
APPENDIX A - RAFTS RESULTS

Run started at: 8th March 2011 17:58:35

 RUNTIME RESULTS
 #####

Max. no. of links allowed = 10000
 Max. no. of routing increments allowed = 250000
 Max. no. of rating curve points = 250000
 Max. no. of storm temporal points = 250000
 Max. no. of channel subreaches = 25
 Max link stack level = 50
 Input Version number = 820

LINK petersham 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 14.28
 ESTIMATED PEAK FLOW (CUMECS) = 11.
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK main 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 95.65
 ESTIMATED PEAK FLOW (CUMECS) = 71.
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK smith 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 40.27
 ESTIMATED PEAK FLOW (CUMECS) = 30.
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK dum 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 149.9
 ESTIMATED PEAK FLOW (CUMECS) = 88.
 ESTIMATED TIME TO PEAK (MINS) = 40.00

LINK out 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 161.4
 ESTIMATED PEAK FLOW (CUMECS) = 90.
 ESTIMATED TIME TO PEAK (MINS) = 40.00

 summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised
 #####

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 20.
 BX = 2.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 223.61
 TOTAL OF SECOND SUB-AREAS (ha) = 71.09
 TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
Label	#1 #2	#1 #2	#1 #2	#1 #2	#1 #2	No.
	(ha)	(%)	(%)			
petersham	20.240 5.060	6.100 6.100	99.90 .1000	.018 .050	.0101 .1097	1.000
main	133.98 40.020	6.000 6.000	99.90 .1000	.018 .050	.0273 .3243	2.000
smith	55.280 18.420	5.000 5.000	99.90 .1000	.018 .050	.0189 .2373	3.000

```
dum      .00001  0.000  1.000  0.000  .1000  0.000  .018  0.00  0.000  0.000  1.001
out      14.110  7.590  5.300  5.300  99.90  .1000  .018  .050  .0090  .1453  1.002
```

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2 (mm)	Cont. #1 (mm/h)	Loss #2 (mm/h)	Excess #1 (mm)	Rain #2 (mm)	Peak Inflow (m ³ /s)	Time to Peak	Link Lag (mins)
petersham	71.405	10.00	30.00	.5000	2.600	60.970	39.666	11.201	25.00	3.300
main	71.405	10.00	30.00	.5000	2.600	60.970	39.666	71.191	25.00	15.00
smith	71.405	10.00	30.00	.5000	2.600	60.970	39.666	29.899	25.00	7.500
dum	71.405	10.00	0.000	.5000	0.000	60.970	0.000	87.786	40.00	0.000
out	71.405	10.00	30.00	.5000	2.600	60.970	39.666	90.008	40.00	0.000

LINK petersham 2.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 16.91
ESTIMATED PEAK FLOW (CUMECS) = 12.
ESTIMATED TIME TO PEAK (MINS) = 30.00
```

LINK main 2.000

WARNING 13 - IBFL SELECTED WITH RET = ZERO
WARNING 13 - IBFL SELECTED WITH RET = ZERO

```
ESTIMATED VOLUME (CU METRES*10**3) = 113.4
ESTIMATED PEAK FLOW (CUMECS) = 74.
ESTIMATED TIME TO PEAK (MINS) = 30.00
```

LINK smith 2.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 47.84
ESTIMATED PEAK FLOW (CUMECS) = 31.
ESTIMATED TIME TO PEAK (MINS) = 30.00
```

LINK dum 2.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 177.9
ESTIMATED PEAK FLOW (CUMECS) = 86.
ESTIMATED TIME TO PEAK (MINS) = 45.00
```

LINK out 2.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 191.5
ESTIMATED PEAK FLOW (CUMECS) = 88.
ESTIMATED TIME TO PEAK (MINS) = 45.00
```


summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

```
ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 90.
RETURN PERIOD (YRS) = 20.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70
```

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area (ha)	Slope #1 #2 (%)	% Impervious #1 #2 (%)	Pern #1 #2	B #1 #2	Link No.
petersham	20.240 5.060	6.100 6.100	99.90 .1000	.018 .050	.0101 .1097	1.000
main	133.98 40.020	6.000 6.000	99.90 .1000	.018 .050	.0273 .3243	2.000
smith	55.280 18.420	5.000 5.000	99.90 .1000	.018 .050	.0189 .2373	3.000

```
dum      .00001  0.000  1.000  0.000  .1000  0.000  .018  0.00  0.000  0.000  1.001
out      14.110  7.590  5.300  5.300  99.90  .1000  .018  .050  .0090  .1453  1.002
```

Link Label	Average Intensity (mm/h)	Init. #1	Loss #2	Cont. #1	Loss #2	Excess #1	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
petersham	54.865	10.00	30.00	.5000	2.600	71.619	49.338	11.751	30.00	3.300
main	54.865	10.00	30.00	.5000	2.600	71.619	49.338	74.471	30.00	15.00
smith	54.865	10.00	30.00	.5000	2.600	71.619	49.338	31.321	30.00	7.500
dum	54.865	10.00	0.000	.5000	0.000	71.619	0.000	86.296	45.00	0.000
out	54.865	10.00	30.00	.5000	2.600	71.619	49.338	88.311	45.00	0.000

LINK petersham 3.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 18.90
ESTIMATED PEAK FLOW (CUMECS) = 11.
ESTIMATED TIME TO PEAK (MINS) = 35.00
```

LINK main 3.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 126.9
ESTIMATED PEAK FLOW (CUMECS) = 68.
ESTIMATED TIME TO PEAK (MINS) = 35.10
```

LINK smith 3.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 53.56
ESTIMATED PEAK FLOW (CUMECS) = 29.
ESTIMATED TIME TO PEAK (MINS) = 35.00
```

LINK dum 3.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 199.0
ESTIMATED PEAK FLOW (CUMECS) = 86.
ESTIMATED TIME TO PEAK (MINS) = 50.00
```

LINK out 3.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 214.3
ESTIMATED PEAK FLOW (CUMECS) = 87.
ESTIMATED TIME TO PEAK (MINS) = 50.00
```


summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

```
ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 120.
RETURN PERIOD (YRS) = 20.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70
```

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 #2 (ha)	Slope #1 #2 (%)	% Impervious #1 #2 (%)	Pern #1 #2	B #1 #2	Link No.
petersham	20.240 5.060	6.100 6.100	99.90 .1000	.018 .050	.0101 .1097	1.000
main	133.98 40.020	6.000 6.000	99.90 .1000	.018 .050	.0273 .3243	2.000
smith	55.280 18.420	5.000 5.000	99.90 .1000	.018 .050	.0189 .2373	3.000
dum	.00001 0.000	1.000 0.000	.1000 0.000	.018 0.00	0.000 0.000	1.001
out	14.110 7.590	5.300 5.300	99.90 .1000	.018 .050	.0090 .1453	1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
petersham	45.334	10.00	30.00	.5000	2.600	79.772	56.778	11.006	35.00	3.300
main	45.334	10.00	30.00	.5000	2.600	79.772	56.778	68.202	35.10	15.00
smith	45.334	10.00	30.00	.5000	2.600	79.772	56.778	28.946	35.00	7.500
dum	45.334	10.00	0.000	.5000	0.000	79.772	0.000	85.563	50.00	0.000
out	45.334	10.00	30.00	.5000	2.600	79.772	56.778	87.228	50.00	0.000

LINK petersham 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 21.89
ESTIMATED PEAK FLOW (CUMECS) = 5.9
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK main 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 146.9
ESTIMATED PEAK FLOW (CUMECS) = 39.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK smith 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 61.93
ESTIMATED PEAK FLOW (CUMECS) = 16.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK dum 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 230.2
ESTIMATED PEAK FLOW (CUMECS) = 57.
ESTIMATED TIME TO PEAK (MINS) = 51.50

LINK out 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 247.9
ESTIMATED PEAK FLOW (CUMECS) = 59.
ESTIMATED TIME TO PEAK (MINS) = 51.20

summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 180.
RETURN PERIOD (YRS) = 20.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0101	.1097	1.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0273	.3243	2.000
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0189	.2373	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0090	.1453	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
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Label	Intensity (mm/h)	#1 (mm)	#2 (mm)	#1 (mm/h)	#2 (mm)	#1 (mm)	#2 (mm)	Inflow (m ³ /s)	to Peak	Lag mins
petersham	34.539	10.00	30.00	.5000	2.600	92.262	67.266	5.946	45.00	3.300
main	34.539	10.00	30.00	.5000	2.600	92.262	67.266	39.040	45.00	15.00
smith	34.539	10.00	30.00	.5000	2.600	92.262	67.266	16.140	45.00	7.500
dum	34.539	10.00	0.000	.5000	0.000	92.262	0.000	57.103	51.50	0.000
out	34.539	10.00	30.00	.5000	2.600	92.262	67.266	58.721	51.20	0.000

LINK petersham 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 20.32
 ESTIMATED PEAK FLOW (CUMECS) = 14.
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK main 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 136.6
 ESTIMATED PEAK FLOW (CUMECS) = 89.
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK smith 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 57.64
 ESTIMATED PEAK FLOW (CUMECS) = 37.
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK dum 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 214.2
 ESTIMATED PEAK FLOW (CUMECS) = 0.11E+03
 ESTIMATED TIME TO PEAK (MINS) = 40.00

LINK out 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 230.8
 ESTIMATED PEAK FLOW (CUMECS) = 0.11E+03
 ESTIMATED TIME TO PEAK (MINS) = 40.00

 summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 100.
 BX = 2.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 223.61
 TOTAL OF SECOND SUB-AREAS (ha) = 71.09
 TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 #2 (ha)	Slope #1 #2 (%)	% Impervious #1 #2 (%)	Pern #1 #2	B #1 #2	Link No.
petersham	20.240 5.060	6.100 6.100	99.90 .1000	.018 .050	.0113 .1219	1.000
main	133.98 40.020	6.000 6.000	99.90 .1000	.018 .050	.0304 .3603	2.000
smith	55.280 18.420	5.000 5.000	99.90 .1000	.018 .050	.0210 .2636	3.000
dum	.00001 0.000	1.000 0.000	.1000 0.000	.018 0.00	0.000 0.000	1.001
out	14.110 7.590	5.300 5.300	99.90 .1000	.018 .050	.0100 .1615	1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 #2 (mm)	Cont. Loss #1 #2 (mm/h)	Excess Rain #1 #2 (mm)	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
petersham	34.539	10.00 30.00	.5000 2.600	92.262 67.266	5.946	45.00	3.300
main	34.539	10.00 30.00	.5000 2.600	92.262 67.266	39.040	45.00	15.00
smith	34.539	10.00 30.00	.5000 2.600	92.262 67.266	16.140	45.00	7.500
dum	34.539	10.00 0.000	.5000 0.000	92.262 0.000	57.103	51.50	0.000
out	34.539	10.00 30.00	.5000 2.600	92.262 67.266	58.721	51.20	0.000

petersham	95.495	10.00	30.00	.5000	2.600	85.029	63.575	14.083	25.00	3.300
main	95.495	10.00	30.00	.5000	2.600	85.029	63.575	88.913	25.00	15.00
smith	95.495	10.00	30.00	.5000	2.600	85.029	63.575	37.480	25.00	7.500
dum	95.495	10.00	0.000	.5000	0.000	85.029	0.000	111.55	40.00	0.000
out	95.495	10.00	30.00	.5000	2.600	85.029	63.575	114.82	40.00	0.000

LINK petersham 6.000

ESTIMATED VOLUME (CU METRES*10**3) =	23.79
ESTIMATED PEAK FLOW (CUMECS) =	15.
ESTIMATED TIME TO PEAK (MINS) =	30.00

LINK main 6.000

ESTIMATED VOLUME (CU METRES*10**3) =	160.1
ESTIMATED PEAK FLOW (CUMECS) =	92.
ESTIMATED TIME TO PEAK (MINS) =	30.00

LINK smith 6.000

ESTIMATED VOLUME (CU METRES*10**3) =	67.61
ESTIMATED PEAK FLOW (CUMECS) =	39.
ESTIMATED TIME TO PEAK (MINS) =	30.00

LINK dum 6.000

ESTIMATED VOLUME (CU METRES*10**3) =	251.0
ESTIMATED PEAK FLOW (CUMECS) =	0.11E+03
ESTIMATED TIME TO PEAK (MINS) =	45.00

LINK out 6.000

ESTIMATED VOLUME (CU METRES*10**3) =	270.5
ESTIMATED PEAK FLOW (CUMECS) =	0.11E+03
ESTIMATED TIME TO PEAK (MINS) =	45.00

summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) =	0.10
STORM DURATION (MINS) =	90.
RETURN PERIOD (YRS) =	100.
BX =	2.0000
TOTAL OF FIRST SUB-AREAS (ha) =	223.61
TOTAL OF SECOND SUB-AREAS (ha) =	71.09
TOTAL OF ALL SUB-AREAS (ha) =	294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0113	.1219	1.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0304	.3603	2.000
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0210	.2636	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0100	.1615	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
petersham	73.141	10.00	30.00	.5000	2.600	99.010 76.541	14.611 30.00 3.300
main	73.141	10.00	30.00	.5000	2.600	99.010 76.541	91.990 30.00 15.00

```
smith      73.141 10.00 30.00 .5000 2.600 99.010 76.541 38.907 30.00 7.500
dum        73.141 10.00 0.000 .5000 0.000 99.010 0.000 108.33 45.00 0.000
out        73.141 10.00 30.00 .5000 2.600 99.010 76.541 111.20 45.00 0.000
```

LINK petersham 7.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 26.40
ESTIMATED PEAK FLOW (CUMECS) = 14.
ESTIMATED TIME TO PEAK (MINS) = 35.00
```

LINK main 7.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 177.8
ESTIMATED PEAK FLOW (CUMECS) = 84.
ESTIMATED TIME TO PEAK (MINS) = 35.10
```

LINK smith 7.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 75.09
ESTIMATED PEAK FLOW (CUMECS) = 36.
ESTIMATED TIME TO PEAK (MINS) = 35.00
```

LINK dum 7.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 278.7
ESTIMATED PEAK FLOW (CUMECS) = 0.11E+03
ESTIMATED TIME TO PEAK (MINS) = 50.00
```

LINK out 7.000

```
ESTIMATED VOLUME (CU METRES*10**3) = 300.3
ESTIMATED PEAK FLOW (CUMECS) = 0.11E+03
ESTIMATED TIME TO PEAK (MINS) = 50.00
```


summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

