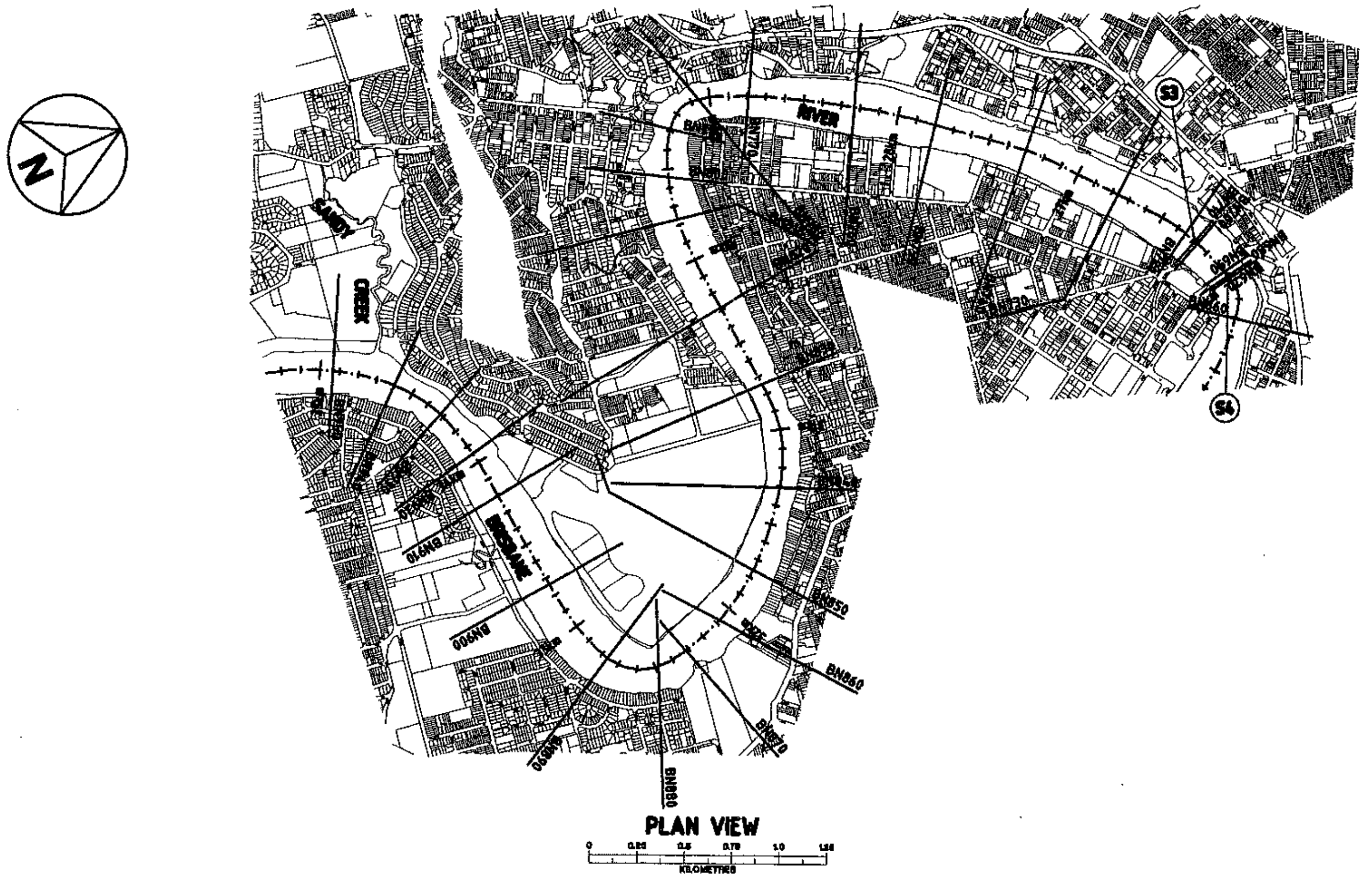
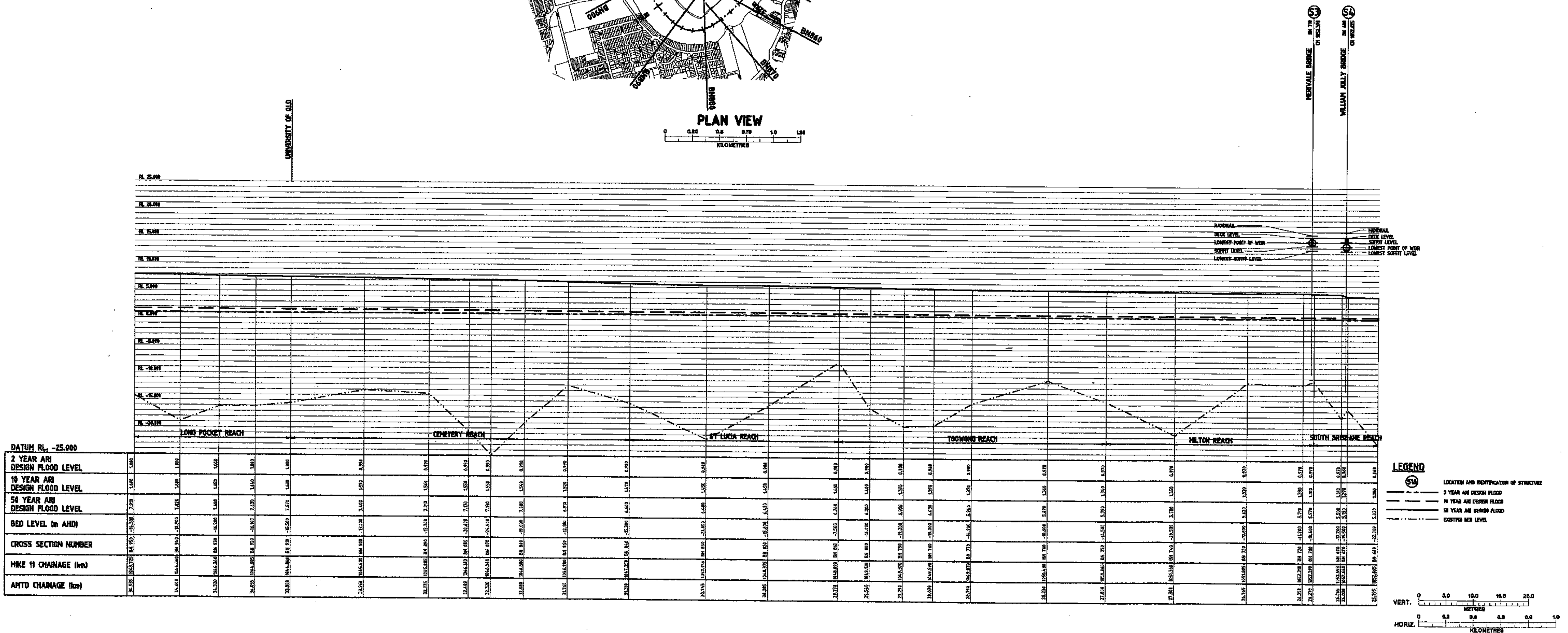
SINCLAIR KNIGHT MERZ

FIGURE J-2f

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS - REGULATION LINES AND REVEGETATION STRATEGY CASE



PLAN VIEW



DATUM RL. -25.000

2 YEAR ARI DESIGN FLOOD LEVEL	1.080	1.000	1.000	1.000	1.000	0.990	0.990	0.990	0.990	0.990	0.990	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.960	0.960
10 YEAR ARI DESIGN FLOOD LEVEL	1.690	1.680	1.650	1.640	1.630	1.590	1.560	1.550	1.550	1.540	1.520	1.470	1.450	1.450	1.440	1.400	1.390	1.390	1.370	1.360	1.340	1.350	1.320	1.330	1.310	1.310	1.290	1.290
50 YEAR ARI DESIGN FLOOD LEVEL	7.910	7.620	7.480	7.630	7.570	7.400	7.210	7.170	7.130	7.080	6.910	6.680	6.480	6.430	6.240	6.200	6.050	6.030	5.940	5.890	5.790	5.780	5.620	5.710	5.570	5.500	5.530	5.030
BED LEVEL (m AHD)	-16.380	-18.900	-16.200	-16.100	-15.500	-13.100	-13.700	-20.600	-24.900	-19.000	-12.100	-15.300	-21.800	-15.600	-7.500	-16.000	-19.200	-19.000	-16.900	-10.600	-14.500	-26.500	-10.800	-11.200	-10.400	-17.200	-15.500	-22.000
CROSS SECTION NUMBER	BN 950	BN 940	BN 930	BN 920	BN 910	BN 900	BN 890	BN 880	BN 870	BN 860	BN 850	BN 840	BN 830	BN 820	BN 810	BN 800	BN 790	BN 780	BN 770	BN 760	BN 750	BN 740	BN 730	BN 720	BN 700	BN 690	BN 670	BN 660
MIKE 11 CHAINAGE (km)	1043.725	1044.060	1044.340	1044.605	1044.860	1045.400	1045.885	1046.180	1046.340	1046.580	1046.900	1047.350	1047.915	1048.375	1048.890	1049.120	1049.370	1049.590	1049.870	1050.430	1050.860	1051.360	1051.895	1052.310	1052.390	1052.595	1052.640	1052.865
AMTD CHAINAGE (km)	34.935	34.600	34.320	34.055	33.800	33.260	32.775	32.480	32.320	32.080	31.760	31.310	30.745	30.285	29.770	29.540	29.290	29.070	28.790	28.230	27.800	27.300	26.765	26.350	26.270	26.065	26.020	25.795

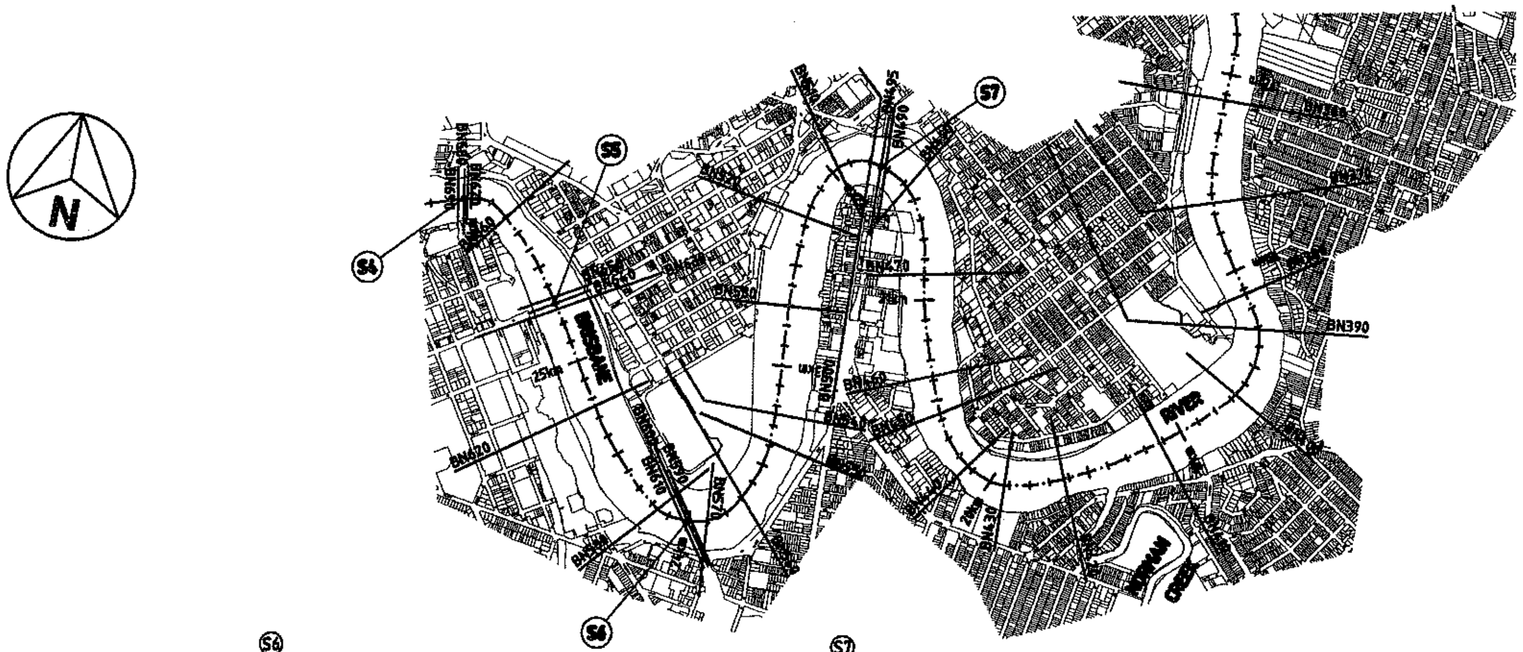
BRISBANE RIVER - BN 950 TO BN 660

FILL NAME: 415.
PLOT SCALE: 1=30
DISK N: C:\DWG
JOB N: T004
DATE: 23/3/

SINCLAIR KNIGHT MERZ

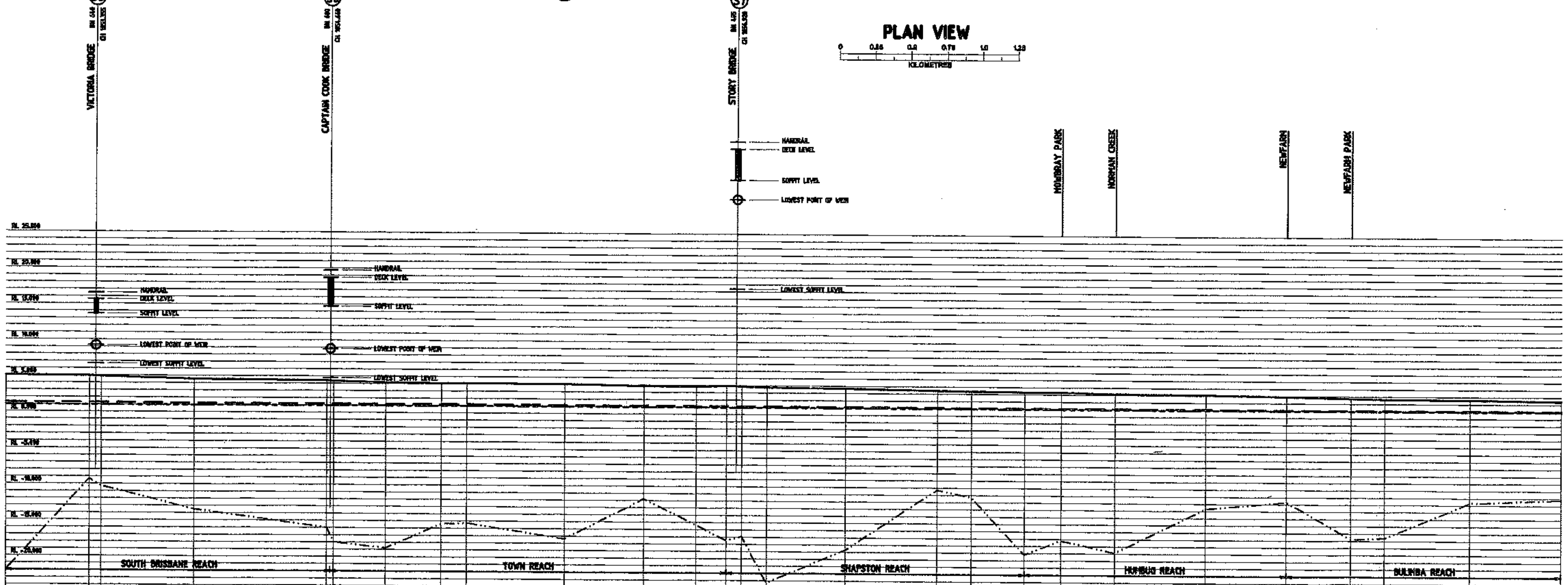
FIGURE J-2g

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS - REGULATION LINES AND REVEGETATION STRATEGY CASE



PLAN VIEW

0 0.25 0.5 0.75 1.0 1.25
KILOMETRES



DATUM RL. -25.000

2 YEAR ARI DESIGN FLOOD LEVEL	0.960	0.960	0.960	0.950	0.950	0.950	0.950	0.950	0.950
10 YEAR ARI DESIGN FLOOD LEVEL	1.280	1.270	1.260	1.210	1.190	1.180	1.160	1.160	1.160
50 YEAR ARI DESIGN FLOOD LEVEL	5.030	4.950	4.590	4.514	4.420	4.340	4.150	4.110	4.090
BED LEVEL (m AHD)	-22.000	-9.300	-10.300	-13.504	-16.000	-18.000	-18.800	-15.400	-15.300
CROSS SECTION NUMBER	BN 660	BN 650	BN 634	BN 620	BN 610	BN 599	BN 560	BN 550	BN 540
MIKE 11 CHAINAGE (km)	1052.885	1053.300	1053.385	1053.940	1054.440	1054.484	1054.970	1055.280	1055.424
AMTD CHAINAGE (km)	25.795	25.340	25.295	24.760	24.020	23.980	23.690	23.380	23.260

2 YEAR ARI DESIGN FLOOD LEVEL	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
10 YEAR ARI DESIGN FLOOD LEVEL	1.150	1.140	1.130	1.140	1.150	1.120	1.120	1.100	1.090
50 YEAR ARI DESIGN FLOOD LEVEL	4.050	3.860	3.870	3.950	3.880	3.770	3.670	3.470	3.460
BED LEVEL (m AHD)	-17.400	-11.800	-15.100	-17.500	-16.900	-23.300	-18.700	-10.300	-11.300
CROSS SECTION NUMBER	BN 530	BN 520	BN 510	BN 500	BN 490	BN 480	BN 470	BN 460	BN 450
MIKE 11 CHAINAGE (km)	1055.940	1056.400	1056.695	1056.845	1056.950	1057.090	1057.530	1058.040	1058.230
AMTD CHAINAGE (km)	22.700	22.260	21.965	21.795	21.710	21.570	21.150	20.620	20.430

2 YEAR ARI DESIGN FLOOD LEVEL	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940
10 YEAR ARI DESIGN FLOOD LEVEL	1.090	1.090	1.070	1.070	1.050	1.040	1.030	1.030	1.020
50 YEAR ARI DESIGN FLOOD LEVEL	3.390	3.300	3.130	3.090	2.920	2.740	2.650	2.610	2.640
BED LEVEL (m AHD)	-19.200	-17.200	-18.900	-12.700	-11.700	-16.800	-16.600	-11.700	-11.200
CROSS SECTION NUMBER	BN 440	BN 430	BN 420	BN 410	BN 400	BN 390	BN 380	BN 370	BN 360
MIKE 11 CHAINAGE (km)	1058.530	1058.735	1059.035	1059.540	1059.994	1060.345	1060.535	1061.015	1061.530
AMTD CHAINAGE (km)	20.130	19.925	19.625	19.120	18.670	18.315	18.125	17.645	17.130

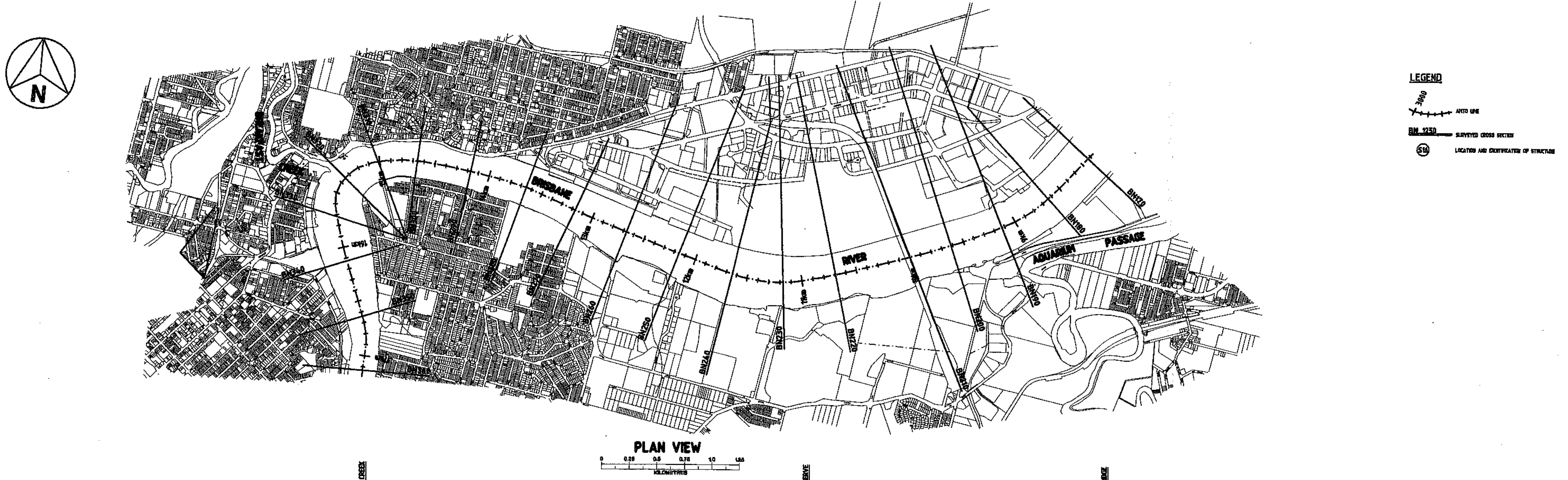
BRISBANE RIVER - BN 660 TO BN 360

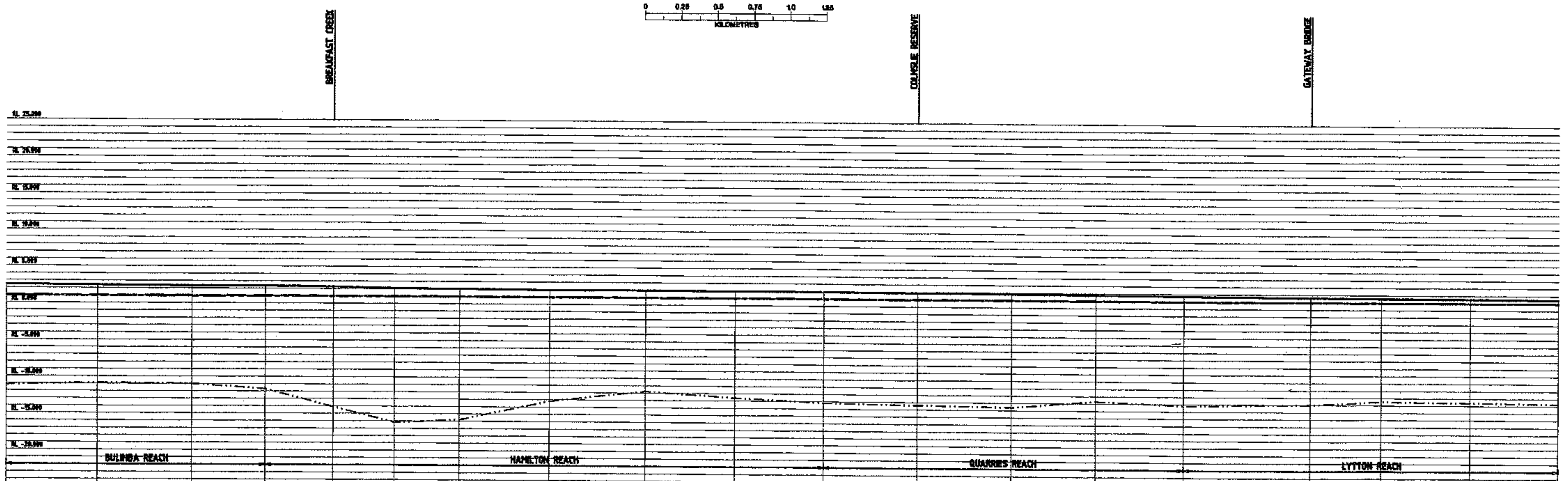
FILE NAME: 41
PLOT SCALE: 1=30
DISK No: C:\DWG
JOB No: T00457
DATE: 23/3/

SINCLAIR KNIGHT MERZ

FIGURE J-2h

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS - REGULATION LINES AND REVEGETATION STRATEGY CASE





DATUM RL. -25.000

2 YEAR ARI DESIGN FLOOD LEVEL	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.930	0.930
10 YEAR ARI DESIGN FLOOD LEVEL	1.020	1.010	1.010	1.010	1.000	0.990	0.990	0.980	0.980	0.980	0.980	0.980	0.970	0.970	0.960	0.960	0.950	0.950	0.950
50 YEAR ARI DESIGN FLOOD LEVEL	2.440	2.400	2.360	2.350	2.280	2.060	2.040	1.950	1.940	1.930	1.950	1.900	1.860	1.780	1.710	1.590	1.550	1.510	1.460
BED LEVEL (m AHD)	-11.200	-10.900	-11.000	-11.700	-14.100	-16.200	-15.800	-13.200	-11.800	-12.600	-13.200	-13.400	-13.600	-12.700	-13.200	-13.000	-12.500	-12.600	-12.700
CROSS SECTION NUMBER	BN 364	BN 350	BN 340	BN 330	BN 320	BN 310	BN 300	BN 290	BN 280	BN 270	BN 260	BN 250	BN 240	BN 230	BN 220	BN 210	BN 200	BN 190	BN 180
MIKE 11 CHAINAGE (km)	1041.530	1042.020	1042.535	1042.940	1043.310	1043.645	1044.000	1044.490	1045.010	1045.503	1045.990	1046.505	1047.020	1047.485	1047.965	1048.660	1049.045	1049.535	1050.025
AMTD CHAINAGE (km)	17.130	16.640	16.125	15.720	15.350	15.015	14.660	14.170	13.650	13.157	12.670	12.155	11.640	11.175	10.695	10.000	9.615	9.125	8.635

BRISBANE RIVER - BN 360 TO BN 180

LEGEND

- S16 LOCATION AND IDENTIFICATION OF STRUCTURE
- 2 YEAR ARI DESIGN FLOOD
- 10 YEAR ARI DESIGN FLOOD
- 50 YEAR ARI DESIGN FLOOD
- EXISTING BED LEVEL

VERT. 0 5.0 10.0 15.0 20.0 METRES

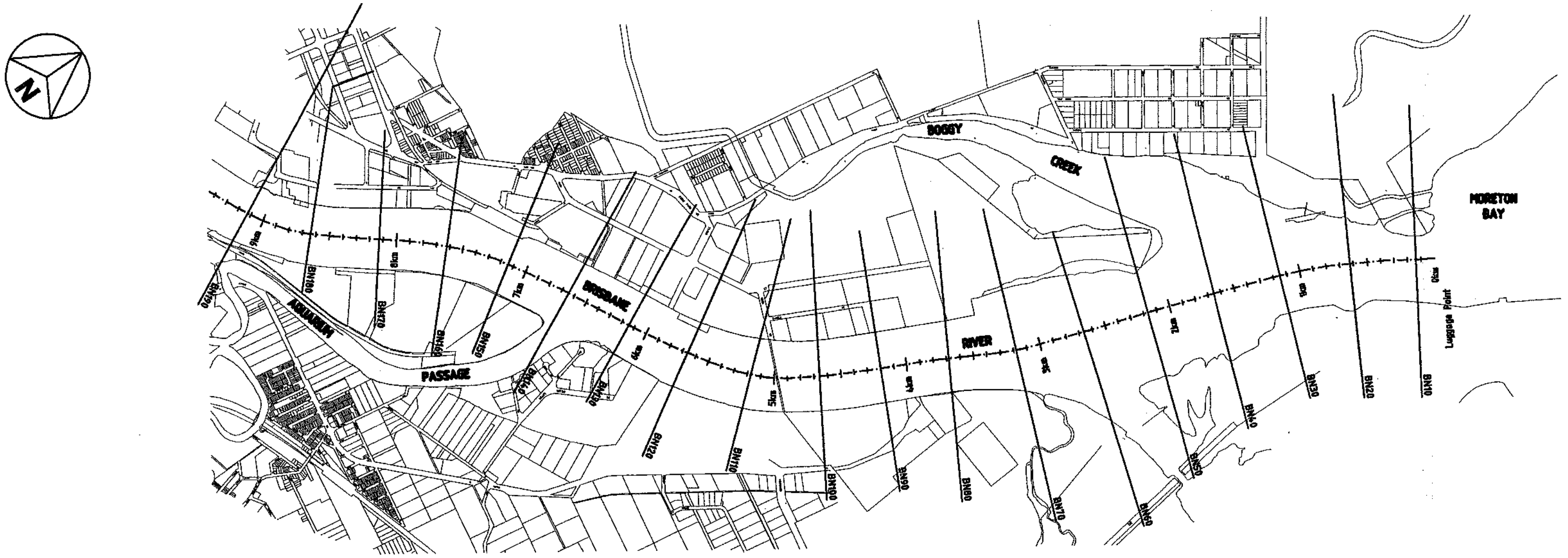
HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

FILE NAME: 415/-1/2
PLOT SCALE: 1=30
DISK N°: C:\DWG
JOB N°: T00415/
DATE: 23/3/97

FIGURE J-2i

SINCLAIR KNIGHT MERZ

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS - REGULATION LINES AND REVEGETATION STRATEGY CASE



PLAN VIEW

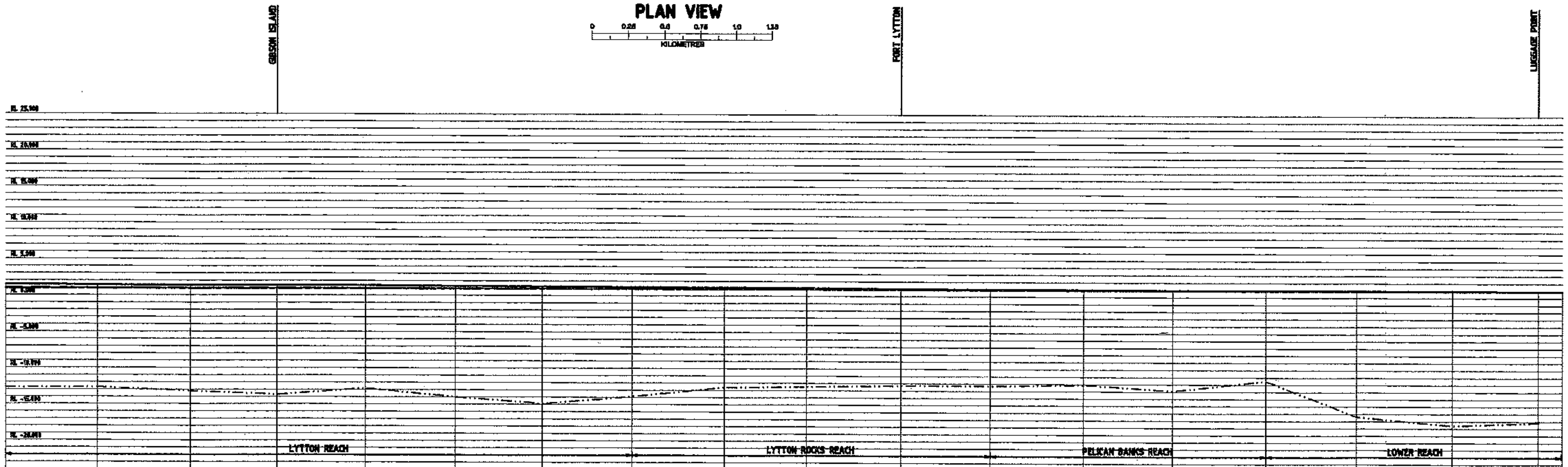
0 0.25 0.5 0.75 1.0 1.25
KILOMETRES

LEGEND

3000 AMTD LINE

BN 1250 SURVEYED CROSS SECTION

(S16) LOCATION AND IDENTIFICATION OF STRUCTURE



DATUM RL. -25.000

2 YEAR ARI DESIGN FLOOD LEVEL	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920
10 YEAR ARI DESIGN FLOOD LEVEL	0.950	0.950	0.940	0.940	0.940	0.940	0.940	0.930	0.930	0.930	0.930	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920
50 YEAR ARI DESIGN FLOOD LEVEL	1.460	1.400	1.340	1.370	1.350	1.270	1.250	1.180	1.140	1.100	1.020	1.000	1.010	0.940	0.950	0.950	0.940	0.920	0.930
BED LEVEL (m AHD)	-12.700	-12.700	-13.200	-13.700	-12.800	-14.000	-14.900	-13.900	-12.600	-12.500	-12.300	-12.300	-12.100	-12.900	-11.500	-16.400	-17.650	-17.200	
CROSS SECTION NUMBER	BN 180	BN 170	BN 160	BN 150	BN 140	BN 130	BN 120	BN 110	BN 100	BN 90	BN 80	BN 70	BN 60	BN 50	BN 40	BN 30	BN 20	BN 10	
MIKE 11 CHAINAGE (km)	1070.025	1070.530	1071.040	1071.520	1072.015	1072.515	1072.995	1073.485	1074.000	1074.460	1074.985	1075.480	1076.000	1076.495	1077.010	1077.510	1078.040	1078.525	1078.660
AMTD CHAINAGE (km)	8.435	8.130	7.620	7.140	6.645	6.145	5.665	5.175	4.660	4.200	3.675	3.180	2.660	2.165	1.650	1.150	0.620	0.135	0

BRISBANE RIVER - BN 180 TO BN 10

LEGEND

(S16) LOCATION AND IDENTIFICATION OF STRUCTURE
2 YEAR ARI DESIGN FLOOD
10 YEAR ARI DESIGN FLOOD
50 YEAR ARI DESIGN FLOOD
EXISTING BED LEVEL

VERT. 0 5.0 10.0 15.0 20.0 METRES

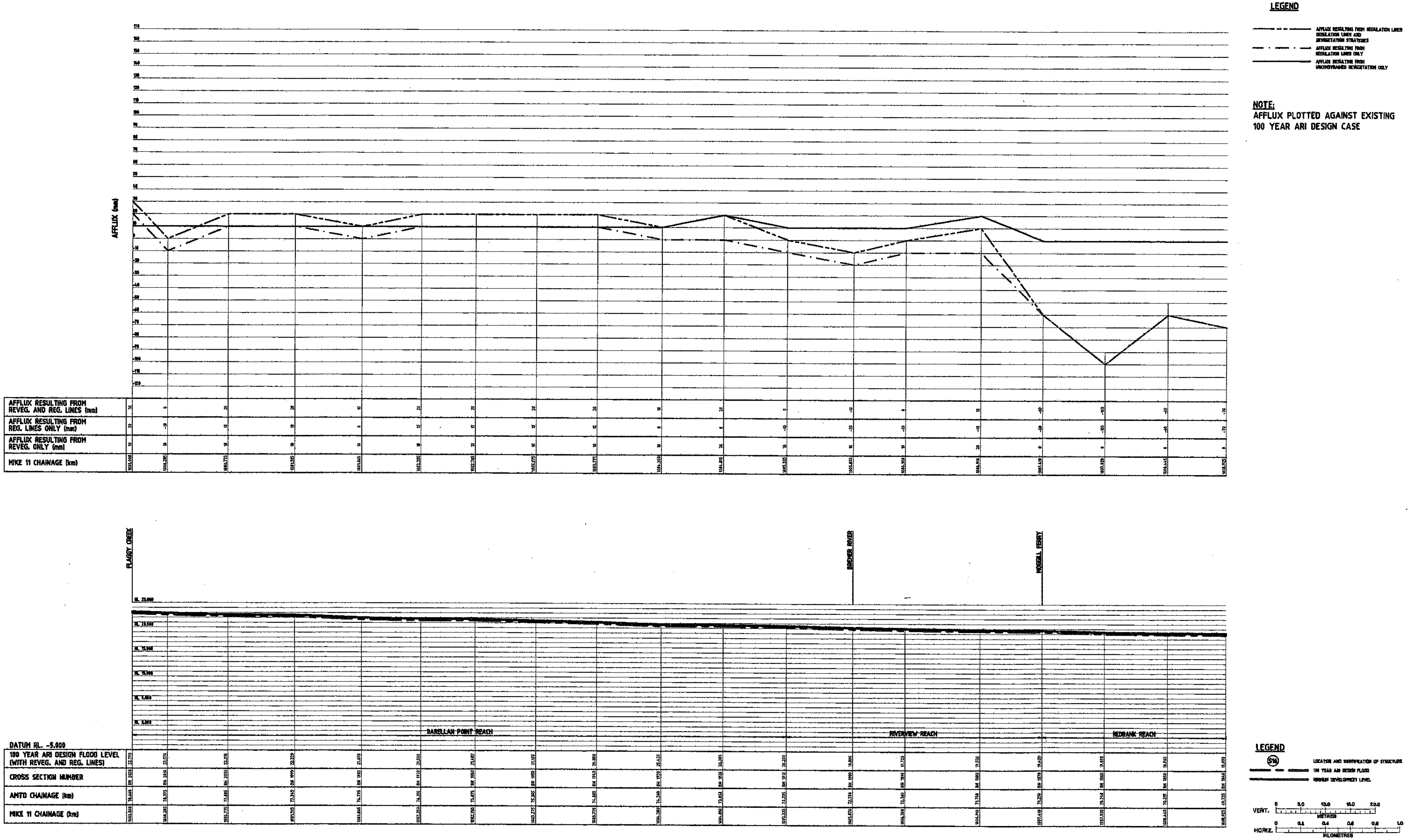
HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

FILE NAME: 415... PLOT SCALE: 1=30
DISK N: C:\DWG
JOB N: T004...
DATE: 23/3/...

FIGURE J-3a

BRISBANE RIVER FLOOD STUDY

AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS - REGULATION LINES AND REVEGETATION STRATEGY CASE



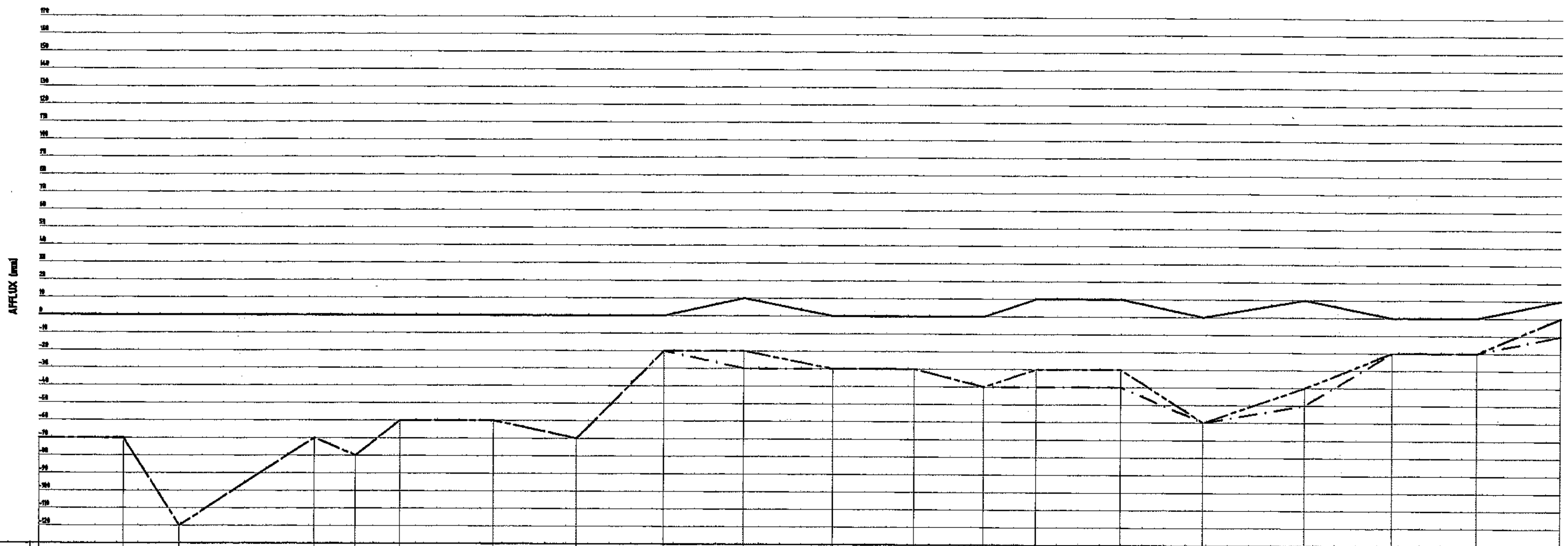
NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE

BRISBANE RIVER - BN 2020 TO BN 1840

SINCLAIR KNIGHT MERZ

FIGURE J-3b

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE

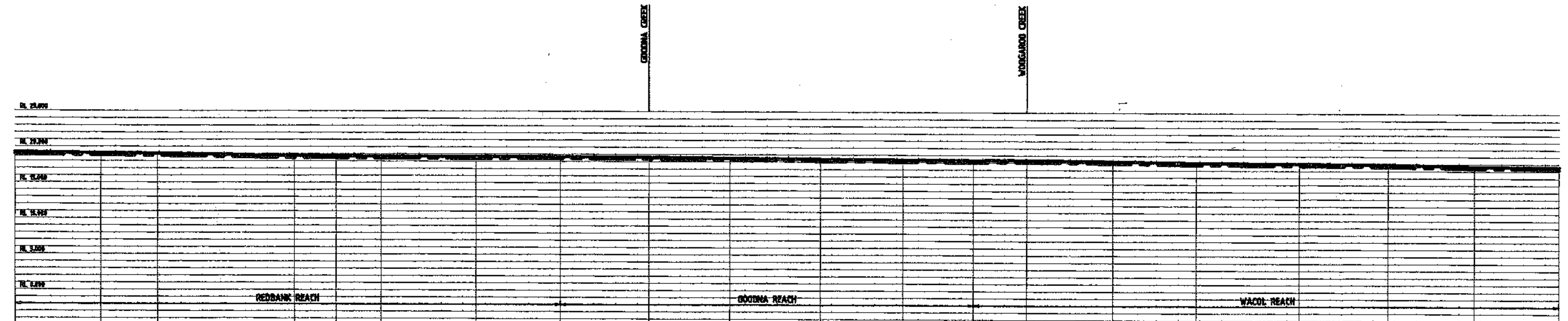


LEGEND

- – – – AFFLUX RESULTING FROM REGULATION LINES AND REVEGETATION STRATEGIES
- – · – · AFFLUX RESULTING FROM REGULATION LINES ONLY
- —— AFFLUX RESULTING FROM UNCONSTRAINED REVEGETATION ONLY

NOTE:
AFFLUX PLOTTED AGAINST EXISTING
100 YEAR ARI DESIGN CASE

AFFLUX RESULTING FROM REVEG. AND REG. LINES (mm)	-70	-70	-120	-70	-80	-60	-60	-70	-20	-20	-30	-30	-40	-30	-30	-60	-40	-20	-20	0
AFFLUX RESULTING FROM REG. LINES ONLY (mm)	-70	-70	-120	-70	-80	-60	-60	-70	-20	-30	-30	-30	-40	-40	-40	-60	-50	-20	-20	-10
AFFLUX RESULTING FROM REVEG. ONLY (mm)	0	0	0	0	0	0	0	0	0	10	0	0	0	10	10	0	10	0	0	10
MIKE 11 CHAINAGE (km)	1008.925	1009.440	1009.730	1010.490	1010.725	1010.980	1011.510	1011.980	1012.475	1012.935	1013.445	1013.910	1014.330	1014.610	1015.090	1015.560	1016.140	1016.640	1017.130	1017.610



DATUM RL. -5.000

100 YEAR ARI DESIGN FLOOD LEVEL (WITH REVEG. AND REG. LINES)	18.890	18.790	18.730	18.630	18.440	18.380	18.370	18.360	18.310	18.200	18.110	18.050	18.010	18.050	17.910	17.750	17.670	17.600	17.570	17.250
CROSS SECTION NUMBER	BN 1840	BN 1830	BN 1820	BN 1810	BN 1800	BN 1790	BN 1780	BN 1770	BN 1760	BN 1750	BN 1740	BN 1730	BN 1720	BN 1710	BN 1700	BN 1690	BN 1680	BN 1670	BN 1660	BN 1650
AMTD CHAINAGE (km)	69.735	69.260	68.840	68.170	67.935	67.460	67.150	66.480	66.185	65.725	65.215	64.760	64.550	64.050	63.570	63.100	62.520	62.020	61.530	61.050
MIKE 11 CHAINAGE (km)	1008.925	1009.400	1009.720	1010.490	1010.725	1010.980	1011.510	1011.980	1012.475	1012.935	1013.445	1013.910	1014.310	1014.610	1015.090	1015.540	1016.140	1016.640	1017.130	1017.610

BRISBANE RIVER - BN 1840 TO BN 1650

LEGEND

- 510 LOCATION AND IDENTIFICATION OF STRUCTURE
- – – – 100 YEAR ARI DESIGN FLOOD
- ━━━ MINIMUM DEVELOPMENT LEVEL

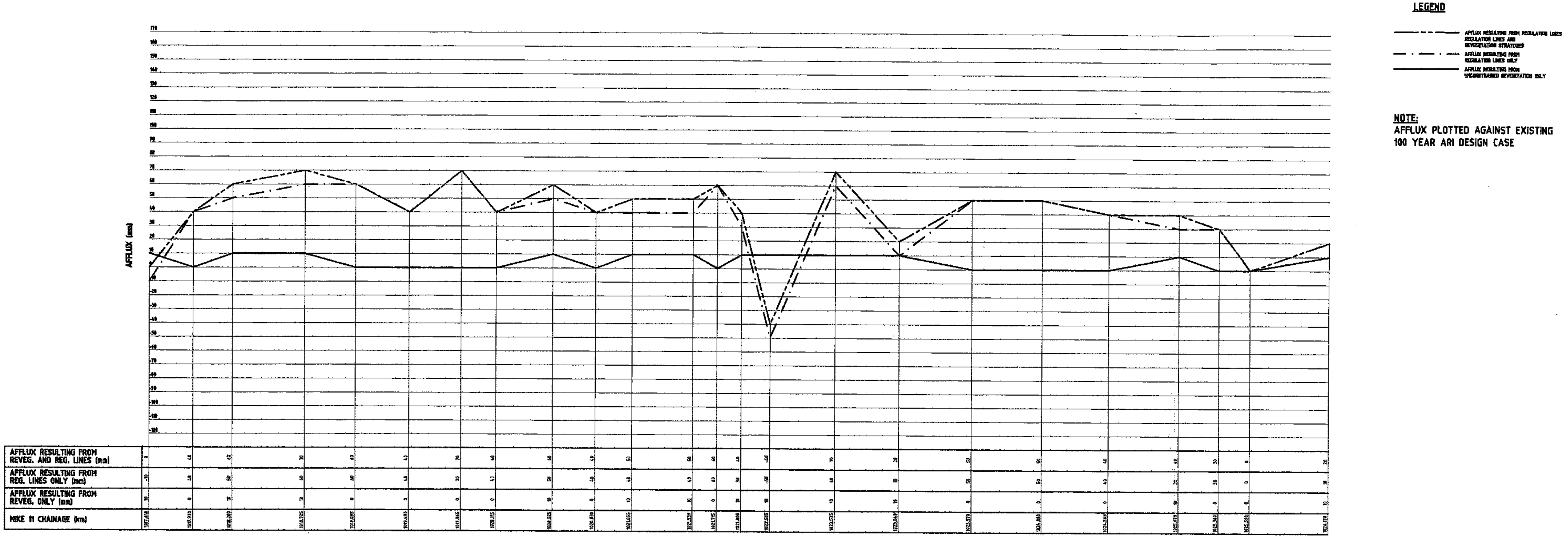
VERT. 0 5.0 10.0 15.0 20.0 METRES

HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

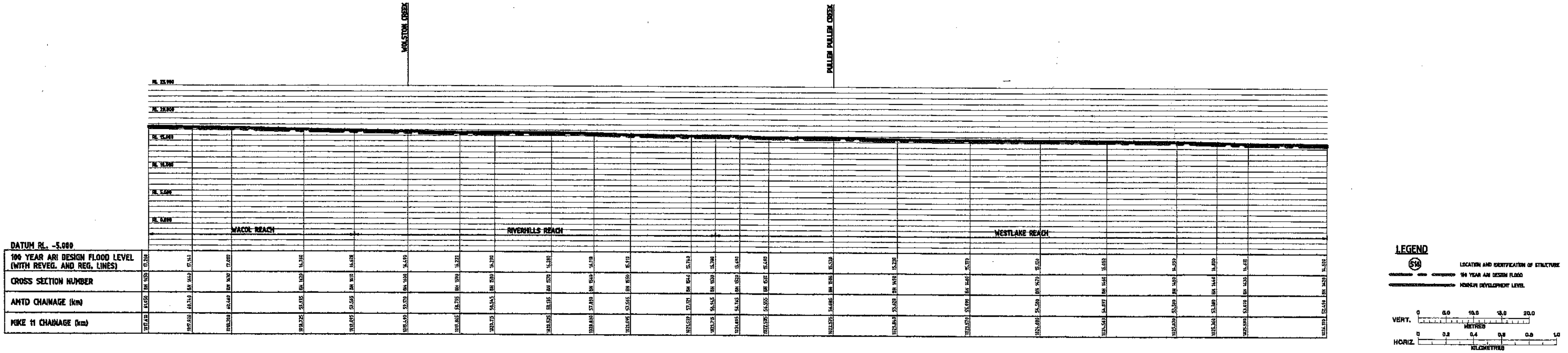
FILE NAME: 415
PLOT SCALE: 1=30
DATE: 23/3
JOB NO: T004

