Appendix D

Stormwater Drainage and Management

Municipal Servicing Class Environmental Assessment Master Plan VAUGHAN METROPOLITAN CENTRE • CITY OF VAUGHAN NOV 2012
Appendix D1
Target Release Rates

Project #: 08104

Date: April 2012

Target Release Rates

Catchment ID	Area (ha)			Unit Flov	v (L/s/ha)				Та	rget Releas	e Rates (m ³	³ /s)	
Catchinent ID	Alea (lia)	2-year	5-year	10-year	25-year	50-year	100-year	2-year	5-year	10-year	25-year	50-year	100-year
NE Corner of Millway Avenue and Hwy 7	54.43	4.699	6.979	8.513	10.626	12.278	13.956	0.256	0.380	0.463	0.578	0.668	0.760
SE Corner of Jane Street and Hwy 7	31.88	5.107	7.580	9.231	11.530	13.334	15.163	0.163	0.242	0.294	0.368	0.425	0.483
SW Corner of Jane Street and Hwy 7	73.62	4.469	6.640	8.108	10.116	11.682	13.275	0.329	0.489	0.597	0.745	0.860	0.977
NW Corner of Millway Avenue and Hwy 7	46.38	4.821	7.159	8.728	10.897	12.594	14.317	0.224	0.332	0.405	0.505	0.584	0.664

Note:

Unit Flow Equation for Humber River Watershed

- Q_{2-year} = 7.745-0.762ln(A)

- Q_{5-year} = 11.468-1.123ln(A)

- Q_{10-year} = 13.877-1.342ln(A)

- Q_{25-year} = 17.381-1.690ln(A)

- Q_{50-year} = 20.164-1.973ln(A)

- Q_{100-year} = 22.973-2.256ln(A)

where Q = unit flow in L/s/ha; A = area in ha

*Note : The total area contributing to the pond in the NW corner of Millway Avenue and Hwy 7 is 46.38ha as per the Black Creek Optimization Study.

Municipal Servicing Class Environmental Assessment Master Plan
VAUGHAN METROPOLITAN CENTRE - CITY OF VAUGHAN
NOV 2012

Appendix D2

Target Release Rates for On-Site Controlled Areas

ON SITE CONTROLS













2 YR RELEASE RATE FROM SITES



100 YR RELEASE RATE FROM ON SITE CONTROLS



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R: MENTS: *************** * SIMULATION NUMBE *************** READ STORM total= 36.00 mm TIME hrs .25 .50 .75 1.00 1.25	Filenam Comment RAIN mm/hr 0 .72 1 .72 1 .72 1 .72	08104 \Desi s: 2yr/6 TIME hrs 2.00 2.25 2.50 2.75 3.00	ojects\2(1)	D08\ an Corpc D2 model TIME hrs 3.75 4.50 4.25 4.50	Prate Cen \STORM\6 RAIN mm/hr 5.04 2.88 1.44 1.	TIME hrs	RAIN mm/hr
R: MENTS: *************** * SIMULATION NUMBE *************** READ STORM total= 36.00 mm TIME hrs .25 .50 .75 1.00 1.25	Filenam Comment RAIN mm/hr 0	08104 \Desi s: 2yr/6 TIME hrs 2.00 2.25 2.50 2.75 3.00	ojects\2() - Vaughgn\SWM\V() hr RAIN mm/hr 12.24 12.24 33.12 33.12 9.36	D08\ an Corpc D2 model TIME hrs 3.75 4.25 4.50 4.75	Prate Cen \STORM\6 RAIN mm/hr 5.04 2.88 2.88 1.44 1.	TIME hrs 5.50 5.75 6.00 6.25	RAIN mm/hr
R: MENTS: ************** * SIMULATION NUMBE **************** READ STORM total= 36.00 mm TIME hrs .25 .50 .75 1.00 1.25	Filenam Comment RAIN mm/hr 0	08104 \Desi s: 2yr/6 TIME hrs 2.00 2.25 2.50 2.75 3.00	ojects\2() - Vaughgn\SWM\V() hr RAIN mm/hr 12.24 12.24 33.12 33.12 9.36	D08\ an Corpc D2 model TIME hrs 3.75 4.25 4.50 4.75	Prate Cen \STORM\6 RAIN mm/hr 5.04 2.88 2.88 1.44 1.	TIME hrs 5.50 5.75 6.00 6.25	RAIN mm/hr
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	:	IMPERVIOU	S PI	ERVIOUS (i))		
Surface Area Dep. Storage Average Slope Length Mannings n	(ha)=	27.76		6.94			
Dep. Storage	(mm) =	1.00		5.00			
Average Slope	(%)=	1.00		1.00			
Length	(m) =	481.00		40.00			
Mannings n	=	.013		.250			
NOTE: RAINF	ALL WAS T	RANSFORME	D TO	5.0 MIN. 5	TIME STE	P.	
				ED HYETOGRA			
				TIME			
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.083	.00	1.667	4.32	3.250	9.36	4.83	. /2
.167	.00	1 1 022	4.32	3.230 3.333 3.417 3.500 3.583 3.667 3.750	5.04	4.92	.72
.250	.00	1 1 017	12.24	1 3.41/	5.04	5.00	.72
.333 417	72	1 2 000	12.24	1 3 583	5 04 1	5.00	.72 .72 .72
500	72	2.083	12 24	1 3.667	5.04	5.25	.72
.583	.72	2.167	12.24	3.750	5.04	5.33	.72
.667	.72	2.250	12.24	3.833	2.88	5.42	.72
.750	.72	2.333	33.12	3.917	2.88	5.50	.72
.833	.72	2.417	33.12	4.000	2.88	5.58	.72
.917	.72	2.500	33.12	4.083	2.88	5.67	.72
1.000	.72	2.583	33.12	4.167	2.88	5.75	.72
1.083	.72	2.667	33.12	4.250	2.88	5.83	.72
1.16/	. /2	2.750	33.12	4.333	1.44	5.92	. /2
1.230	1 22	2.033	9.30	1 4.417	1.44	6.00	. / 2
1.333	4.32	1 3 000	9.36	1 4.500	1 44	6.00	72
1 500	4.32	1 3 083	9.36	1 4 667	1 44 1	6 25	72
1.583	4.32	3.167	9.36	3.750 3.833 3.917 4.000 4.083 4.167 4.250 4.333 4.417 4.500 4.583 4.667 4.750	1.44	0.20	• / -
Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr)=	33.12		13.05			
over	(min)	10.00		30.00			
Storage Coeff.	(min)=	10.20	(ii)	29.82 (ii))		
Jnit Hyd. Tpeak	(min)=	10.00		30.00			
лит нуа. реак	(cms)=	.11		.04	*TOT	7.T.C.*	
PEAK FLOW	(cms)=	2 44		13	101	ALS [*] 512 (iii	i)
TIME TO PEAK	(hrs)=	2.75		3.17	2.	.75	- /
RUNOFF VOLUME	(mm) =	35.00		11.57	30		
TOTAL RAINFALL	(mm) =	36.00		36.00	30 36	.00	
PEAK FLOW FIME TO PEAK RUNOFF VOLUME FOTAL RAINFALL RUNOFF COEFFICIE	NT =	.97		.32		.84	
(1)							
(i) CN PROCEDU							
CN* = 8 (ii) TIME STEP							
THAN THE S				v rānur			
(iii) PEAK FLOW				W IF ANY.			
TRUOTE (0045)							
ERVOIR (0045) 2> OUT= 1							
5.0 min	OTTENT A	OM CHO	DACE	I OTTERT OF	и сто	DACE	

AREA

(ha)

34.70

34.70

INFLOW : ID= 2 (0044)

OUTFLOW: ID= 1 (0045)

QPEAK

(cms)

2.51

1.04

TPEAK

(hrs)

2.75

3.17

R.V.

(mm)

30.31

30.31

	TIME SHIFT MAXIMUM S	OF PEAK FLO	N [Qout/Qin] (%) = W (min) = D (ha.m.) =	25.00 .4782
CALIB	 		18 00 Dir. Conn.(%	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	IMPERVIOUS 8.94 1.00 1.00 273.00 .013	PERVIOUS (i) 2.24 5.00 1.00 40.00 .250	
Max.Eff.Inten.	.(mm/hr)=	33.12		*TOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALI RUNOFF COEFFIC	(cms) = (hrs) = (mm) = L (mm) = CIENT =	.81 2.75 35.00 36.00 .97	.05 3.08 11.57 36.00	.841 (iii) 2.75 30.31 36.00 .84
		OULD BE SMALL	ER OR EQUAL	
THAN THE (iii) PEAK FLO RESERVOIR (0047) THAN THE (iii) PEAK FLO THAN THE	E STORAGE C DW DOES NOT 	COEFFICIENT.	EFLOW IF ANY.	STORAGE (ha.m.)
THAN THE (iii) PEAK FLO RESERVOIR (0047) IN= 2> OUT= 1 DT= 5.0 min INFLOW : ID= 2	E STORAGE COW DOES NOT	COEFFICIENT. CINCLUDE BAS: CIN	_	R.V. (mm) 30.31
THAN THI (iii) PEAK FLO RESERVOIR (0047) IN= 2> OUT= 1 DT= 5.0 min	E STORAGE COW DOES NOT COM DO	COEFFICIENT. CINCLUDE BAS: CIOW STORA: (Na) (ha.m) (ha) 11.18 11.18 COF PEAK FLO	GE OUTFLOW .) (cms) 000 .8410	R.V. (mm) 30.31 30.30 41.40 15.00
THAN THE (iii) PEAK FLC RESERVOIR (0047) IN= 2> OUT= 1 OT= 5.0 min INFLOW: ID= 1 OUTFLOW: ID= 1	E STORAGE COW DOES NOT	COEFFICIENT. CINCLUDE BAS: CIOW STORA (Na) (Na.m) (Na.m) (Na.m) (Na) (Na) (Na) (Na) (Na) (Na) (Na) (Na	GE OUTFLOW .) (cms) 00 .8410 QPEAK TPEAK (cms) (hrs) .84 2.75 .35 3.00 N [Qout/Qin](%)= W (min)= D (ha.m.)=	R.V. (mm) 30.31 30.30 41.40 15.00 .1531
THAN THE (iii) PEAK FLO RESERVOIR (0047) IN= 2> OUT= 1 TT= 5.0 min INFLOW: ID= 1 OUTFLOW: ID= 1	E STORAGE COW DOES NOT COM DO	FLOW STORA S) (ha.m. (ha) 11.18 11.18 W REDUCTION TOF PEAK FLOM STORAGE USE: (ha) = 10. Imp(%) = 80.	GE OUTFLOW .) (cms) 00 .8410 QPEAK TPEAK (cms) (hrs) .84 2.75 .35 3.00 N [Qout/Qin] (%)= W (min)= D (ha.m.)=	R.V. (mm) 30.31 30.30 41.40 15.00 .1531

over	(min)	5.00		30.00			
Storage Coeff.	(min) =	7.19	(ii)	26.81	(ii)		
Unit Hyd. Tpeak	(min) =	5.00		30.00			
Unit Hyd. peak	(cms) =	.17		.04			
						TOTALS	
PEAK FLOW	(cms) =	.79		.04		.813	(iii)
TIME TO PEAK	(hrs) =	2.75		3.08		2.75	
RUNOFF VOLUME	(mm) =	35.00		11.57		30.31	
TOTAL RAINFALL	(mm) =	36.00		36.00		36.00	
RUNOFF COEFFICIE	INT =	.97		.32		.84	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
- $CN^* = 83.0$ Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0049)	I				
IN= 2> OUT= 1	1				
DT= 5.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE	
	- (cms)	(ha.m.)	(cms)	(ha.m.)	
	.0000	.0000	.8130	.3571	
	ARE	A QPEAK	TPEAK	R.V.	
	(ha	(cms)	(hrs)	(mm)	
INFLOW : ID= 2	(0048) 10.8	.81	2.75	30.31	
OUTFLOW: ID= 1	(0049) 10.8	.34	3.00	30.30	
	PEAK FLOW RE	DUCTION [Qout.	/Oinl(%)= 4	11.42	
	TIME SHIFT OF PE		(min) = 1		

MAXIMUM STORAGE USED (ha.m.) = .1479

CALIB							
STANDHYD (0050)	Area	(ha) =	2.86				
ID= 1 DT= 5.0 min	Total	Imp(%)=	80.00	Dir.	Conn.(%)=	80.00)
		IMPERVIO					
Surface Area		2.29					
Dep. Storage							
Average Slope	(%)=	1.00		1.00			
Length	(m) =	138.10		40.00			
Mannings n	=	.013		.250			
Max.Eff.Inten.(mm/hr)=	33.12		13.05			
over	(min)	5.00		25.00			
Storage Coeff.	(min) =	4.82	(ii)	24.44	(ii)		
Unit Hyd. Tpeak	(min) =	5.00		25.00			
Unit Hyd. peak	(cms) =	.22		.05			
					**	OTALS*	k
PEAK FLOW	(cms) =	.21		.01		.219	(iii)
TIME TO PEAK	(hrs) =	2.75		3.00		2.75	
RUNOFF VOLUME	(mm) =	35.00		11.57		30.31	
TOTAL RAINFALL	(mm) =	36.00		36.00		36.00	
RUNOFF COEFFICI				.32		.84	

**** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
- $CN^* = 83.0$ Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0051) IN= 2> OUT= 1 DT= 5.0 min	OUTFL (cms					
INFLOW: ID= 2	2 (0050) L (0051)	AREA (ha) 2.86 2.86	QPEAK (cms) .22 .09	TPEAK (hrs) 2.75 2.92	R.V. (mm) 30.31 30.27	
	PEAK FLOW TIME SHIFT MAXIMUM ST					
STANDHYD (0052) ID= 1 DT= 5.0 min	 Area Total I	(ha)= 16	5.19).00 Dir	. Conn.(%	s) = 80.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	IMPERVIOUS 12.95 1.00 1.00 328.50 .013	3. 5. 1. 40.	24 00 00 00 00		
Max.Eff.Inten ove Storage Coeff Unit Hyd. Tpea Unit Hyd. peal	(mm/hr) = er (min) (min) = ek (min) = ek (min) = ek (cms) =	33.12 10.00 8.11 10.00 .13	13. 30. (ii) 27. 30.	05 00 73 (ii) 00	*TOTALS*	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALI RUNOFF COEFFI	(cms) = (hrs) = (mm) = (mm) = CIENT =	1.16 2.75 35.00 36.00 .97	3. 11. 36.	.06 .08 .57 .00	1.201 (iii) 2.75 30.31 36.00 .84	
(ii) TIME ST	83.0 Ia EP (DT) SHOU E STORAGE CO	= Dep. St LD BE SMAI EFFICIENT.	orage (<i>F</i> LER OR EÇ	Above) QUAL		
RESERVOIR (0053) IN= 2> OUT= 1 DT= 5.0 min	i	OW STOR	**************************************	OUTFLOW (cms)	STORAGE (ha.m.) .5367	
INFLOW: ID= 2	2 (0052) L (0053)	AREA (ha) 16.19 16.19	QPEAK (cms) 1.20 .50	TPEAK (hrs) 2.75 3.08	R.V. (mm) 30.31 30.31	
	PEAK FLOW TIME SHIFT MAXIMUM ST					

CALIB	
IMPERVIOUS PERVIOUS (i) Surface Area (ha) = 7.05 1.76 Dep. Storage (mm) = 1.00 5.00 Average Slope (%) = 1.00 1.00 Length (m) = 242.30 40.00 Mannings n = .013 .250	
Max.Eff.Inten.(mm/hr)= 33.12 13.05 over (min) 5.00 30.00 Storage Coeff. (min)= 6.76 (ii) 26.38 (ii) Unit Hyd. Tpeak (min)= 5.00 30.00 Unit Hyd. peak (cms)= .18 .04	
PEAK FLOW (cms) = .64 .04 .665 (iii) TIME TO PEAK (hrs) = 2.75 3.08 2.75 RUNOFF VOLUME (mm) = 35.00 11.57 30.31 TOTAL RAINFALL (mm) = 36.00 36.00 36.00 RUNOFF COEFFICIENT = .97 .32 .84	
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. RESERVOIR (0055)	
IN= 2> OUT= 1 OUTFLOW STORAGE OUTFLOW STO	
AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0054) 8.81 .66 2.75 30.31 OUTFLOW: ID= 1 (0055) 8.81 .28 3.00 30.30	
PEAK FLOW REDUCTION [Qout/Qin](%) = 41.47 TIME SHIFT OF PEAK FLOW (min) = 15.00 MAXIMUM STORAGE USED (ha.m.) = .1209	

READ STORM Filename: G:\Projects\2008\	
TIME RAIN TIME R	IN hr 61 61

1.00 1.61 | 2.75 73.88 | 4.50 3.21 | 6.25

```
1.25 1.61 | 3.00 20.88 | 4.75 3.21 |
                      9.64 | 3.25 20.88 | 5.00
               1.75 9.64 | 3.50 11.24 | 5.25 1.61 |
| STANDHYD (0044) | Area (ha) = 34.70
|ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 80.00
                           IMPERVIOUS
                                        PERVIOUS (i)
                    (ha) =
                              27.76
                                          6.94
    Surface Area
     Dep. Storage
                    (mm) =
                              1.00
                                          5.00
    Average Slope
                    (%)=
                              1.00
                                          1.00
                     (m) =
                             481.00
                                         40.00
    Length
    Mannings n
                              .013
        NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                            ---- TRANSFORMED HYETOGRAPH ----
               TIME RAIN | TIME RAIN | TIME RAIN | TIME
                hrs mm/hr | hrs mm/hr | hrs
                                                  mm/hr | hrs
               .083
                      .00 | 1.667
                                    9.64 | 3.250
                                                  20.88 | 4.83
                       .00 | 1.750
                                     9.64 | 3.333
                                                   11.24 | 4.92
               .250
                       .00 | 1.833
                                    27.30 | 3.417
                                                  11.24 | 5.00
                                                                  1.61
                                                  11.24 | 5.08
               .333
                      1.61 | 1.917
                                    27.30 | 3.500
               .417
                      1.61 | 2.000
                                    27.30 | 3.583
                                                   11.24 |
                                                          5.17
               .500
                      1.61 | 2.083
                                    27.30 | 3.667
                                                  11.24 | 5.25
               .583
                      1.61 | 2.167
                                    27.30 | 3.750
                                                  11.24 | 5.33
               .667
                      1.61 | 2.250
                                    27.30 | 3.833
                                                   6.42 | 5.42
               .750
                      1.61 | 2.333
                                    73.88 | 3.917
                                                   6.42 | 5.50
                                                                  1.61
               .833
                      1.61 | 2.417
                                    73.88 | 4.000
                                                   6.42 | 5.58
                                                                  1.61
               .917
                      1.61 | 2.500
                                    73.88 | 4.083
                                                   6.42 |
               1.000
                      1.61 | 2.583
                                    73.88 | 4.167
                                                   6.42 | 5.75
               1.083
                      1.61 | 2.667
                                    73.88 | 4.250
                                                   6.42 | 5.83
                                                                 1.61
                                                   3.21 | 5.92
               1.167
                      1.61 | 2.750
                                    73.88 | 4.333
               1.250
                      1.61 | 2.833
                                    20.88 | 4.417
                                                   3.21 | 6.00
              1.333
                      9.64 | 2.917
                                    20.88 | 4.500
                                                   3.21 | 6.08
                                                                 1.61
                      9.64 | 3.000
                                    20.88 | 4.583
                                                   3.21 | 6.17
                                                   3.21 | 6.25
               1.500 9.64 | 3.083 20.88 | 4.667
                                                                 1.61
               1.583 9.64 | 3.167 20.88 | 4.750
                                                   3.21 |
                              73.88
                                          51.42
    Max.Eff.Inten.(mm/hr)=
                              5.00
                                         20.00
               over (min)
                              7.40 (ii) 18.74 (ii)
     Storage Coeff. (min) =
                            5.00
     Unit Hyd. Tpeak (min) =
                                         20.00
    Unit Hyd. peak (cms)=
                                                      *TOTALS*
     PEAK FLOW
                   (cms) =
                            5.63
                                                      6.242 (iii)
                            2.75
                                         2.92
     TIME TO PEAK
                  (hrs) =
                                                       2.75
     RUNOFF VOLUME
                   (mm) =
                              79.31
                                        44.54
                                                       72.36
     TOTAL RAINFALL (mm) =
                              80.31
                                                       80.31
    RUNOFF COEFFICIENT =
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN^* = 83.0 Ia = Dep. Storage (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| RESERVOIR (0045) |
| IN= 2---> OUT= 1 |
```

DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms) 2.5120	STORAGE (ha.m.) 1.1572	
INFLOW : ID= 2	A (2 (0044) 34 (0045) 34				
	PEAK FLOW TIME SHIFT OF MAXIMUM STORA	REDUCTION [PEAK FLOW GE USED	Qout/Qin](%)= (min)=	= 40.21 = 20.00	
CALIB STANDHYD (0046) D= 1 DT= 5.0 min	 Area (h Total Imp(a) = 11.18 %) = 80.00	Dir. Conn.	(%)= 80.00	
		ERVIOUS	PERVIOUS (i)		
Surface Area	(ha)=	8.94	2.24		
Dep. Storage	(mm) = (%) =	1.00	1 00		
Length	(m) = 2	73.00	40.00		
Mannings n	IMP (ha) = (mm) = (%) = (m) = 2	.013	.250		
May Eff Inton	. (mm/hr) = er (min) . (min) = ak (min) = c (cms) =	72 00	E1 42		
Max.EII.IIICEII	· (mm/nr)- er (min)	5.00	20.00		
Storage Coeff	(min) =	5.27 (ii)	16.61 (ii)		
Unit Hyd. Tpea	ak (min)=	5.00	20.00		
Unit Hyd. peal	c (cms)=	.21	.06	*TOTALS*	
				2.038 (iii) 2.75	
TIME TO PEAK	(hrs)=	2.75	2.92	2.75	
RUNOFF VOLUME	(mm) =	79.31	44.54	72.36	
TOTAL RAINFALI	(cms) = (hrs) = (mm) = L (mm) = CIENT =	80.31	80.31	80.31 .90	
KUNOFF COEFFIC	JIENI -	. 99	.55	. 90	
(i) CN PROCE	EDURE SELECTED	FOR PERVIOU	IS LOSSES:		
CN* =	83.0 Ia =	Dep. Storag	re (Above)		
	EP (DT) SHOULD		OR EQUAL		
	E STORAGE COEFF OW DOES NOT INC		OW IF ANY		
(111) 11111 111	J. 2020 HOT 1HO				
RESERVOIR (0047)					
IN= 2> OUT= 1 OT= 5.0 min	OUTFIOW	STORAGE	OUTFIOW	STORAGE	
	(cms)	(ha.m.)	(cms)	(ha.m.)	
IN= 2> OUT= 1 DT= 5.0 min	.0000	.0000	.8410	.3698	
	(ha) (cm	CAK TPEAK (hrs) 04 2.75	(111111)	
INFLOW : ID= 2					
OUTFLOW: ID= 1	1 (0047) 11	.18 .	84 3.00	72.35	
	PEAK FLOW	REDUCTION [Qout/Qin](%)=	= 41.20	
	TIME SHIFT OF	PEAK FLOW	(min)=	= 15.00	
	MAXIMUM STORA	GE USED	(ha.m.)=	3698	
CALIB STANDHYD (0048)	1 7 2	-1- 10 00			
STANDHYD (0048) D= 1 DT= 5.0 min	Area (h	a)= 10.80 %)= 80 00	Dir Conn	(%)= 80 00	
. 1 21 3.0 11111	, rocar imp(0, 00.00	DII. COIII.	(0, 00.00	

Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	IMPERVIOU 8.64 1.00 1.00 268.30 .013		2.16 5.00 1.00 40.00 .250			
Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr) = (min) (min) = (min) = (cms) =	73.88 5.00 5.21 5.00 .21	(ii)	51.42 20.00 16.55 20.00	(ii)	*TOTALS*	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	(cms) = (hrs) = (mm) =	1.77 2.75 79.31 80.31 .99		.22 2.92 44.54 80.31 .55		1.970 (iii) 2.75 72.36 80.31	
(i) CN PROCEDU CN* = 8 (ii) TIME STEP THAN THE S (iii) PEAK FLOW	3.0 I (DT) SHO TORAGE O	Ta = Dep. S DULD BE SMA COEFFICIENT F INCLUDE B	torac LLER ASEFI	ge (Abov OR EQUAL LOW IF AN	e) Y.		
RESERVOIR (0049) IN= 2> OUT= 1 DT= 5.0 min							
INFLOW : ID= 2 (OUTFLOW: ID= 1 (0048) 0049)	AREA (ha) 10.80 10.80	QPI (cr	EAK T ns) (.97	PEAK hrs) 2.75 3.00	R.V. (mm) 72.36 72.35	
PE TI M#	AK FLO ME SHIFT XIMUM S	DW REDUCT F OF PEAK F STORAGE U	ION LOW SED	[Qout/Qin ((ha](%)= min)= .m.)=	41.23 15.00 .3571	
CALIB	Area Total	(ha) = Imp(%) = 8	2.86	Dir. C	onn.(%)= 80.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	IMPERVIOU 2.29 1.00 1.00 138.10	IS	PERVIOUS .57 5.00 1.00 40.00 .250	(i)		
Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr) = (min) (min) = (min) = (cms) =	73.88 5.00 3.50 5.00	(ii)	51.42 15.00 14.84 15.00	(ii)	*TOTALS*	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL	(cms) = (hrs) = (mm) = (mm) =	.47 2.75 79.31 80.31		.06 2.83 44.54 80.31		.530 (iii) 2.75 72.35 80.31	

### WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:					
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:	RUNOFF COEFFIC	EENT =	.99	.55	.90
CN = 83.0	**** WARNING: STOR	AGE COEFF. IS S	MALLER THAN	N TIME STEP!	
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. RESERVOIR (0051) IN=2> OUT=1 DT=5.0 min	(i) CN PROCEI	DURE SELECTED E	OR PERVIOUS	S LOSSES:	
THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. RESERVOIR (0051) IN=2> OUT= 1 DT= 5.0 min	CN* =	83.0 Ia = I	ep. Storage	e (Above)	
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. RESERVOIR (0051) IN=2> OUT=1 DT= 5.0 min				OR EQUAL	
RESERVOIR (0051) N= 2> OUT= 1 DT= 5.0 min				OW IF ANY.	
RESERVOIR (0051) N= 2> OUT= 1 DT= 5.0 min					
IN= 2> OUT= 1 DT= 5.0 min					
DT= 5.0 min		ı			
AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) (hrs) (mm) (ms) (Decomposed of the color	DT= 5.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE
AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) (hrs) (mm) (ms) (Decomposed of the color		- (cms)	(ha.m.)	(cms)	(ha.m.)
PEAK FLOW REDUCTION [Qout/Qin](%) = 41.27 TIME SHIFT OF PEAK FLOW (min) = 10.00 MAXIMUM STORAGE USED (ha.m.) = .0960					
PEAK FLOW REDUCTION [Qout/Qin](%) = 41.27 TIME SHIFT OF PEAK FLOW (min) = 10.00 MAXIMUM STORAGE USED (ha.m.) = .0960		AF	REA QPEA	AK TPEAK	R.V.
PEAK FLOW REDUCTION [Qout/Qin](%) = 41.27 TIME SHIFT OF PEAK FLOW (min) = 10.00 MAXIMUM STORAGE USED (ha.m.) = .0960	INFLOW : ID= 2	(0050) 2.	.86 .5	53 2.75	72.35
PEAK FLOW REDUCTION [Qout/Qin](%) = 41.27 TIME SHIFT OF PEAK FLOW (min) = 10.00 MAXIMUM STORAGE USED (ha.m.) = .0960	OUTFLOW: ID= 1	(0051) 2.	86 .2	22 2.92	72.32
TIME SHIFT OF PEAK FLOW (min) = 10.00 (ha.m.) = .0960					
CALIB	5	TIME SHIFT OF E	PEAK FLOW	(min) =	10.00
CALIB	1	MAXIMUM STORAG	GE USED	(ha.m.)=	.0960
STANDHYD (0052) Area (ha) = 16.19 ID= 1 DT= 5.0 min Total Imp(%) = 80.00 Dir. Conn.(%) = 80.00					
STANDHYD (0052) Area (ha) = 16.19 ID= 1 DT= 5.0 min Total Imp(%) = 80.00 Dir. Conn.(%) = 80.00	CALIB	- 			
IMPERVIOUS PERVIOUS (i)	STANDHYD (0052)	Area (ha	a) = 16.19		
Max.Eff.Inten.(mm/hr) = 73.88 51.42		_			5) = 80.00
Max.Eff.Inten.(mm/hr) = 73.88 51.42		IMPE	ERVIOUS I	PERVIOUS (i)	
Max.Eff.Inten.(mm/hr) = 73.88 51.42	Surface Area	(ha) = 1	.2.95	3.24	
Max.Eff.Inten.(mm/hr) = 73.88 51.42	Average Slope	(%) =	1.00	1.00	
Max.Eff.Inten.(mm/hr) = 73.88 51.42	Length	(m) = 32	28.50	40.00	
PEAK FLOW (cms) = 2.65 .33 2.942 (iii) TIME TO PEAK (hrs) = 2.75 2.92 2.75 RUNOFF VOLUME (mm) = 79.31 44.54 72.36 TOTAL RAINFALL (mm) = 80.31 80.31 80.31 RUNOFF COEFFICIENT = .99 .55 .90 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.	Mannings n	=	.013	.250	
PEAK FLOW (cms) = 2.65 .33 2.942 (iii) TIME TO PEAK (hrs) = 2.75 2.92 2.75 RUNOFF VOLUME (mm) = 79.31 44.54 72.36 TOTAL RAINFALL (mm) = 80.31 80.31 80.31 RUNOFF COEFFICIENT = .99 .55 .90 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.	Max.Eff.Inten.	(mm/hr) = 7	73.88	51.42	
PEAK FLOW (cms) = 2.65 .33 2.942 (iii) TIME TO PEAK (hrs) = 2.75 2.92 2.75 RUNOFF VOLUME (mm) = 79.31 44.54 72.36 TOTAL RAINFALL (mm) = 80.31 80.31 80.31 RUNOFF COEFFICIENT = .99 .55 .90 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.	over Storage Coeff.	(min) =	5.00 5.89 (ii)	20.00 17.22 (ii)	
PEAK FLOW (cms) = 2.65 .33 2.942 (iii) TIME TO PEAK (hrs) = 2.75 2.92 2.75 RUNOFF VOLUME (mm) = 79.31 44.54 72.36 TOTAL RAINFALL (mm) = 80.31 80.31 80.31 RUNOFF COEFFICIENT = .99 .55 .90 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.	Unit Hyd. Tpeal	c (min) =	5.00	20.00	
PEAK FLOW (cms) = 2.65 .33 2.942 (iii) TIME TO PEAK (hrs) = 2.75 2.92 2.75 RUNOFF VOLUME (mm) = 79.31 44.54 72.36 TOTAL RAINFALL (mm) = 80.31 80.31 80.31 RUNOFF COEFFICIENT = .99 .55 .90 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CM* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.	Unit Hyd. peak	(cms) =	.19	.06	*TOTAT.9*
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CM* = 83.0	PEAK FLOW	(cms) =	2.65	.33	2.942 (iii)
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CM* = 83.0	TIME TO PEAK	(hrs)=	2.75	2.92	2.75
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CM* = 83.0	TOTAL RAINFALL	(mm) = 8	79.31 80.31	80.31	80.31
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CM* = 83.0	RUNOFF COEFFIC	ENT =	.99	.55	.90
CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. RESERVOIR (0053) IN= 2> OUT= 1					
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.					
THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.					
RESERVOIR (0053) IN= 2> OUT= 1	THAN THE	STORAGE COEFFI	CIENT.		
RESERVOIR (0053) IN= 2> OUT= 1	(iii) PEAK FLOW	N DOES NOT INCI	UDE BASEFLO	OW IF ANY.	
RESERVOIR (0053) IN= 2> OUT= 1					
IN= 2> OUT= 1		- I			
DT= 5.0 min	IN= 2> OUT= 1				
.0000 .0000 1.2010 .5367		OUTFLOW	STORAGE	OUTFLOW	STORAGE
		.0000	.0000	1.2010	.5367

INFLOW : ID= 2 OUTFLOW: ID= 1	(0052) (0053)	AREA QF (ha) (c 16.19 2 16.19 1	PEAK TPEAK (hrs) (hrs) 2.94 2.75 3.00	R.V. (mm) 72.36 72.35	
T M	IME SHIFT (AXIMUM STO	OF PEAK FLOW DRAGE USED		= 15.00 = .5369	
CALIB	Area	(ha)= 8.81		(%) = 80.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = =	7.05 1.00 1.00 242.30	PERVIOUS (i) 1.76 5.00 1.00 40.00 .250		
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(,		• • •	*TOTALS*	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =	1.44 2.75 79.31 80.31 .99	.18 2.92 44.54 80.31 .55	1.609 (iii) 2.75 72.36 80.31	
(ii) TIME STEP	URE SELECTE 83.0 Ia (DT) SHOUI STORAGE COE DOES NOT I	ED FOR PERVIO = Dep. Stora D BE SMALLER EFFICIENT.	OUS LOSSES: ge (Above) OR EQUAL CLOW IF ANY.		
RESERVOIR (0055) IN= 2> OUT= 1 DT= 5.0 min		OW STORAGE (ha.m.)	C OUTFLOW (cms) .6650	STORAGE (ha.m.) .2915	
INFLOW: ID= 2 OUTFLOW: ID= 1					
T	IME SHIFT (AXIMUM STO	OF PEAK FLOW DRAGE USED	[Qout/Qin] (%) = (min) = (ha.m.) =	= 15.00 = .2915	
FINISH					

Municipal Servicing Class Environmental Assessment Master Plan
VAUGHAN METROPOLITAN CENTRE - CITY OF VAUGHAN
NOV 2012

Appendix D3

VO2 Calibration and Parameter Adjustment

SUMMARY OF VO2 MODEL AND SWM POND 18.0 DEVELOPMENT

April, 2012 TMIG File 08104

AECOM SWMHYMO MODEL CONNECTIVITY

Using the SWMHYMO 'Existing Conditions Model', prepared by Aecom, January 2008, the connectivity of the model was followed from START to FINISH at NODE 47.20.

The outlet of Pond 18.0, at Regional Rd. 7 is Node 46.30.

No problems were found. All ID numbers were accounted for, with no IDs overwritten.

CALIBRATION OF VO2 MODEL TO PREVIOUS SWMHYMO MODEL

To calibrate the VO2 model to the SWMHYMO model, the watershed was considered as two catchments. The area upstream of Jane Street (576.91 ha) was represented by the SWMHYMO hydrograph at Jane Street.

The remaining 190 ha, from Jane Street to Regional Road 7, was modelled as one catchment. The area of Pond 18.0 was assumed to be included in the 190 ha.

Parameters were adjusted to provide the best match of SWMHYMO and VO2 peak discharge and runoff volume for the 190 ha at Pond 18.0.

The following table summarizes the parameter changes.

Parameter	SWMHYMO VO2	
	Value	Value
AREA	190	190
XIMP	0.90	0.79
TIMP	0.91	0.83
CN	76	76
IA	4.7	4.7
SLPP	2.0	0.4
LGP	40	200
DPSI	0.5	0.5
SLPI	1.0	0.3
LGI	1125.5 *	1800
MNI	0.013	0.016

^{*} LGI based on A=1.5L

Peak flow and runoff volumes from SWMHYMO and the calibrated VO2 models, for the existing (Dec, 2011) development of the 190 ha, are summarized below.

	SWMHYMO	VO2	SWMHYMO	VO2
Ret. Per.	Qp	Qp	R.V.	R.V.
6 hour				
2yr	8.25	8.31	30.50	30.29
5yr	11.60	11.65	41.57	41.11
10yr	13.94	13.97	49.01	48.44
25yr	17.06	16.98	58.43	57.75
50yr	19.34	19.23	65.50	64.77
100yr	21.61	22.01	72.50	71.74

The VMC lands to the west and east of Pond 18.0 were then separated from the 190 ha to be calibrated and modelled individually. The hydrograph from west of Jane Street was added to the model, to compare the total flow and runoff volume to Pond 18.0.

The calibration results, to Pond 18.0, are summarized below.

	SWMHYMO	VO2	SWMHYMO	VO2
Ret. Per.	Qp	Qp	R.V.	R.V.
6 hour				
2yr	15.03	15.07	27.92	27.41
5yr	21.49	21.77	38.56	37.91
10yr	25.94	26.27	45.81	45.07
25yr	31.81	32.18	55.03	54.26
50yr	36.29	36.39	62.01	62.22
100yr	40.81	41.94	68.95	68.15
			_	
100 Year Pond Outflow	19.06	23.00	68.95	68.14



DATE: JULY 27, 2012 PROJECT NO: 08104

TO: FILE

FROM:

SUBJECT: SUMMARY OF VO2 MODEL AND SWM POND 18.0 DEVELOPMENT

INTRODUCTION

The purpose of this memo is to summarize the findings of TMIG's analysis for the existing SWM Pond 18.0. SWM Pond 18.0 is an online pond and a total drainage area of 767ha is routed through this pond. As per previous reports, the pond is designed as a dry pond providing attenuation of all storms including the Regional Storm event.

Flooding problems are encountered around Jane Street and Hwy 7 Area and downstream Pond 18.0, therefore the necessity to retrofit the pond is considered.

The documents / information used during this exercise are:

- "Black Creek Optimization Study" (includes SWMHYMO modeling for Black Creek) completed by AECOM, May 2011;
- Existing topographic information of the site available to date;
- "Hydrological Analysis of Black Creek Watershed" Report by Ander Engineering and Associates Limited dated January 1986.

METHODOLOGY

The main steps followed during our analysis are as follow:

- Analyze the AECOM SWMHYMO modeling, assumptions made and connectivity;
- Create and Calibrate an existing VO2 model based on the previous SWMMHYMO Model:
- Conceptually design the proposed retrofitted pond 18.0:
- Create VO2 modeling for the proposed conditions, to account for the future redevelopment of VMC lands. This model includes two scenarios:
 - 1. Proposed conditions with proposed VMC lands without an impervious reduction.
 - 2. Proposed conditions with proposed VMC lands with an impervious reduction. Impervious reduction is justified by applying a 15mm reduction from the overall rainfall on designated areas (residential lots, commercial and mixed use).

AECOM SWMHYMO MODEL CONNECTIVITY

Using the SWMHYMO 'Existing Conditions Model', prepared by Aecom, January 2008, the connectivity of the model was followed from START to FINISH at NODE 47.20.

The outlet of Pond 18.0, at Regional Rd. 7 is Node 46.30.

No problems were found. All ID numbers were accounted for, with no IDs overwritten.

The Existing Conditions Release Rates from SMW Pond 18.0, based on AECOM model are summarized as follows:

Event	6 hr AES	12 hr AES
	Release Rate (m3/s)	Release Rate (m3/s)
2 yr	3.526	3.775
5 yr	5.810	6.823
10 yr	8.616	9.185
25 yr	12.675	12.589
50 yr	15.796	15.202
100 yr	19.055	18.016

CALIBRATION OF VO2 MODEL TO PREVIOUS SWMMHYMO MODEL

To calibrate the VO2 model to the SWMMHYMO model, the watershed was considered as two catchments. The area upstream of Jane Street (576.91 ha) was represented by the SWMMHYMO hydrograph at Jane Street.

The remaining 190 ha, from Jane Street to Regional Road 7, was modelled as one catchment. The area of Pond 18.0 was assumed to be included in the 190 ha.

Parameters were adjusted to provide the best match of SWMMHYMO and VO2 peak discharge and runoff volume for the 190 ha at Pond 18.0.

The following table summarizes the parameter changes.

Parameter	SWMMHYMO Value	VO2 Value
AREA	190	190
XIMP	0.90	0.79
TIMP	0.91	0.83
CN	76	76
IA	4.7	4.7
SLPP	2.0	0.4
LGP	40	200
DPSI	0.5	0.5
SLPI	1.0	0.3
LGI	1125.5 *	1800
MNI	0.013	0.016

^{*} LGI based on A=1.5L

Peak flow and runoff volumes from SWMMHYMO and the calibrated VO2 models, for the existing (Dec, 2011) development of the 190 ha, are summarized below.

Retention Period	SWMMHYMO	VO2	SWMMHYMO	VO2
6 Hour	Qp	Qp	R.V.	R.V.
2yr	8.25	8.31	30.50	30.29
5yr	11.60	11.65	41.57	41.11
10yr	13.94	13.97	49.01	48.44
25yr	17.06	16.98	58.43	57.75
50yr	19.34	19.23	65.50	64.77
100yr	21.61	22.01	72.50	71.74

The VMC lands to the west and east of Pond 18.0 were then separated from the 190 ha to be calibrated and modelled individually. The hydrograph from west of Jane Street was added to the model, to compare the total flow and runoff volume to Pond 18.0.

The calibration results, to Pond 18.0, are summarized below, (inflow/runoff before pond reservoir routine).

Retention Period	SWMMHYMO	VO2	SWMMHYMO	VO2
6 Hour	Qp	Qp	R.V.	R.V.
2yr	15.03	15.07	27.92	27.41
5yr	21.49	21.77	38.56	37.91
10yr	25.94	26.27	45.81	45.07
25yr	31.81	32.18	55.03	54.26
50yr	36.29	36.39	62.01	62.22
100yr	40.81	41.94	68.95	68.15
100 Year Pond Outflow	19.06	23.00	68.95	68.14

POND 18.0 SCENARIOS

The existing Pond 18.0 was designed and constructed before TRCA unit flow rates were developed. As a result, outflow from the pond far exceeds the TRCA target discharge rates for the total contributing area of 767 ha.

Utilizing the Unit Flow Target Release Rates as per Humber River Subwatershed Study the following would have been the Target Release Rates required for SWM pond 18.0

RETURN PERIOD	TARGET RELEASE RATE
(Years)	(m³/s)
2	2.059
5	3.075
10	3.808
25	4.722
50	5.415
100	6.128

We acknowledge the fact that utilizing the same pond block as per existing conditions, retrofitting the swm pond block for sure will improve the provided volumes, hence the discharge release rates from the pond, however reaching the above targets would require a much larger pond block. The following details the options analyzed.

After VO2 modeling was calibrated, as explained in the above paragraph, and VMC drainage areas incorporated in the model, the following scenarios were generated:

Scenario 1: Utilizing existing rating curve for pond 18.0,

Scenario 2: Utilizing Proposed Rating Curve for pond 18.0, and drainage areas for VMC sites use the initial imperviousness (with no reduction due to 15.0mm rainfall retention)

Sceanrio3: Proposed Rating Curve for pond 18.0, and the designated drainage areas for VMC sites use the reduced imperviousness due to 15.0mm rainfall retention.

The following Tables summarize the findings:

RETURN PERIOD			PEAI	AK FLOW WITH PROPOSED VMC DEVELOPMENT				
Years	TARGET DISCHARGE		EXISTING POND	PROPOSED POND	PROPOSED POND W %IMP REDUCTION	APPROXIMATE VOLUME REQUIRED FOR TARGET FLOW		
	Unit Q	Release Q						
	L/s/ha	m³/s	m³/s	m³/s	m³/s	ha*m		
						**		
2	2.683	2.059	3.625	3.301	3.212	12.00		
5	4.008	3.075	7.078	4.713	4.239	15.82		
10	4.962	3.808	10.274	7.436	5.667	18.40		
25	6.155	4.722	14.911	11.735	10.716	21.85		
50	7.058	5.415	18.539	15.091	14.023	24.80 *		
100	7.987 6.128		24.502	18.436	17.423	28.20 *		
	Approx 100 year vol remaining (ha*m)			5.1*	5.2*	-0.9*		

^{*} Maximum Proposed Pond Volume =

As illustrated in the above table the proposed pond will reduce the release rates from the pond for all storm events.

RETURN PERIOD	TARGET RELEASE RATE	EXISTING POND RELEASE RATE	PROPOSED POND RELEASE RATE **	PROPOSED POND VOLUME **	Approximate Water Surface Elevation	% OF TARGET FLOW	% OF EXISTING FLOW
Years	m³/s	m³/s	m³/s	ha m	m	%	%
2	2.059	3.625	3.21	8.81	200.10	156	89
5	3.075	7.078	4.24	12.74	201.00	138	60
10	3.808	10.274	6.64	14.31	201.25	174	65
25	4.722	14.911	10.72	15.89	201.50	227	72
50	5.415	18.539	14.02	16.97	201.70	259	76
100	6.128	24.502	17.42	17.99	201.85	284	71

^{*} Maximum Proposed Pond Volume (ha m) = 23.5

Comparing the target discharge, based on unit flow rates, to the actual discharge from the pond, it was determined that the actual discharge exceeds the targets by 175% to 400% for the 2 year to 100 year design storms.

With some regrading of the pond, the actual discharge can be reduced to 156% to 284 % of the target.

Detailed calculations are attached this memo.

The conceptual design of the SWM pond is based on the existing pond block. Side slopes of 4:1 are used. Two forebays are introduced. One is located on the west side of the pond to accommodate inflows from the west side of the site and the other linear forebay is located on the south east side of the pond to accommodate flows from the east side of the site. Both forebays include a berm on either side to create a separation with the wet cell. It should be noted that the design is preliminary and should be refined during the detail design stage to accommodate the

^{23.5} ha*m

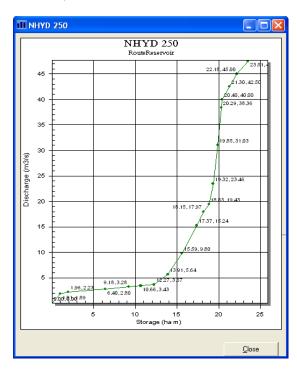
^{**} Note: 25 mm values in VisualOTTHYMO have been estimated.

^{**} With %IMP Reduction

exact permanent pool requirement and to account for additional design features like using armour stones or retaining walls to maximize the provided volumes. The following table summarizes the provided pond volumes:

Water Surface Elevation (m)	Existing Peak Outflow (cms)	Existing Channel Plus Pond Storage (ha*m)	Existing Channel Storage (ha*m)	Existing Pond Storage (ha*m)	Proposed Pond Storage (ha*m)	* Proposed Pond+Existing North Channel Storage (ha*m)
197.500	0.000	0.000	0.000	0.000	0.000	0.000
198.720	1.890	1.100	0.000	0.075	1.008	1.008
199.025	2.233	1.620	0.180	0.641	1.783	1.963
199.634	2.795	3.810	0.552	2.666	5.850	6.402
200.244	3.276	6.290	0.949	4.708	8.234	9.183
200.549	3.427	7.730	1.194	5.822	9.467	10.661
200.854	3.670	9.118	1.522	7.058	10.745	12.267
201.158	5.644	10.750	1.858	8.337	12.048	13.906
201.463	9.799	12.430	2.204	9.644	13.382	15.586
201.768	15.238	14.110	2.605	11.027	14.766	17.371
201.900	17.973	14.840	2.780	11.621	15.367	18.147
202.040	19.434	15.250	2.817		16.013	18.830
202.094	23.459	15.579	3.053	12.526	16.271	19.324
202.178	31.034	16.111	3.178	12.933	16.671	19.849
202.249	38.361	16.560	3.283		17.009	20.292
202.266	40.000	16.668	3.308	13.360	17.090	20.398
202.411	42.500	17.586	3.523	14.063	17.780	21.303
202.556	45.000	18.476	3.700	14.776	18.483	22.183
202.701	47.500	19.319	3.815	15.504	19.695	23.510
203.000		the overall provided			20.695	

^{*}similarly to the existing model the, overall provided volume accounts the north channel storage + swm pond 18.0 storage.



CONSIDERATIONS AND CONCLUSIONS

SWM pond 18.0 is an online pond. Therefore the construction staging should be emphasized and looked into detail. In addition, the erosion control during construction is very important and should be specific for this type of pond. Pond inlet and outlet conditions need to be analyzed in detail, to add additional benefits into the retrofitting process. The existing sanitary sewers crossing the pond block are taken into account; however during detailed design, final verification of the sewer location might be required.

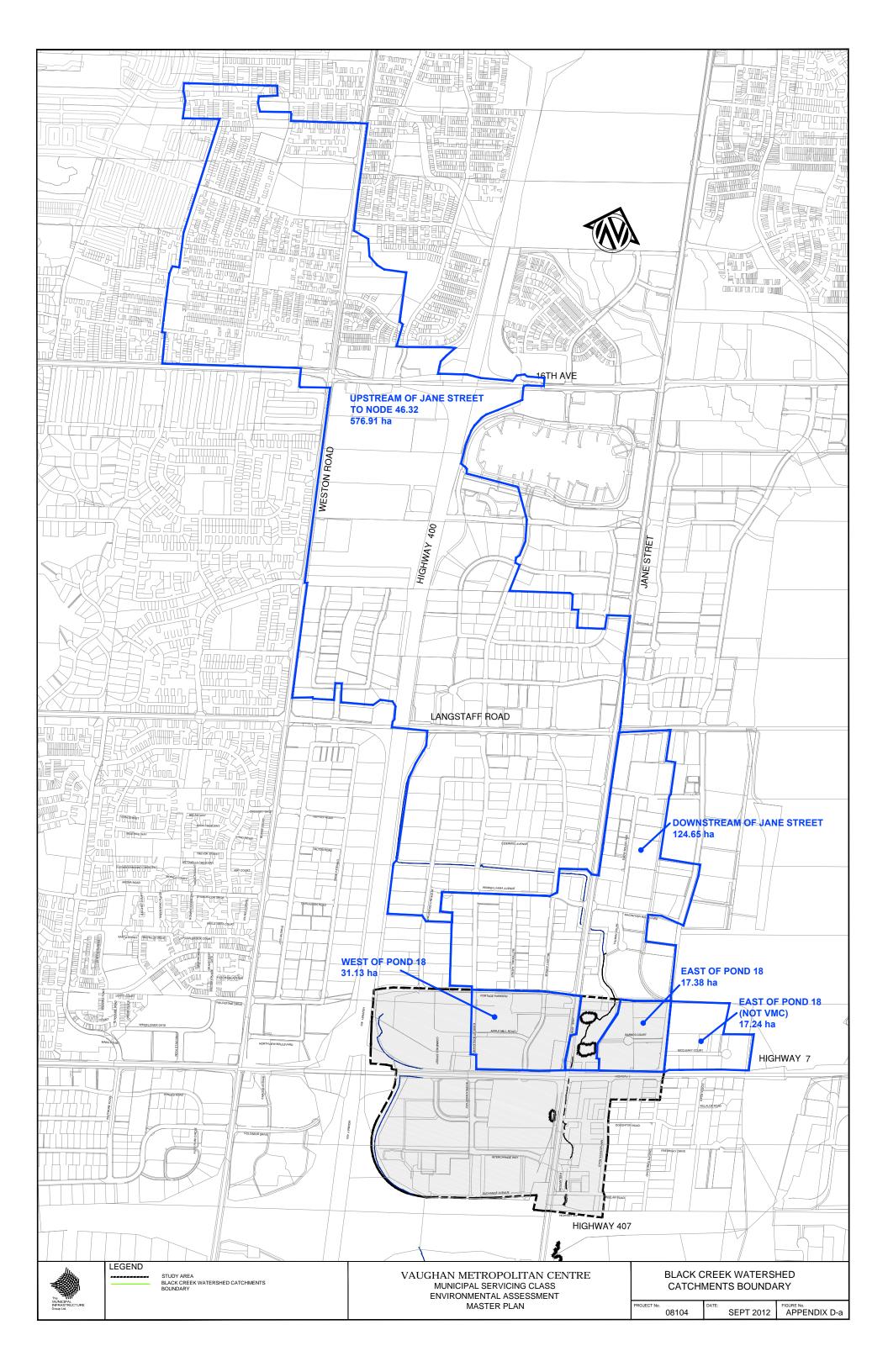
In conclusion, the pond retrofitting will improve the release rates from the pond and hence reduce the flooding issues downstream. Water quality improvement are expected from introducing the forebay cells. The pond embankment will be nicely planted to account for any loss in existing natural features.

Link: g:\projects\2008\08104 - vaughan corporate centre - master servicing strategy\design\swm\2012 02 final submission\vo2 calibration summary+additional info (ept) - for appendix july 2012.docx

Municipal Servicing Class Environmental Assessment Master Plan
VAUGHAN METROPOLITAN CENTRE - CITY OF VAUGHAN
NOV 2012

Appendix D4

North-East SWM Pond Calculations



City of Vaughan

25mm Runoff Coefficient Adjustment NE Corner of Millway Avenue & Hwy 7

Project #: 08104 Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient =

Runoff reduction =

0.25 10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

 $\mathbf{m}\mathbf{m}$

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

Area & Imperviousness for Permanent Pool Calculation (based on 25mm Runoff Coefficient)

NE Corner of Millway Avenue & Hwy 7

WEST SIDE

		Area (ha)	С	AC			
Mized Use	Building	4.80	0.30	1.44			
(Residential)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.00	0.00			
Mixed Use	Building	4.80	0.30	1.44			
(Commercial)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.00	0.00			
	Total	16.19		5.76	←	Weighted "C" = 0.36	
			1		•	Weighted Imperviousness =	0.22
	Open Space / Parkland	3.16	0.50	1.58			
	Road	11.78	0.90	10.60			
	Total	14.94		12.18	←	Weighted "C" = 0.82	
					1	Weighted Imperviousness =	= 0.88
EAST SIDE							
		Area (ha)	С	AC			
Residential	Building	3.65	0.30	1.09			
	Paved Area	1.22	0.90	1.09			
	Landscape	1.29	0.00	0.00		4.796288	3
Commercial	Building	1.57	0.30	0.47		1.69995	5
	Paved Area	0.52	0.90	0.47			
	Landscape	0.56	0.00	0.00			
	Total	8.81		3.13	←	Weighted "C" = 0.36	_
		•	•		•	Weighted Imperviousness =	0.22
	Open Space / Parkland	1.57	0.50	0.79			
	Road	7.00	0.90	6.30			
	Total	8.57		7.09	←	Weighted "C" = 0.83	_
		•			1	Weighted Imperviousness =	0.90

City of Vaughan

2-year Runoff Coefficient Adjustment **NE Corner of Millway Avenue & Hwy 7**

Project #: 08104 Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient = 0.25 Runoff reduction =

 $\mathbf{m}\mathbf{m}$

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

Assumption:

<u>Residential</u>

0.75 C = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

0.75 C =| = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

for Parkland (in accordance with the City's design criteria) C = 0.75

C = 0.25 for open space

Area & Imperviousness for Permanent Pool Calculation (based on 2-year Runoff Coefficient)

NE Corner of Millway Avenue & Hwy 7

Open Space / Parkland

Road

Total

1.57

7.00

8.57

0.50

0.90

0.79

6.30

7.09

WEST SIDE

WEST SIDE		Area (ha)	С	AC		
Mized Use	Building	4.80	0.48	2.32		
(Residential)	Paved Area	1.60	0.90	1.44		
(**************************************	Landscape	1.70	0.00	0.00		
Mixed Use	Building	4.80	0.48	2.32		
(Commercial)	Paved Area	1.60	0.90	1.44		
,	Landscape	1.70	0.00	0.00		
	Total	16.19		7.51	←	Weighted "C" = 0.46
						Weighted Imperviousness = 0.38
	Open Space / Parkland	3.16	0.50	1.58		
	Road	11.78	0.90	10.60		
	Total	14.94		12.18	←	Weighted "C" = 0.82
			ı			Weighted Imperviousness = 0.88
EAST SIDE						
		Area (ha)	С	AC		
Residential	Building	3.65	0.48	1.76		
	Paved Area	1.22	0.90	1.09		
	Landscape	1.29	0.00	0.00		
Commercial	Building	1.57	0.48	0.76		
	Paved Area	0.52	0.90	0.47		
	Landscape	0.56	0.00	0.00		
	Total	8.81		4.09	←	Weighted "C" = 0.46
		•			•	

Weighted Imperviousness =

Weighted Imperviousness =

Weighted "C" =

0.38

0.90

0.83

City of Vaughan

5-year Runoff Coefficient Adjustment NE Corner of Millway Avenue & Hwy 7

Project #: 08104 Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient = 0.25

Runoff reduction =

10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

 $\mathbf{m}\mathbf{m}$

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

Area & Imperviousness for Permanent Pool Calculation (based on 5-year Runoff Coefficient)

8.57

7.09

Weighted "C" =

Weighted Imperviousness =

0.83

0.90

NE Corner of Millway Avenue & Hwy 7

Total

WEST SIDE

WEST SIDE							
		Area (ha)	С	AC			
Mized Use	Building	4.80	0.59	2.81			
(Residential)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.04	0.07			
Mixed Use	Building	4.80	0.59	2.81			
(Commercial)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.04	0.07			
	Total	16.19		8.64	←	Weighted "C" = 0.53	
			l		l	Weighted Imperviousness =	0.48
	Open Space / Parkland	3.16	0.50	1.58			
	Road	11.78	0.90	10.60			
	Total	14.94		12.18	\leftarrow	Weighted "C" = 0.82	
						Weighted Imperviousness =	0.88
EAST SIDE					•		
		Area (ha)	C	AC			
Residential	Building	3.65	0.59	2.14			
	Paved Area	1.22	0.90	1.09			
	Landscape	1.29	0.04	0.05			
Commercial	Building	1.57	0.59	0.92			
	Paved Area	0.52	0.90	0.47			
	Landscape	0.56	0.04	0.02			
	Total	8.81		4.70	\leftarrow	Weighted "C" = 0.53	
						Weighted Imperviousness =	0.48
	Open Space / Parkland		0.50	0.79			
	Road	7.00	0.90	6.30			

City of Vaughan

10-year Runoff Coefficient Adjustment

NE Corner of Millway Avenue & Hwy 7

Project #: 08104 Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient = 0.25

Runoff reduction =

10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

 $\mathbf{m}\mathbf{m}$

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

Area & Imperviousness for Permanent Pool Calculation (based on 10-year Runoff Coefficient)

NE Corner of Millway Avenue & Hwy 7

WEST SIDE

		Araa (ba)	С	AC	1		
Minad Llas	Duilding	Area (ha)					
Mized Use	Building	4.80	0.63	3.03			
(Residential)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.07	0.12			
Mixed Use	Building	4.80	0.63	3.03			
(Commercial)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.07	0.12			
	Total	16.19		9.17	←	Weighted "C" = 0.57	_
					•	Weighted Imperviousness =	0.52
	Open Space / Parkland	3.16	0.50	1.58			
	Road	11.78	0.90	10.60			
	Total	14.94		12.18	←	Weighted "C" = 0.82	
			ı		1	Weighted Imperviousness =	0.88
EAST SIDE							
		Area (ha)	С	AC	1		
Residential	Building	3.65	0.63	2.30			
	Paved Area	1.22	0.90	1.09			
	Landscape	1.29	0.07	0.09			
Commercial	Building	1.57	0.63	0.99			
	Paved Area	0.52	0.90	0.47			
	Landscape	0.56	0.07	0.04			
	Total	8.81		4.99	←	Weighted "C" = 0.57	
			J			Weighted Imperviousness =	0.52
						Trongmod importionalization	
	Open Space / Parkland	1.57	0.50	0.79	1		
	Road	7.00	0.90	6.30			
	Total	8.57		7.09	←	Weighted "C" = 0.83	
		1	ı		1	Weighted Imperviousness =	0.90
						11 2 G C	

City of Vaughan

25-year Runoff Coefficient Adjustment

NE Corner of Millway Avenue & Hwy 7

Project #: 08104 Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient =

Runoff reduction =

0.25 10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

 $\mathbf{m}\mathbf{m}$

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

Area & Imperviousness for Permanent Pool Calculation (based on 25-year Runoff Coefficient)

8.57

NE Corner of Millway Avenue & Hwy 7

Total

WEST SIDE

		Area (ha)	С	AC			
Mized Use	Building	4.80	0.67	3.22			
(Residential)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.10	0.17			
Mixed Use	Building	4.80	0.67	3.22			
(Commercial)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.10	0.17			
	Total	16.19		9.65	←	Weighted "C" = 0.60	
					•	Weighted Imperviousness =	0.57
	Open Space / Parkland	3.16	0.50	1.58]		
	Road	11.78	0.90	10.60			
	Total	14.94		12.18	←	Weighted "C" = 0.82	
			l			Weighted Imperviousness =	0.88
EAST SIDE					1		
		Area (ha)	С	AC			
Residential	Building	3.65	0.67	2.45			
	Paved Area	1.22	0.90	1.09			
	Landscape	1.29	0.10	0.13			
Commercial	Building	1.57	0.67	1.05			
	Paved Area	0.52	0.90	0.47			
	Landscape	0.56	0.10	0.05			
	Total	8.81		5.25	←	Weighted "C" = 0.60	_
			•			Weighted Imperviousness =	0.57
					_		
	Open Space / Parkland		0.50	0.79]		
	Open Space / Parkland Road	1.57 7.00	0.50 0.90	0.79 6.30			

7.09

Weighted "C" =

Weighted Imperviousness =

0.83

0.90

City of Vaughan

50-year Runoff Coefficient Adjustment

NE Corner of Millway Avenue & Hwy 7

Project #: 08104 Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient =

Runoff reduction =

0.25 10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

 $\mathbf{m}\mathbf{m}$

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

Area & Imperviousness for Permanent Pool Calculation (based on 50-year Runoff Coefficient)

NE Corner of Millway Avenue & Hwy 7

WEST SIDE

					-		
		Area (ha)	С	AC			
Mized Use	Building	4.80	0.69	3.33			
(Residential)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.11	0.19			
Mixed Use	Building	4.80	0.69	3.33			
(Commercial)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.11	0.19			
	Total	16.19		9.92	←	Weighted "C" = 0.61	
					•	Weighted Imperviousness =	0.59
	Open Space / Parkland	3.16	0.50	1.58	1	9	
	Road	11.78	0.90	10.60			
	Total	14.94	0.00	12.18	←	Weighted "C" = 0.82	
	Total	14.54		12.10]		= 000
						Weighted Imperviousness =	0.88
EACT CIDE							
EAST SIDE		Araa (ba)	0	1 40	1		
Desidential	ID attalian as	Area (ha)	С	AC	-		
Residential	Building	3.65	0.69	2.53			
	Paved Area	1.22	0.90	1.09			
	Landscape	1.29	0.11	0.15			
Commercial	Building	1.57	0.69	1.09			
	Paved Area	0.52	0.90	0.47			
	Landscape	0.56	0.11	0.06			
	Total	8.81		5.40	←	Weighted "C" = 0.61	_
	•				•	Weighted Imperviousness =	0.59
	Open Space / Parkland	1.57	0.50	0.79	1		
	Road	7.00	0.90	6.30			
	Total	8.57		7.09	←	Weighted "C" = 0.83	
						5	

Weighted Imperviousness =

0.90

City of Vaughan

100-year Runoff Coefficient Adjustment

NE Corner of Millway Avenue & Hwy 7

Project #: 08104 Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient = 0.25

Runoff reduction =

10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

 $\mathbf{m}\mathbf{m}$

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

Area & Imperviousness for Permanent Pool Calculation (based on 100-year Runoff Coefficient)

NE Corner of Millway Avenue & Hwy 7

Open Space / Parkland

Road

Total

1.57

7.00

8.57

0.50

0.90

0.79

6.30

7.09

Weighted "C" =

Weighted Imperviousness =

0.83

0.90

WEST SIDE

WEST SIDE		-			-		
		Area (ha)	С	AC			
Mized Use	Building	4.80	0.71	3.42			
(Residential)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.13	0.21			
Mixed Use	Building	4.80	0.71	3.42]		
(Commercial)	Paved Area	1.60	0.90	1.44			
	Landscape	1.70	0.13	0.21			
	Total	16.19		10.15	←	Weighted "C" = 0.63	
			l		•	Weighted Imperviousness =	0.61
	Open Space / Parkland	3.16	0.50	1.58			
	Road	11.78	0.90	10.60			
	Total	14.94		12.18	←	Weighted "C" = 0.82	_
	•			^	-	Weighted Imperviousness =	0.88
EAST SIDE							
		Area (ha)	С	AC	1		
Residential	Building	3.65	0.71	2.60			
	Paved Area	1.22	0.90	1.09			
	Landscape	1.29	0.13	0.16			
Commercial	Building	1.57	0.71	1.12]		
	Paved Area	0.52	0.90	0.47			
	Landscape	0.56	0.13	0.07			
	Total	8.81		5.52	←	Weighted "C" = 0.63	_
					•	Weighted Imperviousness =	0.61

City of Vaughan

Summary of Controlled / Uncontrolled areas

NE Corner of Millway Avenue & Hwy 7

		Reduced Runoff Coefficients				
	West	(31.13ha)	East (17.38ha)			
	16.19	14.94	8.81	8.57		
Return Period	Controlled	Uncontrolled	Controlled	Uncontrolled		
25mm	0.36	0.82	0.36	0.83		
2-yr	0.46	0.82	0.46	0.83		
5-yr	0.53	0.82	0.53	0.83		
10-yr	0.57	0.82	0.57	0.83		
25-yr	0.60	0.82	0.60	0.83		
50-yr	0.61	0.82	0.61	0.83		
100-yr	0.63	0.82	0.63	0.83		

		Level of Imperviousness				
	West	(31.13ha)	East (17.38ha)			
	16.19	14.94	8.81	8.57		
Return Period	Controlled	Uncontrolled	Controlled	Uncontrolled		
25mm	0.22	0.88	0.22	0.90		
2-yr	0.38	0.88	0.38	0.90		
5-yr	0.48	0.88	0.48	0.90		
10-yr	0.52	0.88	0.52	0.90		
25-yr	0.57	0.88	0.57	0.90		
50-yr	0.59	0.88	0.59	0.90		
100-yr	0.61	0.88	0.61	0.90		

existing conditions

total area to Jane street 576.91 ha
C12 catchment 190.40 ha
total area to pond 18.0 767.31 ha

Proposed conditions

total area to Jane street		57	6.91 ha	
	VMC	54.43	ha	
	west block	3	1.13	
	controlled	16.19		
	uncontrolled	14.94		
	east block		7.38	
controlled		8.81		
	uncontrolled	8.57		
	SWM Block	5.92	ha	
Exter	nal East of VMC	1	7.24 ha	
ernal North of V	MC + Pond block	12	4.65 ha	

total area to pond 18.0 **767.31** ha

On site controls (rating curve) west

16.19 ha

qout (m3/s) v (ha.m) 1.201 0.5367

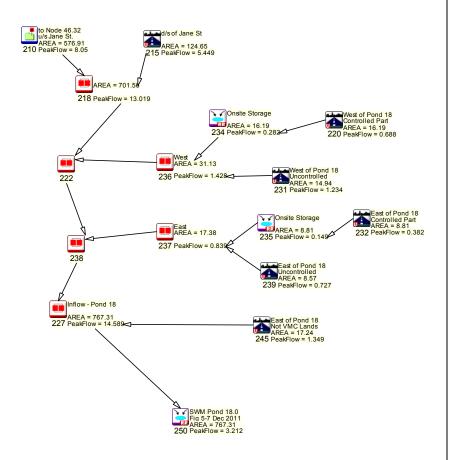
east 8.81 ha

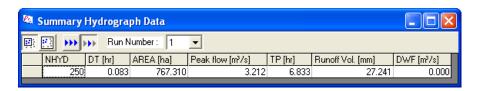
 qout (m3/s)
 vol (ha.m)

 0.665
 0.2915

 $note: model \ G: \ Projects \ 2008 \ 08104 - Vaughan \ Corporate \ Centre - Master \ Servicing \ Strategy \ Design \ SWM \ 2012 \ 02 \ final \ submission \ 100-year \ to \ 2-year, \ scenario: target \ release \ rates, \ TRR \ are \ based \ on \ 80\% \ imperviousness$

North East POND (2yr 6hr AES)





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************** ** SIMULATION 1 ************* READ STORM Ptotal= 36.00 r	************* NUMBER: 1 *********** Fil Con TIME RF hrs mm/	*** .ename: (.mments: 2 .IN T: .hr 1	G:\Pro 08104 - \Design 2yr/6hi IME IME I	jects\20 - Vaugha h\SWM\De r RAIN mm/hr	08\ n Corpo: cember 2 TIME hrs 3 75	rate Centr 2011 - TS\ RAIN mm/hr 5 04	e - Mas VO2 Inp TIME hrs 5 50	ster Ser out Hydr RAIN mm/hr 72
************** ** SIMULATION 1 ************* READ STORM Ptotal= 36.00 r	************* NUMBER: 1 *********** Fil Con TIME RF hrs mm/	*** .ename: (.mments: 2 .IN T: .hr 1	G:\Pro 08104 - \Design 2yr/6hi IME IME I	jects\20 - Vaugha h\SWM\De r RAIN mm/hr	08\ n Corpo: cember 2 TIME hrs 3 75	rate Centr 2011 - TS\ RAIN mm/hr 5 04	e - Mas VO2 Inp TIME hrs 5 50	ster Ser out Hydr RAIN mm/hr 72
************** ** SIMULATION 1 ************* READ STORM Ptotal= 36.00 r	NUMBER: 1 ********** Fil nm Con TIME RF hrs mm/	*** .ename: (.mments: 2 .IN T: .hr 1	G:\Pro 08104 - \Design 2yr/6hi IME IME I	jects\20 - Vaugha h\SWM\De r RAIN mm/hr	08\ n Corpo: cember 2 TIME hrs 3 75	rate Centr 2011 - TS\ RAIN mm/hr 5 04	e - Mas VO2 Inp TIME hrs 5 50	ster Ser out Hydr RAIN mm/hr 72

CALIB STANDHYD (0245) ID= 1 DT= 5.0 min	Area Total	(ha) = Imp(%) =		Dir. Co	nn.(%)=	85.00
		IMPERVIO	US	PERVIOUS	(i)	
Surface Area	(ha)=	14.65		2.59		
Dep. Storage	(mm) =	1.00		4.30		
Average Slope	(%)=	1.00		2.00		
Length	(m) =	339.00		40.00		
Mannings n	=	.013		.250		
WARE		mp 11/2 mont		F 0 14717		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

		TRA	ANSFORMED	HYETOGRA	PH		
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
				hrs i			
.083	.00	1.667	4.32	3.250	9.36	4.83	.72
.167	.00	1.750	4.32	3.333	5.04	4.92	.72
.250	.00	1.833	12.24	3.417	5.04	5.00	.72
.333	.72	1.917	12.24	3.500	5.04	5.08	.72
.417	.72	2.000		3.583		5.17	.72
.500	.72	2.083	12.24	3.667	5.04	5.25	.72
.583	.72	2.167	12.24	3.750	5.04	5.33	.72
.667	.72	2.250	12.24	3.833	2.88	5.42	.72
.750	.72	2.333	33.12	3.917	2.88	5.50	.72
	.72			4.000			.72
.917	.72	2.500	33.12	4.083	2.88	5.67	.72
1.000	.72	2.583	33.12	4.167	2.88		.72
1.083	.72	2.667	33.12	4.250	2.88	5.83	.72
1.167	.72	2.750	33.12	4.333	1.44	5.92	.72
1.250	.72	2.833	9.36	4.417	1.44	6.00	.72
1.333	4.32	2.917	9.36	4.500	1.44	6.08	.72
1.417	4.32	3.000	9.36	4.583	1.44	6.17	.72
1.500	4.32	3.083	9.36	4.667	1.44	6.25	.72
1.583	4.32	3.167	9.36	4.750	1.44		
Max.Eff.Inten.(mm	/hr)=	33 12	1	1 75			
			2.				
Storage Coeff. (
Unit Hyd. Tpeak (
Unit Hyd. peak (
,	,				*TOTA	LS*	
PEAK FLOW (cms)=	1.31		.05		 49 (iii)	
TIME TO PEAK (
RUNOFF VOLUME					31.	33	
TOTAL RAINFALL	(mm) =	36.00	3	6.00	36.	00	
RUNOFF COEFFICIEN	T =	.97		.29		87	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 80.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0239) ID= 1 DT= 5.0 min	Area Total	(ha) = Imp(%) =	8.57 90.00	Dir. Conn.(%)=	90.00
Surface Area Dep. Storage Average Slope	(ha) = (mm) = (%) =	IMPERVI 7.7 1.0 1.0	1	PERVIOUS (i) .86 4.30 2.00	

Length Mannings n	(m) = =	239.00 .013	40.00 .250	
Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak	(mm/hr)=	33.12	13.24	
ove	r (min)	5.00	15.00	
Storage Coeff.	(min)=	6.70 (ii) 11.26 (ii)	
Unit Hyd. Tpea	k (min)=	5.00	15.00	
				TOTALS
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC	(cms)=	.70	.02	.727 (iii)
TIME TO PEAK	(hrs) =	2.75	2.83	2.75
RUNOFF VOLUME	(mm) =	35.00	10.56	32.55
TOTAL RAINFALL	(mm) =	36.00	36.00	36.00 .90
RUNOFF COEFFIC	TENT =	.97	.29	.90
(i) CN PROCE	DIDE CELECE	PD PAR REBUT	OHE LOSSES.	
		= Dep. Stor		
(ii) TIME STE				
	STORAGE CC			
(iii) PEAK FLO	W DOES NOT	INCLUDE BASE	FLOW IF ANY.	
	_			
CALIB	1		_	
STANDHYD (0232) ID= 1 DT= 5.0 min	Area	(ha)= 8.8	1 0 Din G	(0) - 20 00
TD= 1 DT= 5.0 MIN		mp(s) = 38.0	o Dir. Conn.	(%) = 38.00
		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	3.35	5.46	
Dep. Storage	(mm) =	1.00	4.30	
Average Slope	(%) = (m) =	242 30	40.00	
Surface Area Dep. Storage Average Slope Length Mannings n	=	.013	.250	
Max.Eff.Inten.	(mm/hr)=	33.12	11.75	
ove	r (min)	5.00	25.00	
Storage Coeff.	(min) =	6.76 (ii) 23.38 (ii)	
Unit Hyd. Tpea	k (min)=	5.00	25.00	
Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak	(cms)=	.18	.05	
				TOTALS
TIME TO PEAK	(hrs)=	2.75	3.00	.382 (iii) 2.75
RUNOFF VOLUME	(mm) =	35.00	10.56	
TOTAL RAINFALL	(mm) =	36.00	36.00	19.84 36.00
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC	IENT =	.97	.29	.55
(i) CN PROCE				
CN* = (ii) TIME STE		= Dep. Stor		
	STORAGE CC		N OK EQUAL	
(iii) PEAK FLO			FLOW IF ANY.	
RESERVOIR (0235)				
IN= 2> OUT= 1	I			
DT= 5.0 min	OUTFL	OW STORAG	E OUTFLOW	STORAGE
DT= 5.0 min	- (cms	(ha.m.) (cms)	(ha.m.)
	.00	.000	u .5820	.3000
		AREA O	PEAK TPEAK	R.V.
				4 1

(ha)

8.81

8.81

INFLOW : ID= 2 (0232)

OUTFLOW: ID= 1 (0235)

(cms)

.38

.15

(hrs)

3.33

2.75

(mm)

19.84

19.83

	PEAK FLO TIME SHIFT MAXIMUM S	W REDU OF PEAK TORAGE	CTION [Qo FLOW USED	out/Qin] (m (ha.	(%)= 3 nin)= 3 m.)=	9.05 5.00 .0770	
ADD HYD (0237) 1 + 2 = 3 ID1= 1 (0 + ID2= 2 (0	- - 239):	AREA (ha) 8.57	QPEAK (cms) .727	TPEAK (hrs)	R.V (mm 32.55		
+ ID2= 2 (0	235): 	8.81 ======	.149 	3.33	19.83	=	
ID = 3 (0	237): 1	7.38	.839	2.75	26.10		
NOTE: PEAK FI	OWS DO NOT	INCLUDE	BASEFLO	NS IF AN	IY.		
CALIB STANDHYD (0220) ID= 1 DT= 5.0 min	Area Total	(ha) = Imp(%) =	16.19 38.00	Dir. Co	onn.(%)	= 38.00	
		IMPERVI	OUS PI	ERVIOUS	(i)		
Surface Area Dep. Storage	(ha) = (mm) =	1.0	0	10.04			
Average Slope	(%)=	1.0	0	2.00			
Surface Area Dep. Storage Average Slope Length Mannings n	(m) = =	328.5	0 3	40.00 .250			
Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak	(mm/hr)=	33.1	2	11.75			
ove Storage Coeff	er (min)	10.0	0 1 (ii)	25.00	(4.4.)		
Unit Hyd. Tpea	k (min)=	10.0	0	25.00	(11)		
Unit Hyd. peak	(cms)=	.1	3	.05		*TOTALS*	
PEAK FLOW	(cms) =	. 5	5	.19		.688 (ii	Li)
TIME TO PEAK	(hrs) =	2.7	5	3.00		2 75	
RUNOFF VOLUME	(mm) =	35.0	0	10.56		19.84	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALI RUNOFF COEFFIC	CIENT =	.9	7	.19 3.00 10.56 36.00 .29		.55	
(ii) TIME STE THAN THE (iii) PEAK FLC	80.0 I EP (DT) SHO STORAGE C	a = Dep. ULD BE SI OEFFICIEI	Storage MALLER O	(Above	e)		
RESERVOIR (0234)	= -						
	1						
IN= 2> OUT= I DT= 5.0 min	OUTF	LOW S'	TORAGE	OUTE	LLOW	STORAGE	
	.0	000	.0000	1 1.1	.510	STORAGE (ha.m.) .5700	
		(ha)	(cms)	(h	ırs)	(mm)	
<pre>INFLOW : ID= 2 OUTFLOW: ID= 1</pre>	(0220)	16.19 16.19	.69	9 2	2.75 3.42	19.84 19.84	
	PEAK FLO						
	TIME SHIFT						
	MAXIMUM S	TORAGE	USED	(ha.	m.)=	.1398	

PEAK FLOW REDUCTION [Qout/Qin](%)= 39.05

CALIB STANDHYD (0231) ID= 1 DT= 5.0 min	Area Total	(ha) = Imp(%) =	14.94 88.00	Dir. Co	onn.(%)=	88.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	13.1 1.0 1.0 315.6	5 0 0 0 3	PERVIOUS 1.79 1.50 2.00 40.00 .250		
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	33.1 10.0 7.9 10.0	2 0 2 (ii) 0 3	34.19 15.00 12.87 15.00	(ii)	DOMNI O*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI						TOTALS* 1.234 (iii) 2.75 32.26 36.00 .90
(i) CN PROCEL CN* = (ii) TIME STEF THAN THE (iii) PEAK FLOW	80.0 (DT) SHO STORAGE O	Ia = Dep. OULD BE SI COEFFICIE	Storac MALLER NT.	ge (Above OR EQUAL	∍)	
ADD HYD (0236) 1 + 2 = 3 ID1= 1 (02 + ID2= 2 (02	34): 31):	AREA (ha) 16.19 14.94 1	QPEAK (cms) .282 .234	TPEAK (hrs) 3.42 2.75	R.V. (mm) 19.84 32.26	
ID = 3 (02)					25.80	
NOTE: PEAK FLO	WS DO NO	T INCLUDE	BASEFI	LOWS IF AN	1Y.	
CALIB	Area Total					79.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	IMPERVI 103.4 .5 .3 1800.0	OUS 6 0 0 0 6	PERVIOUS 21.19 4.70 .40 200.00 .250	(i)	
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	33.1 30.0 36.6 30.0	2 0 0 (ii) 0 3	8.97 120.00 115.40 120.00	(ii)	DOMNI O*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL	(cms) = (hrs) = (mm) = (mm) =	5.4 3.0 35.5 36.0	1 0 0 0	.20 4.67 10.67 36.00	*]	FOTALS* 5.449 (iii) 3.00 30.29 36.00

RUN	NOFF COE	FFICIENT	=	.99	.30	.84		3.92 4.00		37.33 37.42	.148 70.75 .147 70.83		.020 137.58 .020 137.67	.010
								4.08		37.50	.147 70.92		.020 137.07	.010
	(i) CN P	ROCEDURE	SELECTE	D FOR PE	RVIOUS LOSSES:			4.17		37.58	.147 71.00		.020 137.83	.010
					torage (Above)			4.25		37.67	.147 71.08		.020 137.92	.010
(i	ii) TIME	STEP (D	T) SHOUL	D BE SMA	LLER OR EQUAL			4.33	5.826	37.75	.146 71.17	.054 104.58	.020 138.00	.010
		THE STO						4.42		37.83	.146 71.25		.020 138.08	.010
(ii	li) PEAK	FLOW DO	ES NOT I	NCLUDE B	ASEFLOW IF ANY.			4.50		37.92	.146 71.33		.020 138.17	.010
								4.58		38.00	.146 71.42		.020 138.25	.010
								4.67		38.08	.145 71.50		.020 138.33	.010
	IVD (00		3 D D 3	/11-	E7.C 01			4.75		38.17 38.25	.145 71.58		.020 138.42 .019 138.50	.010
		10) 1			576.91 3.33			4.83 4.92		38.33	.145 71.67		.019 138.58	.010
		1		(mm) =				5.00		38.42	.145 71.83		.019 138.67	.010
						Centre - Master S	Servicing			38.50	.144 71.92		.019 138.75	.010
		\SWM\Dec			-		-	5.17		38.58	.144 72.00		.019 138.83	.010
Commer	nts: Out	flow at	46.32					5.25		38.67	.144 72.08		.019 138.92	.010
								5.33		38.75	.144 72.17		.019 139.00	.010
TIME		TIME		TIME	FLOW TIME	FLOW TIME	FLOW	5.42		38.83	.143 72.25		.019 139.08	.010
hrs	cms	hrs	cms	hrs	cms hrs	cms hrs	cms	5.50		38.92	.143 72.33		.019 139.17	.010
.00		33.42		66.83 66.92	.063 100.25 .063 100.33	.022 133.67 .022 133.75	.010	5.58 5.67		39.00 39.08	.143 72.42		.019 139.25 .019 139.33	.010
.17		33.58		1 67.00	.063 100.33	.022 133.73	.010	5.75		39.00	.143 72.58		.019 139.33	.010
.25		33.67		67.08	.063 100.42	.022 133.03	.010	5.83		39.25	.142 72.67		.019 139.50	.010
.33		33.75		67.17	.062 100.58	.022 134.00	.010	5.92		39.33	.142 72.75		.019 139.58	.010
.42		33.83		67.25	.062 100.67	.022 134.08	.010	6.00		39.42	.142 72.83		.019 139.67	.010
.50	.000	33.92	.157	67.33	.062 100.75	.022 134.17	.010	6.08	3.385	39.50	.142 72.92	.051 106.33	.019 139.75	.010
.58		34.00		67.42	.062 100.83	.022 134.25	.010	6.17		39.58	.141 73.00		.019 139.83	.010
.67		34.08		67.50	.062 100.92	.022 134.33	.010	6.25		39.67	.141 73.08		.019 139.92	.010
.75		34.17		67.58	.062 101.00	.022 134.42	.010	6.33		39.75	.141 73.17		.019 140.00	.010
.83		34.25		67.67	.061 101.08	.022 134.50	.010	6.42		39.83	.141 73.25		.019 140.08	.010
.92 1.00		34.33		67.75 67.83	.061 101.17 .061 101.25	.022 134.58	.010	6.50 6.58		39.92 40.00	.141 73.33		.019 140.17 .019 140.25	.010
1.00		34.42		67.92	.061 101.25	.022 134.67	.010	6.67		40.00	.140 73.42		.019 140.25	.010
1.17		34.58		68.00	.061 101.33	.022 134.73	.010	6.75		40.17	.140 73.58		.018 140.42	.010
1.25		34.67		68.08	.060 101.50	.022 134.92	.010	6.83		40.25	.140 73.67		.018 140.50	.010
1.33	.000	34.75		68.17	.060 101.58	.021 135.00	.010	6.92	2.826	40.33	.139 73.75		.018 140.58	.010
1.42	.000	34.83	.155	68.25	.060 101.67	.021 135.08	.010	7.00		40.42	.139 73.83		.018 140.67	.010
1.50		34.92		68.33	.060 101.75	.021 135.17	.010	7.08		40.50	.139 73.92		.018 140.75	.010
1.58		35.00		68.42	.060 101.83	.021 135.25	.010	7.17		40.58	.139 74.00		.018 140.83	.010
1.67		35.08		68.50	.059 101.92	.021 135.33	.010	7.25		40.67	.139 74.08		.018 140.92	.010
1.75 1.83		35.17 35.25		68.58 68.67	.059 102.00 .059 102.08	.021 135.42 .021 135.50	.010	7.33 7.42		40.75 40.83	.138 74.17		.018 141.00 .018 141.08	.010
1.92		35.33		68.75	.059 102.08	.021 135.58	.010	7.50		40.83	.138 74.23		.018 141.17	.010
2.00		35.42		68.83	.059 102.25	.021 135.67	.010	7.58		41.00	.138 74.42		.018 141.25	.010
2.08		35.50		68.92	.059 102.33	.021 135.75	.010	7.67		41.08	.137 74.50		.018 141.33	.010
2.17	.168	35.58	.152	69.00	.058 102.42	.021 135.83	.010	7.75	2.274	41.17	.137 74.58	.048 108.00	.018 141.42	.010
2.25		35.67		69.08	.058 102.50	.021 135.92	.010	7.83		41.25	.137 74.67		.018 141.50	.010
2.33		35.75		69.17	.058 102.58	.021 136.00	.010	7.92		41.33	.137 74.75		.018 141.58	.010
2.42	1.605			69.25	.058 102.67	.021 136.08	.010	8.00		41.42	.137 74.83		.018 141.67	.010
2.50 2.58	2.245			69.33 69.42	.058 102.75 .058 102.83	.021 136.17 .021 136.25	.010	8.08 8.17		41.50 41.58	.136 74.92 .136 75.00		.018 141.75 .018 141.83	.010
2.58		36.08		1 69.42	.058 102.83	.021 136.25	.010	8.25		41.58	.136 75.08		.018 141.83	.010
2.75	4.624			69.58	.057 102.32	.021 136.42	.010	8.33		41.75	.136 75.17		.018 142.00	.010
2.83		36.25		69.67	.057 103.08	.021 136.50	.010	8.42		41.83	.135 75.25		.018 142.08	.010
2.92		36.33		69.75	.057 103.17	.021 136.58	.010	8.50		41.92	.135 75.33		.018 142.17	.010
3.00	6.798	36.42	.150	69.83	.057 103.25	.020 136.67	.010	8.58	1.915	42.00	.135 75.42	.047 108.83	.018 142.25	.010
3.08	7.382			69.92	.056 103.33	.020 136.75	.010	8.67		42.08	.135 75.50		.017 142.33	.010
3.17	7.777			70.00	.056 103.42	.020 136.83	.010	8.75		42.17	.135 75.58		.017 142.42	.010
3.25	7.984			70.08	.056 103.50	.020 136.92	.010	8.83		42.25	.134 75.67		.017 142.50	.010
3.33 3.42	8.050 8.001	36.75	.149	70.17 70.25	.056 103.58	.020 137.00 .020 137.08	.010	8.92 9.00		42.33 42.42	.134 75.75 .134 75.83		.017 142.58	.010
3.42	7.869			70.25	.056 103.67 .056 103.75	.020 137.08	.010	9.00		42.42	.134 75.83 .134 75.92		.017 142.67	.010
3.58	7.682			70.33	.055 103.83	.020 137.17	.010	9.08		1 42.50	.134 75.92		.017 142.75	.010
3.67	7.461			70.42	.055 103.83	.020 137.23	.010	9.25		1 42.50	.133 76.08		.017 142.83	.010
3.75		37.17		70.58	.055 104.00	.020 137.33	.010	9.33		42.75	.133 76.17		.017 142.32	.010
	6.976			70.67	.055 104.08	.020 137.50	.010	9.42		42.83	.133 76.25		.017 143.08	.010
						*		1						