```
ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 120.
RETURN PERIOD (YRS) = 100.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70
```

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
Label	#1 #2	#1 #2	#1 #2	#1 #2	#1 #2	No.
	(ha)	(%)	(%)			
petersham	20.240 5.060	6.100 6.100	99.90 .1000	.018 .050	.0113 .1219	1.000
main	133.98 40.020	6.000 6.000	99.90 .1000	.018 .050	.0304 .3603	2.000
smith	55.280 18.420	5.000 5.000	99.90 .1000	.018 .050	.0210 .2636	3.000
dum	.00001 0.000	1.000 0.000	.1000 0.000	.018 0.00	0.000 0.000	1.001
out	14.110 7.590	5.300 5.300	99.90 .1000	.018 .050	.0100 .1615	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1 #2	#1 #2	#1 #2	Inflow	to	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	Peak	mins
petersham	60.296	10.00 30.00	.5000 2.600	109.65 86.440	13.644	35.00	3.300
main	60.296	10.00 30.00	.5000 2.600	109.65 86.440	83.568	35.10	15.00
smith	60.296	10.00 30.00	.5000 2.600	109.65 86.440	35.638	35.00	7.500
dum	60.296	10.00 0.000	.5000 0.000	109.65 0.000	106.00	50.00	0.000

out 60.296 10.00 30.00 .5000 2.600 109.65 86.440 108.44 50.00 0.000

LINK petersham 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 30.32
ESTIMATED PEAK FLOW (CUMECS) = 7.4
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK main 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 203.9
ESTIMATED PEAK FLOW (CUMECS) = 49.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK smith 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 86.08
ESTIMATED PEAK FLOW (CUMECS) = 20.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK dum 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 319.4
ESTIMATED PEAK FLOW (CUMECS) = 71.
ESTIMATED TIME TO PEAK (MINS) = 52.50

LINK out 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 344.3
ESTIMATED PEAK FLOW (CUMECS) = 73.
ESTIMATED TIME TO PEAK (MINS) = 52.50

summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 180.
RETURN PERIOD (YRS) = 100.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0113	.1219	1.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0304	.3603	2.000
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0210	.2636	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0100	.1615	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)		(m^3/s)	mins
petersham	45.785	10.00	30.00	.5000	2.600	125.98	3.300
main	45.785	10.00	30.00	.5000	2.600	125.98	15.00
smith	45.785	10.00	30.00	.5000	2.600	125.98	7.500
dum	45.785	10.00	0.000	.5000	0.000	125.98	0.000
out	45.785	10.00	30.00	.5000	2.600	125.98	0.000

LINK petersham 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 9.804
 ESTIMATED PEAK FLOW (CUMECS) = 8.4
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK main 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 65.74
 ESTIMATED PEAK FLOW (CUMECS) = 55.
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK smith 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 27.54
 ESTIMATED PEAK FLOW (CUMECS) = 23.
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK dum 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 103.0
 ESTIMATED PEAK FLOW (CUMECS) = 67.
 ESTIMATED TIME TO PEAK (MINS) = 40.00

LINK out 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 110.7
 ESTIMATED PEAK FLOW (CUMECS) = 68.
 ESTIMATED TIME TO PEAK (MINS) = 40.00

 summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 5.
 BX = 2.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 223.61
 TOTAL OF SECOND SUB-AREAS (ha) = 71.09
 TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
Label	#1 #2	#1 #2	#1 #2	#1 #2	#1 #2	No.
	(ha)	(%)	(%)			
petersham	20.240 5.060	6.100 6.100	99.90 .1000	.018 .050	.0075 .0813	1.000
main	133.98 40.020	6.000 6.000	99.90 .1000	.018 .050	.0202 .2402	2.000
smith	55.280 18.420	5.000 5.000	99.90 .1000	.018 .050	.0140 .1757	3.000
dum	.00001 0.000	1.000 0.000	.1000 0.000	.018 0.00	0.000 0.000	1.001
out	14.110 7.590	5.300 5.300	99.90 .1000	.018 .050	.0067 .1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1 #2	#1 #2	#1 #2	Inflow	to	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	Peak	mins
petersham	53.519	10.00 30.00	.5000 2.600	43.102 21.922	8.361	25.00	3.300
main	53.519	10.00 30.00	.5000 2.600	43.102 21.922	54.595	25.00	15.00
smith	53.519	10.00 30.00	.5000 2.600	43.102 21.922	22.699	25.00	7.500
dum	53.519	10.00 0.000	.5000 0.000	43.102 0.000	66.556	40.00	0.000
out	53.519	10.00 30.00	.5000 2.600	43.102 21.922	68.156	40.00	0.000

LINK petersham 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 11.81
 ESTIMATED PEAK FLOW (CUMECS) = 8.8
 ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK main 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 79.42
 ESTIMATED PEAK FLOW (CUMECS) = 57.
 ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK smith 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 33.32
 ESTIMATED PEAK FLOW (CUMECS) = 24.
 ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK dum 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 124.4
 ESTIMATED PEAK FLOW (CUMECS) = 66.
 ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK out 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 133.8
 ESTIMATED PEAK FLOW (CUMECS) = 67.
 ESTIMATED TIME TO PEAK (MINS) = 45.00

 summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
 STORM DURATION (MINS) = 90.
 RETURN PERIOD (YRS) = 5.
 BX = 2.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 223.61
 TOTAL OF SECOND SUB-AREAS (ha) = 71.09
 TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
Label	#1 #2	#1 #2	#1 #2	#1 #2	#1 #2	No.
	(ha)	(%)	(%)			
petersham	20.240 5.060	6.100 6.100	99.90 .1000	.018 .050	.0075 .0813	1.000
main	133.98 40.020	6.000 6.000	99.90 .1000	.018 .050	.0202 .2402	2.000
smith	55.280 18.420	5.000 5.000	99.90 .1000	.018 .050	.0140 .1757	3.000
dum	.00001 0.000	1.000 0.000	.1000 0.000	.018 0.00	0.000 0.000	1.001
out	14.110 7.590	5.300 5.300	99.90 .1000	.018 .050	.0067 .1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1 #2	#1 #2	#1 #2	Inflow	to	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	Peak	mins
petersham	41.278	10.00 30.00	.5000 2.600	51.254 29.149	8.796	30.00	3.300
main	41.278	10.00 30.00	.5000 2.600	51.254 29.149	57.407	30.00	15.00
smith	41.278	10.00 30.00	.5000 2.600	51.254 29.149	23.891	30.00	7.500
dum	41.278	10.00 0.000	.5000 0.000	51.254 0.000	65.853	45.00	0.000
out	41.278	10.00 30.00	.5000 2.600	51.254 29.149	67.316	45.00	0.000

LINK petersham 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 13.35

ESTIMATED PEAK FLOW (CUMECS) = 8.3
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK main 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 89.79
ESTIMATED PEAK FLOW (CUMECS) = 54.
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK smith 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 37.72
ESTIMATED PEAK FLOW (CUMECS) = 22.
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK dum 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 140.7
ESTIMATED PEAK FLOW (CUMECS) = 66.
ESTIMATED TIME TO PEAK (MINS) = 49.70

LINK out 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 151.3
ESTIMATED PEAK FLOW (CUMECS) = 67.
ESTIMATED TIME TO PEAK (MINS) = 49.70

summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 120.
RETURN PERIOD (YRS) = 5.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	1.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	2.000
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link			
Label	Intensity	#1	#2	#1	#2	Inflow	to			
	(mm/h)	(mm)	(mm/h)	(mm)		(m^3/s)	Peak			
							Lag			
							mins			
petersham	34.200	10.00	30.00	.5000	2.600	57.541	34.646	8.286	35.00	3.300
main	34.200	10.00	30.00	.5000	2.600	57.541	34.646	53.602	35.00	15.00
smith	34.200	10.00	30.00	.5000	2.600	57.541	34.646	22.415	35.00	7.500
dum	34.200	10.00	0.000	.5000	0.000	57.541	0.000	65.646	49.70	0.000
out	34.200	10.00	30.00	.5000	2.600	57.541	34.646	66.831	49.70	0.000

LINK petersham 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 15.66
ESTIMATED PEAK FLOW (CUMECS) = 4.4

ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK main 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 105.2

ESTIMATED PEAK FLOW (CUMECS) = 29.

ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK smith 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 44.27

ESTIMATED PEAK FLOW (CUMECS) = 12.

ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK dum 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 164.8

ESTIMATED PEAK FLOW (CUMECS) = 43.

ESTIMATED TIME TO PEAK (MINS) = 49.20

LINK out 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 177.4

ESTIMATED PEAK FLOW (CUMECS) = 45.

ESTIMATED TIME TO PEAK (MINS) = 48.40

summer hill -allied mill -100yr, 20yr, 5yr 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990

to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 180.
RETURN PERIOD (YRS) = 5.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	1.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	2.000
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
petersham	26.158	10.00	30.00	.5000	2.600	67.143 42.364	4.442 45.00 3.300
main	26.158	10.00	30.00	.5000	2.600	67.143 42.364	29.319 45.00 15.00
smith	26.158	10.00	30.00	.5000	2.600	67.143 42.364	12.125 45.00 7.500
dum	26.158	10.00	0.000	.5000	0.000	67.143 0.000	43.482 49.20 0.000
out	26.158	10.00	30.00	.5000	2.600	67.143 42.364	44.751 48.40 0.000

Run completed at: 8th March 2011 17:59:05

Run started at: 8th March 2011 17:59:42

```
#####
                        RUNTIME                RESULTS
#####
```

```
Max. no. of links allowed =      10000

Max. no. of routing increments allowed =      250000

Max. no. of rating curve points =      250000

Max. no. of storm temporal points =      250000

Max. no. of channel subreaches =      25

Max link stack level =      50

Input Version number =      820
```

```
LINK smith      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      106.5
ESTIMATED PEAK FLOW      (CUMECS) =      0.15E+03
ESTIMATED TIME TO PEAK      (MINS) =      5.70
```

```
LINK petersham      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      36.83
ESTIMATED PEAK FLOW      (CUMECS) =      54.
ESTIMATED TIME TO PEAK      (MINS) =      4.00
```

```
LINK main      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      252.0
ESTIMATED PEAK FLOW      (CUMECS) =      0.35E+03
ESTIMATED TIME TO PEAK      (MINS) =      5.70
```

```
LINK dum      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      395.4
ESTIMATED PEAK FLOW      (CUMECS) =      0.43E+03
ESTIMATED TIME TO PEAK      (MINS) =      19.90
```

```
LINK out      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      426.3
ESTIMATED PEAK FLOW      (CUMECS) =      0.44E+03
ESTIMATED TIME TO PEAK      (MINS) =      19.90
```

```
#####
summer hill -allied mill -pmf 1-3-11 revised
```

```
Results for period from 0: 0.0 1/ 1/1990
                        to 12: 0.0 1/ 1/1990
```

```
#####
```

```
ROUTING INCREMENT (MINS) =      0.10
STORM DURATION (MINS) =      15.
RETURN PERIOD (YRS) =      0.
BX =      2.0000
TOTAL OF FIRST SUB-AREAS (ha) =      223.61
TOTAL OF SECOND SUB-AREAS (ha) =      71.09
TOTAL OF ALL SUB-AREAS (ha) =      294.70
```

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
smith	-1.000	10.00	30.00	.5000	2.600	149.67	129.26
petersham	-1.000	10.00	30.00	.5000	2.600	149.67	129.26
main	-1.000	10.00	30.00	.5000	2.600	149.67	129.26
dum	-1.000	10.00	0.000	.5000	0.000	434.36	19.90
out	-1.000	10.00	30.00	.5000	2.600	149.67	129.26

LINK smith 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 165.2
ESTIMATED PEAK FLOW (CUMECS) = 0.11E+03
ESTIMATED TIME TO PEAK (MINS) = 6.40

LINK petersham 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 57.04
ESTIMATED PEAK FLOW (CUMECS) = 44.
ESTIMATED TIME TO PEAK (MINS) = 5.80

LINK main 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 390.9
ESTIMATED PEAK FLOW (CUMECS) = 0.27E+03
ESTIMATED TIME TO PEAK (MINS) = 6.80

LINK dum 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 613.2
ESTIMATED PEAK FLOW (CUMECS) = 0.41E+03
ESTIMATED TIME TO PEAK (MINS) = 21.80

LINK out 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 661.4
ESTIMATED PEAK FLOW (CUMECS) = 0.44E+03
ESTIMATED TIME TO PEAK (MINS) = 21.80

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 30.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init.	Loss	Cont.	Loss	Excess	Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	#1	#2	Inflow	to	Lag
	(mm/h)	(mm)		(mm/h)		(mm)		(m^3/s)	Peak	mins
smith	-1.000	10.00	30.00	.5000	2.600	229.61	208.74	114.37	6.400	7.500
petersham	-1.000	10.00	30.00	.5000	2.600	229.61	208.74	44.112	5.800	3.300
main	-1.000	10.00	30.00	.5000	2.600	229.61	208.74	272.99	6.800	15.00
dum	-1.000	10.00	0.000	.5000	0.000	229.61	0.000	414.58	21.80	0.000
out	-1.000	10.00	30.00	.5000	2.600	229.61	208.74	438.61	21.80	0.000

LINK smith 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 209.3
ESTIMATED PEAK FLOW (CUMECS) = 0.10E+03
ESTIMATED TIME TO PEAK (MINS) = 8.60

LINK petersham 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 72.15
ESTIMATED PEAK FLOW (CUMECS) = 38.
ESTIMATED TIME TO PEAK (MINS) = 8.60

LINK main 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 495.0
ESTIMATED PEAK FLOW (CUMECS) = 0.24E+03
ESTIMATED TIME TO PEAK (MINS) = 8.70

LINK dum 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 776.5
ESTIMATED PEAK FLOW (CUMECS) = 0.37E+03
ESTIMATED TIME TO PEAK (MINS) = 23.80

LINK out 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 837.7
ESTIMATED PEAK FLOW (CUMECS) = 0.39E+03
ESTIMATED TIME TO PEAK (MINS) = 24.00

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 45.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
smith	-1.000	10.00	30.00	.5000	2.600	289.52 268.19	100.92 8.600 7.500
petersham	-1.000	10.00	30.00	.5000	2.600	289.52 268.19	37.775 8.600 3.300
main	-1.000	10.00	30.00	.5000	2.600	289.52 268.19	240.62 8.700 15.00
dum	-1.000	10.00	0.000	.5000	0.000	289.52 0.000	369.62 23.80 0.000
out	-1.000	10.00	30.00	.5000	2.600	289.52 268.19	391.60 24.00 0.000

LINK smith 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 238.7
ESTIMATED PEAK FLOW (CUMECS) = 88.
ESTIMATED TIME TO PEAK (MINS) = 11.40

LINK petersham 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 82.22
ESTIMATED PEAK FLOW (CUMECS) = 32.
ESTIMATED TIME TO PEAK (MINS) = 11.40

LINK main 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 564.3
ESTIMATED PEAK FLOW (CUMECS) = 0.21E+03
ESTIMATED TIME TO PEAK (MINS) = 11.50

LINK dum 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 885.2
ESTIMATED PEAK FLOW (CUMECS) = 0.32E+03
ESTIMATED TIME TO PEAK (MINS) = 26.40

LINK out 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 955.0
ESTIMATED PEAK FLOW (CUMECS) = 0.34E+03
ESTIMATED TIME TO PEAK (MINS) = 26.50

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
smith	-1.000	10.00	30.00	.5000	2.600	329.42	307.63
petersham	-1.000	10.00	30.00	.5000	2.600	329.42	307.63
main	-1.000	10.00	30.00	.5000	2.600	329.42	307.63
dum	-1.000	10.00	0.000	.5000	0.000	321.01	26.40
out	-1.000	10.00	30.00	.5000	2.600	329.42	307.63

LINK smith 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 275.2
ESTIMATED PEAK FLOW (CUMECS) = 69.
ESTIMATED TIME TO PEAK (MINS) = 42.80

LINK petersham 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 94.76
ESTIMATED PEAK FLOW (CUMECS) = 26.
ESTIMATED TIME TO PEAK (MINS) = 42.80

LINK main 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 650.5
ESTIMATED PEAK FLOW (CUMECS) = 0.16E+03
ESTIMATED TIME TO PEAK (MINS) = 17.10

LINK dum 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 1020.
ESTIMATED PEAK FLOW (CUMECS) = 0.25E+03
ESTIMATED TIME TO PEAK (MINS) = 32.10

LINK out 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 1101.
ESTIMATED PEAK FLOW (CUMECS) = 0.27E+03
ESTIMATED TIME TO PEAK (MINS) = 32.10

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 90.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	-1.000	10.00	30.00	.5000	2.600	379.22	356.50
petersham	-1.000	10.00	30.00	.5000	2.600	379.22	356.50
main	-1.000	10.00	30.00	.5000	2.600	379.22	356.50
dum	-1.000	10.00	0.000	.5000	0.000	250.01	32.10
out	-1.000	10.00	30.00	.5000	2.600	379.22	356.50

LINK smith 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 311.7
ESTIMATED PEAK FLOW (CUMECS) = 62.
ESTIMATED TIME TO PEAK (MINS) = 57.10

LINK petersham 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 107.3
ESTIMATED PEAK FLOW (CUMECS) = 22.
ESTIMATED TIME TO PEAK (MINS) = 57.10

LINK main 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 736.7
ESTIMATED PEAK FLOW (CUMECS) = 0.14E+03
ESTIMATED TIME TO PEAK (MINS) = 57.10

LINK dum 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 1156.
ESTIMATED PEAK FLOW (CUMECS) = 0.22E+03
ESTIMATED TIME TO PEAK (MINS) = 60.60

LINK out 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 1247.
ESTIMATED PEAK FLOW (CUMECS) = 0.23E+03
ESTIMATED TIME TO PEAK (MINS) = 60.60

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 120.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link			
Label	Intensity	#1	#2	#1	#2	#1	#2	Inflow	to	Lag
	(mm/h)	(mm)		(mm/h)		(mm)		(m^3/s)	Peak	mins
smith	-1.000	10.00	30.00	.5000	2.600	429.00	405.34	61.957	57.10	7.500
petersham	-1.000	10.00	30.00	.5000	2.600	429.00	405.34	22.379	57.10	3.300
main	-1.000	10.00	30.00	.5000	2.600	429.00	405.34	144.61	57.10	15.00
dum	-1.000	10.00	0.000	.5000	0.000	429.00	0.000	217.58	60.60	0.000
out	-1.000	10.00	30.00	.5000	2.600	429.00	405.34	232.62	60.60	0.000

LINK smith 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 333.5
ESTIMATED PEAK FLOW (CUMECS) = 55.
ESTIMATED TIME TO PEAK (MINS) = 71.40

LINK petersham 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 114.8
ESTIMATED PEAK FLOW (CUMECS) = 19.
ESTIMATED TIME TO PEAK (MINS) = 71.40

LINK main 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 788.0
ESTIMATED PEAK FLOW (CUMECS) = 0.13E+03
ESTIMATED TIME TO PEAK (MINS) = 71.40

LINK dum 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 1236.
ESTIMATED PEAK FLOW (CUMECS) = 0.19E+03
ESTIMATED TIME TO PEAK (MINS) = 72.20

LINK out 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 1334.
ESTIMATED PEAK FLOW (CUMECS) = 0.20E+03
ESTIMATED TIME TO PEAK (MINS) = 72.20

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 150.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
smith	-1.000	10.00	30.00	.5000	2.600	458.78 434.18	54.530 71.40 7.500
petersham	-1.000	10.00	30.00	.5000	2.600	458.78 434.18	19.192 71.40 3.300
main	-1.000	10.00	30.00	.5000	2.600	458.78 434.18	127.51 71.40 15.00
dum	-1.000	10.00	0.000	.5000	0.000	458.78 0.000	189.00 72.20 0.000
out	-1.000	10.00	30.00	.5000	2.600	458.78 434.18	203.89 72.20 0.000

LINK smith 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 347.9
ESTIMATED PEAK FLOW (CUMECS) = 48.
ESTIMATED TIME TO PEAK (MINS) = 85.70

LINK petersham 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 119.7
ESTIMATED PEAK FLOW (CUMECS) = 17.
ESTIMATED TIME TO PEAK (MINS) = 68.50

LINK main 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 822.1
ESTIMATED PEAK FLOW (CUMECS) = 0.11E+03
ESTIMATED TIME TO PEAK (MINS) = 85.70

LINK dum 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 1290.
ESTIMATED PEAK FLOW (CUMECS) = 0.17E+03
ESTIMATED TIME TO PEAK (MINS) = 83.50

LINK out 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 1392.
ESTIMATED PEAK FLOW (CUMECS) = 0.18E+03
ESTIMATED TIME TO PEAK (MINS) = 83.50

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 180.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
smith	-1.000	10.00	30.00	.5000	2.600	478.55 453.02	48.025 85.70 7.500
petersham	-1.000	10.00	30.00	.5000	2.600	478.55 453.02	16.723 68.50 3.300
main	-1.000	10.00	30.00	.5000	2.600	478.55 453.02	112.77 85.70 15.00
dum	-1.000	10.00	0.000	.5000	0.000	478.55 0.000	167.29 83.50 0.000
out	-1.000	10.00	30.00	.5000	2.600	478.55 453.02	181.47 83.50 0.000

LINK smith 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 384.0
ESTIMATED PEAK FLOW (CUMECS) = 40.
ESTIMATED TIME TO PEAK (MINS) = 114.20

LINK petersham 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 132.2
ESTIMATED PEAK FLOW (CUMECS) = 14.
ESTIMATED TIME TO PEAK (MINS) = 91.40

LINK main 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 907.4
ESTIMATED PEAK FLOW (CUMECS) = 94.
ESTIMATED TIME TO PEAK (MINS) = 114.20

LINK dum 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 1424.
ESTIMATED PEAK FLOW (CUMECS) = 0.14E+03
ESTIMATED TIME TO PEAK (MINS) = 121.80

LINK out 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 1536.
ESTIMATED PEAK FLOW (CUMECS) = 0.15E+03
ESTIMATED TIME TO PEAK (MINS) = 94.70

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 240.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
smith	-1.000	10.00	30.00	.5000	2.600	528.10	39.989
petersham	-1.000	10.00	30.00	.5000	2.600	528.10	13.875
main	-1.000	10.00	30.00	.5000	2.600	528.10	94.399
dum	-1.000	10.00	0.000	.5000	0.000	528.10	143.91
out	-1.000	10.00	30.00	.5000	2.600	528.10	154.60

LINK smith 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 412.7
ESTIMATED PEAK FLOW (CUMECS) = 35.
ESTIMATED TIME TO PEAK (MINS) = 114.20

LINK petersham 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 142.1
ESTIMATED PEAK FLOW (CUMECS) = 12.
ESTIMATED TIME TO PEAK (MINS) = 57.10

LINK main 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 975.4
ESTIMATED PEAK FLOW (CUMECS) = 81.
ESTIMATED TIME TO PEAK (MINS) = 114.20

LINK dum 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 1530.
ESTIMATED PEAK FLOW (CUMECS) = 0.13E+03
ESTIMATED TIME TO PEAK (MINS) = 117.60

LINK out 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 1651.
ESTIMATED PEAK FLOW (CUMECS) = 0.14E+03
ESTIMATED TIME TO PEAK (MINS) = 114.30

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 300.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)		(mm/h)		(m^3/s)	Peak mins
smith	-1.000	10.00	30.00	.5000	2.600	567.63 538.32	34.567 114.2 7.500
petersham	-1.000	10.00	30.00	.5000	2.600	567.63 538.32	12.196 57.10 3.300
main	-1.000	10.00	30.00	.5000	2.600	567.63 538.32	81.386 114.2 15.00
dum	-1.000	10.00	0.000	.5000	0.000	567.63 0.000	126.86 117.6 0.000
out	-1.000	10.00	30.00	.5000	2.600	567.63 538.32	136.55 114.3 0.000

LINK smith 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 434.1
ESTIMATED PEAK FLOW (CUMECS) = 30.
ESTIMATED TIME TO PEAK (MINS) = 137.10

LINK petersham 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 149.5
ESTIMATED PEAK FLOW (CUMECS) = 11.
ESTIMATED TIME TO PEAK (MINS) = 68.50

LINK main 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 1026.
ESTIMATED PEAK FLOW (CUMECS) = 72.
ESTIMATED TIME TO PEAK (MINS) = 137.10

LINK dum 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 1609.
ESTIMATED PEAK FLOW (CUMECS) = 0.11E+03
ESTIMATED TIME TO PEAK (MINS) = 140.40

LINK out 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 1737.
ESTIMATED PEAK FLOW (CUMECS) = 0.12E+03
ESTIMATED TIME TO PEAK (MINS) = 137.10

summer hill -allied mill -pmf 1-3-11 revised

Results for period from 0: 0.0 1/ 1/1990
to 12: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 360.
RETURN PERIOD (YRS) = 0.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss		Cont. Loss		Excess Rain		Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	#1	#2	Inflow	to	Lag
	(mm/h)	(mm)		(mm/h)		(mm)		(m^3/s)	Peak	mins
smith	-1.000	10.00	30.00	.5000	2.600	597.17	565.97	30.364	137.1	7.500
petersham	-1.000	10.00	30.00	.5000	2.600	597.17	565.97	10.948	68.50	3.300
main	-1.000	10.00	30.00	.5000	2.600	597.17	565.97	71.636	137.1	15.00
dum	-1.000	10.00	0.000	.5000	0.000	597.17	0.000	112.18	140.4	0.000
out	-1.000	10.00	30.00	.5000	2.600	597.17	565.97	120.96	137.1	0.000

Run completed at: 8th March 2011 18:00:44

Run started at: 8th March 2011 18:14:38