FIGURE J-3c

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE



NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE



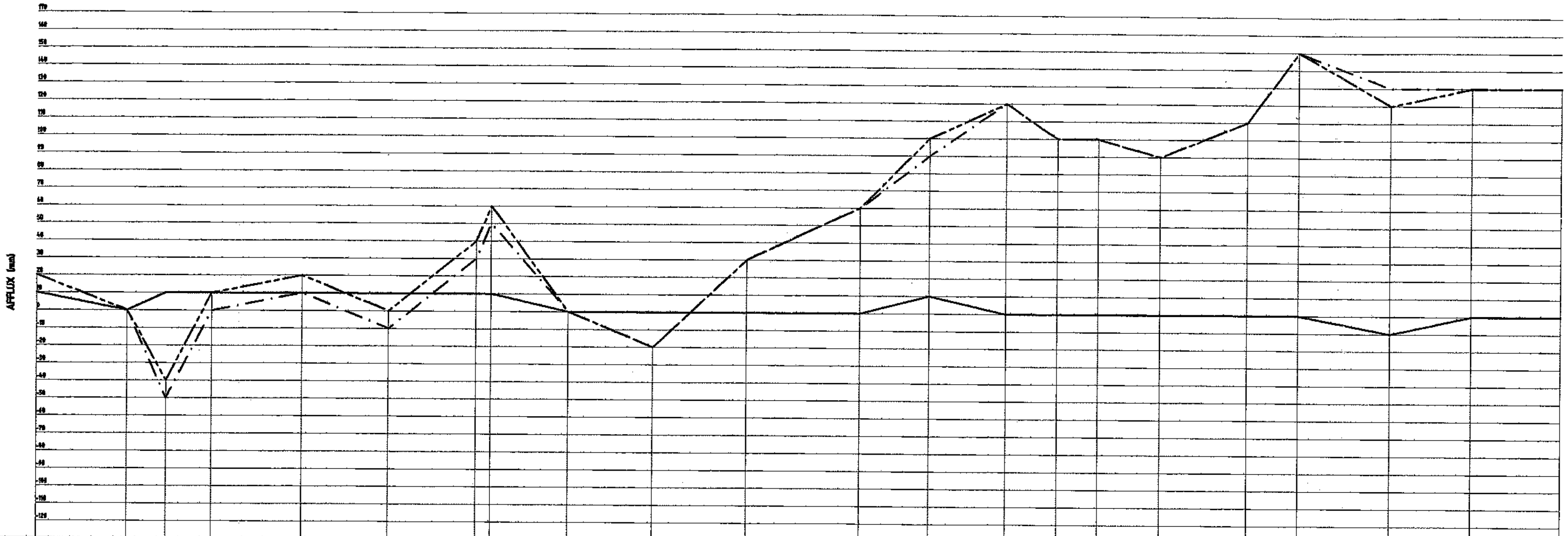
BRISBANE RIVER - BN 1650 TO BN 1420

PLOT SCALE: 1=30

SINCLAIR KNIGHT MERZ

FIGURE J-3d

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE

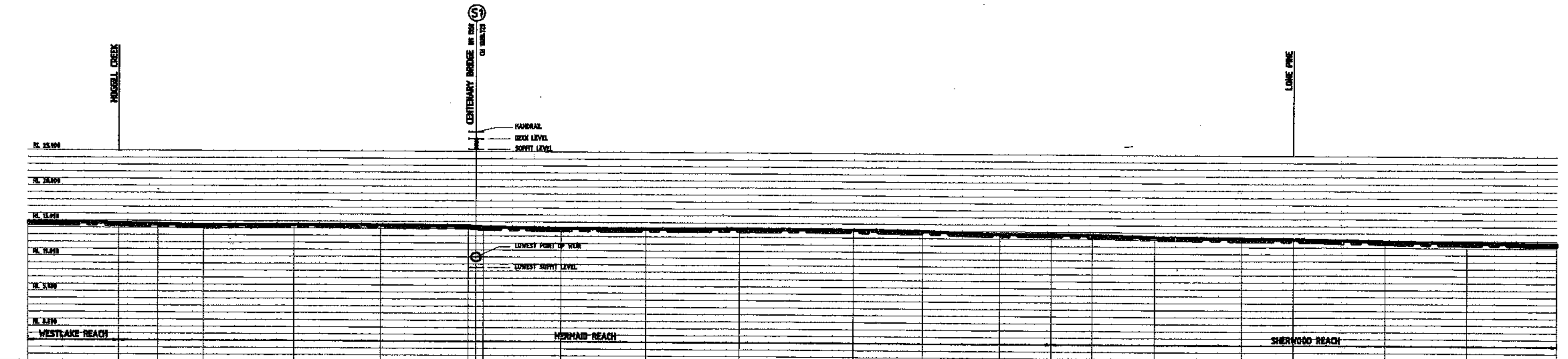


AFFLUX RESULTING FROM REVEG. AND REG. LINES (mm)	20	0	-40	10	20	0	40	60	0	-20	30	60	100	120	100	100	90	110	150	120	130	130
AFFLUX RESULTING FROM REG. LINES ONLY (mm)	10	0	-50	0	10	-10	30	50	0	-20	30	60	90	120	100	100	90	110	150	130	130	130
AFFLUX RESULTING FROM REVEG. ONLY (mm)	10	0	10	10	10	10	10	10	0	0	0	0	10	0	0	0	0	0	0	-10	0	0
MIKE 11 CHAINAGE (km)	1026.170	1026.460	1026.900	1027.160	1027.680	1028.180	1028.680	1028.760	1029.200	1029.680	1030.220	1030.820	1031.260	1031.780	1031.995	1032.230	1032.585	1033.080	1033.370	1033.900	1034.370	1034.890

LEGEND

- AFFLUX RESULTING FROM REGULATION LINES REGULATION LINES AND REVEGETATION STRATEGIES
- AFFLUX RESULTING FROM REGULATION LINES ONLY
- AFFLUX RESULTING FROM UNCONSTRAINED REVEGETATION ONLY

NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE



DATUM RL. -5.000

100 YEAR ARI DESIGN FLOOD LEVEL (WITH REVEG. AND REG. LINES)	14.500	14.300	14.210	14.120	14.190	14.190	14.100	13.970	13.600	13.800	13.850	13.810	13.690	13.330	13.410	13.280	13.030	12.900	12.830	12.570	12.620	12.320
CROSS SECTION NUMBER	BN 1420	BN 1410	BN 1400	BN 1390	BN 1380	BN 1370	BN 1360	BN 1346	BN 1330	BN 1320	BN 1310	BN 1300	BN 1290	BN 1280	BN 1270	BN 1260	BN 1250	BN 1240	BN 1230	BN 1220	BN 1210	BN 1200
AMTD CHAINAGE (km)	52.490	51.980	51.760	51.500	50.980	50.480	49.980	49.900	49.440	48.900	48.440	47.790	47.680	46.860	46.665	46.430	46.075	45.580	45.290	44.760	44.290	43.770
MIKE 11 CHAINAGE (km)	1026.170	1026.460	1026.900	1027.160	1027.680	1028.180	1028.680	1028.740	1029.200	1029.680	1030.220	1030.870	1031.260	1031.780	1031.995	1032.230	1032.585	1033.080	1033.370	1033.900	1034.370	1034.890

BRISBANE RIVER - BN 1420 TO BN 1200

LEGEND

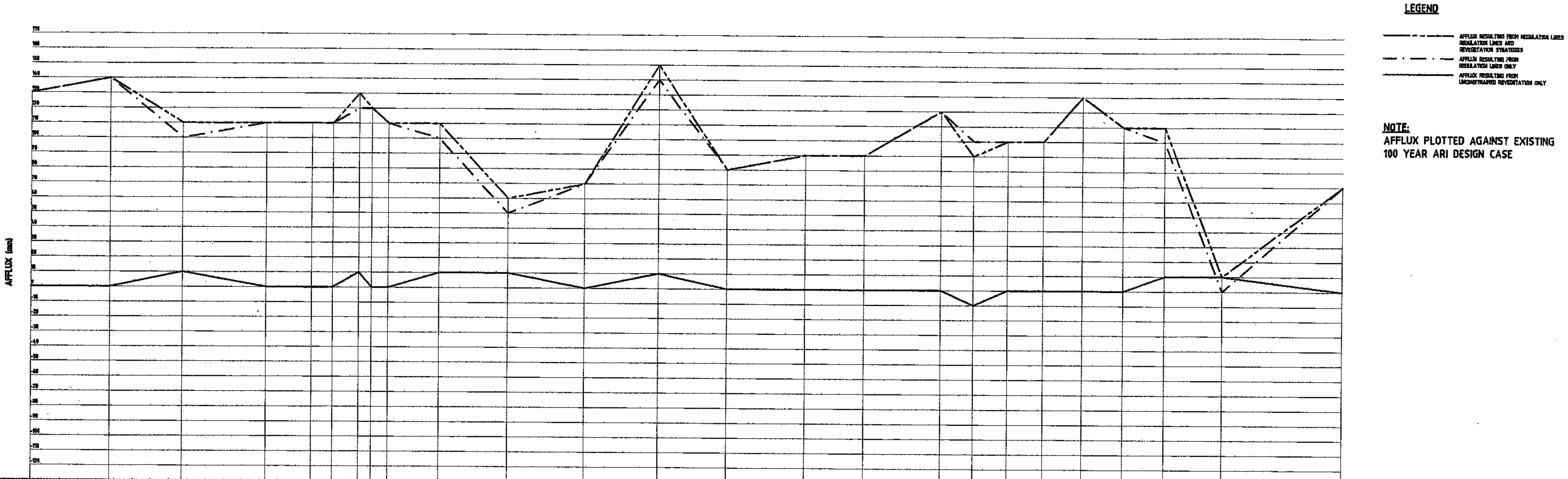
(S1) LOCATION AND IDENTIFICATION OF STRUCTURE
100 YEAR ARI DESIGN FLOOD
MINIMUM DEVELOPMENT LEVEL

VERT. 0 5.0 10.0 15.0 20.0 METRES
HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

FILE NAME: 415/-1/7
PLOT SCALE: 1=30
DISK N: C:\DWG
JOB N: T00457
DATE: 23/3/97

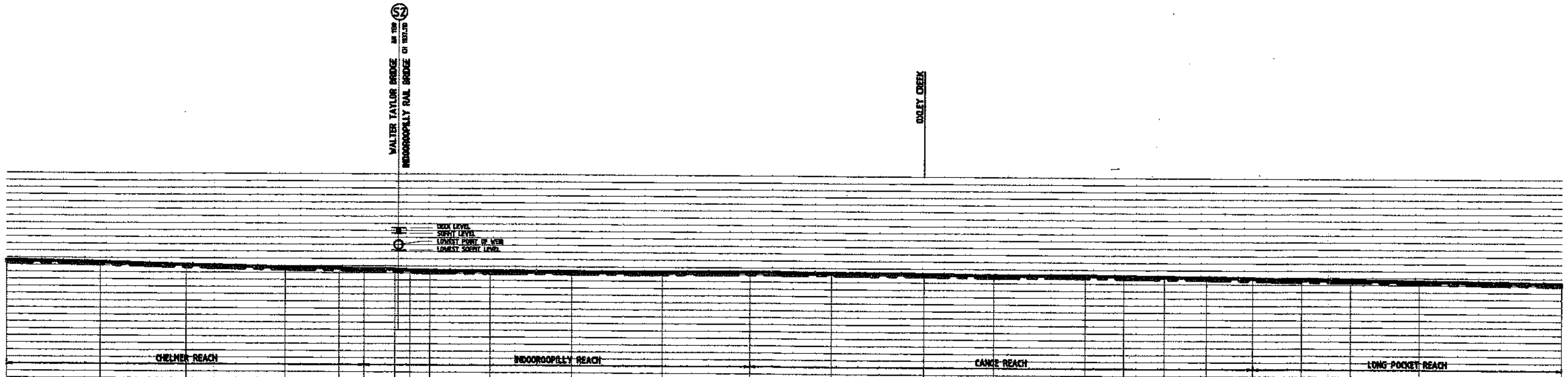
SINCLAIR KNIGHT MERZ

FIGURE J-3e
BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE



NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE

AFFLUX RESULTING FROM REVEG. AND REG. LINES (mm)	AFFLUX RESULTING FROM REG. LINES ONLY (mm)	AFFLUX RESULTING FROM REVEG. ONLY (mm)	MIKE 11 CHAINAGE (km)
130	130	0	1034.890
140	140	0	1035.414
110	100	10	1035.900
110	110	0	1036.440
110	110	0	1036.770
110	110	0	1036.915
130	120	10	1037.090
120	120	0	1037.175
110	110	0	1037.285
110	100	10	1037.625
60	50	10	1038.085
70	70	0	1038.600
150	140	10	1039.180
80	80	0	1039.565
90	90	0	1040.090
90	90	0	1040.490
120	120	0	1041.010
90	100	-10	1041.230
100	100	0	1041.460
100	100	0	1041.700
130	130	0	1041.960
110	110	0	1042.235
110	100	10	1042.515
10	0	10	1042.910
70	70	0	1043.725



DATUM RL. -5.000

100 YEAR ARI DESIGN FLOOD LEVEL (WITH REVEG. AND REG. LINES)	CROSS SECTION NUMBER	AMTD CHAINAGE (km)	MIKE 11 CHAINAGE (km)
12.330	BN 1200	43.770	1034.890
12.080	BN 1190	43.244	1035.414
11.760	BN 1180	42.768	1035.900
11.660	BN 1170	42.200	1036.440
11.390	BN 1160	41.890	1036.770
11.230	BN 1150	41.745	1036.915
11.200	BN 1140	41.570	1037.090
11.100	BN 1120	41.485	1037.175
11.040	BN 1110	41.375	1037.285
11.020	BN 1100	41.035	1037.625
10.998	BN 1090	40.575	1038.085
10.980	BN 1080	40.060	1038.600
11.050	BN 1070	39.560	1039.180
11.000	BN 1060	39.050	1039.565
10.930	BN 1050	38.570	1040.090
10.800	BN 1040	38.170	1040.490
10.860	BN 1030	37.560	1041.010
10.800	BN 1020	37.430	1041.230
10.720	BN 1010	37.200	1041.460
10.690	BN 1000	36.964	1041.700
10.560	BN 990	36.700	1041.960
10.410	BN 980	36.425	1042.235
10.400	BN 970	36.145	1042.515
10.330	BN 960	35.750	1042.910
9.980	BN 950	34.935	1043.725

LEGEND
(S1) LOCATION AND IDENTIFICATION OF STRUCTURE
100 YEAR ARI DESIGN FLOOD
FROUDH DEVELOPMENT LEVEL

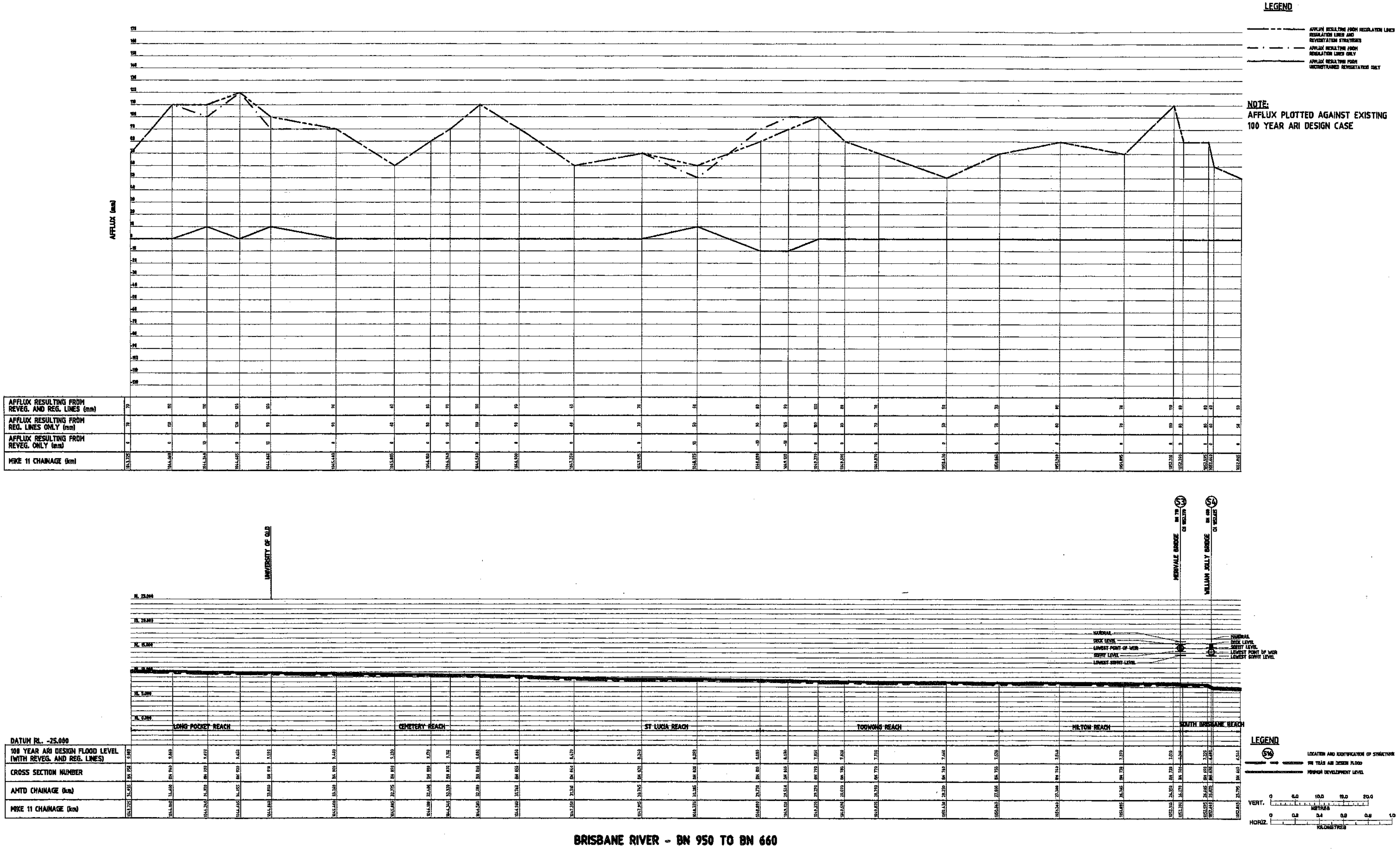
VERT. 0 5.0 10.0 15.0 20.0 METRES
HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

BRISBANE RIVER - BN 1200 TO BN 950

FILE NAME: 415/-1/0
PLOT SCALE: 1=30
DISK N: C:\DWG
JOB N: T00415
DATE: 23/3/9

FIGURE J-3f

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD
- REGULATION LINES AND REVEGETATION STRATEGY CASE



MIKE 11 CHAINAGE (km)	AFFLUX RESULTING FROM REVEG. AND REG. LINES (mm)	AFFLUX RESULTING FROM REG. LINES ONLY (mm)	AFFLUX RESULTING FROM REVEG. ONLY (mm)
1043.725	70	70	0
1044.040	110	110	0
1044.340	110	100	10
1044.605	120	120	0
1044.860	100	90	10
1045.440	90	90	0
1045.885	60	60	0
1046.180	80	80	0
1046.340	70	90	0
1046.580	110	110	0
1046.900	90	90	0
1047.350	60	60	0
1047.985	70	70	0
1048.375	60	50	10
1048.890	80	90	-10
1049.120	90	100	-10
1049.370	100	100	0
1049.510	80	80	0
1049.870	70	70	0
1050.430	50	50	0
1050.960	70	70	0
1051.300	80	80	0
1051.895	70	70	0
1052.310	110	110	0
1052.390	80	80	0
1052.595	80	80	0
1052.640	60	60	0
1052.865	50	50	0

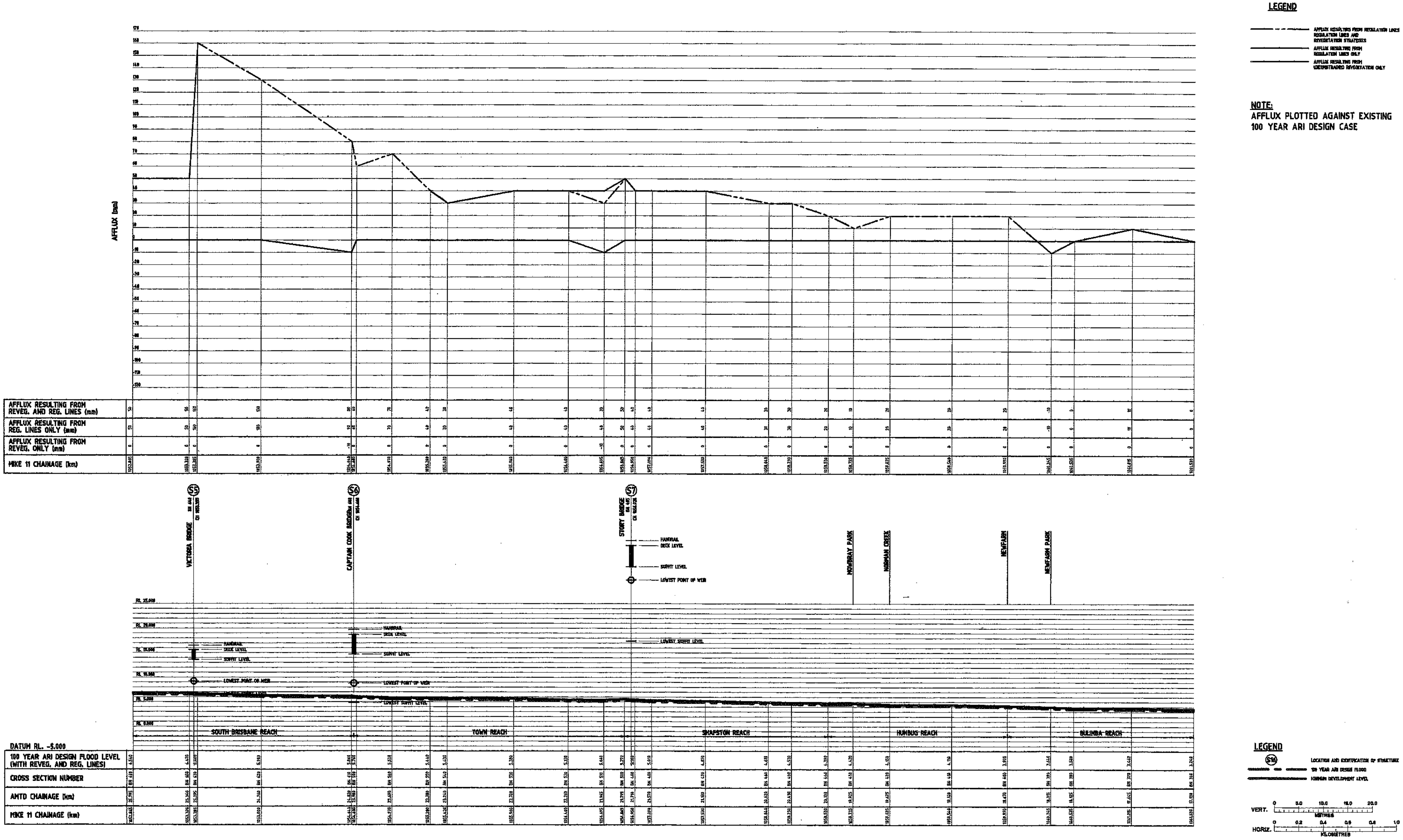
BRISBANE RIVER - BN 950 TO BN 660

FILE NAME: 4157-1/9
PLOT SCALE: 1=30
DISK N°: C:\DWG
JOB N°: T00457
DATE: 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE J-3g

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD
- REGULATION LINES AND REVEGETATION STRATEGY CASE

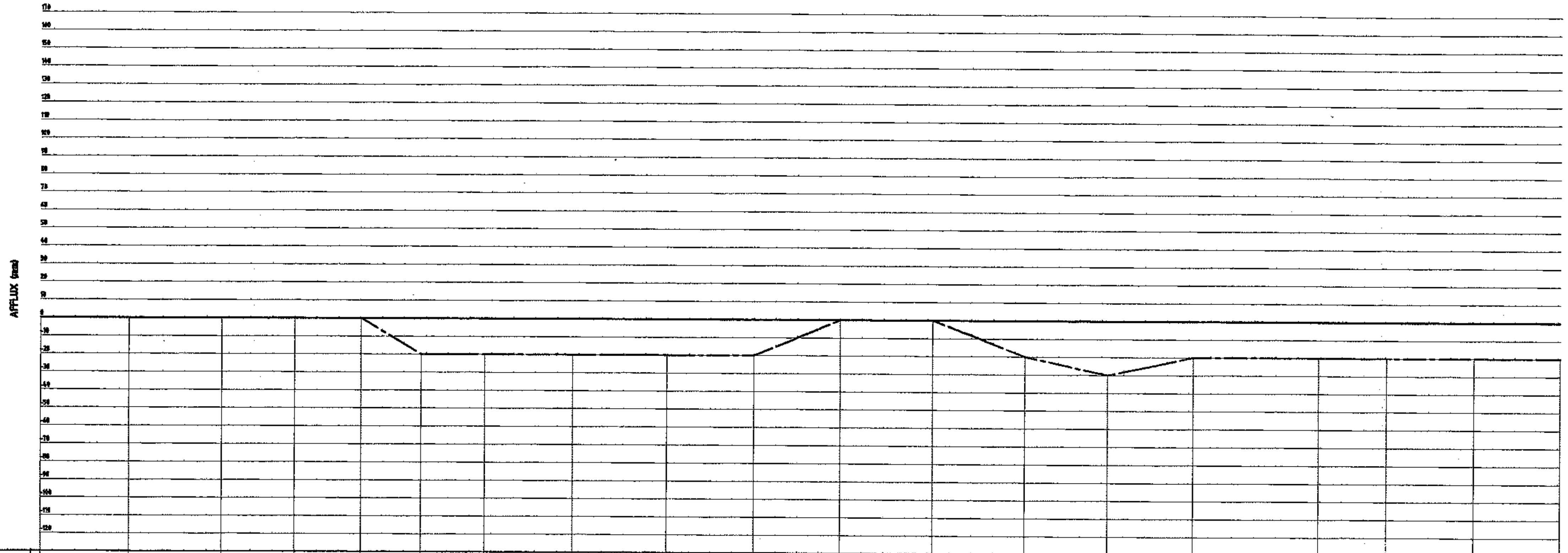


NOTE:
AFFLUX PLOTTED AGAINST EXISTING
100 YEAR ARI DESIGN CASE

BRISBANE RIVER - BN 660 TO BN 360

SINCLAIR KNIGHT MERZ

FIGURE J-3h
BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE

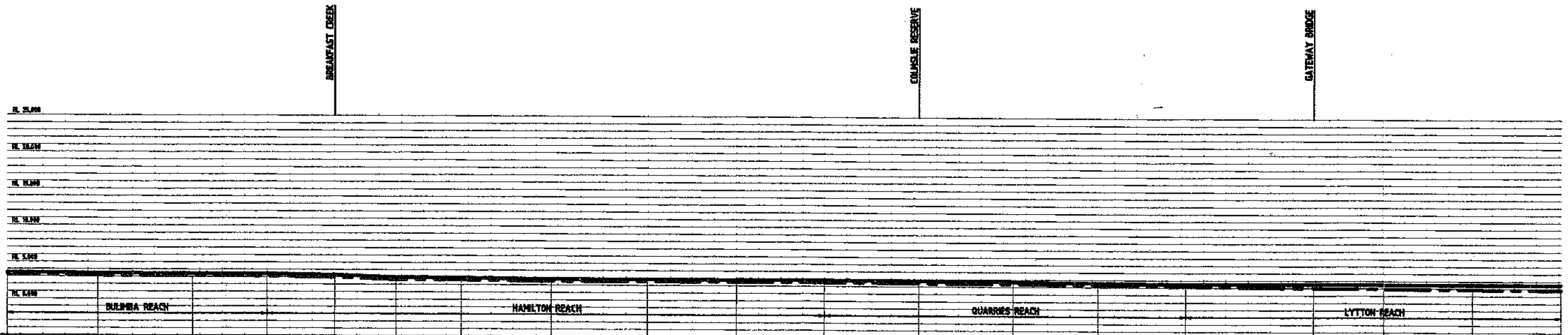


AFFLUX RESULTING FROM REVEG. AND REG. LINES (mm)	0	0	0	0	0	-20	-20	-20	-20	-20	0	0	-20	-30	-20	-20	-20	-20	-20
AFFLUX RESULTING FROM REG. LINES ONLY (mm)	0	0	0	0	0	-20	-20	-20	-20	-20	0	0	-20	-30	-20	-20	-20	-20	-20
AFFLUX RESULTING FROM REVEG. ONLY (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIKE 11 CHAINAGE (km)	1061.530	1062.020	1062.535	1062.940	1063.310	1063.645	1064.000	1064.490	1065.010	1065.503	1065.998	1066.505	1067.020	1067.485	1067.965	1068.660	1069.045	1069.535	1070.025

LEGEND

- ——— — — ——— AFFLUX RESULTING FROM REGULATION LINES REGULATION LINES AND REVEGETATION STRATEGIES
- —— · —— · —— AFFLUX RESULTING FROM REGULATION LINES ONLY
- ————————— AFFLUX RESULTING FROM UNCONSTRAINED REVEGETATION ONLY

NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE



DATUM RL. -5.000

100 YEAR ARI DESIGN FLOOD LEVEL (WITH REVEG. AND REG. LINES)	3.240	3.160	3.120	3.110	2.990	2.790	2.660	2.530	2.550	2.510	2.540	2.460	2.418	2.296	2.189	2.000	1.930	1.870	1.860
CROSS SECTION NUMBER	BN 360	BN 350	BN 340	BN 330	BN 320	BN 314	BN 300	BN 290	BN 280	BN 270	BN 260	BN 250	BN 240	BN 230	BN 220	BN 210	BN 200	BN 190	BN 180
AMTD CHAINAGE (km)	17.138	16.648	16.125	15.720	15.350	15.015	14.660	14.170	13.650	13.157	12.678	12.155	11.640	11.175	10.695	10.000	9.615	9.125	8.635
MIKE 11 CHAINAGE (km)	1061.530	1062.020	1062.535	1062.940	1063.310	1063.645	1064.000	1064.490	1065.010	1065.503	1065.990	1066.505	1067.020	1067.445	1067.965	1068.660	1069.045	1069.535	1070.025

BRISBANE RIVER - BN 360 TO BN 180

LEGEND

- Ⓢ LOCATION AND IDENTIFICATION OF STRUCTURE
- ——— — ——— 100 YEAR ARI DESIGN FLOOD
- ————————— HORIZON DEVELOPMENT LEVEL

VERT. 0 5.0 10.0 15.0 20.0 METRES

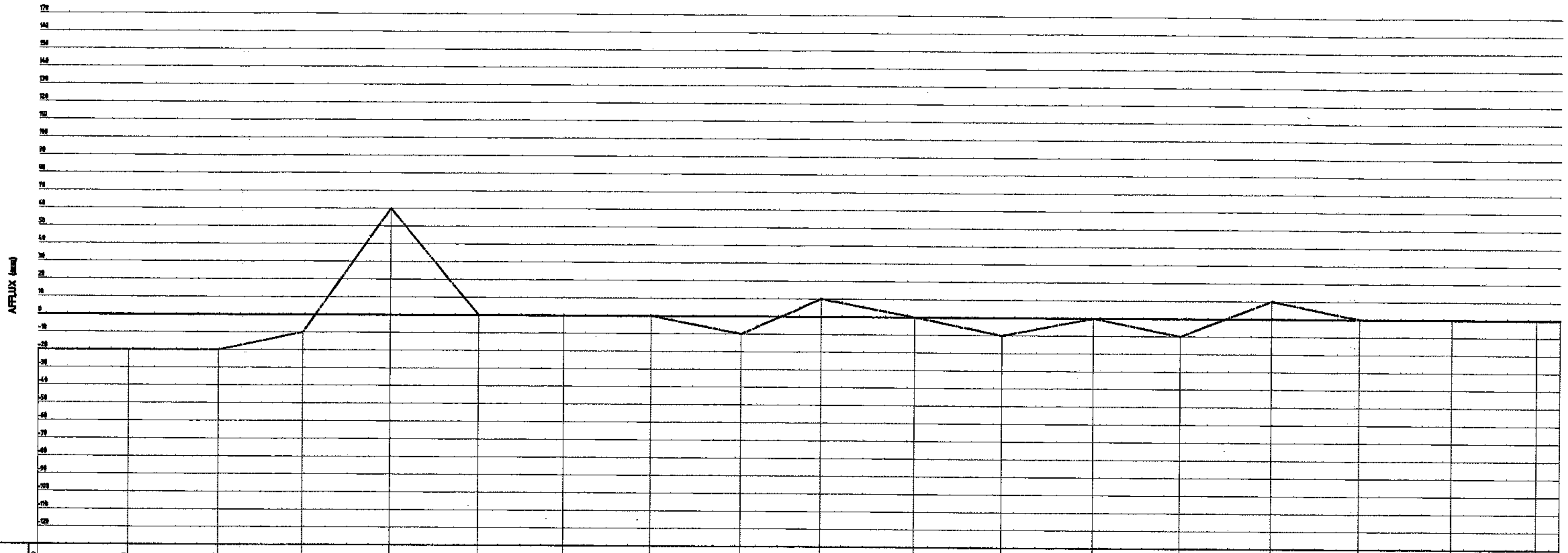
HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

FILE ... 415 ... PLOT SCALE: 1=30

SINCLAIR KNIGHT MERZ

FIGURE J-3i

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE



AFFLUX RESULTING FROM REVEG. AND REG. LINES (mm)	-20	-20	-20	-10	60	0	0	0	-10	10	0	-10	0	-10	10	0	0	0	0
AFFLUX RESULTING FROM REG. LINES ONLY (mm)	-20	-20	-20	-10	60	0	0	0	-10	10	0	-10	0	-10	10	0	0	0	0
AFFLUX RESULTING FROM REVEG. ONLY (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIKE 11 CHAINAGE (km)	1070.025	1070.530	1071.040	1071.520	1072.015	1072.515	1072.995	1073.445	1074.080	1074.440	1074.985	1075.480	1076.000	1076.495	1077.010	1077.510	1078.040	1078.525	1078.660

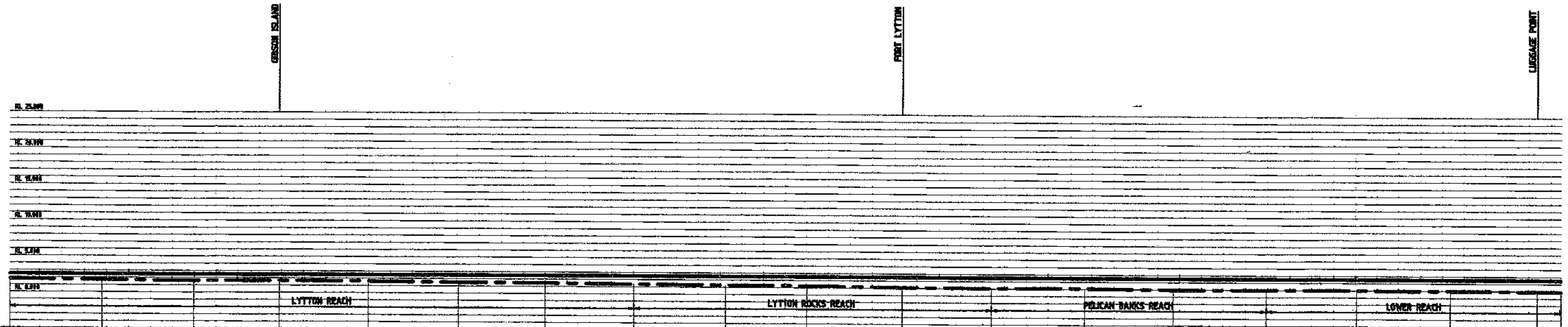
LEGEND

AFFLUX RESULTING FROM REGULATION LINES REGULATION LINES AND REVEGETATION STRATEGIES

AFFLUX RESULTING FROM REGULATION LINES ONLY

AFFLUX RESULTING FROM UNCONSTRAINED REVEGETATION ONLY

NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE



DATUM RL. -5.000

100 YEAR ARI DESIGN FLOOD LEVEL (WITH REVEG. AND REG. LINES)	1.800	1.700	1.620	1.660	1.620	1.580	1.460	1.360	1.280	1.230	1.090	1.050	1.070	0.950	0.970	0.970	0.950	0.920	0.920
CROSS SECTION NUMBER	BN 180	BN 170	BN 160	BN 150	BN 140	BN 130	BN 120	BN 110	BN 100	BN 90	BN 80	BN 70	BN 60	BN 50	BN 40	BN 30	BN 20	BN 10	
AMTD CHAINAGE (km)	8.635	8.130	7.620	7.140	6.645	6.145	5.665	5.115	4.660	4.200	3.675	3.180	2.660	2.165	1.650	1.150	0.620	0.135	0
MIKE 11 CHAINAGE (km)	1070.025	1070.530	1071.040	1071.520	1072.015	1072.515	1072.995	1073.445	1074.080	1074.440	1074.985	1075.480	1076.000	1076.495	1077.010	1077.510	1078.040	1078.525	1078.660

LEGEND

(S14) LOCATION AND IDENTIFICATION OF STRUCTURE

100 YEAR ARI DESIGN FLOOD

MINIMUM DEVELOPMENT LEVEL

VERT. 0 5.0 10.0 15.0 20.0 METRES

HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

BRISBANE RIVER - BN 180 TO BN 10

FILE NAME: 4157-182
PLOT SCALE: 1=30
DISK N : C:\DWG
JOB N : T004
DATE: 23/3

Appendix K - Hydraulic Structure Reference Sheets

CENTENARY BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK: Brisbane River

LOCATION: Centenary Highway

AERIAL PHOTO No: Film BCC100, Sheet 5

BCC XS No: BN 1350

DATE OF SURVEY

UBD REF: 177 Q17

STRUCTURE ID S1

AMTD(m): 49 940

STRUCTURE DESCRIPTION: Bridge; Concrete Piers and Superstructure

STRUCTURE SIZE: 4 Spans @ 42.3m; 1 Span @ 48.3m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9

UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.9
For culverts give floor level.

DOWNSTREAM OBVERT LEVEL:
For bridges give bed level.

For Culverts

LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 10.6m LOWEST POINT OF WEIR (m AHD): 10.0m PIER WIDTH: 0.76m
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

Posts:	102mm x 102mm
Verticals:	16mm dia
Handrails:	102 x 52 TFC

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE:

PLAN NUMBER:

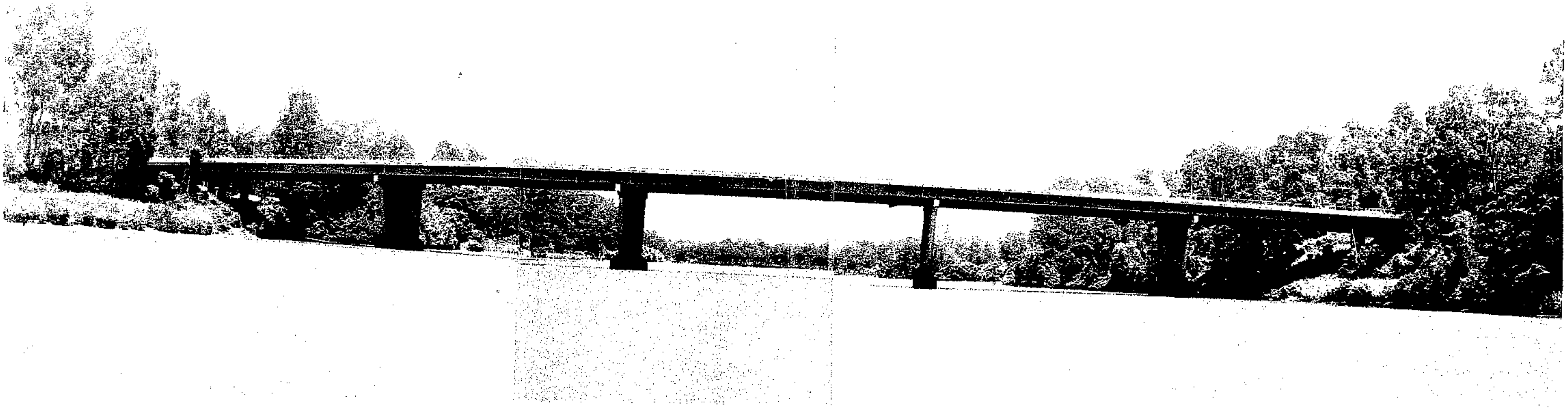
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Structure has approximately 41 year ARI flood immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER		AREA		VELOCITY	
			SURFACE	MAX				
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	ELEVATION (m AHD)	AFFLUX (mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	26640	14317	33.23	570	8904	3389	2.95	4.3
10 000	18626	14090	28.11	610	6597	3316	2.8	4.3
2 000	10963	13424	23.48	560	4006	3306	2.65	4.08
1 000	5690	12881	21.43	250	3193	3289	1.7	3.9
500	3054	11483	18.55	230	1908	3265	1.6	3.45
200	1380	10400	16.36	220	999	3256	1.48	3.1
100	377	9085	14.06	150	418	3301	1	2.7
50	9	9294	11.54	90	17	2866	1.4	2.5
20	-	3516	6.05	80	-	1812	-	1.9
10	-	1589	2.67	40	-	1307	-	1.2
5	-	949	1.66	20	-	1140	-	0.82
2	-	371	1.08	10	-	1058	-	0.5

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 1-CENTENARY BRIDGE (LOOKING UPSTREAM)

INDOOROOPILLY - WALTER TAYLOR BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	
LOCATION:	Honour Avenue	UBD REF:	178 K7
AERIAL PHOTO No:	Film BCC100, Sheet 4	STRUCTURE ID	S2
BCC XS No:	BN 1130	AMTD(m):	41 550

STRUCTURE DESCRIPTION: Single span suspension bridge; concrete towers; steel girders; timber decking.

STRUCTURE SIZE: Span: 152.4m
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.7 DOWNSTREAM OBVERT LEVEL:
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 10.3m LOWEST POINT OF WEIR (m AHD): 15.0m PIER WIDTH: 10.1m
(In the direction of flow, ie. distance from u/s face to d/s face) (Base of tower)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

Galv. steel chain fencing

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: PLAN NUMBER:

HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI flood immunity

NB Walter Taylor Bridge & Albert Bridge modelled as a single bridge

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER		AREA		VELOCITY	
	QWEIR	QSTRUCTURE	SURFACE ELEVATION	MAX AFFLUX	WEIR	STRUCTURE	WEIR	STRUCTURE
(years)	(m^3/s)	(m^3/s)	(m AHD)	(mm)	(m^2)	(m^2)	(m/s)	(m/s)
PMF	7487	29071	28.88	2055	1249	4170	6.5	6.6
10 000	2211	26236	23.12	190	809	4088	5.25	5.9
2 000	725	20782	19.1	380	219	4065	2	4.9
1 000	10	18392	17.35	250	19	4046	1.7	4.4
500	-	14461	14.73	190	-	3892	-	3.6
200	-	11706	12.92	150	-	3700	-	3.1
100	-	9392	11.07	90	-	3181	-	2.9
50	-	7227	8.98	80	-	2833	-	2.5
20	-	3487	4.47	150	-	2041	-	1.67
10	-	1587	2	60	-	1741	-	0.9
5	-	949	1.35	20	-	1583	-	0.59
2	-	372	1.03	10	-	1511	-	0.35

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.

INDOOROOPILLY - RAIL BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	
LOCATION:	Railway crossing, Indooroopilly	UBD REF:	178 K7
AERIAL PHOTO No:	Film BCC100, Sheet 4	STRUCTURE ID	S2
BCC XS No:	BN 1130	AMTD(m):	41 550

STRUCTURE DESCRIPTION: Truss bridge; Steel superstructure; Concrete piers.

STRUCTURE SIZE: 2 Spans @ 104.2m
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.7 DOWNSTREAM OBVERT LEVEL:
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 8.4m LOWEST POINT OF WEIR (m AHD): 15.0m PIER WIDTH:
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

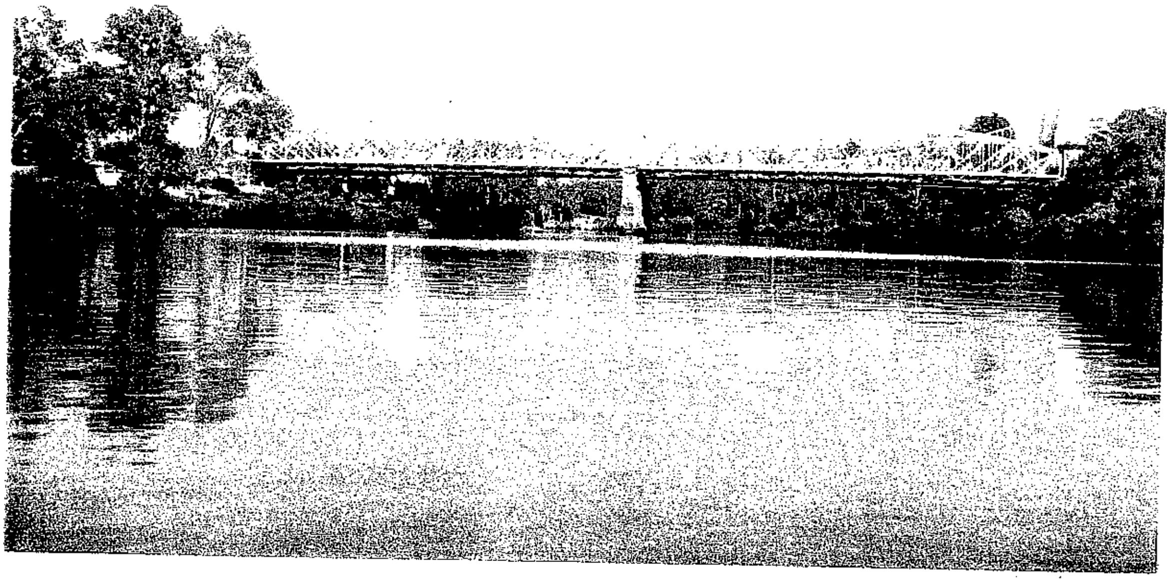
The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: PLAN NUMBER:

HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

NB Walter Taylor Bridge & Albert Bridge modelled as a single bridge



STRUCTURE 2-INDOOROOPILLY BRIDGES (LOOKING UPSTREAM)

STRUCTURE 2-INDOOROOPILLY BRIDGES (LOOKING DOWNSTREAM)

MERIVAL BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	
LOCATION:	Railway Link: South Brisbane - Roma Street	UBD REF:	159 J11
AERIAL PHOTO No:	Film BCC100, Sheet 3	STRUCTURE ID	S3
BCC XS No:	BN 710	AMTD(m):	26 290

STRUCTURE DESCRIPTION: Single span arch bridge and approaches; Concrete deck & piers.

