m

NOTES

CHECKED BY

Peto MacCallum Ltd
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

PROJECT Residential Subdivision
LOCATION County Rd 40 & Woodland Park Rd, Town of the Blue Mountains **BORING DATE** February 24, 2004
BORING METHOD Continuous Flight Solid Stem Augers

OUR PROJECT NO. 04BF001
ENGINEER TLB
TECHNICIAN GW

DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES
	GROUND ELEVATION 188.40					
0.08	TOPSOIL: Black, silt, trace sand, moist		188			
1.30	SILT: Compact, brown, silt, some clay, trace sand, moist		187	1	SS	28
1.50	SILT TILL: Compact to very dense, brown to grey, silt, some sand and gravel, occ. sand seams, moist		186	2	SS	26
2.90				3	SS	32
3.00	gravelly		185	4	SS	70
4.50	with black shale inclusions		184	5	SS	89/225 mm
5.50			183			
6.00	SILT: Very dense, grey, silt, wet, dilatent		182	6	SS	69
6.55	BOREHOLE TERMINATED AT 6.55 m					

SHEAR STRENGTH C_u(kPa) ▲ (50 100 150 200)
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M (20 40 60 80)

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % (10 20 30)

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering
Wet cave at 6.4 m

NOTES

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Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 6

PROJECT Residential Subdivision
LOCATION County Rd 40 & Woodland Park Rd, Town of the Blue Mountains **BORING DATE** February 24, 2004
BORING METHOD Continuous Flight Solid Stem Augers

OUR PROJECT NO. 04BF001
ENGINEER TLB
TECHNICIAN GW

DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES
	GROUND ELEVATION 188.90					
0.10	TOPSOIL: Black, silt, trace sand, moist					
0.60	SAND: Brown, sand, with organic inclusions, moist		188	1	SS	22
1.50	SILT TILL: Compact to very dense, brown to grey, silt, some sand and gravel, moist		187	2	SS	28
				3	SS	41
3.00	silt seams		186	4	SS	50/140 mm
4.00	SAND: Dense, grey, silty fine sand to fine sandy silt, very moist		185			
4.50				5	SS	46
5.60	sand and gravel, saturated		184			
6.00			183			
6.30	grey fine sand			6	SS	79
6.55	BOREHOLE TERMINATED AT 6.55 m					

SHEAR STRENGTH C_u(kPa) ▲ 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

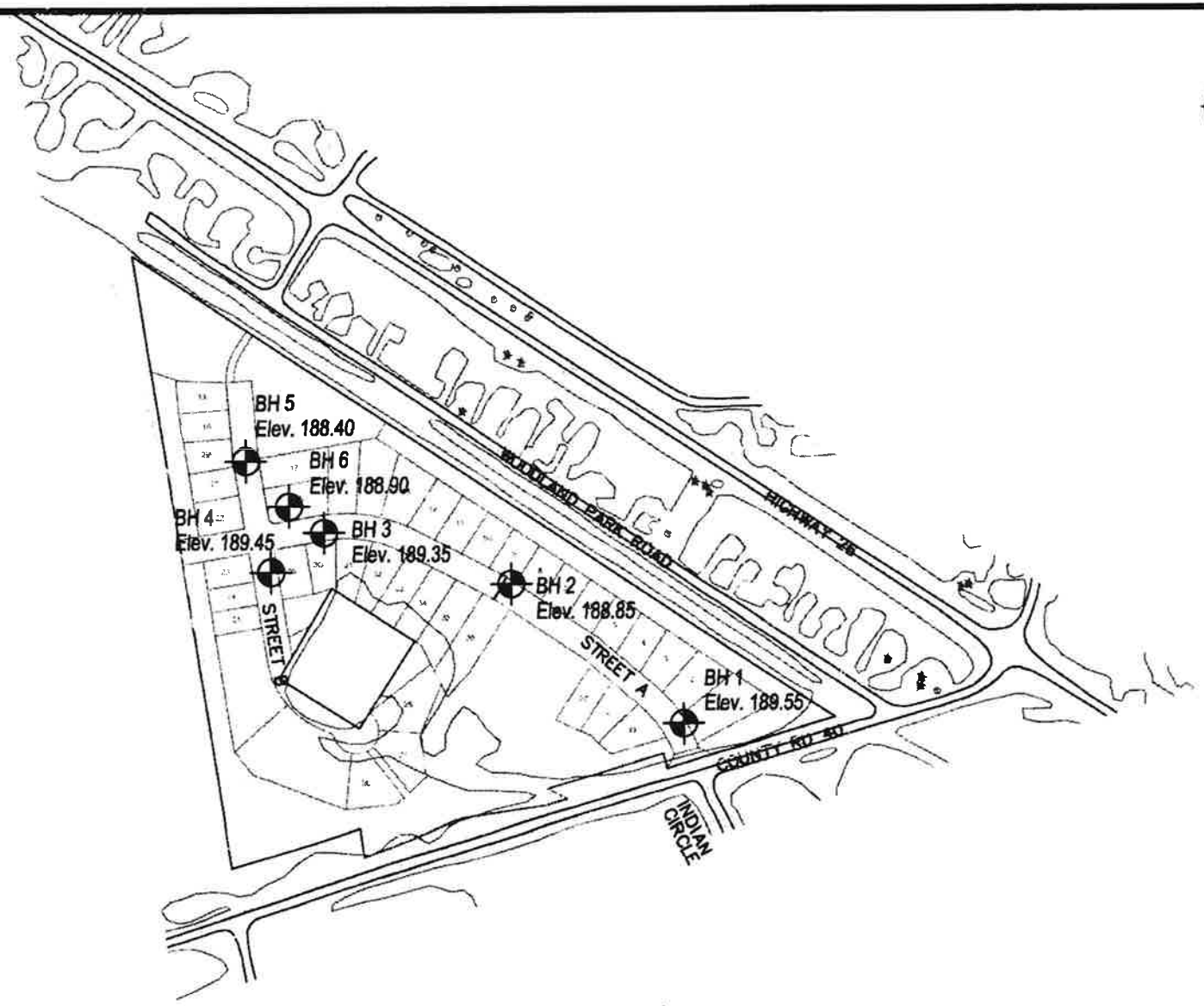
LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering
Wet cave at 3.8 m

NOTES

CHECKED BY



LEGEND

BH 1 — Borehole 1
Elev. 189.55 — Ground Surface Elevation

BOREHOLE LOCATION PLAN

RESIDENTIAL SUBDIVISION
COUNTY ROAD 40 AND WOODLAND PARK ROAD
TOWN OF THE BLUE MOUNTAINS, ONTARIO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DATE	SCALE	JOB NO.	DRAWING NO.
MARCH 2004	1:500	04BF001	1

APPENDIX E

Supporting Calculations

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

GEORGIAN GLEN - STORM SEWER DESIGN SHEET

FREQUENCY: 5 YEARS - Owen Sound IDF
Coef. A= 28.5 Coef. B= -0.726

PROJECT: Georgian Glen
PROJECT No.: 101-2501
FILE: storm sewer design

Design: Ian McCutcheon
Date: 04/15/04 Revised:

TIME OF CONCENTRATION 10.00 MANNINGS "n": 0.013

location	FR MH NO	TO MH NO	AREA (A) Ha	RUN-OFF COEFF	A x C	Cummul. A x C	TIME OF CONC. min	I mm/hr	Q l/sec	SLOPE %	PIPE DIA. mm	VEL. m/sec	LENGTH m	TIME OF FLOW min	CAPACITY l/sec	FALL m	GROUND ELEV. UPPER END	GROUND ELEV. LOWER END	PIPE INV. ELEV. UPPER END	PIPE INV. ELEV. LOWER END	COVER UPPER END	COVER LOWER END
STREET A																						
	1A	2A	0.19	0.35	0.07	0.067	10.00	104.66	19.35	0.50	300	0.97	59.8	1.03	68.49	0.30	189.609	189.309	188.100	187.800	1.21	1.21
	2A	3A	0.32	0.35	0.11	0.179	11.03	97.48	48.37	0.50	300	0.97	59.6	1.03	68.38	0.30	189.309	189.090	187.770	187.472	1.24	1.32
	3A	4A	2.71	0.35	0.95	1.127	12.06	91.38	286.29	0.50	525	1.41	59.5	0.71	304.36	0.30	189.090	188.709	187.247	186.949	1.32	1.23
	4A	5A	0.54	0.35	0.19	1.316	12.76	87.68	320.79	0.50	600	1.54	60	0.65	434.17	0.30	188.709	188.409	186.874	186.574	1.23	1.23
	5A	6A	0.84	0.35	0.29	1.610	13.41	84.57	378.52	0.50	600	1.54	31.2	0.34	434.17	0.16	188.409	188.246	186.544	186.388	1.26	1.26
	6A	7A	0.00	0.35	0.00	1.610	13.75	83.05	371.73	0.50	600	1.54	26.6	0.29	434.17	0.13	188.246	188.109	186.328	186.195	1.32	1.31
	7A	8A	0.58	0.35	0.20	1.813	14.04	81.81	412.34	0.50	600	1.53	48.7	0.53	433.73	0.24	188.109	187.800	186.165	185.922	1.34	1.28
	8A	7B	0.27	0.35	0.09	1.908	14.57	79.64	422.33	0.50	600	1.54	6.8	0.07	434.17	0.03	187.800	187.830	185.892	185.858	1.31	1.37
STREET B																						
Phase II	*1B*	*2B*	*0.72*	*0.35*	*0.25*	*0.252*	*10.00*	*104.66*	*73.32*	*1.00*	*300*	*1.37*	*19.2*	*0.23*	*96.70*	*0.19*	*190.695*	*190.495*	*189.190*	*188.998*	*1.21*	*1.20*
Phase II	*2B*	*3B*	*0.00*	*0.35*	*0.00*	*0.252*	*10.23*	*102.92*	*72.10*	*1.00*	*300*	*1.37*	*18.7*	*0.23*	*96.70*	*0.19*	*190.495*	*190.295*	*188.938*	*188.751*	*1.26*	*1.24*
Phase II	*3B*	*4B*	*0.63*	*0.35*	*0.22*	*0.473*	*10.46*	*101.29*	*133.04*	*1.00*	*375*	*1.59*	*18.6*	*0.20*	*175.33*	*0.19*	*190.295*	*190.095*	*188.676*	*188.490*	*1.24*	*1.23*
Phase II	*4B*	*5B*	*0.00*	*0.35*	*0.00*	*0.473*	*10.66*	*99.94*	*131.27*	*1.00*	*375*	*1.59*	*29.5*	*0.31*	*175.33*	*0.30*	*190.095*	*189.783*	*188.430*	*188.135*	*1.29*	*1.27*
	5B	6B	0.47	0.35	0.16	0.637	10.97	97.88	173.33	2.50	375	2.51	60	0.40	277.22	1.50	189.783	188.340	188.105	186.605	1.30	1.36
	6B	7B	0.61	0.35	0.21	0.851	11.37	95.38	225.50	5.18	375	3.61	9.5	0.04	399.00	0.49	188.340	188.055	186.575	186.083	1.39	1.60
	7B	8B	0.00	0.35	0.00	2.758	14.64	79.35	608.40	2.00	600	3.07	60.5	0.33	867.98	1.21	188.055	187.033	185.798	184.589	1.66	1.84
	8B	9B	0.63	0.35	0.22	2.979	14.97	78.08	646.54	2.50	600	3.43	19.6	0.10	970.84	0.49	187.033	186.833	184.559	184.069	1.87	2.16
	10B	9B	0.40	0.35	0.14	0.140	10.00	104.66	40.73	0.50	300	0.97	48.6	0.84	68.38	0.24	186.208	186.833	184.612	184.369	1.30	2.16
	9B	Outlet	0.00	0.35	0.00	3.119	15.07	77.72	673.83	1.50	600	2.66	20	0.13	752.01	0.30	186.833	187.000	184.009	183.709	2.22	2.69

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

Project: Georgian Glen
Project No.: 101-2501
File: runoff coef
Date: 15-Apr-04
Revised: 14-May-04

RUNOFF COEFFICIENT

Drainage Area	Land Use			Area (ha)	Runoff Coef.	A x C		
A1								
	Roadway	9.5 width(m)	65 length(m)	0.06	0.90	0.06		
	Sidewalk	1.5 width(m)	65 length(m)	0.01	0.90	0.01	Timp (ha)	0.09
	Driveway	50 area(m2)	1 no. units	0.01	0.90	0.00	%	47%
	Building	250 area(m2)	0.5 no. units	0.01	0.90	0.01		
	Lawn/Boulevard			0.10	0.20	0.02	Ximp (ha)	0.08
	Forest			0.00	0.25	0.00	%	40%
						0.10		
							Total Area (ha)=	0.19
							Runoff Coef.=	0.53
A2								
	Roadway	9.5 width(m)	60.5 length(m)	0.06	0.90	0.05		
	Sidewalk	1.5 width(m)	60.5 length(m)	0.01	0.90	0.01	Timp (ha)	0.14
	Driveway	50 area(m2)	2 no. units	0.01	0.90	0.01	%	43%
	Building	250 area(m2)	2.5 no. units	0.06	0.90	0.06		
	Lawn/Boulevard			0.18	0.20	0.04	Ximp (ha)	0.08
	Forest			0.00	0.25	0.00	%	24%
						0.16		
							Total Area (ha)=	0.32
							Runoff Coef.=	0.50
A3								
	Roadway	9.5 width(m)	60 length(m)	0.06	0.90	0.05		
	Sidewalk	1.5 width(m)	60 length(m)	0.01	0.90	0.01	Timp (ha)	0.09
	Driveway	50 area(m2)	0 no. units	0.00	0.90	0.00	%	3%
	Building	250 area(m2)	1 no. units	0.03	0.90	0.02		
	Lawn/Boulevard			0.20	0.20	0.04	Ximp (ha)	0.07
	Forest			2.42	0.25	0.61	%	2%
						0.73		
							Total Area (ha)=	2.71
							Runoff Coef.=	0.27
A4								
	Roadway	9.5 width(m)	60 length(m)	0.06	0.90	0.05		
	Sidewalk	1.5 width(m)	60 length(m)	0.01	0.90	0.01	Timp (ha)	0.15
	Driveway	50 area(m2)	4 no. units	0.02	0.90	0.02	%	0.27
	Building	250 area(m2)	2.5 no. units	0.06	0.90	0.06		
	Lawn/Boulevard			0.40	0.20	0.08	Ximp (ha)	0.09
	Forest			0.00	0.25	0.00	%	0.16
						0.21		
							Total Area (ha)=	0.55
							Runoff Coef.=	0.39

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT CONSULTANTS

Project: Georgian Glen
Project No.: 101-2501
File: runoff coef
Date: 15-Apr-04
Revised: 14-May-04

RUNOFF COEFFICIENT

Drainage Area	Land Use			Area (ha)	Runoff Coef.	A x C		
A5								
	Roadway	9.5 width(m)	60 length(m)	0.06	0.90	0.05		
	Sidewalk	1.5 width(m)	60 length(m)	0.01	0.90	0.01	Timp (ha)	0.19
	Driveway	50 area(m2)	4 no. units	0.02	0.90	0.02	%	22%
	Building	250 area(m2)	4 no. units	0.10	0.90	0.09		
	Lawn/Boulevard			0.65	0.20	0.13	Ximp (ha)	0.09
	Forest			0.00	0.25	0.00	%	10%
						0.30		
							Total Area (ha)=	0.84
							Runoff Coef.=	0.36
A6								
	Roadway	9.5 width(m)	60 length(m)	0.06	0.90	0.05		
	Sidewalk	1.5 width(m)	60 length(m)	0.01	0.90	0.01	Timp (ha)	0.19
	Driveway	50 area(m2)	5 no. units	0.03	0.90	0.02	%	33%
	Building	250 area(m2)	4 no. units	0.10	0.90	0.09		
	Lawn/Boulevard			0.39	0.20	0.08	Ximp (ha)	0.09
	Forest			0.00	0.25	0.00	%	16%
						0.25		
							Total Area (ha)=	0.58
							Runoff Coef.=	0.43
A7								
	Roadway	9.5 width(m)	48.5 length(m)	0.05	0.90	0.04		
	Sidewalk	1.5 width(m)	48.5 length(m)	0.01	0.90	0.01	Timp (ha)	0.10
	Driveway	50 area(m2)	2 no. units	0.01	0.90	0.01	%	37%
	Building	250 area(m2)	1.5 no. units	0.04	0.90	0.03		
	Lawn/Boulevard			0.17	0.20	0.03	Ximp (ha)	0.06
	Forest			0.00	0.25	0.00	%	23%
						0.12		
							Total Area (ha)=	0.27
							Runoff Coef.=	0.46
A8								
	Roadway	4 width(m)	210 length(m)	0.08	0.90	0.08		
	Sidewalk	1.5 width(m)	0 length(m)	0.00	0.90	0.00	Timp (ha)	0.17
	Driveway	50 area(m2)	3 no. units	0.02	0.90	0.01	%	15%
	Building	250 area(m2)	3 no. units	0.08	0.90	0.07		
	Lawn/Boulevard			0.44	0.20	0.09	Ximp (ha)	0.10
	Forest			0.55	0.25	0.14	%	9%
						0.38		
							Total Area (ha)=	1.16
							Runoff Coef.=	0.33
A9								
	Roadway	9 width(m)	0 length(m)	0.00	0.90	0.00		
	Sidewalk	1.5 width(m)	0 length(m)	0.00	0.90	0.00	Timp (ha)	0.23
	Driveway	50 area(m2)	5 no. units	0.03	0.90	0.02	%	13%
	Building	250 area(m2)	8 no. units	0.20	0.90	0.18		
	Lawn/Boulevard			0.78	0.20	0.16	Ximp (ha)	0.03
	Forest			0.75	0.25	0.19	%	1%
						0.55		
							Total Area (ha)=	1.75
							Runoff Coef.=	0.31

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

Project: Georgian Glen
Project No.: 101-2501
File: runoff coef
Date: 15-Apr-04
Revised: 14-May-04

RUNOFF COEFFICIENT

Drainage Area	Land Use			Area (ha)	Runoff Coef.	A x C		
A10								
	Roadway	9 width(m)	90 length(m)	0.08	0.90	0.07		
	Sidewalk	1.5 width(m)	55 length(m)	0.01	0.90	0.01	Timp (ha)	0.22
	Driveway	50 area(m2)	5.5 no. units	0.03	0.90	0.02	%	30%
	Building	250 area(m2)	4 no. units	0.10	0.90	0.09		
	Lawn/Boulevard			0.32	0.20	0.06	Ximp (ha)	0.12
	Forest			0.18	0.25	0.05	%	0.16
						0.30		
							Total Area (ha)=	0.72
							Runoff Coef.=	0.42
A11								
	Roadway	9 width(m)	40 length(m)	0.04	0.90	0.03		
	Sidewalk	1.5 width(m)	40 length(m)	0.01	0.90	0.01	Timp (ha)	0.15
	Driveway	50 area(m2)	3.5 no. units	0.02	0.90	0.02	%	0.23
	Building	250 area(m2)	3.5 no. units	0.09	0.90	0.08		
	Lawn/Boulevard			0.40	0.20	0.08	Ximp (ha)	0.06
	Forest			0.08	0.25	0.02	%	9%
						0.23		
							Total Area (ha)=	0.63
							Runoff Coef.=	0.37
A12								
	Roadway	9 width(m)	50 length(m)	0.05	0.90	0.04		
	Sidewalk	1.5 width(m)	50 length(m)	0.01	0.90	0.01	Timp (ha)	0.20
	Driveway	50 area(m2)	5 no. units	0.03	0.90	0.02	%	43%
	Building	250 area(m2)	5 no. units	0.13	0.90	0.11		
	Lawn/Boulevard			0.23	0.20	0.05	Ximp (ha)	0.08
	Forest			0.04	0.25	0.01	%	16%
						0.24		
							Total Area (ha)=	0.47
							Runoff Coef.=	0.51
A13								
	Roadway	9 width(m)	60 length(m)	0.05	0.90	0.05		
	Sidewalk	1.5 width(m)	60 length(m)	0.01	0.90	0.01	Timp (ha)	0.21
	Driveway	50 area(m2)	5 no. units	0.03	0.90	0.02	%	35%
	Building	250 area(m2)	5 no. units	0.13	0.90	0.11		
	Lawn/Boulevard			0.31	0.20	0.06	Ximp (ha)	0.09
	Forest			0.09	0.25	0.02	%	14%
						0.28		
							Total Area (ha)=	0.61
							Runoff Coef.=	0.45
A14								
	Roadway	9 width(m)	70 length(m)	0.06	0.90	0.06		
	Sidewalk	1.5 width(m)	70 length(m)	0.01	0.90	0.01	Timp (ha)	0.18
	Driveway	50 area(m2)	4 no. units	0.02	0.90	0.02	%	29%
	Building	250 area(m2)	3.5 no. units	0.09	0.90	0.08		
	Lawn/Boulevard			0.37	0.20	0.07	Ximp (ha)	0.09
	Forest			0.08	0.25	0.02	%	15%
						0.26		
							Total Area (ha)=	0.63
							Runoff Coef.=	0.41

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT CONSULTANTS

Project: Georgian Glen
Project No.: 101-2501
File: runoff coef
Date: 15-Apr-04
Revised: 14-May-04

RUNOFF COEFFICIENT

Drainage Area	Land Use			Area (ha)	Runoff Coef.	A x C		
A15								
	Roadway	9 width(m)	70 length(m)	0.06	0.90	0.06		
	Sidewalk	1.5 width(m)	70 length(m)	0.01	0.90	0.01	Timp (ha)	0.15
	Driveway	50 area(m2)	3 no. units	0.02	0.90	0.01	%	38%
	Building	250 area(m2)	2.5 no. units	0.06	0.90	0.06		
	Lawn/Boulevard			0.20	0.20	0.04	Ximp (ha)	0.09
	Forest			0.05	0.25	0.01	%	22%
						0.19		
							Total Area (ha)=	0.4
							Runoff Coef.=	0.47
A16								
	Roadway	9 width(m)	0 length(m)	0.00	0.90	0.00		
	Sidewalk	1.5 width(m)	0 length(m)	0.00	0.90	0.00	Timp (ha)	0.23
	Driveway	50 area(m2)	0 no. units	0.00	0.90	0.00	%	35%
	Building	250 area(m2)	0.5 no. units	0.01	0.90	0.01		
	Lawn/Boulevard			0.06	0.20	0.01	Ximp (ha)	0.22
	SWM Facility			0.60	0.25	0.15	%	33%
	Wet Pond Area			0.22	0.90	0.20		
						0.37	Total Area (ha)=	0.67
							Runoff Coef.=	0.55
A17								
	Roadway	9 width(m)	0 length(m)	0.00	0.90	0.00		
	Sidewalk	1.5 width(m)	0 length(m)	0.00	0.90	0.00	Timp (ha)	0.03
	Driveway	50 area(m2)	0 no. units	0.00	0.90	0.00	%	2%
	Building	250 area(m2)	1 no. units	0.03	0.90	0.02		
	Lawn/Boulevard			0.12	0.20	0.02	Ximp (ha)	0.00
	Forest			1.18	0.25	0.30	%	0%
						0.34		
							Total Area (ha)=	1.32
							Runoff Coef.=	0.26

Site Statistics:

Total Area (ha)	13.82
Average Runoff Coef.	0.36
Total Drainage Area to Pond (ha)	11.34
Total Imperviousness (%)	22%
Directly Connected Imperviousness Ratio (%)	12%

Project: Sorichetti Inc.
Date: May 7 2004
File: 101-2501
By: CFC

Stage-Storage Relationship for SWM Pond

Elev. (m)	Contour Area (m2)	Average Area (m2)	Incremental Depth (m)	Incremental Volume (m3)	Total Volume (m3)	
					Permanent Pool	Active Storage
182.5	0.0	0.0		0.0	0	
183.0	1080.0	540.0	0.5	270.0	300	
184.0	2110.0	1595.0	1.0	1595.0	1900	0
184.5	2750.0	2430.0	0.5	1215.0		1200
185.0	3400.0	3075.0	0.5	1537.5		2800
185.5	3800.0	3600.0	0.5	1800.0		4600

Normal Water Level

Total storage volumes rounded to nearest 50 cubic meter increment.

J:\101-Sorichetti\2501\Design\Detailed SWM - CFCA\Calculations\[SWM Pond Stage Storage.xls]Stage-Storage-Discharge SWM2

PS 1.11

Project: Sorichetti
Date: May 10 2004
File: 101-2501
By: CFC

SWM Outlet: Stage-Discharge Relationship

FLOW THROUGH EXTENDED DETENTION ORIFICE:

$Q_{oExt.Det.} = C_d * A_o * \sqrt{(2*g*H_o)}$

Invert of Orifice =	184.00 m
Diameter =	0.11 m
=	110 mm
Orifice Centreline =	184.05 m
C_d =	0.62
Area =	0.0095 m^2
Orifice Obvert =	184.11 m

FLOW OVER DICB
NOTE: ***Weir for quantity control***

As Weir Flow use:

$Q_{w-mh} = C_w*(L-0.2*H_w)*(H^w)^{1.5}$

Flow by 450 mm lead @ 1%

Pressure flow per Culvert Master

Invert of Weir =	185.06 m
Weir Length =	***3.60*** m
C_w =	1.8308

WATER ELEVATION (m)	EXT. DET. PIPE ORIFICE $H_{ORIFICE}$ (m)	EXT. DET. PIPE ORIFICE FLOW (m^3/s)	DICB as WEIR Flow H (m)	DICB as WEIR Flow FLOW (m^3/s)	DICB as 450mm Lead HW (m)	DICB as 450mm Lead FLOW (m^3/s)	TOTAL FLOW (m^3/s)
184.00				0.000		0.000	***0.000***
184.10	0.050	0.006		0.000		0.000	***0.006***
184.20	0.150	0.010		0.000		0.000	***0.010***
184.30	0.250	0.013		0.000		0.000	***0.013***
184.40	0.350	0.015		0.000		0.000	***0.015***
184.50	0.450	0.018		0.000		0.000	***0.018***
184.60	0.550	0.019		0.000		0.000	***0.019***
184.70	0.650	0.021		0.000		0.000	***0.021***
184.75	0.700	0.022		0.000		0.000	***0.022***
184.80	0.750	0.023		0.000		0.000	***0.023***
184.90	0.850	0.024		0.000		0.000	***0.024***
185.00	0.950	0.025	0.00	0.000	0.000	0.000	***0.025***
185.10	1.050	0.027	0.04	0.026	0.930	0.360	***0.053***
185.20	1.150	0.028	0.14	0.171	1.030	0.387	***0.199***
185.30	1.250	0.029	0.24	0.382	1.130	0.413	***0.411***
185.40	1.350	0.030	0.34	0.641	1.230	0.440	***0.470***
185.50	1.450	0.031	0.44	0.938	1.330	0.450	***0.481***

Notes:
1 Indicates governing hydraulics for flow calculations
2 Flow through DICB has assumed 50% blockage factor

3.3.2 Water Quality Sizing Criteria

The volumetric water quality criteria are presented in Table 3.2. The values are based on a 24 hour drawdown time and a design which conforms to the guidance provided in this manual. Requirements differ with SWMP type to reflect differences in removal efficiencies. Of the specified storage volume for wet facilities, 40 m³/ha is extended detention, while the remainder represents the permanent pool.

Table 3.2 Water Quality Storage Requirements based on Receiving Waters[1, 2]

Protection Level	SWMP Type	Storage Volume (m³/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced 80% long-term S.S. removal	Infiltration	25	30	35	40
	Wetlands	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	25	30
	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20
	Wetlands	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

[1]*Table 3.2 does not include every available SWMP type. Any SWMP type that can be demonstrated to the approval agencies to meet the required long-term suspended solids removal for the selected protection levels under the conditions of the site is acceptable for water quality objectives. The sizing for these SWMP types is to be determined based on performance results that have been peer-reviewed. The designer and those who review the design should be fully aware of the assumptions and sampling methodologies used in formulating performance predictions and their implications for the design.*

[2]*Hybrid Wet Pond/Wetland systems have 50-60% of their permanent pool volume in deeper portions of the facility (e.g., forebay, wet pond).*

Source: Stormwater Planning & Design Manual (MOE, 2003)

EROSION CONTROL

MAY 7 04
CFC
pg 1 of 6

EROSION CONTROL TO BE APPLIED PER RECOMMENDATIONS OF MOE (2003) SIMPLIFIED DESIGN APPROACH.

CHOICE OF SIMPLIFIED DESIGN APPROACH IS SUPPORTED BY FOLLOWING SELECTION SCREENING PER TABLE 3.4 (MOE, 2003)

PARAMETER	CRITERIA	VALUE	COMMENT	MEETS CRITERIA
SIZE OF DEV'MT	CDA ≤ 20ha	Area = 11.3ha		Y
HEADWATER STREAM	1ST	1ST		Y
STABILITY INDEX	SI ≤ 0.4	S = 0.15	SEE ATTACHED FORM.	Y
ENTRENCHMENT RATIO	T ≥ 2.2		Non Entrenched Conditions D/S	Y
BANKFULL DEPTH	DBFL < 0.75m	DBFL ≤ 0.3	D/S OF SITE	Y
ANSI / ESA	N/A	N/A	No ESA / ANSI	Y
RIPARIAN VEGETATION	DENSE	DENSE	HEAVY, NATURAL VEG. D/S OF SITE.	Y

NOTES

1) ENTRENCHMENT RATIO:

$$ER = \frac{\text{Floodplain Width (@ 2x Def)}}{\text{Bankfull Depth (m)}}$$

2. Volume Determination

Given the applicability of using the Simplified Design Approach, it is necessary to determine the volume of Source Control & Active Storage Volume for the proposed end-of-pipe SWM facility.

Following the procedures outlined in Appendix C (MOE, 2003)...

(i) Directly Connected Site Impervious FRIMP

use FRIMP = 15%

(ii) SCS Hydrologic Soil Classification

Soil Group AB (Burnside, 2003)

(iii) Source Control

None proposed. ∴ SC = 0 mm

Using Fig. C.1(a), Pond Active storage volume based on the conditions above requires: V = 100 $m^3/ha^{\pm}$.

Given the drainage area (CDA) of 11.3

∴ Minimum Pond Active Storage = 1130 m^3 ⬅

Table C.1: Summary of Rapid Geomorphic Assessment (RGA) Classification

FORM/ PROCESS (1)	GEOMORPHIC INDICATOR		PRESENT		FACTOR
	NO (2)	DESCRIPTION (3)	NO (4)	YES (5)	VALUE (6)
Evidence of Aggradation (AI)	1	Lobate bar	X		
	2	Coarse material in riffles embedded	X		
	3	Siltation in pools	X		
	4	Medial bars	X		
	5	Accretion on point bars	X		
	6	Poor longitudinal sorting of bed materials	X		
	7	Deposition in the overbank zone	X		
		SUM OF INDICES	7	0	0/7 = 0
Evidence of Degradation (DI)	1	Exposed bridge footing(s)	X		
	2	Exposed sanitary/storm sewer/pipeline/etc.	X		
	3	Elevated stormsewer outfall(s)	X		
	4	Undermined gabion baskets/concrete aprons/etc.	X		
	5	Scour pools d/s of culverts/stormsewer outlets		X	
	6	Cut face on bar forms	X		
	7	Head cutting due to knick point migration	X		
	8	Terrace cut through older bar material	X		
	9	Suspended armor layer visible in bank	X		
	10	Channel worn into undisturbed overburden/bedrock	X		
		SUM OF INDICES	9	1	1/10 = .10
Evidence of Widening (WI)	1	Fallen/leaning trees/fence posts/etc.		X	
	2	Occurrence of large organic debris		X	
	3	Exposed tree roots		X	
	4	Basal scour on inside meander bends	X		
	5	Basal scour on both sides of channel through riffle		X	
	6	Gabion baskets/concrete walls/etc. out flanked	X		
	7	Length of basal scour > 50% through subject reach	X		
	8	Exposed length of previously buried pipe/cable/etc.	X		
	9	Fracture lines along top of bank	X		
	10	Exposed building foundation	X		
		SUM OF INDICES	6	4	4/10 = 0.40
Evidence of Planimetric Form Adjustment (PI)	1	Formation of cute(s)	X		
	2	Single thread channel to multiple channel	X		
	3	Evolution of pool-riffle form to low bed relief form	X		
	4	Cutoff channel(s)	X		
	5	Formation of island(s)	X		
	6	Thalweg alignment out of phase meander form	X		
	7	Bar forms poorly formed/reworked/removed	X		
		SUM OF INDICES	7	0	0
STABILITY INDEX (SI) = (AI + DI + WI + PI) / m ≈ (0+0.1+0.4+0)/4 = 0.12					

3. DRAW DOWN TIME / OUTLET DESIGN

THE DRAW DOWN TIME IN THE POND CAN BE ESTIMATED USING EQ^{N} 4.10 (MOE, 2003) BASED ON THE FALLING HEAD EQUATION:

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

IT IS REASONABLE TO DESIGN THE POND TO MEET A DRAW DOWN OF 24 to 48hrs. FOR DESIGN PURPOSES, USE 36 HOURS.

EQ^{N} 4.10 CAN BE EXPRESSED AS:

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

where
- A_o = cross sectional area (m^2) of Orifice Control
- A_p = surface area of pond (varies)
- C = discharge coefficient
- t = drawdown time of pond (sec)
- g = acceleration due to gravity (m/s^2)
- h_1 = starting water elevation above orifice (m)
- h_2 = ending water elevation above orifice (m)

GIVEN:
- A_p = 2490 m^2 ** (average area between start/end water level)
- C = 0.62
- t = 129600 sec
- g = 9.81 m/sec^2
- h_1 = 0.5 m (@ 184.50 m elevation)
- h_2 = 0 (@ 184.0 m elevation = NWL)

** SEE STAGE/STORAGE RELATION TABLE

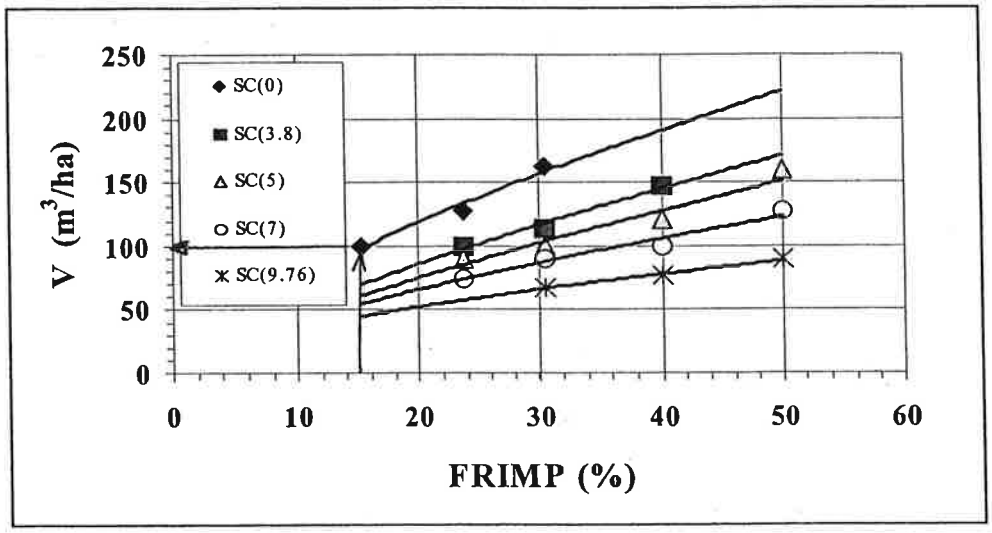
SUBSTITUTING: $A_o = 0.01\ m^2$

FINDING EQUIVALENT DIAMETER: $D = \sqrt{\frac{4A}{\pi}} = 0.113\text{m} = 113\text{mm}$

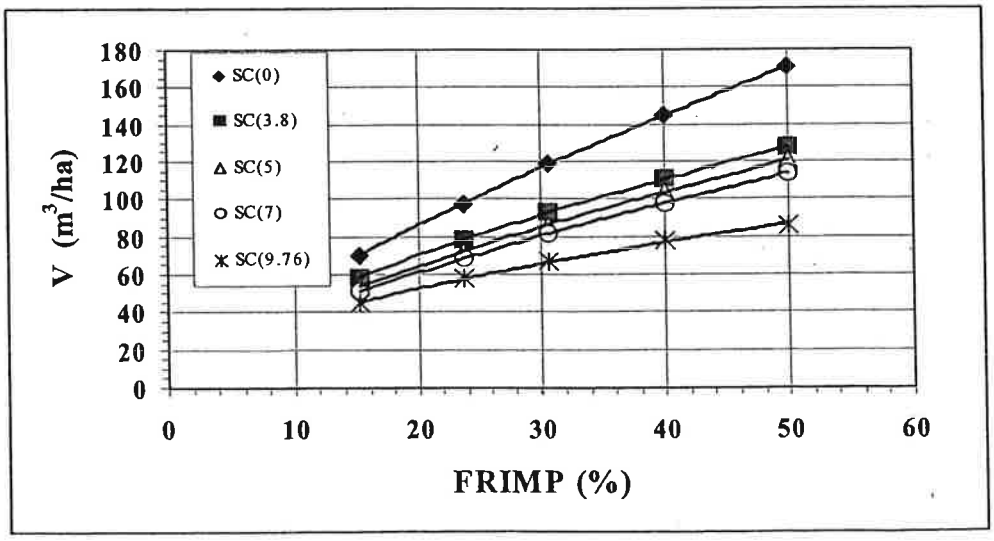
∴ USE ORIFICE OF 110MM for design purposes.