```
#####
                        RUNTIME                RESULTS
#####
```

```
Max. no. of links allowed =      10000

Max. no. of routng increments allowed =      250000

Max. no. of rating curve points =      250000

Max. no. of storm temporal points =      250000

Max. no. of channel subreaches =      25

Max link stack level =      50

Input Version number =      820
```

```
LINK smith      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      48.11
ESTIMATED PEAK FLOW      (CUMECS) =      35.
ESTIMATED TIME TO PEAK      (MINS) =      25.00
```

```
LINK petersham  1.000

ESTIMATED VOLUME (CU METRES*10**3) =      16.98
ESTIMATED PEAK FLOW      (CUMECS) =      13.
ESTIMATED TIME TO PEAK      (MINS) =      25.00
```

```
LINK main      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      114.1
ESTIMATED PEAK FLOW      (CUMECS) =      83.
ESTIMATED TIME TO PEAK      (MINS) =      25.00
```

```
LINK dum      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      179.0
ESTIMATED PEAK FLOW      (CUMECS) =      0.10E+03
ESTIMATED TIME TO PEAK      (MINS) =      40.00
```

```
LINK out      1.000

ESTIMATED VOLUME (CU METRES*10**3) =      192.7
ESTIMATED PEAK FLOW      (CUMECS) =      0.10E+03
ESTIMATED TIME TO PEAK      (MINS) =      40.00
```

```
#####
summer hill - 1-3-11 revised Climate Change 15% Inc Intensity
```

```
Results for period from 0: 0.0 1/ 1/1990
                        to 5: 0.0 1/ 1/1990
```

