BURNSIDE

City of Owen Sound
East Side Master Servicing
Volume II
Stormwater Management Study

Appendices A to E

Prepared by

R.J.Burnside & Associates Limited
3 Ronell Crescent Collingwood ON L9Y 4J6 Canada

February 2008 - Final
October 2007

File No: MCG 10665

Table of Contents

BURNSIDE

Appendix A
Telfer Creek

BURNSIDE

Appendix A1
Telfer Creek (Existing Condition)

Project Name: Telfer Creek Drainage Study
Project No: MCG 10665
Location: Owen Sound
Designer: T. Lozon
Date: 18-Jun-2007
Date Modified: 14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

SWMHYMO INPUT TABLE - TELFER CREEK EXISTING CONDITION

AREA No.	AREA (ha)	CN/CCN	XIMP	TIMP	Tp (hr)	IAper	SLPP	LGP	MNP	IAimp	SLPI	LGI	MNI
Catchment #1- Existing Hydrology	65.14	79	N/A	N/A	1.39	7.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Catchment #2- Existing Hydrology	122.07	80	N/A	N/A	1.07	7.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Catchment #3- Existing Hydrology	245.35	80	N/A	N/A	1.12	7.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

AREA The total catchment area (ha)
CN/CCN The composite SCS Curve Number for NASHYD commands, and the pervious SCS Curve Number for STANDHYD commands
XIMP The ratio of the directly connected impervious area
TIMP The ratio of the total impervious area
Tp The time of peak of the unit hydrograph (hrs)
Iaper The composite intital abstraction for NASHYD commands, and the pervious intial abstraction for STANDHYD commands (mm)
SLPP The average pervious surface slope over which runoff travels (%)
LGP The average lot depth or pervious length over which surface water travels along the longest flow path (m)
MNP The representative roughness coefficient for the pervious surface over which water travels before reaching the street or sewer system
Iaimp The impervious intial abstraction for STANDHYD commands (mm)
SLPI The average impervious surface slope over which runoff travels (%)
LGI The impervious travel length of the longest flow path (m)
MNI The average roughness coefficient for the impervious surface over which water travels

F:\10665.9\DESIGN\C\SWM\EX- TELFER CREEK\[CN,_C,_Tp.xls]Summary

Project Name: Telfer Creek Drainage Study
Project No: MCG 10665
Location: Owen Sound
Designer: T. Lozon
Date: 18-Jun-2007
Date Modified: 14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

SCS Curve Number and Uplands Method Reference Sheet

SCS Curve Number and Initial Rainfall Abstraction Data

Hydrologic Soil Group	SCS Curve Number (AMCII)					
	Forest/Woodlot	Meadow/Field	Crop	Lawn/Grass	Pavement	Water
A	30	39	66	44	98	100
AB	44	50	71	55	98	100
B	58	61	76	65	98	100
BC	65	68	79	71	98	100
C	71	74	82	76	98	100
CD	74	78	84	79	98	100
D	77	80	86	82	98	100

	Initial Rainfall Abstraction, Ia (mm)					
Land Use	Forest/Woodlot	Meadow/Field	Crop	Lawn/Grass	Pavement	Water
Ia	10	8	7	5	2	0

CN (I)= 4.2CN(II)/(10-0.058CN(II)) CN (III)= 23CN(II)/(10+0.13CN(II))

NOTE: Standhyd commands - CN value is based solely on the pervious surfaces only.
Nashyd commands - CN value is based on a composite of both the pervious and impervious surfaces

Estimating Travel Velocity Using Uplands Method

$V = (x)(S)^{0.5}$ (Refer to Fig 3.12 Velocities for Upland method for estimating travel time for overland flow)

V= Velocity
S= Slope
x = Land Cover Coefficient **(see below)**

x = 0.6	Forest with Heavy Ground Litter, hay meadow (overland flow)
1.5	Trash Fallow or Minimum Tillage cultivation, strip cropped woodland(overland flow)
2.3	Short grass pasture (overland flow)
2.7	Cultivated Straight row (overland flow)
3.0	Nearly bare untilled (overland flow) or alluvial fans located in the Western mountain Regions
4.6	Grassed Waterway
6.1	Paved Areas (sheet flow); small upland gullies

Time of Concentration for One Land Use on Flow Path

$Tc_1 = L_1 / V_1$ $Tp_1 = 0.67 \times Tc_1$

Total Time of Concentration for Multiple Land Uses on Flow Path

$Tc_{total} = Tc_1 + Tc_2 + Tc_3 + Tc_4 + Tc_5$ $Tp_{total} = Tp_1 + Tp_2 + Tp_3 + Tp_4 + Tp_5$

Project Name:	Telfer Creek Drainage Study
Project No:	MCG 10665
Location:	Owen Sound
Designer:	T. Lozon
Date:	18-Jun-2007
Date Modified:	14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

Catchment #1- Existing Hydrology

SWMHYMO Nashyd Modelling Parameters

Hydrologic Soil Group	Total Area per Various Land Use (ha)					
	Forest/Woodlot	Meadow/Field	Crop	Lawn/Grass	Pavement	Water
A						
AB						
B			12.9			
BC			49.9			
C			2.3			
CD						
D						

Total area (ha):	65.1	Composite CN(I):	61		
Pervious area (ha):	65.1	Composite CN(II):	79	Composite Ia (mm):	7.0
Impervious area (ha):	0.0	Composite CN(III):	89		

Drainage Area Calculations

Table 1

Parameters	x_1	x_2	x_3	x_4	x_5	*Total*
Length (m)	444.0	280.0	404.0			1128
h_1 (m)	238.5	228.0	225.5			238.5
h_2 (m)	228.0	225.5	224.0			224
Δh (m)	10.5	2.5	1.5			14.5
Slope (%)	2.4	0.9	0.4			1.29
x	2.7	0.6	4.6			N/A
V (m/s)	0.4	0.1	0.3			N/A
Tc (min)	17.8	82.3	24.0			124.16
Tc (hr)	0.3	1.4	0.4			2.07
Tp (hr)	0.2	0.9	0.3			1.39

x =	Land Cover Coefficient (see below)	
x =	0.6	Forest with Heavy Ground Litter, hay meadow (overland flow)
	1.5	Trash Fallow or Minimum Tillage cultivation, strip cropped woodland(overland flow)
	2.3	Short grass pasture (overland flow)
	2.7	Cultivated Straight row (overland flow)
	3.0	Nearly bare untilled (overland flow) or alluvial fans located in the Western mountain Regions
	4.6	Grassed Waterway
	6.1	Paved Areas (sheet flow); small upland gullies

Project Name:	Telfer Creek Drainage Study
Project No:	MCG 10665
Location:	Owen Sound
Designer:	T. Lozon
Date:	18-Jun-2007
Date Modified:	14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

Catchment #2- Existing Hydrology

SWMHYMO Nashyd Modelling Parameters

Hydrologic Soil Group	Total Area per Various Land Use (ha)					
	Forest/Woodlot	Meadow/Field	Crop	Lawn/Grass	Pavement	Water
A						
AB						
B						
BC			88.33			
C			33.74			
CD						
D						

Total area (ha):	122.07	Composite CN(I):	62		
Pervious area (ha):	122.1	Composite CN(II):	80	Composite Ia (mm):	7.0
Impervious area (ha):	0.0	Composite CN(III):	90		

Drainage Area Calculations

Table 1

Parameters	x_1	x_2	x_3	x_4	x_5	*Total*
Length (m)	961	953				1914
h_1 (m)	248	232				248
h_2 (m)	232	227.5				227.5
Δh (m)	16	4.5				20.5
Slope (%)	1.66	0.47				1.07
x	2.7	4.6				N/A
V (m/s)	0.35	0.32				N/A
Tc (min)	45.97	50.25				96.22
Tc (hr)	0.77	0.84				1.60
Tp (hr)	0.51	0.56				1.07

x =	Land Cover Coefficient (see below)	
x =	0.6	Forest with Heavy Ground Litter, hay meadow (overland flow)
	1.5	Trash Fallow or Minimum Tillage cultivation, strip cropped woodland(overland flow)
	2.3	Short grass pasture (overland flow)
	2.7	Cultivated Straight row (overland flow)
	3.0	Nearly bare untilled (overland flow) or alluvial fans located in the Western mountain Regions
	4.6	Grassed Waterway
	6.1	Paved Areas (sheet flow); small upland gullies

Project Name:	Telfer Creek Drainage Study
Project No:	MCG 10665
Location:	Owen Sound
Designer:	T. Lozon
Date:	18-Jun-2007
Date Modified:	14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