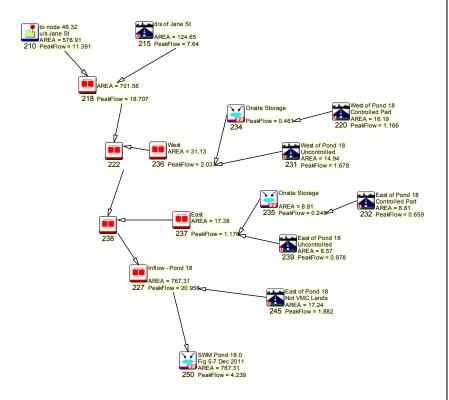
9.50	1.615	42 92	.133 76	33 045 1	109.75 .	017 143.17	7 .010	15.08	413	48.50	.119	81 92	.038 115.33	015	148.75	.009
9.58	1.589		.132 76			017 143.17		15.17		48.58	.118		.038 115.42		148.83	.009
9.67	1.563		.132 76			017 143.23		15.25		48.67	.118		.038 115.50		148.92	.009
9.75	1.537		.132 76			017 143.42		15.33		48.75	.118		.038 115.58		149.00	.009
9.83	1.511		.132 76			017 143.50		15.42		48.83	.118		.038 115.67		149.08	.009
9.92	1.486		.132 76			017 143.58		15.50		48.92	.118		.038 115.75		149.17	.009
10.00	1.461		.131 76			017 143.67		15.58		49.00	.117		.038 115.83		149.25	.009
10.08	1.436	43.50	.131 76	.92 .045	110.33 .	017 143.75	.010	15.67	.381	49.08	.117	82.50	.038 115.92	.014	149.33	.009
10.17	1.409	43.58	.131 77	.00 .044	110.42 .	017 143.83	.010	15.75	.377	49.17	.117	82.58	.037 116.00	.014	149.42	.009
10.25	1.382		.131 77			017 143.92		15.83		49.25	.117		.037 116.08		149.50	.009
10.33	1.353		.130 77			017 144.00		15.92		49.33	.116		.037 116.17		149.58	.009
10.42	1.323		.130 77			017 144.08		16.00		49.42	.116		.037 116.25		149.67	.009
10.50	1.293		.130 77			017 144.00		16.08		49.50	.116		.037 116.23		149.75	.009
10.58	1.262		.130 77			017 144.25		16.17		49.58	.116		.037 116.42		149.83	.009
10.67	1.232		.130 77			017 144.33		16.25		49.67	.116		.037 116.50		149.92	.009
10.75	1.202		.129 77			017 144.42		16.33		49.75	.115		.037 116.58		150.00	.009
10.83	1.172		.129 77			016 144.50		16.42		49.83	.115		.037 116.67		150.08	.009
10.92	1.142	44.33	.129 77	.75 .043	111.17 .	016 144.58	.010	16.50	.344	49.92	.115	83.33	.037 116.75	.014	150.17	.009
11.00	1.114	44.42	.129 77	.83 .043	111.25 .	016 144.67	7 .010	16.58	.341	50.00	.115	83.42	.037 116.83	.014	150.25	.009
11.08	1.085		.129 77			016 144.75		16.67		50.08	.114		.036 116.92		150.33	.009
11.17	1.058		.128 78			016 144.83		16.75		50.17	.114		.036 117.00		150.42	.009
11.25	1.031		.128 78			016 144.92		16.83		50.25	.114		.036 117.08		150.50	.009
11.33	1.005		.128 78			016 145.00		16.92		50.33	.113		.036 117.17		150.58	.009
								17.00								
11.42		44.83	.128 78			016 145.08				50.42	.113		.036 117.25		150.67	.009
11.50		44.92	.128 78			016 145.17		17.08		50.50	.113		.036 117.33		150.75	.009
11.58	.931		.127 78			016 145.25		17.17		50.58	.113		.036 117.42		150.83	.009
11.67	.907		.127 78			016 145.33		17.25		50.67	.112		.036 117.50		150.92	.009
11.75	.885		.127 78			016 145.42		17.33		50.75	.112		.036 117.58		151.00	.009
11.83	.863	45.25	.127 78	.67 .042	112.08 .	016 145.50	.010	17.42	.309	50.83	.112	84.25	.036 117.67	.014	151.08	.009
11.92	.842	45.33	.127 78	.75 .042	112.17 .	016 145.58	.010	17.50	.306	50.92	.112	84.33	.036 117.75	.014	151.17	.009
12.00	.822	45.42	.126 78	.83 .042	112.25 .	016 145.67	7 .010	17.58	.303	51.00	.111 8	84.42	.035 117.83	.014	151.25	.009
12.08		45.50	.126 78			016 145.75		17.67		51.08	.111		.035 117.92		151.33	.009
12.17		45.58	.126 79			016 145.83		17.75		51.17	.111		.035 118.00		151.42	.009
12.25		45.67	.126 79			016 145.92		17.83		51.25	.110		.035 118.08		151.50	.009
12.23		45.75	.125 79					17.92		51.33			.035 118.17			.009
						016 146.00					.110				151.58	
12.42		45.83	.125 79			016 146.08		18.00		51.42	.110		.035 118.25		151.67	.009
12.50		45.92	.125 79			016 146.17		18.08		51.50	.110		.035 118.33		151.75	.009
12.58	.699		.125 79			016 146.25		18.17		51.58	.109		.035 118.42		151.83	.009
12.67		46.08	.125 79			016 146.33		18.25		51.67	.109		.035 118.50		151.92	.009
12.75	.669	46.17	.124 79	.58 .041	113.00 .	016 146.42	.010	18.33	.278	51.75	.109	85.17	.035 118.58	.013	152.00	.009
12.83	.655	46.25	.124 79	.67 .041	113.08 .	016 146.50	.010	18.42	.276	51.83	.108	85.25	.035 118.67	.013	152.08	.009
12.92	.641	46.33	.124 79	.75 .041 I	113.17 .	016 146.58	.010	18.50	.274	51.92	.108	85.33	.034 118.75	.013	152.17	.009
13.00		46.42	.124 79			016 146.67		18.58		52.00	.108		.034 118.83		152.25	.009
13.08	. 615	46.50	.124 79			015 146.75		18.67		52.08	.108	85.50	.034 118.92		152.33	.009
13.17		46.58	.123 80			015 146.83		18.75		52.17	.107		.034 119.00		152.42	.009
13.25		46.67	.123 80			015 146.92		18.83		52.25	.107		.034 119.08		152.50	.009
13.33		46.75	.123 80			015 147.00		18.92		52.33	.107		.034 119.17		152.58	.009
13.42		46.83	.123 80			015 147.08		19.00		52.42	.106		.034 119.17		152.67	.009
13.50	.558		.123 80			015 147.17		19.08		52.50	.106		.034 119.33		152.75	.009
13.58		47.00	.122 80			015 147.25		19.17		52.58	.106		.034 119.42		152.83	.009
13.67		47.08	.122 80			015 147.33		19.25		52.67	.105		.034 119.50		152.92	.009
13.75		47.17	.122 80			015 147.42		19.33		52.75	.105		.034 119.58		153.00	.009
13.83		47.25	.122 80			015 147.50		19.42		52.83	.105		.034 119.67		153.08	.009
13.92	.510	47.33	.122 80	.75 .040	114.17 .	015 147.58	.009	19.50	.250	52.92	.105	86.33	.033 119.75	.013	153.17	.009
14.00	.502	47.42	.121 80	.83 .039	114.25 .	015 147.67	7 .009	19.58	.248	53.00	.104	86.42	.033 119.83	.013	153.25	.009
14.08	.494	47.50	.121 80	.92 .039 [114.33 .	015 147.75	.009	19.67	.247	53.08	.104	86.50	.033 119.92	.013	153.33	.009
14.17		47.58	.121 81			015 147.83		19.75		53.17	.104		.033 120.00		153.42	.009
14.25		47.67	.121 81			015 147.92		19.83		53.25	.103		.033 120.08		153.50	.009
14.33		47.75	.121 81			015 148.00		19.92		53.33	.103		.033 120.00		153.58	.009
14.42		47.83	.120 81			015 148.08		20.00		53.42	.103		.033 120.17		153.67	.009
14.50		47.03	.120 81			015 148.08		20.08		53.50	.103		.033 120.23		153.07	.009
14.58		48.00	.120 81			015 148.25		20.17		53.58	.102		.033 120.42		153.83	.009
14.67		48.08	.120 81			015 148.33		20.25		53.67	.102		.033 120.50		153.92	.009
14.75		48.17	.120 81			015 148.42		20.33		53.75	.102		.033 120.58		154.00	.009
14.83		48.25	.119 81			015 148.50		20.42		53.83	.101		.033 120.67		154.08	.009
14.92		48.33	.119 81			015 148.58		20.50		53.92	.101		.032 120.75		154.17	.009
15.00	.419	48.42	.119 81	.83 .038	115.25 .	015 148.67	.009	20.58	.232	54.00	.101	87.42	.032 120.83	.013	154.25	.009

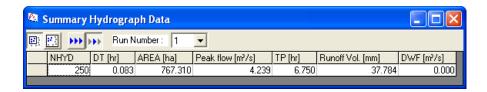
20.67	.230	54.08	.100	87.50	.032 120.92	.013	154.33	.009	26.25	.186	59.67	.082	93.08	.027	126.50	. 011	159.92	.009
20.75		54.17		87.58	.032 121.00		154.42	.009	26.33		59.75		93.17		126.58		160.00	.009
20.83		54.25		87.67	.032 121.08		154.50	.009	26.42		59.83		93.25		126.67		1160.08	.009
20.92		54.33		87.75	.032 121.17		154.58	.009	26.50		59.92		93.33		126.75		160.17	.009
21.00		54.42		87.83	.032 121.25		154.67	.009	26.58		60.00		93.42		126.83		160.25	.009
21.08		54.50		87.92	.032 121.33		154.75	.009	26.67		60.08		93.50		126.92		160.33	.009
21.17	.224	54.58	.099	88.00	.032 121.42	.012	154.83	.009	26.75	.184	60.17	.081	93.58	.027	127.00	.011	160.42	.009
21.25	.223	54.67	.098	88.08	.032 121.50	.012	154.92	.009	26.83	.184	60.25	.081	93.67	.027	127.08	.011	160.50	.009
21.33		54.75		88.17	.032 121.58		155.00	.009	26.92		60.33		93.75		127.17		160.58	.009
21.42		54.83		88.25	.032 121.67		155.08	.009	27.00		60.42		93.83		127.25		1160.67	.009
21.50		54.92		88.33	.032 121.07		155.17	.009	27.08		60.50		93.92		127.23		1160.75	.009
21.58		55.00		88.42	.031 121.83		155.25	.009	27.17		60.58		94.00		127.42		160.83	.009
21.67		55.08		88.50	.031 121.92		155.33	.009	27.25		60.67		94.08		127.50		160.92	.009
21.75	.217	55.17	.097	88.58	.031 122.00	.012	155.42	.009	27.33	.181	60.75	.079	94.17	.027	127.58	.010	161.00	.009
21.83	.217	55.25	.096	88.67	.031 122.08	.012	155.50	.009	27.42	.181	60.83	.079	94.25	.026	127.67	.010	161.08	.009
21.92	.216	55.33	.096	88.75	.031 122.17	.012	155.58	.009	27.50	.181	60.92	.079	94.33	.026	127.75	.010	161.17	.009
22.00		55.42		88.83	.031 122.25		155.67	.009	27.58		61.00		94.42		127.83		161.25	.009
22.08		55.50		88.92	.031 122.23		155.75	.009	27.67		61.08		94.50		127.92		1161.33	.009
									27.75									
22.17		55.58		89.00	.031 122.42		155.83	.009			61.17		94.58		128.00		161.42	.009
22.25		55.67		89.08	.031 122.50		155.92	.009	27.83		61.25		94.67		128.08		161.50	.009
22.33		55.75		89.17	.031 122.58		156.00	.009	27.92		61.33		94.75		128.17		161.58	.009
22.42	.211	55.83	.094	89.25	.031 122.67	.012	156.08	.009	28.00	.178	61.42	.077	94.83	.026	128.25	.010	161.67	.009
22.50	.210	55.92	.094	89.33	.031 122.75	.012	156.17	.009	28.08	.178	61.50	.077	94.92	.026	128.33	.010	161.75	.009
22.58	.210	56.00	.094	89.42	.031 122.83	.012	156.25	.009	28.17	.178	61.58	.077	95.00		128.42	.010	161.83	.009
22.67		56.08		89.50	.030 122.92		1156.33	.009	28.25		61.67		95.08		128.50		1161.92	.009
22.75		56.17		89.58	.030 122.32		156.42	.009	28.33		61.75		95.17		128.58		1162.00	.009
22.83		56.25		89.67	.030 123.08		156.50	.009	28.42		61.83		95.25		128.67		162.08	.009
22.92		56.33		89.75	.030 123.17		156.58	.009	28.50		61.92		95.33		128.75		162.17	.009
23.00	.206	56.42	.093	89.83	.030 123.25	.012	156.67	.009	28.58		62.00	.076	95.42	.026	128.83	.010	162.25	.009
23.08	.205	56.50	.092	89.92	.030 123.33	.012	156.75	.009	28.67	.176	62.08	.075	95.50	.026	128.92	.010	162.33	.009
23.17	.205	56.58	.092	90.00	.030 123.42	.012	156.83	.009	28.75	.175	62.17	.075	95.58	.025	129.00	.010	162.42	.009
23.25		56.67	.092	90.08	.030 123.50		156.92	.009	28.83		62.25	.075	95.67		129.08		162.50	.009
23.33		56.75		90.17	.030 123.58		157.00	.009	28.92		62.33		95.75		129.17		1162.58	.009
23.42		56.83		90.25	.030 123.67		157.08	.009	29.00		62.42		95.83		129.25		1162.67	.009
23.50		56.92		90.33	.030 123.75		1157.17	.009	29.08		62.50		95.92		129.33		1162.75	.009
23.58		57.00		90.42	.030 123.83		157.25	.009	29.17		62.58		96.00		129.42		162.83	.009
23.67	.201	57.08	.090	90.50	.030 123.92	.012	157.33	.009	29.25	.173	62.67	.074	96.08	.025	129.50	.010	162.92	.009
23.75	.201	57.17	.090	90.58	.029 124.00	.012	157.42	.009	29.33	.173	62.75	.074	96.17	.025	129.58	.010	163.00	.009
23.83	.200	57.25	.090	90.67	.029 124.08	.012	157.50	.009	29.42	.173	62.83	.073	96.25	.025	129.67	.010	163.08	.009
23.92		57.33		90.75	.029 124.17		157.58	.009	29.50		62.92		96.33		129.75		163.17	.009
24.00		57.42		90.83	.029 124.25		1157.67	.009	29.58		63.00		96.42		129.83		1163.25	.009
24.08		57.50		90.92	.029 124.23		1157.75	.009	29.67		63.08		96.50		129.92		1163.23	.009
24.17		57.58		91.00	.029 124.42		1157.83	.009	29.75		63.17		96.58		130.00		163.42	.009
24.25		57.67		91.08	.029 124.50		157.92	.009	29.83		63.25		96.67		130.08		163.50	.009
24.33		57.75		91.17	.029 124.58		158.00	.009	29.92		63.33		96.75		130.17		163.58	.009
24.42	.196	57.83	.088	91.25	.029 124.67	.011	158.08	.009	30.00	.170	63.42	.072	96.83	.025	130.25	.010	163.67	.009
24.50	.196	57.92	.088	91.33	.029 124.75	.011	158.17	.009	30.08	.170	63.50	.072	96.92	.025	130.33	.010	163.75	.009
24.58	.195	58.00	.088	91.42	.029 124.83	.011	158.25	.009	30.17	.170	63.58	.071	97.00	.024	130.42	.010	163.83	.009
24.67		58.08		91.50	.029 124.92		158.33	.009	30.25		63.67		97.08		130.50		163.92	.009
24.75		58.17		91.58	.029 125.00		158.42	.009	30.33		63.75		97.17		130.58		164.00	.008
24.83		58.25		91.67	.029 125.08		158.50	.009	30.42		63.83		97.25		130.67		1164.08	.008
24.92		58.33		91.75	.028 125.17		158.58	.009	30.50		63.92		97.33		130.75		164.17	.008
25.00		58.42		91.83	.028 125.25		158.67	.009	30.58		64.00		97.42		130.83		164.25	.008
25.08	.193	58.50	.086	91.92	.028 125.33	.011	158.75	.009	30.67	.168	64.08	.070	97.50	.024	130.92	.010	164.33	.008
25.17	.192	58.58	.086	92.00	.028 125.42	.011	158.83	.009	30.75	.168	64.17	.070	97.58	.024	131.00	.010	164.42	.008
25.25		58.67		92.08	.028 125.50		1158.92	.009	30.83		64.25		97.67		131.08		1164.50	.008
25.33		58.75		92.17	.028 125.58		159.00	.009	30.92		64.33		97.75		131.17		164.58	.008
25.42		58.83		92.25	.028 125.67		159.08	.009	31.00		64.42		97.83		131.25		1164.67	.008
25.50		58.92		92.33	.028 125.75		159.17	.009	31.08		64.50		97.92		131.33		1164.75	.008
25.58		59.00		92.42	.028 125.83		159.25	.009	31.17		64.58		98.00		131.42		164.83	.008
25.67	.189	59.08	.084	92.50	.028 125.92	.011	159.33	.009	31.25	.166	64.67	.069	98.08	.024	131.50	.010	164.92	.008
25.75	.189	59.17	.084	92.58	.028 126.00	.011	159.42	.009	31.33	.166	64.75	.068	98.17	.024	131.58	.010	165.00	.008
25.83	.189	59.25	.084	92.67	.028 126.08	.011	159.50	.009	31.42	.165	64.83	.068	98.25	.024	131.67	.010	165.08	.008
25.92		59.33		92.75	.028 126.17		1159.58	.009	31.50		64.92		98.33		131.75		1165.17	.008
26.00		59.42		92.83	.028 126.25		159.67	.009	31.58		65.00		98.42		131.83		1165.25	.008
		59.50		92.03				.009	31.56									
26.08					.028 126.33		1159.75				65.08		98.50		131.92		1165.33	.008
26.17	.18/	59.58	.083	93.00	.027 126.42	.011	159.83	.009	31.75	.164	65.17	.06/	98.58	.023	132.00	.010	165.42	.008

31.92 .164 32.00 .163 32.08 .163 32.17 .163 32.25 .163 32.25 .163 32.33 .162 32.50 .162 32.50 .162 32.50 .162 32.57 .161 32.75 .161 32.83 .161 32.92 .160 33.00 .160 33.07 .160 33.27 .159	65.58 65.67 65.75 65.83 65.92 66.00 66.08 66.17 66.25 66.33 66.42 66.50 66.58	.067 .066 .066 .066 .066 .065 .065 .065 .065	98.75 98.83 98.92 99.00 99.08 99.17 99.23 99.50 99.58 99.67 99.75 99.83 99.92	.023 .023 .023 .023 .023 .023 .023 .023	1132.17	.010 .010 .010 .010 .010 .010 .010 .010	1	.008
READ STORM					2008\ han Corp December			ıster Ser ıput Hydr
	TIME hrs n .25	RAIN nm/hr .00 .72	TIME hrs 2.00 2.25	RAIN mm/hr 12.24 12.24	hrs 3.75 4.00	mm/hr 5.04 2.88	TIME hrs 5.50 5.75 6.00 6.25	mm/hr .72 .72
ADD HYD (021 1 + 2 = 3 ID1= 1 + ID2= 2	(0215): (0210):	ARE (ha 124.6 576.9	EA QP a) (c 55 5.4 91 8.0	EAK ms) 49	TPEAK (hrs) 3.00 3.33	R.V. (mm) 30.29 26.58		
	(0218):	701.5	66 13.0	19	3.17	27.24		
ADD HYD (022 1 + 2 = 3 ID1= 1 + ID2= 2	(0236): (0218):	ARE (ha 31.1 701.5	EA QP a) (c .3 1.4	EAK ms) 28	TPEAK (hrs) 2.75 3.17	R.V. (mm) 25.80 27.24		
	(0222):	732.6	59 13.7	21	3.17	27.18		

+	ID1= 1	(0237):	AREA (ha) 17.38	QPEAK (cms) .839 13.721	TPEAK (hrs) 2.75	R.V. (mm) 26.10 27.18		
				14.093			=	
NOTE		, , .		UDE BASEFLO				
1 +	(0227 2 = 3		AREA	QPEAK (cms)	TPEAK (hrs)	R.V.	•	
+	ID2= 2		17.24 750.07	1.349 14.093	2.75 3.17	31.33 27.15		
				14.589			=	
NOTE	: PEAK	FLOWS DO	NOT INCL	UDE BASEFLO	OWS IF A	NY.		
	0 min 		(cms)	STORAGE (ha.m.) .0000 1.0080 1.9630 6.4020	(cr 17.9 19.4 23.4	ms) 9700 4300 4600	(ha.m.) 18.1470 18.8300 19.3240 19.8490	
			3.2760 3.4270 3.6700 5.6440 9.7990 15.2400	10.6610 12.2670 13.9060 15.5860 17.3710	38.3 40.0 42.3 45.0 47.3	3600 0000 5000 0000 5000	21.3030 22.1830 23.5100 .0000	
		2 (0227	3.2760 3.4270 3.6700 5.6440 9.7990 15.2400 AR (h)	12.2670 13.9060 15.5860	38.1 40.0 42.3 45.0 47.3 47.3 69 (1)	3600 0000 5000 0000 5000 0000 PEAK hrs) 3.17	21.3030 22.1830 23.5100 .0000 R.V. (mm) 27.25	
		2 (0227 1 (0250 PEAK TIME S	3.2760 3.4270 3.6700 5.6440 9.7990 15.2400 AR (h)) 767.) 767.	12.2670 13.9060 15.5860 17.3710 EA QPE a) (cm: 31 14.	38.: 40.0 42.! 45.0 47.! .0 AK TH .0 59 : 21 (r	3600 0000 5000 0000 5000 0000 PEAK hrs) 3.17 6.83](%) = 22 min) = 220	21.3030 22.1830 23.5100 .0000 R.V. (mm) 27.25 27.24	

North East POND (5yr 6hr AES)





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                                                            vo2-0145
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                ***** DETAILED OUTPUT *****
 Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
 Output filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final
\verb|submission|| 05PROP~1| 5y6 w Dev VMC, Prop Pond 18 With $IMP Reduction.o|
 Summary filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final
submission\05PROP~1\5y6 w Dev VMC, Prop Pond 18 With %IMP Reduction.s
DATE: 4/10/2012
                                    TIME: 12:19:47 PM
USER:
COMMENTS:
 ** SIMULATION NUMBER: 1 **
    READ STORM |
                    Filename: G:\Projects\2008\
                             08104 - Vaughan Corporate Centre - Master Ser
                             \Design\SWM\December 2011 - TS\VO2 Input Hydr
| Ptotal= 47.81 mm |
                    Comments: 5yr/6hr
              TIME
                     RAIN | TIME
                                  RAIN | TIME
                                                RAIN | TIME
                                                              RATN
               hrs
                    mm/hr |
                            hrs
                                  mm/hr
                                          hrs
                                                mm/hr |
                                                        hrs
                                                              mm/hr
                      .00 | 2.00
                                  16.25 |
                                          3.75
                                                 6.69 |
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                      .96 | 2.50
                                  43.98
                                          4.25
                                                 3.82
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              1.00
                      .96 | 2.75
                                  43.98 |
                                         4.50
                                                 1.91 |
                                                       6.25
                                                                .96
              1.25
                      .96 | 3.00
                                  12.43 |
                                         4.75
                                                 1.91
                     5.74 | 3.25
                                  12.43 |
                                          5.00
                                                 .96
              1.75
                     5.74 | 3.50
                                  6.69 | 5.25
                                                 .96 |
| STANDHYD (0245) | Area (ha) = 17.24
|ID= 1 DT= 5.0 min | Total Imp(%)= 85.00 Dir. Conn.(%)= 85.00
```

			IMPERVIOUS	PERVIOUS (i	.)	
	Surface Area	(ha)=	14.65	2.59		
	Dep. Storage	(mm) =	1.00	4.30		
	Average Slope	(%)=	1 00	2 00		
	Length	(m) =	339 00	40 00		
	Surface Area Dep. Storage Average Slope Length Mannings n	=	013	250		
			.010	.200		
	NOTE: RAINE	FALL WAS T	RANSFORMED	ro 5.0 MIN.	TIME STE	P.
			TRANS	FORMED HYETOGR	APH	
	TIME	E RAIN	TIME	RAIN TIME	RAIN	TIME RAIN
	hrs	s mm/hr	hrs m	m/hr hrs	mm/hr	hrs mm/hr
	.083	3 .00	1.667	5.74 3.250	12.43	4.83 .96
	.167	7 .00	1.750	5.74 3.333	6.69	4.92 .96
	.250	.00	1.833 1	6.25 3.417	6.69	5.00 .96
	.333	3 .96	1.917 1	6.25 3.500	6.69	5.08 .96
	.417	7 .96	2.000 1	6.25 3.583	6.69	5.17 .96
	.500	.96	2.083 1	6.25 3.667	6.69	TIME RAIN hrs mm/hr 4.83 .96 4.92 .96 5.00 .96 5.17 .96 5.25 .96 5.33 .96 5.42 .96 5.50 .96 5.58 .96 5.57 .96 5.58 .96 5.67 .96 5.75 .96 5.83 .96 5.92 .96 6.00 .96 6.08 .96 6.17 .96 6.25 .96
	.583	3 .96	2.167 1	6.25 3.750	6.69 i	5.33 .96
	.667	7 .96	2.250 1	6.25 3.833	3.82	5.42 .96
	. 750	96	1 2.333 4	3.98 3.917	3.82	5.50 .96
	831	3 .96	1 2.417 4	3.98 4.000	3.82	5.58 .96
	017	7 96	1 2 500 4	3 98 4 083	3 82 1	5 67 96
	1 000	, .50	1 2 583 4	3 98 4 167	3 22 1	5 75 06
	1 000	3 .50	1 2 667 4	3 98 1 4 250	3 22 1	5.73 .30
	1 16	7 06	1 2 750 4	2 00 1 4 222	1 01 1	5.03 .90
	1.10		1 2 0 2 2 1	3.30 4.333	1 01 1	5.92 .90
	1.230	.90	2.033 1	2.43 4.417	1.91	6.00 .96
	1.333	3 5./4	2.91/ 1	2.43 4.500	1.91	6.08 .96
	1.41	5./4	3.000 1	2.43 4.583	1.91	6.1/ .96
	1.500	5.74	3.083 1	2.43 4.667	1.91	6.25 .96
	1.583	3 5.74	3.167 1	2.43 4.750	1.91	
		(2)	40.00	0.5.50		
	Max.Eff.Inten.(r	nm/hr)=	43.98	37.78		
	over	(min)	5.00	15.00		
	Storage Coeff.	(min) =	7.38 (i	i) 12.28 (ii	.)	
	Unit Hyd. Tpeak	(min)=	5.00	15.00		
	Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(cms) =	.17	.09		
					' '()' '	
	PEAK FLOW	(cms) =	1.77	.12	1.	882 (iii)
	TIME TO PEAK	(hrs) =	2.75	2.83	2	.75
	RUNOFF VOLUME	(mm) =	46.81	17.69	42	.44
	TOTAL RAINFALL	(mm) =	47.81	47.81	42 47	.81
	PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	ENT =	.98	.37		.89
	(i) CN PROCEDU					
				rage (Above)		
	(ii) TIME STEP	(DT) SHOU	JLD BE SMALL	ER OR EQUAL		
			EFFICIENT.			
	(iii) PEAK FLOW	DOES NOT	INCLUDE BAS	EFLOW IF ANY.		
CAL	JIB NDHYD (0215)	Area	(ha) = 124.	65		
 CAL STA ID=	IB (0215) 1 DT= 5.0 min	Area Total 1	(ha) = 124. Emp(%) = 83.	65 00 Dir. Conn	1.(%)= 7	9.00
CAL STA ID=	ANDHYD (0215) 1 DT= 5.0 min	Area Total 1	imp(%) = 83.	00 Dir. Conn		9.00
CAL STA ID=	ANDHYD (0215) 1 DT= 5.0 min	Area Total 1	imp(%) = 83.	00 Dir. Conn		9.00
CAL STA ID=	ANDHYD (0215) 1 DT= 5.0 min	Area Total 1	imp(%) = 83.	00 Dir. Conn		9.00
CAL STA ID=	ANDHYD (0215) 1 DT= 5.0 min	Area Total 1	imp(%) = 83.	00 Dir. Conn		9.00
CAL STA ID=	ANDHYD (0215) 1 DT= 5.0 min	Area Total 1	imp(%) = 83.	00 Dir. Conn		9.00
CAL STA ID=	ANDHYD (0215) 1 DT= 5.0 min	Area Total 1	imp(%) = 83.	00 Dir. Conn		9.00
CAL STA ID=	ANDHYD (0215) 1 DT= 5.0 min	Area Total 1	imp(%) = 83.	00 Dir. Conn		9.00
CAL STA ID=	IB (0215) 1 DT= 5.0 min	Area Total 1	imp(%) = 83.	00 Dir. Conn		9.00

S U U P T R T R	torage Coe nit Hyd. T nit Hyd. T EAK FLOW IME TO PE? UNOFF VOLU OTAL RAINI UNOFF COE	over (mi eff. (mi Tpeak (mi peak (cm (cm AK (hr JME (m FALL (m	n) n)= n)= s)= s)= s)= m)= m)=	30.00 32.67 30.00 .04 7.54 3.00 47.31 47.81 .99	1(ii) 9 10	00.00 06.84 (isologous) 00.00 01 .37 4.33 17.78 17.81 .37	*TOT 7. 3 41 47	640 (iii	.)
	CN* (ii) TIME THAN iii) PEAK	THE STOR	Ia :) SHOULI AGE COEI S NOT II	= Dep. St D BE SMAI FFICIENT. NCLUDE BA	orage LLER OR ASEFLOW	(Above) EQUAL IF ANY.			
File	HYD (02: 5.0 min name: G:\I gy\Pesign\ ents: Outi FLOW cms .000 .000 .000 .000 .000 .000 .000 .0	Projects\	2008\08:	104 - Vai	ighan Co				
m T MIZ	ET OM	I DIME	EI OM	I DIME	ET OM	I TELME	ET OM	I DIME	ET OM
TIME	FLOW	l hre	FLOW	TIME	FLOW	TIME	FLOW	l hre	FLOW
111.5	000	1 33 43	107	1 66 83	110	1100 25	0.4.1	1133 67	016
.00	000	1 33 50	107	1 66 92	110	1100.23	041	1133.07	016
17	000	1 33.50	106	1 67 00	110	1100.33	040	1133.73	016
25	000	33.50	106	1 67 08	110	1100.42	040	1133.03	016
.23	.000	1 33.07	106	1 67.00	110	1100.50	040	1134 00	.016
.33	000	1 33 83	106	1 67 25	100	1100.50	040	1134.00	016
50	000	1 33 02	105	1 67 33	100	1100.07	040	1134.00	016
58	000	33.32	195	1 67 42	109	1100.73	040	1134 25	.016
67	000	34.00	195	1 67 50	109	1100.03	040	1134.23	016
75	000	34.00	195	1 67 58	109	1101.02	040	1134.42	016
83	000	34 25	194	67.50	109	1101.00	040	1134 50	016
92	000	34.23	194	1 67 75	108	1101.00	040	1134 58	016
1 00	000	34 42	194	67.73	108	1101.17	039	1134 67	016
1 08	000	34 50	194	1 67 92	108	1101.23	039	1134 75	016
1 17	000	34 58	193	68 00	108	1101.33	039	1134 83	016
1.25	.000	34.67	.193	68.08	.108	1101.50	.039	1134.92	.016
1.33	.000	34.75	.193	68.17	.107	1101.58	.039	1135.00	.016
1.42	.000	34.83	.193	68.25	.107	101.67	.039	135.08	.016
1.50	.000	34.92	.192	68.33	.107	101.75	.039	135.17	.016
1.58	.001	35.00	.192	68.42	.107	1101.83	.039	1135.25	.016
1.67	.002	35.08	.192	68.50	.107	1101.92	.039	1135.33	.016
1.75	.003	35.17	.192	68.58	.107	102.00	.039	135.42	.016
1.83	.005	35.25	.191	68.67	.106	102.08	.039	135.50	.016
1.92	.007	35.33	.191	68.75	.106	102.17	.038	135.58	.016
2.00	.095	35.42	.191	68.83	.106	102.25	.038	135.67	.016
2.08	.587	35.50	.191	68.92	.106	102.33	.038	135.75	.015
2.17	1.110	35.58	.190	69.00	.106	102.42	.038	135.83	.015
2.25	1.648	35.67	.190	69.08	.105	102.50	.038	135.92	.015
2.33	2.229	35.75	.190	69.17	.105	102.58	.038	136.00	.015
2.42	2.937	35.83	.190	69.25	.105	102.67	.038	136.08	.015
2.50	3.804	35.92	.189	69.33	.105	102.75	.038	136.17	.015
2.58	4.802	36.00	.189	69.42	.105	102.83	.038	136.25	.015
2.67	5.896	36.08	.189	69.50	.105	102.92	.038	136.33	.015
2.75	7.100	36.17	.189	69.58	.104	103.00	.038	136.42	.015
2.83	8.593	36.25	.188	69.67	.104	103.08	.037	136.50	.015
2.92	9.794	36.33	.188	69.75	.104	103.17	.037	136.58	.015
3.00	10.635	36.42	.188	69.83	.104	103.25	.037	136.67	.015
3.08	11.143	36.50	.188	69.92	.104	1103.33	.037	136.75	.015

3 17	11.370	1 36 58	.188 70.00	.104 103.42	.037 136.83	.015	8.75	2.604	42 17	.173 75.58	.090 109.00	.032 142.42	.013
	11.391		.187 70.08	.103 103.50	.037 136.92	.015	8.83	2.565		.173 75.67	.090 109.08	.032 142.50	.013
	11.266		.187 70.17	.103 103.58	.037 137.00	.015	8.92	2.525		.172 75.75	.090 109.17	.032 142.58	.013
3.42	11.028	36.83	.187 70.25	.103 103.67	.037 137.08	.015	9.00	2.485	42.42	.172 75.83	.089 109.25	.032 142.67	.013
3.50	10.711		.187 70.33	.103 103.75	.037 137.17	.015	9.08	2.444	42.50	.172 75.92	.089 109.33	.032 142.75	.013
	10.351		.186 70.42	.103 103.83	.037 137.25	.015	9.17	2.403		.172 76.00	.089 109.42	.031 142.83	.013
3.67	9.973		.186 70.50	.103 103.92	.037 137.33	.015	9.25	2.362		.172 76.08	.089 109.50	.031 142.92	.013
3.75	9.599	37.17	.186 70.58	.102 104.00	.037 137.42	.015	9.33	2.321	42.75	.171 76.17	.088 109.58	.031 143.00	.013
3.83	9.237	1 37 25	.186 70.67	.102 104.08	.036 137.50	.015	9.42	2.280	42 83	.171 76.25	.088 109.67	.031 143.08	.013
3.92	8.884		.185 70.75	.102 104.17	.036 137.58	.015	9.50	2.239		.171 76.33	.088 109.75	.031 143.17	.013
4.00	8.538		.185 70.83	.102 104.25	.036 137.67	.015	9.58	2.198		.171 76.42	.088 109.83	.031 143.25	.013
4.08	8.205	37.50	.185 70.92	.102 104.33	.036 137.75	.015	9.67	2.159	43.08	.171 76.50	.087 109.92	.031 143.33	.013
4.17	7.887	1 37 58	.185 71.00	.102 104.42	.036 137.83	.015	9.75	2.121		.170 76.58	.087 110.00	.031 143.42	.013
4.25	7.590		.185 71.08	.101 104.50	.036 137.92	.015	9.83	2.086		.170 76.67	.087 110.08	.031 143.50	.013
4.33	7.313	37.75	.184 71.17	.101 104.58	.036 138.00	.015	9.92	2.051		.170 76.75	.087 110.17	.031 143.58	.013
4.42	7.048	37.83	.184 71.25	.101 104.67	.036 138.08	.015	10.00	2.019	43.42	.170 76.83	.086 110.25	.031 143.67	.013
4.50	6.817		.184 71.33	.101 104.75	.036 138.17	.015	10.08	1.987		.170 76.92	.086 110.33	.031 143.75	.013
4.58	6.631		.184 71.42	.101 104.83	.036 138.25	.014	10.17	1.956		.169 77.00	.086 110.42	.031 143.83	.012
4.67	6.446	38.08	.183 71.50	.101 104.92	.036 138.33	.014	10.25	1.927	43.67	.169 77.08	.086 110.50	.031 143.92	.012
4.75	6.263	38.17	.183 71.58	.100 105.00	.036 138.42	.014	10.33	1.898	43.75	.169 77.17	.085 110.58	.030 144.00	.012
4.83	6.085		.183 71.67	.100 105.08	.035 138.50	.014	10.42	1.870		.169 77.25	.085 110.67	.030 144.08	.012
	5.910		.183 71.75	.100 105.00	.035 138.58	.014	10.50	1.843			.085 110.07	.030 144.17	.012
4.92										.169 77.33			
5.00	5.738	38.42	.183 71.83	.100 105.25	.035 138.67	.014	10.58	1.817	44.00	.168 77.42	.085 110.83	.030 144.25	.012
5.08	5.571	38.50	.182 71.92	.100 105.33	.035 138.75	.014	10.67	1.791	44.08	.168 77.50	.085 110.92	.030 144.33	.012
5.17	5.413		.182 72.00	.100 105.42	.035 138.83	.014	10.75	1.766		.168 77.58	.084 111.00	.030 144.42	.012
5.25	5.264		.182 72.08	.099 105.50	.035 138.92	.014	10.83	1.741		.168 77.67	.084 111.08	.030 144.50	.012
5.33	5.124	38.75	.182 72.17	.099 105.58	.035 139.00	.014	10.92	1.717	44.33	.168 77.75	.084 111.17	.030 144.58	.012
5.42	4.994	1 38.83	.181 72.25	.099 105.67	.035 139.08	.014	11.00	1.692	44.42	.167 77.83	.084 111.25	.030 144.67	.012
5.50	4.873		.181 72.33	.099 105.75	.035 139.17	.014	11.08	1.667		.167 77.92	.083 111.33	.030 144.75	.012
5.58	4.762		.181 72.42	.099 105.83	.035 139.25	.014	11.17	1.643		.167 78.00	.083 111.42	.030 144.83	.012
5.67	4.660	39.08	.181 72.50	.098 105.92	.035 139.33	.014	11.25	1.618	44.67	.167 78.08	.083 111.50	.030 144.92	.012
5.75	4.566	39.17	.181 72.58	.098 106.00	.035 139.42	.014	11.33	1.593	44.75	.166 78.17	.083 111.58	.030 145.00	.012
5.83	4.479		.180 72.67	.098 106.08	.034 139.50	.014		1.568		.166 78.25	.082 111.67	.030 145.08	.012
5.92	4.399		.180 72.75	.098 106.17	.034 139.58	.014	11.50	1.543		.166 78.33	.082 111.75	.030 145.17	.012
6.00	4.326	39.42	.180 72.83	.098 106.25	.034 139.67	.014	11.58	1.518	45.00	.166 78.42	.082 111.83	.029 145.25	.012
6.08	4.257	39.50	.180 72.92	.097 106.33	.034 139.75	.014	11.67	1.494	45.08	.166 78.50	.082 111.92	.029 145.33	.012
6.17	4.194		.179 73.00	.097 106.42	.034 139.83	.014	11.75	1.470		.165 78.58	.082 112.00	.029 145.42	.012
6.25	4.135		.179 73.08	.097 106.50	.034 139.92	.014	11.83	1.446		.165 78.67	.081 112.08	.029 145.50	.012
6.33	4.079		.179 73.17	.097 106.58	.034 140.00	.014	11.92	1.423		.165 78.75	.081 112.17	.029 145.58	.012
6.42	4.021	39.83	.179 73.25	.097 106.67	.034 140.08	.014	12.00	1.399	45.42	.165 78.83	.081 112.25	.029 145.67	.012
6.50	3.960	39.92	.179 73.33	.096 106.75	.034 140.17	.014	12.08	1.377	45.50	.165 78.92	.081 112.33	.029 145.75	.012
6.58	3.895		.178 73.42	.096 106.83	.034 140.25	.014	12.17	1.354		.164 79.00	.080 112.42	.029 145.83	.012
6.67	3.828		.178 73.50	.096 106.92	.034 140.33	.014	12.25	1.331		.164 79.08	.080 112.50	.029 145.92	.012
6.75	3.760	40.17	.178 73.58	.096 107.00	.034 140.42	.014	12.33	1.307	45.75	.164 79.17	.080 112.58	.029 146.00	.012
6.83	3.692	40.25	.178 73.67	.096 107.08	.034 140.50	.014	12.42	1.282	45.83	.164 79.25	.080 112.67	.029 146.08	.012
6.92	3.625		.178 73.75	.095 107.17	.033 140.58	.014	12.50	1.255		.164 79.33	.079 112.75	.029 146.17	.012
			.177 73.83										
7.00	3.559			.095 107.25	.033 140.67	.014	12.58	1.227		.163 79.42	.079 112.83	.029 146.25	.012
7.08	3.496	40.50	.177 73.92	.095 107.33	.033 140.75	.014	12.67	1.199		.163 79.50	.079 112.92	.029 146.33	.012
7.17	3.436	40.58	.177 74.00	.095 107.42	.033 140.83	.014	12.75	1.171	46.17	.163 79.58	.079 113.00	.029 146.42	.012
7.25	3.377		.177 74.08	.094 107.50	.033 140.92	.014	12.83	1.143		.163 79.67	.079 113.08	.028 146.50	.012
			.176 74.17				12.92	1.115		.163 79.75	.078 113.17		
7.33	3.322			.094 107.58	.033 141.00	.013						.028 146.58	.012
7.42	3.268		.176 74.25	.094 107.67	.033 141.08	.013	13.00	1.088		.162 79.83	.078 113.25	.028 146.67	.012
7.50	3.218	40.92	.176 74.33	.094 107.75	.033 141.17	.013	13.08	1.061	46.50	.162 79.92	.078 113.33	.028 146.75	.012
7.58	3.169	41 00	.176 74.42	.093 107.83	.033 141.25	.013	13.17	1.034	46 58	.162 80.00	.078 113.42	.028 146.83	.012
7.67	3.122		.176 74.50	.093 107.92	.033 141.33	.013	13.25	1.008		.162 80.08	.078 113.50	.028 146.92	.012
7.75	3.077		.175 74.58	.093 108.00	.033 141.42	.013	13.33		46.75	.162 80.17	.077 113.58	.028 147.00	.011
7.83	3.033	41.25	.175 74.67	.093 108.08	.033 141.50	.013	13.42	.958	46.83	.161 80.25	.077 113.67	.028 147.08	.011
7.92	2.990		.175 74.75	.092 108.17	.033 141.58	.013	13.50		46.92	.161 80.33	.077 113.75	.028 147.17	.011
8.00	2.949		.175 74.83	.092 108.25	.033 141.67	.013	13.58		47.00	.161 80.42	.077 113.73	.028 147.25	.011
8.08	2.908		.175 74.92	.092 108.33	.032 141.75	.013	13.67		47.08	.161 80.50	.076 113.92	.028 147.33	.011
8.17	2.869	41.58	.174 75.00	.092 108.42	.032 141.83	.013	13.75	.867	47.17	.161 80.58	.076 114.00	.028 147.42	.011
8.25	2.830	41.67	.174 75.08	.092 108.50	.032 141.92	.013	13.83	.845 I	47.25	.160 80.67	.076 114.08	.028 147.50	.011
8.33	2.792		.174 75.17	.091 108.58	.032 142.00	.013	13.92		47.33	.160 80.75	.076 114.17	.028 147.58	.011
8.42	2.755		.174 75.25	.091 108.67	.032 142.08	.013	14.00		47.42	.160 80.83	.076 114.25	.028 147.67	.011
8.50	2.718		.173 75.33	.091 108.75	.032 142.17	.013	14.08		47.50	.160 80.92	.075 114.33	.028 147.75	.011
8.58	2.681	42.00	.173 75.42	.091 108.83	.032 142.25	.013	14.17	.768	47.58	.160 81.00	.075 114.42	.027 147.83	.011
8.67	2.643	42.08	.173 75.50	.090 108.92	.032 142.33	.013	14.25	.751 i	47.67	.159 81.08	.075 114.50	.027 147.92	.011
													· · · -

14.33	734	47.75	159	81.17	.075 114.58	.027 1	148 00	.011	19.92	325	53.33	144	86.75	0.62	120.17	024	153.58	.010
14.42		47.83		81.25	.075 114.67	.027 1					53.42		86.83		120.25		153.67	.010
14.50	.702			81.33	.074 114.75	.027 [1		.011	20.00		53.50		86.92		120.23		153.07	.010
								.011	20.08									
14.58		48.00		81.42	.074 114.83	.027 1		.011	20.17		53.58		87.00		120.42		153.83	.010
14.67		48.08	.158	81.50	.074 114.92	.027 1		.011	20.25		53.67	.143	87.08		120.50		153.92	.010
14.75	.658	48.17	.158	81.58	.074 115.00	.027 1	148.42	.011	20.33	.317	53.75	.143	87.17	.061	120.58	.023	154.00	.010
14.83	.645	48.25	.158	81.67	.073 115.08	.027 1	148.50	.011	20.42	.315	53.83	.143	87.25	.061	120.67	.023	154.08	.010
14.92	. 632	48.33		81.75	.073 115.17	.027 1	148.58	.011	20.50	. 314	53.92		87.33		120.75	.023	154.17	.010
15.00		48.42		81.83	.073 115.25	.027 1		.011	20.58		54.00		87.42		120.83		154.25	.010
								.011	20.30									
15.08		48.50		81.92	.073 115.33	.027 1		.011	20.67		54.08		87.50		120.92		154.33	.010
15.17		48.58		82.00	.073 115.42	.027 1		.011	20.75		54.17		87.58		121.00		154.42	.010
15.25	.584	48.67	.157	82.08	.072 115.50	.027 1	148.92	.011	20.83	.308	54.25	.142	87.67	.060	121.08	.023	154.50	.010
15.33	.574	48.75	.157	82.17	.072 115.58	.027 1	149.00	.011	20.92	.306	54.33	.142	87.75	.060	121.17	.023	154.58	.010
15.42	.563 L	48.83	.156	82.25	.072 115.67	.027 1	149.08	.011	21.00	. 305	54.42	.141	87.83	.060	121.25	.023	154.67	.010
15.50		48.92		82.33	.072 115.75	.026 [1		.011	21.08		54.50		87.92		121.33		154.75	.010
15.58	.544			82.42	.072 115.73	.026 1		.011	21.17		54.58		88.00		121.42		154.83	.010
								.011	21.17									
15.67	.535			82.50	.071 115.92	.026 1		.011	21.25		54.67		88.08		121.50		154.92	.010
15.75	.526			82.58	.071 116.00	.026 1		.011	21.33		54.75	.140	88.17		121.58		155.00	.010
15.83	.517	49.25	.155	82.67	.071 116.08	.026 1	149.50	.011	21.42	.297	54.83	.140	88.25	.059	121.67	.023	155.08	.010
15.92	.509 I	49.33	.155	82.75	.071 116.17	.026 1	149.58	.011	21.50	.295	54.92	.140	88.33	.059	121.75	.023	155.17	.010
16.00		49.42		82.83	.071 116.25	.026 [1		.011	21.58		55.00		88.42		121.83		155.25	.010
16.08		49.50		82.92	.070 116.33	.026 1		.011	21.67		55.08		88.50		121.92		155.33	.010
								.011	21.07									
16.17		49.58		83.00	.070 116.42	.026 1		.011	21.75		55.17		88.58		122.00		155.42	.010
16.25	.479			83.08	.070 116.50	.026 1		.011	21.83		55.25		88.67		122.08		155.50	.010
16.33	.472	49.75	.154	83.17	.070 116.58	.026 1	150.00	.011	21.92	.286	55.33	.139	88.75	.058	122.17	.022	155.58	.010
16.42	.466	49.83	.154	83.25	.070 116.67	.026 1	150.08	.011	22.00	.284	55.42	.139	88.83	.058	122.25	.022	155.67	.010
16.50	.459			83.33	.070 116.75	.026 1		.011	22.08		55.50		88.92		122.33		155.75	.010
16.58	.453			83.42	.069 116.83	.026 1		.011	22.17		55.58		89.00		122.42		155.83	.010
								.011	22.17									
16.67		50.08		83.50	.069 116.92	.026 1		.011	22.25		55.67		89.08		122.50		155.92	.010
16.75		50.17		83.58	.069 117.00	.026 1		.010	22.33		55.75		89.17		122.58		156.00	.010
16.83	.436	50.25	.153	83.67	.069 117.08	.026 1	150.50	.010	22.42	.276	55.83	.138	89.25	.057	122.67	.022	156.08	.010
16.92	.431	50.33	.152	83.75	.069 117.17	.025 1	150.58	.010	22.50	.274	55.92	.137	89.33	.057	122.75	.022	156.17	.010
17.00	.426	50.42	.152	83.83	.068 117.25	.025 1	150.67	.010	22.58	.272	56.00	.137	89.42	.057	122.83	.022	156.25	.010
17.08		50.50		83.92	.068 117.33	.025 1		.010	22.67		56.08		89.50		122.92		156.33	.010
17.17	.417			84.00	.068 117.42	.025 1		.010	22.75		56.17		89.58		123.00		156.42	.010
17.25	.413			84.08	.068 117.50	.025 1		.010	22.73		56.25		89.67		123.08		156.50	.010
								.010	22.03									
17.33	.409			84.17	.068 117.58	.025 1		.010	22.92		56.33		89.75		123.17		156.58	.010
17.42	.404			84.25	.067 117.67	.025 1		.010	23.00		56.42		89.83		123.25		156.67	.010
17.50	.401	50.92	.151	84.33	.067 117.75	.025 1		.010	23.08		56.50	.136	89.92		123.33	.022	156.75	.010
17.58	.397	51.00	.151	84.42	.067 117.83	.025 1	151.25	.010	23.17	.261	56.58	.136	90.00	.056	123.42	.022	156.83	.010
17.67	.393 I	51.08	.150	84.50	.067 117.92	.025 1	151.33	.010	23.25	.260	56.67	.135	90.08	.056	123.50	.021	156.92	.010
17.75		51.17		84.58	.067 118.00	.025 1		.010	23.33		56.75		90.17		123.58		157.00	.010
17.83		51.25		84.67	.066 118.08	.025 1		.010	23.42		56.83		90.25		123.67		1157.08	.010
		51.33				.025 1		.010	23.50		56.92						157.00	
17.92				84.75	.066 118.17			.010	23.50				90.33		123.75			.010
18.00		51.42		84.83	.066 118.25	.025 1		.010	23.58		57.00		90.42		123.83		157.25	.010
18.08		51.50		84.92	.066 118.33	.025 1		.010	23.67		57.08		90.50		123.92		157.33	.010
18.17	.373	51.58	.149	85.00	.066 118.42	.025 1	151.83	.010	23.75	.252	57.17	.134	90.58	.055	124.00	.021	157.42	.010
18.25	.371	51.67	.149	85.08	.066 118.50	.025 1	151.92	.010	23.83	.251	57.25	.134	90.67	.054	124.08	.021	157.50	.010
18.33		51.75		85.17	.065 118.58	.025 1		.010	23.92		57.33		90.75		124.17		157.58	.010
18.42		51.83		85.25	.065 118.67	.024 1		.010	24.00		57.42		90.83		124.25		157.67	.010
18.50		51.92		85.33	.065 118.75	.024 1		.010	24.08		57.50		90.92		124.33		1157.75	.010
								.010	24.00									
18.58		52.00		85.42	.065 118.83	.024 1		.010	24.17		57.58		91.00		124.42		157.83	.010
18.67	.357	52.08	.148	85.50	.065 118.92	.024 1	152.33	.010	24.25	.245	57.67	.133	91.08	.054	124.50	.021	157.92	.010
18.75	.354	52.17	.147	85.58	.064 119.00	.024 1	152.42	.010	24.33	.244	57.75	.132	91.17	.054	124.58	.021	158.00	.010
18.83	.352	52.25	.147	85.67	.064 119.08	.024 1	152.50	.010	24.42	.243	57.83	.132	91.25	.053	124.67	.021	158.08	.010
18.92		52.33		85.75	.064 119.17	.024 1		.010	24.50		57.92		91.33		124.75		1158.17	.010
19.00		52.42		85.83	.064 119.25	.024 1		.010	24.58		58.00		91.42		124.83		158.25	.010
19.08		52.50		85.92	.064 119.33	.024 1		.010	24.67		58.08		91.50		124.03		158.33	.010
								.010	24.07									
19.17	.343			86.00	.064 119.42	.024 1		.010	24.75		58.17		91.58		125.00		158.42	.010
19.25	.341			86.08	.063 119.50	.024 1		.010	24.83		58.25		91.67		125.08		158.50	.010
19.33	.339	52.75	.146	86.17	.063 119.58	.024 1	153.00	.010	24.92	.238	58.33	.131	91.75	.053	125.17	.021	158.58	.010
19.42	.337	52.83	.146	86.25	.063 119.67	.024 1		.010	25.00		58.42	.131	91.83		125.25		158.67	.010
19.50		52.92		86.33	.063 119.75	.024 1		.010	25.08		58.50		91.92		125.33		158.75	.010
19.58		53.00		86.42	.063 119.83	.024 1		.010	25.17		58.58		92.00		125.42		1158.83	.010
19.67		53.08		86.50	.063 119.92	.024 1		.010	25.25		58.67		92.08		125.50		158.92	.010
								010	23.23									
19.75		53.17		86.58	.062 120.00	.024 1		.010	25.33		58.75		92.17		125.58		159.00	.010
19.83	.32/	53.25	.144	86.67	.062 120.08	.024 1	153.50	.010	25.42	.234	58.83	.130	92.25	.052	125.67	.020	159.08	.010

25.50	.233	58 92	129 I	92.33	052	125.75	020	159.17	.010
		59.00		92.42	051	1125.83		1159.25	.010
	.232			92.50				159.33	.010
25.75	.231	59.17	.129	92.58	.051	126.00	.020	159.42	.010
25.83	.230	59.25	.129 I	92.67	.051	126.08	.020	159.50	.010
25.92	.230			92.75		126.17		159.58	.010
26.00	.229			92.83				159.67	.010
	.229			92.92				159.75	.010
26.17	.228	59.58	.128	93.00	.050	126.42	.020	159.83	.010
	.227			93.08				159.92	.010
	.227			93.17				1160.00	.010
20.33	.227	59.75							
	.226							160.08	.010
	.226			93.33	.050			160.17	.010
26.58	.225	60.00	.127 I	93.42	.050	126.83	.020	160.25	.010
26.67	.225			93.50				160.33	.010
26.75		60.17		93.58		127.00		1160.42	.010
26.83		60.25		93.67				160.50	.010
26.92	.223	60.33	.126	93.75	.049	127.17	.019	160.58	.010
27.00	.223	60.42	.126 I	93.83	.049	1127.25	.019	160.67	.010
	.222			93.92				160.75	.010
	.222			94.00		127.42		160.83	.010
	.221	60.67	.125	94.08	.049	127.50	.019	160.92	.010
27.33	.221	60.75	.125 I	94.17	.049	127.58	.019	161.00	.010
		60.83						161.08	.010
	.220							1161.17	.010
				94.33	.048	1127.75			
	.220			94.42	.048	127.75 127.83 127.92 128.00 128.08 128.17 128.25 128.33 128.42 128.50		161.25	.010
27.67	.219	61.08	.124	94.50	.048	127.92	.019	161.33	.010
27.75	.219	61.17	.124 I	94.58	.048	1128.00	.019	161.42	.010
27.83	.218	61 25		94.67	048	1128 08		161.50	.010
	.218			94.75	040	1128.17		1161.58	.010
				94.75	.048	1120.17			
	.217			94.83	.048	128.25		161.67	.010
28.08	.217	61.50	.123	94.92	.047	128.33	.019	161.75	.010
28.17	.217 I	61.58	.123 I	95.00	.047	1128.42	.019	161.83	.010
	.216			95.08	0.47	1128 50		161.92	.010
				95.17	.047	1120.50			
	.216							162.00	.010
28.42		61.83		95.25	.047	1128.67 1128.75 1128.92 1129.00 1129.08 1129.17 1129.25 1129.33 1129.42 1129.50 1129.50 1129.51		162.08	.010
28.50	.215	61.92	.122	95.33	.047	128.75	.019	162.17	.010
28.58		62.00	.122 I	95.42	.047	1128.83	.019	162.25	.010
	.214	62 08		95.50	047	1128 92		162.33	.010
				95.58	046	1120.52		1162.42	.010
		62.17		93.38	.046	1129.00			
	.214			95.67	.046	129.08		162.50	.010
		62.33	.121	95.75	.046	129.17		162.58	.010
29.00	.213	62.42	.121 I	95.83	.046	129.25	.018	162.67	.010
		62.50		95.92	046	1129 33		162.75	.010
				96.00	.040	1120.33			
		62.58		96.00	.046	1129.42		1162.83	.010
		62.67		96.08	.046	1129.50		162.92	.010
29.33	.212	62.75	.120	96.17	.046	129.58	.018	163.00	.010
29.42	.211 I	62.83	.120 I	96.25	.045	1129.67	.018	163.08	.010
	.211	62 92		96.33	0.45	1129 75		163.17	.010
	.211	62.92		96.42	.045	1129.83		1163.25	.010
				96.42	.045	1129.83			
	.210			96.30	.045	1129.92		163.33	.010
29.75	.210	63.17	.119	96.58	.045	130.00	.018	163.42	.010
29.83	.210	63.25	.119 I	96.67	.045	130.08	.018	1163.50	.010
	.209							163.58	.010
	.209			96.83				163.67	.010
30.08		63.50		96.92	.045	130.33		163.75	.010
30.17	.208	63.58	.118	97.00	.044	130.42	.018	163.83	.010
30.25		63.67		97.08		130.50		163.92	.010
30.33		63.75		97.17		1130.58		1164.00	.010
	.207			97.25				164.08	.010
	.207			97.33				164.17	.010
30.58	.207	64.00	.117	97.42	.044	130.83	.018	164.25	.010
30.67	.206			97.50				164.33	.010
	.206							1164.42	.010
	.206							164.50	.010
	.206				.044			164.58	.010
31.00	.205	64.42	.116	97.83	.043	131.25	.017	164.67	.010

```
31.08
         .205 | 64.50
                       .116 | 97.92
                                       .043 |131.33
                                                     .017 |164.75
 31.17
         .205 | 64.58
                        .116 | 98.00
                                       .043 |131.42
                                                      .017 |164.83
31.25
        .204 | 64.67
                        .115 | 98.08
                                      .043 |131.50
                                                     .017 | 164.92
                                                                     .010
                       .115 | 98.17
31.33
         .204 | 64.75
                                       .043 |131.58
                                                      .017 |165.00
                                                                     .010
31.42
         .204 | 64.83
                        .115 | 98.25
                                       .043 |131.67
                                                      .017 |165.08
31.50
         .203 | 64.92
                        .115 | 98.33
                                       .043 |131.75
                                                     .017 |165.17
                                                                     .010
                        .115 | 98.42
         .203 | 65.00
                                       .043 |131.83
31.58
                                                      .017 |165.25
                                                                     .010
31.67
         .203 | 65.08
                        .114 | 98.50
                                       .043 |131.92
                                                      .017 |165.33
                                                                     .010
31.75
        .203 | 65.17
                        .114 | 98.58
                                       .043 |132.00
                                                     .017 |165.42
                                                                     .010
31.83
         .202 | 65.25
                        .114 | 98.67
                                       .042 |132.08
                                                      .017 |165.50
                                                                     .010
 31.92
         .202 | 65.33
                        .114 | 98.75
                                       .042 |132.17
                                                      .017 |165.58
 32.00
         .202 | 65.42
                                                      .017 |165.67
                        .114 | 98.83
                                       .042 |132.25
                                                                     .010
 32.08
         .201 | 65.50
                        .113 | 98.92
                                       .042 |132.33
                                                      .017 |165.75
                                                                     .010
 32.17
         .201 | 65.58
                        .113 | 99.00
                                       .042 |132.42
                                                      .017 |165.83
                                                                     .010
        .201 | 65.67
 32.25
                       .113 | 99.08
                                       .042 | 132.50
                                                     .017 |165.92
                                                                     .010
 32.33
                        .113 | 99.17
         .201 | 65.75
                                       .042 |132.58
                                                      .017 |166.00
                                                                     .010
 32.42
         .200 | 65.83
                        .113 | 99.25
                                       .042 |132.67
                                                      .017 |166.08
32.50
        .200 | 65.92
                        .113 | 99.33
                                       .042 |132.75
                                                     .017 |166.17
                                                                     .010
32.58
         .200 | 66.00
                        .112 | 99.42
                                       .042 |132.83
                                                      .017 |166.25
                                                                     .010
 32.67
         .199 | 66.08
                        .112 | 99.50
                                       .041 |132.92
                                                      .017 |166.33
                                                                     .010
32.75
        .199 | 66.17
                        .112 | 99.58
                                       .041 |133.00
                                                     .017 |166.42
                                                                     .010
         .199 | 66.25
                       .112 | 99.67
                                       .041 |133.08
                                                      .017 |166.50
32.83
                                                                     010
32.92
         .199 | 66.33
                        .112 | 99.75
                                       .041 |133.17
                                                      .017 |166.58
 33.00
        .198 | 66.42
                       .111 | 99.83
                                       .041 |133.25
33.08
        .198 | 66.50
                       .111 | 99.92
                                       .041 |133.33
                                                      .017 |
 33.17
        .198 | 66.58
                        .111 |100.00
                                       .041 |133.42
                                                      .016
                                      .041 |133.50
33.25
       .198 | 66.67
                       .111 |100.08
                                                     .016 |
33.33 .197 | 66.75
                       .111 |100.17
                                       .041 |133.58
                                                      .016 |
| READ STORM | Filename: G:\Projects\2008\
                    08104 - Vaughan Corporate Centre - Master Ser
                               \Design\SWM\December 2011 - TS\V02 Input Hydr
| Ptotal= 47.81 mm | Comments: 5yr/6hr
            TIME RAIN | TIME
                                    RAIN | TIME RAIN | TIME
                                                                   RATN
               hrs mm/hr | hrs
                                     mm/hr |
                                             hrs
                                                   mm/hr |
                                                                   mm/hr
                      .00 | 2.00
                                    16.25 | 3.75 6.69 | 5.50
                        .96 | 2.25
                                     16.25 | 4.00
                                                    3.82 | 5.75
                        .96 | 2.50
                                     43.98 |
                                             4.25
                                                    3.82 | 6.00
               1.00
                        .96 | 2.75
                                     43.98 | 4.50
                                                    1.91 | 6.25
               1.25
                        .96 | 3.00
                                    12.43 | 4.75
                                                     1.91
                       5.74 | 3.25
                                    12.43 | 5.00
               1.75
                       5.74 | 3.50
                                    6.69 | 5.25
                                                     .96 |
| 1 + 2 = 3 |
                          AREA OPEAK TPEAK
                                                    R.V.
                          (ha)
                                 (cms)
                                          (hrs)
                                                    (mm)
       ID1= 1 (0215): 124.65 7.640
                                          3.00
                                                  41.11
      + ID2= 2 (0210): 576.91 11.391
                                          3.25
                                                  36 96
         ID = 3 (0218): 701.56 18.707
                                          3.08
                                                  37.70
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| STANDHYD (0231) | Area (ha) = 14.94
|ID= 1 DT= 5.0 min | Total Imp(%)= 88.00 Dir. Conn.(%)= 88.00
                            IMPERVIOUS PERVIOUS (i)
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Surface Area	(ha) =	13.15	1.79
Dep. Storage	(mm) =	1.00	1.50
Average Slope	(%) =	1.00	2.00
Length	(m) =	315.60	40.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

		TRA	ANSFORME	D HYETOGRA	PH		
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.083	.00	1.667	5.74	3.250	12.43	4.83	.96
.167	.00	1.750	5.74	3.333	6.69	4.92	.96
.250	.00	1.833	16.25		6.69	5.00	.96
.333	.96	1.917	16.25	3.500	6.69	5.08	.96
.417	.96	2.000	16.25	3.583	6.69	5.17	.96
.500	.96	2.083	16.25	3.667	6.69	5.25	.96
.583		2.167		3.750			.96
.667		2.250		3.833			.96
.750		2.333		3.917	3.82		.96
.833		2.417		4.000	3.82		.96
.917		2.500		4.083	3.82		.96
1.000		2.583	43.98		3.82	5.75	.96
1.083		2.667	43.98			5.83	.96
1.167		2.750	43.98		1.91	5.92	.96
1.250		2.833	12.43		1.91	6.00	.96
1.333		2.917		4.500	1.91		.96
1.417		3.000		4.583	1.91		.96
1.500		3.083		1 4.667	1.91	6.25	.96
1.583	5.74	3.167	12.43	4.750	1.91		
Max.Eff.Inten.(m	m/hr)=	43.98		23.12			
over	(min)	5.00		15.00			
Storage Coeff.	(min) =	7.07	(ii)	11.49 (ii)			
Unit Hyd. Tpeak	(min) =	5.00		15.00			
Unit Hyd. peak	(cms) =	.17		.09			
					*TOT		
	(cms)=	1.59		.09		678 (iii	.)
	(hrs)=	2.75		2.83		.75	
	(mm) =	46.81		19.53		.54	
TOTAL RAINFALL	(mm) =	47.81		47.81		.81	
RUNOFF COEFFICIE	NT =	.98		.41		.91	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 80.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| STANDHYD (0220) | Area (ha) = 16.19 | ID= 1 DT= 5.0 min | Total Imp(%)= 48.00 Dir. Conn.(%)= 48.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =7.77 8.42 Dep. Storage 1.00 4.30 (mm) = 2.00 Average Slope (%)= 1.00 328.50 Length (m) = 40.00 Mannings n .013 Max.Eff.Inten.(mm/hr) = 43.98 20.80 over (min) 5.00 25.00 Storage Coeff. (min)= 7.24 (ii) 20.47 (ii)

Unit Hyd. Tpea Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALI RUNOFF COEFFIC		5.00 .17 .94 2.75 46.81 47.81	25.00 .05 .30 3.00 17.69 47.81		OTALS* 1.166 (iii) 2.75 31.67 47.81
(i) CN PROCE CN* = (ii) TIME STE THAN THE	CDURE SELECTED 80.0 Ia = EP (DT) SHOULD C STORAGE COEF DW DOES NOT IN	FOR PERVIO Dep. Stora BE SMALLER FICIENT.	US LOSSES: ge (Above OR EQUAL	: =)	.66
	OUTFLOW (cms) .0000	STORAGE (ha.m.)			
INFLOW : ID= 2 OUTFLOW: ID= 1					
	PEAK FLOW TIME SHIFT OF MAXIMUM STOR	PEAK FLOW AGE USED	(r (ha.	nin)= 35. .m.)= .2	00 288
ADD HYD (0236) 1 + 2 = 3	1	A QPEAK	TPEAK	R.V.	
ID1= 1 (0 + ID2= 2 (0)231): 14.9)234): 16.1) (cms) 4 1.678 9 .461	(hrs) 2.75 3.33	(mm) 43.54 31.66	
	0236): 31.1 LOWS DO NOT IN	3 2.037	2.75	37.36	
ADD HYD (0222) 1 + 2 = 3 ID1= 1 (0 + ID2= 2 (0	ARE. (ha 0218): 701.5 0236): 31.1	A QPEAK) (cms) 6 18.707 3 2.037	TPEAK (hrs) 3.08 2.75	R.V. (mm) 37.70 37.36	
	732.6	9 19.732	3.08	37.68	
STANDHYD (0239) ID= 1 DT= 5.0 min		ha)= 8.57 (%)= 90.00	Dir. Co	onn.(%)=	90.00

Dep. Storage Average Slope Length Mannings n	(mm) = (%) = (m) = =		4.30 2.00 40.00 .250		
Storage Coeff. Unit Hyd. Tpeak	(min) (min) = (min) =	5.00	(ii) 10.06 15.00	(ii)	
Unit Hyd. peak	(cms)=	.19	.10	*TOTALS	*
PEAK FLOW	(cms) =	.94	.04	.978	(iii)
TIME TO PEAK	(hrs) =	2.75	2.83	2.75	
RUNOFF VOLUME	(mm) =	46.81	17.69	43.90	
TOTAL RAINFALL	(mm) =	47.81	47.81	47.81	
RUNOFF COEFFICIE	ENT =	.98	.37	.92	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

 CN* = 80.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	3	(1)-	0 01				
STANDHYD (0232) ID= 1 DT= 5.0 min					(0)-	40 00	
ID= 1 DT= 5.0 MIN	TOLAI	Imp (%) =	40.00	DIF. C	= (%) . mno.	40.00	
		TMDFD1/TA	110	PERVIOUS	: (i)		
Surface Area	(ba) =) (±)		
				4.30			
Dep. Storage							
Average Slope							
		242.30					
Mannings n	=	.013		.250			
Max.Eff.Inten.(mm/hr)=	43.98		20.80			
over	(min)	5.00		20.00			
Storage Coeff.	(min) =	6.03	(ii)	19.26	(ii)		
Unit Hyd. Tpeak	(min) =	5.00		20.00			
Unit Hyd. peak	(cms) =	.19		.06			
					T	OTALS	
PEAK FLOW	(cms) =	.51		.17		.659	(iii)
TIME TO PEAK	(hrs) =	2.75		2.92		2.75	
RUNOFF VOLUME						31.67	
TOTAL RAINFALL						47.81	
RUNOFF COEFFICT	. ,			.37		.66	
ROBOTT COEFFICE		. 50		.57		.00	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 80.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

INFLOW : ID= 2 (0232)

| RESERVOIR (0235) | | IN= 2---> OUT= 1 | | DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE (cms) (ha.m.) (cms) .0000 .5820 .3000 AREA QPEAK TPEAK R.V. (ha) (hrs) (cms) (mm)

2.75

31.67

8.81

OUTFI	LOW: ID=	= 1 (0235	5)	8.81	.25	3.	33	31.65	
				REDUCTION PEAK FLOAGE USI					
1 3 DD 1111D	(0007								
1 + 2	2 = 3		ARE (ha	A QPEA .) (cm:	AK TE s) (h	PEAK nrs)	R.V. (mm)		
+	ID1= 1 ID2= 2	(0239): (0235):	8.5 8.8	A QPEA) (cms 7 .978 1 .248	8 2. 8 3.	.75 .33	43.90 31.65		
				8 1.17					
NOTE:	PEAK	FLOWS DO	NOT IN	CLUDE BAS	SEFLOWS	IF ANY	•		
ADD HYD	(0238	3)	ARE	A OPE	AK TE	PEAK	R.V		
1 + 2			(ha	.) (cm:	s) (h	nrs)	(mm)		
+	ID1= 1 ID2= 2	(0222): (0237):	732.6	A QPEA) (cms 9 19.732 8 1.176	2 3. 6 2.	.75	37.68 37.69		
				7 20.28					
NOTE:	PEAK	FLOWS DO	NOT IN	CLUDE BAS	SEFLOWS	IF ANY			
ADD HYD	(0227	7)	ARE (ha	A QPEA	AK TE	PEAK	R.V.		
+	ID1= 1 ID2= 2	(0245): (0238):	17.2 750.0	A QPEA) (cms 4 1.882 7 20.289	2 2. 9 3.	.75 .08	42.44 37.68		
				1 20.95					
NOTE:	PEAK	FLOWS DO	NOT IN	CLUDE BAS	SEFLOWS	IF ANY			
RESERVOI IN= 2 DT= 5.0	> OTTE:-	1 1	OUTFLOW (cms)	STORA (ha.r	AGE m.)	OUTFL	WC) 0.0	STORAGE (ha.m.)	
			1.8900 2.2330 2.7950	6.40	020 I	.3 1 . 0.3	()()	18.8300 19.3240 19.8490	
			3.2760	9.10	830 610 670	38.36	00	20.2920 20.3980	
						40 -			
			3.6700 5.6440	12.20 13.90 15.58 17.3	060	45.00	00	21.3030 22.1830 23.5100 .0000	
		0.400==	3.6700 5.6440 9.7990 15.2400	13.90	060 860 710 OPEAK	45.00 47.50 .00	00 00 00 AK	22.1830 23.5100 .0000	

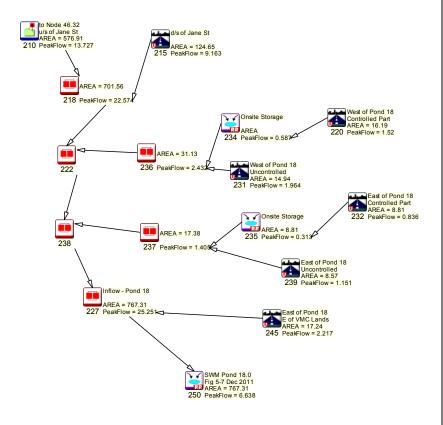
08104 – Vaughan Metropolitan Centre, City of Vaughan Hydrologic Model Output – Required Storage –Controlled to 2-year post at 80% Imperviousness (6hr AES Storm)

April 2012

PEAK FLOW REDUCTION [Qout/Qin](%) = 20.23
TIME SHIFT OF PEAK FLOW (min) = 220.00
MAXIMUM STORAGE USED (ha.m.) = 12.7401

FINISH

North East POND (10yr 6hr AES)





