

EXTERNAL CATCHMENT

FLOW

CALCULATIONS

FOR

CATCHMENT B



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Stormwater System for Yennora External flows

* model of pre dev situation with 100 yr overland flows

*CATCHMENT "B" - Renfrew Street

AAA 888 0 -1

0 0 80.0 5.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.26 75.0 10.0 0.0 20.0 7.0 2.0

AAA 777 0 -1

0 0 190.0 6.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.47 75.0 20.0 0.0 25.0 40.0 2.0

BBB 111 0 -1

0 0 200.0 8.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.47 75.0 4.0 0.0 25.0 7.0 2.0

ADD BBB TO AAA

AAA 666 0 -1

0 0 175.0 3.5 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.28 75.0 20.0 0.0 25.0 40.0 2.0

CCC 111 0 -1

0 0 185.0 4.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.06 75.0 4.0 0.0 25.0 7.0 2.0

ADD CCC TO AAA

AAA 555 0 -1

0 0 130.0 2.5 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.76 75.0 20.0 0.0 25.0 40.0 2.0

AAA 444 0 -1

0 0 120.0 3.0 0.040 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.34 50.0 20.0 0.0 50.0 40.0 10.0

AAA 333 0 -1

0 0 115.0 3.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.31 75.0 20.0 0.0 25.0 40.0 2.0

AAA 222 0 -1

0 0 150.0 2.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
.968 95.0 3.0 0.0 5.0 5.0 2.0

DDD 444 0 -1

0 0 140.0 3.3 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.82 75.0 4.0 0.0 25.0 7.0 2.0

DDD 333 0 -1

0 0 115.0 4.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.56 75.0 4.0 0.0 25.0 7.0 2.0

DDD 222 0 -1

0 0 110.0 4.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.54 75.0 10.0 0.0 25.0 20.0 2.0

EEE 777 0 -1
0 0 90.0 5.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.04 75.0 10.0 0.0 25.0 20.0 2.0

EEE 666 0 -1
0 0 80.0 3.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.47 75.0 10.0 0.0 25.0 20.0 2.0

EEE 555 0 -1
0 0 85.0 3.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.62 75.0 7.0 0.0 25.0 15.0 2.0

EEE 444 0 -1
0 0 120.0 3.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.34 50.0 7.0 0.0 50.0 15.0 2.0

EEE 333 0 -1
0 0 120.0 4.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
2.28 20.0 7.0 0.0 80.0 15.0 2.0

EEE 222 0 -1
0 0 95.0 2.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.84 20.0 7.0 0.0 80.0 15.0 2.0

FFF 555 0 -1
0 0 70.0 3.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.26 75.0 4.0 0.0 25.0 7.0 2.0

FFF 444 0 -1
0 0 85.0 3.3 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.95 75.0 4.0 0.0 25.0 7.0 2.0

FFF 333 0 -1
0 0 115.0 6.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.87 75.0 4.0 0.0 25.0 7.0 2.0

FFF 222 0 -1
0 0 120.0 3.1 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.62 75.0 5.0 0.0 25.0 8.0 2.0

FFF 111 0 -1
0 0 105.0 2.5 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
1.0 75.0 5.0 0.0 25.0 8.0 2.0

ADD FFF TO EEE

EEE 111 0 -1
0 0 230.0 3.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0
0.98 90.0 3.0 0.0 10.0 5.0 2.0

ADD EEE TO DDD

DDD 111 0 -1
0 0 135.0 3.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0

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0.63 95.0 2.0 0.0 5.0 3.0 2.0

ADD DDD TO AAA

AAA 111 0 -1

0 0 40.0 2.0 0.030 3 0 0.25 6.0 0.083 30.0 1.0 0 0 0

0.12 95.0 1.0 0.0 5.0 3.0 2.0

* Dummy reach to get external catchment flow

AAA 000 0 -1

0 0 2.0 2.5 0.030 3 0 0.25 6.0 0.083 50.0 1.0 0 0 0

0.0001 75.0 4.0 0.0 25.0 7.0 2.0

END

Stormwater System for Yennora External flows 1 in 100years

CATCHMENT "B" - Renfrew Street

PEAK FLOWS AMONG RUNOFFS FROM 8 RAINFALL PATTERNS

(The following lines give Branch and Reach names;

Maximum surface flow arriving at an entry point or pit,

Maximum flow in the pit before routing through downstream reach,

Maximum surface overflow and Total flows to this point (m3/s);

Pipe Diameter or Normal Depth (open sections) (mm) & Capacity (m3/s).

Other information is given for non-circular reaches

- refer to the program code for details.)

AAA 888	.575	.575	.000	.575	381.	.354
AAA 777	.762	1.251	.000	1.251	457.	.631
BBB 111	1.283	1.283	.000	1.283	381.	.448
AAA 666	.703	3.116	.000	3.116	762.	1.883
CCC 111	1.070	1.070	.000	1.070	457.	.515
AAA 555	.543	4.534	.000	4.534	914.	2.585
AAA 444	.529	4.882	.000	4.882	914.	2.832
AAA 333	.713	5.476	.000	5.476	991.	3.513
AAA 222	.585	5.890	.000	5.890	1067.	3.493
DDD 444	.945	.945	.000	.945	457.	.468
DDD 333	.810	1.701	.000	1.701	533.	.776
DDD 222	.641	2.230	.000	2.230	610.	1.112
EEE 777	.850	.850	.000	.850	457.	.576
EEE 666	1.029	1.865	.000	1.865	610.	.963
EEE 555	.706	2.507	.000	2.507	686.	1.317
EEE 444	.905	3.321	.000	3.321	762.	1.743
EEE 333	.770	4.051	.000	4.051	762.	2.013
EEE 222	.621	4.630	.000	4.630	914.	2.312
FFF 555	.654	.654	.000	.654	381.	.275
FFF 444	1.013	1.646	.000	1.646	533.	.705
FFF 333	.971	2.567	.000	2.567	533.	.951
FFF 222	.832	3.325	.000	3.325	686.	1.339
FFF 111	.513	3.718	.000	3.718	762.	1.592
EEE 111	.569	8.458	.000	8.458	1067.	4.278
DDD 111	.384	10.586	.000	10.586	1143.	5.140
AAA 111	.073	16.087	.000	16.087	1448.	7.886
AAA 000	.000	15.973	.000	15.973	1448.	8.817

END

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JOB NO. - 01/0340

CATCHMENT "B"

RERUN WITH NEW RAINFALL PATTERN NO. 5

100 YEAR ARI, 1.5 hr, 90 MIN

(ANTECEDENT MOISTURE CONDITION = 3.00)

CATCHMENT PARAMETERS

INFILTRATION

DEPRESSION STORAGE (mm)	SOIL TYPE	AMC	PARAMETERS
PAVED AREA	GRASSED	1234=ABCD	FI = 50.0 mm
5=NEW		F0 = 125.0 mm/h	
		FC = 6.0 mm/h	
1.0	5.0	3.00	K = 2.0 /h
			FID = 45.6 mm
			INITIAL RATE = 33.7 mm/h

RAINFALL PARAMETERS AND DATA

DURATION (minutes)	TIME INCREMENT (minutes)	NUMBER OF RAINFALL INCREMENTS	TOTAL RAINFALL (mm)
90.0	5.0	18	84.7

STANDARD AUSTRALIAN RAINFALL PATTERN FOR ZONE 1

WITH AVERAGE INTENSITY 56.50 mm/h (MULTIPLIER = 1.000)

35.6	60.0	141.4	81.4	101.7	198.3	55.9	54.9	45.8	35.6
45.8	36.6	24.4	26.4	26.4	16.3	15.3	15.3		

COMPUTATIONAL TIME STEP = 5.0 minutes

PIPE SYSTEM DETAILS

REACH AAA - 888

** DESIGN MODE **

NOTE - COMBINED LAND-USE AREAS ARE LESS THAN TOTAL AREA - 5.00 % IS UNDRAINED

	TOTAL			
	PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	.94 ha	.00 ha	.25 ha	1.20 ha
75.0 %	.0 %	20.0 %	95.0 %	
ACCUMULATED AREA	.94 ha	.00 ha	.25 ha	1.20 ha
75.0 %	.0 %	20.0 %	95.0 %	
PAVED AREA	TIME OF ENTRY PROVIDED = 10.0 min PEAK Q = .394 m3/s			
GRASSED AREA	TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .107 m3/s			
	LAG = 2.0 min			

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 936 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE
	PAV SUP GRAS	TOTAL	TIME Q	TIME Q	Q	Q	Q	
AAA_888	.94 .00 .25	1.20	10	.394	2-9	.107	.877	936 .501 .501 .487