STRUCTURE SIZE: Centre span: 132.9m; Approach spans either side: 33.45m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.4 DOWNSTREAM OBVERT LEVEL:
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 13.4m LOWEST POINT OF WEIR (m AHD): 15.1m PIER WIDTH: Varies
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

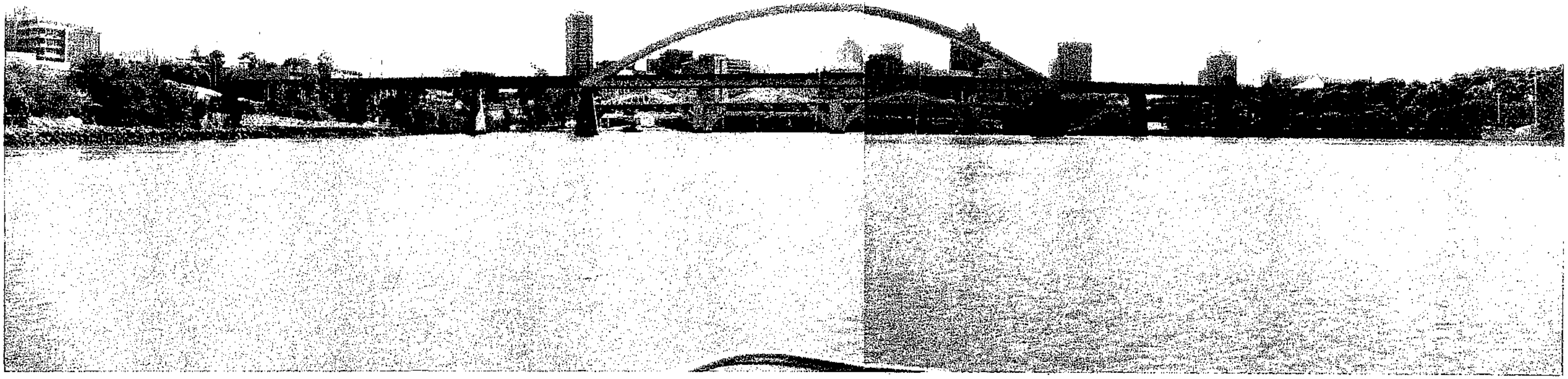
DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: PLAN NUMBER:

HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity



STRUCTURE 3-MERIVALE BRIDGE (LOOKING DOWNSTREAM)

WILLIAM JOLLY BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	
LOCATION:	Grey Street	UBD REF:	159 K11
AERIAL PHOTO No:	Film BCC100, Sheet 3	STRUCTURE ID	S4
BCC XS No:	BN 680	AMTD(m):	26 035

STRUCTURE DESCRIPTION: Arch bridge with approaches; Concrete and granite piers, steel girders, concrete deck.

STRUCTURE SIZE: 3 spans @ 72.5m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.4 DOWNSTREAM OBVERT LEVEL:
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 20.1m LOWEST POINT OF WEIR (m AHD): 14.3m PIER WIDTH: 6.6m
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.
Concrete balustrade

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: PLAN NUMBER:

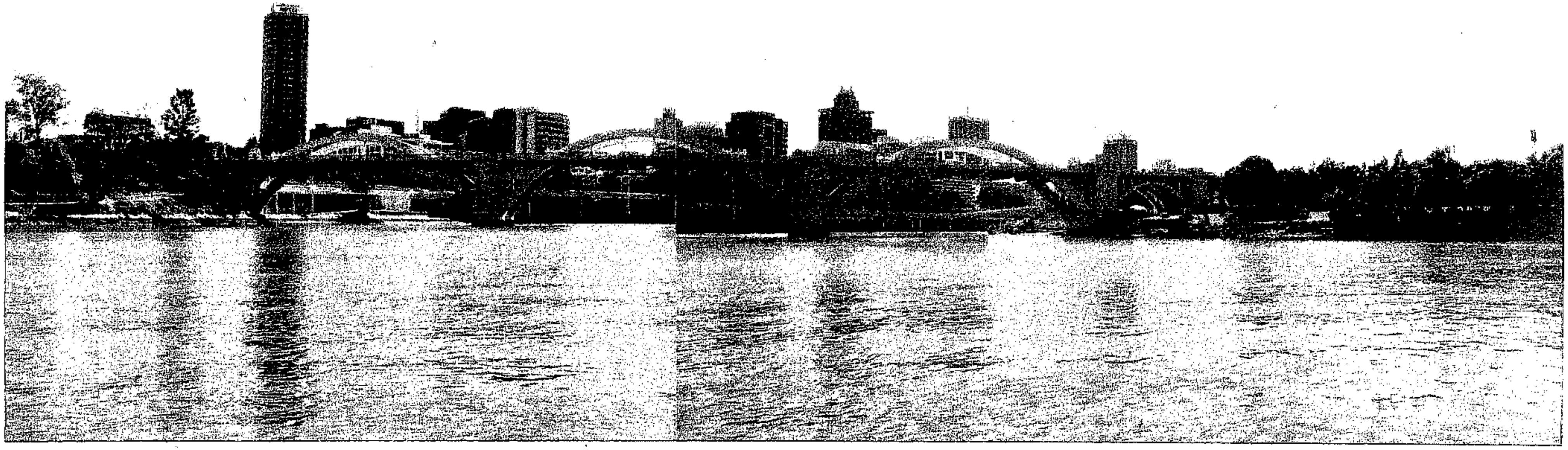
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI (years)	DISCHARGE		WATER SURFACE ELEVATION (m AHD)	MAX AFFLUX (mm)	AREA		VELOCITY	
	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)			WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	3790	32073	21.33	1190	863	3566	5.2	8.6
10 000	1057	28231	18.63	1800	394	3165	3.5	8.6
2 000	-	19996	14.81	1960	-	2667	-	7.4
1 000	-	17416	13.29	1600	-	2643	-	6.5
500	-	13791	10.59	980	-	2506	-	5.3
200	-	11395	8.79	650	-	2224	-	5
100	-	9274	7.14	510	-	2150	-	4.2
50	-	7087	5.45	370	-	2022	-	3.4
20	-	3397	2.47	80	-	1783	-	1.9
10	-	1586	1.3	20	-	1702	-	0.9
5	-	949	1.07	10	-	1637	-	0.6
2	-	423	0.97	10	-	1629	-	0.4

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 4-WILLIAM JOLLY BRIDGE (LOOKING DOWNSTREAM)

VICTORIA BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	
LOCATION:	Melbourne Street	UBD REF:	159 M12
AERIAL PHOTO No:	Film BCC100, Sheet 3	STRUCTURE ID	S5
BCC XS No:	BN 640	AMTD(m):	25 305

STRUCTURE DESCRIPTION: Concrete bridge; Single span with cantilever ends resting on abutments.

STRUCTURE SIZE: Centre span: 136.1m; End contilevers: 85.3m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.4 DOWNSTREAM OBVERT LEVEL:
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 21.9m LOWEST POINT OF WEIR (m AHD): 9.2m PIER WIDTH: 4.0m (Base)
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: PLAN NUMBER:

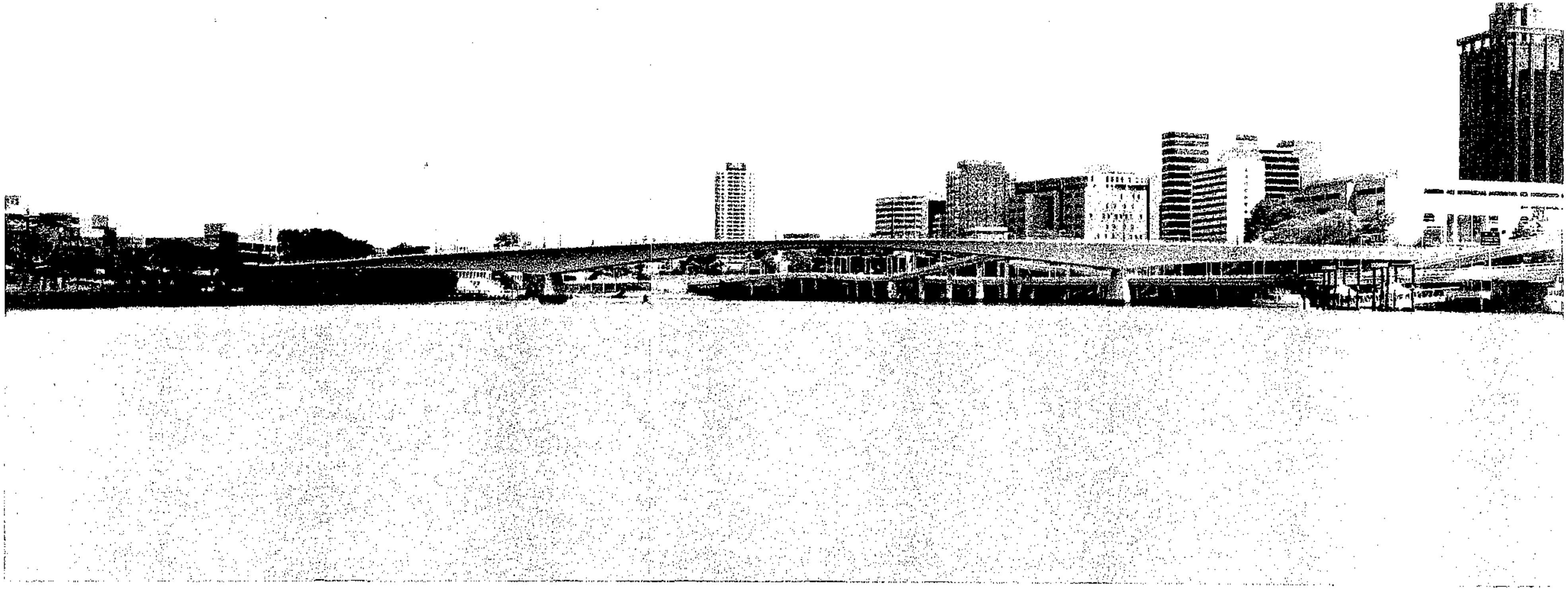
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER SURFACE ELEVATION	MAX AFFLUX	AREA		VELOCITY	
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	(m AHD)	(mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	3523	32348	20.07	1920	931	4217	5.6	7.1
10 000	961	27920	16.61	110	271	4174	5.5	6.4
2 000	95	19900	12.55	300	93	4148	1.8	4.7
1 000	60	17389	11.42	380	42	4072	1.2	4.2
500	-	13786	9.36	270	-	3688	-	3.6
200	-	11363	7.88	210	-	3497	-	3.15
100	-	9223	6.42	180	-	3335	-	2.7
50	-	7066	4.92	150	-	2985	-	2.3
20	-	3397	2.28	80	-	2288	-	1.45
10	-	1586	1.26	20	-	2061	-	0.76
5	-	949	1.06	10	-	1964	-	0.5
2	-	423	0.96	10	-	1966	-	0.29

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 5-VICTORIA BRIDGE (LOOKING UPSTREAM)

CAPTAIN COOK BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK: Brisbane River

LOCATION: Riverside Expressway

AERIAL PHOTO No: Film BCC100, Sheet 3

BCC XS No: BN 600

DATE OF SURVEY

UBD REF: 159 R16

STRUCTURE ID S6

AMTD(m): 24 000

STRUCTURE DESCRIPTION: Bridge; Concrete piers, girders and deck.

STRUCTURE SIZE: 1 @ 42.7m; 1 @ 182.9m; 1 @ 146.3m; 1 @ 109.7m; 1 @ 73.2m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9
UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.4
For culverts give floor level.
DOWNSTREAM OBVERT LEVEL:
For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 27.1m LOWEST POINT OF WEIR (m AHD): 8.8m PIER WIDTH: 5.6m (Base)
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE:
PLAN NUMBER:

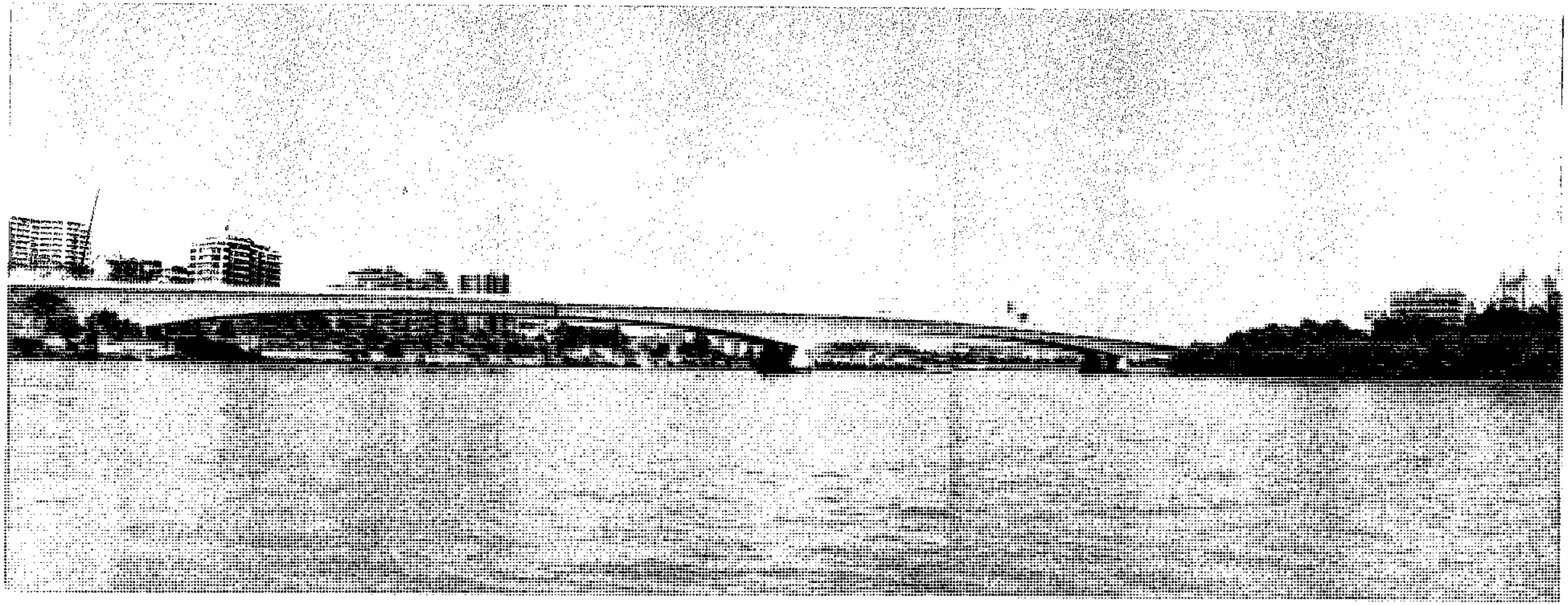
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI Immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER		AREA		VELOCITY	
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	SURFACE ELEVATION (m AHD)	MAX AFFLUX (mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	2921	33049	17.86	500	1450	7332	2.5	4.3
10 000	1085	27618	15.15	260	794	7277	1.9	3.65
2 000	124	19869	11.69	150	117	6680	1.8	2.9
1 000	15	17399	10.48	120	56	6385	1.1	2.65
500	-	13739	8.54	100	-	5530	-	2.4
200	-	11360	7.14	90	-	5137	-	2.15
100	-	9229	5.78	80	-	4494	-	2
50	-	7033	4.36	60	-	3913	-	1.75
20	-	3397	2.01	30	-	3015	-	1.1
10	-	1586	1.19	10	-	2747	-	0.57
5	-	949	1.03	10	-	2654	-	0.37
2	-	424	0.95	0	-	2719	-	0.21

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 6-CAPTAIN COOK BRIDGE (LOOKING UPSTREAM)

STORY BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK: Brisbane River

LOCATION: Bradfield Highway

AERIAL PHOTO No: Film BCC100, Sheet 3

BCC XS No: BN 495

DATE OF SURVEY

UBD REF: 160 B9

STRUCTURE ID S7

AMTD(m): 21 740

STRUCTURE DESCRIPTION: Suspension bridge; Steel superstructure, concrete piers.
Single span with cantilever ends and an extensive southern approach.

STRUCTURE SIZE: Centre span: 281.6m; Cantilever ends: 82.1m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9

UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.5
For culverts give floor level.

DOWNSTREAM OBVERT LEVEL:
For bridges give bed level.

For Culverts

LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 28.2m LOWEST POINT OF WEIR (m AHD): 29.8m PIER WIDTH: 9.6m (Base)
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE:

PLAN NUMBER:

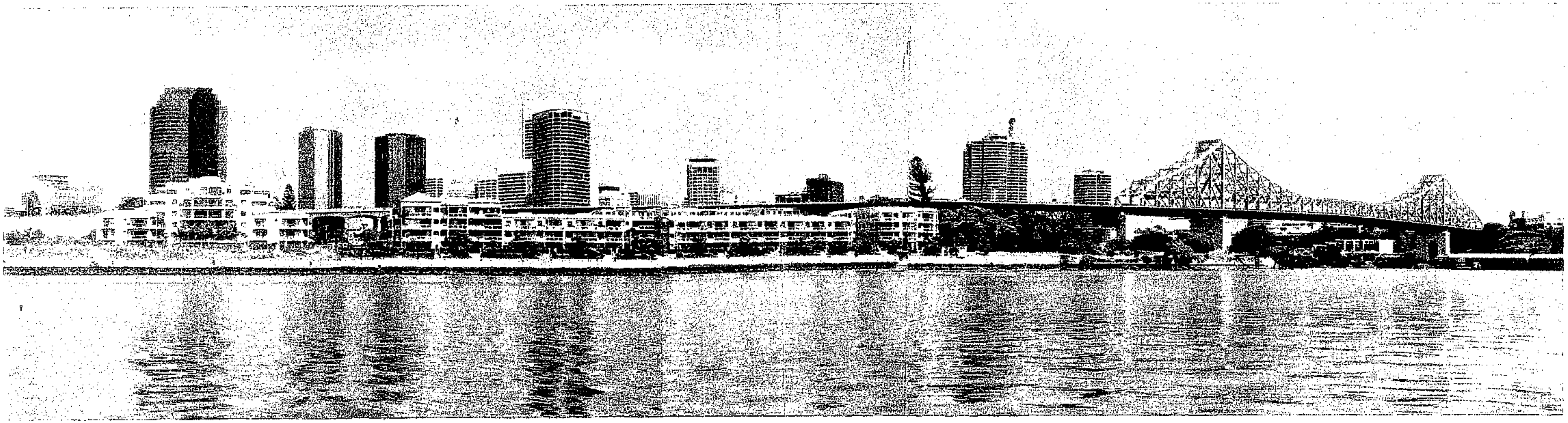
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER SURFACE ELEVATION	MAX AFFLUX	AREA		VELOCITY	
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	(m AHD)	(mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	-	35862	16.59	270	-	7479	-	4.7
10 000	-	28658	14.19	240	-	6472	-	4.3
2 000	-	19991	10.9	180	-	5128	-	3.8
1 000	-	17413	9.74	170	-	4585	-	3.7
500	-	13737	7.88	150	-	4021	-	3.3
200	-	11330	6.53	120	-	3550	-	3.1
100	-	9143	5.22	100	-	3179	-	2.8
50	-	7028	3.93	80	-	2851	-	2.4
20	-	3397	1.84	30	-	2369	-	1.4
10	-	1586	1.14	10	-	2175	-	0.72
5	-	950	1	0	-	2137	-	0.46
2	-	424	0.95	10	-	2119	-	0.27

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 7-STORY BRIDGE (LOOKING UPSTREAM)

GATEWAY BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK: Brisbane River		DATE OF SURVEY	
LOCATION: Gateway Motorway		UBD REF:	141 M20
AERIAL PHOTO No:	Film BCC100, Sheet 2	STRUCTURE ID	
BCC XS No:	BN210	AMTD(m):	10 000

STRUCTURE DESCRIPTION: Bridge; Concrete piers, girders and deck.
Single span with cantilever ends and extensive north and south approachs.

STRUCTURE SIZE: Centre span: 260m; Contilever ends: 130m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL:

UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL:
For culverts give floor level.

DOWNSTREAM OBVERT LEVEL:
For bridges give bed level.

For Culverts

LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE?
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 21.9m LOWEST POINT OF WEIR (m AHD): >PMF Flood Level PIER WIDTH: 13.5m
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

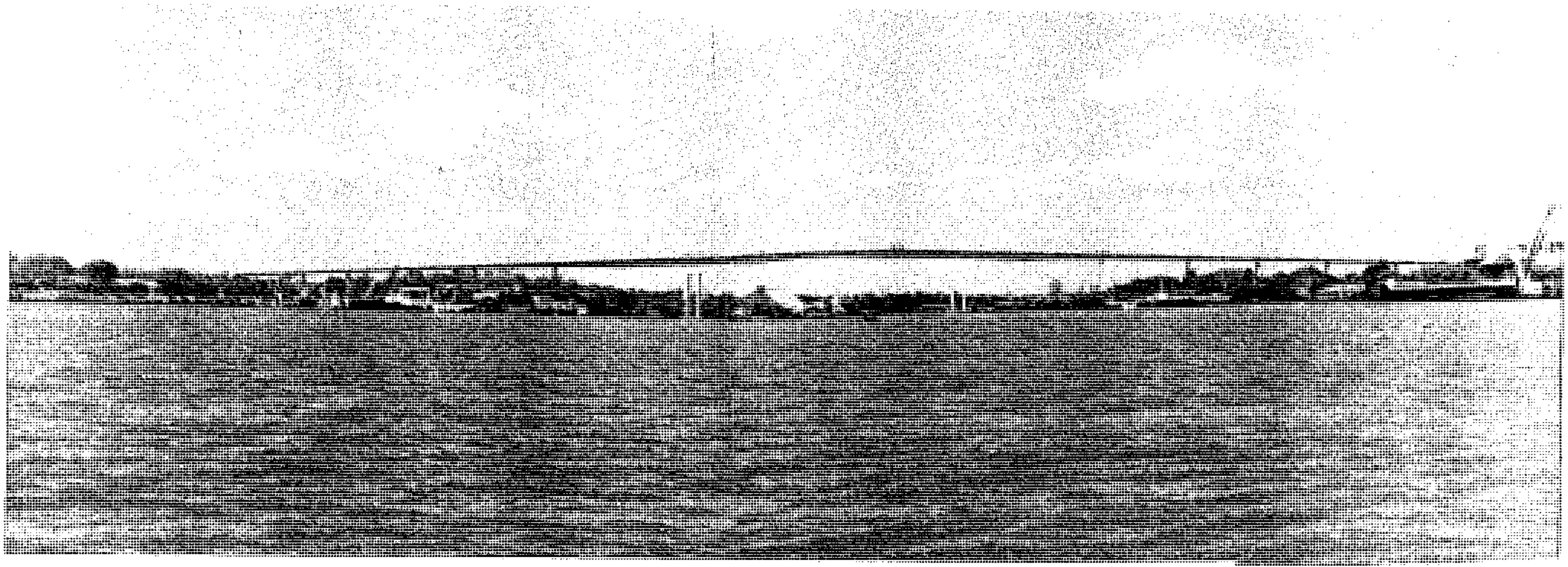
The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE:

PLAN NUMBER:

HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity



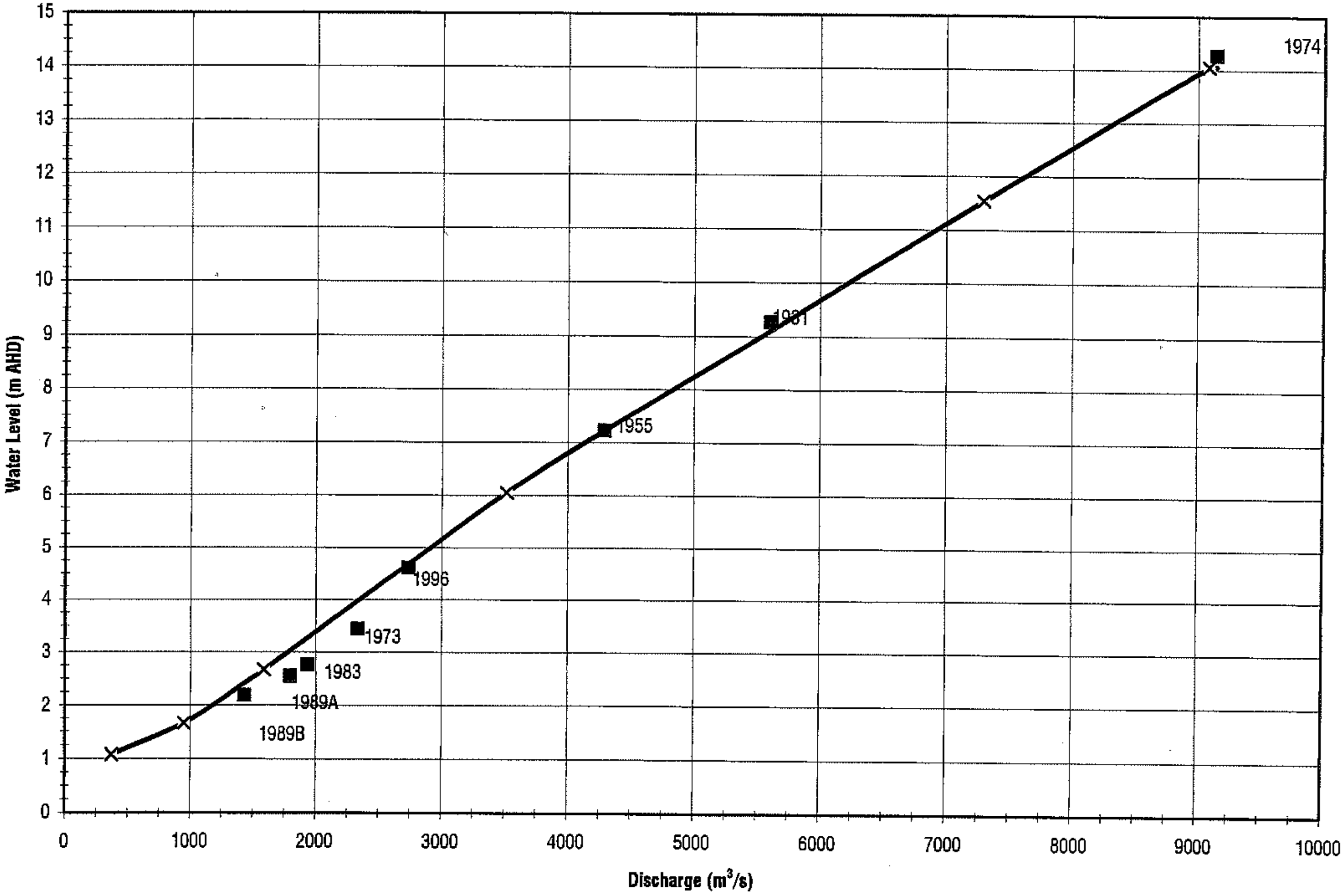
STRUCTURE 8-GATEWAY BRIDGE (LOOKING UPSTREAM)

Appendix L - Rating Curves at Structures

Centenary Bridge
CH 1028.72

Q (m³/s)	Design WL (m AHD)
371	1.08
949	1.66
1587	2.67
3516	6.05
7294	11.54
9085	14.06

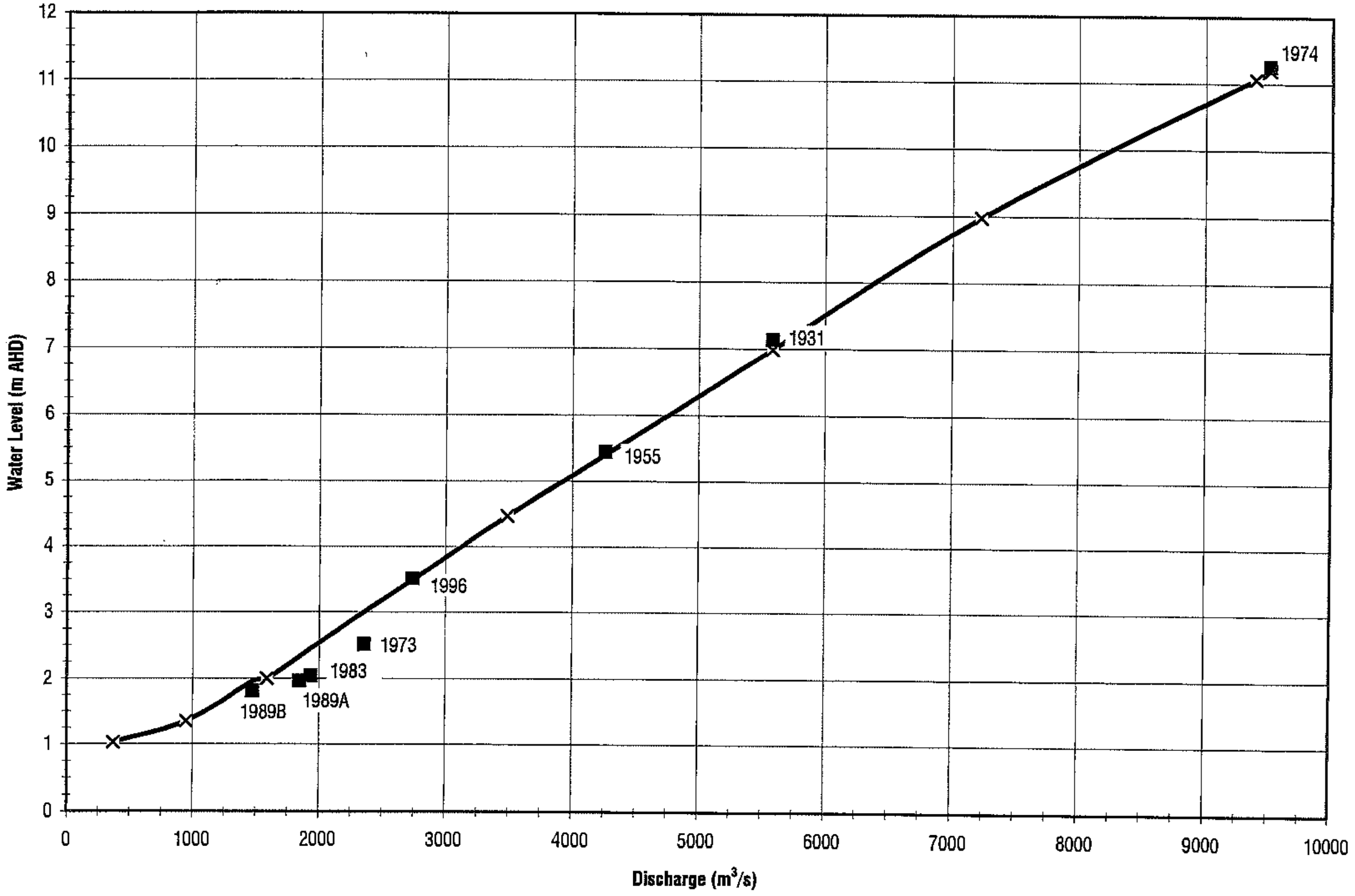
Figure L-1 - Centenary Bridge Rating Curve (CH 1028.72 km)



Indooroopilly Bridge
1037.11

Q (m^3/s)	Design WL (m AHD)
372	1.03
949	1.35
1587	2
3487	4.47
7227	8.98
9392	11.07

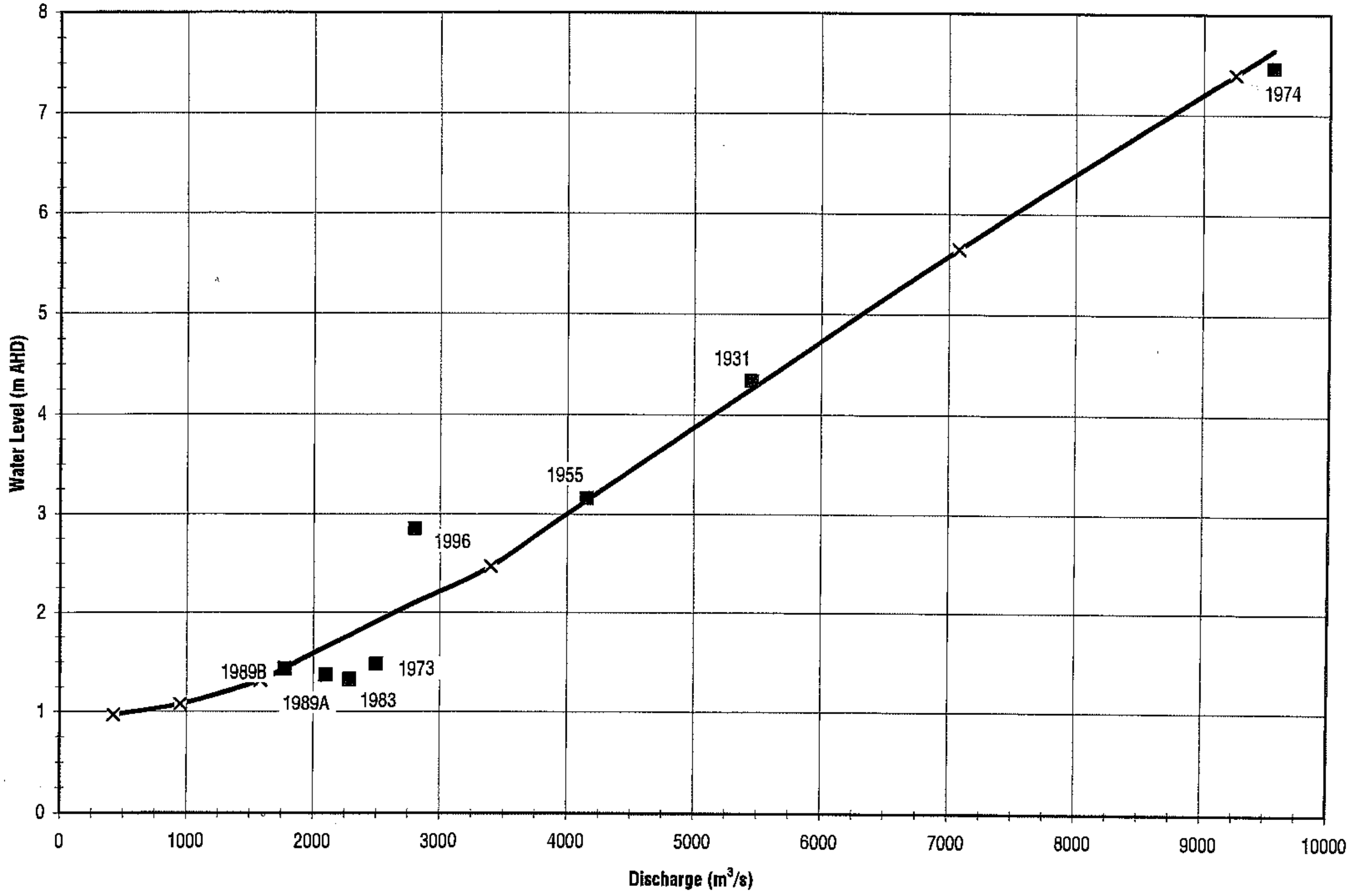
Figure L-2 - Indooroopilly Bridge Rating Curve (CH 1037.11 km)



Merivale Bridge
1052.37

Q (m^3/s)	Design WL (m AHD)
423	0.97
949	1.08
1586	1.32
3397	2.49
7079	5.65
9250	7.40

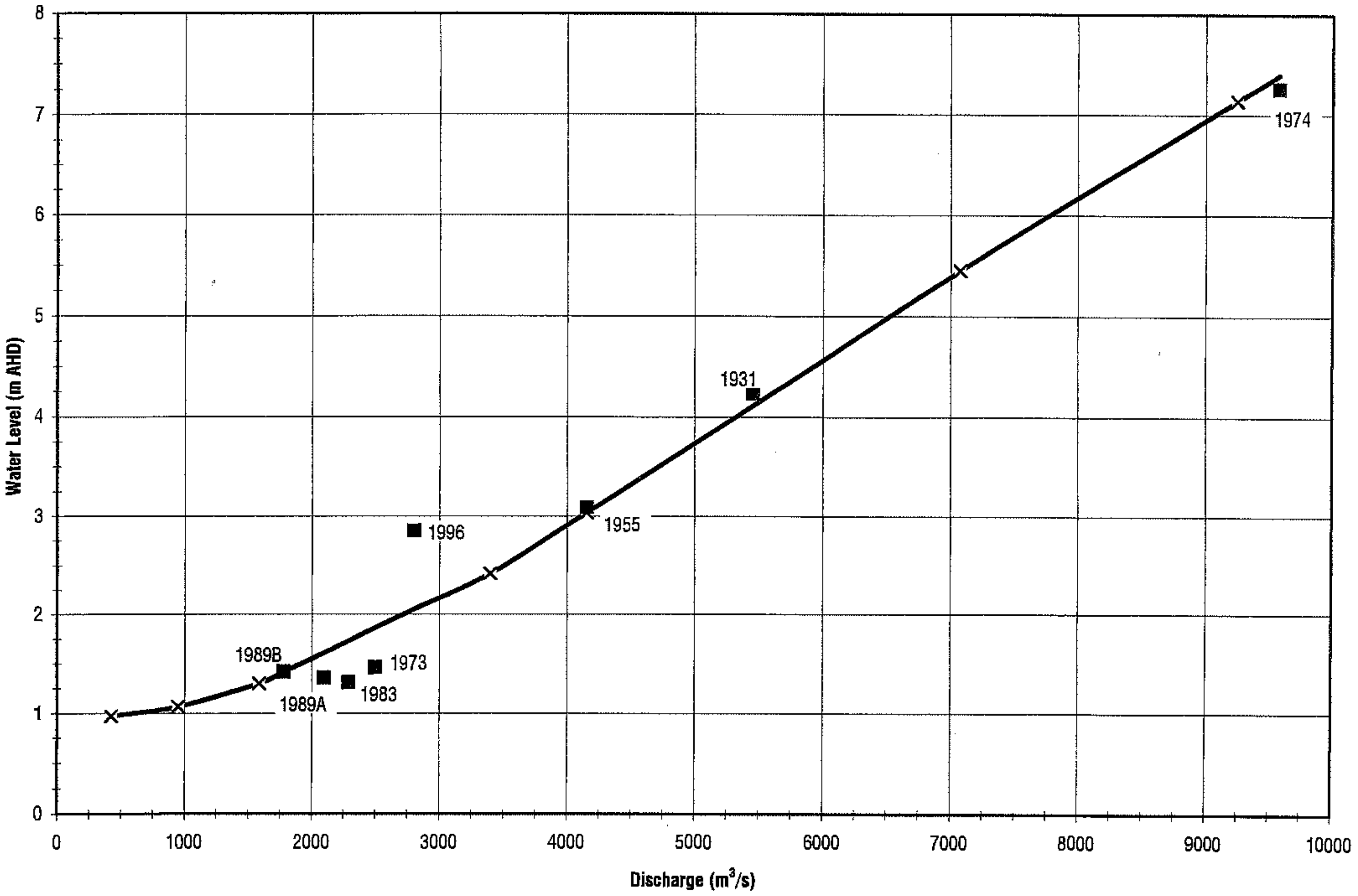
Figure L-3 - Merivale Bridge Rating Curve (CH 1052.37 km)



William Jolly Bridge
1052.625

Q (m^3/s)	Design WL (m AHD)
423	0.97
949	1.07
1586	1.30
3397	2.42
7074	5.45
9248	7.14

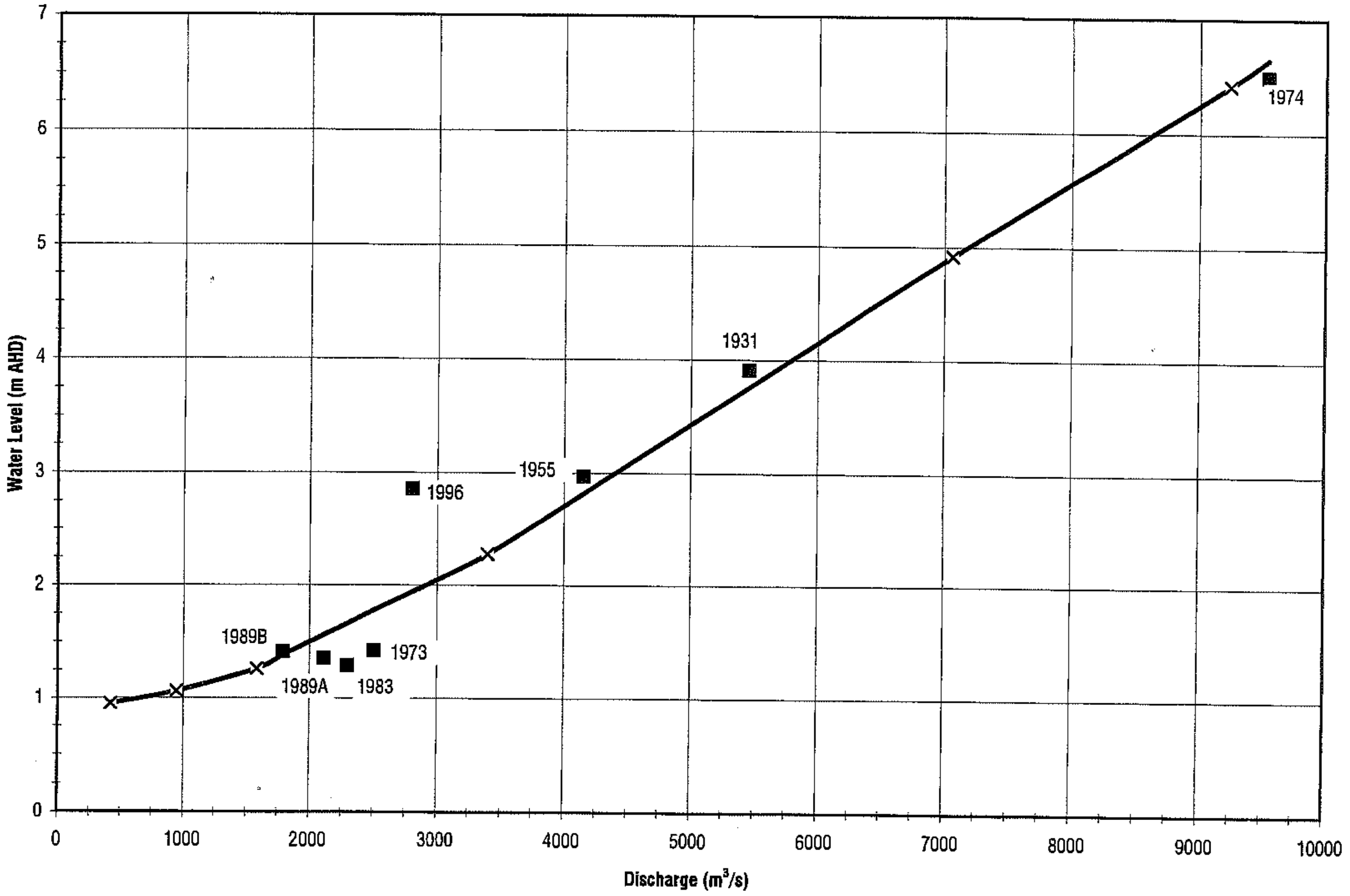
Figure L-4 - William Jolly Bridge Rating Curve (CH 1052.63 km)



Victoria Bridge
1053.355

Q (m^3/s)	Design WL (m AHD)
423	0.95
949	1.06
1586	1.26
3397	2.28
7066	4.92
9240	6.42

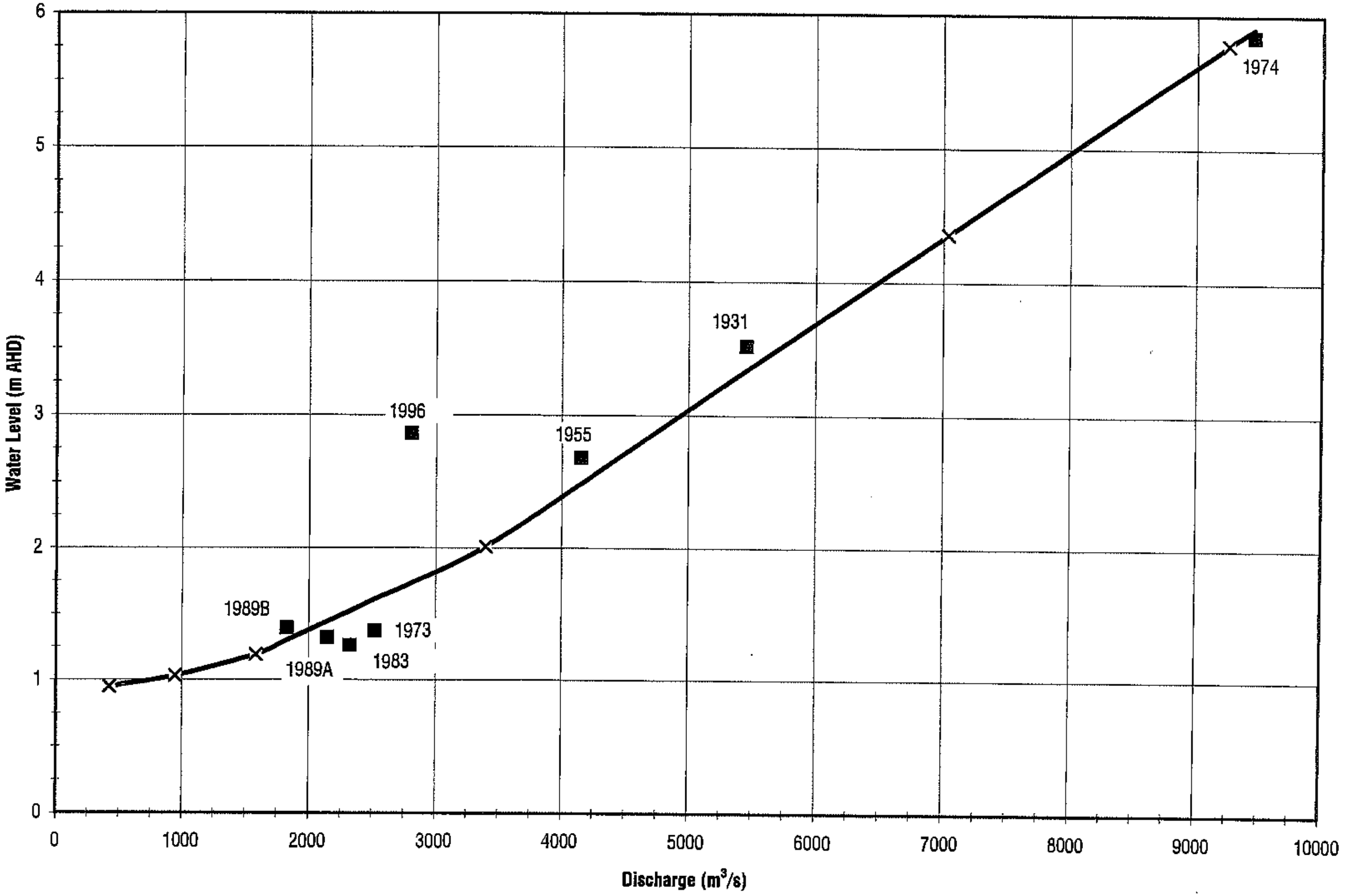
Figure L-5 - Victoria Bridge Rating Curve (CH 1053.36 km)