Figure C.1: Pond Active Storage Volume for Control of In-Stream Erosion Potential as a Function of Total Directly Connected Impervious Area (FRIMP) and Source Control (including lot level and conveyance control, in watershed-mm)

(a) SCS Soil Groups A and B



(b) SCS Soils Groups C and D



APPENDIX F

Hydrologic Computer Modeling Files

```
00001> ********************************************************************************
00002>
00003>  SSSSS   W     W   M     M   H     H   Y     Y   M     M    000          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 M   HHHHHH     Y       M M M M   O   O   ##   9   9   9   9  Ver. 4.02
00006>      S   W W W  M  M  M   H     H     Y       M  M  M   O   O          9999    9999  July 1999
00007>  SSSSS   W W W  M     M   H     H     Y       M     M    000             9       9  =========
00008>                                                                       9   9   9   9  # 3737016
00009>       StormWater Management HYdrologic Model                          999     999  =========
00010>
00011> ********************************************************************************
00012> ************************** SWMHYMO-99 Ver/4.02 ***********************************
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) 727-5199          ***************
00019> *******                  Gatineau, Quebec: (819) 243-6858          ***************
00020> *******                  E-Mail: swmhymo@jfsa.com                  ***************
00021> ********************************************************************************
00022>
00023> ********************************************************************************
00024> ******* Licensed user: C.F. Crozier & Associates Inc.                ***************
00025> *******                 Collingwood              SERIAL#:3737016     ***************
00026> ********************************************************************************
00027>
00028> ********************************************************************************
00029> *******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++                ***************
00030> *******            Maximum value for ID numbers  :     10               ***************
00031> *******            Max. number of rainfall points:  15000               ***************
00032> *******            Max. number of flow points    :  15000               ***************
00033> ********************************************************************************
00034>
00035>
00036> ******************  D E T A I L E D   O U T P U T  ******************************
00037> ********************************************************************************
00038> *       DATE: 2004-05-10       TIME: 16:59:55      RUN COUNTER: 000083         *
00039> ********************************************************************************
00040> * Input   filename: C:\TEMP\SORICH~1\QUANIT~1\25mmB.DAT                        *
00041> * Output  filename: C:\TEMP\SORICH~1\QUANIT~1\25mmB.out                       *
00042> * Summary filename: C:\TEMP\SORICH~1\QUANIT~1\25mmB.sum                       *
00043> * User comments:                                                             *
00044> * 1: ________________________________________________________________________*
00045> * 2: ________________________________________________________________________*
00046> * 3: ________________________________________________________________________*
00047> ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001----------------------------------------------------------------------
00051> *#*******************************************************************************
00052> *#  Project Name    : SORICHETTI POST-DEVELOPMENT 25mm SHORT DURATION EVENT
00053> *#  Details         : SWM Pond for Quality & Quantity Control
00054> *#  Original Date   : 10-24-2002  (Burnside)
00055> *#  Revised         : May 2004  (CF Crozier & Associates Inc)
00056> *#  Modeller        : Chris Crozier, P.Eng.
00057> *#*******************************************************************************
00058> ---------------------
00059> | START             |  Project  dir.: C:\TEMP\SORICH~1\QUANIT~1\
00060> ---------- ----------  Rainfall dir.: C:\TEMP\SORICH~1\QUANIT~1\
00061>     TZERO =   .00 hrs on      0
00062>     METOUT=   2 (output = METRIC)
00063>     NRUN  = 001
00064>     NSTORM=   0
00065> --------------------------------------------------------------------------------
00066> 001:0002----------------------------------------------------------------------
00067> ---------------------
00068> | READ STORM        |    Filename: C:\TEMP\SORICH~1\QUANIT~1\chmf25mm.4hr
00069> | Ptotal=  25.00 mm|    Comments: 4 hr chicago storm 25 mm depth derived f
00070> ---------- ----------
00071>              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00072>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00073>               .17   1.530 |   1.17   6.120 |   2.17   4.470 |   3.17   1.890
00074>               .33   1.720 |   1.33  14.480 |   2.33   3.610 |   3.33   1.740
00075>               .50   2.000 |   1.50  54.950 |   2.50   3.030 |   3.50   1.610
00076>               .67   2.370 |   1.67  17.550 |   2.67   2.630 |   3.67   1.500
00077>               .83   2.950 |   1.83   8.850 |   2.83   2.320 |   3.83   1.400
00078>              1.00   3.950 |   2.00   5.920 |   3.00   2.080 |   4.00   1.320
00079>
00080> --------------------------------------------------------------------------------
00081> 001:0003----------------------------------------------------------------------
00082> ---------------------
00083> | CALIB NASHYD      |   Area    (ha)=  221.70   Curve Number   (CN)=73.00
00084> | 01:2101   DT= 5.00 |   Ia      (mm)=    5.000  # of Linear Res.(N)= 3.00
00085> ---------- ----------  U.H. Tp(hrs)=    4.570
00086>
00087>      Unit Hyd Qpeak  (cms)=     1.853
00088>
00089>      PEAK FLOW       (cms)=      .250 (i)
00090>      TIME TO PEAK    (hrs)=     6.667
00091>      RUNOFF VOLUME    (mm)=     3.510
00092>      TOTAL RAINFALL   (mm)=    24.998
00093>      RUNOFF COEFFICIENT   =     .140
00094>
00095>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00096>
00097> --------------------------------------------------------------------------------
00098> 001:0004----------------------------------------------------------------------
00099> ---------------------
00100> | ROUTE CHANNEL     |     Routing time step (min) =  5.00
00101> |  IN> 01:2101      |     Number of SEGMENTS =  3
00102> | OUT< 02:2301      |     Slopes (%), CHANNEL=5.00   FLOODPLAIN=5.00
00103> ---------- ----------                 LENGTH =  530.00     (m)
00104>
00105>                 <------ DATA FOR SECTION (   1.0) ------>
00106>                 Distance      Elevation       Manning
00107>                    .00          20.00          .0600
00108>                  10.00          19.70     .0600 / .0350  Main Channel
00109>                  12.10          18.30          .0350     Main Channel
00110>                  16.30          18.30          .0350     Main Channel
00111>                  18.40          19.70     .0350 / .0600  Main Channel
00112>                  28.40          20.00          .0600
00113>
00114>    <---------- TRAVEL TIME TABLE ----------> <---------->
00115>     DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00116>       (m)      (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
00117>      .088   18.387   .201E+03  .332E+00       .464     1.225       7.21      .107
00118>      .175   18.475   .414E+03  .137E+01      1.481     1.896       4.66      .332
00119>      .263   18.563   .639E+03  .317E+01      2.928     2.428       3.64      .637
00120>      .350   18.650   .876E+03  .579E+01      4.764     2.881       3.07     1.008
00121>      .438   18.738   .113E+04  .930E+01      6.968     3.279       2.69     1.435
00122>      .525   18.825   .139E+04  .137E+02      9.527     3.638       2.43     1.910
00123>      .613   18.913   .166E+04  .192E+02     12.437     3.967       2.23     2.430
00124>      .700   19.000   .195E+04  .257E+02     15.696     4.271       2.07     2.990
00125>      .788   19.088   .225E+04  .334E+02     19.304     4.555       1.94     3.587
00126>      .875   19.175   .256E+04  .422E+02     23.263     4.823       1.83     4.220
00127>      .963   19.263   .288E+04  .523E+02     27.575     5.076       1.74     4.886
00128>     1.050   19.350   .321E+04  .637E+02     32.245     5.318       1.66     5.584
00129>     1.138   19.438   .356E+04  .764E+02     37.278     5.549       1.59     6.312
00130>     1.225   19.525   .392E+04  .906E+02     42.678     5.770       1.53     7.069
00131>     1.313   19.613   .429E+04  .106E+03     48.451     5.984       1.48     7.854
00132>     1.400   19.700   .467E+04  .123E+03     54.601     6.191       1.43     8.667
00133>     1.500   19.800   .530E+04  .150E+03     63.709     6.375       1.39     9.563
00134>     1.600   19.900   .627E+04  .189E+03     74.084     6.261       1.41    10.017
00135>     1.700   20.000   .760E+04  .244E+03     86.162     6.008       1.47    10.214
00136>
00137>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00138>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00139>
00140>                                      <---- hydrograph ---->   <-pipe / channel->
00141>                                AREA     QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00142>                                (ha)     (cms)    (hrs)   (mm)       (m)      (m/s)
00143>    INFLOW : ID= 1:2101       221.70    .250     6.67   3.510      .047      1.225
00144>    OUTFLOW: ID= 2:2301       221.70    .250     6.83   3.510      .047      1.225
00145>
00146>
00147> --------------------------------------------------------------------------------
00148> 001:0005----------------------------------------------------------------------
00149> ---------------------
00150> | ROUTE CHANNEL     |     Routing time step (min) =  5.00
00151> |  IN> 02:2301      |     Number of SEGMENTS =  3
00152> | OUT< 03:2302      |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00153> ---------- ----------                 LENGTH =  520.00     (m)
00154>
00155>                 <------ DATA FOR SECTION (   2.0) ------>
00156>                 Distance      Elevation       Manning
00157>                    .00          10.00          .0600
00158>                  10.00           9.80     .0600 / .0350  Main Channel
00159>                  10.80           9.30          .0350     Main Channel
00160>                  12.50           9.30          .0350     Main Channel
00161>                  13.00          10.30     .0350 / .0600  Main Channel
00162>                  16.00          10.30          .0600
00163>
00164>    <---------- TRAVEL TIME TABLE ----------> <---------->
00165>     DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00166>       (m)      (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
00167>      .036    9.336   .323E+02  .222E+00       .013     .213       40.61      .008
00168>      .071    9.371   .659E+02  .906E+00       .042     .331       26.21      .024
00169>      .107    9.407   .101E+03  .208E+01       .082     .424       20.45      .045
00170>      .143    9.443   .137E+03  .378E+01       .133     .503       17.24      .072
00171>      .179    9.479   .175E+03  .602E+01       .193     .572       15.15      .102
00172>      .214    9.514   .215E+03  .884E+01       .262     .635       13.66      .136
00173>      .250    9.550   .255E+03  .123E+02       .339     .691       12.54      .173
00174>      .286    9.586   .297E+03  .163E+02       .425     .744       11.65      .213
00175>      .321    9.621   .341E+03  .211E+02       .519     .793       10.94      .255
00176>      .357    9.657   .385E+03  .265E+02       .621     .838       10.34      .299
00177>      .393    9.693   .432E+03  .326E+02       .731     .881        9.83      .346
00178>      .429    9.729   .479E+03  .395E+02       .850     .922        9.40      .395
00179>      .464    9.764   .528E+03  .472E+02       .976     .961        9.02      .446
00180>      .500    9.800   .579E+03  .556E+02      1.111     .998        8.68      .499
00181>      .540    9.840   .657E+03  .682E+02      1.292    1.023        8.47      .552
00182>      .580    9.880   .777E+03  .867E+02      1.498    1.003        8.64      .582
00183>      .620    9.920   .939E+03  .112E+03      1.738     .962        9.00      .597
00184>      .660    9.960   .114E+04  .145E+03      2.020     .919        9.44      .606
00185>      .700   10.000   .139E+04  .187E+03      2.349     .879        9.86      .615
00186>
00187>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00188>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00189>
00190>                                      <---- hydrograph ---->   <-pipe / channel->
00191>                                AREA     QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00192>                                (ha)     (cms)    (hrs)   (mm)       (m)      (m/s)
00193>    INFLOW : ID= 2:2301       221.70    .250     6.83   3.510      .208      .623
00194>    OUTFLOW: ID= 3:2302       221.70    .250     7.00   3.510      .208      .622
00195>
00196>
00197> --------------------------------------------------------------------------------
00198> 001:0006----------------------------------------------------------------------
00199> ---------------------
00200> | CALIB NASHYD      |   Area    (ha)=   14.10   Curve Number   (CN)=69.00
00201> | 04:2102   DT= 5.00 |   Ia      (mm)=    5.000  # of Linear Res.(N)= 3.00
00202> ---------- ----------  U.H. Tp(hrs)=     .770
00203>
00204>      Unit Hyd Qpeak  (cms)=      .699
00205>
00206>      PEAK FLOW       (cms)=      .052 (i)
00207>      TIME TO PEAK    (hrs)=     2.500
00208>      RUNOFF VOLUME    (mm)=     2.982
00209>      TOTAL RAINFALL   (mm)=    24.998
00210>      RUNOFF COEFFICIENT   =     .119
00211>
00212>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00213>
00214> --------------------------------------------------------------------------------
00215> 001:0007----------------------------------------------------------------------
00216> ---------------------
00217> | ROUTE CHANNEL     |     Routing time step (min) =  5.00
00218> |  IN> 04:2102      |     Number of SEGMENTS =  3
00219> | OUT< 05:2303      |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00220> ---------- ----------                 LENGTH =  520.00     (m)
00221>
00222>                 <------ DATA FOR SECTION (   2.0) ------>
00223>                 Distance      Elevation       Manning
00224>                    .00          10.00          .0600
00225>                  10.00           9.80     .0600 / .0350  Main Channel
00226>                  10.80           9.30          .0350     Main Channel
00227>                  12.50           9.30          .0350     Main Channel
00228>                  13.00          10.30     .0350 / .0600  Main Channel
00229>                  16.00          10.30          .0600
00230>
00231>    <---------- TRAVEL TIME TABLE ----------> <---------->
00232>     DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00233>       (m)      (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
00234>      .036    9.336   .323E+02  .222E+00       .013     .213       40.61      .008
00235>      .071    9.371   .659E+02  .906E+00       .042     .331       26.21      .024
00236>      .107    9.407   .101E+03  .208E+01       .082     .424       20.45      .045
00237>      .143    9.443   .137E+03  .378E+01       .133     .503       17.24      .072
00238>      .179    9.479   .175E+03  .602E+01       .193     .572       15.15      .102
00239>      .214    9.514   .215E+03  .884E+01       .262     .635       13.66      .136
00240>      .250    9.550   .255E+03  .123E+02       .339     .691       12.54      .173
00241>      .286    9.586   .297E+03  .163E+02       .425     .744       11.65      .213
00242>      .321    9.621   .341E+03  .211E+02       .519     .793       10.94      .255
00243>      .357    9.657   .385E+03  .265E+02       .621     .838       10.34      .299
00244>      .393    9.693   .432E+03  .326E+02       .731     .881        9.83      .346
00245>      .429    9.729   .479E+03  .395E+02       .850     .922        9.40      .395
00246>      .464    9.764   .528E+03  .472E+02       .976     .961        9.02      .446
00247>      .500    9.800   .579E+03  .556E+02      1.111     .998        8.68      .499
00248>      .540    9.840   .657E+03  .682E+02      1.292    1.023        8.47      .552
00249>      .580    9.880   .777E+03  .867E+02      1.498    1.003        8.64      .582
00250>      .620    9.920   .939E+03  .112E+03      1.738     .962        9.00      .597
00251>      .660    9.960   .114E+04  .145E+03      2.020     .919        9.44      .606
00252>      .700   10.000   .139E+04  .187E+03      2.349     .879        9.86      .615
00253>
00254>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00255>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00256>
00257>                                      <---- hydrograph ---->   <-pipe / channel->
00258>                                AREA     QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00259>                                (ha)     (cms)    (hrs)   (mm)       (m)      (m/s)
00260>    INFLOW : ID= 4:2102       14.10     .052     2.50   2.982      .081      .351
00261>    OUTFLOW: ID= 5:2303       14.10     .047     2.92   2.982      .076      .341
00262>
00263>
00264> --------------------------------------------------------------------------------
00265> 001:0008----------------------------------------------------------------------
00266> ---------------------
00267> | CALIB NASHYD      |   Area    (ha)=   21.50   Curve Number   (CN)=65.00
00268> | 06:2103   DT= 5.00 |   Ia      (mm)=    5.000  # of Linear Res.(N)= 3.00
00269> ---------- ----------  U.H. Tp(hrs)=     .900
00270>
```

```
00271>      Unit Hyd Qpeak  (cms)=      .912
00272>
00273>      PEAK FLOW       (cms)=      .061 (i)
00274>      TIME TO PEAK    (hrs)=     2.750
00275>      RUNOFF VOLUME    (mm)=     2.551
00276>      TOTAL RAINFALL   (mm)=    24.998
00277>      RUNOFF COEFFICIENT   =      .102
00278>
00279>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00280>
00281> ------------------------------------------------------------------------------
00282> 001:0009----------------------------------------------------------------------
00283> ---------------------
00284> | ADD HYD (010203) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
00285> ---------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
00286>                    ID1 03:2302    221.70     .250     7.00    3.51     .000
00287>                   +ID2 05:2303     14.10     .047     2.92    2.98     .000
00288>                   +ID3 06:2103     21.50     .061     2.75    2.55     .000
00289>                    ==========================================================
00290>                    SUM 07:010203  257.30     .253     6.67    3.40     .000
00291>
00292>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00293>
00294> ------------------------------------------------------------------------------
00295> 001:0010----------------------------------------------------------------------
00296> *#  Sorichetti Site and SWM Pond hydrograph
00297> ---------------------
00298> | DESIGN STANDHYD    |   Area     (ha)=    11.33
00299> | 05:2104    DT= 5.00 |   Total Imp(%)=    30.00   Dir. Conn.(%)=   20.00
00300> ---------------------
00301>                              IMPERVIOUS     PERVIOUS (i)
00302>      Surface Area      (ha)=       3.40          7.93
00303>      Dep. Storage      (mm)=       .80          1.50
00304>      Average Slope      (%)=      2.00          2.00
00305>      Length             (m)=    274.83         40.00
00306>      Mannings n            =       .013          .250
00307>
00308>      Max.eff.Inten.(mm/hr)=      54.95          4.35
00309>                 over (min)=       5.00         30.00
00310>      Storage Coeff.  (min)=       4.84 (ii)    29.56 (ii)
00311>      Unit Hyd. Tpeak (min)=       5.00         30.00
00312>      Unit Hyd. peak  (cms)=       .22           .04
00313>                                                          *TOTALS*
00314>      PEAK FLOW       (cms)=       .31           .06          .324 (iii)
00315>      TIME TO PEAK    (hrs)=      1.50          2.00         1.500
00316>      RUNOFF VOLUME    (mm)=     24.20          3.38         7.547
00317>      TOTAL RAINFALL   (mm)=     25.00         25.00        24.998
00318>      RUNOFF COEFFICIENT   =       .97           .14          .302
00319>      *** WARNING: Storage Coefficient is smaller than DT!
00320>                   Use a smaller DT or a larger area.
00321>
00322>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00323>           CN* =  61.0    Ia = Dep. Storage  (Above)
00324>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00325>           THAN THE STORAGE COEFFICIENT.
00326>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00327>
00328> ------------------------------------------------------------------------------
00329> 001:0011----------------------------------------------------------------------
00330> ---------------------
00331> | ROUTE RESERVOIR    |     Requested routing time step =  5.0 min.
00332> |  IN>05:(2104  )    |
00333> | OUT<02:(002104)    |     ==========  OUTFLOW STORAGE TABLE  ==========
00334> ---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00335>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
00336>                              .000   .0000E+00   |     .025   .2800E+00
00337>                              .018   .1245E+00   |     .480   .4600E+00
00338>
00339>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00340>      ---------------           (ha)     (cms)     (hrs)       (mm)
00341>      INFLOW >05: (2104  )      11.33     .324     1.500      7.547
00342>      OUTFLOW<02: (002104)      11.33     .011     4.250      7.546
00343>
00344>                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.321
00345>                      TIME SHIFT OF PEAK FLOW          (min)=   165.00
00346>                      MAXIMUM  STORAGE   USED       (ha.m.)=.7447E-01
00347>
00348> ------------------------------------------------------------------------------
00349> 001:0012----------------------------------------------------------------------
00350> *#  Uncontrolled Drainage Area including Sorichetti Open Space and GT
00351> ---------------------
00352> | CALIB NASHYD       |   Area     (ha)=     1.51   Curve Number    (CN)=54.00
00353> | 01:2106    DT= 5.00 |   Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00354> ---------------------   U.H. Tp(hrs)=     .590
00355>
00356>      Unit Hyd Qpeak  (cms)=      .098
00357>
00358>      PEAK FLOW       (cms)=      .004 (i)
00359>      TIME TO PEAK    (hrs)=     2.250
00360>      RUNOFF VOLUME    (mm)=     1.691
00361>      TOTAL RAINFALL   (mm)=    24.998
00362>      RUNOFF COEFFICIENT   =      .068
00363>
00364>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00365>
00366> ------------------------------------------------------------------------------
00367> 001:0013----------------------------------------------------------------------
00368> ---------------------
00369> | ADD HYD (040607) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
00370> ---------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
00371>                    ID1 02:002104  11.33     .011     4.25    7.55     .000
00372>                   +ID2 01:2106     1.51     .004     2.25    1.69     .000
00373>                    ==========================================================
00374>                    SUM 06:040607   12.84     .012     2.75    6.86     .000
00375>
00376>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00377>
00378> ------------------------------------------------------------------------------
00379> 001:0014----------------------------------------------------------------------
00380> ---------------------
00381> | ROUTE CHANNEL      |     Routing time step (min) =  5.00
00382> |  IN> 06:040607     |     Number of SEGMENTS =  3
00383> | OUT< 10:2304       |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00384> ---------------------                 LENGTH =  520.00     (m)
00385>
00386>                  <------ DATA FOR SECTION (   2.0) ------>
00387>                  Distance      Elevation       Manning
00388>                       .00          10.00          .0600
00389>                     10.00           9.80      .0600 / .0350  Main Channel
00390>                     10.80           9.30          .0350      Main Channel
00391>                     12.50           9.30          .0350      Main Channel
00392>                     13.00          10.30      .0350 / .0600  Main Channel
00393>                     16.00          10.30          .0600
00394>
00395>    <------------------------- TRAVEL TIME TABLE -------------------------->
00396>     DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00397>       (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
00398>      .036    9.336  .323E+02  .222E+00       .013      .213      40.61     .008
00399>      .071    9.371  .659E+02  .906E+00       .042      .331      26.21     .024
00400>      .107    9.407  .101E+03  .208E+01       .082      .424      20.45     .045
00401>      .143    9.443  .137E+03  .378E+01       .133      .503      17.24     .072
00402>      .179    9.479  .175E+03  .602E+01       .193      .572      15.15     .102
00403>      .214    9.514  .215E+03  .884E+01       .262      .635      13.66     .136
00404>      .250    9.550  .255E+03  .123E+02       .339      .691      12.54     .173
00405>      .286    9.586  .297E+03  .163E+02       .425      .744      11.65     .213
00406>      .321    9.621  .341E+03  .211E+02       .519      .793      10.94     .255
00407>      .357    9.657  .385E+03  .265E+02       .621      .838      10.34     .299
00408>      .393    9.693  .432E+03  .326E+02       .731      .881       9.83     .346
00409>      .429    9.729  .479E+03  .395E+02       .850      .922       9.40     .395
00410>      .464    9.764  .528E+03  .472E+02       .976      .961       9.02     .446
00411>      .500    9.800  .579E+03  .556E+02      1.111      .998       8.68     .499
00412>      .540    9.840  .657E+03  .682E+02      1.292     1.023       8.47     .552
00413>      .580    9.880  .777E+03  .867E+02      1.498     1.003       8.64     .582
00414>      .620    9.920  .939E+03  .112E+03      1.738      .962       9.00     .597
00415>      .660    9.960  .114E+04  .145E+03      2.020      .919       9.44     .606
00416>      .700   10.000  .139E+04  .187E+03      2.349      .879       9.86     .615
00417>
00418>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00419>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00420>
00421>                                    <---- hydrograph ---->   <-pipe / channel->
00422>                                AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
00423>                                (ha)    (cms)    (hrs)    (mm)       (m)      (m/s)
00424>    INFLOW : ID= 6:040607      12.84     .012     2.75    6.858      .034      .213
00425>    OUTFLOW: ID=10:2304        12.84     .012     4.25    6.858      .032      .213
00426>
00427>
00428> ------------------------------------------------------------------------------
00429> 001:0015----------------------------------------------------------------------
00430> ---------------------
00431> | ADD HYD (2401  ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
00432> ---------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
00433>                    ID1 07:010203  257.30     .253     6.67    3.40     .000
00434>                   +ID2 10:2304     12.84     .012     4.25    6.86     .000
00435>                    ==========================================================
00436>                    SUM 09:2401    270.14     .263     6.58    3.57     .000
00437>
00438>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00439>
00440> ------------------------------------------------------------------------------
00441> 001:0016----------------------------------------------------------------------
00442> ---------------------
00443> | CALIB NASHYD       |   Area     (ha)=     1.16   Curve Number    (CN)=54.00
00444> | 08:2105    DT= 5.00 |   Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00445> ---------------------   U.H. Tp(hrs)=     .430
00446>
00447>      Unit Hyd Qpeak  (cms)=      .103
00448>
00449>      PEAK FLOW       (cms)=      .004 (i)
00450>      TIME TO PEAK    (hrs)=     2.083
00451>      RUNOFF VOLUME    (mm)=     1.691
00452>      TOTAL RAINFALL   (mm)=    24.998
00453>      RUNOFF COEFFICIENT   =      .068
00454>
00455>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00456>
00457> ------------------------------------------------------------------------------
00458> 001:0017----------------------------------------------------------------------
00459>       FINISH
00460> ------------------------------------------------------------------------------
00461> ********************************************************************************
00462>      WARNINGS / ERRORS / NOTES
00463>      -------------------------
00464>  001:0010 DESIGN STANDHYD
00465>       *** WARNING: Storage Coefficient is smaller than DT!
00466>                    Use a smaller DT or a larger area.
00467>   Simulation ended on 2004-05-10     at 16:59:56
00468> ================================================================================
00469>
00470>
```

```
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. 4.02
00006>      S  W W W  M   M  H   H    Y    M   M   O   O        9999    9999  July 1999
00007>  SSSSS   W W   M   M  H   H    Y    M   M    OOO            9       9  =========
00008>                                                          9   9   9   9  # 3737016
00009>        StormWater Management HYdrologic Model             999     999  =========
00010>
00011>  ********************************************************************************
00012>  ************************** SWMHYMO-99 Ver/4.02 ***********************************
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) 727-5199           ********
00019>  *******                  Gatineau, Quebec: (819) 243-6858           ********
00020>  *******                  E-Mail: swmhymo@jfsa.com                   ********
00021>  ********************************************************************************
00022>
00023>  ********************************************************************************
00024>  +++++++ Licensed user: C.F. Crozier & Associates Inc.                +++++++
00025>  +++++++                Collingwood          SERIAL#:3737016         +++++++
00026>  ********************************************************************************
00027>
00028>  ********************************************************************************
00029>  *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++               ********
00030>  *******          Maximum value for ID numbers  :     10              ********
00031>  *******          Max. number of rainfall points:  15000              ********
00032>  *******          Max. number of flow points    :  15000              ********
00033>  ********************************************************************************
00034>
00035>
00036>  ******************  D E T A I L E D   O U T P U T  ******************************
00037>  ********************************************************************************
00038>  *       DATE: 2004-05-14     TIME: 15:48:30     RUN COUNTER: 000086          *
00039>  ********************************************************************************
00040>  * Input   filename: C:\TEMP\SORICH~1\QUANIT~1\2yr.DAT                          *
00041>  * Output  filename: C:\TEMP\SORICH~1\QUANIT~1\2yr.out                          *
00042>  * Summary filename: C:\TEMP\SORICH~1\QUANIT~1\2yr.sum                          *
00043>  * User comments:                                                              *
00044>  * 1:_____________________________________________________________________     *
00045>  * 2:_____________________________________________________________________     *
00046>  * 3:_____________________________________________________________________     *
00047>  ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001----------------------------------------------------------------------
00051> *#*****************************************************************************
00052> *#  Project Name   : SORICHETTI POST-DEVELOPMENT 2 YEAR 24 HOUR CHICAGO STORM
00053> *#  Details        : SWM Pond for Quality and Quantity Control
00054> *#  Original Date  : 10-24-2002  (Burnside)
00055> *#  Revised        : May 2004  (CF Crozier & Associates Inc)
00056> *#  Modeller       : Chris Crozier, P.Eng.
00057> *#*****************************************************************************
00058> ------------------
00059> | START          |  Project dir.: C:\TEMP\SORICH~1\QUANIT~1\
00060> ------------------  Rainfall dir.: C:\TEMP\SORICH~1\QUANIT~1\
00061>     TZERO =   .00 hrs on       0
00062>     METOUT=   2 (output = METRIC)
00063>     NRUN  = 001
00064>     NSTORM=   0
00065> --------------------------------------------------------------------------------
00066> 001:0002----------------------------------------------------------------------
00067> ------------------
00068> | CHICAGO STORM  |    IDF curve parameters: A= 935.424
00069> | Ptotal= 47.14 mm |                      B=  10.500
00070> ------------------                      C=    .847
00071>                          used in:   INTENSITY =  A / (t + B)^C
00072>
00073>                            Duration of storm  = 24.00 hrs
00074>                            Storm time step    =  5.00 min
00075>                            Time to peak ratio =   .33
00076>
00077>                      The CORRELATION coefficient is = .9991333
00078>
00079>                        TIME        ENTERED          COMPUTED
00080>                       (min)       (mm/hr)          (mm/hr)
00081>                          5.         98.00            91.79
00082>                         10.         70.00            72.44
00083>                         15.         58.00            60.21
00084>                         30.         38.00            40.69
00085>                         60.         25.00            25.44
00086>                        120.         17.00            15.10
00087>                        360.          6.30             6.24
00088>                        720.          3.50             3.51
00089>                       1440.          1.90             1.96
00090>
00091>      TIME   RAIN |  TIME   RAIN |  TIME   RAIN |  TIME   RAIN
00092>      hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
00093>      .08    .316 |  6.08  1.158 | 12.08  1.080 | 18.08    .470
00094>      .17    .319 |  6.17  1.209 | 12.17  1.060 | 18.17    .467
00095>      .25    .322 |  6.25  1.265 | 12.25  1.040 | 18.25    .464
00096>      .33    .325 |  6.33  1.326 | 12.33  1.021 | 18.33    .460
00097>      .42    .328 |  6.42  1.395 | 12.42  1.003 | 18.42    .457
00098>      .50    .331 |  6.50  1.471 | 12.50   .985 | 18.50    .454
00099>      .58    .334 |  6.58  1.558 | 12.58   .968 | 18.58    .451
00100>      .67    .338 |  6.67  1.655 | 12.67   .952 | 18.67    .447
00101>      .75    .341 |  6.75  1.766 | 12.75   .937 | 18.75    .444
00102>      .83    .345 |  6.83  1.894 | 12.83   .921 | 18.83    .441
00103>      .92    .348 |  6.92  2.044 | 12.92   .907 | 18.92    .438
00104>     1.00    .352 |  7.00  2.220 | 13.00   .893 | 19.00    .435
00105>     1.08    .356 |  7.08  2.431 | 13.08   .879 | 19.08    .432
00106>     1.17    .360 |  7.17  2.688 | 13.17   .866 | 19.17    .429
00107>     1.25    .363 |  7.25  3.009 | 13.25   .853 | 19.25    .427
00108>     1.33    .367 |  7.33  3.418 | 13.33   .840 | 19.33    .424
00109>     1.42    .372 |  7.42  3.958 | 13.42   .828 | 19.42    .421
00110>     1.50    .376 |  7.50  4.701 | 13.50   .817 | 19.50    .418
00111>     1.58    .380 |  7.58  5.783 | 13.58   .805 | 19.58    .416
00112>     1.67    .385 |  7.67  7.487 | 13.67   .794 | 19.67    .413
00113>     1.75    .389 |  7.75 10.507 | 13.75   .784 | 19.75    .410
00114>     1.83    .394 |  7.83 17.032 | 13.83   .773 | 19.83    .408
00115>     1.92    .399 |  7.92 38.371 | 13.92   .763 | 19.92    .405
00116>     2.00    .404 |  8.00 91.790 | 14.00   .754 | 20.00    .403
00117>     2.08    .409 |  8.08 48.328 | 14.08   .744 | 20.08    .400
00118>     2.17    .414 |  8.17 28.461 | 14.17   .735 | 20.17    .398
00119>     2.25    .419 |  8.25 19.513 | 14.25   .726 | 20.25    .396
00120>     2.33    .425 |  8.33 14.594 | 14.33   .717 | 20.33    .393
00121>     2.42    .430 |  8.42 11.546 | 14.42   .708 | 20.42    .391
00122>     2.50    .436 |  8.50  9.499 | 14.50   .700 | 20.50    .389
00123>     2.58    .442 |  8.58  8.041 | 14.58   .692 | 20.58    .386
00124>     2.67    .448 |  8.67  6.956 | 14.67   .684 | 20.67    .384
00125>     2.75    .455 |  8.75  6.122 | 14.75   .676 | 20.75    .382
00126>     2.83    .461 |  8.83  5.462 | 14.83   .669 | 20.83    .380
00127>     2.92    .468 |  8.92  4.928 | 14.92   .661 | 20.92    .377
00128>     3.00    .475 |  9.00  4.488 | 15.00   .654 | 21.00    .375
00129>     3.08    .482 |  9.08  4.120 | 15.08   .647 | 21.08    .373
00130>     3.17    .490 |  9.17  3.808 | 15.17   .640 | 21.17    .371
00131>     3.25    .498 |  9.25  3.539 | 15.25   .634 | 21.25    .369
00132>     3.33    .506 |  9.33  3.307 | 15.33   .627 | 21.33    .367
00133>     3.42    .514 |  9.42  3.103 | 15.42   .621 | 21.42    .365
00134>     3.50    .522 |  9.50  2.923 | 15.50   .614 | 21.50    .363
00135>     3.58    .531 |  9.58  2.764 | 15.58   .608 | 21.58    .361
00136>     3.67    .541 |  9.67  2.621 | 15.67   .602 | 21.67    .359
00137>     3.75    .550 |  9.75  2.493 | 15.75   .596 | 21.75    .357
00138>     3.83    .560 |  9.83  2.377 | 15.83   .591 | 21.83    .355
00139>     3.92    .571 |  9.92  2.271 | 15.92   .585 | 21.92    .353
00140>     4.00    .581 | 10.00  2.175 | 16.00   .579 | 22.00    .351
00141>     4.08    .593 | 10.08  2.087 | 16.08   .574 | 22.08    .350
00142>     4.17    .604 | 10.17  2.006 | 16.17   .569 | 22.17    .348
00143>     4.25    .617 | 10.25  1.932 | 16.25   .564 | 22.25    .346
00144>     4.33    .629 | 10.33  1.863 | 16.33   .558 | 22.33    .344
00145>     4.42    .643 | 10.42  1.799 | 16.42   .553 | 22.42    .342
00146>     4.50    .657 | 10.50  1.739 | 16.50   .549 | 22.50    .341
00147>     4.58    .672 | 10.58  1.683 | 16.58   .544 | 22.58    .339
00148>     4.67    .687 | 10.67  1.631 | 16.67   .539 | 22.67    .337
00149>     4.75    .703 | 10.75  1.583 | 16.75   .534 | 22.75    .336
00150>     4.83    .720 | 10.83  1.537 | 16.83   .530 | 22.83    .334
00151>     4.92    .738 | 10.92  1.494 | 16.92   .525 | 22.92    .332
00152>     5.00    .757 | 11.00  1.453 | 17.00   .521 | 23.00    .331
00153>     5.08    .778 | 11.08  1.415 | 17.08   .517 | 23.08    .329
00154>     5.17    .799 | 11.17  1.379 | 17.17   .512 | 23.17    .328
00155>     5.25    .821 | 11.25  1.345 | 17.25   .508 | 23.25    .326
00156>     5.33    .845 | 11.33  1.312 | 17.33   .504 | 23.33    .324
00157>     5.42    .871 | 11.42  1.281 | 17.42   .500 | 23.42    .323
00158>     5.50    .898 | 11.50  1.252 | 17.50   .496 | 23.50    .321
00159>     5.58    .928 | 11.58  1.224 | 17.58   .492 | 23.58    .320
00160>     5.67    .959 | 11.67  1.197 | 17.67   .489 | 23.67    .318
00161>     5.75    .993 | 11.75  1.172 | 17.75   .485 | 23.75    .317
00162>     5.83   1.029 | 11.83  1.147 | 17.83   .481 | 23.83    .315
00163>     5.92   1.068 | 11.92  1.124 | 17.92   .477 | 23.92    .314
00164>     6.00   1.111 | 12.00  1.102 | 18.00   .474 | 24.00    .312
00165>
00166> --------------------------------------------------------------------------------
00167> 001:0003----------------------------------------------------------------------
00168> --------------------
00169> | CALIB NASHYD     |   Area     (ha)=  221.70   Curve Number    (CN)=73.00
00170> | 01:2101   DT= 5.00 |  Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00171> --------------------  U.H. Tp(hrs)=   4.570
00172>
00173>      Unit Hyd Qpeak  (cms)=    1.853
00174>
00175>      PEAK FLOW       (cms)=     .689 (i)
00176>      TIME TO PEAK    (hrs)=   13.750
00177>      RUNOFF VOLUME    (mm)=   13.050
00178>      TOTAL RAINFALL   (mm)=   47.143
00179>      RUNOFF COEFFICIENT  =     .277
00180>
00181>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00182>
00183> --------------------------------------------------------------------------------
00184> 001:0004----------------------------------------------------------------------
00185> --------------------
00186> | ROUTE CHANNEL    |     Routing time step (min) =  5.00
00187> |  IN> 01:2101     |     Number of SECTION =  3
00188> | OUT< 02:2301     |     Slopes (%), CHANNEL=5.00   FLOODPLAIN=5.00
00189> --------------------                     LENGTH =  530.00    (m)
00190>
00191>                  <------ DATA FOR SECTION (   1.0) ------>
00192>                  Distance      Elevation      Manning
00193>                     .00          20.00          .0600
00194>                   10.00          19.70     .0600 / .0350  Main Channel
00195>                   12.10          18.30          .0350     Main Channel
00196>                   16.30          18.30          .0350     Main Channel
00197>                   18.40          19.70     .0350 / .0600  Main Channel
00198>                   28.40          20.00          .0600
00199>
00200>  <------------------------------ TRAVEL TIME TABLE ------------------------------>
00201>    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00202>      (m)      (m)     (cu.m.)   (cu.m.)     (cms)     (m/s)      (min)   (m2/s)
00203>     .088   18.387    .201E+03  .332E+00      .464     1.225       7.21     .107
00204>     .175   18.475    .414E+03  .137E+01     1.481     1.896       4.66     .332
00205>     .263   18.563    .639E+03  .317E+01     2.928     2.428       3.64     .637
00206>     .350   18.650    .876E+03  .579E+01     4.764     2.881       3.07    1.008
00207>     .438   18.738    .113E+04  .930E+01     6.968     3.279       2.69    1.435
00208>     .525   18.825    .139E+04  .137E+02     9.527     3.638       2.43    1.910
00209>     .613   18.913    .166E+04  .192E+02    12.437     3.967       2.23    2.430
00210>     .700   19.000    .195E+04  .257E+02    15.696     4.271       2.07    2.990
00211>     .788   19.088    .225E+04  .334E+02    19.304     4.555       1.94    3.587
00212>     .875   19.175    .256E+04  .422E+02    23.263     4.823       1.83    4.220
00213>     .963   19.263    .288E+04  .523E+02    27.575     5.076       1.74    4.886
00214>    1.050   19.350    .321E+04  .637E+02    32.245     5.318       1.66    5.584
00215>    1.138   19.438    .356E+04  .764E+02    37.278     5.549       1.59    6.312
00216>    1.225   19.525    .392E+04  .906E+02    42.678     5.770       1.53    7.069
00217>    1.313   19.613    .429E+04  .106E+03    48.451     5.984       1.48    7.854
00218>    1.400   19.700    .467E+04  .123E+03    54.601     6.191       1.43    8.667
00219>    1.500   19.800    .530E+04  .150E+03    63.709     6.375       1.39    9.563
00220>    1.600   19.900    .627E+04  .189E+03    74.084     6.261       1.41   10.017
00221>    1.700   20.000    .760E+04  .244E+03    86.162     6.008       1.47   10.214
00222>
00223>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00224>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00225>
00226>                                        <---- hydrograph ---->   <-pipe / channel->
00227>                              AREA      QPEAK     TPEAK    R.V.    MAX DEPTH  MAX VEL
00228>                              (ha)      (cms)     (hrs)    (mm)       (m)      (m/s)
00229>    INFLOW : ID= 1:2101      221.70     .689   13.75 13.050          .107     1.329
00230>    OUTFLOW: ID= 2:2301      221.70     .689   13.83 13.050          .106     1.326
00231>
00232>
00233> --------------------------------------------------------------------------------
00234> 001:0005----------------------------------------------------------------------
00235> --------------------
00236> | ROUTE CHANNEL    |     Routing time step (min) =  5.00
00237> |  IN> 02:2301     |     Number of SECTION =  3
00238> | OUT< 03:2302     |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00239> --------------------                     LENGTH =  520.00    (m)
00240>
00241>
00242>                  <------ DATA FOR SECTION (   2.0) ------>
00243>                  Distance      Elevation      Manning
00244>                     .00          10.00          .0600
00245>                   10.00           9.80     .0600 / .0350  Main Channel
00246>                   10.80           9.30          .0350     Main Channel
00247>                   12.50           9.30          .0350     Main Channel
00248>                   13.00          10.30     .0350 / .0600  Main Channel
00249>                   16.00          10.30          .0600
00250>
00251>  <------------------------------ TRAVEL TIME TABLE ------------------------------>
00252>    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00253>      (m)      (m)     (cu.m.)   (cu.m.)     (cms)     (m/s)      (min)   (m2/s)
00254>     .036    9.336    .323E+02  .222E+00      .013      .213      40.61     .008
00255>     .071    9.371    .659E+02  .906E+00      .042      .331      26.21     .024
00256>     .107    9.407    .101E+03  .208E+01      .082      .424      20.45     .045
00257>     .143    9.443    .137E+03  .378E+01      .133      .503      17.24     .072
00258>     .179    9.479    .175E+03  .602E+01      .193      .572      15.15     .102
00259>     .214    9.514    .215E+03  .884E+01      .262      .635      13.66     .136
00260>     .250    9.550    .255E+03  .123E+02      .339      .691      12.54     .173
00261>     .286    9.586    .297E+03  .163E+02      .425      .744      11.65     .213
00262>     .321    9.621    .341E+03  .211E+02      .519      .793      10.94     .255
00263>     .357    9.657    .385E+03  .265E+02      .621      .838      10.34     .299
00264>     .393    9.693    .432E+03  .326E+02      .731      .881       9.83     .346
00265>     .429    9.729    .479E+03  .395E+02      .850      .922       9.40     .395
00266>     .464    9.764    .528E+03  .472E+02      .976      .961       9.02     .446
00267>     .500    9.800    .579E+03  .556E+02     1.111      .998       8.68     .499
00268>     .540    9.840    .657E+03  .682E+02     1.292     1.023       8.47     .552
00269>     .580    9.880    .777E+03  .867E+02     1.498     1.003       8.64     .582
00270>     .620    9.920    .939E+03  .112E+03     1.738      .962       9.00     .597
00271>     .660    9.960    .114E+04  .145E+03     2.020      .919       9.44     .606
```

```
00271>      .700   10.000  .139E+04  .187E+03      2.349      .879      9.86      .615
00272>
00273>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00274>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00275>
00276>                                          <---- hydrograph ---->   <-pipe / channel->
00277>                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00278>                                  (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00279>     INFLOW : ID= 2:2301        221.70     .689   13.83  13.050      .379      .864
00280>     OUTFLOW: ID= 3:2302        221.70     .689   14.00  13.050      .379      .864
00281>
00282>
00283> ----------------------------------------------------------------------------------
00284> 001:0006----------------------------------------------------------------------------
00285> ---------------------
00286> | CALIB NASHYD       |   Area     (ha)=   14.10   Curve Number    (CN)=69.00
00287> | 04:2102    DT= 5.00 |   Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00288> --------------------   U.H. Tp(hrs)=    .770
00289>
00290>      Unit Hyd Qpeak  (cms)=      .699
00291>
00292>      PEAK FLOW       (cms)=      .144 (i)
00293>      TIME TO PEAK    (hrs)=     9.000
00294>      RUNOFF VOLUME    (mm)=   11.366
00295>      TOTAL RAINFALL   (mm)=   47.143
00296>      RUNOFF COEFFICIENT   =      .241
00297>
00298>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00299>
00300> ----------------------------------------------------------------------------------
00301> 001:0007----------------------------------------------------------------------------
00302> --------------------
00303> | ROUTE CHANNEL     |      Routing time step (min) =  5.00
00304> |  IN> 04:2102      |      Number of SEGMENTS =  3
00305> | OUT< 05:2303      |      Slopes (%), CHANNEL= .50    FLOODPLAIN= .50
00306> --------------------                    LENGTH =  520.00     (m)
00307>
00308>                 <------ DATA FOR SECTION (   2.0) ------>
00309>                 Distance      Elevation       Manning
00310>                     .00          10.00          .0600
00311>                   10.00           9.80      .0600 / .0350  Main Channel
00312>                   10.80           9.30          .0350      Main Channel
00313>                   12.50           9.30          .0350      Main Channel
00314>                   13.00          10.30      .0350 / .0600  Main Channel
00315>                   16.00          10.30          .0600
00316>
00317>    <---------------------------- TRAVEL TIME TABLE ----------------------------->
00318>     DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00319>       (m)      (m)   (cu.m.)   (cu.m.)      (cms)      (m/s)      (min)    (m2/s)
00320>      .036    9.336  .323E+02  .222E+00       .013       .213      40.61      .008
00321>      .071    9.371  .659E+02  .906E+00       .042       .331      26.21      .024
00322>      .107    9.407  .101E+03  .208E+01       .082       .424      20.45      .045
00323>      .143    9.443  .137E+03  .378E+01       .133       .503      17.24      .072
00324>      .179    9.479  .175E+03  .602E+01       .193       .572      15.15      .102
00325>      .214    9.514  .215E+03  .884E+01       .262       .635      13.66      .136
00326>      .250    9.550  .255E+03  .123E+02       .339       .691      12.54      .173
00327>      .286    9.586  .297E+03  .163E+02       .425       .744      11.65      .213
00328>      .321    9.621  .341E+03  .211E+02       .519       .793      10.94      .255
00329>      .357    9.657  .385E+03  .265E+02       .621       .838      10.34      .299
00330>      .393    9.693  .432E+03  .326E+02       .731       .881       9.83      .346
00331>      .429    9.729  .479E+03  .395E+02       .850       .922       9.40      .395
00332>      .464    9.764  .528E+03  .472E+02       .976       .961       9.02      .446
00333>      .500    9.800  .579E+03  .556E+02      1.111      1.998       8.68      .499
00334>      .540    9.840  .657E+03  .682E+02      1.292      1.023       8.47      .552
00335>      .580    9.880  .777E+03  .867E+02      1.498      1.003       8.64      .582
00336>      .620    9.920  .939E+03  .112E+03      1.738       .962       9.00      .597
00337>      .660    9.960  .114E+04  .145E+03      2.020       .919       9.44      .606
00338>      .700   10.000  .139E+04  .187E+03      2.349       .879       9.86      .615
00339>
00340>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00341>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00342>
00343>                                          <---- hydrograph ---->   <-pipe / channel->
00344>                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00345>                                  (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00346>     INFLOW : ID= 4:2102        14.10     .144    9.00  11.366      .150      .515
00347>     OUTFLOW: ID= 5:2303        14.10     .137    9.25  11.366      .145      .506
00348>
00349>
00350> ----------------------------------------------------------------------------------
00351> 001:0008----------------------------------------------------------------------------
00352> ---------------------
00353> | CALIB NASHYD       |   Area     (ha)=   21.50   Curve Number    (CN)=65.00
00354> | 06:2103    DT= 5.00 |   Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00355> ---------------------   U.H. Tp(hrs)=    .900
00356>
00357>      Unit Hyd Qpeak  (cms)=      .912
00358>
00359>      PEAK FLOW       (cms)=      .170 (i)
00360>      TIME TO PEAK    (hrs)=     9.167
00361>      RUNOFF VOLUME    (mm)=     9.927
00362>      TOTAL RAINFALL   (mm)=   47.143
00363>      RUNOFF COEFFICIENT   =      .211
00364>
00365>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00366>
00367> ----------------------------------------------------------------------------------
00368> 001:0009----------------------------------------------------------------------------
00369> --------------------
00370> | ADD HYD (010203) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
00371> --------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
00372>                    ID1 03:2302     221.70     .689   14.00  13.05     .000
00373>                   +ID2 05:2303      14.10     .137    9.25  11.37     .000
00374>                   +ID3 06:2103      21.50     .170    9.17   9.93     .000
00375>                    ==========================================================
00376>                    SUM 07:010203   257.30     .729   13.92  12.70     .000
00377>
00378>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00379>
00380> ----------------------------------------------------------------------------------
00381> 001:0010----------------------------------------------------------------------------
00382> *#  Sorichetti Site and SWM Pond hydrograph
00383> ---------------------
00384> | DESIGN STANDHYD    |  Area     (ha)=   11.33
00385> | 05:2104    DT= 5.00 |  Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
00386> ---------------------
00387>                          IMPERVIOUS     PERVIOUS (i)
00388>      Surface Area     (ha)=      3.40          7.93
00389>      Dep. Storage     (mm)=      .80          1.50
00390>      Average Slope     (%)=     2.00          2.00
00391>      Length            (m)=   274.83         40.00
00392>      Mannings n             =     .013          .250
00393>
00394>      Max.eff.Inten.(mm/hr)=    91.79         12.17
00395>                over (min)        5.00         20.00
00396>      Storage Coeff.  (min)=     3.94 (ii)    20.33 (ii)
00397>      Unit Hyd. Tpeak (min)=     5.00         20.00
00398>      Unit Hyd. peak  (cms)=      .24           .06
00399>                                                        *TOTALS*
00400>      PEAK FLOW       (cms)=      .47           .16        .514 (iii)
00401>      TIME TO PEAK    (hrs)=     8.00          8.33       8.000
00402>      RUNOFF VOLUME    (mm)=    46.34         11.18      16.210
00403>      TOTAL RAINFALL   (mm)=    47.14         47.14      47.143
00404>      RUNOFF COEFFICIENT   =      .98           .24        .386
00405>       *** WARNING: Storage Coefficient is smaller than DT!
00406>                Use a smaller DT or a larger area.
00407>
00408>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00409>           CN* =  61.0    Ia = Dep. Storage  (Above)
00410>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00411>           THAN THE STORAGE COEFFICIENT.
00412>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00413>
00414> ----------------------------------------------------------------------------------
00415> 001:0011----------------------------------------------------------------------------
00416> ---------------------
00417> | ROUTE RESERVOIR    |     Requested routing time step =  5.0 min.
00418> |  IN>05:(2104  )    |
00419> | OUT<02:(002104)    |     ==========  OUTFLOW STORAGE TABLE  ==========
00420> ---------------------     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
00421>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
00422>                              .000   .0000E+00    |     .025   .2800E+00
00423>                              .018   .1245E+00    |     .480   .4600E+00
00424>
00425>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00426>      ---------------           (ha)     (cms)     (hrs)       (mm)
00427>      INFLOW >05: (2104  )     11.33      .514     8.000     18.210
00428>      OUTFLOW<02: (002104)     11.33      .019    12.083     18.209
00429>
00430>                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.638
00431>                   TIME SHIFT OF PEAK FLOW          (min)=   245.00
00432>                   MAXIMUM  STORAGE   USED        (ha.m.)=.1399E+00
00433>
00434> ----------------------------------------------------------------------------------
00435> 001:0012----------------------------------------------------------------------------
00436> *#   Uncontrolled Drainage Area including Sorichetti Open Space and GT
00437> ---------------------
00438> | CALIB NASHYD       |   Area     (ha)=    1.51   Curve Number    (CN)=54.00
00439> | 01:2106    DT= 5.00 |   Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00440> ---------------------   U.H. Tp(hrs)=    .590
00441>
00442>      Unit Hyd Qpeak  (cms)=      .098
00443>
00444>      PEAK FLOW       (cms)=      .011 (i)
00445>      TIME TO PEAK    (hrs)=     8.750
00446>      RUNOFF VOLUME    (mm)=     6.869
00447>      TOTAL RAINFALL   (mm)=   47.143
00448>      RUNOFF COEFFICIENT   =      .146
00449>
00450>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00451>
00452> ----------------------------------------------------------------------------------
00453> 001:0013----------------------------------------------------------------------------
00454> --------------------
00455> | ADD HYD (040607) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
00456> --------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
00457>                    ID1 02:002104    11.33      .019   12.08  18.21     .000
00458>                   +ID2 01:2106       1.51      .011    8.75   6.87     .000
00459>                    ==========================================================
00460>                    SUM 06:040607    12.84      .027    9.00  16.88     .000
00461>
00462>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00463>
00464> ----------------------------------------------------------------------------------
00465> 001:0014----------------------------------------------------------------------------
00466> ---------------------
00467> | ROUTE CHANNEL      |      Routing time step (min) =  5.00
00468> |  IN> 06:040607     |      Number of SEGMENTS =  3
00469> | OUT< 10:2304       |      Slopes (%), CHANNEL= .50    FLOODPLAIN= .50
00470> ---------------------                   LENGTH =  520.00     (m)
00471>
00472>                 <------ DATA FOR SECTION (   2.0) ------>
00473>                 Distance      Elevation       Manning
00474>                     .00          10.00          .0600
00475>                   10.00           9.80      .0600 / .0350  Main Channel
00476>                   10.80           9.30          .0350      Main Channel
00477>                   12.50           9.30          .0350      Main Channel
00478>                   13.00          10.30      .0350 / .0600  Main Channel
00479>                   16.00          10.30          .0600
00480>
00481>    <---------------------------- TRAVEL TIME TABLE ----------------------------->
00482>     DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00483>       (m)      (m)   (cu.m.)   (cu.m.)      (cms)      (m/s)      (min)    (m2/s)
00484>      .036    9.336  .323E+02  .222E+00       .013       .213      40.61      .008
00485>      .071    9.371  .659E+02  .906E+00       .042       .331      26.21      .024
00486>      .107    9.407  .101E+03  .208E+01       .082       .424      20.45      .045
00487>      .143    9.443  .137E+03  .378E+01       .133       .503      17.24      .072
00488>      .179    9.479  .175E+03  .602E+01       .193       .572      15.15      .102
00489>      .214    9.514  .215E+03  .884E+01       .262       .635      13.66      .136
00490>      .250    9.550  .255E+03  .123E+02       .339       .691      12.54      .173
00491>      .286    9.586  .297E+03  .163E+02       .425       .744      11.65      .213
00492>      .321    9.621  .341E+03  .211E+02       .519       .793      10.94      .255
00493>      .357    9.657  .385E+03  .265E+02       .621       .838      10.34      .299
00494>      .393    9.693  .432E+03  .326E+02       .731       .881       9.83      .346
00495>      .429    9.729  .479E+03  .395E+02       .850       .922       9.40      .395
00496>      .464    9.764  .528E+03  .472E+02       .976       .961       9.02      .446
00497>      .500    9.800  .579E+03  .556E+02      1.111      1.998       8.68      .499
00498>      .540    9.840  .657E+03  .682E+02      1.292      1.023       8.47      .552
00499>      .580    9.880  .777E+03  .867E+02      1.498      1.003       8.64      .582
00500>      .620    9.920  .939E+03  .112E+03      1.738       .962       9.00      .597
00501>      .660    9.960  .114E+04  .145E+03      2.020       .919       9.44      .606
00502>      .700   10.000  .139E+04  .187E+03      2.349       .879       9.86      .615
00503>
00504>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00505>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00506>
00507>                                          <---- hydrograph ---->   <-pipe / channel->
00508>                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00509>                                  (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00510>     INFLOW : ID= 6:040607      12.84      .027    9.00  16.876      .053      .257
00511>     OUTFLOW: ID=10:2304        12.84      .024    9.67  16.876      .049      .245
00512>
00513>
00514> ----------------------------------------------------------------------------------
00515> 001:0015----------------------------------------------------------------------------
00516> ---------------------
00517> | ADD HYD (2401  ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
00518> --------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
00519>                    ID1 07:010203   257.30      .729   13.92  12.70     .000
00520>                   +ID2 10:2304      12.84      .024    9.67  16.88     .000
00521>                    ==========================================================
00522>                    SUM 09:2401     270.14      .748   13.92  12.90     .000
00523>
00524>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00525>
00526> ----------------------------------------------------------------------------------
00527> 001:0016----------------------------------------------------------------------------
00528> ---------------------
00529> | CALIB NASHYD       |   Area     (ha)=    1.16   Curve Number    (CN)=54.00
00530> | 08:2105    DT= 5.00 |   Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00531> ---------------------   U.H. Tp(hrs)=    .430
00532>
00533>      Unit Hyd Qpeak  (cms)=      .103
00534>
00535>      PEAK FLOW       (cms)=      .010 (i)
00536>      TIME TO PEAK    (hrs)=     8.583
00537>      RUNOFF VOLUME    (mm)=     6.869
00538>      TOTAL RAINFALL   (mm)=   47.143
00539>      RUNOFF COEFFICIENT   =      .146
00540>
```