LEN	SLOPE	ORIGINAL	DESIGNED	CAP	VEL	VOLUMES	OFLOW
H	B	SS	NO DIA	nOrk	NO DIA	nOrk	PAT Q
80	5.00	.25	6.00	.08	0.000	457.015	1.576
						3.5	0 0 0 .000

(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH AAA - 777

** DESIGN MODE **

	TOTAL			
	PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	1.85 ha	.00 ha	.62 ha	2.47 ha
75.0 %	.0 %	25.0 %	100.0 %	

ACCUMULATED AREA 2.80 ha .00 ha .87 ha 3.67 ha
 75.0 % .0 % 23.3 % 98.3 %
 PAVED AREA TIME OF ENTRY PROVIDED = 20.0 min PEAK Q = .672 m3/s
 GRASSED AREA TIME OF ENTRY PROVIDED = 40.0 min PEAK Q = .119 m3/s
 LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 2835 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH	RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE
PAV	SUP	GRAS	TOTAL	TIME	Q	TIME	Q	Q	Q
AAA_777	1.85	.00	.62	2.47	20	.672	2.42	.119	.907
						1899	.762	1.249	1.200

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
 190 6.00 .25 6.00 .08 0.000 610.015 1.362 4.7 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH BBB - 111 ** DESIGN MODE **

	PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	1.85 ha	.00 ha	.62 ha	2.47 ha
75.0 %	.0 %	25.0 %	100.0 %	
ACCUMULATED AREA	1.85 ha	.00 ha	.62 ha	2.47 ha
75.0 %	.0 %	25.0 %	100.0 %	
PAVED AREA	TIME OF ENTRY PROVIDED = 4.0 min PEAK Q = 1.020 m3/s			
GRASSED AREA	TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .262 m3/s			
	LAG = 2.0 min			

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 1906 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH	RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE
PAV	SUP	GRAS	TOTAL	TIME	Q	TIME	Q	Q	Q
BBB_111	1.85	.00	.62	2.47	4	1.020	2.9	.262	.910
						1906	1.283	1.283	1.213

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
 200 8.00 .25 6.00 .08 0.000 610.015 1.573 5.4 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

CONFLUENCE : BRANCH BBB TERMINATES - BRANCH AAA CONTINUES

REACH AAA - 666 ** DESIGN MODE **

	PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	1.71 ha	.00 ha	.57 ha	2.28 ha
75.0 %	.0 %	25.0 %	100.0 %	
ACCUMULATED AREA	6.36 ha	.00 ha	2.06 ha	8.42 ha
75.0 %	.0 %	24.3 %	99.3 %	
PAVED AREA	TIME OF ENTRY PROVIDED = 20.0 min PEAK Q = .621 m3/s			
GRASSED AREA	TIME OF ENTRY PROVIDED = 40.0 min PEAK Q = .110 m3/s			
	LAG = 2.0 min			

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 6495 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH	RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE
PAV	SUP	GRAS	TOTAL	TIME	Q	TIME	Q	Q	Q
AAA_666	1.71	.00	.57	2.28	20	.621	2.42	.110	.907
						1753	.703	3.116	2.995

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
 175 3.50 .25 6.00 .08 0.000 991.015 3.795 4.9 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

**** DESIGN MODE ****

		TOTAL			
		PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA		1.54 ha	.00 ha	.51 ha	2.06 ha
75.0 %		.0 %	25.0 %	100.0 %	
ACCUMULATED AREA		1.54 ha	.00 ha	.51 ha	2.06 ha
75.0 %		.0 %	25.0 %	100.0 %	
PAVED AREA	TIME OF ENTRY PROVIDED = 4.0 min PEAK Q = .851 m3/s				
GRASSED AREA	TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .219 m3/s				
		LAG = 2.0 min			

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 1589 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH	RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE				
PAV	SUP	GRAS	TOTAL	TIME	Q	TIME	Q	Q	Q				
CCC_111	1.54	.00	.51	2.06	4	.851	2-9	.219	.910	1589	1.070	1.070	.995

LEN	SLOPE	ORIGINAL H B SS	DESIGNED NO DIA nORk	CAP VEL NO DIA nORk	PAT Q	VEL BY	VOLUMES OF FLOW UPW OFL Q
185	4.00	.25 6.00 .08	0.000	610.015	1.112	3.8 0 0 0	.000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m ³ /s), VOLUME STORED = 0 m ³							

CONFLUENCE : BRANCH CCC TERMINATES - BRANCH AAA CONTINUES

**** DESIGN MODE ****

	TOTAL				
	PAVED	SUPPLEMENTARY		GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA		1.32 ha	.00 ha	.44 ha	1.76 ha
	75.0 %	.0 %	25.0 %	100.0 %	
ACCUMULATED AREA		9.22 ha	.00 ha	3.01 ha	12.24 ha
	75.0 %	.0 %	24.5 %	99.5 %	
PAVED AREA	TIME OF ENTRY PROVIDED = 20.0 min PEAK Q = .479 m3/s				
GRASSED AREA	TIME OF ENTRY PROVIDED = 40.0 min PEAK Q = .085 m3/s				
	LAG = 2.0 min				

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 9438 m³

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH	RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE				
PAV	SUP	GRAS	TOTAL	TIME	Q	TIME	Q	Q	Q				
AAA_555	1.32	.00	.44	1.76	20	.479	2-42	.085	.907	1353	.543	4.534	4.395

LEN	SLOPE	ORIGINAL		DESIGNED		CAP VEL	VOLUMES OF FLOW							
H	B	SS	NO	DIA	nORk	NO	DIA	nORk	PAT	Q	BYP	UPW	OFL	Q
130	2.50	.25	6.00	.08	0.000	1143	.015	4.692	4.6	0	0	0	.000	

(APPROX. ROUTING WITH FLOW LIMITED TO 30,000 m³/s), VOLUME STORED = 0 m³

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** DESIGN MODE **

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	TOTAL			
	PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	1.17 ha	.00 ha	1.17 ha	2.34 ha
50.0 %	.0 %	50.0 %	100.0 %	
ACCUMULATED AREA	10.39 ha	.00 ha	4.18 ha	14.58 ha
71.0 %	.0 %	28.6 %	99.6 %	
PAVED AREA	TIME OF ENTRY PROVIDED = 20.0 min PEAK Q = .425 m3/s			
GRASSED AREA	TIME OF ENTRY PROVIDED = 40.0 min PEAK Q = .226 m3/s			
	LAG = 10.0 min			

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 11077 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
 PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
 AAA_444 1.17 .00 1.17 2.34 20 .425 10-50 .226 .827 1639 .503 4.882 4.763

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORK NO DIA nORK PAT Q BY UPW OFL Q
 120 3.00 .25 6.00 .08 0.000 1143 .015 5.140 5.0 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH AAA - 333 ** DESIGN MODE **

TOTAL
 PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
 SUB-CATCHMENT AREA 1.73 ha .00 ha .58 ha 2.31 ha
 75.0 % .0 % 25.0 % 100.0 %
 ACCUMULATED AREA 12.13 ha .00 ha 4.76 ha 16.89 ha
 71.5 % .0 % 28.1 % 99.6 %
 PAVED AREA TIME OF ENTRY PROVIDED = 20.0 min PEAK Q = .629 m3/s
 GRASSED AREA TIME OF ENTRY PROVIDED = 40.0 min PEAK Q = .111 m3/s
 LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 12853 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
 PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
 AAA_333 1.73 .00 .58 2.31 20 .629 2-42 .111 .907 1776 .713 5.476 5.359

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORK NO DIA nORK PAT Q BY UPW OFL Q
 115 3.00 .25 6.00 .08 0.000 1219 .015 6.103 5.2 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH AAA - 222 ** DESIGN MODE **

TOTAL
 PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
 SUB-CATCHMENT AREA .92 ha .00 ha .05 ha .97 ha
 95.0 % .0 % 5.0 % 100.0 %
 ACCUMULATED AREA 13.05 ha .00 ha 4.81 ha 17.85 ha
 72.8 % .0 % 26.8 % 99.6 %
 PAVED AREA TIME OF ENTRY PROVIDED = 3.0 min PEAK Q = .507 m3/s
 GRASSED AREA TIME OF ENTRY PROVIDED = 5.0 min PEAK Q = .024 m3/s
 LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 13651 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
 PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
 AAA_222 .92 .00 .05 .97 3 .507 2-7 .024 .973 798 .531 5.890 5.698

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORK NO DIA nORK PAT Q BY UPW OFL Q
 150 2.00 .25 6.00 .08 0.000 1372 .015 6.830 4.6 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH DDD - 444 ** DESIGN MODE **