Catchment #3- Existing Hydrology

SWMHYMO Nashyd Modelling Parameters

Hydrologic Soil Group	Total Area per Various Land Use (ha)					
	Forest/Woodlot	Meadow/Field	Crop	Lawn/Grass	Pavement	Water
A						
AB						
B						
BC			158			
C			87.35			
CD						
D						

Total area (ha):	245.35	Composite CN(I):	63		
Pervious area (ha):	245.4	Composite CN(II):	80	Composite Ia (mm):	7.0
Impervious area (ha):	0.0	Composite CN(III):	90		

Drainage Area Calculations

Table 1

Parameters	x_1	x_2	x_3	x_4	x_5	*Total*
Length (m)	708	1865				2573
h_1 (m)	266	245				266
h_2 (m)	245	230				230
Δh (m)	21	15				36
Slope (%)	2.97	0.80				1.40
x	2.7	4.6				N/A
V (m/s)	0.47	0.41				N/A
Tc (min)	25.38	75.35				100.72
Tc (hr)	0.42	1.26				1.68
Tp (hr)	0.28	0.84				1.12

x =	Land Cover Coefficient (see below)	
x =	0.6	Forest with Heavy Ground Litter, hay meadow (overland flow)
	1.5	Trash Fallow or Minimum Tillage cultivation, strip cropped woodland(overland flow)
	2.3	Short grass pasture (overland flow)
	2.7	Cultivated Straight row (overland flow)
	3.0	Nearly bare untilled (overland flow) or alluvial fans located in the Western mountain Regions
	4.6	Grassed Waterway
	6.1	Paved Areas (sheet flow); small upland gullies

Project Name:	Telfer Creek Drainage Study
Project No:	MCG 10665
Location:	Owen Sound
Designer:	T. Lozon
Date:	18-Jun-2007
Date Modified:	14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 445-2399
web www.rjburnside.com

Catchment #3 to Catchment #2 - Shift- Existing Hydrology

Drainage Area Calculations

Table 1

h_1 (m)	230.0
h_2 (m)	227.5
Δh (m)	2.5
Length (m)	1225.0
Slope (%)	0.2

Table 2

Parameters	x_1	x_2	x_3	x_4	x_5	*Total*
Length (m)	1225.0					1225
x	4.6					N/A
V (m/s)	0.2					N/A
Tc (min)	98.2					98.25

x =	Land Cover Coefficient (see below)	
x =	0.6	Forest with Heavy Ground Litter, hay meadow (overland flow)
	1.5	Trash Fallow or Minimum Tillage cultivation, strip cropped woodland(overland flow)
	2.3	Short grass pasture (overland flow)
	2.7	Cultivated Straight row (overland flow)
	3.0	Nearly bare untilled (overland flow) or alluvial fans located in the Western mountain Regions
	4.6	Grassed Waterway
	6.1	Paved Areas (sheet flow); small upland gullies

Project Name:	Telfer Creek Drainage Study
Project No:	MCG 10665
Location:	Owen Sound
Designer:	T. Lozon
Date:	18-Jun-2007
Date Modified:	14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

Catchment #2 to Catchment #1 - Shift- Existing Hydrology

Drainage Area Calculations

Table 1

h_1 (m)	228.5
h_2 (m)	218.5
Δh (m)	10
Length (m)	1150
Slope (%)	0.87

Table 2

Parameters	x_1	x_2	x_3	x_4	x_5	*Total*
Length (m)	1150					1150
x	4.6					N/A
V (m/s)	0.43					N/A
Tc (min)	44.68					44.68

x = Land Cover Coefficient **(see below)**

x = 0.6	Forest with Heavy Ground Litter, hay meadow (overland flow)
1.5	Trash Fallow or Minimum Tillage cultivation, strip cropped woodland(overland flow)
2.3	Short grass pasture (overland flow)
2.7	Cultivated Straight row (overland flow)
3.0	Nearly bare untilled (overland flow) or alluvial fans located in the Western mountain Regions
4.6	Grassed Waterway
6.1	Paved Areas (sheet flow); small upland gullies

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 11-16-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*************************************************************************
*%
*% TELFER CREEK - EXISTING CONDITION
*%
*% Drainage area is located at the East limit of Owen Sound,ON. Bordered by the
*% 9th Avenue and Concession Road 10.
*%
*%
*% 2-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                   ["2SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM          STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
*%
*% Flow to the Outlet of Catchment #3
*%
CALIB NASHYD        ID=[2], NHYD=["CA#3"], DT=[2]min, AREA=[245.35](ha),
                    DWF=[0](cms),  CN/C=[80], IA=[7.0](mm),
                    N=[3], TP=[1.12]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
*%
*% Flow to the Outlet of Catchment #2
*%
CALIB NASHYD        ID=[3], NHYD=["CA#2"], DT=[2]min, AREA=[122.07](ha),
                    DWF=[0](cms),  CN/C=[80], IA=[7.0](mm),
                    N=[3], TP=[1.07]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
SHIFT HYD           IDout=[4], NHYD=["SH3-2"], IDin=[2], TLAG=[98.3](min)
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[5], NHYD=["TOT2"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*%
*% Flow to the Outlet of Catchment #1
*%
CALIB NASHYD        ID=[6], NHYD=["CA#1"], DT=[2]min, AREA=[65.14](ha),
                    DWF=[0](cms),  CN/C=[79], IA=[7.0](mm),
                    N=[3], TP=[1.39]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
SHIFT HYD           IDout=[7], NHYD=["SH2-1"], IDin=[5], TLAG=[44.68](min)
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["TOT1"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------|
*% 5-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*                   ["5SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*                   ["10SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*                   ["25SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
```



```
*                   ["50SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*                   ["100SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% Timmins Regional Storm (12-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
*                   ["12regtim.o89"] <--storm filename
*%-----------------|-------------------------------------------------------|
FINISH
```

```
================================================================================

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO         999   55555 =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O       9   9  5     =========
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##   9   9  5     Ver.  3.1
     S   W W   M   M  H   H    Y    M   M  O   O        9999  5555  Oct. 1997
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      5 =========
                                                       9   9      5 # 3846413
      StormWater Management HYdrologic Model            999   5555  =========

 ********************************************************************************
 ***************************** SWMHYMO-95w Ver/3.1 *****************************
 *******  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: R. J Burnside and Associates                    +++++++
 +++++++                Stayner              SERIAL#:3846413           +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             ********
 *******           Maximum value for ID numbers  :     10            ********
 *******           Max. number of rainfall points:   5000            ********
 *******           Max. number of flow points    :   5000            ********
 ********************************************************************************

 *** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
 ***------------------------------------------------------------------------***
 ***    ID:  Hydrograph IDentification numbers, (1-10).                     ***
 ***  NHYD:  Hydrograph reference numbers, (6 digits or characters).        ***
 ***  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).      ***
 *** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).        ***
 *** TpeakDate_hh:mm is the date and time of the peak flow.                 ***
 ***  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).           ***
 ***  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).           ***
 ***    *:   see WARNING or NOTE message printed at end of run.             ***
 ***   **:   see  ERROR  message printed at end of run.                     ***
 ********************************************************************************
 ********************************************************************************

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

 ********************************************************************************

 ********************   S U M M A R Y   O U T P U T   ***********************
 ********************************************************************************
 *       DATE: 2007-06-18     TIME: 11:39:43     RUN COUNTER: 001253          *
 ********************************************************************************
 * Input   filename: C:\DOCUME~1\SWMHYMO\6-HOUR~1\2-CYRSCS.DAT                  *
 * Output  filename: C:\DOCUME~1\SWMHYMO\6-HOUR~1\2-CYRSCS.out                  *
 * Summary filename: C:\DOCUME~1\SWMHYMO\6-HOUR~1\2-CYRSCS.sum                  *
 * User comments:                                                               *
 * 1:_____________________________________________________________________      *
 * 2:_____________________________________________________________________      *
 * 3:_____________________________________________________________________      *
 ********************************************************************************


*#*******************************************************************************
```