```
#####
```

```
ROUTING INCREMENT (MINS) =      0.10
STORM DURATION (MINS) =      60.
RETURN PERIOD (YRS) =      20.
BX =      2.0000
TOTAL OF FIRST SUB-AREAS (ha) =      223.61
TOTAL OF SECOND SUB-AREAS (ha) =      71.09
TOTAL OF ALL SUB-AREAS (ha) =      294.70
```

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0189	.2373	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0101	.1097	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0273	.3243	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0090	.1453	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link			
Label	Intensity	#1	#2	#1	#2	#1	#2	Inflow	to	Lag
	(mm/h)	(mm)		(mm/h)		(mm)		(m^3/s)	Peak	mins
smith	82.116	10.00	30.00	.5000	2.600	71.671	50.295	34.664	25.00	7.500
petersham	82.116	10.00	30.00	.5000	2.600	71.671	50.295	12.948	25.00	3.300
main	82.116	10.00	30.00	.5000	2.600	71.671	50.295	82.627	25.00	15.00
dum	82.116	10.00	0.000	.5000	0.000	71.671	0.000	101.82	40.00	0.000
out	82.116	10.00	30.00	.5000	2.600	71.671	50.295	104.48	40.00	0.000

LINK smith 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 56.87
ESTIMATED PEAK FLOW (CUMECS) = 36.
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK petersham 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 20.02
ESTIMATED PEAK FLOW (CUMECS) = 14.
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK main 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 134.7
ESTIMATED PEAK FLOW (CUMECS) = 87.
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK dum 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 211.3
ESTIMATED PEAK FLOW (CUMECS) = 0.10E+03
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK out 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 227.6
ESTIMATED PEAK FLOW (CUMECS) = 0.10E+03
ESTIMATED TIME TO PEAK (MINS) = 45.00

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 90.
RETURN PERIOD (YRS) = 20.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0189	.2373	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0101	.1097	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0273	.3243	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0090	.1453	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link			
Label	Intensity	#1	#2	#1	#2	#1	#2	Inflow	to	Lag
	(mm/h)	(mm)		(mm/h)		(mm)		(m^3/s)	Peak	mins
smith	63.095	10.00	30.00	.5000	2.600	83.956	61.580	36.377	30.00	7.500
petersham	63.095	10.00	30.00	.5000	2.600	83.956	61.580	13.575	30.00	3.300
main	63.095	10.00	30.00	.5000	2.600	83.956	61.580	86.529	30.00	15.00
dum	63.095	10.00	0.000	.5000	0.000	83.956	0.000	100.26	45.00	0.000
out	63.095	10.00	30.00	.5000	2.600	83.956	61.580	102.69	45.00	0.000

LINK smith 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 63.53
ESTIMATED PEAK FLOW (CUMECS) = 34.
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK petersham 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 22.33
ESTIMATED PEAK FLOW (CUMECS) = 13.
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK main 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 150.5
ESTIMATED PEAK FLOW (CUMECS) = 79.
ESTIMATED TIME TO PEAK (MINS) = 35.10

LINK dum 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 235.9
ESTIMATED PEAK FLOW (CUMECS) = 99.
ESTIMATED TIME TO PEAK (MINS) = 50.00

LINK out 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 254.1
ESTIMATED PEAK FLOW (CUMECS) = 0.10E+03
ESTIMATED TIME TO PEAK (MINS) = 50.00

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 120.
RETURN PERIOD (YRS) = 20.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0189	.2373	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0101	.1097	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0273	.3243	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0090	.1453	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	52.135	10.00	30.00	.5000	2.600	93.351	7.500
petersham	52.135	10.00	30.00	.5000	2.600	93.351	3.300
main	52.135	10.00	30.00	.5000	2.600	93.351	15.00
dum	52.135	10.00	0.000	.5000	0.000	99.339	0.000
out	52.135	10.00	30.00	.5000	2.600	101.35	0.000

LINK smith 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 73.29
ESTIMATED PEAK FLOW (CUMECS) = 19.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK petersham 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 25.81
ESTIMATED PEAK FLOW (CUMECS) = 6.9
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK main 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 173.7
ESTIMATED PEAK FLOW (CUMECS) = 45.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK dum 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 272.1
ESTIMATED PEAK FLOW (CUMECS) = 66.
ESTIMATED TIME TO PEAK (MINS) = 51.30

LINK out 4.000

ESTIMATED VOLUME (CU METRES*10**3) = 293.2
ESTIMATED PEAK FLOW (CUMECS) = 68.
ESTIMATED TIME TO PEAK (MINS) = 51.10

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 180.
RETURN PERIOD (YRS) = 20.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0189	.2373	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0101	.1097	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0273	.3243	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0090	.1453	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to Peak	mins
smith	39.719	10.00	30.00	.5000	2.600	107.79	7.500
petersham	39.719	10.00	30.00	.5000	2.600	107.79	3.300
main	39.719	10.00	30.00	.5000	2.600	107.79	15.00
dum	39.719	10.00	0.000	.5000	0.000	66.027	0.000
out	39.719	10.00	30.00	.5000	2.600	107.79	0.000

LINK smith 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 68.18
ESTIMATED PEAK FLOW (CUMECS) = 43.
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK petersham 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 23.93
ESTIMATED PEAK FLOW (CUMECS) = 16.
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK main 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 161.3
ESTIMATED PEAK FLOW (CUMECS) = 0.10E+03
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK dum 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 253.1
ESTIMATED PEAK FLOW (CUMECS) = 0.13E+03
ESTIMATED TIME TO PEAK (MINS) = 40.00

LINK out 5.000

ESTIMATED VOLUME (CU METRES*10**3) = 272.7
ESTIMATED PEAK FLOW (CUMECS) = 0.13E+03
ESTIMATED TIME TO PEAK (MINS) = 40.00

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 100.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0210	.2636	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0113	.1219	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0304	.3603	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0100	.1615	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	109.82	10.00	30.00	.5000	2.600	99.338	7.500
petersham	109.82	10.00	30.00	.5000	2.600	99.338	3.300
main	109.82	10.00	30.00	.5000	2.600	99.338	15.00
dum	109.82	10.00	0.000	.5000	0.000	129.49	0.000
out	109.82	10.00	30.00	.5000	2.600	133.33	0.000

LINK smith 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 79.65
ESTIMATED PEAK FLOW (CUMECS) = 45.
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK petersham 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 27.93
ESTIMATED PEAK FLOW (CUMECS) = 17.
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK main 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 188.6
ESTIMATED PEAK FLOW (CUMECS) = 0.11E+03
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK dum 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 295.7
ESTIMATED PEAK FLOW (CUMECS) = 0.13E+03
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK out 6.000

ESTIMATED VOLUME (CU METRES*10**3) = 318.7
ESTIMATED PEAK FLOW (CUMECS) = 0.13E+03
ESTIMATED TIME TO PEAK (MINS) = 45.00

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 90.
RETURN PERIOD (YRS) = 100.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0210	.2636	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0113	.1219	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0304	.3603	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0100	.1615	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	84.112	10.00	30.00	.5000	2.600	115.45	7.500
petersham	84.112	10.00	30.00	.5000	2.600	115.45	3.300
main	84.112	10.00	30.00	.5000	2.600	115.45	15.00
dum	84.112	10.00	0.000	.5000	0.000	125.80	0.000
out	84.112	10.00	30.00	.5000	2.600	129.20	0.000

LINK smith 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 88.30
ESTIMATED PEAK FLOW (CUMECS) = 42.
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK petersham 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 30.97
ESTIMATED PEAK FLOW (CUMECS) = 16.
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK main 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 209.0
ESTIMATED PEAK FLOW (CUMECS) = 98.
ESTIMATED TIME TO PEAK (MINS) = 35.10

LINK dum 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 327.7
ESTIMATED PEAK FLOW (CUMECS) = 0.12E+03
ESTIMATED TIME TO PEAK (MINS) = 50.00

LINK out 7.000

ESTIMATED VOLUME (CU METRES*10**3) = 353.3
ESTIMATED PEAK FLOW (CUMECS) = 0.13E+03
ESTIMATED TIME TO PEAK (MINS) = 50.00

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 120.
RETURN PERIOD (YRS) = 100.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0210	.2636	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0113	.1219	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0304	.3603	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0100	.1615	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	69.340	10.00	30.00	.5000	2.600	127.72	7.500
petersham	69.340	10.00	30.00	.5000	2.600	127.72	3.300
main	69.340	10.00	30.00	.5000	2.600	127.72	15.00
dum	69.340	10.00	0.000	.5000	0.000	123.83	0.000
out	69.340	10.00	30.00	.5000	2.600	126.73	0.000

LINK smith 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 101.2
ESTIMATED PEAK FLOW (CUMECS) = 23.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK petersham 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 35.53
ESTIMATED PEAK FLOW (CUMECS) = 8.6
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK main 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 239.3
ESTIMATED PEAK FLOW (CUMECS) = 56.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK dum 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 375.0
ESTIMATED PEAK FLOW (CUMECS) = 82.
ESTIMATED TIME TO PEAK (MINS) = 52.50

LINK out 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 404.4
ESTIMATED PEAK FLOW (CUMECS) = 85.
ESTIMATED TIME TO PEAK (MINS) = 52.50

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 180.
RETURN PERIOD (YRS) = 100.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0210	.2636	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0113	.1219	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0304	.3603	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0100	.1615	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	52.653	10.00	30.00	.5000	2.600	146.57	7.500
petersham	52.653	10.00	30.00	.5000	2.600	146.57	3.300
main	52.653	10.00	30.00	.5000	2.600	146.57	15.00
dum	52.653	10.00	0.000	.5000	0.000	82.286	0.000
out	52.653	10.00	30.00	.5000	2.600	146.57	0.000

LINK smith 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 33.40
ESTIMATED PEAK FLOW (CUMECS) = 26.
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK petersham 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 11.83
ESTIMATED PEAK FLOW (CUMECS) = 9.7
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK main 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 79.61
ESTIMATED PEAK FLOW (CUMECS) = 63.
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK dum 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 124.7
ESTIMATED PEAK FLOW (CUMECS) = 77.
ESTIMATED TIME TO PEAK (MINS) = 40.00

LINK out 9.000

ESTIMATED VOLUME (CU METRES*10**3) = 134.1
ESTIMATED PEAK FLOW (CUMECS) = 79.
ESTIMATED TIME TO PEAK (MINS) = 40.00

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 5.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	61.547	10.00	30.00	.5000	2.600	51.120	29.877
petersham	61.547	10.00	30.00	.5000	2.600	51.120	29.877
main	61.547	10.00	30.00	.5000	2.600	51.120	29.877
dum	61.547	10.00	0.000	.5000	0.000	51.120	0.000
out	61.547	10.00	30.00	.5000	2.600	51.120	29.877

LINK smith 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 40.11
ESTIMATED PEAK FLOW (CUMECS) = 28.
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK petersham 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 14.15
ESTIMATED PEAK FLOW (CUMECS) = 10.
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK main 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 95.43
ESTIMATED PEAK FLOW (CUMECS) = 67.
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK dum 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 149.5
ESTIMATED PEAK FLOW (CUMECS) = 76.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK out 10.000

ESTIMATED VOLUME (CU METRES*10**3) = 160.9
ESTIMATED PEAK FLOW (CUMECS) = 78.
ESTIMATED TIME TO PEAK (MINS) = 45.00

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 90.
RETURN PERIOD (YRS) = 5.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	47.469	10.00	30.00	.5000	2.600	60.533	7.500
petersham	47.469	10.00	30.00	.5000	2.600	60.533	3.300
main	47.469	10.00	30.00	.5000	2.600	60.533	15.00
dum	47.469	10.00	0.000	.5000	0.000	60.533	0.000
out	47.469	10.00	30.00	.5000	2.600	60.533	0.000

LINK smith 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 45.26
ESTIMATED PEAK FLOW (CUMECS) = 26.
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK petersham 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 15.94
ESTIMATED PEAK FLOW (CUMECS) = 9.6
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK main 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 107.6
ESTIMATED PEAK FLOW (CUMECS) = 62.
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK dum 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 168.5
ESTIMATED PEAK FLOW (CUMECS) = 76.
ESTIMATED TIME TO PEAK (MINS) = 49.50

LINK out 11.000

ESTIMATED VOLUME (CU METRES*10**3) = 181.4
ESTIMATED PEAK FLOW (CUMECS) = 78.
ESTIMATED TIME TO PEAK (MINS) = 49.50

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 120.
RETURN PERIOD (YRS) = 5.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	to	mins
smith	39.330	10.00	30.00	.5000	2.600	67.782	7.500
petersham	39.330	10.00	30.00	.5000	2.600	67.782	3.300
main	39.330	10.00	30.00	.5000	2.600	67.782	15.00
dum	39.330	10.00	0.000	.5000	0.000	76.118	0.000
out	39.330	10.00	30.00	.5000	2.600	77.565	0.000

LINK smith 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 52.90
ESTIMATED PEAK FLOW (CUMECS) = 14.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK petersham 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 18.62
ESTIMATED PEAK FLOW (CUMECS) = 5.2
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK main 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 125.5
ESTIMATED PEAK FLOW (CUMECS) = 34.
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK dum 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 196.7
ESTIMATED PEAK FLOW (CUMECS) = 50.
ESTIMATED TIME TO PEAK (MINS) = 48.40

LINK out 12.000

ESTIMATED VOLUME (CU METRES*10**3) = 211.8
ESTIMATED PEAK FLOW (CUMECS) = 52.
ESTIMATED TIME TO PEAK (MINS) = 48.40