Captain Cook Bridge
1054.66

Q (m^3/s)	Design WL (m AHD)
424	0.95
949	1.03
1586	1.19
3397	2.01
7039	4.36
9253	5.78

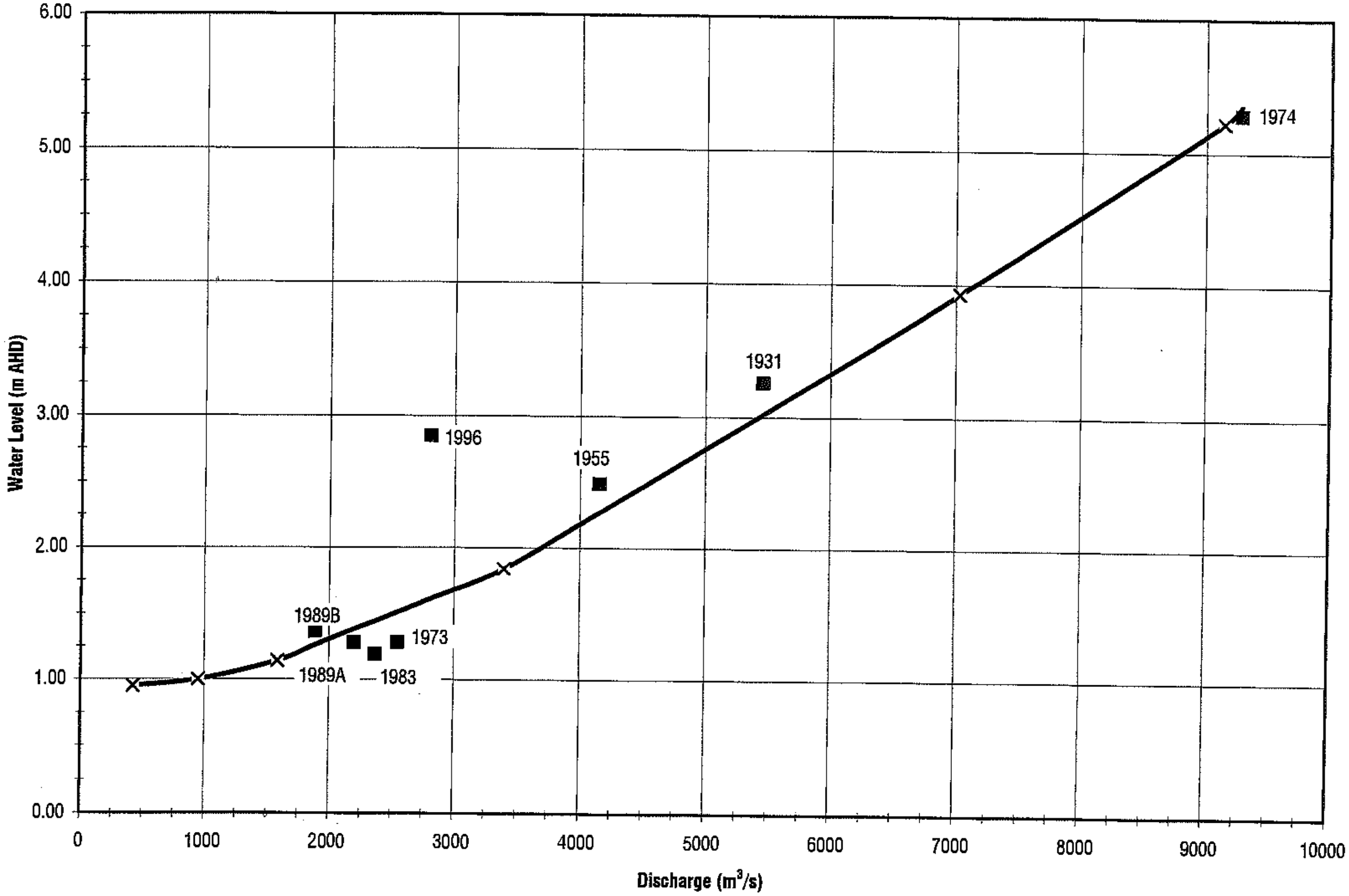
Figure L-6 - Captain Cook Bridge Rating Curve (CH 1054.66 km)



Story Bridge
1056.92

Q (m^3/s)	Design WL (m AHD)
424	0.95
950	1.00
1586	1.14
3397	1.84
7028	3.93
9143	5.22

Figure L-7 - Story Bridge Rating Curve (CH 1056.92 km)



Appendix M - Flood Forecasting Model Results

TABLE M-1 - Flood Forecasting Model Results

			1996 Flood Event					100 Year ARI Event		
MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	Small "n" MIKE 11 WL (m AHD)	Small "n" FF Model WL (m AHD)	Small "n" Difference (m)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)	Large "n" MIKE 11 WL (m AHD)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)
1000	78.66	BN 2020	9.49	9.5	0.01	9.9	0.41	22.76	22.76	0.00
1000.285	78.375	BN 2010	9.40	9.41	0.01	9.82	0.42	22.57	22.57	0.00
1000.775	77.885	BN 2000	9.23	9.24	0.01	9.68	0.45	22.29	22.29	0.00
1001.315	77.345	BN 1990	9.09	9.1	0.01	9.58	0.49	22.20	22.20	0.00
1001.865	76.795	BN 1980	8.84	8.85	0.01	9.38	0.54	21.68	21.68	0.00
1002.35	76.310	BN 1970	8.57	8.58	0.01	9.19	0.62	21.48	21.48	0.00
1002.785	75.875	BN 1960	8.47	8.48	0.01	9.15	0.68	21.46	21.46	0.00
1003.275	75.385	BN 1950	8.25	8.26	0.01	8.99	0.74	21.13	21.13	0.00
1003.775	74.885	BN 1940	8.06	8.07	0.01	8.84	0.78	20.86	20.86	0.00
1004.3	74.360	BN 1930	7.80	7.82	0.02	8.62	0.82	20.41	20.41	0.00
1004.81	73.850	BN 1920	7.68	7.69	0.01	8.53	0.85	20.37	20.38	0.01
1005.325	73.335	BN 1910	7.53	7.55	0.02	8.41	0.88	20.20	20.20	0.00
1005.87	72.790	BN 1900	7.38	7.39	0.01	8.23	0.85	19.89	19.89	0.00
1006.3	72.360	BN 1890	7.37	7.39	0.02	8.17	0.80	19.72	19.72	0.00
1006.91	71.750	BN 1880	7.27	7.28	0.01	8	0.73	19.51	19.51	0.00
1007.41	71.250	BN 1870	7.21	7.22	0.01	7.91	0.70	19.48	19.48	0.00
1007.92	70.740	BN 1860	7.04	7.05	0.01	7.75	0.71	19.19	19.19	0.00
1008.445	70.215	BN 1850	6.99	7.01	0.02	7.66	0.67	19.02	19.02	0.00
1008.925	69.735	BN 1840	6.93	6.95	0.02	7.61	0.68	18.96	18.96	0.00
1009.4	69.260	BN 1830	6.85	6.87	0.02	7.54	0.69	18.86	18.86	0.00
1009.72	68.940	BN 1820	6.81	6.83	0.02	7.51	0.70	18.85	18.85	0.00
1010.49	68.170	BN 1810	6.65	6.67	0.02	7.37	0.72	18.50	18.50	0.00
1010.725	67.935	BN 1800	6.65	6.66	0.01	7.37	0.72	18.52	18.52	0.00
1010.98	67.680	BN 1790	6.60	6.62	0.02	7.33	0.73	18.44	18.44	0.00
1011.51	67.150	BN 1780	6.54	6.56	0.02	7.28	0.74	18.43	18.43	0.00
1011.98	66.680	BN 1770	6.47	6.49	0.02	7.22	0.75	18.43	18.43	0.00
1012.475	66.185	BN 1760	6.39	6.41	0.02	7.14	0.75	18.33	18.33	0.00
1012.935	65.725	BN 1750	6.32	6.34	0.02	7.07	0.75	18.22	18.22	0.00
1013.445	65.215	BN 1740	6.26	6.28	0.02	7.01	0.75	18.14	18.14	0.00
1013.91	64.750	BN 1730	6.19	6.21	0.02	6.94	0.75	18.08	18.08	0.00
1014.31	64.350	BN 1720	6.11	6.13	0.02	6.87	0.76	18.05	18.05	0.00
1014.61	64.050	BN 1710	6.06	6.08	0.02	6.82	0.76	18.08	18.08	0.00
1015.09	63.570	BN 1700	6.05	6.07	0.02	6.8	0.75	17.94	17.95	0.01
1015.56	63.100	BN 1690	5.97	6	0.03	6.73	0.76	17.81	17.81	0.00
1016.14	62.520	BN 1680	5.91	5.94	0.03	6.67	0.76	17.71	17.72	0.01
1016.64	62.020	BN 1670	5.80	5.82	0.02	6.57	0.77	17.62	17.62	0.00
1017.13	61.530	BN 1660	5.66	5.68	0.02	6.4	0.74	17.39	17.39	0.00
1017.61	61.050	BN 1650	5.56	5.58	0.02	6.23	0.67	17.26	17.26	0.00
1017.92	60.740	BN 1640	5.48	5.51	0.03	6.12	0.64	17.10	17.10	0.00
1018.2	60.460	BN 1630	5.49	5.51	0.02	6.08	0.59	17.02	17.03	0.01
1018.725	59.935	BN 1620	5.42	5.45	0.03	5.96	0.54	16.69	16.70	0.01
1019.095	59.565	BN 1610	5.37	5.39	0.02	5.86	0.49	16.56	16.56	0.00
1019.49	59.170	BN 1600	5.33	5.36	0.03	5.78	0.45	16.45	16.45	0.00
1019.865	58.795	BN 1590	5.28	5.31	0.03	5.68	0.40	16.15	16.15	0.00
1020.115	58.545	BN 1580	5.28	5.3	0.02	5.64	0.36	16.25	16.25	0.00
1020.525	58.135	BN 1570	5.27	5.3	0.03	5.6	0.33	16.22	16.22	0.00
1020.83	57.830	BN 1560	5.23	5.25	0.02	5.53	0.30	16.07	16.07	0.00
1021.095	57.565	BN 1550	5.16	5.19	0.03	5.45	0.29	15.86	15.86	0.00
1021.539	57.121	BN 1540	5.10	5.13	0.03	5.33	0.23	15.69	15.69	0.00
1021.715	56.945	BN 1530	5.10	5.13	0.03	5.31	0.21	15.72	15.72	0.00
1021.895	56.765	BN 1520	5.09	5.12	0.03	5.28	0.19	15.65	15.65	0.00
1022.105	56.555	BN 1510	5.09	5.11	0.02	5.26	0.17	15.53	15.53	0.00
1022.575	56.085	BN 1500	5.02	5.05	0.03	5.18	0.16	15.45	15.46	0.01
1023.04	55.620	BN 1490	4.92	4.95	0.03	5.1	0.18	15.21	15.21	0.00
1023.57	55.090	BN 1480	4.88	4.91	0.03	5.08	0.20	15.12	15.12	0.00
1024.08	54.580	BN 1470	4.81	4.84	0.03	5.02	0.21	15.07	15.07	0.00
1024.563	54.097	BN 1460	4.72	4.75	0.03	4.94	0.22	15.01	15.01	0.00
1025.07	53.590	BN 1450	4.67	4.7	0.03	4.88	0.21	14.91	14.91	0.00
1025.36	53.300	BN 1440	4.60	4.64	0.04	4.81	0.21	14.77	14.77	0.00
1025.59	53.070	BN 1430	4.54	4.57	0.03	4.74	0.20	14.61	14.61	0.00
1026.17	52.490	BN 1420	4.51	4.54	0.03	4.7	0.19	14.48	14.49	0.01
1026.68	51.980	BN 1410	4.43	4.46	0.03	4.61	0.18	14.38	14.38	0.00
1026.9	51.760	BN 1400	4.38	4.42	0.04	4.56	0.18	14.25	14.25	0.00
1027.16	51.500	BN 1390	4.35	4.39	0.04	4.52	0.17	14.11	14.11	0.00
1027.68	50.980	BN 1380	4.32	4.36	0.04	4.5	0.18	14.17	14.17	0.00
1028.18	50.480	BN 1370	4.27	4.31	0.04	4.48	0.21	14.19	14.20	0.01
1028.68	49.980	BN 1360	4.17	4.21	0.04	4.43	0.26	14.06	14.06	0.00
1028.72	49.940	BN1350								
1028.76	49.900	BN 1340	4.08	4.12	0.04	4.35	0.27	13.91	13.91	0.00
1029.2	49.460	BN 1330	3.98	4.03	0.05	4.29	0.31	13.80	13.80	0.00

TABLE M-1 - Flood Forecasting Model Results

			1996 Flood Event					100 Year ARI Event		
MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	Small "n" MIKE 11 WL (m AHD)	Small "n" FF Model WL (m AHD)	Small "n" Difference (m)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)	Large "n" MIKE 11 WL (m AHD)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)
1029.68	48.980	BN 1320	3.95	3.99	0.04	4.28	0.33	13.82	13.82	0.00
1030.22	48.440	BN 1310	3.89	3.93	0.04	4.26	0.37	13.82	13.82	0.00
1030.87	47.790	BN 1300	3.79	3.84	0.05	4.23	0.44	13.75	13.75	0.00
1031.26	47.400	BN 1290	3.71	3.76	0.05	4.18	0.47	13.59	13.59	0.00
1031.7	46.960	BN 1280	3.59	3.65	0.06	4.04	0.45	13.21	13.21	0.00
1031.995	46.665	BN 1270	3.60	3.65	0.05	3.99	0.39	13.31	13.31	0.00
1032.23	46.430	BN 1260	3.57	3.62	0.05	3.94	0.37	13.18	13.18	0.00
1032.585	46.075	BN 1250	3.52	3.57	0.05	3.85	0.33	12.94	12.94	0.00
1033.08	45.580	BN 1240	3.48	3.54	0.06	3.79	0.31	12.79	12.79	0.00
1033.37	45.290	BN 1230	3.43	3.49	0.06	3.73	0.30	12.68	12.68	0.00
1033.9	44.760	BN 1220	3.35	3.41	0.06	3.65	0.30	12.45	12.45	0.00
1034.37	44.290	BN 1210	3.29	3.35	0.06	3.6	0.31	12.29	12.29	0.00
1034.89	43.770	BN 1200	3.23	3.29	0.06	3.53	0.30	12.19	12.19	0.00
1035.414	43.246	BN 1190	3.15	3.21	0.06	3.42	0.27	11.94	11.94	0.00
1035.9	42.760	BN 1180	3.06	3.12	0.06	3.29	0.23	11.65	11.66	0.01
1036.46	42.200	BN 1170	2.98	3.05	0.07	3.17	0.19	11.35	11.35	0.00
1036.77	41.890	BN 1160	2.95	3.02	0.07	3.11	0.16	11.28	11.28	0.00
1036.915	41.745	BN 1150	2.92	2.99	0.07	3.06	0.14	11.12	11.12	0.00
1037.09	41.570	BN 1140	2.93	2.99	0.06	3.06	0.13	11.07	11.07	0.00
1037.11	41.550	BN 1130								
1037.175	41.485	BN 1120	2.79	2.86	0.07	2.93	0.14	10.98	10.98	0.00
1037.285	41.375	BN 1110	2.77	2.84	0.07	2.9	0.13	10.93	10.93	0.00
1037.625	41.035	BN 1100	2.73	2.81	0.08	2.86	0.13	10.91	10.91	0.00
1038.085	40.575	BN 1090	2.72	2.79	0.07	2.85	0.13	10.93	10.93	0.00
1038.6	40.060	BN 1080	2.63	2.71	0.08	2.8	0.17	10.91	10.91	0.00
1039.1	39.560	BN 1070	2.54	2.62	0.08	2.77	0.23	10.90	10.90	0.00
1039.565	39.095	BN 1060	2.49	2.57	0.08	2.76	0.27	10.92	10.92	0.00
1040.09	38.570	BN 1050	2.46	2.55	0.09	2.76	0.30	10.84	10.84	0.00
1040.49	38.170	BN 1040	2.40	2.48	0.08	2.71	0.31	10.71	10.71	0.00
1041.01	37.650	BN 1030	2.38	2.46	0.08	2.71	0.33	10.74	10.75	0.01
1041.23	37.430	BN 1020	2.36	2.44	0.08	2.68	0.32	10.71	10.71	0.00
1041.46	37.200	BN 1010	2.32	2.4	0.08	2.64	0.32	10.62	10.62	0.00
1041.7	36.960	BN 1000	2.32	2.4	0.08	2.64	0.32	10.59	10.59	0.00
1041.96	36.700	BN 990	2.27	2.34	0.07	2.58	0.31	10.45	10.45	0.00
1042.235	36.425	BN 980	2.21	2.29	0.08	2.53	0.32	10.30	10.30	0.00
1042.515	36.145	BN 970	2.20	2.28	0.08	2.52	0.32	10.29	10.29	0.00
1042.91	35.750	BN 960	2.12	2.19	0.07	2.44	0.32	10.22	10.23	0.01
1043.725	34.935	BN 950	1.94	2.01	0.07	2.28	0.34	9.91	9.91	0.00
1044.06	34.600	BN 940	1.91	1.98	0.07	2.24	0.33	9.75	9.75	0.00
1044.34	34.320	BN 930	1.86	1.92	0.06	2.18	0.32	9.58	9.59	0.01
1044.605	34.055	BN 920	1.84	1.9	0.06	2.15	0.31	9.53	9.53	0.00
1044.86	33.800	BN 910	1.81	1.87	0.06	2.11	0.30	9.49	9.50	0.01
1045.4	33.260	BN 900	1.73	1.79	0.06	2.01	0.28	9.31	9.31	0.00
1045.885	32.775	BN 890	1.71	1.72	0.01	1.9	0.19	9.17	9.17	0.00
1046.18	32.480	BN 880	1.71	1.72	0.01	1.89	0.18	9.09	9.09	0.00
1046.34	32.320	BN 870	1.71	1.72	0.01	1.88	0.17	9.02	9.02	0.00
1046.58	32.080	BN 860	1.70	1.72	0.02	1.85	0.15	8.97	8.97	0.00
1046.9	31.760	BN 850	1.70	1.71	0.01	1.77	0.07	8.78	8.78	0.00
1047.35	31.310	BN 840	1.70	1.71	0.01	1.72	0.02	8.41	8.41	0.00
1047.915	30.745	BN 830	1.70	1.71	0.01	1.72	0.02	8.17	8.17	0.00
1048.375	30.285	BN 820	1.69	1.7	0.01	1.72	0.03	8.23	8.24	0.01
1048.89	29.770	BN 810	1.69	1.7	0.01	1.71	0.02	8.00	8.00	0.00
1049.12	29.540	BN 800	1.69	1.7	0.01	1.71	0.02	7.94	7.94	0.00
1049.37	29.290	BN 790	1.69	1.69	0.00	1.71	0.02	7.75	7.76	0.01
1049.59	29.070	BN 780	1.68	1.69	0.01	1.7	0.02	7.74	7.74	0.00
1049.87	28.790	BN 770	1.68	1.69	0.01	1.7	0.02	7.63	7.63	0.00
1050.43	28.230	BN 760	1.68	1.68	0.00	1.7	0.02	7.61	7.61	0.00
1050.86	27.800	BN 750	1.67	1.68	0.01	1.69	0.02	7.46	7.46	0.00
1051.36	27.300	BN 740	1.67	1.68	0.01	1.69	0.02	7.46	7.46	0.00
1051.895	26.765	BN 730	1.67	1.67	0.00	1.68	0.01	7.30	7.30	0.00
1052.31	26.350	BN 720	1.66	1.67	0.01	1.68	0.02	7.40	7.41	0.01
1052.37	26.290	BN 710								
1052.39	26.270	BN 700	1.66	1.66	0.00	1.68	0.02	7.23	7.23	0.00
1052.595	26.065	BN 690	1.66	1.66	0.00	1.67	0.01	7.14	7.14	0.00
1052.607	26.053	BN 680								
1052.64	26.020	BN 670	1.65	1.66	0.01	1.67	0.02	6.63	6.63	0.00
1052.865	25.795	BN 660	1.65	1.66	0.01	1.67	0.02	6.49	6.49	0.00
1053.32	25.340	BN 650	1.65	1.65	0.00	1.67	0.02	6.42	6.42	0.00
1053.356	25.304	BN 640								
1053.385	25.275	BN630	1.65	1.65	0.00	1.66	0.01	6.24	6.24	0.00

Appendix N - Community Consultation Information Bulletins/Questionnaires

SINCLAIR KNIGHT MERZ

Brisbane City Council
June 1998

Brisbane River Flood Study

FINAL REPORT
Volume 1

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Acknowledgments

Sinclair Knight Merz would like to thank the following organisations for their assistance throughout this study.

Department of Natural Resources (DNR)
Bureau of Meteorology (BOM)
South East Queensland Water Board (SEQWB)

In particular, we would like to thank Terry Malone (BOM), John Ruffini (DNR) and Garry Grant (SEQWB) for without their help and supply of information our task would have been much more difficult.

Executive Summary

Executive Summary

Sinclair Knight Merz were commissioned on the 5 November 1996 by Brisbane City Council to undertake a flood study of Brisbane River.

The **primary objectives** of the study were;

☐ to provide technically based flood development levels along the length of the Brisbane River within the confines of the Brisbane City Boundary, and

☐ develop a Flood Forecasting Model.

The **secondary objectives** of the study were to;

☐ set flood regulation lines, and

☐ to develop a revegetation strategy compatible with hydraulic constraints.

The modelling and investigation undertaken in this study will form the basis for a floodplain management strategy for the Brisbane River.

The study involved the collection and analysis of available rainfall, survey and hydrographic data. Using this data a hydrologic and hydraulic model was developed, calibrated and tested using four historical flood events. These floods were;

☐ January 1974

☐ May 1996

☐ June 1983 and

☐ Late April 1989

Following calibration, the models were then verified against the following historical events:

☐ February 1931

☐ March 1955

☐ Early April 1989 and

☐ July 1973

Data for the February 1931 and March 1955 historical events was not available during the calibration/verification phase of the study and verification of these events was performed at a later date.

The hydrologic modelling has been carried out using the XP-RAFTS hydrologic model. This model converts rainfall to runoff after considering catchment storage effects and losses.

The MIKE 11 hydrodynamic hydraulic model was selected for the hydraulic analysis.

Calibration of the hydrologic and hydraulic models has been carried out in parallel to ensure the river storage in the two models is consistent. Parameters within the hydrologic model were adjusted until a good match between continuous historical streamflow records and predicted streamflows were achieved. These flows were then used in the hydraulic model and calibration was conducted until predicted flood levels provided a good match between continuous historical flood level data and peak flood levels. The discharge hydrographs routed through MIKE 11 were then compared to the discharge hydrographs produced by RAFTS. This process was repeated until the peak discharges of the hydrographs produced by each model were consistent to within 10%.

The MIKE 11 hydraulic model was calibrated to recorded historical flood levels primarily through variation of Manning's n roughness parameters along the river.

Good calibration of both the hydrologic and hydraulic models have been obtained. These results were achieved on the basis of;

- maintaining realistic rainfall loss rates over the entire catchment
- maintaining realistic river roughness parameters representative of the current river configuration and
- obtaining a satisfactory hydraulic performance of the major structures.

An analysis of design storm events was then performed to establish design flood characteristics in the Brisbane River using the calibrated hydrologic RAFTS model and the hydraulic MIKE 11 model. A range of varying average recurrence intervals from 2 year ARI through to Probable Maximum Precipitation were analysed.

The hydrologic analysis was performed for existing catchment conditions to determine inflow hydrographs for the calculation of design flood profiles for the Brisbane River. These design events were analysed assuming simplified operations of Wivenhoe and Somerset Dams as RAFTS cannot model the complex operations associated with these dams. The design flood profiles have been prepared using MIKE 11. The tabulated results from these profiles provide peak flood levels and discharges at each cross section within the extent of the hydraulic model (river mouth to upstream city boundary).

Major hydraulic structures along the Brisbane River were assessed individually and it was found that three of these structures generated affluxes in excess of the 150 mm for the 100 year ARI flood event. It was concluded that no upgrades of these structures should occur due to the high costs involved in undertaking such a project.

The waterway management component of this study required application of the hydraulic model of the Brisbane River to delineate flood regulation lines, determine a revegetation strategy and to assess stream rehabilitation.

Regulation Line Strategy
Regulation lines are used by Council as a control on development encroaching onto the floodplains of major rivers and creeks. They are set to ensure that works such as placement of fill does not compromise existing flood immunity.

As no interim regulation lines were in place for the Brisbane River, regulation lines were set using the calibrated hydraulic MIKE 11 model. This work was principally based on the 'worst case' design scenario of the 100 year ARI flood event with regulation lines and revegetation strategy in place.

Revegetation Strategy
A revegetation strategy for the Brisbane River (river mouth to upper city boundary) has been developed which complies with the current Strategic Plan for the Management of Brisbane Waterways. The testing was conducted using the 100 year ARI design flood.

The approach taken was generally to adhere to the interim Waterway Corridor widths for the Brisbane River. These widths are generally practical in terms of width of river corridor to private property boundaries. They also provide a sufficient width to act as wildlife corridors.

The proposed revegetation strategy applies to areas both within and beyond the waterway corridors. Tree planting has been proposed and tested for areas beyond the waterway corridor as private landholders may revegetate these areas. It has been assumed that this will create the worst case scenario.

All proposed revegetation has been tested by adding 0.15 to existing case Manning's n roughness parameters as this was assumed to be the worst case tree planting density. The maximum increase in flood levels throughout the reach due to proposed revegetation was predicted to be 20 mm.

In some reaches several solutions to the regulation line location and the revegetation strategy satisfy the hydraulic constraints. In these areas the most practical solution was adopted considering planning, environmental and economic criteria.

A flood forecasting model has also been developed for the Brisbane River in conjunction with an assessment of possible escape routes and areas within the city boundary that become isolated during flood events. Since the Brisbane River system is effected by tidal influences, a hydrologic and hydraulic model had to be developed. These models will form an integral part of the PROPHET flood warning system that will enable the forecasting of flood levels at key locations on the Brisbane River. These models require rainfall information from radio telemetry gauges within the confines of the city boundary and inflow hydrographs provided by the DNR at the upstream Brisbane City Boundary and Bremer River inflow points. These hydrographs account for the complex dam operations that cannot be simply modelled by the RAFTS hydrologic model.

A flood contouring exercise was conducted using MIKE 11 predicted flood levels and super-elevation formula to produce a two dimensional flood surface along the hydraulic reach of the Brisbane River. Initially it was proposed that the two dimensional hydrodynamic model FastTABS would be used to post process one dimensional results generated by MIKE 11 to produce these contours however due to the size of the river, FastTABS was unable cope with the amount of digital terrain data that was required to complete this process.

Finally a community consultation process was conducted during the course of the study. An Information Bulletin/Questionnaire was distributed to 13 community groups offering these groups the opportunity to respond to a survey which was primarily concerned with the revegetation and rehabilitation of the river corridor. The response from the community groups was considered to be poor however 100% of the respondents agree with revegetation of the river corridor.

1. Introduction

1. Introduction

The Brisbane River Flood Study is a major initiative of the Brisbane City Council to establish design flood levels along the lower reach of Brisbane River. Additional outcomes of the investigation shall be the setting of flood regulation lines, a revegetation strategy compatible with hydraulic constraints and a flood forecasting model.

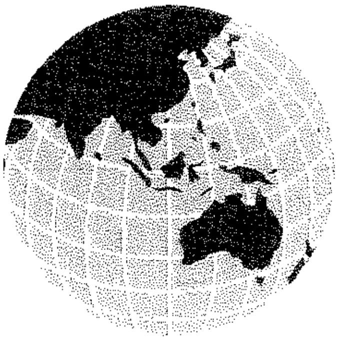
This is the final report which comprises the four (4) progress reports generated throughout the study. These progress reports consisted of:

☐ Calibration Report

☐ Design Event Report

☐ Waterway Management Report

☐ Flood Mapping Report.



2. Catchment Description

2. Catchment Description

The extent of the Brisbane River catchment is shown in **Figure 2-1 - Locality Plan**. It covers an area of 13 570 square kilometres and is bounded to the west by the Great Dividing Range and by a number of smaller coastal ranges to the east and north. Most of the catchment comprises of forest and grazing land, with the exception of the Brisbane - Ipswich metropolitan areas and numerous small rural townships.

Cooyar Creek, Emu Creek and Cressbrook Creek are the main tributaries of the upper Brisbane River and have headwaters in the Great Dividing Range. Cooyar Creek is the most northerly of the upper Brisbane River tributaries and tends to have the lowest annual rainfalls recorded within the catchment.

The Stanley River is the only major tributary of the Brisbane River that flows westwards and its source is the Conandale and D'Aguilar Ranges near the coast. This part of the Brisbane River catchment is relatively steep and receives the highest rainfall.

Lockyer Creek is the largest tributary of the Brisbane River in terms of catchment size, with a total area of 2 600 square kilometres. The lower floodplains of the Lockyer Valley are used for intensive agriculture, including vegetables and small crops. The hilly upper parts of the catchment to the south and west is mainly forest.

The Bremer River occupies the south west corner of the Brisbane Valley and has its headwaters in the Little Liverpool Range. Its catchment is generally hilly and lightly forested. A major tributary of the Bremer River is Warrill Creek. The lower reaches of the Bremer River flow through the City of Ipswich.

The Brisbane River and its major tributaries are regulated by several dams and reservoirs. A list of major dam structures is given in **Table 2-1 - Major Dams in the Brisbane Valley**. The largest storages are associated with Somerset Dam and Wivenhoe Dam.

Table 2-1 - Major Dams in the Brisbane Valley

Damsite	River/Creek	Year of Completion	Capacity at Full Supply Level (ML)
Wivenhoe	Brisbane	1985	1 150 000
Somerset	Stanley	1959	369 750
Cressbrook	Cressbrook	1982	78 300
Perseverance	Perseverance	1965	30 300
Atkinson	Buaraba	1970	31 300
Lake Manchester	Cabbage Tree	1916	25 700
Mt Crosby Weir	Brisbane	1901	2 590
Moongerah Dam	Reynolds	1961	92 500
Enoggera Creek	Enoggera	1866	4 500

Somerset Dam is a multi-purpose dam owned by the South East Queensland Water Board and operated by Brisbane City Council. It supplies water for Brisbane, Ipswich and adjacent shires, has a limited power generation capacity and is also used for recreation purposes. A major role of the dam is for flood mitigation and a temporary flood storage of 524 000 ML is available.

Wivenhoe Dam is the largest dam structure in the Brisbane Valley and commands about half of the total Brisbane River catchment. It has a major effect on river hydrology due to its large flow regulation capacity. About 1 450 000 ML of flood storage is available at the dam.

For the purpose of hydrologic modelling the Brisbane River catchment can be divided into six broad subcatchments. The boundary of each subcatchment; defined as Upper Brisbane, Somerset, Wivenhoe, Lockyer, Bremer and Lower Brisbane, are shown in **Figure 2-2 - Brisbane River Subcatchments**

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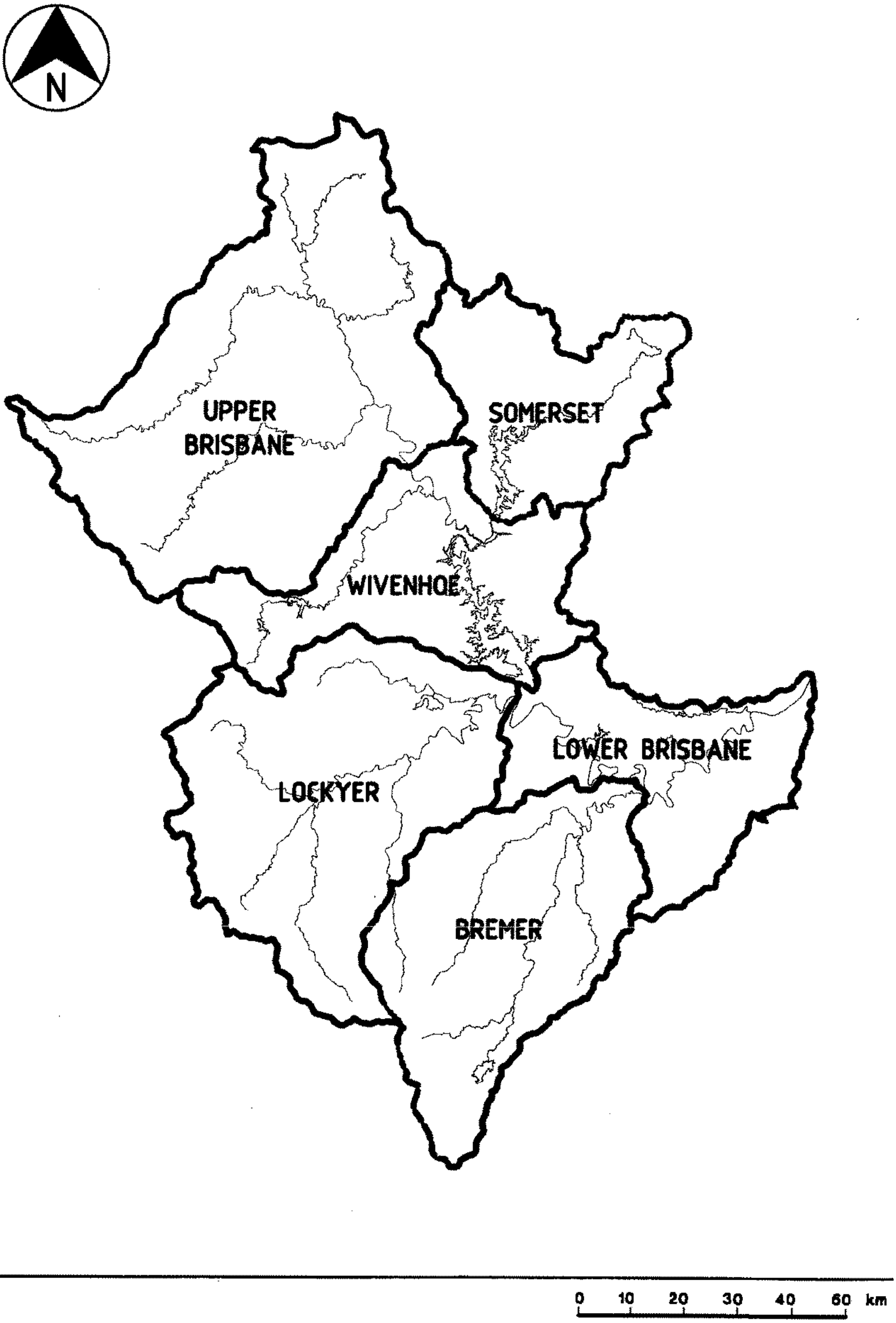
FIGURE 2.2

BRISBANE RIVER FLOOD STUDY
BRISBANE RIVER SUBCATCHMENTS



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3. Available Data

3. Available Data

3.1 Stream Gauges

Available Stream Gauges

Recorded flood hydrographs at key locations in the Brisbane River system are required for the purpose of hydrologic model calibration.

The network of stream gauges associated with the Brisbane River catchment is shown in **Figure 3-1 - Stream Gauge Locations** and detailed in **Table 3-1 - Brisbane River Stream Gauge Summary**. Several stream gauges have historical records extending over a period of more than eighty years. The majority of stream recorders were installed during the post 1960 period. Some gauges have been decommissioned including Brisbane River at Middle Creek, Cressbrook Creek at Damsite (both due to dam construction) and Warrill Creek at Kalbar.

Table 3-1 - Brisbane River Stream Gauge Summary

Number	Stream	Site	Record	% Catchment Area
Upper Brisbane River				
143015	Cooyar Creek	Damsite	1968 - date	7
143007	Brisbane River	Linville	1964 - date	15
143010	Emu Creek	Boat Mtn	1976 - date	7
143009	Brisbane River	Gregors Creek	1962 - date	29
143002	Brisbane River	Fulham Vale	1920 - 1965	29
Somerset and Wivenhoe				
143305	Stanley River	Somerset Dam	1935 - date	10
143008	Brisbane River	Middle Creek	1962 - 1982	49
143036	Brisbane River	Wivenhoe Dam	1986 - date	52
143901	Stanley River	Woodford	1918 date	2
143303	Stanley River	Peachester	1927 - date	1
143013	Cressbrook Creek	Damsite	1965 - 1981	2
143006	Tinton	Cressbrook Ck	1928 - 1980	3
143302	Stanley River	Silverton	1919 - 1968	10

Table 3-1 - Brisbane River Stream Gauge Summary (Continued)

Lockyer				
143203	Lockyer Creek	Helidon	1926 - date	3
143212	Tenthill Creek	Tenthill	1968 - date	3
143225	Laidley Creek	Showground	1984 - date	2
143210A	Lockyer Creek	Lyons Bridge	1909 - date	19
143210B	Lockyer Creek	Rifle Range	1988 - date	19
143907	Brisbane River	Lowood	1909 - date	77
143905	Lockyer Creek	Glenore Grove	1955 - date	16
143904	Lockyer Creek	Gatton	1929 - date	12
143204	Lockyer Creek	Wilsons Weir	1953 - 1982	12
143206	Brisbane River	Brightveiw Weir	1953 - 1973	18
Bremer and Lower Brisbane				
143001	Brisbane River	Savages Cross	1909 - date	78
143003	Brisbane River	Mt Crosby	1900 - date	78
143110	Bremer River	Adams Bridge	1968 - date	1
143107	Bremer River	Walloon	1961 - date	5
143102	Warrill Creek	Kalbar	1912 - 1973	3
143108	Warrill Creek	Amberley	1961 - date	7
143113	Purga Creek	Loamside	1973 - date	2
143911	Bremer River	David Trumpy	1893 - date	14
143915	Brisbane River	Moggill	1965 - date	94
143982	Brisbane River	Jindalee	1974?	95
143919	Brisbane River	Port Office	1841 - date	100
143101	Warrill Creek	Mudtapilly	1914 - 1953	6

Note: % catchment area estimated as proportion of total Brisbane River Catchment (equal to 13 570 km^2) upstream of the stream gauge.

Several stream gauges are located in the upper tributaries of the Brisbane River system and command a relatively small fraction of the total catchment draining to the City of Brisbane. About ten gauges have drainage areas less than 5 percent of the total Brisbane Valley catchment and are of secondary importance in the RAFTS model calibration process.

The primary stream gauges used for model calibration purposes include:

☐ Brisbane River at Linville - includes Cooyar Creek and headwaters of Brisbane River.

☐ Brisbane River at Gregors Creek - downstream of Linville and includes streamflows from Emu Creek, Maronghi Creek and Ivory Creek.

- Brisbane River at Middle Creek - is sited downstream of the Stanley River confluence and was closed in August 1982 due to the construction of Wivenhoe Dam. Records since 1959 include the flow regulation effects of Somerset Dam,

- Brisbane River at Lowood - is sited downstream of the confluence of Brisbane River and Lockyer Creek.

- Brisbane River at Savages Crossing and Mt Crosby - are both long term stream gauge sites and are important in isolating flow travel times and channel routing effects along the mid-reach section of the Brisbane River (between the Lockyer Creek and Bremer River junctions).

- Brisbane River at Moggill, Jindalee and Post Office Gauge are downstream of the Bremer River and are located within the coverage of the Brisbane River MIKE 11 model.

- Lockyer Creek at Glenore Grove - accounts for about 85% of the Lockyer Creek catchment (which in turn is of the order of 20% of the total Brisbane River catchment).

- Lockyer Creek at Lyons Bridge and Rifle Range are sited near the Brisbane River. Gauge heights are subject to backwater effects associated with Brisbane River floodwaters.

- Warrill Creek at Amberley measures streamflows at a major tributary of the Bremer River catchment.

- Bremer River at David Trumpy Bridge is located near the Brisbane River and gauge heights are affected by the incidence of flooding within the Brisbane River. The Bremer River catchment contributes to about 15 percent of the total Brisbane River catchment area.

A series of telemetric alert gauges have been established within the catchment for flood warning purposes and are utilised by the Department of Natural Resources and the Bureau of Meteorology. Most of these stream gauges have been installed in the last five years and are also shown in **Figure 3-1 - Stream Gauge Locations**. A listing of selected gauges is given in **Table 3-2 - Brisbane River Flood Alert Gauges**.

Table 3-2 - Brisbane River Flood Alert Gauges

Alert Number	Stream	Site
Upper Brisbane		
6709	Brisbane River	Devon Hills
6515	Brisbane River	Gregors Creek
Somerset and Wivenhoe		
6554	Cressbrook Creek	Rosentreters Bridge
6575	Brisbane River	Caboonbah
Lockyer		
6634	Lockyer Creek	Lyon
21019	Laidley Creek	Thornton
7078	Laidley Creek	Mulgowie
7167	Laidley Creek	Warrego Highway
Bremer and Lower Brisbane		
21025	Western Creek	Kuss Road
7020	Bremer River	Rosewood
6572	Warrill Creek	Harrisville
6740	Purga Creek	Washpool

Note: This table excludes alert stations located in Brisbane metropolitan area.

Stream Gauge Rating Curves

Stage discharge curves are available at the majority of stream gauges and were supplied by the Hydrology Section, Bureau of Meteorology. These rating curves are presented in **Figure 3-2 - Brisbane River Catchment Rating Curves**. All original rating curves were used in the RAFTS hydrological model except where identified on **Figure 3-2**.

Somerset Dam and Wivenhoe Dam Discharges

Inflow and outflow hydrographs associated with Somerset Dam and Wivenhoe Dam for several floods were supplied by Surface Water Assessment, Department of Natural Resources. The inflows are synthetic hydrographs derived from historical lake level data and storage outflow records.

3.2 Rainfall Data

Daily rainfall data and representative pluviograph data is required to describe the areal and temporal distribution of rainfall associated with historical flood events.

A total of about 60 rainfall stations were applied in this flood study and the coverage of these stations within and adjacent to the catchment is shown in **Figure 3-3 - Rainfall Station Locations**. A listing of stations is compiled in **Appendix A**.

Pluviometers, which record the temporal variation of rainfall during a storm, are distributed within the catchment as indicated on **Figure 3-4 - Pluviometer Locations**. These recorders are owned and operated by various authorities including the Bureau of Meteorology, Department of Natural Resources, Brisbane City Council, Toowoomba City Council and CSIRO. Several pluviometers have been recently installed as part of a flood alert system for the Brisbane River. A listing of pluviometers is also compiled in **Appendix A** along with pluviograph data overlaid onto IFD curves for each event at representative locations.