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                ***** DETAILED OUTPUT *****
 Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
 Output filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final
\verb|submission|| 05PROP~1| 10y6 w Dev VMC, Proposed Pond 18.out|
 Summary filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final
submission\05PROP~1\10y6 w Dev VMC, Proposed Pond 18.sum
DATE: 4/10/2012
                                    TIME: 12:21:43 PM
USER:
COMMENTS:
 ** SIMULATION NUMBER: 1 **
    READ STORM |
                    Filename: G:\Projects\2008\
                             08104 - Vaughan Corporate Centre - Master Ser
                             \Design\SWM\December 2011 - TS\VO2 Input Hydr
| Ptotal= 55.69 mm |
                    Comments: 10yr/6hr
              TIME
                     RAIN | TIME
                                  RAIN | TIME
                                                RAIN | TIME
                                                              RATN
               hrs
                    mm/hr |
                            hrs
                                  mm/hr |
                                          hrs
                                               mm/hr |
                                                        hrs
                                                             mm/hr
                     .00 | 2.00
                                  18.94 |
                                         3.75
                                                7.80 |
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                     1.11 | 2.50
                                  51.24 |
                                         4.25
                                                 4.46 |
                                                       6.00
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                     1.11 | 2.75
                                  51.24 | 4.50
                                                2.23 |
                                                       6.25
                                                              1.11
              1.25
                     1.11 | 3.00
                                  14.48 | 4.75
                                                2.23
              1.50
                     6.68 | 3.25
                                  14.48 |
                                         5.00
                                                1.11
              1.75
                     6.68 | 3.50
                                  7.80 | 5.25
                                                1.11 |
| STANDHYD (0215) | Area (ha) = 124.65
|ID= 1 DT= 5.0 min | Total Imp(%)= 83.00 Dir. Conn.(%)= 79.00
```

	.25	.000	33.67 .215	67.08	.129 100.50	.056 133.9	2 .022
IMPERVIOUS PERVIOUS (i)	.33	.000			.129 100.58	.056 134.0	
Surface Area (ha) = 103.46 21.19	.42	.000			.129 100.67	.056 134.0	
Dep. Storage (mm) = .50 4.70	.50	.000	33.92 .214	67.33	.129 100.75	.056 134.1	7 .022
Average Slope (%) = .30 .40	.58	.000	34 00 214	67.42	.128 100.83	.055 134.2	5 .022
Length (m) = 1800.00 200.00	.67	.000		67.50	.128 100.92	.055 134.3	
Mannings n = $.016$ $.250$.75	.000	34.17 .214	67.58	.128 101.00	.055 134.4	2 .022
-	.83	.000		67.67	.128 101.08	.055 134.5	
NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.	.92	.000		67.75	.128 101.17	.055 134.5	
	1.00	.000	34.42 .213	67.83	.127 101.25	.055 134.6	7 .021
	1.08	.000		67.92	.127 101.33	.055 134.7	
TRANSFORMED HYETOGRAPH	1.17	.000		68.00	.127 101.42	.054 134.8	3 .021
TIME RAIN TIME RAIN TIME RAIN TIME RAIN	1.25	.000	34.67 .212	68.08	.127 101.50	.054 134.9	2 .021
	1.33	.000		68.17	.127 101.58	.054 135.0	
.083 .00 1.667 6.68 3.250 14.48 4.83 1.11	1.42	.000	34.83 .212	68.25	.126 101.67	.054 135.0	8 .021
.167 .00 1.750 6.68 3.333 7.80 4.92 1.11	1.50	.001	34.92 .211	68.33	.126 101.75	.054 135.1	7 .021
.250 .00 1.833 18.94 3.417 7.80 5.00 1.11	1.58	.002		68.42	.126 101.83	.054 135.2	
.333 1.11 1.917 18.94 3.500 7.80 5.08 1.11	1.67	.003	35.08 .211	68.50	.126 101.92	.053 135.3	3 .021
.417 1.11 2.000 18.94 3.583 7.80 5.17 1.11	1.75	.005		68.58	.126 102.00	.053 135.4	
.500 1.11 2.083 18.94 3.667 7.80 5.25 1.11	1.83	.007			.125 102.08	.053 135.5	
.583 1.11 2.167 18.94 3.750 7.80 5.33 1.11	1.92	.010	35.33 .210	68.75	.125 102.17	.053 135.5	8 .021
.667 1.11 2.250 18.94 3.833 4.46 5.42 1.11	2.00	.493		68.83	.125 102.25	.053 135.6	
.750 1.11 2.333 51.24 3.917 4.46 5.50 1.11	2.08	1.040		68.92	.125 102.33	.053 135.7	
.833 1.11 2.417 51.24 4.000 4.46 5.58 1.11	2.17	1.630	35.58 .209	69.00	.125 102.42	.053 135.8	3 .021
.917 1.11 2.500 51.24 4.083 4.46 5.67 1.11	2.25	2.241		69.08	.124 102.50	.053 135.9	
1.000 1.11 2.583 51.24 4.167 4.46 5.75 1.11	2.33	2.907		69.17	.124 102.58	.052 136.0	
1.083 1.11 2.667 51.24 4.250 4.46 5.83 1.11	2.42	3.724	35.83 .209	69.25	.124 102.67	.052 136.0	8 .021
1.167 1.11 2.750 51.24 4.333 2.23 5.92 1.11	2.50	4.728		69.33	.124 102.75	.052 136.1	
1.250 1.11 2.833 14.48 4.417 2.23 6.00 1.11	2.58	5.892		69.42	.124 102.83	.052 136.2	
1.333 6.68 2.917 14.48 4.500 2.23 6.08 1.11	2.67	7.281	36.08 .208	69.50	.123 102.92	.052 136.3	3 .021
1.417 6.68 3.000 14.48 4.583 2.23 6.17 1.11	2.75	9.088		69.58	.123 103.00	.052 136.4	
1.500 6.68 3.083 14.48 4.667 2.23 6.25 1.11	2.83	10.761	36.25 .207	69.67	.123 103.08	.052 136.5	0 .020
1.583 6.68 3.167 14.48 4.750 2.23	2.92	12.101	36.33 .207	69.75	.123 103.17	.051 136.5	8 .020
		13.011		69.83	.123 103.25	.051 136.6	
Max.Eff.Inten.(mm/hr) = 51.24 19.46	3.08	13.526	36.50 .207	69.92	.122 103.33	.051 136.7	5 .020
over (min) 30.00 90.00	3.17	13.727	36.58 .207	70.00	.122 103.42	.051 136.8	3 .020
Storage Coeff. (min) = 30.73 (ii) 88.56 (ii)		13.713		70.08	.122 103.50	.051 136.9	
Unit Hyd. Tpeak (min) = 30.00 90.00	3.33	13.549	36.75 .206	70.17	.122 103.58	.051 137.0	0 .020
Unit Hyd. peak (cms) = .04 .01	3.42	13.267	36.83 .206	70.25	.122 103.67	.051 137.0	8 .020
TOTALS		12.894		70.33	.121 103.75	.050 137.1	
PEAK FLOW (cms) = 9.00 .52 9.163 (iii)	3.58	12.465	37.00 .205	70.42	.121 103.83	.050 137.2	5 .020
TIME TO PEAK (hrs) = 3.00 4.17 3.00	3.67	12.011	37.08 .205	70.50	.121 103.92	.050 137.3	3 .020
RUNOFF VOLUME $(mm) = 55.19 23.04 48.44$		11.558		70.58	.121 104.00	.050 137.4	
TOTAL RAINFALL (mm) = 55.69 55.69 55.69		11.119		70.67	.121 104.08	.050 137.5	
RUNOFF COEFFICIENT = .99 .41 .87	3.92	10.689	37.33 .204	70.75	.120 104.17	.050 137.5	8 .020
		10.267		70.83	.120 104.25	.050 137.6	
	4.08	9.858		70.92	.120 104.33	.050 137.7	
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:	4.17	9.467	37.58 .204	71.00	.120 104.42	.049 137.8	3 .020
$CN^* = 76.0$ Ia = Dep. Storage (Above)	4.25	9.101	37 67 203	71.08	.120 104.50	.049 137.9	2 .020
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL	4.33	8.759		71.17	.119 104.58	.049 138.0	
THAN THE STORAGE COEFFICIENT.	4.42	8.433	37.83 .203	71.25	.119 104.67	.049 138.0	8 .020
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.	4.50	8.117			.119 104.75	.049 138.1	
(III) THAN THOW DODG NOT INCHOUSE BANGSINGS IT ANT.							
	4.58	7.812		71.42	.119 104.83	.049 138.2	
	4.67	7.521	38.08 .202	71.50	.119 104.92	.049 138.3	3 .019
	4.75	7.246		71.58	.118 105.00	.048 138.4	
READ HYD (0210) AREA (ha) = 576.91	4.83	6.988		71.67	.118 105.08	.048 138.5	
DT= 5.0 min	4.92	6.780	38.33 .202	71.75	.118 105.17	.048 138.5	8 .019
	5.00	6.600		71.83	.118 105.25	.048 138.6	
Filename: G:\Projects\2008\08104 - Vaughan Corporate Centre - Master Servicing	5.08	6.420		71.92	.118 105.33	.048 138.7	
Strategy\Design\SWM\December 20	5.17	6.242	38.58 .201	72.00	.117 105.42	.048 138.8	3 .019
Comments: Outflow at 46.32	5.25	6.068		72.08	.117 105.50	.048 138.9	
Commences. Odellow de 10.32							
	5.33	5.900		72.17	.117 105.58	.048 139.0	
TIME FLOW TIME FLOW TIME FLOW TIME FLOW	5.42	5.739	38.83 .200	72.25	.117 105.67	.047 139.0	8 .019
hrs cms hrs cms hrs cms hrs cms	5.50	5.587		72.33	.117 105.75	.047 139.1	
.00 .000 33.42 .216 66.83 .130 100.25 .056 133.67 .022	5.58	5.443		72.42	.116 105.83	.047 139.2	
.08 .000 33.50 .216 66.92 .130 100.33 .056 133.75 .022	5.67	5.309	39.08 .200	72.50	.116 105.92	.047 139.3	3 .019
.17 .000 33.58 .216 67.00 .129 100.42 .056 133.83 .022	5.75			72.58	.116 106.00	.047 139.4	
.1000 00.00 .210 07.00 .125 100.42 .000 130.00 .022	1 3.73	3.100		, ,2.50	.110 100.00	.04/ 133.	019

5.83	5.074	39.25	.199	72.67	.116 106.08	.047 139.50	.019	11.42	1.891	1 44.83	.185	78.25	.104	111.67	.040	145.08	.016
5.92	4.972			72.75	.116 106.17	.047 139.58	.019	11.50	1.859		.185			111.75		145.17	.016
6.00	4.879			72.83	.116 106.25	.047 139.67	.019	11.58	1.827		.184			111.83		145.25	.016
6.08	4.794			72.92	.115 106.33	.046 139.75	.019	11.67	1.795		.184			111.92		145.33	.016
6.17	4.716			73.00	.115 106.42	.046 139.83	.019	11.75	1.765		.184			112.00		145.42	.016
6.25	4.644			73.08	.115 106.50	.046 139.92	.019	11 93	1.735		.184			112.08		145.50	.016
6.33	4.576			73.00	.115 106.58	.046 140.00	.019	11.92	1.706		.184			112.17		145.58	.016
							.019	12.00	1.677								
6.42	4.507			73.25	.115 106.67	.046 140.08	.019	12.00			.183			112.25		145.67	.016
6.50		39.92		73.33	.114 106.75	.046 140.17	.019	12.08	1.649		.183			112.33		145.75	.016
6.58	4.358			73.42	.114 106.83	.046 140.25	.019	12.17	1.622		.183			112.42		145.83	.016
6.67	4.280			73.50	.114 106.92	.046 140.33	.018	12.25	1.595		.183			112.50		145.92	.016
6.75	4.201			73.58	.114 107.00	.045 140.42	.018	12.33	1.569		.183			112.58		146.00	.016
6.83	4.122			73.67	.114 107.08	.045 140.50	.018	12.42	1.544		.182			112.67	.039	146.08	.016
6.92	4.045	40.33	.196	73.75	.113 107.17	.045 140.58	.018	12.50	1.519	45.92	.182	79.33	.102	112.75	.039	146.17	.016
7.00	3.971	40.42	.196	73.83	.113 107.25	.045 140.67	.018	12.58	1.495		.182		.102	112.83	.039	146.25	.016
7.08	3.900	40.50	.196	73.92	.113 107.33	.045 140.75	.018	12.67	1.471	46.08	.182	79.50	.102	112.92	.039	146.33	.016
7.17	3.833	1 40.58	.196	74.00	.113 107.42	.045 140.83	.018	12.75	1.448	46.17	.181	79.58	.102	113.00	.038	146.42	.016
7.25	3.769	1 40.67		74.08	.113 107.50	.045 140.92	.018	12.83	1.425		.181		.102			146.50	.016
7.33	3.708			74.17	.113 107.58	.045 141.00	.018	12.92	1.403		.181			113.17		146.58	.016
7.42		40.83		74.25	.112 107.67	.045 141.08	.018	13.00	1.381		.181			113.25		146.67	.016
7.50	3.595			74.33	.112 107.75	.044 141.17	.018	13.08	1.360		.181			113.33		146.75	.016
7.58	3.542			74.42	.112 107.73	.044 141.25	.018	13.17	1.339		.180			113.42		146.83	.016
		41.00					.010	13.17									
7.67				74.50	.112 107.92	.044 141.33	.018	13.25	1.319		.180			113.50		146.92	.016
7.75	3.445			74.58	.112 108.00	.044 141.42	.018	13.33	1.299		.180			113.58		147.00	.015
7.83	3.400			74.67	.112 108.08	.044 141.50	.018	13.42	1.280		.180			113.67		147.08	.015
7.92	3.356			74.75	.111 108.17	.044 141.58	.018	13.50	1.261		.180			113.75		147.17	.015
8.00	3.314			74.83	.111 108.25	.044 141.67	.018	13.58	1.242		.179		.100			147.25	.015
8.08	3.273			74.92	.111 108.33	.044 141.75	.018	13.67	1.224		.179		.100			147.33	.015
8.17	3.234	41.58	.193	75.00	.111 108.42	.044 141.83	.018	13.75	1.206	47.17	.179	80.58	.100	114.00	.037	147.42	.015
8.25	3.195	41.67	.193	75.08	.111 108.50	.044 141.92	.018	13.83	1.189	47.25	.179	80.67	.100	114.08	.037	147.50	.015
8.33	3.157	41.75	.193	75.17	.110 108.58	.043 142.00	.018	13.92	1.172	47.33	.179	80.75	.100	114.17	.037	147.58	.015
8.42	3.119	41.83	.193	75.25	.110 108.67	.043 142.08	.018	14.00	1.153	47.42	.178	80.83	.100	114.25	.037	147.67	.015
8.50	3.082			75.33	.110 108.75	.043 142.17	.018	14.08	1.133		.178			114.33		147.75	.015
8.58	3.046			75.42	.110 108.83	.043 142.25	.018	14.17	1.112		.178			114.42		147.83	.015
8.67	3.010			75.50	.110 100.03	.043 142.23	.018	14.25	1.091		.178			114.50		147.92	.015
8.75	2.975			75.58	.110 100.92	.043 142.42	.017	14.33	1.069		.178			114.58		148.00	.015
8.83	2.940			75.67	.109 109.08	.043 142.42	.017	14.42	1.047		.177			114.67		148.08	.015
8.92	2.905			75.75	.109 109.17	.043 142.58	.017	14.50	1.024		.177			114.75		148.17	.015
				75.83			.017	14.50									
9.00	2.871				.109 109.25	.043 142.67	.017	14.58	1.002		.177		.099			148.25	.015
9.08	2.837			75.92	.109 109.33	.043 142.75	.017	14.67		48.08	.177			114.92		148.33	.015
9.17		42.58		76.00	.109 109.42	.042 142.83	.017	14.75		48.17	.176			115.00		148.42	.015
9.25	2.770			76.08	.109 109.50	.042 142.92	.017	14.83		48.25	.176			115.08		148.50	.015
9.33		42.75		76.17	.108 109.58	.042 143.00	.017	14.92		48.33	.176			115.17		148.58	.015
9.42	2.705			76.25	.108 109.67	.042 143.08	.017	15.00		48.42	.176			115.25	.036	148.67	.015
9.50	2.673	42.92	.190	76.33	.108 109.75	.042 143.17	.017	15.08	.872	48.50	.176	81.92	.098	115.33	.036	148.75	.015
9.58	2.642	43.00	.190	76.42	.108 109.83	.042 143.25	.017	15.17	.851	48.58	.175	82.00	.098	115.42	.036	148.83	.015
9.67	2.610	43.08	.189	76.50	.108 109.92	.042 143.33	.017	15.25	.831	48.67	.175	82.08	.097	115.50	.036	148.92	.015
9.75	2.579	43.17	.189	76.58	.108 110.00	.042 143.42	.017	15.33	.812	48.75	.175	82.17	.097	115.58	.036	149.00	.015
9.83	2.548			76.67	.107 110.08	.042 143.50	.017	15.42		48.83	.175			115.67		149.08	.015
9.92	2.518			76.75	.107 110.17	.042 143.58	.017	15.50		48.92	.175			115.75		149.17	.015
10.00		43.42		76.83	.107 110.25	.041 143.67	.017	15.58		1 49.00	.174			115.83		149.25	.015
10.08	2.456			76.92	.107 110.33	.041 143.75	.017	15.67		49.08	.174			115.92		149.33	.015
10.17	2.425			77.00	.107 110.42	.041 143.83	.017	15.75		49.17	.174			116.00		149.42	.015
10.25	2.394			77.08	.107 110.42	.041 143.03	.017	15.83		49.25	.174			116.08		149.50	.015
10.33	2.362			77.17	.106 110.58	.041 144.00	.017	15.92		49.33	.174			116.17		149.58	.014
							.017	15.92									
10.42	2.330			77.25	.106 110.67	.041 144.08	.017	16.00		49.42	.173			116.25		149.67	.014
10.50	2.296			77.33	.106 110.75	.041 144.17	.017	16.08		49.50	.173			116.33		149.75	.014
10.58	2.262			77.42	.106 110.83	.041 144.25	.017	16.17		49.58	.173			116.42		149.83	.014
10.67	2.226			77.50	.106 110.92	.041 144.33	.017	16.25		49.67	.173			116.50		149.92	.014
10.75	2.189			77.58	.106 111.00	.041 144.42	.017	16.33		49.75	.172			116.58		150.00	.014
10.83	2.151			77.67	.105 111.08	.041 144.50	.017	16.42		49.83	.172			116.67		150.08	.014
10.92	2.113			77.75	.105 111.17	.040 144.58	.017	16.50		49.92	.172			116.75		150.17	.014
11.00	2.074	44.42	.186	77.83	.105 111.25	.040 144.67	.016	16.58	.585	50.00	.172	83.42	.095	116.83	.035	150.25	.014
11.08	2.035			77.92	.105 111.33	.040 144.75	.016	16.67		50.08	.172			116.92		150.33	.014
11.17	1.997			78.00	.105 111.42	.040 144.83	.016	16.75		50.17	.171			117.00		150.42	.014
11.25	1.960			78.08	.105 111.50	.040 144.92	.016	16.83		50.25	.171			117.08		150.50	.014
	1.925			78.17	.104 111.58	.040 145.00	.016	16.92		50.33	.171			117.17		150.58	.014
					,						1						

17.00	.534	50.42	.171	83.83	.094 117.25	.034	150.67	.014	22.58	.312	56.00	.157	89.42	.080	122.83	.029	1156.25	.012
17.08	.525			83.92	.094 117.33		150.75	.014	22.67		56.08		89.50		122.92		156.33	.012
17.17	.516			84.00	.094 117.42		150.83	.014	22.75		56.17		89.58		123.00		156.42	.012
17.25	.508			84.08	.094 117.50		150.92	.014	22.73		56.25		89.67		123.00		156.50	.012
17.33	.500			84.17	.094 117.58		151.00	.014	22.92		56.33		89.75		123.17		156.58	.012
17.42	.493			84.25	.094 117.67		151.08	.014	23.00		56.42		89.83		123.25		156.67	.012
17.50	.486	50.92	.170	84.33	.093 117.75	.034	151.17	.014	23.08	.306	56.50	.156	89.92	.079	123.33	.029	156.75	.012
17.58	.479	51.00	.169	84.42	.093 117.83	.034	151.25	.014	23.17	.305	56.58	.156	90.00	.079	123.42	.029	156.83	.012
17.67	.472	51.08	.169	84.50	.093 117.92	.034	151.33	.014	23.25	.304	56.67	.156	90.08	.078	123.50	.029	156.92	.012
17.75	.466			84.58	.093 118.00		151.42	.014	23.33		56.75		90.17		123.58		157.00	.012
17.83	.460			84.67	.093 118.08		151.50	.014	23.42		56.83		90.25		123.67		157.08	.012
17.92	.454			84.75	.092 118.17		151.58	.014	23.50		56.92		90.33		123.75		157.17	.012
18.00	.449			84.83	.092 118.25		151.67	.014	23.58		57.00		90.42		123.83		157.25	.012
18.08	.444			84.92	.092 118.33		151.75	.014	23.67		57.08		90.50		123.92		157.33	.012
18.17	.439			85.00	.092 118.42		151.83	.014	23.75		57.17		90.58		124.00		157.42	.012
18.25	.434	51.67	.168	85.08	.092 118.50	.033	151.92	.014	23.83	.297	57.25	.154	90.67	.077	124.08	.029	157.50	.012
18.33	.429	51.75	.168	85.17	.091 118.58	.033	152.00	.014	23.92	.296	57.33	.154	90.75	.077	124.17	.028	157.58	.012
18.42	.424	51.83	.167	85.25	.091 118.67	.033	152.08	.014	24.00	.296	57.42	.154	90.83	.077	124.25	.028	157.67	.012
18.50	.420			85.33	.091 118.75		152.17	.014	24.08		57.50		90.92		124.33		157.75	.012
18.58	.416			85.42	.091 118.83		152.25	.013	24.17		57.58		91.00		124.42		157.83	.012
18.67	.412			85.50	.091 118.92		152.33	.013	24.25		57.67		91.08		124.50		157.92	.012
18.75	.408			85.58	.090 119.00		152.42	.013	24.33		57.75		91.17		124.58		158.00	.012
18.83	.404			85.67	.090 119.08		152.50	.013	24.42		57.83		91.25		124.67		158.08	.012
18.92	.401	52.33	.166	85.75	.090 119.17	.033	152.58	.013	24.50	.290	57.92	.153	91.33	.075	124.75	.028	158.17	.012
19.00	.397	52.42	.166	85.83	.090 119.25	.032	152.67	.013	24.58	.289	58.00	.152	91.42	.075	124.83	.028	158.25	.012
19.08	.394	52.50	.166	85.92	.089 119.33	.032	152.75	.013	24.67	.287	58.08	.152	91.50	.075	124.92	.028	158.33	.011
19.17	.390			86.00	.089 119.42		152.83	.013	24.75		58.17		91.58		125.00		158.42	.011
19.25	.387			86.08	.089 119.50		152.92	.013	24.83		58.25		91.67		125.08		158.50	.011
19.33	.384			86.17	.089 119.58		153.00	.013	24.92		58.33		91.75		125.17		158.58	.011
19.42	.381			86.25	.089 119.67			.013	25.00		58.42		91.83				1158.67	.011
							153.08								125.25			
19.50	.378			86.33	.088 119.75		153.17	.013	25.08		58.50		91.92		125.33		158.75	.011
19.58	.375			86.42	.088 119.83		153.25	.013	25.17		58.58		92.00		125.42		158.83	.011
19.67	.373		.164	86.50	.088 119.92	.032	153.33	.013	25.25		58.67	.151	92.08		125.50		158.92	.011
19.75	.370	53.17	.164	86.58	.088 120.00	.032	153.42	.013	25.33	.277	58.75	.151	92.17	.073	125.58	.027	159.00	.011
19.83	.368	53.25	.164	86.67	.087 120.08	.032	153.50	.013	25.42	.276	58.83	.151	92.25	.073	125.67	.027	159.08	.011
19.92	.365	53.33	.164	86.75	.087 120.17		153.58	.013	25.50	.274	58.92	.150	92.33	.073	125.75	.027	159.17	.011
20.00	.363			86.83	.087 120.25		153.67	.013	25.58		59.00		92.42		125.83		159.25	.011
20.08	.360			86.92	.087 120.33		153.75	.013	25.67		59.08		92.50		125.92		159.33	.011
20.17	.358			87.00	.087 120.42		153.83	.013	25.75		59.17		92.58		126.00		159.42	.011
	.356			87.08					25.83		59.25							
20.25					.086 120.50		153.92	.013					92.67		126.08		159.50	.011
20.33	.354			87.17	.086 120.58		154.00	.013	25.92		59.33		92.75		126.17		159.58	.011
20.42	.352			87.25	.086 120.67		154.08	.013	26.00		59.42		92.83		126.25		159.67	.011
20.50	.350	53.92	.162	87.33	.086 120.75		154.17	.013	26.08	.265	59.50	.149	92.92	.072	126.33		159.75	.011
20.58	.348	54.00	.162	87.42	.085 120.83	.031	154.25	.013	26.17	.263	59.58	.149	93.00	.071	126.42	.027	159.83	.011
20.67	.346	54.08	.162	87.50	.085 120.92	.031	154.33	.013	26.25	.262	59.67	.149	93.08	.071	126.50	.027	159.92	.011
20.75	.344	54.17	.162	87.58	.085 121.00		154.42	.013	26.33	.261	59.75	.148	93.17		126.58	.027	160.00	.011
20.83	.342			87.67	.085 121.08		154.50	.013	26.42		59.83		93.25		126.67	.027	160.08	.011
20.92	.340			87.75	.085 121.17		154.58	.013	26.50		59.92		93.33		126.75		160.17	.011
21.00	.339			87.83	.084 121.25		154.67	.013	26.58		60.00		93.42		126.83		1160.25	.011
	.337			87.92	.084 121.23			.013	26.67		60.08		93.50				1160.23	.011
21.08							154.75								126.92			
21.17	.335			88.00	.084 121.42		154.83	.013	26.75		60.17		93.58		127.00		160.42	.011
21.25	.334			88.08	.084 121.50		154.92	.013	26.83		60.25		93.67		127.08		160.50	.011
21.33	.332			88.17	.083 121.58		155.00	.013	26.92		60.33		93.75		127.17		160.58	.011
21.42	.331	54.83	.160	88.25	.083 121.67	.030	155.08	.013	27.00	.252	60.42	.147	93.83	.069	127.25	.026	160.67	.011
21.50	.329	54.92	.160	88.33	.083 121.75	.030	155.17	.012	27.08	.251	60.50	.147	93.92	.069	127.33	.026	160.75	.011
21.58	.328			88.42	.083 121.83		155.25	.012	27.17		60.58		94.00		127.42		160.83	.011
21.67	.326			88.50	.083 121.92		155.33	.012	27.25		60.67		94.08		127.50		160.92	.011
21.75	.325			88.58	.082 122.00		155.42	.012	27.33		60.75		94.17		127.58		1161.00	.011
21.73	.323			88.67	.082 122.08		155.50	.012	27.33		1 60.73		94.17		1127.50		1161.00	.011
21.92	.322			88.75	.082 122.17		155.58	.012	27.50		60.92		94.33		127.75		161.17	.011
22.00	.321			88.83	.082 122.25		155.67	.012	27.58		61.00		94.42		127.83		161.25	.011
22.08	.319			88.92	.081 122.33		155.75	.012	27.67		61.08		94.50		127.92		161.33	.011
22.17	.318	55.58	.158	89.00	.081 122.42		155.83	.012	27.75		61.17	.145	94.58	.068	128.00	.026	161.42	.011
22.25	.317	55.67	.158	89.08	.081 122.50	.030 I	155.92	.012	27.83	.243	61.25	.145	94.67	.068	128.08	.026	161.50	.011
22.33	.316	55.75	.158	89.17	.081 122.58	.030 i	156.00	.012	27.92	.243	61.33	.144	94.75	.067	128.17	.026	161.58	.011
22.42	.315			89.25	.081 122.67		156.08	.012	28.00		61.42		94.83		128.25		161.67	.011
22.50	.313			89.33	.080 122.75		156.17	.012	28.08		61.50		94.92		128.33		161.75	.010
22.00	. 515	00.52	.10,	55.55	.000 122.75	.000		. 012	20.00	. 2 -1 1	, 01.00		1 24.22	.007	1220.00	.025	1 - 0	.010

28.17	241	61.58	144	1 95.00	0.67	1128.42	025	1161.83	.010
28.25		61.67		95.08		128.50		1161.92	.010
28.33		61.75		95.17		1128.58		1162.00	.010
			.143	95.17					
28.42		61.83	.143	95.25		128.67	.025	162.08	.010
28.50		61.92	.143	95.33		128.75	.025	162.17	.010
28.58		62.00	.143	95.42		128.83	.025 .025 .025	162.25	.010
28.67	.237	62.08	.142	95.50	.066	128.92	.025	1162.33	.010
28.75		62.17	.142	95.58		129.00	.025	162.42	.010
28.83		62.25		95.67		1129.08		1162.50	.010
28.92		62.23							
		62.33	.142	95.75		129.17		162.58	.010
29.00	.235	62.42	.141	95.83		129.25	.025	162.67	.010
29.08	.234	62.50	.141	95.92		129.33	.025	162.75	.010
29.17	.234	62.58	.141	96.00	.065	129.42	.025	162.83	.010
29.25	.233	62.67	.141	96.08	.065	129.50	.025 .025 .025 .025	162.92	.010
29.33		62.75	.141	95.83 95.92 96.00 96.08		129.58	.025	163.00	.010
29.42						129.67		163.08	.010
29.50		62.92	140	1 06 22		1129.75	025	1162 17	.010
		02.92	140	1 90.33		1129.73	.023	1163.17	
29.58		63.00	.140	96.42		129.83	.024	1163.25	.010
29.67		63.08	.140	96.50		129.92	.024	1163.33	.010
29.75		63.17	.139	96.58		130.00	.024	163.42	.010
29.83	.230	63.25	.139	96.67	.063	130.08	.024	163.50	.010
29.92	.230	63.33	.139	96.23 96.33 96.42 96.50 96.58 96.67	.063	1130.17	.025 .024 .024 .024 .024	1163.58	.010
30.00	.229	63.42	.139	96.83	.063				.010
30.08		63.50	138	96.92		130.33	024	1163 75	.010
30.17		63.58	120	1 07 00		1130.42	.024	1163.73	.010
		03.38	.138	97.00		1130.42	.024	1163.63	
30.25		63.67	.138	97.08		130.50	.024	1163.92	.010
30.33		63.75	.138	97.17		130.58	.024	164.00	.010
30.42		63.83	.138	96.92 97.00 97.08 97.17 97.25 97.33		130.67	.024 .024 .024 .024 .024 .024	164.08	.010
30.50	.227	63.92	.137	97.33	.062	130.75	.024	164.17	.010
30.58	.227	64.00	.137	97.42	.062	1130.83	.024	164.25	.010
30.67	.226	64.08	.137	97.50	.062	130.92	004	1164 22	.010
30.75		64 17	137	1 97 58		131.00	024	1164 42	.010
30.83		64.25	.137 .136 .136 .136	1 07 67		131.08	.024 .024 .024 .024 .024 .023	1164.50	.010
		04.23	.13/	97.07		1131.08	.024	1164.50	
30.92		64.33	.136	97.75		131.17	.024	1164.58	.010
31.00		64.42	.136	97.83		131.25	.024	164.67	.010
31.08		64.50	.136	97.92		131.33	.023	164.75	.010
31.17	.224	64.58	.136	98.00	.061	131.42	.023	164.83	.010
31.25	.224	64.67	.135	98.08	.061	131.50	.023	164.92	.010
31.33		64.75	.135	1 98.17		131.58		165.00	.010
31.42		64.83	135	98.17 98.25 98.33 98.42 98.50 98.58		131.67		165.08	.010
31.50		64.92	125	1 00.23		131.75	.023	1165.00	.010
		04.92	135	1 20.33		1131.73	.023 .023 .023 .023	1165.17	
31.58		65.00	.135	98.42		131.83	.023	1165.25	.010
31.67		65.08	.134	98.50	.060	131.92	.023	1165.33	.010
31.75		65.17	.134	98.58		132.00	.023	165.42	.010
31.83		65.25	.134	98.67		132.08		165.50	.010
31.92	.221	65.33	.134	98.75	.059	132.17	.023	165.58	.010
32.00	.221	65.42	.133	98.75 98.83 98.92 99.00 99.08 99.17	.059	132.25	.023	165.67	.010
32.08	221	65.50	133	1 98 92	059	1132.33		1165.75	.010
32.17		65.58	133	1 99 00		1132.42	.023 .023 .023	1165 83	.010
32.25		65.67	122	1 00 00		1132.50	.023	1165.03	.010
		05.07	.133	99.08		1132.50	.023	1165.92	
32.33		65.75	.133	99.17		132.58	.023	1166.00	.010
32.42		00.00	. 132	1 22.23		132.67		166.08	.010
32.50		65.92		99.33		132.75		166.17	.010
32.58		66.00		99.42		132.83	.023	166.25	.010
32.67		66.08	.132	99.50	.058	132.92	.023	166.33	.010
32.75	.218	66.17	.132	1 99.58		1133.00	.022	1166.42	.010
32.83		66.25	131	1 99 67		1133.08	022	1166 50	.010
32.92	.218	66.33	131	1 00 75		133.00	022	1166 59	.010
		00.33	.132	1 22./3		1133.1/	.023 .023 .022 .022 .022	1 100.30	.010
33.00		00.42	. 131	1 22.03		1133.23	. 022	1	
33.08	.217	66.50	.131	99.92	.057	133.33	.022		
33.17		66.58	.131	100.00	.057	133.42	.022		
33.25		66.67	.130	100.08	.057	133.50	.022		
33.33	.216	66.75	.130	100.00 100.08 100.17	.057	133.58	.022	I	

| READ STORM | Filename: G:\Projects\2008\

 Ptotal= 55.69 r	 nm	Comment						Master Sen Input Hydn
	TIME	RAIN	TIME	RAIN	l hwo	mm/hx	. I have	RAIN mm/hr 1.11 1.11 1.11 1.11
	(0215) (0210)							
ID = 3	FLOWS		NCLUDE E	ASEFLO	NS IF AN	<i>.</i>		
CALIB STANDHYD (023: ID= 1 DT= 5.0 m: Surface Are: Dep. Storage Average Slor Length Mannings n	1)	Total Imp	MPERVIOU 13.15 1.00 1.00 315.60 .013	8.00	1.79 4.30 2.00 40.00 .250	(i)		
	TIME hrs .083 .167 .250 .333 .417 .500 .833 .917 1.083 1.167 1.250 1.333 1.417 1.500 .1583 1.167 1.250 1.333 1.417 1.500 1.583	DATM I	TIME	DATM	ED HYETO(TIME hrs 3.250 3.250 3.333 3.417 3.590 3.583 3.667 3.750 3.750 4.083 4.167 4.250 4.333 4.417 4.583 4.583 4.670 4.583 4.675 4.750 4.750 4.7583 4.675 4.750 4.7583 4.675 4.750 4.7583 4.675 4.750 4.7583 4.675 4.750 4.7583 4.675 4.750 4.7583 4.675 4.757	דא ד א ד	I TEME	RAIN mm/hr 1.11 2.1.11 3.1.11 3.1.11 4.1.11 5.1.11 5.1.11 6.1.11 7.1.11 6.1.11 7.1.11

Max.Eff.Inten.(mm/hr) = over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT =			*TOTALS* 1.964 (iii) 2.75 50.89 55.69 .91
(i) CN PROCEDURE SELECT CN* = 80.0 I; (ii) TIME STEP (DT) SHOT THAN THE STORAGE CO (iii) PEAK FLOW DOES NOT	a = Dep. Storage JLD BE SMALLER (DEFFICIENT.	e (Above) DR EQUAL	
CALIB	(ha) = 16.19 Imp(%) = 52.00	Dir. Conn.(%)= 52.00
Surface Area (ha) = Dep. Storage (mm) = Average Slope (%) = Length (m) = Mannings n =	IMPERVIOUS 8.42 1.00 1.00 328.50 .013	PERVIOUS (i) 7.77 4.30 2.00 40.00 .250	
<pre>Max.Eff.Inten.(mm/hr)=</pre>	51.24 5.00 6.81 (ii) 5.00 .18	26.89 20.00 18.75 (ii) 20.00 .06	*TOTALS*
PEAK FLOW (cms) = TIME TO PEAK (hrs) = RUNOFF VOLUME (mm) = TOTAL RAINFALL (mm) = RUNOFF COEFFICIENT =	1.19 2.75 54.69 55.69 .98	.39 2.92 22.99 55.69 .41	1.520 (iii) 2.75 39.47 55.69 .71
(i) CN PROCEDURE SELEC' CN* = 80.0 I: (ii) TIME STEP (DT) SHOI THAN THE STORAGE C((iii) PEAK FLOW DOES NOT	a = Dep. Storage ULD BE SMALLER (DEFFICIENT. INCLUDE BASEFL(e (Above) DR EQUAL DW IF ANY.	
RESERVOIR (0234) IN= 2> OUT= 1 DT= 5.0 min OUTF: (cm:			
INFLOW: ID= 2 (0220) OUTFLOW: ID= 1 (0234)	AREA QPEA (ha) (cms 16.19 1.5 16.19 .5	AK TPEAK (hrs) 52 2.75 59 3.25	R.V. (mm) 39.47 39.46
TIME SHIFT	N REDUCTION [(30.00

MAXIMUM STORAGE USED

(ha.m.) = .2913

```
AREA QPEAK TPEAK R.V.
1 + 2 = 3
                          (ha) (cms) (hrs)
                                                  (mm)
      ID1= 1 (0231): 14.94 1.964
                                          2.75 50.89
      + ID2= 2 (0234): 16.19 .587 3.25 39.46
        ID = 3 (0236): 31.13 2.432 2.75 44.95
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| ADD HYD (0222) |
| 1 + 2 = 3 | AREA QPEAK TPEAK R.V.
       + ID2= 2 (0236): 31.13 2.432 2.75 44.95
        _____
        ID = 3 (0222): 732.69 23.813 3.08 44.85
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
______
| STANDHYD (0239) | Area (ha) = 8.57
|ID= 1 DT= 5.0 min | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00
                           IMPERVIOUS PERVIOUS (i)
    Surface Area (ha) = Dep. Storage (mm) =
                            7.71 .86
1.00 4.30
    Average Slope (%)= 1.00 2.00

Length (m)= 239.00 40.00

Mannings n = .013 .250
    Max.Eff.Inten.(mm/hr) = 51.24 67.30 over (min) 5.00 10.00 Storage Coeff. (min) = 5.63 (ii) 9.46 (ii) Unit Hyd. Tpeak (min) = 5.00 10.00 Unit Hyd. peak (cms) = .20 .12
    PEAK FLOW (cms) = 1.09 .06

TIME TO PEAK (hrs) = 2.75 2.75

RUNOFF VOLUME (mm) = 54.69 22.99

TOTAL RAINFALL (mm) = 55.69 55.69

RUNOFF COEFFICIENT = .98 .41
                                                     *TOTALS*
                                                    1.151 (iii)
                                                       2.75
                                                     51.52
                                          .41
                                                        .93
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* = 80.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| STANDHYD (0232) | Area (ha) = 8.81
|ID= 1 DT= 5.0 min | Total Imp(%)= 52.00 Dir. Conn.(%)= 52.00
                            IMPERVIOUS PERVIOUS (i)
    Surface Area (ha) = 4.58
                                           4 23
```

Dep. Storage (Average Slope Length Mannings n	mm) = (%) = (m) = 24	1.00 1.00 12.30 .013	4.30 2.00 40.00 .250		
Max.Eff.Inten.(mm/ over (m Storage Coeff. (m Unit Hyd. Tpeak (m Unit Hyd. peak (c	hr) = 5 in) in) = in) = ms) =	51.24 5.00 5.68 (ii) 5.00	26.89 20.00 17.61 (20.00 .06	ii)	FOTALS*
PEAK FLOW (C TIME TO PEAK (h RUNOFF VOLUME (TOTAL RAINFALL (RUNOFF COEFFICIENT	ms) = rs) = mm) = 5 mm) = 5	.65 2.75 64.69 55.69 .98	.21 2.92 22.99 55.69 .41		.836 (iii) 2.75 39.47 55.69
(i) CN PROCEDURE CN* = 80. (ii) TIME STEP (D THAN THE STO (iii) PEAK FLOW DO	0 Ia = E T) SHOULD E RAGE COEFFI	Dep. Storag BE SMALLER CCIENT.	e (Above OR EQUAL)	
RESERVOIR (0235) IN= 2> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTF (cm	LOW S	STORAGE (ha.m.) .3000
INFLOW: ID= 2 (02 OUTFLOW: ID= 1 (02	AF (h 32) 8. 35) 8.	REA QPE na) (cm .81 .	EAK TP ns) (h 84 2 31 3	EAK rs) .75	R.V. (mm) 39.47 39.46
PEAK	FLOW F SHIFT OF E MUM STORAG	REDUCTION [[Qout/Qin]	(%) = 37.	.47 .00 L617
ADD HYD (0237)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.	
TD1= 1 (0239)	(na) 8 57	(CMS)	(nrs)	(mm) 51 52	
ID1= 1 (0239) + ID2= 2 (0235)	8.81	.313	3.25	39.46	
ID = 3 (0237)				45.40	
NOTE: PEAK FLOWS	DO NOT INCI	UDE BASEFI	OWS IF AN	Υ.	
ADD HYD (0238)	Y D C Y	OPEAK	TDEAK	R W	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 1 (0222) + ID2= 2 (0237)	: 732.69 : 17.38	23.813 1.405	3.08 2.75	44.85 45.40	
ID = 3 (0238)				44.86	
NOTE: PEAK FLOWS	DO NOT INCI	UDE BASEFI	OWS IF AN	Υ.	

CALIB STANDHYD (0245) ID= 1 DT= 5.0 min	Area Total	(ha) = Imp(%) =	17.24 85.00	Dir. Co	onn.(%)=	= 85.00
Surface Area Dep. Storage Average Slope Length Mannings n		IMPERVI(ous	PERVIOUS	(i)	
Surface Area	(ha)=	14.65	5	2.59	,	
Dep. Storage	(mm) =	1.00)	4.30		
Average Slope	(%) = (m) =	330 00)	2.00		
Mannings n	=	.013	3	.250		
Max.Eff.Inten.() over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr)=	51.24	1	44.87		
over	(min)	5.00) (::)	15.00	14.4.	
Unit Hvd. Tpeak	(min) =	5.00)	15.00	. 11/	
Unit Hyd. peak	(cms) =	.17	7	.09		
						TOTALS*
PEAK FLOW	(cms)=	2.07	7	.16		2.217 (iii)
RINOFF VOLUME	(mm) =	54 69) }	2.83		2.75
TOTAL RAINFALL	(mm) =	55.69	é	55.69		49.93 55.69
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	ENT =	.98	3	.41		.90
ADD HYD (0227) 1 + 2 = 3	DOES NO	I INCLUDE	BASEFL			
+ ID2= 2 (02-	45):	17.24 2. =======	.217 ======	2.75	49.93	•
ID = 3 (02)	27): 7	67.31 25.	.251	3.08	44.98	
NOTE: PEAK FLO	WS DO NO	r include	BASEFL	OWS IF AN	IY.	
RESERVOIR (0250) IN= 2> OUT= 1 DT= 5.0 min	OUT: (cr 1.: 2.: 2.:		9.1830 0.6610 2.2670 3.9060 5.5860 7.3710	1 31.0	600 000 000 000 000 000	19.6490 20.2920 20.3980 21.3030 22.1830 23.5100
INFLOW : ID= 2 OUTFLOW: ID= 1						

08104 – Vaughan Metropolitan Centre, City of Vaughan Hydrologic Model Output – Required Storage –Controlled to 2-year post at 80% Imperviousness (6hr AES Storm)

April 2012

PEAK FLOW REDUCTION [Qout/Qin](%)= 26.29

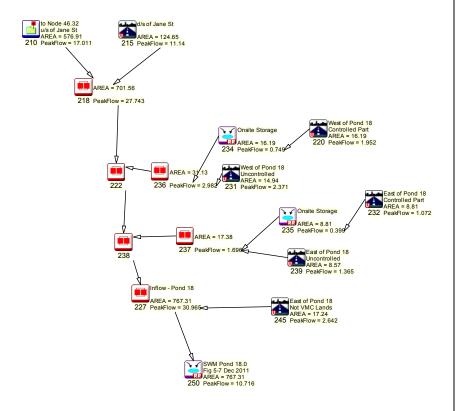
TIME SHIFT OF PEAK FLOW (min)=155.00

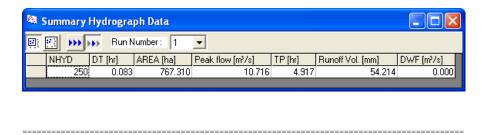
MAXIMUM STORAGE USED (ha.m.)=14.3082

FINISH

8 of 8

North East POND (25yr 6hr AES)





VV		V .	V V	I I I	SSSSS SS SS	U U	U U U	A A A AAAAA a a	L L L					
O O T T H H H Y Y M M O O Licensed To:														
O O T T H H H Y M M O O Licensed To:		000	T O	TTTT T	TTTTT	H H	H H	Y Y Y Y	M M	000	TM, Ve	rsion 2	.0	
Opyright 1996, 2001 Schaeffer & Associates Ltd. ****** DETAILED OUTPUT ***** Input filename: C:\Program Files\Visual OTHYMO v2.0\voin.dat Output filename: G:\Projects\2008\03104~~\lossign\SwM\2012 02 final ubmission\05FROP-\125y6 w Dev VMC, ProposedPond 18.out Summary filename: G:\Projects\2008\03104~~\lossign\SwM\2012 02 final ubmission\05FROP-\125y6 w Dev VMC, ProposedPond 18.sum ATE: 4/5/2012 TIME: 12:24:46 PM SER: OMMENTS: READ STORM Filename: G:\Projects\2008\ 08104 - Vaughan Corporate Centre - Master Ser \text{Vosign\SwM\December 2011} - TS\Vo2 Input Hydr Ptotal= 65.59 mm Comments: 25yr/6hr TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN hrs mm/hr		0	0	T	T	H	H	Y	M M	0 0		ed To:		
Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat Output filename: G:\Projects\2008\08104-~1\Design\SwM\2012 02 final ubmission\05PROP-1\25y6 w Dev VMC, ProposedPond 18.out Summary filename: G:\Projects\2008\08104-~1\Design\SwM\2012 02 final ubmission\05PROP-1\25y6 w Dev VMC, ProposedPond 18.sum ATE: 4/5/2012	opyri	ght 1	996,	2001 rved.	Schaef	fer	& As	socia	tes Ltd	•		Inc.		
Output filename: G:\Projects\2008\08104-~\losign\SWM\2012 02 final ubmission\05PROP~\1\25y6 w Dev VMC, ProposedPond 18.out Summary filename: G:\Projects\2008\08104-~\1\Design\SWM\2012 02 final ubmission\05PROP~\1\25y6 w Dev VMC, ProposedPond 18.sum ATE: 4/5/2012 TIME: 12:24:46 PM SER: OMMENTS: READ STORM Filename: G:\Projects\2008\				*	****	EI	' A I	LE	D O U	TPU:	****			
SER: ***********************************	ubmis Summ	sion\ ary f	05PR ilen	OP~1\ ame:	25y6 w G:\Proj	Dev ects	VMC,	Prop 8\081	osedPon 04-~1\D	d 18.out esign\SV	: 7M\2012 0			
OMMENTS: ***********************************										. 12.24	46 PM			
**************************************		4/5/2	012						TIME	. 12.24				
** SIMULATION NUMBER: 1 ** ********************************	SER:									. 12:24				
**************************************	SER:	TS: _												
READ STORM Filename: G:\Projects\2008\	COMMEN	TS: _	 ***	****	*****	***								
READ STORM Filename: G:\Projects\2008\	COMMEN ***	TS:	 ****	**** NUME	****** BER: 1	***								
08104 - Vaughan Corporate Centre - Master Ser Nesign\SWM\December 2011 - TS\VO2 Input Hydr	COMMEN ***	TS:	 ****	**** NUME	****** BER: 1	***								
Ptotal= 65.59 mm Comments: 25yr/6hr TIME RAIN TIM	OMMEN **** ****	TS: _ ***** IMULA ****	 **** TION ****	**** NUME ****	****** ER: 1 *****	***								
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr .25	SER: OMMEN **** ** S ****	TS: _ ***** IMULA ****	 **** TION ****	***** NUME ****	******* BER: 1 ******	***	ne: G	 :\Pro 8104	 .jects\2 - Vaugh	008\ an Corpo	orate Cen	tre - Ma	aster Ser	
.75	SER: OMMEN **** ** S ****	TS: ***** IMULA *****	 **** TION ****	***** NUME ****	******* ER: 1 ******	*** ** ***	ne: G	:\Pro 8104 Desig	.jects\2 - Vaugh n\SWM\D	008\ an Corpo	orate Cen	tre - Ma	aster Ser	
.75	COMMEN **** *** R	TS: ***** IMULA *****	 **** TION ****	***** NUME *****	******* ER: 1 ****** Fil Con	*** ** enam	ne: G 0 \ xs: 2	:\Pro 8104 Desig 5yr/6	jects\2 - Vaugh m\SWM\D hr	008\ an Corpo	orate Cen 2011 - T	tre - Ma S\VO2 II TIME	aster Ser nput Hydr RAIN	
.75	SER: OMMEN **** ** S ****	TS: ***** IMULA *****	 **** TION ****	***** NUME *****	******* ER: 1 ****** Fil Con	*** ** enam	ne: G 0 \ xs: 2	:\Pro 8104 Desig 5yr/6	jects\2 - Vaugh m\SWM\D hr	008\ an Corpo	orate Cen 2011 - T	tre - Ma S\VO2 II TIME	aster Ser nput Hydr RAIN	
1.00	COMMEN **** *** R	TS: ***** IMULA *****	 **** TION ****	***** NUME *****	******* ER: 1 ****** Fil Con	*** ** enam	ne: G 0 \ xs: 2	:\Pro 8104 Desig 5yr/6	jects\2 - Vaugh m\SWM\D hr	008\ an Corpo	orate Cen 2011 - T	tre - Ma S\VO2 II TIME	aster Ser nput Hydr RAIN	
1.50 /.8/ 3.25 1/.06 5.00 1.31	COMMEN **** *** R	TS: ***** IMULA *****	 **** TION ****	***** NUME *****	Con EE RF s mm/5		ne: G 0 \ 2. TI h 2.	:\Pro 8104 Desig 5yr/6 ME rs 00 25	rjects\2 - Vaugh m\SWM\D hr RAIN mm/hr 22.30 22.30	008\ an Corpo ecember TIME hrs 3.75 4.00	Prate Cen 2011 - T RAIN mm/hr 9.18 5.25	tre - M S\VO2 I TIME hrs 5.50 5.75	aster Ser nput Hydr RAIN mm/hr 1.31	
1.50 /.8/ 3.25 1/.06 5.00 1.31	COMMEN **** *** R	TS: ***** IMULA *****	 **** TION ****	***** NUME ***** mm TIM hr	******* Fil Con EE RF S mm/ 50 0 1.55 1	.enam mment MIN (hr 00 31	me: G 0 \ .s: 2 TI h 2.	:\Pro 8104 Desig 5yr/6 ME rs 00 25	pjects\2 - Vaugh n\SWM\D hr RAIN mm/hr 22.30 60.35	008\ an Corpo ecember TIME hrs 3.75 4.00	orate Cen 2011 - T RAIN mm/hr 9.18 5.25	tre - Ma S\V02 I: TIME hrs 5.50 5.75	aster Ser nput Hydr RAIN mm/hr 1.31 1.31	
1.75 7.87 3.50 9.18 5.25 1.31	COMMEN **** *** R	TS: ***** IMULA *****	 **** TION ****	***** NUME ***** mm TIM hr	******* Fil Con EE RF S mm/ 50 0 1.55 1	.enam mment MIN (hr 00 31	me: G 0 \ .s: 2 TI h 2.	:\Pro 8104 Desig 5yr/6 ME rs 00 25	pjects\2 - Vaugh n\SWM\D hr RAIN mm/hr 22.30 60.35	008\ an Corpo ecember TIME hrs 3.75 4.00	orate Cen 2011 - T RAIN mm/hr 9.18 5.25	tre - Ma S\V02 I: TIME hrs 5.50 5.75	aster Ser nput Hydr RAIN mm/hr 1.31 1.31	
	COMMEN **** *** R	TS: ***** IMULA *****	 **** TION ****	****** NUME *****	******** ER: 1 ******* Con ER: RF: 1 00 1 55 1 00 1 55 1 00 7 00 7 00 7	**** enam in in	TI h 2 2. 3. 3. 3.	:\Pro 8:\Pro 8104 Desig 5yr/6 ME rs 00 25 50 75 00 25	ojects\2 - Vaugh in\SWM\D ihr mm/hr 22.30 60.35 60.35 17.06 17.06 17.06	008\ an Corpo ecember TIME hrs 3.75 4.00 4.25 4.50 4.70 5.00	Prate Cen 2011 - T RAIN mm/hr 9.18 5.25 5.25 2.62 2.62	tre - M S\VO2 II TIME hrs 5.50 5.75 6.00 6.25	aster Ser nput Hydr RAIN mm/hr 1.31 1.31	
	COMMEN **** *** R	TS: ***** IMULA *****	 **** TION ****	****** NUME *****	******** ER: 1 ******* Con ER: RF: 1 00 1 55 1 00 1 55 1 00 7 00 7 00 7	**** enam in in	TI h 2 2. 3. 3. 3.	:\Pro 8:\Pro 8104 Desig 5yr/6 ME rs 00 25 50 75 00 25	ojects\2 - Vaugh in\SWM\D ihr mm/hr 22.30 60.35 60.35 17.06 17.06 17.06	008\ an Corpo ecember TIME hrs 3.75 4.00 4.25 4.50 4.70 5.00	Prate Cen 2011 - T RAIN mm/hr 9.18 5.25 5.25 2.62 2.62	tre - M S\VO2 II TIME hrs 5.50 5.75 6.00 6.25	aster Ser nput Hydr RAIN mm/hr 1.31 1.31	

ID= 1 DT= 5.0 min	Total In	mp (%) = 8	35.00	Dir. Conn	n.(%)= 8	5.00	
ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n		IMPERVIOU	JS PI	ERVIOUS (i)		
Suriace Area	(na)=	14.65		2.59			
Nucrage Slope	(11111) =	1.00		2.00			
Length	(%) =	339 00		40 00			
Mannings n	(111) —	013		250			
namingo n		.015		.230			
NOTE: RAINF	ALL WAS T	RANSFORME	ED TO	5.0 MIN.	TIME STE	P.	
		TRA	NSFORME	ED HYETOGI	RAPH	-	
TIME	RATM	TTME	RATM	I TIME	PATM I	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.083	.00	1.667	7.87	3.250	17.06	4.83	1.31
.167	.00	1.750	7.87	3.333	9.18	4.92	1.31
.250	.00	1.833	22.30	3.417	9.18	5.00	1.31
.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
.583	1.31	2.167	22.30	3.750	9.18 i	5.33	1.31
.667	1.31	2.250	22.30	3.833	5.25 i	5.42	1.31
.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
.833	1.31	2.417	60.35	1 4.000	5.25	5.58	1.31
.917	1.31	2.500	60.35	1 4.083	5.25 I	5.67	1.31
1.000	1.31	2.583	60.35	1 4.167	5.25 I	5.75	1.31
1.083	1.31	2.667	60.35	1 4.250	5.25 I	5.83	1.31
1.167	1.31	2.750	60.35	1 4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	1 4.417	2.62	6.00	1.31
1 333	7 87	2 917	17.06	1 4 500	2 62 1	6.08	1 31
1 417	7.87	1 3 000	17.06	1 4 583	2 62 1	6 17	1 31
1.41/	7.07	3.000	17.00	1 4 667	2.02	6 25	1 21
1.583	mm/hr .00 .00 .00 1.31 1.31 1.31 1.31 1.31 1.	3.167	17.06	4.750	2.62	0.23	1.31
Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr)=	60.35		36.31			
over	(min)	5.00		15.00			
Storage Coeff.	(min) =	6.50	(ii)	10.82 (i:	i)		
Unit Hyd. Tpeak	(min) =	5.00		15.00			
Unit Hyd. peak	(cms) =	.18		.09			
						'ALS*	
PEAK FLOW	(cms) =	2.44		.21	2.	642 (iii)
TIME TO PEAK	(hrs)=	2.75		2.83	2	.75	
RUNOFF VOLUME	(mm) =	64.59		30.10	5.9	. 42	
TOTAL RAINFALL	(mm) =	65.59		65.59	6.5	642 (iii 1.75 1.42 1.59	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	NT =	.98		.46		.91	
(i) CN PROCEDU							
CN* = 8							
(ii) TIME STEP				R EQUAL			
THAN THE S							
(iii) PEAK FLOW	DOES NOT :	INCLUDE E	BASEFLOV	w if ANY.			
CALIB							
STANDHYD (0215)	Area	(ha) = 12	24.65				
ID= 1 DT= 5.0 min	Total Ir	mp(%) = 8	33.00	Dir. Conn	n.(%)= 7	9.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) =	102 4C	JS PI	21 10 21 10	⊥)		
Surrace Area	(11d) =	103.46		4 70			
рер. Storage	(inm) =	.50		4./0			
Average Slope	(%)=	.30		.40			
Length	(m) =	T800.00	2	200.00			
Mannings n	=	.016		.250			

```
60.35
                                             26 44
     Max.Eff.Inten.(mm/hr)=
              over (min)
                                30.00
                                             80.00
     Storage Coeff. (min) =
                                28.79 (ii)
                                            79.93 (ii)
     Unit Hyd. Tpeak (min) =
                                30.00
                                             80.00
     Unit Hyd. peak (cms)=
                                                          *TOTALS*
                                                          11.140 (iii)
     PEAK FLOW
                    (cms) =
                                10.86
     TIME TO PEAK
                    (hrs) =
                                 3.00
                                             4.00
                                                            3.00
     RUNOFF VOLUME
                    (mm) =
                                65.09
                                             30.12
                                                            57.75
                                             65.59
     TOTAL RAINFALL (mm) =
                                65.59
                                                            65.59
     RUNOFF COEFFICIENT =
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 76.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| READ HYD (0210) | AREA
                                 (ha) = 576.91
| DT= 5.0 min | TPEAK
                               (hrs) = 3.17
----- VOLUME
                               (mm) = 53.22
 Filename: G:\Projects\2008\08104 - Vaughan Corporate Centre - Master Servicing
Strategy\Design\SWM\December 20
 Comments: Outflow at 46.32
         FLOW | TIME
                         FLOW |
                                 TIME
                                         FLOW | TIME
                                                         FLOW | TIME
  hrs
          cms | hrs
                         cms |
                                 hrs
                                         cms | hrs
                                                         cms |
                                                                         cms
   .00
          .000 | 33.42
                         .224 | 66.83
                                         .136 |100.25
                                                         .060 |133.67
                                                                         .023
   .08
          .000 | 33.50
                         .223 | 66.92
                                         .136 |100.33
                                                         .059 |133.75
                                                                         .023
  .17
         .000 | 33.58
                         .223 | 67.00
                                         .136 |100.42
                                                         .059 | 133.83
                                                                         .023
          .000 | 33.67
                         .222 | 67.08
                                         .135 |100.50
                                                         .059 |133.92
                                                                         .023
   .25
   .33
          .000 | 33.75
                         .222 | 67.17
                                         .135 |100.58
                                                         .059 |134.00
          .000 | 33.83
                                         .135 |100.67
  .42
                         .222 | 67.25
                                                         .059 |134.08
          .000 | 33.92
                                         .135 |100.75
   .50
                         .221 | 67.33
                                                         .059 |134.17
                                                                         .023
                                                         .058 |134.25
   .58
          .000 | 34.00
                         .221 | 67.42
                                         .134 |100.83
                                                                         .023
   .67
         .000 | 34.08
                         .221 | 67.50
                                         .134 |100.92
                                                         .058 |134.33
   .75
          .000 | 34.17
                         .220 | 67.58
                                         .134 |101.00
                                                         .058 |134.42
                                                                         .023
  .83
          .000 | 34.25
                         .220 | 67.67
                                         .134 |101.08
                                                         .058 |134.50
  .92
1.00
          .000 | 34.33
                         .220 | 67.75
                                         .134 |101.17
                                                         .058 |134.58
                                                                         .022
                         .219 | 67.83
          .000 | 34.42
                                         .133 |101.25
                                                         .058 |134.67
                                                                         .022
  1.08
          .000
               | 34.50
                         .219 | 67.92
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                                                                         .022
 1.17
         .000 | 34.58
                         .219 | 68.00
                                         .133 |101.42
                                                         .057 |134.83
                                                                         .022
                                                         .057 |134.92
  1.25
          .000 | 34.67
                         .218 | 68.08
                                         .133 |101.50
                                                                         .022
  1.33
          .000
               | 34.75
                         .218 | 68.17
                                         .132 |101.58
                                                         .057 |135.00
                                                                         .022
 1.42
         .000 | 34.83
                         .218 | 68.25
                                         .132 |101.67
                                                         .057 |135.08
                                                                         .022
  1.50
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                         .218 | 68.33
                                         .132 |101.75
                                                         .057 |135.17
                                                                         .022
  1.58
          .003 | 35.00
                         .217 | 68.42
                                         .132 |101.83
                                                         .057 |135.25
 1.67
         .004 | 35.08
                         .217 | 68.50
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                                                                         .022
                         .217 | 68.58
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  1.75
          .007 | 35.17
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  1.83
          .010 | 35.25
                         .216 | 68.67
                                         .131 |102.08
                                                         .056 |135.50
  1.92
         .429 | 35.33
                         .216 | 68.75
                                         .131 |102.17
                                                         .056 |135.58
                         .216 | 68.83
         .984 | 35.42
                                         .131 |102.25
                                                         .056 |135.67
                                                                         .022
  2.00
        1.611 | 35.50
                         .216 | 68.92
                                         .131 |102.33
                                                         .056 |135.75
  2.17
        2.291 | 35.58
                         .215 | 69.00
                                         .130 |102.42
                                                         .056 |135.83
                                                                         .022
        3.000 | 35.67
                         .215 | 69.08
                                         .130 |102.50
                                                         .055 |135.92
  2.33
        3.771 | 35.75
                         .215 | 69.17
                                         .130 |102.58
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                         .215 | 69.25
                                         .130 |102.67
        4.721 | 35.83
                                                         .055 |136.08
  2.42
                                                                         .022
        5.903 | 35.92
7.429 | 36.00
                         .214 | 69.33
                                         .130 |102.75
                                                         .055 |136.17
                                                                         .022
  2.50
                         .214 | 69.42
                                         .129 |102.83
                                                         .055 |136.25
                                                                         .021
        9.481 | 36.08
                         .214 | 69.50
                                         .129 |102.92
                                                         .055 | 136.33
                                                                         .021
                         .213 | 69.58
  2.75 11.562 | 36.17
                                         .129 |103.00
                                                         .055 |136.42
       13.503 | 36.25
                         .213 | 69.67
                                         .129 |103.08
                                                         .054 |136.50
                                         .128 | 103.17
  2.92 15.067 | 36.33
                         .213 | 69.75
                                                         .054 |136.58
  3.00 16.149 | 36.42
                         .213 | 69.83
                                         .128 |103.25
                                                         .054 |136.67
```

3 08	16.772	1 36 50	.212 69.92	.128 103.33	.054 136.75	.021	8 67	3 541	1 42 08	197	75.50	.115 108.92	.045 142.33	.018
	17.011		.212 70.00	.128 103.42	.054 136.83	.021	8 75	3 502	1 42 17		75.58	.115 109.00	.045 142.42	.018
	16.983		.212 70.00	.128 103.50	.054 136.92	.021	0.73	2 161	1 42 25		75.67	.114 109.08	.045 142.50	.018
						.021	0.03	2 407	42.23					
	16.769		.212 70.17	.127 103.58	.053 137.00	.021	0.92	3.427	42.33		75.75	.114 109.17	.045 142.58	.018
	16.409		.211 70.25	.127 103.67	.053 137.08	.021	9.00	3.389	42.42		75.83	.114 109.25	.045 142.67	.018
	15.935		.211 70.33	.127 103.75	.053 137.17	.021	9.08	3.353	42.50		75.92	.114 109.33	.045 142.75	.018
	15.391		.211 70.42	.127 103.83	.053 137.25	.021	9.17	3.317	42.58		76.00	.114 109.42	.044 142.83	.018
3.67	14.814	37.08	.211 70.50	.127 103.92	.053 137.33	.021	9.25	3.281	42.67	.196	76.08	.113 109.50	.044 142.92	.018
3.75	14.236	37.17	.211 70.58	.126 104.00	.053 137.42	.021	9.33	3.246	42.75	.196	76.17	.113 109.58	.044 143.00	.018
3.83	13.675	37.25	.210 70.67	.126 104.08	.053 137.50	.021	9.42	3.212	42.83	.195	76.25	.113 109.67	.044 143.08	.018
3.92	13.123	37.33	.210 70.75	.126 104.17	.052 137.58	.021	9.50	3.178	42.92	.195	76.33	.113 109.75	.044 143.17	.018
	12.579		.210 70.83	.126 104.25	.052 137.67	.021	9.58	3.144	43.00		76.42	.113 109.83	.044 143.25	.018
	12.050		.210 70.92	.126 104.33	.052 137.75	.021	9 67	3 112	43.08		76.50	.113 109.92	.044 143.33	.018
	11.542		.209 71.00	.125 104.42	.052 137.83	.021	9 75	3 079	1 43 17		76.58	.112 110.00	.044 143.42	.018
	11.065		.209 71.08	.125 104.42	.052 137.03	.021	9.73	3 047	1 43 25		76.67	.112 110.00	.044 143.50	.018
	10.617		.209 71.17	.125 104.58	.052 137.32	.020	0.00	2 015	1 43.23		76.75	.112 110.00	.044 143.58	.018
						.020	9.92	3.015	43.33					
	10.188		.209 71.25	.125 104.67	.052 138.08	.020	10.00	2.984	43.42		76.83	.112 110.25	.043 143.67	.018
	9.772		.208 71.33	.125 104.75	.052 138.17	.020	10.08	2.954	43.50		76.92	.112 110.33	.043 143.75	.018
4.58	9.371		.208 71.42	.124 104.83	.051 138.25	.020	10.17	2.923	43.58		77.00	.111 110.42	.043 143.83	.018
4.67	8.986	38.08	.208 71.50	.124 104.92	.051 138.33	.020	10.25	2.893	43.67		77.08	.111 110.50	.043 143.92	.018
4.75	8.624	38.17	.208 71.58	.124 105.00	.051 138.42	.020	10.33	2.862	43.75	.193	77.17	.111 110.58	.043 144.00	.017
4.83	8.287	38.25	.207 71.67	.124 105.08	.051 138.50	.020	10.42	2.832	43.83	.193	77.25	.111 110.67	.043 144.08	.017
4.92	7.971	38.33	.207 71.75	.124 105.17	.051 138.58	.020	10.50	2.802	43.92	.193	77.33	.111 110.75	.043 144.17	.017
5.00	7.671		.207 71.83	.123 105.25	.051 138.67	.020	10.58	2.772	44.00		77.42	.111 110.83	.043 144.25	.017
5.08	7.387		.207 71.92	.123 105.33	.051 138.75	.020	10 67	2 742	1 44 08		77.50	.110 110.92	.043 144.33	.017
5.17	7.119		.207 72.00	.123 105.42	.050 138.83	.020	10.75	2 712	44 17		77.58	.110 111.00	.042 144.42	.017
5.25	6.874		.206 72.08	.123 105.42	.050 138.92	.020	10.73	2 693	1 44 25		77.67	.110 111.00	.042 144.50	.017
5.33		38.75	.206 72.17	.123 105.58	.050 130.92	.020	10.03	2.003	1 44.23		77.75	.110 111.00	.042 144.58	.017
						.020	10.52	2.034	44.33		77.83			
5.42	6.538		.206 72.25	.122 105.67	.050 139.08	.020	11.00	2.020	44.42			.110 111.25	.042 144.67	.017
5.50		38.92	.206 72.33	.122 105.75	.050 139.17	.020	11.08	2.59/	44.50		77.92	.109 111.33	.042 144.75	.017
5.58	6.232		.205 72.42	.122 105.83	.050 139.25	.020	11.17	2.570	44.58		78.00	.109 111.42	.042 144.83	.017
5.67		39.08	.205 72.50	.122 105.92	.050 139.33	.020	11.25	2.542	44.67		78.08	.109 111.50	.042 144.92	.017
5.75	5.960	39.17	.205 72.58	.122 106.00	.049 139.42	.020	11.33	2.515	44.75		78.17	.109 111.58	.042 145.00	.017
5.83	5.837	39.25	.205 72.67	.121 106.08	.049 139.50	.020	11.42	2.488	44.83	.190	78.25	.109 111.67	.042 145.08	.017
5.92	5.722	39.33	.205 72.75	.121 106.17	.049 139.58	.020	11.50	2.462	44.92	.190	78.33	.109 111.75	.042 145.17	.017
6.00	5.614	39.42	.204 72.83	.121 106.25	.049 139.67	.020	11.58	2.435	45.00	.190	78.42	.108 111.83	.042 145.25	.017
6.08	5.515	39.50	.204 72.92	.121 106.33	.049 139.75	.020	11.67	2.409	45.08		78.50	.108 111.92	.041 145.33	.017
6.17	5.426		.204 73.00	.121 106.42	.049 139.83	.020	11.75	2.383	45.17		78.58	.108 112.00	.041 145.42	.017
6.25	5.346		.204 73.08	.120 106.50	.049 139.92	.019	11 83	2 356	45 25		78.67	.108 112.08	.041 145.50	.017
6.33	5.271		.203 73.17	.120 106.58	.049 140.00	.019	11 92	2 329	1 45 33		78.75	.108 112.17	.041 145.58	.017
6.42	5.196		.203 73.25	.120 106.55	.048 140.08	.019	12.00	2.323	1 45.55		78.83	.108 112.25	.041 145.67	.017
6.50	5.117		.203 73.23	.120 106.67	.048 140.08	.019	12.00	2.302	1 45.42		78.92	.107 112.23		.017
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6.67		40.08	.203 73.50	.119 106.92	.048 140.33	.019	12.25	2.218	45.6/		79.08	.107 112.50	.041 145.92	.017
6.75	4.860		.202 73.58	.119 107.00	.048 140.42	.019	12.33	2.190	45.75		79.17	.107 112.58	.041 146.00	.017
6.83	4.774		.202 73.67	.119 107.08	.048 140.50	.019	12.42	2.162	45.83		79.25	.107 112.67	.041 146.08	.017
6.92	4.690		.202 73.75	.119 107.17	.048 140.58	.019	12.50	2.134	45.92		79.33	.107 112.75	.040 146.17	.016
7.00	4.609	40.42	.202 73.83	.119 107.25	.048 140.67	.019	12.58	2.107	46.00	.187	79.42	.106 112.83	.040 146.25	.016
7.08	4.532	40.50	.201 73.92	.118 107.33	.047 140.75	.019	12.67	2.079	46.08	.187	79.50	.106 112.92	.040 146.33	.016
7.17	4.458	40.58	.201 74.00	.118 107.42	.047 140.83	.019	12.75	2.052	46.17	.187	79.58	.106 113.00	.040 146.42	.016
7.25	4.388	40.67	.201 74.08	.118 107.50	.047 140.92	.019	12.83	2.025	46.25	.187	79.67	.106 113.08	.040 146.50	.016
7.33		40.75	.201 74.17	.118 107.58	.047 141.00	.019	12.92	1.998	46.33		79.75	.106 113.17	.040 146.58	.016
7.42	4.258		.201 74.25	.118 107.67	.047 141.08	.019	13.00	1.971	46.42		79.83	.106 113.25	.040 146.67	.016
7.50	4.198		.200 74.33	.117 107.75	.047 141.17	.019	13 08	1 945	1 46 50		79.92	.105 113.33	.040 146.75	.016
7.58	4.140		.200 74.42	.117 107.83	.047 141.25	.019	13.00	1 919	1 46 58		80.00	.105 113.42	.040 146.83	.016
7.67		41.08	.200 74.42	.117 107.03	.047 141.23	.019	13.17	1 000	1 40.50		80.08	.105 113.42		.016
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7.75	4.030		.200 74.58	.117 108.00	.046 141.42	.019	13.33	1.868	46.75		80.17	.105 113.58	.040 147.00	.016
7.83	3.978		.199 74.67	.117 108.08	.046 141.50	.019	13.42	1.843	46.83		80.25	.105 113.67	.039 147.08	.016
7.92	3.928		.199 74.75	.117 108.17	.046 141.58	.019	13.50	1.818	46.92		80.33	.105 113.75	.039 147.17	.016
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8.25	3.745		.198 75.08	.116 108.50	.046 141.92	.018	13.83	1.720	47.25		80.67	.104 114.08	.039 147.50	.016
8.33	3.702	41.75	.198 75.17	.116 108.58	.046 142.00	.018	13.92	1.693	47.33	.184	80.75	.104 114.17	.039 147.58	.016
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8.50	3.620	41.92	.198 75.33	.115 108.75	.045 142.17	.018	14.08	1.635	47.50	.184	80.92	.103 114.33	.039 147.75	.016
8.58	3.580	42.00	.198 75.42	.115 108.83	.045 142.25	.018	14.17	1.605	47.58	.183	81.00	.103 114.42	.039 147.83	.016
							•							

14.25	1.574	1 47.67	.183	81.08	.103 114.50	.039 147.9	2 .016	19.83	. 497	53.25	.170 I	86.67	.092	120.08	. 033	153.50	.014
14.33	1.543			81.17	.103 114.58	.038 148.0		19.92		53.33		86.75		120.17		153.58	.014
14.42	1.514			81.25	.103 114.67	.038 148.0		20.00		53.42		86.83		120.25		153.67	.014
14.50	1.486			81.33	.103 114.75	.038 148.1		20.08		53.50		86.92		120.23		153.75	.013
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14.92	1.365	48.33	.182	81.75	.102 115.17	.038 148.5	8 .015	20.50	.439	53.92	.168	87.33	.091	120.75	.033	154.17	.013
15.00	1.343	1 48.42	.181	81.83	.102 115.25	.038 148.6	7 .015	20.58	.433	54.00	.168 I	87.42	.090	120.83	.032	154.25	.013
15.08	1.323			81.92	.102 115.33	.038 148.7		20.67		54.08		87.50		120.92		154.33	.013
15.17	1.303			82.00	.101 115.42	.038 148.8		20.75		54.17		87.58		121.00		1154.42	.013
15.25	1.284			82.08	.101 115.50	.038 148.9		20.83		54.25		87.67		121.08		154.50	.013
15.33	1.265			82.17	.101 115.58	.037 149.0		20.92		54.33		87.75		121.17		154.58	.013
15.42	1.247			82.25	.101 115.67	.037 149.0		21.00		54.42		87.83		121.25		154.67	.013
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15.58	1.212	49.00	.180	82.42	.101 115.83	.037 149.2	5 .015	21.17	.398	54.58	.166	88.00	.089	121.42	.032	154.83	.013
15.67	1.196	49.08	.180	82.50	.100 115.92	.037 149.3	3 .015	21.25	.393	54.67	.166	88.08	.089	121.50	.032	154.92	.013
15.75	1.179	49.17	.180	82.58	.100 116.00	.037 149.4	2 .015	21.33	.389	54.75	.166	88.17	.088	121.58	.032	155.00	.013
15.83	1.163			82.67	.100 116.08	.037 149.5		21.42		54.83		88.25		121.67		155.08	.013
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16.00	1.133			82.83	.100 116.25	.037 149.6		21.58		55.00		88.42		121.83		155.25	.013
	1.118				.100 116.23			21.67		55.08						155.33	
16.08				82.92		.037 149.7						88.50		121.92			.013
16.17	1.104			83.00	.100 116.42	.037 149.8		21.75		55.17		88.58		122.00		155.42	.013
16.25	1.090			83.08	.099 116.50	.037 149.9		21.83		55.25		88.67		122.08		155.50	.013
16.33	1.076	49.75	.178	83.17	.099 116.58	.036 150.0		21.92	.365	55.33	.165	88.75		122.17		155.58	.013
16.42	1.062	49.83	.178	83.25	.099 116.67	.036 150.0	8 .015	22.00	.362	55.42	.164	88.83	.086	122.25	.031	155.67	.013
16.50	1.049	49.92	.178	83.33	.099 116.75	.036 150.1	7 .015	22.08	.359	55.50	.164	88.92	.086	122.33	.031	155.75	.013
16.58	1.036	1 50.00	.177	83.42	.099 116.83	.036 150.2	5 .015	22.17	.356	55.58	.164 I	89.00	.086	122.42	.031	155.83	.013
16.67	1.024			83.50	.099 116.92	.036 150.3		22.25		55.67		89.08		122.50		1155.92	.013
16.75	1.011			83.58	.098 117.00	.036 150.4		22.33		55.75		89.17		122.58		156.00	.013
16.83		50.25		83.67	.098 117.08	.036 150.5		22.42		55.83		89.25		122.67		156.08	.013
16.92				83.75				22.50				89.33					
		50.33			.098 117.17	.036 150.5				55.92				122.75		156.17	.013
17.00		50.42		83.83	.098 117.25	.036 150.6		22.58		56.00		89.42		122.83		156.25	.013
17.08		50.50		83.92	.098 117.33	.036 150.7		22.67		56.08		89.50		122.92		156.33	.013
17.17		50.58		84.00	.098 117.42	.036 150.8		22.75		56.17		89.58		123.00		156.42	.013
17.25	.919	50.67	.176	84.08	.098 117.50	.036 150.9	2 .015	22.83	.338	56.25	.162	89.67	.084	123.08	.031	156.50	.013
17.33	.900	50.75	.176	84.17	.097 117.58	.035 151.0	0 .015	22.92	.336	56.33	.162	89.75	.084	123.17	.030	156.58	.013
17.42	.882	50.83	.175	84.25	.097 117.67	.035 151.0	8 .014	23.00	.334	56.42	.162	89.83	.084	123.25	.030	156.67	.012
17.50	.864	50.92	.175	84.33	.097 117.75	.035 151.1	7 .014	23.08	.332	56.50	.162 I	89.92	.084	123.33	.030	156.75	.012
17.58		51.00		84.42	.097 117.83	.035 151.2		23.17		56.58		90.00		123.42		156.83	.012
17.67		51.08		84.50	.097 117.92	.035 151.3		23.25		56.67		90.08		123.50		156.92	.012
17.75		51.17		84.58	.097 117.32	.035 151.4		23.23		56.75		90.17		123.58		1157.00	.012
		51.25						23.42		56.83							
17.83				84.67	.097 118.08	.035 151.5						90.25		123.67		157.08	.012
17.92		51.33		84.75	.096 118.17	.035 151.5		23.50		56.92		90.33		123.75		157.17	.012
18.00		51.42		84.83	.096 118.25	.035 151.6		23.58		57.00		90.42		123.83		157.25	.012
18.08		51.50		84.92	.096 118.33	.035 151.7		23.67		57.08		90.50		123.92		157.33	.012
18.17	.729	51.58	.174	85.00	.096 118.42	.035 151.8		23.75		57.17	.160	90.58		124.00	.030	157.42	.012
18.25	.714	51.67	.173	85.08	.096 118.50	.035 151.9	2 .014	23.83	.318	57.25	.160	90.67	.082	124.08	.030	157.50	.012
18.33	.700	51.75	.173	85.17	.096 118.58	.035 152.0	0 .014	23.92	.317	57.33	.160	90.75	.081	124.17	.030	157.58	.012
18.42	.686	51.83	.173	85.25	.096 118.67	.034 152.0	8 .014	24.00	.315	57.42	.160 I	90.83		124.25	.030	157.67	.012
18.50		51.92		85.33	.095 118.75	.034 152.1		24.08		57.50		90.92		124.33		157.75	.012
18.58		52.00		85.42	.095 118.83	.034 152.2		24.17		57.58		91.00		124.42		157.83	.012
18.67		52.08		85.50	.095 118.92	.034 152.2		24.25		57.67		91.08		124.50		1157.92	.012
18.75		52.17		85.58	.095 119.00	.034 152.4		24.33		57.75		91.17		124.58		158.00	.012
18.83		52.25		85.67	.095 119.08	.034 152.5		24.42		57.83		91.25		124.67		158.08	.012
18.92		52.33		85.75	.094 119.17	.034 152.5		24.50		57.92		91.33		124.75		158.17	.012
19.00		52.42		85.83	.094 119.25	.034 152.6		24.58		58.00		91.42		124.83		158.25	.012
19.08		52.50		85.92	.094 119.33	.034 152.7		24.67		58.08		91.50		124.92		158.33	.012
19.17	.575	52.58	.171	86.00	.094 119.42	.034 152.8	3 .014	24.75	.305	58.17	.158	91.58	.079	125.00	.029	158.42	.012
19.25		52.67		86.08	.094 119.50	.034 152.9		24.83		58.25		91.67		125.08		158.50	.012
19.33		52.75		86.17	.094 119.58	.034 153.0		24.92		58.33		91.75		125.17		158.58	.012
19.42		52.83		86.25	.093 119.67	.034 153.0		25.00		58.42		91.83		125.25		158.67	.012
19.50		52.92		86.33	.093 119.75	.033 153.1		25.08		58.50		91.92		125.33		1158.75	.012
		53.00				.033 153.1		25.17								158.83	
19.58				86.42	.093 119.83					58.58		92.00		1125.42			.012
19.67		53.08		86.50	.093 119.92	.033 153.3		25.25		58.67		92.08		125.50		158.92	.012
19.75	.506	53.17	.1/0	86.58	.092 120.00	.033 153.4	2 .014	25.33	.298	58.75	.156	92.17	.078	125.58	.029	159.00	.012

25.42	298	58.83	156	92.25	077	125.67	029	159.08	.012
25.50		58.92		92.33		1125.75		159.17	.012
25.58		59.00		92.42		125.83		159.25	.012
25.67	.295	59.08	.156	92.50	.077	125.92	.028	159.33	.012
25.75	.294	59.17	.155	92.58	.077	1126.00	.028	159.42	.012
25.83		59.25		92.67		126.08		159.50	.012
25.92		59.33		92.75		126.17		159.58	.012
26.00	.292	59.42	.155	92.83	.076	126.25	.028	159.67	.012
26.08	.291	1 59.50	.155	92.92	.076	126.33	.028	159.75	.012
26.17		59.58		93.00		126.42		159.83	.011
26.25		59.67		93.08		1126.50			
								159.92	.011
26.33		59.75		93.17		126.58		160.00	.011
26.42	.288	59.83	.154	93.25	.075	126.67	.028	160.08	.011
26.50	. 288	59.92	.154	93.33	.075	126.75	.028	160.17	.011
26.58		60.00		93.42		126.83		160.25	.011
26.67		60.08		93.50		126.92		160.33	.011
26.75		60.17		93.58	.074	127.00		160.42	.011
26.83	.285	60.25	.153	93.67	.074	1127.08	.027	160.50	.011
26.92		60.33		93.75	074	127.17		160.58	.011
27.00		60.42		93.83		127.25		160.67	
									.011
27.08		60.50		93.92		127.33		160.75	.011
27.17	.282	60.58	.152	94.00	.073	127.42	.027	160.83	.011
27.25	.282	60.67	.152	94.08	.073	127.50	.027	160.92	.011
27.33		60.75		94.17		127.58		161.00	.011
27.42		60.83		94.25		127.67		161.08	.011
27.50		60.92		94.33		127.75		161.17	.011
27.58	.279	61.00	.151	94.42	.072	127.83	.027	161.25	.011
27.67		61.08		94.50		1127 92	027	1161 33	.011
27.75		61.17		94.58		128.00	.027	1161 42	.011
						1120.00	.027	1101.42	
27.83		61.25		94.67		128.08		161.50	.011
27.92	.277	61.33		94.75	.071	128.17		161.58	.011
28.00	.276	61.42	.150	94.83	.071	128.25	.027	161.67	.011
28.08		61.50		94.92		128.33		161.75	.011
28.17				95.00				161.83	
		61.58				128.42			.011
28.25		61.67		95.08		128.50		161.92	.011
28.33	.274	61.75	.149	95.17	.070	128.58	.026	162.00	.011
28.42	.273	61.83	.149	95.25	.070	128.67	.026	162.08	.011
28.50		61.92		95.33		128.75		162.17	.011
28.58		62.00		95.42		128.83		162.25	
									.011
28.67		62.08		95.50		128.92		162.33	.011
28.75	.269	62.17	.148	95.58	.069	129.00	.026	162.42	.011
28.83		62.25		95.67		129.08		162.50	.011
28.92		62.33		95.75		129.17		162.58	.011
29.00		62.42		95.83		129.25		162.67	.011
29.08	.265	62.50	.148	95.92	.069	129.33	.026	162.75	.011
29.17	.264	62.58	.147	96.00	.068	129.42	.026	162.83	.011
29.25	. 263	62.67	.147	96.08	.068	129.50	.026	162.92	.011
29.33		62.75		96.17		1129.58		1163.00	.011
29.42		62.83		96.25		129.67		163.08	.011
29.50	.260	62.92	.146	96.33	.068	129.75	.026	163.17	.011
29.58	.258	63.00	.146	96.42	.068	1129.83	.025	163.25	.010
29.67	257	63.08	146	96.50	0.67	129.92	025	163.33	.010
29.75		63.17		96.58		1130.00		1163.42	.010
29.83		63.25		96.67		130.08		163.50	.010
29.92	.254	63.33	.145	96.75	.067	130.17	.025	163.58	.010
30.00	.252	63.42	.145	96.83	.067	130.25	.025	163.67	.010
30.08		63.50		96.92		130.33		163.75	.010
30.17		63.58		97.00		130.42		163.83	.010
30.25		63.67		97.08		130.50		163.92	.010
30.33	.248	63.75	.144	97.17	.066	130.58	.025	164.00	.010
30.42		63.83		97.25		1130.67		164.08	.010
30.50	.246			97.33		130.75	.025		.010
30.58		64.00		97.42		130.83		164.25	.010
30.67		64.08		97.50		130.92	.025	164.33	.010
30.75	.243	64.17	.143	97.58	.065	131.00	.025	164.42	.010
30.83		64.25		97.67		1131.08	.025 .025 .025	164.50	.010
30.92		64.33		97.75		131.17		164.58	.010
JU.JZ	. 41	07.33	. 143	21.13	.005	1 + 3 + • + /	.023	1104.00	.010