TOTAL
 PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
 SUB-CATCHMENT AREA 1.37 ha .00 ha .46 ha 1.82 ha
 75.0 % .0 % 25.0 % 100.0 %
 ACCUMULATED AREA 1.37 ha .00 ha .46 ha 1.82 ha
 75.0 % .0 % 25.0 % 100.0 %
 PAVED AREA TIME OF ENTRY PROVIDED = 4.0 min PEAK Q = .752 m3/s

GRASSED AREA TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .193 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 1404 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
DDD_444 1.37 .00 .46 1.82 4 .752 2-9 .193 .910 1404 .945 .945 .890

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
140 3.30 .25 6.00 .08 0.000 610.015 1.010 3.5 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH DDD - 333 ** DESIGN MODE **

TOTAL
PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
SUB-CATCHMENT AREA 1.17 ha .00 ha .39 ha 1.56 ha
75.0 % .0 % 25.0 % 100.0 %
ACCUMULATED AREA 2.53 ha .00 ha .85 ha 3.38 ha
75.0 % .0 % 25.0 % 100.0 %
PAVED AREA TIME OF ENTRY PROVIDED = 4.0 min PEAK Q = .645 m3/s
GRASSED AREA TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .166 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 2608 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
DDD_333 1.17 .00 .39 1.56 4 .645 2-9 .166 .910 1204 .810 1.701 1.637

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
115 4.00 .25 6.00 .08 0.000 762.015 2.013 4.4 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH DDD - 222 ** DESIGN MODE **

TOTAL
PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
SUB-CATCHMENT AREA 1.15 ha .00 ha .38 ha 1.54 ha
75.0 % .0 % 25.0 % 100.0 %
ACCUMULATED AREA 3.69 ha .00 ha 1.23 ha 4.92 ha
75.0 % .0 % 25.0 % 100.0 %
PAVED AREA TIME OF ENTRY PROVIDED = 10.0 min PEAK Q = .481 m3/s
GRASSED AREA TIME OF ENTRY PROVIDED = 20.0 min PEAK Q = .112 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 3795 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
DDD_222 1.15 .00 .38 1.54 10 .481 2-22 .112 .909 1187 .593 2.230 2.161

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
110 4.00 .25 6.00 .08 0.000 838.015 2.594 4.7 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH EEE - 777 ** DESIGN MODE **

TOTAL

PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
 SUB-CATCHMENT AREA 1.53 ha .00 ha .51 ha 2.04 ha
 75.0 % .0 % 25.0 % 100.0 %
 ACCUMULATED AREA 1.53 ha .00 ha .51 ha 2.04 ha
 75.0 % .0 % 25.0 % 100.0 %
 PAVED AREA TIME OF ENTRY PROVIDED = 10.0 min PEAK Q = .638 m3/s
 GRASSED AREA TIME OF ENTRY PROVIDED = 20.0 min PEAK Q = .148 m3/s
 LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 1572 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
 PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
 EEE_777 1.53 .00 .51 2.04 10 .638 2-22 .148 .909 1572 .785 .785 .764

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
 90 5.00 .25 6.00 .08 0.000 533.015 1 .868 3.9 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH EEE - 666 ** DESIGN MODE **

TOTAL
 PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
 SUB-CATCHMENT AREA 1.85 ha .00 ha .62 ha 2.47 ha
 75.0 % .0 % 25.0 % 100.0 %
 ACCUMULATED AREA 3.38 ha .00 ha 1.13 ha 4.51 ha
 75.0 % .0 % 25.0 % 100.0 %
 PAVED AREA TIME OF ENTRY PROVIDED = 10.0 min PEAK Q = .772 m3/s
 GRASSED AREA TIME OF ENTRY PROVIDED = 20.0 min PEAK Q = .179 m3/s
 LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 3475 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
 PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
 EEE_666 1.85 .00 .62 2.47 10 .772 2-22 .179 .909 1903 .951 1.715 1.674

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
 80 3.00 .25 6.00 .08 0.000 762.015 1 1.743 3.8 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH EEE - 555 ** DESIGN MODE **

TOTAL
 PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
 SUB-CATCHMENT AREA 1.22 ha .00 ha .41 ha 1.62 ha
 75.0 % .0 % 25.0 % 100.0 %
 ACCUMULATED AREA 4.60 ha .00 ha 1.53 ha 6.13 ha
 75.0 % .0 % 25.0 % 100.0 %
 PAVED AREA TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .576 m3/s
 GRASSED AREA TIME OF ENTRY PROVIDED = 15.0 min PEAK Q = .121 m3/s
 LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 4724 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
 PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
 EEE_555 1.22 .00 .41 1.62 7 .576 2-17 .121 .910 1249 .698 2.372 2.319

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
 H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
 85 3.00 .25 6.00 .08 0.000 914.015 1 2.832 4.3 0 0 0 .000
 (APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH EEE - 444

** DESIGN MODE **

	TOTAL			
	PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	1.17 ha	.00 ha	1.17 ha	2.34 ha
	50.0 %	.0 %	50.0 %	100.0 %
ACCUMULATED AREA	5.77 ha	.00 ha	2.70 ha	8.47 ha
	68.1 %	.0 %	31.9 %	100.0 %
PAVED AREA	TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .555 m3/s			
GRASSED AREA	TIME OF ENTRY PROVIDED = 15.0 min PEAK Q = .351 m3/s			
	LAG = 2.0 min			

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 6373 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH	AREAS (ha)	PAVED	GRASSED	C	VOL SURFACE	PIT PIPE
PAV	SUP GRAS	TOTAL TIME Q	TIME Q		Q Q Q	
EEE_444	1.17 .00	1.17 2.34	7 .555 2-17	.351 .831	1649 .905	3.224 3.132

LEN SLOPE	ORIGINAL	DESIGNED	CAP VEL	VOLUMES OFLOW
H B SS NO DIA nORk	NO DIA nORk	PAT Q	BYP UPW OFL Q	
120 3.00 .25 6.00 .08	0.000 991.015	1 3.513 4.6	0 0 0	.000

(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH EEE - 333

** DESIGN MODE **

	TOTAL			
	PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	.46 ha	.00 ha	1.82 ha	2.28 ha
	20.0 %	.0 %	80.0 %	100.0 %
ACCUMULATED AREA	6.22 ha	.00 ha	4.53 ha	10.75 ha
	57.9 %	.0 %	42.1 %	100.0 %
PAVED AREA	TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .216 m3/s			
GRASSED AREA	TIME OF ENTRY PROVIDED = 15.0 min PEAK Q = .547 m3/s			
	LAG = 2.0 min			

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 7797 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH	AREAS (ha)	PAVED	GRASSED	C	VOL SURFACE	PIT PIPE
PAV	SUP GRAS	TOTAL TIME Q	TIME Q		Q Q Q	
EEE_333	.46 .00	1.82 2.28	7 .216 2-17	.547 .737	1424 .763	3.895 3.806

LEN SLOPE	ORIGINAL	DESIGNED	CAP VEL	VOLUMES OFLOW
H B SS NO DIA nORk	NO DIA nORk	PAT Q	BYP UPW OFL Q	
120 4.00 .25 6.00 .08	0.000 991.015	1 4.057 5.3	0 0 0	.000

(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH EEE - 222

** DESIGN MODE **

	TOTAL			
	PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	.37 ha	.00 ha	1.47 ha	1.84 ha
	20.0 %	.0 %	80.0 %	100.0 %
ACCUMULATED AREA	6.59 ha	.00 ha	6.00 ha	12.59 ha
	52.4 %	.0 %	47.6 %	100.0 %
PAVED AREA	TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .175 m3/s			
GRASSED AREA	TIME OF ENTRY PROVIDED = 15.0 min PEAK Q = .441 m3/s			
	LAG = 2.0 min			

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 8947 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH	AREAS (ha)	PAVED	GRASSED	C	VOL SURFACE	PIT PIPE
PAV	SUP GRAS	TOTAL TIME Q	TIME Q		Q Q Q	

EEE_222 .37 .00 1.47 1.84 7 .175 2-17 .441 .737 1150 .616 4.421 4.326

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
95 2.00 .25 6.00 .08 0.000 1219.015 14.983 4.3 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH FFF - 555 ** DESIGN MODE **

TOTAL
PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
SUB-CATCHMENT AREA .94 ha .00 ha .31 ha 1.26 ha
75.0 % .0 % 25.0 % 100.0 %
ACCUMULATED AREA .94 ha .00 ha .31 ha 1.26 ha
75.0 % .0 % 25.0 % 100.0 %
PAVED AREA TIME OF ENTRY PROVIDED = 4.0 min PEAK Q = .521 m3/s
GRASSED AREA TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .134 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 972 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
FFF_555 .94 .00 .31 1.26 4 .521 2-9 .134 .910 972 .654 .654 .633

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
70 3.00 .25 6.00 .08 0.000 533.015 .672 3.0 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH FFF - 444 ** DESIGN MODE **