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LEGEND

● STREAM GAUGE LOCATION

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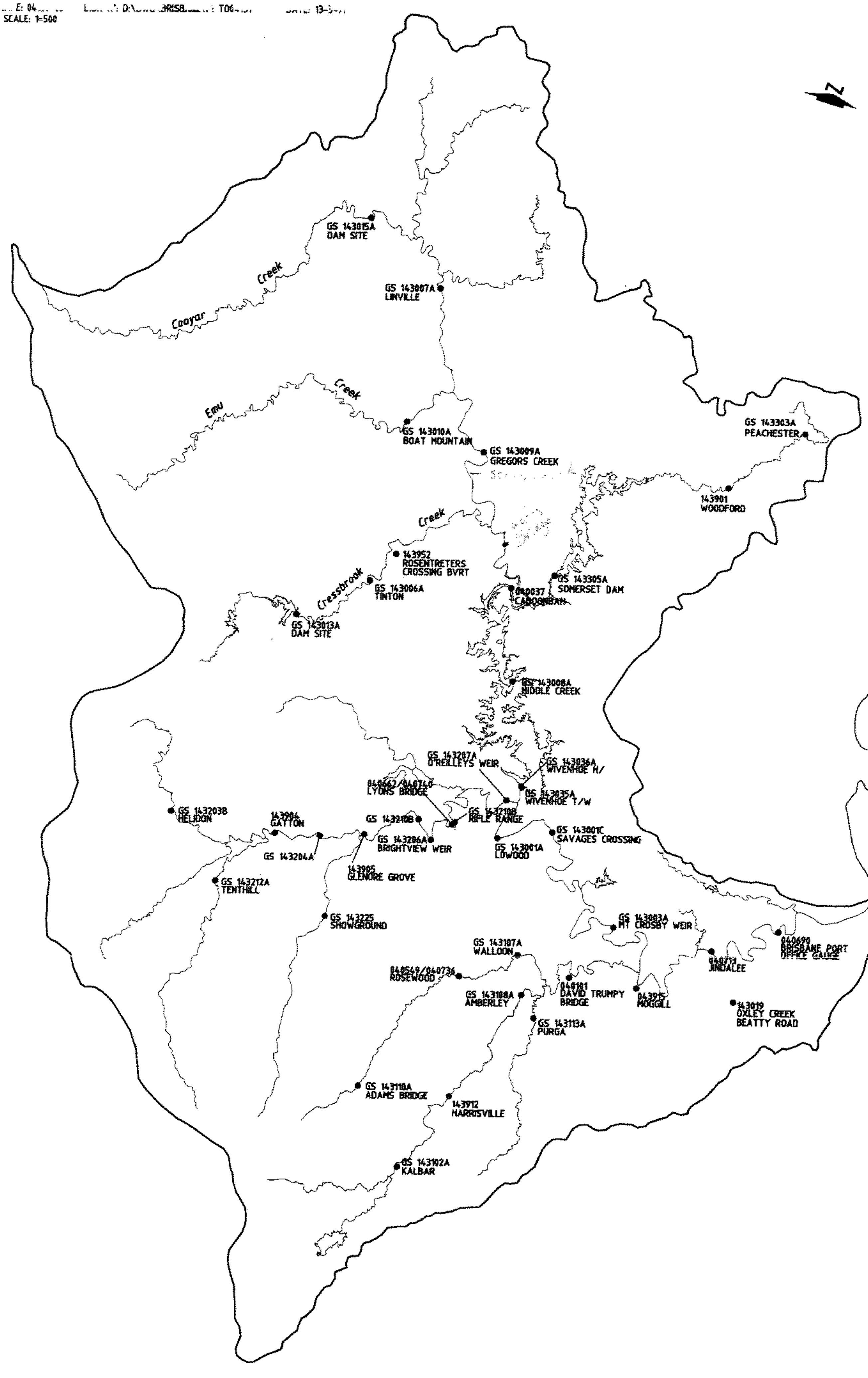


0 5 10 15 20 25 km

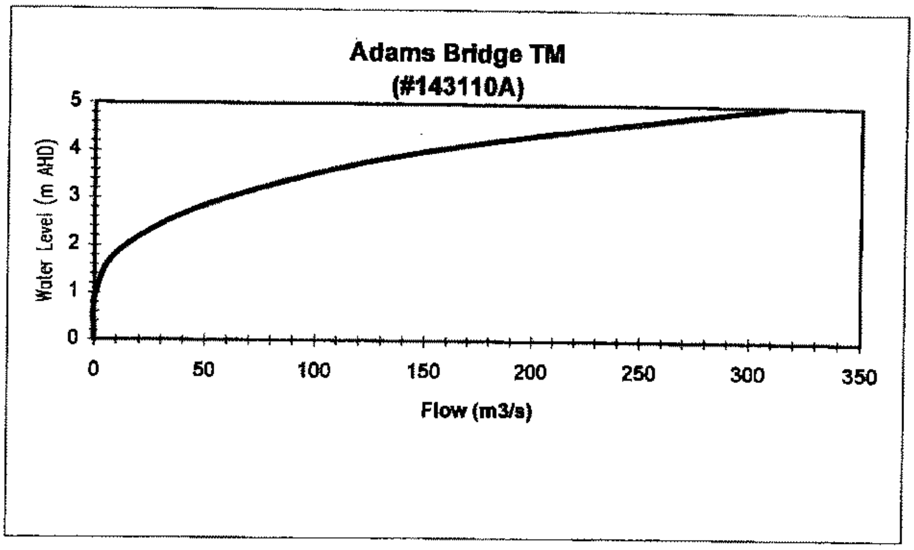
FIGURE 3.1

BRISBANE RIVER FLOOD STUDY
STREAM GAUGE LOCATIONS

Figure 3.2 - Brisbane River Catchment Rating Curves

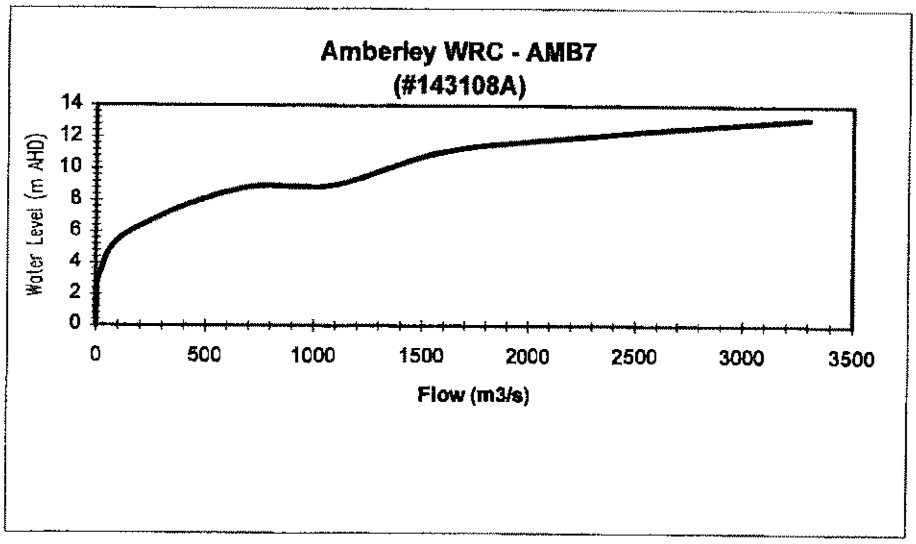
Bremer River at ADAMS BRIDGE TM - WAL4

Level (m)	Discharge (m^3/s)
0	0
1	0.5
2	14
3	60
4	150
5	316



Warrill Creek at Amberley WRC - AMB7

Level (m)	Discharge (m^3/s)
0	0
1.8	1
2.8	5
3.8	30
4.8	60
5.8	130
6.8	265
7.9	450
8.9	730
9	1100
11.1	1600
12.1	2300
13.2	3300



Warrill Creek at Amberley - CBM

Level (m)	Discharge (m^3/s)
1	0
2	5
3	30
4	60
5	130
6	265
7	450
6	730
9	1100
10	1600
11	2300
12	3300

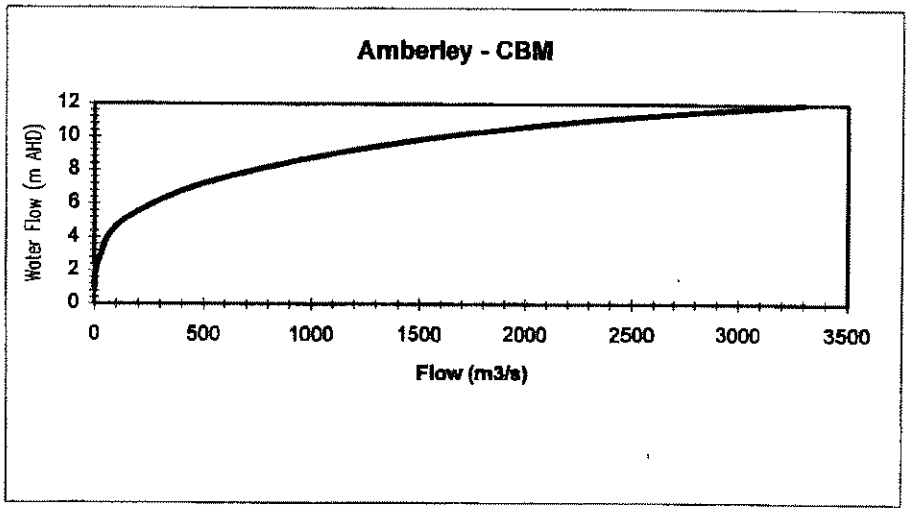
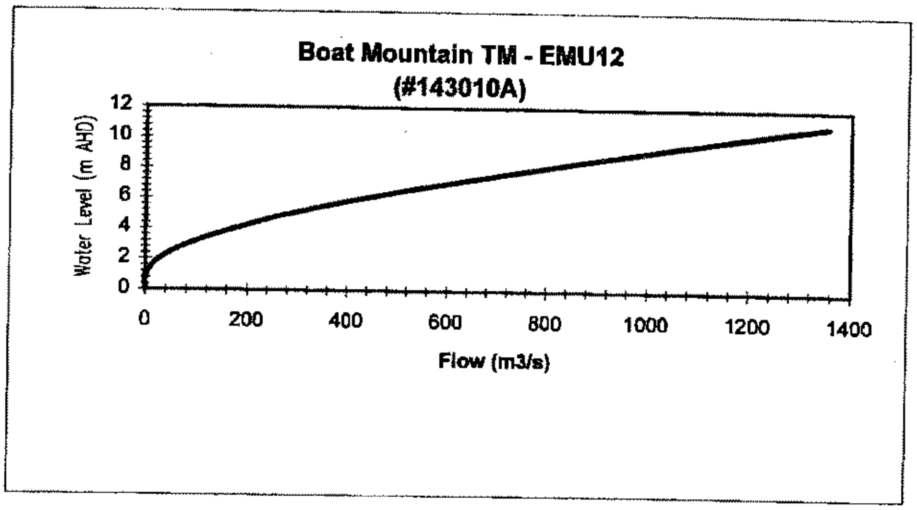


Figure 3.2 - Brisbane River Catchment Rating Curves

Emu Creek at BOAT MOUNTAIN TM - EMU12

Level (m)	Discharge (m^3/s)
0	0
1	1
2	27
3	83
4	172
5	284
6	427
7	592
8	775
9	958
10	1150
11	1356

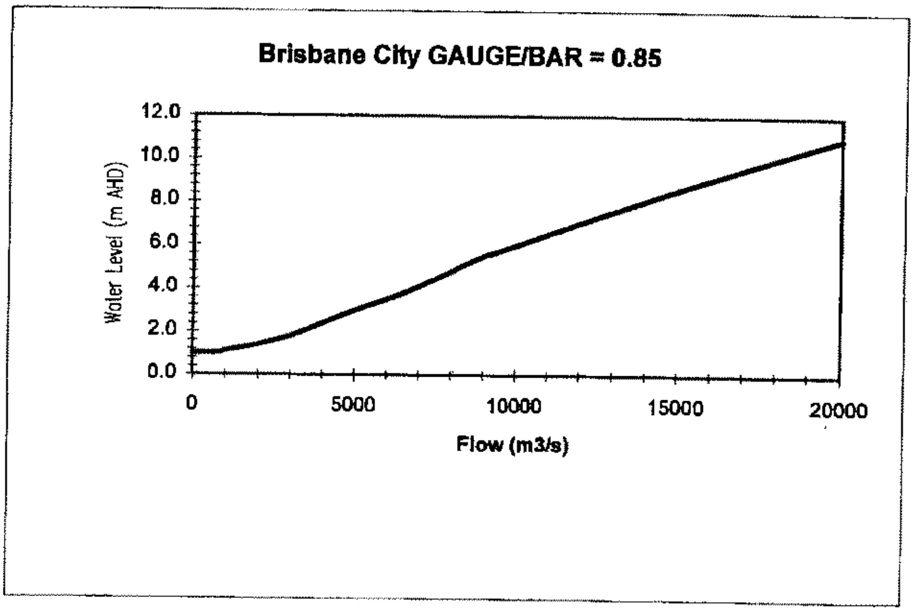


Brisbane City GAUGE

BAR = -1.15

AHD=GAUGE D

Level (m)	Discharge (m^3/s)
-0.9	0
-0.7	500
-0.4	1000
0.3	2000
1	3000
1.6	4000
2.3	5000
2.9	6000
3.5	7000
4.2	8000
4.9	9000
5.5	10000
8.6	15000
11	20000



Brisbane City GAUGE

BAR = 0.15

AHD=0.15

Level (m)	Discharge (m^3/s)
0	0
0.01	500
0.2	1000
0.8	2000
1.4	3000
2	4000
2.5	5000
3.2	6000
3.8	7000
4.5	8000
5.2	9000
5.7	10000
8.6	15000
11	20000

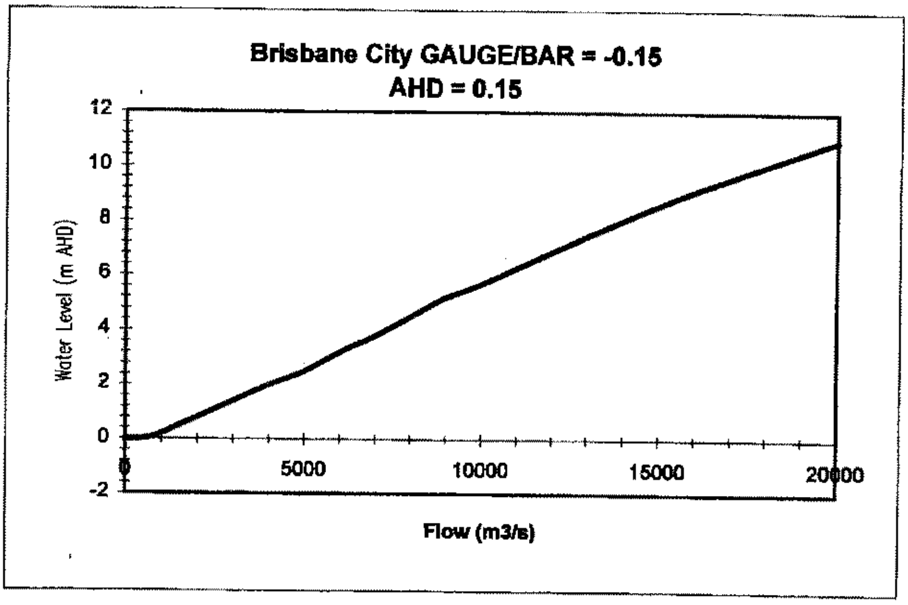
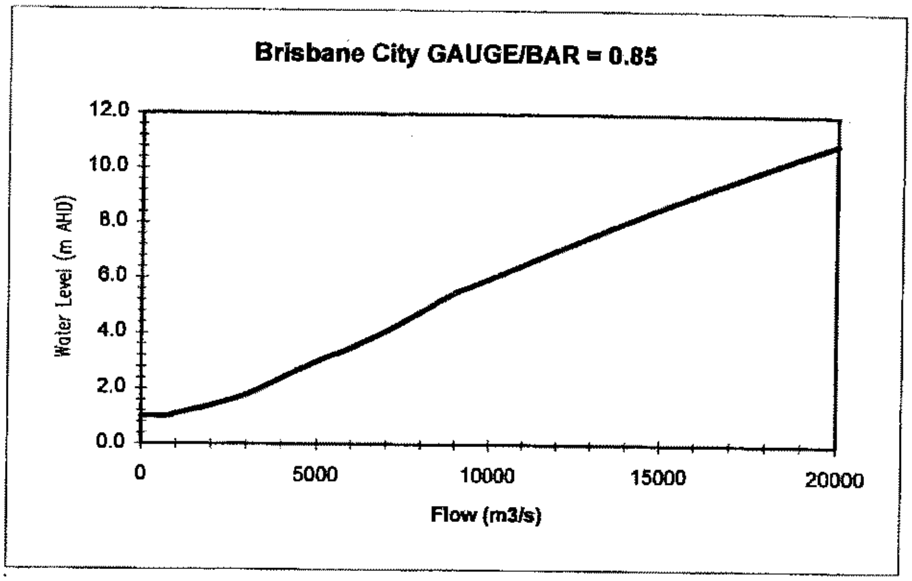


Figure 3.2 - Brisbane River Catchment Rating Curves

Brisbane City GAUGE

BAR = 0.85

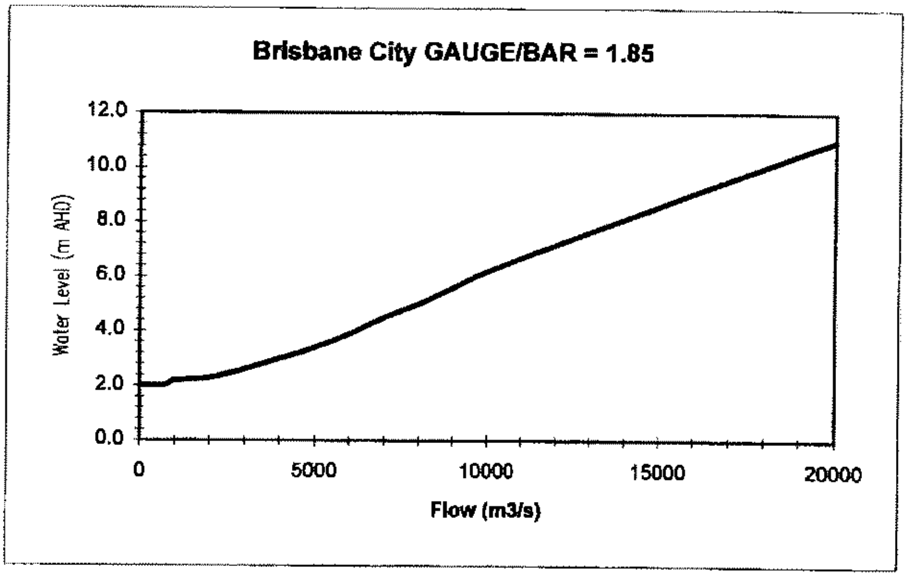
Level (m)	Discharge (m^3/s)
1	0
1.01	800
1.1	1000
1.4	2000
1.8	3000
2.4	4000
3	5000
3.5	6000
4.1	7000
4.8	8000
5.5	9000
6	10000
8.6	15000
11	20000



Brisbane City GAUGE

BAR = 1.85

Level (m)	Discharge (m^3/s)
2	0
2.01	700
2.2	1000
2.3	2000
2.6	3000
3	4000
3.4	5000
3.9	6000
4.5	7000
5	8000
5.6	9000
6.2	10000
8.6	15000
11	20000



Brisbane City GAUGE

BAR = 2.85

Level (m)	Discharge (m^3/s)
3	0
3.01	800
3.1	1000
3.2	2000
3.4	3000
3.5	4000
3.8	5000
4.3	6000
4.8	7000
5.3	8000
5.9	9000
6.4	10000
8.6	15000
11	20000

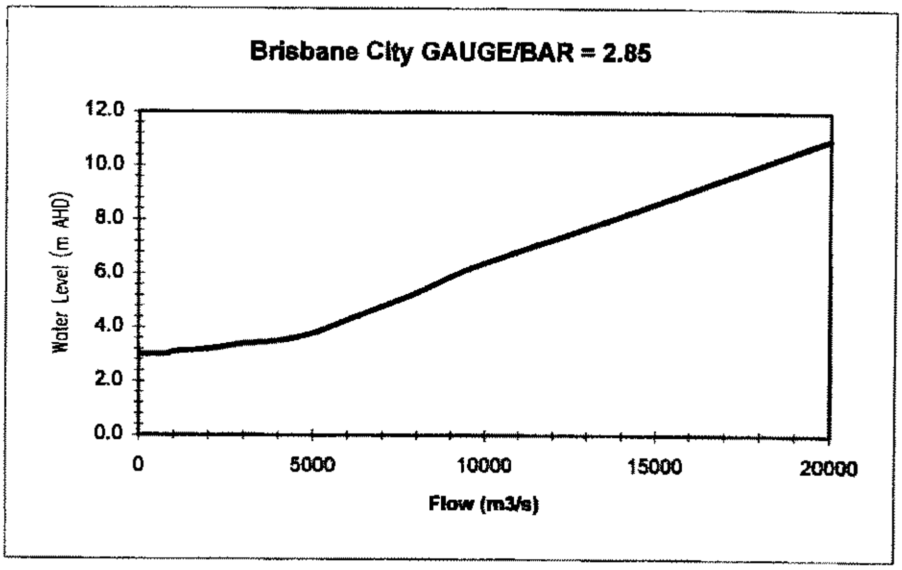
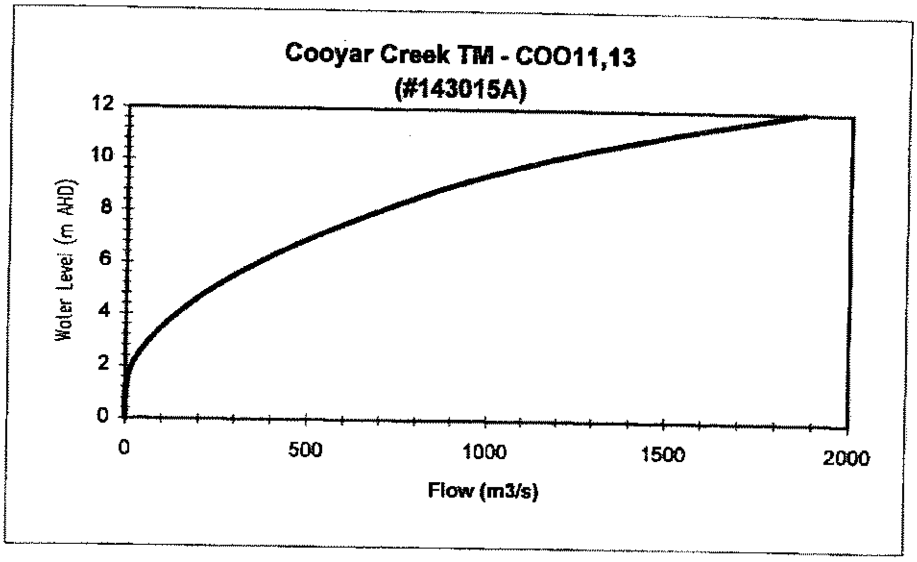


Figure 3.2 - Brisbane River Catchment Rating Curves

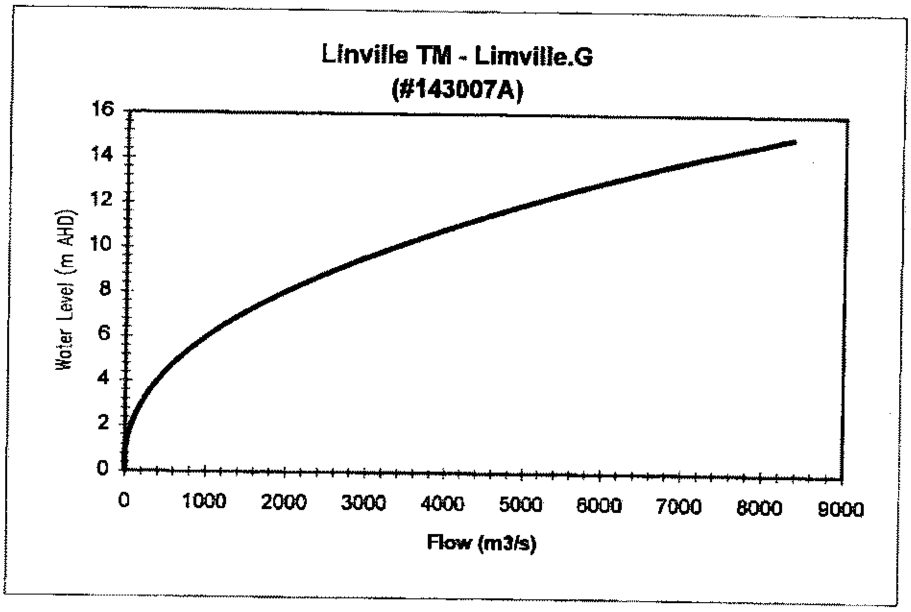
Cooyar Creek at COOYAR CREEK TM - COO11,13

Level (m)	Discharge (m^3/s)
0	0
1	1
2	15
3	65
4	139
5	237
6	361
7	511
8	687
9	889
10	1149
11	1484
12	1873



BRISBANE at LINVILLE TM - LIMVILLE.G

Level (m)	Discharge (m^3/s)
0	0
1	3
2	64
3	195
4	390
5	657
6	1000
7	1439
8	1966
9	2586
10	3299
11	4108
12	5016
13	6024
14	7134
15	8348



LOCKYER CREEK at GATTON - GAT10

Level (m)	Discharge (m^3/s)
0	0
1	5
2	15
3	40
4	60
5	80
6	140
7	180
8	260
9	400
10	630
11	860
12	1125
13	1350
14	1550
15	2500
16	3000

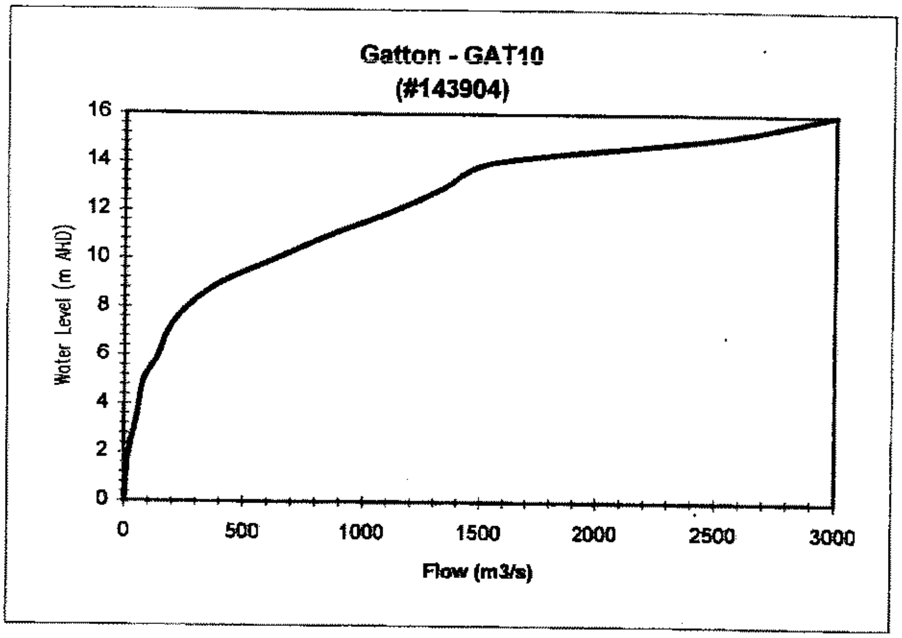
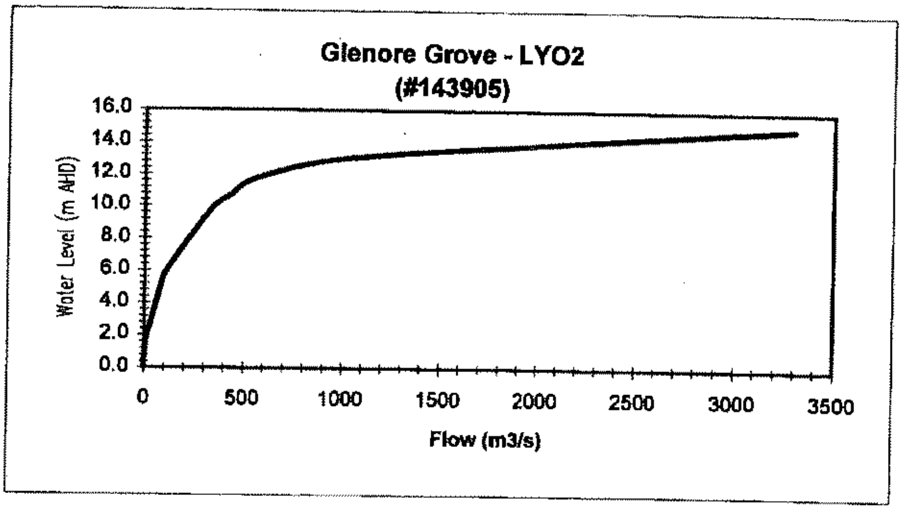


Figure 3.2 - Brisbane River Catchment Rating Curves

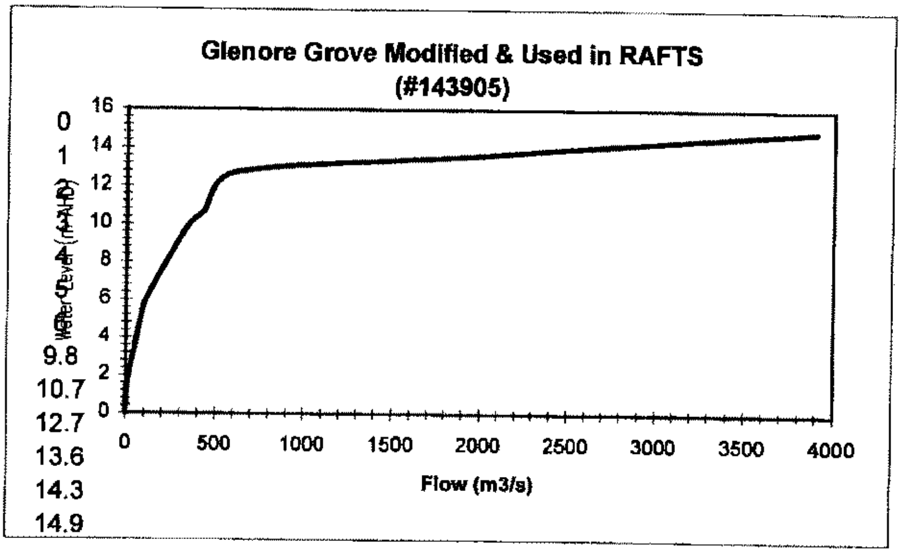
LOCKYER CREEK at GLENORE GROVE - LYO2

Level (m)	Discharge (m^3/s)
0	0
1	1
2	13
3	37
4	57
5	80
6	110
9.8	333
10.7	433
11.7	550
13	1000
14	2100
15	3300



LOCKYER CREEK at GLENORE GROVE - LYO2 Modified & used in RAFTS

Level (m)	Discharge (m^3/s)
0	0
1	1
2	13
3	37
4	57
5	80
6	110
9.8	333
10.7	433
12.7	600
13.6	1950
14.3	3000
14.9	3900



BRISBANE RIVER at GREGOR CREEK CBM - GRE 17

Level (m)	Discharge (m^3/s)
0	0
1	1
2	10
3	50
4	85
5	190
6	400
7	600
8	850
9	1200
10	1600
11	2000
12	2400
13	3000
14	3500

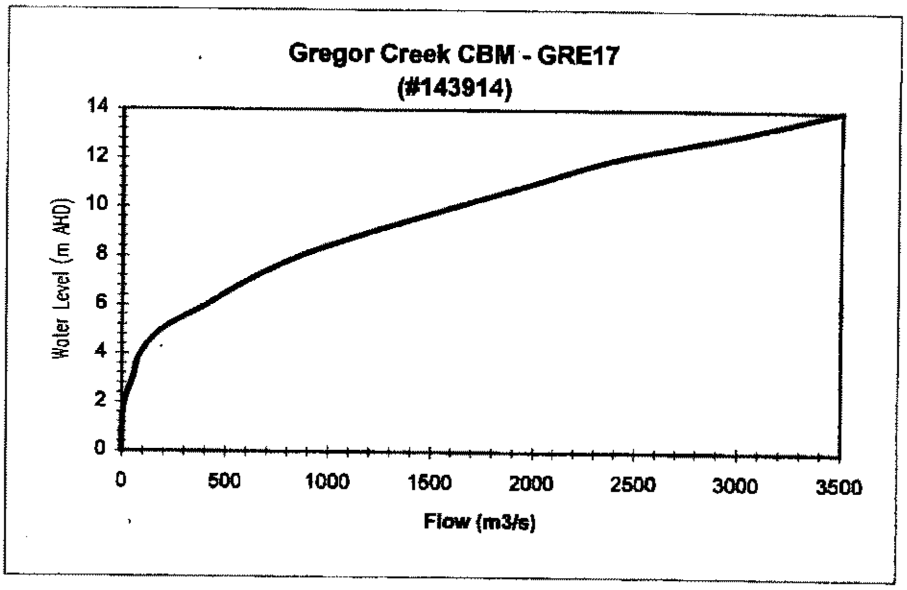
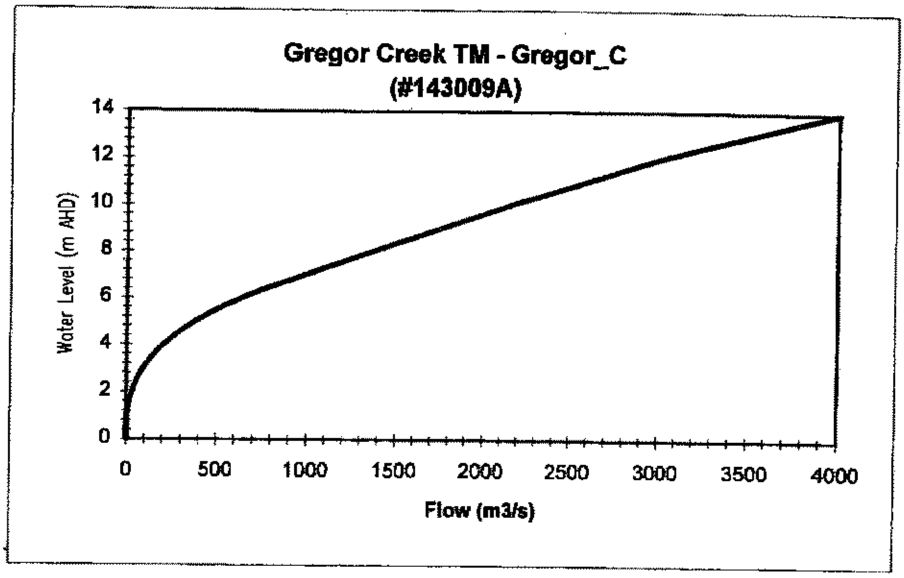


Figure 3.2 - Brisbane River Catchment Rating Curves

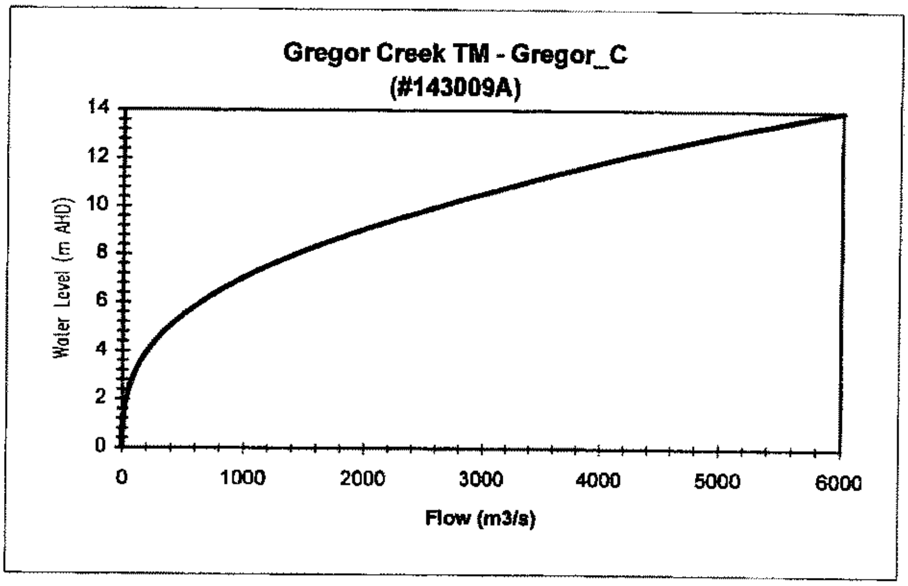
BRISBANE RIVER at GREGOR CREEK TM - GREGOR_C

Level (m)	Discharge (m^3/s)
0	0
1	2
2	29
3	93
4	206
5	381
6	638
7	981
8	1360
9	1750
10	2140
11	2580
12	3000
13	3500
14	4000



BRISBANE RIVER at GREGOR CREEK TM - GREGOR_C

Level (m)	Discharge (m^3/s)
0	0
1	2
2	29
3	93
4	206
5	381
6	638
7	981
8	1419
9	1960
10	2612
11	3328
12	4121
13	5013
14	6000



WARRILL CK at HARRISVILLE

Level (m)	Discharge (m^3/s)
0	0
1	5
2	25
3	40
4	75
5	150
5.5	200
6	400
7	1000

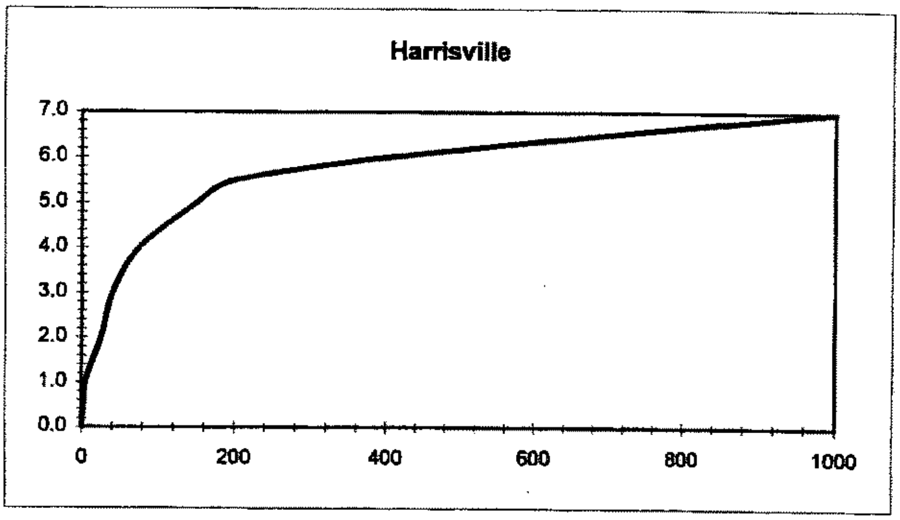
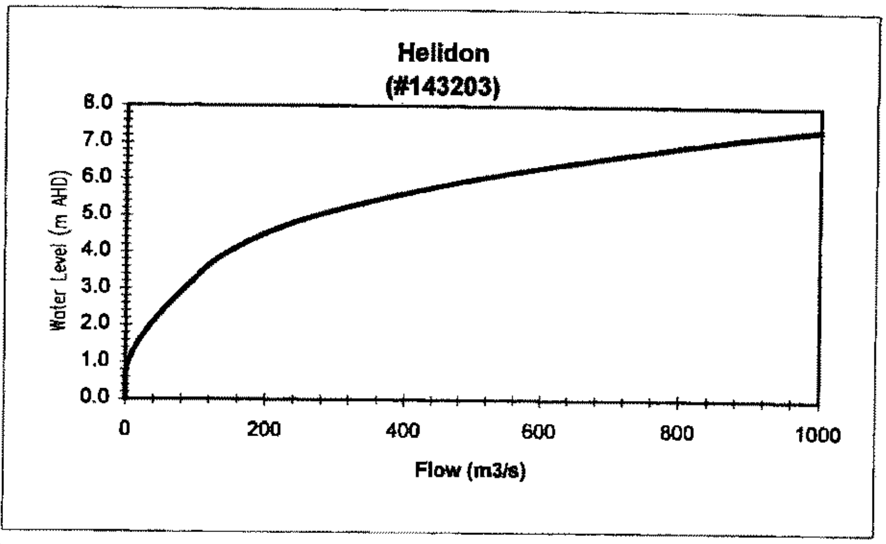


Figure 3.2 - Brisbane River Catchment Rating Curves

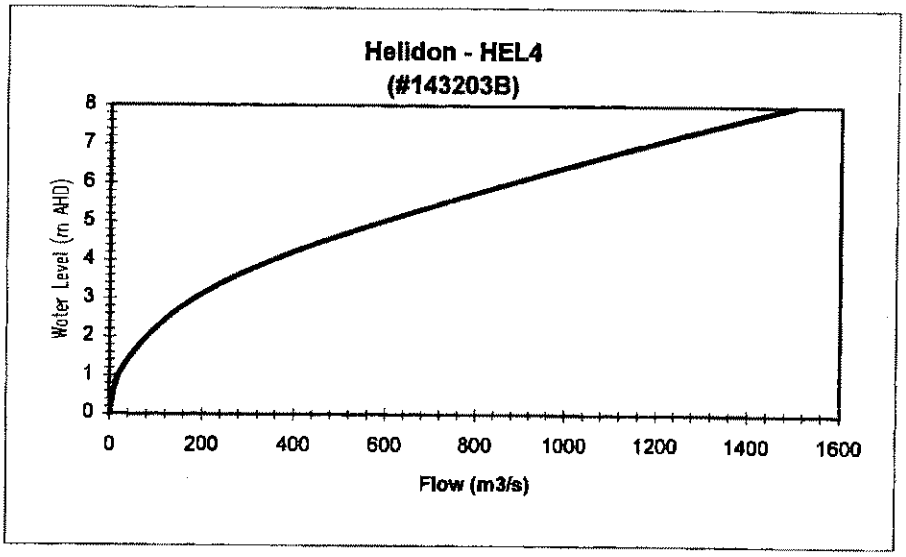
LOCKYER Ck at HELIDON

Level (m)	Discharge (m^3/s)
0	0
1	3
2	35
3	84
4	146
5	270
6	499
7	833
7.4	1000



LOCKYER CREEK at HELIDON - HEL4

Level (m)	Discharge (m^3/s)
0	0
1	18
2	80
3	184
4	351
5	591
6	875
7	1180
8	1500



Bremer River at IPSWICH - 143911

MOGGILL = 0.0

Level (m)	Discharge (m^3/s)
0	0
5.5	500
8.8	1000
13.3	2000
16	3000
17.9	4000

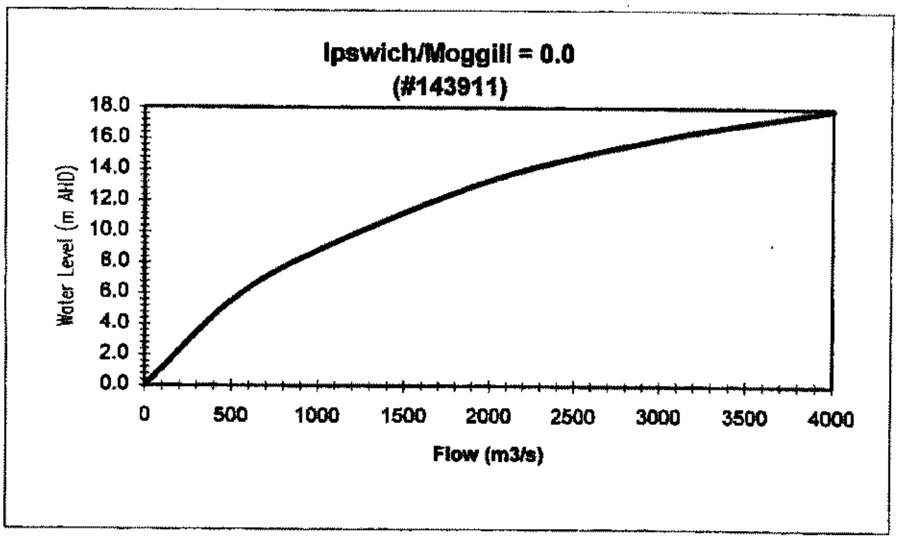
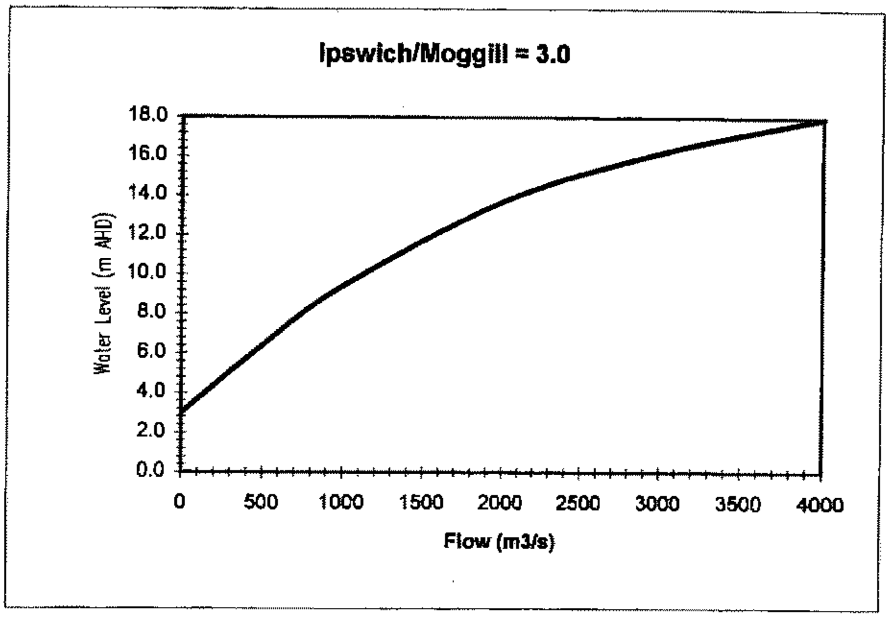


Figure 3.2 - Brisbane River Catchment Rating Curves

Bremer River at IPSWICH - 143911

MOGGILL = 3.0

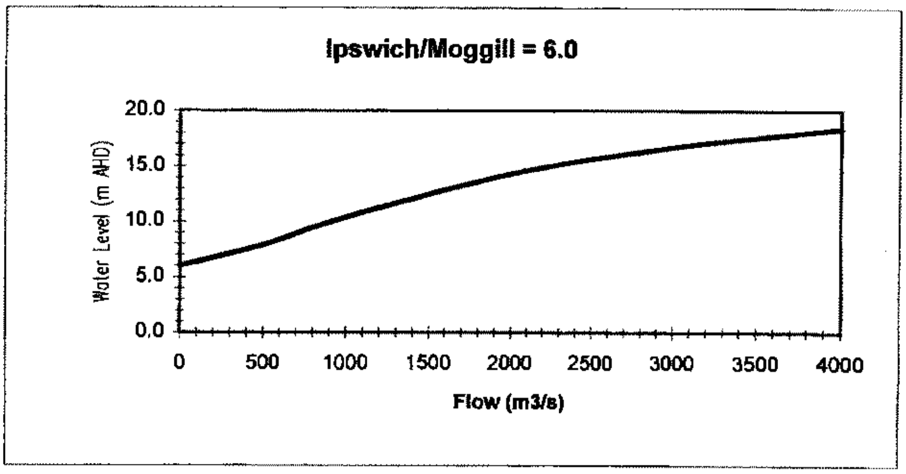
Level (m)	Discharge (m^3/s)
3	0
6.4	500
9.4	1000
13.7	2000
16.2	3000
18	4000



Bremer River at IPSWICH - 143911

MOGGILL = 6.0

Level (m)	Discharge (m^3/s)
6	0
7.9	500
10.4	1000
14.3	2000
16.7	3000
18.4	4000



Bremer River at IPSWICH - 143911

MOGGILL = 9.0

Level (m)	Discharge (m^3/s)
9	0
10	500
11.9	1000
15.2	2000
17.3	3000
18.7	4000

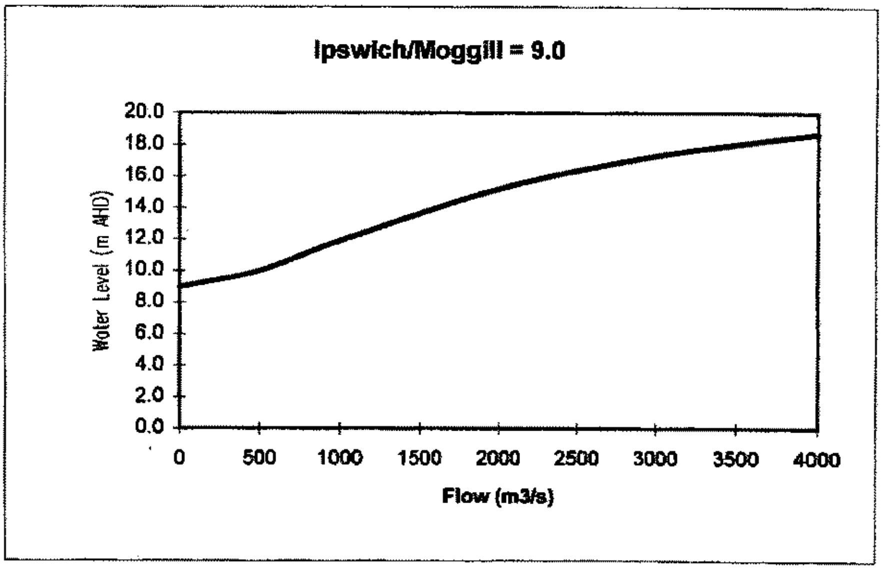
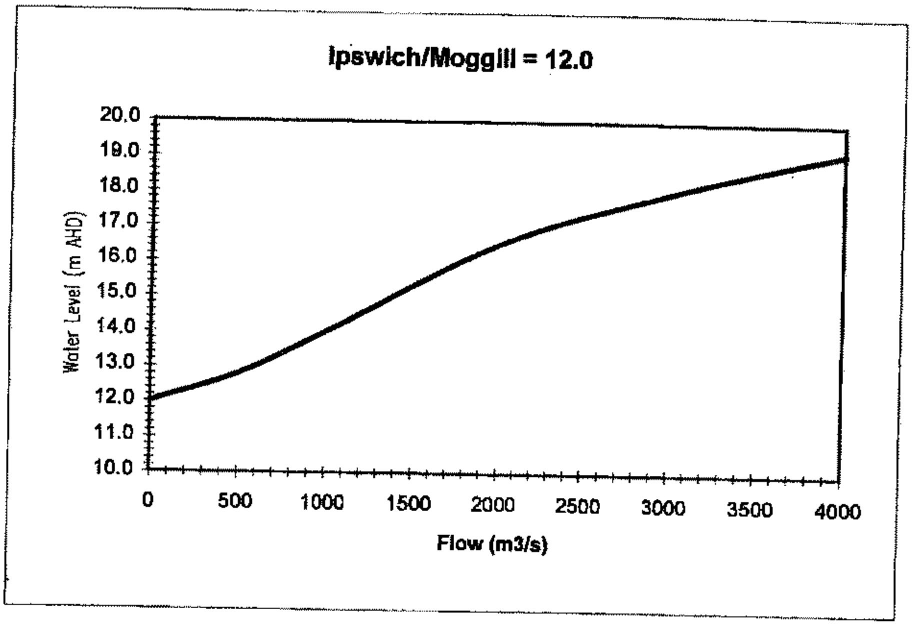