```
31.00
         .240 | 64.42
                        .142 | 97.83
                                        .064 |131.25
                                                       .025 |164.67
 31.08
         .239 | 64.50
                        .142 | 97.92
                                        .064 |131.33
                                                       .024 |164.75
31.17
         .238 | 64.58
                        .142 | 98.00
                                        .064 | 131.42
                                                       .024 | 164.83
                                                                       .010
31.25
         .238 | 64.67
                        .142 | 98.08
                                        .064 |131.50
                                                       .024 | 164.92
                                                                       .010
31.33
         .237 | 64.75
                        .142 | 98.17
                                        .064 |131.58
                                                       .024 |165.00
31.42
         .236 | 64.83
                        .141 | 98.25
                                        .064 |131.67
                                                       .024 |165.08
                                                                       .010
31.50
         .235 | 64.92
                        .141 | 98.33
                                        .063 |131.75
                                                       .024 |165.17
                                                                       .010
31.58
         .235 | 65.00
                        .141 | 98.42
                                        .063 |131.83
                                                       .024 | 165.25
                                                                       .010
31.67
         .234 | 65.08
                        .141 | 98.50
                                        .063 |131.92
                                                       .024 |165.33
                                                                       .010
 31.75
         .233 | 65.17
                        .140 | 98.58
                                        .063 |132.00
                                                       .024 |165.42
                                                                       .010
 31.83
         .233 | 65.25
                        .140 | 98.67
                                        .063 |132.08
                                                       .024 |165.50
         .232 | 65.33
 31.92
                        .140 | 98.75
                                        .063 |132.17
                                                       .024 | 165.58
                                                                       .010
 32.00
          .232 | 65.42
                        .140 | 98.83
                                        .062 |132.25
                                                       .024 |165.67
                                                                       .010
 32.08
         .231 | 65.50
                        .140 | 98.92
                                        .062 |132.33
                                                       .024 |165.75
                                                                       .010
 32.17
         .230 | 65.58
                        .139 | 99.00
                                        .062 | 132.42
                                                       .024 | 165.83
                                                                       .010
                        .139 | 99.08
 32.25
         .230 | 65.67
                                        .062 |132.50
                                                       .024 |165.92
                                                                       .010
 32.33
         .229 | 65.75
                        .139 | 99.17
                                        .062 |132.58
                                                       .024 |166.00
32.42
         .229 | 65.83
                        .139 | 99.25
                                        .062 | 132.67
                                                       .024 | 166.08
                                                                       .010
 32.50
         .228 | 65.92
                        .138 | 99.33
                                        .061 |132.75
                                                       .024 |166.17
                                                                       .010
 32.58
         .228 | 66.00
                        .138 | 99.42
                                        .061 |132.83
                                                       .024 |166.25
                                                                       .010
        .227 | 66.08
32.67
                        .138 | 99.50
                                        .061 |132.92
                                                       .023 |166.33
                                                                       .010
                                        .061 |133.00
         .227 | 66.17
                                                       .023 |166.42
32.75
                        .138 | 99.58
                                                                       .010
32.83
         .227 | 66.25
                        .138 | 99.67
                                        .061 |133.08
                                                       .023 |166.50
 32.92
        .226 | 66.33
                        .137 | 99.75
                                        .061 |133.17
                                                       .023 |166.58
 33.00
         .226 | 66.42
                        .137 | 99.83
                                        .060 |133.25
                                                       .023 |
 33.08
         .225 | 66.50
                        .137 | 99.92
                                        .060 |133.33
                                                       .023
33.17
        .225 | 66.58
                        .137 |100.00
                                        .060 |133.42
                                                       .023 |
        .224 | 66.67
                        .136 |100.08
                                        .060 |133.50
                                                       .023 |
33.25
33.33
        .224 | 66.75
                        .136 |100.17
                                        .060 |133.58
| READ STORM | Filename: G:\Projects\2008\
                                08104 - Vaughan Corporate Centre - Master Ser
                                \Design\SWM\December 2011 - TS\VO2 Input Hydr
| Ptotal= 65.59 mm | Comments: 25yr/6hr
                     RAIN | TIME
                                      RAIN | TIME RAIN | TIME
                                                                     RAIN
                hrs
                      mm/hr | hrs
                                      mm/hr | hrs mm/hr | hrs
                                                                     mm/hr
                .25
                        .00 | 2.00
                                      22.30 |
                                                     9.18 | 5.50
                                                                     1 31
                                              3.75
                        1.31 | 2.25
                                      22.30 |
                                              4.00
                                                      5.25 | 5.75
                       1.31 | 2.50
                                      60.35 | 4.25
                                                      5.25 | 6.00
                                                                     1.31
                1.00
                       1.31 | 2.75
                                      60.35 | 4.50
                                                      2.62 | 6.25
                                                                     1.31
                1.25
                        1.31
                            3.00
                                      17.06 |
                                              4.75
                                                      2.62
                                     17.06 | 5.00
               1.50
                       7.87 | 3.25
                                                      1.31 |
                       7.87 | 3.50
                                      9.18 | 5.25
                                                      1.31 I
| ADD HYD (0218) |
1 + 2 = 3
                           AREA QPEAK
                                           TPEAK
                           (ha)
                                   (cms)
                                           (hrs)
                                                      (mm)
       ID1= 1 (0215): 124.65 11.140
                                           3 00
                                                   57 75
       + ID2= 2 (0210): 576.91 17.011
                                           3.17
                                                    53.22
         ID = 3 (0218): 701.56 27.743
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
I CALTR
| STANDHYD (0231) |
                     Area (ha) = 14.94
|ID= 1 DT= 5.0 min | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00
```

		IMPERVIOUS	PERVIOUS	(i)
Surface Area	(ha) =	13.45	1.49	
Dep. Storage	(mm) =	1.00	4.30	
Average Slope	(%)=	1.00	2.00	
Length	(m) =	315.60	40.00	
Mannings n	=	.013	.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

		TRA	ANSFORMED	HYETOGR	APH		
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
					mm/hr		
.083	.00	1.667	7.87	3.250	17.06	4.83	1.31
.167	.00	1.750	7.87	3.333	9.18	4.92	1.31
.250	.00	1.833	22.30	3.417	9.18	5.00	1.31
.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
.583		2.167		3.750		5.33	1.31
.667		2.250		3.833			
.750		2.333	60.35	3.917	5.25	5.50	1.31
.833					5.25	5.58	1.31
.917		2.500					
1.000					5.25		
1.083		2.667					
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250					2.62		
1.333		2.917					
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
					2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		
Max.Eff.Inten.(m	m/hr)=	60.35	3	7.96			
over	(min)	5.00	1	0.00			
Storage Coeff.	(min) =	6.23	(ii)	9.82 (ii)		
Unit Hyd. Tpeak	(min) =	5.00	1	0.00			
Unit Hyd. peak	(cms) =	.19		.11			
					TOTA	LS	
PEAK FLOW				.13	2.3	71 (iii)
TIME TO PEAK	(hrs) =	2.75		2.75	2.	75	
RUNOFF VOLUME	(mm) =	64.59	3				
FOTAL RAINFALL				5.59	65.	59	
RUNOFF COEFFICIE	NT =	.98		.46		93	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 80.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

over (min) 5.00

______ | CALIB | STANDHYD (0220) | Area (ha) = 16.19 |ID= 1 DT= 5.0 min | Total Imp(%)= 57.00 Dir. Conn.(%)= 57.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) = 9.23 6.96 Dep. Storage (mm) = 1.00 4.30 2.00 Average Slope (%)= Length (m) = 328.50 40.00 Mannings n .013 .250 Max.Eff.Inten.(mm/hr) = 60.35

20.00

PEAK FLOW (cms)= 1.54	Stora Unit Unit	ge Coeff. Hyd. Tpeak Hyd. peak	(min) = (min) = (cms) =	6.38 5.00 .18	(ii)	17.13 (20.00 .06		TOTALS*	
CN* = 80.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAR FLOW DOES NOT INCLUDE BASEFLOW IF ANY. RESERVOIR (0234) IN= 2> OUT= 1 DT= 5.0 min	PEAK TIME RUNOF TOTAL RUNOF	FLOW TO PEAK F VOLUME RAINFALL F COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =	1.54 2.75 64.59 65.59		2.92 30.10 65.59		1.952 (ii 2.75 49.76 65.59	ii)
RESERVOIR (0234)	(ii) (iii)	CN* = TIME STEP THAN THE PEAK FLOW	80.0 Ia (DT) SHOUI STORAGE COE DOES NOT I	= Dep. S D BE SMA FFICIENT NCLUDE I	Storage ALLER O F. BASEFLO	(Above R EQUAL W IF ANY	·)		
AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0220) 16.19 1.95 2.75 49.76 OUTFLOW: ID= 1 (0234) 16.19 .75 3.25 49.75 PEAK FLOW REDUCTION [Qout/Qin](%)= 38.39 TIME SHIFT OF PEAK FLOW (min)= 30.00 MAXIMUM STORAGE USED (ha.m.)= .3713 ADD HYD (0236) 1 + 2 = 3	RESERVOI	R (0234)							
PEAK FLOW REDUCTION [Qout/Qin] (%) = 38.39			.000	00	.0000	1.1	.510	.5700	
PEAK FLOW REDUCTION [Qout/Qin](%) = 38.39	INFLO OUTFL	W : ID= 2 OW: ID= 1	(0220) (0234)	AREA (ha) 16.19 16.19	QPEA (cms 1.9	K TE) (h 5 2 5 3	PEAK nrs) 2.75 3.25	(mm) 49.76	
ADD HYD (0236) 1 + 2 = 3		Т М	IME SHIFT C AXIMUM STC	OF PEAK I	FLOW JSED	(n (ha.	nin) = 30	0.00	
AREA QPEAK TPEAK R.V.	מעם ממע ו	(0236)	AF	REA QI	PEAK	TPEAK	R.V.		
ADD HYD (0222) 1 + 2 = 3	+	ID1= 1 (02 ID2= 2 (02	31): 14. 34): 16.	94 2.3 19 .7	371 749	2.75 3.25	61.14		
ADD HYD (0222) 1 + 2 = 3								:	
ADD HYD (0222) 1 + 2 = 3									
ID = 3 (0222): 732.69 29.250 3.08 54.07 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.	I ADD HYD	(0222) I	AF ()	REA QI	PEAK	TPEAK	R.V.		
ID = 3 (0222): 732.69 29.250 3.08 54.07 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.	+	ID1= 1 (02 ID2= 2 (02	18): 701. 36): 31.	56 27. 13 2.9	743	3.08	54.02 55.22		
CALIB		ID = 3 (02)	22): 732.	69 29.2	250	3.08	54.07	=	
STANDHYD (0239) Area (ha) = 8.57 ID = 1 DT = 5.0 min Total Imp(%) = 90.00 Dir. Conn.(%) = 90.00	CALIB STANDHYD ID= 1 DT=	(0239) 5.0 min	Area Total Im						

65.59

.76

Surface Area	(ha)=	7.71	.86			
Dep. Storage	(mm) =	1.00	4.30			
Average Slope	(%)=	1.00	2.00			
Length		239.00				
Mannings n	=	.013	.250			
Max.Eff.Inten.(mm/hr)=	60.35	78.07			
over	(min)	5.00	10.00			
Storage Coeff.	(min) =	5.27	(ii) 8.86	(ii)		
Unit Hyd. Tpeak	(min) =	5.00	10.00			
Unit Hyd. peak	(cms) =	.21	.12			
					*TOTALS	k.
PEAK FLOW	(cms) =	1.29	.08		1.365	(iii)
TIME TO PEAK	(hrs) =	2.75	2.75		2.75	
RUNOFF VOLUME	(mm) =	64.59	30.10		61.14	
TOTAL RAINFALL	(mm) =	65.59	65.59		65.59	
RUNOFF COEFFICE	ENT =	.98	.46		.93	
(i) CN PROCED	URE SELECT	red for Pe	RVIOUS LOSSE	s:		
CN* =	80.0 Ia	a = Dep. S	Storage (Abo	ve)		
(ii) TIME STEP						
THAN THE	STORAGE CO	DEFETCIENT	, -			

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

| CALIB | STANDHYD (0232) | Area (ha) = 8.81 |ID= 1 DT= 5.0 min | Total Imp(%)= 57.00 Dir. Conn.(%)= 57.00 IMPERVIOUS PERVIOUS (i) 5.02 Surface Area (ha)= 3.79 Dep. Storage (mm) = 1.00 4.30 1.00 Average Slope (%) = 1.00 Length (m) = 242.30 = .013 2.00 40.00 .013 .250 Max.Eff.Inten.(mm/hr) = 60.35 5.00 over (min) 20.00 Storage Coeff. (min) = 5.32 (ii) 16.06 (ii) Unit Hyd. Tpeak (min) = 5.00 20.00 .06 Unit Hyd. peak (cms)= .21 .84 .26 2.75 2.92 *TOTALS* PEAK FLOW 1.072 (iii) (cms) = 2.75 2.92 64.59 30.10 TIME TO PEAK (hrs)= 2.75 RUNOFF VOLUME (mm) = 49.76

65.59 65.59

.46

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 80.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

TOTAL RAINFALL (mm) =

RUNOFF COEFFICIENT =

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

RESERVOIR (0235) IN= 2> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	 	OUTFLOW (cms)	STORAGE (ha.m.)	
	ARE.	~		TPEAK (hrs)	R.V. (mm)	

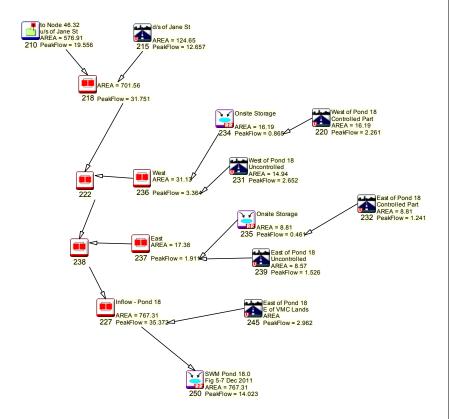
INFLOUTF	OW : ID= 2 LOW: ID= 1	(0232)	8. 8.	81 1 81	.07 2	2.75 3.25	49.76 49.74	
		PEAK FI TIME SHII MAXIMUM	LOW R FT OF P STORAG	EDUCTION EAK FLOW E USED	[Qout/Qin] (r (ha	(%) = 37 min) = 30 .m.) = .	7.28).00 .2061	
ADD HYD	(0237)	 	AREA	QPEAK	TPEAK	R.V.		
+	ID1= 1 (C ID2= 2 (C	1239): 1235):	8.57 8.81	1.365 .399	2.75	61.14 49.74		
NOTE		1237):	17.38	1.696	2.75	55.36	=	
ADD HYD 1 + 2	(0238) 2 = 3 ID1= 1 (0 ID2= 2 (0		AREA (ha) 732.69	QPEAK (cms) 29.250	TPEAK (hrs) 3.08	R.V. (mm) 54.07		
		238):	750.07	30.066	3.08	54.10	=	
ADD HYD	(0227) 2 = 3 ID1= 1 (0 ID2= 2 (0	 2245): 238):	AREA (ha) 17.24 750.07	QPEAK (cms) 2.642 30.066	TPEAK (hrs) 2.75 3.08	R.V. (mm) 59.42 54.10		
NOTE		1227):	767.31	30.965	3.08	54.22	=	
RESERVO	IR (0250)							
DT= 5.0	0 min	1 OUT: 1 2 2 3 3 3 3 5 9 9 15	.7950 .2760 .4270 .6700 .6440 .7990	6.4020 9.1830 10.6610 12.2670 13.9060 15.5860 17.3710	31.0 38.3 40.0 42.5 45.0 47.5	3600 3600 5000 5000 5000	19.8490 20.2920 20.3980 21.3030 22.1830 23.5100 .0000	
INFLO OUTF	OW : ID= 2 LOW: ID= 1	(0227) (0250)	AR (h 767. 767.	EA QPI a) (cr 31 30 31 10	EAK TI ns) (1 .97 3	PEAK nrs) 3.08 4.92	R.V. (mm) 54.22 54.21	

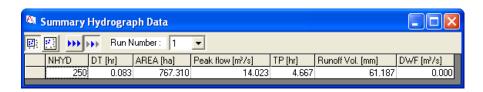
08104 – Vaughan Metropolitan Centre, City of Vaughan Hydrologic Model Output – Required Storage –Controlled to 2-year post at 80% Imperviousness (6hr AES Storm)

April 2012

PEAK FLOW REDUCTION [Qout/Qin](%) = 34.61 TIME SHIFT OF PEAK FLOW (min)=110.00 MAXIMUM STORAGE USED (ha.m.)=15.8872

North East POND (50yr 6hr AES)





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                SS U U A A
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                SSSSS UUUUU A A LLLLL
          TTTTT TTTTT H H Y Y M M OOO
     0 0
                 T H H Y Y MM MM O O
     0 0
                 T H H Y M M O O Licensed To: TMIG
                                                       vo2-0145
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Copyright 1996, 2001 Schaeffer & Associates Ltd.
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               **** DETAILED OUTPUT ****
 Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
 Output filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final
submission\05PROP~1\50y6 w Dev VMC, Prop Pond 18 With %IMP Reduction.
 Summary filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final
submission\05PROP~1\50y6 w Dev VMC, Prop Pond 18 With %IMP Reduction.
DATE: 4/10/2012
                                 TIME: 12:25:45 PM
COMMENTS .
 ********
 ** SIMULATION NUMBER: 1 **
 ********
   READ STORM |
                  Filename: G:\Projects\2008\
                          08104 - Vaughan Corporate Centre - Master Ser
                           \Design\SWM\December 2011 - TS\VO2 Input Hydr
| Ptotal= 73.00 mm |
                  Comments: 50yr/6hr
             TIME
                   RAIN | TIME
                                RAIN | TIME
                                            RAIN | TIME
                                                         RAIN
                   mm/hr | hrs
                               mm/hr |
                                      hrs
                                            mm/hr |
                                                   hrs
                                                        mm/hr
              .25
                    .00 | 2.00
                               24 82 I
                                            10 22 L
                                                  5 50
                                      3 75
                                                         1 46
                   1.46 | 2.25
                               24.82
                                      4.00
                                            5.84 |
                                                  5.75
                                                         1.46
              .75
                   1.46 | 2.50
                               67.16 |
                                     4.25
                                             5.84 | 6.00
                                                         1.46
             1.00
                   1.46 | 2.75
                               67.16 | 4.50
                                            2.92 |
                                                  6.25
                                                         1.46
                   1.46 | 3.00
                               18.98 |
                                      4.75
                                             2.92
             1.50
                   8.76 | 3.25
                               18.98 |
                                      5.00
                                            1.46
                   8.76 | 3.50
                               10.22 |
                                      5.25
                                            1.46
| CALIB
| STANDHYD (0215) | Area
                       (ha) = 124.65
```

ID= 1 DT= 5.0 min Total Imp(%)= 83.00 Dir. Conn.(%)= 79.00	.17	.000			67.00 67.08	.139 100.42 .139 100.50		
IMPERVIOUS PERVIOUS (i)	.33	.000			67.17	.139 100.58		
Surface Area (ha) = 103.46 21.19	.42	.000			67.25	.138 100.67		
Dep. Storage (mm) = .50 4.70	.50	.000	33.92	.233	67.33	.138 100.75	.060 134.17	7 .023
Average Slope (%)= .30 .40	.58	.000	34.00	.232	67.42	.138 100.83	.060 134.25	.023
Length (m) = 1800.00 200.00	.67	.000			67.50	.138 100.92		
Mannings n = .016 .250	.75	.000			67.58	.138 101.00		
NOTE DIVINIVE WAS EDIVISIONED TO SEA VIVE OFFICE	.83	.000			67.67	.137 101.08		
NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.	.92 1.00	.000			67.75 67.83	.137 101.17 .137 101.25		
	1.08	.000			67.92	.137 101.23		
TRANSFORMED HYETOGRAPH	1.17	.000			68.00	.136 101.42		
TIME RAIN TIME RAIN TIME RAIN TAIN	1.25	.000			68.08	.136 101.50		
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr	1.33	.000			68.17	.136 101.58		
.083 .00 1.667 8.76 3.250 18.98 4.83 1.46	1.42	.001			68.25	.136 101.67		
.167 .00 1.750 8.76 3.333 10.22 4.92 1.46	1.50	.002			68.33	.136 101.75		
.250 .00 1.833 24.82 3.417 10.22 5.00 1.46 .333 1.46 1.917 24.82 3.500 10.22 5.08 1.46	1.58 1.67	.003			68.42 68.50	.135 101.83 .135 101.92		
.333 1.40 1.91/ 24.02 3.300 10.22 3.00 1.40	1.75	.008			68.58	.135 101.92		
.500 1.46 2.083 24.82 3.667 10.22 5.25 1.46	1.83	.215			68.67	.135 102.08		
.583 1.46 2.167 24.82 3.750 10.22 5.33 1.46	1.92	.722			68.75	.134 102.17		
.667 1.46 2.250 24.82 3.833 5.84 5.42 1.46		1.327			68.83	.134 102.25		
.750 1.46 2.333 67.16 3.917 5.84 5.50 1.46		2.017			68.92	.134 102.33		
.833 1.46 2.417 67.16 4.000 5.84 5.58 1.46		2.770			69.00	.134 102.42		
.917 1.46 2.500 67.16 4.083 5.84 5.67 1.46 1.000 1.46 2.583 67.16 4.167 5.84 5.75 1.46		3.550 4.396			69.08 69.17	.134 102.50 .133 102.58		
1.000 1.40 2.565 67.16 4.150 5.84 5.83 1.46		5.449			69.25	.133 102.56		
1.167 1.46 2.750 67.16 4.333 2.92 5.92 1.46		6.772			69.33	.133 102.75		
1.250 1.46 2.833 18.98 4.417 2.92 6.00 1.46		8.840			69.42	.133 102.83		
1.333 8.76 2.917 18.98 4.500 2.92 6.08 1.46		11.101			69.50	.132 102.92		
1.417 8.76 3.000 18.98 4.583 2.92 6.17 1.46		13.408			69.58	.132 103.00		
1.500 8.76 3.083 18.98 4.667 2.92 6.25 1.46 1.583 8.76 3.167 18.98 4.750 2.92		15.593 17.376			69.67	.132 103.08		
1.583 8.76 3.167 18.98 4.750 2.92		18.606			69.75 69.83	.132 103.17 .132 103.25		
Max.Eff.Inten.(mm/hr) = 67.16 32.81		19.305			69.92	.131 103.33		
over (min) 30.00 75.00		19.556			70.00	.131 103.42		
Storage Coeff. (min) = 27.58 (ii) 74.50 (ii)		19.495			70.08	.131 103.50		
Unit Hyd. Tpeak (min) = 30.00 75.00		19.223			70.17	.131 103.58		
Unit Hyd. peak (cms) = .04 .02		18.782			70.25	.131 103.67		
TOTALS PEAK FLOW (cms) = 12.27 .91 12.657 (iii)		18.213 17.565			70.33 70.42	.130 103.75 .130 103.83		
PEAK FLOW (cms) = 12.27 .91 12.657 (iii) TIME TO PEAK (hrs) = 3.00 3.92 3.00		16.881			70.42	.130 103.83		
RUNOFF VOLUME (mm) = 72.50 35.70 64.77		16.201			70.58	.130 103.32		
TOTAL RAINFALL (mm) = 73.00 73.00 73.00		15.543			70.67	.129 104.08		
RUNOFF COEFFICIENT = .99 .49 .89		14.898			70.75	.129 104.17		
		14.263			70.83	.129 104.25		
(i) ON PROGRAMME GELEGIED FOR PROVINCIA LOCATIO.		13.647			70.92	.129 104.33		
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 76.0 Ia = Dep. Storage (Above)		13.058 12.507			71.00 71.08	.129 104.42 .128 104.50		
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL		11.995			71.00	.128 104.58		
THAN THE STORAGE COEFFICIENT.		11.509			71.25	.128 104.67		
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.		11.041			71.33	.128 104.75		
		10.594			71.42	.128 104.83		
		10.169			71.50	.127 104.92		
		9.774			71.58 71.67	.127 105.00		
READ HYD (0210) AREA (ha)= 576.91 DT= 5.0 min TPEAK (hrs)= 3.17		9.407 9.062			71.67	.127 105.08 .127 105.17		
DI		8.736			71.83	.127 105.17		
Filename: G:\Projects\2008\08104 - Vaughan Corporate Centre - Master Servicing		8.432			71.92	.126 105.33		
Strategy\Design\SWM\December 20	5.17	8.151	38.58	.210	72.00	.126 105.42	.051 138.83	.020
Comments: Outflow at 46.32		7.893			72.08	.126 105.50		
		7.659			72.17	.126 105.58		
TIME FLOW TIME FLOW TIME FLOW TIME FLOW TIME FLOW hrs cms hrs cms hrs cms hrs cms hrs cms		7.448 7.259			72.25	.126 105.67 .125 105.75		
.00 .000 33.42 .238 66.83 .140 100.25 .061 133.67 .023		7.239			72.42	.125 105.75		
.08 .000 33.50 .237 66.92 .139 100.33 .061 133.75 .023		6.936			72.50	.125 105.92		
	•							

5.75	6.821	39.17	.208	72.58	.125 106.00	.050 139.42	.020	11.33	2.778	1 44.75	.193	78.17	.112	111.58	.043	145.00	.017
5.83		39.25		72.67	.125 106.08	.050 139.50	.020	11.42		44.83		78.25		111.67		145.08	.017
5.92		39.33		72.75	.124 106.17	.050 139.58	.020	11.50		44.92		78.33		111.75		1145.17	.017
6.00		39.42		72.83	.124 106.25	.050 139.67	.020	11.58	2.678			78.42		111.83		145.25	.017
6.08		39.50		72.92	.124 106.33	.050 139.75	.020	11.67		45.08		78.50		111.92		1145.33	.017
6.17		39.58		73.00	.124 106.42	.050 139.83	.020	11.75	2.614			78.58		111.00		1145.42	.017
6.25		39.67		73.08	.124 106.42	.050 139.92	.020	11.83		45.25		78.67		112.08		1145.50	.017
6.33		39.75		73.00	.123 106.58	.050 139.92	.020	11.92		45.33		78.75		112.00		145.58	.017
							.020	11.92									
6.42		39.83		73.25	.123 106.67	.049 140.08	.020	12.00	2.521			78.83		112.25		145.67	.017
6.50		39.92		73.33	.123 106.75	.049 140.17	.020	12.08		45.50		78.92		112.33		1145.75	.017
6.58		40.00		73.42	.123 106.83	.049 140.25	.020	12.17		45.58		79.00		112.42		145.83	.017
6.67		40.08		73.50	.123 106.92	.049 140.33	.020	12.25	2.427			79.08		112.50		145.92	.017
6.75	5.813			73.58	.122 107.00	.049 140.42	.019	12.33		45.75		79.17		112.58		146.00	.017
6.83	5.719			73.67	.122 107.08	.049 140.50	.019	12.42		45.83		79.25		112.67		146.08	.017
6.92	5.627	40.33	.205	73.75	.122 107.17	.049 140.58	.019	12.50	2.334	45.92	.190	79.33	.109	112.75	.041	146.17	.017
7.00	5.538	40.42	.205	73.83	.122 107.25	.048 140.67	.019	12.58	2.303	46.00	.190	79.42	.109	112.83	.041	146.25	.017
7.08	5.452	40.50	.204	73.92	.122 107.33	.048 140.75	.019	12.67	2.272	46.08	.190	79.50	.109	112.92	.041	146.33	.017
7.17		40.58		74.00	.121 107.42	.048 140.83	.019	12.75		46.17		79.58		113.00		146.42	.017
7.25		40.67		74.08	.121 107.50	.048 140.92	.019	12.83	2.212			79.67		113.08		146.50	.017
7.33	5.214			74.17	.121 107.58	.048 141.00	.019	12.92	2.183			79.75		113.17		146.58	.017
7.42	5.140			74.25	.121 107.67	.048 141.08	.019	13.00	2.154			79.83		113.25		1146.67	.016
7.50		40.92		74.33	.121 107.75	.048 141.17	.019	13.08		46.50		79.92		113.33		1146.75	.016
7.58		41.00		74.42	.120 107.83	.048 141.25	.019	13.17		46.58		80.00		113.42		1146.83	.016
							.019	13.17									
7.67		41.08		74.50	.120 107.92	.047 141.33	.019	13.25		46.67		80.08		113.50		146.92	.016
7.75		41.17		74.58	.120 108.00	.047 141.42	.019	13.33	2.040			80.17		113.58		147.00	.016
7.83		41.25		74.67	.120 108.08	.047 141.50	.019	13.42	2.012			80.25		113.67		147.08	.016
7.92		41.33		74.75	.120 108.17	.047 141.58	.019	13.50	1.985			80.33		113.75		147.17	.016
8.00		41.42		74.83	.119 108.25	.047 141.67	.019	13.58	1.958			80.42		113.83		147.25	.016
8.08	4.622			74.92	.119 108.33	.047 141.75	.019	13.67	1.932			80.50		113.92		147.33	.016
8.17		41.58		75.00	.119 108.42	.047 141.83	.019	13.75	1.906			80.58		114.00		147.42	.016
8.25	4.503	41.67	.201	75.08	.119 108.50	.047 141.92	.019	13.83	1.880	47.25	.187	80.67	.106	114.08	.040	147.50	.016
8.33	4.444	41.75	.201	75.17	.119 108.58	.046 142.00	.019	13.92	1.855	47.33	.187	80.75	.106	114.17	.040	147.58	.016
8.42	4.386	41.83	.201	75.25	.118 108.67	.046 142.08	.019	14.00	1.830	47.42	.187	80.83	.106	114.25	.039	1147.67	.016
8.50	4.328	41.92		75.33	.118 108.75	.046 142.17	.019	14.08	1.805	1 47.50	.187 i	80.92		114.33	.039	147.75	.016
8.58		42.00		75.42	.118 108.83	.046 142.25	.019	14.17	1.781			81.00		114.42		147.83	.016
8.67		42.08		75.50	.118 108.92	.046 142.33	.018	14.25	1.757			81.08		114.50		1147.92	.016
8.75	4.157			75.58	.118 109.00	.046 142.42	.018	14.33	1.733			81.17		114.58		148.00	.016
8.83	4.102			75.67	.117 109.08	.046 142.50	.018	14.42	1.709			81.25		114.67		1148.08	.016
8.92		42.33		75.75	.117 109.17	.046 142.58	.018	14.50	1.683			81.33		1114.75		1148.17	.016
9.00	3.992			75.83	.117 109.17	.045 142.67	.018	14.58	1.656			81.42		114.83		1148.25	.016
9.08	3.938			75.92			.010	14.50				81.50					.016
					.117 109.33	.045 142.75	.018	14.67	1.629					114.92		148.33	
9.17		42.58		76.00	.117 109.42	.045 142.83	.018	14.75	1.600			81.58		115.00		148.42	.016
9.25		42.67		76.08	.116 109.50	.045 142.92	.018	14.83	1.570			81.67		115.08		148.50	.016
9.33	3.781			76.17	.116 109.58	.045 143.00	.018	14.92	1.539			81.75		115.17		148.58	.016
9.42		42.83		76.25	.116 109.67	.045 143.08	.018	15.00	1.509			81.83		115.25		148.67	.016
9.50		42.92		76.33	.116 109.75	.045 143.17	.018	15.08	1.480			81.92		115.33		148.75	.016
9.58	3.631			76.42	.116 109.83	.045 143.25	.018	15.17	1.452			82.00		115.42		148.83	.016
9.67	3.584			76.50	.116 109.92	.045 143.33	.018	15.25	1.426			82.08		115.50		148.92	.016
9.75	3.537	43.17		76.58	.115 110.00	.044 143.42	.018	15.33	1.402		.183	82.17		115.58	.038	149.00	.015
9.83	3.491	43.25	.197	76.67	.115 110.08	.044 143.50	.018	15.42	1.378	48.83	.183	82.25	.103	115.67	.038	149.08	.015
9.92	3.445	43.33	.197	76.75	.115 110.17	.044 143.58	.018	15.50	1.356	48.92	.183	82.33	.103	115.75	.038	149.17	.015
10.00	3.401	43.42	.197	76.83	.115 110.25	.044 143.67	.018	15.58	1.335	49.00	.183	82.42	.103	115.83	.038	149.25	.015
10.08	3.358	43.50	.197	76.92	.115 110.33	.044 143.75	.018	15.67	1.314	49.08	.183	82.50		115.92	.038	149.33	.015
10.17	3.315			77.00	.114 110.42	.044 143.83	.018	15.75	1.294	1 49.17		82.58		116.00		149.42	.015
10.25	3.274			77.08	.114 110.50	.044 143.92	.018	15.83	1.275			82.67		116.08		149.50	.015
10.33	3.233			77.17	.114 110.58	.044 144.00	.018	15.92	1.257			82.75		116.17		149.58	.015
10.42	3.192			77.25	.114 110.67	.044 144.08	.018	16.00		49.42		82.83		116.25		1149.67	.015
10.50	3.152			77.33	.114 110.07	.044 144.17	.018	16.08	1.222			82.92		116.33		1149.75	.015
10.50	3.112			77.42	.114 110.75	.043 144.17	.018	16.08	1.222			83.00		116.33		149.75	.015
							.010	10.1/									
10.67	3.072			77.50	.113 110.92	.043 144.33	.018	16.25	1.188			83.08		1116.50		149.92	.015
10.75	3.033			77.58	.113 111.00	.043 144.42	.017	16.33	1.172			83.17		116.58		150.00	.015
10.83	2.995			77.67	.113 111.08	.043 144.50	.017	16.42	1.157			83.25		116.67		150.08	.015
10.92	2.958			77.75	.113 111.17	.043 144.58	.017	16.50	1.142			83.33		116.75		150.17	.015
11.00	2.920			77.83	.112 111.25	.043 144.67	.017	16.58	1.127			83.42		116.83		150.25	.015
11.08	2.884			77.92	.112 111.33	.043 144.75	.017	16.67	1.113			83.50		116.92		150.33	.015
11.17	2.848			78.00	.112 111.42	.043 144.83	.017	16.75	1.099			83.58		117.00		150.42	.015
11.25	2.813	44.67	.194	78.08	.112 111.50	.043 144.92	.017	16.83	1.085	50.25	.180	83.67	.100	117.08	.037	150.50	.015

16.92	1.072 50	0.33	.180 I	83.75	.100 117.17	.036	150.58	.015	22.50	. 405	55.92	.166	89.33	.087	122.75	. 0.31	156.17	.013
17.00	1.059 50			83.83	.100 117.25	.036		.015	22.58		56.00		89.42		122.83		156.25	.013
17.08	1.046 50			83.92	.100 117.23	.036		.015	22.67		56.08		89.50		122.92		156.33	.013
17.17	1.033 50			84.00	.100 117.33	.036		.015	22.75		56.17		89.58		123.00		156.42	.013
17.25	1.021 50			84.08	.100 117.50	.036		.015	22.83		56.25		89.67		123.08		156.50	.013
17.33	1.009 50			84.17	.099 117.58	.036		.015	22.92		56.33		89.75		123.17		156.58	.013
17.42	.997 50			84.25	.099 117.67	.036		.015	23.00		56.42		89.83		123.25		156.67	.013
17.50	.986 50	0.92	.178	84.33	.099 117.75	.036	151.17	.015	23.08	.377	56.50	.165	89.92	.086	123.33	.031	156.75	.013
17.58	.973 53	1.00	.178	84.42	.099 117.83	.036	151.25	.015	23.17	.373	56.58	.165	90.00	.085	123.42	.031	156.83	.013
17.67	.960 53	1.08	.178 I	84.50	.099 117.92	.036	151.33	.015	23.25	.370	56.67	.165	90.08	.085	123.50	.031	156.92	.013
17.75	.945 53			84.58	.099 118.00	.036		.015	23.33		56.75		90.17		123.58		157.00	.013
17.83	.929 53			84.67	.099 118.08	.036		.014	23.42		56.83		90.25		123.67		1157.08	.012
17.92	.912 53			84.75	.098 118.17	.035		.014	23.50		56.92		90.33		123.75		157.17	.012
18.00	.895 51			84.83	.098 118.25	.035		.014	23.58		57.00		90.42		123.83		1157.25	.012
18.08	.878 53			84.92	.098 118.33	.035		.014	23.67		57.08		90.50		123.92		157.33	.012
18.17	.860 53			85.00	.098 118.42	.035		.014	23.75		57.17		90.58		124.00		157.42	.012
18.25	.843 53	1.67	.176	85.08	.098 118.50	.035	151.92	.014	23.83	.348	57.25	.163	90.67	.083	124.08	.030	157.50	.012
18.33	.826 53	1.75	.176	85.17	.098 118.58	.035	152.00	.014	23.92	.346	57.33	.163	90.75	.083	124.17	.030	157.58	.012
18.42	.809 53	1.83	.176	85.25	.097 118.67	.035	152.08	.014	24.00	.343	57.42	.163	90.83	.083	124.25	.030	157.67	.012
18.50	.792 53			85.33	.097 118.75	.035		.014	24.08		57.50		90.92		124.33		1157.75	.012
18.58	.776 52			85.42	.097 118.83	.035		.014	24.17		57.58		91.00		124.42		157.83	.012
18.67	.760 52			85.50	.097 118.92	.035		.014	24.25		57.67		91.08		124.50		157.92	.012
	.744 52				.097 110.92	.035		.014	24.23		57.75						158.00	
18.75				85.58									91.17		124.58			.012
18.83	.730 52			85.67	.097 119.08	.035		.014	24.42		57.83		91.25		124.67		158.08	.012
18.92	.715 52			85.75	.096 119.17	.034		.014	24.50		57.92		91.33		124.75		158.17	.012
19.00	.701 52		.175	85.83	.096 119.25	.034		.014	24.58		58.00	.161	91.42	.081	124.83		158.25	.012
19.08	.688 52	2.50	.174	85.92	.096 119.33	.034	152.75	.014	24.67	.327	58.08	.161	91.50	.081	124.92		158.33	.012
19.17	.675 52	2.58	.174	86.00	.096 119.42	.034	152.83	.014	24.75	.325	58.17	.161	91.58	.081	125.00	.029	158.42	.012
19.25	.662 52	2.67	.174 I	86.08	.096 119.50	.034	152.92	.014	24.83	.323	58.25	.161	91.67	.081	125.08		158.50	.012
19.33	.650 52			86.17	.096 119.58	.034		.014	24.92		58.33		91.75		125.17		1158.58	.012
19.42	.639 52			86.25	.095 119.67	.034		.014	25.00		58.42		91.83		125.25		158.67	.012
19.50	.628 52			86.33	.095 119.75	.034		.014	25.08		58.50		91.92		125.33		158.75	.012
	.617 53			86.42				.014	25.17									
19.58					.095 119.83	.034					58.58		92.00		125.42		158.83	.012
19.67	.607 53			86.50	.095 119.92	.034		.014	25.25		58.67		92.08		125.50		158.92	.012
19.75	.597 53			86.58	.095 120.00	.034		.014	25.33		58.75		92.17		125.58		159.00	.012
19.83	.588 53			86.67	.094 120.08	.034		.014	25.42		58.83		92.25		125.67		159.08	.012
19.92	.579 53	3.33	.172	86.75	.094 120.17	.034	153.58	.014	25.50	.311	58.92	.159	92.33	.079	125.75	.029	159.17	.012
20.00	.570 53	3.42	.172	86.83	.094 120.25	.033	153.67	.014	25.58	.310	59.00	.159	92.42	.079	125.83	.029	159.25	.012
20.08	.562 53	3.50	.172	86.92	.094 120.33	.033	153.75	.014	25.67	.309	59.08	.159	92.50	.079	125.92	.029	159.33	.012
20.17	.554 53			87.00	.094 120.42	.033		.014	25.75		59.17		92.58		126.00		159.42	.012
20.25	.547 53			87.08	.093 120.50	.033		.014	25.83		59.25		92.67		126.08		1159.50	.012
20.33	.539 53			87.17	.093 120.58	.033		.014	25.92		59.33		92.75		126.17		159.58	.012
20.42	.532 53			87.25	.093 120.67	.033		.014	26.00		59.42		92.83		1126.25		1159.67	.012
	.526 53				.093 120.07	.033			26.08								159.75	
20.50				87.33				.014			59.50		92.92		126.33			.012
20.58	.519 54			87.42	.092 120.83	.033		.013	26.17		59.58		93.00		126.42		159.83	.012
20.67	.513 54			87.50	.092 120.92	.033		.013	26.25		59.67		93.08		126.50		159.92	.012
20.75	.507 54			87.58	.092 121.00	.033		.013	26.33		59.75		93.17		126.58		160.00	.012
20.83	.502 54		.170	87.67	.092 121.08	.033		.013	26.42		59.83	.157	93.25		126.67	.028	160.08	.012
20.92	.496 54	4.33	.170	87.75	.092 121.17	.033	154.58	.013	26.50	.298	59.92	.157	93.33	.076	126.75	.028	160.17	.012
21.00	.491 54	4.42	.170 I	87.83	.091 121.25	.033	154.67	.013	26.58	.298	60.00	.157	93.42	.076	126.83	.028	160.25	.011
21.08	.486 54	4.50	.170 I	87.92	.091 121.33	.033	154.75	.013	26.67	.297	60.08	.157	93.50		126.92	.028	160.33	.011
21.17	.481 54			88.00	.091 121.42	.032		.013	26.75		60.17		93.58		127.00		160.42	.011
21.25	.476 54			88.08	.091 121.50	.032		.013	26.83		60.25		93.67		127.08		1160.50	.011
21.33	.472 54			88.17	.090 121.58	.032		.013	26.92		60.33		93.75		1127.17		1160.58	.011
									27.00									
21.42	.467 54			88.25	.090 121.67	.032		.013			60.42		93.83		127.25		160.67	.011
21.50	.462 54			88.33	.090 121.75	.032		.013	27.08		60.50		93.92		127.33		160.75	.011
21.58	.458 55			88.42	.090 121.83	.032		.013	27.17		60.58		94.00		127.42		160.83	.011
21.67	.453 55			88.50	.089 121.92	.032		.013	27.25		60.67		94.08		127.50		160.92	.011
21.75	.448 55			88.58	.089 122.00	.032		.013	27.33		60.75		94.17		127.58		161.00	.011
21.83	.443 55	5.25	.168	88.67	.089 122.08	.032	155.50	.013	27.42	.290	60.83	.155	94.25	.074	127.67	.027	161.08	.011
21.92	.439 55			88.75	.089 122.17	.032		.013	27.50		60.92		94.33		127.75		161.17	.011
22.00	.434 55			88.83	.089 122.25	.032		.013	27.58		61.00		94.42		127.83		161.25	.011
22.08	.429 55			88.92	.088 122.33	.032		.013	27.67		61.08		94.50		127.92		161.33	.011
22.17	.424 55			89.00	.088 122.42	.032		.013	27.75		61.17		94.58		1128.00		1161.42	.011
	.424 5					.032		.013	27.75									
22.25				89.08	.088 122.50						61.25		94.67		128.08		161.50	.011
22.33	.415 55			89.17	.088 122.58	.031		.013	27.92		61.33		94.75		128.17		161.58	.011
22.42	.410 55	5.83	.16/	89.25	.087 122.67	.031	126.08	.013	28.00	.285	61.42	.154	94.83	.0/3	128.25	.027	161.67	.011

28.08	.284	61.50	.153	94.92	.073	128.33	.027	161.75	.011
28.17			1 = 0			1128.42		1161.83	.011
28.25		61.67	.153	1 95.08		1128.50		1161.92	.011
28.33		61.75	153	95 17		128.58	027	1162 00	011
28.42		61.83	153	1 95 25		1128.67	027	1162.00	011
28.50		61.92	150	1 05 22		1128.75	.027	1162.00	.011
		01.92	.152	95.33		1120.75	.027	1162.17	.011
28.58		62.00	.152	95.00 95.08 95.17 95.25 95.33 95.42 95.50		128.83	.027	162.00 162.08 162.17 162.25 162.33 162.42	.011 .011 .011 .011
28.67	.280	62.08	.152	95.50		128.92	.026	1162.33	.011
28.75		62.17	.152	95.58		129.00	.026	162.42	.011
28.83		62.25	.151	1 95.6/	.071	1129.08	.026	162.50	.011
28.92		62.33	.151	95.75	.071	129.17	.026	162.58	.011
29.00	.278	62.42	.151	95.83	.070	129.25	.026	162.67	.011
29.08	.277	62.50	.151	95.92	.070	129.33	.026	162.75	.011
29.17	.277	62.58	.151	96.00	.070	129.42	.026	162.83	.011
29.25	.276	62.67	.150	96.08	.070	1129.50	.026	1162.92	.011
29.33	.276	62.58 62.67 62.75 62.83	.150	95.75 95.83 95.92 96.00 96.08 96.17 96.25 96.33	.070	129.17 129.25 129.33 129.42 129.50 129.58 129.67 129.75 129.83 129.92 130.00 130.08	.026	162.50 162.58 162.67 162.75 162.83 162.92 163.00 163.17 163.25 163.33	.011
29.42	275	62 83	150	1 96 25	069	1129 67	026	1163 08	011
29.50	275	62.92	150	1 96 33	069	1129 75	026	1163.00	011
29.58		63.00	150	96.42	069	1120.73	026	1163 25	011
29.67	274	63.08	1/0	1 06 50	.009	1120.03	.026	1162 22	011
29.07		63.17	140	1 00.50	.009	1120.00	.026	1163.33	.011
		03.17	.149	96.58	.069	1130.00	.026	1163.42	.011
29.83		63.25	.149	96.67	.068	1130.08	.026	1163.50	.011
29.92		63.33	.149	96.75	.068	1130.17	.026	1163.58	.011
30.00	.272	63.42	.148	96.42 96.50 96.58 96.67 96.75 96.83 96.92 97.00 97.08	.068	129.83 129.92 130.00 130.08 130.17 130.25 130.33 130.42 130.50 130.58	.026	1163.67	.011
30.08	.271	63.50 63.58	.148	96.92	.068	130.33	.025	163.75	.010
30.17	.271	63.58	.148	97.00	.068	130.42	.025	163.83	.010
30.25	. 2 / 0	63.67	.148	97.08	.068	130.50	.025	163.92	.010
30.33	.270	63.75	.148	97.17	.067	130.58	.025	164.00	.010
30.42	.269	63.83	.147	97.25	.067	130.67	.025	164.08	.010
30.50	.269	63.92	.147	97.33	.067	1130.75	.025	1164.17	.010
30.58	.269	64.00	.147	97.42	.067	1130.83	.025	1164.25	.010
30.67	. 268	64.08	.147	1 97.50	.067	1130.92	.025	1164.33	.010
30.75	268	63.92 64.00 64.08 64.17 64.25 64.33	147	97.17 97.25 97.33 97.42 97.50 97.58 97.67 97.75	066	130.50 130.50 130.58 130.67 130.75 130.83 130.92 131.00 131.08 131.09 131.08 131.15 131.35 131.50 131.58 131.50 131.58 131.75 131.63 132.57 132.25 132.33 132.57 132.83 132.58 132.58 132.58 132.58 132.75 132.83 132.75 132.83 132.75 132.83 132.75 132.83 132.95 132.83 132.75 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 132.83 132.95 1	025	1164 42	010
30.83	267	64 25	146	1 97 67	066	1131.00	025	1164 50	010
30.92	267	04.23	1/6	1 07 75	.000	1121.00	.025	1164.50	010
31.00	266	64.42	116	97.83	.000	1131.17	.023	1164.50	.010
31.00		64.50	140	1 07 00	.000	1131.23	.025	1104.07	.010
		04.50	.140	97.92 98.00 98.08 98.17 98.25 98.33 98.42 98.50 98.58	.066	1131.33	.025	1164.75	.010
31.17		64.58	.145	98.00	.065	1131.42	.025	1164.83	.010
31.25		64.67	.145	98.08	.065	1131.50	.025	1164.92	.010
31.33		64.75	.145	98.17	.065	131.58	.025	165.00	.010
31.42	.263	64.83	.145	98.25	.065	131.67	.025	165.08	.010
31.50	.262 .261 .260	64.92	.145	98.33	.065	131.75	.025	165.17	.010
31.58	.261	65.00	.144	98.42	.065	131.83	.024	165.25	.010
31.67	.260	65.08	.144	98.50	.064	131.92	.024	165.33	.010
31.75	.259	65.17	.144	98.58	.064	132.00	.024	165.42	.010
31.83	.258	65.25	.144	98.67	.064	132.08	.024	165.50	.010
31.92	.257	65.33	.143	98.75	.064	132.17	.024	165.58	.010
32.00	.256	65.42	.143	98.67 98.75 98.83 98.92 99.00 99.08 99.17 99.25 99.33 99.42	.064	1132.25	.024	1165.67	.010
32.08		65.50	.143	1 98.92	.064	1132.33	.024	1165.75	.010
32.17		65.58	.143	1 99.00	.063	1132.42	.024	1165.83	.010
32.25		65.67	143	1 99 08	063	1132 50	024	1165 92	010
		65.75	142	99 17	063	1132.58	024	1166 00	010
32.42	251	1 65 83	1/2	1 99 25	063	1132.50	024	1166 08	010
32.50	.252 .251	65.92	1/2	1 99.23	.003	1132.07	024	1166 17	010
52.50	.230	66.00	142	1 00 40	.063	1132.73	.024	1100.17	.010
32.38	.249	1 66.00	.142	99.42	.063	132.83	.024	166.25	.010
32.67	.248	66.08	.142	99.50	.062	1132.92	.024	1166.33	.010
32.75	.246	66.17	.141	99.58	.062	1133.00	.024	1166.42	.010
32.83	.245	66.25	.141	99.67	.062	1133.08	.024	1166.50	.010
32.92	.244	66.33	.141	99.75	.062	133.17	.024	166.58	.010
33.00	.243	66.42	.141	99.83	.062	133.25	.024	I	
33.08	.242	66.50	.140	99.92	.062	133.33	.024	1	
33.17	.241	66.58	.140	100.00	.061	133.42	.023	1	
33.25	.240	66.67	.140	100.08	.061	133.50	.023	I	
33.33	.239	66.00 66.08 66.17 66.25 66.33 66.42 66.50 66.58 66.67	.140	100.17	.061	133.58	.023	I	

READ STORM 	Filenam	08104	- Vaug	ghan Corp		entre - M TS\VO2 I	
Ptotal= 73.00 mm	Comment	s: 50yr/	6hr				
TIME		TIME		TIME		TIME	
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.25	.00 1.46 1.46 1.46 1.46 8.76	2.00	24.82	1 4 00	5 84	1 5.50	1.46
.75	1.46	2.50	67.16	4.25	5.84	6.00	1.46
1.00	1.46	2.75	67.16	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.98	1 4.75	2.92	1	
1.50 1.75	8.76	3.50	10.22	5.25	1.46		
ADD HYD (0218) 1 + 2 = 3 ID1= 1 (0218 + ID2= 2 (0210							
ID = 3 (0218)	3): 701.	56 31.7	51	3.08	60.97		
NOTE: PEAK FLOWS	DO NOT I	NCLUDE B	BASEFLOV	NS IF AN	7.		
STANDHYD (0231) ID= 1 DT= 5.0 min	_						
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	MPERVIOU 13.45 1.00 1.00 315.60 .013		1.49 4.30 2.00 40.00 .250	(i)		
Surface Area Dep. Storage Average Slope Length Mannings n NOTE: RAINFA	(ha) = (mm) = (%) = (m) =	13.45 1.00 1.00 315.60 .013		1.49 4.30 2.00 40.00 .250		ΓΕΡ.	
Mannings n	(ha) = (mm) = (%) = (m) = = = = = = = = = = = = = = = = = = =	13.45 1.00 1.00 315.60 .013	D TO	1.49 4.30 2.00 40.00 .250 5.0 MIN			
Mannings n	(ha) = (mm) = (%) = (m) = = = ALL WAS TR	13.45 1.00 1.00 315.60 .013 XANSFORME	D TO	1.49 4.30 2.00 40.00 .250 5.0 MIN	. TIME ST		RAIN
Mannings n NOTE: RAINF	(ha) = (mm) = (%) = (m) = = = ALL WAS TR	13.45 1.00 1.00 315.60 .013 XANSFORME	D TO	1.49 4.30 2.00 40.00 .250 5.0 MIN	. TIME ST		RAIN mm/hr
Mannings n	(ha) = (mm) = (%) = (m) = = = ALL WAS TR	13.45 1.00 1.00 315.60 .013 XANSFORME	D TO	1.49 4.30 2.00 40.00 .250 5.0 MIN	. TIME ST		RAIN mm/hr 1.46
Mannings n NOTE: RAINF	(ha) = (mm) = (%) = (m) = = = ALL WAS TR	13.45 1.00 1.00 315.60 .013 XANSFORME	D TO	1.49 4.30 2.00 40.00 .250 5.0 MIN	. TIME ST		RAIN mm/hr 1.46 1.46 1.46
Mannings n NOTE: RAINF	(ha) = (mm) = (%) = (m) = = = ALL WAS TR	13.45 1.00 1.00 315.60 .013 XANSFORME	D TO	1.49 4.30 2.00 40.00 .250 5.0 MIN	. TIME ST		RAIN mm/hr 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250 .333	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250 .333	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250 .333	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250 .333	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250 .333	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250 .333	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250 .333	(ha) = (mm) = (%) = (%) = (m) = = ALL WAS TR RAIN mm/hr .00 .00 .00 .1.46 1.46 1.46	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46
NOTE: RAINFA TIME hrs .083 .167 .250 .333	(ha) = (mm) = (%) = (m) = = = ALL WAS TR	13.45 1.00 1.00 315.60 .013 ANSFORME TRA TIME hrs 1.667 1.750 1.833 1.917 2.000	ED TO ENSFORMI RAIN mm/hr 8.76 8.76 24.82 24.82	1.49 4.30 2.00 40.00 .250 5.0 MIN ED HYETOC TIME hrs 3.250 3.333 3.417 3.500 3.583	FRAPH RAIN mm/hr 18.98 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08	mm/hr 1.46 1.46 1.46 1.46 1.46

57.11

3.25

.87 PEAK FLOW REDUCTION [Qout/Qin](%)= 38.26 TIME SHIFT OF PEAK FLOW (min)= 30.00

Max.Eff.Inten.(mm/hr) =	67.16 5.00	44.65	
Storage Coeff. (min) =	5.97 (ii)	9.41 (ii)	
Unit Hyd. Tpeak (min) =	5.00	10.00	
Unit Hyd. peak (cms)=	.19		
DEAK FLOW (cmc) =	2 50	1.5	*TOTALS*
PEAK FLOW (CMS)=	2.30	2 75	2.652 (iii) 2.75
RUNOFF VOLUME (mm)=	72.00	35.70	2.75 68.37
TOTAL RAINFALL (mm) =	73.00	73.00	73.00
PEAK FLOW (cms) = TIME TO PEAK (hrs) = RUNOFF VOLUME (mm) = TOTAL RAINFALL (mm) = RUNOFF COEFFICIENT =	.99	.49	.94
///			
(i) CN PROCEDURE SELECT CN* = 80.0 Ia			
(ii) TIME STEP (DT) SHOU			
THAN THE STORAGE CO		01. 120111	
(iii) PEAK FLOW DOES NOT	INCLUDE BASEFL	OW IF ANY.	
CALIB STANDHYD (0220) Area	(ha) = 16.19		
ID= 1 DT= 5.0 min Total I	mp(%) = 59.00	Dir. Conn.(%	5) = 59.00
	-		
Cumfa 3 (b-)-	IMPERVIOUS	PERVIOUS (i)	
Den Storage (mm)=	1 00	4 30	
Average Slope (%)=	1.00	2.00	
Length (m) =	328.50	40.00	
Surface Area (ha) = Dep. Storage (mm) = Average Slope (%) = Length (m) = Mannings n =	.013	.250	
<pre>Max.Eff.Inten.(mm/hr) =</pre>	67.16	42.73	
over (min)	5.00	20.00	
Storage Coeff. (min) =	6.12 (ii)	16.03 (ii)	
Unit Hyd. Tpeak (min) =	5.00	20.00	
Unit Hyd. peak (cms)=	.19	.06	*moma
			TOTALS 2.261 (iii)
TIME TO PEAK (hrs)=	2 75	2 92	2.75
RUNOFF VOLUME (mm) =	72.00	35.70	57.12
TOTAL RAINFALL (mm) =	73.00	73.00	57.12 73.00
PEAK FLOW (cms) = TIME TO PEAK (hrs) = RUNOFF VOLUME (mm) = TOTAL RAINFALL (mm) = RUNOFF COEFFICIENT =	.99	.49	.78
(i) CN PROCEDURE SELECT			
CN* = 80.0 Ia (ii) TIME STEP (DT) SHOU			
THAN THE STORAGE CO		OK EQUAL	
(iii) PEAK FLOW DOES NOT		OW IF ANY.	
RESERVOIR (0234)			
IN= 2> OUT= 1	OW STORAGE) (ha.m.)		
DT= 5.0 min OUTFL	OW STORAGE	OUTFLOW	STORAGE
(cms) (ha.m.) 00 .0000	(cms)	(ha.m.)
.00	.0000	1 1.1510	.5700
	AREA OPE	AK TPEAK	R.V.
INFLOW : ID= 2 (0220)	(ha) (cm	s) (hrs)	(mm)
INFLOW : ID= 2 (0220)	16.19 2.	26 2.75	57.12
OUTFLOW: $TD = 1 (0234)$	16.19 .	87 3.25	57.11

OUTFLOW: ID= 1 (0234)

16.19

					m.)= .	
ADD HYD (0236) 1 + 2 = 3 ID1= 1 + ID2= 2	(0231):	AREA (ha) 14.94	QPEAK (cms) 2.652	TPEAK (hrs) 2.75	R.V. (mm) 68.37	
ID = 3 NOTE: PEAK E				2.75 LOWS IF AN		
ADD HYD (0222) 1 + 2 = 3 ID1= 1 + ID2= 2	 (0218): (0236):	AREA (ha) 701.56 31.13	QPEAK (cms) 31.751 3.364	TPEAK (hrs) 3.08 2.75	R.V. (mm) 60.97 62.51	
======				3.08		
NOTE: PEAK E	FLOWS DO N	OT INCLU	JDE BASEF	LOWS IF AN	IY.	
STANDHYD (0239) ID= 1 DT= 5.0 mir		TMDET	DITTOILG	DED1/TOITE		90.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	239	7.71 1.00 1.00 9.00	.86 4.30 2.00 40.00 .250		
Max.Eff.Inter ov Storage Coeff Unit Hyd. Tpe Unit Hyd. pea	n.(mm/hr) = yer (min) f. (min) = eak (min) = ak (cms) =	= 6 : : :	7.16 5.00 5.05 (ii) 5.00	87.60 10.00 8.49 10.00	(ii)	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFAI RUNOFF COEFFI	(cms)=		1 44	.09 2.75 35.70 73.00 .49	*	TOTALS* 1.526 (iii) 2.75 68.37 73.00 .94
(i) CN PROC CN* = (ii) TIME ST THAN TH (iii) PEAK FI	CEDURE SEL = 80.0 FEP (DT) S HE STORAGE LOW DOES N	JECTED FO Ia = De SHOULD BH COEFFIC OT INCLU	OR PERVIO PP. Stora E SMALLER CIENT. UDE BASEF	ge (Above OR EQUAL LOW IF ANY	e)	
CALIB STANDHYD (0232) ID= 1 DT= 5.0 mir	Area	(ha)) = 8.81) = 59.00	Dir. Co	onn.(%)=	59.00

Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	5.20 1.00 1.00 242.30	3.61 4.30 2.00 40.00 .250		
Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	67.16 5.00 5.09 (ii) 5.00 .21	42.73 20.00 15.01 (i 20.00	i) *TOTA	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	(cms) = (hrs) = (mm) = (mm) = ENT =	.97 2.75 72.00 73.00	.30 2.92 35.70 73.00 .49	10111	41 (iii) 75 12 00
(ii) TIME STEP	0.0 Ia (DT) SHOUL STORAGE COE	= Dep. Stora D BE SMALLER FFICIENT.	ge (Above) OR EQUAL		
RESERVOIR (0235) IN= 2> OUT= 1 DT= 5.0 min	OUTFLO (cms)	W STORAGE (ha.m.) 0 .0000	OUTFI (cms .58	OW STOR	AGE n.) 000
INFLOW: ID= 2 OUTFLOW: ID= 1 PI T:	EAK FLOW	AREA QP (ha) (c 8.81 1 8.81	[Qout/Qin] ((%) = 37.17	.V. nm) .12 .10
ADD HYD (0237) 1 + 2 = 3 ID1= 1 (0237) ID1= 2 (0237)	AR (h 39): 8.	EA QPEAK a) (cms) 57 1.526 81 .461	TPEAK (hrs) 2.75 3.25	R.V. (mm) 68.37 57.10	
	37): 17.	38 1.911	2.75	62.66	
ADD HYD (0238) 1 + 2 = 3 ID1= 1 (022 + ID2= 2 (023	AR (h 22): 732. 37): 17.	EA QPEAK a) (cms) 69 33.453 38 1.911	TPEAK (hrs) 3.08 2.75	R.V. (mm) 61.03 62.66	
========		07 34.377			
NOTE: PEAK FLOW	NS DO NOT I	NCLUDE BASEF	LOWS IF ANY	:.	

```
I CALTE
| STANDHYD (0245) | Area (ha) = 17.24
|ID= 1 DT= 5.0 min | Total Imp(%)= 85.00 Dir. Conn.(%)= 85.00
                            IMPERVIOUS PERVIOUS (i)
    Surface Area (ha)=
                            14.65
                                         2.59
                              1.00
    Dep. Storage (mm)=
    Average Slope (%) =
Length (m) =
Mannings n =
                             339.00
                                           40.00
                             67.16
    Max.Eff.Inten.(mm/hr)=
                            5.00 15.00
6.23 (ii) 10.37 (ii)
5.00 15.00
              over (min)
     Storage Coeff. (min) =
    Unit Hyd. Tpeak (min) =
    Unit Hyd. peak (cms)=
                             .19
                                                        *TOTALS*
    PEAK FLOW (cms)= 2.72 .25

TIME TO PEAK (hrs)= 2.75 2.83

RUNOFF VOLUME (mm)= 72.00 35.70

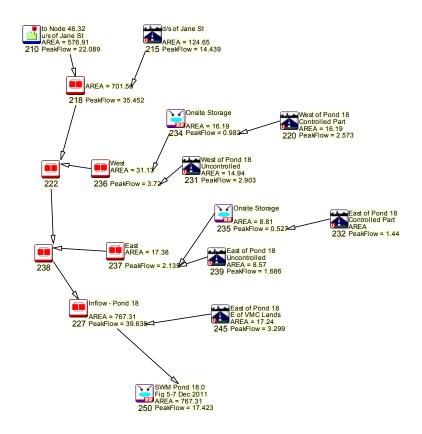
TOTAL RAINFALL (mm)= 73.00 73.00
                                                       2.962 (iii)
                                                         2.75
                                                         73.00
    RUNOFF COEFFICIENT =
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN^* = 80.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| ADD HYD (0227) |
1 + 2 = 3
                        AREA QPEAK TPEAK
                          (ha) (cms) (hrs)
                                                    (mm)
        ID1= 1 (0238): 750.07 34.377
                                          3.08
                                                  61 07
                                        2.75
       + ID2= 2 (0245): 17.24 2.962
                                                  66.55
        ID = 3 (0227): 767.31 35.372 3.08 61.19
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| RESERVOIR (0250) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
                       OUTFLOW
                                 STORAGE | OUTFLOW
                        (cms)
                                  (ha.m.) | (cms)
                                                         (ha.m.)
                         .0000
                                   .0000 | 17.9700
                                                        18.1470
                        1.8900
                                  1.0080 | 19.4300
                                                        18.8300
                                             23.4600
                        2.2330
                                  1.9630 |
                                                        19.3240
                        2.7950
                                   6.4020
                                              31.0300
                                                        19.8490
                        3.2760
                                  9.1830
                                              38.3600
                                                        20.2920
                        3.4270
                                  10.6610 |
                                              40.0000
                                                        20.3980
                        3.6700
                                  12.2670
                                              42.5000
                        5.6440
                                  13.9060
                                              45.0000
                                                        22.1830
                        9.7990
                                  15.5860 | 47.5000
                                                        23.5100
                       15.2400
                                 17.3710 |
                                              .0000
                                                          .0000
                                      OPEAK
                              AREA
                                               TPEAK
                                                          R.V.
                                       (cms)
                                                (hrs)
     INFLOW : ID= 2 (0227)
                            767.31
                                      35.37
                                                3.08
                                                          61.19
     OUTFLOW: ID= 1 (0250) 767.31 14.02
                                              4.67
                                                          61.19
```

08104 – Vaughan Metropolitan Centre, City of Vaughan Hydrologic Model Output – Required Storage –Controlled to 2-year post at 80% Imperviousness (6hr AES Storm)

April 2012

PEAK FLOW REDUCTION [Qout/Qin](%) = 39.64 TIME SHIFT OF PEAK FLOW (min) = 95.00 MAXIMUM STORAGE USED (ha.m.)=16.9729

North East POND (100yr 6hr AES)





V V I S V V I S V V I V V I	SS U U SS U U	JAA JAAAA JA A	L A L A L				
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All rights reserved.							
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COMMENTS: ***********************************	****** : 1 ** *****	: G:\Pro	pjects\20	708\ an Corpo	orate Cent	ire - Ma	aster Ser
JSER: COMMENTS: ***********************************	******** :: 1 ** ******* Filename:	: G:\Pro 08104 \Desig	ojects\2(708\ an Corpo		ire - Ma	aster Ser
JSER: COMMENTS: ***********************************	******** :: 1 ** ******* Filename:	: G:\Pro 08104 \Desig	ojects\2(708\ an Corpo	orate Cent	ire - Ma	aster Ser
COMMENTS: ****************** ** SIMULATION NUMBER ***********************************	******** :: 1 ** ******* Filename:	: G:\Pro 08104 \Desig : 100yr/	ojects\20 - Vaugh gn\SWM\De 6hr	008\ an Corpcecember	rate Cent	ire - Ma S\VO2 Ir	ister Ser iput Hydr
JSER: COMMENTS: ***********************************	******* :: 1 ** ****** Filename: Comments: RAIN mm/hr	: G:\Prc 08104 \Desig : 100yr/ TIME hrs	ojects\20 - Vaugh gn\SWM\De /6hr - RAIN mm/hr	008\ an Corpo ecember TIME hrs	rate Cent 2011 - T: RAIN mm/hr	ire - Ma S\VO2 Ir TIME hrs	aster Ser aput Hydr RAIN mm/hr
JSER: COMMENTS: **************** *****************	******* :: 1 ** ****** Filename: Comments: RAIN mm/hr .00	: G:\Prc 08104 \Desig : 100yr/ TIME hrs 2.00	ojects\2(- Vaugh gn\SWM\De /6hr RAIN mm/hr 27.30	DO8\ an Corposecember TIME hrs 3.75	rate Cent 2011 - T: RAIN mm/hr 11.24	TIME hrs 5.50	nster Ser nput Hydr RAIN mm/hr 1.61
JSER: COMMENTS: **************** *****************	******* :: 1 ** ****** Filename: Comments: RAIN mm/hr .00	: G:\Prc 08104 \Desig : 100yr/ TIME hrs 2.00	ojects\2(- Vaugh gn\SWM\De /6hr RAIN mm/hr 27.30	DO8\ an Corposecember TIME hrs 3.75	rate Cent 2011 - T: RAIN mm/hr 11.24	TIME hrs 5.50	nster Ser nput Hydr RAIN mm/hr 1.61
### STORM Ptotal= 80.31 mm ### TIME hrs .25 .50 .75	******** Filename: Comments: RAIN mm/hr .00 1.61 1.61	: G:\Prc 08104 \Desig: 100yr/ TIME hrs 2.00 2.25	ojects\20 - Vaughd jn\SWM\De/6hr RAIN mm/hr 27.30 73.88	008\ an Corpo ecember TIME hrs 3.75 4.00 4.25	rate Cent 2011 - T: RAIN mm/hr 11.24 6.42 6.42	TIME hrs 5.50 5.75	RAIN mm/hr 1.61 1.61
### STORM Ptotal= 80.31 mm ### TIME hrs .25 .50 .75	******** Filename: Comments: RAIN mm/hr .00 1.61 1.61	: G:\Prc 08104 \Desig: 100yr/ TIME hrs 2.00 2.25	ojects\20 - Vaughd jn\SWM\De/6hr RAIN mm/hr 27.30 73.88	008\ an Corpo ecember TIME hrs 3.75 4.00 4.25	rate Cent 2011 - T: RAIN mm/hr 11.24 6.42 6.42	TIME hrs 5.50 5.75	RAIN mm/hr 1.61 1.61
### STORM Ptotal= 80.31 mm ### TIME hrs .25 .50 .75	******** Filename: Comments: RAIN mm/hr .00 1.61 1.61	: G:\Prc 08104 \Desig: 100yr/ TIME hrs 2.00 2.25	ojects\20 - Vaughd jn\SWM\De/6hr RAIN mm/hr 27.30 73.88	008\ an Corpo ecember TIME hrs 3.75 4.00 4.25	rate Cent 2011 - T: RAIN mm/hr 11.24 6.42 6.42	TIME hrs 5.50 5.75	RAIN mm/hr 1.61 1.61
### STORM Ptotal= 80.31 mm ### TIME hrs .25 .50 .75	******** Filename: Comments: RAIN mm/hr .00 1.61	: G:\Prc 08104 \Desic 100yr/ TIME hrs 2.00 2.25 2.75 3.00 3.25	ojects\2(- Vaugha gn\SWM\De (6hr mm/hr 27.30 27.30 73.88 20.88 20.88	D08\ an Corpcecember TIME hrs 3.75 4.00 4.25 4.50 4.75 5.00	main / ma	TIME hrs 5.50 5.75	RAIN mm/hr 1.61 1.61

ID= 1 DT= 5.0 min	Total	Imp(%)=	88.00	Dir. Con	ın.(%)=	88.00
		IMPERVI(OUS	PERVIOUS (i)	
Surface Area	(ha) =	13.1	5	1.79		
Dep. Storage	(mm) =	1.0	0	4.30		
Average Slope	(%)=	1.0	0	2.00		
Length	(m) =	315.6	0	40.00		
Mannings n	=	.01	3	.250		
NOTE DATE		mp . March		F 0 14711	m = 1 / m = 0	mmn

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

		TRA	ANSFORMED	HYETOGRA	PH		
TIME	RAIN	I TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs i	mm/hr	hrs	mm/hr
.083	3 .00	1.667	9.64	3.250	20.88	4.83	1.61
.167	7 .00	1.750	9.64	3.333	11.24	4.92	1.61
.250	.00	1.833	27.30	3.417	11.24	5.00	1.61
.333	1.61	1.917	27.30	3.500	11.24	5.08	1.61
.417	7 1.61	2.000	27.30	3.583	11.24	5.17	1.61
.500	1.61	2.083	27.30	3.667	11.24	5.25	1.61
.583	1.61	2.167	27.30	3.750	11.24	5.33	1.61
.667	1.61	2.250	27.30	3.833	6.42	5.42	1.61
.750	1.61	2.333	73.88	3.917	6.42	5.50	1.61
.833	1.61	2.417	73.88	4.000	6.42	5.58	1.61
.917	1.61	2.500	73.88	4.083	6.42	5.67	1.61
1.000	1.61	2.583	73.88	4.167	6.42	5.75	1.61
1.083		2.667		4.250	6.42	5.83	1.61
1.16		2.750	73.88	4.333	3.21	5.92	1.61
1.250	1.61	2.833	20.88	4.417	3.21	6.00	1.61
1.333	9.64	2.917	20.88	4.500	3.21	6.08	1.61
1.417	9.64	3.000	20.88	4.583	3.21	6.17	1.61
1.500	9.64	3.083	20.88	4.667	3.21	6.25	1.61
1.583	9.64	3.167	20.88	4.750	3.21		
Max.Eff.Inten.(r	nm/hr)=	73.88	4	9.21			
over	(min)	5.00	10	0.00			
Storage Coeff.	(min) =	5.75	(ii) !	9.34 (ii)			
Unit Hyd. Tpeak		5.00	10	0.00			
Unit Hyd. peak	(cms) =	.20		.12			
					TOTA	LS	
PEAK FLOW	(cms) =	2.69		.21	2.9	03 (iii)	
TIME TO PEAK	(hrs) =	2.75		2.75	2.	75	
RUNOFF VOLUME	(mm) =	79.31	4	1.41	74.	76	
TOTAL RAINFALL	(mm) =	80.31	8 (0.31	80.3	31	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 80.0 Ia = Dep. Storage (Above)

.99

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

RUNOFF COEFFICIENT =

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

CALIB				
STANDHYD (0220)	Area	(ha) = 16.1	9	
ID= 1 DT= 5.0 min	Total	Imp(%) = 61.0	<pre>0 Dir. Conn.(%)=</pre>	61.00
		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha) =	9.88	6.31	
Dep. Storage	(mm) =	1.00	4.30	
Average Slope	(%)=	1.00	2.00	
Length	(m) =	328.50	40.00	
Mannings n	=	.013	.250	

```
Max.Eff.Inten.(mm/hr)=
                             73.88
                                        49 21
             over (min)
                             5.00
                                        20.00
    Storage Coeff. (min)=
                             5.89 (ii) 15.26 (ii)
    Unit Hyd. Tpeak (min) =
                           5.00
                                        20.00
                           .19
    Unit Hyd. peak (cms)=
                                                    *TOTALS*
                             2.02 .61
2.75 2.92
79.31 41.41
    PEAK FLOW
                  (cms)=
                                                   2.573 (iii)
    TIME TO PEAK
                 (hrs)=
                                                      2.75
    RUNOFF VOLUME (mm) =
                                                      64.53
                                     80.31
    TOTAL RAINFALL (mm) =
                             80.31
                                                     80.31
    RUNOFF COEFFICIENT =
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* = 80.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
L RESERVOIR (0234) L
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
                      OUTFLOW STORAGE | OUTFLOW
                      (cms)
                               (ha.m.) |
                                           (cms)
                       .0000
                                .0000
                                            1.1510
                            AREA
                                    OPEAK
                                             TPEAK
                                                       R.V.
                            (ha)
    INFLOW : ID= 2 (0220)
                           16.19
                                   2.57
                                            2.75
                                                      64.53
    OUTFLOW: ID= 1 (0234)
                           16.19
                                             3.25
                                                      64.52
                 PEAK FLOW REDUCTION [Qout/Qin](%)= 38.16
                 TIME SHIFT OF PEAK FLOW
                                           (min) = 30.00
                 MAXIMUM STORAGE USED
                                           (ha.m.) = .4865
L ADD HYD (0236) L
1 + 2 = 3 |
                                QPEAK
                         (ha)
                                (cms)
                                        (hrs)
                                                 (mm)
      ID1= 1 (0231): 14.94 2.903
                                        2.75
                                               74.76
       + ID2= 2 (0234):
                        16.19
                                        3.25
                                                64.52
        ID = 3 (0236): 31.13 3.720
                                       2.75 69.44
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
I CALTR
| STANDHYD (0215) | Area (ha) = 124.65
|ID= 1 DT= 5.0 min | Total Imp(%)= 83.00 Dir. Conn.(%)= 79.00
                          IMPERVIOUS
                                       PERVIOUS (i)
    Surface Area (ha)=
                           103.46
                                        21.19
                            .50
    Dep. Storage (mm)=
                                         4.70
    Average Sicr.

Length (m) =
    Average Slope (%)=
                               .30
                   (m)=
                           1800.00
                                        200.00
    Max.Eff.Inten.(mm/hr)=
                            73.88
                                        40.22
                            25.00
                                        70.00
             over (min)
    Storage Coeff. (min)=
                             26.55 (ii) 69.80 (ii)
    Unit Hyd. Tpeak (min) =
                            25.00
                                        70.00
    Unit Hyd. peak (cms)=
                             .04
```

TI RU TO	AK FLOW ME TO PEA NOFF VOLU TAL RAINI NOFF COEB	AK (hi UME (r FALL (r	ns) = cs) = nm) = nm) =	14.00 2.92 79.81 80.31 .99	1.11 3.83 41.38 80.31 .52	*TOTALS* 14.439 (iii) 2.92 71.74 80.31 .89		3.58 3.67 3.75 3.83 3.92	20.471 19.721 18.933 18.155 17.407 16.681 15.972	37.00 37.08 37.17 37.25 37.33	.225 70.33 .224 70.42 .223 70.50 .223 70.58 .222 70.67 .221 70.75 .221 70.83	.133 103.75 .133 103.83 .133 103.92 .133 104.00 .132 104.08 .132 104.17 .132 104.25	.055 137.17 .055 137.25 .055 137.33 .055 137.42 .054 137.50 .054 137.58	.021 .021 .021 .021 .021 .021
(i	CN* ii) TIME THAN ii) PEAK	= 76.0 STEP (DT THE STOP FLOW DOE) Ia = F) SHOULI RAGE COEH ES NOT IN	= Dep. St D BE SMAI FFICIENT. NCLUDE BA	RVIOUS LOSSES: Corage (Above) LER OR EQUAL ASEFLOW IF ANY.			4.08 4.17 4.25 4.33 4.42 4.50 4.58	15.289 14.644 14.046 13.498 12.992 12.521 12.082	37.50 37.58 37.67 37.75 37.83 37.92 38.00	.220 70.92 .220 71.00 .219 71.08 .219 71.17 .218 71.25 .218 71.33 .217 71.42	.132 104.33 .132 104.42 .131 104.50 .131 104.58 .131 104.67 .131 104.83	.054 137.75 .054 137.83 .054 137.92 .054 138.00 .053 138.08 .053 138.17 .053 138.25	.021 .021 .021 .021 .021 .021
 READ DT= 5	HYD (021	 10) <i>I</i>	AREA PPEAK	(ha) = (hrs) = (mm) =	576.91 3.17			4.75 4.83 4.92	11.675 11.303 10.962 10.644 10.342	38.17 38.25 38.33	.217 71.50 .217 71.58 .216 71.67 .216 71.75 .215 71.83	.130 104.92 .130 105.00 .130 105.08 .130 105.17 .129 105.25	.053 138.33 .053 138.42 .053 138.50 .053 138.58 .052 138.67	.021 .021 .021 .021
Filen Strateg		Projects\ \SWM\Dece	\2008\081 ember 20		ıghan Corporate C	Centre - Master S	ervicing	5.08 5.17	10.054 9.782 9.530	38.50 38.58	.215 71.92 .215 72.00 .214 72.08 .214 72.17	.129 105.33 .129 105.42 .129 105.50 .129 105.58	.052 138.75 .052 138.83 .052 138.92 .052 139.00	.020 .020 .020 .020
TIME		TIME		TIME	FLOW TIME cms hrs	FLOW TIME cms hrs	FLOW	5.42 5.50	9.092	38.83	.213 72.25	.128 105.67	.052 139.08	.020
hrs	.000	hrs 33.42		hrs 66.83	.142 100.25	.062 133.67	.023	5.58	8.729	38.92 39.00	.213 72.33	.128 105.75 .128 105.83	.052 139.17 .051 139.25	.020
.08		33.50	.260	66.92	.142 100.33	.062 133.75	.023	5.67		39.08	.212 72.50	.128 105.92	.051 139.33	.020
.17		33.58		67.00	.142 100.42	.061 133.83	.023	5.75			.212 72.58	.128 106.00	.051 139.42	.020
.23		33.75		67.08 67.17	.142 100.50 .142 100.58	.061 133.92 .061 134.00	.023		8.281 8.150		.212 72.67 .211 72.75	.127 106.08 .127 106.17	.051 139.50 .051 139.58	.020
.42		33.83	.258	67.25	.141 100.67	.061 134.08	.023	6.00		39.42	.211 72.83	.127 106.25	.051 139.67	.020
.50		33.92		67.33	.141 100.75	.061 134.17	.023		7.904		.211 72.92	.127 106.33	.051 139.75	.020
.58		34.00		67.42	.141 100.83	.061 134.25	.023	6.17		39.58	.211 73.00	.126 106.42	.050 139.83	.020
.67 .75		34.08 34.17		67.50 67.58	.141 100.92 .140 101.00	.060 134.33	.023	6.25 6.33		39.67 39.75	.210 73.08 .210 73.17	.126 106.50 .126 106.58	.050 139.92 .050 140.00	.020
.73		34.17		67.67	.140 101.00	.060 134.42	.023	6.42		39.75	.210 73.17	.126 106.58	.050 140.00	.020
.92		34.33		67.75	.140 101.00	.060 134.58	.023	6.50		39.92	.209 73.33	.126 106.75	.050 140.00	.020
1.00		34.42		67.83	.140 101.25	.060 134.67	.023	6.58		40.00	.209 73.42	.125 106.83	.050 140.25	.020
1.08		34.50		67.92	.140 101.33	.060 134.75	.023	6.67		40.08	.209 73.50	.125 106.92	.050 140.33	.020
1.17		34.58		68.00	.139 101.42	.059 134.83	.023	6.75			.209 73.58	.125 107.00	.049 140.42	.020
1.25		34.67		68.08	.139 101.50	.059 134.92	.023		6.718		.208 73.67	.125 107.08	.049 140.50	.020
1.33		34.75		68.17 68.25	.139 101.58 .139 101.67	.059 135.00 .059 135.08	.023	6.92	6.596 6.473		.208 73.75	.125 107.17 .124 107.25	.049 140.58 .049 140.67	.020
1.50		34.03		68.33	.139 101.07	.059 135.17	.023		6.350		.208 73.83	.124 107.23	.049 140.75	.019
1.58		35.00		68.42	.138 101.83	.059 135.25	.023	7.17		40.58	.207 74.00	.124 107.42	.049 140.83	.019
1.67		35.08		68.50	.138 101.92	.058 135.33	.022	7.25			.207 74.08	.124 107.50	.049 140.92	.019
1.75		35.17		68.58	.138 102.00	.058 135.42	.022	7.33			.207 74.17	.124 107.58	.049 141.00	.019
1.83		35.25		68.67	.138 102.08	.058 135.50	.022		5.874		.207 74.25	.123 107.67	.048 141.08	.019
1.92	1.014			68.75	.137 102.17	.058 135.58	.022	7.50			.206 74.33	.123 107.75	.048 141.17	.019
2.00	1.671			68.83 68.92	.137 102.25 .137 102.33	.058 135.67 .058 135.75	.022	7.58 7.67	5.651	41.00	.206 74.42	.123 107.83 .123 107.92	.048 141.25 .048 141.33	.019
2.17	3.247			69.00	.137 102.33	.057 135.83	.022		5.455		.206 74.58	.123 107.92	.048 141.42	.019
2.25	4.095			69.08	.137 102.50	.057 135.92	.022	7.83			.205 74.67	.122 108.08	.048 141.50	.019
2.33	5.017	35.75	.237	69.17	.136 102.58	.057 136.00	.022	7.92	5.281	41.33	.205 74.75	.122 108.17	.048 141.58	.019
2.42	6.176			69.25	.136 102.67	.057 136.08	.022		5.201		.205 74.83	.122 108.25	.048 141.67	.019
2.50	7.915			69.33	.136 102.75	.057 136.17	.022	8.08		41.50	.205 74.92	.122 108.33	.047 141.75	.019
	10.223			69.42	.136 102.83	.057 136.25	.022	8.17		41.58	.204 75.00	.122 108.42	.047 141.83	.019
	12.707			69.50	.136 102.92	.057 136.33	.022	8.25 8.33			.204 75.08 .204 75.17	.121 108.50	.047 141.92	.019
	15.273 17.728			69.58 69.67	.135 103.00 .135 103.08	.056 136.42 .056 136.50	.022	8.33		41.75 41.83	.204 75.17	.121 108.58 .121 108.67	.047 142.00 .047 142.08	.019
	19.732			69.75	.135 103.00	.056 136.58	.022	8.50			.203 75.33	.121 108.75	.047 142.00	.019
	21.097			69.83	.135 103.25	.056 136.67	.022	8.58		42.00	.203 75.42	.121 108.83	.047 142.17	.019
	21.845			69.92	.134 103.33	.056 136.75	.022	8.67		42.08	.203 75.50	.120 108.92	.047 142.33	.019
	22.089			70.00	.134 103.42	.056 136.83	.022	8.75	4.568		.203 75.58	.120 109.00	.046 142.42	.019
3.25	21.987	36.67	.227	70.08	.134 103.50	.055 136.92	.022	8.83	4.503	42.25	.203 75.67	.120 109.08	.046 142.50	.019
	21.653			70.17	.134 103.58	.055 137.00	.021	8.92	4.438		.202 75.75	.120 109.17	.046 142.58	.018
3.42	21.134	36.83	.225	70.25	.134 103.67	.055 137.08	.021	9.00	4.374	42.42	.202 75.83	.120 109.25	.046 142.67	.018