TOTAL
PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
SUB-CATCHMENT AREA 1.46 ha .00 ha .49 ha 1.95 ha
75.0 % .0 % 25.0 % 100.0 %
ACCUMULATED AREA 2.41 ha .00 ha .80 ha 3.21 ha
75.0 % .0 % 25.0 % 100.0 %
PAVED AREA TIME OF ENTRY PROVIDED = 4.0 min PEAK Q = .806 m3/s
GRASSED AREA TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .207 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 2477 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
FFF_444 1.46 .00 .49 1.95 4 .806 2-9 .207 .910 1505 1.013 1.646 1.596

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
85 3.30 .25 6.00 .08 0.000 762.015 1.829 4.0 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH FFF - 333 ** DESIGN MODE **

TOTAL
PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
SUB-CATCHMENT AREA 1.40 ha .00 ha .47 ha 1.87 ha
75.0 % .0 % 25.0 % 100.0 %
ACCUMULATED AREA 3.81 ha .00 ha 1.27 ha 5.08 ha
75.0 % .0 % 25.0 % 100.0 %
PAVED AREA TIME OF ENTRY PROVIDED = 4.0 min PEAK Q = .773 m3/s
GRASSED AREA TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .199 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 3920 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
FFF_333 1.40 .00 .47 1.87 4 .773 2-9 .199 .910 1443 .971 2.567 2.493

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORK NO DIA nORK PAT Q BY P UPW OFL Q
115 6.00 .25 6.00 .08 0.000 838 .015 3.177 5.8 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH FFF - 222 ** DESIGN MODE **

TOTAL
PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
SUB-CATCHMENT AREA 1.22 ha .00 ha .41 ha 1.62 ha
75.0 % .0 % 25.0 % 100.0 %
ACCUMULATED AREA 5.03 ha .00 ha 1.67 ha 6.70 ha
75.0 % .0 % 25.0 % 100.0 %
PAVED AREA TIME OF ENTRY PROVIDED = 5.0 min PEAK Q = .669 m3/s
GRASSED AREA TIME OF ENTRY PROVIDED = 8.0 min PEAK Q = .162 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 5169 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
FFF_222 1.22 .00 .41 1.62 5 .669 2-10 .162 .910 1250 .832 3.325 3.205

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORK NO DIA nORK PAT Q BY P UPW OFL Q
120 3.10 .25 6.00 .08 0.000 991 .015 3.571 4.6 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH FFF - 111 ** DESIGN MODE **

TOTAL
PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
SUB-CATCHMENT AREA .75 ha .00 ha .25 ha 1.00 ha
75.0 % .0 % 25.0 % 100.0 %
ACCUMULATED AREA 5.78 ha .00 ha 1.92 ha 7.70 ha
75.0 % .0 % 25.0 % 100.0 %
PAVED AREA TIME OF ENTRY PROVIDED = 5.0 min PEAK Q = .413 m3/s
GRASSED AREA TIME OF ENTRY PROVIDED = 8.0 min PEAK Q = .100 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 5941 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
FFF_111 .75 .00 .25 1.00 5 .413 2-10 .100 .910 771 .513 3.718 3.597

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORK NO DIA nORK PAT Q BY P UPW OFL Q
105 2.50 .25 6.00 .08 0.000 1067 .015 3.906 4.4 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

CONFLUENCE : BRANCH FFF TERMINATES - BRANCH EEE CONTINUES

REACH EEE - 111 ** DESIGN MODE **

TOTAL

PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	.88 ha	.00 ha	.10 ha
90.0 %	.0 %	10.0 %	100.0 %
ACCUMULATED AREA	13.25 ha	.00 ha	8.02 ha
62.3 %	.0 %	37.7 %	100.0 %
PAVED AREA	TIME OF ENTRY PROVIDED = 3.0 min PEAK Q = .486 m3/s		
GRASSED AREA	TIME OF ENTRY PROVIDED = 5.0 min PEAK Q = .049 m3/s		
	LAG = 2.0 min		

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 15683 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE
PAV	SUP GRAS	TOTAL	TIME Q	TIME Q	Q	Q	Q	Q
EEE_111	.88 .00 .10 .98	3	.486	2	-.7	.049	.957	795 .535 8.458 8.080

LEN SLOPE	ORIGINAL	DESIGNED	CAP VEL	VOLUMES OF FLOW
H B SS NO DIA nOrk NO DIA nOrk PAT Q	BYP	UPW	OFL	Q
230 3.00 .25 6.00 .08	0.000	1448 .015	9.658 5.9	0 0 0 .000

(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

CONFLUENCE : BRANCH EEE TERMINATES - BRANCH DDD CONTINUES

REACH DDD - 111 ** DESIGN MODE **

TOTAL			
PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	.60 ha	.00 ha	.03 ha
95.0 %	.0 %	5.0 %	100.0 %
ACCUMULATED AREA	17.54 ha	.00 ha	9.28 ha
65.4 %	.0 %	34.6 %	100.0 %
PAVED AREA	TIME OF ENTRY PROVIDED = 2.0 min PEAK Q = .330 m3/s		
GRASSED AREA	TIME OF ENTRY PROVIDED = 3.0 min PEAK Q = .016 m3/s		
	LAG = 2.0 min		

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 19996 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE
PAV	SUP GRAS	TOTAL	TIME Q	TIME Q	Q	Q	Q	Q
DDD_111	.60 .00 .03 .63	2	.330	2	-.5	.016	.973	519 .346 10.586 10.323

LEN SLOPE	ORIGINAL	DESIGNED	CAP VEL	VOLUMES OF FLOW
H B SS NO DIA nOrk NO DIA nOrk PAT Q	BYP	UPW	OFL	Q
135 3.00 .25 6.00 .08	0.000	1524 .015	11.070 6.1	0 0 0 .000

(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

CONFLUENCE : BRANCH DDD TERMINATES - BRANCH AAA CONTINUES

REACH AAA - 111 ** DESIGN MODE **

TOTAL			
PAVED	SUPPLEMENTARY	GRASSED	CONTRIBUTING
SUB-CATCHMENT AREA	.11 ha	.00 ha	.01 ha
95.0 %	.0 %	5.0 %	100.0 %
ACCUMULATED AREA	30.70 ha	.00 ha	14.10 ha
68.4 %	.0 %	31.4 %	99.9 %
PAVED AREA	TIME OF ENTRY PROVIDED = 1.0 min PEAK Q = .063 m3/s		
GRASSED AREA	TIME OF ENTRY PROVIDED = 3.0 min PEAK Q = .003 m3/s		
	LAG = 2.0 min		

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 33746 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH	AREAS (ha)	PAVED	GRASSED	C	VOL	SURFACE	PIT	PIPE
PAV	SUP GRAS	TOTAL	TIME Q	TIME Q	Q	Q	Q	Q

AAA_111 .11 .00 .01 .12 1 .063 2-5 .003 .969 99 .06616.08715.973

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
40 2.00 .25 6.00 .08 0.000 1981.015 18.190 5.9 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 30.000 m3/s), VOLUME STORED = 0 m3

REACH AAA - 000 ** DESIGN MODE **

TOTAL
PAVED SUPPLEMENTARY GRASSED CONTRIBUTING
SUB-CATCHMENT AREA .00 ha .00 ha .00 ha .00 ha
75.0 % .0 % 25.0 % 100.0 %
ACCUMULATED AREA 30.70 ha .00 ha 14.10 ha 44.80 ha
68.4 % .0 % 31.4 % 99.9 %
PAVED AREA TIME OF ENTRY PROVIDED = 4.0 min PEAK Q = .000 m3/s
GRASSED AREA TIME OF ENTRY PROVIDED = 7.0 min PEAK Q = .000 m3/s
LAG = 2.0 min

TOTAL FLOWS TO THIS POINT (SURFACE + PIPES) - VOLUME = 33746 m3

CIRCULAR PIPE, UNRESTRICTED, NO-OVERFLOW INLET

BCH RCH AREAS (ha) PAVED GRASSED C VOL SURFACE PIT PIPE
PAV SUP GRAS TOTAL TIME Q TIME Q Q Q Q
AAA_000 .00 .00 .00 .00 4 .000 2-9 .000 .741 0 .00015.97315.968

LEN SLOPE ORIGINAL DESIGNED CAP VEL VOLUMES OFLOW
H B SS NO DIA nORk NO DIA nORk PAT Q BYP UPW OFL Q
2 2.50 .25 6.00 .08 0.000 1981.015 20.337 6.6 0 0 0 .000
(APPROX. ROUTING WITH FLOW LIMITED TO 50.000 m3/s), VOLUME STORED = 0 m3

OUTFALL HYDROGRAPH (m3/s)