```
*#  Project Name: ]Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 11-16-2006
*#  Modeller    : ]T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*******************************************************************************
 RUN:COMMAND#
 001:0001--------------------------------------------------------------------------
     START
      ]TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002--------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 2-Year SCS Type-II Storm Distribution (6-hour) Owen Sound, O
      [SDT=30.00:SDUR=   6.50:PTOT= 37.20]
 001:0003---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD        02:CA#3      245.35    2.264 No_date    4:52    9.73 .262
      [CN= 80.0: N= 3.00]
      [Tp= 1.12:DT= 2.00]
 001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD        03:CA#2      122.07    1.163 No_date    4:48    9.73 .262
      [CN= 80.0: N= 3.00]
      [Tp= 1.07:DT= 2.00]
 001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD        -> 02:CA#3      245.35    2.264 No_date    4:52    9.73  n/a
      ]LAG= 98.3 min]<- 04:SH3-2      245.35    2.264 No_date    6:30    9.73  n/a
 001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD             03:CA#2      122.07    1.163 No_date    4:48    9.73  n/a
                       +  04:SH3-2     245.35    2.264 No_date    6:30    9.73  n/a
      [DT= 2.00]  SUM=   05:TOT2      367.42    2.891 No_date    6:20    9.73  n/a
 001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD        06:CA#1       65.14     .495 No_date    5:12    9.33 .251
      [CN= 79.0: N= 3.00]
      ]Tp= 1.39:DT= 2.00]
 001:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD        -> 05:TOT2      367.42    2.891 No_date    6:20    9.73  n/a
      [LAG= 44.7 min]<- 07:SH2-1      367.42    2.891 No_date    7:04    9.73  n/a
 001:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD             06:CA#1       65.14     .495 No_date    5:12    9.33  n/a
                       +  07:SH2-1     367.42    2.891 No_date    7:04    9.73  n/a
      [DT= 2.00]  SUM=   08:TOT1      432.56    3.181 No_date    7:00    9.67  n/a
  ** END OF RUN :   1

********************************************************************************



 RUN:COMMAND#
 002:0010--------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      ]NSTORM=   1 ]
      ]NRUN  =   2 ]
*#*******************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 11-16-2006
*#  Modeller    : ]T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*******************************************************************************
 002:0012--------------------------------------------------------------------------
```

```
     READ STORM
      Filename = STORM.001
      Comment  = 5-Year SCS Type-II Storm Distribution (6-hour) Owen Sound, O
      [SDT=30.00:SDUR=   6.50:PTOT= 48.30]
 002:0013--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       02:CA#3     245.35    3.852 No_date    4:48   16.28 .337
      [CN= 80.0: N= 3.00]
      [Tp= 1.12:DT= 2.00]
 002:0014--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       03:CA#2     122.07    1.980 No_date    4:44   16.28 .337
      [CN= 80.0: N= 3.00]
      [Tp= 1.07:DT= 2.00]
 002:0015--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 02:CA#3     245.35    3.852 No_date    4:48   16.28  n/a
      [LAG= 98.3 min]<- 04:SH3-2    245.35    3.852 No_date    6:26   16.28  n/a
 002:0016--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            03:CA#2     122.07    1.980 No_date    4:44   16.28  n/a
                      + 04:SH3-2    245.35    3.852 No_date    6:26   16.28  n/a
      [DT= 2.00]  SUM=  05:TOT2     367.42    4.888 No_date    6:16   16.28  n/a
 002:0017--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       06:CA#1      65.14     .842 No_date    5:08   15.67 .325
      [CN= 79.0: N= 3.00]
      [Tp= 1.39:DT= 2.00]
 002:0018--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 05:TOT2     367.42    4.888 No_date    6:16   16.28  n/a
      [LAG= 44.7 min]<- 07:SH2-1    367.42    4.888 No_date    7:00   16.28  n/a
 002:0019--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:CA#1      65.14     .842 No_date    5:08   15.67  n/a
                      + 07:SH2-1    367.42    4.888 No_date    7:00   16.28  n/a
      [DT= 2.00]  SUM=  08:TOT1     432.56    5.369 No_date    6:56   16.19  n/a
  ** END OF RUN :   2

*******************************************************************************



 RUN:COMMAND#
 003:0021--------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   3 ]
*#*****************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 11-16-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*****************************************************************************
 003:0023--------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 10-Year SCS Type-II Storm Distribution (6-hour) Owen Sound,
      [SDT=30.00:SDUR=   6.50:PTOT= 55.70]
 003:0024--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       02:CA#3     245.35    5.043 No_date    4:46   21.14 .379
      [CN= 80.0: N= 3.00]
      [Tp= 1.12:DT= 2.00]
 003:0025--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       03:CA#2     122.07    2.592 No_date    4:42   21.14 .379
      [CN= 80.0: N= 3.00]
      [Tp= 1.07:DT= 2.00]
 003:0026--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 02:CA#3     245.35    5.043 No_date    4:46   21.14  n/a
```



```
      [LAG= 98.3 min]<- 04:SH3-2    245.35    5.043 No_date    6:24   21.14  n/a
 003:0027--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            03:CA#2     122.07    2.592 No_date    4:42   21.14  n/a
                      + 04:SH3-2    245.35    5.043 No_date    6:24   21.14  n/a
      [DT= 2.00]  SUM=  05:TOT2     367.42    6.379 No_date    6:14   21.14  n/a
 003:0028--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       06:CA#1      65.14    1.103 No_date    5:08   20.41 .366
      [CN= 79.0: N= 3.00]
      [Tp= 1.39:DT= 2.00]
 003:0029--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 05:TOT2     367.42    6.379 No_date    6:14   21.14  n/a
      [LAG= 44.7 min]<- 07:SH2-1    367.42    6.379 No_date    6:58   21.14  n/a
 003:0030--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:CA#1      65.14    1.103 No_date    5:08   20.41  n/a
                      + 07:SH2-1    367.42    6.379 No_date    6:58   21.14  n/a
      [DT= 2.00]  SUM=  08:TOT1     432.56    7.001 No_date    6:54   21.03  n/a
  ** END OF RUN :   3

*******************************************************************************



 RUN:COMMAND#
 004:0033--------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   4 ]
*#*****************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 11-16-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*****************************************************************************
 004:0035--------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 25-Year SCS Type-II Storm Distribution (6-hour) Owen Sound,
      [SDT=30.00:SDUR=   6.50:PTOT= 65.00]
 004:0036--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       02:CA#3     245.35    6.655 No_date    4:44   27.69 .426
      [CN= 80.0: N= 3.00]
      [Tp= 1.12:DT= 2.00]
 004:0037--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       03:CA#2     122.07    3.422 No_date    4:40   27.69 .426
      [CN= 80.0: N= 3.00]
      [Tp= 1.07:DT= 2.00]
 004:0038--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 02:CA#3     245.35    6.655 No_date    4:44   27.69  n/a
      [LAG= 98.3 min]<- 04:SH3-2    245.35    6.655 No_date    6:22   27.69  n/a
 004:0039--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            03:CA#2     122.07    3.422 No_date    4:40   27.69  n/a
                      + 04:SH3-2    245.35    6.655 No_date    6:22   27.69  n/a
      [DT= 2.00]  SUM=  05:TOT2     367.42    8.393 No_date    6:14   27.69  n/a
 004:0040--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       06:CA#1      65.14    1.457 No_date    5:06   26.80 .412
      [CN= 79.0: N= 3.00]
      [Tp= 1.39:DT= 2.00]
 004:0041--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 05:TOT2     367.42    8.393 No_date    6:14   27.69  n/a
      [LAG= 44.7 min]<- 07:SH2-1    367.42    8.393 No_date    6:58   27.69  n/a
 004:0042--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:CA#1      65.14    1.457 No_date    5:06   26.80  n/a
```

```
                  +  07:SH2-1     367.42    8.393 No_date    6:58   27.69  n/a
     [DT= 2.00]  SUM=  08:TOT1     432.56    9.206 No_date    6:54   27.55  n/a
  ** END OF RUN :   4