9.08	4.310	1 42.50	.202	75.92	.119 109.33	.046 142.75	.018	14.67	1.733	1 48.08	.188	81.50	.107	114.92	.039	148.33	.016
9.17	4.247			76.00	.119 109.42	.046 142.83	.018	14.75	1.709			81.58		115.00		148.42	.016
9.25	4.185			76.08	.119 109.50	.046 142.92	.018	14.83	1.685			81.67		115.08		148.50	.016
9.33	4.124			76.17	.119 109.58	.046 143.00	.018	14.92	1.660			81.75		115.17		1148.58	.016
9.42	4.064			76.25	.119 109.67	.045 143.08	.018	15.00	1.633			81.83		115.25		1148.67	.016
9.50	4.005			76.33	.118 109.75	.045 143.17	.018	15.08	1.606			81.92		115.33		1148.75	.016
9.58	3.947			76.42	.118 109.83	.045 143.17	.018	15.17		48.58		82.00		115.42		1148.83	
								15.17									.016
9.67	3.890			76.50	.118 109.92	.045 143.33	.018	15.25	1.548			82.08		115.50		148.92	.016
9.75	3.834			76.58	.118 110.00	.045 143.42	.018	15.33	1.518			82.17		115.58		149.00	.016
9.83	3.780			76.67	.118 110.08	.045 143.50	.018	15.42	1.488			82.25		115.67		149.08	.016
9.92	3.726			76.75	.118 110.17	.045 143.58	.018	15.50	1.460			82.33		115.75		149.17	.016
10.00	3.674			76.83	.117 110.25	.045 143.67	.018	15.58	1.433		.185	82.42		115.83	.038	149.25	.015
10.08	3.623	43.50	.199	76.92	.117 110.33	.045 143.75	.018	15.67	1.408	49.08	.185	82.50	.105	115.92	.038	149.33	.015
10.17	3.572	43.58	.199	77.00	.117 110.42	.044 143.83	.018	15.75	1.384	49.17	.185	82.58	.105	116.00	.038	149.42	.015
10.25	3.523	43.67	.199	77.08	.117 110.50	.044 143.92	.018	15.83	1.361	49.25	.185	82.67	.104	116.08	.038	149.50	.015
10.33	3.475	43.75	.199	77.17	.117 110.58	.044 144.00	.018	15.92	1.340	1 49.33	.184	82.75	.104	116.17	.038	149.58	.015
10.42	3.428			77.25	.116 110.67	.044 144.08	.018	16.00	1.319			82.83		116.25		149.67	.015
10.50	3.382			77.33	.116 110.75	.044 144.17	.018	16.08	1.299			82.92		116.33		149.75	.015
10.58	3.336			77.42	.116 110.83	.044 144.25	.018	16.17	1.280			83.00		116.42		1149.83	.015
10.67	3.291			77.50	.116 110.92	.044 144.33	.018	16.25	1.261			83.08		116.50		1149.92	.015
10.75	3.246			77.58	.116 111.00	.044 144.42	.018	16.23	1.243			83.17		116.58		1150.00	.015
								10.33									
10.83	3.202			77.67	.115 111.08	.044 144.50	.018	16.42	1.226			83.25		116.67		150.08	.015
10.92	3.159			77.75	.115 111.17	.044 144.58	.018	16.50	1.209			83.33		116.75		150.17	.015
11.00	3.117			77.83	.115 111.25	.043 144.67	.017	16.58	1.193			83.42		116.83		150.25	.015
11.08	3.075			77.92	.115 111.33	.043 144.75	.017	16.67		50.08		83.50		116.92		150.33	.015
11.17	3.034			78.00	.115 111.42	.043 144.83	.017	16.75	1.162			83.58		117.00		150.42	.015
11.25	2.994			78.08	.114 111.50	.043 144.92	.017	16.83	1.147		.182	83.67		117.08		150.50	.015
11.33	2.955	44.75		78.17	.114 111.58	.043 145.00	.017	16.92	1.132		.182	83.75		117.17	.037	150.58	.015
11.42	2.916	44.83	.196	78.25	.114 111.67	.043 145.08	.017	17.00	1.118	50.42	.182	83.83	.102	117.25	.037	150.67	.015
11.50	2.878	44.92	.196	78.33	.114 111.75	.043 145.17	.017	17.08	1.104	50.50	.182	83.92	.102	117.33	.037	150.75	.015
11.58	2.841	45.00	.195	78.42	.114 111.83	.043 145.25	.017	17.17	1.091	50.58	.181	84.00	.102	117.42	.037	150.83	.015
11.67	2.804			78.50	.114 111.92	.043 145.33	.017	17.25	1.077			84.08		117.50		150.92	.015
11.75	2.768			78.58	.113 112.00	.042 145.42	.017	17.33		50.75		84.17		117.58		1151.00	.015
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11.92	2.699			78.75	.113 112.00	.042 145.58	.017	17.50		50.92		84.33		117.75		151.17	.015
12.00	2.665			78.83	.113 112.17	.042 145.67	.017	17.58		51.00		84.42		117.73		151.25	.015
12.00	2.632			78.92	.113 112.23	.042 145.75	.017	17.67		51.00		84.50		117.03		151.23	.015
								17.07									
12.17	2.598			79.00	.112 112.42	.042 145.83	.017	17.75		51.17		84.58		118.00		1151.42	.015
12.25	2.564			79.08	.112 112.50	.042 145.92	.017	17.83		51.25		84.67		118.08		151.50	.015
12.33	2.530			79.17	.112 112.58	.042 146.00	.017	17.92		51.33		84.75		118.17		151.58	.015
12.42	2.497			79.25	.112 112.67	.042 146.08	.017	18.00		51.42		84.83		118.25		151.67	.015
12.50	2.464	45.92	.193	79.33	.112 112.75	.042 146.17	.017	18.08		51.50	.179	84.92	.100	118.33	.036	151.75	.014
12.58	2.431	46.00	.193	79.42	.111 112.83	.041 146.25	.017	18.17	.944	51.58	.179	85.00	.100	118.42	.036	151.83	.014
12.67	2.399	46.08	.193	79.50	.111 112.92	.041 146.33	.017	18.25	.929	51.67	.179	85.08	.100	118.50	.035	151.92	.014
12.75	2.367	46.17	.192	79.58	.111 113.00	.041 146.42	.017	18.33	.913	51.75	.179	85.17	.099	118.58	.035	152.00	.014
12.83	2.335	46.25	.192	79.67	.111 113.08	.041 146.50	.017	18.42	.897	51.83	.179	85.25	.099	118.67	.035	152.08	.014
12.92	2.304	46.33	.192	79.75	.111 113.17	.041 146.58	.017	18.50	.880	51.92	.178	85.33	.099	118.75	.035	152.17	.014
13.00	2.272	1 46.42	.192	79.83	.111 113.25	.041 146.67	.017	18.58	.863	52.00	.178	85.42	.099	118.83	.035	152.25	.014
13.08	2.242			79.92	.110 113.33	.041 146.75	.017	18.67		52.08		85.50		118.92		152.33	.014
13.17	2.212			80.00	.110 113.42	.041 146.83	.017	18.75		52.17		85.58		119.00		152.42	.014
13.25	2.182			80.08	.110 113.50	.041 146.92	.016	18.83		52.25		85.67		119.08		1152.50	.014
13.33	2.152			80.17	.110 113.58	.041 147.00	.016	18.92		52.33		85.75		119.17		152.58	.014
13.42	2.123			80.25	.110 113.67	.041 147.08	.016	19.00		52.42		85.83		119.25		152.67	.014
13.50	2.094			80.33	.109 113.75	.040 147.17	.016	19.08		1 52.50		85.92		119.33		1152.75	.014
								19.00									
13.58	2.066			80.42	.109 113.83	.040 147.25	.016	19.17		52.58		86.00		119.42		152.83	.014
13.67	2.038			80.50	.109 113.92	.040 147.33	.016	19.25		52.67		86.08		119.50		152.92	.014
13.75	2.011			80.58	.109 114.00	.040 147.42	.016	19.33		52.75		86.17		119.58		153.00	.014
13.83	1.983			80.67	.109 114.08	.040 147.50	.016	19.42		52.83		86.25		119.67		153.08	.014
13.92	1.957			80.75	.108 114.17	.040 147.58	.016	19.50		52.92		86.33		119.75		153.17	.014
14.00	1.930			80.83	.108 114.25	.040 147.67	.016	19.58		53.00		86.42		119.83		153.25	.014
14.08	1.904	47.50		80.92	.108 114.33	.040 147.75	.016	19.67	.669	53.08	.176	86.50	.097	119.92	.034	153.33	.014
14.17	1.879	47.58	.189	81.00	.108 114.42	.040 147.83	.016	19.75		53.17	.175	86.58	.096	120.00	.034	153.42	.014
14.25	1.853	47.67		81.08	.108 114.50	.040 147.92	.016	19.83		53.25	.175	86.67		120.08		153.50	.014
14.33	1.828			81.17	.108 114.58	.040 148.00	.016	19.92		53.33		86.75		120.17		1153.58	.014
14.42	1.804			81.25	.107 114.67	.039 148.08	.016	20.00		53.42		86.83		120.25		153.67	.014
14.50	1.780			81.33	.107 114.75	.039 148.17	.016	20.08		53.50		86.92		120.33		153.75	.014
	1.756			81.42	.107 114.83	.039 148.25	.016	20.17		53.58		87.00		120.33		153.83	.014
11.00	100	. 10.00		, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0, 111.00	. 303 110.20	.010		.001	, 00.00	•		.000	0.12	.001	,	.011

20.25	.595 5	53 67	174	87.08	.095 120.50	.034	153 92	.014	25.83	343	59.25	1.61	92.67	079	126.08	029	1159.50	.012
	.586 !			87.17	.095 120.58	.033			25.92		59.33				126.17		159.58	
20.33								.014					92.75					.012
20.42	.578 !			87.25	.095 120.67	.033		.014	26.00		59.42		92.83		126.25		159.67	.012
20.50	.570 5	53.92	.174	87.33	.094 120.75	.033	154.17	.014	26.08		59.50	.161	92.92	.079	126.33	.029	159.75	.012
20.58	.562 !	54.00	.173	87.42	.094 120.83	.033	154.25	.014	26.17	.333	59.58	.161	93.00	.079	126.42	.029	159.83	.012
20.67	.554			87.50	.094 120.92	.033		.014	26.25		59.67		93.08		126.50		159.92	.012
20.75					.094 121.00	.033		.013	26.33		59.75		93.17		126.58		1160.00	
	.547 !			87.58														.012
20.83	.540 5			87.67	.094 121.08	.033		.013	26.42		59.83		93.25		126.67		160.08	.012
20.92	.534 !	54.33	.173	87.75	.093 121.17	.033	154.58	.013	26.50	.325	59.92	.160	93.33	.078	126.75	.028	160.17	.012
21.00	.527 !	54.42	.172	87.83	.093 121.25	.033	154.67	.013	26.58	.323	60.00	.160	93.42	.078	126.83	.028	160.25	.012
21.08	.521			87.92	.093 121.33	.033		.013	26.67		60.08		93.50		126.92		160.33	.012
	.515 !			88.00				.013			60.17						1160.42	
21.17					.093 121.42	.033			26.75				93.58		127.00			.012
21.25	.510 5			88.08	.092 121.50	.033		.013	26.83		60.25		93.67		127.08		160.50	.011
21.33	.505 !	54.75	.172	88.17	.092 121.58	.033	155.00	.013	26.92	.316	60.33	.159	93.75	.077	127.17	.028	160.58	.011
21.42	.499 !	54.83	.172	88.25	.092 121.67	.033	155.08	.013	27.00	.314	60.42	.159	93.83	.076	127.25	.028	160.67	.011
21.50	.495			88.33	.092 121.75	.032		.013	27.08		60.50		93.92		127.33		160.75	.011
21.58	.490			88.42	.091 121.83	.032		.013	27.17		60.58		94.00		127.42		160.83	.011
21.67	.485 5			88.50	.091 121.92	.032		.013	27.25		60.67		94.08		127.50		160.92	.011
21.75	.481 !	55.17	.171	88.58	.091 122.00	.032	155.42	.013	27.33	.308	60.75	.158	94.17	.076	127.58	.028	161.00	.011
21.83	.477 !	55.25	.171	88.67	.091 122.08	.032	155.50	.013	27.42	.307	60.83	.158	94.25	.075	127.67	.028	161.08	.011
21.92	.473 5			88.75	.090 122.17	.032		.013	27.50		60.92	157	94.33		127.75		161.17	.011
22.00	.469			88.83	.090 122.25	.032		.013	27.58		61.00		94.42		127.73		1161.25	.011
22.08	.465			88.92	.090 122.33	.032		.013	27.67		61.08		94.50		127.92		161.33	.011
22.17	.462 !	55.58	.170	89.00	.090 122.42	.032	155.83	.013	27.75	.302	61.17	.157	94.58	.075	128.00	.027	161.42	.011
22.25	.458 !	55.67	.170	89.08	.089 122.50	.032	155.92	.013	27.83	.300	61.25	.157	94.67	.074	128.08	.027	161.50	.011
22.33	.455			89.17	.089 122.58	.032		.013	27.92		61.33		94.75		128.17		161.58	.011
22.42	.451			89.25	.089 122.67	.032		.013	28.00		61.42		94.83		128.25		1161.67	.011
22.50	.448			89.33	.089 122.75	.032		.013	28.08		61.50		94.92		128.33		161.75	.011
22.58	.445 3	56.00	.169	89.42	.089 122.83	.031	156.25	.013	28.17	.296	61.58	.156	95.00	.074	128.42	.027	161.83	.011
22.67	.442 !	56.08	.169	89.50	.088 122.92	.031	156.33	.013	28.25	.295	61.67	.156	95.08	.073	128.50	.027	161.92	.011
22.75	.440	56.17	.168	89.58	.088 123.00	.031	156.42	.013	28.33	. 294	61.75	.156	95.17	.073	128.58	.027	162.00	.011
22.83	.437			89.67	.088 123.08	.031		.013	28.42		61.83		95.25		128.67		162.08	.011
22.92	.434			89.75	.088 123.17	.031		.013	28.50		61.92		95.33		128.75		162.17	.011
23.00	.432 !	56.42	.168	89.83	.087 123.25	.031	156.67	.013	28.58	.292	62.00	.155	95.42	.073	128.83	.027	162.25	.011
23.08	.429 !	56.50	.168	89.92	.087 123.33	.031	156.75	.013	28.67	.291	62.08	.155	95.50	.072	128.92	.027	162.33	.011
23.17	.427 !	56.58	.167	90.00	.087 123.42	.031	156.83	.013	28.75	.290	62.17	.155	95.58	.072	129.00	.027	162.42	.011
23.25	.425			90.08	.087 123.50	.031		.013	28.83		62.25		95.67		129.08		162.50	.011
23.33	.422			90.17	.086 123.58	.031		.013	28.92		62.33		95.75		129.17		1162.58	.011
23.42	.420			90.25	.086 123.67	.031		.013	29.00		62.42		95.83		129.25		162.67	.011
23.50	.418 !	56.92	.167	90.33	.086 123.75	.031	157.17	.013	29.08	.287	62.50	.154	95.92	.071	129.33	.026	162.75	.011
23.58	.416 5	57.00	.167	90.42	.086 123.83	.031	157.25	.013	29.17	.286	62.58	.154	96.00	.071	129.42	.026	1162.83	.011
23.67	.414			90.50	.085 123.92	.031		.012	29.25		62.67		96.08		129.50		162.92	.011
23.75	.412			90.58	.085 124.00	.031		.012	29.33		62.75		96.17		129.58		1163.00	.011
23.83	.410			90.67	.085 124.08	.030		.012	29.42		62.83		96.25		129.67		163.08	.011
23.92	.408 5	57.33		90.75	.085 124.17	.030 [157.58	.012	29.50	.283	62.92		96.33	.070	129.75	.026	163.17	.011
24.00	.406 !	57.42	.166	90.83	.085 124.25	.030	157.67	.012	29.58	.283	63.00	.152	96.42	.070	129.83	.026	163.25	.011
24.08	.404 5	57.50	.165	90.92	.084 124.33	.030	157.75	.012	29.67	.282	63.08	.152	96.50	.070	129.92	.026	163.33	.011
24.17	.402			91.00	.084 124.42	.030		.012	29.75		63.17		96.58		130.00		163.42	.011
24.25	.400			91.08	.084 124.50	.030		.012	29.83		63.25		96.67		130.08		1163.50	.011
24.33	.397 5			91.17	.084 124.58	.030		.012	29.92		63.33		96.75		130.17		163.58	.011
24.42	.394 !	57.83	.165	91.25	.083 124.67	.030	158.08	.012	30.00		63.42	.151	96.83	.069	130.25	.026	163.67	.011
24.50	.392 !	57.92	.164	91.33	.083 124.75	.030	158.17	.012	30.08	.279	63.50	.151	96.92	.069	130.33	.026	163.75	.011
24.58	.389 !	58.00	.164	91.42	.083 124.83	.030	158.25	.012	30.17	.279	63.58	. 151	97.00	.069	130.42	.026	163.83	.011
24.67	.386			91.50	.083 124.92	.030		.012	30.25		63.67		97.08		130.50		1163.92	.010
24.75	.383 5			91.58	.082 125.00	.030		.012	30.33		63.75		97.17		130.58		164.00	.010
24.83	.380 !	58.25	.164	91.67	.082 125.08	.030 [158.50	.012	30.42	.277	63.83	.150	97.25	.068	130.67	.025	164.08	.010
24.92	.377 !	58.33	.163	91.75	.082 125.17	.030	158.58	.012	30.50	.276	63.92	.150	97.33	.068	130.75	.025	164.17	.010
25.00	.373 !	58.42		91.83	.082 125.25	.029		.012	30.58		64.00		97.42		130.83		164.25	.010
25.08	.370			91.92	.082 125.33	.029		.012	30.67		64.08		97.50		130.92		1164.33	.010
									30.75									
25.17	.367 1			92.00	.081 125.42	.029		.012			64.17		97.58		131.00		164.42	.010
25.25	.364 3			92.08	.081 125.50	.029		.012	30.83		64.25		97.67		131.08		164.50	.010
25.33	.361 5			92.17	.081 125.58	.029		.012	30.92		64.33		97.75		131.17		164.58	.010
25.42	.358 3	58.83	.162	92.25	.081 125.67	.029	159.08	.012	31.00	.273	64.42	.149	97.83	.067	131.25	.025	164.67	.010
25.50	.355			92.33	.080 125.75	.029		.012	31.08		64.50		97.92		131.33		1164.75	.010
25.58	.352			92.42	.080 125.83	.029		.012	31.17		64.58		98.00		131.42		1164.83	.010
25.67	.349 5			92.50	.080 125.92	.029		.012	31.25		64.67		98.08		131.50		164.92	.010
25.75	.346 !	59.17	.162	92.58	.080 126.00	.029	159.42	.012	31.33	.271	64.75	.148	98.17	.066	131.58	.025	165.00	.010

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.271 | 64.83
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                     .148 | 98.25
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                     .147 | 98.42
                                  .066 |131.83
                                                .025 |165.25
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                                  .065 |131.92
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        .270 | 65.08
                     .147 | 98.50
                                                .025 |165.33
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 31.75
        .269 | 65.17
                     .147 | 98.58
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        .269 | 65.25
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        .268 | 65.33
                     .146 | 98.75 .065 |132.17
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        .268 | 65.42
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33.17 .262 | 66.58
                    .143 |100.00 .062 |133.42
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                     .143 |100.08
33.25
        .261 | 66.67
                                   .062 |133.50
33.33 .261 | 66.75 .143 | 100.17 .062 | 133.58
   READ STORM | Filename: G:\Projects\2008\
                            08104 - Vaughan Corporate Centre - Master Ser
                            \Design\SWM\December 2011 - TS\VO2 Input Hydr
| Ptotal= 80.31 mm | Comments: 100yr/6hr
             TIME RAIN | TIME RAIN | TIME RAIN | TIME
              hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
                     .00 | 2.00
                                 27.30 | 3.75
                                              11.24 | 5.50
                                                            1 61
               .50
                    1.61 | 2.25
                                 27.30 | 4.00
                                              6.42 | 5.75
                                 73.88 | 4.25
                    1.61 | 2.50
                                               6.42 | 6.00 1.61
                                               3.21 | 6.25
              1.00
                    1.61 | 2.75
                                 73.88 | 4.50
                    1.61 | 3.00
                                20.88 | 4.75 3.21 |
              1.50 9.64 | 3.25 20.88 | 5.00 1.61 |
              1.75 9.64 | 3.50 11.24 | 5.25 1.61 |
______
| ADD HYD (0218) |
1 + 2 = 3
                       AREA OPEAK TPEAK
                        (ha) (cms)
                                      (hrs)
                                              (mm)
      ID1= 1 (0215): 124.65 14.439
                                      2.92
      + ID2= 2 (0210): 576.91 22.089
                                      3.17
                                             67.05
        _____
        ID = 3 (0218): 701.56 35.452 3.08 67.89
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY
| ADD HYD (0222) |
1 + 2 = 3
                       AREA OPEAK
                                      TPEAK
                                              R.V.
                        (ha)
                               (cms)
                                      (hrs)
        ID1= 1 (0236): 31.13 3.720
                                      2.75
                                             69.44
      + ID2= 2 (0218): 701.56 35.452
                                      3.08
                                             67 89
        _____
        ID = 3 (0222): 732.69 37.365 3.00 67.95
```

```
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| STANDHYD (0239) | Area (ha)= 8.57
|ID= 1 DT= 5.0 min | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00
  _____
                             IMPERVIOUS PERVIOUS (i)
                              7.71
     Surface Area
                      (ha) =
       Dep. Storage
                      (mm) =
                                            4.30
     Average Slope
                      (%)=
                                1.00
                                            2.00
     Length
                               239.00
                       (m) =
                                           40.00
      Mannings n
                               .013
        NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME RAIN | TIME RAIN | TIME RAIN | TIME
                  hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs
                                                                  mm/hr
                         0.83
                                                                   1 61
                         .00 | 1.750
                                      9.64 | 3.333
                                                    11.24 | 4.92
                         .00 | 1.833 27.30 | 3.417
                                                    11.24 | 5.00
                 .333
                         1.61 | 1.917
                                      27.30 | 3.500
                                                   11.24 | 5.08
                 .417
                         1.61 | 2.000
                                      27.30 | 3.583
                                                    11.24 | 5.17
                 .500
                         1.61 | 2.083
                                      27.30 | 3.667
                                                    11.24 | 5.25
                                                                   1.61
                 .583
                         1.61 | 2.167
                                      27.30 | 3.750
                                                    11.24 | 5.33
                 .667
                         1.61 | 2.250
                                      27.30 | 3.833
                 .750
                         1.61 | 2.333
                                      73.88 | 3.917
                                                     6.42 | 5.50
                 .833
                        1.61 | 2.417
                                      73.88 | 4.000
                                                     6.42 | 5.58
                 .917
                         1.61 | 2.500
                                      73.88 | 4.083
                                                    6.42 | 5.67
                 1.000
                        1.61 | 2.583
                                      73.88 | 4.167
                                                    6.42 | 5.75
                                                                   1.61
                                      73.88 | 4.250
                 1.083
                        1.61 | 2.667
                                                    6.42 | 5.83
                         1.61 | 2.750
                                      73.88 | 4.333
                                                     3.21 | 5.92
                 1.167
                 1.250
                         1.61 | 2.833
                                      20.88 | 4.417
                                                     3.21 | 6.00
                 1.333
                        9.64 | 2.917
                                      20.88 | 4.500
                                                     3.21 | 6.08
                                                                   1.61
                 1.417
                         9.64 | 3.000
                                      20.88 | 4.583
                                                     3.21 |
                                                           6.17
                 1.500 9.64 | 3.083
                                      20.88 | 4.667
                                                    3.21 | 6.25
                 1.583 9.64 | 3.167 20.88 | 4.750
                                                    3 21 I
    Max.Eff.Inten.(mm/hr)=
                                73.88
                                            51.42
                               5.00
                 over (min)
                                           10.00
       Storage Coeff. (min) =
                                 4.86 (ii)
                                           8.17 (ii)
                              5.00
       Unit Hyd. Tpeak (min) =
                                           10.00
       Unit Hyd. peak (cms)=
                                                       *TOTALS*
       PEAK FLOW
                                                       1.686 (iii)
                     (cms)=
                               2.75
                                          2.75
       TIME TO PEAK
                    (hrs)=
       RUNOFF VOLUME
                      (mm) =
                                79.31
                                           41.41
       TOTAL RAINFALL (mm) =
                                80.31
                                                        80.31
                                           80.31
       RUNOFF COEFFICIENT =
  **** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* = 80.0 Ia = Dep. Storage (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
  I CALTE
   | STANDHYD (0232) | Area (ha)= 8.81
   |ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
```

Surface Area (ha Dep. Storage (mm Average Slope (% Length (m Mannings n Max.Eff.Inten.(mm/hr over (min Storage Coeff. (mir Unit Hyd. Tpeak (min Unit Hyd. peak (cms	1) = 5. 1) = 1. 1) = 1. 242. = .0		3.44 4.30 2.00 40.00 .250			
PEAK FLOW (cms TIME TO PEAK (hrs RUNOFF VOLUME (mm TOTAL RAINFALL (mm RUNOFF COEFFICIENT ***** WARNING: STORAGE CC) = 1.) = 2. 1) = 79. 1) = 80. = .	10 75 31 31 99	.35 2.83 41.41 80.31 .52	*1	OTALS* 1.440 (2.75 64.53 80.31 .80	iii)
(i) CN PROCEDURE S CN* = 80.0 (ii) TIME STEP (DT) THAN THE STORA (iii) PEAK FLOW DOES	ELECTED FOR Ia = Dep SHOULD BE GE COEFFICI	PERVIOUS Storage SMALLER (S LOSSES: (Above OR EQUAL)		
RESERVOIR (0235) IN= 2> OUT= 1 DT= 5.0 min	(cms)	(ha.m.)	(cm .5	s) (820	ha.m.) .3000	
INFLOW : ID= 2 (0232 OUTFLOW: ID= 1 (0235	AREA (ha)) 8.81) 8.81	QPEA (cms 1.4	AK TP s) (h 14 2 53 3	EAK rs) .75 .17	R.V. (mm) 64.53 64.51	
TIME S	FLOW RED HIFT OF PEA M STORAGE	K FLOW	(m	(%) = 36. in) = 25. m.) = .2	00	
ADD HYD (0237) 1 + 2 = 3 ID1= 1 (0239): + ID2= 2 (0235):	AREA (ha) 8.57 8.81	QPEAK (cms) 1.686 .527	TPEAK (hrs) 2.75 3.17	R.V. (mm) 75.52 64.51		
ID = 3 (0237):	17.38	2.135	2.75	69.94		
NOTE: PEAK FLOWS DO	NOT INCLUE	E BASEFLO	OWS IF AN	Υ.		
ADD HYD (0238) 1 + 2 = 3 ID1= 1 (0222): + ID2= 2 (0237):	AREA (ha) 732.69 3 17.38	QPEAK (cms) 37.365 2.135	TPEAK (hrs) 3.00 2.75	R.V. (mm) 67.95 69.94		
ID = 3 (0238):				68.00		

NOTE: PEAK FLO						
CALIB STANDHYD (0245) ID= 1 DT= 5.0 min	Area Total I	(ha) = 1 mp(%) = 8	7.24 5.00 Dir	. Conn.	(%)= 85.00	
Surface Area Dep. Storage Average Slope Length Mannings n		14.65 1.00 1.00 339.00 .013	S PERVI 2. 4. 2. 40.	OUS (i) 59 30 00 00		
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	73.88 5.00 6.00 5.00	10. (ii) 9. 10.	97 00 98 (ii) 00		
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =		2. 41. 80.	30 75 41 31 52	*TOTALS* 3.299 2.75 73.63 80.31 .92	
(ii) TIME STEP	80.0 Ia (DT) SHOU	= Dep. St LD BE SMA	torage (A	bove)		
ADD HVD (0227) I	DOES NOT	INCLUDE BA	ASEFLOW IE	ANY.		
(iii) PEAK FLOW	DOES NOT	INCLUDE BA	ASEFLOW IE	ANY.	R.V. (mm) .00	
(iii) PEAK FLOW	A (: 38): 750 (45): 17	REA QPI ha) (cr .07 38.4. .24 3.2	EAK TPE	ANY. AK S) 0 68 5 73	====	
ADD HYD (0227) 1 + 2 = 3 ID1= 1 (02 + ID2= 2 (02 	A: (38): 750 45): 17 =====27): 767 WS DO NOT	REA QPI ha) (cr .07 38.4: .24 3.22: .31 39.6:	EAK TPE ms) (hr 39 3.0 99 2.7 38 3.0 ASEFLOWS 1	ANY. CAK SS) 0 68 5 73 0 68 F ANY.	.13	
(iii) PEAK FLOW ADD HYD (0227) 1 + 2 = 3 ID1= 1 (02 + ID2= 2 (02 ID = 3 (02	ANDES NOT ANDES NOT (1) (38): 750 45): 17 27): 767 WWS DO NOT	REA QPI ha) (cr .24 3.2; .31 39.6; INCLUDE Bi 	EAK TPE ms) (hr 39 3.0 99 2.7 38 3.0 ASEFLOWS 1	CAR (SS) (10 68 5 73 10 68 68 65 73 10 68 68 67 ANY. (Cms) 17.9700 12.34600 42.5000 42.5000 42.5000 47.5000	STORAGE (ha.m.) 18.1470 18.8300 19.3240 19.8490 20.2920 20.3980 21.3030 22.1830 23.5100	

08104 – Vaughan Metropolitan Centre, City of Vaughan Hydrologic Model Output – Required Storage –Controlled to 2-year post at 80% Imperviousness (6hr AES Storm)

April 2012

INFLOW: ID= 2 (0227) 767.31 39.64 3.00 68.13
OUTFLOW: ID= 1 (0250) 767.31 17.42 4.50 68.12

PEAK FLOW REDUCTION [Qout/Qin] (%) = 43.96
TIME SHIFT OF PEAK FLOW (min) = 90.00
MAXIMUM STORAGE USED (ha.m.)=17.9930

=========

Municipal Servicing Class Environmental Assessment Master Plan
VAUGHAN METROPOLITAN CENTRE - CITY OF VAUGHAN
NOV 2012

Appendix D5

South-East SWM Pond Calculations

Vaughan Metropolitan Centre

City of Vaughan

SE Corner of Jane St. and Hwy 7

Project #: 08104

Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient = 0.25

Runoff reduction =

mm

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

An average runoff coefficient of 0.50 is used for the land indicated as major parks and open spaces

Area & Imperviousness for Permanent Pool Calculation (based on 5-year Runoff Coefficient)

SE Corner of Jane St. and Hwy 7

Area Directly to Pond

		Area (ha)	С	AC
Residential	Building	5.98	0.59	3.51
	Paved Area	1.99	0.90	1.80
	Landscape	2.12	0.04	0.09
Commercial	Building	0.41	0.59	0.24
	Paved Area	0.14	0.90	0.12
	Landscape	0.15	0.04	0.01
	Open Space / Parkland	1.88	0.50	0.94
	Open Channel	2.34	0.55	1.29
	SWM Pond Block	2.13	0.55	1.17
	Road	9.56	0.90	8.60
	Total	26.71		17.77

Area Not Directly to Pond

		Area (ha)	С	AC
Mized Use	Building	0.60	0.59	0.35
(Residential)	Paved Area	0.20	0.90	0.18
	Landscape	0.21	0.04	0.01
Mized Use	Building	0.60	0.59	0.35
(Commercial)	Paved Area	0.20	0.90	0.18
	Landscape	0.21	0.04	0.01

		Area (ha)	С	AC
Residential	Building	0.49	0.59	0.29
	Paved Area	0.16	0.90	0.15
	Landscape	0.17	0.04	0.01
	Road	2.31	0.90	2.08
	Total	5.17		3.61

Weighted "C" = 0.70
Weighted Imperviousness = 0.71

<u>Vaughan Metropolitan Centre</u> <u>City of Vaughan</u>

Project #: 08104

Date: April 2012

SWM Pond Permanent Pool/Extended Detention Volume

SE Corner of Jane St. and Hwy 7

Table A.1 – MOE Water Quality Storage Requirements (SWMP 2003)*

		Storage Volume (m³/ha) for Impervious Level			for
Protection Level	SWMP Type	35%	55%	70%	85%
Enhanced	Infiltration	25	30	35	40
80% long-term S.S. removal	Wetlands	80	105	120	140
5.5. 10115 111	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	Infiltration	20	20	20	20
60% long-term S.S. removal	Wetlands	60	60	60	60
S.S. ICHIOVEL	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

^{*} Values in table for Wet Ponds and Wetlands include 40m³/ha of extended detention storage.

SWM Facility Type = Wet Pond Level of Protection = 1

Drainage Area = 31.88 ha Area-Weighted Imperviousness = 67%

Water Quality Requirement = 218.00 m³/ha

Permanent Pool Unit Volume Requirement = 178.00 m³/ha

Total Permanent Pool Storage Volume Required =

5,675 m³

Extended Detention Unit Volume Requirement =

40 m³/ha

Total Extended Detention Volume Required = 1,275 m³

(compare with Erosion Volume required)

2011-12-Revised On-Site Controls at 80% - SE Pond

Erosion Control Volume and Release Rate SE Corner of Jane St. and Hwy 7

SWM Pond

Input:

Area = 31.88 (ha)

R.V = 18.959 (mm)

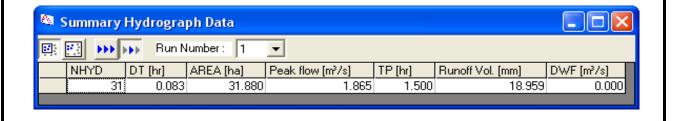
Draw Down Time = 48 (hrs)

Calculations:

Storage = $6,044 \text{ (m}^3)$

Average Outflow = $0.035 \text{ (m}^3/\text{s)}$

Peak Outflow = 0.052 (m³/s) - Estimated at 1.5 times Average Outflow



Vaughan Metropolitan Centre

City of Vaughan

SE Corner of Jane St. and Hwy 7

Project #: 08104

Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient =

Runoff reduction =

0.25 10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

 $\mathbf{m}\mathbf{m}$

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

An average runoff coefficient of 0.50 is used for the land indicated as major parks and open spaces

Area & Imperviousness for Permanent Pool Calculation (based on 100-year Runoff Coefficient)

SE Corner of Jane St. and Hwy 7

Area Directly to Pond

		Area (ha)	C	AC
Residential	Building	5.98	0.71	4.27
	Paved Area	1.99	0.90	1.80
	Landscape	2.12	0.13	0.27
Commercial	Building	0.41	0.71	0.30
	Paved Area	0.14	0.90	0.12
	Landscape	0.15	0.13	0.02
	Total	10.80		6.77

	Area (ha)	C	AC
Open Space / Parkland	1.88	0.50	0.94
Open Channel	2.34	0.55	1.29
SWM Pond Block	2.13	0.55	1.17
Road	9.56	0.90	8.60
Total	15.91		12.00

Weighted "C" = <u>0.63</u>
Weighted Imperviousness = <u>0.61</u>

Weighted "C" = 0.75
Weighted Imperviousness = 0.79

Area Not Directly to Pond

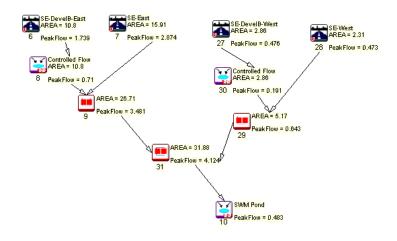
		Area (ha)	С	AC
Mized Use	Building	0.60	0.71	0.43
(Residential)	Paved Area	0.20	0.90	0.18
	Landscape	0.21	0.13	0.03
Mized Use	Building	0.60	0.71	0.43
(Commercial)	Paved Area	0.20	0.90	0.18
	Landscape	0.21	0.13	0.03
Residential	Building	0.49	0.71	0.35
	Paved Area	0.16	0.90	0.15
	Landscape	0.17	0.13	0.02
	Total	2.86		1.79

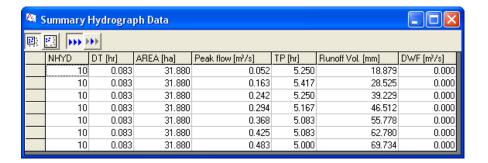
	Area (ha)	С	AC
Road	2.31	0.90	2.08
Total	2.31		2.08

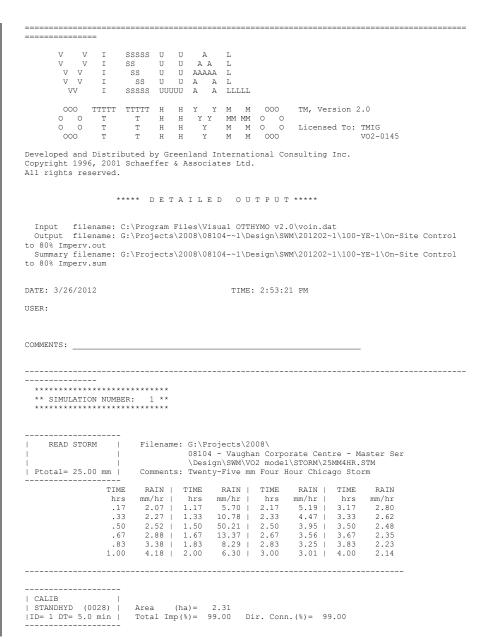
Weighted "C" = 0.63
Weighted Imperviousness = 0.61

Weighted "C" = 0.90
Weighted Imperviousness = 1.00

South East POND







		IMPERVIOUS	PERVIOUS	(i)
Surface Area	(ha) =	2.29	.02	
Dep. Storage	(mm) =	1.00	5.00	
Average Slope	(%)=	1.00	1.00	
Length	(m) =	124.10	40.00	
Mannings n	=	.013	.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

) HYETOGRA			
TIME		TIME	RAIN		RAIN	TIME	RAIN
hrs		hrs			mm/hr	hrs	mm/hr
.083		1.083				3.08	2.80
.167			5.70			3.17	
.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
.917	4.17	1.917	6.30 I	2.917	3.01 i	3.92	2.14
1.000	4.18	2.000	6.29 I	3.000	3.01 i	4.00	2.14
Max.Eff.Inten.(m	m/hr)=	50.21		7.91			
over	(min)	5.00	1	0.00			
Storage Coeff.	(min) =	3.83	(ii)	5.65 (ii)			
Unit Hyd. Tpeak	(min) =	5.00	1	0.00			
Unit Hyd. peak	(cms) =	.25		.15			
					TOTA	LS	
PEAK FLOW	(cms) =	.30		.00	.3	01 (iii)	
TIME TO PEAK	(hrs)=	1.50		1.58	1.	50	
RUNOFF VOLUME	(mm) =	24.00		5.55	23.	81	
TOTAL RAINFALL	(mm) =	25.00		5.00	25.		
RUNOFF COEFFICIE	. ,	.96	_	.22		95	
				-			

**** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB | STANDHYD (0027) | Area (ha) = 2.86 |ID= 1 DT= 5.0 min | Total Imp(%) = 61.00 Dir. Conn.(%) = 61.00 IMPERVIOUS PERVIOUS (i) 1.12 Surface Area (ha) = 1.74 1.00 5.00 Dep. Storage (mm) = Average Slope (%)= 1.00 1.00 (m) = 138.10 40.00 Length Mannings n .013 50.21 4.90 Max.Eff.Inten.(mm/hr)= 5.00 35.00 4.08 (ii) 33.11 (ii) 5.00 35.00 over (min) Storage Coeff. (min) = Unit Hyd. Tpeak (min) = Unit Hyd. peak (cms)= .24 .23 .01 1.50 2.17 PEAK FLOW (cms) = .228 (iii) 1.50 TIME TO PEAK (hrs)=

RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC	(mm) = (mm) = IENT =	24.0 25.0	00 00 96	5.55 25.00 .22		16.80 25.00 .67
***** WARNING: STOR	AGE COEFF.	IS SMAI	LLER THAN	N TIME ST	EP!	
(ii) TIME STE THAN THE (iii) PEAK FLO	83.0 Ia P (DT) SHOU STORAGE CO W DOES NOT	= Dep LD BE S EFFICIA INCLUDA	. Storage SMALLER (ENT. E BASEFL(e (Above OR EQUAL OW IF ANY	e) 7.	
RESERVOIR (0030) IN= 2> OUT= 1 DT= 5.0 min	I	OW S) 00	STORAGE (ha.m.)	OUTE (cm .2	FLOW (as)	STORAGE (ha.m.) .0960
INFLOW: ID= 2 OUTFLOW: ID= 1	(0027) (0030)	AREA (ha) 2.86 2.86	QPEA (cms	AK TE s) (h 23 1 05 1	PEAK nrs) 1.50	R.V. (mm) 16.80 16.76
1	PEAK FLOW FIME SHIFT MAXIMUM ST	OF PEAR ORAGE	K FLOW USED	(n (ha.	min) = 20 .m.) = .	.00
	A - (028): 2 030): 2	.31 .86 ======	.301 .047		23.81 16.76	
NOTE: PEAK FL	029): 5 DWS DO NOT					
CALIB STANDHYD (0006) ID= 1 DT= 5.0 min	 Area Total I:					61.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	IMPERVI 6.5 1.0 1.0 268.3	EOUS 1 59 00 00 00 30	4.21 5.00 1.00 40.00 .250	(i)	
Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak	(mm/hr) = r (min) (min) = k (min) = (cms) =	50.2 5.0 6.0 5.0	21 00 08 (ii) 00 19	4.90 40.00 35.11 40.00 .03	(ii) **	TOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC	(cms) = (hrs) = (mm) = (mm) = IENT =	1.5 24.0 25.0	78 50 00 00 96	.03 2.25 5.55 25.00 .22		1779 (iii) 1.50 16.80 25.00

(i) CN PROCEDURE SEI CN* = 83.0 (ii) TIME STEP (DT) S THAN THE STORAGI (iii) PEAK FLOW DOES 1	Ia = Dep. Storage SHOULD BE SMALLER O E COEFFICIENT.	e (Above) DR EQUAL	
RESERVOIR (0008) IN= 2> OUT= 1			
IN- 2> 001- 1 DT= 5 0 min	TTFI.OW STORAGE	I OUTELOW	STORAGE
	(cms) (ha.m.)	(cms)	(ha.m.)
DT= 5.0 min	.0000 .0000	.8130	.3571
	AREA QPEA	AK TPEAK	R.V.
	(ha) (cms	s) (hrs)	(mm)
INFLOW : ID= 2 (0006)	10.80 .7	78 1.50	16.80
INFLOW : ID= 2 (0006) OUTFLOW: ID= 1 (0008)	10.80 .1	17 1.92	16.79
PEAK I TIME SH	FLOW REDUCTION [GIFT OF PEAK FLOW STORAGE USED	Qout/Qin](%)= 22 (min)= 25	.30
CALIB			
STANDHYD (0007) Area	a (ha) = 15.91	-1 - (0)	50.00
ID= 1 DT= 5.0 min Tota	al $Imp(%) = /9.00$	Dir. Conn.(%)=	/9.00
	IMPERVIOUS E	PERVIOUS (i)	
Surface Area (ha):	= 12 57	3 34	
Den Storage (mm):	= 1.00	5.00	
Average Slope (%):	= 1.00	1.00	
Length (m)	= 325.70	40.00	
Surface Area (ha): Dep. Storage (mm): Average Slope (%): Length (m): Mannings n	.013	.250	
Max.Eff.Inten.(mm/hr):	= 50.21	4.90	
over (min)	5.00	40.00	
Storage Coeff. (min)=	= 6.83 (11)	35.86 (11)	
Unit Hyd. Tpeak (min)	= 5.00	40.00	
Unit Hyd. peak (CMS)	10	.03	TOTALS*
PEAK FLOW (cms)=	= 1.42	0.2	1.426 (iii)
TIME TO PEAK (hrs):	= 1.50	2.25	1.50
RUNOFF VOLUME (mm)=	= 24.00	5.55	20.12
TOTAL RAINFALL (mm) =	= 25.00	25.00	20.12 25.00
PEAK FLOW (cms): TIME TO PEAK (hrs): RUNOFF VOLUME (mm): TOTAL RAINFALL (mm): RUNOFF COEFFICIENT :	96	.02 2.25 5.55 25.00	.80
(i) CN PROCEDURE SEI CN* = 83.0 (ii) TIME STEP (DT) S THAN THE STORAGE (iii) PEAK FLOW DOES 1	Ia = Dep. Storage SHOULD BE SMALLER O E COEFFICIENT.	e (Above) DR EQUAL	
ADD HYD (0009)			
1 + 2 = 3	AREA QPEAK	TPEAK R.V.	
	(ha) (cms)	(hrs) (mm)	
ID1= 1 (0008):	10.80 .174	1.92 16.79	
+ ID2= 2 (0007):	15.91 1.426 	1.50 20.12	
	26.71 1.533		

ADD HYD (0031) 1 + 2 = 3 ID1= 1 (002) + ID2= 2 (000)	AF (1 9): 5. 9): 26.	REA Q: na) (0 .17 .:	PEAK Toms) (332 1533 1	PEAK (hrs) .50	R.V. (mm) 19.91 18.77		
ID = 3 (0033	1): 31.	.88 1.	365 1	.50	18.96		
NOTE. FEAR FLOW							
RESERVOIR (0010) IN= 2> OUT= 1 DT= 5.0 min	OUTFLC (cms) .000 .052 .163	DW ST0 (ha) 00 20 30	DRAGE a.m.) .0000 .5230 .7202 .9521	OUTFL (cms .29 .36 .42	OW 5) 40 80 50	STORAGE (ha.m.) 1.1158 1.3234 1.4787 1.6325	
INFLOW: ID= 2 ((OUTFLOW: ID= 1 (OPER TIME)	0031) 0010)	AREA (ha) 31.88 31.88	QPEAK (cms) 1.86 .05	TPE (hr 1. 5.	AK s) 50 25	R.V. (mm) 18.96 18.88	
PE/ TIN MA)	AK FLOW ME SHIFT (KIMUM STO	REDUC' OF PEAK I	FION [Qou FLOW JSED	t/Qin]((mi (ha.m	%) = 2 n) =225 .) = .!	.79 .00 5229	
**************************************	R: 2 **						
READ STORM Ptotal= 36.00 mm		0810 \Des	4 - Vaugh ign\SWM\V	an Corp	orate (l\STORM	Centre - M M\6 and 12	laster Se: hour AE:
READ STORM	Comment RAIN mm/hr .00 .72 .72 .72 .72 4.32	0810 \Desi cs: 2yr/	4 - Vaugh ign\SWM\V 5hr RAIN mm/hr 12.24 12.24 33.12 33.12 9.36 9.36	an Corp O2 mode TIME	RAII mm/h: 5.04 2.88 1.44 1.44	M\6 and 12 N TIME r hrs 4 5.50 8 5.75 8 6.00 4 6.25 4	RAIN

Average Slope Length Mannings n	(%) = (m) = =	1.00 124.10 .013	1.00 40.00 .250	
NOTE: RAINF	ALL WAS T	FRANSFORMED	TO 5.0 MIN.	TIME STEP.
		TRANS	FORMED HYETOGE	RAPH

			TF	RANSFORM	ΞD	HYETOG	RAPH			
TIME	RAIN	1	TIME	RAIN		TIME	RAIN		TIME	RAIN
hrs	mm/hr		hrs	mm/hr	-1	hrs	mm/hr		hrs	mm/hr
.083	.00		1.667	4.32	-1	3.250	9.36		4.83	.72
.167	.00		1.750	4.32	- 1	3.333	5.04		4.92	.72
.250	.00		1.833	12.24	-1	3.417	5.04		5.00	.72
.333	.72		1.917	12.24	-1	3.500	5.04		5.08	.72
.417	.72		2.000	12.24	-1	3.583	5.04		5.17	.72
.500	.72		2.083	12.24	-1	3.667	5.04		5.25	.72
.583	.72		2.167	12.24	-1	3.750	5.04	1	5.33	.72
.667	.72		2.250	12.24	-1	3.833	2.88	1	5.42	.72
.750	.72	1	2.333	33.12		3.917	2.88		5.50	.72
.833	.72		2.417	33.12	-1	4.000	2.88		5.58	.72
.917	.72		2.500	33.12	-1	4.083	2.88		5.67	.72
1.000	.72		2.583	33.12	-1	4.167	2.88		5.75	.72
1.083	.72		2.667	33.12	-1	4.250	2.88		5.83	.72
1.167	.72		2.750	33.12	-1	4.333	1.44		5.92	.72
1.250	.72	1	2.833	9.36		4.417	1.44		6.00	.72
1.333	4.32		2.917	9.36	-1	4.500	1.44		6.08	.72
1.417	4.32		3.000	9.36	-1	4.583	1.44		6.17	.72
1.500	4.32		3.083	9.36	-1	4.667	1.44		6.25	.72
1.583	4.32	1	3.167	9.36	-	4.750	1.44	1		
ten.(mm/	hr)=		33.12	2	8	3.11				

Max.Eff.Inten.(mm/hr) = over (min) Storage Coeff. (min) = Unit Hyd. Tpeak (min) = Unit Hyd. peak (cms) =	33.12 5.00 4.52 5.00 .23	83.11 10.00 (ii) 6.68 10.00 .14	,	
PEAK FLOW (cms) = TIME TO PEAK (hrs) = RUNOFF VOLUME (mm) = TOTAL RAINFALL (mm) = RUNOFF COEFFICIENT =	.21 2.75 35.00 36.00 .97	.00 2.75 11.57 36.00	*TOTALS* .211 2.75 34.76 36.00 .97	

**** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
- ${
 m CN^*}=83.0$ Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

	THAN THE S	TORAGE (COEFFICIEN	т.				
	(iii) PEAK FLOW	DOES NOT	I INCLUDE	BASEFI	LOW IF AN	IY.		
								_
CAL	TD I							
	· ·	3	/h - \ -	2 00				
	NDHYD (0027)						64 00	
I I D=	1 DT= 5.0 min	Total	Imp(%)=	61.00	Dir. (conn.(%)=	61.00	
			IMPERVIO	US	PERVIOUS	S (i)		
	Surface Area	(ha) =	1.74		1.12			
	Dep. Storage	(mm) =	1.00		5.00			
	Average Slope							
			138.10					
	Mannings n	=						
	Maillings II	_	.013		.230			
	Max.Eff.Inten.(m							
	over	(min)	5.00		25.00			
	Storage Coeff.	(min) =	4.82	(ii)	24.44	(ii)		
	Unit Hyd. Tpeak	(min) =	5.00		25.00			

	Unit Hyd. peak	(cms)=	.22	2	.05	*	TOTALS*	
	PEAK FLOW	(cms)=	.16	5	.02		.177 (i	Lii)
	TIME TO PEAK	(hrs)=	2.75	5	3.00		2.75	,
	RUNOFF VOLUME	(mm) =	35.00)	11.57		25.86	
	TOTAL RAINFALL	(mm) =	36.00)	36.00		36.00	
	PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICE * WARNING: STORA	ENT =	.97	/	.32		.72	

	(i) CN PROCED		CTED FOR F Ia = Dep.					
	(ii) TIME STEP							
			COEFFICIEN					
	(iii) PEAK FLOW	DOES NO	T INCLUDE	BASEFL	OW IF AN	Υ.		
	SERVOIR (0030)							
DT:	= 2> OUT= 1 = 5.0 min	TUO	FLOW ST	TORAGE	I OUTI	FIOW	STORAGE	
		· (c	ms) (h	na.m.)	(cr	ms)	(ha.m.)	
	= 5.0 min							
	<pre>INFLOW : ID= 2 OUTFLOW: ID= 1</pre>		AREA	QPE	AK TI	PEAK	R.V.	
	TNETOW . TD= 2	(0027)	(ha)	(cm	1S) (I	hrs)	(mm)	
	OUTFLOW: ID= 2	(0027)	2.86	•	07	3 08	25.80	
	P	EAK FL	OW REDUC	CTION [Qout/Qin] (%) = 40	.99	
	T	'IME SHIF	T OF PEAK	FLOW	(r	min)= 20	0.00	
	T M	'IME SHIF	T OF PEAK STORAGE	FLOW USED	(I (ha	min)= 20 .m.)= .	0318	
AΠ		. 						
AΠ	D HYD (0029) 1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00		AREA (ha) (2.31 .2.86	QPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08	R.V. (mm) 34.76 25.82		
AD:	D HYD (0029) 1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00		AREA (ha) (2.31 .2.86	QPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08	R.V. (mm) 34.76 25.82		
AD:	D HYD (0029) 1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00	28): 30): 29):	AREA (ha) (2.31 . 2.86	QPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08	R.V. (mm) 34.76 25.82		
AD	D HYD (0029) 1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00 ====== ID = 3 (00 NOTE: PEAK FLC		AREA (ha) (2.31 . 2.86	QPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08	R.V. (mm) 34.76 25.82		
AD	D HYD (0029) 1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00 	28): 30): 	AREA (ha) (2.31 2.86 5.17 TINCLUDE	QPEAK (cms) 211 072 276 BASEFL	TPEAK (hrs) 2.75 3.08 2.75	R.V. (mm) 34.76 25.82 29.82	:	
AD	D HYD (0029) 1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00 	28): 30): 	AREA (ha) (2.31 2.86 5.17 TINCLUDE	QPEAK (cms) 211 072 276 BASEFL	TPEAK (hrs) 2.75 3.08 2.75	R.V. (mm) 34.76 25.82 29.82	:	
AD	D HYD (0029) 1 + 2 = 3 1 D1= 1 (00 + ID2= 2 (00 		AREA (ha) (2.31 . 2.86 . 5.17 . T INCLUDE (ha) = Imp(%) =	DPEAK (cms), 211 072 276 BASEFL	TPEAK (hrs) 2.75 3.08 E.75 CWS IF Al	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3 1 D1= 1 (00 + ID2= 2 (00 		AREA (ha) (2.31 . 2.86 . 5.17 . T INCLUDE (ha) = Imp(%) =	DPEAK (cms), 211 072 276 BASEFL	TPEAK (hrs) 2.75 3.08 E.75 CWS IF Al	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3 1 D1= 1 (00 + ID2= 2 (00 		AREA (ha) (2.31 . 2.86 . 5.17 . T INCLUDE (ha) = Imp(%) =	DPEAK (cms), 211 072 276 BASEFL	TPEAK (hrs) 2.75 3.08 E.75 CWS IF Al	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3 1 D1= 1 (00 + ID2= 2 (00 		AREA (ha) (2.31 . 2.86 . 5.17 . T INCLUDE (ha) = Imp(%) =	DPEAK (cms), 211 072 276 BASEFL	TPEAK (hrs) 2.75 3.08 E.75 CWS IF Al	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3 1 D1= 1 (00 + ID2= 2 (00 		AREA (ha) (2.31 . 2.86 . 5.17 . T INCLUDE (ha) = Imp(%) =	DPEAK (cms), 211 072 276 BASEFL	TPEAK (hrs) 2.75 3.08 E.75 CWS IF Al	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3	228): (330): (29): WS DO NO Area Total (ha)= (mm)= (%)= (m)=	AREA (ha) (2.31 2.86 5.17 T INCLUDE	DPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08 2.75 3.08 IF AI	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3	228): (330): (29): WS DO NO Area Total (ha)= (mm)= (%)= (m)=	AREA (ha) (2.31 2.86 5.17 T INCLUDE	DPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08 2.75 3.08 IF AI	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3	228): (330): (29): WS DO NO Area Total (ha)= (mm)= (%)= (m)=	AREA (ha) (2.31 2.86 5.17 T INCLUDE	DPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08 2.75 3.08 IF AI	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3	228): (330): (29): WS DO NO Area Total (ha)= (mm)= (%)= (m)=	AREA (ha) (2.31 2.86 5.17 T INCLUDE	DPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08 2.75 3.08 IF AI	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3	228): (330): (29): WS DO NO Area Total (ha)= (mm)= (%)= (m)=	AREA (ha) (2.31 2.86 5.17 T INCLUDE	DPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08 2.75 3.08 IF AI	R.V. (mm) 34.76 25.82 29.82 NY.	:	
AD	D HYD (0029) 1 + 2 = 3 1 D1= 1 (00 + ID2= 2 (00 	228): (330): (29): WS DO NO Area Total (ha)= (mm)= (%)= (m)=	AREA (ha) (2.31 2.86 5.17 T INCLUDE	DPEAK (cms) .211 .072	TPEAK (hrs) 2.75 3.08 2.75 3.08 IF AI	R.V. (mm) 34.76 25.82 29.82 NY	61.00	
AD:	D HYD (0029) 1 + 2 = 3	28): 300:	AREA ((ha) (2.31 . 2.86	DPEAK (cms) 211 072 276 BASEFL 10.80 61.00 DUS 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	TPEAK (hrs) 2.75 3.08 2.75	R.V. (mm) 34.76 25.82 29.82 NY. (ii)	:	

RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(mm) = (mm) = ENT =	35.00 36.00 .97	11.57 36.00 .32	25.86 36.00 .72	
(ii) TIME STEP	83.0 Ia = (DT) SHOULI STORAGE COEI	Dep. St BE SMAL FICIENT.	orage (Above LER OR EQUAL)	
RESERVOIR (0008) IN= 2> OUT= 1 DT= 5.0 min	OUTFLO	V STOR (ha.	AGE OUTF m.) (cm 000 .8	LOW STORAGI (s) (ha.m. 130 .357	Ξ) 1
INFLOW : ID= 2 OUTFLOW: ID= 1	(0006) :	AREA (ha) LO.80 LO.80	QPEAK TF (cms) (h .65 2 .27 3	EAK R.V rs) (mm) .75 25.8 .17 25.8) 6 5
P	EAK FLOW	REDUCTI	ON [Qout/Qin] OW (m ED (ha.	(%) = 41.52	
CALIB STANDHYD (0007) ID= 1 DT= 5.0 min	Area Total Imp	(ha) = 15 b(%) = 79	.91 .00 Dir. Co	nn.(%)= 79.0	0
Surface Area Dep. Storage Average Slope Length Mannings n	Th	MPERVIOUS 12.57 1.00 1.00 325.70 .013	PERVIOUS 3.34 5.00 1.00 40.00 .250	(i)	
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	33.12 10.00 8.07 (10.00 .13	13.05 30.00 ii) 27.69 30.00 .04	ii) *TOTALS:	*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =	1.13 2.75 35.00 36.00 .97	.07 3.08 11.57 36.00	1.168 2.75 30.08 36.00 .84	(iii)
(ii) TIME STEP	83.0 Ia = (DT) SHOULI STORAGE COE	Dep. St BE SMAL FICIENT.	orage (Above LER OR EQUAL)	
ADD HYD (0009) 1 + 2 = 3 ID1= 1 (00	ARI (h: 08): 10.8	EA QPE a) (cm 30 .27	AK TPEAK s) (hrs) 0 3.17	R.V. (mm) 25.85	

```
+ ID2= 2 (0007): 15.91 1.168 2.75 30.08
        _____
        ID = 3 (0009): 26.71 1.401 2.75 28.37
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| ADD HYD (0031) |
      1 + 2 = 3
        ID = 3 (0031): 31.88 1.677 2.75 28.61
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| RESERVOIR (0010) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
                      OUTFLOW STORAGE | OUTFLOW
                      (cms)
                               (ha.m.) | (cms)
                                                     (ha.m.)
                              .0000 | .2940
.5230 | .3680
.7202 | .4250
.9521 | .4830
                                                    1.3234
                       .0520
                       .1630
                                                    1.4787
                       .2420
                           AREA QPEAK TPEAK
                                                     R.V.
                           (ha)
                                   (cms)
                                            (hrs)
                                          2.75
    INFLOW : ID= 2 (0031)
                                  1.68
                           31.88
                                                    28.61
    OUTFLOW: ID= 1 (0010)
                         31.88
                 PEAK FLOW REDUCTION [Qout/Qin](%)= 9.70
                TIME SHIFT OF PEAK FLOW
                                          (min) = 160.00
                                           (ha.m.) = .7197
                MAXIMUM STORAGE USED
  *********
  ** SIMULATION NUMBER: 3 **
| READ STORM | Filename: G:\Projects\2008\
                    08104 - Vaughan Corporate Centre - Master Ser
                             \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 47.81 mm | Comments: 5yr/6hr
              TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
               hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs
                                                               mm/hr
                     .00 | 2.00 | 16.25 | 3.75 | 6.69 | 5.50 | .96
               .50
                     .96 | 2.25 | 16.25 | 4.00 | 3.82 | 5.75 | .96 | .96 | 2.50 | 43.98 | 4.25 | 3.82 | 6.00 | .96 | .96 | 2.75 | 43.98 | 4.50 | 1.91 | 6.25 | .96
              1.00
              1.25
                      .96 | 3.00 12.43 | 4.75 1.91 |
              1.50 5.74 | 3.25 12.43 | 5.00 .96 | 1.75 5.74 | 3.50 6.69 | 5.25 .96 |
| STANDHYD (0028) | Area (ha) = 2.31
|ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
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		IMPERVIOUS	PERVIOUS	(i)
Surface Area	(ha) =	2.29	.02	
Dep. Storage	(mm) =	1.00	5.00	
Average Slope	(%)=	1.00	1.00	
Length	(m) =	124.10	40.00	
Mannings n	=	.013	.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

	TI	RANSFORMED HYE	TOGRAPH		
TIME	RAIN TIME	RAIN TI	ME RAIN	TIME	RAIN
hrs	mm/hr hrs	mm/hr h	rs mm/hr	hrs	mm/hr
.083	.00 1.667	5.74 3.2	50 12.43	4.83	.96
.167	.00 1.750	5.74 3.3	33 6.69	4.92	.96
.250	.00 1.833	16.25 3.4	17 6.69	5.00	.96
.333	.96 1.917	16.25 3.5	00 6.69	5.08	.96
.417	.96 2.000	16.25 3.5	83 6.69	5.17	.96
.500	.96 2.083	16.25 3.6	6.69	5.25	.96
.583	.96 2.167				.96
.667	.96 2.250				.96
.750	.96 2.333				.96
.833	.96 2.417				.96
.917	.96 2.500				.96
1.000	.96 2.583				.96
1.083					.96
1.167					.96
1.250					.96
1.333					.96
1.417					.96
1.500					.96
1.583	5.74 3.167	12.43 4.7	50 1.91		
Max.Eff.Inten.(mm	n/hr) = 43.98	154.40			
over					
Storage Coeff.		1 (ii) 5.96			
Unit Hyd. Tpeak					
Unit Hyd. peak	(cms) = .24	1 .15			
				TALS*	
	(cms) = .21			.281 (iii	L)
	(hrs) = 2.75			2.75	
	(mm) = 46.83			16.53	
TOTAL RAINFALL	(mm) = 47.83			17.81	
RUNOFF COEFFICIEN	NT = .98	.40		.97	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 83.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

Max.Eff.Inten ov Storage Coeff Unit Hyd. Tpe Unit Hyd. pea PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFAL RUNOFF COEFFI					*	TOTALS* .246 (iii) 2.75 36.09 47.81 .75	
(ii) TIME ST	EDURE SELEC 83.0 I EP (DT) SHO E STORAGE O	CTED FOR Ta = Dep. DULD BE S	PERVIOU Storag SMALLER	JS LOSSES: ge (Above OR EQUAL)		
RESERVOIR (0030) IN= 2> OUT= 1 DT= 5.0 min	1						
INFLOW: ID= OUTFLOW: ID=		W REDU	JCTION [CAK TP us) (h 25 2 10 3 Qout/Qin]	(%) = 41	.03	
	MAXIMUM S	STORAGE	USED	(ha.	m.)= .	0443	
ID = 3 (AREA (ha) 2.31 2.86 5.17	QPEAK (cms) .281 .101	TPEAK (hrs) 2.75 3.17	R.V. (mm) 46.53 36.05 ======	0443	
ADD HYD (0029) 1 + 2 = 3 ID1= 1 (+ ID2= 2 (======= ID = 3 (NOTE: PEAK F		AREA (ha) 2.31 2.86 5.17 INCLUDE (ha) = Imp(%) =	QPEAK (cms) .281 .101 .371 .BASEFI .10.80 61.00	TPEAK (hrs) 2.75 3.17 2.75	R.V. (mm) 46.53 36.05 ====== 40.73 Y.		
ADD HYD (0029) 1 + 2 = 3 ID1= 1 (+ ID2= 2 (======== ID = 3 (NOTE: PEAK F CALIB STANDHYD (0006) ID= 1 DT= 5.0 min	0028): 0029): LOWS DO NOT Area Total (ha) = (mm) = (%) = (m) =	AREA (ha) 2.31 2.86 5.17 'INCLUDE Imp(%)= IMPERVI 6.5 1.0 1.0 2.66	QPEAK (cms) .281 .101 .371 .371 .371 .2 BASEFI	TPEAK (hrs) 2.75 3.17 2.75	R.V. (mm) 46.53 36.05 ======= 40.73 Y. nn.(%)=		

(ii) TIME STEP	(cms) = (hrs) = (mm) = (mm) = ENT = URE SELECTE 83.0 Ia (DT) SHOUL	.80 2.75 46.81 47.81 .98 D FOR PERVI	OUS LOSSES:	*TOTALS* .919 (iii) 2.75 36.09 47.81 .75
THAN THE (iii) PEAK FLOW RESERVOIR (0008) IN= 2> OUT= 1 DT= 5.0 min		NCLUDE BASE		STORAGE (ha.m.)
INFLOW: ID= 2 OUTFLOW: ID= 1	(0006) (0008) EAK FLOW	AREA () (ha) () 10.80 10.80 REDUCTION	PEAK TPEAK	R.V. (mm) 36.09 36.08
CALIB STANDHYD (0007) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area Total Im (ha) = (mm) = (%) = (m) =	(ha) = 15.9 p(%) = 79.0 MPERVIOUS 12.57 1.00 1.00 325.70	Dir. Conn. PERVIOUS (i) 3.34 5.00 1.00 40.00	(%) = 79.00
Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	mm/hr) = (min) (min) = (min) = (cms) =	43.98 5.00 7.21 (ii 5.00	21.81 25.00 23.18 (ii) 25.00 .05	*TOTALS* 1.613 (iii) 2.75 41.04 47.81 .86
(i) CN PROCED CN* = (ii) TIME STEP	URE SELECTE 83.0 Ia (DT) SHOUL STORAGE COE	D FOR PERVI = Dep. Stor D BE SMALLE FFICIENT.	OUS LOSSES: age (Above) R OR EQUAL	

1 + 2 = 3 ID1= 1 (0 + ID2= 2 (0	 - 	AREA (ha) 10.80 15.91	QPEAK (cms) .380 1.613	TPEAK (hrs) 3.17 2.75	R.V. (mm) 36.08 41.04		
ID = 3 (0)			1.938	2.75	39.03		
NOTE: PEAK FL	OWS DO NO	OT INCLU	DE BASEFLO	OWS IF AN	IY.		
ADD HYD (0031)	- I						
1 + 2 = 3	i =	AREA	QPEAK (cms)	TPEAK	R.V.		
1 + 2 = 3 ID1= 1 (0 + ID2= 2 (0	029): 009):	5.17	.371	2.75	40.73		
ID = 3 (0)					39.31		
NOTE: PEAK FL	OWS DO NO	OT INCLU	DE BASEFLO	OWS IF AN	IY.		
RESERVOIR (0010) IN= 2> OUT= 1 DT= 5.0 min	OUT OUT - (d	rFLOW ems) .0000 .0520 .1630	STORAGE (ha.m.) .0000 .5230 .7202 .9521	OUTF (cm .2 .3	TLOW : ss) 940 6680 250 830	STORAGE (ha.m.) 1.1158 1.3234 1.4787 1.6325	
INFLOW : ID= 2 OUTFLOW: ID= 1		ARE. (ha 31.8 31.8	A QPEA) (cms 8 2.3	AK TE s) (h 31 2 24 5	EAK rs) .75	R.V. (mm) 39.31 39.23	
	TIME SHIE	T OF PE.	DUCTION [(AK FLOW USED	(m		.00	
	BER: 4 ******* - File	** *** ename: G 0	Design\SWI	ughan Cor		Centre - M M\6 and 12	
	- ME DA:	ENI I DEL	ME DAT	V I TIME	RATI	N TIME	RAT
11 h	rs mm/h 25 .0 50 1.1	nr h 00 2. 11 2.	rs mm/h: 00 18.94 25 18.94 50 51.24	r hrs 4 3.75 4 4.00 4 4.25	mm/h: 7.8 4.4	r hrs 0 5.50 6 5.75 6 6.00	mm/h 1.1 1.1

CALIB STANDHYD (0028) ID= 1 DT= 5.0 min		(ha) = mp(%) =	2.31 99.00	Dir. Con	n.(%)= 9	99.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	1.00 1.00 1.00 1.00 124.10 .013	OUS PI	ERVIOUS (3 .02 5.00 1.00 40.00 .250	i)		
NOTE: RAINE	ALL WAS T	RANSFORM	ED TO	5.0 MIN.	TIME ST	EP.	
hrs	RAIN mm/hr .000 .000 .000 .111 .111 .111 .111 .11	TIME hrs 1.667	RAIN mm/hr 6.68	hrs 3.250	RAIN mm/hr 14.48	TIME hrs 4.83	mm/hr 1.11
1.583	6.68	3.167	14.48	4.750	2.23	6.25	1.11
Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr) = (min) (min) = (min) = (cms) =	51.24 5.00 3.80 5.00	(ii) (ii)	252.17 10.00 5.61 (i: 10.00 .15	i.)		
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	(cms) = (hrs) = (mm) = (mm) = CNT =	.33 2.75 54.69 55.69	3 5 9 9	.00 2.75 25.02 55.69 .45	*1705 2 54 55	FALS* .327 (iii 2.75 4.39 5.69 .98	i)
(i) CN PROCEDU (i) CN PROCEDU CN* = 8 (ii) TIME STEP THAN THE S (iii) PEAK FLOW	E COEFF.	IS SMALI ED FOR F = Dep. LD BE SM EFFICIEN	ER THAN PERVIOUS Storage MALLER O	TIME STEI LOSSES: (Above) R EQUAL			
CALIB STANDHYD (0027) ID= 1 DT= 5.0 min	Area	(ha)=	2.86				
Surface Area Dep. Storage	(ha) =	IMPERVIO	DUS PI	ERVIOUS (i)		

Average Slope (%) = Length (m) = Mannings n =	1.00 138.10 .013	1.00 40.00 .250	
Max.Eff.Inten.(mm/hr)=	51.24	29.52	
Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)=	5.00	20.00	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	.24		
PEAK FLOW (cms)=	.25		TOTALS* .301 (iii)
PEAK FLOW (cms) = TIME TO PEAK (hrs) = RUNOFF VOLUME (mm) =	2.75	2 02	2.75
RUNOFF VOLUME (mm) =	54.69	25.02 55.69	43.11 55.69
TIME TO PEAK (hrs) = RUNOFF VOLUME (mm) = TOTAL RAINFALL (mm) = RUNOFF COEFFICIENT =	.98	.45	.77
**** WARNING: STORAGE COEF		N TIME STEP!	
(i) CN PROCEDURE SEL			
CN* = 83.0 (ii) TIME STEP (DT) S	Ia = Dep. Storag		
THAN THE STORAGE		OK EQUAL	
(iii) PEAK FLOW DOES N	OT INCLUDE BASEFL	OW IF ANY.	
RESERVOIR (0030)			
IN= 2> OUT= 1			
DT= 5.0 min	TFLOW STORAGE	OUTFLOW	STORAGE
(cms) (ha.m.) .0000 .0000	(cms)	(ha.m.) .0960
	AREA QPE	AK TPEAK s) (hrs) 30 2.75 12 3.08	R.V. (mm)
<pre>INFLOW : ID= 2 (0027) OUTFLOW: ID= 1 (0030)</pre>	2.86 .	30 2.75	43.11
OUTFLOW: ID= 1 (0030)	2.86 .	12 3.08	43.08
	LOW REDUCTION [
TIME SHI	FT OF PEAK FLOW STORAGE USED	(min) = 20	0.00
HAXIMON	SIONAGE USED	(110.111.)-	.0337
ADD HYD (0029) 1 + 2 = 3	ADEA ODEAU	morav o u	
1 + 2 = 3 	(ha) (cms)	(hrs) (mm)	
ID1= 1 (0028):	2.31 .327	2.75 54.39	
+ 1D2= 2 (0030):	2.86 .123	3.08 43.08	
ID = 3 (0029):	5.17 .436	2.75 48.13	
NOTE: PEAK FLOWS DO N	OT INCLUDE BASEFI	OWS IF ANY.	
CALIB			
STANDHYD (0006) Area ID= 1 DT= 5.0 min Tota	(ha) = 10.80	Di- C (8)-	- 61 00
			- 01.00
Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n =	IMPERVIOUS	PERVIOUS (i)	
Surrace Area (ha)= Dep. Storage (mm)=	1.00	4.∠⊥ 5.00	
Average Slope (%)=	1.00	1.00	
Length (m) =	268.30	40.00	
rannings n =	.013	.230	

Max.Eff.Inten.() over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	<pre>mm/hr) = (min) (min) = (min) = (cms) = (cms) = (hrs) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) =</pre>	51.24 5.00 6.03 (ii) 5.00 .19 .93 2.75 54.69 55.69 .98	29.52 25.00 20.19 (ii) 25.00 .05 .22 3.00 25.02 55.69 .45	*TOTALS* 1.102 (iii) 2.75 43.12 55.69 .77
(ii) TIME STEP	33.0 Ia: (DT) SHOULI STORAGE COE	= Dep. Storage D BE SMALLER (FFICIENT.	e (Above) OR EQUAL	
RESERVOIR (0008) IN= 2> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	W STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.) .3571
INFLOW: ID= 2 OUTFLOW: ID= 1				
			<pre>Qout/Qin] (%) =</pre>	
CALIB STANDHYD (0007) ID= 1 DT= 5.0 min	Area Total Imp)= 79.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = =	MPERVIOUS 12.57 1.00 1.00 325.70 .013	PERVIOUS (i) 3.34 5.00 1.00 40.00 .250	
Max.Eff.Inten.(1 over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	51.24 5.00 6.78 (ii) 5.00 .18	29.52 25.00 20.94 (ii) 25.00 .05	*TOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =	1.78 2.75 54.69 55.69 .98	.17 3.00 25.02 55.69 .45	1.906 (iii) 2.75 48.46 55.69
(ii) TIME STEP	33.0 Ia: (DT) SHOUL STORAGE COE	= Dep. Storage D BE SMALLER (FFICIENT.	e (Above) OR EQUAL	

+ ID2= 2	(0008): (0007):	(ha) 10.80 15.91	.456 1.906	(hrs) 3.17 2.75	(mm) 43.11 48.46		
ID = 3	3 (0009):	26.71	2.295	2.75	46.29		
NOTE: PEAR	FLOWS DO	NOT INCL			NY. 		
ADD HYD (003 1 + 2 = 3	31)	AREA	QPEAK	TPEAK	R.V.		
ID1= 1 + ID2= 2	(0029): (0009):		.436 2.295	2.75	46.29		
	(0031):						
NOTE: PEAR	FLOWS DO	NOT INCL	UDE BASEFI	OWS IF A	NY.		
RESERVOIR (001 IN= 2> OUT= DT= 5.0 min	.0) = 1 0	(cms)	STORAGE	OUTI	FLOW	STORAGE	
		.0000 .0520 .1630 .2420	(ha.m.) .0000 .5230 .7202 .9521			1.1158 1.3234 1.4787 1.6325	
INFLOW : II)= 2 (0031))= 1 (0010)	(h	EA QPE a) (cm 88 2. 88 .	s) (1 73	PEAK nrs) 2.75 5.17	R.V. (mm) 46.59 46.51	
	TIME SH MAXIMUM	IFT OF P STORAG	EDUCTION [EAK FLOW E USED	(r (ha	min)=145 .m.)= 1.	.00 1156	
*********** ** SIMULATION *******	**************************************	**** 5 **					
READ STORM Ptotal= 65.59	Fi 		G:\Project 08104 - Va \Design\SW 25yr/6hr	ughan Co:			
	TIME R hrs mm .25 .50 1 .75 1	31 2	IME RAI hrs mm/h .00 22.3 .25 22.3 .50 60.3 .75 60.3 .00 17.0 .25 17.0	r hrs 0 3.7! 0 4.00 5 4.2!	mm/h 5 9.1 5 5.2 5 2.6	2 6.00	mm/hr 1.31 1.31 1.31

CALIB STANDHYD (0028) D= 1 DT= 5.0 min						9.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	1.00 1.00 1.00 1.24.10 .013	S PE	ERVIOUS (i) .02 5.00 1.00 40.00 .250			
NOTE: RAINF	ALL WAS TRA	ANSFORMEI	TO TO	5.0 MIN. 7	IME STE	EP.	
.083 .167 .250 .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 1.167 1.250 1.333 1.417 1.500	RAIN mm/hr .00 .00 .00 .131	TIME hrs 1.667 1.750 1.833 1.917 2.000 2.083 2.167 2.250 2.333 2.417 2.500 2.583 2.667 2.750 2.833 2.917 3.000 3.083 3.167	RAIN mmm/hr 7.87 7.87 22.30 22.30 22.30 22.30 60.35 60.35 60.35 60.35 60.35 17.06 17.06 17.06 17.06	D HYETOGR# TIME hrs 3.250 3.333 3.417 3.500 3.583 3.667 3.750 3.750 4.000 4.083 4.167 4.250 4.333 4.417 4.500 4.583 4.667 4.750	RAIN mm/hr 17.06 9.18 9.18 9.18 9.18 9.18 9.18 9.18 5.25	TIME hrs 4.83 4.92 5.00 5.08 5.17 5.25 5.33 5.42	mm/hr 1.31 1.31 1.31 1.31 1.31 1.31 1.31
Max.Eff.Inten. (mm	(cms) = (hrs) = (hrs) = (mm) = (mm) = HT = E COEFF. IS RE SELECTEI B.O IA = (DT) SHOULD CORAGE COEF	.38 2.75 64.59 65.59 .98 SMALLER D FOR PER = Dep. St D BE SMAI	R THAN RVIOUS Corage LLER OF	.00 2.75 32.60 65.59 .50 TIME STEP! LOSSES: (Above)	*TOT 2 64 65	PALS* 386 (iii .75 .27 .59 .98	.)