OUTLET B

OUTLET C

OUTLET A

```
00541>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00542>
00543> ------------------------------------------------------------------------------
00544> 001:0017----------------------------------------------------------------------
00545>      FINISH
00546> ------------------------------------------------------------------------------
00547> ******************************************************************************
00548>      WARNINGS / ERRORS / NOTES
00549>      -------------------------
00550>  001:0010 DESIGN STANDHYD
00551>       *** WARNING: Storage Coefficient is smaller than DT!
00552>                    Use a smaller DT or a larger area.
00553>   Simulation ended on 2004-05-14     at 15:48:31
00554> ==============================================================================
00555>
```

```
00001> ********************************************************************************
00002>
00003>  SSSSS  W    W  M    M  H    H  Y    Y  M    M   OOO         999    999  =========
00004> 5      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  HHHHHH    Y     M M M  O   O  ##   9   9  9   9  Ver. 4.02
00006>      S  W W W  M   M  H    H    Y     M   M  O   O        9999   9999 July 1999
00007>  SSSSS   W W   M   M  H    H    Y     M   M   OOO             9      9  =========
00008>                                                           9   9  9   9  # 3737016
00009>       StormWater Management HYdrologic Model               999    999  =========
00010>
00011> ********************************************************************************
00012> ************************** SWMHYMO-99 Ver/4.02 ***********************************
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) 727-5199            ********
00019> *******                  Gatineau, Quebec: (819) 243-6858            ********
00020> *******                  E-Mail: swmhymo@jfsa.com                    ********
00021> ********************************************************************************
00022>
00023> ********************************************************************************
00024> +++++++ Licensed user: C.F. Crozier & Associates Inc.                  +++++++
00025> +++++++                 Collingwood          SERIAL#:3737016         +++++++
00026> ********************************************************************************
00027>
00028> ********************************************************************************
00029> *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++               ********
00030> *******          Maximum value for ID numbers  :     10              ********
00031> *******          Max. number of rainfall points:  15000              ********
00032> *******          Max. number of flow points    :  15000              ********
00033> ********************************************************************************
00034>
00035>
00036> ********************   D E T A I L E D   O U T P U T   ********************
00037> ********************************************************************************
00038> *       DATE: 2004-05-10      TIME: 17:05:28      RUN COUNTER: 000084       *
00039> ********************************************************************************
00040> * Input   filename: C:\TEMP\SORICH~1\QUANIT~1\5yr.DAT                       *
00041> * Output  filename: C:\TEMP\SORICH~1\QUANIT~1\5yr.out                       *
00042> * Summary filename: C:\TEMP\SORICH~1\QUANIT~1\5yr.sum                       *
00043> * User comments:                                                           *
00044> * 1:_____________________________________________________________________*
00045> * 2:_____________________________________________________________________*
00046> * 3:_____________________________________________________________________*
00047> ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001----------------------------------------------------------------------
00051> *#*****************************************************************************
00052> *#  Project Name   : SORICHETTI POST-DEVELOPMENT 5 YEAR 24 HOUR CHICAGO STORM
00053> *#  Details        : SWM Pond for Quality and Quantity Control
00054> *#  Original Date  : 10-24-2002  (Burnside)
00055> *#  Revised        : May 2004  (CF Crozier & Associates Inc)
00056> *#  Modeller       : Chris Crozier, P.Eng.
00057> *#*****************************************************************************
00058> --------------------
00059> | START            |  Project dir.: C:\TEMP\SORICH~1\QUANIT~1\
00060> --------------------  Rainfall dir.: C:\TEMP\SORICH~1\QUANIT~1\
00061>     TZERO =   .00 hrs on        0
00062>     METOUT=   2 (output = METRIC)
00063>     NRUN  = 001
00064>     NSTORM=   0
00065> --------------------------------------------------------------------------------
00066> 001:0002----------------------------------------------------------------------
00067> --------------------
00068> | CHICAGO STORM    |     IDF curve parameters: A=1081.402
00069> | Ptotal= 64.95 mm |                           B=    9.194
00070> --------------------                           C=     .823
00071>                            used in:   INTENSITY = A / (t + B)^C
00072>
00073>                            Duration of storm  = 24.00 hrs
00074>                            Storm time step    =  5.00 min
00075>                            Time to peak ratio =   .33
00076>
00077>                       The CORRELATION coefficient is = .9993036
00078>
00079>                        TIME        ENTERED              COMPUTED
00080>                       (min)       (mm/hr)              (mm/hr)
00081>                          5.         130.00               121.84
00082>                         10.          90.00                95.05
00083>                         15.          77.00                78.56
00084>                         30.          50.00                52.82
00085>                         60.          33.00                33.08
00086>                        120.          21.00                19.79
00087>                        360.           8.80                 8.34
00088>                        720.           4.70                 4.76
00089>                       1440.           2.60                 2.71
00090>
00091>          TIME   RAIN |  TIME   RAIN |  TIME   RAIN |  TIME   RAIN
00092>           hrs  mm/hr |   hrs  mm/hr |   hrs  mm/hr |   hrs  mm/hr
00093>           .08   .498 |  6.08  1.722 | 12.08  1.612 | 18.08   .730
00094>           .17   .502 |  6.17  1.793 | 12.17  1.583 | 18.17   .725
00095>           .25   .507 |  6.25  1.872 | 12.25  1.556 | 18.25   .720
00096>           .33   .512 |  6.33  1.958 | 12.33  1.529 | 18.33   .715
00097>           .42   .516 |  6.42  2.053 | 12.42  1.503 | 18.42   .710
00098>           .50   .521 |  6.50  2.159 | 12.50  1.478 | 18.50   .705
00099>           .58   .526 |  6.58  2.278 | 12.58  1.454 | 18.58   .701
00100>           .67   .531 |  6.67  2.412 | 12.67  1.431 | 18.67   .696
00101>           .75   .536 |  6.75  2.564 | 12.75  1.408 | 18.75   .691
00102>           .83   .542 |  6.83  2.739 | 12.83  1.387 | 18.83   .687
00103>           .92   .547 |  6.92  2.941 | 12.92  1.366 | 18.92   .682
00104>          1.00   .553 |  7.00  3.178 | 13.00  1.346 | 19.00   .678
00105>          1.08   .558 |  7.08  3.461 | 13.08  1.326 | 19.08   .674
00106>          1.17   .564 |  7.17  3.803 | 13.17  1.307 | 19.17   .669
00107>          1.25   .570 |  7.25  4.226 | 13.25  1.289 | 19.25   .665
00108>          1.33   .576 |  7.33  4.763 | 13.33  1.271 | 19.33   .661
00109>          1.42   .582 |  7.42  5.465 | 13.42  1.254 | 19.42   .657
00110>          1.50   .589 |  7.50  6.422 | 13.50  1.237 | 19.50   .653
00111>          1.58   .595 |  7.58  7.803 | 13.58  1.220 | 19.58   .649
00112>          1.67   .602 |  7.67  9.957 | 13.67  1.205 | 19.67   .645
00113>          1.75   .609 |  7.75 13.740 | 13.75  1.189 | 19.75   .641
00114>          1.83   .616 |  7.83 21.884 | 13.83  1.174 | 19.83   .637
00115>          1.92   .623 |  7.92 49.106 | 13.92  1.160 | 19.92   .633
00116>          2.00   .630 |  8.00 121.844| 14.00  1.146 | 20.00   .629
00117>          2.08   .638 |  8.08 62.007 | 14.08  1.132 | 20.08   .626
00118>          2.17   .646 |  8.17 36.265 | 14.17  1.118 | 20.17   .622
00119>          2.25   .654 |  8.25 24.983 | 14.25  1.105 | 20.25   .618
00120>          2.33   .662 |  8.33 18.839 | 14.33  1.093 | 20.33   .615
00121>          2.42   .671 |  8.42 15.038 | 14.42  1.080 | 20.42   .611
00122>          2.50   .679 |  8.50 12.480 | 14.50  1.068 | 20.50   .608
00123>          2.58   .688 |  8.58 10.653 | 14.58  1.056 | 20.58   .604
00124>          2.67   .697 |  8.67  9.289 | 14.67  1.045 | 20.67   .601
00125>          2.75   .707 |  8.75  8.234 | 14.75  1.033 | 20.75   .598
00126>          2.83   .717 |  8.83  7.395 | 14.83  1.022 | 20.83   .594
00127>          2.92   .727 |  8.92  6.714 | 14.92  1.012 | 20.92   .591
00128>          3.00   .737 |  9.00  6.150 | 15.00  1.001 | 21.00   .588
00129>          3.08   .748 |  9.08  5.675 | 15.08   .991 | 21.08   .585
00130>          3.17   .759 |  9.17  5.270 | 15.17   .981 | 21.17   .582
00131>          3.25   .771 |  9.25  4.922 | 15.25   .971 | 21.25   .578
00132>          3.33   .782 |  9.33  4.618 | 15.33   .961 | 21.33   .575
00133>          3.42   .795 |  9.42  4.351 | 15.42   .952 | 21.42   .572
00134>          3.50   .807 |  9.50  4.114 | 15.50   .943 | 21.50   .569
00135>          3.58   .821 |  9.58  3.903 | 15.58   .934 | 21.58   .566
00136>          3.67   .834 |  9.67  3.714 | 15.67   .925 | 21.67   .563
00137>          3.75   .848 |  9.75  3.543 | 15.75   .916 | 21.75   .561
00138>          3.83   .863 |  9.83  3.389 | 15.83   .908 | 21.83   .558
00139>          3.92   .878 |  9.92  3.247 | 15.92   .900 | 21.92   .555
00140>          4.00   .894 | 10.00  3.118 | 16.00   .892 | 22.00   .552
00141>          4.08   .911 | 10.08  3.000 | 16.08   .884 | 22.08   .549
00142>          4.17   .928 | 10.17  2.890 | 16.17   .876 | 22.17   .547
00143>          4.25   .946 | 10.25  2.789 | 16.25   .868 | 22.25   .544
00144>          4.33   .965 | 10.33  2.696 | 16.33   .861 | 22.33   .541
00145>          4.42   .985 | 10.42  2.608 | 16.42   .853 | 22.42   .538
00146>          4.50  1.005 | 10.50  2.527 | 16.50   .846 | 22.50   .536
00147>          4.58  1.027 | 10.58  2.451 | 16.58   .839 | 22.58   .533
00148>          4.67  1.049 | 10.67  2.380 | 16.67   .832 | 22.67   .531
00149>          4.75  1.073 | 10.75  2.313 | 16.75   .825 | 22.75   .528
00150>          4.83  1.097 | 10.83  2.250 | 16.83   .818 | 22.83   .526
00151>          4.92  1.124 | 10.92  2.190 | 16.92   .812 | 22.92   .523
00152>          5.00  1.151 | 11.00  2.134 | 17.00   .805 | 23.00   .521
00153>          5.08  1.180 | 11.08  2.081 | 17.08   .799 | 23.08   .518
00154>          5.17  1.211 | 11.17  2.031 | 17.17   .793 | 23.17   .516
00155>          5.25  1.244 | 11.25  1.983 | 17.25   .786 | 23.25   .513
00156>          5.33  1.278 | 11.33  1.938 | 17.33   .780 | 23.33   .511
00157>          5.42  1.315 | 11.42  1.895 | 17.42   .775 | 23.42   .509
00158>          5.50  1.354 | 11.50  1.854 | 17.50   .769 | 23.50   .506
00159>          5.58  1.396 | 11.58  1.814 | 17.58   .763 | 23.58   .504
00160>          5.67  1.440 | 11.67  1.777 | 17.67   .757 | 23.67   .502
00161>          5.75  1.488 | 11.75  1.741 | 17.75   .752 | 23.75   .500
00162>          5.83  1.540 | 11.83  1.707 | 17.83   .746 | 23.83   .497
00163>          5.92  1.596 | 11.92  1.674 | 17.92   .741 | 23.92   .495
00164>          6.00  1.656 | 12.00  1.643 | 18.00   .736 | 24.00   .493
00165>
00166> --------------------------------------------------------------------------------
00167> 001:0003----------------------------------------------------------------------
00168> --------------------
00169> | CALIB NASHYD     |  Area    (ha)=  221.70   Curve Number   (CN)=73.00
00170> | 01:2101   DT= 5.00 |  Ia      (mm)=  5.000   # of Linear Res.(N)= 3.00
00171> --------------------  U.H. Tp(hrs)=  4.570
00172>
00173>     Unit Hyd Qpeak  (cms)=    1.853
00174>
00175>     PEAK FLOW       (cms)=    1.217 (i)
00176>     TIME TO PEAK    (hrs)=   13.750
00177>     RUNOFF VOLUME    (mm)=   23.355
00178>     TOTAL RAINFALL   (mm)=   64.952
00179>     RUNOFF COEFFICIENT   =    .360
00180>
00181>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00182>
00183> --------------------------------------------------------------------------------
00184> 001:0004----------------------------------------------------------------------
00185> --------------------
00186> | ROUTE CHANNEL    |     Routing time step (min) =  5.00
00187> |  IN> 01:2101     |     Number of SEGMENTS =  3
00188> | OUT< 02:2301     |     Slopes (%), CHANNEL=5.00   FLOODPLAIN=5.00
00189> --------------------          LENGTH =  530.00     (m)
00190>
00191>              <------ DATA FOR SECTION (   1.0) ------>
00192>             Distance     Elevation       Manning
00193>                .00         20.00          .0600
00194>              10.00         19.70    .0600 / .0350  Main Channel
00195>              12.10         18.30          .0350      Main Channel
00196>              16.30         18.30          .0350      Main Channel
00197>              18.40         19.70    .0350 / .0600  Main Channel
00198>              28.40         20.00          .0600
00199>
00200>  <---------------------------- TRAVEL TIME TABLE ---------------------------->
00201>   DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00202>     (m)      (m)    (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
00203>    .088   18.387   .201E+03  .332E+00      .464     1.225      7.21      .107
00204>    .175   18.475   .414E+03  .137E+01     1.481     1.896      4.66      .332
00205>    .263   18.563   .639E+03  .317E+01     2.928     2.428      3.64      .637
00206>    .350   18.650   .876E+03  .579E+01     4.764     2.881      3.07     1.008
00207>    .438   18.738   .113E+04  .930E+01     6.968     3.279      2.69     1.435
00208>    .525   18.825   .139E+04  .137E+02     9.527     3.638      2.43     1.910
00209>    .613   18.913   .166E+04  .192E+02    12.437     3.967      2.23     2.430
00210>    .700   19.000   .195E+04  .257E+02    15.696     4.271      2.07     2.990
00211>    .788   19.088   .225E+04  .334E+02    19.304     4.555      1.94     3.587
00212>    .875   19.175   .256E+04  .422E+02    23.263     4.823      1.83     4.220
00213>    .963   19.263   .288E+04  .523E+02    27.575     5.076      1.74     4.886
00214>   1.050   19.350   .321E+04  .637E+02    32.245     5.318      1.66     5.584
00215>   1.138   19.438   .356E+04  .764E+02    37.278     5.549      1.59     6.312
00216>   1.225   19.525   .392E+04  .906E+02    42.678     5.770      1.53     7.069
00217>   1.313   19.613   .429E+04  .106E+03    48.451     5.984      1.48     7.854
00218>   1.400   19.700   .467E+04  .123E+03    54.601     6.191      1.43     8.667
00219>   1.500   19.800   .530E+04  .150E+03    63.709     6.375      1.39     9.563
00220>   1.600   19.900   .627E+04  .189E+03    74.084     6.261      1.41    10.017
00221>   1.700   20.000   .760E+04  .244E+03    86.162     6.008      1.47    10.214
00222>
00223>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00224>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00225>
00226>                                    <---- hydrograph ---->   <-pipe / channel->
00227>                          AREA      QPEAK     TPEAK    R.V.   MAX DEPTH  MAX VEL
00228>                          (ha)      (cms)     (hrs)    (mm)      (m)      (m/s)
00229>   INFLOW : ID= 1:2101   221.70    1.217     13.75   23.355      .152     1.660
00230>   OUTFLOW: ID= 2:2301   221.70    1.217     13.83   23.355      .152     1.657
00231>
00232>
00233> --------------------------------------------------------------------------------
00234> 001:0005----------------------------------------------------------------------
00235> --------------------
00236> | ROUTE CHANNEL    |     Routing time step (min) =  5.00
00237> |  IN> 02:2301     |     Number of SEGMENTS =  3
00238> | OUT< 03:2302     |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00239> --------------------          LENGTH =  520.00     (m)
00240>
00241>              <------ DATA FOR SECTION (   2.0) ------>
00242>             Distance     Elevation       Manning
00243>                .00         10.00          .0600
00244>              10.00          9.80    .0600 / .0350  Main Channel
00245>              10.80          9.30          .0350      Main Channel
00246>              12.50          9.30          .0350      Main Channel
00247>              13.00         10.30    .0350 / .0600  Main Channel
00248>              16.00         10.30          .0600
00249>
00250>  <---------------------------- TRAVEL TIME TABLE ---------------------------->
00251>   DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00252>     (m)      (m)    (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
00253>    .036    9.836   .323E+02  .222E+00      .013      .213     40.61      .008
00254>    .071    9.871   .659E+02  .906E+00      .042      .331     26.21      .024
00255>    .107    9.907   .101E+03  .208E+01      .082      .424     20.45      .045
00256>    .143    9.943   .137E+03  .378E+01      .133      .503     17.24      .072
00257>    .179    9.979   .175E+03  .602E+01      .193      .572     15.15      .102
00258>    .214    9.514   .215E+03  .884E+01      .262      .635     13.66      .136
00259>    .250    9.550   .255E+03  .123E+02      .339      .691     12.54      .173
00260>    .286    9.586   .297E+03  .163E+02      .425      .744     11.65      .213
00261>    .321    9.621   .341E+03  .211E+02      .519      .793     10.94      .255
00262>    .357    9.657   .385E+03  .265E+02      .621      .838     10.34      .299
00263>    .393    9.693   .432E+03  .326E+02      .731      .881      9.83      .346
00264>    .429    9.729   .479E+03  .395E+02      .850      .922      9.40      .395
00265>    .464    9.764   .528E+03  .472E+02      .976      .961      9.02      .446
00266>    .500    9.800   .579E+03  .556E+02     1.111     1.998      8.68      .499
00267>    .540    9.840   .657E+03  .682E+02     1.292     1.023      8.47      .552
00268>    .580    9.880   .777E+03  .867E+02     1.498     1.003      8.64      .582
00269>    .620    9.920   .939E+03  .112E+03     1.738      .962      9.00      .597
00270>    .660    9.960   .114E+04  .145E+03     2.020      .919      9.44      .606
```

```
00271>      .700   10.000  .139E+04  .187E+03      2.349      .879      9.86      .615
00272>
00273>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00274>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00275>
00276>                                        <---- hydrograph ---->   <-pipe / channel->
00277>                                 AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00278>                                 (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00279>    INFLOW : ID= 2:2301        221.70    1.217   13.83  23.355      .523      1.013
00280>    OUTFLOW: ID= 3:2302        221.70    1.216   13.92  23.355      .523      1.012
00281>
00282>
00283> ------------------------------------------------------------------------------
00284> 001:0006------------------------------------------------------------------------
00285> ------------------
00286> | CALIB NASHYD       |   Area     (ha)=   14.10   Curve Number    (CN)=69.00
00287> | 04:2102   DT= 5.00 |   Ia       (mm)=    5.000  # of Linear Res.(N)= 3.00
00288> ---------------------   U.H. Tp(hrs)=    .770
00289>
00290>      Unit Hyd Qpeak  (cms)=      .699
00291>
00292>      PEAK FLOW       (cms)=      .257 (i)
00293>      TIME TO PEAK    (hrs)=     9.000
00294>      RUNOFF VOLUME    (mm)=    20.648
00295>      TOTAL RAINFALL   (mm)=    64.952
00296>      RUNOFF COEFFICIENT  =      .318
00297>
00298>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00299>
00300> ------------------------------------------------------------------------------
00301> 001:0007------------------------------------------------------------------------
00302> --------------------
00303> | ROUTE CHANNEL     |     Routing time step (min) =  5.00
00304> |  IN> 04:2102      |     Number of SEGMENTS =  3
00305> | OUT< 05:2303      |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00306> --------------------                LENGTH =  520.00     (m)
00307>
00308>                <------ DATA FOR SECTION (   2.0) ------>
00309>                Distance      Elevation        Manning
00310>                   .00          10.00           .0600
00311>                 10.00           9.80     .0600 / .0350  Main Channel
00312>                 10.80           9.30           .0350     Main Channel
00313>                 12.50           9.30           .0350     Main Channel
00314>                 13.00          10.30     .0350 / .0600  Main Channel
00315>                 16.00          10.30           .0600
00316>
00317>    <---------------------------- TRAVEL TIME TABLE ---------------------------->
00318>     DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00319>       (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
00320>      .036    9.336  .323E+02  .222E+00       .013      .213      40.61      .008
00321>      .071    9.371  .659E+02  .906E+00       .042      .331      26.21      .024
00322>      .107    9.407  .101E+03  .208E+01       .082      .424      20.45      .045
00323>      .143    9.443  .137E+03  .378E+01       .133      .503      17.24      .072
00324>      .179    9.479  .175E+03  .602E+01       .193      .572      15.15      .102
00325>      .214    9.514  .215E+03  .884E+01       .262      .635      13.66      .136
00326>      .250    9.550  .255E+03  .123E+02       .339      .691      12.54      .173
00327>      .286    9.586  .297E+03  .163E+02       .425      .744      11.65      .213
00328>      .321    9.621  .341E+03  .211E+02       .519      .793      10.94      .255
00329>      .357    9.657  .385E+03  .265E+02       .621      .838      10.34      .299
00330>      .393    9.693  .432E+03  .326E+02       .731      .881       9.83      .346
00331>      .429    9.729  .479E+03  .395E+02       .850      .922       9.40      .395
00332>      .464    9.764  .528E+03  .472E+02       .976      .961       9.02      .446
00333>      .500    9.800  .579E+03  .556E+02      1.111     1.998       8.68      .499
00334>      .540    9.840  .657E+03  .682E+02      1.292     1.023       8.47      .552
00335>      .580    9.880  .777E+03  .867E+02      1.498     1.003       8.64      .582
00336>      .620    9.920  .939E+03  .112E+03      1.738      .962       9.00      .597
00337>      .660    9.960  .114E+04  .145E+03      2.020      .919       9.44      .606
00338>      .700   10.000  .139E+04  .187E+03      2.349      .879       9.86      .615
00339>
00340>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00341>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00342>
00343>                                        <---- hydrograph ---->   <-pipe / channel->
00344>                                 AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00345>                                 (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00346>    INFLOW : ID= 4:2102         14.10     .257    9.00  20.648      .212      .629
00347>    OUTFLOW: ID= 5:2303         14.10     .248    9.17  20.648      .206      .619
00348>
00349>
00350> ------------------------------------------------------------------------------
00351> 001:0008------------------------------------------------------------------------
00352> --------------------
00353> | CALIB NASHYD       |   Area     (ha)=   21.50   Curve Number    (CN)=65.00
00354> | 06:2103   DT= 5.00 |   Ia       (mm)=    5.000  # of Linear Res.(N)= 3.00
00355> ---------------------   U.H. Tp(hrs)=    .900
00356>
00357>      Unit Hyd Qpeak  (cms)=      .912
00358>
00359>      PEAK FLOW       (cms)=      .306 (i)
00360>      TIME TO PEAK    (hrs)=     9.167
00361>      RUNOFF VOLUME    (mm)=    18.271
00362>      TOTAL RAINFALL   (mm)=    64.952
00363>      RUNOFF COEFFICIENT  =      .281
00364>
00365>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00366>
00367> ------------------------------------------------------------------------------
00368> 001:0009------------------------------------------------------------------------
00369> ---------------------
00370> | ADD HYD (010203) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
00371> ---------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
00372>                    ID1 03:2302    221.70    1.216   13.92  23.35     .000
00373>                   +ID2 05:2303     14.10     .248    9.17  20.65     .000
00374>                   +ID3 06:2103     21.50     .306    9.17  18.27     .000
00375>                    ==========================================================
00376>                    SUM 07:010203   257.30    1.290   13.75  22.78     .000
00377>
00378>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00379>
00380> ------------------------------------------------------------------------------
00381> 001:0010------------------------------------------------------------------------
00382> *#  Sorichetti Site and SWM Pond hydrograph
00383> ----------------------
00384> | DESIGN STANDHYD    |   Area     (ha)=   11.33
00385> | 05:2104   DT= 5.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
00386> ----------------------
00387>                              IMPERVIOUS     PERVIOUS (i)
00388>      Surface Area     (ha)=       3.40          7.93
00389>      Dep. Storage     (mm)=       .80          1.50
00390>      Average Slope     (%)=      2.00          2.00
00391>      Length            (m)=    274.83         40.00
00392>      Mannings n            =      .013          .250
00393>
00394>      Max.eff.Inten.(mm/hr)=    121.84         23.81
00395>                over (min)          5.00         15.00
00396>      Storage Coeff.  (min)=      3.52 (ii)     16.05 (ii)
00397>      Unit Hyd. Tpeak (min)=      5.00         15.00
00398>      Unit Hyd. peak  (cms)=       .26           .07
00399>                                                      *TOTALS*
00400>      PEAK FLOW       (cms)=       .65           .32          .763 (iii)
00401>      TIME TO PEAK    (hrs)=      8.00          8.25         8.000
00402>      RUNOFF VOLUME    (mm)=     64.15         19.69        28.579
00403>      TOTAL RAINFALL   (mm)=     64.95         64.95        64.952
00404>      RUNOFF COEFFICIENT  =       .99           .30          .440
00405>       *** WARNING: Storage Coefficient is smaller than DT!
00406>                   Use a smaller DT or a larger area.
00407>
00408>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00409>            CN* =  61.0    Ia = Dep. Storage  (Above)
00410>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00411>            THAN THE STORAGE COEFFICIENT.
00412>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00413>
00414> ==============================================================================
00415> 001:0011------------------------------------------------------------------------
00416> --------------------
00417> | ROUTE RESERVOIR    |     Requested routing time step =  5.0 min.
00418> |  IN>05:(2104  )    |
00419> | OUT<02:(002104)    |     ========  OUTFLOW STORAGE TABLE  ========
00420> ---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00421>                             (cms)     (ha.m.)  |    (cms)    (ha.m.)
00422>                              .000   .0000E+00   |    .025   .2800E+00
00423>                              .018   .1245E+00   |    .480   .4600E+00
00424>
00425>      ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
00426>      ---------------              (ha)     (cms)     (hrs)       (mm)
00427>      INFLOW >05: (2104  )       11.33      .763     8.000     28.579
00428>      OUTFLOW<02: (002104)       11.33      .022    13.833     28.578
00429>
00430>                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.945
00431>                   TIME SHIFT OF PEAK FLOW          (min)=   350.00
00432>                   MAXIMUM  STORAGE   USED        (ha.m.)=.2240E+00
00433>
00434> ==============================================================================
00435> 001:0012------------------------------------------------------------------------
00436> *#   Uncontrolled Drainage Area including Sorichetti Open Space and GT
00437> --------------------
00438> | CALIB NASHYD       |  Area     (ha)=    1.51   Curve Number    (CN)=54.00
00439> | 01:2106   DT= 5.00 |  Ia       (mm)=    5.000  # of Linear Res.(N)= 3.00
00440> ---------------------  U.H. Tp(hrs)=     .590
00441>
00442>      Unit Hyd Qpeak  (cms)=      .098
00443>
00444>      PEAK FLOW       (cms)=      .020 (i)
00445>      TIME TO PEAK    (hrs)=     8.750
00446>      RUNOFF VOLUME    (mm)=    13.007
00447>      TOTAL RAINFALL   (mm)=    64.952
00448>      RUNOFF COEFFICIENT  =      .200
00449>
00450>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00451>
00452> ------------------------------------------------------------------------------
00453> 001:0013------------------------------------------------------------------------
00454> ---------------------
00455> | ADD HYD (040607) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
00456> ---------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
00457>                    ID1 02:002104   11.33     .022    13.83  28.58     .000
00458>                   +ID2 01:2106      1.51     .020     8.75  13.01     .000
00459>                    ==========================================================
00460>                    SUM 06:040607    12.84     .040     8.83  26.75     .000
00461>
00462>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00463>
00464> ------------------------------------------------------------------------------
00465> 001:0014------------------------------------------------------------------------
00466> --------------------
00467> | ROUTE CHANNEL      |     Routing time step (min) =  5.00
00468> |  IN> 06:040607     |     Number of SEGMENTS =  3
00469> | OUT< 10:2304       |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00470> --------------------                LENGTH =  520.00     (m)
00471>
00472>                <------ DATA FOR SECTION (   2.0) ------>
00473>                Distance      Elevation        Manning
00474>                   .00          10.00           .0600
00475>                 10.00           9.80     .0600 / .0350  Main Channel
00476>                 10.80           9.30           .0350     Main Channel
00477>                 12.50           9.30           .0350     Main Channel
00478>                 13.00          10.30     .0350 / .0600  Main Channel
00479>                 16.00          10.30           .0600
00480>
00481>    <---------------------------- TRAVEL TIME TABLE ---------------------------->
00482>     DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00483>       (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
00484>      .036    9.336  .323E+02  .222E+00       .013      .213      40.61      .008
00485>      .071    9.371  .659E+02  .906E+00       .042      .331      26.21      .024
00486>      .107    9.407  .101E+03  .208E+01       .082      .424      20.45      .045
00487>      .143    9.443  .137E+03  .378E+01       .133      .503      17.24      .072
00488>      .179    9.479  .175E+03  .602E+01       .193      .572      15.15      .102
00489>      .214    9.514  .215E+03  .884E+01       .262      .635      13.66      .136
00490>      .250    9.550  .255E+03  .123E+02       .339      .691      12.54      .173
00491>      .286    9.586  .297E+03  .163E+02       .425      .744      11.65      .213
00492>      .321    9.621  .341E+03  .211E+02       .519      .793      10.94      .255
00493>      .357    9.657  .385E+03  .265E+02       .621      .838      10.34      .299
00494>      .393    9.693  .432E+03  .326E+02       .731      .881       9.83      .346
00495>      .429    9.729  .479E+03  .395E+02       .850      .922       9.40      .395
00496>      .464    9.764  .528E+03  .472E+02       .976      .961       9.02      .446
00497>      .500    9.800  .579E+03  .556E+02      1.111      .998       8.68      .499
00498>      .540    9.840  .657E+03  .682E+02      1.292     1.023       8.47      .552
00499>      .580    9.880  .777E+03  .867E+02      1.498     1.003       8.64      .582
00500>      .620    9.920  .939E+03  .112E+03      1.738      .962       9.00      .597
00501>      .660    9.960  .114E+04  .145E+03      2.020      .919       9.44      .606
00502>      .700   10.000  .139E+04  .187E+03      2.349      .879       9.86      .615
00503>
00504>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00505>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00506>
00507>                                        <---- hydrograph ---->   <-pipe / channel->
00508>                                 AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00509>                                 (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00510>    INFLOW : ID= 6:040607       12.84     .040    8.83  26.747      .069      .317
00511>    OUTFLOW: ID=10:2304         12.84     .035    9.25  26.747      .063      .292
00512>
00513>
00514> ==============================================================================
00515> 001:0015------------------------------------------------------------------------
00516> --------------------
00517> | ADD HYD (2401  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
00518> ---------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
00519>                    ID1 07:010203  257.30    1.290   13.75  22.78     .000
00520>                   +ID2 10:2304     12.84     .035    9.25  26.75     .000
00521>                    ==========================================================
00522>                    SUM 09:2401    270.14    1.314   13.75  22.97     .000
00523>
00524>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00525>
00526> ------------------------------------------------------------------------------
00527> 001:0016------------------------------------------------------------------------
00528> --------------------
00529> | CALIB NASHYD       |  Area     (ha)=    1.16   Curve Number    (CN)=54.00
00530> | 08:2105   DT= 5.00 |  Ia       (mm)=    5.000  # of Linear Res.(N)= 3.00
00531> ---------------------  U.H. Tp(hrs)=     .430
00532>
00533>      Unit Hyd Qpeak  (cms)=      .103
00534>
00535>      PEAK FLOW       (cms)=      .019 (i)
00536>      TIME TO PEAK    (hrs)=     8.500
00537>      RUNOFF VOLUME    (mm)=    13.007
00538>      TOTAL RAINFALL   (mm)=    64.952
00539>      RUNOFF COEFFICIENT  =      .200
00540>
```