**********************************************************************************



 RUN:COMMAND#
 005:0046-------------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   5 ]
*#*********************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 11-16-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*********************************************************************************
 005:0048-------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 50-Year SCS Type-II Storm Distribution (6-hour) Owen Sound,
      [SDT=30.00:SDUR=   6.50:PTOT= 71.90]
 005:0049--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       02:CA#3     245.35    7.920 No_date    4:44   32.80 .456
      [CN= 80.0: N= 3.00]
      [Tp= 1.12:DT= 2.00]
 005:0050--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       03:CA#2     122.07    4.073 No_date    4:40   32.80 .456
      [CN= 80.0: N= 3.00]
      [Tp= 1.07:DT= 2.00]
 005:0051--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 02:CA#3     245.35    7.920 No_date    4:44   32.80  n/a
      [LAG= 98.3 min]<- 04:SH3-2     245.35    7.920 No_date    6:22   32.80  n/a
 005:0052--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            03:CA#2     122.07    4.073 No_date    4:40   32.80  n/a
                   +  04:SH3-2     245.35    7.920 No_date    6:22   32.80  n/a
      [DT= 2.00]  SUM=  05:TOT2     367.42    9.971 No_date    6:12   32.80  n/a
 005:0053--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       06:CA#1      65.14    1.736 No_date    5:04   31.81 .442
      [CN= 79.0: N= 3.00]
      [Tp= 1.39:DT= 2.00]
 005:0054--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 05:TOT2     367.42    9.971 No_date    6:12   32.80  n/a
      [LAG= 44.7 min]<- 07:SH2-1     367.42    9.971 No_date    6:56   32.80  n/a
 005:0055--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:CA#1      65.14    1.736 No_date    5:04   31.81  n/a
                   +  07:SH2-1     367.42    9.971 No_date    6:56   32.80  n/a
      [DT= 2.00]  SUM=  08:TOT1     432.56   10.931 No_date    6:52   32.65  n/a
  ** END OF RUN :   5

**********************************************************************************



 RUN:COMMAND#
 006:0060-------------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
```



```
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   6 ]
*#*********************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 11-16-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*********************************************************************************
 006:0062-------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 100-Year SCS Type-II Storm Distribution (6-hour) Owen Sound,
      [SDT=30.00:SDUR=   6.50:PTOT= 78.70]
 006:0063--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       02:CA#3     245.35    9.212 No_date    4:44   38.02 .483
      [CN= 80.0: N= 3.00]
      [Tp= 1.12:DT= 2.00]
 006:0064--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       03:CA#2     122.07    4.739 No_date    4:40   38.02 .483
      [CN= 80.0: N= 3.00]
      [Tp= 1.07:DT= 2.00]
 006:0065--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 02:CA#3     245.35    9.212 No_date    4:44   38.02  n/a
      [LAG= 98.3 min]<- 04:SH3-2     245.35    9.212 No_date    6:22   38.02  n/a
 006:0066--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            03:CA#2     122.07    4.739 No_date    4:40   38.02  n/a
                   +  04:SH3-2     245.35    9.212 No_date    6:22   38.02  n/a
      [DT= 2.00]  SUM=  05:TOT2     367.42   11.582 No_date    6:12   38.02  n/a
 006:0067--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       06:CA#1      65.14    2.021 No_date    5:04   36.93 .469
      [CN= 79.0: N= 3.00]
      [Tp= 1.39:DT= 2.00]
 006:0068--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 05:TOT2     367.42   11.582 No_date    6:12   38.02  n/a
      [LAG= 44.7 min]<- 07:SH2-1     367.42   11.582 No_date    6:56   38.02  n/a
 006:0069--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:CA#1      65.14    2.021 No_date    5:04   36.93  n/a
                   +  07:SH2-1     367.42   11.582 No_date    6:56   38.02  n/a
      [DT= 2.00]  SUM=  08:TOT1     432.56   12.693 No_date    6:52   37.86  n/a
  ** END OF RUN :   6

**********************************************************************************



 RUN:COMMAND#
 007:0075-------------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   7 ]
*#*********************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 11-16-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*********************************************************************************
 007:0077-------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = TIMMINS REGIONAL STORM (12-hour)
```

```
     [SDT=60.00:SDUR=  12.00:PTOT=193.00]
 007:0078--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       02:CA#3     245.35   15.760 No_date    7:58  138.66 .718
      [CN= 80.0: N= 3.00]
      [Tp= 1.12:DT= 2.00]
 007:0079--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       03:CA#2     122.07    7.995 No_date    7:52  138.66 .718
      [CN= 80.0: N= 3.00]
      [Tp= 1.07:DT= 2.00]
 007:0080--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 02:CA#3     245.35   15.760 No_date    7:58  138.66  n/a
      [LAG= 98.3 min]<- 04:SH3-2    245.35   15.760 No_date    9:36  138.66  n/a
 007:0081--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            03:CA#2     122.07    7.995 No_date    7:52  138.66  n/a
                     +  04:SH3-2    245.35   15.760 No_date    9:36  138.66  n/a
      [DT= 2.00]  SUM=  05:TOT2     367.42   22.688 No_date    9:26  138.66  n/a
 007:0082--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       06:CA#1      65.14    3.804 No_date    8:46  136.46 .707
      [CN= 79.0: N= 3.00]
      [Tp= 1.39:DT= 2.00]
 007:0083--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     SHIFT HYD       -> 05:TOT2     367.42   22.688 No_date    9:26  138.66  n/a
      [LAG= 44.7 min]<- 07:SH2-1    367.42   22.688 No_date   10:10  138.66  n/a
 007:0084--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:CA#1      65.14    3.804 No_date    8:46  136.46  n/a
                     +  07:SH2-1    367.42   22.688 No_date   10:10  138.66  n/a
      [DT= 2.00]  SUM=  08:TOT1     432.56   26.074 No_date   10:06  138.33  n/a
 007:0091--------------------------------------------------------------------------
      FINISH
-------------------------------------------------------------------------------
*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2007-06-18     at 11:39:43
===============================================================================
```

Project Name:	Teffler Creek Drainage Study
Project No:	MCG 10665
Location:	Owen Sound
Designer:	T. Lozon
Date:	18-Jun-2007
Date Modified:	14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Roneli Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

TELFER CREEK -EXISTING CONDITION FLOW SUMMARY

Table 1: Owen Sound Drainage Study, 4hr Chicago Storm Distribution

Return Period (yrs)	Flow (m^3/s)		
	ND3	ND2	ND1
100	7.244	9.340	10.278

Table 2: Owen Sound Drainage Study, 6hr SCS Type II Storm Distribution

Return Period (yrs)	Flow (m^3/s)		
	ND3	ND2	ND1
2	2.264	2.891	3.181
5	3.852	4.888	5.369
10	5.043	6.379	7.001
25	6.655	8.393	9.206
50	7.920	7.920	10.931
100	9.212	11.582	12.693
Timmins Regional	15.760	22.688	26.074

Table 3: Owen Sound Drainage Study, 12hr SCS Type II Storm Distribution

Return Period (yrs)	Flow (m^3/s)		
	ND3	ND2	ND1
100	9.192	11.531	12.640

Table 4: Owen Sound Drainage Study, 24hr SCS Type II Storm Distribution

Return Period (yrs)	Flow (m^3/s)		
	ND3	ND2	ND1
100	9.046	11.269	12.313

Note: Flows illustrated in the tables above represent total flows to Flow Nodes 1, 2 and 3.

BURNSIDE

Appendix A2
Telfer Creek (Proposed Condition)

```
2     Metric units
*#**************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 12-18-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#**************************************************************************
*%
*% TELFER CREEK- PROPOSED CONDITION HYDROLOGY
*% Drainage area is located at the East limit of Owen Sound, ON. Bordered by
*% the 9th Avenue and Concession Road 10.
*%
*%
*% 2-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                   ["2SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM          STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
*%
*% Flow to the Outlet of undeveloped area of Catchment #3.
*% Catchment #3 also considers all green space and agricultural areas located
*% within catchments #1 and #2.
*%
*% Total Undeveloped and Green Area
CALIB NASHYD        ID=[1], NHYD=["TUNDLP"], DT=[2]min, AREA=[309.15](ha),
                    DWF=[0](cms),  CN/C=[79], IA=[7.0](mm),
                    N=[3], TP=[1.0]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
*% Total Residential Area
CALIB STANDHYD      ID=[2], NHYD=["TRES"], DT=[2](min), AREA=[51.22](ha),
                    XIMP=[0.30], TIMP=[0.50], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[73],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2](%),
                                         LGP=[45](m), MNP=[0.25], SCP=[0](hrs),
                    Impervious surfaces: IAimp=[2.0](mm), SLPI=[1](%),
                                         LGI=[610](m), MNI=[0.013], SCI=[0](hrs),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR     IDout=[3],   NHYD=["RESPND"],  IDin=[2],
                    RDT=[2](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [ 0.000 , 0.0000 ]
                                [ 0.377 , 0.5990 ] Two-year
                                ] 0.636 , 0.8400 ] Five-year
                                [ 0.829 , 1.0075 ] Ten-year
                                [ 1.090 , 1.2250 ] Twenty Five-year
                                [ 1.294 , 1.3830 ] Fifty-year
                                [ 1.503 , 1.5455 ] One Hundred-year
                                [    -1 ,     -1 ] (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------|
*% Total Commercial Area
CALIB STANDHYD      ID=[4], NHYD=["TCOM"], DT=[2](min), AREA=[17.39](ha),
                    XIMP=[0.9], TIMP=[0.9], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[73],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                         LGP=[20](m), MNP=[0.25], SCP=[0](hrs),
                    Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.0](%),
                                         LGI=[357](m), MNI=[0.013], SCI=[0](hrs),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR     IDout=[5],   NHYD=["COMPND"],  IDin=[4],
                    RDT=[2](min),
```