Figure 3.2 - Brisbane River Catchment Rating Curves

Bremer River at IPSWICH - 143911

MOGGILL = 12.0

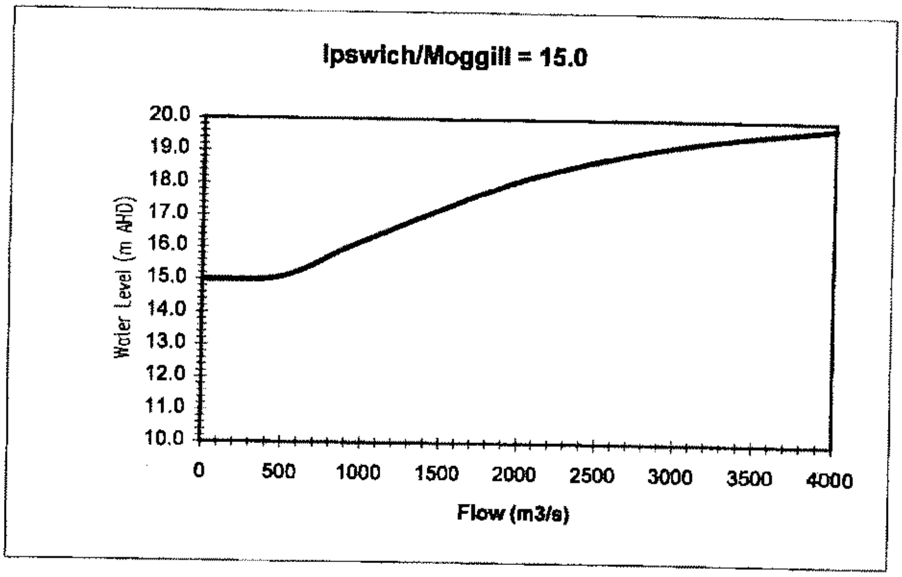
Level (m)	Discharge (m^3/s)
12	0
12.8	500
14	1000
16.5	2000
18	3000
19.2	4000



Bremer River at IPSWICH - 143911

MOGGILL = 15.0

Level (m)	Discharge (m^3/s)
15	0
15.1	500
16.2	1000
18.1	2000
19.2	3000
19.8	4000



Bremer River at IPSWICH - 143911

MOGGILL = 20.0

Level (m)	Discharge (m^3/s)
20	0
21.2	4000

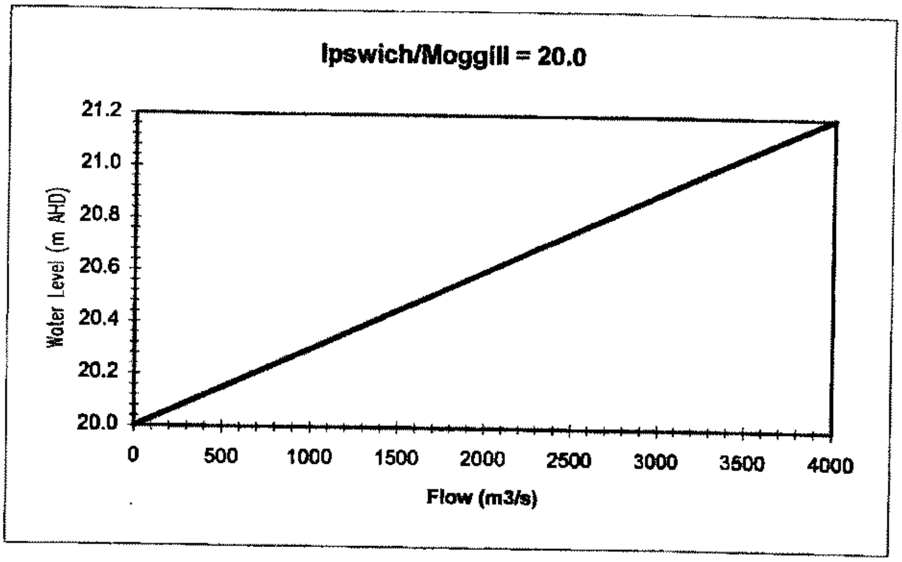
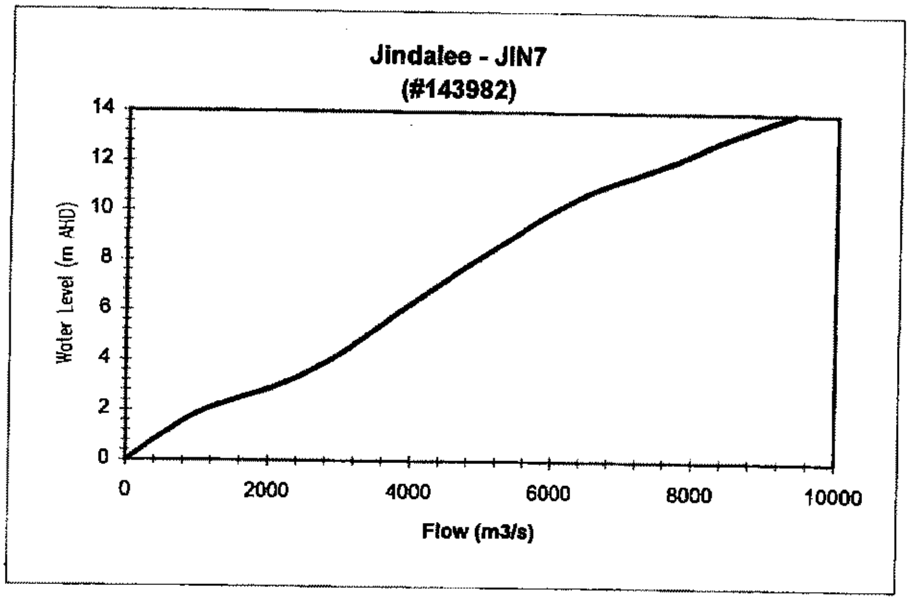


Figure 3.2 - Brisbane River Catchment Rating Curves

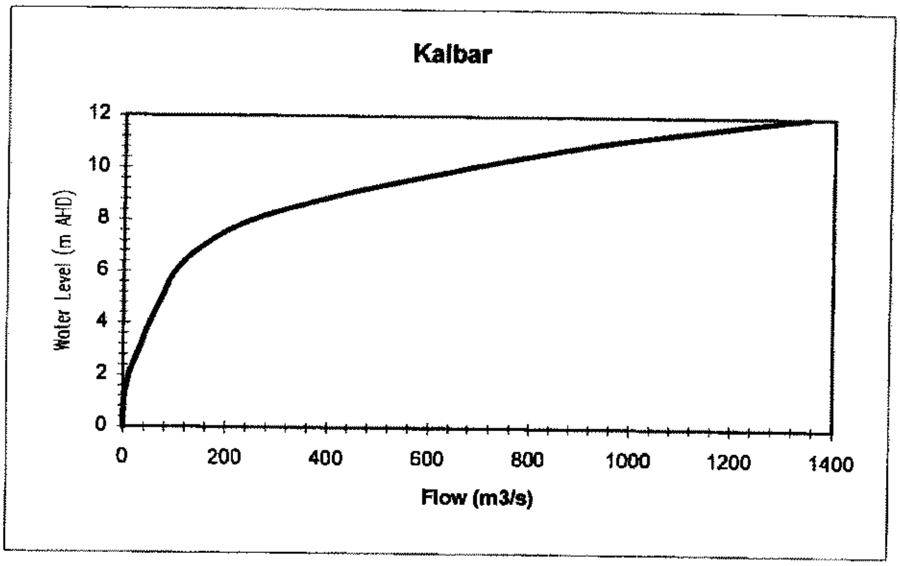
BRISBANE RIVER at JINDALEE - JIN7

Level (m)	Discharge (m^3/s)
0	0
1	500
2	1100
3	2140
4	2860
5	3380
6	3860
7	4370
8	4890
9	5440
10	6000
11	6710
12	7670
13	8470
14	9400



WARRILL CK at KALBAR

Level (m)	Discharge (m^3/s)
0	0
1	1
2	10
3	30
4	50
5	75
6	100
7	155
8	250
9	430
10	670
11	950
12	1350



BREMER RIVER at KUSS RD

Level (m)	Discharge (m^3/s)
0	0
7	110
7.8	370

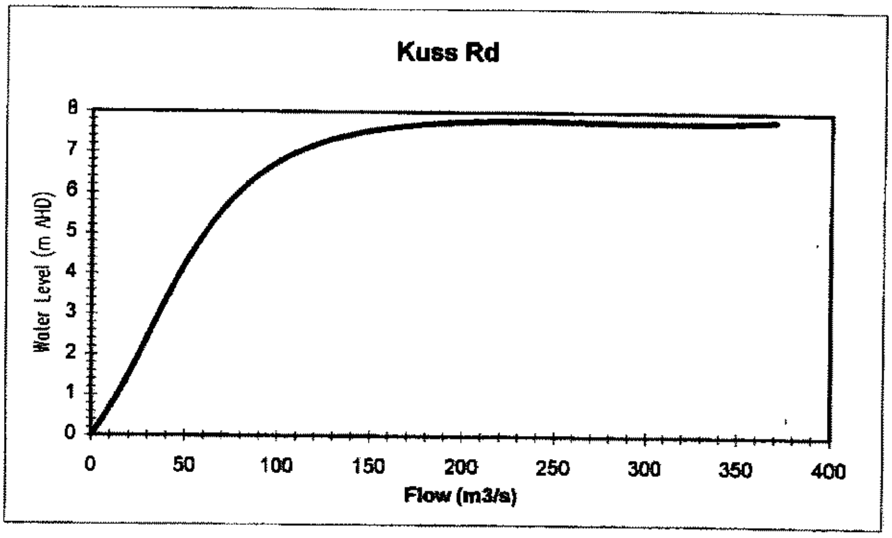
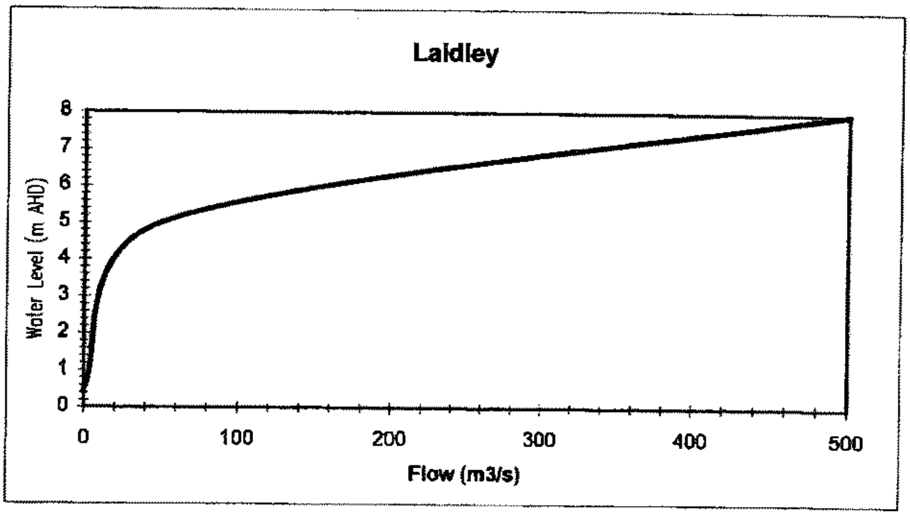


Figure 3.2 - Brisbane River Catchment Rating Curves

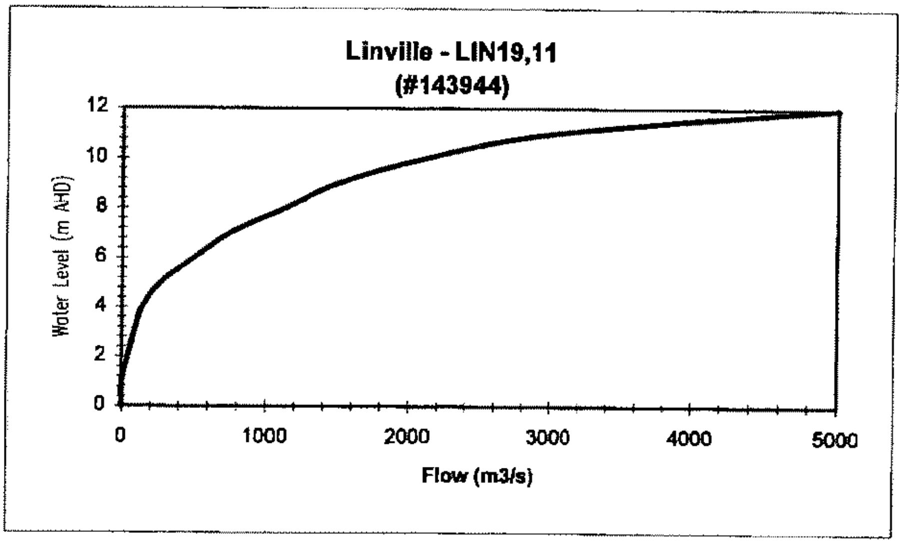
LAIDLEY CREEK at LAIDLEY

Level (m)	Discharge (m^3/s)
0.5	0
5	50
8	500



BRISBANE at LINVILLE - LIN19,11

Level (m)	Discharge (m^3/s)
0	0
1	1
2	40
3	85
4	140
5	270
6	500
7	750
8	1130
9	1500
10	2100
11	3000
12	5000



BRISBANE at LINVILLE TM

Level (m)	Discharge (m^3/s)
0	0
1	3
2	64
3	195
4	390
5	657
6	1000
7	1439
8	1966
9	2586
10	3299
11	4108
12	5016
13	6024
14	7134
15	8348

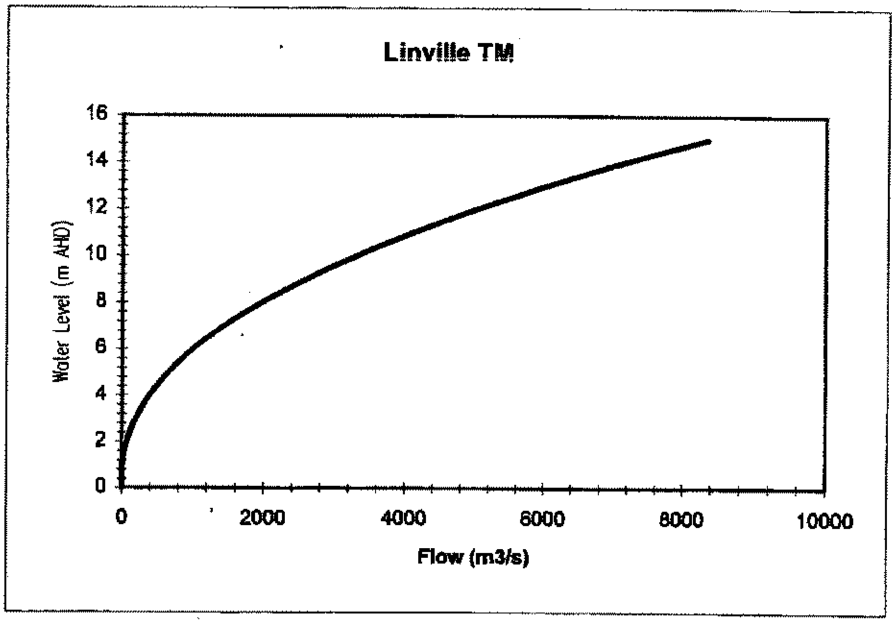
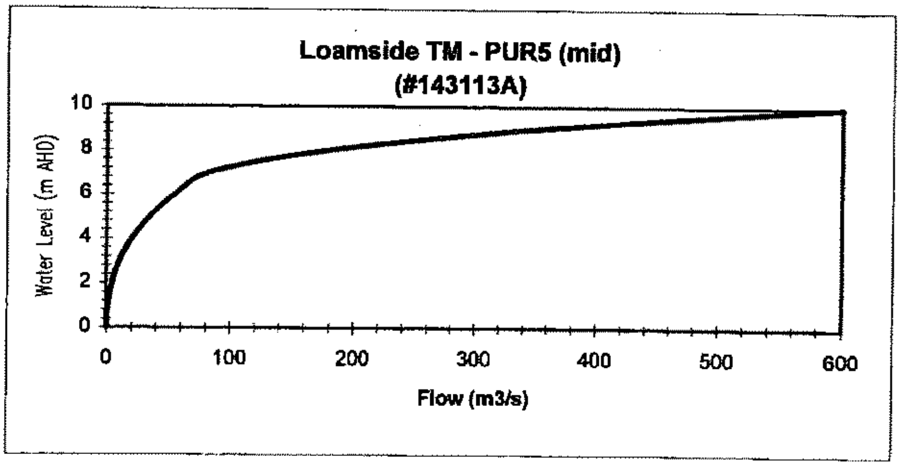


Figure 3.2 - Brisbane River Catchment Rating Curves

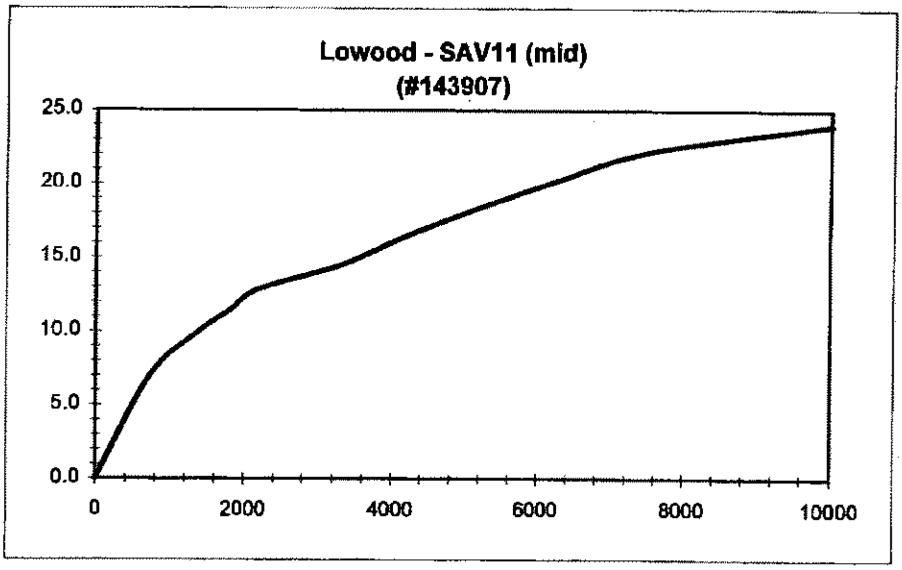
PURGA CREEK at LOAMSIDE TM - PUR5(mid)

Level (m)	Discharge (m^3/s)
0	0
1	1
2	4
3	10
4	20
5	35
6	55
7	83
8	179
9	350
10	600



BRISBANE RIVER at LOWOOD - SAV11(mid)

Level (m)	Discharge (m^3/s)
0	0
5.5	541
6.7	684
7.5	802
8.5	987
9.4	1238
10.5	1518
11.5	1826
12.8	2163
14.5	3313
16.5	4209
18.4	5210
20.3	6316
22.2	7525
24	10000



LOCKYER CREEK at LYONS BRIDGE - LYO6, LYONS_BR

Level (m)	Discharge (m^3/s)
0	0
1	1
2	6
3	13
4	23
5	37
6	57
7	81
8	110
9	145
10	184
11	251
12	333
13	433
14	552
15	750
16	1000
17.5	2000

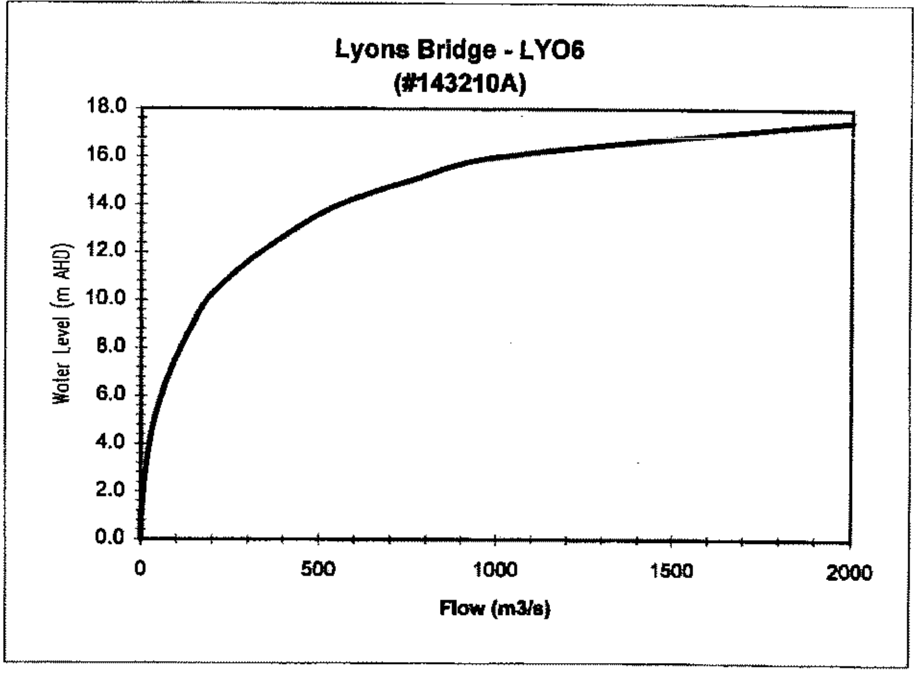
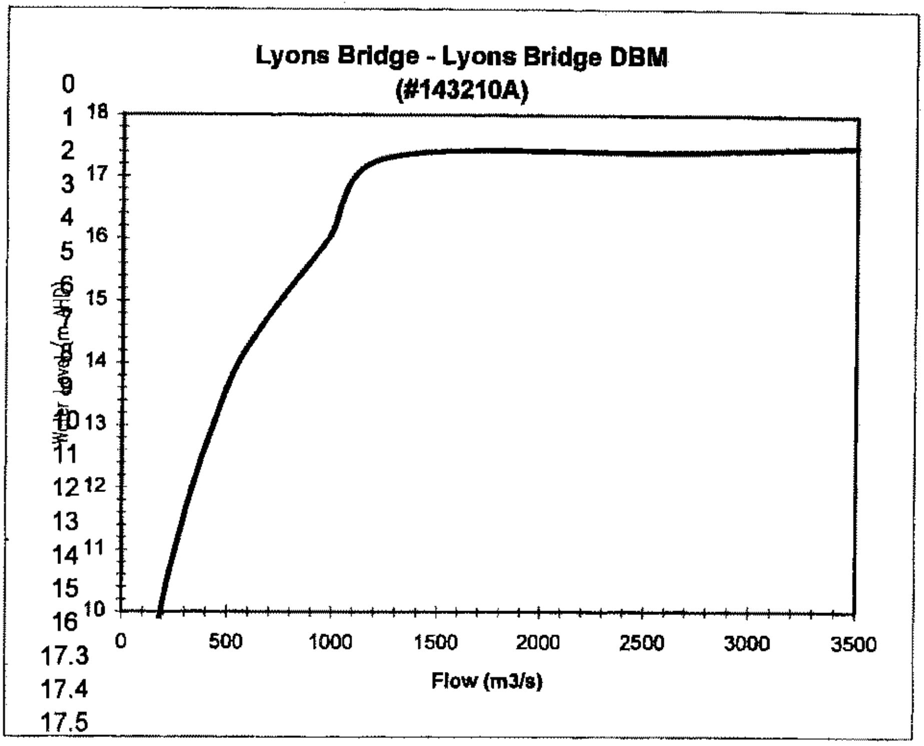


Figure 3.2 - Brisbane River Catchment Rating Curves

LOCKYER CREEK at LYONS BRIDGE CBM used in RAFTS - LYO6, LYONS_BR

Level (m)	Discharge (m^3/s)
0	0
1	1
2	6
3	13
4	23
5	37
6	57
7	81
8	110
9	145
10	184
11	251
12	333
13	433
14	552
15	750
16	980
17.3	1250
17.4	2650
17.5	3500



0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17.3
17.4
17.5

BRISBANE RIVER at MIDDLE CREEK

Level (m)	Discharge (m^3/s)
0	0
1	6
2	47
3	115
4	212
5	338
6	491
7	672
8	880
9	1115
10	1376
11	1665
12	1980
13	2321
14	2688
15	3082
16	3501
17	3946
18	4417
19	4914
20	5436

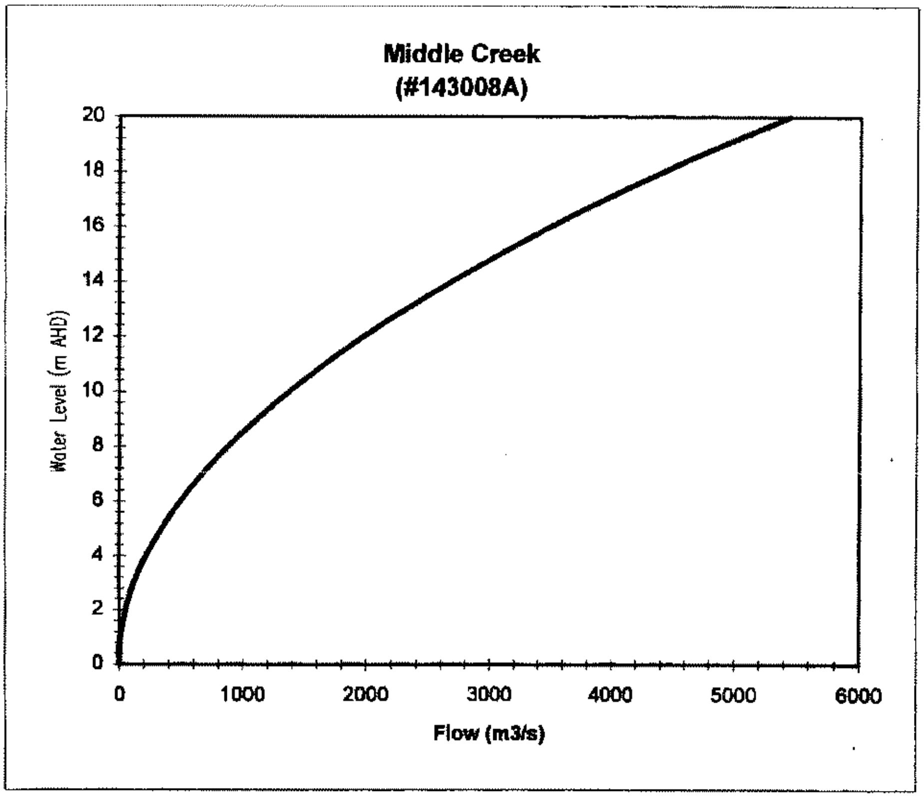
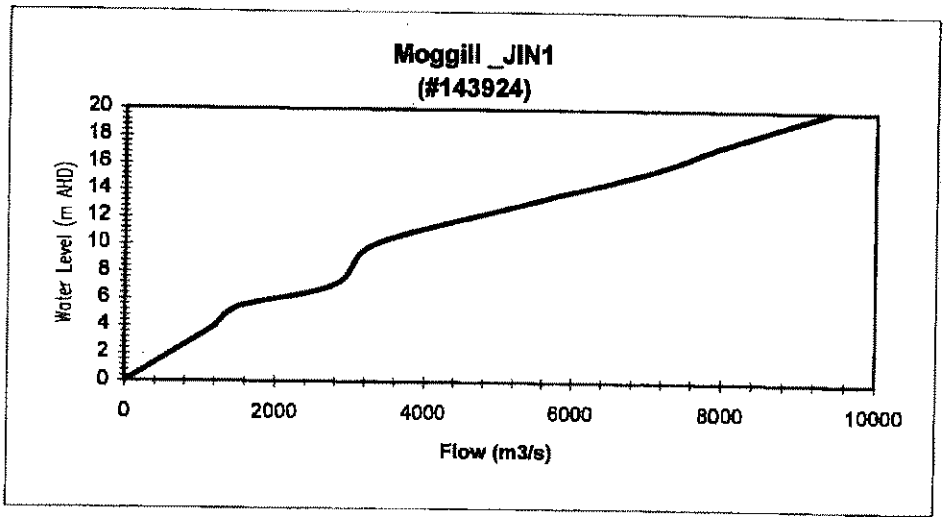


Figure 3.2 - Brisbane River Catchment Rating Curves

BRISBANE RIVER at MOGGILL - JIN1

Level (m)	Discharge (m^3/s)
0	0
1	300
2	600
3	900
4	1200
5.4	1500
7.1	2800
10	3300
12.6	5000
15.4	7000
17.4	8000
20	9400



MT CROSBY WEIR - MTC7

Level (m)	Discharge (m^3/s)
0	0
1	220
2	498
3	804
4	1129
5	1470
6	1822
7	2186
8	2559
9	2941
10	3330
11	3726
12	4129
13	4538
14	4953
15	5373
16	5798
17	6228
18	6663
19	7102
20	7545
21	7992
22	8443
23	8897
24	9356
25	9817
26	10282
27	10751
28	11222
29	11696

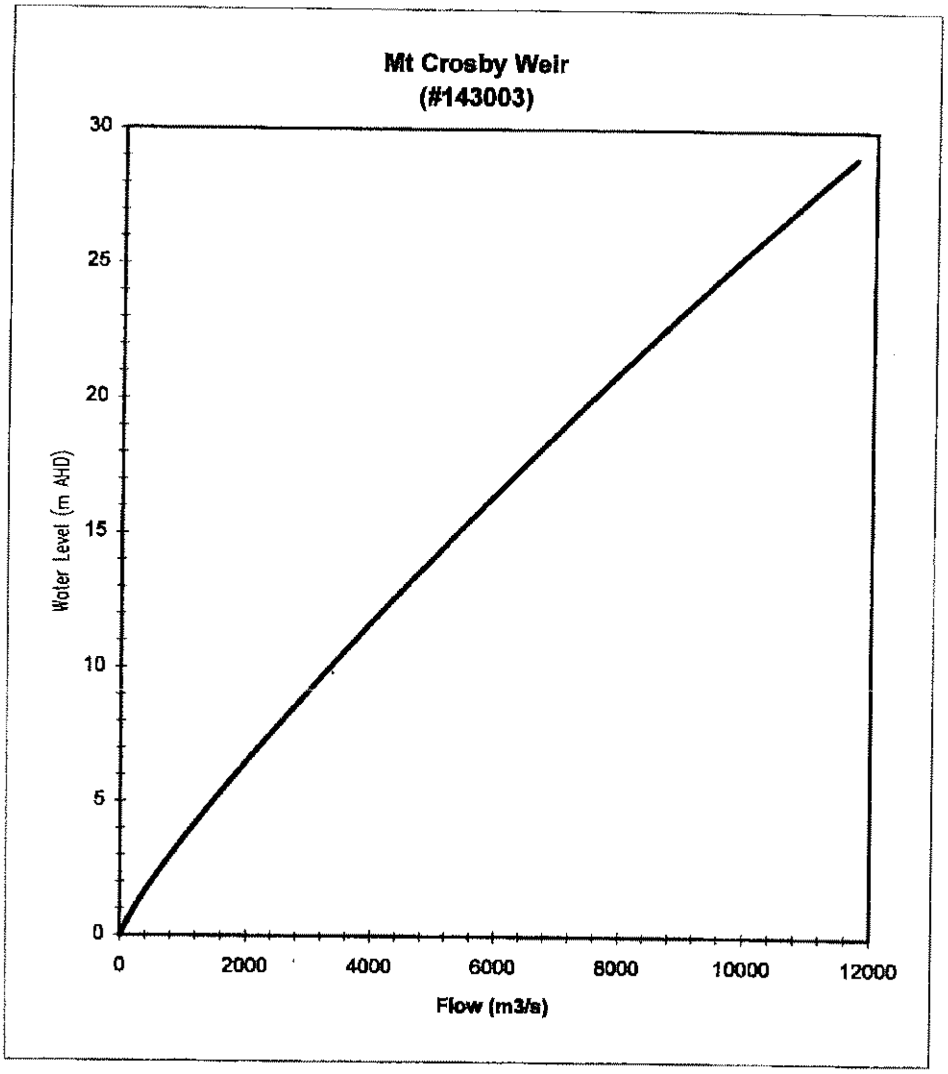
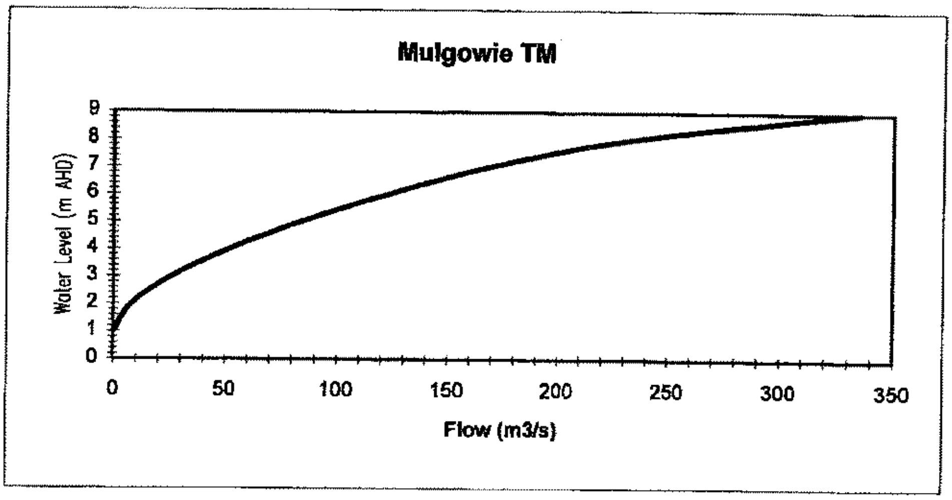


Figure 3.2 - Brisbane River Catchment Rating Curves

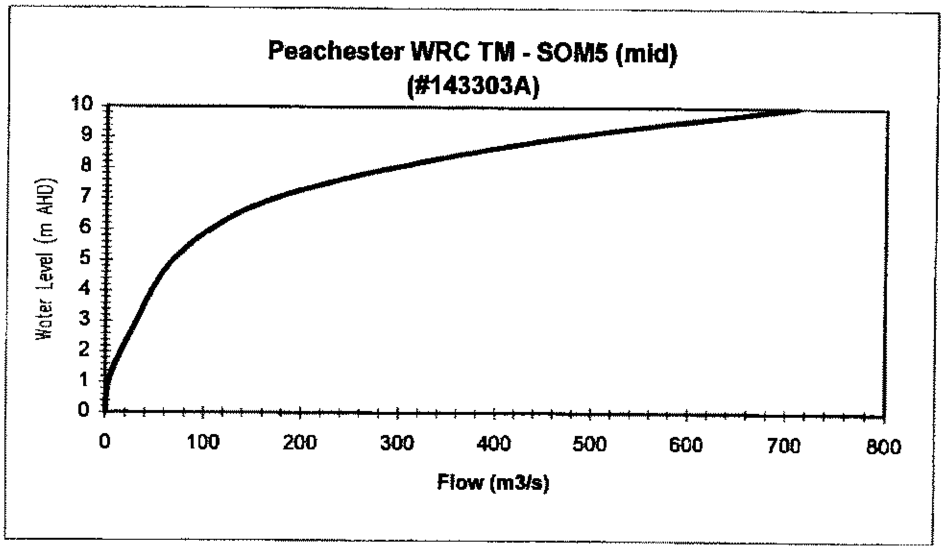
LAIDLEY CREEK at MULGOWIE TM

Level (m)	Discharge (m^3/s)
1	0
2	8
3	26
4	52
5	84
6	123
7	168
8	231
9	335



STANLEY RIVER at PEACHESTER WRC TM - SOM5(mid)

Level (m)	Discharge (m^3/s)
0	0
1	3
2	15
3	31
4	46
5	68
6	106
7	170
8	290
9	466
10	711



LOCKYER CREEK at LYONS BRIDGE (QWRC) TM - LYO6

Level (m)	Discharge (m^3/s)
0	0
1	1
2	8
3	17
4	28
5	40
6	60
7	85
8	115
9	149
10	193
11	263
12	348
13	450
14	571
15	712
16	900
17	1100
18	1400

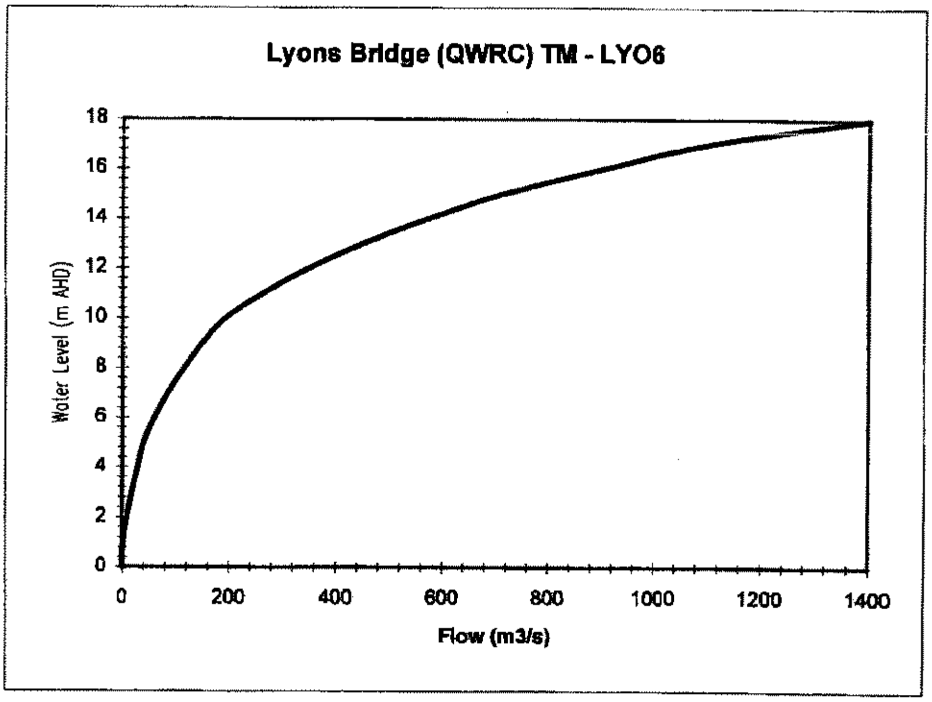
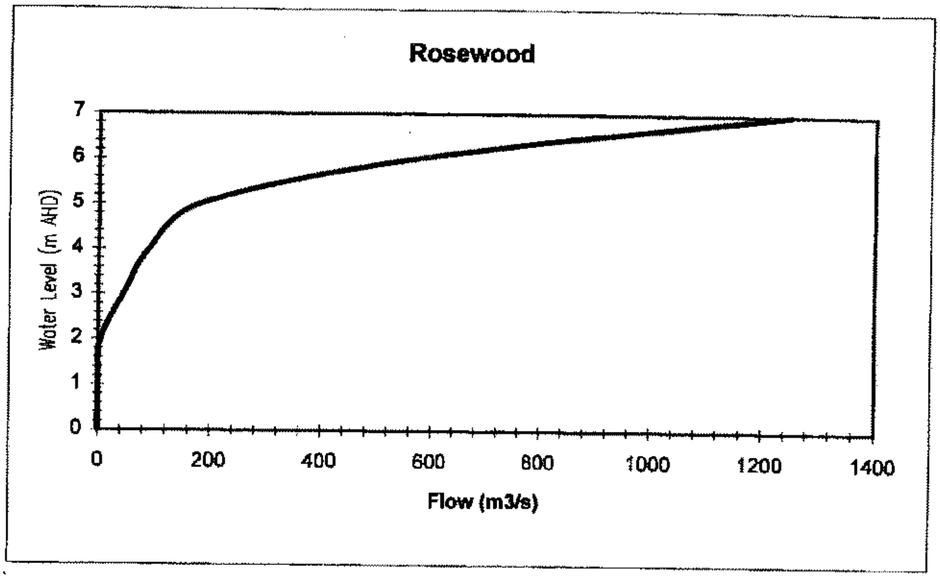


Figure 3.2 - Brisbane River Catchment Rating Curves

ROSEWOOD

Level (m)	Discharge (m^3/s)
0	0
1	0.2
2	4
3	45
4	90
5	180
6	560
7	1250



BRISBANE RIVER at SAVAGES CROSSING TM - SAV11

Level (m)	Discharge (m^3/s)
0	0
1	8
2	56
3	142
4	274
5	403
6	541
7	684
8	802
9	987
10	1238
11	1518
12	1826
13	2163
14	2522
15	2904
16	3313
17	3748
18	4209
19	4697
20	5210
21	5750
22	6316
23	6907
24	7525
25	8169
26	10000

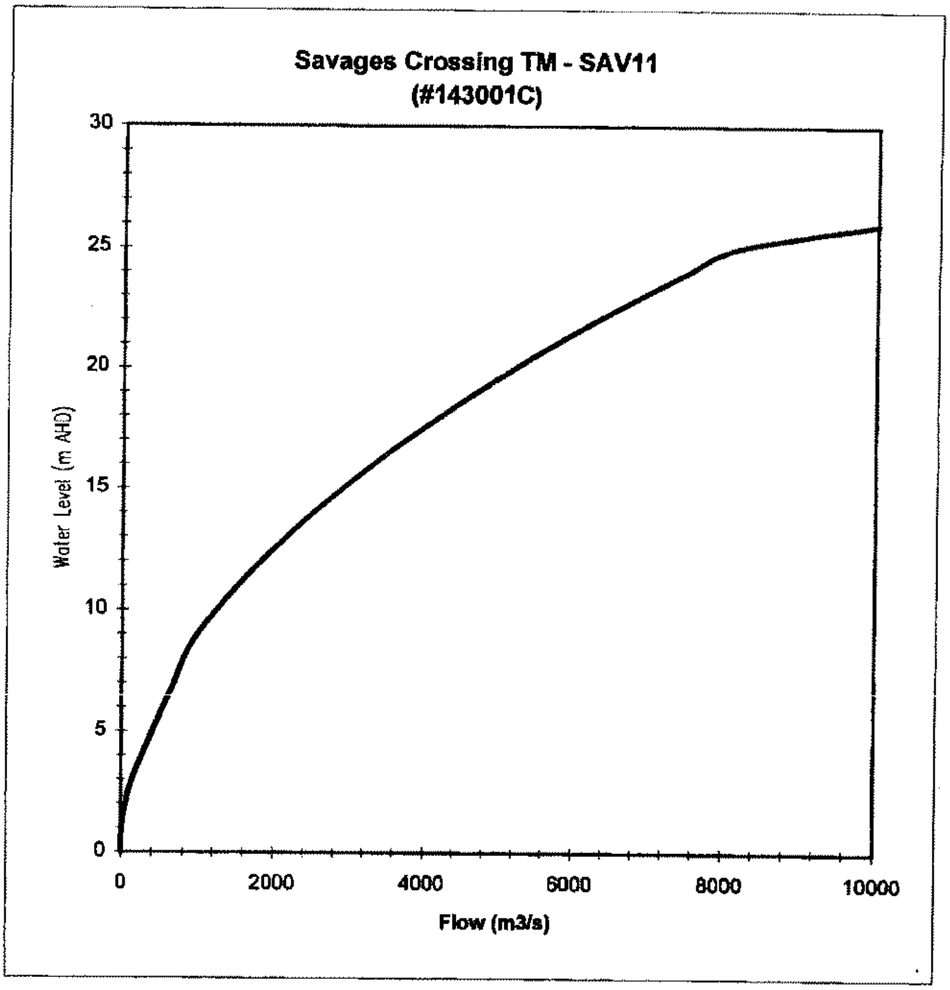
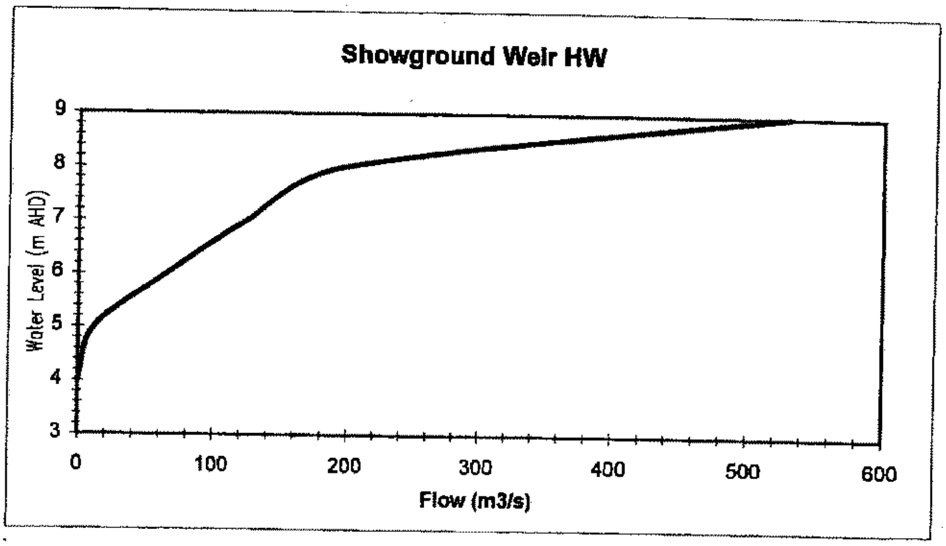


Figure 3.2 - Brisbane River Catchment Rating Curves

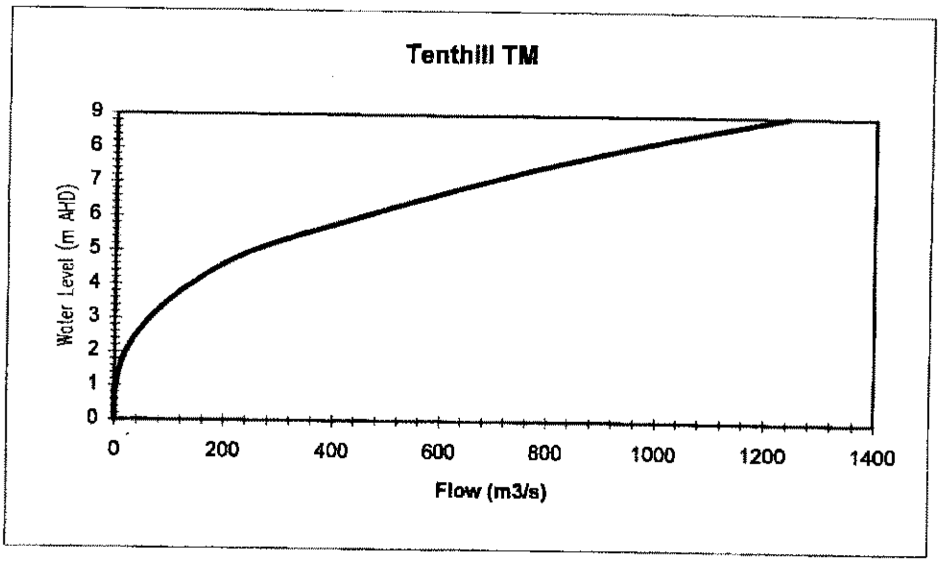
LAIDLEY CREEK at Showground Weir HW

Level (m)	Discharge (m^3/s)
4	0
5	12
6	65
7	125
8	196
9	530



TENTHILL CREEK at TENTHILL TM

Level (m)	Discharge (m^3/s)
0	0
1	1
2	19
3	63
4	137
5	252
6	451
7	675
8	934
9	1240