summer hill - 1-3-11 revised Climate Change 15% Inc Intensity

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 0.10
STORM DURATION (MINS) = 180.
RETURN PERIOD (YRS) = 5.
BX = 2.0000
TOTAL OF FIRST SUB-AREAS (ha) = 223.61
TOTAL OF SECOND SUB-AREAS (ha) = 71.09
TOTAL OF ALL SUB-AREAS (ha) = 294.70

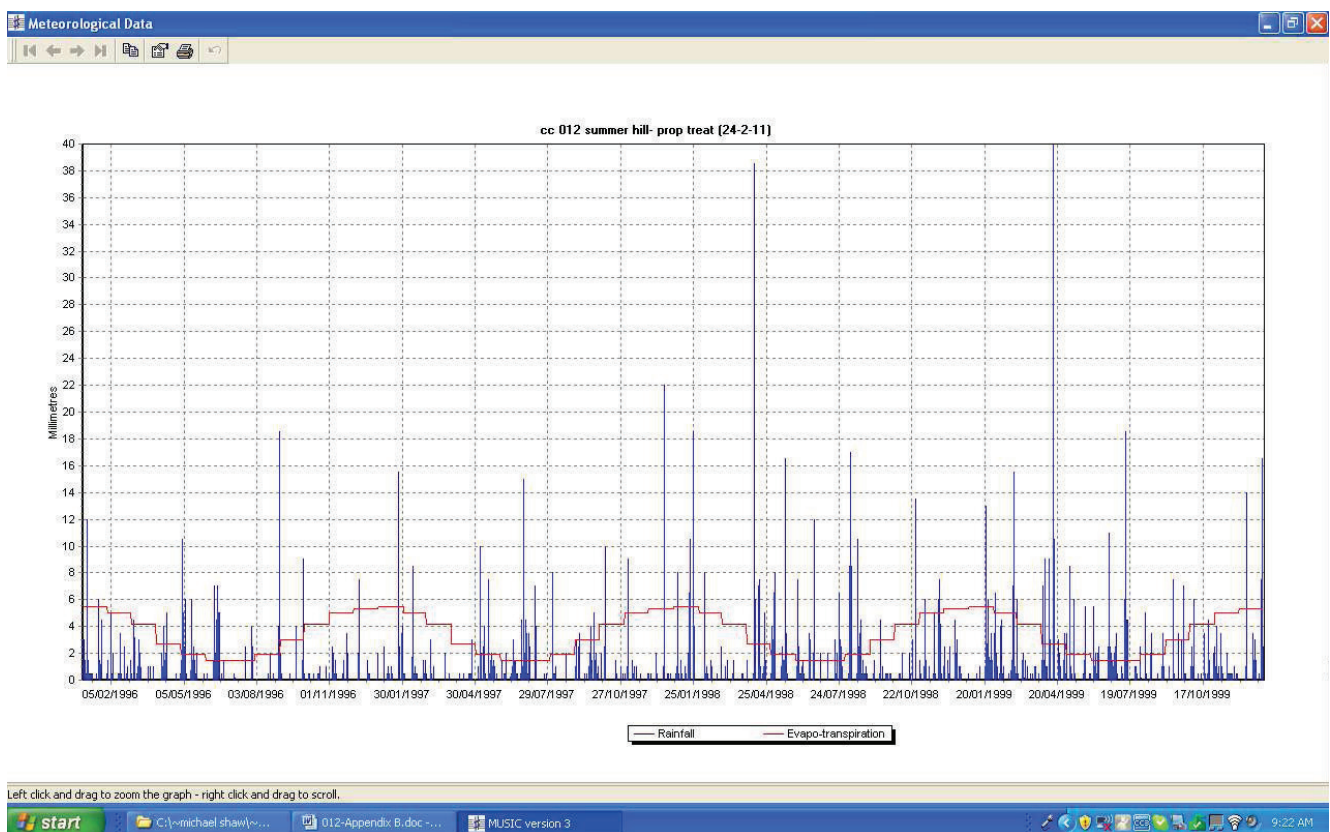
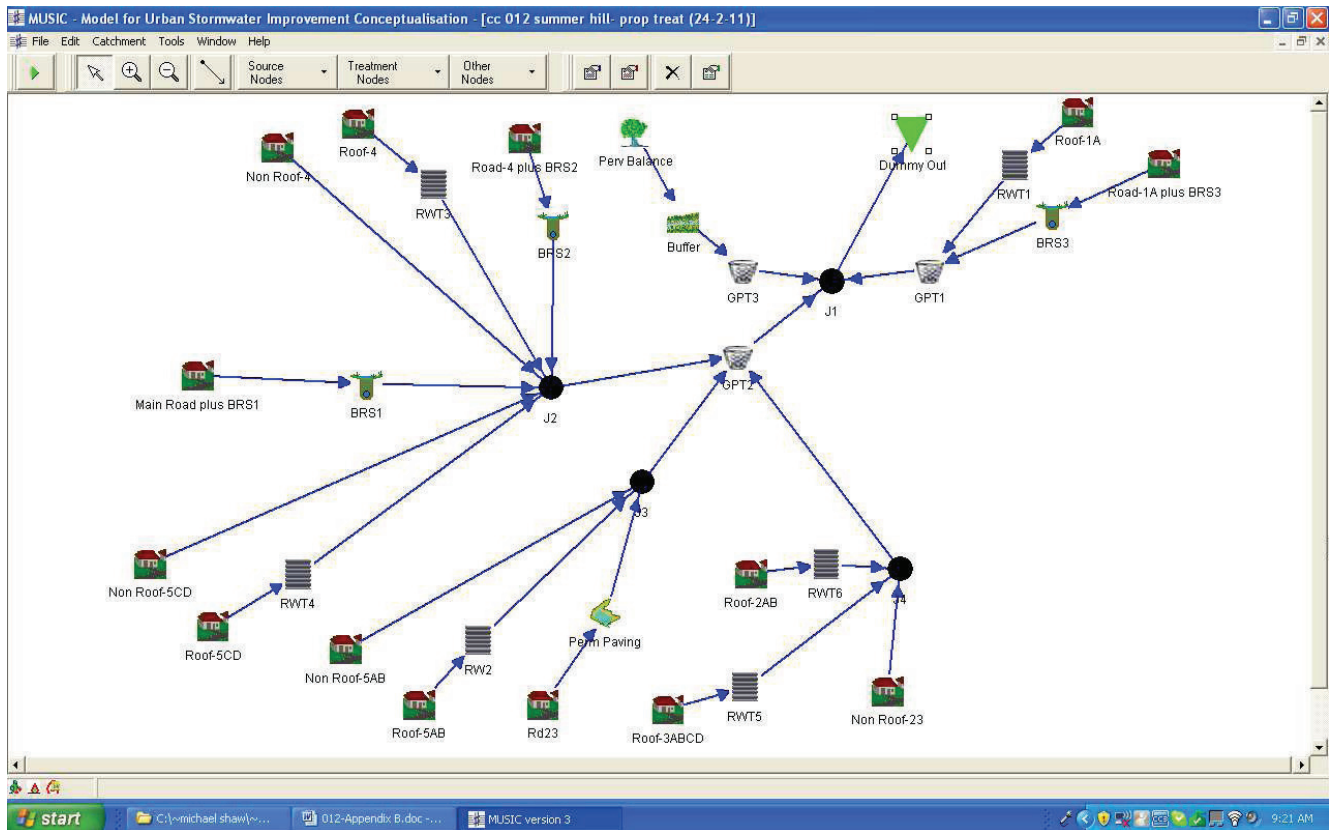
SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
smith	55.280	18.420	5.000	5.000	99.90	.1000	.018	.050	.0140	.1757	1.000
petersham	20.240	5.060	6.100	6.100	99.90	.1000	.018	.050	.0075	.0813	2.000
main	133.98	40.020	6.000	6.000	99.90	.1000	.018	.050	.0202	.2402	3.000
dum	.00001	0.000	1.000	0.000	.1000	0.000	.018	0.00	0.000	0.000	1.001
out	14.110	7.590	5.300	5.300	99.90	.1000	.018	.050	.0067	.1077	1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	Inflow	to
	(mm/h)	(mm)	(mm/h)	(mm)		(m^3/s)	Peak
							mins
smith	30.081	10.00	30.00	.5000	2.600	78.901 54.003	14.050
petersham	30.081	10.00	30.00	.5000	2.600	78.901 54.003	5.177
main	30.081	10.00	30.00	.5000	2.600	78.901 54.003	33.958
dum	30.081	10.00	0.000	.5000	0.000	78.901 0.000	50.359
out	30.081	10.00	30.00	.5000	2.600	78.901 54.003	51.913

Run completed at: 8th March 2011 18:15:07

APPENDIX B - MUSIC RESULTS



Source nodes

Location, Roof-5CD, Roof-4, Roof-1A, Road-1A plus BRS3, Non Roof-4, Road-4 plus BRS2, Main Road plus BRS1, Non Roof-5CD, Roof-2AB, Roof-3ABCD, Non Roof-23, Rd23, Roof-5AB, Non Roof-5AB, Perv Balance

ID, 3, 4, 5, 14, 15, 17, 18, 19, 23, 25, 26, 27, 29, 30, 33

Node

Type, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, UrbanSourceNode, ForestSourceNode

Total Area (ha), 0.124, 0.2, 0.192, 0.077, 0.13, 0.064, 0.056, 0.169, 0.096, 0.149, 0.12, 0.188, 0.069, 0.048, 0.82

Area Impervious

(ha), 0.124, 0.2, 0.192, 0.0654027192982456, 0.0978250000000001, 0.054360701754386, 0.0475975438596491, 0.118937456140351, 0.096, 0.149, 0.0839210526315789, 0.159791754385965, 0.069, 0.033781052631579, 0.366410526315789

Area Pervious

(ha), 0, 0, 0, 0.0115972807017544, 0.0321749999999999, 0.00963929824561403, 0.00840245614035089, 0.050062543859649, 0, 0, 0.0360789473684211, 0.0282082456140349, 0, 0.014218947368421, 0.45358947368421

Field Capacity (mm), 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50

Pervious Area Infiltration Capacity coefficient - a, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50

Pervious Area Infiltration Capacity exponent - b, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2

Impervious Area Rainfall Threshold (mm/day), 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1

Pervious Area Soil Storage Capacity

(mm), 150, 150, 150, 150, 150, 150, 150, 150, 150, 150, 150, 150, 150, 150, 150

Pervious Area Soil Initial Storage (% of Capacity), 25, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25

Groundwater Initial Depth (mm), 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50, 50

Groundwater Daily Recharge Rate

(%), 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65, 0.65

Groundwater Daily Baseflow Rate

(%), 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85, 0.85

Groundwater Daily Deep Seepage Rate (%), 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

Stormflow Total Suspended Solids Mean (log

mg/L), 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 2.2, 1.9

Stormflow Total Suspended Solids Standard Deviation (log

mg/L), 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.32, 0.2

Stormflow Total Suspended Solids Estimation

Method, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic

Stormflow Total Suspended Solids Serial Correlation, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

Stormflow Total Phosphorus Mean (log mg/L), -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -0.45, -1.1

Stormflow Total Phosphorus Standard Deviation (log

mg/L), 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.25, 0.22

No Imported Data Source nodes

USTM treatment nodes

Location,BRS1,BRS2,BRS3,RWT4,RWT3,RWT1,RWT6,RWT5,RW2,Buffer,Perm Paving

ID,6,7,8,11,12,13,22,24,28,31,32

Node

Type,BioRetentionNode,BioRetentionNode,BioRetentionNode,RainWaterTankNode,RainWaterTankNode,RainWaterTankNode,RainWaterTankNode,RainWaterTankNode,RainWaterTankNode,BufferNode,InfiltrationSystemNode

Lo-flow bypass rate (cum/sec),0,0,0,0,0,0,0,0,0,0

Hi-flow bypass rate (cum/sec),100,100,100,100,100,100,100,100,100,0.05

Inlet pond volume, , , 0,0,0,0,0,0,0

Area (sqm),60,120,135,62.5,62.5,62.5,25,125,125,1648.84736842105,450

Extended detention depth (m),0.25,0.25,0.25,0.01,0.01,0.01,0.01,0.01,0.01,0.2

Permanent pool volume (cum), , , 125,125,125,25,250,250,0

Proportion vegetated, , , 0,0,0,0,0,0,0

Equivalent pipe diameter (mm), , , 150,150,150,150,150,150,0

Overflow weir width (m),2,2,2,10,10,10,10,10,10,20

Notional Detention Time (hrs), , , 33.1E-3,33.1E-3,33.1E-3,13.2E-3,66.2E-3,66.2E-3,0.00

Orifice discharge coefficient, , , 0.6,0.6,0.6,0.6,0.6,0.6,0.6

Weir coefficient,1.7,1.7,1.7,1.7,1.7,1.7,1.7,1.7,1.7,1.7

Number of CSTR cells,3,3,3,2,2,2,2,2,2,1

Total Suspended Solids k (m/yr),1000,1000,1000,400,400,400,400,400,400,400

Total Suspended Solids C* (mg/L),12,12,12,12,12,12,12,12,12,12

Total Suspended Solids C** (mg/L), , , 12,12,12,12,12,12,12

Total Phosphorus k (m/yr),500,500,500,300,300,300,300,300,300,300

Total Phosphorus C* (mg/L),0.13,0.13,0.13,0.13,0.13,0.13,0.13,0.13,0.13,0.09

Total Phosphorus C** (mg/L), , , 0.13,0.13,0.13,0.13,0.13,0.13,0.09

Total Nitrogen k (m/yr),50,50,50,40,40,40,40,40,40,40

Total Nitrogen C* (mg/L),1.3,1.3,1.3,1.4,1.4,1.4,1.4,1.4,1.4,1

Total Nitrogen C** (mg/L), , , 1.4,1.4,1.4,1.4,1.4,1.4,1

Threshold hydraulic loading for C** (m/yr), , , 3500,3500,3500,3500,3500,3500,3500

Extraction for Re-use,Off,Off,Off,On,On,On,On,On,On,Off,Off

Annual Re-use Demand - scaled by daily PET (ML), , , 0,0,0,0,0,0,0

Constant Daily Re-use Demand (kL), , , 4,5.4,8.1,1.35,16.2,13.5, ,

User-defined Annual Re-use Demand (ML), , , 0,0,0,0,0,0, ,

Percentage of User-defined Annual Re-use Demand

Jan, , , 8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Feb, , , 8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Mar, , , 8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Apr, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

May, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Jun, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Jul, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Aug, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Sep, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Oct, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Nov, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Percentage of User-defined Annual Re-use Demand

Dec, , , ,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333,8.33333333333333, ,

Filter area (sqm),30,60,67.5, , , , , , ,

Filter depth (m),1,1,1, , , , , , ,

Filter median particle diameter (mm),5,5,5, , , , , , ,

Saturated hydraulic conductivity (mm/hr),100,100,100, , , , , , ,

Voids ratio,0.3,0.3,0.3, , , , , , ,

Length (m), , , , , , , , ,

Bed slope, , , , , , , , ,

Base Width (m), , , , , , , , ,

Top width (m), , , , , , , , ,

Vegetation height (m), , , , , , , , ,

Proportion of upstream impervious area treated, , , , , , , ,0.5,

Seepage Rate (mm/hr),10,10,10,0,0,0,0,0,10,25

Evap Loss as proportion of PET, , , ,0,0,0,0,0, ,1

Depth in metres below the drain pipe,0.05,0.05,0.05, , , , , , ,

IN - Mean Annual Flow (ML/yr),0.655,0.749,0.901,1.58,2.55,2.44,1.22,1.90,0.879,7.33,2.20

IN - TSS Mean Annual Load (kg/yr),139,153,182,329,535,506,255,382,180,633,455

IN - TP Mean Annual Load (kg/yr),0.278,0.315,0.372,0.675,1.08,1.03,0.527,0.777,0.367,0.647,0.926

IN - TN Mean Annual Load (kg/yr),1.91,2.16,2.63,4.61,7.53,7.34,3.57,5.59,2.51,6.95,6.29

IN - Gross Pollutant Mean Annual Load (kg/yr),15.9,18.1,21.8,37.9,61.1,58.7,29.3,45.5,21.1,167,53.3

OUT - Mean Annual Flow (ML/yr),0.392,0.352,0.439,0.482,1.05,0.772,0.794,92.0E-3,0.00,4.84,46.8E-3
 OUT - TSS Mean Annual Load (kg/yr),9.36,8.61,10.4,48.2,117,86.8,91.4,9.97,0.00,345,5.72
 OUT - TP Mean Annual Load (kg/yr),55.6E-3,51.9E-3,63.1E-3,0.131,0.308,0.228,0.237,27.8E-3,0.00,0.418,14.9E-3
 OUT - TN Mean Annual Load (kg/yr),0.679,0.608,0.755,1.23,2.77,2.18,2.10,0.253,0.00,4.48,0.127
 OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,97.6,0.00

Generic treatment nodes

Location,GPT2,GPT1,GPT3

ID,9,10,34

Node Type,GPTNode,GPTNode,GPTNode

Lo-flow bypass rate (cum/sec),0,0,0

Hi-flow bypass rate (cum/sec),100,100,100

Flow Transfer Function

Input (cum/sec),0,0,0

Output (cum/sec),0,0,0

Input (cum/sec),10,10,10

Output (cum/sec),10,10,10

Input (cum/sec), , ,

Output (cum/sec), , ,

Input (cum/sec), , ,

Output (cum/sec), , ,

Input (cum/sec), , ,

Output (cum/sec), , ,

Input (cum/sec), , ,

Output (cum/sec), , ,

Input (cum/sec), , ,

Output (cum/sec), , ,

Input (cum/sec), , ,

Output (cum/sec), , ,

Input (cum/sec), , ,

Output (cum/sec), , ,

Input (cum/sec), , ,

Output (cum/sec), , ,

Gross Pollutant Transfer Function

Input (kg/ML),0,0,0

Output (kg/ML),0,0,0

Input (kg/ML),15,15,15

Output (kg/ML),0.4,0.4,0.4

Input (kg/ML), , ,

Output (kg/ML), , ,

Input (kg/ML), , ,

Output (kg/ML), , ,

Input (kg/ML), , ,

Output (kg/ML), , ,

Input (kg/ML), , ,

Output (kg/ML), , ,

[illegible]

Output (mg/L), , ,
 Total Suspended Solids Transfer Function
 Input (mg/L),0,0,0
 Output (mg/L),0,0,0
 Input (mg/L),1000,1000,1000
 Output (mg/L),150,150,150
 Input (mg/L), , ,
 Output (mg/L), , ,
 Input (mg/L), , ,
 Output (mg/L), , ,
 Input (mg/L), , ,
 Output (mg/L), , ,
 Input (mg/L), , ,
 Output (mg/L), , ,
 Input (mg/L), , ,
 Output (mg/L), , ,
 Input (mg/L), , ,
 Output (mg/L), , ,
 Input (mg/L), , ,
 Output (mg/L), , ,
 IN - Mean Annual Flow (ML/yr),8.24,1.21,4.84
 IN - TSS Mean Annual Load (kg/yr),1.30E3,97.2,345
 IN - TP Mean Annual Load (kg/yr),2.88,0.291,0.418
 IN - TN Mean Annual Load (kg/yr),22.3,2.94,4.48
 IN - Gross Pollutant Mean Annual Load (kg/yr),121,0.00,97.6
 OUT - Mean Annual Flow (ML/yr),8.24,1.21,4.84
 OUT - TSS Mean Annual Load (kg/yr),195,14.6,51.8
 OUT - TP Mean Annual Load (kg/yr),2.02,0.204,0.292
 OUT - TN Mean Annual Load (kg/yr),20.0,2.64,4.03
 OUT - Gross Pollutant Mean Annual Load (kg/yr),3.23,0.00,2.60

Other nodes

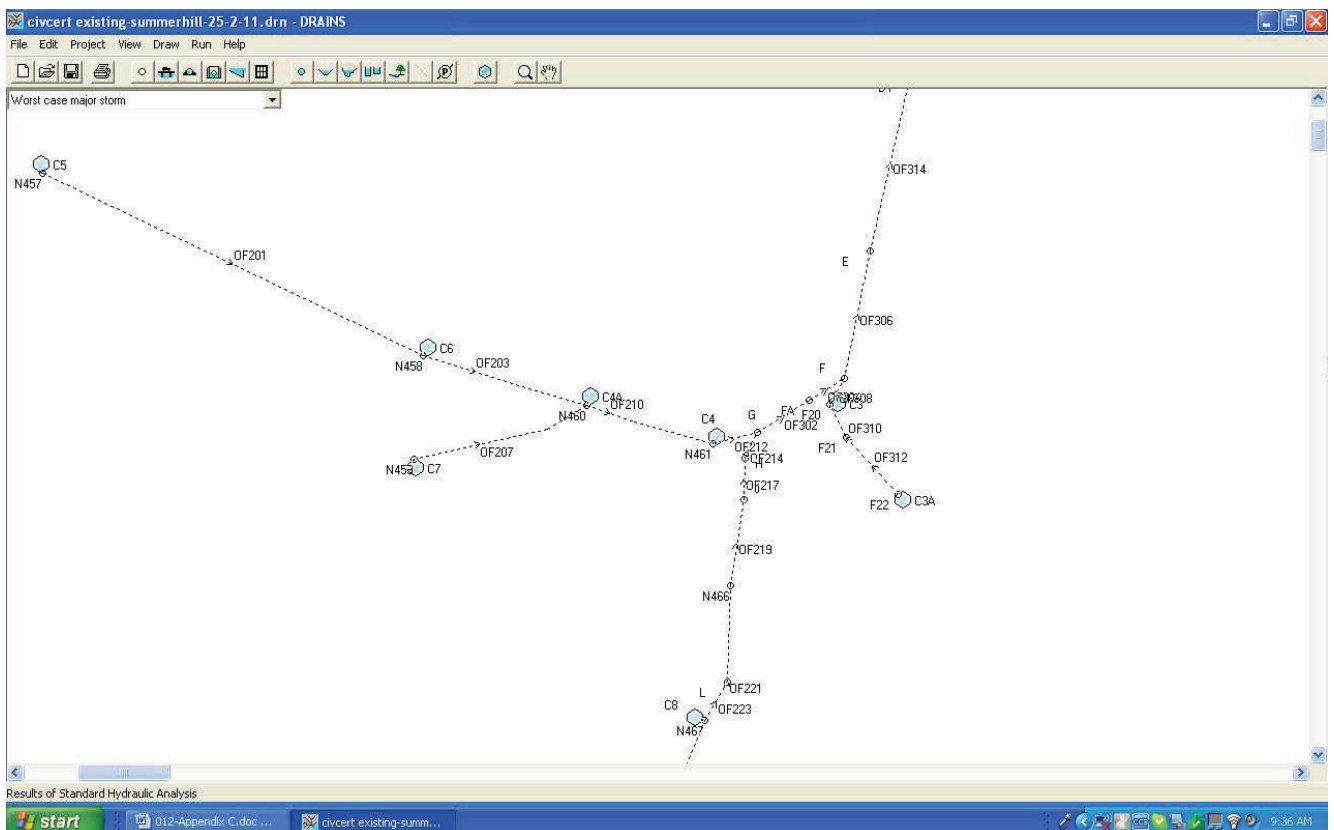
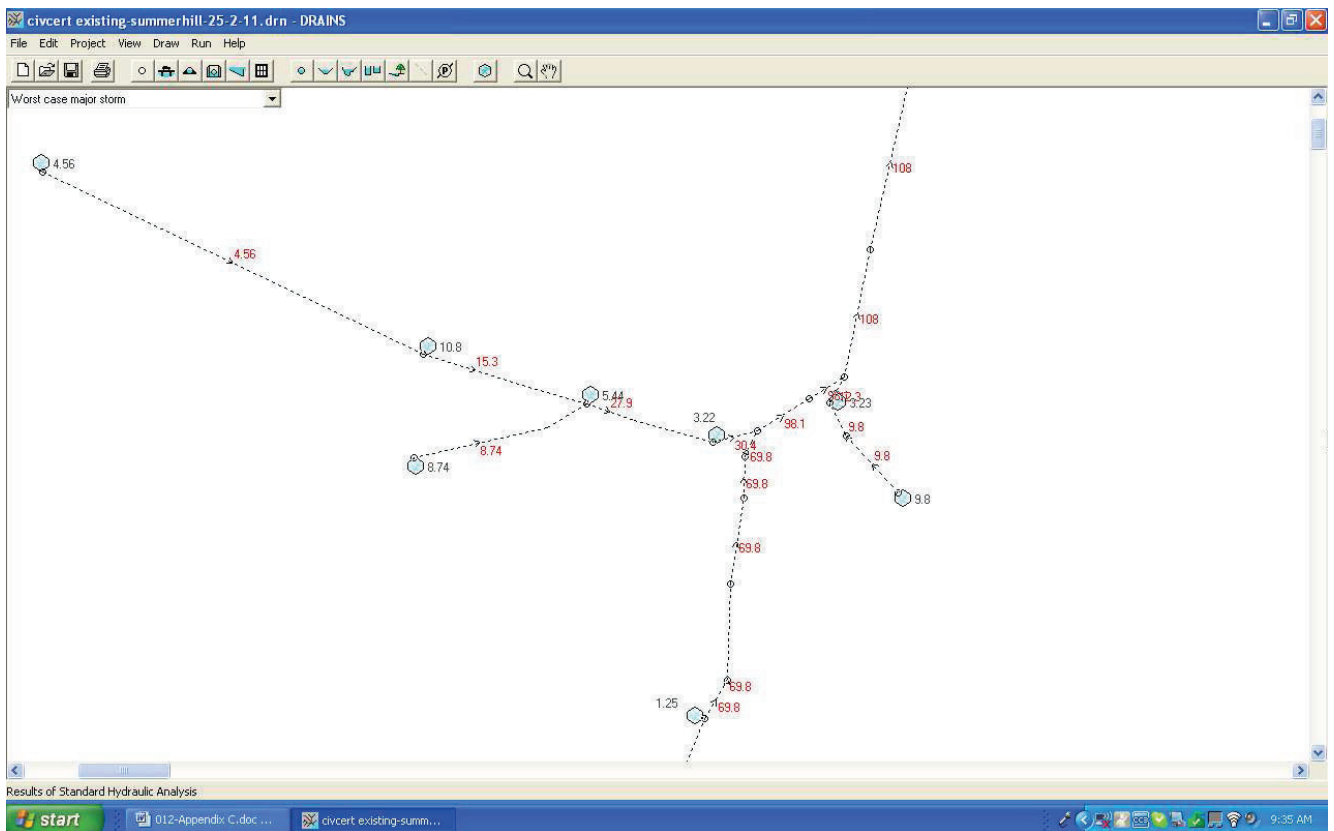
Location,Dummy Out,J1,J2,J3,J4
 ID,1,2,16,20,21
 Node Type,ReceivingNode,JunctionNode,JunctionNode,JunctionNode,JunctionNode
 IN - Mean Annual Flow (ML/yr),14.3,14.3,5.51,0.559,2.17
 IN - TSS Mean Annual Load (kg/yr),261,261,845,105,350
 IN - TP Mean Annual Load (kg/yr),2.51,2.51,1.89,0.220,0.770
 IN - TN Mean Annual Load (kg/yr),26.7,26.7,14.6,1.58,6.04
 IN - Gross Pollutant Mean Annual Load (kg/yr),5.84,5.84,78.1,12.3,30.9
 OUT - Mean Annual Flow (ML/yr),0.00,14.3,5.51,0.559,2.17
 OUT - TSS Mean Annual Load (kg/yr),0.00,261,845,105,350
 OUT - TP Mean Annual Load (kg/yr),0.00,2.51,1.89,0.220,0.770
 OUT - TN Mean Annual Load (kg/yr),0.00,26.7,14.6,1.58,6.04
 OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00,5.84,78.1,12.3,30.9

OUT - Gross Pollutant Mean Annual Load

(kg/yr),5.84,3.23,0.00,0.00,37.9,61.1,58.7,21.8,0.00,78.1,34.6,0.00,18.1,0.00,15.9,0.00,43.5,0.00,12.3,
30.9,0.00,29.3,45.5,0.00,0.00,21.1,12.3,30.9,53.3,0.00,167,97.6,2.60

APPENDIX C - DRAINS RESULTS

Existing Simplified (Civil Certification)



PIT / NODE DETAILS

Name	Type	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss
L	Node	12		0		313123.489	1247999.705		37392984	
N447	Node	13.5		0		313062.802	1247866.796		37267129	
Q	Node	14		0		313009.798	1247770.53		37267117	
R	Node	15.3		0		312958.093	1247686.408		37161091	
S	Node	16.5		0		312886.285	1247632.54		37008020	
U	Node	16.7		0		312856.23	1247565.963		36944653	
X	Node	19		0		312779.312	1247496.1		31139909	
C	Node	5		0		313300.854	1248586.555		18191693	
XX	Node	20.3		0		312788.903	1247492.559		978	
D1	Node	4		0		313295.757	1248579.652		964	
D	Node	4		0		313299.853	1248582.375		157	
E	Node	6		0		313260.899	1248413.245		156	
F	Node	10		0		313236.491	1248291.444		155	
G	Node	10		0		313152.767	1248239.425		153	
H	Node	10		0		313140.714	1248214.832		152	
J	Node	10		0		313139.741	1248174.713		150	
N457	Node			0		312466.796	1248487.973		90883888	
N458	Node			0		312832.391	1248312.77		90883891	
N459	Node			0		312823.058	1248213.604		90883896	
N460	Node			0		312989.307	1248265.52		90883897	
N461	Node			0		313109.535	1248228.147		90883901	
N466	Node			0		313126.929	1248092.179		90883918	
N467	Node			0		313101.611	1247963.619		90883922	
N468	Node			0		313049.804	1247845.232		90883927	
N469	Node			0		313046.299	1247839.353		90883930	
N470	Node			0		312871.066	1247612.455		90883940	
N471	Node			0		312846.081	1247556.136		90883946	
N472	Node			0		312834.776	1247546.149		90883949	

PIT / NODE DETAILS										
Name	Type	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss
N473	Node			0		312705.049	1247553.654		90883958	
N474	Node			0		312479.476	1247759.189		90883961	
N475	Node			0		312736.56	1247378.816		90883965	
N476	Node			0		312663.185	1247250.819		90883968	
XD	Node			0		312645.563	1247225.032		90883973	
N479	Node			0		312485.537	1247139.052		90883980	
ZH	Node			0		312475.314	1247136.402		90883984	
ZJ	Node			0		312443.724	1247129.378		90883988	
ZK	Node	30.5		0		312301.838	1247063.98		90883994	
ZL1	Node	30.65		0		312238.542	1247044.851		90884000	
ZL	Node	30.6		0		312237.699	1247072.701		90884004	
ZM	Node	33		0		312050.063	1247107.584		90884006	
ZN	Node	35		0		311948.509	1247146.686		90884011	
ZF	Node	25.5		0		312585.606	1247148.371		90884015	
ZE	Node	25		0		312625.288	1247175.051		90884019	
ZD	Node	24		0		312632.41	1247186.922		90884023	
Z3	Node	29.9		0		312644.168	1247207.159		90884027	
ZB	Node	23.85		0		312655.473	1247224.908		90884031	
ZA	Node	23.8		0		312666.213	1247239.718		90884035	
Z1	Node	22.75		0		312704.538	1247295.114		90884039	
Z	Node	21.5		0		312741.281	1247346.327		90884043	
ZA1	Node	22		0		312678.676	1247224.967		90884047	
Y	Node	21		0		312767.075	1247436.212		90884053	
FA	Node			0		313201.899	1248270.11		90884055	
F20	Node	10		0		313221.871	1248266.017		90884065	
F21	Node	12		0		313238.49	1248234.927		90884069	
F22	Node	12.1		0		313287.329	1248179.531		90884073	

SUB-CATCHMENT DETAILS													
Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Paved Time (min)	Grass Time (min)	Paved Length (m)	Grass Length (m)	Paved Slope (%)	Grass Slope %	Paved Rough	Grass Rough	Lag Time or Factor
		(ha)	%	%	(min)	(min)	(m)	(m)	%	%			
C10	Q	6.525	74.6	25.4	5	0	250	100	5.6	5	0.013	0.2	2.5
C11	S	18.137	70.1	29.9	5	0	500	200	4	6	0.013	0.2	4
C12A	X	4.832	52.4	47.6	5	0	150	250	2.7	4	0.013	0.2	0
C15	XX	1.276	56	44	5	0	1	150	2	2	0.013	0.2	0
C2	D1	11.257	68.9	31.1	5	0	630	240	2.9	4.6	0.013	0.2	2
C1	D	10.395	63.7	36.3	5	0	580	190	3.1	4.2	0.013	0.2	3
C5	N457	8.752	74.3	25.7	5	0	330	170	3.3	5.9	0.013	0.2	1.3
C6	N458	29.815	66.7	33.3	5	0	870	450	2.1	2	0.013	0.2	4
C7	N459	18.101	78.9	21.1	5	0	450	250	4	4	0.013	0.2	6
C4A	N460	11.189	73.1	26.9	5	0	400	200	2.8	4.5	0.013	0.2	1.7
C4	N461	5.842	87.4	12.6	5	0	300	150	2	4	0.013	0.2	0
C8	N467	2.494	79.9	20.1	5	0	500	180	3.8	3.9	0.013	0.2	3