```
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [ 0.000 , 0.0000 ]
                                [ 0.128 , 0.4390 ] Two-year
                                [ 0.216 , 0.5655 ] Five-year
                                [ 0.281 , 0.6465 ] Ten-year
                                [ 0.370 , 0.7455 ] Twenty Five-year
                                [ 0.439 , 0.8190 ] Fifty-year
                                [ 0.510 , 0.8905 ] One Hundred-year
                                ]    -1 ,     -1 ] (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------|
*% Total Industrial Area
CALIB STANDHYD      ID=[6], NHYD=["TIND"], DT=[2](min), AREA=[40.99](ha),
                    XIMP=[0.75], TIMP=[0.75], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[71],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                         LGP=[20](m), MNP=[0.25], SCP=[0](hrs),
                    Impervious surfaces: IAimp=[2.0](mm), SLPI=[1](%),
                                         LGI=[331](m), MNI=[0.013], SCI=[0](hrs),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR     IDout=[7],   NHYD=["INDPND"],  IDin=[6],
                    RDT=[2](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [ 0.000 , 0.0000 ]
                                ] 0.301 , 0.8800 ] Two-year
                                [ 0.509 , 1.1395 ] Five-year
                                [ 0.663 , 1.3050 ] Ten-year
                                [ 0.872 , 1.5150 ] Twenty Five-year
                                [ 1.036 , 1.6700 ] Fifty-year
                                [ 1.203 , 1.8280 ] One Hundred-year
                                [    -1 ,     -1 ] (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------|
*% Total Institutional Area
CALIB STANDHYD      ID=[8], NHYD=["TINST"], DT=[2](min), AREA=[13.81](ha),
                    XIMP=[0.40], TIMP=[0.65], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[75],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2](%),
                                         LGP=[50](m), MNP=[0.25], SCP=[0](hrs),
                    Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.0](%),
                                         LGI=[465](m), MNI=[0.013], SCI=[0](hrs),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[9], NHYD=["Add 1"], IDs to add=[1+3]
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[1], NHYD=["Add 2"], IDs to add=[9+5]
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["Add 3"], IDs to add=[1+7]
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[3], NHYD=["Add 4"], IDs to add=[2+8]
*%-----------------|-------------------------------------------------------|
*% 5-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*                   ["5SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*                   ["10SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*                   ["25SCS6.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
```

```
START              TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*                  ['50SCS6.stm'] <--storm filename
*%-----------------|-----------------------------------------------------------|
*% 100-year SCS Type-II Storm Distribution for Owen Sound, ON. (6-hour)
START              TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*                  ['100SCS6.stm'] <--storm filename
*%-----------------|-----------------------------------------------------------|
FINISH
```

```
 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   55555 =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  5     =========
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  5     Ver.  3.1
     S   W W   M   M  H   H    Y    M   M  O   O       9999  5555  Oct. 1997
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      5 =========
                                                      9   9      5 # 3846413
      StormWater Management HYdrologic Model           999   5555  =========

 ********************************************************************************
 ************************** SWMHYMO-95w Ver/3.1 *********************************
 *******  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: R. J Burnside and Associates                  +++++++
 +++++++                Stayner              SERIAL#:3846413         +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++              ********
 *******          Maximum value for ID numbers  :     10             ********
 *******          Max. number of rainfall points:   5000             ********
 *******          Max. number of flow points    :   5000             ********
 ********************************************************************************

 *** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
 ***------------------------------------------------------------------------***
 ***    ID:  Hydrograph IDentification numbers, (1-10).                     ***
 ***  NHYD:  Hydrograph reference numbers, (6 digits or characters).        ***
 ***  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).      ***
 *** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).        ***
 *** TpeakDate_hh:mm is the date and time of the peak flow.                 ***
 ***  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).           ***
 ***  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).           ***
 ***     *:  see WARNING or NOTE message printed at end of run.             ***
 ***    **:  see  ERROR  message printed at end of run.                     ***
 ********************************************************************************
 ********************************************************************************

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

 ********************************************************************************

 ********************   S U M M A R Y   O U T P U T   ***************************
 ********************************************************************************
 *       DATE: 2007-06-19     TIME: 10:37:18     RUN COUNTER: 001344          *
 ********************************************************************************
 * Input   filename: C:\DOCUME~1\SWMHYMO\PR-TEF~1\6-HOUR~1\2-CYRSCS.DAT        *
 * Output  filename: C:\DOCUME~1\SWMHYMO\PR-TEF~1\6-HOUR~1\2-CYRSCS.out        *
 * Summary filename: C:\DOCUME~1\SWMHYMO\PR-TEF~1\6-HOUR~1\2-CYRSCS.sum        *
 * User comments:                                                             *
 * 1:_____________________________________________________________________    *
 * 2:_____________________________________________________________________    *
 * 3:_____________________________________________________________________    *
 ********************************************************************************


*#*******************************************************************************
```



```
*#  Project Name: (Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 12-18-2006
*#  Modeller    : (T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*******************************************************************************
 RUN:COMMAND#
 001:0001----------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002----------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 2-Year SCS Type-II Storm Distribution (6-hour) Owen Sound, O
      [SDT=30.00:SDUR=    6.50:PTOT= 37.20]
 001:0003---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       01:TUNDLP   309.15    2.953 No_date    4:42    9.33 .251
      [CN= 79.0: N= 3.00]
      [Tp= 1.00:DT= 2.00]
 001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     02:TRES      51.22    1.952 No_date    3:34   18.42 .495
      [XIMP=.30:TIMP=.50]
      [LOSS= 2 :CN= 73.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  45.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 610.:MNI=.013:SCI=    .0]
 001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 02:TRES      51.22    1.952 No_date    3:34   18.42  n/a
      [RDT= 2.00] out<- 03:RESPND    51.22     .377 No_date    5:04   18.42  n/a
     {MxStoUsed=.5983E+00}
 001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     04:TCOM      17.39    1.615 No_date    3:30   32.50 .874
      [XIMP=.90:TIMP=.90]
      [LOSS= 2 :CN= 73.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 357.:MNI=.013:SCI=    .0]
 001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 04:TCOM      17.39    1.615 No_date    3:30   32.50  n/a
      [RDT= 2.00] out<- 05:COMPND    17.39     .128 No_date    5:06   32.50  n/a
     {MxStoUsed=.4389E+00}
 001:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     06:TIND      40.99    3.256 No_date    3:30   28.31 .761
      [XIMP=.75:TIMP=.75]
      [LOSS= 2 :CN= 71.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 331.:MNI=.013:SCI=    .0]
 001:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 06:TIND      40.99    3.256 No_date    3:30   28.31  n/a
      [RDT= 2.00) out<- 07:INDPND    40.99     .299 No_date    5:02   28.31  n/a
     {MxStoUsed=.8731E+00}
 001:0010---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     08:TINST     13.81     .709 No_date    3:32   22.51 .605
      [XIMP=.40:TIMP=.65]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  50.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 465.:MNI=.013:SCI=    .0]
 001:0011---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:TUNDLP   309.15    2.953 No_date    4:42    9.33  n/a
                      + 03:RESPND    51.22     .377 No_date    5:04   18.42  n/a
      [DT= 2.00]  SUM=  09:Add 1    360.37    3.324 No_date    4:42   10.62  n/a
 001:0012---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            09:Add 1    360.37    3.324 No_date    4:42   10.62  n/a
                      + 05:COMPND    17.39     .128 No_date    5:06   32.50  n/a
      [DT= 2.00)  SUM=  01:Add 2    377.76    3.451 No_date    4:42   11.63  n/a
 001:0013---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
```

```
    ADD HYD            01:Add 2    377.76    3.451 No_date    4:42   11.63  n/a
                     + 07:INDPND    40.99     .299 No_date    5:02   28.31  n/a
     [DT= 2.00]  SUM=  02:Add 3    418.75    3.749 No_date    4:42   13.26  n/a
001:0014--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            02:Add 3    418.75    3.749 No_date    4:42   13.26  n/a
                     + 08:TINST     13.81     .709 No_date    3:32   22.51  n/a
     [DT= 2.00]  SUM=  03:Add 4    432.56    3.900 No_date    4:38   13.56  n/a
  ** END OF RUN :   1