(27 VALUES AT 5.0 minute INTERVALS)

.000 .938 2.996 8.364 9.304 10.366 15.968 12.681 9.525 7.464
5.640 5.319 4.923 4.022 3.487 3.219 2.555 2.096 1.856 .990
.446 .213 .078 .027 .009 .002 .000

TOTAL AREA = 44.86 ha (30.70 ha PAVED, .00 ha SUPPLEMENTARY
14.10 ha GRASSED AND .06 ha UNDRAINED)

ACCUMULATED RUNOFF = 33746 m3

INCLUDING BASEFLOW = 0 m3

& USER HYDROGRAPHS = 0 m3

VOLUME DIVERTED OUT = 0 m3

OVERFLOWS IN TRANSIT = 0 m3 (NET)

RUNOFF COEFFICIENTS = .888 (VOLUMETRIC) BASED ONLY ON RAINFALL INPUTS
2.268 (PEAK/AVERAGE) AND .646 (PEAK/PEAK)

INCL. USER-PROVIDED HYDROGRAPHS, BUT NOT BASEFLOWS

NO. OF PIPES = 27

PEAK FLOWRATE = 15.968 m3/s 35.0 minutes AFTER START OF STORM

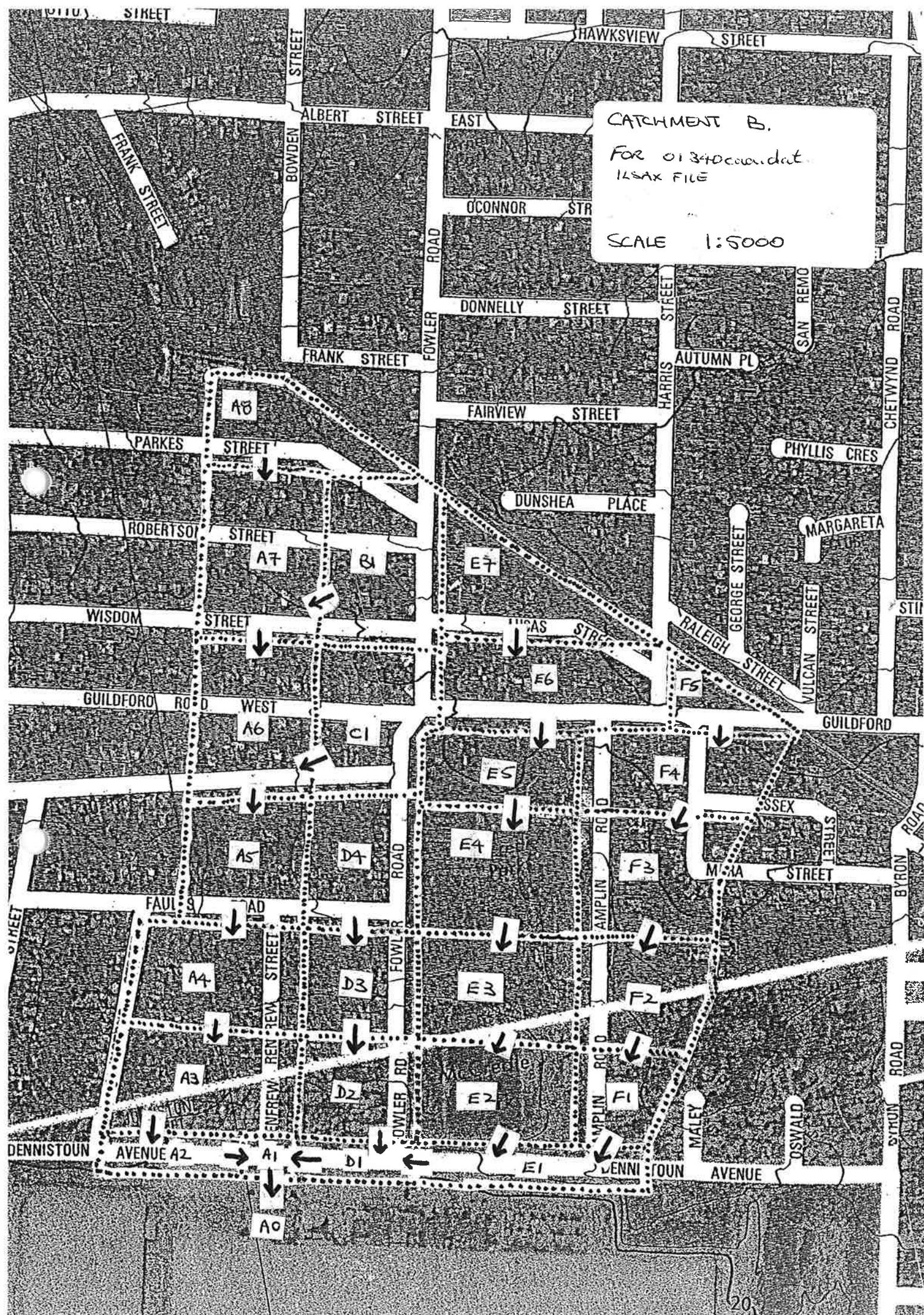
TOTAL BASEFLOW = .000 m3/s

GRASSED RUNOFF = 23.8 %

CATCHMENT B.