C9	N468	15.659	71.4	28.6	5	0	530	190	3.4	3.2	0.013	0.2	3.5
C12	N470	2.333	77.2	22.8	5	0	280	180	5.7	5	0.013	0.2	1
C14	N473	16.319	76.4	23.6	5	0	450	80	4.2	7.5	0.013	0.2	5
C13	N474	27.365	69.7	30.3	5	0	750	250	3.7	4	0.013	0.2	5
C18	N479	9.998	62.3	37.7	5	0	150	300	1.3	2	0.013	0.2	0
C20	ZL1	9.72	82.4	17.6	5	0	420	270	2.4	4.4	0.013	0.2	2.8
C19	ZL	6.612	82.9	17.1	5	0	380	230	4.2	6.5	0.013	0.2	0
C21	ZN	31.34	60.7	39.3	5	0	550	400	2.9	3.5	0.013	0.2	0
C17	ZF	10.013	53.1	46.9	5	0	300	230	4	5.7	0.013	0.2	1.5
C16	ZA1	11.392	77.8	22.2	5	0	500	270	4	5.2	0.013	0.2	3.5
C3	F20	5.617	86.4	13.6	5	0	190	100	1.6	4	0.013	0.2	2
C3A	F22	19.699	73.3	26.7	5	0	320	190	3.8	4.7	0.013	0.2	4

OVERFLOW ROUTE DETAILS								
Name	From	To	Travel Time (min)	Safe Depth Major Storms (m)	SafeDepth Minor Storms (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %
OF221	L	N466	0.1	0.2	0.05	0.6	1	0
OF225	N447	N467	1	0.2	0.05	0.6	1	0
OF231	Q	N469	1	0.2	0.05	0.6	1	0
OF233	R	Q	1	0.2	0.05	0.6	1	0
OF235	S	R	1	0.2	0.05	0.6	1	0
OF239	U	N470	0.1	0.2	0.05	0.6	1	0
OF245	X	N472	0.1	0.2	0.05	0.6	1	0
OF247	XX	X	0.1	0.2	0.05	0.6	1	0
OF316	D1	D	0.1	0.2	0.05	0.6	1	0
OF318	D	C	0.1	0.2	0.05	0.6	1	0
OF314	E	D	0.1	0.2	0.05	0.6	1	0
OF306	F	E	0.1	0.2	0.05	0.6	1	0
OF302	G	FA	0.1	0.2	0.05	0.6	1	0
OF214	H	G	0.1	0.2	0.05	0.6	1	0
OF217	J	H	0.1	0.2	0.05	0.6	1	0
OF201	N457	N458	2	0.2	0.05	0.6	1	0
OF203	N458	N460	2	0.2	0.05	0.6	1	0
OF207	N459	N460	0.1	0.2	0.05	0.6	1	0
OF210	N460	N461	2	0.2	0.05	0.6	1	0
OF212	N461	G	1.5	0.2	0.05	0.6	1	0
OF219	N466	J	0.1	0.2	0.05	0.6	1	0
OF223	N467	L	0.1	0.2	0.05	0.6	1	0
OF227	N468	N447	1	0.2	0.05	0.6	1	0
OF229	N469	N468	0.1	0.2	0.05	0.6	1	0
OF237	N470	S	1	0.2	0.05	0.6	1	0
OF241	N471	U	0.1	0.2	0.05	0.6	1	0
OF243	N472	N471	0.8	0.2	0.05	0.6	1	0
OF251	N473	X	0.1	0.2	0.05	0.6	1	0
OF253	N474	N473	0.1	0.2	0.05	0.6	1	0

OVERFLOW ROUTE DETAILS									
Name	From	To	Travel Time (min)	Safe Depth Major Storms (m)	SafeDepth Minor Storms (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	
OF256	N475	X	0.1	0.2	0.05	0.6	1	0	
OF258	N476	N475	0.1	0.2	0.05	0.6	1	0	
OF260	XD	N476	0.1	0.2	0.05	0.6	1	0	
OF262	N479	XD	0.1	0.2	0.05	0.6	1	0	
OF267	ZH	N479	0.1	0.2	0.05	0.6	1	0	
OF269	ZJ	ZH	0.1	0.2	0.05	0.6	1	0	
OF271	ZK	ZJ	0.1	0.2	0.05	0.6	1	0	
OF275	ZL1	ZK	0.1	0.2	0.05	0.6	1	0	
OF273	ZL	ZK	0.1	0.2	0.05	0.6	1	0	
OF277	ZM	ZL	0.1	0.2	0.05	0.6	1	0	
OF279	ZN	ZM	0.1	0.2	0.05	0.6	1	0	
OF282	ZF	ZE	0.1	0.2	0.05	0.6	1	0	
OF284	ZE	ZD	0.1	0.2	0.05	0.6	1	0	
OF286	ZD	Z3	0.1	0.2	0.05	0.6	1	0	
OF288	Z3	ZB	0.1	0.2	0.05	0.6	1	0	
OF290	ZB	ZA	0.1	0.2	0.05	0.6	1	0	
OF292	ZA	Z1	0.1	0.2	0.05	0.6	1	0	
OF294	Z1	Z	0.1	0.2	0.05	0.6	1	0	
OF298	Z	Y	0.1	0.2	0.05	0.6	1	0	
OF296	ZA1	Z	0.1	0.2	0.05	0.6	1	0	
OF300	Y	X	6.4	0.2	0.05	0.6	1	0	
OF304	FA	F	0.1	0.2	0.05	0.6	1	0	
OF308	F20	F	0.1	0.2	0.05	0.6	1	0	
OF310	F21	F20	0.1	0.2	0.05	0.6	1	0	
OF312	F22	F21	3.3	0.2	0.05	0.6	1	0	

SUB-CATCHMENT DETAILS (100yr ARI)									
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved T _c (min)	Grassed T _c (min)	Supp. T _c (min)	Due to Storm		
C10	3.611	3.056	0.756	9.39	13.51	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C11	8.421	7.264	1.844	12.36	19.39	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C12A	2.108	1.599	0.605	9.02	25.03	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C15	0.645	0.495	0.18	5.3	31.05	0	AR&R 100 year, 1.5 hours storm, average 73 mm/h, Zone 1		
C2	4.958	4.203	0.983	14.31	23.42	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C1	4.472	3.645	1.185	13.68	20.92	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C5	4.564	3.878	0.838	11.08	17.67	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C6	10.755	9.509	1.492	17.45	43.85	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C7	8.739	8.276	1.004	11.91	25.03	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C4A	5.441	4.701	0.937	12.16	21.13	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C4	3.221	2.982	0.263	11.67	18.42	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C8	1.246	1.135	0.159	12.47	20.71	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C9	7.127	6.268	1.296	13	22.7	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C12	1.274	1.125	0.182	9.67	19.22	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C14	8.598	7.249	2.068	11.81	10.46	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C13	11.468	10.237	2.179	14.61	25.03	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C18	4.533	3.875	0.723	10.01	34.38	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C20	4.841	4.526	0.443	12.73	25.47	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C19	3.589	3.26	0.362	11.15	20.58	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C21	12.637	10.499	2.349	13.58	34.54	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C17	4.415	3.252	1.441	10.42	21.41	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C16	5.519	5.064	0.687	12.36	24.23	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C3	3.235	2.967	0.332	10.42	14.44	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		
C3A	9.799	8.727	1.709	10.72	20.23	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1		

Outflow Volumes for Total Catchment (208 impervious + 86.8 pervious = 295 total ha)

	Storm		Total Rainfall		Total Runoff		Impervious Runoff		Pervious Runoff	
	cu.m	mm/h	cu.m	%	cu.m	%	cu.m	%	cu.m	%
AR&R 100 year, 10 minutes storm, average 212 mm/h, Zone 1	104121				90162.92	(86.6%)	71376.45	(97.2%)	18786.48	(61.3%)
AR&R 100 year, 15 minutes storm, average 181 mm/h, Zone 1	133343.6				118036.82	(88.5%)	91992.39	(97.8%)	26044.43	(66.3%)
AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	157163.7				140723.71	(89.5%)	108797.20	(98.1%)	31926.52	(69.0%)
AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	178037				160268.59	(90.0%)	123522.79	(98.3%)	36745.80	(70.1%)
AR&R 100 year, 30 minutes storm, average 134 mm/h, Zone 1	197436.9				178593.54	(90.5%)	137209.28	(98.5%)	41384.25	(71.2%)
AR&R 100 year, 45 minutes storm, average 110 mm/h, Zone 1	243112.6				221697.04	(91.2%)	169432.41	(98.8%)	52264.63	(73.0%)
AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1	279947.9				256510.93	(91.6%)	195419.33	(98.9%)	61091.60	(74.1%)
AR&R 100 year, 1.5 hours storm, average 73 mm/h, Zone 1	322676.7				295841.26	(91.7%)	225564.13	(99.1%)	70277.13	(73.9%)
AR&R 100 year, 2 hours storm, average 60 mm/h, Zone 1	353618.5				323764.98	(91.6%)	247391.67	(99.2%)	76373.31	(73.3%)
AR&R 100 year, 3 hours storm, average 45.8 mm/h, Zone 1	404893				369992.26	(91.4%)	283568.81	(99.3%)	86423.45	(72.5%)

OVERFLOW ROUTE DETAILS (100yr ARI)

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm	
OF221	69.79	69.79	7.665	0.23	2.61	49.99	11.35	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF225	69.023	69.023	7.665	0.23	2.58	49.99	11.23	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF231	64.121	64.121	7.665	0.23	2.4	49.99	10.43	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF233	62.166	62.166	7.665	0.23	2.33	49.99	10.11	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF235	62.166	62.166	7.665	0.23	2.33	49.99	10.11	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF239	53.923	53.923	7.665	0.23	2.02	49.99	8.77	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF245	53.923	53.923	7.665	0.23	2.02	49.99	8.77	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF247	0.645	0.645	7.665	0.072	0.06	18.46	0.86	AR&R 100 year, 1.5 hours storm, average 73 mm/h, Zone 1	
OF316	4.958	4.958	7.665	0.167	0.24	37.5	1.45	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF318	116.089	116.089	7.665	0.23	4.34	49.99	18.88	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1	
OF314	107.845	107.845	7.665	0.23	4.03	49.99	17.54	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1	
OF306	107.845	107.845	7.665	0.23	4.03	49.99	17.54	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1	
OF302	98.074	98.074	7.665	0.23	3.67	49.99	15.95	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1	
OF214	69.79	69.79	7.665	0.23	2.61	49.99	11.35	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF217	69.79	69.79	7.665	0.23	2.61	49.99	11.35	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF201	4.564	4.564	7.665	0.162	0.23	36.42	1.42	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	

OVERFLOW ROUTE DETAILS (100yr ARI)

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max D _{xV}	Max Width	Max V	Due to Storm
OF203	15.278	15.278	7.665	0.23	0.57	49.99	2.49	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF207	8.739	8.739	7.665	0.211	0.35	46.12	1.67	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF210	27.888	27.888	7.665	0.23	1.04	49.99	4.54	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF212	30.408	30.408	7.665	0.23	1.14	49.99	4.95	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF219	69.79	69.79	7.665	0.23	2.61	49.99	11.35	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
OF223	69.79	69.79	7.665	0.23	2.61	49.99	11.35	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
OF227	69.023	69.023	7.665	0.23	2.58	49.99	11.23	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
OF229	64.121	64.121	7.665	0.23	2.4	49.99	10.43	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF237	54.864	54.864	7.665	0.23	2.05	49.99	8.92	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF241	53.923	53.923	7.665	0.23	2.02	49.99	8.77	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF243	53.923	53.923	7.665	0.23	2.02	49.99	8.77	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF251	20.06	20.06	7.665	0.23	0.75	49.99	3.26	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF253	11.468	11.468	7.665	0.23	0.43	49.99	1.87	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF256	25.18	25.18	7.665	0.23	0.94	49.99	4.1	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF258	25.18	25.18	7.665	0.23	0.94	49.99	4.1	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF260	25.18	25.18	7.665	0.23	0.94	49.99	4.1	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF262	25.18	25.18	7.665	0.23	0.94	49.99	4.1	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF267	21.003	21.003	7.665	0.23	0.79	49.99	3.42	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF269	21.003	21.003	7.665	0.23	0.79	49.99	3.42	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF271	21.003	21.003	7.665	0.23	0.79	49.99	3.42	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF275	4.841	4.841	7.665	0.167	0.24	37.32	1.43	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF273	16.194	16.194	7.665	0.23	0.61	49.99	2.63	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF277	12.637	12.637	7.665	0.23	0.47	49.99	2.06	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF279	12.637	12.637	7.665	0.23	0.47	49.99	2.06	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF282	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF284	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF286	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF288	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF290	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF292	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF294	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1

OVERFLOW ROUTE DETAILS (100yr ARI)

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max D _{xV}	Max Width	Max V	Due to Storm
OF298	9.834	9.834	7.665	0.221	0.38	48.27	1.72	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF296	5.519	5.519	7.665	0.176	0.26	39.11	1.48	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF300	9.834	9.834	7.665	0.221	0.38	48.27	1.72	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF304	98.074	98.074	7.665	0.23	3.67	49.99	15.95	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1
OF308	12.269	12.269	7.665	0.23	0.46	49.99	2	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF310	9.799	9.799	7.665	0.22	0.38	48.09	1.72	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
OF312	9.799	9.799	7.665	0.22	0.38	48.09	1.72	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1

CONTINUITY CHECK for AR&R 100 year, 1.5 hours storm, average 73 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
L	174043.2	174043.2	0	0
N447	171473.8	171473.8	0	0
Q	155708.7	155708.2	0	0
R	149074.2	149074.2	0	0
S	149074.4	149074.2	0	0
U	128482.3	128482.3	0	0
X	128482.6	128482.3	0	0
C	295840.6	295840.6	0	0
XX	1230.95	1230.95	0	0
D1	11255.3	11255.3	0	0
D	295840.9	295840.6	0	0
E	274335.2	274335.2	0	0
F	274334.8	274335.2	0	0
G	248504.7	248504.1	0	0
H	174043.2	174043.2	0	0
J	174043.2	174043.2	0	0
N457	8886.62	8886.62	0	0
N458	38412.05	38412.05	0	0
N459	18590.79	18590.79	0	0

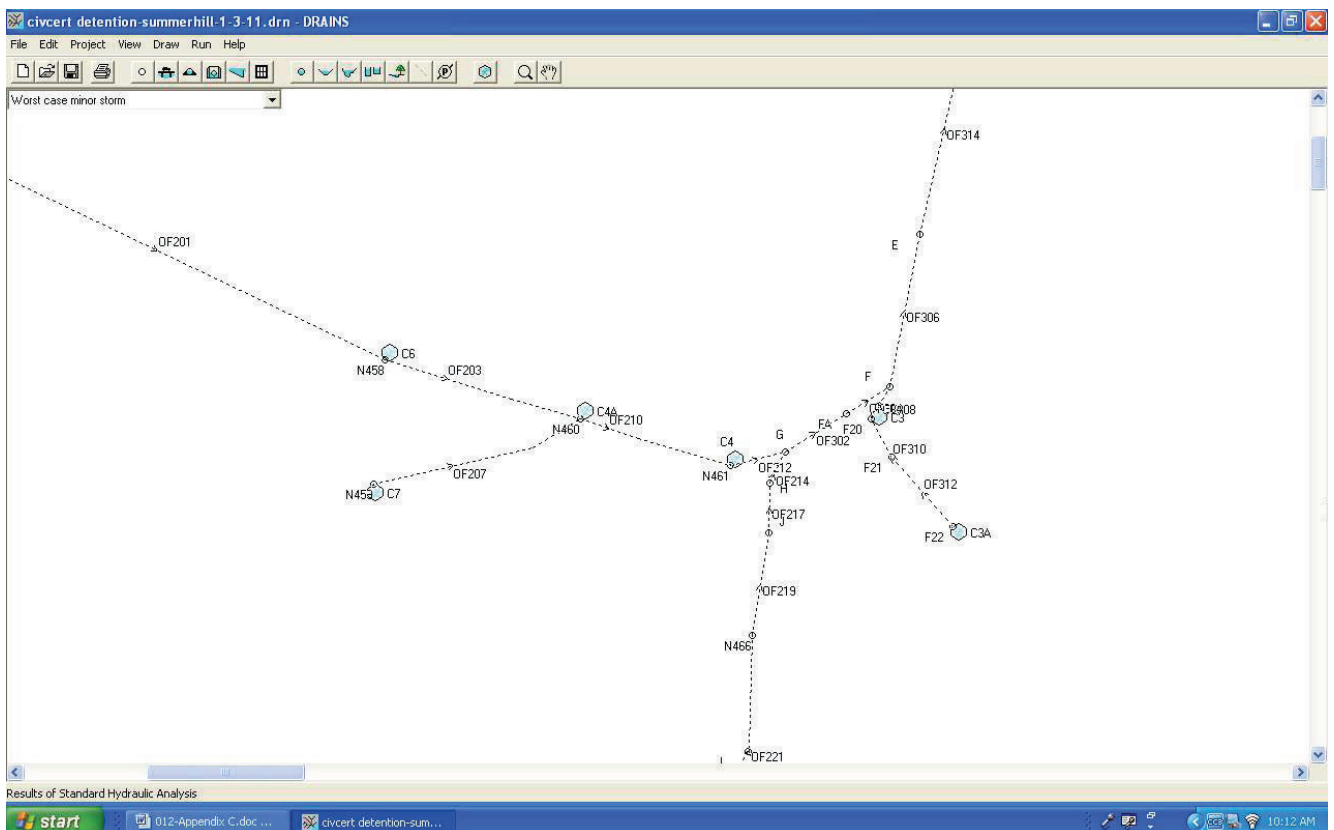
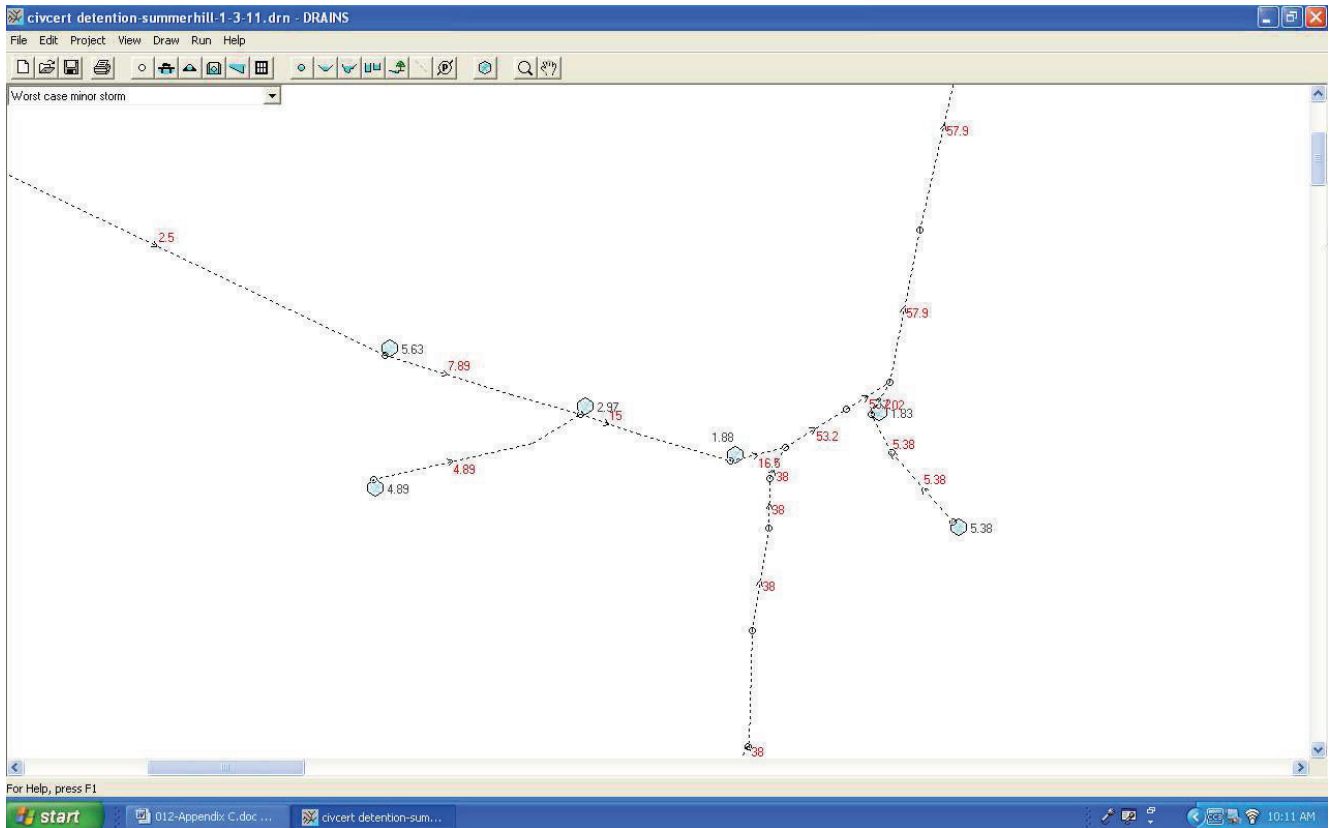
CONTINUITY CHECK for AR&R 100 year, 1.5 hours storm, average 73 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
N460	68322.3	68322.38	0	0
N461	74461.2	74461.22	0	0
N466	174043.2	174043.2	0	0
N467	174043.3	174043.2	0	0
N468	171473.7	171473.8	0	0
N469	155708.2	155708.2	0	0
N470	130869	130869.2	0	0
N471	128482.3	128482.3	0	0
N472	128482.3	128482.3	0	0
N473	44091	44091.03	0	0
N474	27414.16	27414.16	0	0
N475	57299.6	57299.6	0	0
N476	57299.6	57299.6	0	0
XD	57299.6	57299.6	0	0
N479	57299.57	57299.6	0	0
ZH	47504.62	47504.62	0	0
ZJ	47504.62	47504.62	0	0
ZK	47504.61	47504.62	0	0
ZL1	10076.06	10076.06	0	0
ZL	37428.52	37428.57	0	0
ZM	30562.46	30562.46	0	0
ZN	30562.46	30562.46	0	0
ZF	9583.02	9583.02	0	0
ZE	9583.02	9583.02	0	0
ZD	9583.02	9583.02	0	0
Z3	9583.02	9583.02	0	0
ZB	9583.02	9583.02	0	0
ZA	9583.02	9583.02	0	0
Z1	9583.02	9583.02	0	0
Z	21249.86	21249.88	0	0

CONTINUITY CHECK for AR&R 100 year, 1.5 hours storm, average 73 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
ZA1	11666.87	11666.87	0	0
Y	21249.88	21249.88	0	0
FA	248504.1	248504.1	0	0
F20	25830.61	25830.64	0	0
F21	19941.88	19941.88	0	0
F22	19941.88	19941.88	0	0

Detention Case (Civil Certification)



SUB-CATCHMENT DETAILS											
Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Paved Time (min)	Grass Time (min)	Paved Length (m)	Grass Length (m)	Paved Slope(%)	Grass Slope %	Lag Time or Factor
C10	Q	6.525	74.6	25.4	5	0	250	100	5.6	5	2.5
C11	S	18.137	70.1	29.9	5	0	500	200	4	6	4
C12A	X	4.832	52.4	47.6	5	0	150	250	2.7	4	0
C15	XX	1.276	56	44	5	0	1	150	2	2	0
C2	D1	11.257	68.9	31.1	5	0	630	240	2.9	4.6	2
C1	D	10.395	63.7	36.3	5	0	580	190	3.1	4.2	3
C5	N457	8.752	74.3	25.7	5	0	330	170	3.3	5.9	1.3
C6	N458	29.815	66.7	33.3	5	0	870	450	2.1	2	4
C7	N459	18.101	78.9	21.1	5	0	450	250	4	4	6
C4A	N460	11.189	73.1	26.9	5	0	400	200	2.8	4.5	1.7
C4	N461	5.842	91.7	8.3	5	0	300	150	2	4	0
C8	N467	2.494	79.9	20.1	5	0	500	180	3.8	3.9	3
C9	N468	15.659	71.4	28.6	5	0	530	190	3.4	3.2	3.5
C12	N470	2.333	77.2	22.8	5	0	280	180	5.7	5	1
C14	N473	16.319	76.4	23.6	5	0	450	80	4.2	7.5	5
C13	N474	27.365	69.7	30.3	5	0	750	250	3.7	4	5
C18	N479	9.998	62.3	37.7	5	0	150	300	1.3	2	0
C20	ZL1	9.72	82.4	17.6	5	0	420	270	2.4	4.4	2.8
C19	ZL	6.612	82.9	17.1	5	0	380	230	4.2	6.5	0
C21	ZN	31.34	60.7	39.3	5	0	550	400	2.9	3.5	0
C17	ZF	10.013	53.1	46.9	5	0	300	230	4	5.7	1.5
C16	ZA1	11.392	77.8	22.2	5	0	500	270	4	5.2	3.5
C3	F20	5.617	86.4	13.6	5	0	190	100	1.6	4	2
C3A	F22	19.699	73.3	26.7	5	0	320	190	3.8	4.7	4

SUB-CATCHMENT DETAILS (5yr ARI)									