		_				
	····-	(1)-	IMPERVIOUS	PERVIOUS (i)	
E	Surface Area Dep. Storage Average Slope	(na)= (mm)=	1.74 1.00 1.00 138.10	1.12 5.00		
A	Average Slope	(%)=	1.00	1.00		
I	Length Mannings n	(m) =	138.10	1.00 40.00 .250		
M	Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea	(mm/hr)=	60.35	38.12		
S	ove Storage Coeff.	(min) =	3.79 (ii	20.00 .) 16.57 (i	i)	
U	Jnit Hyd. Tpea	k (min)=	5.00	20.00		
U	Jnit Hyd. peak	(cms)=	.25	.06	*TOTALS*	
F	PEAK FLOW	(cms)=	.29	.08	.366 (ii	i)
T	PEAK FLOW	(hrs)=	2.75	2.92	2.75	
P.	RUNOFF VOLUME	(mm) =	64.59	32.60 65.59	52.11 65.59	
F	PEAR FLOW PIME TO PEAK RUNOFF VOLUME POTAL RAINFALL RUNOFF COEFFIC	IENT =	.98	.50	.79	
	WARNING: STOR			HAN TIME STE	P!	
	(i) ON DROOM	יתושף שמווחי	CTED FOR PERVI	UIIG INGGEG.		
			TED FOR PERVI			
	(ii) TIME STE	P (DT) SHO	OULD BE SMALLE			
,	THAN THE (iii) PEAK FLC		COEFFICIENT.	TELOW TE ANV		
,	(TII) FEAR FEC	DOED NO	. INCHUDE BASE	LLOW IF ANI.		
	ERVOIR (0030)					
	2> OUT= 1					
	5.0 min	OUTE	FLOW STORAG	E OUTFL	OW STORAGE	
		- (CI	0000 .000) (cms 00 .21	90 .0960	
	INFLOW : ID= 2 OUTFLOW: ID= 1		AREA (PEAK TPE	AK R.V. s) (mm)	
I	INFLOW : ID= 2	(0027)	2.86	.37 2.	75 52.11	
С	OUTFLOW: ID= 1	(0030)	2.86	.15 3.	08 52.07	
		PEAK FLO	OW REDUCTION	[Oout/Oin]	%)= 40.61	
		TIME SHIFT	DW REDUCTION F OF PEAK FLOW STORAGE USEL	I (mi	n) = 20.00	
		MAXIMUM S	STORAGE USEI) (ha.m	.)= .0653	
ADD	HYD (0029)					
ADD	HYD (0029)					
ADD	HYD (0029)					
ADD	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0	- - 		TPEAK (hrs) 2.75 3.08	R.V. (mm) 64.27 52.07	
ADD	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0	- - 	AREA QPEAF (ha) (cms) 2.31 .386 2.86 .149	TPEAK (hrs) 2.75 3.08	R.V. (mm) 64.27 52.07	
ADD 1	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0	028): 030):	AREA QPEAF (ha) (cms) 2.31 .386 2.86 .149 5.17 .518	TPEAK (hrs) 2.75 3.08	R.V. (mm) 64.27 52.07 ===== 57.52	
ADD 1	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0 ID = 3 (0	028): 030): 029): 000):	AREA QPEAR (ha) (cms) 2.31 .386 2.86 .149 5.17 .518	TPEAK (hrs) 2.75 3.08 2.75	R.V. (mm) 64.27 52.07 ===== 57.52	
ADD 1	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0 ID = 3 (0	028): 030): 029): 008) DO NOT	AREA QPEAR (ha) (cms) 2.31 .386 2.86 .149 5.17 .518	TPEAK (hrs) 2.75 3.08 2.75	R.V. (mm) 64.27 52.07 ===== 57.52	
ADD 1 	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0 ======= ID = 3 (0	028): 030): 029): 008) DO NOT	AREA QPEAH (ha) (cms) 2.31 .386 2.86 .149	TPEAK (hrs) 2.75 3.08 	R.V. (mm) 64.27 52.07 ===== 57.52	
ADD 1 N	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0 ID = 3 (0	028): 030): 029): 008) DO NOT	AREA QPEAR (ha) (cms) 2.31 .386 2.86 .149 5.17 .518 TINCLUDE BASE (ha) = 10.8	TPEAK (hrs) 2.75 3.08 2.75 2.75	R.V. (mm) 64.27 52.07 ===== 57.52	
ADD 1 1 CALI STAN	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0 ID = 3 (0 NOTE: PEAK FI	-	AREA QPEAR (ha) (cms) 2.31 .386 2.86 .149 5.17 .518 FINCLUDE BASE (ha)= 10.8 Imp(%)= 61.0	(TPEAK (hrs) 2.75 3.08 2.75 2.75 2.75 2.75 2.70 0.0 Dir. Con	R.V. (mm) 64.27 52.07 ===== 57.52	
ADD 1 1 CALI STAN	HYD (0029) + 2 = 3 ID1= 1 (0 + ID2= 2 (0 ======= ID = 3 (0 KOTE: PEAK FL	-	AREA QPEAR (ha) (cms) 2.31 .386 2.86 .149 5.17 .518 FINCLUDE BASE (ha)= 10.8 Imp(%)= 61.0	(TPEAK (hrs) 2.75 3.08 2.75 2.75 2.75 2.75 2.70 0.0 Dir. Con	R.V. (mm) 64.27 52.07 ===== 57.52	

Hydrologic Model	Output –	Required S	torage –Cor	itrolled to 2-year p
Average Slope Length Mannings n	(%) = (m) = =	1.00 268.30 .013	1.00 40.00 .250	
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	60.35 5.00 5.65 (ii) 5.00	38.12 20.00 18.43 (ii) 20.00	*TOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(mm) = (mm) =	64.59 65.59	.30 2.92 32.60 65.59 .50	1.367 (iii) 2.75 52.11 65.59
(ii) TIME STEP	83.0 Ia (DT) SHOU STORAGE CO	= Dep. Stora LD BE SMALLER EFFICIENT.	age (Above) R OR EQUAL	
RESERVOIR (0008) IN= 2> OUT= 1 DT= 5.0 min	OUTFL	OW STORAGE) (ha.m.) 00 .0000	E OUTFLOW (cms)	STORAGE (ha.m.) .3571
<pre>INFLOW : ID= 2 OUTFLOW: ID= 1</pre>	(0006) (0008)	(ha) (d	PEAK TPEAK cms) (hrs) 1.37 2.75 .56 3.17	(mm) 52.11
T	IME SHIFT	OF PEAK FLOW	[Qout/Qin] (%) (min) (ha.m.)	= 25.00
CALIB STANDHYD (0007) ID= 1 DT= 5.0 min	Area			(%)= 79.00
Surface Area Dep. Storage	(ha)=	IMPERVIOUS 12.57 1.00	PERVIOUS (i) 3.34 5.00	

SIMMULI	.D (0007)	Alea	(IIa) -	10.51				
ID= 1 DT	= 5.0 min	Total	Imp(%)=	79.00	Dir.	Conn.(%)=	79.00)
		-	IMPERVIO	DIIS	PERVIOU	S (i)		
		(1)						
	ace Area							
Dep.	Storage	(mm) =	1.00)	5.00			
Aver	age Slope	(%)=	1.00)	1.00			
Leng	ŗth	(m) =	325.70)	40.00			
Mann	nings n	=	.013	3	.250			
Max.	Eff.Inten.	(mm/hr)=	60.35	5	38.12			
	ove	c (min)	5.00)	20.00			
Stor	age Coeff.	(min) =	6.35	(ii)	19.13	(ii)		
Unit	Hyd. Tpeal	<pre>((min) =</pre>	5.00)	20.00			
Unit	Hyd. peak	(cms) =	.19	9	.06			
						*	rotals,	k
PEAK	K FLOW	(cms) =	2.10)	.24		2.303	(iii)
TIME	TO PEAK	(hrs) =	2.75	5	2.92		2.75	
RUNC	FF VOLUME	(mm) =	64.59	9	32.60		57.87	
TOTA	AL RAINFALL	(mm) =	65.59	9	65.59		65.59	
RUNC	FF COEFFIC:	ENT =	.98	3	.50		.88	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

```
CN* = 83.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| ADD HYD (0009) |
1 + 2 = 3 |
                        AREA QPEAK
                                      TPEAK
                                               R.V.
                        (ha)
                              (cms)
                                       (hrs)
                                              52.10
      ID1=1 (0008):
                       10.80
                              .559
                                      3.17
      + ID2= 2 (0007): 15.91 2.303
                                    2.75 57.87
       ID = 3 (0009): 26.71 2.781 2.75 55.54
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| ADD HYD (0031) |
1 + 2 = 3 |
                        AREA QPEAK TPEAK
                       (ha) (cms) (hrs)
                                             (mm)
      ID1= 1 (0029): 5.17 .518 2.75 57.52
+ ID2= 2 (0009): 26.71 2.781 2.75 55.54
       ID = 3 (0031): 31.88 3.298 2.75 55.86
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| RESERVOIR (0010) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
                     OUTFLOW STORAGE | OUTFLOW STORAGE
                      (cms)
                              (ha.m.) | (cms)
                                                   (ha.m.)
                      .0000
                               .0000
                                          .2940
                                                   1.1158
                      .0520
                               .5230 | .3680
                                                   1.3234
                      .1630
                             .7202 | .4250
.9521 | .4830
                                                   1 4787
                      .2420
                                                   R.V.
                          AREA OPEAK TPEAK
                           (ha)
                                 (cms)
                                           (hrs)
                                                     (mm)
    INFLOW : ID= 2 (0031)
                                 3.30
                          31.88
                                           2.75
                                                   55.86
    OUTFLOW: ID= 1 (0010)
                          31.88
                PEAK FLOW REDUCTION [Qout/Qin](%)= 11.15
                TIME SHIFT OF PEAK FLOW
                                         (min) = 140.00
                MAXIMUM STORAGE USED
                                         (ha.m.) = 1.3232
 *********
 ** SIMULATION NUMBER: 6 **
-----
| READ STORM | Filename: G:\Projects\2008\
                            08104 - Vaughan Corporate Centre - Master Ser
                            \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 73.00 mm | Comments: 50yr/6hr
              TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
              hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
              .25
                   .00 | 2.00 24.82 | 3.75 10.22 | 5.50 1.46
               .50
                   1.46 | 2.25 24.82 | 4.00 5.84 | 5.75 1.46
```

.75 1.00 1.25 1.50 1.75	1.46 1.46 1.46 8.76 8.76	2.75 3.00 3.25 3.50	67.16 18.98 18.98 10.22	4.50 4.75 5.00 5.25	2.92 2.92 1.46 1.46	6.25	1.46
CALIB STANDHYD (0028) ID= 1 DT= 5.0 min	Area (ha) = : (%) = 9	2.31 9.00	Dir. Conn	. (%) = 9	9.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(h a) =	2 20		ERVIOUS (i .02 5.00 1.00 40.00 .250)		
NOTE: RAINFA	ALL WAS TRA	NSFORME:	D TO	5.0 MIN.	TIME STE	P.	
hrs .083 .167 .250 .333	RAIN mm/hr .00 .00 .00 .1.46	TIME hrs 1.667 1.750 1.833 1.917 2.000	RAIN mm/hr 8.76 8.76 24.82 24.82	hrs 3.250 3.333 3.417 3.500 3.583	RAIN mm/hr 18.98 10.22 10.22 10.22 10.22 10.22	TIME hrs 4.83 4.92 5.00 5.08 5.17	mm/hr 1.46 1.46 1.46 1.46
Max.Eff.Inten.(mr over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIEN	n/hr) = (min) (min) = (min) = (cms) = (cms) = (hrs) =	67.16 5.00 3.41 5.00 .26	(ii)	114.32 10.00 5.03 (ii 10.00 .16 .00 2.75 38.53 73.00 .53	*TOT. 2 71	ALS* 429 (iii .75 .66	
**** WARNING: STORAGE (i) CN PROCEDUR	COEFF. IS RE SELECTED 3.0 Ia = (DT) SHOULD CORAGE COEF	FOR PE Dep. S BE SMA FICIENT	R THAN RVIOUS torage LLER OF	TIME STEP LOSSES: (Above) R EQUAL			

CALIB STANDHYD (0027) ID= 1 DT= 5.0 min						61.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =					
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak					ii) *5	FOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =	.33 2.79 72.00 73.00	3 5 0 0	.10 2.92 38.53 73.00 .53		.416 (iii) 2.75 58.94 73.00 .81
(ii) TIME STEF THAN THE (iii) PEAK FLOW 	(DT) SHO	OULD BE SI	MALLER (NT. BASEFL(OW IF ANY		
DT= 5.0 min				OUTFI Coms Coms Coms Coms Coms Coms Coms Coms		
T	EAK FLO	W REDUC	CTION [Qout/Qin] (m:	(%) = 40.	.57 .00
ADD HYD (0029) 1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00	28): 30):	AREA (ha) 2.31 2.86	QPEAK (cms) .429 .169	TPEAK (hrs) 2.75 3.08	R.V. (mm) 71.66 58.91	
ID = 3 (00	29):	5.17	.579	2.75	64.61	
NOTE: PEAK FLC	PON Ou aw	. INCLUDE	BASEFL	JWS IF AN		
CALIB	Area			Dir. Con	nn.(%)=	61.00

IMPERVIOUS Surface Area (ha) = 6.59	JS PERVIOUS (i) 4.21
Dep. Storage (mm) = 1.00	5.00
Average Slope (%)= 1.00	1.00
Length (m) = 268.30	40.00
mannings n = .013	.250
Max.Eff.Inten.(mm/hr) = 67.16 over (min) 5.00 Storage Coeff. (min) = 5.42 Unit Hyd. Tpeak (min) = 5.00 Unit Hyd. peak (cms) = .20	44.75
Over (min) 5.00 Storage Coeff (min) = 5.42	(ii) 17 40 (ii)
Unit Hyd. Tpeak (min) = 5.00	20.00
Unit Hyd. peak (cms)= .20	.06
DD31/ DT01/	*TOTALS*
TIME TO PEAK (hrs)= 2.75	.37 1.553 (iii) 2.92 2.75
RUNOFF VOLUME (mm) = 72.00	38.53 58.94
TOTAL RAINFALL (mm) = 73.00	38.53 58.94 73.00 73.00
PEAK FLOW (cms) = 1.23 TIME TO PEAK (hrs) = 2.75 RUNOFF VOLUME (mm) = 72.00 TOTAL RAINFALL (mm) = 73.00 RUNOFF COEFFICIENT = .99	.53 .81
(i) CN PROCEDURE SELECTED FOR PROCEDURE SELEC	
(ii) TIME STEP (DT) SHOULD BE SMA	
THAN THE STORAGE COEFFICIENT	
(iii) PEAK FLOW DOES NOT INCLUDE E	BASEFLOW IF ANY.
RESERVOIR (0008)	
IN= 2> OUT= 1 DT= 5 0 min	DRAGE OUTELOW STORAGE
(cms)	a.m.) (cms) (ha.m.)
RESERVOIR (0008)	0000 .8130 .3571
A D IF A	ODEAN EDEAN D M
(ha)	(cms) (hrs) (mm)
INFLOW : ID= 2 (0006) 10.80	1.55 2.75 58.94
AREA (ha) INFLOW: ID= 2 (0006) 10.80 OUTFLOW: ID= 1 (0008) 10.80	.63 3.17 58.93
PEAK FLOW REDUCT	TION [Qout/Qin](%) = 40.87
TIME SHIFT OF PEAK H	FLOW (min) = 25.00 USED (ha.m.) = .2790
MAXIMUM STORAGE (JSED (ha.m.)= .2790
CALIB	
STANDHYD (0007) Area (ha) = 1 ID= 1 DT= 5.0 min Total Imp(%) = 5	5.91
Surface Area (ha) = 12.57	JS PERVIOUS (i)
Surface Area (ha)= 12.57	3.34
Dep. Storage (mm) = 1.00	5.00
Average Slope (%) = 1.00	1.00
Mannings n = 013	250
Max.Eff.Inten.(mm/hr) = 67.16 over (min) 5.00 Storage Coeff. (min) = 6.08 Unit Hyd. Tpeak (min) = 5.00 Unit Hyd. peak (cms) = .19	44.75
over (min) 5.00 Storage Coeff (min)= 6.08	∠∪.UU (ii) 18 07 (ii)
Unit Hyd. Tpeak (min) = 5.00	20.00
Unit Hyd. peak (cms)= .19	.06
TIME TO PEAK (hrs)= 2.33	2.92 2.589 (111) 2.92 2.75
RUNOFF VOLUME (mm) = 72.00	38.53 64.97
PEAK FLOW (cms) = 2.33 TIME TO PEAK (hrs) = 2.75 RUNOFF VOLUME (mm) = 72.00 TOTAL RAINFALL (mm) = 73.00	73.00 73.00

RUNOFF COEFFICIENT	=	.99	.53		.89	
(i) CN PROCEDURE CN* = 83. (ii) TIME STEP (D) THAN THE STO (iii) PEAK FLOW DO	0 Ia = I T) SHOULD E RAGE COEFFI	Dep. Storag BE SMALLER CCIENT.	e (Above OR EQUAL	e)		
ADD HYD (0009)						
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V.		
1 + 2 = 3 	: 10.80 : 15.91	.635 2.589	3.17	58.93 64.97		
ID = 3 (0009)						
NOTE: PEAK FLOWS	DO NOT INCI	UDE BASEFI	OWS IF AN	1Y.		
ADD HYD (0031) 1 + 2 = 3	ARFA	OPEAK	TOFAK	R W		
1 + 2 = 3 	(ha)	(cms)	(hrs)	(mm)		
+ ID2= 2 (0009)	: 26.71	3.131	2.75	62.53		
ID = 3 (0031) NOTE: PEAK FLOWS						
RESERVOIR (0010) IN= 2> OUT= 1	OTTER ON	CHODACE	I OUT	et OM	CHODACE	
DI- 3.0 MIN	(cms)	(ha.m.)	(cn	ns)	(ha.m.)	
	.0520	.5230	1 .3	3680	1.3234	
DT= 5.0 min	.1630 .2420	.7202 .9521	.4	1250 1830	1.4787 1.6325	
					R.V.	
INFLOW: ID= 2 (00 OUTFLOW: ID= 1 (00	(h 31) 31.	na) (cm .88 3.	ns) (h 71 2	nrs)	(mm) 62.87	
	10) 31. FLOW F				62.78	
TIME MAXI	SHIFT OF E	PEAK FLOW GE USED	(n (ha.	nin)=140 .m.)= 1.	0.00 4785	
**************************************	7 **					
READ STORM	Filename:	G:\Project	.s\2008\			
		\Design\SW	ugnan cor	porate del\STOF	Centre - RM\6 and 1	Master Ser 12 hour AES
rtota1= 60.31 mm	comments:	TOOAL/ pur				

hrs mm/hr .25 .00 .50 1.61 .75 1.61 1.00 1.61	hrs 2.00 2.25 2.50 2.75 3.00 3.25 3.50	mm/hr hrs 27.30 3.75 27.30 4.00 73.88 4.25 73.88 4.50 20.88 4.75 20.88 5.00 11.24 5.25		mm/hr 1.61 1.61 1.61 1.61
CALIB STANDHYD (0028) Area ID= 1 DT= 5.0 min Total I Surface Area (ha) = Dep. Storage (mm) = Average Slope (%) = Length (m) =	mp(%) = 99	.00 Dir. Conn		
Average Slope (%) = Length (m) =	124.10	40.00		
Mannings n =	.013	.250		
NOTE: RAINFALL WAS T	RANSFORMED	TO 5.0 MIN.	TIME STEP.	
	TRAN	SFORMED HYETOGR	APH	
TIME RAIN	TIME	RAIN TIME	RAIN TIME	RAIN
hrs mm/hr	hrs	mm/hr hrs	mm/hr hrs 20.88 4.83 11.24 4.92 11.24 5.00 11.24 5.17 11.24 5.17 11.24 5.25 11.24 5.33 6.42 5.42 6.42 5.50 6.42 5.58 6.42 5.58 6.42 5.57 6.42 5.57 6.42 5.58 3.21 5.92 3.21 6.00 3.21 6.00	mm/hr
167 00	1 1 750	9.64 3.250	20.88 4.83	1.61
250 00	1 1 833	27 30 3 417	11 24 4.92	1 61
.333 1.61	1 1.917	27.30 3.417	11.24 5.08	1.61
.417 1.61	2.000	27.30 3.583	11.24 5.17	1.61
.500 1.61	2.083	27.30 3.667	11.24 5.25	1.61
.583 1.61	2.167	27.30 3.750	11.24 5.33	1.61
.667 1.61	2.250	27.30 3.833	6.42 5.42	1.61
.750 1.61	2.333	73.88 3.917	6.42 5.50	1.61
.833 1.61	2.417	73.88 4.000	6.42 5.58	1.61
.917 1.61	2.500	73.88 4.083	6.42 5.67	1.61
1.000 1.61	2.583	73.88 4.167	6.42 5.75	1.61
1.167 1.61	1 2.750	73.88 4.333	3.21 5.92	1.61
1.250 1.61	2.833	20.88 4.417	3.21 6.00	1.61
1.333 9.64	2.917	20.88 4.500	3.21 6.08	1.61
1.417 9.64	3.000	20.88 4.583	3.21 6.17	1.61
1.500 9.64	3.083	20.88 4.667	3.21 6.08 3.21 6.17 3.21 6.25 3.21	1.61
Max.Eff.Inten.(mm/hr) = over (min) Storage Coeff. (min) = Unit Hyd. Tpeak (min) = Unit Hyd. peak (cms) =	73.88	484.93		
over (min)	5.00	5.00		
Storage Coeff. (min)=	3.28 (ii) 4.84 (ii)	
Unit Hyd. Tpeak (min) =	5.00	5.00		
			TOTALS	
PEAK FLOW (cms)=	.47	.00	473 (iiii)	
TIME TO PEAK (hrs) =	2.75	2.75	2.75	
RUNOFF VOLUME (mm) =	79.31	44.54	78.96 80.31	
PEAK FLOW (cms) = TIME TO PEAK (hrs) = RUNOFF VOLUME (mm) = TOTAL RAINFALL (mm) = RUNOFF COEFFICIENT =	80.31	80.31		
RUNOFF COEFFICIENT =	.99	.55	.98	
**** WARNING: STORAGE COEFF.	IS SMALLER	THAN TIME STEP	!	
(i) CN PROCEDURE SELECT	ED FOR PER	VIOUS LOSSES:		

⁽i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. | STANDHYD (0027) | Area (ha) = 2.86 |ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) = Dep. Storage (mm) = 1.74 1.00 5.00 1.00 Average Slope (%)= 1.00 Length (m) = Mannings n = 138.10 .013 .250 Max.Eff.Inten.(mm/hr)= 5.00 15.00 over (min) 3.50 (ii) 14.84 (ii) 5.00 15.00 .26 .08 Storage Coeff. (min)= Unit Hyd. Tpeak (min) = Unit Hyd. peak (cms)= THEAK FLOW (cms) = .36 .12

TIME TO PEAK (hrs) = 2.75 2.83

RUNOFF VOLUME (mm) = 79.31 44.54

TOTAL RAINFALL (mm) = 80.31 80.31

RUNOFF COEFFICIENT = .99 .55 *TOTALS* .476 (iii) 2.75 65.75 .82 **** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. | RESERVOIR (0030) | | TN= 2---> OUT= 1 | | DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW (cms) (ha.m.) | (cms) (ha.m.) .0000 .0000 | .2190 .0960 AREA OPEAK TPEAK R.V. (hrs) (ha) (cms) .48 INFLOW : ID= 2 (0027) 2.86 2.75 65.75 3.08 OUTFLOW: ID= 1 (0030) 2.86 PEAK FLOW REDUCTION [Qout/Qin] (%) = 40.13 TIME SHIFT OF PEAK FLOW (min) = 20.00 MAXIMUM STORAGE USED (ha.m.) = .0838| ADD HYD (0029) | 1 + 2 = 3 AREA OPEAK TPEAK R.V. (cms) (hrs) (mm) 78.96 ID1=1 (0028): 2.31 2.75 + ID2= 2 (0030): 2.86 .191 3.08 65.71 ID = 3 (0029): 5.17 .643 2.75 71.63 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0006) ID= 1 DT= 5.0 min					%)= 61.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	6.59 1.00 1.00 268.30	S PE	ERVIOUS (i) 4.21 5.00 1.00 40.00 .250		
Max.Eff.Inten.(mr over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	n/hr) = (min) (min) = (min) = (cms) =	73.88 5.00 5.21 5.00 .21	(ii)	51.42 20.00 16.55 (ii) 20.00 .06	*TOTALS*	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIEN	(cms) = (hrs) = (mm) = (mm) = VT =	1.35 2.75 79.31 80.31 .99		.43 2.92 44.54 80.31 .55	1.739 (iii) 2.75 65.75 80.31 .82	
(i) CN PROCEDUI CN* = 8: (ii) TIME STEP THAN THE S: (iii) PEAK FLOW I	3.0 Ia (DT) SHOUI FORAGE COE	= Dep. St LD BE SMA EFFICIENT	torage LLER OF	(Above) R EQUAL		
RESERVOIR (0008) IN= 2> OUT= 1 DT= 5.0 min						
INFLOW: ID= 2 ((OUTFLOW: ID= 1 ((0006) 0008)	AREA (ha) 10.80 10.80	QPEAF (cms) 1.74 .71	TPEAK (hrs) 2.75 3.17	R.V. (mm) 65.75 65.74	
IIT XAM	ME SHIFT (OF PEAK F	LOW	out/Qin](%)= (min)= (ha.m.)=	25.00	
CALIB	Area Total Ir	(ha) = 1: np(%) = 7:	5.91 9.00	Dir. Conn.(%) = 79.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = =	12.57 1.00 1.00 325.70 .013		3.34 5.00 1.00 40.00		
Max.Eff.Inten.(mr over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	n/hr) = (min) (min) = (min) = (cms) =	73.88 5.00 5.86 5.00 .20	(ii)	51.42 20.00 17.19 (ii) 20.00 .06	*TOTALS*	

```
PEAK FLOW (cms) = 2.57 .34

TIME TO PEAK (hrs) = 2.75 2.92

RUNOFF VOLUME (mm) = 79.31 44.54

TOTAL RAINFALL (mm) = 80.31 80.31

RUNOFF COEFFICIENT = .99 .55
                                                      2.874 (iii)
                                                              2.75
                                                             72.01
                                                           80.31
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* = 83.0 Ia = Dep. Storage (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| ADD HYD (0009) |
| 1 + 2 = 3 | AREA QPEAK TPEAK R.V. ---- (ha) (cms) (hrs) (mm)
      ----- (ha) (cms) (hrs) (mm)

ID1= 1 (0008): 10.80 .710 3.17 65.74

+ ID2= 2 (0007): 15.91 2.874 2.75 72.01
         ______
         ID = 3 (0009): 26.71 3.481 2.75 69.47
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| ADD HYD (0031) |
| 1 + 2 = 3 | AREA QPEAK TPEAK
                                                        R.V.
        .----- (ha) (cms) (hrs) (mm)
ID1= 1 (0029): 5.17 .643 2.75 71.63
       + ID2= 2 (0009): 26.71 3.481 2.75 69.47
         _____
         ID = 3 (0031): 31.88 4.124 2.75 69.82
     NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| RESERVOIR (0010) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
                         OUTFLOW STORAGE | OUTFLOW
                                                            STORAGE
                         (cms) (ha.m.) | (cms)
                                                             (ha.m.)
                           .0000 .0000 | .2940 1.1158
.0520 .5230 | .3680 1.3234
.1630 .7202 | .4250 1.4787
.2420 .9521 | .4830 1.6325
                          .1630
                                AREA QPEAK TPEAK
                                                              R.V.
                               (ha) (cms) (hrs)
31.88 4.12 2.75
31.88 .48 5.00
                                                              (mm)
     INFLOW : ID= 2 (0031)
                             31.88
                                                              69.82
     OUTFLOW: ID= 1 (0010) 31.88
                   PEAK FLOW REDUCTION [Qout/Qin] (%) = 11.71
                   TIME SHIFT OF PEAK FLOW (min)=135.00
                   MAXIMUM STORAGE USED
                                                 (ha.m.) = 1.6324
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Municipal Servicing Class Environmental Assessment Master Plan
VAUGHAN METROPOLITAN CENTRE · CITY OF VAUGHAN
NOV 2012

Appendix D6

South-West SWM Pond Calculations

Vaughan Metropolitan Centre

City of Vaughan

SW Corner of Jane St. and Hwy 7

Project #: 08104

Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient = 0.25

Runoff reduction =

10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

mm

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

An average runoff coefficient of 0.50 is used for the land indicated as major parks and open spaces

Area & Imperviousness for Permanent Pool Calculation (based on 5-year Runoff Coefficient)

SW Corner of Jane St. and Hwy 7

		Area (ha)	O	AC
Mized Use	Building	5.34	0.59	3.13
(Residential)	Paved Area	1.78	0.90	1.60
	Landscape	1.89	0.04	0.08
Mized Use	Building	5.34	0.59	3.13
(Commercial)	Paved Area	1.78	0.90	1.60
	Landscape	1.89	0.04	0.08
Residential	Building	8.09	0.59	4.74
	Paved Area	2.70	0.90	2.43
	Landscape	2.87	0.04	0.12
Commercial	Building	1.78	0.59	1.05
	Paved Area	0.59	0.90	0.54
	Landscape	0.63	0.04	0.03
	Open Space / Parkland	8.14	0.50	4.07
	Open Channel	3.95	0.55	2.17
	SWM Pond Block	5.49	0.55	3.02
	Road	21.34	0.90	19.21
	Total	73.62		46.99

Weighted "C" = 0.64
Weighted Imperviousness = 0.63

<u>Vaughan Metropolitan Centre</u> <u>City of Vaughan</u>

Project #: 08104

Date: April 2012

SWM Pond Permanent Pool/Extended Detention Volume

SW Corner of Jane St. and Hwy 7

Table A.1 – MOE Water Quality Storage Requirements (SWMP 2003)*

		Storage Volume (m³/ha) for Impervious Level				
Protection Level	SWMP Type	35%	55%	70%	85%	
Enhanced	Infiltration	25	30	35	40	
80% long-term S.S. removal	Wetlands	80	105	120	140	
S.S. Tellioval	Hybrid Wet Pond/Wetland	110	150	175	195	
	Wet Pond	140	190	225	250	
Normal	Infiltration	20	20	25	30	
70% long-term S.S. removal	Wetlands	60	70	80	90	
5.5. 10110	Hybrid Wet Pond/Wetland	75	90	105	120	
	Wet Pond	90	110	130	150	
Basic	Infiltration	20	20	20	20	
60% long-term S.S. removal	Wetlands	60	60	60	60	
S.S. Telloval	Hybrid Wet Pond/Wetland	60	70	75	80	
	Wet Pond	60	75	85	95	
	Dry Pond (Continuous Flow)	90	150	200	240	

^{*} Values in table for Wet Ponds and Wetlands include 40m³/ha of extended detention storage.

SWM Facility Type = Wet Pond Level of Protection = 1

Drainage Area = 73.62 ha Area-Weighted Imperviousness = 63%

Water Quality Requirement = 208.70 m³/ha

Permanent Pool Unit Volume Requirement = 168.70 m³/ha **Total Permanent Pool Storage Volume Required = 12,420** m³

Extended Detention Unit Volume Requirement = 40 m³/ha

Total Extended Detention Volume Required = 2,945 m³ (compare with Erosion Volume required)

2011-12-Revised On-Site Controls at 80% - SW Pond

Erosion Control Volume and Release Rate SW Corner of Jane St. and Hwy 7

SWM Pond

Input:

Area = 73.62 (ha)

R.V = 18.263 (mm)

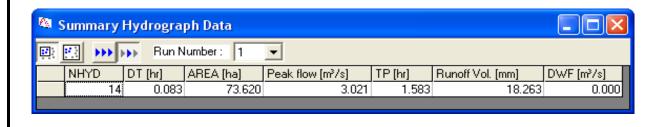
Draw Down Time = 48 (hrs)

Calculations:

Storage = $13,445 \text{ (m}^3)$

Average Outflow = $0.078 \text{ (m}^3/\text{s)}$

Peak Outflow = 0.117 (m³/s) - Estimated at 1.5 times Average Outflow



Vaughan Metropolitan Centre

City of Vaughan

SW Corner of Jane St. and Hwy 7

Project #: 08104

Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient =

Runoff reduction =

0.25 10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

 $\mathbf{m}\mathbf{m}$

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

An average runoff coefficient of 0.50 is used for the land indicated as major parks and open spaces

Area & Imperviousness for Permanent Pool Calculation (based on 100-year Runoff Coefficient)

SW Corner of Jane St. and Hwy 7

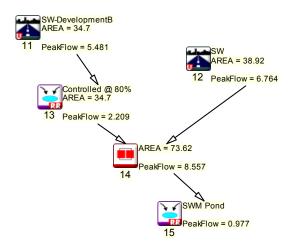
		Area (ha)	С	AC
Mized Use	Building	5.34	0.71	3.81
(Residential)	Paved Area	1.78	0.90	1.60
	Landscape	1.89	0.13	0.24
Mized Use	Building	5.34	0.71	3.81
(Commercial)	Paved Area	1.78	0.90	1.60
	Landscape	1.89	0.13	0.24
Residential	Building	8.09	0.71	5.77
	Paved Area	2.70	0.90	2.43
	Landscape	2.87	0.13	0.36
Commercial	Building	1.78	0.71	1.27
	Paved Area	0.59	0.90	0.54
	Landscape	0.63	0.13	0.08
	Total	34.70		21.75

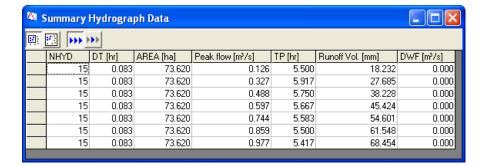
	Area (ha)	C	AC
Open Space / Parkland	8.14	0.50	4.07
Open Channel	3.95	0.55	2.17
SWM Pond Block	5.49	0.55	3.02
Road	21.34	0.90	19.21
Total	38.92		28.47

Weighted "C" = 0.63
Weighted Imperviousness = 0.61

Weighted "C" = 0.73
Weighted Imperviousness = 0.76

South West POND





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______
     V V I SSSSS U U A L
        7.7
                SS U U A A
      V V I
                SS U U AAAAA L
      VV I
                 SS U U A A L
                SSSSS UUUUU A A LLLLL
      OOO TTTTT TTTTT H H Y Y M M OOO TM, Version 2.0
     O O T T H H Y Y MM MM O O
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                  T H H Y M M O O
                                              Licensed To: TMIG
                  T H H Y M M OOO
                                                         vo2-0145
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               ***** DETAILED OUTPUT *****
 Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
 Output filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final submission\100-
YE~1\On-Site Control to 80% Imperv.out
 Summary filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final submission\100-
YE~1\On-Site Control to 80% Imperv.sum
DATE: 4/10/2012
                                   TIME: 11:55:54 AM
USER:
COMMENTS:
 ** SIMULATION NUMBER: 1 **
   READ STORM |
                   Filename: G:\Projects\2008\
                           08104 - Vaughan Corporate Centre - Master Ser
                            \Design\SWM\VO2 model\STORM\25MM4HR.STM
| Ptotal= 25.00 mm |
                   Comments: Twenty-Five mm Four Hour Chicago Storm
             TIME
                   RAIN | TIME
                                RAIN | TIME RAIN | TIME
                                                           RATN
              hrs
                   mm/hr |
                          hrs
                                mm/hr
                                        hrs
                                             mm/hr |
                                                     hrs
                                                           mm/hr
                    2.07 | 1.17
                                 5.70 |
                                       2.17
                                              5.19 | 3.17
                    2.27 | 1.33
                                10.78 I
                                              4.47 | 3.33
                                                           2 62
               .33
                                       2.33
                    2.52 | 1.50
                                50.21 |
                                       2.50
                                              3.95 | 3.50
              .67
                    2.88 | 1.67
                                13.37 | 2.67
                                              3.56 | 3.67
                                                           2.35
               . 83
                    3.38 | 1.83
                                8.29 | 2.83
                                             3.25 | 3.83
                                                           2.23
                    4.18 | 2.00
                                 6.30 | 3.00
                                              3.01 | 4.00
| CALIB
| STANDHYD (0011) |
                  Area (ha) = 34.70
|ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
```

Surface Area Dep. Storage Average Slope Length	(ha) = (mm) = (%) =	21.17 1.00 1.00	PERV 13 5 1 40	10US (1) .53 .00			
Length Mannings n	=	.013		250			
NOTE: RAINE	ALL WAS T	RANSFORMED	TO 5.	0 MIN. T	IME STE	٠.	
		TRANS	SFORMED :	HYETOGRAI	РН		
TIME hrs .083 .167	RAIN mm/hr 2.07 2.07	TIME hrs r 1.083 1.167	RAIN nm/hr 5.70 5.70	TIME hrs r 2.083 2.167	RAIN nm/hr 5.19 5.19	TIME hrs 3.08 3.17	RAIN mm/hr 2.80 2.80
.250 .333 .417 .500	2.27 2.27 2.52 2.52	1.250 1.333 1.417 1.500	10.78 1 10.78 1 50.21 1	2.250 2.333 2.417 2.500	4.47 4.47 3.95 3.95	3.25 3.33 3.42 3.50	2.62 2.62 2.48 2.48
.583 .667 .750 .833 .917	2.88 2.88 3.38 3.38 4.17	hrs 1.083 1.167 1.250 1.333 1.417 1.583 1.583 1.667 1.750 1.833 1.917 2.000	13.37 13.37 18.29 18.29 16.30 1	2.583 2.667 2.750 2.833 2.917	3.56 3.56 3.25 3.25 3.01	3.58 3.67 3.75 3.83 3.92	2.35 2.35 2.23 2.23 2.14
1.000	4.18	2.000	6.29	3.000	3.01	4.00	2.14
Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr) = (min) (min) = (min) = (cms) =	50.21 10.00 8.64 (: 10.00 .12	40 40 ii) 37 40	.90 .00 .66 (ii) .00			
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE				.09 .25 .55 .00		955 (iii .58 .80 .00)
(i) CN PROCEDU CN* = 8 (ii) TIME STEP THAN THE S (iii) PEAK FLOW	3.0 Ia (DT) SHOU: TORAGE CO	= Dep. Sto LD BE SMALI EFFICIENT.	orage (. LER OR E	Above) QUAL			
RESERVOIR (0013) IN= 2> OUT= 1							
DT= 5.0 min	OUTFL (cms	OW STORA) (ha.r	AGE m.) DOO	OUTFLOW (cms) 2.5120	STOR (ha. 1.1	RAGE .m.) L572	
INFLOW : ID= 2 (OUTFLOW: ID= 1 (AREA (ha) 34.70 34.70	QPEAK (cms) 1.95 .54	1.58	16	R.V. (mm) 5.80 5.80	
TI MA	ME SHIFT (XIMUM ST	REDUCTION REDUCTION PEAK FLOORAGE USI	DW ED	(min)= (ha.m.)=	= 30.00 = .2469		
CALIB							

Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC			21 00 94 (ii) 00 12	4.90 40.00 37.97	(ii)	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC	(cms) = (hrs) = (mm) =	2.		.03	•	*TOTALS*
	(mm) = IENT =	1. 24. 25.	68 58 00 00 96	.06 2.25 5.55 25.00		2.690 (iii) 1.58 19.57 25.00
(i) CN PROCE CN* = (ii) TIME STE THAN THE (iii) PEAK FLO	83.0 P (DT) SH STORAGE	Ia = Dep OULD BE COEFFICI	Storag SMALLER ENT.	e (Abo OR EQUA	ve) L	
ADD HYD (0014)	-					
1 + 2 = 3	<u>i</u>	AREA	QPEAK	TPEAK	R.V	
ID1= 1 (0) + ID2= 2 (0)	013): 012):	34.70 38.92	.536	2.08	16.80 19.57	1
ID = 3 (0						
NOTE: PEAK FL	OWS DO NO	T INCLUE	E BASEFL	OWS IF	ANY.	
RESERVOIR (0015) IN= 2> OUT= 1 DT= 5.0 min		FLOW ms) 0000	STORAGE (ha.m.) .0000	OU (TFLOW cms) .5970	STORAGE (ha.m.) 2.5409 3.0229 3.3869 3.7482
	•	3290 4890	1.6185	į	.8600 .9770	3.3869 3.7482
INFLOW: ID= 2 OUTFLOW: ID= 1	(0014)	AREA (ha) 73.62	QPE (cm	AK s) 02	TPEAK (hrs) 1.58 5.50	
,	PEAK FL TIME SHIF MAXIMUM	T OF PEA	K FLOW		(min) = 23	5.00
**************************************	******* BER: 2	**				

READ STORM 		08104 - Vaug	ghan Corpora		e - Master Ser nd 12 hour AES
TIME	.00 .72 .72 .72 .72 .72 .4.32 4.32	hrs mm/hr 2.00 12.24 2.25 12.24 2.50 33.12 2.75 33.12 3.00 9.36 3.25 9.36 3.50 5.04	hrs r 3.75 4.00 4.25 4.50 4.75 5.00 5.25	nm/hr 5.04 5	5.50 .72 5.75 .72 5.00 .72 5.25 .72
CALIB STANDHYD (0011) ID= 1 DT= 5.0 min	Area (h. Total Imp(a) = 34.70 %) = 61.00	Dir. Conn.	(%)= 61.0	00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = 4	1.00	ERVIOUS (i) 13.53 5.00 1.00 40.00 .250		
NOTE: RAINFA	LL WAS TRAN	SFORMED TO	5.0 MIN. T	IME STEP.	
hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 1.167 1.250 1.333 1.417 1.500 1.583	RAIN mm/hr	TRANSFORMITIME RAIN hrs mm/hr .6667 4.32 .750 4.32 .833 12.24 .917 12.24 .083 12.24 .083 12.24 .167 12.24 .333 33.12 .417 33.12 .500 33.12 .583 33.12 .667 33.12 .833 9.36 .917 9.36 .083 9.36 .083 9.36	TIME hrs r 3.250 3.333 3.417 3.500 3.583 3.667 3.750 3.833 3.917 4.083 4.167 4.250 4.333 4.417 4.500 4.583 4.667 4.750	DATM I D	RIME RAIN hrs mm/hr 1.83 .72 4.92 .72 5.00 .72 5.08 .72 6.25 .72 6.25 .72 6.33 .72 6.42 .72 6.58 .72 6.58 .72 6.75 .72 6.75 .72 6.83 .72 6.92 .72 6.00 .72 6.08 .72 6.08 .72 6.08 .72
Max.Eff.Inten.(mm over (Storage Coeff. (Unit Hyd. Tpeak (Unit Hyd. peak (/hr) = min) min) = min) = cms) =	33.12 10.00 10.20 (ii) 10.00	13.05 30.00 29.82 (ii) 30.00 .04	*TOTALS	5* 7 (iii) 5

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. | RESERVOIR (0013) | | IN= 2---> OUT= 1 | | DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW (cms) (ha.m.) | (cms) .0000 .0000 2.5120 AREA OPEAK TPEAK R.V. (ha) (cms) (hrs) INFLOW : ID= 2 (0011) 34.70 2.01 2.75 25.86 OUTFLOW: ID= 1 (0013) 34.70 3.33 PEAK FLOW REDUCTION [Qout/Qin] (%) = 42.07 TIME SHIFT OF PEAK FLOW (min) = 35.00MAXIMUM STORAGE USED (ha.m.) = .3895I CALTB | STANDHYD (0012) | Area (ha) = 38.92 |ID= 1 DT= 5.0 min | Total Imp(%)= 76.00 Dir. Conn.(%)= 76.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =29.58 9.34 Dep. Storage (mm)= 1.00 5.00 Average Slope (%)= 1.00 1.00 Length (m) = Mannings n = 509.40 40.00 .013 Mannings n .250 33.12 Max.Eff.Inten.(mm/hr)= 13.05 over (min) 10.00 35.00 Storage Coeff. (min)= 10.56 (ii) 30.18 (ii) Unit Hyd. Tpeak (min) = Unit Hyd. peak (cms)= 2.58 .18 2.75 3.25 35.00 11.57 36.00 36.00 .32 *TOTALS* 2.669 (iii) TIME TO PEAK (hrs)= 2.75 RUNOFF VOLUME (mm) = 29.38 TOTAL RAINFALL (mm) = 36.00 .97 RUNOFF COEFFICIENT = .82 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 83.0$ Ia = Dep. Storage (Above) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. | ADD HYD (0014) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. .---- (ha) (cms) (hrs) (mm) ID1= 1 (0013): 34.70 .844 3.33 25.86 + ID2= 2 (0012): 38.92 2.669 2.75 29.38 _____ ID = 3 (0014): 73.62 3.296 2.75 27.72

NOTE: PEAK FLOW	B DO NOT INCLU	JDE BASEFLOWS	S IF ANY.		
RESERVOIR (0015)					
IN= 2> OUT= 1					
DT= 5.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE	
	.0000	.0000	.5970	2.5409	
	.1260	1.1416	.7450	3.0229	
	.3290	1.6185	.8600	3.3869	
	ARE	A QPEAK (cms) 52 3.30	TPEAK	R.V.	
INFLOW : ID= 2 ((hā 1014) 73 6	i) (cms)	(hrs)	(mm) 27.72	
INFLOW: ID= 2 () OUTFLOW: ID= 1 ()	0014) 73.6	52 .33	5.92	27.72	
	AK FLOW RE				
MA:	ME SHIFT OF PE KIMUM STORAGE	AK FLOW USED	(ha.m.)	= 1.6135	

** SIMULATION NUMBER					

READ STORM	Filename: 0	:\Projects\2	2008\		
i				ate Centre -	Master Sei
	,		702 model\	STORM\6 and 1	2 hour AES
Ptotal= 47.81 mm	Comments: 5	yr/6hr			
TIME	RAIN TI	ME RAIN	TIME	RAIN TIME	RAIN
hrs	/1 1 1	/1		/1 1 1	/1
.25	.00 2.	00 16.25	3.75	6.69 5.50	.96
. 75	.96 2.	50 43.98	4.00	3.82 5.73	.96
1.00	mm/hr r .00 296 296 296 296 35.74 3.	75 43.98	4.50	1.91 6.25	.96
1.25	.96 3.	00 12.43	4.75	1.91	
1.50	5.74 3. 5.74 3.	25 12.43	5.00	.96	
1./5	5./4 3.	50 6.69	5.25	.96	
CALIB					
STANDHYD (0011)	Area (ha)	= 34.70			
STANDHYD (0011) D= 1 DT= 5.0 min	Total Imp(%)	= 61.00 I	Dir. Conn.	(%) = 61.00	
Surface Area	(ha) = 21	17 PEF	(V1005 (1) 13 53		
Dep. Storage	(mm) = 1	.00	5.00		
Average Slope	(%) = 1	.00	1.00		
Surface Area Dep. Storage Average Slope Length	(m) = 481	.00 4	10.00		
Mannings n	= .	013	.250		
NOTE: RAINF	ALL WAS TRANSE	FORMED TO 5	5.0 MIN. T	IME STEP.	
		- TRANSFORMEI) HYETOGRA	PH	
TIME	RAIN TI				RAIN
hrs	mm/hr h	rs mm/hr	hrs	mm/hr hrs	mm/hr
.083	.00 1.6 .00 1.7 .00 1.8	5.74	3.250	12.43 4.83	.96
.167	.00 1.7	5.74	3.333	6.69 4.92	.96
.250	.00 1.8	10.25	3.41/	0.00 5.00	.96

.5 .6 .5 .6 .7 .6 .1 .0 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1	333 .96 117 .96 500 .96 883 .96 667 .96 750 .96 117 .96 117 .96 100 .96 167 .96 1683 .96 17 .96 183 .96 117 .96 117 .96 117 .96 117 .96 117 .96 117 .96 117 .96 117 .96 117 .96 118 .96 118 .96 119 .96 119 .96 119 .96 110	1.917 2.000 2.083 2.167 2.250 2.333 2.417 2.500 2.583 2.667 2.750 2.833 2.917 3.000 3.083 3.167	16.25 16.25 16.25 16.25 16.25 43.98 43.98 43.98 43.98 43.98 12.43 12.43 12.43 12.43	3.500 3.583 3.667 3.750 3.833 3.917 4.000 4.083 4.167 4.250 4.333 4.417 4.500 4.583 4.750	6.69 6.69 6.69 3.82 3.82 3.82 3.82 1.91 1.91 1.91 1.91	5.08 5.17 5.25 5.33 5.42 5.50 5.58 5.67 5.75 5.83 5.92 6.00 6.08 6.17 6.25	. 96 . 96 . 96 . 96 . 96 . 96 . 96 . 96
Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peal PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALI RUNOFF COEFFIC (i) CN PROCE CN* = (ii) TIME STF	(mm/hr) = r (min) (min) = ak (min) = (cms) = (cms) = (hrs) = (hrs) = (mm) = L (mm) = EIENT = EDURE SELECTI 83.0 Ia	43.98 10.00 9.11 10.00 .12 2.50 2.75 46.81 47.81 .98 ED FOR PE = Dep. S LD BE SMF	(ii) ERVIOUS Storage ALLER OF	21.81 30.00 25.08 (ii) 30.00 .04 .48 3.08 19.33 47.81 .40 LOSSES: (Above)	*TO: 2. 2. 36 41	FALS* 804 (iii) 2.75 5.09 7.81 .75	
(iii) PEAK FLO	DW DOES NOT :			V IF ANY.			
RESERVOIR (0013) IN= 2> OUT= 1 DT= 5.0 min	OUTFLO			OUTFLOW (cms) 2.5120			
INFLOW : ID= 2 OUTFLOW: ID= 1	2 (0011) 1 (0013) PEAK FLOW						
	TIME SHIFT (DF PEAK E	PLOW JSED	(min) (ha.m.)	35.00	19	
CALIB STANDHYD (0012) ID= 1 DT= 5.0 min	Area	(ha) = 3 mp(%) = 7	38.92 76.00	Dir. Conn.	. (%) =	76.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	29.58 1.00 1.00 509.40	JS PE	9.34 5.00 1.00 40.00			
Max.Eff.Inten	. (mm/hr)=	43.98		21.81			

RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIEN	cms) = nrs) = (mm) = 4 (mm) = 4	3.48 2.75 46.81 47.81 .98	.33 3.08 19.33 47.81 .40	**	TOTALS* 3.688 (iii) 2.75 40.21 47.81 .84
(i) CN PROCEDURING CN* = 83 (ii) TIME STEP (I THAN THE STC (iii) PEAK FLOW DO	.0 Ia = I DT) SHOULD E DRAGE COEFFI	Dep. Storage BE SMALLER C CCIENT.	(Above R EQUAL)	
ADD HYD (0014) 1 + 2 = 3 ID1= 1 (0013) + ID2= 2 (0012)): 34.70): 38.92	QPEAK (cms) 1.181 3.688	3.33	36.09 40.21	
ID = 3 (0014)					
RESERVOIR (0015) IN= 2> OUT= 1 DT= 5.0 min	OUTFLOW (cms) .0000 .1260 .3290 .4890	STORAGE (ha.m.) .0000 1.1416 1.6185 2.1619	OUTF (cm .5 .7 .8	LOW S s) 970 450 600 770	STORAGE (ha.m.) 2.5409 3.0229 3.3869 3.7482
TIM		REA QPEA 1a) (cms 62 4.5 62 .4 REDUCTION [Q	K TP) (h 7 2 9 5 out/Qin]	EAK rs) .75 .75 (%)= 10 in)=180	R.V. (mm) 38.27 38.23
**************************************	: 4 **				
READ STORM		\Design\SWM	\2008\ ghan Cor I\VO2 mod		Centre - Master Ser M\6 and 12 hour AES
TIME					N TIME RAIN r hrs mm/hr

.00 | 2.00

18.94 | 3.75

1.11 | 2.25 18.94 | 4.00

7.80 | 5.50

4.46 | 5.75

1.11

```
1.11 | 2.50 51.24 | 4.25 4.46 | 6.00 1.11
                       1.11 | 2.75
                                     51.24 | 4.50
                                                    2.23 | 6.25
               1.25
                       1.11 | 3.00
                                     14.48 | 4.75
                                                   2.23
               1.50
                       6.68 | 3.25 14.48 | 5.00
                                                   1.11
                      6.68 | 3.50
                                     7.80 | 5.25
| STANDHYD (0011) |
                     Area
                           (ha) = 34.70
|ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
                            IMPERVIOUS
                                         PERVIOUS (i)
    Surface Area
                    (ha)=
                               21.17
                                          13.53
                    (mm) =
                               1.00
                                            5.00
    Dep. Storage
                     (%)=
    Average Slope
                              481.00
                                           40.00
    Length
                     (m) =
    Mannings n
                               .013
        NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                             ---- TRANSFORMED HYETOGRAPH ----
               TIME
                      RAIN | TIME RAIN | TIME RAIN | TIME
                                                                    RAIN
                      mm/hr |
                               hrs
                                     mm/hr |
                                              hrs
                                                    mm/hr |
                       .00 | 1.667
               .083
                                     6.68 | 3.250
                                                    14.48 | 4.83
                                                                    1.11
                                      6.68 | 3.333
               .167
                        .00 | 1.750
                                                     7.80 | 4.92
                        .00 | 1.833
                                     18.94 | 3.417
                                                     7.80 |
               .333
                       1.11 | 1.917
                                     18.94 | 3.500
                                                     7.80 | 5.08
                                                                    1.11
                .417
                       1.11 | 2.000
                                     18.94 | 3.583
                                                     7.80 | 5.17
                                                                    1.11
               .500
                       1.11 | 2.083
                                     18.94 | 3.667
                                                     7.80 | 5.25
               .583
                       1.11 | 2.167
                                     18.94 | 3.750
                                                     7.80 | 5.33
                                                                    1.11
               .667
                       1.11 | 2.250
                                     18.94 | 3.833
                                                     4.46 | 5.42
                                                                    1.11
               .750
                       1.11 | 2.333
                                     51.24 | 3.917
                                                     4.46
               .833
                       1.11 | 2.417
                                     51.24 | 4.000
                                                     4.46 | 5.58
               .917
                       1.11 | 2.500
                                     51.24 | 4.083
                                                     4.46 | 5.67
                                                                    1.11
               1.000
                       1.11 | 2.583
                                     51.24 | 4.167
                                                     4.46
                                                            5.75
               1.083
                       1.11 | 2.667
                                     51.24 | 4.250
                                                     4.46 | 5.83
                                     51.24 | 4.333
                                                     2.23 | 5.92
               1.167
                       1.11 | 2.750
                                                                    1.11
                       1.11 | 2.833
                                     14.48 | 4.417
                                                     2.23 |
                       6.68 | 2.917
               1.333
                                     14.48 | 4.500
                                                     2.23 | 6.08
                                                                    1.11
                       6.68 | 3.000
                                     14.48 | 4.583
                                                     2.23 | 6.17
               1.417
                       6.68 | 3.083
                                     14.48 | 4.667
                                                     2.23 |
               1.583
                       6.68 | 3.167
                                     14.48 | 4.750
                                                     2.23 |
    Max.Eff.Inten.(mm/hr)=
                               51.24
                                           29.52
                              10.00
                                           25.00
               over (min)
    Storage Coeff. (min)=
                               8.57 (ii) 22.72 (ii)
    Unit Hyd. Tpeak (min) =
                               10.00
    Unit Hyd. peak (cms)=
                              .12
                                           .05
                                                       *TOTALS*
     PEAK FLOW
                               2.93
                                                        3.434 (iii)
     TIME TO PEAK
                   (hrs)=
                               2.75
                                           3.00
                                                         2.75
    RINOFF VOLUME
                               54.69
                                           25.02
                    (mm) =
                                                         43.12
     TOTAL RAINFALL
                    (mm) =
                               55.69
                                           55.69
                                                         55.69
    RUNOFF COEFFICIENT =
                                            .45
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 83.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

RESERVOIR (0013) IN= 2> OUT= 1 DT= 5.0 min	.1260 1.1416 .7450 3.0229 .3290 1.6185 .8600 3.3869 .4890 2.1619 .9770 3.7482 AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0014) 73.62 5.49 2.75 45.47 OUTFLOW: ID= 1 (0015) 73.62 .60 5.67 45.42 PEAK FLOW REDUCTION [Qout/Qin] (%) = 10.86 TIME SHIFT OF PEAK FLOW (min)=175.00 MAXIMUM STORAGE USED (ha.m.) = 2.5393
CALIB	** SIMULATION NUMBER: 5 ** *********************************
IMPERVIOUS PERVIOUS (i) Surface Area (ha)= 29.58 9.34 Dep. Storage (mm)= 1.00 5.00 Average Slope (%)= 1.00 1.00	READ STORM Filename: G:\Projects\2008\ 08104 - Vaughan Corporate Centre - Master Ser Design\SWM\VO2 model\STORM\6 and 12 hour AES Ptotal= 65.59 mm Comments: 25yr/6hr
Length (m) = 509.40	TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN hrs mm/hr hrs mm
PEAK FLOW (cms)= 4.08 .46 4.425 (iii) TIME TO PEAK (hrs)= 2.75 3.00 2.75 RUNOFF VOLUME (mm)= 54.69 25.02 47.57 TOTAL RAINFALL (mm)= 55.69 55.69 RUNOFF COEFFICIENT = .98 .45 .85	CALIB
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0	IMPERVIOUS PERVIOUS (i)
ADD HYD (0014)	NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
1 + 2 = 3	TRANSFORMED HYETOGRAPH TIME RAIN TIME RAIN TIME RAIN TIME RAIN hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr .083
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.	. 250
IN= 2> OUT= 1 DT= 5.0 min	.750 1.31 2.333 60.35 3.917 5.25 5.50 1.31 .833 1.31 2.417 60.35 4.000 5.25 5.58 1.31 .917 1.31 2.500 60.35 4.083 5.25 5.67 1.31 1.000 1.31 2.583 60.35 4.167 5.25 5.75 1.31

					5.25 5. 2.62 5. 2.62 6. 2.62 6. 2.62 6. 2.62 6. 2.62 6.	83 1.31 92 1.31 00 1.31 08 1.31 17 1.31 25 1.31
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	60.35 10.00 8.02 10.00 .13	(ii) 2 2	38.12 25.00 20.80 (ii) 25.00	*TOTALS*	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICE	(cms) = (hrs) = (mm) = (mm) = ENT =	3.47 2.75 64.59 65.59 .98	3	.90 3.00 32.60 55.59	4.181 2.75 52.11 65.59	(iii)
(i) CN PROCED CN* = (ii) TIME STEP THAN THE (iii) PEAK FLOW	83.0 Ia (DT) SHOU STORAGE CO	e Dep. S ILD BE SMA DEFFICIENT	torage LLER OR	(Above) EQUAL		
RESERVOIR (0013)						
IN= 2> OUT= 1 DT= 5.0 min	OUTFI	OW STO	RAGE	OUTFLOW	STORAGE	
	.00		0000	2.5120	1.1572	
INFLOW : ID= 2 OUTFLOW: ID= 1	(0011) (0013)	AREA (ha) 34.70 34.70	QPEAK (cms) 4.18 1.74	TPEAK (hrs) 2.75 3.25	R.V. (mm) 52.11 52.11	
P. T M.	EAK FLOW IME SHIFT AXIMUM ST	REDUCT OF PEAK F ORAGE U	ION [Qou LOW SED	nt/Qin](%): (min): (ha.m.):	= 41.53 = 30.00 = .8010	
CALIB STANDHYD (0012) ID= 1 DT= 5.0 min	Area Total I				(%) = 76.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	IMPERVIOU 29.58 1.00 1.00 509.40 .013	S PEF	9.34 5.00 1.00 40.00 .250		
Max.Eff.Inten.(mm/hr) = (min)	60.35 10.00	3	38.12 25.00		
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(min) = (min) = (cms) =	8.30 10.00	(ii) 2	21.08 (ii) 25.00		
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL	(cms) = (hrs) = (mm) =	4.83 2.75 64.59	3	.62 3.00 32.60	5.321 2.75 56.91	(111)
TOTAL RAINFALL	(mm) =	65.59	6	55.59	65.59	

```
RUNOFF COEFFICIENT = .98 .50
                                                  .87
     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* = 83.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| ADD HYD (0014) |
| 1 + 2 = 3 | AREA QPEAK TPEAK
                       (ha) (cms) (hrs)
                                             (mm)
      ID1= 1 (0013): 34.70 1.737 3.25 52.11
+ ID2= 2 (0012): 38.92 5.321 2.75 56.91
       _____
       ID = 3 (0014): 73.62 6.617 2.75 54.65
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| RESERVOIR (0015) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
                    OUTFLOW STORAGE | OUTFLOW
                                                STORAGE
______
                     (cms)
                            (ha.m.) | (cms)
                                                (ha.m.)
                                        .5970
                      .0000
                              .0000
                                                 2.5409
                                       .7450
                     .1260
                             1.1416
                                                3.0229
                      .3290
                            1.6185 | .8600
2.1619 | .9770
                                                 3.3869
                      .4890
                                                 3.7482
                         AREA QPEAK TPEAK
                                                 R.V.
                         (ha)
                               (cms) (hrs)
6.62 2.75
    INFLOW : ID= 2 (0014)
                         73.62
                                                 54.65
    OUTFLOW: ID= 1 (0015)
                       73.62
                                       5.58
               PEAK FLOW REDUCTION [Qout/Qin](%)= 11.25
               TIME SHIFT OF PEAK FLOW (min)=170.00
               MAXIMUM STORAGE USED
                                       (ha.m.) = 3.0208
 ********
 ** SIMULATION NUMBER: 6 **
| READ STORM | Filename: G:\Projects\2008\
    08104 - Vaughan Corporate Centre - Master Ser
                           \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 73.00 mm | Comments: 50yr/6hr
           TIME RAIN | TIME RAIN | TIME RAIN | TIME
                                                          RATN
                  mm/hr | hrs
                                mm/hr |
                                       hrs mm/hr |
                                                    hrs
                                                          mm/hr
                    .00 | 2.00
                                24.82 | 3.75 10.22 | 5.50
                                                          1.46
                                1.46 | 2.25
                                                          1.46
              .75
                    1.46 | 2.50
                                67.16 | 4.25
                                            2.92 | 6.25 1.46
             1.00
                    1.46 | 2.75
                                67.16 | 4.50
                  1.46 | 3.00 18.98 | 4.75 2.92 |
             1.25
                    8.76 | 3.25
                                18.98 | 5.00
                                             1.46 |
             1.75 8.76 | 3.50 10.22 | 5.25 1.46 |
```

R.V.

(mm) 58.94

TPEAK

(hrs) 2.75

(cms) 4.86

(ha) 34.70

INFLOW : ID= 2 (0011)

ANDHYD (0011) 1 DT= 5.0 min	Area Total :	. = (na) . = (%) qm]	51.00	Dir. Conn	. (%)=	61.00	
	_	-					
Surface Area Dep. Storage Average Slope Length		IMPERVIO	JS PI	ERVIOUS (i)		
Surface Area	(ha)=	21.17		13.53			
Dep. Storage	(10111) =	1.00		1 00			
Tonath	(v) =	181 00		1.00			
Mannings n	(111) =	.013		.250			
namings n		.015		.230			
NOTE: RAII	NFALL WAS	TRANSFORM	ED TO	5.0 MIN.	TIME ST	TEP.	
TTT	ME RAIN			D HYETOGR			RATN
h:	co mm/hm	l hro	mm/hx	l hen	mm/hx	l hwo	mm/hx
. 0.1	33 .00	1 1.667	8.76	1 3.250	18.98	1 4.83	1.46
.10	57 .00	1.750	8.76	1 3.333	10.22	1 4.92	1.46
.2!	50 .00	1.833	24.82	1 3.417	10.22	1 5.00	1.46
.3:	33 1.46	1.917	24.82	3.500	10.22	5.08	1.46
.4:	1.46	2.000	24.82	3.583	10.22	5.17	1.46
.50	33 .00 57 .00 50 .00 33 1.46 17 1.46 10 1.46	2.083	24.82	3.667	10.22	5.25	1.46
.58	00 1.46 57 1.46 50 1.46 50 1.46 50 1.46 70	2.167	24.82	3.750	10.22	5.33	1.46
.6	57 1.46	2.250	24.82	3.833	5.84	5.42	1.46
.7	1.46	2.333	67.16	3.917	5.84	5.50	1.46
.83	33 1.46	2.417	67.16	4.000	5.84	5.58	1.46
.9:	1.46	2.500	67.16	4.083	5.84	1 5.67	1.46
1.00	1.46	2.583	67.16	1 4.16/	5.84	5./5	1.46
1.00	53 1.46	1 2.007	67 16	1 4.230	2 02	1 5 02	1.46
1 2	50 1.40	1 2 933	18 08	1 4.333	2 92	1 6 00	1 46
1.2.	20 1.40	1 2 017	10.30	1 4.417	2.32	1 6 00	1 46
1.3.	17 8 76	1 3 000	10.30	1 4.500	2 92	1 6 17	1 46
1 50	10 8 76	1 3 083	18 98	1 4 667	2 92	1 6 25	1 46
1.5	33 8.76	3.167	18.98	1 4.750	2.92	1 0.23	1.10
66	, ,						
Max.Eff.Inten. ove: Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(mm/hr)=	6/.16		44.75			
Ctorage Cooff	(min) =	7 60	(33)	10 67 /33	\		
Unit Hud Theal	(min) =	10.00	(11)	19.07 (11)		
Unit Hyd. iped	(cms)=	10.00		0.00			
onic nya. peak	(CIIIS)	.15		.00	*T(TALS*	
PEAK FLOW	(cms) =	3.87		1.13		1.862 (iii	L)
TIME TO PEAK	(hrs) =	3.87 2.75		2.92		2.75	
RUNOFF VOLUME	(mm) =	72.00		38.53		8.94	
TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC:	(mm) =	73.00		73.00		73.00	
RUNOFF COEFFIC:	ENT =	.99		1.13 2.92 38.53 73.00 .53		.81	
(i) CN PROCE							
	83.0 Ia						
(ii) TIME STE	STORAGE CO			K EQUAL			
(iii) PEAK FLO				TE ANV			
(TII) FEAR FLOI	* POES MOT	TIMCTONE I	JASEF LUV	v ir ANI.			
	 -						
SERVOIR (0013)							
= 2> OUT= 1	l						
= 5.0 min	OUTFI	LOW STO (ha)	JRAGE	OUTFLC	W 51	CORAGE	

	1 (0013)	34.70	1	.99	3.25	58.94	
		LOW REDU FT OF PEAK STORAGE					
CALIB STANDHYD (0012) ID= 1 DT= 5.0 min	Area Tota	(ha)= l Imp(%)=	38.92 76.00	Dir. C	onn.(%):	= 76.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	29.5 1.0 1.0 509.4 .01	8 0 0 0 3	PERVIOUS 9.34 5.00 1.00 40.00			
Max.Eff.Inten ov. Storage Coeff Unit Hyd. Tpe Unit Hyd. pea	. (mm/hr) = er (min) = (min) = ak (min) = k (cms) =	67.1 10.0 7.9 10.0	6 0 6 (ii) 0 3	44.75 20.00 19.94 20.00 .06	(ii)		
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFAL RUNOFF COEFFI	(cms) = (hrs) = (mm) = L (mm) = CIENT =	5.4 2.7 72.0 73.0 .9	0 5 0 0	.77 2.92 38.53 73.00	•	*TOTALS* 6.075 2.75 63.97 73.00 .88	(iii)
(iii) PEAK FL	OW DOES N		BASEF1				
ID1= 1 (+ ID2= 2 (0013): 0012):	(ha) 34.70 1 38.92 6	(cms) .988	(hrs) 3.25 2.75	(mm) 58.94 63.97)	
=======		73.62 7				=	
NOTE: PEAK F	LOWS DO N	OT INCLUDE	BASEFI	LOWS IF A	NY.		
	LOWS DO N	OT INCLUDE	BASEF	LOWS IF A	NY.		
NOTE: PEAK F	 OU	TFLOW SCms) (10000 (1260	TORAGE ha.m.) .0000 1.1416 1.6185 2.1619	OUT	FLOW ms) 5970 7450 8600 9770		

```
PEAK FLOW REDUCTION [Qout/Qin] (%) = 11.35
                TIME SHIFT OF PEAK FLOW (min)=165.00
                MAXIMUM STORAGE USED
                                          (ha.m.) = 3.3854
 *******
 ** SIMILATION NUMBER: 7 **
 *********
 READ STORM | Filename: G:\Projects\2008\
                            08104 - Vaughan Corporate Centre - Master Ser
                             \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 80.31 mm | Comments: 100yr/6hr
              TIME RAIN | TIME RAIN | TIME RAIN | TIME
              hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
                     .00 | 2.00 27.30 | 3.75 11.24 | 5.50 1.61
               .50
                     1.61 | 2.25
                                  27.30 | 4.00
                                                 6.42 | 5.75
               .75
                     1.61 | 2.50
                                  73.88 | 4.25 6.42 | 6.00
                                                              1.61
              1 00
                     1.61 | 2.75
                                  73.88 | 4.50 3.21 | 6.25 1.61
              1.25
                     1.61 | 3.00
                                  20.88 | 4.75
                                                 3.21 |
              1.50 9.64 | 3.25 20.88 | 5.00
                                               1.61 |
              1.75 9.64 | 3.50 11.24 | 5.25 1.61 |
| CALIB
| STANDHYD (0011) | Area (ha) = 34.70
|ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
                         IMPERVIOUS PERVIOUS (i)
                                    13.53
    Surface Area
                   (ha) =
                          21.17
    Dep. Storage
                   (mm) =
                           1.00
                                       5.00
    Average Slope
                   (%)=
                           1.00
                                        1 00
                          481.00
    Length
                   (m) =
                                       40.00
    Mannings n
                          .013
                                       .250
       NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                           --- TRANSFORMED HYETOGRAPH ----
              TIME RAIN | TIME RAIN | TIME RAIN | TIME
                    mm/hr | hrs mm/hr | hrs mm/hr | hrs
                                                              mm/hr
               .083
                     .00 | 1.667
                                  9.64 | 3.250 20.88 | 4.83
              .167
                     .00 | 1.750
                                  9.64 | 3.333 | 11.24 | 4.92
               .250
                      .00 | 1.833 | 27.30 | 3.417 | 11.24 | 5.00
               .333
                     1.61 | 1.917
                                  27.30 | 3.500
                                                11.24 | 5.08
              .417
                     1.61 | 2.000
                                  27.30 | 3.583 | 11.24 | 5.17
              .500
                     1.61 | 2.083
                                  27.30 | 3.667 | 11.24 | 5.25
               .583
                     1.61 | 2.167
                                  27.30 | 3.750
                                               11.24 | 5.33
                     1.61 | 2.250
                                  27.30 | 3.833
                                                 6.42 | 5.42
              .750
                     1.61 | 2.333
                                                 6.42 | 5.50
                                                               1.61
                                  73.88 | 3.917
               .833
                     1.61 | 2.417
                                  73.88 | 4.000
                                                 6.42 | 5.58
              .917
                     1.61 | 2.500
                                  73.88 | 4.083
                                                 6.42 | 5.67
                                                               1.61
              1.000
                     1.61 | 2.583
                                  73.88 | 4.167
                                                 6.42 | 5.75
              1.083
                     1.61 | 2.667
                                  73.88 | 4.250
                                                 6.42 | 5.83
              1.167
                     1.61 | 2.750
                                  73.88 | 4.333
                                                 3.21 | 5.92
              1.250
                     1.61 | 2.833
                                  20.88 | 4.417
                                                 3.21 | 6.00
                                                               1.61
              1.333
                     9.64 | 2.917
                                  20.88 | 4.500
                                                 3.21 | 6.08
              1.417 9.64 | 3.000
                                  20.88 | 4.583
                                                 3.21 | 6.17
             1.500 9.64 | 3.083 20.88 | 4.667
1.583 9.64 | 3.167 20.88 | 4.750
                                                 3.21 | 6.25 1.61
                                                 3.21 |
    Max.Eff.Inten.(mm/hr)=
                           73.88
                                       51.42
```

over (min) 5.00 20.00 Storage Coeff. (min)= 7.40 (ii) 18.74 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms)= .17 .06 **TOTALS* PEAK FLOW (cms)= 4.30 1.33 5.481 (iii) TIME TO PEAK (hrs)= 2.75 2.92 2.75 RUNOFF VOLUME (mm)= 79.31 44.54 65.75 TOTAL RAINFALL (mm)= 80.31 80.31 80.31 RUNOFF COEFFICIENT = .99 .55 .82 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
RESERVOIR (0013) IN= 2> OUT= 1 DT= 5.0 min
AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0011) 34.70 5.48 2.75 65.75 OUTFLOW: ID= 1 (0013) 34.70 2.21 3.25 65.75 PEAK FLOW REDUCTION [Qout/Qin](%) = 40.30 TIME SHIFT OF PEAK FLOW (min) = 30.00 MAXIMUM STORAGE USED (ha.m.) = 1.0181
CALIB
IMPERVIOUS PERVIOUS (i)
Max.Eff.Inten.(mm/hr)= 73.88 51.42 over (min) 10.00 20.00 Storage Coeff. (min)= 7.66 (ii) 19.00 (ii) Unit Hyd. Tpeak (min)= 10.00 20.00 Unit Hyd. peak (cms)= .13 .06
PEAK FLOW (cms) = 5.95 .91 6.764 (iii) TIME TO PEAK (hrs) = 2.75 2.92 2.75 RUNOFF VOLUME (mm) = 79.31 44.54 70.97 TOTAL RAINFALL (mm) = 80.31 80.31 80.31 RUNOFF COEFFICIENT = .99 .55 .88
 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0

ID = 3 (0014): 73.62 8.557 2.75 68.51

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| RESERVOIR (0015) | | IN= 2---> OUT= 1 | | DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE (cms) (ha.m.) | (cms) (ha.m.) .0000 .0000 | .5970 | 2.5409 .1260 | 1.1416 | .7450 | 3.0229 .3290 | 1.6185 | .8600 | 3.3869 .4890 | 2.1619 | .9770 | 3.7482 AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) 8.56 INFLOW : ID= 2 (0014) 73.62 2.75 68.51 5.42 OUTFLOW: ID= 1 (0015) 73.62 68.45

PEAK FLOW REDUCTION [Qout/Qin](%) = 11.42 TIME SHIFT OF PEAK FLOW (min)=160.00 MAXIMUM STORAGE USED (ha.m.)= 3.7481

FINISH

Municipal Servicing Class Environmental Assessment Master Plan
VAUGHAN METROPOLITAN CENTRE · CITY OF VAUGHAN
NOV 2012

Appendix D7

North-West SWM Pond Calculations

Vaughan Metropolitan Centre

City of Vaughan

NW Corner of Millway Avenue & Hwy 7

Project #: 08104

Date: April 2012

Storm Volume (6 hrs AES storms)

-	
Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient = 0.25

Runoff reduction =

10

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

mm

Assumption:

<u>Residential</u>

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

An average runoff coefficient of 0.50 is used for the land indicated as major parks and open spaces

Area & Imperviousness for Permanent Pool Calculation (based on 5-year Runoff Coefficient)

NW Corner of Millway Avenue & Hwy 7

		Area (ha) C	AC
Residential	Building	5.59	0.59	3.28
	Paved Area	1.86	0.90	1.68
	Landscape	1.98	0.04	0.08
Commercial	Building	1.04	0.59	0.61
	Paved Area	0.35	0.90	0.31
	Landscape	0.37	0.04	0.01

Open Space / Parkland	5.68	0.50	2.84
SWM Pond Block	2.61	0.55	1.44
Road	10.14	0.90	9.13
Total	29.61		19.37

Weighted "C" = 0.65
Weighted Imperviousness = 0.65

Vaughan Metropolitan Centre City of Vaughan

Project #: 08104

Date: April 2012

SWM Pond Permanent Pool/Extended Detention Volume NW Corner of Millway Avenue & Hwy 7

Table A.1 – MOE Water Quality Storage Requirements (SWMP 2003)*

		Storage Volume (m²/ha) for Impervious Level			
Protection Level	SWMP Type	35%	55%	70%	85%
Enhanced	Infiltration	25	30	35	40
80% long-term S.S. removal	Wetlands	80	105	120	140
S.S. Tellioval	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal	Infiltration	20	20	25	30
70% long-term S.S. removal	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic	Infiltration	20	20	20	20
60% long-term S.S. removal	Wetlands	60	60	60	60
S.S. Ichiovai	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

^{*} Values in table for Wet Ponds and Wetlands include 40m³/ha of extended detention storage.

SWM Facility Type = Wet Pond Level of Protection = 1

VMC Drainage Area = 29.61 ha
External Drainage Area = 16.77 ha
Total Drainage Area = 46.38 ha

VMC Area-Weighted Imperviousness = 65%

External Imperviousness = 80%

Total Area-Weighted Imperviousness = 70%

Water Quality Requirement = 225.00 m³/ha
Permanent Pool Unit Volume Requirement = 185.00 m³/ha
Total Permanent Pool Storage Volume Required = 8,580 m³
Extended Detention Unit Volume Requirement = 40 m³/ha
Total Extended Detention Volume Required = 1,855 m³

(compare with Erosion Volume required)

2011-12-Revised On-Site Controls at 80% - NW Pond

^{*} Note: Total area contributing into pond is 46.38ha as per the AECOM Black Creek Optimization Study. The contributing external area is from north of Portage Parkway. A weighted imperviousness was calculated for the overall drainage area to the NW pond.

Erosion Control Volume and Release Rate NW Corner of Millway Avenue & Hwy 7

SWM Pond

Input:

Area = 46.38 (ha)

R.V = 18.727 (mm)

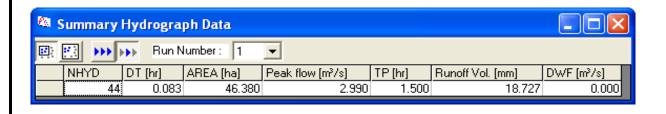
Draw Down Time = 48 (hrs)

Calculations:

Storage = $8,686 \text{ (m}^3)$

Average Outflow = $0.050 \text{ (m}^3/\text{s)}$

Peak Outflow = 0.075 (m³/s) - Estimated at 1.5 times Average Outflow



Vaughan Metropolitan Centre

City of Vaughan

NW Corner of Millway Avenue & Hwy 7

Project #: 08104

Date: April 2012

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

0.90

Runoff reduction =

15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅
25mm	25.00	22.50	7.50	0.30
2-Year	36.00	32.40	17.40	0.48
5-Year	47.80	43.02	28.02	0.59
10-Year	55.70	50.13	35.13	0.63
25-Year	65.60	59.04	44.04	0.67
50-Year	73.00	65.70	50.70	0.69
100-Year	80.30	72.27	57.27	0.71

Base run-off coefficient =

0.25

Runoff reduction =

10 mm

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀
25mm	25.00	6.25	0.00	0.00
2-Year	36.00	9.00	0.00	0.00
5-Year	47.80	11.95	1.95	0.04
10-Year	55.70	13.93	3.93	0.07
25-Year	65.60	16.40	6.40	0.10
50-Year	73.00	18.25	8.25	0.11
100-Year	80.30	20.08	10.08	0.13

Assumption:

Residential

C = 0.75 I = 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Mixed Area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

C = 0.25 for open space

An average runoff coefficient of 0.50 is used for the land indicated as major parks and open spaces

Area & Imperviousness for Permanent Pool Calculation (based on 100-year Runoff Coefficient)

NW Corner of Millway Avenue & Hwy 7

		Area (ha)	C	AC
Residential	Building	5.59	0.71	3.98
	Paved Area	1.86	0.90	1.68
	Landscape	1.98	0.13	0.25
Commercial	Building	1.04	0.71	0.74
	Paved Area	0.35	0.90	0.31
	Landscape	0.37	0.13	0.05
	Total	11.18		7.01

Open Space / Parkland	5.68	0.50	2.84
SWM Pond Block	2.61	0.55	1.44
Road	10.14	0.90	9.13
Total	18.43		13.40

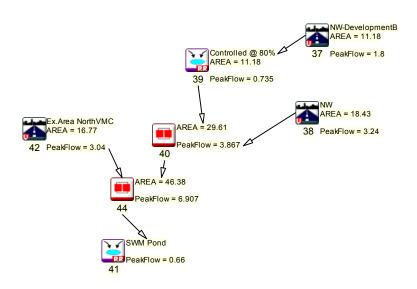
Weighted "C" = <u>0.63</u>
Weighted Imperviousness = <u>0.61</u>

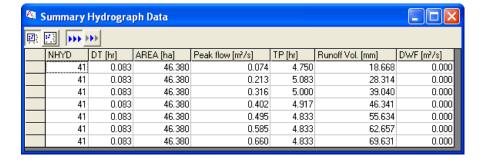
Weighted "C" = <u>0.73</u>

0.75

Weighted Imperviousness =

North West POND





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                ***** DETAILED OUTPUT *****
 Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
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YE~1\On-Site Control to 80% Imperv.out
 Summary filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final submission\100-
YE~1\On-Site Control to 80% Imperv.sum
DATE: 4/4/2012
                                   TIME: 2:53:09 PM
USER:
COMMENTS:
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| Ptotal= 25.00 mm |
                    Comments: Twenty-Five mm Four Hour Chicago Storm
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                    RAIN | TIME
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                    mm/hr |
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                                                            mm/hr
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                                  5.70 |
                                         2.17
                                               5.19 |
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                                  50.21 |
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                                                3.95
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               .67
                     2.88 | 1.67
                                 13.37 | 2.67
                                               3.56 | 3.67
                                                             2.35
                                  8.29 |
               . 83
                     3.38 | 1.83
                                        2.83
                                               3.25 | 3.83
                                                             2.23
                     4.18 | 2.00
                                  6.30 | 3.00
                                               3.01 | 4.00
| CALIB
| STANDHYD (0042) |
                   Area (ha) = 16.77
|ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 70.00
```

		IMPERVIOUS	PERVIOUS	(i)
Surface Area	(ha) =	13.42	3.35	
Dep. Storage	(mm) =	1.00	5.00	
Average Slope	(%)=	1.00	1.00	
Length	(m) =	334.40	40.00	
Mannings n	=	.013	.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

		mp.	MCCODMI	ED HYETOGRA	DII		
TIM	E RAIN		RAIN		RAIN	TIME	RAIN
hr		l hrs	mm/hr		mm/hr	hrs	mm/hr
.08						3.08	2.80
.16			5.70			3.17	2.80
.25		1.250	10.78			3.25	2.62
.33		1.333		2.333		3.33	
.41		1.417	50.21			3.42	2.48
.50			50.21			3.50	2.48
.58		1.583		2.583		3.58	2.35
.66		1.667		2.667			
.75		1.750	8.29			3.75	2.23
				2.833		3.83	
.91	7 4.17	1.917	6.30	2.917	3.01	3.92	2.14
1.00	4.18	2.000	6.29	3.000	3.01	4.00	2.14
Max.Eff.Inten.(nm/hr)=	50.21		15.08			
over	(min)	5.00		30.00			
Storage Coeff.	(min) =	6.94	(ii)	25.46 (ii)			
Unit Hyd. Tpeak	(min) =	5.00		30.00			
Unit Hyd. peak	(cms) =	.17		.04			
					TOTA	LS	
PEAK FLOW	(cms) =	1.32		.07	1.3	36 (iii	.)
TIME TO PEAK	(hrs)=	1.50		1.92	1.	50	
RUNOFF VOLUME	(mm) =	24.00		8.33	19.	29	
TOTAL RAINFALL	(mm) =	25.00		25.00	25.		
RUNOFF COEFFICI	. ,	.96		.33		77	
					•		

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB							
STANDHYD (0038)	Area	(ha) =	18.43				
ID= 1 DT= 5.0 min	Total	Imp(%)=	75.00	Dir.	Conn.(%)=	75.00	1
		IMPERVI(SUC	PERVIOU	JS (i)		
Surface Area	(ha) =	13.8	2	4.61			
Dep. Storage	(mm) =	1.0	0	5.00)		
Average Slope	(%)=	1.0	0	1.00)		
Length	(m) =	350.5	0	40.00)		
Mannings n	=	.01	3	.250)		
Max.Eff.Inten.(r							
	. ,	5.0					
Storage Coeff.	(min) =	7.1	4 (ii)	36.17	(ii)		
Unit Hyd. Tpeak	(min) =	5.0	0	40.00)		
Unit Hyd. peak	(cms) =	.1	7	.03	3		
					* 5	TOTALS*	
PEAK FLOW	(cms) =	1.5	4	.03	3	1.545	(iii)
TIME TO PEAK	(hrs) =	1.5	0	2.25	i	1.50	
RUNOFF VOLUME	(mm) =	24.0	0	5.55	j	19.38	

TOTAL RAINFALL RUNOFF COEFFICI	(mm) = ENT =	25.00 .96	25.00 .22	25.00 .78
(ii) TIME STEP	83.0 Ia : (DT) SHOUL STORAGE COE	= Dep. Storag D BE SMALLER FFICIENT.	e (Above) OR EQUAL	
CALIB	Area Total Im	(ha) = 11.18 p(%) = 61.00	Dir. Conn.(%)= 61.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha)=	MPERVIOUS 6.82 1.00 1.00 273.00 .013	PERVIOUS (i) 4.36 5.00 1.00 40.00 .250	
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak			4.90 40.00 35.17 (ii) 40.00 .03	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI			.03 2.25 5.55 25.00	*TOTALS* .803 (iii) 1.50 16.80 25.00 .67
(ii) TIME STEP	83.0 Ia : (DT) SHOUL STORAGE COE: DOES NOT I	= Dep. Storag D BE SMALLER FFICIENT.	e (Above) OR EQUAL	
RESERVOIR (0039) IN= 2> OUT= 1 DT= 5.0 min	OUTFLO	W STORAGE (ha.m.)	OUTFLOW (cms) .8410	STORAGE (ha.m.) .3698
INFLOW: ID= 2 OUTFLOW: ID= 1	(0037) (0039)	AREA QPE (ha) (cm 11.18	AK TPEAK s) (hrs) 80 1.50 18 1.92	R.V. (mm) 16.80 16.79
Р Т М	EAK FLOW IME SHIFT O	REDUCTION [F PEAK FLOW RAGE USED	Qout/Qin](%)= (min)= (ha.m.)=	22.35 25.00 .0790
ADD HYD (0040) 1 + 2 = 3 ID1= 1 (00	AR: (h. 38): 18.	EA QPEAK a) (cms) 43 1.545	TPEAK R (hrs) (11.50 19.11.92 16.11.92	.V. mm) 38
+ ID2= 2 (00	39): 11.	18 .180	1.92 16.	79

	ID - 3	(0040)	: 29	.61	1.654	1.	50	18.40			
NOTE:					E BASEFI						
ADD HYD 1 + 2	= 3	ł) 	А	REA.	QPEAK	TF	EAK	R.V.			
	TD1= 1	(0042)	. 16	ha)	(cms)	(h	rs)	(mm)			
+	ID2= 2	(0042)	: 29	.61	QPEAK (cms) 1.336 1.654	1.	50	18.40			
					2.990			18.73			
NOTE:	PEAK	FLOWS	DO NOT	INCLUE	E BASEFI	OWS	IF ANY				
RESERVOII											
DT= 5.0			OUTFL	OW	STORAGE	- 1	OUTFL	OW	STORA		
			(cms)	(ha.m.) .0000 .7700 1.1000 1.5000	- 1	(cms)	(ha.m		
			.07	50	.7700	i i	.50	50	1.70		
			.22	40	1.1000	- !	.58	40	2.25	00	
			.33						2.50		
				AREA	QPE (cm 2.	AK	TPE	AK	R.	V.	
TMETO	W . TD=	- 2 (00	44)	(ha)	(cm	s)	(hr	s)	1 O	m)	
	OW: ID=			46.38	٠.	07	4.	75	18.	67	
					UCTION [
		TIME	SHIFT MUM ST	OF PEA ORAGE	USED		(mi (ha.m	n)=195 .)= .	.00 7649		
******** ** SIMUL	****** ATION N	TIME MAXI	SHIFT MUM ST ******* 2 **	OF PEA	K FLOW USED		(mi (ha.m	n)=195 .)= .	.00 7649		
*****	****** ATION N	TIME MAXI	SHIFT MUM ST ******* 2 **	OF PEA	K FLOW USED		(mi (ha.m	n)=195 .)= .	.00 7649		
******* ** SIMUL; ******	******* ATION N	TIME MAXI ****** IUMBER: *****	SHIFT MUM ST ****** 2 ** ******	OF PEA	K FLOW USED		(mi (ha.m	n)=195 .)= .	.00 7649		
******* ** SIMUL; *****	******* ATION N	TIME MAXI ****** IUMBER: *****	SHIFT MUM ST ****** 2 ** ******	OF PEA ORAGE	K FLOW USED		(mi (ha.m	n)=195 .)= .	.00 7649 		
******* ** SIMUL; ******** READ	****** ATION N ****** 	TIME MAXI ******* NUMBER: ******	SHIFT MUM ST ****** 2 ** ****** Filena	OF PEA ORAGE me: G: 08	K FLOW USED Project 104 - Valesign\SW	 .s\20 .ugha	(mi (ha.m	n)=195 .)= .	.00 7649 	e - M	aster S
******* ** SIMUL; ******** READ	****** ATION N ****** 	TIME MAXI	SHIFT MUM ST ******* 2 ** ******* Filena Commen	OF PEA ORAGE me: G: 08 \tau ts: 2y	K FLOW USED \Project 104 - Va esign\SW r/6hr	.s\20 ugha M\VC	(mi (ha.m	n)=195 .)= orate 1\STOR	.00 7649 Centr M\6 a	e - M nd 12 TIME	aster S hour A
******** ** SIMUL; ******** READ	****** ATION N ****** 	TIME MAXI	SHIFT MUM ST ****** 2 ** ******* Filena Commen	OF PEA ORAGE me: G: 0: 1 ts: 2y	K FLOW USED Project 104 - Va esign\SW r/6hr E RAI	.s\20 .ugha M\VC	(mi (ha.m	n)=195 .)= orate 1\STOR	.00 7649 Centr M\6 a	e - M nd 12 TIME	aster S hour A RAIN
******* ** SIMUL; ******** READ	****** ATION N ****** 	TIME MAXI	SHIFT MUM ST ****** 2 ** ******* Filena Commen	OF PEA ORAGE me: G: 0: 1 ts: 2y	K FLOW USED Project 104 - Va esign\SW r/6hr E RAI	.s\20 .ugha M\VC	(mi (ha.m	n)=195 .)= orate 1\STOR	.00 7649 Centr M\6 a	e - M nd 12 TIME	aster S hour A RAIN
******* ** SIMUL; ******** READ	****** ATION N ****** 	TIME MAXI	SHIFT MUM ST ****** 2 ** ******* Filena Commen	OF PEA ORAGE me: G: 0: 1 ts: 2y	K FLOW USED Project 104 - Va esign\SW r/6hr E RAI	.s\20 .ugha M\VC	(mi (ha.m	n)=195 .)= orate 1\STOR	.00 7649 Centr M\6 a	e - M nd 12 TIME	aster S hour A RAIN
******* ** SIMUL; ******** READ	****** ATION N ****** 	TIME MAXI	SHIFT MUM ST ****** 2 ** ******* Filena Commen	OF PEA ORAGE me: G: 0: 1 ts: 2y	K FLOW USED Project 104 - Va esign\SW r/6hr E RAI	.s\20 .ugha M\VC	(mi (ha.m	n)=195 .)= orate 1\STOR	.00 7649 Centr M\6 a	e - M nd 12 TIME	aster S hour A RAIN
******* ** SIMUL; ******	****** ATION N ****** 	TIME MAXI	SHIFT MUM ST ****** 2 ** ******* Filena Commen	OF PEA ORAGE me: G: 0: 1 ts: 2y	K FLOW USED Project 104 - Va esign\SW r/6hr E RAI	.s\20 .ugha M\VC	(mi (ha.m	n)=195 .)= orate 1\STOR	.00 7649 Centr M\6 a	e - M nd 12 TIME	aster S hour A RAIN
******* ** SIMUL; ******** READ	****** ATION N ****** 	TIME MAXI	SHIFT MUM ST ****** 2 ** ******* Filena Commen	OF PEA ORAGE me: G: 0: 1 ts: 2y	K FLOW USED \Project 104 - Va esign\SW r/6hr	.s\20 .ugha M\VC	(mi (ha.m	n)=195 .)= orate 1\STOR	.00 7649 Centr M\6 a	e - M nd 12 TIME	aster S hour A RAIN
******* ** SIMUL; ******** READ	****** ATION N ****** 	TIME MAXI	SHIFT MUM ST ****** 2 ** ******* Filena Commen	OF PEA ORAGE me: G: 0: 1 ts: 2y	K FLOW USED Project 104 - Va esign\SW r/6hr E RAI	.s\20 .ugha M\VC	(mi (ha.m	n)=195 .)= orate 1\STOR	.00 7649 Centr M\6 a	e - M nd 12 TIME	aster S hour A RAIN
******* ** SIMUL ****** READ:	******* ATION N ******* STORM 36.00 n	TIME MAXI ******* ****** UMBER: *******	SHIFT MUM ST ******* Filena Commen RAIN mm/hr .00 .72 .72 .72 4.32 4.32	me: G:	\Project 1004 - Valesign\SW rr/6hr RAI S mm/h 0 12.2 5 12.2 0 9.3 3.1 15 3.3 0 5.0 5.0	s\20 ugha M\VC N 1	(mi (ha.m (ha.m 008) in Corp 12 mode hrs 3.75 4.00 4.25 5.00 5.25	n)=195 .)= . orate 1\STOR RAII mm/h 5.0 2.8 2.8 1.4 7.7	.00 7649 NN r 4 4 8 8 8 4 4 4 2 2	e - M nd 12 TIME hrs 5.50 5.75 6.00 6.25	aster S hour A RAIN
******** ** SIMUL; ******** READ	******* ATION N ******* STORM 36.00 n	TIME MAXI ******* ****** UMBER: *******	SHIFT MUM ST ******* Filena Commen RAIN mm/hr .00 .72 .72 .72 4.32 4.32	me: G:	\Project 1004 - Valesign\SW rr/6hr RAI S mm/h 0 12.2 5 12.2 0 9.3 3.1 15 3.3 0 5.0 5.0	s\20 ugha M\VC N 1	(mi (ha.m (ha.m 008) in Corp 12 mode hrs 3.75 4.00 4.25 5.00 5.25	n)=195 .)= . orate 1\STOR RAII mm/h 5.0 2.8 2.8 1.4 7.7	.00 7649 NN r 4 4 8 8 8 4 4 4 2 2	e - M nd 12 TIME hrs 5.50 5.75 6.00 6.25	aster S hour A RAIN