OUTLET B

OUTLET C

OUTLET A

```
00541>       (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00542>
00543> ---------------------------------------------------------------------------
00544> 001:0017----------------------------------------------------------------------
00545>       FINISH
00546> ---------------------------------------------------------------------------
00547> ***************************************************************************
00548>       WARNINGS / ERRORS / NOTES
00549>       -------------------------
00550>  001:0010 DESIGN STANDHYD
00551>        *** WARNING: Storage Coefficient is smaller than DT!
00552>                     Use a smaller DT or a larger area.
00553>    Simulation ended on 2004-05-10     at 17:05:29
00554> ===========================================================================
00555>
00556>
```

```
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. 4.02
00006>      S  WW W  M   M  H   H    Y    M   M  O   O          9999    9999  July 1999
00007>  SSSSS  W W  M   M  H   H    Y    M   M   OOO            9       9  =========
00008>                                                        9   9   9   9  # 3737016
00009>       StormWater Management HYdrologic Model            999     999  =========
00010>
00011>  ********************************************************************************
00012>  ************************** SWMHYMO-99 Ver/4.02 ********************************
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) 727-5199            *******
00019>  *******                  Gatineau, Quebec: (819) 243-6858            *******
00020>  *******                  E-Mail: swmhymo@jfsa.com                    *******
00021>  ********************************************************************************
00022>
00023>  ********************************************************************************
00024>  +++++++ Licensed user: C.F. Crozier & Associates Inc.                 +++++++
00025>  +++++++                Collingwood          SERIAL#:3737016          +++++++
00026>  ********************************************************************************
00027>
00028>  ********************************************************************************
00029>  *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++               *******
00030>  *******          Maximum value for ID numbers  :     10               *******
00031>  *******          Max. number of rainfall points:  15000               *******
00032>  *******          Max. number of flow points    :  15000               *******
00033>  ********************************************************************************
00034>
00035>
00036>  *********************  D E T A I L E D   O U T P U T  *********************
00037>  ********************************************************************************
00038>  *      DATE: 2004-05-10        TIME: 16:51:37        RUN COUNTER: 000080       *
00039>  ********************************************************************************
00040>  * Input   filename: C:\TEMP\SORICH-1\QUANIT-1\10yr.DAT                        *
00041>  * Output  filename: C:\TEMP\SORICH-1\QUANIT-1\10yr.out                       *
00042>  * Summary filename: C:\TEMP\SORICH-1\QUANIT-1\10yr.sum                       *
00043>  * User comments:                                                            *
00044>  * 1:_____________________________________________________________________   *
00045>  * 2:_____________________________________________________________________   *
00046>  * 3:_____________________________________________________________________   *
00047>  ********************************************************************************
00048>
00049>  --------------------------------------------------------------------------------
00050> 001:0001-----------------------------------------------------------------------
00051> *$*********************************************************************************
00052> *$  Project Name   : SORICHETTI POST-DEVELOPMENT 10 YEAR 24 HOUR CHICAGO STORM
00053> *$  Details        : SWM Pond for Quality & Quantity Control
00054> *$  Original Date  : 10-24-2002  (Burnside)
00055> *$  Revised        : May 2004  (CF Crozier & Associates Inc)
00056> *$  Modeller       : Chris Crozier, P.Eng.
00057> *$*********************************************************************************
00058>  -------------------
00059> | START             |  Project dir.: C:\TEMP\SORICH-1\QUANIT-1\
00060>  -------------------  Rainfall dir.: C:\TEMP\SORICH-1\QUANIT-1\
00061>     TZERO =   .00 hrs on      0
00062>     METOUT=   2 (output = METRIC)
00063>     NRUN  = 001
00064>     NSTORM=   0
00065>  --------------------------------------------------------------------------------
00066> 001:0002-----------------------------------------------------------------------
00067>  -------------------
00068> | CHICAGO STORM     |    IDF curve parameters: A=1228.125
00069> | Ptotal= 76.50 mm  |                          B=    9.193
00070>  -------------------                          C=    .818
00071>                             used in:   INTENSITY =  A / (t + B)^C
00072>
00073>                             Duration of storm  = 24.00 hrs
00074>                             Storm time step    =  5.00 min
00075>                             Time to peak ratio =   .33
00076>
00077>                        The CORRELATION coefficient is = .9989476
00078>
00079>                          TIME        ENTERED              COMPUTED
00080>                         (min)        (mm/hr)              (mm/hr)
00081>                           5.          150.00               140.23
00082>                          10.          105.00               109.55
00083>                          15.           89.00                90.65
00084>                          30.           57.00                61.09
00085>                          60.           38.00                38.38
00086>                         120.           24.00                23.03
00087>                         360.           11.00                 9.76
00088>                         720.            5.50                 5.59
00089>                        1440.            3.00                 3.19
00090>
00091>          TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
00092>           hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
00093>           .08    .602 |  6.08  2.063 | 12.08  1.933 | 18.08    .881
00094>           .17    .608 |  6.17  2.148 | 12.17  1.899 | 18.17    .875
00095>           .25    .613 |  6.25  2.241 | 12.25  1.865 | 18.25    .869
00096>           .33    .619 |  6.33  2.343 | 12.33  1.834 | 18.33    .863
00097>           .42    .625 |  6.42  2.456 | 12.42  1.803 | 18.42    .857
00098>           .50    .630 |  6.50  2.582 | 12.50  1.773 | 18.50    .851
00099>           .58    .636 |  6.58  2.722 | 12.58  1.745 | 18.58    .846
00100>           .67    .642 |  6.67  2.881 | 12.67  1.717 | 18.67    .840
00101>           .75    .649 |  6.75  3.061 | 12.75  1.690 | 18.75    .834
00102>           .83    .655 |  6.83  3.267 | 12.83  1.665 | 18.83    .829
00103>           .92    .662 |  6.92  3.506 | 12.92  1.640 | 18.92    .824
00104>          1.00    .668 |  7.00  3.786 | 13.00  1.616 | 19.00    .818
00105>          1.08    .675 |  7.08  4.119 | 13.08  1.592 | 19.08    .813
00106>          1.17    .682 |  7.17  4.522 | 13.17  1.570 | 19.17    .808
00107>          1.25    .689 |  7.25  5.020 | 13.25  1.548 | 19.25    .803
00108>          1.33    .696 |  7.33  5.650 | 13.33  1.527 | 19.33    .798
00109>          1.42    .704 |  7.42  6.473 | 13.42  1.506 | 19.42    .793
00110>          1.50    .711 |  7.50  7.594 | 13.50  1.486 | 19.50    .788
00111>          1.58    .719 |  7.58  9.208 | 13.58  1.467 | 19.58    .783
00112>          1.67    .727 |  7.67 11.718 | 13.67  1.448 | 19.67    .779
00113>          1.75    .736 |  7.75 16.114 | 13.75  1.429 | 19.75    .774
00114>          1.83    .744 |  7.83 25.543 | 13.83  1.412 | 19.83    .769
00115>          1.92    .753 |  7.92 56.807 | 13.92  1.394 | 19.92    .765
00116>          2.00    .761 |  8.00 140.232| 14.00  1.377 | 20.00    .760
00117>          2.08    .771 |  8.08 71.711 | 14.08  1.361 | 20.08    .756
00118>          2.17    .780 |  8.17 42.130 | 14.17  1.345 | 20.17    .751
00119>          2.25    .789 |  8.25 29.125 | 14.25  1.329 | 20.25    .747
00120>          2.33    .799 |  8.33 22.023 | 14.33  1.314 | 20.33    .743
00121>          2.42    .809 |  8.42 17.621 | 14.42  1.299 | 20.42    .739
00122>          2.50    .820 |  8.50 14.652 | 14.50  1.285 | 20.50    .734
00123>          2.58    .831 |  8.58 12.529 | 14.58  1.271 | 20.58    .730
00124>          2.67    .842 |  8.67 10.940 | 14.67  1.257 | 20.67    .726
00125>          2.75    .853 |  8.75  9.710 | 14.75  1.243 | 20.75    .722
00126>          2.83    .865 |  8.83  8.732 | 14.83  1.230 | 20.83    .718
00127>          2.92    .877 |  8.92  7.935 | 14.92  1.217 | 20.92    .714
00128>          3.00    .889 |  9.00  7.275 | 15.00  1.205 | 21.00    .710
00129>          3.08    .902 |  9.08  6.719 | 15.08  1.193 | 21.08    .707
00130>          3.17    .916 |  9.17  6.245 | 15.17  1.181 | 21.17    .703
00131>          3.25    .929 |  9.25  5.836 | 15.25  1.169 | 21.25    .699
00132>          3.33    .944 |  9.33  5.480 | 15.33  1.157 | 21.33    .695
00133>          3.42    .958 |  9.42  5.166 | 15.42  1.146 | 21.42    .692
00134>          3.50    .973 |  9.50  4.888 | 15.50  1.135 | 21.50    .688
00135>          3.58    .989 |  9.58  4.640 | 15.58  1.125 | 21.58    .685
00136>          3.67   1.006 |  9.67  4.417 | 15.67  1.114 | 21.67    .681
00137>          3.75   1.023 |  9.75  4.216 | 15.75  1.104 | 21.75    .678
00138>          3.83   1.040 |  9.83  4.034 | 15.83  1.094 | 21.83    .674
00139>          3.92   1.058 |  9.92  3.868 | 15.92  1.084 | 21.92    .671
00140>          4.00   1.077 | 10.00  3.715 | 16.00  1.074 | 22.00    .667
00141>          4.08   1.097 | 10.08  3.575 | 16.08  1.064 | 22.08    .664
00142>          4.17   1.118 | 10.17  3.446 | 16.17  1.055 | 22.17    .661
00143>          4.25   1.139 | 10.25  3.327 | 16.25  1.046 | 22.25    .658
00144>          4.33   1.162 | 10.33  3.216 | 16.33  1.037 | 22.33    .654
00145>          4.42   1.185 | 10.42  3.113 | 16.42  1.028 | 22.42    .651
00146>          4.50   1.210 | 10.50  3.017 | 16.50  1.020 | 22.50    .648
00147>          4.58   1.235 | 10.58  2.927 | 16.58  1.011 | 22.58    .645
00148>          4.67   1.262 | 10.67  2.843 | 16.67  1.003 | 22.67    .642
00149>          4.75   1.290 | 10.75  2.763 | 16.75   .995 | 22.75    .639
00150>          4.83   1.320 | 10.83  2.689 | 16.83   .987 | 22.83    .636
00151>          4.92   1.351 | 10.92  2.618 | 16.92   .979 | 22.92    .633
00152>          5.00   1.384 | 11.00  2.552 | 17.00   .971 | 23.00    .630
00153>          5.08   1.419 | 11.08  2.489 | 17.08   .963 | 23.08    .627
00154>          5.17   1.455 | 11.17  2.430 | 17.17   .956 | 23.17    .624
00155>          5.25   1.494 | 11.25  2.373 | 17.25   .948 | 23.25    .621
00156>          5.33   1.535 | 11.33  2.319 | 17.33   .941 | 23.33    .618
00157>          5.42   1.579 | 11.42  2.268 | 17.42   .934 | 23.42    .615
00158>          5.50   1.626 | 11.50  2.219 | 17.50   .927 | 23.50    .613
00159>          5.58   1.675 | 11.58  2.173 | 17.58   .920 | 23.58    .610
00160>          5.67   1.729 | 11.67  2.128 | 17.67   .913 | 23.67    .607
00161>          5.75   1.786 | 11.75  2.086 | 17.75   .907 | 23.75    .604
00162>          5.83   1.847 | 11.83  2.045 | 17.83   .900 | 23.83    .602
00163>          5.92   1.913 | 11.92  2.006 | 17.92   .894 | 23.92    .599
00164>          6.00   1.985 | 12.00  1.969 | 18.00   .887 | 24.00    .596
00165>
00166> --------------------------------------------------------------------------------
00167> 001:0003-----------------------------------------------------------------------
00168>  -------------------
00169> | CALIB NASHYD      |   Area     (ha)=  221.70   Curve Number    (CN)=73.00
00170> | 01:2101   DT= 5.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00171>  -------------------    U.H. Tp(hrs)=   4.570
00172>
00173>     Unit Hyd Qpeak  (cms)=    1.853
00174>
00175>     PEAK FLOW       (cms)=    1.615 (i)
00176>     TIME TO PEAK    (hrs)=   13.750
00177>     RUNOFF VOLUME    (mm)=   30.899
00178>     TOTAL RAINFALL   (mm)=   76.498
00179>     RUNOFF COEFFICIENT   =    .404
00180>
00181>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00182>
00183> --------------------------------------------------------------------------------
00184> 001:0004-----------------------------------------------------------------------
00185>  --------------------
00186> | ROUTE CHANNEL      |     Routing time step (min) =  5.00
00187> |  IN> 01:2101       |     Number of SEGMENTS =  3
00188> | OUT< 02:2301       |     Slopes (%), CHANNEL=5.00   FLOODPLAIN=5.00
00189>  --------------------          LENGTH =  530.00     (m)
00190>
00191>                <------ DATA FOR SECTION (   1.0) ------>
00192>                Distance      Elevation       Manning
00193>                     .00          20.00          .0600
00194>                   10.00          19.70   .0600 / .0350  Main Channel
00195>                   12.10          18.30          .0350  Main Channel
00196>                   16.30          18.30          .0350  Main Channel
00197>                   18.40          19.70   .0350 / .0600  Main Channel
00198>                   28.40          20.00          .0600
00199>
00200>    <------------------------- TRAVEL TIME TABLE -------------------------->
00201>     DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00202>       (m)      (m)  (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
00203>      .088   18.387  .201E+03  .332E+00       .464     1.225       7.21    .107
00204>      .175   18.475  .414E+03  .137E+01     1.481     1.896       4.66    .332
00205>      .263   18.563  .639E+03  .317E+01     2.928     2.428       3.64    .637
00206>      .350   18.650  .876E+03  .579E+01     4.764     2.881       3.07   1.008
00207>      .438   18.738  .113E+04  .930E+01     6.968     3.279       2.69   1.435
00208>      .525   18.825  .139E+04  .137E+02     9.527     3.638       2.43   1.910
00209>      .613   18.913  .166E+04  .192E+02    12.437     3.967       2.23   2.430
00210>      .700   19.000  .195E+04  .257E+02    15.696     4.271       2.07   2.990
00211>      .788   19.088  .225E+04  .334E+02    19.304     4.555       1.94   3.587
00212>      .875   19.175  .256E+04  .422E+02    23.263     4.823       1.83   4.220
00213>      .963   19.263  .288E+04  .523E+02    27.575     5.076       1.74   4.886
00214>     1.050   19.350  .321E+04  .637E+02    32.245     5.318       1.66   5.584
00215>     1.138   19.438  .356E+04  .764E+02    37.278     5.549       1.59   6.312
00216>     1.225   19.525  .392E+04  .906E+02    42.678     5.770       1.53   7.069
00217>     1.313   19.613  .429E+04  .106E+03    48.451     5.984       1.48   7.854
00218>     1.400   19.700  .467E+04  .123E+03    54.601     6.191       1.43   8.667
00219>     1.500   19.800  .530E+04  .150E+03    63.709     6.375       1.39   9.563
00220>     1.600   19.900  .627E+04  .189E+03    74.084     6.261       1.41  10.017
00221>     1.700   20.000  .760E+04  .244E+03    86.162     6.008       1.47  10.214
00222>
00223>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00224>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00225>
00226>                                    <---- hydrograph ---->    <-pipe / channel->
00227>                              AREA     QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
00228>                              (ha)     (cms)    (hrs)    (mm)       (m)      (m/s)
00229>    INFLOW : ID= 1:2101      221.70    1.615   13.75 30.899        .183     1.935
00230>    OUTFLOW: ID= 2:2301      221.70    1.615   13.83 30.899        .183     1.934
00231>
00232>
00233> --------------------------------------------------------------------------------
00234> 001:0005-----------------------------------------------------------------------
00235>  --------------------
00236> | ROUTE CHANNEL      |     Routing time step (min) =  5.00
00237> |  IN> 02:2301       |     Number of SEGMENTS =  3
00238> | OUT< 03:2302       |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00239>  --------------------          LENGTH =  520.00     (m)
00240>
00241>                <------ DATA FOR SECTION (   2.0) ------>
00242>                Distance      Elevation       Manning
00243>                     .00          10.00          .0600
00244>                   10.00           9.80   .0600 / .0350  Main Channel
00245>                   10.80           9.30          .0350  Main Channel
00246>                   12.50           9.30          .0350  Main Channel
00247>                   13.00          10.30   .0350 / .0600  Main Channel
00248>                   16.00          10.30          .0600
00249>
00250>    <------------------------- TRAVEL TIME TABLE -------------------------->
00251>     DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00252>       (m)      (m)  (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
00253>      .036    9.336  .323E+02  .222E+00       .013      .213       40.61    .008
00254>      .071    9.371  .659E+02  .906E+00       .042      .331       26.21    .024
00255>      .107    9.407  .101E+03  .208E+01       .082      .424       20.45    .045
00256>      .143    9.443  .137E+03  .378E+01       .133      .503       17.24    .072
00257>      .179    9.479  .175E+03  .602E+01       .193      .572       15.15    .102
00258>      .214    9.514  .215E+03  .884E+01       .262      .635       13.66    .136
00259>      .250    9.550  .255E+03  .123E+02       .339      .691       12.54    .173
00260>      .286    9.586  .297E+03  .163E+02       .425      .744       11.65    .213
00261>      .321    9.621  .341E+03  .211E+02       .519      .793       10.94    .255
00262>      .357    9.657  .385E+03  .265E+02       .621      .838       10.34    .299
00263>      .393    9.693  .432E+03  .326E+02       .731      .881        9.83    .346
00264>      .429    9.729  .479E+03  .395E+02       .850      .922        9.40    .395
00265>      .464    9.764  .528E+03  .472E+02       .976      .961        9.02    .446
00266>      .500    9.800  .579E+03  .556E+02      1.111      .998        8.68    .499
00267>      .540    9.840  .657E+03  .682E+02      1.292     1.023        8.47    .552
00268>      .580    9.880  .777E+03  .867E+02      1.498     1.003        8.64    .582
00269>      .620    9.920  .939E+03  .112E+03      1.738      .962        9.00    .597
00270>      .660    9.960  .114E+04  .145E+03      2.020      .919        9.44    .606
```

```
00271>      .700   10.000  .139E+04  .187E+03      2.349       .879      9.86      .615
00272>
00273>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00274>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00275>
00276>                                        <---- hydrograph ---->   <-pipe / channel->
00277>                                 AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00278>                                 (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
00279>    INFLOW : ID= 2:2301          221.70   1.615   13.83 30.899      .599       .983
00280>    OUTFLOW: ID= 3:2302          221.70   1.613   14.00 30.899      .597       .986
00281>
00282>
00283> ------------------------------------------------------------------------------
00284> 001:0006----------------------------------------------------------------------
00285> ---------------------
00286> | CALIB NASHYD      |   Area     (ha)=   14.10   Curve Number    (CN)=69.00
00287> | 04:2102    DT= 5.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00288> ---------------------   U.H. Tp(hrs)=    .770
00289>
00290>      Unit Hyd Qpeak  (cms)=      .699
00291>
00292>      PEAK FLOW       (cms)=      .343 (i)
00293>      TIME TO PEAK    (hrs)=     9.000
00294>      RUNOFF VOLUME    (mm)=    27.541
00295>      TOTAL RAINFALL   (mm)=    76.498
00296>      RUNOFF COEFFICIENT  =      .360
00297>
00298>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00299>
00300> ------------------------------------------------------------------------------
00301> 001:0007----------------------------------------------------------------------
00302> ---------------------
00303> | ROUTE CHANNEL     |      Routing time step (min) =  5.00
00304> |  IN> 04:2102      |      Number of SEGMENTS =  3
00305> | OUT< 05:2303      |      Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00306> ---------------------                    LENGTH =  520.00     (m)
00307>
00308>                 <------ DATA FOR SECTION (   2.0) ------>
00309>                 Distance      Elevation       Manning
00310>                    .00          10.00           .0600
00311>                  10.00           9.80     .0600 / .0350  Main Channel
00312>                  10.80           9.30          .0350     Main Channel
00313>                  12.50           9.30          .0350     Main Channel
00314>                  13.00          10.30     .0350 / .0600  Main Channel
00315>                  16.00          10.30           .0600
00316>
00317>    <------------------------- TRAVEL TIME TABLE ---------------------------->
00318>     DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00319>       (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
00320>      .036    9.336  .323E+02  .222E+00       .013      .213     40.61      .008
00321>      .071    9.371  .659E+02  .906E+00       .042      .331     26.21      .024
00322>      .107    9.407  .101E+03  .208E+01       .082      .424     20.45      .045
00323>      .143    9.443  .137E+03  .378E+01       .133      .503     17.24      .072
00324>      .179    9.479  .175E+03  .602E+01       .193      .572     15.15      .102
00325>      .214    9.514  .215E+03  .884E+01       .262      .635     13.66      .136
00326>      .250    9.550  .255E+03  .123E+02       .339      .691     12.54      .173
00327>      .286    9.586  .297E+03  .163E+02       .425      .744     11.65      .213
00328>      .321    9.621  .341E+03  .211E+02       .519      .793     10.94      .255
00329>      .357    9.657  .385E+03  .265E+02       .621      .838     10.34      .299
00330>      .393    9.693  .432E+03  .326E+02       .731      .881     9.83       .346
00331>      .429    9.729  .479E+03  .395E+02       .850      .922     9.40       .395
00332>      .464    9.764  .528E+03  .472E+02       .976      .961     9.02       .446
00333>      .500    9.800  .579E+03  .556E+02      1.111      .998     8.68       .499
00334>      .540    9.840  .657E+03  .682E+02      1.292     1.023     8.47       .552
00335>      .580    9.880  .777E+03  .867E+02      1.498     1.003     8.64       .582
00336>      .620    9.920  .939E+03  .112E+03      1.738      .962     9.00       .597
00337>      .660    9.960  .114E+04  .145E+03      2.020      .919     9.44       .606
00338>      .700   10.000  .139E+04  .187E+03      2.349      .879     9.86       .615
00339>
00340>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00341>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00342>
00343>                                        <---- hydrograph ---->   <-pipe / channel->
00344>                                 AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00345>                                 (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
00346>    INFLOW : ID= 4:2102          14.10    .343    9.00 27.541       .252       .694
00347>    OUTFLOW: ID= 5:2303          14.10    .334    9.17 27.541       .247       .687
00348>
00349>
00350> ------------------------------------------------------------------------------
00351> 001:0008----------------------------------------------------------------------
00352> ---------------------
00353> | CALIB NASHYD      |   Area     (ha)=   21.50   Curve Number    (CN)=65.00
00354> | 06:2103    DT= 5.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00355> ---------------------   U.H. Tp(hrs)=    .900
00356>
00357>      Unit Hyd Qpeak  (cms)=      .912
00358>
00359>      PEAK FLOW       (cms)=      .413 (i)
00360>      TIME TO PEAK    (hrs)=     9.167
00361>      RUNOFF VOLUME    (mm)=    24.545
00362>      TOTAL RAINFALL   (mm)=    76.498
00363>      RUNOFF COEFFICIENT  =      .321
00364>
00365>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00366>
00367> ------------------------------------------------------------------------------
00368> 001:0009----------------------------------------------------------------------
00369> ---------------------
00370> | ADD HYD (010203) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
00371> ---------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
00372>                      ID1 03:2302     221.70   1.613   14.00  30.90     .000
00373>                    +ID2 05:2303      14.10     .334    9.17  27.54     .000
00374>                    +ID3 06:2103      21.50     .413    9.17  24.55     .000
00375>                     ================================================
00376>                     SUM 07:010203    257.30   1.710   13.75  30.18     .000
00377>
00378>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00379>
00380> ------------------------------------------------------------------------------
00381> 001:0010----------------------------------------------------------------------
00382> *#  Sorichetti Site and SWM Pond hydrograph
00383> ---------------------
00384> | DESIGN STANDHYD   |   Area     (ha)=   11.33
00385> | 05:2104    DT= 5.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
00386> ---------------------
00387>                                IMPERVIOUS     PERVIOUS (i)
00388>      Surface Area     (ha)=        3.40          7.93
00389>      Dep. Storage     (mm)=         .80          1.50
00390>      Average Slope     (%)=        2.00          2.00
00391>      Length            (m)=      274.83         40.00
00392>      Mannings n             =       .013          .250
00393>
00394>      Max.eff.Inten.(mm/hr)=      140.23         31.19
00395>                 over (min)=        5.00         15.00
00396>      Storage Coeff.  (min)=        3.32 (ii)     14.57 (ii)
00397>      Unit Hyd. Tpeak (min)=        5.00         15.00
00398>      Unit Hyd. peak  (cms)=         .26          .08
00399>                                                          *TOTALS*
00400>      PEAK FLOW       (cms)=         .76          .44        .923 (iii)
00401>      TIME TO PEAK    (hrs)=        8.00         8.25       8.000
00402>      RUNOFF VOLUME    (mm)=       75.70        26.02      35.953
00403>      TOTAL RAINFALL   (mm)=       76.50        76.50      76.498
00404>      RUNOFF COEFFICIENT  =         .99          .34        .470
00405>       *** WARNING: Storage Coefficient is smaller than DT!
00406>                  Use a smaller DT or a larger area.
00407>
00408>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00409>           CN* = 61.0    Ia = Dep. Storage  (Above)
00410>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00411>           THAN THE STORAGE COEFFICIENT.
00412>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00413>
00414> ------------------------------------------------------------------------------
00415> 001:0011----------------------------------------------------------------------
00416> ---------------------
00417> | ROUTE RESERVOIR   |     Requested routing time step =  5.0 min.
00418> |  IN>05:(2104  )   |
00419> | OUT<02:(002104)   |     =========  OUTFLOW STORAGE TABLE  =========
00420> ---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00421>                             (cms)     (ha.m.)  |    (cms)     (ha.m.)
00422>                              .000   .0000E+00   |     .025   .2800E+00
00423>                              .018   .1245E+00   |     .480   .4600E+00
00424>
00425>      ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
00426>      ---------------               (ha)     (cms)     (hrs)       (mm)
00427>      INFLOW >05: (2104  )        11.33      .923     8.000     35.953
00428>      OUTFLOW<02: (002104)        11.33      .032    13.083     35.952
00429>
00430>                   PEAK   FLOW   REDUCTION (Qout/Qin)(%)=    3.514
00431>                   TIME SHIFT OF PEAK FLOW          (min)=   305.00
00432>                   MAXIMUM  STORAGE   USED        (ha.m.)=.2829E+00
00433>
00434> ------------------------------------------------------------------------------
00435> 001:0012----------------------------------------------------------------------
00436> *#   Uncontrolled Drainage Area including Sorichetti Open Space and GT
00437> ---------------------
00438> | CALIB NASHYD      |   Area     (ha)=    1.51   Curve Number    (CN)=54.00
00439> | 01:2106    DT= 5.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00440> ---------------------   U.H. Tp(hrs)=    .590
00441>
00442>      Unit Hyd Qpeak  (cms)=      .098
00443>
00444>      PEAK FLOW       (cms)=      .027 (i)
00445>      TIME TO PEAK    (hrs)=     8.750
00446>      RUNOFF VOLUME    (mm)=    17.757
00447>      TOTAL RAINFALL   (mm)=    76.498
00448>      RUNOFF COEFFICIENT  =      .232
00449>
00450>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00451>
00452> ------------------------------------------------------------------------------
00453> 001:0013----------------------------------------------------------------------
00454> ---------------------
00455> | ADD HYD (040607) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
00456> ---------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
00457>                      ID1 02:002104    11.33     .032    13.08  35.95     .000
00458>                    +ID2 01:2106        1.51     .027     8.75  17.76     .000
00459>                     ================================================
00460>                     SUM 06:040607    12.84     .049     8.83  33.81     .000
00461>
00462>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00463>
00464> ------------------------------------------------------------------------------
00465> 001:0014----------------------------------------------------------------------
00466> ---------------------
00467> | ROUTE CHANNEL     |      Routing time step (min) =  5.00
00468> |  IN> 06:040607    |      Number of SEGMENTS =  3
00469> | OUT< 10:2304      |      Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00470> ---------------------                    LENGTH =  520.00     (m)
00471>
00472>                 <------ DATA FOR SECTION (   2.0) ------>
00473>                 Distance      Elevation       Manning
00474>                    .00          10.00           .0600
00475>                  10.00           9.80     .0600 / .0350  Main Channel
00476>                  10.80           9.30          .0350     Main Channel
00477>                  12.50           9.30          .0350     Main Channel
00478>                  13.00          10.30     .0350 / .0600  Main Channel
00479>                  16.00          10.30           .0600
00480>
00481>    <------------------------- TRAVEL TIME TABLE ---------------------------->
00482>     DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00483>       (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
00484>      .036    9.336  .323E+02  .222E+00       .013      .213     40.61      .008
00485>      .071    9.371  .659E+02  .906E+00       .042      .331     26.21      .024
00486>      .107    9.407  .101E+03  .208E+01       .082      .424     20.45      .045
00487>      .143    9.443  .137E+03  .378E+01       .133      .503     17.24      .072
00488>      .179    9.479  .175E+03  .602E+01       .193      .572     15.15      .102
00489>      .214    9.514  .215E+03  .884E+01       .262      .635     13.66      .136
00490>      .250    9.550  .255E+03  .123E+02       .339      .691     12.54      .173
00491>      .286    9.586  .297E+03  .163E+02       .425      .744     11.65      .213
00492>      .321    9.621  .341E+03  .211E+02       .519      .793     10.94      .255
00493>      .357    9.657  .385E+03  .265E+02       .621      .838     10.34      .299
00494>      .393    9.693  .432E+03  .326E+02       .731      .881     9.83       .346
00495>      .429    9.729  .479E+03  .395E+02       .850      .922     9.40       .395
00496>      .464    9.764  .528E+03  .472E+02       .976      .961     9.02       .446
00497>      .500    9.800  .579E+03  .556E+02      1.111      .998     8.68       .499
00498>      .540    9.840  .657E+03  .682E+02      1.292     1.023     8.47       .552
00499>      .580    9.880  .777E+03  .867E+02      1.498     1.003     8.64       .582
00500>      .620    9.920  .939E+03  .112E+03      1.738      .962     9.00       .597
00501>      .660    9.960  .114E+04  .145E+03      2.020      .919     9.44       .606
00502>      .700   10.000  .139E+04  .187E+03      2.349      .879     9.86       .615
00503>
00504>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00505>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00506>
00507>                                        <---- hydrograph ---->   <-pipe / channel->
00508>                                 AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00509>                                 (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
00510>    INFLOW : ID= 6:040607        12.84     .049    8.83 33.813       .078       .344
00511>    OUTFLOW: ID=10:2304          12.84     .045    9.17 33.813       .074       .335
00512>
00513>
00514> ------------------------------------------------------------------------------
00515> 001:0015----------------------------------------------------------------------
00516> ---------------------
00517> | ADD HYD (2401  ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
00518> ---------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
00519>                      ID1 07:010203   257.30   1.710   13.75  30.18     .000
00520>                    +ID2 10:2304      12.84     .045    9.17  33.81     .000
00521>                     ================================================
00522>                     SUM 09:2401     270.14   1.744   13.75  30.36     .000
00523>
00524>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00525>
00526> ------------------------------------------------------------------------------
00527> 001:0016----------------------------------------------------------------------
00528> ---------------------
00529> | CALIB NASHYD      |   Area     (ha)=    1.16   Curve Number    (CN)=54.00
00530> | 08:2105    DT= 5.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00531> ---------------------   U.H. Tp(hrs)=    .430
00532>
00533>      Unit Hyd Qpeak  (cms)=      .103
00534>
00535>      PEAK FLOW       (cms)=      .025 (i)
00536>      TIME TO PEAK    (hrs)=     8.500
00537>      RUNOFF VOLUME    (mm)=    17.757
00538>      TOTAL RAINFALL   (mm)=    76.498
00539>      RUNOFF COEFFICIENT  =      .232
00540>
```