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved T _c (min)	Grassed T _c (min)	Supp. T _c (min)	Due to Storm		
C10	2.026	1.843	0.306	10.68	17.48	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C11	4.52	4.118	0.647	14.14	24.09	0	AR&R 5 year, 20 minutes storm, average 93 mm/h, Zone 1		
C12A	1.186	0.98	0.233	10.2	32.39	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C15	0.376	0.32	0.063	5.28	29.35	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C2	2.628	2.289	0.377	17.05	30.31	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C1	2.389	2.017	0.456	16.24	27.07	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C5	2.499	2.263	0.322	12.86	22.87	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C6	5.63	5.1	0.573	21.11	56.74	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C7	4.889	4.805	0.386	13.94	32.39	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C4A	2.97	2.717	0.36	14.27	27.35	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C4	1.878	1.819	0.066	13.63	23.84	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C8	0.686	0.65	0.061	14.67	26.8	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C9	3.843	3.534	0.499	15.35	29.37	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C12	0.725	0.671	0.07	11.05	24.87	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C14	4.582	4.123	0.842	13.46	13	0	AR&R 5 year, 20 minutes storm, average 93 mm/h, Zone 1		
C13	6.126	5.549	0.838	17.43	32.39	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C18	2.526	2.28	0.278	11.48	44.49	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C20	2.684	2.572	0.17	15	32.96	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C19	2.024	1.901	0.139	12.96	26.63	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C21	6.651	5.827	0.903	16.1	44.7	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C17	2.336	1.907	0.553	12.01	27.7	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C16	3.046	2.909	0.264	14.52	31.35	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C3	1.827	1.74	0.134	12.02	18.69	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		
C3A	5.377	5.106	0.658	12.4	26.18	0	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1		

OVERFLOW ROUTE DETAILS (5yr ARI)									
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm	
OF221	37.954	37.954	0.256	0.23	1.42	49.99	6.17	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF225	37.55	37.55	0.256	0.23	1.4	49.99	6.11	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF231	34.613	34.613	0.256	0.23	1.29	49.99	5.63	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF233	33.53	33.53	0.256	0.23	1.25	49.99	5.45	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF235	33.53	33.53	0.256	0.23	1.25	49.99	5.45	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF239	28.967	28.967	0.256	0.23	1.08	49.99	4.71	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF245	28.967	28.967	0.256	0.23	1.08	49.99	4.71	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF247	0.376	0.376	0.256	0.058	0.04	15.58	0.74	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF316	2.628	2.628	0.256	0.13	0.16	29.95	1.23	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF318	61.635	61.635	0.256	0.23	2.31	49.99	10.03	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF314	57.93	57.93	0.256	0.23	2.17	49.99	9.42	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF306	57.93	57.93	0.256	0.23	2.17	49.99	9.42	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF302	53.229	53.229	0.256	0.23	1.99	49.99	8.66	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF214	37.954	37.954	0.256	0.23	1.42	49.99	6.17	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF217	37.954	37.954	0.256	0.23	1.42	49.99	6.17	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF201	2.499	2.499	0.256	0.127	0.15	29.41	1.21	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF203	7.885	7.885	0.256	0.203	0.33	44.5	1.63	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF207	4.889	4.889	0.256	0.167	0.24	37.32	1.45	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF210	15.041	15.041	0.256	0.23	0.56	49.99	2.45	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF212	16.547	16.547	0.256	0.23	0.62	49.99	2.69	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF219	37.954	37.954	0.256	0.23	1.42	49.99	6.17	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF223	37.954	37.954	0.256	0.23	1.42	49.99	6.17	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF227	37.55	37.55	0.256	0.23	1.4	49.99	6.11	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF229	34.613	34.613	0.256	0.23	1.29	49.99	5.63	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF237	29.491	29.491	0.256	0.23	1.1	49.99	4.8	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF241	28.967	28.967	0.256	0.23	1.08	49.99	4.71	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF243	28.967	28.967	0.256	0.23	1.08	49.99	4.71	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF251	10.706	10.706	0.256	0.229	0.4	49.71	1.76	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF253	6.126	6.126	0.256	0.183	0.28	40.55	1.53	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	

OVERFLOW ROUTE DETAILS (5yr ARI)									
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max D _x V	Max Width	Max V	Due to Storm	
OF256	13.566	13.566	0.256	0.23	0.51	49.99	2.21	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF258	13.566	13.566	0.256	0.23	0.51	49.99	2.21	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF260	13.566	13.566	0.256	0.23	0.51	49.99	2.21	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF262	13.566	13.566	0.256	0.23	0.51	49.99	2.21	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF267	11.231	11.231	0.256	0.23	0.42	49.99	1.83	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF269	11.231	11.231	0.256	0.23	0.42	49.99	1.83	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF271	11.231	11.231	0.256	0.23	0.42	49.99	1.83	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF275	2.684	2.684	0.256	0.131	0.16	30.13	1.24	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF273	8.588	8.588	0.256	0.21	0.35	45.94	1.66	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF277	6.651	6.651	0.256	0.189	0.29	41.81	1.56	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF279	6.651	6.651	0.256	0.189	0.29	41.81	1.56	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF282	2.336	2.336	0.256	0.123	0.15	28.7	1.19	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF284	2.336	2.336	0.256	0.123	0.15	28.7	1.19	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF286	2.336	2.336	0.256	0.123	0.15	28.7	1.19	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF288	2.336	2.336	0.256	0.123	0.15	28.7	1.19	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF290	2.336	2.336	0.256	0.123	0.15	28.7	1.19	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF292	2.336	2.336	0.256	0.123	0.15	28.7	1.19	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF294	2.336	2.336	0.256	0.123	0.15	28.7	1.19	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF298	5.325	5.325	0.256	0.173	0.25	38.57	1.47	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF296	3.046	3.046	0.256	0.138	0.18	31.57	1.27	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF300	5.325	5.325	0.256	0.173	0.25	38.57	1.47	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF304	53.229	53.229	0.256	0.23	1.99	49.99	8.66	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF308	7.021	7.021	0.256	0.193	0.31	42.53	1.59	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF310	5.377	5.377	0.256	0.174	0.26	38.75	1.47	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	
OF312	5.377	5.377	0.256	0.174	0.26	38.75	1.47	AR&R 5 year, 25 minutes storm, average 84 mm/h, Zone 1	

SUB-CATCHMENT DETAILS (100yr ARI)							
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved T _c (min)	Grassed T _c (min)	Supp. T _c (min)	Due to Storm
C10	3.611	3.056	0.756	9.39	13.51	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C11	8.421	7.264	1.844	12.36	19.39	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C12A	2.108	1.599	0.605	9.02	25.03	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C15	0.645	0.495	0.18	5.3	31.05	0	AR&R 100 year, 1.5 hours storm, average 73 mm/h, Zone 1
C2	4.958	4.203	0.983	14.31	23.42	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C1	4.472	3.645	1.185	13.68	20.92	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C5	4.564	3.878	0.838	11.08	17.67	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C6	10.755	9.509	1.492	17.45	43.85	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C7	8.739	8.276	1.004	11.91	25.03	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C4A	5.441	4.701	0.937	12.16	21.13	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C4	3.286	3.129	0.173	11.67	18.42	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C8	1.246	1.135	0.159	12.47	20.71	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C9	7.127	6.268	1.296	13	22.7	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C12	1.274	1.125	0.182	9.67	19.22	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C14	8.598	7.249	2.068	11.81	10.46	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C13	11.468	10.237	2.179	14.61	25.03	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C18	4.533	3.875	0.723	10.01	34.38	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C20	4.841	4.526	0.443	12.73	25.47	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C19	3.589	3.26	0.362	11.15	20.58	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C21	12.637	10.499	2.349	13.58	34.54	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C17	4.415	3.252	1.441	10.42	21.41	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C16	5.519	5.064	0.687	12.36	24.23	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C3	3.235	2.967	0.332	10.42	14.44	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1
C3A	9.799	8.727	1.709	10.72	20.23	0	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1

OVERFLOW ROUTE DETAILS (100yr AR)									
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm	
OF221	71.718	71.718	7.665	0.23	2.68	49.99	11.67	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF225	71.003	71.003	7.665	0.23	2.66	49.99	11.55	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF231	65.423	65.423	7.665	0.23	2.45	49.99	10.64	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF233	63.028	63.028	7.665	0.23	2.36	49.99	10.25	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF235	63.028	63.028	7.665	0.23	2.36	49.99	10.25	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF239	54.029	54.029	7.665	0.23	2.02	49.99	8.79	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF245	54.029	54.029	7.665	0.23	2.02	49.99	8.79	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF247	0.645	0.645	7.665	0.072	0.06	18.46	0.86	AR&R 100 year, 1.5 hours storm, average 73 mm/h, Zone 1	
OF316	4.958	4.958	7.665	0.167	0.24	37.5	1.45	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF318	118.587	118.587	7.665	0.23	4.44	49.99	19.29	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF314	110.678	110.678	7.665	0.23	4.14	49.99	18	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF306	110.678	110.678	7.665	0.23	4.14	49.99	18	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF302	100.698	100.698	7.665	0.23	3.77	49.99	16.38	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF214	71.718	71.718	7.665	0.23	2.68	49.99	11.67	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF217	71.718	71.718	7.665	0.23	2.68	49.99	11.67	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF201	4.564	4.564	7.665	0.162	0.23	36.42	1.42	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF203	15.274	15.274	7.665	0.23	0.57	49.99	2.48	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF207	8.739	8.739	7.665	0.211	0.35	46.12	1.67	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF210	27.914	27.914	7.665	0.23	1.04	49.99	4.54	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF212	30.506	30.506	7.665	0.23	1.14	49.99	4.96	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF219	71.718	71.718	7.665	0.23	2.68	49.99	11.67	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF223	71.718	71.718	7.665	0.23	2.68	49.99	11.67	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF227	71.003	71.003	7.665	0.23	2.66	49.99	11.55	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF229	65.423	65.423	7.665	0.23	2.45	49.99	10.64	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF237	55.048	55.048	7.665	0.23	2.06	49.99	8.95	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF241	54.029	54.029	7.665	0.23	2.02	49.99	8.79	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF243	54.029	54.029	7.665	0.23	2.02	49.99	8.79	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF251	20.062	20.062	7.665	0.23	0.75	49.99	3.26	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF253	11.468	11.468	7.665	0.23	0.43	49.99	1.87	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	

OVERFLOW ROUTE DETAILS (100yr AR)									
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm	
OF256	25.391	25.391	7.665	0.23	0.95	49.99	4.13	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF258	25.391	25.391	7.665	0.23	0.95	49.99	4.13	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF260	25.391	25.391	7.665	0.23	0.95	49.99	4.13	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF262	25.391	25.391	7.665	0.23	0.95	49.99	4.13	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF267	21.036	21.036	7.665	0.23	0.79	49.99	3.42	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF269	21.036	21.036	7.665	0.23	0.79	49.99	3.42	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF271	21.036	21.036	7.665	0.23	0.79	49.99	3.42	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF275	4.841	4.841	7.665	0.167	0.24	37.32	1.43	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF273	16.211	16.211	7.665	0.23	0.61	49.99	2.64	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF277	12.637	12.637	7.665	0.23	0.47	49.99	2.06	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF279	12.637	12.637	7.665	0.23	0.47	49.99	2.06	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF282	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF284	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF286	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF288	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF290	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF292	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF294	4.415	4.415	7.665	0.16	0.22	36.06	1.4	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF298	9.881	9.881	7.665	0.221	0.38	48.27	1.73	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF296	5.519	5.519	7.665	0.176	0.26	39.11	1.48	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF300	9.881	9.881	7.665	0.221	0.38	48.27	1.73	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF304	100.698	100.698	7.665	0.23	3.77	49.99	16.38	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1	
OF308	12.317	12.317	7.665	0.23	0.46	49.99	2	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF310	9.799	9.799	7.665	0.22	0.38	48.09	1.72	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	