BREMER at WALLOON WRC

Level (m)	Discharge (m^3/s)
1	0
3.6	2
4.3	30
5.3	75
6.3	150
7.4	300
8.5	420
9.9	1000
12	1850
13	3300
14	6000

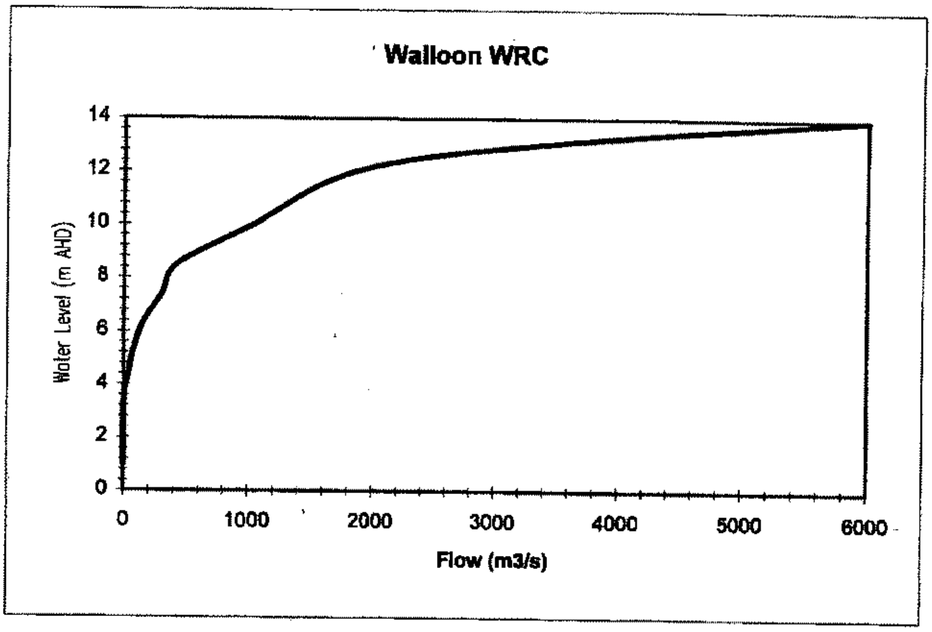
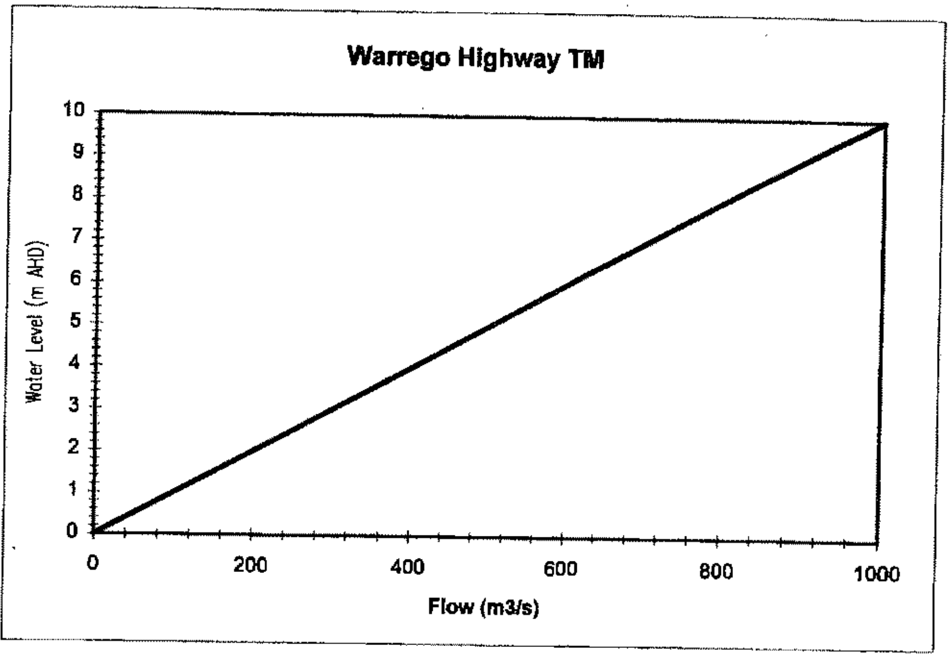


Figure 3.2 - Brisbane River Catchment Rating Curves

LAIDLEY CREEK at WARREGO HIGHWAY TM

Level (m)	Discharge (m^3/s)
0	0
10	1000



STANLEY RIVER at WOODFORD

Level (m)	Discharge (m^3/s)
0	0
3	90
5.5	300
8.3	900
11	2800
13	9000

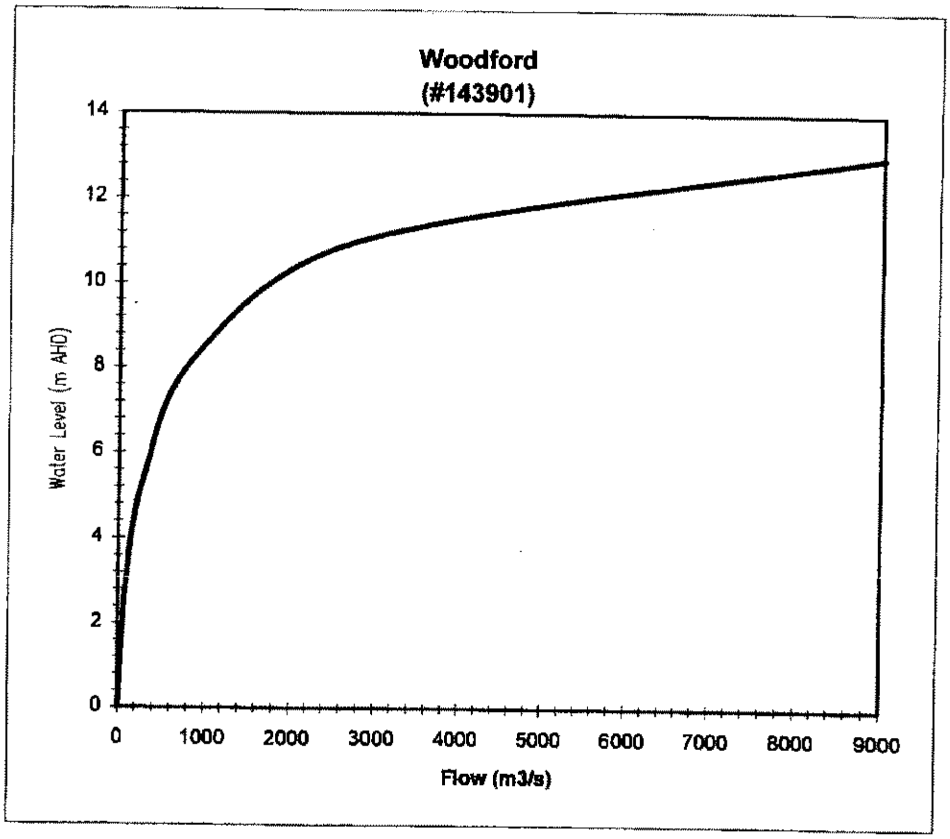
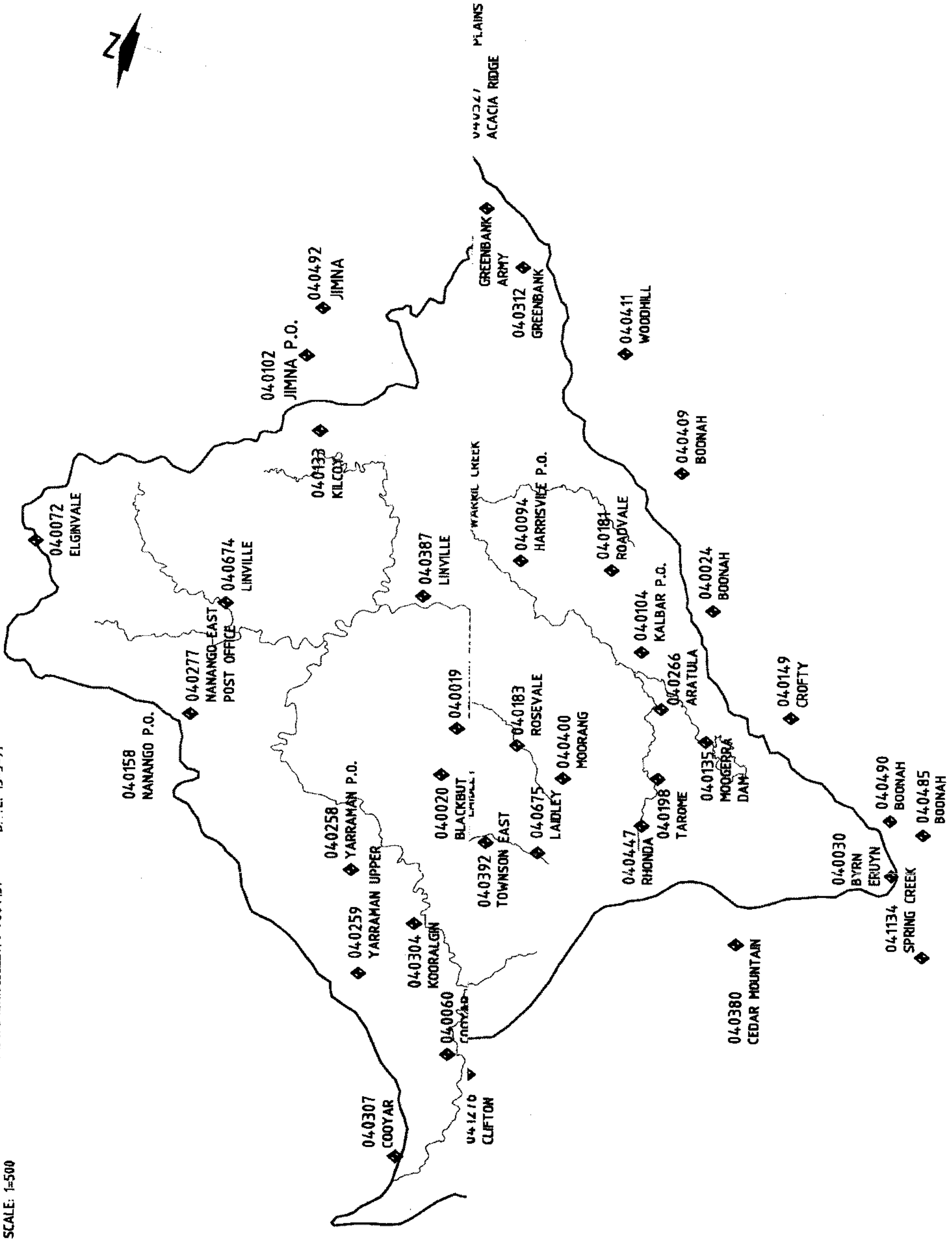


FIGURE 3.3
BRISBANE RIVER FLOOD STUDY
RAINFALL STATION LOCATIONS



PLOT SCALE: 1=500

LEGEND

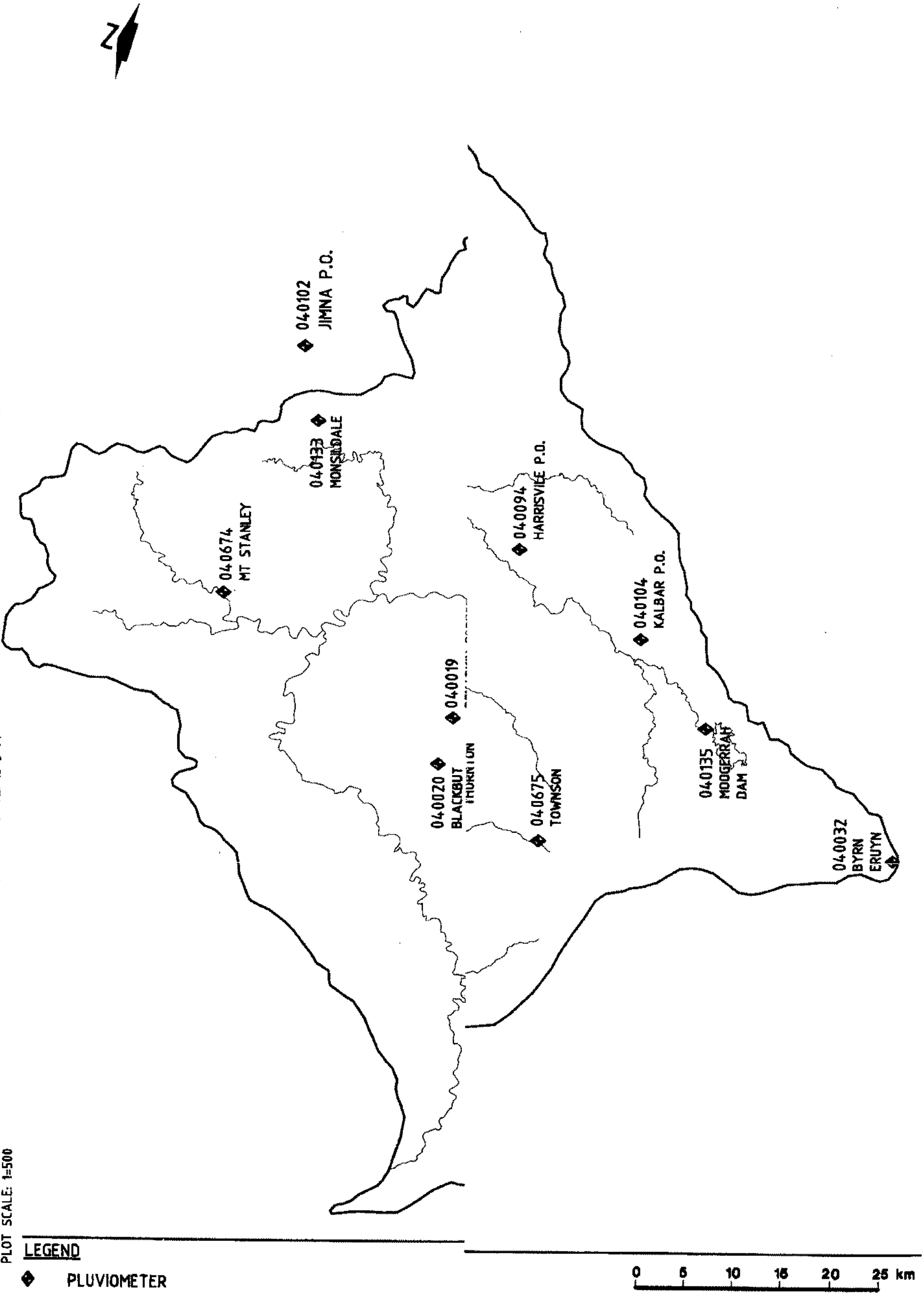
◆ RAINFALL STATION

0 5 10 15 20 25 km

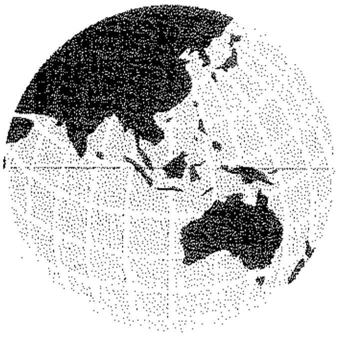
FIGURE 3.4

BRISBANE RIVER FLOOD STUDY

PLUVIOMETER LOCATIONS



PLOT SCALE: 1=500



4. Review of Previous Hydrologic Studies

4. Review of Previous Hydrologic Studies

4.1 Overview

The most significant past study of the Brisbane River catchment was undertaken by the Department of Primary Industries (now Department of Natural Resources or DNR) for the South East Queensland Water Board during the period 1991 to 1994. The study was associated primarily with Somerset Dam and Wivenhoe Dam and included a revision of design floods, the development of runoff routing and hydraulic models and a management system for the flood operation of the dams.

This section summarises the main hydrologic outcomes of the DNR study associated with model calibration.

4.2 Hydrologic Model Calibration

The development of hydrologic models by DNR is documented in 'Brisbane River Flood Hydrology - Runoff Routing Model Calibration' (Vol 1 and 2, September 1991).

An overview of past flood investigations associated with Somerset Dam and Wivenhoe Dam was provided in the DNR report. The most significant of these studies were the original design flood estimates for Wivenhoe Dam completed in 1977 (Hausler and Porter, 1977) and a 1983 revision of these design flows (Weeks, 1983).

Runoff routing model techniques were applied in the 1983 revision and involved calibration against seven historical floods; July 1965, March 1967, June 1967, January 1968, December 1971, January 1971 and January 1976.

WT42PC, a RORB type runoff routing model, was used by DNR in their 1991 study. A total of 24 individual models were set up corresponding to stream gauge locations and calibrated against historical data.

The seven floods used by Weeks (1983) were applied by DNR in addition to floods in June 1983, early April 1989 and late April 1989.

The subdivision of the Brisbane River catchment into 24 separate models which are then linked together such that hydrographs from upstream models form inputs into downstream models is a technique adopted by DNR from flood analysis done for Warragamba Dam, Sydney (Deen, Craig, Sable 1988).

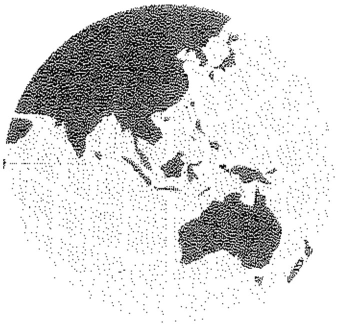
During the calibration phase, recorded hydrographs were used as upstream inflows into several of the WT42PC models in preference to predicted hydrographs. For example, recorded hydrographs available for Brisbane River at Linville and Emu Creek at Boat Mountain were used as direct inflows into the WT42PC model of the Brisbane River upstream of Gregors Creek (refer to **Figure 3-1 - Stream Gauge Locations** for gauge locations).

The preferential use of recorded hydrographs in place of predicted hydrographs from upstream WT42PC models made it difficult to review the performance of the full network model of the Brisbane River (comprising of the individual WT42PC models linked together) in predicting flood hydrographs at the lower reaches of the catchment.

Calibration of the individual WT42PC models was based on matching of peak discharges and flood volumes by adjusting rainfall loss rates and catchment storage parameters (k and m).

The initial loss - continuing loss type of rainfall loss was used in the model calibration. Initial loss rates were adjusted to match the rising limb of the recorded hydrograph. A significant variability in loss rates was noted, both between the individual models for the same storm and over the range of storms that were modelled. Generally the initial loss ranged from 0 to 300 mm and continuing loss rate varied from 0.1 to 9.7 mm/hr. The upper end of the adopted losses are higher than expected for South East Queensland (AR&R, 1987).

The catchment storage parameter, k, was varied within each WT42PC model for each calibration event, generating an extensive set of k values. A k value was nominated for each individual model based on a weighted average; the bias being in proportion to the peak discharge of the calibration event. On this basis, the model parameters were weighted towards larger magnitude floods.



5. Hydrologic Modelling

5. Hydrologic Modelling

5.1 RAFTS Model Description

The objective of the hydrologic analysis was to develop a model that would adequately reproduce historical storm events and reliably predict design flood discharge hydrographs for the Brisbane River catchment.

The runoff routing model, RAFTS, was used for hydrologic modelling purposes. This program was originally developed by Willing and Partners and the Snowy Mountains Engineering Corporation in 1974 and was first distributed as the Regional Stormwater Model (RSWM).

RAFTS has been applied to watersheds ranging from rural to fully urban with catchment areas varying from less than 1 hectare to several thousand square kilometres. Since the 1980's, WP Software have added refinements to the RAFTS software including an EXPERT graphical environment, unsteady flow routing and simulation of retarding basin storages.

5.2 Comparison with URBS Model

As outlined in Section 4, the Department of Natural Resources developed a series of WT42 models of the Brisbane River catchment as part of the flood management of Wivenhoe Dam and Somerset Dam. This program has become the basis of a runoff routing model, URBS, developed jointly by the Brisbane City Council and Department of Natural Resources. URBS has been modified to become an integrated flood forecasting model and is used for this purpose by the Bureau of Meteorology. Presently, the Bureau has an operational URBS model of the Brisbane River catchment as part of its flood alert system.

Both URBS and RAFTS have the capacity to model separately the catchment storage effects (ie routing along overland flowpaths and minor tributaries draining to the major creeks) and channel storage (ie routing associated with the major creeks and channels). The URBS and RAFTS modelling approaches are different and some of these differences are summarised in **Table 5-1 - Comparison of URBS and RAFTS Storage Routing**.

Table 5-1 - Comparison of URBS and RAFTS Storage Routing

RAFTS Model	URBS Model
Catchment Storage	
$S = \left(\frac{0.285A^{0.52}}{(1+U)^{1.97} S_c^{0.5}} \right) Q^m$	$S = \left(\frac{\beta A^{0.5}\ (1+F)^2}{(1+U)^2} \right) Q^m$
where S = storage (m^3h/s) A = catchment area (km^2) Q = discharge (m^3/s) U = fraction urbanisation S_c = drainage slope (%) m = storage non-linearity exponent (default = 0.715)	where S = storage (m^3h/s) A = catchment area (km^2) Q = discharge (m^3/s) U = fraction urbanisation F = fraction forest β = lag parameter m = storage non-linearity exponent (default = 0.8)
Also RAFTS has optional storage factor, PERN, based on the average roughness of the catchment.	
Channel Routing	
Two options are available	One option
1. Simple lag where flood hydrograph is displaced in time by a user-specified delay with zero attenuation. 2. Muskingum - Cunge Routing with routing parameters are calculated from slope, geometry and roughness.	1. Muskingum Routing with direct user inputs of routing parameters (x and α)

5.3 RAFTS Model Setup

Model Layout

A RAFTS model of the Brisbane River catchment was developed to predict runoff hydrographs from rainfall for both historic and design storms.

The schematisation of the model is shown in the following series of four plans included in this report:

- ☐ **Figure 5-1a - RAFTS Layout - Bremer and Lower Brisbane**
- ☐ **Figure 5-1b - RAFTS Layout - Lockyer**
- ☐ **Figure 5-1c - RAFTS Layout - Somerset and Wivenhoe**
- ☐ **Figure 5-1d - RAFTS Layout - Upper Brisbane**

Generally, the majority of nodes are schematised in RAFTS format (subcatchment to subcatchment), however there are some exceptions:

- ☐ At the catchment headwaters where there are 2 subareas joining together (eg WAL1 and WAL2 compared to KAL8 which is a single headwater subarea). In this case, the link lags are set to zero but a link is shown on **Figure 5-1** for clarity.
- ☐ Dummy nodes (zero catchment area) were inserted between RAFTS nodes and these are shown as intermediate nodes. An example is MTC### which is used to sum hydrographs.

The RAFTS model is based on a RORB type model which is centroid to centroid based. During the model setup the RORB type link lags were converted to a RAFTS subarea boundary to subarea boundary type lag. (This involved measuring the river reach distance between subarea boundaries and then checking if the total tributary length is the same as what DNR estimated.)

A single RAFTS model was setup that has full coverage of the Brisbane River catchment. The breakup of the model layout into the four main geographical areas shown in **Figure 5.1a** to **5.1d** was done for presentation only.

The RAFTS model consists of several major elements as follows:

☐ **General Nodes** - the `building blocks' of the model. Routing of flows from each catchment local to each node is routed through a conceptual storage (see **Table 5-1** for details on catchment storage). Many of the nodes coincide (or are close to) stream gauges which enable comparison between recorded and predicted hydrographs.

☐ **Basin Nodes** - are a special type of RAFTS node in which inflow hydrographs are routed through a user specified storage. In the case of the Brisbane River Flood Study, basin nodes were used to model dam storages and significant temporary flood storage zones within the river system.

☐ **Links** - provide a connection between nodes and include channel routing effects (see **Table 5-1** for details on channel routing).

The delineation of RAFTS subarea boundaries, and hence the basic model structure, is based on the DNR WT42 models used for real time flood forecasting. A consistent node numbering system has been applied. In several cases `dummy' nodes have been added (these are denoted with the suffix with one or more `#' or `+').

RAFTS Model Parameters
During the model setup phase, the input of several types of model parameters was required prior to undertaking RAFTS calibration and verification:

☐ **Subarea Properties** - include the local catchment area, the percentage impervious of the catchment surface, the vectored slope of the subcatchment and a surface roughness factor (PERN).

☐ **Link Properties** - generally, hydrographs were lagged between subarea nodes based on travel time.

The subarea and link properties were incorporated into the RAFTS model based on available data. Parameters including area, percentage impervious, and slope were fixed. Surface roughness factor and link travel times were subject to adjustment during the course of model calibration.

The basis of parameter selection during the RAFTS model setup phase was:

☐ **Catchment areas** - the area of the local catchment assigned to each node was based on the catchment subdivision of the DNR flood forecasting models. These node areas were typically of the order of 5 000 to 10 000 ha.

☐ **Percentage impervious** - zero percentage impervious was adopted for most of the catchment, given its predominant rural and natural landuses. RAFTS derives an equivalent fraction urbanisation (referred to as U in **Table 5-1**) using the percentage impervious assigned to each node. On this basis, the majority of the catchment also had a zero fraction urbanisation. In the Brisbane metropolitan area, the assumed percentage impervious varied from 20 to 50% to account for catchment urbanisation.

☐ **Slope** - a slope of 2% was globally applied throughout the RAFTS model. This assumption leads to a constant factor in the catchment storage relationship, making it more consistent with the URBS model approach.

☐ **Surface roughness** - this is an empirical factor based on the average Mannings n of the catchment surface. A Mannings n value of 0.05, consistent with rural landuse, were globally applied in the RAFTS model. This factor was varied during model calibration.

☐ **Link lag** - initial estimates of lags between nodes were based on interpretation of travel time plots between stream gauges supplied by the Hydrology Section, Bureau of Meteorology. These plots were based on the time difference of the incidence of peak gauge height for a range of historical floods.

Rainfall Losses

An initial loss and continuing loss model was employed for the RAFTS calibration. These losses are used to predict the runoff volume generated from the catchment in response to rainfall and includes two components:

☐ **Initial Loss** - a loss (in mm) accounting for infiltration effects that is deducted from rainfall prior to the occurrence of surface runoff. Typical values of Initial loss range from 0 to 150 mm.

☐ **Continuing Loss** - a constant loss rate (in mm/hr) that is deducted from the rainfall over the duration of the storm. Typical continuing loss rates fall in a range from 0 to 3.5 mm/hr.

Initial loss and continuing losses were assumed to be uniform within each of the six broad areas shown in **Figure 2-2 - Brisbane River Subcatchments.**

Basin Nodes

Basin nodes were used in the RAFTS model to account for temporary flood storage effects at key locations within the Brisbane River and its tributaries. The stage-storage discharge relationship assigned to each of these nodes was based on matching the shape and peak discharge of predicted and gauged hydrographs downstream of the nodes.

Basin nodes were also used in the RAFTS model to simulate existing dam storages. For the smaller dams, a simple stage-storage volume - outflow discharge curve based on the dam outlet configuration and the storage volume was used. This data was supplied by DNR and was applied to the dams listed in **Table 2-1 - Major Dams in the Brisbane Valley** with the exception of Wivenhoe and Somerset Dams. It was assumed that the dam storage level was at full supply level at the start of each calibration flood.

Somerset Dam and Wivenhoe Dam are major flood mitigation structures and the regulation of outflows by setting of the dam spillway gates is governed by a set of flood operation rules. Spillway operation depends in part on flooding conditions prevailing downstream of Wivenhoe Dam due to less regulated tributary flows such as Lockyer Creek.

During the RAFTS model calibration phase, recorded or synthetic hydrographs of Somerset and Wivenhoe Dam outflows were used as direct inputs. This approach effectively divided the Brisbane Valley catchment into the following (based on the subcatchments shown on **Figure 2-2**):

☐ **Somerset** - upstream of Somerset Dam and hence modelling inflows to this dam.

☐ **Upper Brisbane and Wivenhoe** - upstream of Wivenhoe Dam including upper Brisbane River, Cooyar Creek, Emu Creek and Cressbrook Creek. Regulated flows from Somerset Dam were directly input based on historical data.

☐ **Lockyer, Bremer and Lower Brisbane** - the remainder of the Brisbane River catchment including Lockyer Creek, Bremer River and the lower Brisbane River. In this case, outflow hydrographs from Wivenhoe Dam were used as direct inputs.

For the case of historical floods prior to the completion of Wivenhoe Dam in 1985, the division of the Brisbane Valley catchment simplified to:

☐ **Somerset** - upstream of Somerset Dam

☐ **Upper Brisbane, Wivenhoe, Lockyer, Bremer and Lower Brisbane** - the remainder of the Brisbane River catchment and downstream of Somerset Dam. Recorded outflow hydrographs from this dam were used as inputs.

5.4 RAFTS Model Validation

General Approach

The approach taken in model validation, in accordance to the study brief, was to derive a single set of catchment and channel routing parameters that would be applicable to the entire range of historical floods under consideration. Rainfall loss rates could be adjusted depending on antecedent moisture conditions and other factors.

Calibration against data recorded for a minimum of four floods was required including the January 1974 flood. Another four floods of varying magnitude were used to verify the model performance.

Achieving a consistency between RAFTS and MIKE 11 prediction of flood discharge at key points within the Brisbane River was also a requirement of the calibration process.

The focus of the RAFTS modelling is to generate inflow hydrographs for the Brisbane River MIKE 11 model which extends from the Inner Bar to upstream of the Moggill gauge. A high priority was achieving an acceptable calibration at locations towards the lower reaches of the Brisbane River and also at stream gauges distributed within the catchment at key points of interest (refer to primary stream gauges in **Section 3.1**).

Selection of Calibration and Verification Floods

A summary of major Brisbane River floods and the availability of hydrological data (rainfalls and streamflows) and hydraulic data (flood levels and discharges in the Brisbane metropolitan area) is given in **Table 5-2 - Data Availability for Major Historical Floods.**

Table 5-2 - Data Availability for Major Historical Floods

Flood	Hydrologic Data	Hydraulic Data
February 1931	✓	✓
March 1955	✓	✓
July 1965	✓	
March 1967	✓	
June 1967	✓	✓
January 1968	✓	✓
December 1971	✓	
July 1973	✓	✓
January 1974	✓	✓
January 1976	✓	✓
June 1983	✓	✓
April 1989 a	✓	✓
April 1989 b	✓	✓
May 1996	✓	✓

Note:
1. Floods modelled by DNR for validation of WT42 and RUBICON models are shaded.
2. Limited data also available for the February 1893 flood.

The historical floods can be grouped as:

- **Pre-Somerset Dam** - Floods that occurred prior to the construction of Somerset Dam. There is some confusion regarding the date in which Somerset Dam was constructed. Although the dam was completed in 1959, construction began in 1943 and it is believed that the war caused construction to be ceased. At this point, it is believed that the dam was completed, except for the radial area flood spillway gates.

- **Pre-Wivenhoe Dam** - floods that occurred prior to the construction of Wivenhoe Dam which was operational in 1985. The June 1983 flood occurred during the construction phase when the dam spillway was at a near completion stage.

- **Post-Wivenhoe Dam** - floods that occurred after completion of Wivenhoe Dam in 1985.

Table 5-3 - Historical Calibration and Verification Events provides a list of the events used in the RAFTS and MIKE 11 model validation. The selection of historical floods took into account various factors including the availability of both hydrologic and hydraulic datasets for the same flood. A higher weighting towards recent floods was applied as these tended to have more data available for calibration purposes, however the 1931 and 1955 events were included as these were the only floods considered to be of medium magnitude.

A selection of floods to have full coverage of both pre-Wivenhoe Dam and post-Wivenhoe Dam conditions was also undertaken. The floods used for RAFTS and MIKE 11 model validation covered a historical period from 1931 to 1996.

Table 5-3 - Historical Calibration and Verification Events

Event	Period of Event	Type
January 1974	24/01/74 to 28/01/74	Calibration
June 1983	20/06/83 to 23/06/83	Calibration
Late April 1989	24/04/89 to 27/04/89	Calibration
May 1996	31/04/96 to 07/05/96	Calibration
February 1931	01/02/31 to 06/02/31	Verification
March 1955	26/03/55 to 29/03/55	Verification
July 1973	01/07/73 to 09/07/73	Verification
Early April 1989	31/3/89 to 04/04/89	Verification

Major Dam Discharges

A major consideration in the RAFTS calibration was the flood regulation characteristics of the two major dams; Somerset Dam and Wivenhoe Dam. The hydrologic effect of Somerset Dam started after its completion in 1959 and full operation of the larger Wivenhoe Dam was initiated in 1985.

Estimates of inflow and outflow hydrographs at both dams for a range of historical floods were available and are compiled as **Figure 5-2 - Wivenhoe Dam Discharges** and **Figure 5-3 - Somerset Dam Discharges.** These are synthetic hydrographs produced by Brisbane City Council and estimated from measured storage levels and records of spillway gate settings. In the case of Wivenhoe releases, DNR suggests that the outflow hydrographs may be over estimated by between 15 to 20 percent, especially for the lesser floods that occurred in early and late April 1989 (SEQWB, October 1994) which correspond to outflows of the order of 1 200 to 1 500 m^3/s.

Wivenhoe Dam releases are derived by a theoretical rating curve based on the hydraulics of the four spillway radial gates. To resolve the potential outflow discrepancy, DNR recommended that the clear gate opening be measured for a range of gate settings and that sensors be installed at each spillway gate.

In the case of RAFTS modelling for the early and late April 1989 floods, both the DNR and Council derived hydrographs were tested. The selection of the Wivenhoe Dam outflow hydrograph used was based on matching the recorded hydrograph at the Savages Crossing streamgauge, particularly after the recession of Lockyer Creek discharges. On this basis, the Council hydrograph was used for the early April 1989 flood and the DNR hydrograph was applied in the late 1989 flood analysis.

No dam releases for both Wivenhoe Dam and Somerset Dam were reported for the May 1996 flood. Data on Somerset Dam releases during the July 1973 flood was unavailable.

5.5 RAFTS Calibration - January 1974 Flood

The January 1974 flood was the first event used in the calibration process and is by far the largest of the floods considered. A significant amount of historical data is available for calibration; including rainfalls, streamflows and flood levels in the Brisbane River.

The 1974 flood occurred prior to construction of Wivenhoe Dam and is thus representative of pre-Wivenhoe Dam conditions. This is also the case for the July 1973 verification flood.

Rainfall

Rainfall occurred over a four day period commencing on mid 24 January 1974. **Figure 5-4 - Rainfall Distribution - January 1974 Storm** presents the spatial distribution of rainfall across the Brisbane River catchment.

Rainfall tended to increase in an easterly direction, with highest values being recorded at stations along the D'Aguilar Range and further south at Mount Glorious and Mount Nebo. Total four day rainfalls ranged from 120 mm to 1 306 mm. Selected pluviograph patterns are shown on **Figure 5-5- Representative Pluviographs - January 1974 Flood**. Peak rainfall intensities tended to occur on 26 January. The Brisbane metropolitan area recorded a sequence of three storms, the first and largest burst occurring on 25 January.

Rainfall Losses

The losses used to reproduce the rising limb and total volume of the recorded hydrograph at key stream gauge are given in **Table 5-4 - Rainfall Losses - January 1974 Calibration**.

Table 5-4 - Rainfall Losses - January 1974 Calibration

Sub-Catchment	Initial Loss (mm)	Continuing Loss (mm/hr)
Upper Brisbane	0	2.5
Somerset	0	2.5
Wivenhoe	0	2.5
Lockyer	0	2.5
Bremer	0	0
Lower Brisbane	0	2.5

Catchment Storage

By calibration to the 1974 flood data, especially against the general shape of recorded hydrographs, the following PERN values were applied:

- ☐ PERN equal to 0.11 - was used for Wivenhoe and Upper Brisbane subcatchments.
- ☐ PERN equal to 0.05 - was used for Somerset, Lockyer Bremer and Lower Brisbane subcatchments.

Channel Routing

A simple lag time assigned to each RAFTS link was found generally to reproduce the channel routing behaviour as recorded by the available stream gauges. For example, the Brisbane River stream gauge data at Savages Crossing and Mt Crosby shows no attenuation of peak discharge. This trend was also the case between the Moggill and Jindalee gauge sites.

On this basis, link lag times were adjusted to match the recorded timing of hydrographs. Hydrograph attenuation due to local storage effects was found to be significant at the following three key sites:

- ☐ **Lowood** - Lockyer Creek enters the Brisbane River upstream of Lowood. The lower reaches of Lockyer Creek are low lying floodplain subject to extensive inundation during major floods. Thus, the Lockyer Creek confluence represents a large temporary flood storage and its ponding effect is controlled by Brisbane River backwater.
- ☐ **Moggill** - The Bremer River enters the Brisbane River upstream of the Moggill gauge. On a similar basis as the Lockyer Creek - Brisbane River confluence, a significant amount of temporary flood storage is available in the lower Bremer River which is regulated by local backwater conditions from the Brisbane River.
- ☐ **Harrisville** - The Warrill Creek floodplain near Harrisville has substantial storage routing effects, based on recorded hydrographs in this area.

Channel storage effects at the above locations were modelled by basin nodes. A stage-storage-discharge relationship was derived at each storage, based on achieving a match against predicted and recorded downstream hydrographs. The storage relationships are shown as:

- ☐ **Figure 5-6 - Channel Storage Curves at Lowood**
- ☐ **Figure 5-7 - Channel Storage Curves at Moggill**
- ☐ **Figure 5-8 - Channel Storage Curves at Harrisville**

Storage Curve A at Lowood (presented in **Figure 5-6**) gave the best fit against recorded stream gauge data for the January 1974 flood.

Recorded and Predicted Hydrographs
Plots of recorded and RAFTS predicted hydrographs for the January 1974 calibration are compiled in **Appendix B** (Figure B-1a to B-1d). A summary is given in **Table 5-5 - RAFTS Calibration - January 1974 Flood.**

Predicted peak discharges within the coverage of the MIKE 11 model (ie at Moggill, Jindalee and Port Office) are within 1 to 3 percent of recorded peaks, RAFTS estimates hydrograph volumes are 13 to 14 percent below measured volumes at Moggill and Jindalee. Part of this volume mismatch can be attributed to inconsistently high flows recorded at Moggill after the hydrograph recession and, similarly, high flows at Jindalee prior to the start of the hydrograph rising limb. At Port Office gauge, the predicted and measured flood volume are within 2 percent.

At other key sites in the Brisbane Valley, predicted peak discharges are within 0 to 13 percent of gauged discharges, except for Lockyer Creek at Lyons Bridge, Bremer River at David Trumpy Bridge and Warrill Creek at Amberley. The Lockyer Creek and Bremer River gauges are subject to backwater effects from Brisbane River.

Table 5-5 - RAFTS Calibration - January 1974 Flood

Number	Stream	Site	Peak Discharge (m^3/s)			Discharge Volume (GL)			Comments
			Gauged	Predicted	Diff(%)	Gauged	Predicted	Diff(%)	
Upper Brisbane									
143015	Cooyar Ck	Damsite	967	585	-40	105	94	-10	
143007	Brisbane Rv	Linville	2 100	1 912	-9	181	220	+22	
143010	Emu Ck	Boat Mtn	1 054	882	-16	151	131	-13	
143009	Brisbane Rv	Gregors	3 750	3 829	+2	651	556	-15	
Somerset & Wivenhoe									
143305	Stanley Rv	Somerset Dam	3 587	3 119	-13	591	465	-21	
143008	Brisbane Rv	Middle Ck	4 813	5 429	+13	1 055	1 054	0	
143901	Stanley Rv	Woodford	1 111	1 332	+20	186	148	-20	
143303	Stanley Rv	Peachester	360	500	+39	77	56	-27	
143013	Cressbrook	Damsite	202	410	+103	33	48	+45	
Lockyer									
143203	Lockyer Ck	Helidon	1 308	858	-34	108	60	-44	
143210A	Lockyer Ck	Lyons Bridge	2 650	3 750	+42	492	475	-3	Backwater effect at gauge
143905	Lockyer Ck	Glenore Grove	3 900	3 466	-11	395	398	0	
143904	Lockyer Ck	Gatton	2 120	2 400	+13	132	200	+52	
143907	Brisbane Rv	Lowood	7 397	7 471	+1	1 891	1 743	-8	
Bremer & Lower Brisbane									
143001	Brisbane Rv	Savages Cross	7 340	7 497	+2	2 031	1 836	-10	
143003	Brisbane Rv	Mt Crosby	7 456	7 503	0	2 185	1 983	-9	
143110	Bremer Rv	Adams Bridge	349	531	+52	46	65	+41	
143108	Warrill Ck	Amberley	1 576	2 132	+35	294	385	+31	
143113	Purga Ck	Loamside	400	868	+117	55	106	+93	Poor rating at high flows
143019	Oxley Ck	Beatty Rd	985	966	-2	98	85	-13	
143911	Bremer Rv	David Trumpy	4 000	4 891	+22	994	876	-11	Backwater effect at gauge
143915	Brisbane Rv	Moggill	9 346	9 663	+3	3 472	2 971	-14	Gauge flow high at end
143982	Brisbane Rv	Jindalee	9 493	9 670	+2	3 567	3 111	-13	Gauge flow high at start
143919	Brisbane Rv	Port Office	9 800	9 675	-1	3 343	3 269	-2	

Note: 1. Primary stream gauges are shaded.

5.6 RAFTS Calibration - June 1983 Flood

The June 1983 flood was a significant flood in the Upper Brisbane and Wivenhoe parts of the Brisbane Valley. Wivenhoe Dam was under construction and four of the five spillway monoliths were built to final crest level. The flood occurred prior to the installation of spillway gates and thus outflow from the dam was unregulated.

The 1983 flood data represents a transition between pre-Wivenhoe Dam and post-Wivenhoe Dam conditions.

Rainfall

Rainfall occurred over a period of three days commencing 20 June 1983. The spatial distribution of rainfall within the Brisbane River catchment is presented in **Figure 5-9 - Rainfall Distribution - June 1983 Storm**. Rainfalls varied from about 40 mm to 240 mm.

As shown in **Figure 5-10 - Representative Pluviographs - June 1983 Storm**, two rainfall peaks occurred with the latter burst recorded on the morning of 22 June generally being dominant.

Rainfall Losses

The losses applied during the June 1983 flood calibration are given in **Table 5-6 - Rainfall Losses - June 1983 Calibration.**

Table 5-6 - Rainfall Losses - June 1983 Calibration

Subcatchment	Initial Loss (mm)	Continuing Loss (mm/hr)
Upper Brisbane	0	2.5
Somerset	0	1.5
Wivenhoe	0	2.5
Lockyer	0	2.5
Bremer	0	0
Lower Brisbane	0	2.5

Catchment Storage

A PERN coefficient of 0.05 was applied to all subcatchments.

Channel Routing

Link lag times used in the 1974 calibration were used except for upstream of the partially constructed Wivenhoe Dam. Faster travel times were used in the drowned reach of the Brisbane River from Somerset Dam to Wivenhoe Dam (Node WIV12 to WIV-OUT) to account for flood wave celerity effects.

At the channel storage nodes assigned at Lowood, Moggill and Harrisville, the storage curves used for the January 1974 flood calibration were applied except for a modified storage relationship at Lowood. This is shown as Storage Curve B on **Figure 5-6 - Channel Storage Curves at Lowood.**

Recorded and Predicted Hydrographs
Plots of recorded and RAFTS predicted hydrographs for the June 1983 calibration are compiled in **Appendix B (Figure B-2a** to **B-2c**) and summarised in **Table 5-7 - RAFTS Calibration - June 1983 Flood.**

The match between predicted and recorded flows at key sites are generally within acceptable limits. Flows based on the Brisbane River gauge at Moggill are substantially lower than RAFTS predicted discharge. This trend was also present in the analysis of both the early and late April 1989 events (refer to Section 5.7 and 5.13). These three floods of the lower Brisbane River were of similar magnitude and less than 2 000 m^3/s.

Also the Moggill hydrograph volume based on the gauge data is substantially less than the volume recorded upstream at Savages Creek. On this basis, it is suggested that the Moggill rating curve be adjusted for moderate floods (less than 2 000 m^3/s). There also may be a need to have a rating curve dependent on downstream tide levels at this site.

Table 5-7 - RAFTS Calibration - June 1983 Flood

Number	Stream	Site	Peak Discharge (m^3/s)			Discharge Volume (GL)			Comments
			Gauged	Predicted	Diff(%)	Gauged	Predicted	Diff(%)	
Upper Brisbane									
143015	Cooyar Ck	Damsite	707	1 159	+64	51	70	+37	
143007	Brisbane Rv	Linville	2 090	2 204	+5	148	146	-1	
143010	Emu Ck	Boat Mtn	885	1 188	+34	47	75	+60	
143009	Brisbane Rv	Gregors Ck	3 850	4 118	+7	332	309	-7	
Somerset & Wivenhoe									
143305	Stanley Rv	Somerset Dam	2 236	2 316	+4	260	177	-32	
143036	Brisbane Rv	Wivenhoe Dam	5 900	5 849	-1	776	739	-5	Synthetic gauged hydrograph
143303	Stanley Rv	Peachester	310	362	+17	27	16	-41	
Lockyer									
143203	Lockyer Ck	Helidon	619	540	-13	41	29	-29	
143212	Tenthill Ck	Tenthill	183	345	+89	15	21	+40	
143210A	Lockyer Ck	Lyons Bridge	2 290	2 379	+4	166	156	-6	Backwater effect at gauge
143905	Lockyer Ck	Glenore Grove	2 100	2 261	+8	218	126	-42	
Bremer & Lower Brisbane									
143001	Brisbane Rv	Savages Cross	1 641	1 513	-8	721	614	-15	
143110	Bremer Rv	Adams Bridge	132	128	-3	10	12	+20	
143107	Bremer Rv	Walloon	387	830	+114	33	72	+118	
143108	Warrill Ck	Amberley	383	398	+4	50	79	+58	
143113	Purga Ck	Loamside	141	235	+67	12	21	+75	
143911	Bremer Rv	David Trumpy	2 045	1 405	-31	119	184	+55	Gauge record incomplete
143915	Brisbane Rv	Moggill	1 457	2 029	+39	450	855	+90	Recorded volume < Savages Crossing

Note: 1. Primary stream gauges are shaded.

5.7 RAFTS Calibration - Late April 1989 Flood

The late April 1989 flood was a significant event in the Upper Brisbane and Somerset parts of the catchment. It occurred about three weeks after the incidence of a flood of similar magnitude (early April 1989 flood used for verification).

The flood regulation function of Wivenhoe Dam was in full operation during the 1989 floods as indicated by the dam outflow hydrographs presented in **Figure 5-2 - Wivenhoe Dam Discharges.** Releases from Wivenhoe Dam during the late 1989 flood continued for a period of four days after the cessation of dam inflows.

On this basis, the late April 1989 flood (in addition to the early April 1989 verification and May 1996 calibration events) are representative of post-Wivenhoe Dam conditions.

Rainfall

As shown in **Figure 5-11 - Rainfall Distribution - Late 1989 Storm**, the highest rainfalls were recorded in the upper parts of the Somerset subcatchment. Total rainfalls up to 355 mm were recorded over a three day period. In the Lockyer and Bremer areas of the catchment, rainfalls were substantially less and generally fell in the range of 50 to 100 mm.

Selected rainfall temporal patterns are presented in **Figure 5-12 - Representative Pluviographs - Late April 1989 Storm**. All stations recorded a storm burst during mid 26 April and at some locations including Ravensbourne, Moongerah Dam and Kirkleagh, this burst was preceded by a similar rainfall pattern on 25 April.