OUTLET B

OUTLET C

OUTLET A

```
00541>       (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00542>
00543> ------------------------------------------------------------------------------
00544> 001:0017----------------------------------------------------------------------
00545>       FINISH
00546> ------------------------------------------------------------------------------
00547> ******************************************************************************
00548>      WARNINGS / ERRORS / NOTES
00549>      -------------------------
00550>  001:0010 DESIGN STANDHYD
00551>        *** WARNING: Storage Coefficient is smaller than DT!
00552>                     Use a smaller DT or a larger area.
00553>    Simulation ended on 2004-05-10     at 16:51:39
00554> ==============================================================================
00555>
00556>
```

```
*******************************************************************************
W   W  M   M  H   H  Y   Y  M   M   OOO         999    999  =========
W W W  MM MM  H   H   Y Y   MM MM  O   O       9   9  9   9
W W W  M M M  HHHHH    Y    M M M  O   O  ##   9   9  9   9  Ver. 4.02
 W W   M   M  H   H    Y    M   M  O   O        9999   9999  July 1999
W   W  M   M  H   H    Y    M   M   OOO             9      9  =========
                                                   9   9  9  # 3737016
      StormWater Management HYdrologic Model       999    999  =========

*******************************************************************************
********************** SWMHYMO-99 Ver/4.02 ************************************
*******  A single event and continuous hydrologic simulation model  *******
*******       based on the principles of HYMO and its successors        *******
*******              OTTHYMO-83 and OTTHYMO-89.                         *******
*******************************************************************************
******* Distributed by:  J.F. Sabourin and Associates Inc.            *******
*******                  Ottawa, Ontario: (613) 727-5199             *******
*******                  Gatineau, Quebec: (819) 243-6858            *******
*******                  E-Mail: swmhymo@jfsa.com                    *******
*******************************************************************************

*******************************************************************************
+++++++ Licensed user: C.F. Crozier & Associates Inc.                  +++++++
++++++++              Collingwood          SERIAL#:3737016            ++++++++
*******************************************************************************

*******************************************************************************
*******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++                 *******
*******            Maximum value for ID numbers  :     10                *******
*******            Max. number of rainfall points:  15000                *******
*******            Max. number of flow points    :  15000                *******
*******************************************************************************

**********  D E T A I L E D   O U T P U T  **********
*******************************************************************************
*       DATE: 2004-05-10      TIME: 17:09:19      RUN COUNTER: 000085         *
*******************************************************************************
* Input   filename: C:\TEMP\SORICH-1\QUANIT~1\25yr.DAT                         *
* Output  filename: C:\TEMP\SORICH-1\QUANIT~1\25yr.out                         *
* Summary filename: C:\TEMP\SORICH-1\QUANIT~1\25yr.sum                         *
* User comments:                                                              *
* 1:_____________________________________________________________________     *
* 2:_____________________________________________________________________     *
* 3:_____________________________________________________________________     *
*******************************************************************************

-------------------------------------------------------------------------------
001:0001-------------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name   : SORICHETTI POST-DEVELOPMENT 25 YEAR 24 HOUR CHICAGO STORM
*#  Details        : SWM Pond for Quality and Quantity Control
*#  Original Date  : 10-24-2002  (Burnside)
*#  Revised        : May 2004  (CF Crozier & Associates Inc)
*#  Modeller       : Chris Crozier, P.Eng.
*#*****************************************************************************
-------------------
| START           |  Project dir.: C:\TEMP\SORICH~1\QUANIT~1\
-------------------  Rainfall dir.: C:\TEMP\SORICH~1\QUANIT~1\
    TZERO =   .00 hrs on     0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-------------------------------------------------------------------------
-----------------
| CHICAGO STORM |    IDF curve parameters: A=1416.634
| Ptotal= 91.52 mm |                      B=    9.025
-----------------                      C=    .813
                          used in:   INTENSITY = A / (t + B)^C

                          Duration of storm  = 24.00 hrs
                          Storm time step    =  5.00 min
                          Time to peak ratio =  .33

                     The CORRELATION coefficient is = .9987929

                       TIME        ENTERED          COMPUTED
                      (min)       (mm/hr)           (mm/hr)
                         5.        180.00            165.51
                        10.        120.00            129.17
                        15.        105.00            106.85
                        30.         67.00             72.03
                        60.         46.00             45.30
                       120.         28.00             27.24
                       360.         13.00             11.59
                       720.          6.50              6.67
                      1440.          3.60              3.81

      TIME   RAIN |  TIME   RAIN |  TIME   RAIN |  TIME   RAIN
       hrs  mm/hr |   hrs  mm/hr |   hrs  mm/hr |   hrs  mm/hr
       .08   .739 |  6.08  2.505 | 12.08  2.349 | 18.08  1.078
       .17   .746 |  6.17  2.607 | 12.17  2.308 | 18.17  1.071
       .25   .753 |  6.25  2.719 | 12.25  2.268 | 18.25  1.064
       .33   .759 |  6.33  2.842 | 12.33  2.229 | 18.33  1.056
       .42   .766 |  6.42  2.978 | 12.42  2.192 | 18.42  1.049
       .50   .774 |  6.50  3.128 | 12.50  2.157 | 18.50  1.042
       .58   .781 |  6.58  3.297 | 12.58  2.122 | 18.58  1.035
       .67   .788 |  6.67  3.487 | 12.67  2.089 | 18.67  1.028
       .75   .796 |  6.75  3.702 | 12.75  2.057 | 18.75  1.022
       .83   .804 |  6.83  3.949 | 12.83  2.026 | 18.83  1.015
       .92   .811 |  6.92  4.234 | 12.92  1.996 | 18.92  1.009
      1.00   .820 |  7.00  4.568 | 13.00  1.967 | 19.00  1.002
      1.08   .828 |  7.08  4.965 | 13.08  1.939 | 19.08   .996
      1.17   .836 |  7.17  5.445 | 13.17  1.912 | 19.17   .989
      1.25   .845 |  7.25  6.037 | 13.25  1.885 | 19.25   .983
      1.33   .854 |  7.33  6.785 | 13.33  1.860 | 19.33   .977
      1.42   .863 |  7.42  7.761 | 13.42  1.835 | 19.42   .971
      1.50   .872 |  7.50  9.087 | 13.50  1.811 | 19.50   .965
      1.58   .882 |  7.58 10.992 | 13.58  1.787 | 19.58   .959
      1.67   .891 |  7.67 13.950 | 13.67  1.764 | 19.67   .954
      1.75   .901 |  7.75 19.118 | 13.75  1.742 | 19.75   .948
      1.83   .912 |  7.83 30.179 | 13.83  1.721 | 19.83   .942
      1.92   .922 |  7.92 66.973 | 13.92  1.700 | 19.92   .937
      2.00   .933 |  8.00 165.511| 14.00  1.679 | 20.00   .931
      2.08   .944 |  8.08 84.397 | 14.08  1.659 | 20.08   .926
      2.17   .955 |  8.17 49.628 | 14.17  1.640 | 20.17   .921
      2.25   .967 |  8.25 34.378 | 14.25  1.621 | 20.25   .915
      2.33   .979 |  8.33 26.052 | 14.33  1.603 | 20.33   .910
      2.42   .991 |  8.42 20.887 | 14.42  1.585 | 20.42   .905
      2.50  1.004 |  8.50 17.401 | 14.50  1.567 | 20.50   .900
      2.58  1.017 |  8.58 14.904 | 14.58  1.550 | 20.58   .895
      2.67  1.031 |  8.67 13.034 | 14.67  1.534 | 20.67   .890
      2.75  1.044 |  8.75 11.585 | 14.75  1.517 | 20.75   .885
      2.83  1.059 |  8.83 10.430 | 14.83  1.501 | 20.83   .880
      2.92  1.073 |  8.92  9.490 | 14.92  1.486 | 20.92   .876
      3.00  1.088 |  9.00  8.710 | 15.00  1.471 | 21.00   .871
      3.08  1.104 |  9.08  8.052 | 15.08  1.456 | 21.08   .866
      3.17  1.120 |  9.17  7.491 | 15.17  1.441 | 21.17   .862
      3.25  1.137 |  9.25  7.006 | 15.25  1.427 | 21.25   .857
      3.33  1.154 |  9.33  6.583 | 15.33  1.413 | 21.33   .853
      3.42  1.172 |  9.42  6.210 | 15.42  1.400 | 21.42   .848
      3.50  1.190 |  9.50  5.880 | 15.50  1.386 | 21.50   .844
      3.58  1.210 |  9.58  5.585 | 15.58  1.373 | 21.58   .839
      3.67  1.229 |  9.67  5.320 | 15.67  1.361 | 21.67   .835
      3.75  1.250 |  9.75  5.081 | 15.75  1.348 | 21.75   .831
      3.83  1.271 |  9.83  4.864 | 15.83  1.336 | 21.83   .827
      3.92  1.293 |  9.92  4.665 | 15.92  1.324 | 21.92   .823
      4.00  1.316 | 10.00  4.484 | 16.00  1.312 | 22.00   .819
      4.08  1.340 | 10.08  4.317 | 16.08  1.301 | 22.08   .814
      4.17  1.365 | 10.17  4.163 | 16.17  1.289 | 22.17   .810
      4.25  1.391 | 10.25  4.020 | 16.25  1.278 | 22.25   .806
      4.33  1.418 | 10.33  3.888 | 16.33  1.267 | 22.33   .803
      4.42  1.447 | 10.42  3.764 | 16.42  1.257 | 22.42   .799
      4.50  1.476 | 10.50  3.649 | 16.50  1.246 | 22.50   .795
      4.58  1.507 | 10.58  3.542 | 16.58  1.236 | 22.58   .791
      4.67  1.540 | 10.67  3.441 | 16.67  1.226 | 22.67   .787
      4.75  1.574 | 10.75  3.346 | 16.75  1.216 | 22.75   .784
      4.83  1.610 | 10.83  3.257 | 16.83  1.206 | 22.83   .780
      4.92  1.648 | 10.92  3.172 | 16.92  1.197 | 22.92   .776
      5.00  1.687 | 11.00  3.093 | 17.00  1.187 | 23.00   .773
      5.08  1.729 | 11.08  3.017 | 17.08  1.178 | 23.08   .769
      5.17  1.773 | 11.17  2.946 | 17.17  1.169 | 23.17   .766
      5.25  1.820 | 11.25  2.878 | 17.25  1.160 | 23.25   .762
      5.33  1.870 | 11.33  2.813 | 17.33  1.151 | 23.33   .759
      5.42  1.923 | 11.42  2.752 | 17.42  1.143 | 23.42   .755
      5.50  1.979 | 11.50  2.693 | 17.50  1.134 | 23.50   .752
      5.58  2.039 | 11.58  2.638 | 17.58  1.126 | 23.58   .748
      5.67  2.103 | 11.67  2.584 | 17.67  1.117 | 23.67   .745
      5.75  2.172 | 11.75  2.533 | 17.75  1.109 | 23.75   .742
      5.83  2.246 | 11.83  2.484 | 17.83  1.101 | 23.83   .739
      5.92  2.325 | 11.92  2.437 | 17.92  1.094 | 23.92   .735
      6.00  2.412 | 12.00  2.392 | 18.00  1.086 | 24.00   .732

-------------------------------------------------------------------------------
001:0003-------------------------------------------------------------------------
--------------------
| CALIB NASHYD     |   Area     (ha)=  221.70   Curve Number    (CN)=73.00
| 01:2101   DT= 5.00 |   Ia       (mm)=    5.000  # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=  4.570

     Unit Hyd Qpeak  (cms)=    1.853

     PEAK FLOW       (cms)=    2.176 (i)
     TIME TO PEAK    (hrs)=   13.667
     RUNOFF VOLUME    (mm)=   41.480
     TOTAL RAINFALL   (mm)=   91.519
     RUNOFF COEFFICIENT   =     .453

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0004-------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  5.00
| IN> 01:2101      |     Number of SEGMENTS =  3
| OUT< 02:2301     |     Slopes (%), CHANNEL=5.00   FLOODPLAIN=5.00
--------------------                LENGTH =  530.00     (m)

                <------ DATA FOR SECTION (   1.0) ------>
                Distance      Elevation       Manning
                   .00          20.00          .0600
                 10.00          19.70     .0600 / .0350  Main Channel
                 12.10          18.30          .0350      Main Channel
                 16.30          18.30          .0350      Main Channel
                 18.40          19.70     .0350 / .0600  Main Channel
                 28.40          20.00          .0600

   <------------------------------ TRAVEL TIME TABLE ------------------------------>
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .088   18.387  .201E+03  .332E+00       .464     1.225       7.21     .107
     .175   18.475  .414E+03  .137E+01      1.481     1.896       4.66     .332
     .263   18.563  .639E+03  .317E+01      2.928     2.428       3.64     .637
     .350   18.650  .876E+03  .579E+01      4.764     2.881       3.07    1.008
     .438   18.738  .113E+04  .930E+01      6.968     3.279       2.69    1.435
     .525   18.825  .139E+04  .137E+02      9.527     3.638       2.43    1.910
     .613   18.913  .166E+04  .192E+02     12.437     3.967       2.23    2.430
     .700   19.000  .195E+04  .257E+02     15.696     4.271       2.07    2.990
     .788   19.088  .225E+04  .334E+02     19.304     4.555       1.94    3.587
     .875   19.175  .256E+04  .422E+02     23.263     4.823       1.83    4.220
     .963   19.263  .288E+04  .523E+02     27.575     5.076       1.74    4.886
    1.050   19.350  .321E+04  .637E+02     32.245     5.318       1.66    5.584
    1.138   19.438  .356E+04  .764E+02     37.278     5.549       1.59    6.312
    1.225   19.525  .392E+04  .906E+02     42.678     5.770       1.53    7.069
    1.313   19.613  .429E+04  .106E+03     48.451     5.984       1.48    7.854
    1.400   19.700  .467E+04  .123E+03     54.601     6.191       1.43    8.667
    1.500   19.800  .530E+04  .150E+03     63.709     6.375       1.39    9.563
    1.600   19.900  .627E+04  .189E+03     74.084     6.261       1.41   10.017
    1.700   20.000  .760E+04  .244E+03     86.162     6.008       1.47   10.214

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA     QPEAK     TPEAK    R.V.    MAX DEPTH   MAX VEL
                              (ha)     (cms)     (hrs)    (mm)        (m)       (m/s)
   INFLOW : ID= 1:2101      221.70     2.176    13.67 41.480        .217       2.119
   OUTFLOW: ID= 2:2301      221.70     2.176    13.75 41.480        .216       2.113

-------------------------------------------------------------------------------
001:0005-------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  5.00
| IN> 02:2301      |     Number of SEGMENTS =  3
| OUT< 03:2302     |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
--------------------                LENGTH =  520.00     (m)

                <------ DATA FOR SECTION (   2.0) ------>
                Distance      Elevation       Manning
                   .00          10.00          .0600
                 10.00           9.80     .0600 / .0350  Main Channel
                 10.80           9.30          .0350      Main Channel
                 12.50           9.30          .0350      Main Channel
                 13.00          10.30     .0350 / .0600  Main Channel
                 16.00          10.30          .0600

   <------------------------------ TRAVEL TIME TABLE ------------------------------>
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .036    9.336  .323E+02  .222E+00       .013      .213      40.61     .008
     .071    9.371  .659E+02  .906E+00       .042      .331      26.21     .024
     .107    9.407  .101E+03  .208E+01       .082      .424      20.45     .045
     .143    9.443  .137E+03  .378E+01       .133      .503      17.24     .072
     .179    9.479  .175E+03  .602E+01       .193      .572      15.15     .102
     .214    9.514  .215E+03  .884E+01       .262      .635      13.66     .136
     .250    9.550  .255E+03  .123E+02       .339      .691      12.54     .173
     .286    9.586  .297E+03  .163E+02       .425      .744      11.65     .213
     .321    9.621  .341E+03  .211E+02       .519      .793      10.94     .255
     .357    9.657  .385E+03  .265E+02       .621      .838      10.34     .299
     .393    9.693  .432E+03  .326E+02       .731      .881       9.83     .346
     .429    9.729  .479E+03  .395E+02       .850      .922       9.40     .395
     .464    9.764  .528E+03  .472E+02       .976      .961       9.02     .446
     .500    9.800  .579E+03  .556E+02      1.111      .998       8.68     .499
     .540    9.840  .657E+03  .682E+02      1.292     1.023       8.47     .552
     .580    9.880  .777E+03  .867E+02      1.498     1.003       8.64     .582
     .620    9.920  .939E+03  .112E+03      1.738      .962       9.00     .597
     .660    9.960  .114E+04  .145E+03      2.020      .919       9.44     .606
```

```
00271>      .700   10.000  .139E+04  .187E+03      2.349      .879      9.86      .615
00272>
00273>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00274>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00275>
00276>                                        <---- hydrograph ---->   <-pipe / channel->
00277>                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00278>                                   (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00279>    INFLOW : ID= 2:2301          221.70   2.176   13.75  41.480      .679      .899
00280>    OUTFLOW: ID= 3:2302          221.70   2.174   13.92  41.480      .676      .902
00281>
00282>
00283> ----------------------------------------------------------------------------------
00284> 001:0006----------------------------------------------------------------------------
00285> --------------------
00286> | CALIB NASHYD       |   Area    (ha)=   14.10   Curve Number   (CN)=69.00
00287> | 04:2102   DT= 5.00 |   Ia      (mm)=    5.000  # of Linear Res.(N)= 3.00
00288> --------------------   U.H. Tp(hrs)=    .770
00289>
00290>      Unit Hyd Qpeak  (cms)=      .699
00291>
00292>      PEAK FLOW       (cms)=      .469 (i)
00293>      TIME TO PEAK    (hrs)=     8.917
00294>      RUNOFF VOLUME    (mm)=    37.310
00295>      TOTAL RAINFALL   (mm)=    91.519
00296>      RUNOFF COEFFICIENT   =      .408
00297>
00298>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00299>
00300> ----------------------------------------------------------------------------------
00301> 001:0007----------------------------------------------------------------------------
00302> --------------------
00303> | ROUTE CHANNEL     |     Routing time step (min) =  5.00
00304> | IN> 04:2102       |     Number of SEGMENTS =  3
00305> | OUT< 05:2303      |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00306> --------------------                  LENGTH =  520.00     (m)
00307>
00308>                <------ DATA FOR SECTION (   2.0) ------>
00309>                Distance       Elevation       Manning
00310>                    .00           10.00          .0600
00311>                  10.00            9.80      .0600 / .0350  Main Channel
00312>                  10.80            9.30          .0350      Main Channel
00313>                  12.50            9.30          .0350      Main Channel
00314>                  13.00           10.30      .0350 / .0600  Main Channel
00315>                  16.00           10.30          .0600
00316>
00317>  <------------------------- TRAVEL TIME TABLE ------------------------->
00318>    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00319>      (m)      (m)   (cu.m.)   (cu.m.)     (cms)      (m/s)      (min)   (m2/s)
00320>     .036    9.336  .323E+02  .222E+00      .013       .213      40.61     .008
00321>     .071    9.371  .659E+02  .906E+00      .042       .331      26.21     .024
00322>     .107    9.407  .101E+03  .208E+01      .082       .424      20.45     .045
00323>     .143    9.443  .137E+03  .378E+01      .133       .503      17.24     .072
00324>     .179    9.479  .175E+03  .602E+01      .193       .572      15.15     .102
00325>     .214    9.514  .215E+03  .884E+01      .262       .635      13.66     .136
00326>     .250    9.550  .255E+03  .123E+02      .339       .691      12.54     .173
00327>     .286    9.586  .297E+03  .163E+02      .425       .744      11.65     .213
00328>     .321    9.621  .341E+03  .211E+02      .519       .793      10.94     .255
00329>     .357    9.657  .385E+03  .265E+02      .621       .838      10.34     .299
00330>     .393    9.693  .432E+03  .326E+02      .731       .881      9.83      .346
00331>     .429    9.729  .479E+03  .395E+02      .850       .922      9.40      .395
00332>     .464    9.764  .528E+03  .472E+02      .976       .961      9.02      .446
00333>     .500    9.800  .579E+03  .556E+02     1.111       .998      8.68      .499
00334>     .540    9.840  .657E+03  .682E+02     1.292      1.023      8.47      .552
00335>     .580    9.880  .777E+03  .867E+02     1.498      1.003      8.64      .582
00336>     .620    9.920  .939E+03  .112E+03     1.738       .962      9.00      .597
00337>     .660    9.960  .114E+04  .145E+03     2.020       .919      9.44      .606
00338>     .700   10.000  .139E+04  .187E+03     2.349       .879      9.86      .615
00339>
00340>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00341>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00342>
00343>                                        <---- hydrograph ---->   <-pipe / channel->
00344>                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00345>                                   (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00346>    INFLOW : ID= 4:2102          14.10    .469    8.92  37.310      .302      .766
00347>    OUTFLOW: ID= 5:2303          14.10    .458    9.08  37.310      .298      .760
00348>
00349>
00350> ----------------------------------------------------------------------------------
00351> 001:0008----------------------------------------------------------------------------
00352> --------------------
00353> | CALIB NASHYD      |   Area    (ha)=   21.50   Curve Number   (CN)=65.00
00354> | 06:2103   DT= 5.00 |   Ia      (mm)=    5.000  # of Linear Res.(N)= 3.00
00355> --------------------   U.H. Tp(hrs)=    .900
00356>
00357>      Unit Hyd Qpeak  (cms)=      .912
00358>
00359>      PEAK FLOW       (cms)=      .567 (i)
00360>      TIME TO PEAK    (hrs)=     9.083
00361>      RUNOFF VOLUME    (mm)=    33.524
00362>      TOTAL RAINFALL   (mm)=    91.519
00363>      RUNOFF COEFFICIENT   =      .366
00364>
00365>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00366>
00367> ----------------------------------------------------------------------------------
00368> 001:0009----------------------------------------------------------------------------
00369> --------------------
00370> | ADD HYD (010203) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
00371> --------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
00372>                    ID1 03:2302     221.70    2.174   13.92  41.48    .000
00373>                   +ID2 05:2303      14.10     .458    9.08  37.31    .000
00374>                   +ID3 06:2103      21.50     .567    9.08  33.52    .000
00375>                    ==========================================================
00376>                    SUM 07:010203   257.30    2.303   13.75  40.59    .000
00377>
00378>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00379>
00380> ----------------------------------------------------------------------------------
00381> 001:0010----------------------------------------------------------------------------
00382> *#  Sorichetti Site and SWM Pond hydrograph
00383> ----------------------
00384> | DESIGN STANDHYD    |   Area    (ha)=   11.33
00385> | 05:2104   DT= 5.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
00386> ----------------------
00387>                                IMPERVIOUS     PERVIOUS (i)
00388>      Surface Area      (ha)=        3.40          7.93
00389>      Dep. Storage      (mm)=         .80          1.50
00390>      Average Slope      (%)=        2.00          2.00
00391>      Length             (m)=      274.83         40.00
00392>      Mannings n             =        .013          .250
00393>
00394>      Max.eff.Inten.(mm/hr)=      165.51         41.94
00395>                  over (min)=        5.00         15.00
00396>      Storage Coeff.  (min)=        3.11 (ii)    13.10 (ii)
00397>      Unit Hyd. Tpeak (min)=        5.00         15.00
00398>      Unit Hyd. peak  (cms)=         .27           .08
00399>                                                          *TOTALS*
00400>      PEAK FLOW       (cms)=         .91           .62      1.152 (iii)
00401>      TIME TO PEAK    (hrs)=        8.00          8.25      8.000
00402>      RUNOFF VOLUME    (mm)=       90.72         35.03     46.167
00403>      TOTAL RAINFALL   (mm)=       91.52         91.52     91.519
00404>      RUNOFF COEFFICIENT   =         .99           .38       .504
00405>       *** WARNING: Storage Coefficient is smaller than DT!
00406>                   Use a smaller DT or a larger area.
00407>
00408>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00409>            CN* =  61.0    Ia = Dep. Storage  (Above)
00410>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00411>            THAN THE STORAGE COEFFICIENT.
00412>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00413>
00414> ----------------------------------------------------------------------------------
00415> 001:0011----------------------------------------------------------------------------
00416> --------------------
00417> | ROUTE RESERVOIR   |       Requested routing time step =  5.0 min.
00418> |  IN>05:(2104  )   |
00419> | OUT<02:(002104)   |    ==========  OUTFLOW STORAGE TABLE  ==========
00420> --------------------    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
00421>                           (cms)     (ha.m.)   |    (cms)     (ha.m.)
00422>                            .000   .0000E+00    |     .025   .2800E+00
00423>                            .018   .1245E+00    |     .480   .4600E+00
00424>
00425>      ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
00426>      ---------------              (ha)     (cms)     (hrs)        (mm)
00427>      INFLOW >05: (2104  )        11.33     1.152     8.000      46.167
00428>      OUTFLOW<02: (002104)        11.33      .103     9.917      46.167
00429>
00430>                    PEAK   FLOW   REDUCTION (Qout/Qin)(%)=     8.926
00431>                    TIME SHIFT OF PEAK FLOW          (min)=    115.00
00432>                    MAXIMUM  STORAGE   USED        (ha.m.)=.3108E+00
00433>
00434> ----------------------------------------------------------------------------------
00435> 001:0012----------------------------------------------------------------------------
00436> *#   Uncontrolled Drainage Area including Sorichetti Open Space and GT
00437> --------------------
00438> | CALIB NASHYD      |   Area    (ha)=    1.51   Curve Number   (CN)=54.00
00439> | 01:2106   DT= 5.00 |   Ia      (mm)=    5.000  # of Linear Res.(N)= 3.00
00440> --------------------   U.H. Tp(hrs)=    .590
00441>
00442>      Unit Hyd Qpeak  (cms)=      .098
00443>
00444>      PEAK FLOW       (cms)=      .038 (i)
00445>      TIME TO PEAK    (hrs)=     8.750
00446>      RUNOFF VOLUME    (mm)=    24.713
00447>      TOTAL RAINFALL   (mm)=    91.519
00448>      RUNOFF COEFFICIENT   =      .270
00449>
00450>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00451>
00452> ----------------------------------------------------------------------------------
00453> 001:0013----------------------------------------------------------------------------
00454> --------------------
00455> | ADD HYD (040607) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
00456> --------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
00457>                    ID1 02:002104    11.33     .103    9.92  46.17    .000
00458>                   +ID2 01:2106       1.51     .038    8.75  24.71    .000
00459>                    ==========================================================
00460>                    SUM 06:040607    12.84     .121    9.67  43.64    .000
00461>
00462>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00463>
00464> ----------------------------------------------------------------------------------
00465> 001:0014----------------------------------------------------------------------------
00466> --------------------
00467> | ROUTE CHANNEL     |     Routing time step (min) =  5.00
00468> | IN> 06:040607     |     Number of SEGMENTS =  3
00469> | OUT< 10:2304      |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00470> --------------------                  LENGTH =  520.00     (m)
00471>
00472>                <------ DATA FOR SECTION (   2.0) ------>
00473>                Distance       Elevation       Manning
00474>                    .00           10.00          .0600
00475>                  10.00            9.80      .0600 / .0350  Main Channel
00476>                  10.80            9.30          .0350      Main Channel
00477>                  12.50            9.30          .0350      Main Channel
00478>                  13.00           10.30      .0350 / .0600  Main Channel
00479>                  16.00           10.30          .0600
00480>
00481>  <------------------------- TRAVEL TIME TABLE ------------------------->
00482>    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00483>      (m)      (m)   (cu.m.)   (cu.m.)     (cms)      (m/s)      (min)   (m2/s)
00484>     .036    9.336  .323E+02  .222E+00      .013       .213      40.61     .008
00485>     .071    9.371  .659E+02  .906E+00      .042       .331      26.21     .024
00486>     .107    9.407  .101E+03  .208E+01      .082       .424      20.45     .045
00487>     .143    9.443  .137E+03  .378E+01      .133       .503      17.24     .072
00488>     .179    9.479  .175E+03  .602E+01      .193       .572      15.15     .102
00489>     .214    9.514  .215E+03  .884E+01      .262       .635      13.66     .136
00490>     .250    9.550  .255E+03  .123E+02      .339       .691      12.54     .173
00491>     .286    9.586  .297E+03  .163E+02      .425       .744      11.65     .213
00492>     .321    9.621  .341E+03  .211E+02      .519       .793      10.94     .255
00493>     .357    9.657  .385E+03  .265E+02      .621       .838      10.34     .299
00494>     .393    9.693  .432E+03  .326E+02      .731       .881      9.83      .346
00495>     .429    9.729  .479E+03  .395E+02      .850       .922      9.40      .395
00496>     .464    9.764  .528E+03  .472E+02      .976       .961      9.02      .446
00497>     .500    9.800  .579E+03  .556E+02     1.111       .998      8.68      .499
00498>     .540    9.840  .657E+03  .682E+02     1.292      1.023      8.47      .552
00499>     .580    9.880  .777E+03  .867E+02     1.498      1.003      8.64      .582
00500>     .620    9.920  .939E+03  .112E+03     1.738       .962      9.00      .597
00501>     .660    9.960  .114E+04  .145E+03     2.020       .919      9.44      .606
00502>     .700   10.000  .139E+04  .187E+03     2.349       .879      9.86      .615
00503>
00504>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00505>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00506>
00507>                                        <---- hydrograph ---->   <-pipe / channel->
00508>                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
00509>                                   (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
00510>    INFLOW : ID= 6:040607        12.84     .121    9.67  43.644      .134      .481
00511>    OUTFLOW: ID=10:2304          12.84     .118    9.92  43.644      .132      .475
00512>
00513>
00514> ----------------------------------------------------------------------------------
00515> 001:0015----------------------------------------------------------------------------
00516> --------------------
00517> | ADD HYD (2401  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
00518> --------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
00519>                    ID1 07:010203   257.30    2.303   13.75  40.59    .000
00520>                   +ID2 10:2304      12.84     .118    9.92  43.64    .000
00521>                    ==========================================================
00522>                    SUM 09:2401     270.14    2.358   13.67  40.73    .000
00523>
00524>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00525>
00526> ----------------------------------------------------------------------------------
00527> 001:0016----------------------------------------------------------------------------
00528> --------------------
00529> | CALIB NASHYD      |   Area    (ha)=    1.16   Curve Number   (CN)=54.00
00530> | 08:2105   DT= 5.00 |   Ia      (mm)=    5.000  # of Linear Res.(N)= 3.00
00531> --------------------   U.H. Tp(hrs)=    .430
00532>
00533>      Unit Hyd Qpeak  (cms)=      .103
00534>
00535>      PEAK FLOW       (cms)=      .036 (i)
00536>      TIME TO PEAK    (hrs)=     8.500
00537>      RUNOFF VOLUME    (mm)=    24.713
00538>      TOTAL RAINFALL   (mm)=    91.519
00539>      RUNOFF COEFFICIENT   =      .270
00540>
```