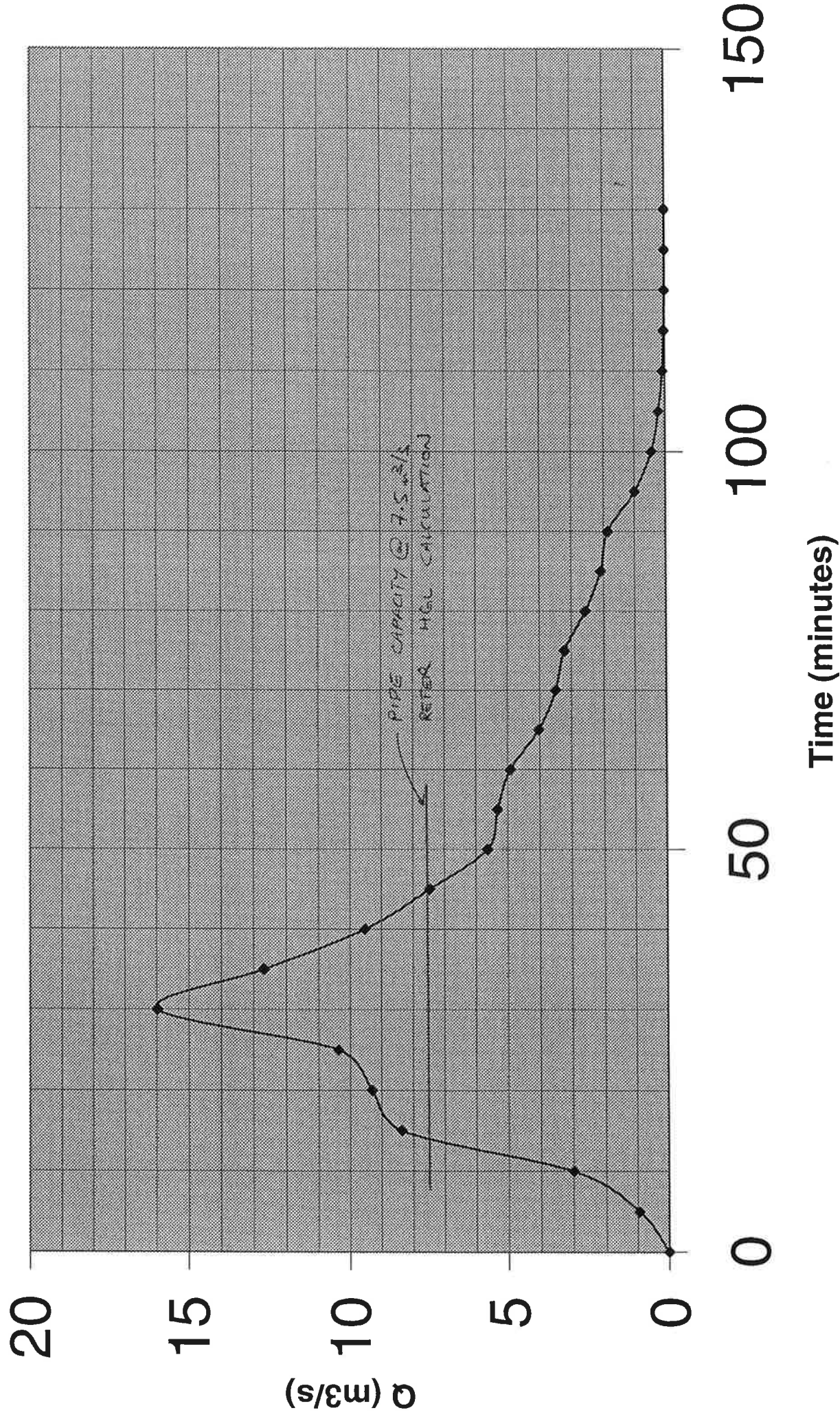
For 01340 coordinate
ILSAX FILE

SCALE 1:5000



Renfrew/Dennistoun Outfall Hydrograph

Q_{max} 15.968 m³/s 1/12/00/R



DESIGN CALCULATIONS OF THE INLET CAPACITIES FOR THE PROPOSED INLET PITS ON DENNISTOUN AVENUE SMITHFIELD



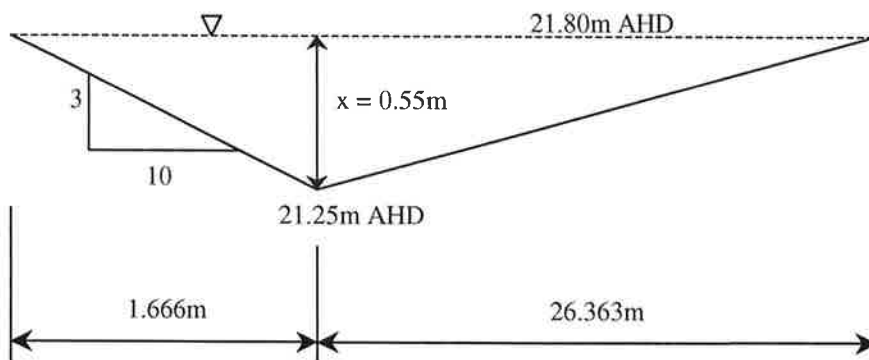
PONDING LEVEL FOR OVERFLOW AT DENNISTOUN/RENFREW

Total Flow to Dennistoun Avenue/Renfrew Street = $15.973\text{m}^3/\text{s}$

Existing 1500mm ϕ pipe capacity = $7.5\text{m}^3/\text{s}$

Overflow into site = $8.473\text{m}^3/\text{s}$

Taking a critical cross section - try TWL 21.80m AHD



$n = 0.023$ (combine driveway and grass)

$S = 0.005$

$A = 7.007\text{m}^2$

$P = 28.107\text{m}$

Using Manning's Equation

$$Q = \frac{1}{n} A R^{2/3} S^{1/2}$$
$$= 8.53\text{m}^3/\text{s}$$

Therefore 1 in 100 year flood level in this region is 21.80m AHD

PIT INLET CAPACITY CHECK FOR PORPOSED PITS ON DENNISTOUN AVENUE

Total Flow to Dennistoun Avenue/Renfrew Street = $15.973\text{m}^3/\text{s}$

Existing 1500mm ϕ pipe capacity = $7.5\text{m}^3/\text{s}$

Overflow into site = $8.473\text{m}^3/\text{s}$

PIT 1

1800mm x 750mm

$$A = 1.35\text{m}^2$$

Open area of grate – 80% = 1.08m^2

Top of grate level 21.13m AHD

Ponding level for (1 in 100year) = 21.80m AHD

$$h = 0.67\text{m}$$

$$\text{inlet capacity} \quad Q = 0.67 A (2gh)^{0.5} \quad \text{AR\& R 1987}$$

$$Q = 2.243\text{m}^3/\text{s}$$

PIT 2

5400mm x 750mm

$$A = 4.05\text{m}^2$$

$$80\% = 3.24\text{m}^2$$

Top of grate level = 21.30m AHD

$$h = 0.5\text{m}$$

$$\text{inlet capacity} \quad Q = 0.67 A (2gh)^{0.5} \quad \text{AR\& R 1987}$$

$$Q = 6.799\text{m}^3/\text{s}$$

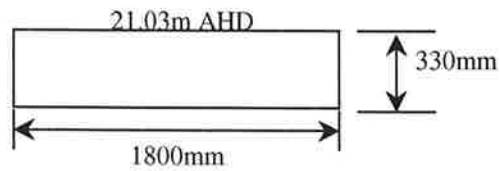
Total inlet capacity = $9.042\text{m}^3/\text{s} > 8.5\text{m}^3/\text{s}$ (overflow)

PIT INLET CAPACITY CHECK FOR THROTTLE INSIDE PIT ON DENNISTOUN AVENUE

PIT 1

Available area 1800mm x 330mm

$$A = 0.594\text{m}^2$$



Available head $21.80\text{m} - 21.03\text{m} = 0.77\text{m}$

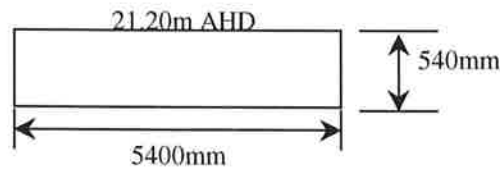
Using Manual of Hydraulics of Precast Concrete Conduits Figure 3.6 (attached)

Discharge Capacity = $1.8\text{m}^3/\text{s}$

PIT 2

Available area = 5400mm x 540mm

$$A = 2.916\text{m}^2$$



Available head = $21.80\text{m} - 21.20\text{m} = 0.6\text{m}$

From Figure 3.6 (attached)

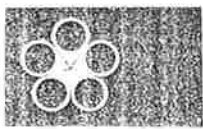
Discharge capacity = $8.3\text{m}^3/\text{s}$

Therefore capture capacity of

PIT 1 = $1.8\text{m}^3/\text{s}$ (Throttle govern)

PIT 2 = $6.8\text{m}^3/\text{s}$ (Grate govern)

Total Capture capacity = $1.8 + 6.8 = 8.6\text{m}^3/\text{s} > 8.473\text{m}^3/\text{s}$

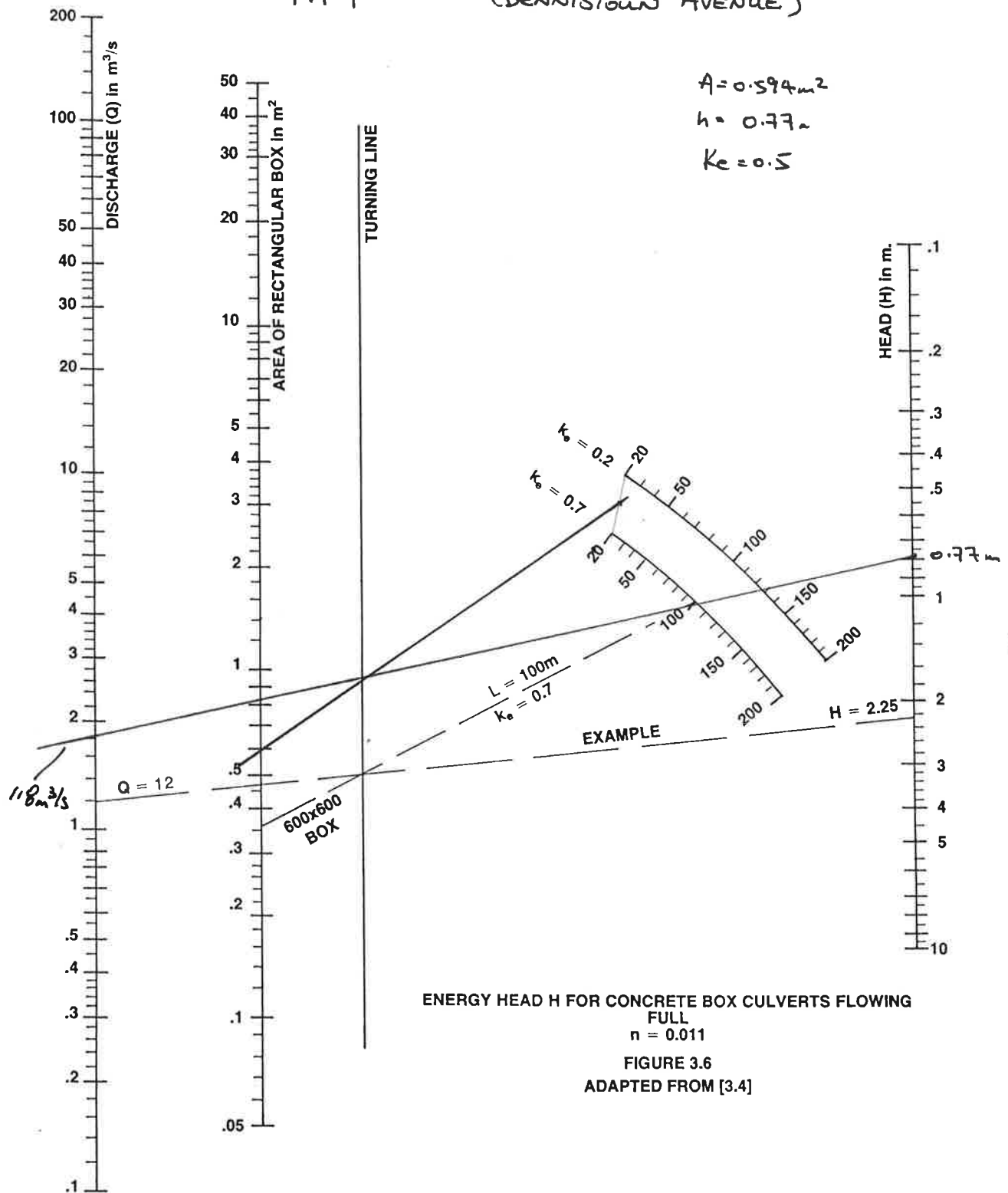


YENNORA DISTRIBUTION PARK

02/0083

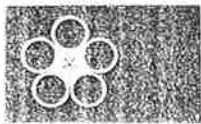
PIT 1

(DENNISTOWN AVENUE)