			PERVIOUS (i 3.35 5.00 1.00 40.00 .250 TO 5.0 MIN.		
T	IME RAIN hrs mm/hr 0083 .00 167 .00 250 .00 3333 .72 417 .72 500 .72 583 .72 667 .72 750 .72 833 .72 917 .72 000 .72 000 .72 000 .72 000 .73 417 .72 000 .73 000 .74 000 .75 0	I DIME	SFORMED HYETOGR RAIN TIME wm/hr hrs with hrs 13.250 4.32 3.333 12.24 3.417 12.24 3.500 12.24 3.583 12.24 3.667 12.24 3.667 13.500 12.24 3.667 13.500 12.24 3.667 13.500 13.12 4.000 13.12 4.000 13.12 4.000 13.12 4.000 13.12 4.167 13.12 4.250 13.12 4.450 13.12 4.500 13.12	DATM I DA	ME RAIN Irs mm/hr 83 .72 92 .72 00 .72 .08 .72 .17 .72 .25 .72 .42 .72 .50 .72 .67 .72 .75 .72 .83 .72 .93 .72 .90 .72 .90 .72 .90 .72 .91 .72 .92 .72 .93 .72 .93 .72 .94 .72 .75 .72 .75 .72 .75 .72 .75 .72 .75 .72 .75 .72 .75 .72 .77 .72 .77 .77 .72 .78 .77 .72 .79 .77 .72 .79 .77 .72
Max.Eff.Inten ov. Storage Coeff Unit Hyd. Tpe. Unit Hyd. pea PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFAL RUNOFF COEFFI (i) CN PROC. CN* = (ii) TIME ST. THAN TH.	. (mm/hr)= er (min) . (min)= ak (min)= k (cms)= (cms)= (hrs)= (hrs)= (nm)= CIENT = EDURE SELECT 83.0 Is EDUTS HOUSE ESTORAGE CC	33.12 10.00 8.20 (: 10.00 .13 1.05 2.75 35.00 36.00 .97 TED FOR PERN 1 = Dep. Stct	28.09 25.00 25.00 25.00 .05 .16 3.00 .15.84 36.00 .44 ZIOUS LOSSES: Drage (Above) LER OR EQUAL)	
CALIB STANDHYD (0038) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten OV	Area Total I Total I (ha) = (mm) = (%) = (m) =	(ha) = 18. mp(%) = 75. IMPERVIOUS 13.82 1.00 1.00 350.50 .013	43 00 Dir. Conn PERVIOUS (i 4.61 5.00 1.00 40.00 .250)

Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(min) =	8.44 10.00 .12	(ii) 28.05 30.00 .04	(ii)	
				TOTALS	
PEAK FLOW	(cms) =	1.24	.09	1.290	(iii)
TIME TO PEAK	(hrs) =	2.75	3.08	2.75	
RUNOFF VOLUME	(mm) =	35.00	11.57	29.14	
TOTAL RAINFALL	(mm) =	36.00	36.00	36.00	
RUNOFF COEFFICIE	ENT =	.97	.32	.81	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 83.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| STANDHYD (0037) | Area (ha) = 11.18 | ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00 IMPERVIOUS PERVIOUS (i) (ha) =6.82 4.36 Surface Area Dep. Storage (mm) = 1.00 5.00 (%)= 1.00 1.00 Average Slope 273.00 40.00 Length (m) = Mannings n .250 Max.Eff.Inten.(mm/hr)= 33.12 13.05 over (min) 5.00 30.00 7.26 (ii) 26.88 (ii) Storage Coeff. (min) = Unit Hyd. Tpeak (min) = 5.00 30.00 Unit Hyd. peak (cms) = *TOTALS* .09 .673 (iii) PEAK FLOW .62 (cms) = 3.08 TIME TO PEAK (hrs) = 2.75 2.75 35.00 11.57 RUNOFF VOLUME (mm) = 25.86 TOTAL RAINFALL (mm) = 36.00 36.00 36.00 RUNOFF COEFFICIENT = .97

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 83.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

I RESERVOIR (0039) I | IN= 2---> OUT= 1 | DT= 5.0 min OUTFLOW STORAGE | OUTFLOW (ha.m.) (cms) (ha.m.) | (cms) .0000 .0000 | .8410 .3698 AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) INFLOW : ID= 2 (0037) .67 11.18 2.75 25.86 OUTFLOW: ID= 1 (0039) 3.17 25.85 11.18 PEAK FLOW REDUCTION [Qout/Qin](%) = 41.51 TIME SHIFT OF PEAK FLOW (min) = 25.00MAXIMUM STORAGE USED (ha.m.) = .1228

ADD HYD		AREA (ha) 18.43 11.18	QPEAK (cms) 1.290 .279	TPEAK (hrs) 2.75 3.17	R.V. (mm) 29.14 25.85		
	= 3 (0040):				27.90		
	PEAK FLOWS DO				MY.		
ADD HYD 1 + 2 = ID1 + ID2	(0044)	AREA (ha) 16.77 29.61	QPEAK (cms) 1.172 1.531	TPEAK (hrs) 2.75 2.75	R.V. (mm) 29.25 27.90		
===	= 3 (0044):						
	PEAK FLOWS DO						
RESERVOIR IN= 2> (DT= 5.0 mi	DUT= 1 .n 	OUTFLOW (cms) .0000 .0750 .2240 .3320	.7700 1.1000 1.5000		5050 5840 6640	STORAGE (ha.m.) 1.7000 2.0500 2.2500 2.5000	
INFLOW :	ID= 2 (0044 ID= 1 (0041	ARE (ha) 46.3	A QPE) (cm 8 2. 8 .	AK TI s) (1 70 2 21	PEAK nrs) 2.75 5.08	R.V. (mm) 28.39 28.31	
	TIME S	FLOW RE HIFT OF PE M STORAGE	AK FLOW	(r		.00	
** SIMULATI	**************************************	3 ** **** ilename: G	8104 - Va	ughan Co		Centre - 1	
 Ptotal= 47.	 			M\VO2 mod	del\STOR	M\6 and 1:	2 hour :
	hrs m .25 .50 .75 1.00 1.25	RAIN TI m/hr h .00 2. .96 2. .96 2. .96 2. .96 3. 5.74 3.	rs mm/h 00 16.2 25 16.2 50 43.9 75 43.9 00 12.4	r hrs 5 3.7! 5 4.00 8 4.2! 8 4.50 3 4.7!	mm/h 6.6 3.8 5 3.8 0 1.9 5 1.9	r hrs 9 5.50 2 5.75 2 6.00 1 6.25 1	mm/hi

CALIB STANDHYD (0042) D= 1 DT= 5.0 min	Area Total In	(ha) = 1 mp(%) = 8	6.77 0.00	Dir. Con	n.(%)=	70.00	
		IMPERVIOU	S PI	ERVIOUS (:	i)		
Surface Area	(ha)=	13.42		3.35			
Dep. Storage	(mm) =	1.00		1.00			
Length	(%) =	334 40		40 00			
Surface Area Dep. Storage Average Slope Length Mannings n	=	.013		3.35 5.00 1.00 40.00 .250			
NOTE: RAINF	ALL WAS T	RANSFORME	D TO	5.0 MIN.	TIME ST	EP.	
				ED HYETOGI			
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.083	.00	1 1.66/	5./4	1 3.250	12.43	4.83	.96
.167	.00	1 1 833	16 25	1 3 417	6 69	1 4.92 1 5 00	.96
.333	.96	1.917	16.25	3.500	6.69	5.08	.96
.417	.96	2.000	16.25	3.583	6.69	5.17	.96
.500	.96	2.083	16.25	3.667	6.69	5.25	.96
.583	.96	2.167	16.25	3.750	6.69	5.33	.96
.667	.96	2.250	16.25	3.833	3.82	5.42	.96
.750	.96	2.333	43.98	3.917	3.82	5.50	.96
.833	.96	2.41/	43.98	1 4.000	3.82	5.58	.96
1 000	96	2.500	43.98	1 4 167	3.02	5.07	96
1.083	.96	2.667	43.98	1 4.250	3.82	5.83	.96
1.167	.96	2.750	43.98	4.333	1.91	5.92	.96
1.250	.96	2.833	12.43	4.417	1.91	6.00	.96
1.333	5.74	2.917	12.43	1 4.500	1.91	6.08	.96
1.417	5.74	3.000	12.43	4.583	1.91	6.17	.96
1.583	mm/hr .00 .00 .00 .96 .96 .96 .96 .96 .96 .96 .96 .96 .96	3.167	12.43	4.750	1.91	1 6.23	. 50
Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr)=	43.98		43.59			
over Storage Coeff	(min) =	7 32	(ii)	20.00 19.43 (i	;)		
Unit Hvd. Tpeak	(min) =	5.00	(11)	20.00	-/		
Unit Hyd. peak	(cms) =	.17		.06			
DD311 DT 011	, ,	1 10		0.7	*TO:	TALS*	
PEAK FLOW	(cms) =	2.42		2 02	1.	.659 (ii:	l)
RINOFF VOLUME	(IIIS) =	46 81		24 99	4 (2.75	
TOTAL RAINFALL	(mm) =	47.81		47.81	4	7.81	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	NT =	.98		.52		.84	
(i) CN PROCEDU	RE SELECT	ED FOR PF	RVIOUS	LOSSES:			
CN* = 8	3.0 Ia	= Dep. S	torage	(Above)			
(ii) TIME STEP				R EQUAL			
THAN THE S							
(iii) PEAK FLOW	DUES NOT .	INCLUDE E	ASEFLO\	N TE ANY.			
CALIB							

IMPERVIOUS PERVIOUS (i)

Surface Area (ha) = 13.82

Dep. Storage Average Slope Length Mannings n					
Max.Eff.Inten. over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(mm/hr) = (min) (min) = (min)	43.98 10.00 7.53 10.00	(ii)	21.81 25.00 23.51 (ii 25.00)
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (cms) = (hrs) = (mm) =	1.66 2.75 46.81		.05 .17 3.00 19.33	1.784 (iii) 2.75 39.94
					47.81 .84
(ii) TIME STEF THAN THE (iii) PEAK FLOW	83.0 I P (DT) SHO STORAGE C I DOES NOT	a = Dep. S ULD BE SMA OEFFICIENT INCLUDE E	Storage ALLER (BASEFL(e (Above) DR EQUAL DW IF ANY.	
CALIB STANDHYD (0037) ID= 1 DT= 5.0 min	Area Total				
		IMPERVIOU	JS I	PERVIOUS (i)
Surface Area	(ha)=	6.82		4.36	
Dep. Storage	(mm) =	1.00		1 00	
Surface Area Dep. Storage Average Slope Length Mannings n					
Max.Eff.Inten. over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(mm/hr)=	43.98		21.81	
over	(min)	5.00	(22)	25.00	
Storage Coeff. Unit Hvd. Tpeak	(min)= : (min)=	5.00	(11)	25.00)
Unit Hyd. peak	(cms)=	.18		.05	
	, ,			4.5	^TOTALS^
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms)= (hrs)=	2.75		3.00	.951 (iii) 2.75
RUNOFF VOLUME	(mm) =	46.81		19.33	36.09
TOTAL RAINFALL	(mm) =	47.81		47.81	47.81
RUNOFF COEFFICI	ENT =	.98		.40	.75
(ii) TIME STEE	83.0 I (DT) SHO STORAGE C	a = Dep. S ULD BE SMA OEFFICIENT	Storage ALLER (e (Above) DR EQUAL	
(III) PEAN FLOW	DOES NOT	TMCTONE E	nazit il	W IF ANI.	
RESERVOIR (0039)					
TN= 2> OUT= 1					
DT= 5.0 min	OUTF	LOW STO	RAGE	OUTFLO	N STORAGE
	.0	o, (na 000 .	.0000	OUTFLOW (cms) .841	(ha.m.) 0 .3698
INFLOW : ID= 2		AREA	QPEA (cms	AK TPEAL	K R.V. (mm)
INFLOW : ID= 2	(0037)	11.18	(Cilla	95 2.7	5 36.09

OUTFLOW: ID=	1 (0039) 11.	18 .3	9 3.	.17	36.08	
	PEAK FLOW R TIME SHIFT OF F MAXIMUM STORAG	EDUCTION [Q EAK FLOW E USED	out/Qin] (mi (ha.r	(%) = 41. in) = 25. n.) = .1	.38 .00 .730	
ADD HYD (0040)	·					
1 + 2 = 3	AREA (ha) 0038): 18.43 0039): 11.18	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)		
ID1= 1 (0038): 18.43	1.784	2.75	39.94		
	0040): 29.61					
NOTE: PEAK F	LOWS DO NOT INCL	UDE BASEFLO	WS IF ANY	ζ.		
ADD HYD (0044)		0.000.00				
1 + 2 = 3	(ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)		
ID1= 1 (+ ID2= 2 (AREA (ha) (0042): 16.77 (0040): 29.61	1.659 2.120	2.75 2.75	40.26		
	0044): 46.38			39.13		
	LOWS DO NOT INCL					
NOIE. FEAR F	LOWS DO NOT INCL	ODE BASEFEO	WO IF AN			
RESERVOIR (0041) IN= 2> OUT= 1 DT= 5.0 min	OUTFLOW (cms) .0000 .0750 .2240	.7700 1.1000	OUTFI	LOW S S) 1 050 050 340	STORAGE (ha.m.) 1.7000 2.0500 2.2500	
	.3320				2.5000	
	AR /b	EA QPEA	K TPE	EAK	R.V. (mm)	
INFLOW : ID=	AR (h 2 (0044) 46. 1 (0041) 46.	38 3.7	8 2.	.75	39.13	
OUITLOW: ID-						
	PEAK FLOW R TIME SHIFT OF P MAXIMUM STORAG	EAK FLOW	(mi	(%) = 8. in) =135. n.) = 1.4	.00	
**************************************	MBER: 4 **					
READ STORM	Filename:	G:\Projects 08104 - Vau \Design\SWM	ghan Corp			
Ptotal= 55.69 mm			.vuz mode	ST / STOKE	ivo and iz l	HOUE AES
	'IME RAIN T hrs mm/hr	IME RAIN				

1.00 1.25 1.50 1.75	1.11 1.11 1.11 1.11 6.68 6.68	2.25 2.50 2.75 3.00 3.25 3.50	18.94 51.24 51.24 14.48 14.48 7.80	4.00 4.25 4.50 4.75 5.00 5.25	4.46 4.46 2.23 2.23 1.11 1.11	6.00 6.25	1. 1. 1.
CALIB STANDHYD (0042) D= 1 DT= 5.0 min	Area Total Imp	(ha) = 1 (%) = 8	6.77 0.00	Dir. Conn	. (%)= 7	0.00	
Surface Area Dep. Storage Average Slope Length Mannings n							
NOTE: RAINF	ALL WAS TRA	ANSFORME	D TO	5.0 MIN.	TIME STE	P.	
TIME hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 1.167 1.250 1.333 1.417 1.500 1.583	RAIN mm/hr .00 .00 .00 .111	TIME hrs 1.667 1.750 1.833 1.917 2.000 2.083 2.167 2.250 2.333 2.417 2.500 2.583 2.667 3.000 3.083 3.167	NSFORMI RAIN mm/hr 6.68 18.94 18.94 18.94 18.94 15.24 51.24 51.24 51.24 51.24 51.24 14.48 14.48 14.48	ED HYETOGRI TIME hrs 3.250 3.333 3.417 3.500 3.583 3.667 3.750 3.750 4.083 4.167 4.250 4.250 4.333 4.417 4.500 4.583 4.667 4.750	APH RAIN mm/hr 14.48 7.80 7.80 7.80 7.80 7.80 4.46 4.46 4.46 4.46 2.23 2.23 2.23 2.23	TIME hrs 4.83 4.92 5.00 5.08 5.17 5.25 5.32 5.50 5.75 5.75 5.83 5.67 5.75 6.00 6.08 6.17 6.25	RPF mm// 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.
Max.Eff.Inten.(mm over (Storage Coeff. (Unit Hyd. Tpeak (Unit Hyd. peak (TIME TO PEAK (RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIEN (i) CN PROCEDUR CN* = 83 (ii) TIME STEP	\(\lambda(\) \(\) \(\) \(\) \(\) \(\) \(\) \(\)	51.24 5.00 6.89 5.00 .18 1.66 2.75 54.69 55.69 .98 D FOR PE	(ii)	54.40 20.00 17.97 (ii 20.00 .06 .35 2.92 31.49 55.69 .57 LOSSES: (Above)	*TOT 1. 2 47 55	ALS* 976 (iii	

PANDHYD (0038) = 1 DT= 5.0 min	Area Total	(ha) = 18.43 Imp(%) = 75.00	Dir. Conn.(%)	= 75.00
		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	13.82	4.61	
Dep. Storage	(mm) =	1.00	5.00	
Average Slope	(%) = (m) =	1.00	1.00	
Surface Area Dep. Storage Average Slope Length Mannings n	=	.013	.250	
Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	nm/hr)=	51.24	29.52	
over	(min)	5.00	25.00	
Unit Hud Theak	(min) =	7.08 (II) 5.00	25.00	
Unit Hyd. peak	(cms) =	.17	.05	
***** *** F ****	()	•=-		*TOTALS*
PEAK FLOW	(cms) =	1.95	.23	2.128 (iii)
TIME TO PEAK	(hrs) =	2.75	3.00	2.75
RUNOFF VOLUME	(mm) =	54.69	25.02	47.27
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	(mm) =	33.69	33.69	33.69
THAN THE S	DOES NO		LOW IF ANY.	
(iii) PEAK FLOW		r include basefi		
(iii) PEAK FLOW ALIB PANDHYD (0037) = 1 DT= 5.0 min	Area Total	(ha) = 11.18 Imp(%) = 61.00	Dir. Conn.(%)	
(iii) PEAK FLOW ALIB PANDHYD (0037) = 1 DT= 5.0 min	Area Total	(ha) = 11.18 Imp(%) = 61.00	Dir. Conn.(%)	
(iii) PEAK FLOW ALIB PANDHYD (0037) = 1 DT= 5.0 min	Area Total	(ha) = 11.18 Imp(%) = 61.00	Dir. Conn.(%)	
(iii) PEAK FLOW ALIB PANDHYD (0037) = 1 DT= 5.0 min	Area Total	(ha) = 11.18 Imp(%) = 61.00	Dir. Conn.(%)	
(iii) PEAK FLOW ALIB PANDHYD (0037) = 1 DT= 5.0 min	Area Total	(ha) = 11.18 Imp(%) = 61.00	Dir. Conn.(%)	
(iii) PEAK FLOW ALIB TANDHYD (0037) = 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area Total (ha) = (mm) = (%) = (m) = =	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250	
(iii) PEAK FLOW ALIB TANDHYD (0037) = 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area Total (ha) = (mm) = (%) = (m) = =	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250	
(iii) PEAK FLOW ALIB TANDHYD (0037) = 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area Total (ha) = (mm) = (%) = (m) = =	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250	
(iii) PEAK FLOW LLIB PANDHYD (0037) 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area Total (ha) = (mm) = (%) = (m) = =	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250	
(iii) PEAK FLOW ALIB TANDHYD (0037) = 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area Total (ha) = (mm) = (%) = (m) = =	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250	
(iii) PEAK FLOW ALIB PANDHYD (0037) 1 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd, peak	Area Total (ha) = (mm) = (%) = (m) = (min) (min) = (min) = (min) = (cms) = (c	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05	= 61.00
(iii) PEAK FLOW ALIB PANDHYD (0037) 1 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd, peak	Area Total (ha) = (mm) = (%) = (m) = (min) (min) = (min) = (min) = (cms) = (c	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05	= 61.00
(iii) PEAK FLOW ALIB PANDHYD (0037) 1 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd, peak	Area Total (ha) = (mm) = (%) = (m) = (min) (min) = (min) = (min) = (cms) = (c	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05	= 61.00
(iii) PEAK FLOW ALIB PANDHYD (0037) 1 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd, peak	Area Total (ha) = (mm) = (%) = (m) = (min) (min) = (min) = (min) = (cms) = (c	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05	= 61.00
(iii) PEAK FLOW ALIB PANDHYD (0037) 1 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd, peak	Area Total (ha) = (mm) = (%) = (m) = (min) (min) = (min) = (min) = (cms) = (c	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05	= 61.00
(iii) PEAK FLOW ALIB TANDHYD (0037) = 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area Total (ha) = (mm) = (%) = (m) = (min) (min) = (min) = (min) = (cms) = (c	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05	= 61.00
(iii) PEAK FLOW ALIB PANDHYD (0037) 1 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(mover Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	Area Total (ha) = (mm) = (%) = (min) (min) = (min) = (cms) = (hrs) = (mm) = (mn) = (m	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19 .97 2.75 54.69 55.69 .98 CTED FOR PERVIOU	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05 .22 3.00 25.02 55.69 .45	= 61.00
(iii) PEAK FLOW ALIB PANDHYD (0037) 1 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(m Over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE (i) CN PROCEDU CN* = 8	Area Total (ha) = (mm) = (%) = (min) = (min) = (min) = (min) = (ms) = (ms) = (ms) = (mm) = (mm) = (mm) = (mm) = (ms) = ((ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19 .97 2.75 54.69 55.69 .98 CTED FOR PERVIOUS	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05 .22 3.00 25.02 55.69 .45 US LOSSES: pe (Above)	= 61.00
(iii) PEAK FLOW ALIB PANDHYD (0037) 1 Total DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE (i) CN PROCEDU CN* = 8 (ii) TIME STEP	Area Total (ha) = (mm) = (%) = (min) = (min) = (min) = (ms) = (m	(ha) = 11.18 Imp(%) = 61.00 IMPERVIOUS 6.82 1.00 1.00 273.00 .013 51.24 5.00 6.10 (ii) 5.00 .19 .97 2.75 54.69 55.69 .98 CTED FOR PERVIOU	Dir. Conn.(%) PERVIOUS (i) 4.36 5.00 1.00 40.00 .250 29.52 25.00 20.25 (ii) 25.00 .05 .22 3.00 25.02 55.69 .45 US LOSSES: pe (Above)	= 61.00

| RESERVOIR (0039) | | IN= 2---> OUT= 1 |

				STORAGE (ha.m.) .0000			(ha.m.) .3698 R.V.
INFL OUTF	OW : ID=	= 2 (0037) = 1 (0039)	(ha 11.1 11.1	EA QPE. a) (cm 18 1.	s) (h 14 2 47 3	rs) .75 .17	(mm) 43.12 43.11
		TIME SH MAXIMUM	IFT OF PE	EDUCTION [EAK FLOW E USED	(m (ha.	in)= 25 m.)= .	.00 2075
ADD HYD 1 +	(0040)) 	AREA (ha)	QPEAK	TPEAK	R.V.	
+	ID1= 1 ID2= 2	(0038): (0039):	18.43 11.18	QPEAK (cms) 2.128 .472	2.75	47.27 43.11	
	ID = 3	(0040):	29.61	2.530	2.75	45.70	
NOTE	: PEAK	FLOWS DO	NOT INCLU	JDE BASEFL	OWS IF AN	Y.	
ADD HYD 1 +	(0044 2 = 3 ID1= 1 ID2= 2	(0042): (0040):	AREA (ha) 16.77 29.61	QPEAK (cms) 1.976 2.530	TPEAK (hrs) 2.75 2.75	R.V. (mm) 47.73 45.70	
				4.506		46.43	
NOTE	: PEAK	FLOWS DO	NOT INCLU	JDE BASEFL	OWS IF AN	Υ.	
RESERVO IN= 2 DT= 5.	-> OUT= 0 min	1 0	.0000 .0750 .2240 .3320	STORAGE (ha.m.) .0000 .7700 1.1000 1.5000	.4 .5 .5	050 050 840 640	STORAGE (ha.m.) 1.7000 2.0500 2.2500 2.5000
INFL OUTF	OW : ID=	= 2 (0044) = 1 (0041)	ARI (ha 46.3 46.3	EA QPE. a) (cm 38 4. 38 .	AK TP s) (h 51 2 40 4	EAK rs) .75 .92	R.V. (mm) 46.43 46.34
		TIME SH	IFT OF P	EDUCTION [EAK FLOW E USED	(m	(%)= 8 in)=130 m.)= 1.	.00
		******	***				

	\Des: Comments: 25yr,		STORM\6 and 12	hour AES
TIME hrs .25 .50 .75 1.00 1.25 1.50 1.75		RAIN TIME mm/hr hrs 22.30 3.75 22.30 4.00 60.35 4.25 60.35 4.50 17.06 4.75 17.06 5.00 9.18 5.25		
CALIB	Area (ha)= 1 Total Imp(%)= 8	16.77 30.00 Dir. Conn.	(%) = 70.00	
Length	IMPERVIOU (%) = 1.00 (%) = 1.00 (m) = 334.40 = .013	40.00		
NOTE: RAINFALI	WAS TRANSFORM	ED TO 5.0 MIN. T	TIME STEP.	
	TRA	ANSFORMED HYETOGRA	APH	
TIME	RAIN TIME	RAIN TIME	RAIN TIME	RAIN mm/hr
.083	.00 1.667	7.87 3.250	17.06 4.83	1.31
.167	.00 1.750	7.87 3.333	9.18 4.92	1.31
.250	.00 1.833	22.30 3.417	9.18 5.00	1.31
.333 417	1.31 1.91/	22.30 3.500	9.18 5.08	1.31
.500	1.31 2.000	22.30 3.667	9.18 5.25	1.31
.583	1.31 2.167	22.30 3.750	9.18 5.33	1.31
.667	1.31 2.250	22.30 3.833	5.25 5.42	1.31
.750	1.31 2.333	60.35 3.917	5.25 5.50	1.31
.917	1.31 2.417	60.35 4.000	5.25 5.67	1.31
1.000	1.31 2.583	60.35 4.167	5.25 5.75	1.31
1.083	1.31 2.667	60.35 4.250	5.25 5.83	1.31
1.167	1.31 2.750	60.35 4.333 17.06 4.417	2.62 5.92	1.31
1.333	7.87 2.917	17.06 4.500	2.62 6.08	1.31
1.417	7.87 3.000	17.06 4.583	2.62 6.17	1.31
1.500 1.583	7.87 3.083	17.06 4.667 17.06 4.750	2.62 6.25	1.31
1.303	7.07 3.107	RAIN TIME mm/hr hrs 7.87 3.250 7.87 3.250 7.87 3.333 22.30 3.503 22.30 3.503 22.30 3.583 22.30 3.750 22.30 3.750 22.30 3.750 22.30 3.750 22.30 3.833 60.35 4.000 60.35 4.000 60.35 4.003 60.35 4.167 60.35 4.250 60.35 4.250 60.35 4.250 60.35 4.250 60.35 4.333 17.06 4.417 17.06 4.503 17.06 4.503 17.06 4.503 17.06 4.503 17.06 4.750	2.02	
Max.Eff.Inten.(mm/r	nr)= 60.35	68.28 20.00		
Storage Coeff. (mi	in) = 6.45	(ii) 16.57 (ii)		
over (mi Storage Coeff. (mi Unit Hyd. Tpeak (mi Unit Hyd. peak (cr	in) = 5.00	20.00		
			TOTALS	
PEAK FLOW (cm	ns)= 1.96	.46	2.381 (iii)
TIME TO PEAK (hi	(s) = 2.75	2.92	2.75	
PEAK FLOW (CI TIME TO PEAK (h) RUNOFF VOLUME (I TOTAL RAINFALL (I	nm) = 64.59	.46 2.92 39.98 65.59	57.21 65.59	
TOTAL KAINFALL (F RUNOFF COEFFICIENT	nm) = 65.59 = .98	.61	.87	

```
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* = 83.0 Ia = Dep. Storage (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
I CALTB
| STANDHYD (0038) | Area (ha) = 18.43
|ID= 1 DT= 5.0 min | Total Imp(%)= 75.00 Dir. Conn.(%)= 75.00
                                  IMPERVIOUS PERVIOUS (i)
     Surface Area (ha) = Dep. Storage (mm) =
                                  13.82
                                                    4.61
                                   1.00
                                                     5.00
    Average Slope (%) = 1.00 1.00

Length (m) = 350.50 40.00

Mannings n = .013 .250
    PEAK FLOW (cms) = 2.30 .32
TIME TO PEAK (hrs) = 2.75 2.92
RUNOFF VOLUME (mm) = 64.59 32.60
TOTAL RAINFALL (mm) = 65.59 65.59
RUNOFF COEFFICIENT = .98 .50
                                                                   *TOTALS*
                                                                 2.585 (iii)
                                                                     2.75
                                                                  56.59
                                                                     65.59
                                                                     .86
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* = 83.0 Ia = Dep. Storage (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| STANDHYD (0037) | Area (ha) = 11.18
|ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
                                  IMPERVIOUS PERVIOUS (i)
     Surface Area (ha) = 6.82 4.36

Dep. Storage (mm) = 1.00 5.00

Average Slope (%) = 1.00 1.00

Length (m) = 273.00 40.00

Mannings n = .013 .250
                                               38.12
     Max.Eff.Inten.(mm/hr) = 60.35
     Max.Eff.Inten.(mm/nt/= 0.53 5...- 0.55 5.00 20.00
Storage Coeff. (min)= 5.71 (ii) 18.49 (ii)
Unit Hyd. Tpeak (min)= 5.00 20.00
Unit Hyd. peak (cms)= .20 .06
                                  1.14 .31
2.75 2.92
64.59 32.60
65.59 65.59
.98 .50
                                                                   *TOTALS*
                       (cms) =
                                                                 1.414 (iii)
     PEAK FLOW
     TIME TO PEAK (hrs)=
     RUNOFF VOLUME (mm) =
                                                                  52.11
     TOTAL RAINFALL (mm) =
                                                                  65.59
     RUNOFF COEFFICIENT =
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN^* = 83.0 Ia = Dep. Storage (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
THAN THE STORAGE COEFFICIENT
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| RESERVOIR (0039) |
 IN= 2---> OUT= 1 |
| DT= 5.0 min |
                       OUTFLOW STORAGE
                                         OUTFLOW
                                                       STORAGE
                       (cms)
                                 (ha.m.)
                                          (cms)
                                                       (ha.m.)
                         .0000
                                  .0000
                                              .8410
                                                         .3698
                             AREA
                                      OPEAK
                                               TPEAK
                                                          R.V.
                             (ha)
                                      (cms)
                                               (hrs)
                                                          (mm)
    INFLOW : ID= 2 (0037)
                            11.18
                                                2.75
                                                         52.11
                                      1.41
    OUTFLOW: ID= 1 (0039)
                            11.18
                                                3.17
                                                         52.10
                 PEAK FLOW REDUCTION [Qout/Qin] (%) = 40.90
                 TIME SHIFT OF PEAK FLOW
                                            (min) = 25.00
                 MAXIMUM STORAGE USED
                                             (ha.m.) = .2546
| ADD HYD (0040) |
| 1 + 2 = 3 |
                          AREA
                                 OPEAK
                                          TPEAK
                                                   R.V.
                           (ha)
                                  (cms)
                                          (hrs)
        ID1= 1 (0038):
                         18.43
                                2.585
                                          2.75
                                                  56.59
       + ID2= 2 (0039):
                         11.18
                                          3.17
                                                  52.10
         ID = 3 (0040): 29.61 3.079
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| ADD HYD (0044) |
1 + 2 = 3
                          AREA
                                 QPEAK
                                          TPEAK
                          (ha)
                                  (cms)
                                          (hrs)
                                                   (mm)
        TD1 = 1 (0042).
                         16 77 2 381
                                          2 75
                                                 57 21
       + ID2= 2 (0040):
                         29.61 3.079
         ID = 3 (0044): 46.38 5.460
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| RESERVOIR (0041) |
 IN= 2---> OUT= 1 |
| DT= 5.0 min |
                       OUTFLOW
                                 STORAGE
                                         OUTFLOW
                        (cms)
                                 (ha.m.)
                                         (cms)
                                                       (ham)
                         .0000
                                  .0000
                                               .4050
                                                        1.7000
                         .0750
                                  .7700
                                              .5050
                                                        2.0500
                         .2240
                                 1 1000
                                               .5840
                                                        2 2500
                         .3320
                                  1.5000
                                               .6640
                                                        2.5000
                             AREA
                                      OPEAK
                                               TPEAK
                                                          R.V.
                             (ha)
                                      (cms)
                                               (hrs)
    INFLOW : ID= 2 (0044)
                            46.38
                                      5.46
                                                2.75
                                                         55.73
    OUTFLOW: TD= 1 (0041)
                                                         55.63
                 PEAK FLOW REDUCTION [Qout/Qin](%) = 9.06
                 TIME SHIFT OF PEAK FLOW
                                              (min) = 125.00
                 MAXIMUM STORAGE USED
```

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*******
  ** SIMULATION NUMBER: 6 **
| READ STORM | Filename: G:\Projects\2008\
                               08104 - Vaughan Corporate Centre - Master Ser
                               \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 73.00 mm | Comments: 50yr/6hr
               TIME RAIN | TIME
                                     RAIN | TIME RAIN | TIME
                     mm/hr | hrs
                                     mm/hr |
                                              hrs
                                                    mm/hr |
                                                                   mm/hr
                        .00 | 2.00
                                     24.82
                                             3.75
                                                    10.22
                                                            5.50
                .50
                       1.46 | 2.25
                                     24.82 | 4.00
                                                    5.84 | 5.75
                                                                   1.46
                                     67.16 | 4.25
                                                    5.84 | 6.00
                       1.46 | 2.50
                                                                   1.46
                                     67.16 |
                                             4.50
                                                     2.92 |
                       1.46 | 2.75
                                                            6.25
                       1.46 | 3.00
                                            4.75
               1.25
                                     18.98 I
                                                    2.92 |
               1.50
                       8.76 | 3.25
                                    18.98 | 5.00
                                                    1.46
               1.75
                       8.76 | 3.50
                                    10.22 | 5.25
I CALTB
| STANDHYD (0042) |
                     Area
                           (ha) = 16.77
|ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 70.00
                            IMPERVIOUS
                                         PERVIOUS (i)
    Surface Area
                    (ha)=
                              13.42
                                           3.35
    Dep. Storage
                    (mm) =
                               1.00
                                           5.00
                     (%)=
                               1.00
                                           1.00
    Average Slope
                             334.40
    Length
                     (m) =
                                          40.00
    Mannings n
                               .013
        NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                             ---- TRANSFORMED HYETOGRAPH ----
               TIME
                      RAIN | TIME RAIN | TIME RAIN | TIME
                                                                   RATN
                      mm/hr | hrs
                                     mm/hr |
                                              hrs
                                                    mm/hr |
                .083
                       .00 | 1.667
                                     8.76 | 3.250
                                                    18.98 | 4.83
                .167
                        .00 | 1.750
                                     8.76 | 3.333
                                                    10.22 | 4.92
                        .00 | 1.833
                                     24.82 | 3.417
                                                    10.22
               .333
                       1.46 | 1.917
                                     24.82 | 3.500
                                                    10.22 | 5.08
                                                                    1.46
                       1.46 | 2.000
                                     24.82 | 3.583
                .417
                                                    10.22 | 5.17
                .500
                       1.46 | 2.083
                                     24.82 | 3.667
                                                    10.22 |
                       1.46 | 2.167
                                     24.82 | 3.750
                                                    10.22 I
               .583
                                                            5.33
                .667
                       1.46 | 2.250
                                     24.82 | 3.833
                                                     5.84 |
                .750
                       1.46 | 2.333
                                     67.16 | 3.917
                                                     5.84
               .833
                       1.46 | 2.417
                                     67.16 | 4.000
                                                    5.84 | 5.58
                                                                    1.46
               917
                       1.46 | 2.500
                                     67.16 | 4.083
                                                    5 84 1 5 67
                                                                   1 46
               1.000
                       1.46 | 2.583
                                     67.16 | 4.167
                                                     5.84 |
                                                           5.75
               1.083
                       1.46 | 2.667
                                     67.16 | 4.250
                                                     5.84 | 5.83
                       1.46 | 2.750
                                     67.16 | 4.333
                                                     2 92 1 5 92
               1 167
                                                                   1 46
                       1.46 | 2.833
                                     18.98 | 4.417
                                                     2.92
               1.333
                       8.76 | 2.917
                                     18.98 | 4.500
                                                     2.92 | 6.08
                                                                   1.46
               1.417
                       8.76 | 3.000
                                     18.98 | 4.583
                                                    2.92 | 6.17
                       8.76 | 3.083
                                     18.98 | 4.667
                                                    2.92
               1.583
                      8.76 | 3.167
                                    18.98 | 4.750
                                                    2.92 |
    Max.Eff.Inten.(mm/hr)=
             over (min)
                               5.00
                                          20.00
    Storage Coeff. (min) =
                               6.18 (ii) 15.66 (ii)
    Unit Hyd. Tpeak (min) =
                               5.00
    Unit Hyd. peak (cms)=
                               .19
                                                       *TOTALS*
```

PEAK FLOW	(cms) =	2.18	.55	2.689 (i	ii)
TIME TO PEAK	(hrs) =	2.75	2.83	2.75	
RUNOFF VOLUME	(mm) =	72.00	46.51	64.35	
TOTAL RAINFALL	(mm) =	73.00	73.00	73.00	
RUNOFF COEFFIC:	ENT =	.99	.64	.88	
(i) CN PROCEI	DURE SELECTED	FOR PERV	IOUS LOSSES:		
CN* =	83.0 Ia =	Dep. Sto	rage (Above)		
(ii) TIME STE	P (DT) SHOULD	BE SMALL	ER OR EQUAL		
THAN THE	STORAGE COER	FICTENT			

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

| CALIB | STANDHYD (0038) | Area (ha) = 18.43 |ID= 1 DT= 5.0 min | Total Imp(%) = 75.00 Dir. Conn.(%) = 75.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) = 13.82 4.61 1.00 5.00 Dep. Storage (mm) = Average Slope (%)= 1.00 Length (m) = 350.5040.00

.013 .250 Mannings n 67.16 44.75 Max.Eff.Inten.(mm/hr)= 5.00 20.00 over (min) 6.36 (ii) 18.34 (ii) Storage Coeff. (min) = Unit Hyd. Tpeak (min) = 5.00 20.00 .19 Unit Hyd. peak (cms)= .06 *TOTALS* PEAK FLOW 2.56 .39 (cms) = 2.913 (iii) TIME TO PEAK (hrs)= 2.75 2.92 2.75 RUNOFF VOLUME (mm) = 72.00 38.53 TOTAL RAINFALL (mm) = 73.00 73.00 73.00 RUNOFF COEFFICIENT = .99

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 83.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB							
STANDHYD (0037)	Area	(ha) =	11.18				
ID= 1 DT= 5.0 min	Total	Imp(%)=	61.00	Dir. C	onn.(%)=	61.00	
		IMPERVI(PERVIOUS	(i)		
Surface Area	(ha)=	6.8	2	4.36			
Dep. Storage	(mm) =	1.0	0	5.00			
Average Slope	(%) =	1.0	0	1.00			
Length	(m) =	273.0	0	40.00			
Mannings n	=		3	.250			
Max.Eff.Inten.(m	m/hr)=	67.1	6	44.75			
over	(min)	5.0	0	20.00			
Storage Coeff.	(min) =	5.4	7 (ii)	17.46	(ii)		
Unit Hyd. Tpeak							
Unit Hyd. peak	(cms) =	.2	0	.06			
					T	OTALS	
PEAK FLOW	(cms) =	1.2	7	.38		1.607 (iii)	
TIME TO PEAK	(hrs)=	2.7	5	2.92		2.75	
		72.0		38.53		58.94	

TOTAL RAINFALL (mm) RUNOFF COEFFICIENT	= 73 =	3.00	73.00 .53		73.00 .81	
(i) CN PROCEDURE SE CN* = 83.0 (ii) TIME STEP (DT) THAN THE STORAG (iii) PEAK FLOW DOES	Ia = De SHOULD BI E COEFFIC	ep. Storage E SMALLER C CIENT.	(Above	:)		
	.0000	STORAGE (ha.m.)	(cm	410	STORAGE (ha.m.) .3698	
INFLOW: ID= 2 (0037) OUTFLOW: ID= 1 (0039) PEAK TIME SH		EA QPEA a) (cms 18 1.6 18 .6 EDUCTION [Q EAK FLOW E USED			R.V. (mm) 58.94 58.93	
ADD HYD (0040) 1 + 2 = 3 ID1= 1 (0038): + ID2= 2 (0039):						
+ ID2= 2 (0039): ID = 3 (0040): NOTE: PEAK FLOWS DO	29.61	3.473	2.75	61.86		
ADD HYD (0044) 1 + 2 = 3				R.V. (mm) 64.35 61.86		
NOTE: PEAK FLOWS DO	NOT INCLU	JDE BASEFLO	WS IF AN	IY.		
RESERVOIR (0041) IN= 2> OUT= 1 DT= 5.0 min O	UTFLOW (cms) .0000 .0750 .2240	STORAGE (ha.m.) .0000 .7700 1.1000	OUTF (cm .4 .5 .5 .6	PLOW us) 050 050 840	STORAGE (ha.m.) 1.7000 2.0500 2.2500 2.5000	
INFLOW : ID= 2 (0044)					R.V. (mm)	

```
OUTFLOW: ID= 1 (0041)
                            46 38
                                        5.8
                                                4 83
                                                         62 66
                 PEAK FLOW REDUCTION [Qout/Qin](%) = 9.49
                 TIME SHIFT OF PEAK FLOW (min)=125.00
                 MAXIMUM STORAGE USED
                                             (ha.m.) = 2.2532
 ** SIMULATION NUMBER: 7 **
                     Filename: G:\Projects\2008\
                      08104 - Vaughan Corporate Centre - Master Ser
                               \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 80.31 mm |
                     Comments: 100yr/6hr
              TIME RAIN | TIME RAIN | TIME RAIN | TIME
                                                                  RATN
                hrs
                      mm/hr |
                              hrs
                                     mm/hr |
                                             hrs
                                                   mm/hr |
                                                                   mm/hr
                       .00 | 2.00
                                    27.30 |
                                            3.75
                                                  11.24 | 5.50
                                                                  1.61
                       1.61 | 2.25
                                     27 30 I 4 00
                                                    6.42 | 5.75
                                                                   1 61
                .75
                      1.61 | 2.50
                                     73.88 |
                                            4.25
                                                    6.42 | 6.00
                      1.61 | 2.75
                                     73.88 | 4.50
                                                     3.21 | 6.25
               1.25
                                    20.88 | 4.75
                      1.61 | 3.00
                                                    3.21 |
                       9.64 | 3.25
                                     20.88 | 5.00
                                                     1.61 |
               1.75
                      9.64 | 3.50
                                   11.24 | 5.25
                                                    1.61 L
| STANDHYD (0042) |
                    Area (ha) = 16.77
|ID= 1 DT= 5.0 min | Total Imp(%) = 80.00 Dir. Conn.(%) = 70.00
                            IMPERVIOUS
                                        PERVIOUS (i)
    Surface Area
                    (ha) =
                              13 42
                                           3 35
    Dep. Storage
                    (mm) =
                               1.00
                                           5.00
    Average Slope
                    (%)=
                               1.00
                                           1.00
                             334 40
                                          40 00
    Length
                     (m) =
                              .013
                                           .250
        NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                            --- TRANSFORMED HYETOGRAPH ----
                       RAIN | TIME
                                    RAIN | TIME
                                                   RAIN | TIME
                      mm/hr | hrs
                                   mm/hr |
                                             hrs
                                                   mm/hr | hrs
                                                                  mm/hr
                        .00 | 1.667
                                     9.64 | 3.250
                                                   20.88 | 4.83
                                                                   1 61
                       .00 | 1.750
                                     9.64 | 3.333
                                                    11.24 | 4.92
                .250
                       .00 | 1.833
                                     27.30 | 3.417
                                                   11.24 | 5.00
                                                                    1.61
                .333
                      1.61 | 1.917
                                     27.30 | 3.500
                                                   11.24 | 5.08
                                                                    1 61
                .417
                      1.61 | 2.000
                                     27.30 | 3.583
                                                    11.24 | 5.17
                      1.61 | 2.083
                                     27.30 | 3.667
                                                    11.24 | 5.25
                583
                      1.61 | 2.167
                                     27.30 | 3.750
                                                    11.24 | 5.33
                                                                    1 61
                                                     6.42 | 5.42
                .667
                       1.61 | 2.250
                                     27.30 | 3.833
               .750
                      1.61 | 2.333
                                     73.88 | 3.917
                                                     6.42 | 5.50
                                                                    1.61
               .833
                      1.61 | 2.417
                                     73.88 | 4.000
                                                     6.42 | 5.58
                .917
                       1.61 | 2.500
                                     73.88 | 4.083
                                                     6.42 | 5.67
              1.000
                      1.61 | 2.583
                                     73.88 | 4.167
                                                     6.42 | 5.75
                                                                    1.61
              1.083
                                                     6.42 | 5.83
                      1.61 | 2.667
                                     73.88 | 4.250
                                                                    1.61
              1.167
                       1.61 | 2.750
                                     73.88 | 4.333
                                                     3.21 | 5.92
              1.250
                      1.61 | 2.833
                                     20.88 | 4.417
                                                     3.21 | 6.00
                                                                    1.61
              1.333
                       9.64 | 2.917
                                     20.88 | 4.500
                                                     3.21 | 6.08
                                                                    1 61
```

1.417

9.64 | 3.000

9.64 | 3.083

20.88 | 4.583

20.88 | 4.667

9.64 | 3.167 20.88 | 4.750

3.21 | 6.17

3.21 | 6.25

3.21 I

```
Max.Eff.Inten.(mm/hr)=
                               5.00
                                           15.00
            over (min)
    Storage Coeff. (min) =
                               5.95 (ii) 14.97 (ii)
    Unit Hyd. Tpeak (min) =
    Unit Hyd. peak (cms)=
                                                        *TOTALS*
    PEAK FLOW
                                                         3.040 (iii)
    TIME TO PEAK
                  (hrs)=
                               2.75
                                           2.83
                                                         2.75
    RUNOFF VOLUME
                    (mm) =
                               79.31
                                           53.07
    TOTAL RAINFALL
                    (mm) =
    RUNOFF COEFFICIENT =
                                           . 66
                                                          . 89
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN^* = 83.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| STANDHYD (0038) | Area (ha) = 18.43
|ID= 1 DT= 5.0 min | Total Imp(%)= 75.00 Dir. Conn.(%)= 75.00
                            IMPERVIOUS
                                         PERVIOUS (i)
                    (ha)=
    Surface Area
                               13.82
                                           4.61
                               1.00
    Dep. Storage
                    (mm) =
    Average Slope
                    (%)=
                               1.00
                                            1.00
    Length
                     (m) =
                              350.50
                                           40.00
    Mannings n
                               .013
                              73.88
    Max.Eff.Inten.(mm/hr)=
                                           51 42
              over (min)
                               5.00
                                           20.00
                              6.12 (ii) 17.46 (ii)
    Storage Coeff. (min) =
    Unit Hyd. Tpeak (min) =
                             5.00
                                           20 00
    Unit Hyd. peak (cms)=
                               .19
                                                       *TOTALS*
    PEAK FLOW
                               2.82
                                           46
                                                        3 240 (iii)
                   (cms)=
    TIME TO PEAK
                   (hrs) =
                               2.75
                                           2.92
                                                         2.75
    RUNOFF VOLUME
                   (mm) =
                               79.31
                                          44.54
                                                         70.62
    TOTAL RAINFALL (mm) =
                               80.31
                                        80.31
                                                         80.31
    RUNOFF COEFFICIENT =
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN^* = 83.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
I CALTE
                     Area
                           (ha) = 11.18
|ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
                            IMPERVIOUS
                                         PERVIOUS (i)
    Surface Area
                     (ha)=
                               6.82
                                            4.36
                     (mm) =
                               1.00
                                            5.00
    Dep. Storage
                     (%)=
                               1.00
    Average Slope
                              273.00
    Length
                     (m) =
                                           40.00
    Mannings n
    Max.Eff.Inten.(mm/hr)=
              over (min)
                               5 00
```

Storage Coeff. (min Unit Hyd. Tpeak (min Unit Hyd. peak (cms PEAK FLOW (cms TIME TO PEAK (hrs RUNOFF VOLUME (mm TOTAL RAINFALL (mm RUNOFF COEFFICIENT (i) CN PROCEDURE SC CN* = 83.0 (ii) TIME STEP (DT) THAN THE STORA (iii) PEAK FLOW DOES) =	1.40 2.75 9.31 0.31 .99 DR PERVIOU ep. Storag E SMALLER	.44 2.92 44.54 80.31 .55 S LOSSES: e (Above	* : :	TOTALS* 1.800 (iii) 2.75 65.75 80.31 .82
RESERVOIR (0039) IN= 2> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTF (cm .8	FLOW	STORAGE (ha.m.) .3698
INFLOW: ID= 2 (0037 OUTFLOW: ID= 1 (0039 PEAK TIME S.	ARI (ha) 11.:) 11.: FLOW RI HIFT OF PI		AK TF s) (h 80 2 73 3 Qout/Qin]	PEAK ars) 2.75 3.17 (%) = 40 ain) = 25	R.V. (mm) 65.75 65.74
ADD HYD (0040) 1 + 2 = 3				R.V. (mm) 70.62 65.74 	
NOTE: PEAK FLOWS DO	NOT INCL	UDE BASEFL	OWS IF AN	IY.	
ADD HYD (0044) 1 + 2 = 3	46.38	6.907	2.75	69.74	
RESERVOIR (0041) IN= 2> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTF (cm .4	FLOW ns)	STORAGE (ha.m.) 1.7000

.2240 1.1000 .5840 2.2500 .3320 1.5000 .6640 2.5000 AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0044) 46.38 6.91 2.75 69.74 OUTFLOW: ID= 1 (0041) 46.38 .66 4.83 69.63 PEAK FLOW REDUCTION [Qout/Qin](%)= 9.56 TIME SHIFT OF PEAK FLOW (min)=125.00 MAXIMUM STORAGE USED (ha.m.)= 2.4897						.0750	.7700		.5050	2.0500	
AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0044) 46.38 6.91 2.75 69.74 OUTFLOW: ID= 1 (0041) 46.38 .66 4.83 69.63 PEAK FLOW REDUCTION [Qout/Qin] (%) = 9.56 TIME SHIFT OF PEAK FLOW (min)=125.00 MAXIMUM STORAGE USED (ha.m.) = 2.4897						.2240	1.1000		.5840	2.2500	
(ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0044)						.3320	1.5000	- 1	.6640	2.5000	
INFLOW: ID= 2 (0044) 46.38 6.91 2.75 69.74 OUTFLOW: ID= 1 (0041) 46.38 .66 4.83 69.63 PEAK FLOW REDUCTION [Qout/Qin] (%) = 9.56 TIME SHIFT OF PEAK FLOW (min)=125.00 MAXIMUM STORAGE USED (ha.m.) = 2.4897						AREA	QPE	ΑK	TPEAK	R.V.	
OUTFLOW: ID= 1 (0041) 46.38 .66 4.83 69.63 PEAK FLOW REDUCTION [Qout/Qin](%)= 9.56 TIME SHIFT OF PEAK FLOW (min)=125.00 MAXIMUM STORAGE USED (ha.m.)= 2.4897						(ha)	(cms	s)	(hrs)	(mm)	
PEAK FLOW REDUCTION [Qout/Qin](%) = 9.56 TIME SHIFT OF PEAK FLOW (min)=125.00 MAXIMUM STORAGE USED (ha.m.) = 2.4897		INFLOW :	ID=	2	(0044)	46.38	6.9	91	2.75	69.74	
TIME SHIFT OF PEAK FLOW (min)=125.00 MAXIMUM STORAGE USED (ha.m.)= 2.4897		OUTFLOW:	ID=	1	(0041)	46.38	. 6	66	4.83	69.63	
TIME SHIFT OF PEAK FLOW (min)=125.00 MAXIMUM STORAGE USED (ha.m.)= 2.4897											
MAXIMUM STORAGE USED (ha.m.)= 2.4897				1	PEAK	FLOW REDU	JCTION [Qout	/Qin](%)=	9.56	
				- 5	TIME SH	IFT OF PEAR	K FLOW		(min) = 1	125.00	
FINISH				1	MUMIXAN	STORAGE	USED		(ha.m.) =	2.4897	
FINISH											
FINISH											
FINISH											
	FIN:	ISH									
	====			==:							

Municipal Servicing Class Environmental Assessment Master Plan
VAUGHAN METROPOLITAN CENTRE - CITY OF VAUGHAN
NOV 2012

Appendix D8

Storage Summary

Vaughan Metropolitan Centre

City of Vaughan

Project #: 08104

Date: April 2012

6 hours AES Storm

SE Corner of Jane St. & Hwy 7 (31.88ha)

Preferred Scenario: Controlled Flow - 2-year post-development release rates controlled at 80% Imperviousness from development block + LID (15mm)

Event	Target Release Rate (m³/s)	Required Storage (m ³)		
Permanent Pool	-	5,675		
Erosion	0.052	5,230		
2-year	0.163	7,202		
5-year	0.242	9,521		
10-year	0.294	11,158		
25-year	0.368	13,234		
50-year	0.425	14,787		
100-year	0.483	16,325		

- Total Storage = Permanent Pool Storage + Active Storage

= 22,000 m^3

SW Corner of Jane St. & Hwy 7 (73.62ha)

Preferred Scenario: Controlled Flow - 2-year post-development release rates controlled at 80% Imperviousness from development block + LID (15mm)

Event	Target Release Rate (m³/s)	Required Storage (m ³)		
Permanent Pool	-	12,420		
Erosion	0.126	11,416		
2-year	0.329	16,185		
5-year	0.489	21,619		
10-year	0.597	25,409		
25-year	0.745	30,229		
50-year	0.860	33,869		
100-year	0.977	37,482		

Total Storage = Permanent Pool Storage + Active Storage = 49,902 m³

NW Corner of Millway Avenue & Hwy 7 (48.38ha)

Preferred Scenario: Controlled Flow - 2-year post-development release rates controlled at 80% Imperviousness from development block + LID (15mm)

Event	Target Release Rate (m³/s)	Required Storage (m³)		
Permanent Pool	-	8,580		
Erosion	0.075	7,700		
2-year	0.224	11,000		
5-year	0.332	15,000		
10-year	0.405	17,000		
25-year	0.505	20,500		
50-year	0.584	22,500		
100-year	0.664	25,000		

Total Storage = Permanent Pool Storage + Active Storage

= <u>33,580</u> m³

Appendix D9

Proposed Hydrologic Modeling for SWM SW Pond (Considering L.I.D. Measures Within R.O.W.)

Vaughan Metropolitan Centre City of Vaughan

Volume Provided within LID measures

Assumptions and Methodology:

The purpose of this modeling is to analyze the positive impact of applying LID measures along proposed ROW. For the purpose of this report the initial runoff coefficient from Roads/ROW is conservatively assumed to be C=0.90 The following analysis will justify a reduction of initial runoff coefficient. As an example this analysis will identify runoff reduction for the road/ROW areas contributing into the proposed interchange pond, SWM Pond SW. Total area contributing into the SWM pond is 73.62ha, of which 34.70ha to have on-site controls, and the remainder of the area of 38.92ha discharging uncontrolled into SWM pond.

Total Area to SWM Pond 73.62 ha
on-site controls 34.07 ha
uncontrolled
open space / parks Roads/ROW 21.34 ha

As per the current Secondary plan and the proposed road layout a total road length where the LID measures can be applied is measured to be 5700m. Therefore if linear underground LID are proposed on both sides of ROW, the maximum available length to be used for LID is 11,400m.

The proposed LID are envisioned as infiltration trenches/linear bioretention trenches, where the filter media will provide quality, erosion and water attenuation within the porous media.

It is assumed that the LID measures will have the following conceptual geometry:

Width: 1.00 m
Height: 1.20 m
Porosity: 0.40

Overall max length 11,400.00 m

Therefore the volume provided within the voids will be:

Provided Volume: 5,472.00 m³

Runoff volume from 25mm storm event is:

Rainfall Depth: 25.00 mm Runoff Coefficient: 0.90 Area Road: 21.34 ha

Accumulated Runoff Volume from 25mm storm: 4,801.50 m³

Form above analysis can be seen that the 25mm storm event runoff volume is less than the provided volumes within voids of media.

Therefore an assumption can be made that the 25mm storm event can be stored within media voids and a runoff coefficient reduction of 25 mm can be applied to road area.

The detailed runoff coefficient reduction calculation can be found in the following Appendix B.

Project #: 08104

Date: April 2012

A separate VO2 modeling is generated to analyze the impact of reduced runoff coefficient applied for road areas into the required pond volumes. The output file from VO2 modeling can be found in Appendix B.

The following table summarizes findings of the analysis regarding Volume Required within SWM Pond SW

	Option 1	Optio	n 2	Opti	on 3
	No LID within ROW	LID applied 100% along both sides of ROW		LID applied 50% along both sides of ROW	
Event	Required	Required	%	Required	% reduction
Event	Volumes	Volumes	reduction	Volumes	70 TCGGGGGGT
25mm storm	11,412.00	9,714.00	15%	10,563.00	7%
2 year	16,135.00	14,000.00	13%	15,054.00	7%
5 year	21,584.00	19,083.00	12%	20,319.00	6%
10 year	25,393.00	22,684.00	11%	24,031.00	5%
25 year	30,208.00	27,268.00	10%	28,734.00	5%
50 year	33,584.00	30,779.00	8%	32,274.00	4%
100 year	37,481.00	34,284.00	9%	35,833.00	4%

As ca be seen from above table, utilizing LID measures within ROW will reduce the required volumes in SWM Pond SW. If LID are applied 100% within the ROW / Roads than a reduction of approximately 9% in the required volumes can be expected. If LID are applied 50% within the ROW / Roads than a reduction of approximately 4% in the required volumes can be expected.

A conceptual analysis is performed to translate this volume reduction into pond block area reduction:

As per current pond design the pond geometry can be summarized:

	Pond Block Area	3.80 ha
	Top of Active storage Area	2.62 ha
	Top of permanent Pool Area	1.70 ha
	Active Storage Depth	2.2 m
	Volume Provided	4.75 ham
Conclusions:		
	Volume after 9 % reduction	4.32 ham
	Calculated base of the pond after volume reduction	1.55 ha
	% Reduction on Pond block area by applying 100% LID	9%
	Volume after 4 % reduction	4.56 ham
	Calculated base of the pond after volume reduction	1.63 ha
	% Reduction on Pond block area by applying 50% LID	4%

Vaughan Metropolitan Centre City of Vaughan

100 year Imperviousness Calculation for areas contributing into SW Pond (100% LID Measures within ROW / Roads)

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

Runoff reduction = 15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅	% reduction
25mm	25.00	22.50	7.50	0.30	67%
2-Year	36.00	32.40	17.40	0.48	46%
5-Year	47.80	43.02	28.02	0.59	35%
10-Year	55.70	50.13	35.13	0.63	30%
25-Year	65.60	59.04	44.04	0.67	25%
50-Year	73.00	65.70	50.70	0.69	23%
100-Year	80.30	72.27	57.27	0.71	21%

Landscape area Base run-off coefficient =

Runoff reduction = 10

mm

mm

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Project #: 08104

Date: April 2012

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀	% reduction
25mm	25.00	6.25	0.00	0.00	100%
2-Year	36.00	9.00	0.00	0.00	100%
5-Year	47.80	11.95	1.95	0.04	84%
10-Year	55.70	13.93	3.93	0.07	72%
25-Year	65.60	16.40	6.40	0.10	61%
50-Year	73.00	18.25	8.25	0.11	55%
100-Year	80.30	20.08	10.08	0.13	50%

Roads base run-off coefficient =

0.90

Runoff reduction =

(According to Preliminary Analysis)

Adjustment to Road Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 25mm	C ₂₅	% reduction
25mm	25.00	22.50	0.00	0.00	100%
2-Year	36.00	32.40	7.40	0.21	77%
5-Year	47.80	43.02	18.02	0.38	58%
10-Year	55.70	50.13	25.13	0.45	50%
25-Year	65.60	59.04	34.04	0.52	42%
50-Year	73.00	65.70	40.70	0.56	38%
100-Year	80.30	72.27	47.27	0.59	35%

Assumption:

Residential

C = 0.75

79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75

|= 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

0.25 for open space C =

An average runoff coefficient of 0.50 is used for the land indicated as major parks and open spaces

Area & Imperviousness for Permanent Pool Calculation (based on 100-year Runoff Coefficient) SW Corner of Jane St. and Hwy 7

Area controlled through on-site controls (100year post to 2 year post at 80% imperviousness)

		Area (ha)	С	AC]	,		
Mized Use	Building	5.34	0.71	3.81				
(Residential)	Paved Area	1.78	0.90	1.60				
	Landscape	1.89	0.13	0.24				
Mized Use	Building	5.34	0.71	3.81				
(Commercial)	Paved Area	1.78	0.90	1.60				
	Landscape	1.89	0.13	0.24				
Residential	Building	8.09	0.71	5.77				
	Paved Area	2.70	0.90	2.43				
	Landscape	2.87	0.13	0.36				
Commercial	Building	1.78	0.71	1.27				
	Paved Area	0.59	0.90	0.54				
	Landscape	0.63	0.13	0.08				
	Total	34.70		21.75	←	Weighted "C" =	0.63	_
					-	Weighted Impervious	ness =	0.61
Uncontrolled Area					_			
		Area (ha)	С	AC				
	Open Space / Parkland	8.14	0.50	4.07				
	Open Channel	3.95	0.55	2.17				
	SWM Pond Block	5.49	0.55	3.02				
	Total	17.58		9.26	←	Weighted "C" =	0.53	_
						Weighted Impervious	ness =	0.47
Area controlled through	gh LID				_			
	Road	21.34	0.59	12.56				
	Total	21.34		12.56	←	Weighted "C" =	0.59	=
Tota	l area to SWM SW Pond	73.62				Weighted Impervious	ness =	0.56

Vaughan Metropolitan Centre **City of Vaughan**

Date: April 2012 100 year Imperviousness Calculation for areas contributing into SW Pond (50% LID Measures within ROW / Roads)

Storm Volume (6 hrs AES storms)

Storm Event	Rainfall Depth (mm)
25mm	25.00
2-Year	36.00
5-Year	47.80
10-Year	55.70
25-Year	65.60
50-Year	73.00
100-Year	80.30

Building base run-off coefficient =

Runoff reduction = 15 mm

(According to LEED Gold Objective)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 15mm	C ₁₅	% reduction
25mm	25.00	22.50	7.50	0.30	67%
2-Year	36.00	32.40	17.40	0.48	46%
5-Year	47.80	43.02	28.02	0.59	35%
10-Year	55.70	50.13	35.13	0.63	30%
25-Year	65.60	59.04	44.04	0.67	25%
50-Year	73.00	65.70	50.70	0.69	23%
100-Year	80.30	72.27	57.27	0.71	21%

Landscape area Base run-off coefficient =

Runoff reduction =

(Assume 5mm initial abstraction to include for the total proposed 15mm)

Project #: 08104

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 10mm	C ₁₀	% reduction
25mm	25.00	6.25	0.00	0.00	100%
2-Year	36.00	9.00	0.00	0.00	100%
5-Year	47.80	11.95	1.95	0.04	84%
10-Year	55.70	13.93	3.93	0.07	72%
25-Year	65.60	16.40	6.40	0.10	61%
50-Year	73.00	18.25	8.25	0.11	55%
100-Year	80.30	20.08	10.08	0.13	50%

mm

Roads base run-off coefficient =

0.90

Runoff reduction = mm (According to Preliminary Analysis)

Adjustment to Building Runoff Coefficient to Account for On-site Measures

Storm Event	Rainfall Depth (mm)	Base Runoff (mm)	Runoff Reduced by 25mm	C ₂₅	% reduction
25mm	25.00	22.50	0.00	0.00	100%
2-Year	36.00	32.40	7.40	0.21	77%
5-Year	47.80	43.02	18.02	0.38	58%
10-Year	55.70	50.13	25.13	0.45	50%
25-Year	65.60	59.04	34.04	0.52	42%
50-Year	73.00	65.70	40.70	0.56	38%
100-Year	80.30	72.27	47.27	0.59	35%

Assumption:

Residential

C = 0.75

79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

Commercial

C = 0.75 |= 79%

For the 79% of impervious area it is assumed that 75% of it is building and 25% of it is paved area

For mixed area 50% is for residential and 50% is for commercial

Open Space and Parkland

C = 0.75 for Parkland (in accordance with the City's design criteria)

0.25 for open space C =

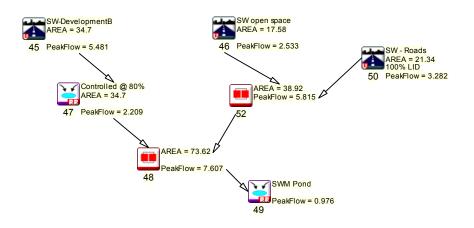
An average runoff coefficient of 0.50 is used for the land indicated as major parks and open spaces

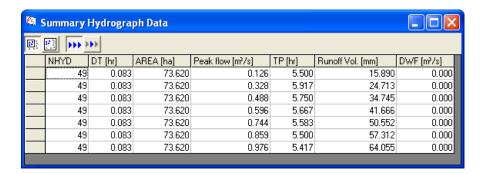
Area & Imperviousness for Permanent Pool Calculation (based on 100-year Runoff Coefficient) SW Corner of Jane St. and Hwy 7

Area controlled through on-site controls (100year post to 2 year post at 80% imperviousness)

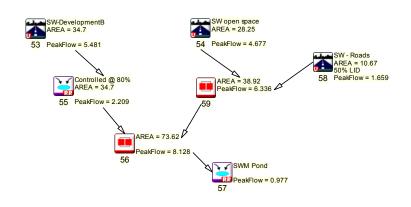
		Area (ha)	С	AC]	,		
Mized Use	Building	5.34	0.71	3.81				
(Residential)	Paved Area	1.78	0.90	1.60				
	Landscape	1.89	0.13	0.24				
Mized Use	Building	5.34	0.71	3.81				
(Commercial)	Paved Area	1.78	0.90	1.60				
	Landscape	1.89	0.13	0.24				
Residential	Building	8.09	0.71	5.77				
	Paved Area	2.70	0.90	2.43				
	Landscape	2.87	0.13	0.36				
Commercial	Building	1.78	0.71	1.27				
	Paved Area	0.59	0.90	0.54				
	Landscape	0.63	0.13	0.08				
	Total	34.70		21.75	←	Weighted "C" =	0.63	
			•		=	Weighted Impervious	sness =	0.61
Uncontrolled Area							•	
		Area (ha)	С	AC				
	Open Space / Parkland	8.14	0.50	4.07				
	Open Channel	3.95	0.55	2.17				
	SWM Pond Block	5.49	0.55	3.02				
	Road	10.67	0.90	9.60]			
	Total	28.25		18.87	_ ←	Weighted "C" =	0.67	
			•		_	Weighted Impervious	sness =	0.67
Area controlled through	gh LID (assuming that L	ID will be a	pplied to 5	0% of Roa	d area)		•	
				0.00	T			
	Road	10.67	0.59	6.28	1			
	Road Total	10.67 10.67	0.59	6.28 6.28	←	Weighted "C" =	0.59	

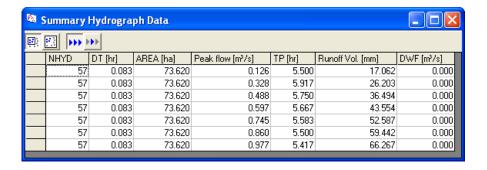
South West POND (100% LID on ROW)





South West POND (50% LID on ROW)





V V I SSSSS U U A L V V I SS U U A A L V V I SS U U AAAAA L V V I SS U U A A L VV I SSSS UUUUU A A LLLLL
OOO TTTTT TTTTT H H Y Y M M OOO TM, Version 2.0 O O T T H H Y Y MM MM O O O O T T H H H Y M M O O Licensed To: TMIG OOO T T H H Y M M OOO vo2-0145
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***** DETAILED OUTPUT *****
Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat Output filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final submission\100-year to 2-year (with LID)\Pond SW lid options.out Summary filename: G:\Projects\2008\08104-~1\Design\SWM\2012 02 final submission\100-year to 2-year (with LID)\Pond SW lid options.sum
DATE: 4/10/2012 TIME: 11:49:57 AM
USER:
COMMENTS:

READ STORM Filename: G:\Projects\2008\ 08104 - Vaughan Corporate Centre - Master Ser \ \Design\SWM\VO2 \model\STORM\25\M4HR.STM Ptotal= 25.00 \mm \Comments: Twenty-Five \mm Four Hour Chicago Storm
TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr .17 2.07 1.17 5.70 2.17 5.19 3.17 2.80 .33 2.27 1.33 10.78 2.33 4.47 3.33 2.62 .50 2.52 1.50 50.21 2.50 3.95 3.50 2.48 .67 2.88 1.67 13.37 2.67 3.56 3.67 2.35 .83 3.38 1.83 8.29 2.83 3.25 3.83 2.23 1.00 4.18 2.00 6.30 3.00 3.01 4.00 2.14
CALIB

STANDHYD (0050) ID= 1 DT= 5.0 min	Area (ha) = Total Imp(%) =	21.34 56.00	Dir. Conn.	. (%) = 56	.00	
Surface Area Dep. Storage Average Slope Length Mannings n	IMPERV (ha) = 11. (mm) = 1. (%) = 1. (m) = 377. = .0	TOUS PE 95 00 00 20 13	9.39 5.00 1.00 40.00 .250	TIME STEF	·.	
TIME hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 .833	RAIN TIM mmm/hr hr 2.07 1.08 2.07 1.25 2.27 1.25 2.27 1.33 2.52 1.50 2.88 1.58 2.88 1.66 3.38 1.75 3.38 1.83 4.17 1.91 4.18 2.00	TRANSFORME RAIN S mm/hr 3 5.70 7 5.70 0 10.78 3 10.78 7 50.21 0 50.21 0 50.21 0 3 13.37 13.37 13.37 0 8.29 3 8.29 7 6.30	ED HYETOGRA I TIME hrs 2.083 2.167 2.250 2.333 2.417 2.500 2.583 2.667 2.750 2.833 2.917	APH RAIN 5.19 5.19 4.47 4.47 3.95 3.56 3.56 3.25 3.25 3.01	TIME hrs 3.08 3.17 3.25 3.33 3.42 3.50 3.58 3.67 3.75 3.83 3.92	RAIN mm/hr 2.80 2.80 2.62 2.62 2.48 2.48 2.35 2.35 2.23 2.23 2.14
1.000 Max.Eff.Inten.(mm over (Storage Coeff. (Unit Hyd. Tpeak (Unit Hyd. peak (TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIEN	m/hr) = 50. (min) 5. (min) = 7. (min) = 5. (cms) = .	21 00 46 (ii) 00 17	4.90 40.00 36.49 (ii) 40.00 .03	*TOTA	LS* 17 (iii 50 88 00	
(ii) TIME STEP (3.0 Ia = Dep (DT) SHOULD BE CORAGE COEFFICI	. Storage SMALLER OF ENT.	(Above) R EQUAL			
CALIB					.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = IMPERV (ha) = 8. (mm) = 1. (%) = 1. (m) = 342. = .0	TOUS PE 26 00 00 30 13	9.32 5.00 1.00 40.00 .250			
Max.Eff.Inten.(mm over (Storage Coeff. (Unit Hyd. Tpeak (Unit Hyd. peak (n/hr) = 50. (min) 5. (min) = 7. (min) = 5. (cms) = .	21 00 04 (ii) 00 17	4.90 40.00 36.07 (iii) 40.00 .03	*TOTA	LS*	

PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	(cms) = (hrs) = (mm) = (mm) = NT =	.93 1.50 24.00 25.00	.06 2.25 5.55 25.00		.932 (iii) 1.50 14.22 25.00 .57
(ii) TIME STEP	3.0 Ia = (DT) SHOULD TORAGE COEFF	Dep. Storag BE SMALLER FICIENT.	ge (Above) OR EQUAL		
	ARE# (ha) 0): 21.34 6): 17.58				
NOTE: PEAK FLOW					
CALIB STANDHYD (0045) ID= 1 DT= 5.0 min	Area (h Total Imp(na) = 34.70 (%) = 61.00	Dir. Cor	ın.(%)=	61.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = 4	21.17 1.00 1.00 181.00	13.53 5.00 1.00 40.00 .250	i)	
Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr) = (min) (min) = (min) = (cms) =	50.21 10.00 8.64 (ii) 10.00 .12	4.90 40.00 37.66 40.00 .03	.i)	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE					TOTALS* 1.955 (iii) 1.58 16.80 25.00 .67
(ii) TIME STEP THAN THE S (iii) PEAK FLOW	3.0 Ia = (DT) SHOULD TORAGE COEFF DOES NOT INC	Dep. Storag BE SMALLER FICIENT. CLUDE BASEFI	re (Above) OR EQUAL OW IF ANY.		
RESERVOIR (0047) IN= 2> OUT= 1 DT= 5.0 min		STORAGE (ha.m.)			

AREA

QPEAK TPEAK

R.V.

INFLOW: ID=	PEAK FL	OW REDUC	TION [Oo	ut/Oinl(%)= 27.42	(mm) 6.80 6.80
	TIME SHIF MAXIMUM	T OF PEAK STORAGE	FLOW USED	(mi (ha.m	n)= 30.00 .)= .246	9
ADD HYD (0048) 1 + 2 = 3 ID1= 1 (. <u></u>	AREA Q (ha) (38.92 2.	PEAK cms) 250	TPEAK (hrs) 1.50	R.V. (mm) 15.13	
=======	(0048):				===== 15.92	
NOTE: PEAK F	LOWS DO NO	T INCLUDE	BASEFLOW	S IF ANY		
RESERVOIR (0049) IN= 2> OUT= 1 DT= 5.0 min	 	FLOW ST ms) (h 0000 1260 3290 1 4890 1	ORAGE a.m.) .0000 .9730 .4013	OUTFL (cms .59 .74 .86 .97	OW STOM) (ha 70 2.1 50 2.1 00 3.1	.m.) 2700 7289 0794
INFLOW : ID= OUTFLOW: ID=	PEAK FL TIME SHIF	AREA (ha) 73.62 73.62 OW REDUC T OF PEAK STORAGE	TION [Qo FLOW	ut/Qin]((mi	\$) 50 1! 50 1! %)= 5.08 n)=240.00	R.V. (mm) 5.92 5.89
CALIB STANDHYD (0053) ID= 1 DT= 5.0 mir	 Area	(ha)=	34.70			
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	IMPERVIO 21.17 1.00 1.00 481.00		13.53 5.00 1.00 40.00 .250		
Max.Eff.Inter ov Storage Coeff Unit Hyd. Tpe Unit Hyd. pea	rer (min) f. (min) = eak (min) = eak (cms) =	50.21 10.00 8.64 10.00	(ii)	4.90 40.00 37.66 (i 40.00	i) *TOT	AI.S*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFAI RUNOFF COEFFI	(cms) = (hrs) = (mm) = L (mm) =	1.94 1.58 24.00 25.00		.09 2.25 5.55 25.00 .22	1.9 1 16 25	955 (iii) .58 .80

CN* = (ii) TIME STE	STORAGE COEF	Dep. Storage BE SMALLER (FICIENT.	e (Above) DR EQUAL	
RESERVOIR (0055) IN= 2> OUT= 1 DT= 5.0 min	I	STORAGE (ha.m.)	OUTFLOW (cms) 2.5120	STORAGE (ha.m.) 1.1572
<pre>INFLOW : ID= 2 OUTFLOW: ID= 1</pre>	(0053) 34 (0055) 34	AREA QPE. (ha) (cm. 4.70 1.4.70		R.V. (mm) 16.80 16.80
1	TIME SHIFT OF MAXIMUM STORA	PEAK FLOW AGE USED	(min) = 3 (ha.m.) =	.2469
CALIB STANDHYD (0054) ID= 1 DT= 5.0 min	Area (l Total Imp	ha) = 28.25 (%) = 67.00	Dir. Conn.(%)	= 67.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m)	PERVIOUS 18.93 1.00 1.00 434.00	9.32 5.00 1.00 40.00	
Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak	<pre>(mm/hr) = r (min) (min) = k (min) = (cms) =</pre>	50.21 10.00 8.12 (ii) 10.00 .13	4.90 40.00 37.15 (ii) 40.00	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC	(cms) = (hrs) = (mm) = (mm) = IENT =	1.77 1.58 24.00 25.00	.06 2.25 5.55 25.00	*TOTALS* 1.777 (iii) 1.58 17.91 25.00 .72
CN* = (ii) TIME STE	STORAGE COEF	Dep. Storage BE SMALLER (FICIENT.	S LOSSES: e (Above) DR EQUAL	
CALIB STANDHYD (0058) ID= 1 DT= 5.0 min	 Area (1 Total Imp			= 56.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = 2	5.98 1.00 1.00 266.70	PERVIOUS (i) 4.69 5.00 1.00 40.00 .250	

		en.(mm/hr): over (min) ff. (min): eak (min): ak (cms): (cms):					TOTALS* .707 (iii) 1.50	
RUNOI TOTAI RUNOI	FF VOLUM L RAINFA FF COEFE	IE (mm): .LL (mm): 'ICIENT :	= 2 = 2 =	.70 1.50 4.00 5.00 .96	5.55 25.00 .22		15.88 25.00 .64	
(ii)	CN*) TIME S THAN T	= 83.0 TEP (DT) :	Ia = D SHOULD B E COEFFI	OR PERVIOU ep. Storac E SMALLER CIENT. UDE BASEFI	ge (Above OR EQUAL	e)		
ADD HYD 1 + 2	(0059	D 1	AREA	QPEAK	TPEAK	R.V.		
+	ID1= 1 ID2= 2	(0054): (0058):	(ha) 28.25 10.67	QPEAK (cms) 1.777 .707	(hrs) 1.58 1.50	(mm) 17.91 15.88		
		(, -						
				2.405			-	
	ID = 3	(0059):	38.92		1.50	17.35	-	
	ID = 3	(0059):	38.92	2.405	1.50	17.35		
NOTE:	ID = 3: PEAK	(0059): FLOWS DO	38.92 NOT INCL	2.405 UDE BASEFI	1.50 LOWS IF A	17.35 NY.		
NOTE:	ID = 3 : PEAK (0056 2 = 3 ID1= 1 ID2= 2	(0059): FLOWS DO 1	38.92 NOT INCL AREA (ha) 34.70 38.92	2.405 UDE BASEFI QPEAK (cms) .536 2.405	1.50 LOWS IF AI TPEAK (hrs) 2.08 1.50	17.35 NY. R.V. (mm) 16.80 17.35		
NOTE:	ID = 3 : PEAK (0056 2 = 3 ID1= 1 ID2= 2	(0059): FLOWS DO 1	38.92 NOT INCL AREA (ha) 34.70 38.92	2.405 UDE BASEFI	1.50 LOWS IF AI TPEAK (hrs) 2.08 1.50	17.35 NY. R.V. (mm) 16.80 17.35		
NOTE:ADD HYD 1 + 2	ID = 3 : PEAK (0056 2 = 3 ID1= 1 ID2= 2 ID = 3	(0059): FLOWS DO 1	38.92 NOT INCL AREA (ha) 34.70 38.92	2.405 UDE BASEFI 	1.50 LOWS IF AI TPEAK (hrs) 2.08 1.50	R.V. (mm) 16.80 17.35		
NOTE:	ID = 3: PEAK (0056 2 = 3 ID1= 1 ID2= 2 ID = 3: PEAK	(0059): FLOWS DO 1	38.92 NOT INCL AREA (ha) 34.70 38.92 73.62	2.405 UDE BASEFI QPEAK (cms) .536 2.405	1.50 LOWS IF AI TPEAK (hrs) 2.08 1.50 1.50 LOWS IF AI	17.35 NY. R.V. (mm) 16.80 17.35 17.09	:	
NOTE:	ID = 3 : PEAK (0056 2 = 3 ID1= 1 ID2= 2 ID = 3 : PEAK : PEAK	(0059): FLOWS DO 1 (0055): (0056): (0056): FLOWS DO 1	38.92 NOT INCL AREA (ha) 34.70 38.92 73.62 NOT INCL	2.405 UDE BASEFI QPEAK (Cms) .536 2.405 2.630 UDE BASEFI	1.50 TPEAK (hrs) 2.08 1.50 1.50 LOWS IF Al	17.35 NY. R.V. (mm) 16.80 17.35		
NOTE: ADD HYD 1 + 2 + NOTE: RESERVO: IN= 2 DT= 5.6	ID = 3 : PEAK (0056 2 = 3 ID1= 1 ID2= 2 ===== ID = 3 : PEAK IR (0057 -) OUT=) min	(0059): FLOWS DO 1 (0055): (0056): (0056): FLOWS DO 1	38.92 NOT INCL AREA (ha) 34.70 38.92 73.62 NOT INCL UTFLOW (cms) .0000 .1260 .3290 .4890 AR (ha)	2.405 UDE BASEFI QPEAK (cms) .536 2.405 2.630 UDE BASEFI STORAGE (ha.m.) .0000 1.0577 1.5066 2.0346 EA QPE	1.50 TPEAK (hrs) 2.08 1.50 1.50 COWS IF All OUT: (ci .	17.35 NY. R.V. (mm) 16.80 17.35 17.09 NY. FLOW ms) 5970 7450 8600 9770	STORAGE (ha.m.) 2.4033 2.8737 3.2276 3.5835	