OUTLET B

OUTLET C

OUTLET A

```
00541>       (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00542>
00543> ------------------------------------------------------------------------------
00544> 001:0017----------------------------------------------------------------------
00545>       FINISH
00546> ------------------------------------------------------------------------------
00547> ******************************************************************************
00548>      WARNINGS / ERRORS / NOTES
00549>      -------------------------
00550>  001:0010 DESIGN STANDHYD
00551>        *** WARNING: Storage Coefficient is smaller than DT!
00552>                     Use a smaller DT or a larger area.
00553>    Simulation ended on 2004-05-10     at 17:09:20
00554> ******************************************************************************
00555>
00556>
```

```
##############################################################################

SSSSS  W    W  M   M  H   H  Y   Y  M   M   000          999     999  =========
S      W W W  MM MM  H   H   Y Y   MM MM  O   O       9   9 9   9
SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##   9   9 9   9  Ver. 4.02
    S  W W W  M   M  H   H    Y    M   M  O   O        9999   9999 July 1999
SSSSS   W W   M   M  H   H    Y    M   M   000             9      9 =========
                                                       9   9 9   9 # 3737016
     StormWater Management HYdrologic Model            999     999  =========

##############################################################################
************************** SWMHYMO-99 Ver/4.02 ********************************
*******  A single event and continuous hydrologic simulation model  *******
*******     based on the principles of HYMO and its successors      *******
*******                 OTTHYMO-83 and OTTHYMO-89.                  *******
##############################################################################
******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
*******                  Ottawa,  Ontario: (613) 727-5199           *******
*******                  Gatineau, Quebec: (819) 243-6858           *******
*******                  E-Mail: swmhymo@jfsa.Com                   *******
##############################################################################

##############################################################################
+++++++ Licensed user: C.F. Crozier & Associates Inc.                 +++++++
+++++++                Collingwood          SERIAL#:3737016          +++++++
##############################################################################

##############################################################################
*******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++                 *******
*******            Maximum value for ID numbers  :     10                *******
*******            Max. number of rainfall points:  15000                *******
*******            Max. number of flow points    :  15000                *******
##############################################################################

*********************   D E T A I L E D   O U T P U T   **********************
##############################################################################
*       DATE: 2004-05-10      TIME: 16:45:39      RUN COUNTER: 000079         *
******************************************************************************
* Input   filename: C:\TEMP\SORICH~1\QUANIT~1\100yr.DAT                       *
* Output  filename: C:\TEMP\SORICH~1\QUANIT~1\100yr.out                       *
* Summary filename: C:\TEMP\SORICH~1\QUANIT~1\100yr.sum                       *
* User comments:                                                             *
* 1:_________________________________________________________________________*
* 2:_________________________________________________________________________*
* 3:_________________________________________________________________________*
##############################################################################

------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*##############################################################################
*#  Project Name   : SORICHETTI POST-DEVELOPMENT 100 YEAR 24 HOUR CHICAGO STORM
*#  Details        : SWM Pond for Quality and Quantity Control
*#  Original Date  : 10-24-2002  (Burnside)
*#  Revised        : May 2004  (CF Crozier & Associates Inc)
*#  Modeller       : Chris Crozier, P.Eng.
*##############################################################################
------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
| CHICAGO STORM  |    IDF curve parameters: A=1660.510
| Ptotal=113.71 mm |                       B=    9.012
--------------------                       C=    .805
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

                    The CORRELATION coefficient is = .9988667

                      TIME        ENTERED          COMPUTED
                     (min)        (mm/hr)          (mm/hr)
                        5.         215.00           198.29
                       10.         145.00           155.10
                       15.         125.00           128.53
                       30.          82.00            86.96
                       60.          56.00            54.94
                      120.          34.00            33.20
                      360.          16.00            14.25
                      720.           8.00             8.24
                     1440.           4.50             4.74

      TIME   RAIN |  TIME   RAIN |  TIME   RAIN |  TIME   RAIN
       hrs  mm/hr |   hrs  mm/hr |   hrs  mm/hr |   hrs  mm/hr
      .08   .956 |  6.08  3.193 | 12.08  2.996 | 18.08  1.389
      .17   .965 |  6.17  3.321 | 12.17  2.944 | 18.17  1.380
      .25   .973 |  6.25  3.461 | 12.25  2.894 | 18.25  1.370
      .33   .982 |  6.33  3.615 | 12.33  2.846 | 18.33  1.361
      .42   .991 |  6.42  3.785 | 12.42  2.799 | 18.42  1.352
      .50  1.000 |  6.50  3.974 | 12.50  2.754 | 18.50  1.343
      .58  1.009 |  6.58  4.185 | 12.58  2.711 | 18.58  1.334
      .67  1.019 |  6.67  4.422 | 12.67  2.669 | 18.67  1.325
      .75  1.029 |  6.75  4.691 | 12.75  2.628 | 18.75  1.317
      .83  1.039 |  6.83  4.999 | 12.83  2.589 | 18.83  1.308
      .92  1.049 |  6.92  5.354 | 12.92  2.551 | 18.92  1.300
     1.00  1.059 |  7.00  5.770 | 13.00  2.515 | 19.00  1.292
     1.08  1.070 |  7.08  6.264 | 13.08  2.478 | 19.08  1.284
     1.17  1.080 |  7.17  6.859 | 13.17  2.445 | 19.17  1.276
     1.25  1.091 |  7.25  7.591 | 13.25  2.412 | 19.25  1.268
     1.33  1.103 |  7.33  8.515 | 13.33  2.379 | 19.33  1.260
     1.42  1.114 |  7.42  9.718 | 13.42  2.348 | 19.42  1.253
     1.50  1.126 |  7.50 11.349 | 13.50  2.317 | 19.50  1.245
     1.58  1.138 |  7.58 13.684 | 13.58  2.288 | 19.58  1.238
     1.67  1.151 |  7.67 17.296 | 13.67  2.259 | 19.67  1.230
     1.75  1.164 |  7.75 23.578 | 13.75  2.231 | 19.75  1.223
     1.83  1.177 |  7.83 36.944 | 13.83  2.204 | 19.83  1.216
     1.92  1.190 |  7.92 81.035 | 13.92  2.177 | 19.92  1.209
     2.00  1.204 |  8.00 198.294| 14.00  2.151 | 20.00  1.202
     2.08  1.218 |  8.08 101.853| 14.08  2.126 | 20.08  1.195
     2.17  1.232 |  8.17  60.313| 14.17  2.102 | 20.17  1.188
     2.25  1.247 |  8.25  42.005| 14.25  2.078 | 20.25  1.181
     2.33  1.263 |  8.33  31.970| 14.33  2.055 | 20.33  1.175
     2.42  1.278 |  8.42  25.723| 14.42  2.032 | 20.42  1.168
     2.50  1.294 |  8.50  21.495| 14.50  2.010 | 20.50  1.162
     2.58  1.311 |  8.58  18.459| 14.58  1.988 | 20.58  1.155
     2.67  1.328 |  8.67  16.180| 14.67  1.967 | 20.67  1.149
     2.75  1.346 |  8.75  14.410| 14.75  1.947 | 20.75  1.143
     2.83  1.364 |  8.83  12.997| 14.83  1.926 | 20.83  1.137
     2.92  1.383 |  8.92  11.844| 14.92  1.907 | 20.92  1.131
     3.00  1.402 |  9.00  10.886| 15.00  1.887 | 21.00  1.125
     3.08  1.422 |  9.08  10.077| 15.08  1.869 | 21.08  1.119
     3.17  1.442 |  9.17   9.386| 15.17  1.850 | 21.17  1.113
     3.25  1.464 |  9.25   8.788| 15.25  1.832 | 21.25  1.107
     3.33  1.485 |  9.33   8.266| 15.33  1.815 | 21.33  1.101
     3.42  1.508 |  9.42   7.806| 15.42  1.797 | 21.42  1.096
     3.50  1.532 |  9.50   7.397| 15.50  1.781 | 21.50  1.090
     3.58  1.556 |  9.58   7.032| 15.58  1.764 | 21.58  1.084
     3.67  1.581 |  9.67   6.704| 15.67  1.748 | 21.67  1.079
     3.75  1.607 |  9.75   6.407| 15.75  1.732 | 21.75  1.074
     3.83  1.634 |  9.83   6.137| 15.83  1.716 | 21.83  1.068
     3.92  1.662 |  9.92   5.891| 15.92  1.701 | 21.92  1.063
     4.00  1.692 | 10.00   5.665| 16.00  1.686 | 22.00  1.058
     4.08  1.722 | 10.08   5.457| 16.08  1.672 | 22.08  1.053
     4.17  1.754 | 10.17   5.266| 16.17  1.657 | 22.17  1.047
     4.25  1.787 | 10.25   5.088| 16.25  1.643 | 22.25  1.042
     4.33  1.821 | 10.33   4.923| 16.33  1.629 | 22.33  1.037
     4.42  1.857 | 10.42   4.769| 16.42  1.616 | 22.42  1.032
     4.50  1.895 | 10.50   4.626| 16.50  1.603 | 22.50  1.027
     4.58  1.934 | 10.58   4.491| 16.58  1.589 | 22.58  1.023
     4.67  1.975 | 10.67   4.365| 16.67  1.577 | 22.67  1.018
     4.75  2.018 | 10.75   4.246| 16.75  1.564 | 22.75  1.013
     4.83  2.064 | 10.83   4.135| 16.83  1.552 | 22.83  1.008
     4.92  2.111 | 10.92   4.029| 16.92  1.540 | 22.92  1.004
     5.00  2.162 | 11.00   3.929| 17.00  1.528 | 23.00   .999
     5.08  2.215 | 11.08   3.835| 17.08  1.516 | 23.08   .995
     5.17  2.270 | 11.17   3.746| 17.17  1.504 | 23.17   .990
     5.25  2.330 | 11.25   3.660| 17.25  1.493 | 23.25   .986
     5.33  2.392 | 11.33   3.580| 17.33  1.482 | 23.33   .981
     5.42  2.459 | 11.42   3.502| 17.42  1.471 | 23.42   .977
     5.50  2.530 | 11.50   3.429| 17.50  1.460 | 23.50   .972
     5.58  2.606 | 11.58   3.359| 17.58  1.449 | 23.58   .968
     5.67  2.686 | 11.67   3.292| 17.67  1.439 | 23.67   .964
     5.75  2.773 | 11.75   3.228| 17.75  1.429 | 23.75   .960
     5.83  2.866 | 11.83   3.166| 17.83  1.418 | 23.83   .956
     5.92  2.967 | 11.92   3.107| 17.92  1.408 | 23.92   .951
     6.00  3.075 | 12.00   3.051| 18.00  1.399 | 24.00   .947

------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
--------------------
| CALIB NASHYD     |    Area    (ha)=  221.70   Curve Number   (CN)=73.00
| 01:2101   DT= 5.00 |  Ia    (mm)=    5.000   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    4.570

     Unit Hyd Qpeak  (cms)=     1.853

     PEAK FLOW       (cms)=     3.063 (i)
     TIME TO PEAK    (hrs)=    13.667
     RUNOFF VOLUME    (mm)=    58.313
     TOTAL RAINFALL   (mm)=   113.707
     RUNOFF COEFFICIENT   =      .513

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  5.00
|  IN> 01:2101     |     Number of SEGMENTS =  3
| OUT< 02:2301     |     Slopes (%), CHANNEL=5.00   FLOODPLAIN=5.00
--------------------           LENGTH =  530.00     (m)

                  <------ DATA FOR SECTION (   1.0) ------>
                  Distance      Elevation       Manning
                     .00          20.00          .0600
                   10.00          19.70     .0600 / .0350  Main Channal
                   12.10          18.30          .0350      Main Channel
                   16.30          18.30          .0350      Main Channel
                   18.40          19.70     .0350 / .0600  Main Channel
                   28.40          20.00          .0600

  <------------------------- TRAVEL TIME TABLE -------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .088  18.387  .201E+03  .332E+00       .464     1.225       7.21     .107
    .175  18.475  .414E+03  .137E+01      1.481     1.896       4.66     .332
    .263  18.563  .639E+03  .317E+01      2.928     2.428       3.64     .637
    .350  18.650  .876E+03  .579E+01      4.764     2.881       3.07    1.008
    .438  18.738  .113E+04  .930E+01      6.968     3.279       2.69    1.435
    .525  18.825  .139E+04  .137E+02      9.527     3.638       2.43    1.910
    .613  18.913  .166E+04  .192E+02     12.437     3.967       2.23    2.430
    .700  19.000  .195E+04  .257E+02     15.696     4.271       2.07    2.990
    .788  19.088  .225E+04  .334E+02     19.304     4.555       1.94    3.587
    .875  19.175  .256E+04  .422E+02     23.263     4.823       1.83    4.220
    .963  19.263  .288E+04  .523E+02     27.575     5.076       1.74    4.886
   1.050  19.350  .321E+04  .637E+02     32.245     5.318       1.66    5.584
   1.138  19.438  .356E+04  .764E+02     37.278     5.549       1.59    6.312
   1.225  19.525  .392E+04  .906E+02     42.678     5.770       1.53    7.069
   1.313  19.613  .429E+04  .106E+03     48.451     5.984       1.48    7.854
   1.400  19.700  .467E+04  .123E+03     54.601     6.191       1.43    8.667
   1.500  19.800  .530E+04  .150E+03     63.709     6.375       1.39    9.563
   1.600  19.900  .627E+04  .189E+03     74.084     6.261       1.41   10.017
   1.700  20.000  .760E+04  .244E+03     86.162     6.008       1.47   10.214

  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                                  <---- hydrograph ---->   <-pipe / channel->
                                    AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                    (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:2101            221.70    3.063   13.67  58.313      .269     2.457
  OUTFLOW: ID= 2:2301            221.70    3.062   13.67  58.313      .268     2.450

------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  5.00
|  IN> 02:2301     |     Number of SEGMENTS =  3
| OUT< 03:2302     |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
--------------------           LENGTH =  520.00     (m)

                  <------ DATA FOR SECTION (   2.0) ------>
                  Distance      Elevation       Manning
                     .00          10.00          .0600
                   10.00           9.80     .0600 / .0350  Main Channel
                   10.80           9.30          .0350      Main Channel
                   12.50           9.30          .0350      Main Channel
                   13.00          10.30     .0350 / .0600  Main Channel
                   16.00          10.30          .0600

  <------------------------- TRAVEL TIME TABLE -------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .036   9.336  .323E+02  .222E+00       .013      .213      40.61     .008
    .071   9.371  .659E+02  .906E+00       .042      .331      26.21     .024
    .107   9.407  .101E+03  .208E+01       .082      .424      20.45     .045
    .143   9.443  .137E+03  .378E+01       .133      .503      17.24     .072
    .179   9.479  .175E+03  .602E+01       .193      .572      15.15     .102
    .214   9.514  .215E+03  .884E+01       .262      .635      13.66     .136
    .250   9.550  .255E+03  .123E+02       .339      .691      12.54     .173
    .286   9.586  .297E+03  .163E+02       .425      .744      11.65     .213
    .321   9.621  .341E+03  .211E+02       .519      .793      10.94     .255
    .357   9.657  .385E+03  .265E+02       .621      .838      10.34     .299
    .393   9.693  .432E+03  .326E+02       .731      .881       9.83     .346
    .429   9.729  .479E+03  .395E+02       .850      .922       9.40     .395
    .464   9.764  .528E+03  .472E+02       .976      .961       9.02     .446
    .500   9.800  .579E+03  .556E+02      1.111      .998       8.68     .499
    .540   9.840  .657E+03  .682E+02      1.292     1.023       8.47     .552
    .580   9.880  .777E+03  .867E+02      1.498     1.003       8.64     .582
    .620   9.920  .939E+03  .112E+03      1.738      .962       9.00     .597
    .660   9.960  .114E+04  .145E+03      2.020      .919       9.44     .606
```

```
00271>      .700   10.000  .139E+04  .187E+03      2.349      .879      9.86      .615
00272>
00273>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00274>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00275>
00276>       *** WARNING: TRAVEL TIME TABLE was exceeded
00277>                                    <----- hydrograph ---->    <-pipe / channel->
00278>                                AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00279>                                (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
00280>    INFLOW : ID= 2:2301       221.70    3.062   13.67 58.313      .700       .879
00281>    OUTFLOW: ID= 3:2302       221.70    3.060   13.83 58.313      .700       .879
00282>
00283>
00284> ----------------------------------------------------------------------------
00285> 001:0006----------------------------------------------------------------------
00286> --------------------
00287> | CALIB NASHYD      |   Area     (ha)=   14.10   Curve Number    (CN)=69.00
00288> | 04:2102   DT= 5.00 |  Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00289> ---------------------   U.H. Tp(hrs)=    .770
00290>
00291>      Unit Hyd Qpeak  (cms)=      .699
00292>
00293>      PEAK FLOW       (cms)=      .666 (i)
00294>      TIME TO PEAK    (hrs)=     8.917
00295>      RUNOFF VOLUME    (mm)=    53.034
00296>      TOTAL RAINFALL   (mm)=   113.707
00297>      RUNOFF COEFFICIENT  =      .466
00298>
00299>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00300>
00301> ----------------------------------------------------------------------------
00302> 001:0007----------------------------------------------------------------------
00303> --------------------
00304> | ROUTE CHANNEL     |     Routing time step (min) =  5.00
00305> |  IN> 04:2102      |     Number of SEGMENTS =  3
00306> | OUT< 05:2303      |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00307> --------------------                          LENGTH =  520.00     (m)
00308>
00309>                 <------ DATA FOR SECTION (   2.0) ------>
00310>                 Distance      Elevation        Manning
00311>                     .00          10.00           .0600
00312>                   10.00           9.80     .0600 / .0350  Main Channel
00313>                   10.80           9.30           .0350     Main Channel
00314>                   12.50           9.30           .0350     Main Channel
00315>                   13.00          10.30     .0350 / .0600  Main Channel
00316>                   16.00          10.30           .0600
00317>
00318>    <------------------------- TRAVEL TIME TABLE ------------------------->
00319>     DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00320>       (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)     (m2/s)
00321>      .036   9.336  .323E+02  .222E+00      .013      .213     40.61      .008
00322>      .071   9.371  .659E+02  .906E+00      .042      .331     26.21      .024
00323>      .107   9.407  .101E+03  .208E+01      .082      .424     20.45      .045
00324>      .143   9.443  .137E+03  .378E+01      .133      .503     17.24      .072
00325>      .179   9.479  .175E+03  .602E+01      .193      .572     15.15      .102
00326>      .214   9.514  .215E+03  .884E+01      .262      .635     13.66      .136
00327>      .250   9.550  .255E+03  .123E+02      .339      .691     12.54      .173
00328>      .286   9.586  .297E+03  .163E+02      .425      .744     11.65      .213
00329>      .321   9.621  .341E+03  .211E+02      .519      .793     10.94      .255
00330>      .357   9.657  .385E+03  .265E+02      .621      .838     10.34      .299
00331>      .393   9.693  .432E+03  .326E+02      .731      .881      9.83      .346
00332>      .429   9.729  .479E+03  .395E+02      .850      .922      9.40      .395
00333>      .464   9.764  .528E+03  .472E+02      .976      .961      9.02      .446
00334>      .500   9.800  .579E+03  .556E+02     1.111      .998      8.68      .499
00335>      .540   9.840  .657E+03  .682E+02     1.292     1.023      8.47      .552
00336>      .580   9.880  .777E+03  .867E+02     1.498     1.003      8.64      .582
00337>      .620   9.920  .939E+03  .112E+03     1.738      .962      9.00      .597
00338>      .660   9.960  .114E+04  .145E+03     2.020      .919      9.44      .606
00339>      .700  10.000  .139E+04  .187E+03     2.349      .879      9.86      .615
00340>
00341>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00342>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00343>
00344>                                    <---- hydrograph ---->    <-pipe / channel->
00345>                                AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00346>                                (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
00347>    INFLOW : ID= 4:2102        14.10     .666    8.92 53.034      .372       .855
00348>    OUTFLOW: ID= 5:2303        14.10     .654    9.08 53.034      .366       .849
00349>
00350>
00351> ----------------------------------------------------------------------------
00352> 001:0008----------------------------------------------------------------------
00353> --------------------
00354> | CALIB NASHYD      |   Area     (ha)=   21.50   Curve Number    (CN)=65.00
00355> | 06:2103   DT= 5.00 |  Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00356> ---------------------   U.H. Tp(hrs)=    .900
00357>
00358>      Unit Hyd Qpeak  (cms)=      .912
00359>
00360>      PEAK FLOW       (cms)=      .813 (i)
00361>      TIME TO PEAK    (hrs)=     9.083
00362>      RUNOFF VOLUME    (mm)=    48.140
00363>      TOTAL RAINFALL   (mm)=   113.707
00364>      RUNOFF COEFFICIENT  =      .423
00365>
00366>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00367>
00368> ----------------------------------------------------------------------------
00369> 001:0009----------------------------------------------------------------------
00370> --------------------
00371> | ADD HYD (010203) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
00372> --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
00373>                     ID1 03:2302    221.70    3.060   13.83  58.31     .000
00374>                   +ID2 05:2303     14.10     .654    9.08  53.03     .000
00375>                   +ID3 06:2103     21.50     .813    9.08  48.14     .000
00376>                    ================================================
00377>                    SUM 07:010203   257.30    3.245   13.67  57.17     .000
00378>
00379>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00380>
00381> ----------------------------------------------------------------------------
00382> 001:0010----------------------------------------------------------------------
00383> *#  Sorichetti Site and SWM Pond hydrograph
00384> --------------------
00385> | DESIGN STANDHYD   |   Area     (ha)=   11.33
00386> | 05:2104   DT= 5.00 |  Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
00387> --------------------
00388>                              IMPERVIOUS    PERVIOUS (i)
00389>      Surface Area     (ha)=       3.40         7.93
00390>      Dep. Storage     (mm)=        .80         1.50
00391>      Average Slope     (%)=       2.00         2.00
00392>      Length            (m)=     274.83        40.00
00393>      Mannings n             =      .013         .250
00394>
00395>      Max.eff.Inten.(mm/hr)=     198.29        70.53
00396>                  over (min)        5.00        10.00
00397>      Storage Coeff.  (min)=       2.89 (ii)    11.01 (ii)
00398>      Unit Hyd. Tpeak (min)=       5.00        10.00
00399>      Unit Hyd. peak  (cms)=        .28          .10
00400>                                                      *TOTALS*
00401>      PEAK FLOW       (cms)=      1.11          .97      1.671 (iii)
00402>      TIME TO PEAK    (hrs)=      8.00         8.17      8.000
00403>      RUNOFF VOLUME    (mm)=    112.91        49.64     62.293
00404>      TOTAL RAINFALL   (mm)=    113.71       113.71    113.707
00405>      RUNOFF COEFFICIENT  =       .99          .44       .548
00406>
00407>       *** WARNING: Storage Coefficient is smaller than DT!
00408>                    Use a smaller DT or a larger area.
00409>
00410>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00411>            CN* = 61.0    Ia = Dep. Storage  (Above)
00412>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00413>            THAN THE STORAGE COEFFICIENT.
00414>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00415> ----------------------------------------------------------------------------
00416> 001:0011----------------------------------------------------------------------
00417> --------------------
00418> | ROUTE RESERVOIR   |     Requested routing time step =  5.0 min.
00419> |  IN>05:(2104  )   |
00420> | OUT<02:(002104)   |     *********  OUTFLOW STORAGE TABLE  *********
00421> --------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00422>                            (cms)     (ha.m.)  |    (cms)    (ha.m.)
00423>                             .000   .0000E+00   |     .025   .2800E+00
00424>                             .018   .1245E+00   |     .480   .4600E+00
00425>
00426>      ROUTING RESULTS              AREA     QPEAK     TPEAK      R.V.
00427>      ---------------               (ha)     (cms)     (hrs)      (mm)
00428>      INFLOW >05: (2104  )        11.33     1.671     8.000    62.293
00429>      OUTFLOW<02: (002104)        11.33      .236     9.167    62.292
00430>
00431>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   14.129
00432>                    TIME SHIFT OF PEAK FLOW          (min)=   70.00
00433>                    MAXIMUM  STORAGE   USED        (ha.m.)=.3636E+00
00434>
00435> ----------------------------------------------------------------------------
00436> 001:0012----------------------------------------------------------------------
00437> *#   Uncontrolled Drainage Area including Sorichetti Open Space and GT
00438> --------------------
00439> | CALIB NASHYD      |   Area     (ha)=    1.51   Curve Number    (CN)=54.00
00440> | 01:2106   DT= 5.00 |  Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00441> ---------------------   U.H. Tp(hrs)=    .590
00442>
00443>      Unit Hyd Qpeak  (cms)=      .098
00444>
00445>      PEAK FLOW       (cms)=      .055 (i)
00446>      TIME TO PEAK    (hrs)=     8.750
00447>      RUNOFF VOLUME    (mm)=    36.352
00448>      TOTAL RAINFALL   (mm)=   113.707
00449>      RUNOFF COEFFICIENT  =      .320
00450>
00451>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00452>
00453> ----------------------------------------------------------------------------
00454> 001:0013----------------------------------------------------------------------
00455> --------------------
00456> | ADD HYD (040607) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
00457> --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
00458>                     ID1 02:002104   11.33      .236     9.17  62.29     .000
00459>                   +ID2 01:2106       1.51      .055     8.75  36.35     .000
00460>                    ================================================
00461>                    SUM 06:040607    12.84      .284     9.08  59.24     .000
00462>
00463>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00464>
00465> ----------------------------------------------------------------------------
00466> 001:0014----------------------------------------------------------------------
00467> --------------------
00468> | ROUTE CHANNEL     |     Routing time step (min) =  5.00
00469> |  IN> 06:040607    |     Number of SEGMENTS =  3
00470> | OUT< 10:2304      |     Slopes (%), CHANNEL= .50   FLOODPLAIN= .50
00471> --------------------                          LENGTH =  520.00     (m)
00472>
00473>                 <------ DATA FOR SECTION (   2.0) ------>
00474>                 Distance      Elevation        Manning
00475>                     .00          10.00           .0600
00476>                   10.00           9.80     .0600 / .0350  Main Channel
00477>                   10.80           9.30           .0350     Main Channel
00478>                   12.50           9.30           .0350     Main Channel
00479>                   13.00          10.30     .0350 / .0600  Main Channel
00480>                   16.00          10.30           .0600
00481>
00482>    <------------------------- TRAVEL TIME TABLE ------------------------->
00483>     DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
00484>       (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)     (m2/s)
00485>      .036   9.336  .323E+02  .222E+00      .013      .213     40.61      .008
00486>      .071   9.371  .659E+02  .906E+00      .042      .331     26.21      .024
00487>      .107   9.407  .101E+03  .208E+01      .082      .424     20.45      .045
00488>      .143   9.443  .137E+03  .378E+01      .133      .503     17.24      .072
00489>      .179   9.479  .175E+03  .602E+01      .193      .572     15.15      .102
00490>      .214   9.514  .215E+03  .884E+01      .262      .635     13.66      .136
00491>      .250   9.550  .255E+03  .123E+02      .339      .691     12.54      .173
00492>      .286   9.586  .297E+03  .163E+02      .425      .744     11.65      .213
00493>      .321   9.621  .341E+03  .211E+02      .519      .793     10.94      .255
00494>      .357   9.657  .385E+03  .265E+02      .621      .838     10.34      .299
00495>      .393   9.693  .432E+03  .326E+02      .731      .881      9.83      .346
00496>      .429   9.729  .479E+03  .395E+02      .850      .922      9.40      .395
00497>      .464   9.764  .528E+03  .472E+02      .976      .961      9.02      .446
00498>      .500   9.800  .579E+03  .556E+02     1.111      .998      8.68      .499
00499>      .540   9.840  .657E+03  .682E+02     1.292     1.023      8.47      .552
00500>      .580   9.880  .777E+03  .867E+02     1.498     1.003      8.64      .582
00501>      .620   9.920  .939E+03  .112E+03     1.738      .962      9.00      .597
00502>      .660   9.960  .114E+04  .145E+03     2.020      .919      9.44      .606
00503>      .700  10.000  .139E+04  .187E+03     2.349      .879      9.86      .615
00504>
00505>  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00506>  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00507>
00508>                                    <---- hydrograph ---->    <-pipe / channel->
00509>                                AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
00510>                                (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
00511>    INFLOW : ID= 6:040607      12.84      .284    9.08 59.242      .224       .650
00512>    OUTFLOW: ID=10:2304        12.84      .276    9.25 59.242      .220       .643
00513>
00514>
00515> ----------------------------------------------------------------------------
00516> 001:0015----------------------------------------------------------------------
00517> --------------------
00518> | ADD HYD (2401  ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
00519> --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
00520>                     ID1 07:010203  257.30    3.245   13.67  57.17     .000
00521>                   +ID2 10:2304      12.84      .276    9.25  59.24     .000
00522>                    ================================================
00523>                    SUM 09:2401    270.14    3.323   13.50  57.27     .000
00524>
00525>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00526>
00527> ----------------------------------------------------------------------------
00528> 001:0016----------------------------------------------------------------------
00529> --------------------
00530> | CALIB NASHYD      |   Area     (ha)=    1.16   Curve Number    (CN)=54.00
00531> | 08:2105   DT= 5.00 |  Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
00532> ---------------------   U.H. Tp(hrs)=    .430
00533>
00534>      Unit Hyd Qpeak  (cms)=      .103
00535>
00536>      PEAK FLOW       (cms)=      .052 (i)
00537>      TIME TO PEAK    (hrs)=     8.500
00538>      RUNOFF VOLUME    (mm)=    36.352
00539>      TOTAL RAINFALL   (mm)=   113.707
00540>      RUNOFF COEFFICIENT  =      .320
```

OUTLET B

OUTLET C

OUTLET A

```
00541>
00542>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00543>
00544> ------------------------------------------------------------------------------
00545> 001:0017----------------------------------------------------------------------
00546>       FINISH
00547> ------------------------------------------------------------------------------
00548> ******************************************************************************
00549>      WARNINGS / ERRORS / NOTES
00550>      -------------------------
00551>  001:0005 ROUTE CHANNEL   ->
00552>       *** WARNING: TRAVEL TIME TABLE was exceeded
00553>  001:0010 DESIGN STANDHYD
00554>       *** WARNING: Storage Coefficient is smaller than DT!
00555>                    Use a smaller DT or a larger area.
00556>    Simulation ended on 2004-05-10     at 16:45:40
00557> ******************************************************************************
00558>
00559>
```

APPENDIX G

Stormwater Management Facility Operations & Maintenance Manual (CFCA, June 2007)

STORMWATER MANAGEMENT FACILITY OPERATION & MAINTENANCE MANUAL

GEORGIAN GLEN RESIDENTIAL DEVELOPMENT

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
110 PINE STREET
COLLINGWOOD, ONTARIO
L9Y 2N9

JUNE 2007

CFCA FILE NO. 101-2501

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1.0 INTRODUCTION

CF Crozier & Associates Inc (Crozier) were retained by Sorichetti Development Group Inc ("Developer") to complete a detailed stormwater management report and detailed design for a stormwater management (SWM) facility for the proposed Georgian Glen Subdivision in the Town of The Blue Mountains.

The 12.3 ha (30 acre) property is legally described as Part of Lot 28, Concession 7, Town of The Blue Mountains, County of Grey. Located in Camperdown (see Figure 1), the property is bounded by privately held lands to the west, the Georgian Trail to the north and County Road 40 to the east.

The Plan of Subdivision consists of 39 single family lots, 16 town house units, a stormwater management facility, public open space and future residential areas. The Draft Plan of Subdivision is reflected in Figure 2.

This manual has been prepared to provide a detailed summary of the operation and maintenance procedures and protocols for the SWM facility to assist the future owners of the facility, Town of The Blue Mountains, and to ensure the long-term successful operation of the facility.

Contained within this manual are a description of the facility (Section 2.0); a discussion of the operation and maintenance procedures and protocols for the facility (Section 3.0); and a summary of various contact information (Section 4.0).

2.0 FACILITY DESCRIPTION

The management of stormwater and site drainage for the development must comply with the policies and standards of various agencies including the Town of The Blue Mountains (TOBM), Ministry of Environment (MOE), Niagara Escarpment Commission (NEC), and the Grey Sauble Conservation Authority (GSCA). The Georgian Glen Subdivision incorporates various measures to meet these standards. The primary method is an "end-of-pipe" stormwater management facility. Given the ultimate receiver of drainage from the subject lands is Georgian Bay, "enhanced" water quality treatment will be implemented for the development. A wet pond, complete with extended detention, was selected as an appropriate facility.

The wet pond facility is located at the northeast portion of the subject property. The outfall from the facility will discharge treated runoff to the open space block to the west. The detailed design of the SWM facility is shown on the enclosed figure, SWM 1. The landscaping plan for the facility is also included in this manual as figure LP.1 of 1, prepared by John D. Bell & Associates Ltd.

The internal road network for the development was constructed using a modified urban cross section, based on the Town of The Blue Mountains standards for urban roadways. The minor and major drainage flow routes follow the alignment of the roadways, and discharge to the SWM facility. The minor system drainage network of storm sewer pipes was designed to accommodate peak flows from the 5-year return period and discharge to the SWM facility via a single outfall. The major system was designed to convey flows greater than the 5-year return period and discharge to the SWM facility via overland flow routes.

A sediment forebay has been incorporated into the SWM pond immediately downstream of the storm sewer outlet to allow any suspended solids in the storm runoff to settle out prior to entering the main treatment area of the facility.

The outlet control structure has been designed as an 1800 mm diameter manhole. The extended detention is provided by a 110 mm diameter orifice connected to a reverse sloping pipe. Higher flows are conveyed to the control manhole by way of a double ditch inlet catchbasin connected to the manhole by a 450 mm sewer. Flow is conveyed from the 1800 mm manhole via a 525 mm storm sewer, outletting to the open space block.

An emergency spillway has also been provided to safely convey the Timmins Regional storm flow or excess flows contained in the facility in the event of a blockage/restriction in the outlet control structure.

The following table provides the various design elements of the facility.

TABLE 1: Summary of Pond Elements

Pond Level	Elevation	Volume
	m	m^3
Base	182.5	0
Permanent Pool	184.0	1,800
Extended Detention	184.5	1,200 (active)
100-Yr	185.2	3,650 (active)
Emergency Spillway	185.5	4,500 (active)
Top of Berm	186.0	6,000 (active)

2.1 Maintenance Enhancements

2.1.1 Access

Maintenance access to both inlet and outlet structures of the SWM facility has been provided via a 6 m access road along the south limit of the pond block. Access to the control manhole can be achieved from the Emergency Access/Future Extension of Street B.

2.1.2 Control Structure

The outlet structure has been specifically designed to minimize blockage with the anticipated debris commonly associated with wetponds (i.e. garbage/vegetation). The orifice plate is easily accessible for cleaning within the manhole.

2.1.3 Forebay

A sediment forebay has been incorporated into the SWM facility to concentrate sediment deposits in one location, which will facilitate maintenance operations.

3.0 FACILITY OPERATION & MAINTENANCE

It is understood that the Town of The Blue Mountains will assume responsibility for the operation and maintenance of the SWM facility 2 years after completion. This will consist of annual debris clean-up, grass mowing and periodic inspections.

3.1 Maintenance Schedule & Operations

3.1.1 Inspections

Inspections are to be conducted by the Developer after every significant storm during the first two years after construction or up until the end of the warranty period to ensure proper functioning. After this period inspections should be conducted annually by the Town of The Blue Mountains.

A suggested inspection routine is listed below, and a typical inspection checklist is provided in Appendix B.

TABLE 2: Inspection Routine for SWM Facility

ABNORMAL OBSERVATION	INSPECTED COMPONENT	MAINTENANCE REQUIRED
Water level higher than normal > 24 hours after a storm.	Outlet structure	Clear blockage by removing trash and/or sediment.
Water level lower than the normal permanent pool elevation.	Inlet structure	Clear blockage by removing trash and/or sediment.
Surrounding vegetation is in poor condition; lack of aquatic vegetation; easy access to open water.	Pond vegetation	Re-planting in affected areas.
Elevated sediment depth in pond.	Sediment forebay	Using a graduated pole, check depth in sediment forebay; if sediment depth is 1.3 m, sediment removal is required. Typically, sediment depths in the forebay are also monitored annually with removal after accumulations reach 50% of the total depth of the forebay. This is likely after 5 to 10 years of operations.

During these inspections, if an oily sheen or abnormal colouring of the water in the facility is noted it may indicate that an industrial spill may have occurred. MOE Spills Action Centre should be contacted immediately; refer to contact information in Appendix A.

The health of the wetpond also relies on a periodic "turn-over" of water which flushes through the facility as a result of rainfall/runoff. There may be occasions, particularly during extended dry spells and/or the initial development phases of the project, when the wetpond turn-over occurs infrequently. This may result in discoloration or algae in the permanent pool, however these effects are temporary and self mitigating.

3.1.2 Grass Cutting

Grass should be cut as infrequently as possible to further enhance water quality and discourage the formation of habitat for geese. Therefore, grass cutting should be undertaken solely to enhance the aesthetics of the facility and must comply with local by-laws.

Grass should not be cut to the edge of the permanent pool and cutting should be done parallel to the shoreline with grass clippings being ejected upland to reduce the potential for organic loadings to the pond. To avoid grass cutting, ground cover such as crown vetch should be employed in lieu of grasses.

3.1.3 Plantings

Aquatic and shoreline fringe zones may require some replanting or enhancement by the Developer during the warranty period of the SWM facility. The extent of replanting or enhancement required will be determined during regular inspections and following consultation with landscape architect.

The planting of shoreline or fringe vegetation should be carried out in mid-May to early June after water levels from spring runoff have stabilized. The use of biodegradable mesh-like erosion control matting is highly recommended to establish ground cover. Shrubs and trees can be planted through openings created in the matting. In aquatic fringe/shallow water areas, hand planting of emergent vegetation is recommended.

3.1.4 Trash Removal

Annual "spring cleanup" should be conducted to remove accumulated trash from the SWM facility. Further trash removal may be required as determined by regular inspections.

3.1.5 Sediment Removal and Maintenance

The removal of sediment from the forebay should be conducted when either accumulation reaches 1.3 m above bottom of forebay or every 10 years to ensure optimum functionality of the SWM facility.

Sediment removal should be conducted using typical grading/excavation equipment such as backhoes and hydraulic dredging.

Samples of all sediment removed from the facility must be tested for any hazardous materials to determine appropriate off-site disposal locations.

The Developer will be required to remove all sediment prior to the Municipality assuming responsibility of the SWM facility.

3.2 Safety

The SWM facility has been designed as a wet pond with a permanent pool depth of 1.5 m. The SWM facility will have a full perimeter chain link fence installed. Use of shallow slopes (3:1 and 5:1) have been employed into the design as additional safety measures.

It is also important that suitable signage be erected around the SWM facility, explaining the nature of the facility and the inherent risks associated with it. A suggested wording is as follows:

WARNING

This stormwater management wetland facility receives runoff from the subdivision, cleaning the water and releasing it back to the natural watercourse downstream. It is subject to rapid rise in water levels and high flow conditions. KEEP OUT/DO NOT ENTER.

4.0 CONTACT INFORMATION

A list of agencies and firms involved with this project and possible contact numbers required by the Town of The Blue Mountains is provided in Appendix A.