**********************************************************************************



 RUN:COMMAND#
 002:0015--------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   2 ]
*#**********************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 12-18-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#**********************************************************************************
 002:0017--------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 5-Year SCS Type-II Storm Distribution (6-hour) Owen Sound, O
      [SDT=30.00:SDUR=   6.50:PTOT= 48.30]
 002:0018--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD       01:TUNDLP   309.15    5.053 No_date    4:38   15.67 .325
      [CN= 79.0: N= 3.00]
      [Tp= 1.00:DT= 2.00]
 002:0019--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     02:TRES      51.22    2.952 No_date    3:34   26.41 .547
      [XIMP=.30:TIMP=.50]
      [LOSS= 2 :CN= 73.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  45.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 610.:MNI=.013:SCI=   .0]
 002:0020--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 02:TRES      51.22    2.952 No_date    3:34   26.41  n/a
      [RDT= 2.00] out<- 03:RESPND   51.22     .635 No_date    4:46   26.41  n/a
     [MxStoUsed=.8394E+00)
 002:0021--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     04:TCOM      17.39    2.136 No_date    3:30   43.04 .891
      [XIMP=.90:TIMP=.90]
      [LOSS= 2 :CN= 73.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 357.:MNI=.013:SCI=   .0]
 002:0022--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 04:TCOM      17.39    2.136 No_date    3:30   43.04  n/a
      [RDT= 2.00] out<- 05:COMPND   17.39     .215 No_date    4:42   43.03  n/a
     [MxStoUsed=.5641E+00)
 002:0023--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     06:TIND      40.99    4.383 No_date    3:30   37.91 .785
      [XIMP=.75:TIMP=.75]
      [LOSS= 2 :CN= 71.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 331.:MNI=.013:SCI=   .0]
 002:0024--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 06:TIND      40.99    4.383 No_date    3:30   37.91  n/a
      [RDT= 2.00] out<- 07:INDPND   40.99     .505 No_date    4:38   37.91  n/a
```



```
     [MxStoUsed=.1135E+01)
 002:0025--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     08:TINST     13.81    1.041 No_date    3:32   31.56 .653
      [XIMP=.40:TIMP=.65]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  50.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 465.:MNI=.013:SCI=   .0]
 002:0026--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:TUNDLP   309.15    5.053 No_date    4:38   15.67  n/a
                     + 03:RESPND    51.22     .635 No_date    4:46   26.41  n/a
     [DT= 2.00]  SUM=  09:Add 1    360.37    5.686 No_date    4:40   17.20  n/a
 002:0027--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            09:Add 1    360.37    5.686 No_date    4:40   17.20  n/a
                     + 05:COMPND    17.39     .215 No_date    4:42   43.03  n/a
     [DT= 2.00]  SUM=  01:Add 2    377.76    5.901 No_date    4:40   18.39  n/a
 002:0028--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:Add 2    377.76    5.901 No_date    4:40   18.39  n/a
                     + 07:INDPND    40.99     .505 No_date    4:38   37.91  n/a
     [DT= 2.00]  SUM=  02:Add 3    418.75    6.406 No_date    4:40   20.30  n/a
 002:0029--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            02:Add 3    418.75    6.406 No_date    4:40   20.30  n/a
                     + 08:TINST     13.81    1.041 No_date    3:32   31.56  n/a
     [DT= 2.00]  SUM=  03:Add 4    432.56    6.615 No_date    4:36   20.66  n/a
  ** END OF RUN :   2

**********************************************************************************



 RUN:COMMAND#
 003:0031--------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   3 ]
*#**********************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 12-18-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#**********************************************************************************
 003:0033--------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 10-Year SCS Type-II Storm Distribution (6-hour) Owen Sound,
      [SDT=30.00:SDUR=   6.50:PTOT= 55.70]
 003:0034--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD       01:TUNDLP   309.15    6.636 No_date    4:38   20.41 .366
      [CN= 79.0: N= 3.00]
      [Tp= 1.00:DT= 2.00]
 003:0035--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     02:TRES      51.22    3.713 No_date    3:34   32.06 .576
      [XIMP=.30:TIMP=.50]
      [LOSS= 2 :CN= 73.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  45.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 610.:MNI=.013:SCI=   .0]
 003:0036--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 02:TRES      51.22    3.713 No_date    3:34   32.06  n/a
      [RDT= 2.00] out<- 03:RESPND   51.22     .827 No_date    4:40   32.06  n/a
     [MxStoUsed=.1006E+01)
 003:0037--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     04:TCOM      17.39    2.494 No_date    3:30   50.11 .900
      [XIMP=.90:TIMP=.90]
```

```
     [LOSS= 2 :CN= 73.0]
     [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp=2.00:SLP1=1.00:LGI= 357.:MNI=.013:SCI=   .0]
003:0038--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 04:TCOM      17.39    2.494 No_date    3:30   50.11  n/a
     [RDT= 2.00] out<- 05:COMPND    17.39     .280 No_date    4:36   50.11  n/a
    [MxStoUsed=.6450E+00]
003:0039--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     06:TIND      40.99    5.130 No_date    3:30   44.44 .798
     [XIMP=.75:TIMP=.75]
     [LOSS= 2 :CN= 71.0]
     [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 331.:MNI=.013:SCI=   .0]
003:0040--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 06:TIND      40.99    5.130 No_date    3:30   44.44  n/a
     [RDT= 2.00] out<- 07:INDPND    40.99     .661 No_date    4:34   44.44  n/a
    [MxStoUsed=.1303E+01]
003:0041--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     08:TINST     13.81    1.285 No_date    3:32   37.84 .679
     [XIMP=.40:TIMP=.65]
     [LOSS= 2 :CN= 75.0]
     [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  50.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 465.:MNI=.013:SCI=   .0]
003:0042--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:TUNDLP   309.15    6.636 No_date    4:38   20.41  n/a
                     + 03:RESPND    51.22     .827 No_date    4:40   32.06  n/a
     [DT= 2.00]  SUM=  09:Add 1    360.37    7.462 No_date    4:38   22.06  n/a
003:0043--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            09:Add 1    360.37    7.462 No_date    4:38   22.06  n/a
                     + 05:COMPND    17.39     .280 No_date    4:36   50.11  n/a
     [DT= 2.00]  SUM=  01:Add 2    377.76    7.742 No_date    4:38   23.35  n/a
003:0044--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:Add 2    377.76    7.742 No_date    4:38   23.35  n/a
                     + 07:INDPND    40.99     .661 No_date    4:34   44.44  n/a
     [DT= 2.00]  SUM=  02:Add 3    418.75    8.402 No_date    4:38   25.42  n/a
003:0045--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            02:Add 3    418.75    8.402 No_date    4:38   25.42  n/a
                     + 08:TINST     13.81    1.285 No_date    3:32   37.84  n/a
     [DT= 2.00]  SUM=  03:Add 4    432.56    8.651 No_date    4:36   25.81  n/a
  ** END OF RUN :   3

*******************************************************************************




RUN:COMMAND#
004:0048--------------------------------------------------------------------------
    START
     [TZERO =    .00 hrs on        0]
     [METOUT=   2    (1=imperial, 2=metric output)]
     [NSTORM=   1 ]
     [NRUN  =   4 ]
*#*****************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 12-18-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*****************************************************************************
004:0050--------------------------------------------------------------------------
    READ STORM
     Filename = STORM.001
     Comment  = 25-Year SCS Type-II Storm Distribution (6-hour) Owen Sound,
     [SDT=30.00:SDUR=   6.50:PTOT= 65.00]
004:0051--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
```