```
********
 ** SIMULATION NUMBER: 2 **
 READ STORM | Filename: G:\Projects\2008\
                               08104 - Vaughan Corporate Centre - Master Ser
                               \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 36.00 mm | Comments: 2yr/6hr
               TIME
                      RAIN | TIME
                                     RAIN | TIME
                                                   RAIN | TIME
                      mm/hr |
                              hrs
                                     mm/hr |
                                             hrs
                                                   mm/hr | hrs
                                                                   mm/hr
                              2.00
                                     12.24 |
                                             3.75
                                                     5.04 | 5.50
                        .00 |
                        .72 | 2.25
                                     12.24 | 4.00
                                                     2.88 | 5.75
                                                                     .72
                .75
                        .72 | 2.50
                                     33.12 | 4.25
                                                     2.88 I 6.00
                                                                     . 72
                        .72
                              2.75
                                     33.12 | 4.50
                                                     1.44 | 6.25
               1.25
                        .72 | 3.00
                                      9.36 | 4.75
                                                     1.44 I
               1.50
                       4.32 | 3.25
                                      9.36 I 5.00
                                                      .72 |
                       4.32 | 3.50
                                      5.04 | 5.25
                                                      .72 |
CALIB
 STANDHYD (0050) |
                     Area
                            (ha) = 21.34
ITD= 1 DT= 5.0 min |
                    Total Imp(%) = 56.00 Dir. Conn.(%) = 56.00
                            IMPERVIOUS
                                        PERVIOUS (i)
    Surface Area
                    (ha) =
                              11.95
                                           9.39
    Dep. Storage
                    (mm) =
                               1.00
                                           5.00
                     (%)=
                               1.00
                                           1.00
    Average Slope
                             377.20
                                           40.00
    Length
                     (m) =
    Mannings n
                               .013
        NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                             ---- TRANSFORMED HYETOGRAPH ----
               TIME
                      RATN | TIME RATN | TIME RATN | TIME
                                                                    RATN
                      mm/hr |
                              hrs
                                     mm/hr |
                                             hrs
                                                    mm/hr | hrs
                .083
                       .00 | 1.667
                                     4.32 | 3.250
                                                     9.36 I 4.83
                                     4.32 | 3.333
                .167
                        .00 | 1.750
                                                     5.04 | 4.92
                                                                      .72
                .250
                        .00 | 1.833
                                     12.24 | 3.417
                                                     5.04 | 5.00
               .333
                        .72 | 1.917
                                     12.24 | 3.500
                                                     5.04 | 5.08
                                                                     .72
                .417
                        .72 | 2.000
                                     12.24 | 3.583
                                                     5.04 | 5.17
                                                                      .72
                .500
                        .72 | 2.083
                                     12.24 | 3.667
                                                     5.04 | 5.25
                                                                      .72
                .583
                        .72 | 2.167
                                     12.24 | 3.750
                                                     5.04 | 5.33
                                                                     .72
                .667
                                     12.24 | 3.833
                                                     2.88 | 5.42
                        .72 | 2.250
                                                                      .72
                .750
                        .72 | 2.333
                                     33.12 | 3.917
                                                     2.88 | 5.50
               .833
                        .72 | 2.417
                                     33.12 | 4.000
                                                     2.88 | 5.58
                                                                     .72
               .917
                        .72 | 2.500
                                     33.12 | 4.083
                                                     2 88 1 5 67
                                                                     .72
              1.000
                        .72 | 2.583
                                     33.12 | 4.167
                                                     2.88 | 5.75
                                                                     .72
              1.083
                        .72 | 2.667
                                     33.12 | 4.250
                                                     2.88 | 5.83
              1 167
                                     33.12 | 4.333
                                                     1.44 | 5.92
                        .72 | 2.750
                                                                     72
              1.250
                        .72 | 2.833
                                      9.36 | 4.417
                                                     1.44 | 6.00
                                                                     .72
              1.333
                       4.32 | 2.917
                                      9.36 | 4.500
                                                     1.44 | 6.08
                                                                     .72
              1.417
                       4.32 | 3.000
                                      9.36 | 4.583
                                                     1.44 | 6.17
                                                                      .72
                       4.32 | 3.083
                                      9.36 | 4.667
                                                     1.44 | 6.25
              1.583
                      4.32 | 3.167
                                      9.36 | 4.750
                                                     1.44 |
    Max.Eff.Inten.(mm/hr)=
                              33.12
                                           13.05
              over (min)
                              10.00
                                          30.00
    Storage Coeff. (min) =
                               8.82 (ii) 28.43 (ii)
    Unit Hyd. Tpeak (min) =
                              10.00
                                           30.00
    Unit Hyd. peak (cms) =
                              .12
                                                       *TOTALS*
```

```
1 07
                                                       1 173 (iii)
    PEAK FLOW
                   (cms)=
    TIME TO PEAK
                   (hrs)=
                               2.75
                                                        2.75
    RUNOFF VOLUME
                  (mm) =
                              35.00
                                          11.57
                                                       24.69
    TOTAL RAINFALL (mm) =
                              36.00
                                          36.00
                                                       36.00
    RUNOFF COEFFICIENT =
                              .97
     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* = 83.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
I CALTB
| STANDHYD (0046) |
                    Area (ha) = 17.58
|ID= 1 DT= 5.0 min | Total Imp(%)= 47.00 Dir. Conn.(%)= 47.00
                           IMPERVIOUS
                                      PERVIOUS (i)
    Surface Area
                    (ha)=
                            8.26
                                         9.32
    Dep. Storage
                    (mm) =
                              1 00
    Average Slope
                    (%)=
                              1.00
    Length
                    (m) =
                             342.30
    Mannings n
                             .013
    Max.Eff.Inten.(mm/hr)=
                              33.12
                              10.00
             over (min)
                                          30.00
    Storage Coeff. (min) =
                              8.32 (ii)
                                         27.94 (ii)
    Unit Hyd. Tpeak (min) =
                              10.00
                                          30.00
    Unit Hyd. peak (cms)=
                                                      *TOTALS*
    PEAK FLOW
                                                       .848 (iii)
                   (cms)=
    TIME TO PEAK
                   (hrs)=
                              2.75
                                                        2 75
                                          3.08
    RUNOFF VOLUME
                   (mm) =
                              35.00
                                                       22 58
    TOTAL RAINFALL (mm) =
                              36.00
                                         36.00
                                                       36.00
    RUNOFF COEFFICIENT =
     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN^* = 83.0 Ia = Dep. Storage (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| ADD HYD (0052) |
1 + 2 = 3
                          AREA
                                 QPEAK
                                          TPEAK
                          (ha)
                                 (cms)
                                          (hrs)
                                                   (mm)
       ID1= 1 (0050):
                         21 34 1 173
                                          2 75
                                                 24 69
       + ID2= 2 (0046): 17.58
                                 .848
                                          2.75
                                                 22.58
        ID = 3 (0052): 38.92 2.021 2.75 23.74
    NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
I CALTB
| STANDHYD (0045) |
                     Area
                          (ha) = 34.70
|ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
                           IMPERVIOUS
                                        PERVIOUS (i)
    Surface Area
                    (ha)=
                              21.17
                                          13.53
    Dep. Storage
                    (mm) =
                              1 00
```

Average Slope Length Mannings n	(%) = (m) = =	1.00 481.00 .013	1.00 40.00 .250		
Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr) = (min) (min) = (min) = (cms) =	33.12 10.00 10.20 (ii 10.00 .11	13.05 30.00) 29.82 (30.00 .04	ii) *TOTALS*	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	(cms) = (hrs) = (mm) = (mm) =	1.86 2.75 35.00 36.00 .97	.26 3.17 11.57 36.00 .32	2.007 2.75 25.86 36.00 .72	
(i) CN PROCEDU	RE SELECTEI 3.0 Ia = (DT) SHOULI FORAGE COEF	FOR PERVI Dep. Stor BE SMALLE	age (Above R OR EQUAL		
RESERVOIR (0047) IN= 2> OUT= 1					
	OUTFLOW	I STORAG	E OUTF	LOW STORAGE	
DT= 5.0 min	(cms)	(ha.m. 000)) (cm 0 2.5	s) (ha.m.) 120 1.1572	
				EAK R.V.	
		AREA Q (ha) (cms) (h	rs) (mm)	
INFLOW: ID= 2 (OUTFLOW: ID= 1 (O	0045) 3	34.70	2.01 2	.75 25.86 .33 25.86	
TII MAX	ME SHIFT OF KIMUM STOF	F PEAK FLOW RAGE USED		in)= 35.00 m.)= .3895	
ADD HYD (0048) 1 + 2 = 3	ARE	A QPEAK	TPEAK	R.V.	
ID1= 1 (005) + ID2= 2 (004)	(na 2): 38.9	02 2.021	(nrs) 2.75	(mm) 23.74	
ID = 3 (004)	3): 73.6	2.648	2.75	24.74	
NOTE: PEAK FLOW	DO NOT IN	ICLUDE BASE	FLOWS IF AN	Υ.	
RESERVOIR (0049) IN= 2> OUT= 1 DT= 5.0 min	OTHER OF	I CHODAC	E I OUBE	IOW CHODACE	
DI- 3.0 MIII	(cms)	(ha.m.) (cm	s) (ha.m.)	
	.0000) .000) 973	0 .5	970 2.2700 450 2.7289	
	.3290	1.401	3 .8	LOW STORAGE (ha.m.) 970 2.2700 450 2.7289 600 3.0794 770 3.4299	
		AREA Q (ha) (PEAK TP	EAK R.V.	
INFLOW : ID= 2 ((na) (73.62	cms) (h 2.65 2	rs) (mm) .75 24.74	

```
OUTFLOW: ID= 1 (0049)
                            73.62 .33 5.92
                                                             24 71
                   PEAK FLOW REDUCTION [Qout/Qin](%) = 12.40
                   TIME SHIFT OF PEAK FLOW (min)=190.00
                   MAXIMUM STORAGE USED
                                                 (ha.m.) = 1.4000
I CALTB
| STANDHYD (0053) | Area (ha) = 34.70
|ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
                              IMPERVIOUS PERVIOUS (i)
    Surface Area (ha) = Dep. Storage (mm) =
                              21.17
                                             13.53
                               1.00
                                              5.00
    Average Slope (%)= 1.00
Length (m)= 481.00
Mannings n = .013
                                              1.00
                              .013
                                            .250
      over (min) 10.00
    Max.Eff.Inten.(mm/hr)=
                                             30.00
    Storage Coeff. (min) = 10.20 (ii) 29.82 (ii)
Unit Hyd. Tpeak (min) = 10.00 30.00
Unit Hyd. peak (cms) = .11 .04
    PEAK FLOW (cms) = 1.86 .26
TIME TO PEAK (hrs) = 2.75 3.17
RUNOFF VOLUME (mm) = 35.00 11.57
TOTAL RAINFALL (mm) = 36.00 36.00
RUNOFF COEFFICIENT = .97 .32
                                                           *TOTALS*
                                                         2.007 (iii)
                                                             2.75
                                                          25.86
                                                            36.00
                                                             .72
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 83.0 Ia = Dep. Storage (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| RESERVOIR (0055) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
                         OUTFLOW STORAGE | OUTFLOW
                                                            STORAGE
                         (cms)
                         .0000
                                  .0000 | 2.5120
                                                            1.1572
                               AREA
                                       QPEAK
                               (ha)
                                       (cms)
                                                  (hrs)
                                                             (mm)
     INFLOW : ID= 2 (0053)
                              34.70
                                       2.01 2.75
.84 3.33
                                                             25.86
     OUTFLOW: ID= 1 (0055)
                              34.70
                                        .84
                   PEAK FLOW REDUCTION [Qout/Qin] (%) = 42.07
                   TIME SHIFT OF PEAK FLOW (min) = 35.00
                   MAXIMUM STORAGE USED
                                                 (ha.m.) = .3895
I CALTB
| STANDHYD (0054) | Area (ha) = 28.25
|ID= 1 DT= 5.0 min | Total Imp(%)= 67.00 Dir. Conn.(%)= 67.00
-----
                              IMPERVIOUS PERVIOUS (i)
     Surface Area (ha)=
                              18.93
                                            9.32
     Dep. Storage (mm) =
                              1.00
    Dep. Storage
Average Slope (%)= 1.00
Length (m)= 434.00
Mannings n = .013
                                          40.00
```

	•	-	_
Max.Eff.Inten.(mm/hr) over (min) Storage Coeff. (min) Unit Hyd. Tpeak (min)	= 33.12	13.05	
over (min)	10.00	30.00	
Storage Coeff. (min)	= 9.59 (ii)	29.21 (ii)	
Unit Hyd. Tpeak (min)	= 10.00	30.00	
Unit Hyd. peak (cms)	= .11	.04	
DEAK FION (cms)	- 1 67	1 0	*TOTALS*
PEAK FLOW (cms) TIME TO PEAK (hrs)	= 2.75	3 17	2 75
RINOFF VOLUME (mm)	= 35.00	11 57	1.777 (iii) 2.75 27.27
RUNOFF VOLUME (mm) TOTAL RAINFALL (mm)	= 1.67 = 2.75 = 35.00 = 36.00	36.00	36.00
RUNOFF COEFFICIENT	= .97	.32	.76
(i) CN PROCEDURE SE			
(ii) TIME STEP (DT)	Ia = Dep. Stora		
(11) TIME STEP (DT) THAN THE STORAG		OK EQUAL	
(iii) PEAK FLOW DOES		I.OW TE ANV	
(III) PEAR PEOW DOES	NOT INCHODE DAGET.	LOW IF ANI.	
ALIB FANDHYD (0058) Are	(1) 10 67		
			0) 56.00
= 1 DT= 5.0 min Tot	ai imp(%)= 56.00	DIF. Conn.(s)= 36.00
Surface Area (ha)	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)	= 5.98	4.69	
Dep. Storage (mm)	= 1.00	5.00	
Dep. Storage (mm) Average Slope (%)	= 1.00	1.00	
Length (m) Mannings n		40.00	
		.250	
Max.Eff.Inten.(mm/hr) over (min)	_ 22 12	12 05	
Max.EII.IIICeII.(IIIII/III)	- 33.12 5.00	13.03	
Storago Cooff (min)	- 7.16 (ii)	26.78 (55)	
Unit Hud Thook (min)	- 7.10 (11) - 5.00	20.70 (11)	
Storage Coeff. (min) Unit Hyd. Tpeak (min) Unit Hyd. peak (cms)	- J.00 - 17	0.00	
onic nya. peak (cms)	1/	.04	*TOTALS*
PEAK FLOW (cms)	= .54	.09	
PEAK FLOW (cms) TIME TO PEAK (hrs) RUNOFF VOLUME (mm) TOTAL RAINFALL (mm)	= 2.75	3.08	.600 (iii) 2.75
RUNOFF VOLUME (mm)	= 35.00	11.57	24.69
TOTAL RAINFALL (mm)	= 36.00	36.00	36.00
RUNOFF COEFFICIENT	= .97	.32	.69
	•••	· · · -	
(i) CN PROCEDURE SE			
CN* = 83.0	Ia = Dep. Stora	ge (Above)	

	CN*	= 83.0	Ia =	Dep.	Storage	(Above)
(ii)	TIME	STEP (DT)	SHOULD	BE SM	MALLER OR	EQUAL
	THAN	THE STORA	GE COEFI	FICIEN	VT.	
(iii)	PEAK	FLOW DOES	NOT TNO	THIDE	BASEFLOW	TF ANY.

ADD HYD (0059)	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0054):	28.25	1.777	2.75	27.27
+ ID2= 2 (0058):	10.67	.600	2.75	24.69
ID = 3 (0059): NOTE: PEAK FLOWS DO	38.92	2.377	2.75	26.56

NOTE: RESERVOIR IN= 2> DT= 5.0 m	(0057) OUT= 1	5): 73. 5 DO NOT I	62 3. NCLUDE	005 BASEFLO	2.75	26			
NOTE: RESERVOIR IN= 2> DT= 5.0 m	(0057) OUT= 1				OWS IF	ANY.			
RESERVOIR IN= 2> DT= 5.0 m	(0057) OUT= 1								
IN= 2> DT= 5.0 m	OUT= 1								
	nin I								
		OUTFLO	W ST	ORAGE	l c	UTFLOV	I S	TORAGE	
		(cms) .000 .126 .329	0 (11	.0000		.5970) (ha.m.) 2.4033	
		.126	0 1	.0577	İ	.7450)	2.4033 2.8737	
		.329	0 1	.5066		.8600)	3.2276 3.5835	
		.405						J.J0JJ	
			AREA	QPEA (TPEAR		R.V.	
INFLOW	: ID= 2 (0 I: ID= 1 (0	056)	(na) 73.62	(cms	00	(hrs)	5	(mm) 26.23	
OUTFLOW	7: ID= 1 (0	057)	73.62	.3	33	5.92		26.20	
		AK FLOW)011± /C)inl(%)	= 10	93	
	TIM	ME SHIFT O	F PEAK	FLOW	2040/6	(min)	=190.	00	
	MAX	IMUM STO	RAGE	USED	(ha.m.)	= 1.5	054	
	******	R: 3 **							
READ ST		******	e: G:\P	rojects	₃\2008				
READ ST	 'ORM	******	0810	4 - Vai	ıghan	Corpor			Master
READ ST	 'ORM 	******** Filenam	0810 \Des	4 - Vau	ıghan	Corpor			Master 12 hour
READ ST	CORM	Filenam	0810 \Des s: 5yr/	4 - Vau ign\SWN 6hr	ighan 1\VO2	Corpor model	STORM	\6 and	12 hour
READ ST	CORM	Filenam Comment	0810 \Des s: 5yr/	4 - Vau ign\SWN	ighan 1\VO2	Corpor model	STORM	\6 and	12 hour
READ ST	CORM	Filenam Comment	0810 \Des s: 5yr/	4 - Vau ign\SWN	ighan 1\VO2	Corpor model	STORM	\6 and	12 hour
READ ST	CORM	Filenam Comment	0810 \Des s: 5yr/	4 - Vau ign\SWN	ighan 1\VO2	Corpor model	STORM	\6 and	12 hour
READ ST	CORM	Filenam Comment RAIN mm/hr .00 .96 .96	0810 \Des s: 5yr/ TIME hrs 2.00 2.25 2.50 2.75	4 - Vau ign\SWM 6hr RAIN mm/hr 16.25 43.98	1ghan 1\VO2 N T S 3 5 4	Corpor model\ TIME hrs 1.75 1.00 1.25	STORM	\6 and	12 hour
READ ST	TIME hrs .255 .500 .755 1.000 1.25	Filenam Comment RAIN mm/hr .00 .96 .96	0810 \Des s: 5yr/ TIME hrs 2.00 2.25 2.50 2.75	4 - Vau ign\SWM 6hr RAIN mm/hr 16.25 43.98	1ghan 1\VO2 N T S 3 5 4	Corpor model\ TIME hrs 1.75 1.00 1.25	RAIN mm/hr 6.69 3.82 3.82 1.91	\6 and TIM hr 5.5 5.7 6.0 6.2	12 hour
	CORM	Filenam Comment RAIN mm/hr .00 .96 .96 .96 .96 .96 .97	0810 \Des s: 5yr/ TIME hrs 2.00 2.25 2.50 2.75	4 - Vau ign\SWM 6hr RAIN mm/hr 16.25 43.98	1ghan 1\VO2 N T S 3 5 4	Corpor model\ TIME hrs 1.75 1.00 1.25	STORM	\6 and TIM hr 5.5 5.7 6.0 6.2	12 hour

NOTE:	RAINFALL	WAS	TRANSFORMED	TO	5.0	MIN.	TIME	STEP.	

				D HYETOGRA			
TIME			RAIN				RAIN
hrs				hrs			
.083				3.250			
.167				3.333			.96
.250				3.417			.96
.333		1.917		3.500			.96
.417	.96	2.000	16.25	3.583	6.69		.96
.500		2.083		3.667			.96
.583		2.167		3.750			.96
		2.250		3.833			.96
.750				3.917			.96
.833				4.000			.96
.917		2.500		4.083			.96
1.000		2.583		4.167	3.82		.96
1.083		2.667	43.98	4.250	3.82	5.83	.96
1.167	.96	2.750	43.98	4.333	1.91	5.92	.96
1.250	.96	2.833	12.43	4.417	1.91	6.00	.96
1.333	5.74	2.917	12.43	4.500	1.91	6.08	.96
				4.583		6.17	.96
1.500	5.74	3.083	12.43	4.667	1.91	6.25	.96
1.583	5.74	3.167	12.43	4.750	1.91		
Max.Eff.Inten.(m	m/hr)=	43.98		21.81			
over	(min)	10.00		25.00			
Storage Coeff.	(min) =	7.87	(ii)	23.85 (ii)			
Unit Hyd. Tpeak	(min) =	10.00		25.00			
Unit Hyd. peak	(cms) =	.13		.05			
					TOT	ALS	
PEAK FLOW	(cms) =	1.43		.35	1.	684 (iii)
TIME TO PEAK	(hrs) =	2.75		3.00	2	.75	
RUNOFF VOLUME	(mm) =	46.81		19.33	34	.72	
TOTAL RAINFALL	(mm) =	47.81		47.81	47	.81	
RUNOFF COEFFICIE	NT =	.98		.40		.73	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

,							
CALIB					Conn.(%):	= 47.00)
		IMPERVIO	US	PERVIOU	S (i)		
Surface Area	(ha)=	8.26		9.32			
Dep. Storage	(mm) =	1.00		5.00			
Average Slope	(%)=	1.00		1.00			
Length	(m) =	342.30		40.00			
Mannings n	=	.013		.250			
Max.Eff.Inten.(r	nm/hr)=	43.98		21.81			
over	(min)	5.00		25.00			
Storage Coeff.	(min) =	7.42	(ii)	23.40	(ii)		
Unit Hyd. Tpeak	(min) =	5.00		25.00			
Unit Hyd. peak	(cms) =	.17		.05			
						*TOTALS	k
PEAK FLOW	(cms) =	1.00		.35		1.254	(iii)
TIME TO PEAK	(hrs) =	2.75		3.00		2.75	
RUNOFF VOLUME	(mm) =	46.81		19.33		32.24	

TOTAL RAINFALL (mm) = RUNOFF COEFFICIENT =	= 47.81 = .98	47.81 .40	47.81 .67
(i) CN PROCEDURE SEI CN* = 83.0 (ii) TIME STEP (DT) S THAN THE STORAGE (iii) PEAK FLOW DOES N	Ia = Dep. Storac SHOULD BE SMALLER E COEFFICIENT.	ge (Above) OR EQUAL	
ADD HYD (0052) 1 + 2 = 3 ID1 = 1 (0050): + ID2 = 2 (0046): ID = 3 (0052): NOTE: FEAK FLOWS DO N	38.92 2.938	2.75 33.60	=
CALIB STANDHYD (0045) Area	a (ha) = 34.70 al Imp(%) = 61.00	Dir. Conn.(%)	= 61.00
Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n =	IMPERVIOUS = 21.17 = 1.00 = 1.00 = 481.00 = .013	PERVIOUS (i) 13.53 5.00 1.00 40.00 .250	
Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)=	43.98 10.00 = 9.11 (ii) = 10.00 = .12	21.81 30.00 25.08 (ii) 30.00 .04	*TOTALS*
PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT =	= 2.50 = 2.75 = 46.81 = 47.81 = .98	.48 3.08 19.33 47.81 .40	2.804 (iii) 2.75 36.09 47.81
(i) CN PROCEDURE SEI	LECTED FOR PERVIOU Ia = Dep. Storag SHOULD BE SMALLER E COEFFICIENT.	JS LOSSES: ge (Above) OR EQUAL	
RESERVOIR (0047) IN= 2> OUT= 1 DT= 5.0 min	UTFLOW STORAGE (cms) (ha.m.)	OUTFLOW (cms) 2.5120	STORAGE (ha.m.) 1.1572
INFLOW: ID= 2 (0045) OUTFLOW: ID= 1 (0047)			

	TIME SHI	FT OF PE	DUCTION [AK FLOW USED	(m		.00
	 0052): 0047): 	73.62	3.816	2.75	34.77	
RESERVOIR (0049) IN= 2> OUT= 1 DT= 5.0 min	 OU! (d	.1260 .3290 .4890	STORAGE (ha.m.) .0000 .9730 1.4013 1.9110	.5 .7 .8 .9	450 600 770	2.7289 3.0794 3.4299
INFLOW: ID= OUTFLOW: ID=	PEAK FI TIME SHII MAXIMUM	LOW RE	(cm (cm (2 3.62 3.62 3.62 3.62 4.64 4.64 4.64 4.64 4.64 4.64 4.64 4	Qout/Qin] (m	(%) = 12	.00
STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area Tota: 	IMPER	VIOUS			61.00
Max.Eff.Inten ov Storage Coeff Unit Hyd. Tpe Unit Hyd. pea PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFAL RUNOFF COEFFI	. (mm/hr) = er (min) . (min) = ak (min) = k (cms) =	43 10 9 10	3.98 3.00 3.11 (ii) 3.00 3.12	21.81 30.00 25.08 (30.00 .04 .48 3.08 19.33 47.81 .40	*	TOTALS* 2.804 (iii) 2.75 36.09 47.81 .75
(i) CN PROC	EDURE SELI 83.0	ECTED FO	R PERVIOU	S LOSSES: e (Above		.75

THAN THE (iii) PEAK FLOW	STORAGE COEF DOES NOT IN		LOW IF ANY.	
RESERVOIR (0055) IN= 2> OUT= 1 DT= 5.0 min		STORAGE (ha.m.) .0000	OUTFLOW (cms) 2.5120	STORAGE (ha.m.) 1.1572
INFLOW: ID= 2 OUTFLOW: ID= 1 P. T.	EAK FLOW	REDUCTION	EAK TPEAK ns) (hrs) .80 2.75 .18 3.33 [Qout/Qin](%)= (min)= (ha.m.)=	42.12
CALIB STANDHYD (0054) ID= 1 DT= 5.0 min	Area (
Surface Area Dep. Storage Average Slope Length Mannings n	IM (ha)=	18.93	PERVIOUS (i) 9.32 5.00 1.00 40.00 .250	
Max.Eff.Inten.(; over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak		43.98 10.00 8.56 (ii) 10.00 .12	21.81 25.00 24.54 (ii) 25.00 .05	*TOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =	2.25 2.75 46.81 47.81 .98	.34 3.00 19.33 47.81 .40	2.497 (iii) 2.75 37.74 47.81 .79
(ii) TIME STEP	83.0 Ia = (DT) SHOULD STORAGE COEF	Dep. Storac BE SMALLER FICIENT.	ge (Above) OR EQUAL	
CALIB STANDHYD (0058) ID= 1 DT= 5.0 min	Area (Total Imp)= 56.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = =	5.98 1.00 1.00 266.70	PERVIOUS (i) 4.69 5.00 1.00 40.00 .250	
Max.Eff.Inten.(mm/hr)= (min)	43.98 5.00	21.81 25.00	

			6.39 (ii) 5.00 .18	22.37 (25.00 .05	(ii) *	TOTALS*
PEAK F TIME T RUNOFF TOTAL RUNOFF	FLOW (C FO PEAK (h F VOLUME (RAINFALL (F COEFFICIENT	ms) = rs) = mm) = mm) =	.73 2.75 46.81 47.81 .98	.18 3.00 19.33 47.81 .40		.858 (iii) 2.75 34.72 47.81
(ii)	CN PROCEDURE CN* = 83. TIME STEP (D THAN THE STO PEAK FLOW DO	0 Ia = 1 T) SHOULD 1 RAGE COEFF	Dep. Storage BE SMALLER (ICIENT.	e (Above OR EQUAL	e)	
	(0059) = 3 ID1= 1 (0054) ID2= 2 (0058)	AREA (ha): 28.25	QPEAK (cms) 2.497	TPEAK (hrs) 2.75 2.75	R.V. (mm) 37.74	
=	ID2= 2 (0058) ======= ID = 3 (0059)					:
NOTE:	PEAK FLOWS	DO NOT INC	LUDE BASEFLO	OWS IF AN	IY.	
ADD HYD 1 + 2	(0056) = 3 ID1= 1 (0055) ID2= 2 (0059)		QPEAK (cms) 1.181 3.355	TPEAK (hrs) 3.33 2.75	R.V. (mm) 36.09 36.91	:
]	ID = 3 (0056)	: 73.62	4.233	2.75	36.52	
	PEAK FLOWS	DO NOT INC.	LUDE BASEFLO	OWS IF AN	IY.	
RESERVOIF						
RESERVOIF	 R (0057)		STORAGE (ha.m.) .0000 1.0577 1.5066	OUTF (cm .5	FLOW ns) 5970	
RESERVOIF IN= 2> DT= 5.0	R (0057) OUT= 1 min	OUTFLOW (cms) .0000 .1260 .3290 .4890	STORAGE (ha.m.) .0000 1.0577 1.5066 2.0346	OUTF (cm .5 .7 .8	LOW (15) (15) (15) (15) (15) (15) (15) (15)	STORAGE (ha.m.) 2.4033 2.8737 3.2276 3.5835

```
READ STORM |
                     Filename: G:\Projects\2008\
                                08104 - Vaughan Corporate Centre - Master Ser
                                \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 55.69 mm |
                      Comments: 10yr/6hr
                TIME
                       RAIN | TIME
                                       RAIN | TIME
                                                      RAIN | TIME
                                                                     RATN
                      mm/hr | hrs
                                      mm/hr |
                                               hrs
                                                     mm/hr |
                                                                     mm/hr
                        .00 | 2.00
                                      18.94 |
                                               3.75
                                                      7.80
                       1.11 | 2.25
                                      18.94 |
                                              4.00
                                                      4.46 | 5.75
                                                                     1.11
                 .75
                                      51.24 |
                                              4.25
                       1.11 | 2.50
                                                      4.46 | 6.00
                1.00
                        1.11
                             | 2.75
                                      51.24 |
                                              4.50
                                                      2.23 |
                                                              6.25
                                              4.75
                1.25
                       1.11 | 3.00
                                      14.48 |
                                                      2.23
                1.50
                        6.68 | 3.25
                                     14.48 |
                                              5.00
                                                      1.11
                       6.68 | 3.50
                                      7.80 | 5.25
I CALTR
| STANDHYD (0050) |
                     Area
                           (ha) = 21.34
|ID= 1 DT= 5.0 min | Total Imp(%)= 56.00 Dir. Conn.(%)= 56.00
                             IMPERVIOUS
                                          PERVIOUS (i)
    Surface Area
                     (ha)=
                               11.95
                                             9.39
                                1.00
                                             5.00
    Dep. Storage
                     (mm) =
    Average Slope
                      (%)=
    Length
                      (m)=
                              377.20
                                            40.00
    Mannings n
                               .013
                                             .250
        NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                             --- TRANSFORMED HYETOGRAPH ----
                      RAIN | TIME
                TIME
                                      RAIN | TIME
                                                     RAIN | TIME
                                                                     RATN
                hrs
                       mm/hr | hrs
                                      mm/hr
                                               hrs
                                                     mm/hr |
                                                                     mm/hr
                       .00 | 1.667
                                      6.68 | 3.250
                                                     14.48 | 4.83
                                       6.68 | 3.333
                .167
                        .00 | 1.750
                                                      7.80 | 4.92
                                                                     1.11
                        .00 | 1.833
                                      18.94 | 3.417
                                                      7.80
                                                             5.00
                .333
                        1.11 | 1.917
                                      18.94 | 3.500
                                                      7.80 |
                                                             5.08
                                                                     1.11
                .417
                       1.11 | 2.000
                                      18.94 | 3.583
                                                      7.80 | 5.17
                .500
                        1.11 | 2.083
                                      18.94 | 3.667
                                                      7.80
                                                             5.25
                .583
                       1.11 | 2.167
                                      18.94 | 3.750
                                                      7.80 | 5.33
                                                                     1.11
                .667
                       1.11 | 2.250
                                      18.94 | 3.833
                                                      4.46 | 5.42
                                                                     1.11
                .750
                       1.11 | 2.333
                                      51.24 | 3.917
                                                      4.46
                                                             5.50
                .833
                       1.11 | 2.417
                                      51.24 | 4.000
                                                      4.46 | 5.58
                                                                     1.11
                .917
                                      51.24 | 4.083
                                                      4.46
                       1.11 | 2.500
                                                             5.67
                                                                     1.11
               1.000
                       1.11 | 2.583
                                      51.24 | 4.167
                                                      4.46
               1.083
                       1.11 | 2.667
                                      51.24 | 4.250
                                                      4.46 | 5.83
                                                                     1.11
               1.167
                       1.11 | 2.750
                                      51.24 | 4.333
                                                      2.23 | 5.92
                                                                     1.11
               1.250
                       1.11 | 2.833
                                      14.48 | 4.417
                                                      2.23 |
                                                             6.00
               1.333
                        6.68 | 2.917
                                      14.48 | 4.500
                                                      2.23 | 6.08
                                                                     1.11
                        6.68 | 3.000
                                      14.48 | 4.583
               1.417
                                                      2.23 | 6.17
                                                                     1.11
               1.500
                        6.68 | 3.083
                                      14.48 | 4.667
                                                      2.23 |
                                                              6.25
               1.583
                       6.68 | 3.167
                                     14.48 | 4.750
                                                      2.23 |
    Max.Eff.Inten.(mm/hr)=
                               51.24
                                            29.52
                                            25.00
               over (min)
                                5.00
                                7.40 (ii)
                                           21.56 (ii)
    Storage Coeff. (min) =
    Unit Hyd. Tpeak (min) =
                                5.00
    Unit Hyd. peak (cms)=
                                .17
                                             .05
                                                         *TOTALS*
     PEAK FLOW
                                                          2.044 (iii)
     TIME TO PEAK
                    (hrs) =
                                2.75
                                            3.00
                                                           2.75
    RUNOFF VOLUME
                    (mm) =
                               54.69
                                           25.02
                                                          41.63
```

TOTAL RAINFALL RUNOFF COEFFICI	(mm) =	55.69	55.69	55.69
RUNOFF COEFFICI	ENT =	.98	.45	.75
	83.0 Ia	ED FOR PERVIO = Dep. Stora LD BE SMALLER	ge (Above)	
THAN THE	STORAGE CO	EFFICIENT.		
(iii) PEAK FLOW	DOES NOT	INCLUDE BASEF	LOW IF ANY.	
CALIB	_			
STANDHYD (0046) ID= 1 DT= 5.0 min				
Surface Area Dep. Storage Average Slope Length Mannings n	(b a) =	IMPERVIOUS	PERVIOUS (i)
Dep. Storage	(mm) =	1.00	5.00	
Average Slope	(%)=	1.00	1.00	
Length Mannings n	(m) =	342.30	40.00	
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr)=	51.24	29.52	
over	(min)	5.00	25.00	2.
Unit Hvd. Tpeak	(min) =	5.00	25.00	.1)
Unit Hyd. peak	(cms) =	.17	.05	
DEAK DIOM	/ \ -	1 17	47	*TOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(CMS) = (hrs) =	2.75	3.00	1.529 (iii) 2.75
RUNOFF VOLUME	(mm) =	54.69	25.02	38.96
TOTAL RAINFALL	(mm) =	55.69	55.69	55.69
RUNOFF COEFFICI	ENT =	.98	.45	.70
CN* = (ii) TIME STEF	83.0 Ia (DT) SHOU STORAGE CO	EFFICIENT.	ge (Above) OR EQUAL	
ADD HYD (0052)				
1 + 2 = 3	A	REA QPEAK ha) (cms) .34 2.044 .58 1.529	TPEAK	R.V.
	(ha) (cms)	(hrs)	(mm)
1D1= 1 (00 + TD2= 2 (00	50): 21 46): 17	.34 2.044	2.75	41.63 38.96
========				=====
ID = 3 (00	52): 38	.92 3.573	2.75	40.43
NOTE: PEAK FLO	WS DO NOT	INCLUDE BASEF	LOWS IF ANY	
CALIB	Area Total I	(ha) = 34.70 mp(%) = 61.00	Dir. Con	n.(%)= 61.00
		IMPERVIOUS 21.17	PERVIOUS (i)
Dep. Storage	(mm) =	1.00	5.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(%) =	1.00	1.00	
Lengtn Mannings n	(m) = =	.013	40.00 .250	

Max.Eff.Inten.(mm/hr) = 51.24 29.52
RESERVOIR (0047) IN= 2> OUT= 1 DT= 5.0 min
AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0045) 34.70 3.43 2.75 43.12 OUTFLOW: ID= 1 (0047) 34.70 1.43 3.25 43.11 PEAK FLOW REDUCTION [Qout/Qin] (%) = 41.63 TIME SHIFT OF PEAK FLOW (min) = 30.00 MAXIMUM STORAGE USED (ha.m.) = .6596
ADD HYD (0048) 1 + 2 = 3
RESERVOIR (0049) IN= 2> OUT= 1 DT= 5.0 min OUTFLOW STORAGE OUTFLOW STORAGE
AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW: ID= 2 (0048) 73.62 4.64 2.75 41.69 OUTFLOW: ID= 1 (0049) 73.62 .60 5.67 41.67 PEAK FLOW REDUCTION [Qout/Qin](%)= 12.86

	TIME SHIFT MAXIMUM ST	OF PEAK FLOW FORAGE USED	(min)=17 (ha.m.)= 2	5.00 .2684
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min	 Area Total			= 61.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = =	IMPERVIOUS 21.17 1.00 1.00 481.00 .013	PERVIOUS (i) 13.53 5.00 1.00 40.00 .250	
Max.Eff.Inten ov. Storage Coeff Unit Hyd. Tpe Unit Hyd. pea	. (mm/hr) = er (min) . (min) = ex (min) = ex (min) = ex (cms) =	51.24 10.00 8.57 (ii) 10.00	29.52 25.00 22.72 (ii) 25.00 .05	*TOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFAL RUNOFF COEFFI	(cms) = (hrs) = (mm) = L (mm) = CIENT =	2.93 2.75 54.69 55.69	.67 3.00 25.02 55.69 .45	3.434 (iii) 2.75 43.12 55.69
CN* = (ii) TIME ST THAN TH (iii) PEAK FL	83.0 Ia EP (DT) SHOU E STORAGE CO DW DOES NOT	TED FOR PERVIO a = Dep. Stora JLD BE SMALLER DEFFICIENT. INCLUDE BASEF	ge (Above) OR EQUAL	
IN= 2> OUT= 1 DT= 5.0 min	OUTFI (cms	LOW STORAGE (ha.m.) 000 .0000	OUTFLOW (cms) 2.5120	STORAGE (ha.m.) 1.1572
INFLOW : ID=	2 (0053) 1 (0055)	AREA QP (ha) (c 34.70 3 34.70 1	EAK TPEAK ms) (hrs) .43 2.75 .43 3.25 [Qout/Qin](%)= 4	R.V. (mm) 43.12 43.11
	TIME SHIFT MAXIMUM ST	OF PEAK FLOW PORAGE USED	(min) = 3 (ha.m.) =	
	 Area Total 1	(ha) = 28.25		
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =		9.32 5.00 1.00 40.00	
Max.Eff.Inten	.(mm/hr) = er (min)	51.24 10.00	29.52 25.00	

Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(min) = (min) =	8.05 (ii) 10.00	22.21 (ii) 25.00	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE				*TOTALS* 2.985 (iii) 2.75 44.90 55.69 .81
(ii) TIME STEP THAN THE S (iii) PEAK FLOW	3.0 Ia (DT) SHOUL TORAGE COE DOES NOT I	= Dep. Stora D BE SMALLER EFFICIENT. ENCLUDE BASEF	ge (Above) OR EQUAL LOW IF ANY.	
CALIB STANDHYD (0058) ID= 1 DT= 5.0 min	Area Total Im	(ha) = 10.67 up(%) = 56.00	Dir. Conn.(%)= 56.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) = =	5.98 1.00 1.00 266.70	PERVIOUS (i) 4.69 5.00 1.00 40.00 .250	
Max.Eff.Inten.(m over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr) = (min) (min) = (min) = (cms) =	51.24 5.00 6.01 (ii) 5.00 .19	29.52 25.00 20.17 (ii) 25.00 .05	*TOTALS*
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	(cms) = (hrs) = (mm) = (mm) = NT =	.85 2.75 54.69 55.69 .98	.24 3.00 25.02 55.69 .45	1.034 (iii) 2.75 41.63 55.69 .75
(i) CN PROCEDU CN* = 8 (ii) TIME STEP	RE SELECTE 3.0 Ia (DT) SHOUL TORAGE COE	D FOR PERVIO = Dep. Stora D BE SMALLER	US LOSSES: ge (Above) OR EQUAL	
ADD HYD (0059)	a Ti	iea odeav	מ עגקמש	v
ID1= 1 (005 + ID2= 2 (005	(h 4): 28. 8): 10.	25 2.985 67 1.034	TPEAK R (hrs) (2.75 44. 2.75 41.	.v. mm) 90 63
	9): 38.	92 4.019	2.75 44.	
ADD HYD (0056) 1 + 2 = 3	AR	REA QPEAK	TPEAK R	.V.

ID1= 1 (0055 + ID2= 2 (0059	(ha)): 34.70): 38.92	(cms) 1.430 4.019	(hrs) 3.25 2.75	(mm) 43.11 44.00		
ID = 3 (0056						
NOTE: PEAK FLOWS	DO NOT INCL	UDE BASEFI	LOWS IF A	NY.		
RESERVOIR (0057) IN= 2> OUT= 1 DT= 5.0 min	(cms) .0000 .1260 .3290 .4890	(ha.m.) .0000 1.0577 1.5066 2.0346	(cr 	ms) 5970 7450 8600 9770	STORAGE (ha.m.) 2.4033 2.8737 3.2276 3.5835	
INFLOW: ID= 2 (0 OUTFLOW: ID= 1 (0	AR (h 056) 73. 057) 73.	EA QPE (cn 62 5.	EAK TI ns) (1 .08 :	PEAK nrs) 2.75 5.67	R.V. (mm) 43.58 43.55	
TIM	K FLOW R E SHIFT OF P IMUM STORAG	EAK FLOW	(1		.00	
1	****** Filename:	08104 - Va	ughan Co:			
Ptotal= 65.59 mm		\Design\SW 25yr/6hr	MI (VOZ IIIO)	iei (STORM	1\6 and 12	nour AES
TIME hrs .25 .50 .75 1.00 1.25 1.50	mm/hr .00 2 1.31 2 1.31 2 1.31 3 7.87 3	hrs mm/r .00 22.3 .25 22.3 .50 60.3 .75 60.3 .00 17.0 .25 17.0	ar hrs 30 3.75 30 4.00 35 4.25 35 4.50 66 4.75 66 5.00	mm/hr 5 9.18 0 5.25 5 5.25 0 2.62 2 2.62 0 1.31	hrs 3 5.50 5 5.75 6 6.00 2 6.25 2	RAIN mm/hr 1.31 1.31 1.31
CALIB STANDHYD (0050)	Total Imp(%	56.00	Dir. Co		56.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = 1 (mm) = (%) = (m) = 37	1.95 1.00 1.00 7.20	9.39 5.00 1.00 40.00 .250	(i)		
NOTE: RAINFA	IJ. WAS TRANS	FORMED TO	5.0 MTI	N. TIME S	STEP.	

MIME DAIN	TRA	NSFORMEI	HYETOGRA	APH	m TAGE	DATM
hrs mm/hr	l TIME	mm/hr	hre	mm/hr	hre	mm/hr
.083 .00	1.667	7.87	3.250	17.06	4.83	1.31
.167 .00	1.750	7.87	3.333	9.18	4.92	1.31
.250 .00	1.833	22.30	3.417	9.18	5.00	1.31
.333 1.31	1.917	22.30	3.500	9.18	5.08	1.31
.417 1.31	2.000	22.30	3.583	9.18	5.17	1.31
.500 1.31	2.083	22.30	3.66/	9.18	5.25	1.31
.505 1.31 667 1.31	2.107	22.30	3.750	5 25 1	5.33	1 31
.750 1.31	2.333	60.35	3.917	5.25	5.50	1.31
.833 1.31	2.417	60.35	4.000	5.25	5.58	1.31
.917 1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000 1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083 1.31	2.66/	60.35	4.250	5.25	5.83	1.31
1.16/ 1.31	2.750	17 06	4.333	2.62	5.92	1.31
1 333 7 87	2 917	17.06	4 500	2 62 1	6.08	1 31
1.417 7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500 7.87	3.083	17.06	4.667	2.62	6.25	1.31
TIME RAIN hrs mm/hr .083 .00 .167 .00 .250 .00 .333 1.31 .417 1.31 .500 1.31 .583 1.31 .667 1.31 .750 1.31 .833 1.31 .917 1.31 1.000 1.31 1.083 1.31 1.167 1.31 1.250 1.31 1.333 7.87 1.417 7.87 1.500 7.87	3.167	17.06	4.750	2.62		
Max.Eff.Inten.(mm/hr)=	60.35		38.12			
Max.Eff.Inten.(mm/hr) = over (min) Storage Coeff. (min) = Unit Hyd. Tpeak (min) = Unit Hyd. peak (cms) =	5.00	2	20.00			
Storage Coeff. (min)=	6.93	(ii) 1	19.71 (ii)			
Unit Hyd. Tpeak (min)=	5.00	2	20.00			
Unit Hyd. peak (cms)=	.17		.06	***	13.1.0.*	
DEAK FION (cms)-	1 00		66		'ALS* 561 (iii)	
TIME TO PEAK (hrs)=	2.75		2.92			
RUNOFF VOLUME (mm)=	64.59	3	32.60	2 50 65	.51	
TOTAL RAINFALL (mm) =	65.59	6	55.59	65	.59	
PEAK FLOW (cms) = TIME TO PEAK (hrs) = RUNOFF VOLUME (mm) = TOTAL RAINFALL (mm) = RUNOFF COEFFICIENT =	.98		.50		.77	
(i) CN PROCEDURE SELECTE CN* = 83.0 Ia (ii) TIME STEP (DT) SHOUL THAN THE STORAGE COI (iii) PEAK FLOW DOES NOT	= Dep. S LD BE SMA EFFICIENT	torage LLER OR	(Above) EQUAL			
CALIB						
STANDHYD (0046) Area D= 1 DT= 5.0 min Total In	(ha) = 1	7 58				
D= 1 DT= 5.0 min Total In	np(%) = 4	7.00 I	Dir. Conn.	(%) = 4	7.00	
1	IMPERVIOU	IS PER	RVIOUS (i)			
Surface Area (ha)=	1 00		9.32			
Average Slope (%)=	1 00		1 00			
Length (m)=	342.30	4	10.00			
Surface Area (ha) = Dep. Storage (mm) = Average Slope (%) = Length (m) = Mannings n =	.013		.250			
Max.Eff.Inten.(mm/hr)=	60.35	3	38.12			
over (min) Storage Coeff (min)=	5.UU 6.5/	(ii) 1	:0.00 9 32 /ii\			
Unit Hvd. Tpeak (min)=	5.00	(11)	20.00			
Max.Eff.Inten.(mm/hr) = over (min) Storage Coeff. (min) = Unit Hyd. Tpeak (min) = Unit Hyd. peak (cms) =	.18	-	.06			
				* TOT	'ALS*	
PEAK FLOW (cms)=	1.38		.66	1.	951 (iii)	
TIME TO PEAK (hrs)=	2.75		2.92	2	.75	
KUNOFF VOLUME (mm)=	64.59	3	5∠.6U	47 65	.63	
PEAK FLOW (cms) = TIME TO PEAK (hrs) = RUNOFF VOLUME (nm) = TOTAL RAINFALL (nm) = RUNOFF COEFFICIENT =	.98	,	.50		.73	
					-	

(i) CN PROCEDU CN* = 8 (ii) TIME STEP THAN THE S (iii) PEAK FLOW	3.0 Ia (DT) SHOU TORAGE CO	a = Dep. S JLD BE SMA DEFFICIENT	Storage ALLER OR F.	(Above) EQUAL			
ADD HYD (0052) 1 + 2 = 3 ID1= 1 (005 + ID2= 2 (004 ========= ID = 3 (005	2): 38	3.92 4.5	512	2.75	49.21		
CALIB STANDHYD (0045) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(mover Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE (i) CN PROCEDU CN* = 8 (ii) TIME STEP THAN THE S (iii) PEAK FLOW	(ha) = (mm) = (%) = (m) = (min) = (min) (min) = (min) = (ms) = (hrs) = (mm) = (mn) = (hrs) = (mn) = (hrs) = (h	IMPERVIOU 21.17 1.00 1.00 481.00 .013 60.35 10.00 8.02 10.00 .13 3.47 2.75 64.59 65.59 65.59 .98 PED FOR PE a = Dep. S JUD BE SMA DEFFICIEM:	US PEI	RVIOUS (13.53 5.00 1.00 40.00250 38.12 25.00 (1.00 40.00 4.00 4.00 4.00 4.00 4.00 4.00	i) i) **	FOTALS* 4.181 (iii) 2.75 52.11 65.59 .79	
RESERVOIR (0047) IN= 2> OUT= 1 DT= 5.0 min	OUTFI (cms	LOW STO	DRAGE a.m.) .0000	OUTFL (cms	OW :	STORAGE (ha.m.) 1.1572	
INFLOW : ID= 2 (OUTFLOW: ID= 1 (0045) 0047)	AREA (ha) 34.70 34.70	QPEAK (cms) 4.18 1.74	TPE (hr 2. 3.	AK s) 75 25	R.V. (mm) 52.11 52.11	

PEAK FLOW REDUCTION [Qout/Qin](%) = 41.53 TIME SHIFT OF PEAK FLOW (min) = 30.00

				(ha.m.)=	.8010
ADD HYD (004 1 + 2 = 3	8)	AREA (ha)	QPEAK (cms)	TPEAK R. (hrs) (m 2.75 49.2 3.25 52.1	V. m)
ID1= 1 + ID2= 2	(0052):	38.92 34.70	4.512 1.737	2.75 49.2 3.25 52.1	1
	(0048):	73.62	5.808	2.75 50.5	
RESERVOIR (004 IN= 2> OUT= DT= 5.0 min	: 1 i	UTFLOW (cms) .0000 .1260 .3290 .4890	STORAGE (ha.m.) .0000 .9730 1.4013 1.9110	OUTFLOW (cms) .5970 .7450 .8600	STORAGE (ha.m.) 2.2700 2.7289 3.0794 3.4299
INFLOW : II	= 2 (0048) = 1 (0049)	AREA (ha) 73.62 73.62	QPE. (cm	AK TPEAK (hrs) 81 2.75 74 5.58	(mm) 50.58
CALIB STANDHYD (005	MAXIMUM		USED	(ha.m.)=	2.7268
		TMDEDI			
		TMLFV	'IOUS	DEDITIONS (:)	
Surface Are Dep. Storag Average Slo Length Mannings n	ea (ha) = (mm) = (%) = (m) = (= 21. = 1. = 1. = 481.	17 00 00 00	DEDITIONS (:)	
Surface Are Dep. Storag Average Slo Length Mannings n		= 21. = 1. = 1. = 481. = .0	17 00 00 00 00 013	PERVIOUS (i) 13.53 5.00 1.00 40.00 .250	
Surface Are Dep. Storag Average Slo Length Mannings n		= 21. = 1. = 1. = 481. = .0	17 00 00 00 00 013	PERVIOUS (i) 13.53 5.00 1.00 40.00 .250	
Surface Are Dep. Storag Average Slo Length Mannings n	en.(mm/hr) = over (min) = ff. (min) = fpeak (min) = feak (cms) = K (hrs) = ME (mm) = ALL (mm) =	= 21. = 1. = 481. - 00 = 60. 10. = 8. = 10. = 2. = 2. = 64.	17 00 00 00 00 113 35 00 02 (ii) 00 13	PERVIOUS (i) 13.53 5.00 1.00 40.00 .250 38.12 25.00 20.80 (ii) 25.00 .05	*TOTALS* 4.181 (iii) 2.75 52.11 65.59 .79

RESERVOIR (0055) IN= 2> OUT= 1 DT= 5.0 min	OUTFI	OW STOF	RAGE	OUTFLOW (cms) 2.5120	STORAGE	
	(cms	(ha.	.m.)	(cms) 2.5120	(ha.m.) 1.1572	
INFLOW: ID= 2 OUTFLOW: ID= 1	(0053) (0055)	AREA (ha) 34.70 34.70	QPEAK (cms) 4.18 1.74		R.V. (mm) 52.11 52.11	
T M	IME SHIFT AXIMUM ST	OF PEAK FI ORAGE US	SED	(min) = (ha.m.) =	30.00	
L CALTR						
CALIB					(s) = 67.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	18.93 1.00 1.00 434.00 .013	9 PERV 9 5 1 40	7IOUS (i) 9.32 5.00 .00 0.00 250		
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	60.35 10.00 7.54 10.00 .13	38 25 (ii) 20 25	3.12 5.00 0.32 (ii) 5.00	*TOTALS*	
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =	3.11 2.75 64.59 65.59 .98	3 32 65	.63 3.00 2.60 5.59	3.612 (iii) 2.75 54.03 65.59 .82	
(ii) TIME STEP	83.0 Ia (DT) SHOU STORAGE CO	. = Dep. St JLD BE SMAI DEFFICIENT.	orage (LLER OR E	(Above) CQUAL		
CALIB	Area Total I				(s) = 56.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha) = (mm) = (%) = (m) =	1MPERVIOUS 5.98 1.00 1.00 266.70 .013	9 PERV 4 5 1 40	7IOUS (i) 1.69 5.00 00 0.00 250		
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	mm/hr) = (min) (min) = (min) = (cms) =	60.35 5.00 5.63 5.00	38 20 (ii) 18 20	3.12 0.00 3.41 (ii) 0.00		

PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI (i) CN PROCED	(hrs) = (mm) = (.34 2.92 32.60 65.59 .50 S LOSSES:		OTALS* 1.295 (iii) 2.75 50.51 65.59
(ii) TIME STEP	STORAGE COEFF	BE SMALLER	OR EQUAL		
========	AREA (ha) 54): 28.25 58): 10.67 59): 38.92				
NOTE: PEAK FLO					
	AREA (ha) 55): 34.70 59): 38.92 56): 73.62	6.203	2.75	52.62	
RESERVOIR (0057) IN= 2> OUT= 1 DT= 5.0 min	OUTFLOW (cms) .0000 .1260 .3290 .4890	STORAGE (ha.m.) .0000 1.0577 1.5066 2.0346	OUTF: (cm .5 .7 .8	LOW Ss) (970	TORAGE ha.m.) 2.4033 2.8737 3.2276 3.5835
INFLOW: ID= 2 OUTFLOW: ID= 1	AI	REA QPE. ha) (cm .62 662 .	AK TP: s) (h 20 2 74 5	EAK rs) .75 .58	R.V. (mm) 52.62 52.59
**************************************	******** ER: 6 **				

Ptotal= 73.00 mm TIME hrs .25	Comments: 5 RAIN TI mm/hr h .00 2.	08104 - Vaug Design\SWM\ 60yr/6hr EME RAIN ars mm/hr 00 24.82	whan Corpora VO2 model\S TIME hrs m 3.75 1	RAIN TIME mm/hr hrs 5.75 5.84 6.00 2.92 6.25 2.92 1.46 1.46	RAIN mm/hr 1.46
CALIB STANDHYD (0050) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n NOTE: RAINF?	IMPER (ha) = 11 (mm) = 1 (%) = 1 (m) = 377	RVIOUS PE 95 00 00 7.20 013	9.39 5.00 1.00 40.00		
hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 .833	RAIN TI mm/hr h.6 .00 1.7 .00 1.8 1.46 1.9 1.46 2.0 1.46 2.1 1.46 2.2 1.46 2.3 1.46 2.3	ME RAIN mm/hr 8.766 667 8.76 8.76 8.76 9.00 24.82 9.00 24.82 9.00 24.82 9.00 24.82 9.00 67.16 67.16 600 67.16	hrs n 3.250 1 3.333 1 3.417 1 3.500 1 3.583 1 3.667 1 3.750 1 3.833 1 3.917 1 4.000 1	RAIN TIME mm/hr hrs 8.98 4.83 0.22 4.50 0.022 5.08 0.22 5.07 0.22 5.33 0.22 5.34 5.50 5.84 5.50 5.84 5.50 5.84 5.56 5.84 5.75 5.84 5.84 5.75 5.84 5.75 5.84 5.75 5.84 5.85 5.84 5.85 5.84 5.85 5.84 5.85 5.84 5.85 5.84 5.85 5.84	mm/hr 1.46 1.46 1.46 1.46 1.46 1.46 1.46 1.46
Max.Eff.Inten.(mm over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIEN	n/hr) = 67 (min) 5 (min) = 6 (min) = 5 (cms) = (cms) = 2 (hrs) = 2	7.16 5.00 5.64 (ii) 5.00 .18 2.21 2.75 3.00	44.75 20.00 18.63 20.00 .06 .80 2.92 38.53 73.00 .53	*TOTALS* 2.920 (iiii 2.75 57.27 73.00 .78	

```
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN^* = 83.0 Ia = Dep. Storage (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| STANDHYD (0046) | Area (ha) = 17.58
|ID= 1 DT= 5.0 min | Total Imp(%)= 47.00 Dir. Conn.(%)= 47.00
-----
                               IMPERVIOUS PERVIOUS (i)
                               8.26
     Surface Area (ha)=
                                              9.32
     Dep. Storage (mm)=
                                  1.00
    Average Slope (%) = 1.00 1.00

Length (m) = 342.30 40.00

Mannings n = .013 .250
    Max.Eff.Inten.(mm/hr) = 67.16 44.75 over (min) 5.00 20.00 Storage Coeff. (min) = 6.27 (ii) 18.25 (ii) Unit Hyd. Tpeak (min) = 5.00 20.00 Unit Hyd. peak (cms) = .19 .06
    PEAK FLOW (cms) = 1.53 .80

TIME TO PEAK (hrs) = 2.75 2.92

RUNOFF VOLUME (mm) = 72.00 38.53

TOTAL RAINFALL (mm) = 73.00 73.00

RUNOFF COEFFICIENT = .99 .53
                                                             *TOTALS*
                                                             2.241 (iii)
                                                               2.75
                                                            73.00
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN^* = 83.0 Ia = Dep. Storage (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
| ADD HYD (0052) |
1 + 2 = 3 |
                             AREA QPEAK
                             (ha) (cms) (hrs)
                                                          (mm)
        ID1= 1 (0050): 21.34 2.920 2.75 57.27
+ ID2= 2 (0046): 17.58 2.241 2.75 54.26
         _____
         ID = 3 (0052): 38.92 5.161 2.75 55.91
     NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
I CALTR
| STANDHYD (0045) | Area (ha) = 34.70
|ID= 1 DT= 5.0 min | Total Imp(%)= 61.00 Dir. Conn.(%)= 61.00
                               IMPERVIOUS
                                             PERVIOUS (i)
                               21.17
     Surface Area (ha)=
                                               13.53
                                 1.00
     Dep. Storage (mm) =
                                                5.00
    Average Slope
Length
                      (%)=
                                  1.00
                       (m) = 481.00
                                            40.00
     Mannings n
                                              .250
     Max.Eff.Inten.(mm/hr)=
                                10.00
               over (min)
                                               20.00
```

CALIB STANDHYD (0053)	Area	(ha) = 34.7	0	
STANDHYD (0053) ID= 1 DT= 5.0 min	Total	Imp $(%) = 61.0$	Dir. Conn.(§) = 61.00
			PERVIOUS (i)	
Surface Area	(ha)=	21 17	13 53	
Dep. Storage	(mm) =	1.00	5.00	
Average Slope	(%)=	1.00	1.00	
Dep. Storage Average Slope Length Mannings n	(m) =	481.00	40.00	
Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	nm/hr)=	67.16	44.75	
over	(min)	10.00	20.00	
Storage Coeff.	(min) =	7.69 (11) 19.6/ (11)	
Unit Hyd. Tpeak	(min) =	10.00	20.00	
				TOTALS
PEAK FLOW TIME TO PEAK	(cms)=	3.87	1.13	4.862 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(mm) =	72.00	1.13 2.92 38.53 73.00	58.94
DINOFF COFFEICT	= (mm) = TM	73.00	73.00	73.00 .81
NONOII CODIIICII	214 1		.55	.01
(ii) TIME STEP THAN THE S (iii) PEAK FLOW	TORAGE C	COEFFICIENT.		
RESERVOIR (0055)				
DT= 5.0 min	OUTE	LOW STORAG	E OUTFLOW	STORAGE
<u></u>	(cn	ns) (ha.m.	E OUTFLOW) (cms) 0 2.5120	(ha.m.) 1 1572
		AREA Q	PEAK TPEAK	R.V.
T1177 017 TD 0	(0050)	(ha) (cms) (hrs)	(mm)
<pre>INFLOW : ID= 2 OUTFLOW: ID= 1</pre>	(0053) (0055)	34.70	PEAK TPEAK cms) (hrs) 4.86 2.75 1.99 3.25	58.94 58.94
OUTIDOW: ID I	(0033)	54.70	3.23	30.34
PI	EAK FLO	W REDUCTION	[Qout/Qin](%)=	40.89
T.	ME SHIFT	OF PEAK FLOW	(min) = (ha.m.) =	30.00
PIE	ANIMUM 3	SIORAGE USED	(11d.III.) -	.9130
CALIB				
STANDHYD (0054) ID= 1 DT= 5.0 min	Area	(ha) = 28.2	5	
ID= 1 DT= 5.0 min	Total	Imp $(%) = 67.0$	Dir. Conn.(8) = 67.00
Surface Area	(ha) -	18 03	PERVIOUS (i) 9.32	
Dep. Storage	(mm) =	1.00	5.00	
Average Slope	(%)=	1.00	1 00	
Length	(m) =	434.00	40.00	
Surface Area Dep. Storage Average Slope Length Mannings n	=	.013	.250	
			44.75	
over	(min)	5.00	20.00	
Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	(min) =	7.23 (ii) 19.21 (ii)	
Unit Hyd. Tpeak	(min) =	5.00	20.00	
			. ub	

PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI	(cms) = (hrs) = (mm) = (mm) = ENT =	3.50 2.75 72.00 73.00 .99	.78 2.92 38.53 73.00	*TOTALS* 4.187 (iii) 2.75 60.95 73.00 .83	
(ii) TIME STEP THAN THE (iii) PEAK FLOW	83.0 Ia (DT) SHOU STORAGE CO DOES NOT	= Dep. Stor LD BE SMALLE EFFICIENT. INCLUDE BASE	age (Above R OR EQUAL FLOW IF ANY)	
CALIB STANDHYD (0058) D= 1 DT= 5.0 min	Area Total I	(ha) = 10.6 mp(%) = 56.0	7 0 Dir. Co	nn.(%)= 56.00	
Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.((ha) = (mm) = (%) = (m) =		4.69 5.00 1.00 40.00 .250		
Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI		5.00 5.40 (ii 5.00 .21 1.11 2.75 72.00	20.00 17.38 (20.00 .06 .41 2.92 38.53 73.00 .53	*TOTALS* 1.477 (iii) 2.75 57.27	
(i) CN PROCED CN* = (ii) TIME STEP	URE SELECT 83.0 Ia (DT) SHOU STORAGE CO	ED FOR PERVI = Dep. Stor LD BE SMALLE EFFICIENT.	OUS LOSSES: age (Above R OR EQUAL)	
ADD HYD (0059)					
1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00	A (54): 28 58): 10	REA QPEAK ha) (cms) .25 4.187 .67 1.477	TPEAK (hrs) 2.75 2.75	R.V. (mm) 60.95 57.27	
ID = 3 (00 NOTE: PEAK FLO	59): 38	.92 5.663	2.75	59.94	
ADD HYD (0056) 1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00	A	REA QPEAK ha) (cms) .70 1.988 .92 5.663	TPEAK (hrs) 3.25 2.75	R.V. (mm) 58.94 59.94	

```
_____
                    ID = 3 (0056): 73.62 7.164 2.75 59.47
         NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
| RESERVOIR (0057) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
                                                 OUTFLOW
                                                                      STORAGE | OUTFLOW
                                                                                                                      STORAGE
                                                   (cms)
                                                                       (ha.m.) | (cms)
                                                                                                                       (ha.m.)
                                                    .0000
                                                                        .0000
                                                                                                  .5970
                                                                                                                      2.4033
                                                     .1260
                                                                        1.0577 | .7450
                                                                                                                        2.8737
                                                    .3290 1.5066 | .8600
.4890 2.0346 | .9770
                                                                                                                        3.2276
                                                                                                                        3.5835
                                                              AREA
                                                                              QPEAK
                                                                                                    TPEAK
                                                              (ha)
                                                                             (cms)
                                                                                                   (hrs)
                                                                                                                          (mm)
         INFLOW : ID= 2 (0056)
                                                            73.62
                                                                             7.16 2.75
.86 5.50
                                                                                                                         59.47
          OUTFLOW: ID= 1 (0057)
                                                            73.62
                                                                                                                         59.44
                                     PEAK FLOW REDUCTION [Qout/Qin](%) = 12.00
                                     TIME SHIFT OF PEAK FLOW
                                                                                                 (min) = 165.00
                                     MAXIMUM STORAGE USED
                                                                                                 (ha.m.) = 3.2274
    ********
    ** SIMULATION NUMBER: 7 **
    ********
| READ STORM | Filename: G:\Projects\2008\
                                                                  08104 - Vaughan Corporate Centre - Master Ser
                                                                   \Design\SWM\VO2 model\STORM\6 and 12 hour AES
| Ptotal= 80.31 mm | Comments: 100yr/6hr
                              TIME RAIN | TIME
                                                                              RAIN | TIME RAIN | TIME
                                hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs
                                                                                                                                             mm/hr
                                  .25
                                                .00 | 2.00 27.30 | 3.75 11.24 | 5.50
                                                                                                                                              1 61
                                            1.61 | 2.25 | 27.30 | 4.00 | 6.42 | 5.75 | 1.61 | 1.61 | 2.50 | 73.88 | 4.25 | 6.42 | 6.00 | 1.61 | 1.61 | 2.75 | 73.88 | 4.50 | 3.21 | 6.25 | 1.61 | 1.61 | 3.00 | 20.88 | 4.75 | 3.21 | 6.25 | 1.61 | 3.00 | 20.88 | 5.00 | 1.61 | 3.01 | 3.25 | 20.88 | 5.00 | 1.61 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.2
                                 1.00
                                1.50
                                1.75 9.64 | 3.50 11.24 | 5.25 1.61 |
| CALIB
| STANDHYD (0050) | Area (ha) = 21.34
|ID= 1 DT= 5.0 min | Total Imp(%)= 56.00 Dir. Conn.(%)= 56.00
                                                           IMPERVIOUS PERVIOUS (i)
         Surface Area (ha) = Dep. Storage (mm) =
                                                            11.95
                                                               1.00
                                                                                            5.00
         Average Slope (%)=
                                                                 1.00
                                                                                          1.00
         Length (m) =
                                                             377.20
                                                             .013
         Mannings n
                                                                                          .250
                  NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.
                                                             ---- TRANSFORMED HYETOGRAPH ----
                                 TIME RAIN | TIME RAIN | TIME RAIN | TIME
                                  hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
```

						3.250				
.167	.00		1.750	9.64		3.333	11.24		4.92	1.61
.250	.00		1.833	27.30		3.417	11.24		5.00	1.61
.333	1.61		1.917	27.30	-1	3.500	11.24		5.08	1.61
.417	1.61		2.000	27.30	-1	3.583	11.24	1	5.17	1.61
.500	1.61		2.083	27.30	-1	3.667	11.24	1	5.25	1.61
.583	1.61		2.167	27.30	-1	3.750	11.24	1	5.33	1.61
.667	1.61		2.250	27.30	-1	3.833	6.42	1	5.42	1.61
.750	1.61	1	2.333	73.88	1	3.917	6.42	1	5.50	1.61
.833	1.61	1	2.417	73.88	1	4.000	6.42	1	5.58	1.61
.917	1.61	1	2.500	73.88	1	4.083	6.42	1	5.67	1.61
1.000	1.61	1	2.583	73.88	1	4.167	6.42	1	5.75	1.61
1.083	1.61	1	2.667	73.88	1	4.250	6.42	1	5.83	1.61
1.167	1.61	1	2.750	73.88	1	4.333	3.21	1	5.92	1.61
1.250	1.61	1	2.833	20.88	1	4.417	3.21	1	6.00	1.61
1.333	9.64	1	2.917	20.88	1	4.500	3.21	1	6.08	1.61
1.417	9.64	ı	3.000	20.88	1	4.583	3.21	1	6.17	1.61
1.500	9.64	Ĺ	3.083	20.88	i	4.667	3.21	Ĺ	6.25	1.61
1.583	9.64	Ì	3.167	20.88	İ	4.750	3.21	İ		
Max.Eff.Inten.(mm	n/hr)=		73.88		5:	1.42				
over ((min)		5.00		21	0.00				
Storage Coeff. ((min) =		6.40	(ii)	1	7.73 (ii)			
Unit Hyd. Tpeak ((min) =		5.00		21	0.00				
Unit Hyd. peak ((cms) =		.18			.06				
							T0	OTA:	LS	
PEAK FLOW ((cms) =		2.44			.94	3	3.2	82 (iii)
TIME TO PEAK ((hrs)=		2.75		- 2	2.92		2.	75	
RUNOFF VOLUME	(mm) =		79.31		4	4.54	6	54.	01	
TOTAL RAINFALL	(mm) =		80.31		81	0.31	8	30.	31	
RUNOFF COEFFICIEN	1T =		.99			.55			80	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

 CN* = 83.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB							
STANDHYD (0046)							
ID= 1 DT= 5.0 min	Total	Imp(%)=	47.00	Dir. C	Conn.(%)=	47.00)
		IMPERVI		PERVIOUS	(1)		
Surface Area							
Dep. Storage	(mm) =	1.0	0	5.00			
Average Slope	(%) =	1.0	0	1.00			
Length	(m) =	342.3	0	40.00			
Mannings n	=	.01	3	.250			
Max.Eff.Inten.(n	nm/hr)=	73.8	8	51.42			
over	(min)	5.0	0	20.00			
Storage Coeff.	(min) =	6.0	3 (ii)	17.37	(ii)		
Unit Hyd. Tpeak	(min) =	5.0	0	20.00			
Unit Hyd. peak							
1 2 1 1 1	, ,				*T	OTALS*	
PEAK FLOW	(cms) =	1.6	9	.94		2.533	(iii)
TIME TO PEAK	(hrs) =	2.7	5	2.92		2.75	
RUNOFF VOLUME				44.54		60.88	
TOTAL RAINFALL						80.31	
RUNOFF COEFFICIE				.55		.76	

⁽i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 83.0 Ia = Dep. Storage (Above)

- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0050):	21.34	3.282	2.75	64.01
+ ID2= 2 (0046):	17.58	2.533	2.75	60.88
=======================================				
ID = 3 (0052):	38.92	5.815	2.75	62.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0045) ID= 1 DT= 5.0 min				Conn.(%)=	61.00	
		IMPERVIOUS	PERVIOUS	(i)		
Surface Area	(ha)=	21.17	13.53			
Dep. Storage	(mm) =	1.00	5.00			
Average Slope	(%)=	1.00	1.00			
Length	(m) =	481.00	40.00			
Mannings n	=	.013	.250			
Max.Eff.Inten.(r		73.88 5.00				
Storage Coeff.				(ii)		
Unit Hyd. Tpeak				(/		
Unit Hyd. peak	(cms) =	.17	.06			
				T	OTALS	
PEAK FLOW	(cms) =	4.30	1.33		5.481 (iii)	
TIME TO PEAK	(hrs) =				2.75	
RUNOFF VOLUME	(mm) =				65.75	
TOTAL RAINFALL	(mm) =	80.31	80.31		80.31	

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

 CN* = 83.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

RUNOFF COEFFICIENT = .99

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

| RESERVOIR (0047) | | IN= 2---> OUT= 1 | | DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW (cms) (ha.m.) | (cms) (ha.m.) .0000 .0000 | 2.5120 AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) INFLOW : ID= 2 (0045) 34.70 5.48 2.75 65.75 OUTFLOW: ID= 1 (0047) 34.70

PEAK FLOW REDUCTION [Qout/Qin](%)= 40.30
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 1.0181

ADD HYD (0048)	A DE	A ODEAN	MDEVA	D 17		
1 + 2 = 3 ID1= 1 (00 + ID2= 2 (00	(ha	A QPEAK) (cms)	(hrs)	(mm)		
ID1= 1 (00	52): 38.9	2 5.815	2.75	62.60		
+ ID2= 2 (00	47): 34.7	0 2.209 =======	3.25	65.75		
ID = 3 (00)	48): 73.6	2 7.607	2.75	64.08		
NOTE: PEAK FLO						
RESERVOIR (0049) IN= 2> OUT= 1						
DT= 5.0 min	OUTFLOW	STORAGE	OUTE	LOW	STORAGE	
	(cms)	(ha.m.)	(cn	ns)	(ha.m.)	
	1260	9730	1 .3	1970 1450	2.2700	
	.3290	1.4013	1 .8	3600	3.0794	
DT= 5.0 min	.4890	1.9110	1 .9	770	3.4299	
	;	AREA OPE	AK TE	EAK	R.V.	
TWEE OF	(0040) =	(ha) (cm	is) (h	rs)	(mm)	
INFLOW: ID= 2 OUTFLOW: ID= 1	(UU48) 7: (0049) 7:	3.62 7. 3.62	61 2 98 F	2.75 5.42	64.08 64.06	
P	EAK FLOW	REDUCTION [Qout/Qin]	(%) = 12	.84	
T M	IME SHIFT OF AXIMUM STOR	AGE USED	(ha.	m.) = 160	4284	
CALID		ha) = 34.70 (%) = 61.00	Dir Co	nn (%)=	61 00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min	Area (1 Total Imp				61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min	Area (1 Total Imp				61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min	Area (1 Total Imp				61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min	Area (1 Total Imp				61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min	Area (1 Total Imp				61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min	Area (1 Total Imp				61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area (1 Total Imp IM (ha) = (mm) = (%) = (m) = -	PERVIOUS 21.17 1.00 1.00 481.00	PERVIOUS 13.53 5.00 1.00 40.00	(i)	61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area (1 Total Imp IM (ha) = (mm) = (%) = (m) = -	PERVIOUS 21.17 1.00 1.00 481.00	PERVIOUS 13.53 5.00 1.00 40.00	(i)	61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area (1 Total Imp IM (ha) = (mm) = (%) = (m) = -	PERVIOUS 21.17 1.00 1.00 481.00	PERVIOUS 13.53 5.00 1.00 40.00	(i)	61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n	Area (1 Total Imp IM (ha) = (mm) = (%) = (m) = -	PERVIOUS 21.17 1.00 1.00 481.00	PERVIOUS 13.53 5.00 1.00 40.00	(i)	61.00	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	Area (I Total Imp IM (ha) = (mm) = (%) = (m) = = (min) (min) = (min) = (cms) =	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 18.74 20.00 .06	(i) (ii)	TOTALS*	
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	Area (I Total Imp IM (ha) = (mm) = (%) = (m) = = (min) (min) = (min) = (cms) =	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 18.74 20.00 .06	(i) (ii)	TOTALS* 5.481 (iii)
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	Area (I Total Imp IM (ha) = (mm) = (%) = (m) = = (min) (min) = (min) = (cms) =	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 18.74 20.00 .06	(i) (ii)	TOTALS* 5.481 (iii 2.75)
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	Area (I Total Imp IM (ha) = (mm) = (%) = (m) = = (min) (min) = (min) = (cms) =	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 18.74 20.00 .06	(i) (ii)	TOTALS* 5.481 (iii 2.75 65.75)
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	Area (I Total Imp IM (ha) = (mm) = (%) = (m) = = (min) (min) = (min) = (cms) =	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17	PERVIOUS 13.53 5.00 1.00 40.00	(i) (ii) *	TOTALS* 5.481 (iii 2.75)
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	Area (I Total Imp IM (ha) = (mm) = (%) = (m) = = (min) (min) = (min) = (cms) =	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 18.74 20.00 .06 1.33 2.92 44.54 80.31	(i) (ii) *	TOTALS* 5.481 (iii 2.75 65.75 80.31)
CALIB STANDHYD (0053) STAN	Area (i Total Imp IM (ha) = (mm) = (%) = (m) = (min) = (min) = (min) = (min) = (min) = (min) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = ENT = UURE SELECTED	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17 4.30 2.75 79.31 80.31 .99	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 18.74 20.00 .06 1.33 2.92 44.54 80.31 .55	(i)	TOTALS* 5.481 (iii 2.75 65.75 80.31)
CALIB STANDHYD (0053) STAN	Area (1 Total Imp IM (ha) = (mm) = (%) = (min) = (min) = (min) = (min) = (min) = (min) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mm) = (mn	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17 4.30 2.75 79.31 80.31 .99 FOR PERVIOU Dep. Storag	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 .06 1.33 2.92 44.54 80.31 .55	(i)	TOTALS* 5.481 (iii 2.75 65.75 80.31)
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. Tpeak Unit Hyd. Peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI (i) CN PROCEE (ii) TIME STEF	Area (() Total Imp IM (ha) = (mm) = (%) = (m) = (min)	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17 4.30 2.75 79.31 80.31 .99 FOR PERVIOU Dep. Storag BE SMALLER	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 .06 1.33 2.92 44.54 80.31 .55	(i)	TOTALS* 5.481 (iii 2.75 65.75 80.31)
CALIB STANDHYD (0053) ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. Tpeak Unit Hyd. Peak PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI (i) CN PROCEE (ii) TIME STEF	Area (i Total Imp IM (ha) = (mm) = (%) = (m) = (min) = (min) = (min) = (min) = (min) = (min) = (mm)	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17 4.30 2.75 79.31 80.31 .99 FOR PERVIOU Dep. Storag BE SMALLER FICTENT.	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 18.74 20.00 .06 1.33 2.92 44.54 80.31 .55 S LOSSES: Re (Above OR EQUAL	(i) ** **	TOTALS* 5.481 (iii 2.75 65.75 80.31)
CALIB STANDHYD (0053) STAN	Area (() Total Imp IM (ha) = (mm) = (%) = (min) = (mi	PERVIOUS 21.17 1.00 1.00 481.00 .013 73.88 5.00 7.40 (ii) 5.00 .17 4.30 2.75 79.31 80.31 .99 FOR PERVIOU Dep. Storag BE SMALLER FICIENT. CLUDE BASEFI	PERVIOUS 13.53 5.00 1.00 40.00 .250 51.42 20.00 18.74 20.00 .06 1.33 2.92 44.54 80.31 .55 SS LOSSES: SE (Above OR EQUAL	(i) ** **	TOTALS* 5.481 (iii 2.75 65.75 80.31)

IN= 2> OUT= 1 DT= 5.0 min	OUTFLO				STORAGE (ha.m.) 1.1572
<pre>INFLOW : ID= 2 (OUTFLOW: ID= 1 (</pre>		AREA (ha) 34.70 34.70	QPEAK (cms) 5.48 2.21		03.73
TI	ME SHIFT (REDUCTI OF PEAK FL ORAGE US:	OW ED	(min) = (ha.m.) =	30.00
CALIB STANDHYD (0054) ID= 1 DT= 5.0 min	Area	(ha) = 28	.25		%)= 67.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha)=	IMPERVIOUS	PER	VIOUS (i) 9.32	
Dep. Storage	(mm) =	1.00		5.00	
Average Slope	(%)=	1.00	4	1.00 0.00	
Mannings n	(m) = =	.013	4	.250	
Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	m/hr)=	73.88	5	1.42	
Storage Coeff.	(min) =	6.96 (ii) 1	8.29 (ii)	
Unit Hyd. Tpeak	(min) =	5.00	2	0.00	
Unit Hyd. peak	(CMS)=	.1/		.00	*TOTALS*
PEAK FLOW	(cms)=	3.85		.92	4.677 (iii)
TIME TO PEAK	(hrs)=	2.75	4	2.92	2.75 67.84
TOTAL RAINFALL	(mm) =	80.31	8	0.31	80.31
PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE	INT =	.99		0.31	.84
(i) CN PROCEDU CN* = 8 (ii) TIME STEP THAN THE S (iii) PEAK FLOW	3.0 Ia (DT) SHOU TORAGE CO	= Dep. St LD BE SMAL EFFICIENT.	VIOUS L orage LER OR	OSSES: (Above) EQUAL	
CALIB	Area Total Ir				%)= 56.00
	:	IMPERVIOUS	PER	VIOUS (i)	
Surface Area Dep. Storage	(ha)= (mm)=	5.98 1.00		4.69 5.00	
Average Slope	(%)=	1.00		1.00	
Surface Area Dep. Storage Average Slope Length Mannings n	(m) = =	266.70 .013	4	0.00 .250	
Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak	nm/hr)=	73.88	5	1.42	
Storage Coeff.	(min) =	5.19 (ii) 1	6.53 (ii)	
Unit Hyd. Tpeak	(min) =	5.00	2	0.00	
Unit Hyd. peak	(cms)=	.21		.06	*TOTALS*
PEAK FLOW TIME TO PEAK	(cms)=	1.22		.48	1.659 (iii)
TIME TO PEAK	(hrs)=	2.75		2.92	2.75

RUNOFF VOLUME	(mm) =	79.31	44.54	64.01
TOTAL RAINFALL	(mm) =	80.31	80.31	80.31
RUNOFF COEFFICIEN	1T =	.99	.55	.80

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: $CN^* = 83.0$ Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0059)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0054):	28.25	4.677	2.75	67.84
+ ID2= 2 (0058):	10.67	1.659	2.75	64.01
============				
ID = 3 (0059):	38.92	6.336	2.75	66.79

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0056)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0055):	34.70	2.209	3.25	65.75
+ ID2= 2 (0059):	38.92	6.336	2.75	66.79
============				
TD = 3 (0056):	73.62	8.128	2.75	66.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

IN= 2> OUT= 1	I					
DT= 5.0 min	(OUTFLOW	STORAGE		OUTFLOW	STORAGE
		(cms)	(ha.m.)		(cms)	(ha.m.)
		.0000	.0000		.5970	2.4033
		.1260	1.0577	- 1	.7450	2.8737
		.3290	1.5066	- 1	.8600	3.2276
		.4890	2.0346	- 1	.9770	3.5835
		ARE!	A QPE	AK	TPEAK	R.V.
		(ha)	(cm	s)	(hrs)	(mm)
INFLOW : ID=	2 (0056)	73.62	2 8.	13	2.75	66.30
OUTFLOW: ID=	1 (0057)	73.62	2 .	98	5.42	66.27

PEAK FLOW REDUCTION [Qout/Qin](%) = 12.02 TIME SHIFT OF PEAK FLOW (min)=160.00 MAXIMUM STORAGE USED (ha.m.) = 3.5833

FINISH