J:\101 - Sorichetti\2501 - Georgian Glen\Reports\GGlenSWM O & M Manual_062507.doc

APPENDIX A

Contact Information for Agencies

CONTACT INFORMATION FOR AGENCIES

Agency	Contact Information	Contact Person
Town of The Blue Mountains	26 Bridge Street P.O. Box 310 Thornbury, ON N0H 2P0 Tel: (519) 599-3131 ext 260 Fax: (519) 599-3664 Email: rrusswurm@town.thebluemountains.on.ca	Reg Russwurm, MBA, P.Eng. Director of Engineering and Public Works
Grey Sauble Conservation Authority	R.R. # 4 #237897 Inglis Falls Road Owen Sound, ON N4K 5N6 Tel: (519) 376-3076 ext. 227 Fax: (519) 371-0437 Email: gsca@bmts.com	Douglas Hill, P.Eng Director of Operations
MOE Spill Action Centre	5775 Yonge Street 5th floor North York ON M2M 4J1 **Toll Free: 1-800-268-6060** Tel: (416) 325-3000 Fax (416) 325-3011	
C.F. Crozier & Associates Inc.	110 Pine Street Collingwood, ON L9Y 2N9 Tel: (705) 446-3510 Fax: (705) 446-3520 Email: kmorris@cfcrozier.ca	Kevin Morris, P.Eng. Project Engineer
John D. Bell Associates Ltd.	No. 1207, Line 2 South RR#3, Box#322 Shanty Bay, ON L0L 2L0 Tel: (705) 722-5660 Fax: (705) 722-6278 Email: jdbellassociates@rogers.com	John D. Bell, President

APPENDIX B

Typical Inspection Checklist for SWM Facility

GEORGIAN GLEN RESIDENTIAL DEVELOPMENT

STORMWATER MANAGEMENT FACILITY INSPECTION CHECKLIST

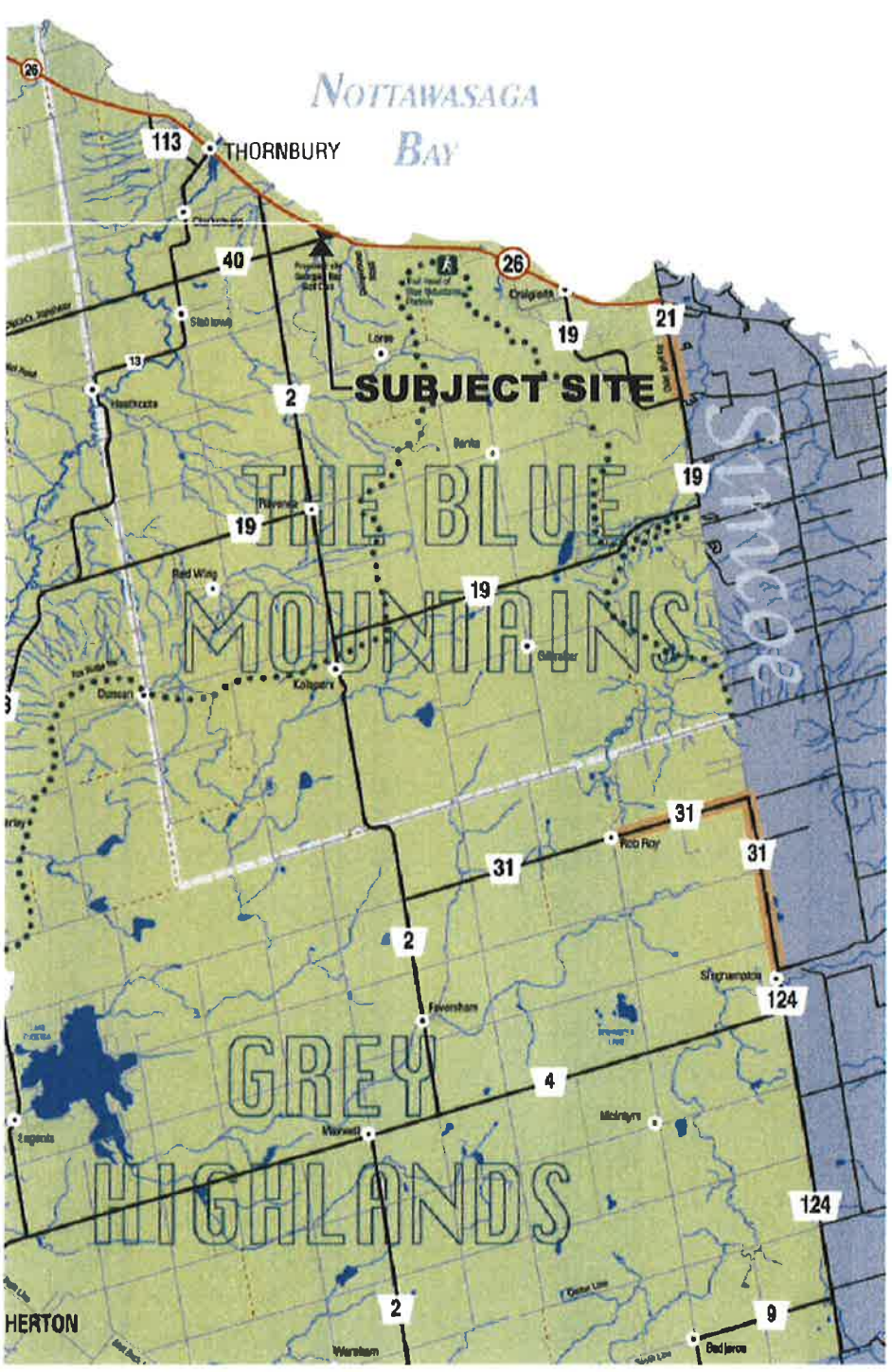
Inspection Date: _____ Previous Inspection Date: _____

Inspector(s): _____ Contact Info: _____

Weather: _____

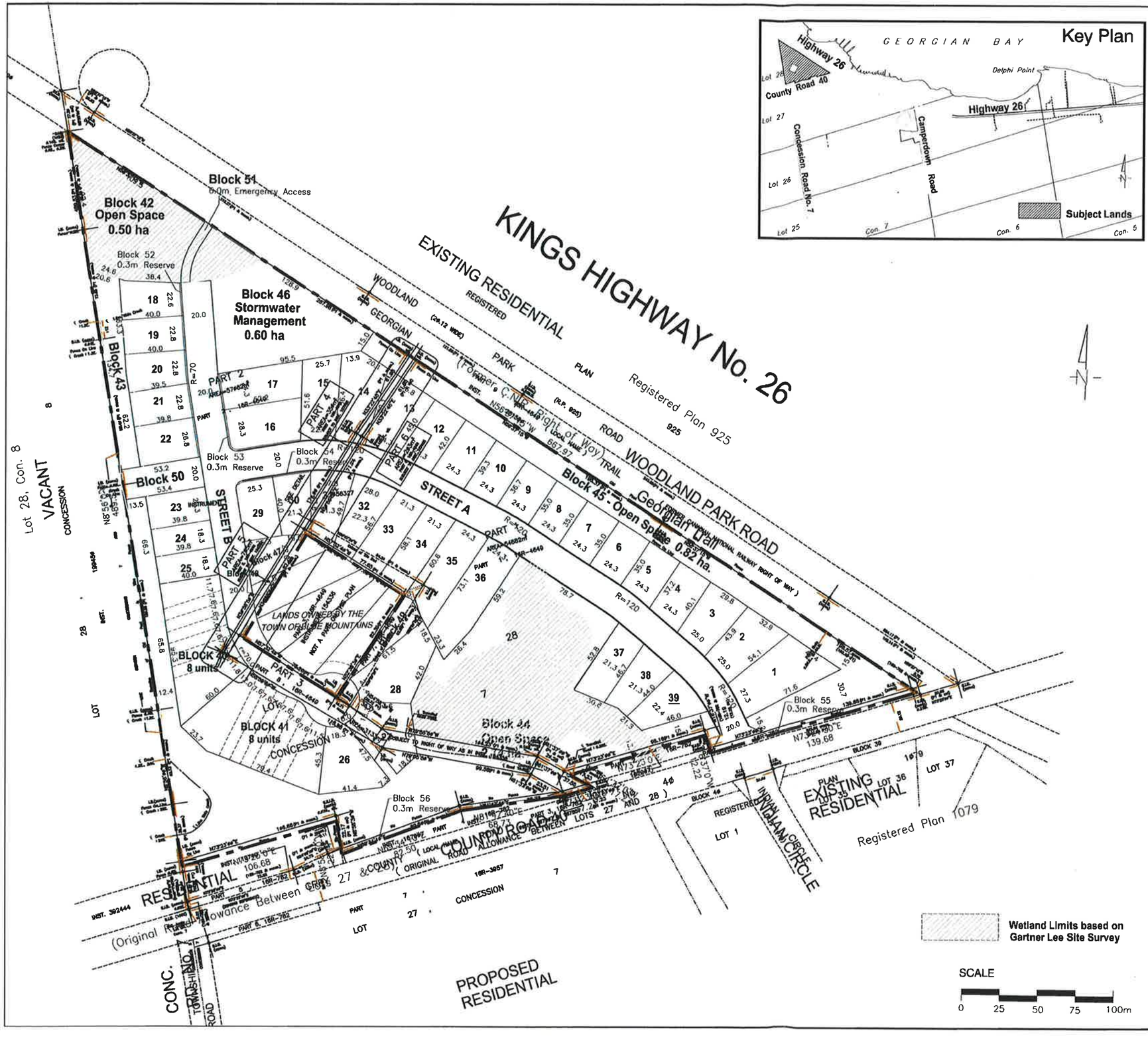
Item	Description	Results	Comments/Recommendations
1	Water Levels	Wetland = Forebay = Micropool =	
2	Inlet Structure (Condition, debris, etc.)		
3	Outlet Structure (Condition, debris, etc.)		
4	Forebay (Sediment Depth)		
5	Vegetation		
6	Access Corridor		
7	Other		
8	Other		
9	Other		

FIGURES



CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET
COLLINGWOOD ON
L9Y 2N9
T. 705-446-3510
F. 705-446-3520
CFCROZIER.CA

PROJECT: GEORGIAN GLEN SUBDIVISION TOWN of THE BLUE MOUNTAINS		DRAWN BY: I.T.M.	PROJECT No.: 101-2501
		DATE: 05/14/2004	SCALE: NTS
TITLE: SITE LOCATION		DRAWING No.: FIG. 1	



Draft Plan of Subdivision 42T-2002-006

Part of Lot 28, Concession 7
Town of The Blue Mountains
County of Grey

Schedule of Land Use

Lot/Block	Land Use	Units	Area(ha)	Density (uph)
1-39	Single Family min. 21.3m (70ft)	39	4.43	8.14 uph
40-41	Townhouses min. 7.6m	16	0.78	18.42 uph
42-45	Open Space		4.25	
46	Storm Water Management		0.60	
47-49	Future Residential		0.17	
50	Future Road		0.10	
51	6m Emergency Access		0.02	
52-56	0.3m Reserve		0.02	
Streets A-B	20m Roads (784m)		1.47	
Total		55	11.84	

Owner's Authorization

I hereby authorize Malone Given Parsons Ltd. to prepare and submit this Draft Plan of Subdivision to the Town of The Blue Mountains

SEE ORIGINAL SUBMISSION

Date:

Surveyor's Certificate

I hereby certify that the boundaries of the land to be subdivided and their relationship to the adjoining properties are correctly shown on this plan.

SEE ORIGINAL SUBMISSION

Paul R. Thomsen, O.L.S., Collingwood Date:
ZUBEK, EMO & PATTEN LTD., Ontario Land Surveyors
39 Stewart Road, Collingwood, Ontario L9Y 4M7
Phone: (705) 445-4910 Fax: (705) 445-5866

Additional Information

As required under section 51(17) of the Planning Act R.S.O. 1990.
(a)(b)(e)(f)(g)(j)(l)-As shown on this Plan.
(c)-As shown on this Draft and Key Plan
(d)-Land to be used in accordance with the Schedule of Land Use
(i)-Soil is Clay Loam.
(h)(k) Municipal services to be provided.

Note: Contours relate to Canadian Geodetic Datum.

Prepared by:
MALONE GIVEN PARSONS LTD.
140 Renfrew Drive, Suite 201
Markham, Ontario, L3R 6B3
Tel. (905) 513-0170
Fax. (905) 513-0177

FIGURE 2

Date: Nov 18, 2003
Project No. 02-1233

CONCRETE HEADWALL
OPSD 804.03 c/w GRATE
INV. 183.50

RIP-RAP APRON
OPSD 810.010 TYPE B
D_{50}=200mmø
400mm MIN. DEPTH

8.0m-450mmø PVC
SDR35 @ 1.0%

OVERFLOW STRUCTURE
600mmx1200mm DITCH INLET
DOUBLE CATCHBASIN
(OPSD 705.040 TYPE A)
INV. 184.18

STRAW BALE CHECK DAM

18.0m - 800mmø CSP
@ 3.3% (2.0mm THICKNESS)
C/W RIP-RAP TREATMENTS
E INV. 184.00
W INV. 183.40

22.0m - 525mmø PVC SDR 35 @ 0.5%

CONTROL STRUCTURE (SEE DETAIL 'A')
MH#19 - 1800mmø c/w 110mmø ORIFICE PLATE
FOR EXTENDED DETENTION. CONTRACTOR TO
PROVIDE SHOP DWG. TO ENGINEER FOR REVIEW
& APPROVAL PRIOR TO INSTALLATION.
S INV. 184.10
E INV. 184.00
W INV. 183.61

EXTENDED DETENTION CONTROL PIPE
24.0m-450mmø PVC SDR35 @ -4.0%
(REVERSE SLOPE PIPE)

CONCRETE HEADWALL c/w GRATE
(OPSD 804.03)
INV. 183.04

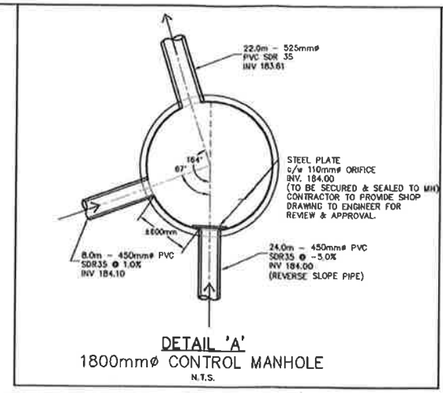
EMERGENCY SPILLWAY
(SEE DETAIL 'B')

STRAW BALE CHECK DAM

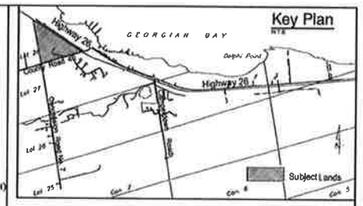
TEMPORARY HICKENBOTTOM
OUTLET. REFER TO DETAIL
ON DWG DT2. EXTEND TO
EXISTING DITCH & PROVIDE CLAY
PLUGS ALONG OUTLET LATERAL.

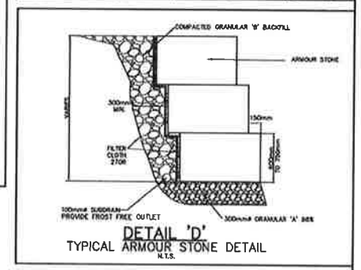
ALL SIDE SLOPES WITHIN THE FACILITY TO BE FINISHED WITH 75mm TOPSOIL, SEED & MULCH, AND EROSION PROTECTION UNTIL SITE IS STABILIZED PER SITE ENGINEER. REFER TO LANDSCAPING PLAN FOR ADDITIONAL DETAILS ON PLANTING SCHEDULE FOR THE FACILITY.

BASED ON THE RESULTS OF GEOTECHNICAL INVESTIGATION AND RECOMMENDATIONS THEREIN IT MAY BE NECESSARY TO INSTALL A CLAY LINER IN THE FACILITY. THE LIMITS AND EXTENTS OF LINER MAY VARY DEPENDING ON EXISTING SITE CONDITIONS FOUND UPON EXCAVATION. THICKNESS OF CLAY LINER MAY VARY BASED ON THE RESULTS OF THE TESTING OF THE SUPPLIED OR AVAILABLE CLAY MATERIAL AND RECOMMENDATIONS MADE BE GEOTECHNICAL CONSULTANT.

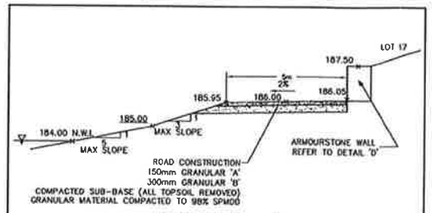


DETAIL 'A'
1800mmø CONTROL MANHOLE
N.T.S.





DETAIL 'D'
TYPICAL ARMOUR STONE DETAIL
N.T.S.



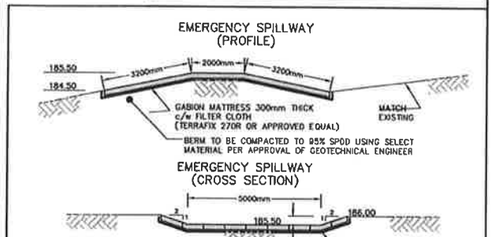
SECTION E - E
MAINTENANCE ACCESS ROUTE
N.T.S.

100 YR HWL =	185.2
PERMANENT POOL =	184.0
TOP POND =	186.0
BOTTOM POND =	182.5

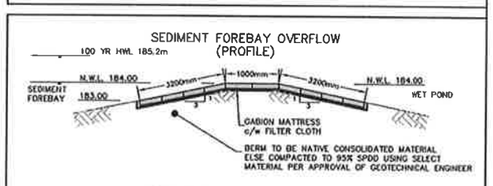
1.8m HIGH CHAIN LINK FENCE TO BE PLACED AROUND STORMWATER FACILITY, ON PROPERTY LINE. REFER TO OPSD 972.102, 972.130 FOR DETAILS ON FENCING.

TOWN of THE BLUE MOUNTAINS TO ASSUME MAINTENANCE OF STORM WATER FACILITY. FACILITY TO BE CLEANED PRIOR TO END OF WARRANTY PERIOD.

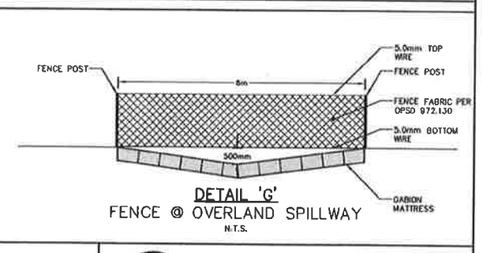
CONTRACTOR TO SUBMIT FOR REVIEW & APPROVAL OF TOWN & ENGINEER A "WARNING SIGN" FOR THE SWM POND & FLUCTUATING WATER LEVELS.



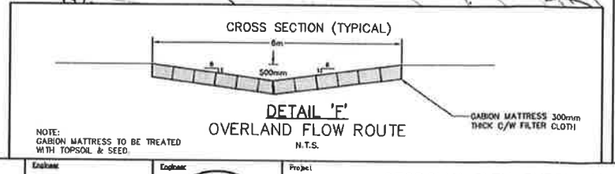
DETAIL 'B'
EMERGENCY SPILLWAY
N.T.S.



DETAIL 'C'
SEDIMENT FOREBAY OVERFLOW
N.T.S.



DETAIL 'G'
FENCE @ OVERLAND SPILLWAY
N.T.S.



NOTE:
GABION MATTRESS TO BE TREATED WITH TOPSOIL & SEED.

DETAIL 'F'
OVERLAND FLOW ROUTE
N.T.S.

No.	Issue / Revision	Date
0	Issued for Review	05/14/04
1	REVISED AS PER TOWN'S COMMENTS	10/14/04
2	ISSUED FOR APPROVAL	03/20/07
3	REVISED PER TOWN COMMENTS DATED MAY 6, 2007	06/25/07

GEODETIC BENCHMARKS

BM# 1
SOUTHEAST CORNER OF EXISTING CONCRETE BOX CULVERT (1.8m x 3.7m) LOCATED IMMEDIATELY EAST OF COUNTY ROAD 40 ON HIGHWAY 26.
ELEV. 181.776m

TEMPORARY BENCHMARKS

BM# 2
TOP OF SIB (GEORGIAN GLEN PROPERTY), LOCATED APPROX. 26m WEST OF STREET 'A' & COUNTY ROAD 40 INTERSECTION.
ELEV. 190.430m

Engineer

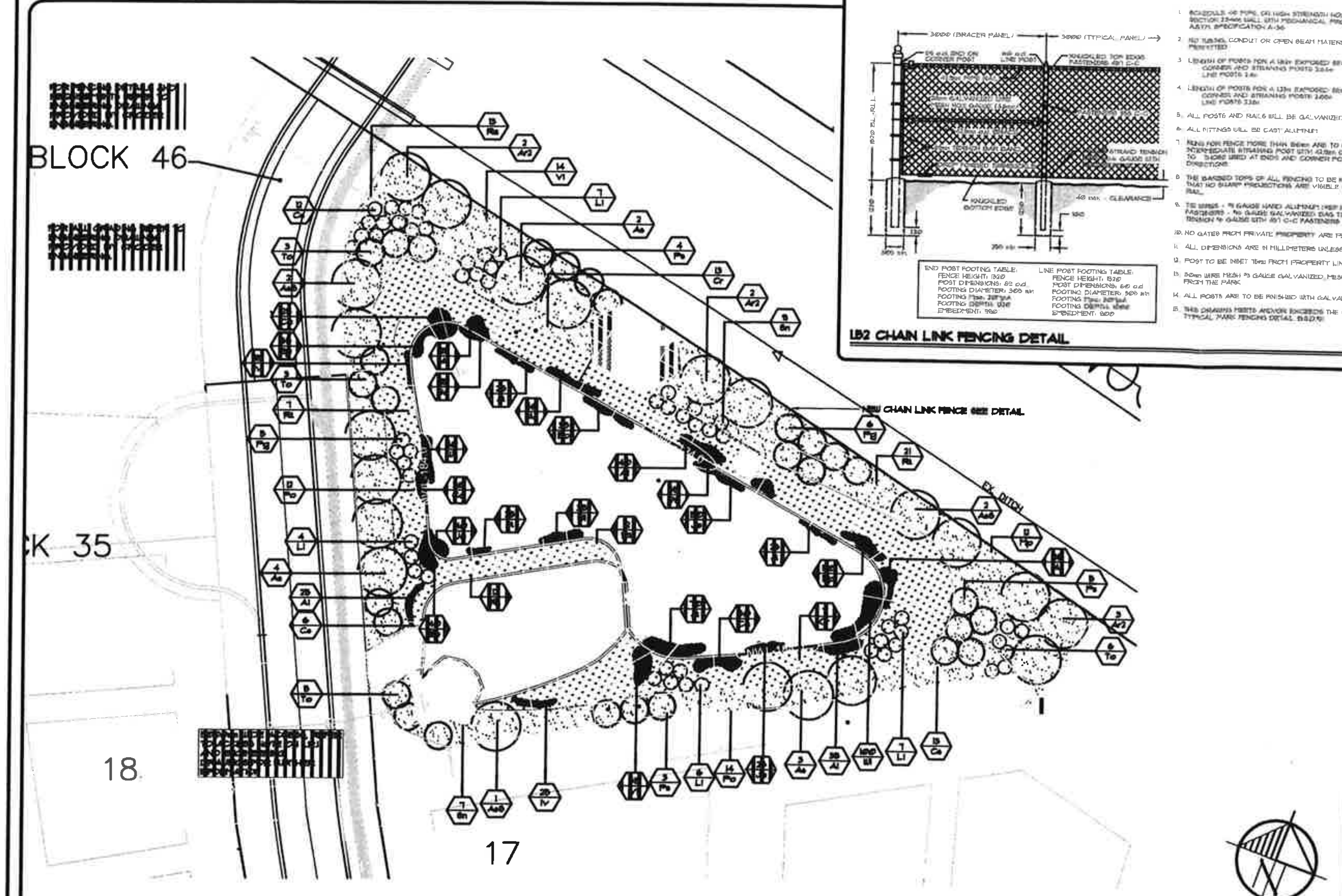
K. A. MORRIS
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

Project
GEORGIAN GLEN SUBDIVISION
TOWN of THE BLUE MOUNTAINS

Drawing
STORMWATER
MANAGEMENT FACILITY

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET
COLLINGWOOD ON
L9Y 3N6
T 705.445.3010
F 705.445.3520
CFCROZIER.CA

Drawn By I.T.M.	Check By K.A.M.	Project No	101-2501
Scale 1: 250	Date 05/14/2004	Drawing No	SWM1

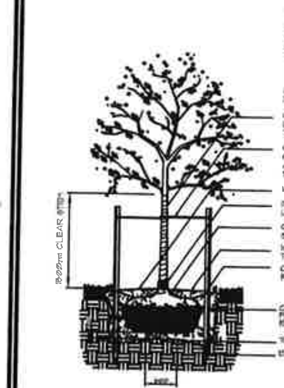


STORM WATER MANAGEMENT POND -- PLANTING LAYOUT

SCALE 1:400

LB2 CHAIN LINK FENCING DETAIL

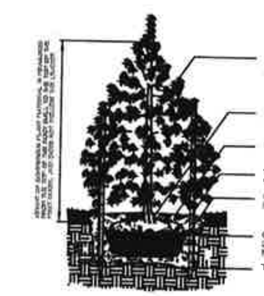
N.T.S.



DP-1 DECIDUOUS TREE PLANTING

N.T.S.

DP-2 CONIFEROUS TREE PLANTING DETAIL



DP-2 CONIFEROUS TREE PLANTING

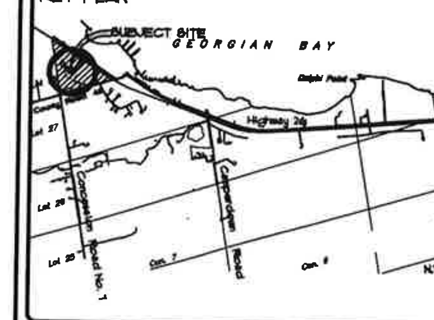
N.T.S.

PLANTING METHOD ILLUSTRATED SHALL APPLY EQUALLY TO BARE ROOT AND BALLED STALK.

DP-3 DECIDUOUS/CONIFEROUS SHRUB PLANTING DETAIL

N.T.S.

KEY PLAN



GENERAL NOTES

CONTRACTOR IS RESPONSIBLE FOR ALL LOCATES INCLUDING ALL UNDERGROUND SERVICES PRIOR TO ANY EXCAVATION OR INSTALLATIONS.

ANY ACCOMPANYING DOCUMENTATION RELATING TO THE PRESERVATION PLAN SUCH AS TENDER DOCUMENTS AND CHANGE NOTICES ARE TO BE ENDORSED BY JOHN D. BELL ASSOCIATES LIMITED PRIOR TO THE BEGINNING OF ANY SITE WORKS. IN THE EVENT THAT OF A DISCREPANCY THE DRAWING SHALL BE ASSUMED CORRECT.

IT IS THE RESPONSIBILITY OF THE PERSON OR PERSONS RESPONSIBLE FOR THE CONSTRUCTED WORKS TO NOTIFY THE LANDSCAPE ARCHITECT WHEN PREPARED FOR ANY REQUIRED INSPECTIONS AND SIGN OFFS.

SCHEDULED MEETINGS SHALL TAKE PLACE AT THE CLOSEST MUTUALLY CONVENIENT TIME. LAYOUT AND INSTALLATION OF PROTECTIVE HOARDING WITHOUT THE PRESENCE OF THE LANDSCAPE ARCHITECT WILL BE THE CONTRACTOR'S RESPONSIBILITY. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO HAVE HOARDING RELOCATED WHETHER INSTALLED OR NOT AT THE COST OF THE CONTRACTOR IN THE EVENT THE LANDSCAPE ARCHITECT WAS NOT PRESENT FOR THE LAYOUT AND INSTALLATION OF THE PROTECTIVE HOARDING.

No.	REVISION	DATE	APPRVD.
1	CLIENT REVIEW	JAN 21/05	SGL
2	SUBMISSION TO THE TOWN OF BLUE MTNS.	JUNE 28/07	MW

GENERAL LEGEND

- 100 YEAR STORM LIMIT
- DIRECTION OF SLOPE
- BOTTOM OF BANK
- TOP OF BANK
- ANTICIPATED LIMIT OF DISTURBANCE
- EXISTING GRADE
- ACCESS ROAD -- REFER TO ENGINEERING DRAWINGS FOR DETAILS
- SHORELINE/WET MEADOW HYDRO-SEEDING ZONE: 1245 sq/m (INCLUDES ACCESS ROADS)
- UPLAND HYDRO-SEEDING ZONE: 1600 sq/m (INCLUDES ACCESS ROADS)

N.T.S.

PLANTING LIST

DECIDUOUS TREES

CODE	QNTY	COMMON NAME	BOTANICAL NAME	SIZE	FORM	SPACING	DETAIL	NOTES
Ar2	7	Red Maple	Acer rubrum	45mm	w.b.	6000mm On Centre	DP1	Full form / Do not cut leader
As	5	Sugar Maple	Acer saccharum	60mm	w.b.	6000mm On Centre	DP1	Full form / Do not cut leader
AsS	5	Silver Maple	Acer saccharinum	45mm	w.b.	6000mm On Centre	DP1	Full form / Do not cut leader

CONIFEROUS TREES

CODE	QNTY	COMMON NAME	BOTANICAL NAME	SIZE	FORM	SPACING	DETAIL	NOTES
Pg	6	White Spruce	Picea glauca	175cm	w.b.	4000mm On Centre	DP2	Nursery sheared
Ps	12	Eastern White Pine	Pinus strobus	175cm	w.b.	4000mm On Centre	DP2	Nursery sheared
Ll	24	American Larch	Larix laricina	175cm	w.b.	3000mm On Centre	DP2	Full form
To	17	White Cedar	Thuja occidentalis	150cm	n/a	2000mm On Centre	DP2	Field dug

SHRUBS

CODE	QNTY	COMMON NAME	BOTANICAL NAME	SIZE	FORM	SPACING	DETAIL	NOTES
Cr	20	Grey Dogwood	Cornus racemosa	60cm	b.r.	1500mm On Centre	DP3	Full form / Container grown
Cs	31	Red Osier Dogwood	Cornus sericea	60cm	F.pot	1000mm On Centre	DP3	Full form / Container grown
Mp	12	Sweetgale	Myrica gale	50cm	pot	1000mm On Centre	DP3	Full form / Container grown
Po	26	Common Ninebark	Physocarpus opulifolius	60cm	b.r.	1000mm On Centre	DP3	Full form / Container grown
Ro	13	Flowering Raspberry	Rubus ordatus	2gal	pot	1500mm On Centre	DP3	Full form / Container grown
Rt	50	Staghorn Sumac	Rhus typhina	60cm	b.r.	1000mm On Centre	DP3	Full form / Container grown
Sn	16	Black Willow	Salix nigra	60cm	b.r.	2500mm On Centre	DP3	Full form / Container grown
Vl	14	Nannyberry	Viburnum lentago	60cm	b.r.	1250mm On Centre	DP3	Full form / Container grown

SHORELINE/WET MEADOW (0-0.3m)

CODE	QNTY	COMMON NAME	BOTANICAL NAME	SIZE	FORM	SPACING	DETAIL	NOTES
Ai	140	Swamp Milkweed	Asclepias incarnata	plug	plug	5 Plants per sq/m	N/A	Material to be fresh
Cc	55	Canada Bluejoint	Calamagrostis canadensis	plug	plug	5 Plants per sq/m	N/A	Material to be fresh
Ep	50	Marsh Spike Rush	Eleocharis palustris	plug	plug	5 Plants per sq/m	N/A	Material to be fresh
Iv	75	Blue Flag Iris	Iris versicolor	plug	plug	5 Plants per sq/m	N/A	Material to be fresh

EMERGENT (0-1m)

CODE	QNTY	COMMON NAME	BOTANICAL NAME	SIZE	FORM	SPACING	DETAIL	NOTES
Ep	120	Marsh Spike Rush	Eleocharis palustris	plug	plug	5 Plants per sq/m	N/A	Material to be fresh
Je	80	Soft Rush	Juncus effusus	plug	plug	5 Plants per sq/m	N/A	Material to be fresh
Jt	140	Torrey's Rush	Juncus torreyi	plug	plug	5 Plants per sq/m	N/A	Material to be fresh
Nt	175	Water Lilies	Nymphaea tuberosa	plug	plug	5 Plants per sq/m	N/A	Material to be fresh

GENERAL PLANTING NOTES

1. VERIFY ALL EXISTING SITE CONDITIONS AND REPORT ANY DISCREPANCIES BEFORE COMMENCING WORK.

2. PLANT MATERIAL LISTED IN THE PLANT SCHEDULE ARE MINIMUM SIZES +/- NURSERY GROWN AND UNIFORM SPECIMENS. NO SUBSTITUTIONS WILL BE PERMITTED WITHOUT WRITTEN APPROVAL FROM THE LANDSCAPE ARCHITECTS.

3. ALL PLANT MATERIAL WHICH ARE SPECIFIED BY O.C. (ON CENTRE SPACING) ARE TO BE PLANTED AS NOTED IN THE PLANT SCHEDULE.

4. INSTALLATION OF PLANT MATERIAL PRIOR TO INSPECTION BY THE LANDSCAPE ARCHITECT WILL BE THE CONTRACTOR'S RESPONSIBILITY. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO REJECT ANY PLANTS, WHETHER INSTALLED OR NOT, WHICH DO NOT CONFORM TO THE SPECIFICATIONS AND/OR SITE DRAWING. REMOVE ALL REJECTED PLANTS FROM THE SITE IMMEDIATELY. DO NOT REMOVE ANY LABELS FROM PLANTS UNTIL PLANTS HAVE BEEN INSPECTED AND APPROVED BY THE LANDSCAPE ARCHITECT.

5. ALL PLANT MATERIAL IS TO MEET THE STANDARDS OF THE NURSERY TRADES ASSOCIATION.

6. ALL PLANT MATERIALS WHICH CAN NOT BE PLANTED IMMEDIATELY UPON ARRIVAL ON SITE SHALL BE PROPERLY HEELED IN OR WELL PROTECTED WITH SOIL OR SIMILAR MATERIALS TO PREVENT DRYING OUT AND SHALL BE KEPT MOIST UNTIL COMMENCEMENT OF PLANTING.

7. GIVE TIMELY NOTICE TO THE LANDSCAPE ARCHITECT WHEN INSPECTIONS OF WORK AND MATERIALS ARE REQUIRED.

8. FINAL ACCEPTANCE OF THE PROJECT WILL BE CARRIED OUT UPON COMPLETION OF ALL WORK INCLUDED IN THE CONTRACT.

9. ALL NEW WORK TO BLEND NEATLY AND SMOOTHLY WITH EXISTING CONDITIONS.

10. FOR ALL AREAS OF DISTURBANCE: NATIVE TOPSOIL IS TO BE STRIPPED, STOCK PILED AND REPLACED TO A MINIMUM DEPTH OF 300mm.

11. ALL SHRUBS NOT SPECIFIED AS BARE ROOT ARE TO BE CONTAINER GROWN.

12. LOCATIONS FOR PLANT MATERIAL AND PLANTING BEDS ARE TO BE MARKED OR STAKED OUT BY THE CONTRACTOR AND APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

13. ALL TREES ARE TO BE STAKED OR GUY WIRED ACCORDING TO DETAILS PROVIDED. NO ACCESSIBLE OPEN HOLE TREE PITS SHALL BE PERMITTED OVERNIGHT. ALL OPEN PITS SHALL BE ADEQUATELY PROTECTED BY BARRIERS OR FILLED IN WITH SOIL PRIOR TO THE END OF EACH PLANTING DAY.

14. REMOVE BURLAP AND ROPE FROM THE TOP 1/3 OF ROOT BALLS.

15. IN THE EVENT OF A DISCREPANCY BETWEEN THE PLANT LIST AND DRAWING, THE DRAWING WILL BE ASSUMED TO BE CORRECT.

HYDRO-SEEDING / ACCESS TREATMENT AND MULCH APPLICATION SPECIFICATIONS

SHORELINE/ EMERGENT PLANT ZONE (0-1m):

"1107 - SEASONALLY FLOODED ANNUAL/PERENNIAL MIXTURE
- 25% FOX SEDGE (Carex vulpinoidea)
- 15% CANADA WILD RYE (Elymus canadensis)
- 15% SWITCHGRASS (Panicum virgatum)
- 25% FOWL MEADOWGRASS (Poa palustris)

SEEDING RATE - 14kg PER HECTARE
SUPPLIED BY - OSC SEEDS 1-519-886-0557

ANNUAL RYE NURSE CROP TO BE APPLIED AT TIME OF SEASONALLY FLOODED ANNUAL/PERENNIAL MIXTURE AT A RATE OF 5kg 0.40 HECTARE

UPLAND PLANTING ZONE:

SIMCOE COUNTY NATIVE UPLAND PLANTING MIX
- 2% NEW ENGLAND ASTER (Aster novae-angliae)
- 12% BLACK EYED SUSAN (Rudbeckia hirta)
- 20% SAND DROPSEED (Sporobolus cryptandrus)
- 20% CANADA WILD RYE (Elymus canadensis)
- 4% CANADA GOLDEN ROD (Solidago canadensis)
- 1% WILD BERGAMONTE (Monarda fistulosa)
- 1% SMOOTH BLUE ASTER (Aster laevis)
- 20% LITTLE BLUE STEM (Andropogon scoparius)
- 20% INDIAN GRASS (Sorghastrum nutans)

SEEDING RATE - 16kg PER HECTARE
SUPPLIED BY - OSC SEEDS 1-519-886-0557

ANNUAL RYE NURSE CROP TO BE APPLIED AT TIME OF NATIVE PRAIRIE MEADOW MIXTURE AT A RATE OF 5kg PER HECTARE

5.0m WIDE ACCESS:

ROAD BED TO BE HYDRO-SEEDED WITH THE NATIVE PRAIRIE MEADOW MIXTURE
REFER TO ENGINEERING DRAWINGS FOR LAYOUT AND RELATED CONSTRUCTION DETAILS

STRAW MULCH:

STRAW MULCH SHALL BE IN THE FORM OF RECTANGULAR BALES SHREDDED AND BLOWN INTO PLACE AFTER SEEDING OR IN THE FORM OF HYDRO-SEEDING. THE STRAW MULCH SHALL FORM A CONTINUOUS BLANKET OVER THE ENTIRE AREA TO BE SEEDED

FOR SLOPES GREATER THAN 30%, AN APPROVED EROSION CONTROL BLANKET OR HYDRO-SEEDING TACTIFIER SHALL BE APPLIED AS PER MANUFACTURER SPECIFICATIONS.

TOP SOIL:

TOPSOIL SHALL BE PROVIDED TO A MINIMUM DEPTH OF 300mm FOR ALL AREAS OF THE STORM WATER BLOCK WITH THE EXCEPTION OF THE ROAD BASE.

PLANTING TIME:

BARE ROOT PLANT INSTALLATIONS SHALL TAKE PLACE IN THE EARLY SPRING UNTIL THE END OF MAY OR LATE FALL AFTER OCTOBER 1st.

BASE INFORMATION PREPARED BY MALONE GIVEN PARSONS LTD., 140 RENFREW DRIVE, SUITE 201, MARKHAM, ONTARIO, L3R 6B3, (905) 513-0170 PLAN DATED MAY 1, 2003 PROJECT No. 02-1254

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL DIMENSIONS ON THE SITE AND REPORT ANY DISCREPANCIES OR VARIATIONS FROM THE SUPPLIED INFORMATION TO THE LANDSCAPE ARCHITECT WITH THE PROJECT. JOHN D. BELL ASSOCIATES LIMITED IS NOT RESPONSIBLE FOR THE ACCURACY OF SURVEY, ARCHITECTURAL, MECHANICAL, ENGINEERING OR ELECTRICAL INFORMATION SHOWN ON THE DRAWING. FOR FURTHER INFORMATION REFER TO APPROPRIATE SURVEY, ARCHITECTURAL, MECHANICAL, ENGINEERING OR ELECTRICAL DRAWINGS PRIOR TO PROCEEDING WITH ANY WORKS.

THIS DRAWING IS NOT TO BE SCALED.

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNLESS IT HAS BEEN SIGNED AND DATED BY THE LANDSCAPE ARCHITECT.