```
    CALIB NASHYD       01:TUNDLP   309.15    8.787 No_date    4:36   26.80 .412
     [CN= 79.0: N= 3.00]
     [Tp= 1.00:DT= 2.00]
004:0052--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     02:TRES      51.22    4.728 No_date    3:32   39.45 .607
     [XIMP=.30:TIMP=.50]
     [LOSS= 2 :CN= 73.0]
     [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  45.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 610.:MNI=.013:SCI=   .0]
004:0053--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 02:TRES      51.22    4.728 No_date    3:32   39.45  n/a
     [RDT= 2.00] out<- 03:RESPND    51.22    1.084 No_date    4:36   39.45  n/a
    [MxStoUsed=.1220E+01]
004:0054--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     04:TCOM      17.39    2.939 No_date    3:30   59.04 .908
     [XIMP=.90:TIMP=.90]
     [LOSS= 2 :CN= 73.0]
     [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 357.:MNI=.013:SCI=   .0]
004:0055--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 04:TCOM      17.39    2.939 No_date    3:30   59.04  n/a
     [RDT= 2.00] out<- 05:COMPND    17.39     .369 No_date    4:30   59.04  n/a
    [MxStoUsed=.7441E+00]
004:0056--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     06:TIND      40.99    6.113 No_date    3:30   52.75 .811
     [XIMP=.75:TIMP=.75]
     [LOSS= 2 :CN= 71.0]
     [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 331.:MNI=.013:SCI=   .0]
004:0057--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 06:TIND      40.99    6.113 No_date    3:30   52.75  n/a
     [RDT= 2.00] out<- 07:INDPND    40.99     .870 No_date    4:24   52.75  n/a
    [MxStoUsed=.1513E+01]
004:0058--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB STANDHYD     08:TINST     13.81    1.610 No_date    3:32   45.95 .707
     [XIMP=.40:TIMP=.65]
     [LOSS= 2 :CN= 75.0]
     [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  50.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 465.:MNI=.013:SCI=   .0]
004:0059--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:TUNDLP   309.15    8.787 No_date    4:36   26.80  n/a
                     + 03:RESPND    51.22    1.084 No_date    4:36   39.45  n/a
     [DT= 2.00]  SUM=  09:Add 1    360.37    9.871 No_date    4:36   28.60  n/a
004:0060--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            09:Add 1    360.37    9.871 No_date    4:36   28.60  n/a
                     + 05:COMPND    17.39     .369 No_date    4:30   59.04  n/a
     [DT= 2.00]  SUM=  01:Add 2    377.76   10.239 No_date    4:36   30.00  n/a
004:0061--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:Add 2    377.76   10.239 No_date    4:36   30.00  n/a
                     + 07:INDPND    40.99     .870 No_date    4:24   52.75  n/a
     [DT= 2.00]  SUM=  02:Add 3    418.75   11.105 No_date    4:36   32.23  n/a
004:0062--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            02:Add 3    418.75   11.105 No_date    4:36   32.23  n/a
                     + 08:TINST     13.81    1.610 No_date    3:32   45.95  n/a
     [DT= 2.00]  SUM=  03:Add 4    432.56   11.406 No_date    4:34   32.66  n/a
  ** END OF RUN :   4

*******************************************************************************




RUN:COMMAND#
005:0066--------------------------------------------------------------------------
    START
     [TZERO =    .00 hrs on        0]
```

```
     [METOUT=   2    (1=imperial, 2=metric output)]
     [NSTORM=   1 ]
     [NRUN  =   5 ]
*#*************************************************************************
*#  Project Name: ]Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 12-18-2006
*#  Modeller    : ]T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*************************************************************************
 005:0068-------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 50-Year SCS Type-II Storm Distribution (6-hour) Owen Sound,
      [SDT=30.00:SDUR=   6.50:PTOT= 71.90]
 005:0069--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       01:TUNDLP   309.15   10.477 No_date    4:36   31.81 .442
      [CN= 79.0: N= 3.00]
      ]Tp= 1.00:DT= 2.00]
 005:0070--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     02:TRES      51.22    5.476 No_date    3:32   45.10 .627
      [XIMP=.30:TIMP=.50]
      [LOSS= 2 :CN= 73.0]
      ]Pervious     area: IAper=5.00:SLPP=2.00:LGP=  45.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 610.:MNI=.013:SCI=   .0]
 005:0071--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 02:TRES      51.22    5.476 No_date    3:32   45.10  n/a
      {RDT= 2.00] out<- 03:RESPND    51.22    1.292 No_date    4:32   45.10  n/a
     {MxStoUsed=.1382E+01}
 005:0072--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     04:TCOM      17.39    3.269 No_date    3:30   65.69 .914
      ]XIMP=.90:TIMP=.90]
      ]LOSS= 2 :CN= 73.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 357.:MNI=.013:SCI=   .0]
 005:0073--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 04:TCOM      17.39    3.269 No_date    3:30   65.69  n/a
      [RDT= 2.00] out<- 05:COMPND    17.39     .437 No_date    4:20   65.69  n/a
     {MxStoUsed=.8174E+00}
 005:0074--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     06:TIND      40.99    6.838 No_date    3:30   58.98 .820
      [XIMP=.75:TIMP=.75]
      [LOSS= 2 :CN= 71.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 331.:MNI=.013:SCI=   .0]
 005:0075--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 06:TIND      40.99    6.838 No_date    3:30   58.98  n/a
      [RDT= 2.00] out<- 07:INDPND    40.99    1.037 No_date    4:18   58.98  n/a
     {MxStoUsed=.1670E+01}
 005:0076--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     08:TINST     13.81    1.842 No_date    3:32   52.08 .724
      [XIMP=.40:TIMP=.65]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  50.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 465.:MNI=.013:SCI=   .0]
 005:0077--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:TUNDLP   309.15   10.477 No_date    4:36   31.81  n/a
                      + 03:RESPND    51.22    1.292 No_date    4:32   45.10  n/a
      ]DT= 2.00]  SUM=  09:Add 1    360.37   11.768 No_date    4:34   33.70  n/a
 005:0078--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            09:Add 1    360.37   11.768 No_date    4:34   33.70  n/a
                      + 05:COMPND    17.39     .437 No_date    4:20   65.69  n/a
      ]DT= 2.00]  SUM=  01:Add 2    377.76   12.204 No_date    4:34   35.17  n/a
 005:0079--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:Add 2    377.76   12.204 No_date    4:34   35.17  n/a
                      + 07:INDPND    40.99    1.037 No_date    4:18   58.98  n/a
      [DT= 2.00]  SUM=  02:Add 3    418.75   13.232 No_date    4:34   37.50  n/a
```



```
 005:0080--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:Add 3    418.75   13.232 No_date    4:34   37.50  n/a
                      + 08:TINST     13.81    1.842 No_date    3:32   52.08  n/a
      [DT= 2.00]  SUM=  03:Add 4    432.56   13.571 No_date    4:32   37.97  n/a
  ** END OF RUN :   5

*************************************************************************




 RUN:COMMAND#
 006:0085-------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      ]NSTORM=   1 ]
      ]NRUN  =   6 ]
*#*************************************************************************
*#  Project Name: [Owen Sound Drainage Study]    Project Number: [MCG 10665]
*#  Date        : 12-18-2006
*#  Modeller    : [T.Lozon]
*#  Company     : R.J. Burnside and Associates
*#  License #   :  3846413
*#*************************************************************************
 006:0087-------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = 100-Year SCS Type-II Storm Distribution (6-hour) Owen Sound,
      ]SDT=30.00:SDUR=   6.50:PTOT= 78.70]
 006:0088--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB NASHYD       01:TUNDLP   309.15   12.212 No_date    4:34   36.93 .469
      [CN= 79.0: N= 3.00]
      [Tp= 1.00:DT= 2.00]
 006:0089--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     02:TRES      51.22    6.241 No_date    3:32   50.79 .645
      [XIMP=.30:TIMP=.50]
      ]LOSS= 2 :CN= 73.0]
      ]Pervious     area: IAper=5.00:SLPP=2.00:LGP=  45.:MNP=.250:SCP=   .0]
      ]Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 610.:MNI=.013:SCI=   .0]
 006:0090--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 02:TRES      51.22    6.241 No_date    3:32   50.79  n/a
      ]RDT= 2.00] out<- 03:RESPND    51.22    1.502 No_date    4:28   50.79  n/a
     {MxStoUsed=.1545E+01}
 006:0091--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     04:TCOM      17.39    3.602 No_date    3:30   72.27 .918
      [XIMP=.90:TIMP=.90]
      [LOSS= 2 :CN= 73.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 357.:MNI=.013:SCI=   .0]
 006:0092--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 04:TCOM      17.39    3.602 No_date    3:30   72.27  n/a
      ]RDT= 2.00] out<- 05:COMPND    17.39     .510 No_date    4:16   72.27  n/a
     {MxStoUsed=.8900E+00}
 006:0093--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     06:TIND      40.99    7.597 No_date    3:30   65.18 .828
      [XIMP=.75:TIMP=.75]
      [LOSS= 2 :CN= 71.0]
      ]Pervious     area: IAper=5.00:SLPP=2.00:LGP=  20.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 331.:MNI=.013:SCI=   .0]
 006:0094--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 06:TIND      40.99    7.597 No_date    3:30   65.18  n/a
      [RDT= 2.00] out<- 07:INDPND    40.99    1.203 No_date    4:14   65.18  n/a
     {MxStoUsed=.1828E+01}
 006:0095--------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     CALIB STANDHYD     08:TINST     13.81    2.076 No_date    3:32   58.21 .740
```