OF312	9.799	9.799	7.665	0.22	0.38	48.09	1.72	AR&R 100 year, 20 minutes storm, average 160 mm/h, Zone 1	

APPENDIX D - AUTHORS CV



1. SUMMARY

Michael is a senior civil engineer with over 17 years experience in the fields of civil engineering, road design, drainage, hydrology, stormwater management and urban infrastructure design. He operates his own business specialising in private certification and stormwater management. Michael has worked on many civil design projects ranging from development of large scale strategic masterplans to detailed design of stormwater management facilities and urban infrastructure for residential subdivisions. His expertise lies in solving complicated drainage problems, water sensitive urban design (*WSUD*), flooding, detailed civil design, understanding the local government approvals process and managing multidisciplinary teams. Michael's experience covers all facets of civil engineering for urban development from due diligence through to approvals, detailed design, superintendency and certification. He has also provided expert advice to the Land and Environment Court with relation to drainage and stormwater quality issues.

2. EXPERIENCE

Positions held -& Location

Oct 2010 – Present	► Principal, Civil Certification, Sydney, NSW, Australia
April 2008- Sept 2010	► Manager, Urban Infrastructure, Environment Group - Worley Parsons, Sydney, NSW, Australia.
Aug. 2007- March 2008	► Principal Engineer – Urban Infrastructure - Worley Parsons incorporating Patterson Britton & Partners, Sydney, NSW, Australia;
Nov. 1997- Jul. 2007	► Senior Associate – Urban Infrastructure - Patterson Britton & Partners, Sydney, NSW, Australia;
Aug. 1996- Oct 1997	► Water Resources Engineer – Willing & Partners, Sydney, NSW, Australia;
Feb. 1991- Aug. 1994	► Design Engineer, Development Engineer, Investigation Engineer & Survey Assistant – Ryde City Council, Sydney, NSW, Australia.

Standout Projects

- **Stormwater Management Strategies(SMS)**
- Port Jackson South Stormwater Management Plan (2,870ha catchment);
- Drummoyne Council Stormwater Quality Strategy (830ha catchment);
- Lake Illawarra South Stormwater Quality Strategy (1,548ha catchment);
- Elliot Lake Stormwater Quality Strategy (1,220ha catchment);
- Scotland Island SMS (53ha catchment);
- Corks Lane Milton, DA Stage SMS (150 lot residential subdivision);



Resume

- Pasadena, Church Point, DA Stage Stormwater Management and Reuse Strategy (*mixed use dev.*);
- Yallambee Ave West Gosford, DA Stage SMS (*100 lot residential subdivision*);
- CSIRO Greystanes, Employment Lands SMS (*60ha industrial site*);
- Warriewood Valley, Sector 3, Rezoning Stage SMS (*130 lot residential subdivision*);
- Warriewood Valley, Sector 8, Rezoning to Subdivision Certificate Stage SMS (*140 lot residential subdivision*);
- Warriewood Valley, Buffer Areas 1 and 2, Rezoning and DA Stage SMS (*300 lot residential subdivision*);
- Warriewood Valley, Buffer Area 3, Rezoning and DA Stage SMS (*250 townhouse subdivision*);
- Macarthur Square Regional Centre Masterplan DA Stage WSUD Strategy (*61ha residential subdivision*);
- Department of Defence Site, Ermington ("*Ermington Riverfront*") DA Stage SMS (*20ha residential subdivision*);
- West Kembla Grange, Wollongong, Aquatic Issues Assessment (*858ha catchment*);
- Eastwood Quarry, Masterplan/Rezoning Stage SMS (*20ha residential subdivision*);
- Perentie and Dawes Road Masterplan, Belrose, Stormwater Quality Strategy (*30ha residential subdivision*);
- Walter Road, Ingleside DA Stage SMS (*15ha rural residential subdivision*);
- Domayne, Austlink Park Belrose SMS (*large commercial use development*);
- Grassmere LES, Camden SMS (*50ha rural residential subdivision*); and
- Warriewood Valley (*Sectors C, D, & 12*) Rezoning Stage SMS (*100 lot residential subdivision*).

► **Water Sensitive Urban Design (WSUD)**

- Sand Filtration Unit, Drummoyne Park (*ie Stormwater Treatment*);
- Barnwell Park Golf Course Stormwater Treatment and Reuse;
- Powell Creek Reserve Eco Carpark
- Warriewood Valley, Sector 10, Detailed Design of WSUD elements (*bio-retention systems and wetland for 170 lot residential subdivision*);
- Warriewood Valley, Sector 12, Detailed Design of WSUD elements (*bio-retention systems and wetland for 180 lot residential subdivision*); and
- Rouse Hill Regional Centre – Detailed design and performance analysis of bio retention systems, raingardens and constructed wetland .

► **Riparian/Creek Design/Investigation**

- Wollondilly Shire Riparian Corridor Definition Study;
- Parsley Bay, Woollahra, Creekline Rehabilitation;
- Embankment Stabilisation Design, Koloona Ave, Byarong Creek ,Wollongong;



Resume

- Embankment Stabilisation Design, 5 sites along Cabbage Tree Creek, Towradgi Creek and Byarong Creek, Wollongong;
- Prospect Creek, Fairfield – Design of confluence stabilisation and creek rehabilitation measures; and
- Narrabeen Creek, Pittwater – Detailed design of creek rehabilitation and embankment stabilisation measures from Graf Ave to Ponderosa Parade.

► **Civil Subdivision Design**

- Potts Hill, Eastern Precinct – Lead design team for 13ha Industrial development of Sydney Water Surplus Lands. Engaged by Landcom to provide approval documentation for Part 3 Major Project and to deliver detailed design of all subdivision infrastructure (*ie civil, roads, RE walls, stormwater, power, sewer, water, recycled water and utility services*).
- Tweed Road, Lithgow, Detailed Design of Civil Infrastructure (*roads, drainage, water, sewer and all other utility services*) for a 38 lot residential subdivision;
- Sector 20, Warriewood, Detailed Design of Civil Infrastructure (*roads, drainage, water, sewer and all other utility services*) for a 63 lot residential subdivision;
- 7 Orchard Road, Warriewood, Detailed Design of Lot Based Stormwater Management Facilities and Access Road for a 10 lot residential subdivision;
- Heritage Estates, Shoalhaven, Conceptual Design of Civil Infrastructure. (*water, sewage, utility services, roads and drainage*) for 20ha residential subdivision;
- Randwick Defence Site (*Stage 1A*), Detailed Design of Civil Infrastructure (*roads, drainage, water, sewer and all other utility services*) for a 80 lot residential subdivision; and
- Cooks Cove Development, Upgrade to Scarborough and Bicentennial Parks – Lead design team for approvals and detailed design of upgrade to park facilities, including carparks, creekline, stormwater drainage, bulk earthworks, access roads, services etc to accommodate future relocation of facilities from Cooks Cove development site (*Part 3A Major Project*).

► **Drainage Analysis/Design**

- Canada Bay Council city wide DRAINS modelling project (*970ha catchment*);
- Canada Bay Council Detention modelling and OSD policy development;
- City of Canada Bay Council MAPINFO drainage database update;
- Old Bathurst Road, Emu Plains, Detailed Design of Stormwater Management Facilities (*24ha industrial subdivision*)
- Andrew Road, Penrith, Detailed Design of Stormwater Management Facilities (*8ha industrial subdivision*)
- St Mervyns Ave, Woollahra, Stormwater Outlet Extension;
- Grosvenor Street Stormwater Drainage Study;
- Perentie and Dawes Road Masterplan, Belrose, Stormwater Drainage Concept Plan;
- Yulong Concept Drainage Study, Dept Defence Moorebank (*25ha industrial subdivision*);
- Headland Road, Curl Curl OSD Design;



Resume

- Cooper Park Amphitheatre , Woollahra, Detailed Stormwater Drainage Design;
- Paradise Avenue, Paradise Beach, Detailed Stormwater Drainage Design;
- Georges River Sailing Club, Seawall and Beach Nourishment Design;
- St Andrew Church, Wahroonga OSD and Stormwater Drainage Design;
- North Sydney Catchment Management Studies (*in total 86ha catchment*);
- Greystanes Estate, Northern Residential Lands, Detailed Design of Water Management Facilities (*70ha residential development*); and
- Barina Downs Road, Detention Basin Design (*large regional detention facility*).
- Robertson Road, Scotland Island – Detailed Stormwater Drainage Design

► **Flood Studies (FS)**

- Prospect Creek Channel Enhancement FS;
- Oats Ave, Gladesville FS;
- Casa Paloma Caravan Park FS;
- Kiaora Place Development, Double Bay FS;
- Darling Park/Cross City Tunnel - Flood impact assessment;
- Mowbray Road, Nursing Home, Assessment of overland flow impacts;
- Macquarie Links Golf Course FS (*Bunburry Curran Creek, Campbelltown*);
- Wigan Road, Dee Why FS;
- Green Road FS;
- Anzac Creek, Moorebank FS;
- Eastwood Hotel Drainage/Flooding Study;
- Mona Street, Mona Vale FS;
- Frenchs Creek FS;
- Darling Walk Flood Assessment, Darling Harbour; and
- Lynwood Ave, Dee Why Flood Assessment.

► **Dam Hazard Assessment**

- Kellyville Ridge Dam, Second Ponds Creek, Dam Hazard Assessment;
- UWS Campbelltown Dam Hazard Assessment;
- Hume Golf Course, Albury Dam Hazard Assessment; and
- CSIRO, Greystanes Dam Hazard Assessment.

► **Water Quality Monitoring**

- Sectors 2, 8 and 11 Warriewood, Post construction (*ie residential subdivision*) stormwater quality monitoring;
- Warriewood Valley (*Various Sectors*) Approval Stage Water Quality Monitoring over an 8 year period
- Shellharbour Council Stormwater Monitoring Strategy (*entire Shellharbour LGA - 14,000ha*);



Resume

- St Marys Eastern Precinct Water Quality Monitoring Strategy (*160ha residential subdivision*);
- Rouse Hill Regional Centre – Post development water quality monitoring of treatment measures and receiving waters (*Auto sampling and grab sampling*);
- Water Quality Sampling for Metal Recycling development, Ingleburn.

► **Major Culvert Amplification Design**

- Careel Creek/Barrenjoey Road Culvert Amplification Works (*Pittwater Council and RTA*);
- Fern Creek/Garden Street Culvert Amplification (*Pittwater Council*);
- Narrabeen Creek/Ponderosa Pde Culvert Amplification (*Pittwater Council*); and
- Garie Beach Culvert Amplification (*RTA and NPWS*).

► **Road/Carpark Design**

- Transport Infrastructure Development Corporation (*TIDC*) Commuter Car Park Program, Detailed Design of At Grade Carparks at Emu Plains Station, Woonona Station and Waterfall Station (over \$1 million in fees)
- Rookwood Road Potts Hill, Detailed Design of RTA signalised intersection upgrade (*Landcom*)
- Brunker Road Potts Hill, Detailed Design of RTA signalised intersection upgrade (*Landcom*)
- Scotland Island Road Reserve Masterplan (*53ha area*);
- P&O Port Botany, Detailed Design of Staff Carparking Facilities (*50 spaces*);
- McKeown Street, Maroubra Beach, Detailed Road Design for streetscape improvement works;
- Department of Defence Site, Randwick (*Stages 1A, 1B and Community Centre*), Detailed Road Design for large residential subdivision(*5.6ha residential subdivision*); and
- Greystanes Estate Northern Residential Land, Detailed Road Design for large residential subdivision (*50ha residential subdivision*).
- Sector 20 Warriewood, Detailed Road Design for large residential subdivision (*50ha residential subdivision*)
- Lidcombe Botanica, Detailed Road Design for heritage precinct of large residential subdivision
- Heffron Park Randwick, Detailed Design of 100 space carpark and associated road improvement works.

► **Infrastructure/Service Strategies**

- Ermington Naval Stores (*700 lot residential development*);
- Greystanes Estate, Prospect (*250ha residential & employment development*);
- UWS Werrington (*48ha residential development*) ;
- Airds Town Centre Masterplan;
- Sector 7 (2 Daydream Avenue), Warriewood (*3ha mixed use commercial/light industrial development*);
- St Mary's (*ADI Site-Eastern Precinct-160ha residential development*); and



Resume

-Green Square Master Plan, South Sydney (Zetland).

► **Gross Pollutant Traps (GPT's)**

-Dee Why Beach GPT design (*special non proprietary*);

-Birkenhead Point and Brent Street GPTs (*special non proprietary*);

-St Georges Crescent Catchment Oil/Grit Separators (*multiple proprietary*);

-Stormwater Trust Application Assistance, Waterways Authority - Blackwattle Bay GPT;

-Brookvale Creek Rehabilitation – detailed design of large offline GPT/trash rack; and

-Drummoyne Council - Three Ways to Improve The Bays GPT Design Project (*special non proprietary*);

► **General Civil Engineering**

BER Sydney South, provision of general civil engineering design for Abigroup for a number of Schools in Sydney South

► **Expert Advice / Certification**

-DA Stormwater management, West Ryde Urban Village Redevelopment for Ryde City Council (*ie acting on behalf of Council*);

-DA Stormwater management, Top Ryde Shopping Centre Redevelopment for Ryde City Council (*ie acting on behalf of Council*);

-Yulong Moorebank , review of road design for Department of Defence;

-Rushcutters Bay Flood Study Peer Review for Lindsay Bennelong Developments;

-Review of Managing Urban Stormwater Manual April 2004 on behalf of Landcom;

-Clontarf Street, Seaforth – Civil inspections for Landcom residential development on behalf of Manly Council;

-Sector 20, Warriewood – Superintendency for \$6 million Civil Works Contract; and

-Expert advice (*water quality on industrial site*) for L&E Court Case - Phiney Place, Ingleburn.

-Expert advice (*drainage*) for L&E Court Case – Park Street, Mona Vale.

-Expert advice (*drainage*) for L&E Court Case – 120 Hopetoun Avenue, Vacluse

-Expert advice (*drainage/riparian corridor*) for L&E Court Case – 23B Macpherson Street, Warriewood



Civil Certification

Accredited Certifiers
Civil Engineering

ABN 87 532 718 229

0412 264 237



Michael J Shaw
BE MIEAust CPEng NPER

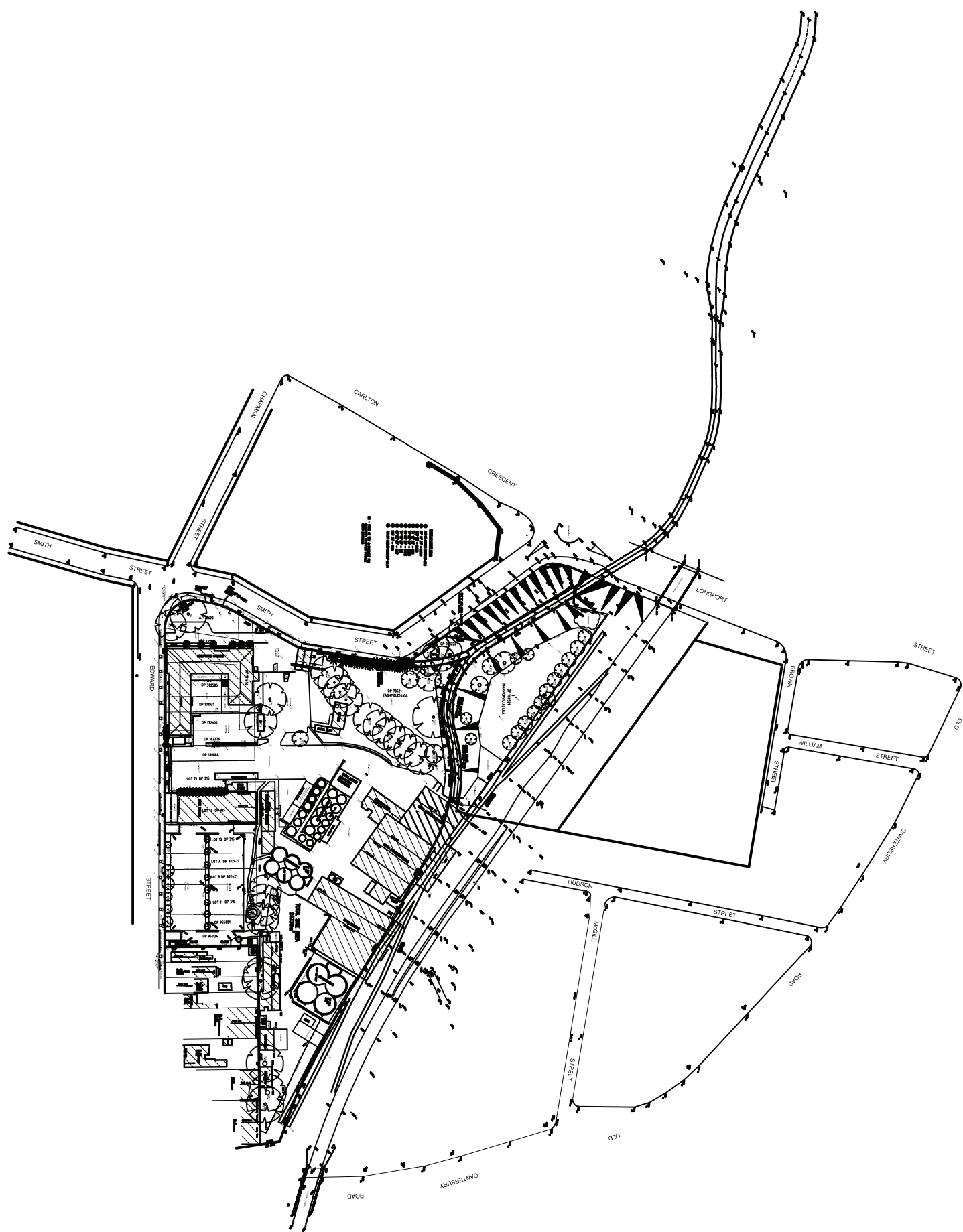
Principal
Civil Certification

Resume

3. EDUCATION & PROFESSIONAL AFFILIATIONS

- ▶ Bachelor of Engineering (*Civil*), University of Technology, Sydney, 1996;
- ▶ Member, Institution of Engineers, Australia (*MIEAust*);
- ▶ Chartered Professional Engineer (*CPEng*);
- ▶ National Professional Engineers Register (*NPER - Civil*);
- ▶ NSW Accredited Certifier (BPAct 2005) – Categories B1, C1, C2, C3, C4, C6, C15 (*BPB 0816*)

APPENDIX E - EXISTING SITE SURVEY



BY D.P. 73561

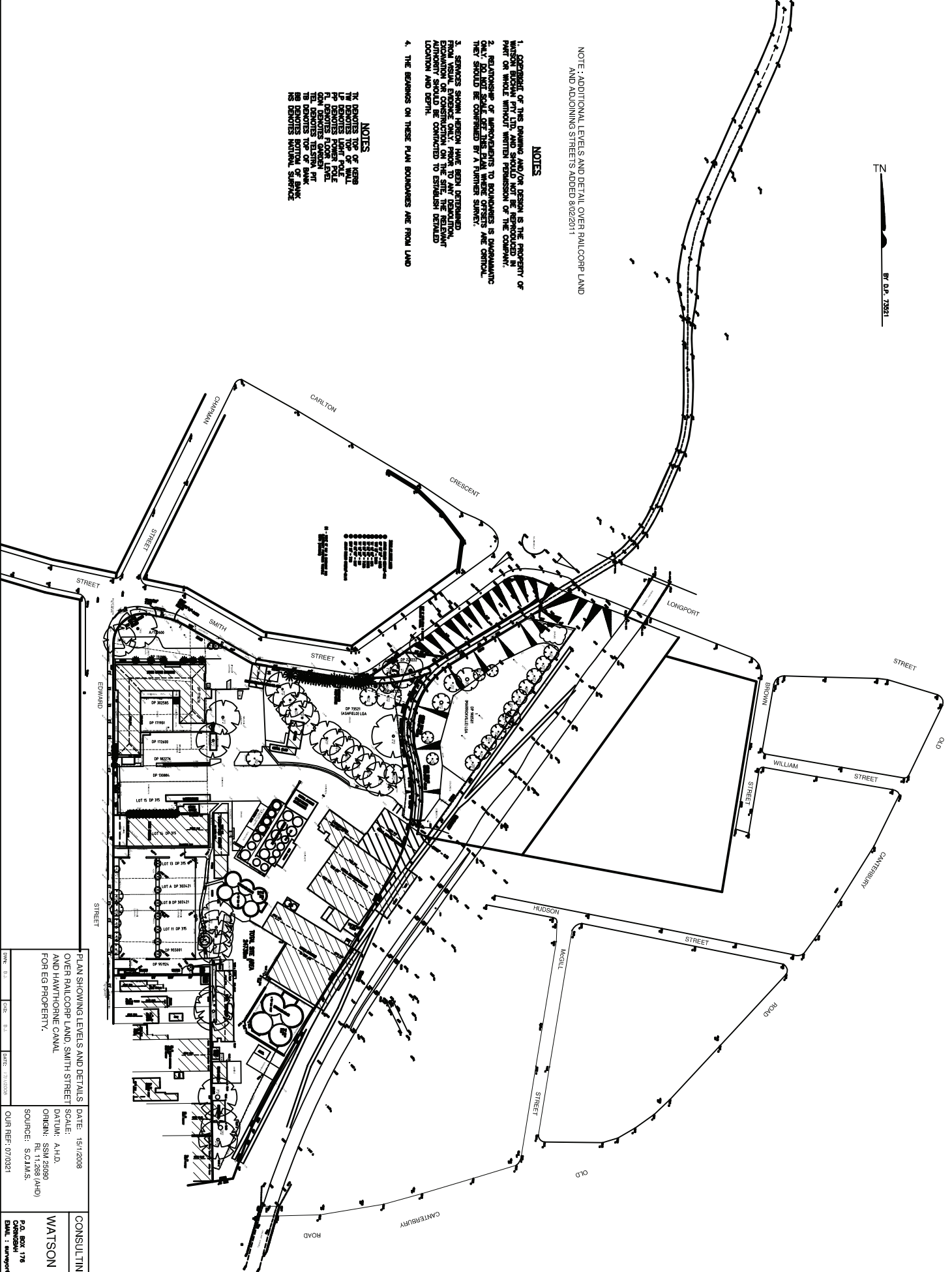
NOTE: ADDITIONAL LEVELS AND DETAIL OVER RAILCOOP LAND
AND ADDITIONAL STREETS ADDED 8/02/2011

NOTES

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3. SERVICES SHOWN HEREON HAVE BEEN DETERMINED FROM VISUAL EVIDENCE ONLY. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELIANT ADVISORY SERVICE SHOULD BE CONSULTED TO ESTABLISH EXISTENT LOCATION AND DEPTH.
4. THE BOUNDARIES ON THESE PLAN BOUNDARIES ARE FROM LAND

NOTES

- TK DENOTES TOP OF KERB
- TP DENOTES TOP OF PAVEMENT
- FP DENOTES FLOOR FINISH
- FL DENOTES FLOOR LEVEL
- CL DENOTES CURB LEVEL
- TL DENOTES TIE LINE
- TT DENOTES TOP OF TANK
- MB DENOTES MAIN BOUNDARY



PLAN SHOWING LEVELS AND DETAILS OVER RAILCOOP LAND SMITH STREET AND HAWTHORNE CANAL FOR EG PROPERTY.			
DATE: 15/12/2008	SCALE: A.H.D.	CONSULTING SURVEYORS	
ORIGIN: SSM 25090	DATE: 15/12/2008	WATSON BUCHAN	
SOURCE: RL T1288 (AHD)	OUR REF: 07/0321	P.O. BOX 176 PHONE: 9224 4073	
		DARWIN FAX: 9240 1387	
		EMAIL: info@watsonbuchan.com.au	