SIGNED ____ DATE ____

DRAWING ISSUED FOR:
- ☐ OFFICE USE ONLY
- ☐ CLIENT REVIEW
- ☐ PRELIMINARY SUBMISSION
- ☐ FINAL SUBMISSION
- ☐ CLIENT COPY
- ☐ ISSUED FOR TENDER
- ☐ ISSUED FOR CONSTRUCTION
- ☐ VOID

INITIAL ____ DATE ____

LANDSCAPE ARCHITECTS STAMP

JOHN D. BELL ASSOCIATES LTD.
Ecological Planners
Landscape Architects
Site Planners
No. 1207, Line 2 South
RR#3, Box#332
Shanty Bay, Ontario
L0L 2L0
Fax: 705-722-5860
Tel: 705-722-6276

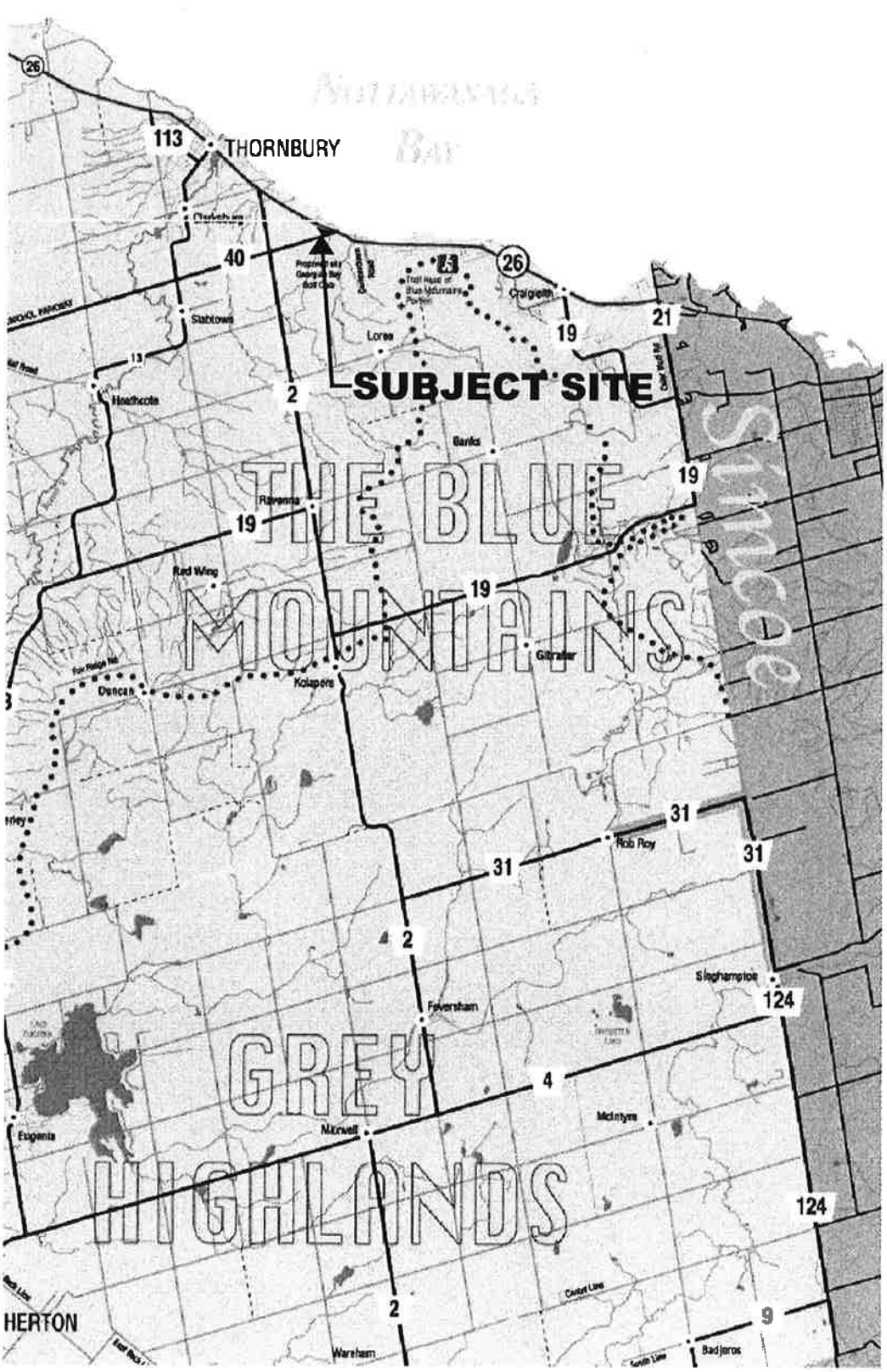
SORICHETTI SUBDIVISION GEORGIAN GLEN

DRAFT PLAN OF SUBDIVISION 42T-2002-006
PART OF LOT 28
CONCESSION 7
TOWN OF THE BLUE MOUNTAINS
COUNTY OF GREY

STORM WATER POND REVEGETATION PLAN

PLOT DATE: JUNE 21/2005	PROJECT DATE: JANUARY 21/05	DESIGNED BY: SGL	REVIEWED BY: J. BELL
SCALE: 1:250	OUR FILE REF.# 9904-04	DRAWN BY: SGL	LP.1 of 1

FIGURES

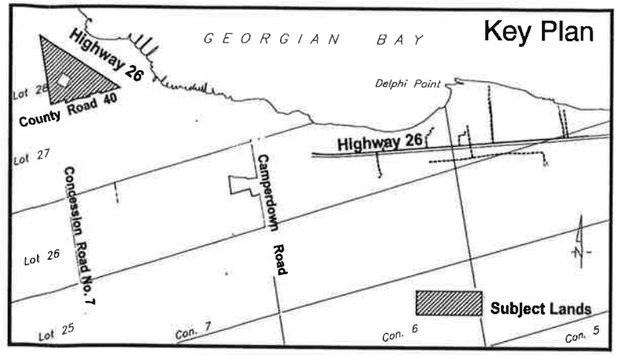


CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET
COLLINGWOOD ON
L9Y 2N9
T. 705-446-3510
F. 705-446-3520
CFCROZIER.CA

PROJECT: GEORGIAN GLEN SUBDIVISION TOWN of THE BLUE MOUNTAINS		DRAWN BY: I.T.M.	PROJECT No.: 101-2501
		DATE: 05/14/2004	SCALE: NTS
TITLE: SITE LOCATION		DRAWING No.: FIG. 1	

Draft Plan of Subdivision 42T-2002-006

Part of Lot 28, Concession 7
Town of The Blue Mountains
County of Grey



Schedule of Land Use

Lot/Block	Land Use	Units	Area(ha)	Density (uph)
1-39	Single Family min. 21.3m (70ft)	39	4.43	8.14 uph
40-41	Townhouses min. 7.6m	16	0.78	18.42 uph
42-45	Open Space		4.25	
46	Storm Water Management		0.60	
47-49	Future Residential		0.17	
50	Future Road		0.10	
51	6m Emergency Access		0.02	
52-56	0.3m Reserve		0.02	
Streets A-B	20m Roads (784m)		1.47	
Total		55	11.84	

Owner's Authorization

I hereby authorize Malone Given Parsons Ltd. to prepare and submit this Draft Plan of Subdivision to the Town of The Blue Mountains

SEE ORIGINAL SUBMISSION _____ Date: _____

Surveyor's Certificate

I hereby certify that the boundaries of the land to be subdivided and their relationship to the adjoining properties are correctly shown on this plan.

SEE ORIGINAL SUBMISSION _____ Date: _____

Paul R. Thomsen, O.L.S., Collingwood
ZUBEK, EMO & PATTEN LTD., Ontario Land Surveyors
39 Stewart Road, Collingwood, Ontario L9Y 4M7
Phone: (705) 445-4910 Fax: (705) 445-5866

Additional Information

As required under section 51(17) of the Planning Act R.S.O. 1990.
(a)(b)(e)(f)(g)(j)(l)-As shown on this Plan.
(c)-As shown on this Draft and Key Plan
(d)-Land to be used in accordance with the Schedule of Land Use
(i)-Soil is Clay Loam.
(h)(k) Municipal services to be provided.

Note: Contours relate to Canadian Geodetic Datum.

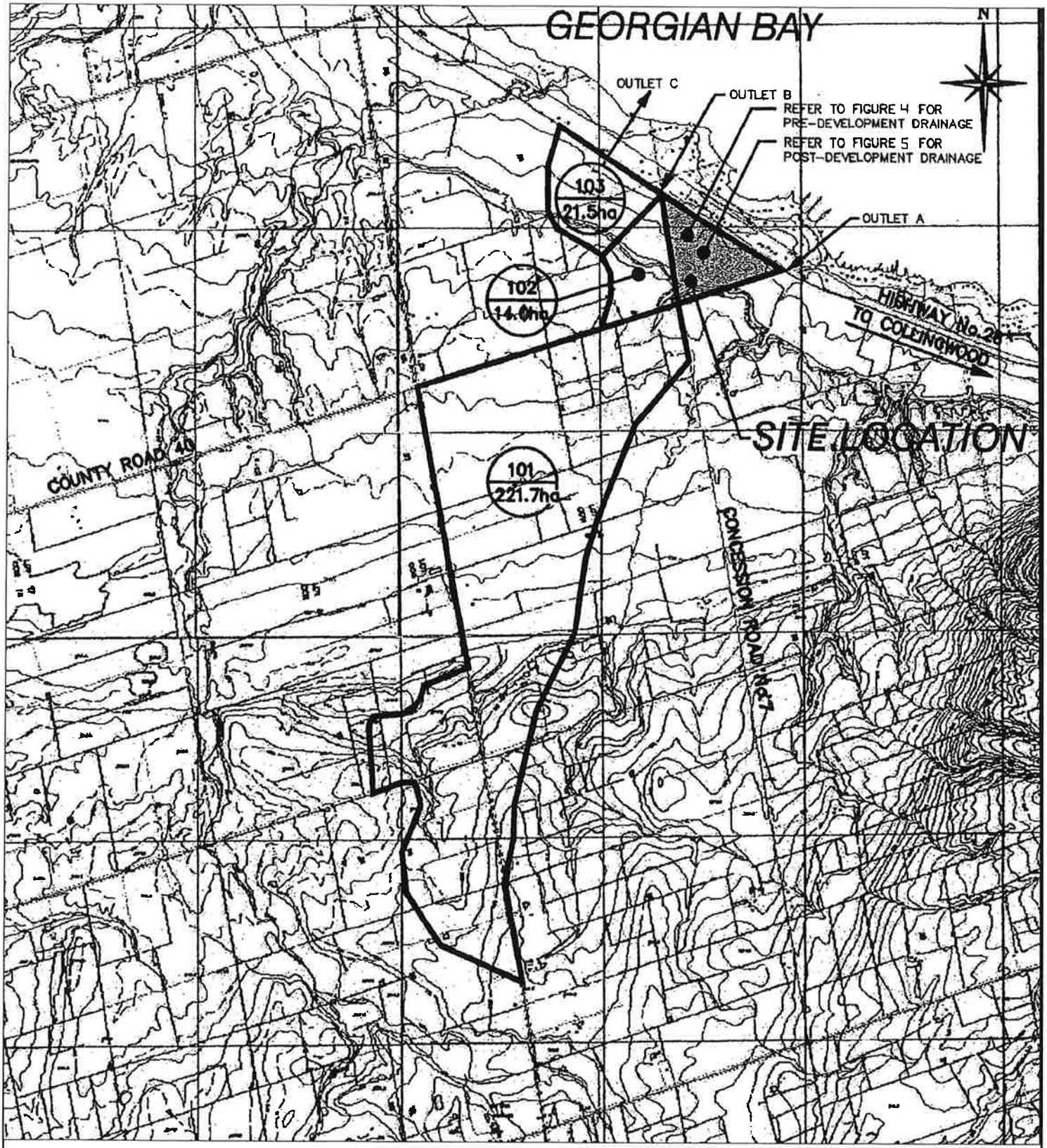
Wetland Limits based on Gartner Lee Site Survey

SCALE
0 25 50 75 100m

Prepared by:
MALONE GIVEN PARSONS LTD.
140 Renfrew Drive, Suite 201
Markham, Ontario, L3R 6B3
Tel. (905) 513-0170
Fax. (905) 513-0177

FIGURE 2

Date: Nov 18, 2003
Project No. 02-1233



LEGEND

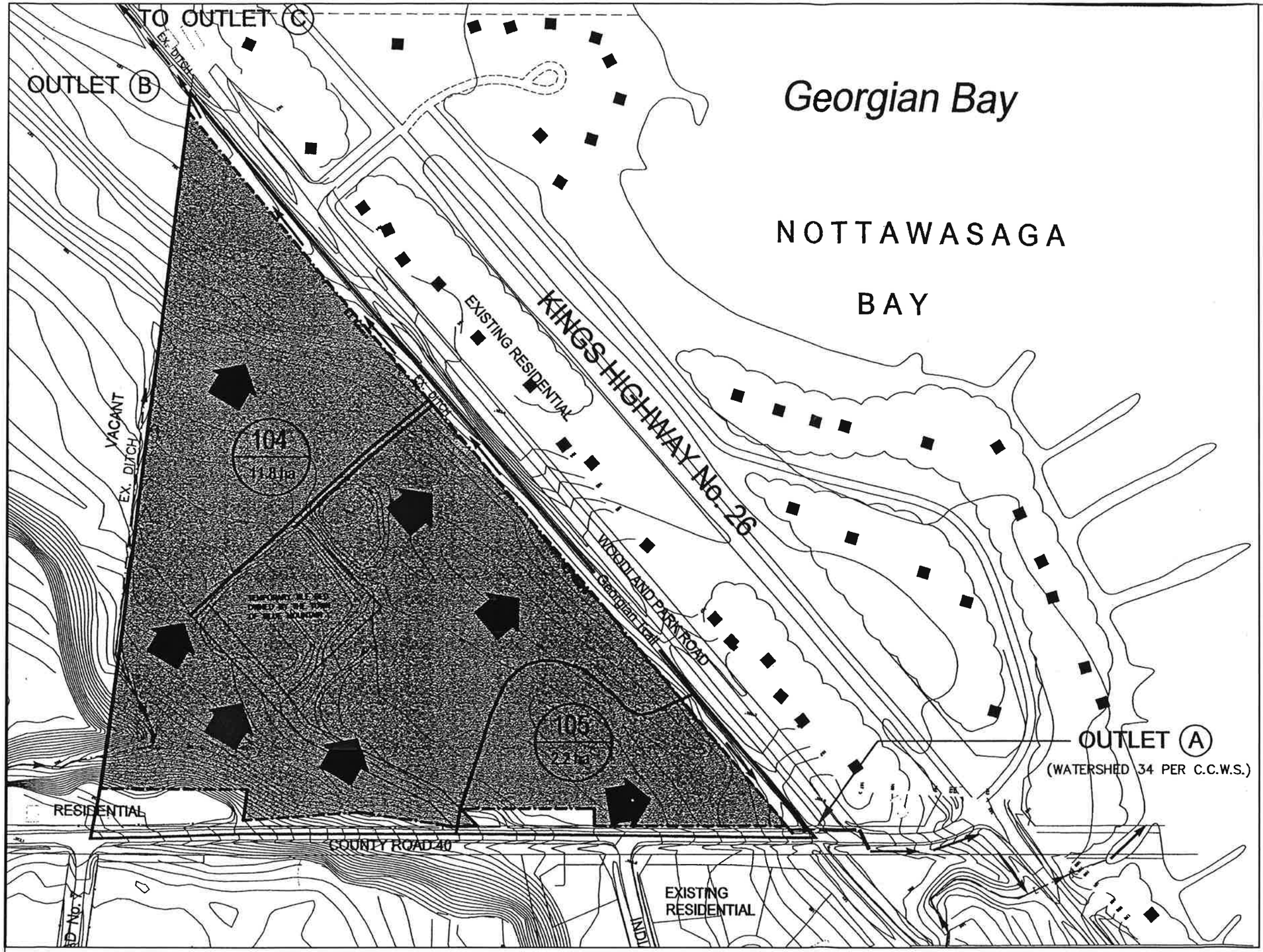
101 — IDENTIFICATION

221.7ha — AREA

BASEPLAN PER RJ BURNSIDE & ASSOCIATES LTD

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET
COLLINGWOOD ON
L9Y 2N9
T. 705-446-3510
F. 705-446-3520
CFCROZIER.CA

PROJECT: GEORGIAN GLEN SUBDIVISION TOWN of THE BLUE MOUNTAINS		DRAWN BY: I.T.M.	PROJECT No.: 101-2501
		DATE: 05/14/2004	SCALE: NTS
TITLE: PRE-DEVELOPMENT WATERSHED PLAN		DRAWING No.: FIG. 3	



N

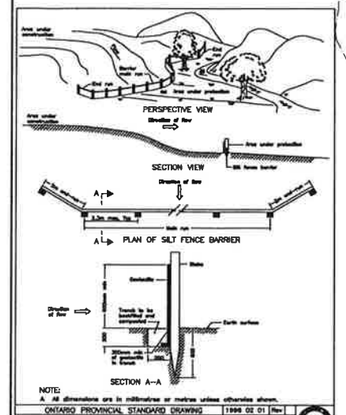
LEGEND

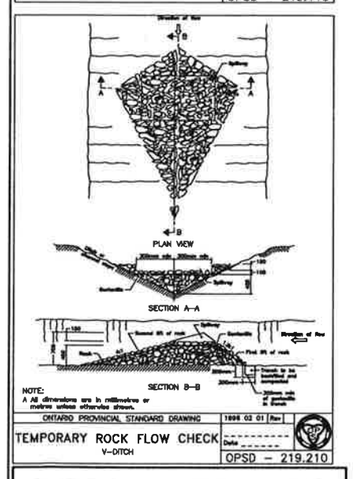
- 193 — EXISTING CONTOURS
- 105 / 2.2 ha — IDENTIFICATION / AREA (HECTARES)
- DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- PROPERTY LINE

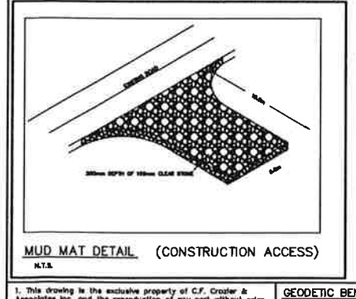
ORIGINAL FIGURE PER RJ BURNSIDE & ASSOCIATES LTD.

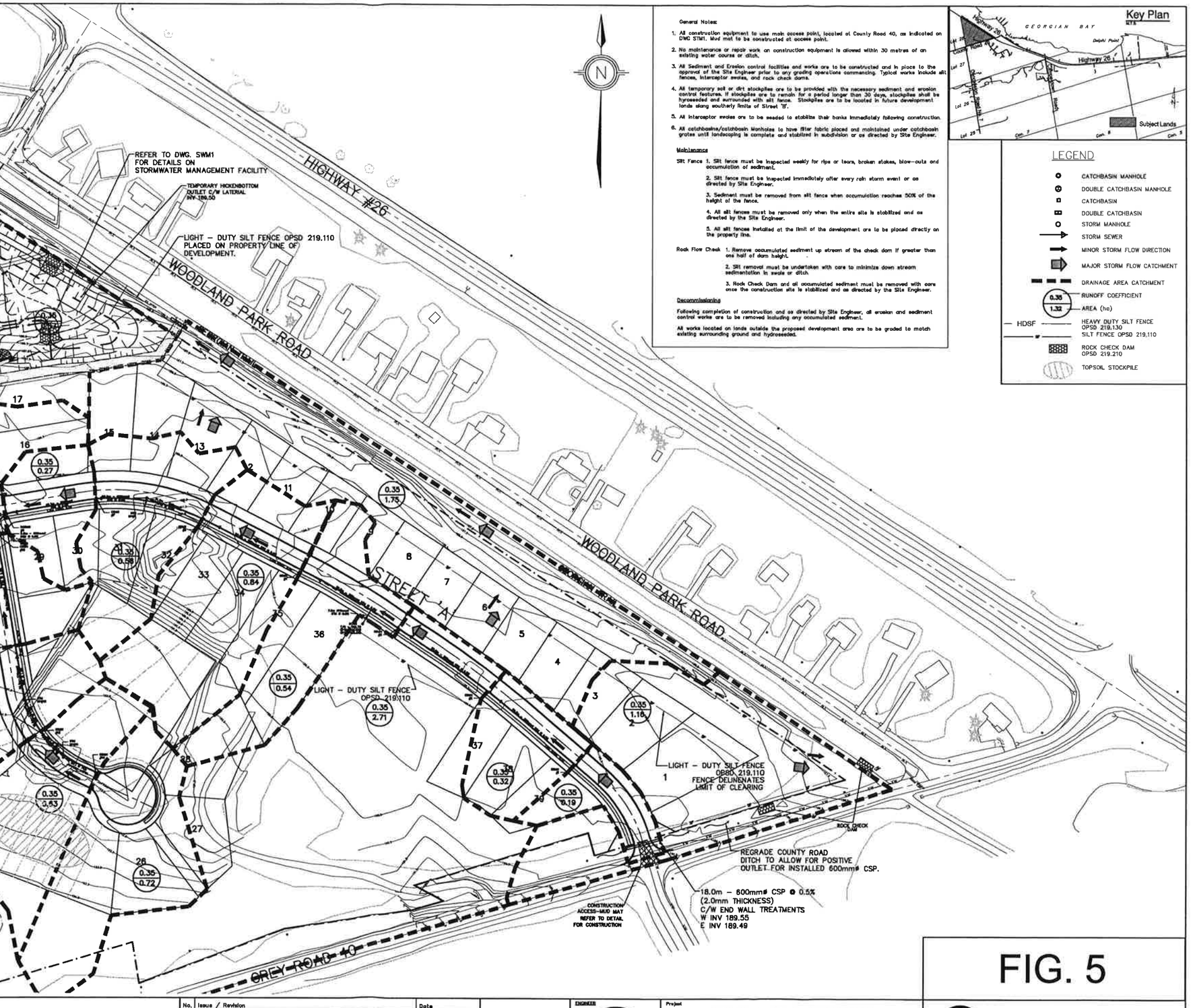
CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET
COLLINGWOOD ON
L9Y 2N9
T. 705-446-3510
F. 705-446-3520
CFCROZIER.CA

PROJECT: GEORGIAN GLEN SUBDIVISION, TOWN OF THE BLUE MOUNTAINS	DRAWN BY: I.T.M.	PROJECT No.: 101-2501
	DATE: 05/14/2004	SCALE: NTS
TITLE: SITE PRE-DEVELOPMENT DRAINAGE PLAN	DRAWING No.: FIG. 4	









General Notes:

1. All construction equipment to use main access point, located at County Road 40, as indicated on DWG STM1. Mud mat to be constructed at access point.
2. No maintenance or repair work on construction equipment is allowed within 30 metres of an existing water course or ditch.
3. All Sediment and Erosion control facilities and works are to be constructed and in place to the approval of the Site Engineer prior to any grading operations commencing. Typical works include silt fences, interceptor swales, and rock check dams.
4. All temporary soil or dirt stockpiles are to be provided with the necessary sediment and erosion control features. If stockpiles are to remain for a period longer than 30 days, stockpiles shall be hydroseeded and surrounded with silt fence. Stockpiles are to be located in future development lands along southerly limits of Street 'B'.
5. All interceptor swales are to be seeded to stabilize their banks immediately following construction.
6. All catchbasins/catchbasin Manholes to have filter fabric placed and maintained under catchbasin grates until landscaping is complete and stabilized in subdivision or as directed by Site Engineer.

Maintenance

Silt Fence 1. Silt fence must be inspected weekly for rips or tears, broken stakes, blow–outs and accumulation of sediment.

2. Silt fence must be inspected immediately after every rain storm event or as directed by Site Engineer.

3. Sediment must be removed from silt fence when accumulation reaches 50% of the height of the fence.

4. All silt fences must be removed only when the entire site is stabilized and as directed by the Site Engineer.

5. All silt fences installed at the limit of the development are to be placed directly on the property line.

Rock Flow Check 1. Remove accumulated sediment up stream of the check dam if greater than one half of dam height.

2. Silt removal must be undertaken with care to minimize down stream sedimentation in swale or ditch.

3. Rock Check Dam and all accumulated sediment must be removed with care once the construction site is stabilized and as directed by the Site Engineer.

Decommissioning

Following completion of construction and as directed by Site Engineer, all erosion and sediment control works are to be removed including any accumulated sediment.

All works located on lands outside the proposed development area are to be graded to match existing surrounding ground and hydroseeded.

LEGEND

- CATCHBASIN MANHOLE
- DOUBLE CATCHBASIN MANHOLE
- CATCHBASIN
- DOUBLE CATCHBASIN
- STORM MANHOLE
- STORM SEWER
- MINOR STORM FLOW DIRECTION
- MAJOR STORM FLOW CATCHMENT
- DRAINAGE AREA CATCHMENT
- 0.35 / 1.32 RUNOFF COEFFICIENT / AREA (ha)
- HDSF HEAVY DUTY SILT FENCE OPSD 219.130
- SILT FENCE OPSD 219.110
- ROCK CHECK DAM OPSD 219.210
- TOPSOIL STOCKPILE

FIG. 5

GEODETIC BENCHMARKS

BM# 1
SOUTHEAST CORNER OF EXISTING CONCRETE BOX CULVERT (1.8m x 3.7m) LOCATED IMMEDIATELY EAST OF COUNTY ROAD 40 ON HIGHWAY 26.
ELEV. 181.776m

TEMPORARY BENCHMARKS

BM# 2
TOP OF SIB (GEORGIAN GLEN PROPERTY), LOCATED APPROX. 26m WEST OF STREET 'A' & COUNTY ROAD 40 INTERSECTION.
ELEV. 190.430m

No.	Issue / Revision	Date
0	Issued for Review	05/14/04

ENGINEER
LICENSED PROFESSIONAL ENGINEER
K. A. MORRIS
PROVINCE OF ONTARIO

Project
GEORGIAN GLEN SUBDIVISION
TOWN of THE BLUE MOUNTAINS

Drawing
STORM DRAINAGE PLAN

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET, COLLINGWOOD ON L9Y 2N8
T. 7084469810
F. 7084463830
CFCROZIER.CA

Drawn By	Check By	Project No.
I.T.M.	K.A.M.	101-2501
Scale	Date	Drawing No.
1:750	05/14/2004	STM1

CONCRETE HEADWALL
OPSD 804.03 c/w GRATE
INV. 183.50

RIPRAP APRON
OPSD 810.010 TYPE B
D_{50}=200mmø
300mm MIN DEPTH

8.0m–450mmø PVC
SDR35 @ 1.0%

OVERFLOW STRUCTURE
600mmx1200mm DITCH INLET
CATCHBASIN
(OPSD 705.040 TYPE A)
INV. 184.18

12.0m – 500mmø CSP
@ 3.3% (2.0mm THICKNESS)
C/W END WALL TREATMENTS
E INV 183.90
W INV 183.50

22.0m – 525mmø
PVC SDR 35 @ 0.5%

CONTROL STRUCTURE (SEE DETAIL 'A')
MH#19 – 1800mmø c/w 110mmø ORIFICE PLATE
FOR EXTENDED DETENTION. CONTRACTOR TO
PROVIDE SHOP DWG. TO ENGINEER FOR REVIEW
& APPROVAL. PRIOR TO INSTALLATION.
S INV 184.10
E INV 184.00
W INV 183.61

EXTENDED DETENTION CONTROL PIPE
24.0m–450mmø PVC SDR35 @ –4.0%
(REVERSE SLOPE PIPE)

CONCRETE HEADWALL c/w
GRATE (OPSD 804.03)
INV. 183.04

EMERGENCY SPILLWAY
(SEE DETAIL 'B')

ALL SIDE SLOPES WITHIN THE FACILITY TO BE FINISHED WITH 75mm TOPSOIL, SEED & MUTCH, AND EROSION PROTECTION UNTIL SITE IS STABILIZED PER SITE ENGINEER. REFER TO LANDSCAPING PLAN FOR ADDITIONAL DETAILS ON PLANTING SCHEDULE FOR THE FACILITY.

MATCH EXISTING GRADES ALONG PROPERTY LINE

GEORGIAN TRAIL

STREET 'B'

RT/FW=187.15
U/SF=185.60
FFE=187.20
GFE=186.80

RT/FW=188.80
U/SF=186.35
FFE=187.95
GFE=187.55

RT/FW=188.85
U/SF=186.60
FFE=188.20
GFE=187.80

T/FW=188.15
U/SF=186.80

RIPRAP APRON
OPSD 810.010 TYPE B
D_{50}=500mmø
500mm MIN DEPTH

CONE HEADWALL
C/W GRATE
OPSD 804.030
INV 184.10

SEDIMENT FORBAY

FOREBAY OVERFLOW
(SEE DETAIL 'C')

ARMOURSTONE WALL

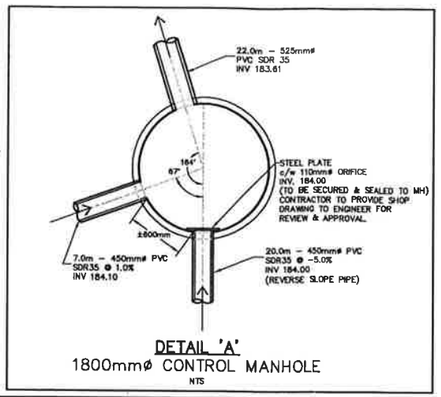
ARMOURSTONE WALL
T/WALL 187.50
B/WALL 186.00

MAINTENANCE ACCESS ROUTE

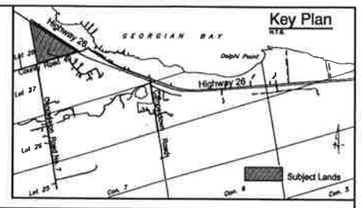
EX. DITCH

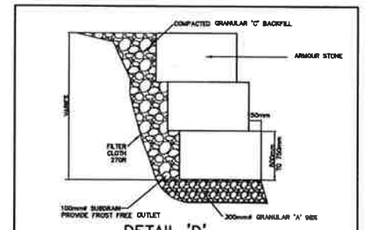
10.0m – 500mmø CSP
(2.0mm THICKNESS)
C/W END WALL TREATMENTS
MATCH EXISTING DITCH GRADES

BASED ON THE RESULTS OF GEOTECHNICAL INVESTIGATION AND RECOMMENDATIONS THEREIN IT MAY BE NECESSARY TO INSTALL A CLAY LINER IN THE FACILITY. THE LIMITS AND EXTENTS OF LINER MAY VARY DEPENDING ON EXISTING SITE CONDITIONS FOUND UPON EXCAVATION. THICKNESS OF CLAY LINER MAY VARY BASED ON THE RESULTS OF THE TESTING OF THE SUPPLIED OR AVAILABLE CLAY MATERIAL AND RECOMMENDATIONS MADE BE GEOTECHNICAL CONSULTANT.

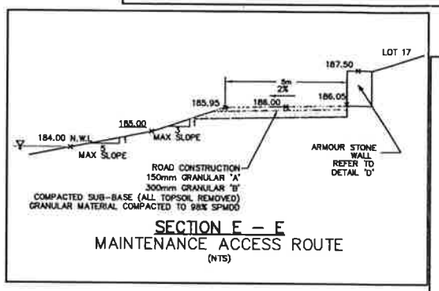


DETAIL 'A'
1800mmø CONTROL MANHOLE
NTS

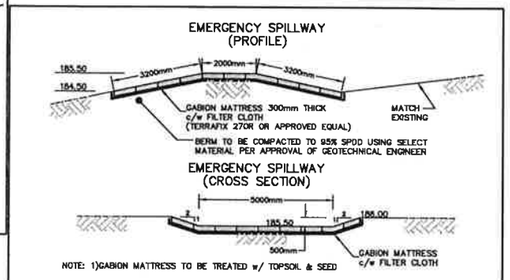




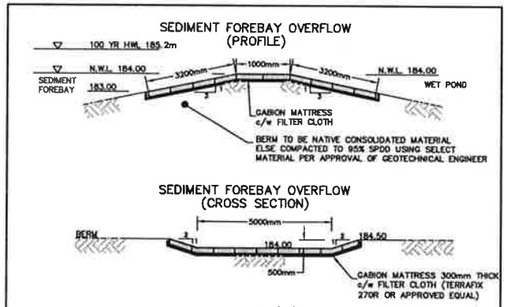
DETAIL 'D'
TYPICAL ARMOUR STONE DETAIL
NTS



SECTION E – E
MAINTENANCE ACCESS ROUTE
(NTS)



DETAIL 'B'
EMERGENCY SPILLWAY
NTS



DETAIL 'C'
SEDIMENT FOREBAY OVERFLOW
NTS

FIG. 6

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3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.
4. Do not scale the drawings.
5. All existing underground utilities to be verified in the field by the contractor prior to construction.

GEODETIC BENCHMARKS
BM# 1
SOUTHEAST CORNER OF EXISTING CONCRETE BOX CULVERT (1.8m x 3.7m) LOCATED IMMEDIATELY EAST OF COUNTY ROAD 40 ON HIGHWAY 26.
ELEV. 181.776m

TEMPORARY BENCHMARKS
BM# 2
TOP OF SIB (GEORGIAN GLEN PROPERTY), LOCATED APPROX. 26m WEST OF STREET 'A' & COUNTY ROAD 40 INTERSECTION.
ELEV. 190.430m

No.	Issue / Revision	Date
0	Issued for Review	05/14/04

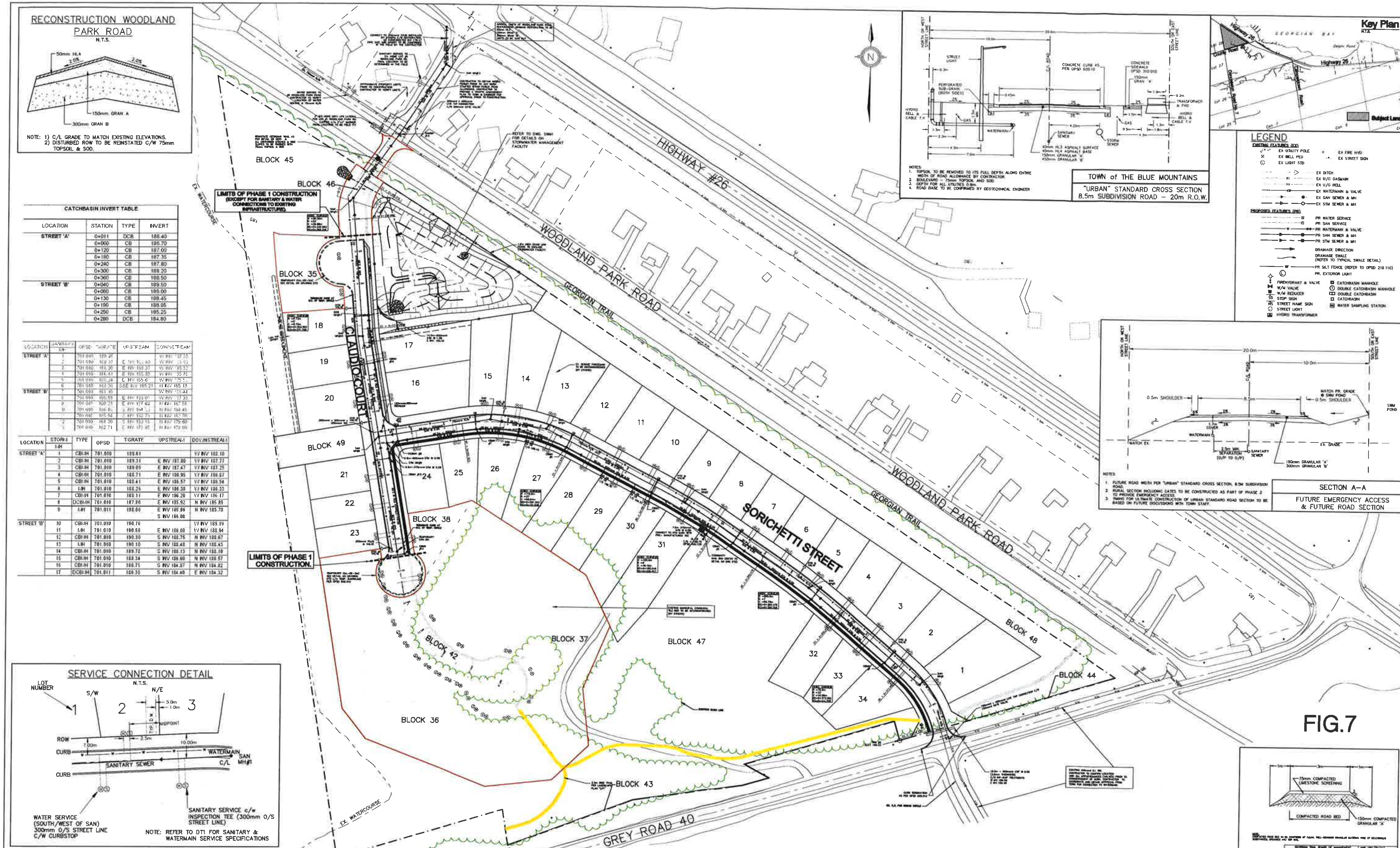
Engineer: LICENSED PROFESSIONAL ENGINEER G.F. CROZIER PROVINCE OF ONTARIO

Project: GEORGIAN GLEN SUBDIVISION
TOWN of THE BLUE MOUNTAINS

Drawing: STORMWATER MANAGEMENT FACILITY

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET, COLLINGWOOD ON L9Y 2A9
T: 705-445-5510 F: 705-445-5630 CFCROZIER.CA

Drawn By	Check By	Project No.
I.T.M.	C.F.C	101-2501
Scale: N.T.S. 1:600	Date: 05/14/2004	Drawing No.: SWM1



CATCHBASIN INVERT TABLE

LOCATION	STATION	TYPE	INVERT
STREET 'A'	0+011	DCB	186.40
	0+060	CB	186.70
	0+120	CB	187.00
	0+180	CB	187.35
	0+240	CB	187.80
	0+300	CB	188.20
	0+360	CB	188.50
STREET 'B'	0+040	CB	189.50
	0+080	CB	189.00
	0+130	CB	188.45
	0+190	CB	188.95
	0+250	CB	185.25
	0+280	DCB	184.80

LOCATION	SANITARY MH	OPSD	T/GRATE	UPSTREAM	DOWNSTREAM
STREET 'A'	1	701.010	189.28		W INV 187.35
	2	701.010	189.37	E INV [illegible]	W INV [illegible]
	3	701.010	186.56	E INV [illegible]	W INV 185.52
	4	701.010	186.41	E INV 185.33	W INV [illegible]
	5	701.010	186.24	E INV 185.6	W INV [illegible]
	6	701.010	[illegible]	S&E INV 185.21	N INV 185.13
STREET 'B'	7	701.010	[illegible]		W INV [illegible]
	8	701.010	[illegible]	E INV [illegible]	W INV [illegible]
	9	701.010	[illegible]	E INV [illegible]	N INV [illegible]
	[illegible]	701.010	[illegible]	[illegible]	N INV [illegible]
	[illegible]	701.010	185.54	[illegible]	N INV [illegible]
	[illegible]	701.010	[illegible]	[illegible]	N INV [illegible]
	[illegible]	701.010	182.71	[illegible]	N INV [illegible]

LOCATION	STORM MH	TYPE	OPSD	T/GRATE	UPSTREAM	DOWNSTREAM
STREET 'A'	1	CBMH	701.010	189.61		W INV 188.10
	2	CBMH	701.010	189.31	E INV 187.80	W INV 187.77
	3	CBMH	701.010	189.09	E INV 187.47	W INV 187.25
	4	CBMH	701.010	188.71	E INV 186.95	W INV 186.67
	5	CBMH	701.010	188.41	E INV 186.57	W INV 186.54
	6	MH	701.010	188.25	E INV 186.38	W INV 186.33
	7	CBMH	701.010	188.11	E INV 186.20	W INV 186.17
	8	DCBMH	701.010	187.86	E INV 185.92	N INV 185.89
	9	MH	701.011	188.00	E INV 185.86 S INV 186.08	N INV 185.70
STREET 'B'	10	CBMH	701.010	190.70		W INV 189.19
	11	MH	701.010	190.50	E INV 189.00	W INV 188.94
	12	CBMH	701.010	190.30	S INV 188.75	N INV 188.67
	13	MH	701.010	190.10	S INV 188.48	N INV 188.43
	14	CBMH	701.010	189.72	S INV 188.13	N INV 188.10
	15	CBMH	701.010	188.34	S INV 186.60	N INV 186.57
	16	CBMH	701.010	186.75	S INV 184.87	N INV 184.82
	17	DCBMH	701.011	186.30	S INV 184.40	E INV 184.32

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GEODETIC BENCHMARKS

BM# 1

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ELEV. 181.776m

TEMPORARY BENCHMARKS

BM# 2

TOP OF SIB (GEORGIAN GLEN PROPERTY), LOCATED APPROX. 26m WEST OF STREET 'A' & COUNTY ROAD 40 INTERSECTION.

ELEV. 190.430m

Town

No.	Issue / Revision	Date MM/DD/YYYY
0	Issued for Review	05/14/04
1	REVISED AS PER TOWN'S COMMENTS	10/14/04
2	ISSUED FOR APPROVAL	03/20/07
3	REVISED PER TOWN COMMENTS DATED MAY 4, 2007	06/25/07
4	ISSUED FOR APPROVAL	07/16/07
5	ISSUED FOR INCLUSION OF SUBDIVISION AGREEMENT	02/10/09

ENGINEER

LICENSED PROFESSIONAL ENGINEER
K. A. MORRIS
PROVINCE OF ONTARIO

Project: GEORGIAN GLEN SUBDIVISION
TOWN of THE BLUE MOUNTAINS

Drawing: GENERAL SERVICING PLAN

CF CROZIER & ASSOCIATES INC.
LAND DEVELOPMENT ENGINEERS

Drawn By: I.T.M.	Check By: K.A.M.	Project No.	101-2501
Scale: 1:1000	Date: 05/14/2004	Drawing No.	GEN1