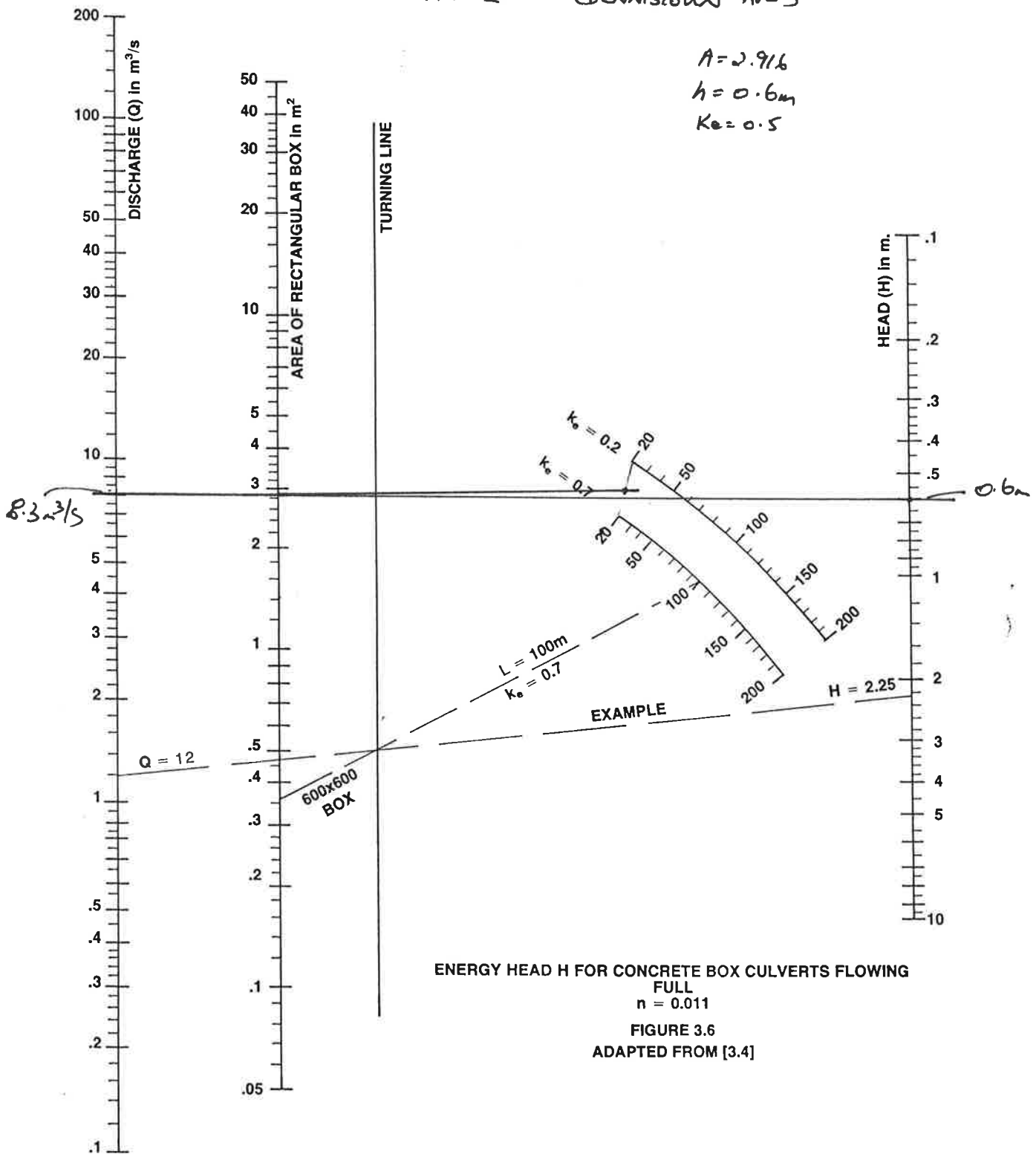
NOTE:

- For a different value of n , use the length scale shown with an adjusted length $L_1 = L(n_1/n)^2$
- For a different value of k_e connect the given length on adjacent scales by a straight line and select a point on this line spaced from the two chart scales in proportion to the k_e values.



YENNORA DISTRIBUTION PARK 02/0083

INLET PIT 2 (DENNISTOWN AVE)



NOTE:

- For a different value of n , use the length scale shown with an adjusted length $L_1 = L(n_1/n)^2$
- For a different value of K_e connect the given length on adjacent scales by a straight line and select a point on this line spaced from the two chart scales in proportion to the K_e values.

Hydraulic Grade Line Calculations

For

Proposed Pipe System

From

Dennistoun Avenue

To

Swale Drain



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Hydraulic Grade Line Checking Sheet

DRAINAGE SYSTEM

Job No. 02/0083 17-May-02

Yennora Distribution Park - Dennistoun Avenue, Smithfield
Proposed pipe system to convey stormwater from Dennistoun Avenue to new stormwater swale drain

Pit	d/s Length L (m)	Des Flow Q m ³ /sec	Pipe Dia D (m)	Full Vel V (m/s)	V ² /2g (m)	Pipe frict Sf (m/m)	Pipe Loss Sf.L (m)	Pit Coeff Ku	Pit Loss (m)	Total loss	Pipe inv at pit (m AHD)	Pipe Obvt at pit (m AHD)	D/S HGL (m AHD)	Pit HGL (m AHD)	Pit Cover level (m AHD)	Free Board at Pit (m)	Pit
1	70.000	4.250	1.050	4.908	1.228	0.009	0.627	1.3	1.572	2.198	19.330	20.380	18.980	21.178	21.300	0.122	1
2	28.000	1.800	1.050	2.079	0.220	0.003	0.097	1.5	0.330	0.427	19.650	20.700	21.178	21.605	21.130	-0.475	2

NOTE:

The 1 in 100year flood level (pond level) is 21.80m at the intersection of Renfrew/Dennistoun.
Therefore the pond level is 670mm above pit 2 grate level and 500mm above pit 2 grate level.
Therefore a negative freeboard of 475mm is satisfactory for the system to convey the flow to swale.

Dual pipe 1050mm, flow is half the total flow

HEC – RAS

COMPUTER MODEL

OF

PROPOSED SWALE DRAIN

WITH

1 IN 100 YEAR FLOW

PROPOSED SWALE DRAIN - YENNORA DISTRIBUTION PAAK 02/0083



1

4

New Channel

3

2

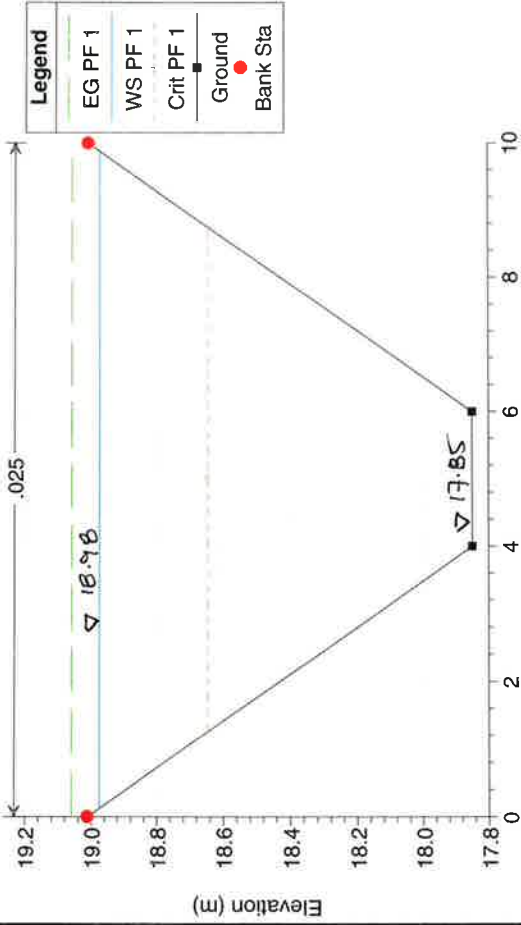
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5