```
      [XIMP=.40:TIMP=.65]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper=5.00:SLPP=2.00:LGP=  50.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=2.00:SLPI=1.00:LGI= 465.:MNI=.013:SCI=   .0]
 006:0096---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD             01:TUNDLP   309.15   12.212 No_date    4:34   36.93  n/a
                       + 03:RESPND    51.22    1.502 No_date    4:28   50.79  n/a
      [DT= 2.00]  SUM=  09:Add 1    360.37   13.711 No_date    4:34   38.90  n/a
 006:0097---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD             09:Add 1    360.37   13.711 No_date    4:34   38.90  n/a
                       + 05:COMPND    17.39     .510 No_date    4:16   72.27  n/a
      [DT= 2.00]  SUM=  01:Add 2    377.76   14.216 No_date    4:34   40.43  n/a
 006:0098---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD             01:Add 2    377.76   14.216 No_date    4:34   40.43  n/a
                       + 07:INDPND    40.99    1.203 No_date    4:14   65.18  n/a
      [DT= 2.00]  SUM=  02:Add 3    418.75   15.402 No_date    4:34   42.85  n/a
 006:0099---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD             02:Add 3    418.75   15.402 No_date    4:34   42.85  n/a
                       + 08:TINST     13.81    2.076 No_date    3:32   58.21  n/a
      [DT= 2.00]  SUM=  03:Add 4    432.56   15.780 No_date    4:32   43.35  n/a
 006:0105---------------------------------------------------------------------------
      FINISH
-------------------------------------------------------------------------------
*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2007-06-19     at 10:37:19
===============================================================================
```

Project Name: Owen Sound Functional Servicing Report
Project No: MCG 10665
Location: Owen Sound, ON.
Date: 19-Dec-2006
Updated: 14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

Telfer Creek

Table 1: Unit Flow Rates for Return Period Events (Flow Rates at 20th Ave, North of Hwy 26)

Return Period Storm			2-year	5-year	10-year	25-year	50-year	100-year
Area	432.56	ha						
Modeled Flow		m^3/s	3.181	5.369	7.001	9.206	10.931	12.693
Unit Rate		$m^3/s/ha$	0.0074	0.0124	0.0162	0.0213	0.0253	0.0293

Notes: Volume Requirement is for approximation, actual volume should be based on measured imperivousness and model simulation based on proponents area X unit flow rate.
* - Volume Requirement does not include permanent pool storage or erosion control for 25mm An additional 5% greater volume may be require due to 24hr detention of the first 25mm of rain. Permanet Pool volumes should be determined based on Enhanced Level of Protection as per MOE 2003 SWM Manual Table 3.2.

Land Uses have been assumed as:

Land Use	Timp	Ximp
Residential	50%	30% - for Low density
Commerical	90%	90% - mostly impervious
Industrial	75%	75% - mostly impervious
Institutional	65%	40% - some impervious areas go to grass fields

Green Area includes natural escarpment, protected escarpment and hazard lands.

Green Area and Undeveloped have been combined for modelling purposes

Institutional Area is assumed to be currently fully developed, therefore no pond storage has been calculated

Project Name: Owen Sound Functional Servicing Report
Project No: MCG 10665
Location: Owen Sound, ON.
Date: 19-Dec-2006
Updated: 14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

Telfer Creek

Table 2: Allowable Release Rate for Each Land Use based on Pre-Development Unit Flow Rates

Land Use	Area (ha)	2-year m^3/s	5-year m^3/s	10-year m^3/s	25-year m^3/s	50-year m^3/s	100-year m^3/s
Residential	51.2	0.377	0.636	0.829	1.090	1.294	1.503
Comm.	17.4	0.128	0.216	0.281	0.370	0.439	0.510
Industrial	41.0	0.301	0.509	0.663	0.872	1.036	1.203
Institutional	13.8	0.102	0.171	0.224	0.294	0.349	0.405
Green Area	0.0	0.000	0.000	0.000	0.000	0.000	0.000
Undeveloped	309.2	2.274	3.837	5.004	6.580	7.813	9.072
Total	**432.6**	**3.181**	**5.369**	**7.001**	**9.206**	**10.931**	**12.693**

Notes: Volume Requirement is for approximation, actual volume should be based on measured imperivousness and model simulation based on proponents area X unit flow rate.
* - Volume Requirement does not include permanent pool storage or erosion control for 25mm An additional 5% greater volume may be require due to 24hr detention of the first 25mm of rain. Permanet Pool volumes should be determined based on Enhanced Level of Protection as per MOE 2003 SWM Manual Table 3.2.

Land Uses have been assumed as:

Land Use	Timp	Ximp
Residential	50%	30% - for Low density
Commerical	90%	90% - mostly impervious
Industrial	75%	75% - mostly impervious
Institutional	65%	40% - some impervious areas go to grass fields

Green Area includes natural escarpment, protected escarpment and hazard lands.

Green Area and Undeveloped have been combined for modelling purposes

Institutional Area is assumed to be currently fully developed, therefore no pond storage has been calculated

Project Name: Owen Sound Functional Servicing Report
Project No: MCG 10665
Location: Owen Sound, ON.
Date: 19-Dec-2006
Updated: 14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

Telfer Creek

Table 3: Required Storage Volumes for Each Land Use based on Pre-Development Unit Flow Rates

Land Use	Area (ha)	2-year m^3	5-year m^3	10-year m^3	25-year m^3	50-year m^3	100-year m^3
Residential	51.2	5640	7910	9455	11450	13000	14500
Comm.	17.4	4265	5475	6240	7200	7915	8615
Industrial	41.0	8445	10950	12560	14600	16100	17610
Institutional	13.8						
Green Area	0.0						
Undeveloped	309.2						
Total	**432.6**						

Notes: Volume Requirement is for approximation, actual volume should be based on measured imperivousness and model simulation based on proponents area X unit flow rate.
* - Volume Requirement does not include permanent pool storage or erosion control for 25mm An additional 5% greater volume may be require due to 24hr detention of the first 25mm of rain. Permanet Pool volumes should be determined based on Enhanced Level of Protection as per MOE 2003 SWM Manual Table 3.2.

Land Uses have been assumed as:

Land Use	Timp	Ximp
Residential	50%	30% - for Low density
Commerical	90%	90% - mostly impervious
Industrial	75%	75% - mostly impervious
Institutional	65%	40% - some impervious areas go to grass fields

Green Area includes natural escarpment, protected escarpment and hazard lands.

Green Area and Undeveloped have been combined for modelling purposes

Institutional Area is assumed to be currently fully developed, therefore no pond storage has been calculated

Project Name: Owen Sound Functional Servicing Report
Project No: MCG 10665
Location: Owen Sound, ON.
Date: 19-Dec-2006
Updated: 14-Oct-2007

BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com

Telfer Creek

Table 4: Required Unit Rate Storage Volumes for Each Land Use based on Storage Volume/Land Use Drainage Area*

Land Use	Area (ha)	2-year m^3/ha	5-year m^3/ha	10-year m^3/ha	25-year m^3/ha	50-year m^3/ha	100-year m^3/ha
Residential	51.2	110	154	185	224	254	283
Comm.	17.4	245	315	359	414	455	495
Industrial	41.0	206	267	306	356	393	430
Institutional	13.8						
Green Area	0.0						
Undeveloped	309.2						
Total	**432.6**						

Notes: Volume Requirement is for approximation, actual volume should be based on measured imperivousness and model simulation based on proponents area X unit flow rate.
* - Volume Requirement does not include permanent pool storage or erosion control for 25mm of rain. An additional 5% greater volume may be required due to 24hr detention of the first 25mm of rain. Permanet Pool volumes should be determined based on Enhanced Level of Protection as per MOE 2003 SWM Manual Table 3.2.

Land Uses have been assumed as:

Land Use	Timp	Ximp	
Residential	50%	30%	- for Low density
Commerical	90%	90%	- mostly impervious
Industrial	75%	75%	- mostly impervious
Institutional	65%	40%	- some impervious areas go to grass fields

Green Area includes natural escarpment, protected escarpment and hazard lands.

Green Area and Undeveloped have been combined for modelling purposes

Institutional Area is assumed to be currently fully developed, therefore no pond storage has been calculated