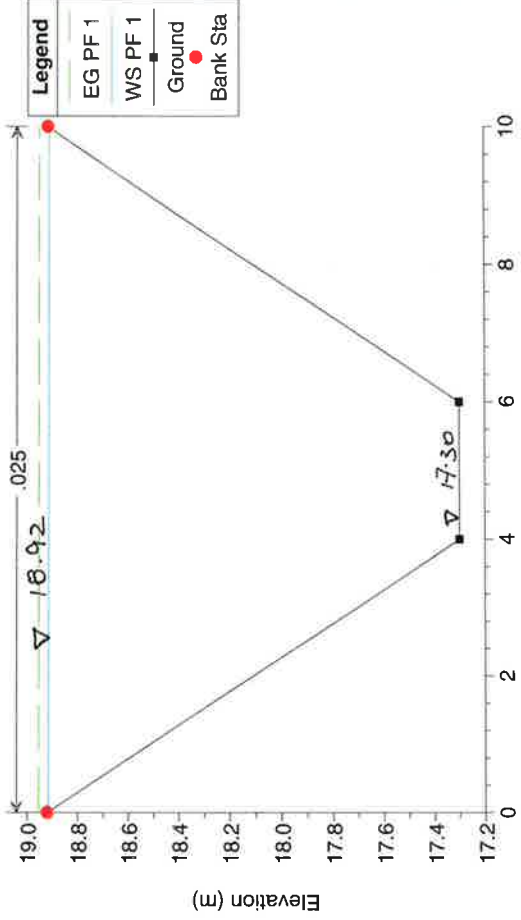
6

PROPOSED SWALE DRAIN - YENNORA DISTRIBUTION PARK 02/0083

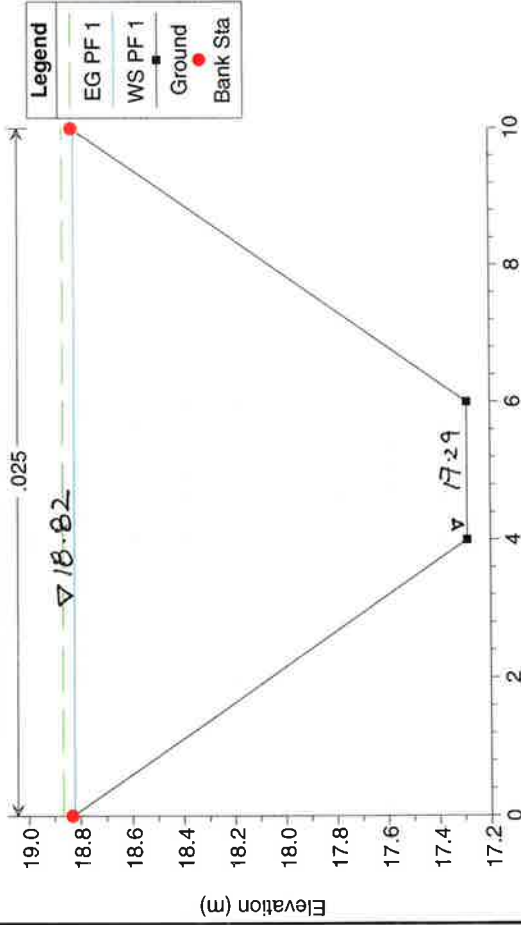
RS7 Yennora Distribution Centre Plan 04 5/22/02



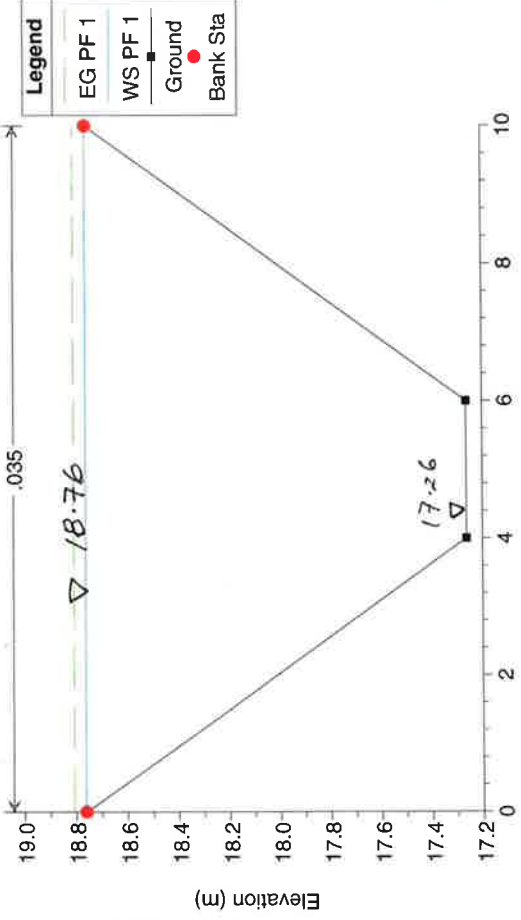
RS6 Yennora Distribution Centre Plan 04 5/22/02



RS5 Yennora Distribution Centre Plan 04 5/22/02



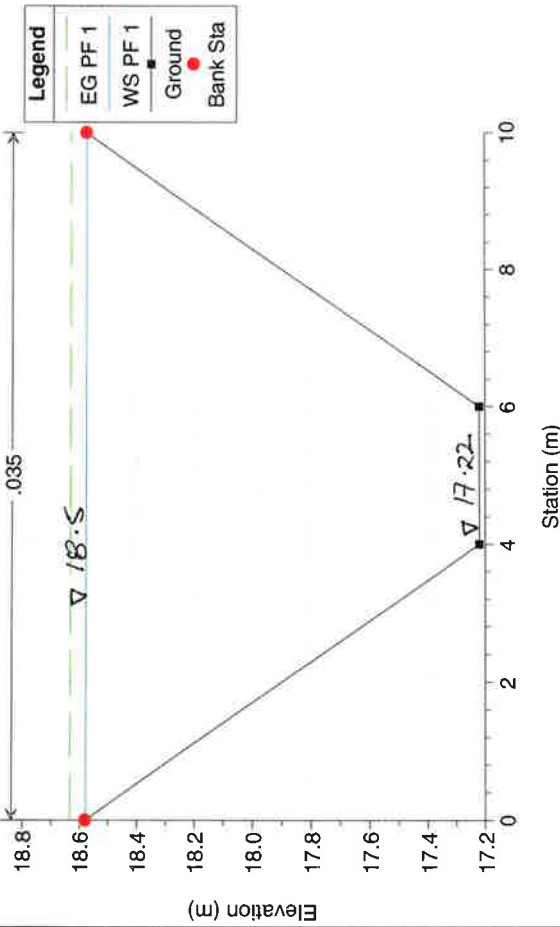
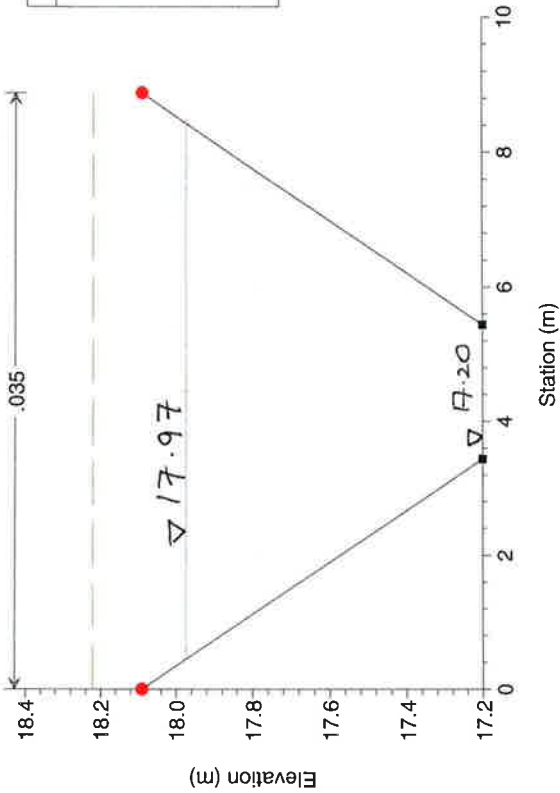
RS4 Yennora Distribution Centre Plan 04 5/22/02



PROPOSED SWALE DRAIN - YENNORA DISTRIBUTION PARK 02/0083

RS 2 Yennora Distribution Centre Plan 04 5/22/02

RS 3 Yennora Distribution Centre Plan 04 5/22/02



RS 1 Yennora Distribution Centre Plan 04 5/22/02