Rainfall Losses

Table 5-8 - Rainfall Losses - Late April 1989 Calibration lists the initial and continuing losses applied in the hydrograph calibration.

Table 5-8 - Rainfall Losses - Late April 1989 Calibration

Subcatchment	Initial Loss (mm)	Continuing Loss (mm/hr)
Upper Brisbane	30	2.5
Somerset	30	0
Wivenhoe	30	2.5
Lockyer	30	2.5
Bremer	10	0
Lower Brisbane	30	2.5

Catchment Storage

A PERN coefficient of 0.05 was applied to all subcatchments.

Catchment Routing

The late April 1989 flood was the first event analysed that incorporated controlled flood regulation at Wivenhoe Dam.

Link lag times were a modified set of travel times used in the June 1983 flood when the dam was under construction. In the case of the late April 1989 flood calibration, travel times were reduced in the Brisbane River reach from the dam wall to the upstream extent of the Wivenhoe Dam storage (Node WIV7 to WIV-OUT).

During the calibration process, travel times were also reduced in the Brisbane River reach from Linville to Scrub Creek (Node GRE1 to GRE-OUT).

At the channel storage nodes assigned at Lowood, Moggill and Harrisville, the storage curves used in the June 1983 flood calibration were used.

Recorded and Predicted Hydrographs
Plots of recorded and RAFTS predicted hydrographs for the late April 1989 calibration are presented in **Appendix B (Figure B-3a** to **B-3d**). Further details are given in **Table 5-9 - RAFTS Calibration - Late April 1989 Flood**.

Recorded and predicted discharge peaks at key sites are generally matched within about 15 percent.

The synthetic inflow hydrograph at Wivenhoe Dam has an unrealistic discharge `spike' and this accounts for the discrepancy with RAFTS peak discharge at this location.

Table 5-9 - RAFTS Calibration - Late April 1989 Flood

Number	Stream	Site	Peak Discharge (m^3/s)			Discharge Volume (GL)			Comments
			Gauged	Predicted	Diff(%)	Gauged	Predicted	Diff(%)	
Upper Brisbane									
143015	Cooyar Ck	Damsite	436	648	+49	34	47	+38	
143007	Brisbane Rv	Linville	2 214	2 178	-2	116	128	+10	
143010	Emu Ck	Boat Mtn	610	612	0	39	45	+15	
143009	Brisbane Rv	Gregors Ck	3 250	3 457	+6	297	238	-20	Lag error in gauge
Somerset & Wivenhoe									
143305	Stanley Rv	Somerset Dam	3 639	2 620	-28	337	273	-19	
143036	Brisbane Rv	Wivenhoe Dam	9 632	4 750	-50	792	682	-14	Spike in synthetic hydrograph
143901	Stanley Rv	Woodford	642	1 089	+70	201	111	-45	
143303	Stanley Rv	Peachester	431	729	+69	34	53	+56	
Lockyer									
143203	Lockyer Ck	Helidon	499	184	-63	19	11	-42	
143212	Tenthill Ck	Tenthill	89	70	-17	15	7	-53	
143225	Laidley Ck	Showground	119	46	-61	16	4.3	-73	
143905	Lockyer Ck	Glenore Grove	422	409	-3	67	34	-49	
Bremer & Lower Brisbane									
143001	Brisbane Rv	Savages Cross	1 406	1 210	-14	815	753	-8	
143110	Bremer Rv	Adams Bridge	96	79	-18	6.3	9	+43	
143107	Bremer Rv	Walloon	259	521	+101	20	51	+155	
143108	Warrill Ck	Amberley	252	290	+15	41	64	+56	
143113	Purga Ck	Loamside	112	169	+51	11	15	+36	
143911	Bremer Rv	David Trumpy	773	873	+13	74	139	+88	Gauge record incomplete
143915	Brisbane Rv	Moggill	1 200	1 400	+17	752	931	+24	

Note: 1. Primary stream gauges are shaded.

5.8 RAFTS Calibration - May 1996 Flood

The flood of May 1996 caused extensive flooding of rural areas throughout the Brisbane Valley, especially in the Laidley and Lockyer Creek areas. Significant flows were also recorded along the Bremer River and Warrill Creek and this caused moderate flooding at Ipswich. A full description of the meteorological and hydrologic aspects of the May 1996 flood has been prepared by the Bureau of Meteorology (BOM, 1996).

No dam releases during the May 1996 flood were reported at both Somerset Dam and Wivenhoe Dam.

Rainfall

Rainfall associated with the May 1996 flood occurred over a period of several days. Eight day rainfall totals within the Brisbane Valley are shown in **Figure 5-13 - Rainfall Distribution - May 1996 Storm**. Maximum rainfalls of in excess of 1 000 mm were recorded at Mount Glorious. As shown in **Figure 5-14 - Representative Pluviographs - May 1996 Storm**, the rainfall pattern was multi-peaked with recorded intensities generally less than 4 mm/hr with peaks of the order of 10 mm/hr.

Rainfall Losses

Table 5-10 - Rainfall Losses - May 1996 Calibration lists the rainfall losses assigned to each Brisbane River subcatchment.

Table 5-10 - Rainfall Losses - May 1996 Calibration

Subcatchment	Initial Loss (mm)	Continuing Loss (mm/hr)
Upper Brisbane	150	2.5
Somerset	150	2.0
Wivenhoe	150	2.5
Lockyer	140	1.2
Bremer	100	1.5
Lower Brisbane	100	1.5

Catchment Storage

A PERN coefficient of 0.05 was applied to all subcatchments.

Channel Routing

Link lag times within the RAFTS model and channel storage properties at Lowood, Moggill and Harrisville were identical to those used in the late April 1989 flood calibration.

Recorded and Predicted Hydrographs

Plots of recorded and RAFTS predicted hydrographs for the May 1996 calibration are presented in **Appendix B (Figures B-4a** to **B-4d)**. Further summary information is compiled in **Table 5-11 - RAFTS Calibration - May 1996 Flood.** For the lower reaches of the Brisbane River, peak discharges are predicted by RAFTS to within 5 percent of gauged flows.

Table 5-11 - RAFTS Calibration - May 1996 Flood

Number	Stream	Site	Peak Discharge (m^3/s)			Discharge Volume (GL)			Comments
			Gauged	Predicted	Diff(%)	Gauged	Predicted	Diff(%)	
Upper Brisbane									
143015	Cooyar Ck	Damsite	41	74	+80	9.3	6.4	-31	Relatively low flow
143007	Brisbane Rv	Linville	57	75	+32	17.4	6.9	-60	Relatively low flow
143010	Emu Ck	Boat Mtn	388	198	-49	39	18	-54	
143009	Brisbane Rv	Gregors Ck	479	340	-29	76	52	-32	
Somerset & Wivenhoe									
143036	Brisbane Rv	Wivenhoe Dam	2 386	2 644	+11	343	232	-32	
Lockyer									
143203	Lockyer Ck	Helidon	739	259	-65	93	34	-63	
143212	Tenthill Ck	Tenthill	628	592	-6	71	107	+51	
143225	Laidley Ck	Showground	540	485	-10	66	76	+15	
143907	Brisbane Rv	Lowood	2 020	2 088	+3	525	578	+10	
143905	Lockyer Ck	Glenore Grove	2 460	2 253	-8	475	410	-14	
Bremer & Lower Brisbane									
143001	Brisbane Rv	Savages Cross	2 011	2 102	+5	532	609	+14	
143110	Bremer Rv	Adams Bridge	225	199	-12	35	24	-31	
7020	Bremer Rv	Rosewood	781	766	-2	155	126	-19	
6572	Warrill Ck	Harrisville	376	568	+51	88	80	-9	
143107	Bremer Rv	Walloon	726	837	+15	127	140	+10	
143102	Warrill Ck	Kalbar	426	533	+25	52	56	+8	
143108	Warrill Ck	Amberley	402	384	-4	129	100	-22	
143019	Oxley Ck	Beatty Rd	237	297	+25	49	42	-14	
143915	Brisbane Rv	Moggill	2 792	2 807	0	761	1 028	+35	Record incomplete

Note: 1. Primary stream gauges are shaded.

5.9 RAFTS Verification - February 1931

The 1931 historical flood event commenced on the 1 Feb 1931 and continued for a period of five days. This event was the second largest flood recorded this century and was considered to be an important flood in the verification process.

Limited stream gauge information was available in the lower reaches of the Brisbane River however it was considered that there was sufficient information to provide some indication of the reliability of the RAFTS model output.

Wivenhoe and Somerset Dams were not constructed for this event and the RAFTS model was adjusted accordingly.

Rainfall
One of the main concerns modelling this event was the lack of pluviograph information. Pluviographs provide temporal variation throughout the catchment during a storm.

To account for spatial variation, rainfall depths for the event were calculated and these depths were input into Civilcad where isohyetal maps were generated. **Figure 5-15 - Isohyetal Map - February 1931 Flood** illustrates the rainfall depths for the Brisbane River Catchment.

Rainfall depths were then interpolated at each sub-area and input into the software package HYDCON where appropriate temporal patterns were applied. HYDCON is a software package produced by Sinclair Knight Merz specifically for this study.

A single temporal pattern was applied over the entire catchment for the 1931 flood which was measured at Brisbane Regional Office. This was the only temporal pattern (other than daily rainfall information) available for this flood event.

After inspection of the daily rainfall data it was considered that the temporal pattern over the catchment was reasonably consistent for the lower part of the catchment. However for the upper catchment the rainfall commenced half to a full day earlier than in the lower catchments (Lower Brisbane and Bremer catchments). To account for these effects the temporal pattern for the upper catchments was applied half a day earlier as illustrated in **Figure 5-16 - Representative Pluviographs - February 1931 Storm.**

Rainfall Losses
Table 5-12 - Rainfall Losses - February 1931 Verification lists the initial and continuing losses used for the pre Wivenhoe and pre Somerset Dam verification event.

Table 5-12- Rainfall Losses - February 1931 Verification

Subcatchment	Initial Loss (mm)	Continuing Loss (mm/hr)
Upper Brisbane	150	3.5
Somerset	120	3.0
Wivenhoe	150	3.5
Lockyer	100	2.5
Bremer	40	1.0
Lower Brisbane	40	1.0

The above losses are consistent with the loss rates used for the previous calibration/verification events although the maximum continuing loss had to be increased from a previous maximum of 3 mm/hr to 3.5 mm/hr.

Catchment Storage

The PERN value applied to the catchment were applied as follows:

- PERN equal to 0.11 - was used for Wivenhoe, Somerset and the Upper Brisbane subcatchments.
- PERN equal to 0.05 - was used for Lockyer, Bremer and Lower Brisbane subcatchments.

These PERN values reflect the absence of Wivenhoe and Somerset Dams.

Channel Routing

Channel routing within the Somerset subcatchment were modified to account for the effects of Somerset Dam not being constructed during this event. Lag times were adjusted until a good match of the Savages Crossing hydrograph was achieved.

Storage properties assigned at Lowood, Moggill and Harrisville basin nodes were identical to those used in the 1974 flood calibration.

Recorded and Predicted Hydrographs

Plots of recorded and RAFTS predicted hydrographs for the February 1931 flood are compiled in **Appendix B - RAFTS Results (Figure B-5)** and summary details are given in **Table 5-13 - RAFTS Verification - February 1931 Flood Event.**

Table 5-13 - Rafts Verification - February 1931 Flood

Number	Stream	Site	Peak Discharge (m^3/s)			Discharge Volume (GL)			Comments
			Gauged	Predicted	Diff (%)	Gauged	Predicted	Diff (%)	
Upper Brisbane									
143002	Brisbane	Fulham Vale	3005	3150	+4.9	338340	287870	-15.0	
Somerset and Wivenhoe									
143303	Stanley	Peachester	625	640	+2.9	59330	35760	-40.0	
Lockyer									
143203	Lockyer	Helidon	370	545	+45.0	33310	23230	-30.0	
Bremer and Lower Brisbane									
143102	Warrill	Kalbar	40	245	+499	1920	16620	+765	Poor Data
143101	Warrill	Mudtapilly	260	285	+9.7	20970	27930	+33.0	Key Location
143001	Brisbane	Savages Crossing	5575	5685	+2.0	1009760	915750	-9.0	Key location

The main object of this verification was to match hydrographs at Savages Crossing and Mudtapilly as these locations directly influence the inflow into the Lower Brisbane River.

5.10 RAFTS Verification - March 1955

The 1955 flood event commenced on the 26 March 1955 and was the third largest recorded flood event this century. The event continued over a period of three days. Although Somerset Dam was not fully completed for the 1955 flood event, it was modelled because the dam storage was completed.

Rainfall

A similar procedure to that adopted for the 1931 flood event was used for the 1955 event. An isohyetal map was generated and rainfall depths were interpolated using Civilcad. HYDCON was used to apply the temporal patterns at each sub area. **Figure 5-17 - Isohyetal Map - March 1955 Flood** presents rainfall depths over the Brisbane River Catchment

For this event a temporal pattern was available at the Brisbane Regional Office and Somerset Dam hence temporal variation over the catchment could be better represented in the 1931 event. The Theissen polygon method was applied to the catchment to determine the area of influence for each of these temporal patterns. **Figure 5-18 - Representative Pluviographs - March 1955 Storm** illustrates each of these temporal patterns.

Rainfall Losses

Table 5-14 - Rainfall Losses - March 1955 Verification lists the initial and continuing losses used for the pre Wivenhoe and Somerset Dam verification events.

Table 5-14 - Rainfall Losses - March 1955 Verification

Subcatchment	Initial Loss (mm)	Continuing Loss (mm/hr)
Upper Brisbane	20	1.8
Somerset	130	2.5
Wivenhoe	20	1.8
Lockyer	85	2.5
Bremer	50	1.5
Lower Brisbane	100	2.5

The loss parameters used for this verification event conform to the values used for the previous calibration and verification events.

Catchment Storage

The PERN value applied to the catchment was 0.5 except for Wivenhoe and the Upper Brisbane subcatchment where a PERN coefficient of 0.11 was used. These PERN values reflect the absence of Wivenhoe Dam.

Channel Routing

The link travel times and storage properties assigned at Lowood, Moggill and Harrisville basin nodes were identical to those used in the January 1974 flood calibration.

5.11 Recorded and Predicted Hydrographs

Plots of recorded and RAFTS predicted hydrographs for the March 1955 flood are compiled in **Appendix B (Figure B-6a to B-6b)** and summary details are given in **Table 5-15 - RAFTS Verification - March 1955 Flood Event.**

Table 5-15 - Rafts Verification - March 1955 Flood

Number	Stream	Site	Peak Discharge (m^3/s)			Discharge Volume (GL)			Comments
			Gauged	Predicted	Diff (%)	Gauged	Predicted	Diff (%)	
Upper Brisbane									
143002	Brisbane	Fulham Vale	5090	4800	-5.6	437310	414570	-5.2	
Somerset and Wivenhoe									
143006	Cressbrook Ck	Tinton	485	480	-1.2	27120	44680	+65.0	
143303	Stanley	Peachester	455	425	-6.9	104690	15870	-85.0	
Lockyer									
143206	Lockyer	Brightview Weir	620	800	+31.0	48850	45230	-7.4	
143204	Lockyer	Wilsons Weir	934	931	-0.3	201470	65950	-67.0	
143203	Lockyer	Helidon	225	235	+4.5	14930	10100	-32.0	
Bremer and Lower Brisbane									
143102	Warrill	Kalbar	3314	348	+5.1	32220	19600	-39.0	Key location
143001	Brisbane	Savages Crossing	5270	5085	-3.5	1125840	758900	-33.0	Key Location

Again most emphasis for the matching of hydrographs was placed on two primary stream gauges, Savages Crossing and Kalbar. These gauges were the predominant gauges for estimating inflows into the Lower Brisbane River for the 1955 flood event.

5.12 RAFTS Verification - July 1973 Flood

The July 1973 flood was the first of two floods used to verify the RAFTS model. It is representative of pre-Wivenhoe conditions and the RAFTS assumptions used in the January 1974 flood calibration were checked against recorded July 1973 flood data.

Records on Somerset Dam outflows were not available for this verification event.

Rainfall

The spatial distribution of rainfalls over a eight day period commencing 1 July 1973 is shown in **Figure 5-19 - Rainfall Distribution - July 1973 Storm**. Highest rainfalls were registered in the upper Somerset area and the lowest readings were associated with the southern parts of the Bremer River subcatchment.

Rainfall temporal patterns recorded in the Brisbane Valley were highly variable as indicated in **Figure 5-20 - Representative Pluviographs - July 1973 Storm**.

Rainfall Losses

Table 5-16 - Rainfall Losses - July 1973 Verification lists the initial and continuing losses used in the pre-Wivenhoe Dam verification analysis.

Table 5-16 - Rainfall Losses - July 1973 Verification

Subcatchment	Initial Loss (mm)	Continuing Loss (mm/hr)
Upper Brisbane	100	3.0
Somerset	100	2.5
Wivenhoe	100	3.0
Lockyer	100	1.2
Bremer	120	2.5
Lower Brisbane	100	2.5

Catchment Storage

A PERN coefficient of 0.05 was applied, except for the Wivenhoe and Upper Brisbane areas where a PERN coefficient of 0.11 was used.

Channel Routing

The link travel times and storage properties assigned at Lowood, Moggill and Harrisville basin nodes were identical to those used in the January 1974 flood calibration.

Recorded and Predicted Hydrographs

Plots of recorded and RAFTS predicted hydrographs for the July 1973 flood are compiled in **Appendix B** (**Figures B-7a** to **B-7b**) and summary details are given in **Table 5-17 - RAFTS Verification - July 1973 Flood.**

Table 5-17 - RAFTS Verification - July 1973 Flood

Number	Stream	Site	Peak Discharge (m^3/s)			Discharge Volume (GL)			Comments
			Gauged	Predicted	Diff(%)	Gauged	Predicted	Diff(%)	
Upper Brisbane									
143015	Cooyar Ck	Damsite	430	399	-7	43	35	-19	High gauged flows prior to flood
143007	Brisbane Rv	Linville	373	1 492	+300	71	127	+80	Gauged flow less than Cooyar Ck
143010	Emu Ck	Boat Mtn	354	337	-5	33	29	-12	
143009	Brisbane Rv	Gregors Ck	2 702	2 559	-5	255	228	-10	
Somerset & Wivenhoe									
143008	Brisbane Rv	Middle Ck	2 442	2 871	+18	632	298	-53	Somerset Dam outflow not modelled
143013	Cressbrook	Damsite	30	67	+120	6.9	7.1	+3	
Lockyer									
143203	Lockyer Ck	Helidon	96	94	-2	23	5.3	-80	High gauged flows prior to flood
143210A	Lockyer Ck	Lyons Bridge	130	563	+330	32	66	+110	Backwater effect at gauge
Bremer & Lower Brisbane									
143001	Brisbane Rv	Savages Cross	2 711	2 610	-4	788	796	+1	
143003	Brisbane Rv	Mt Crosby	2 484	2614	+5	736	824	+12	
143107	Bremer Rv	Walloon	71	114	+60	10.0	7.3	-27	
143108	Warrill Ck	Amberley	3.3	6.4	+90	0.7	0.6	-14	Very low flows

Note: 1. Primary stream gauges are shaded.

5.13 RAFTS Verification - Early April 1989 Flood

To validate the post-Wivenhoe Dam assumptions established by RAFTS calibration against the late April 1989 and May 1996 floods, available data for the early April 1989 flood was used as a model verification.

The early April 1989 flood was a minor event in the western Brisbane Valley and only small flows were recorded for Cooyar Creek, Emu Creek and Lockyer Creek. The flood regulation effect of Wivenhoe Dam was evident during the flood as indicated in **Figure 5-2 - Wivenhoe Dam Discharges**.

Rainfall

Total rainfalls recorded at various stations within the Brisbane Valley are presented as **Figure 5-21 - Rainfall Distribution - Early April 1989 Storm**. The western part of the catchment generally received less than 100 mm of rainfall over the five day period from 31 March to 4 April 1989. Highest rainfalls were recorded at the headwaters of the Stanley River (Somerset) and further south towards Mount Glorious.

Figure 5-22 - Representative Pluviographs - Early April 1989 Storm indicates that peak rainfall intensities occurred during a period from late 31 March to mid 1 April 1989.

Rainfall Losses

Rainfall losses used in the post-Wivenhoe Dam verification analysis are given in **Table 5-18 - Rainfall Losses - Early April 1989 Verification**.

Table 5-18 - Rainfall Losses - Early April 1989 Verification

Subcatchment	Initial Loss (mm)	Continuing Loss (mm/hr)
Upper Brisbane	50	2.5
Somerset	50	1.5
Wivenhoe	50	2.5
Lockyer	120	0
Bremer	120	0
Lower Brisbane	120	0

Catchment Storage

A PERN coefficient of 0.05 was applied globally in the RAFTS model.

Channel Routing

The link travel times and storage properties assigned at Lowood, Moggill and Harrisville basin nodes were the same as those used in the post-Wivenhoe calibration against the late April 1989 and May 1996 floods.

Recorded and Predicted Hydrographs

Plots of recorded and RAFTS predicted hydrographs are compiled in **Appendix B** (**Figures B-8a** to **B-8c**). A summary of peak flows and hydrograph volumes is given in **Table 5-19 - RAFTS verification - Early April 1989 Flood.**

Table 5-19 - RAFTS Verification - Early April 1989 Flood

Number	Stream	Site	Peak Discharge (m^3/s)			Discharge Volume (GL)			Comments
			Gauged	Predicted	Diff(%)	Gauged	Predicted	Diff(%)	
Upper Brisbane									
143015	Cooyar Ck	Damsite	35	30	-14	4.3	3.1	-28	Relatively low flow
143007	Brisbane Rv	Linville	1 307	1 452	+11	98	69	-30	
143010	Emu Ck	Boat Mtn	27	5	-81	4.0	0.5	-88	Relatively low flow
143009	Brisbane Rv	Gregors Ck	1 711	1 587	-7	141	109	-23	
Somerset & Wivenhoe									
143036	Brisbane Rv	Wivenhoe Dam	4 722	3 644	-23	639	594	-7	Synthetic gauged hydrograph
Lockyer									
143212	Tenthill Ck	Tenthill	37	62	+68	6.8	2.5	-63	Relatively low flow
143225	Laidley Ck	Showground	95	121	+27	11.4	8.2	-28	
143210A	Lockyer Ck	Lyons Bridge	91	196	+115	14	20	+43	Backwater effect at gauge
143905	Lockyer Ck	Glenore Grove	104	174	+67	33	15	-55	Record in error
Bremer & Lower Brisbane									
143001	Brisbane Rv	Savages Cross	1 434	1 525	+6	677	696	+3	
143110	Bremer Rv	Adams Bridge	78	22	-72	5.8	1.3	-78	
143107	Bremer Rv	Walloon	164	503	+207	24	36	+50	
143108	Warrill Ck	Amberley	211	157	-26	33	24	-27	
143113	Purga Ck	Loamside	112	234	+109	11	15	+36	
143911	Bremer Rv	David Trumpy	530	612	+15	61	83	+36	
143915	Brisbane Rv	Moggill	1 080	1 773	+64	382	840	+120	Record incomplete

Note: 1. Primary stream gauges are shaded.

5.14 Adopted RAFTS Model Parameters

RAFTS Storage

By a process of calibration and verification against a series of historical floods, a set of RAFTS storage parameters were determined. These parameters tended to fall into three groups; pre-Somerset Dam conditions prior to 1943, pre-Wivenhoe Dam conditions prior to 1985 and post-Wivenhoe Dam conditions following completion of the dam. **Table 5-20 - Summary of RAFTS Storage Parameters** provides an overview of adopted storage properties.

Table 5-20- Summary of RAFTS Storage Parameters

Storage Type	Pre-Somerset Dam Conditions	Pre-Wivenhoe Dam Conditions	Post-Wivenhoe Dam Conditions
Catchment Storage	PERN = 0.05 except PERN =0.11 for Upper Brisbane	PERN = 0.05 except PERN = 0.11 for Wivenhoe and Upper Brisbane	PERN = 0.05
Channel Routing	Link travel times based on timing of record hydrographs Basin node storage at Lowood (storage curve A), Moggill and Harrisville as shown in Figures 5-6,5-7 and 5-8	Link times based on timing of recorded hydrographs Basin node storage at Lowood (storage curve A), Moggill and Harrisville as shown in Figures 5-6,5-7 and 5-8	Link travel times as per Pre-Wivenhoe conditions, modified to account for Wivenhoe Dam drowned reach Basin node storage as per Pre-Wivenhoe conditions, except storage curve B used at Lowood.

Notes:

1. Pre-Wivenhoe conditions based on calibration against January 1974 flood and verified against June 1973 flood.
2. Post-Wivenhoe conditions based on calibration against late April 1989 and May 1996 floods. Verified against early April 1989 flood.

The difference in model factors, such as faster link travel times upstream of the dam for post-Wivenhoe Dam conditions, can be directly attributed to the physical presence of the Wivenhoe Dam lake. Other factors, such as the adopted PERN coefficient in the Wivenhoe and Upper Brisbane areas, are due to the state of vegetative growth in the catchment at the time of flood.

As a check on the sensitivity of predicted hydrographs to assumptions on storage parameters, the January 1974 and June 1973 events were rerun assuming post-Wivenhoe Dam storage conditions (except for link travel times). A PERN value of 0.05 was applied throughout the RAFTS model and storage curve A was used at the Lowood basin node.

Plots of predicted hydrographs are compiled in **Appendix B** (**Figure B-9a** for July 1973 flood and **Figure B-10a** and **B-10b** for January 1974 flood). Summary details at key gauges are given in **Table 5-21 - July 1973 and January 1974 Flood - Post Wivenhoe PERN Values Sensitivity Analysis.**

Table 5-21 - July 1973 and January 1974 - Post Wivenhoe PERN Values Flood Sensitivity Analysis

Number	Stream	Site	Peak Discharge (m^3/s) Gauged	Predicted	Diff (%)
July 1973 Flood					
143009	Brisbane Rv	Gregors Ck	2 702	3 276	+21
143008	Brisbane Rv	Middle Ck	2 242	3 561	+59
143001	Brisbane Rv	Savages Cross	2 711	2 274	-16
143003	Brisbane Rv	Mt Crosby	2 484	2 276	-8
January 1974 Flood					
143007	Brisbane Rv	Linville	2 100	2 430	+16
143009	Brisbane Rv	Gregors Ck	3 750	4 358	+14
143008	Brisbane Rv	Middle Ck	4 813	5 903	+23
143907	Brisbane Rv	Lowood	7 397	7 840	+6
143001	Brisbane Rv	Savages Cross	7 340	7 868	+7
143003	Brisbane Rv	Mt Crosby	7 456	7 874	+6
143915	Brisbane Rv	Moggill	9 346	10 226	+12
143919	Brisbane Rv	Port Office	9 800	10 247	+5

Note: Wivenhoe storage not included in the analysis.

The reduced catchment storage within the Upper Brisbane and Wivenhoe areas tended to increase predicted discharge peaks compared to the calibrated values (refer to **Tables 5.21** and **5.5**). Towards the lower reaches of the Brisbane River, the difference between predicted and recorded peaks are less than 10 percent. The change in node storage properties at Lowood introduces a steeper hydrograph in the January 1974 flood.

Rainfall Losses

An overview of initial and continuing losses used in the RAFTS calibration and verification analysis is given in **Table 5-22 - Summary of RAFTS Rainfall Losses.**

Table 5-22 - Summary of RAFTS Rainfall Losses

Subcatchment	February 1931	March 1955	July 1973	January 1974	June 1983	Early April 1989	Late April 1989	May 1996
Upper Brisbane	150 & 3.5	20 & 1.8	100 & 3.0	0 & 2.5	0 & 2.5	100 & 3.0	30 & 2.5	150 & 2.5
Somerset	120 & 3.0	130 & 2.5	100 & 2.5	0 & 2.5	0 & 1.5	100 & 2.5	30 & 0	150 & 2.0
Wivenhoe	150 & 3.5	20 & 1.8	100 & 3.0	0 & 2.5	0 & 2.5	100 & 3.0	30 & 2.5	150 & 2.5
Lockyer	100 & 2.5	85 & 2.5	100 & 1.2	0 & 2.5	0 & 2.5	100 & 1.2	30 & 2.5	140 & 1.2
Bremer	40 & 1.0	50 & 1.5	120 & 2.5	0 & 0	0 & 0	120 & 2.5	10 & 0	100 & 1.5
Lower Brisbane	40 & 1.0	100 & 2.5	100 & 2.5	0 & 2.5	0 & 2.5	100 & 2.5	30 & 2/5	100 & 1.5

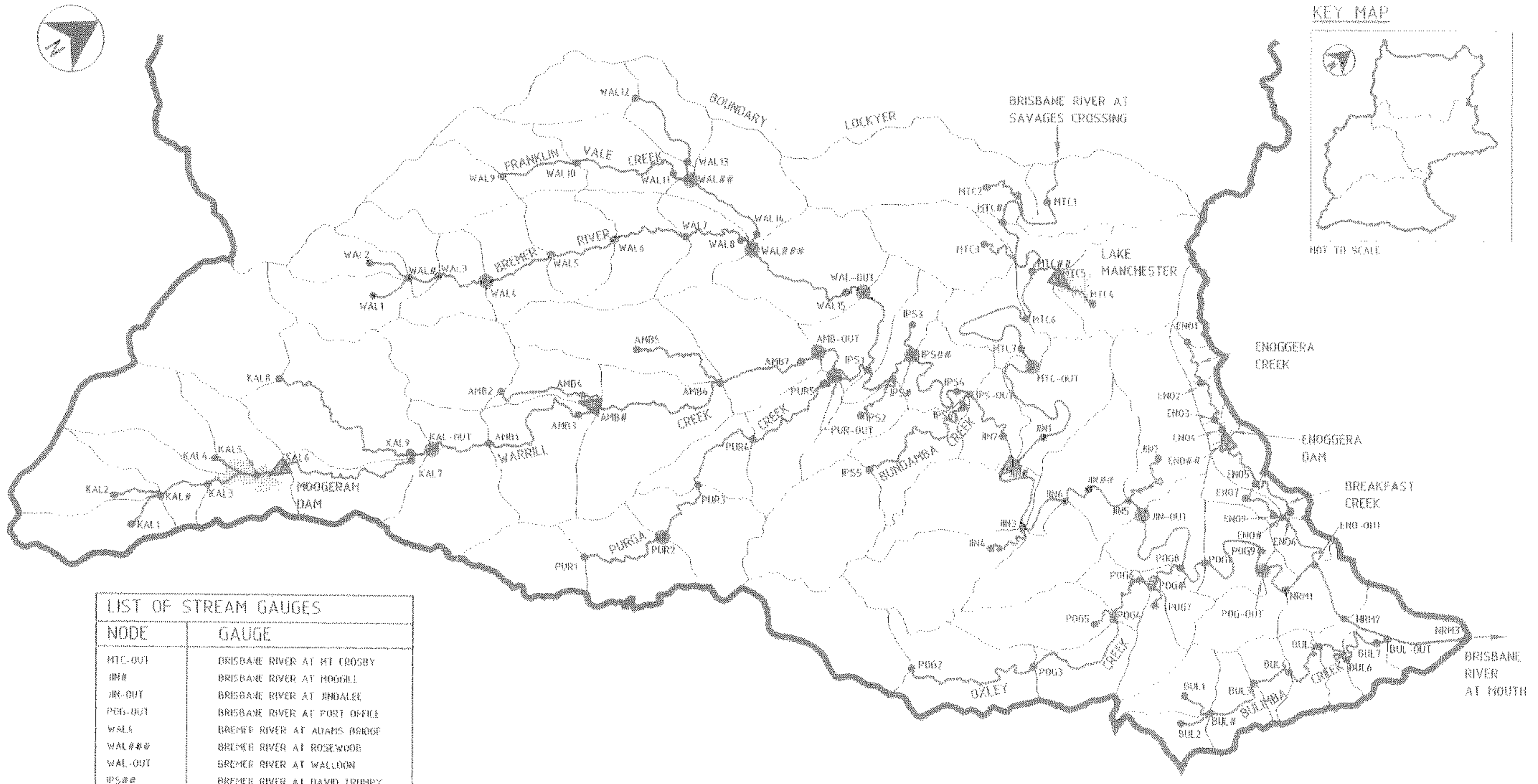
Note: 0 & 2.5 denotes 0 mm initial loss and 2.5 mm continuing loss.

The above losses fall in the expected range for South East Queensland and shall be used as input into the selection of appropriate losses for design flood analysis.

FIGURE 5.1a

BRISBANE RIVER FLOOD STUDY

RAFTS LAYOUT BREMER AND LOWER BRISBANE



LIST OF STREAM GAUGES

NODE	GAUGE
MTC-OUT	BRISBANE RIVER AT MT CROSBY
JIN#	BRISBANE RIVER AT MOGGILL
JIN-OUT	BRISBANE RIVER AT JINDALEE
POG-OUT	BRISBANE RIVER AT PORT OFFICE
WAL4	BREMER RIVER AT ADAMS BRIDGE
WAL###	BREMER RIVER AT ROSEWOOD
WAL-OUT	BREMER RIVER AT WALLOON
IPS##	BREMER RIVER AT DAVID TRUMPY
KAL-OUT	WARRILL CREEK AT KALBAR
AMB#	WARRILL CREEK AT HARRISVILLE
AMB-OUT	WARRILL CREEK AT AMBERLY
PUR-OUT	PURGA CREEK AT LOAMSIDE
PUR7	PURGA CREEK AT WASHPOOL
WAL##	WESTERN CREEK AT KOSS ROAD

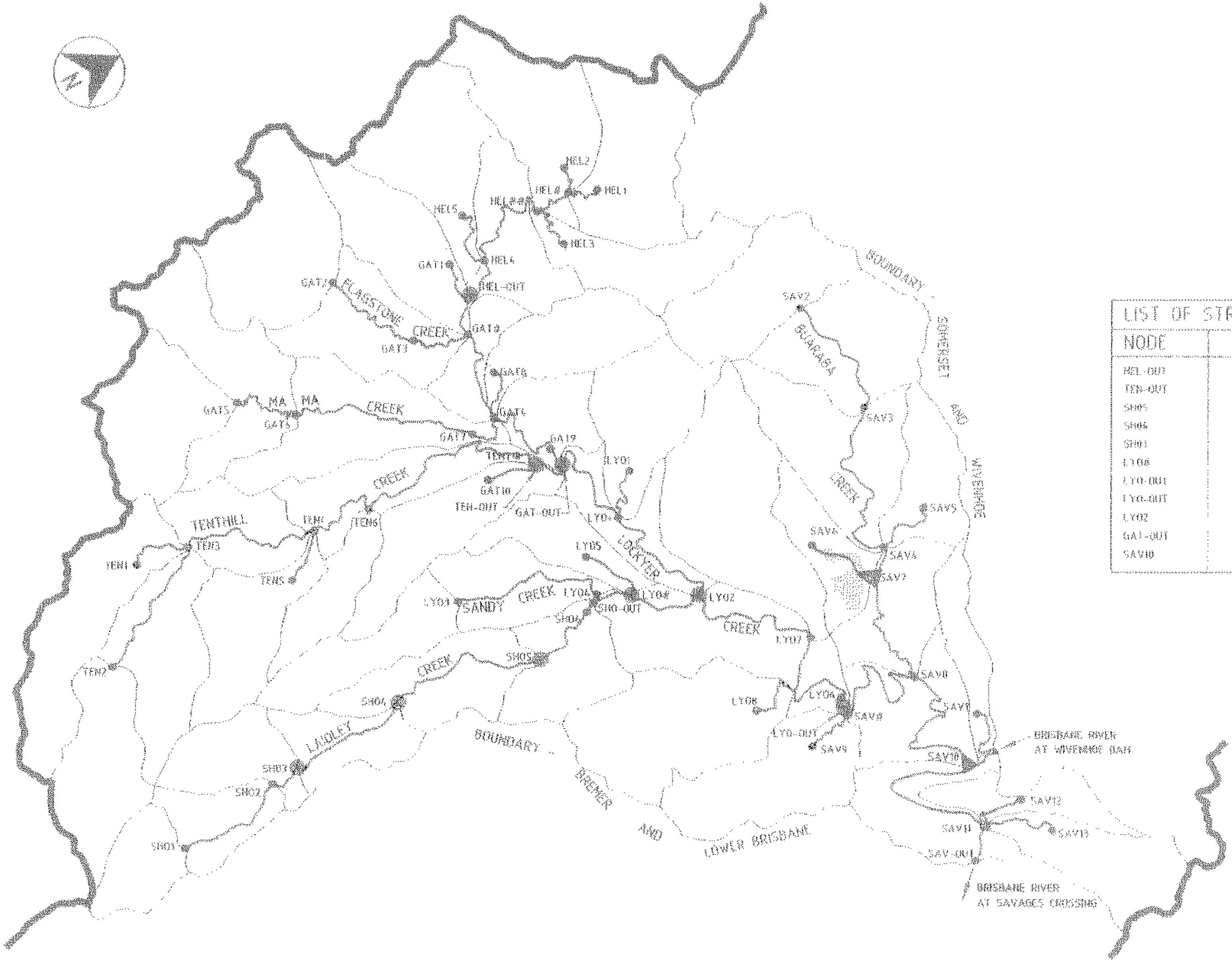
LEGEND

- CATCHMENT BOUNDARY
- RAFTS SUB-AREA BOUNDARY
- ● RAFTS GENERAL NODE
- RAFTS LINK
- ▲● RAFTS NODE AT STREAM GAUGE
- ▲ RAFTS BASIN NODE

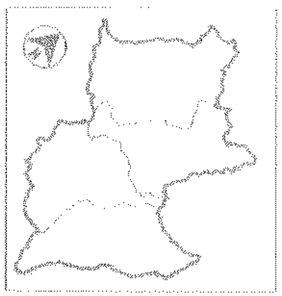
SINCLAIR KNIGHT MERZ

FIGURE 5.1b

BRISBANE RIVER FLOOD STUDY
RAFTS LAYOUT - LOCKYER



KEY MAP



NOT TO SCALE

LIST OF STREAM GAUGES

NODE	GAUGE
HEL-OUT	LOCKYER CREEK AT HELIDON
TEN-OUT	TENTHILL CREEK AT TENTHILL
SHO5	LAIDLEY CREEK AT SHOWGROUND
SHO4	LAIDLEY CREEK AT MULGOWIE
SHO3	LAIDLEY CREEK AT THORNTON
LYO8	LAIDLEY CREEK AT WARREGO HIGHWAY
LYO-OUT	LOCKYER CREEK AT LYONS BRIDGE
LYO-OUT	LOCKYER CREEK AT RIFLE RANGE
LYO2	LOCKYER CREEK AT GLENORE GROVE
GAT-OUT	LOCKYER CREEK AT GATTON
SAV10	BRISBANE RIVER AT LOWOOD

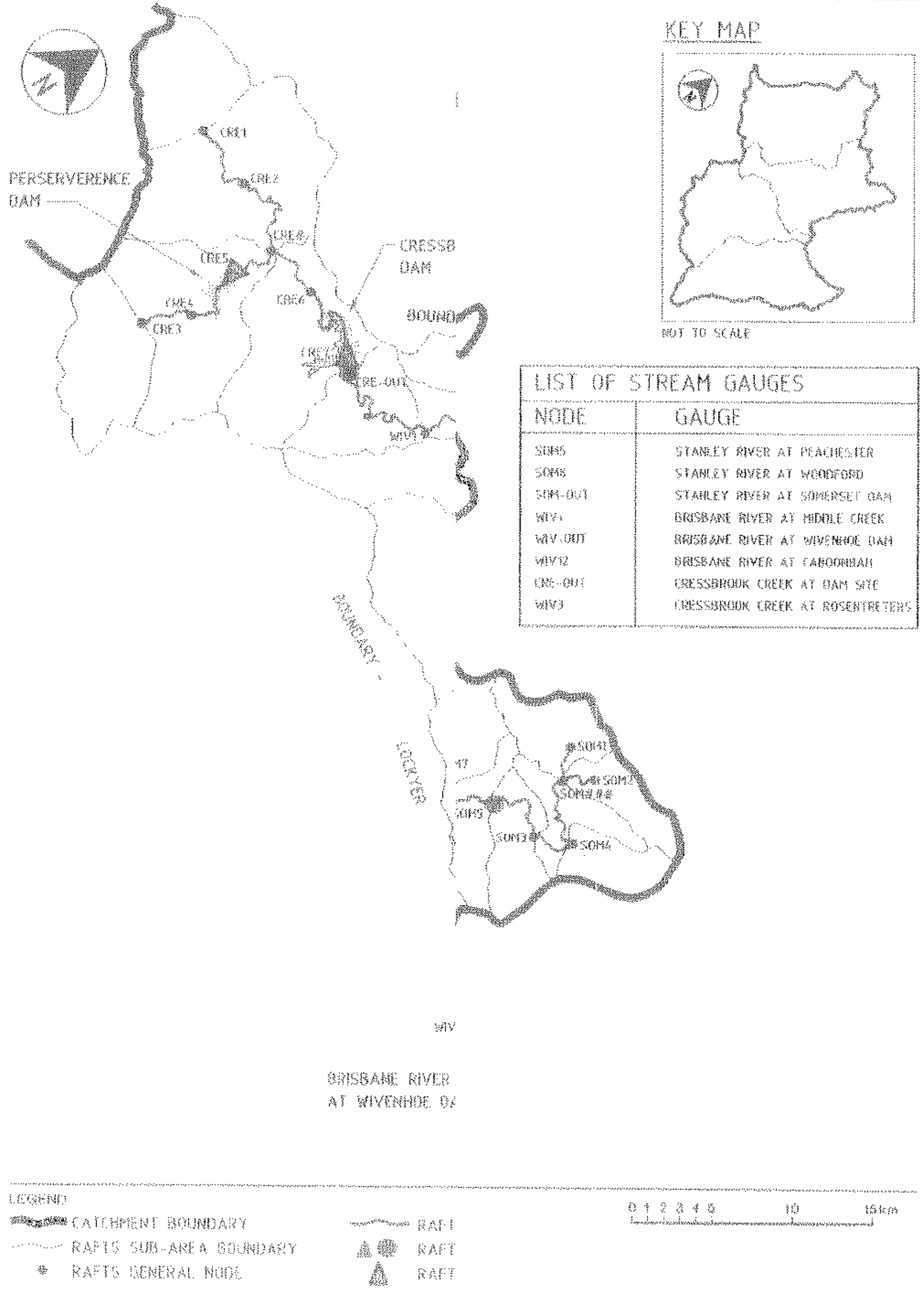
LEGEND
CATCHMENT BOUNDARY
RAFTS SUB-AREA BOUNDARY
● RAFTS GENERAL NODE
RAFTS LINK
▲ ● RAFTS NODE AT STREAM GAUGE
▲ RAFTS BASIN NODE

0 1 2 3 4 5 10 15 km

SINCLAIR KNIGHT MERZ

FIGURE 5.1c

BRISBANE RIVER FLOOD STUDY
RAFTS LAYOUT - SOMERSET AND WIVENHOE



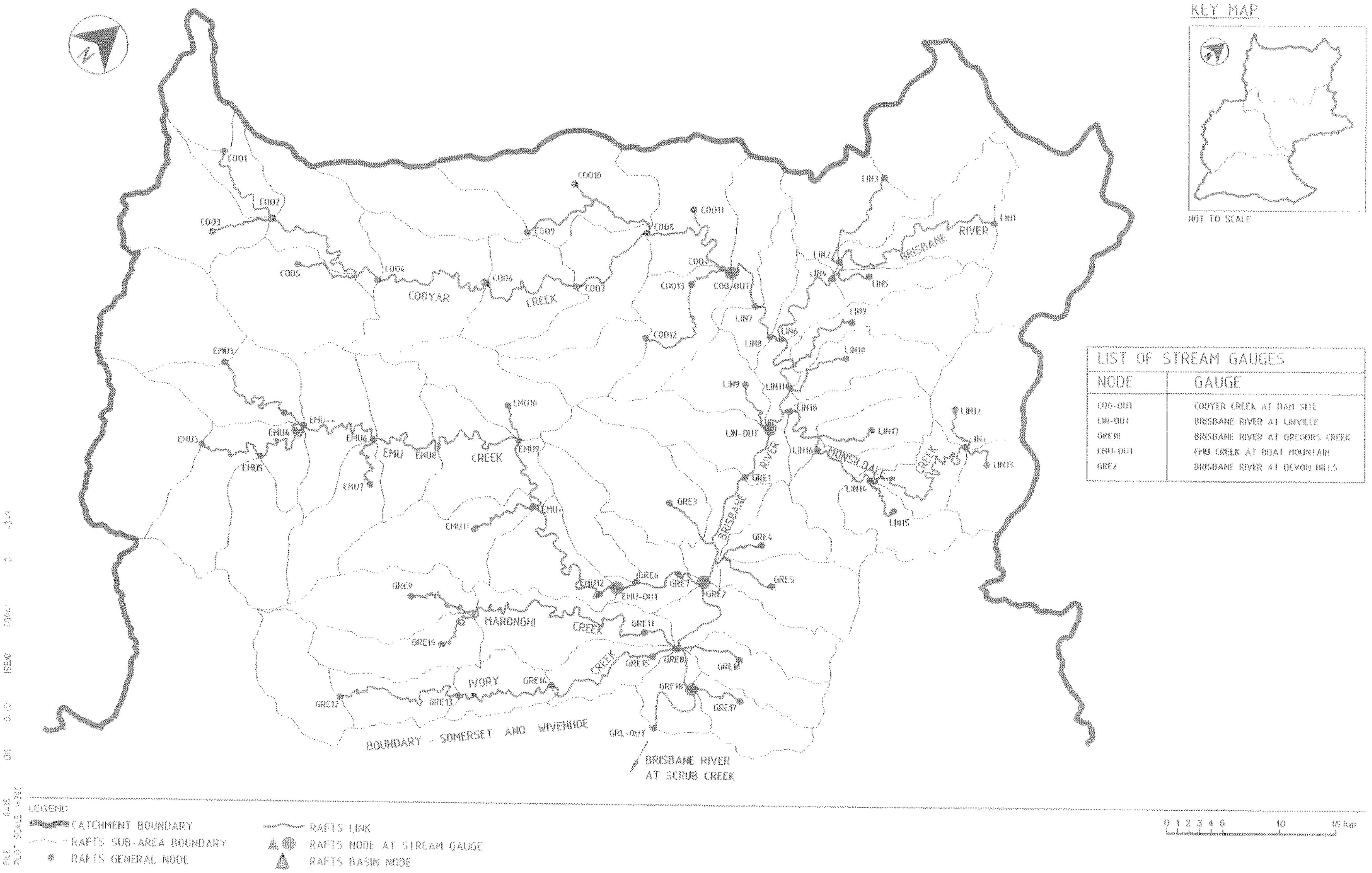
LIST OF STREAM GAUGES

NODE	GAUGE
SOM5	STANLEY RIVER AT PEACHESTER
SOM8	STANLEY RIVER AT WOODFORD
SOM-OUT	STANLEY RIVER AT SOMERSET DAM
WIV1	BRISBANE RIVER AT MIDDLE CREEK
WIV-OUT	BRISBANE RIVER AT WIVENHOE DAM
WIV12	BRISBANE RIVER AT CABOONBAH
CRE-OUT	CRESSBROOK CREEK AT DAM SITE
WIV3	CRESSBROOK CREEK AT ROSENTRETERS

SINCLAIR KNIGHT MERZ

FIGURE 5.1d

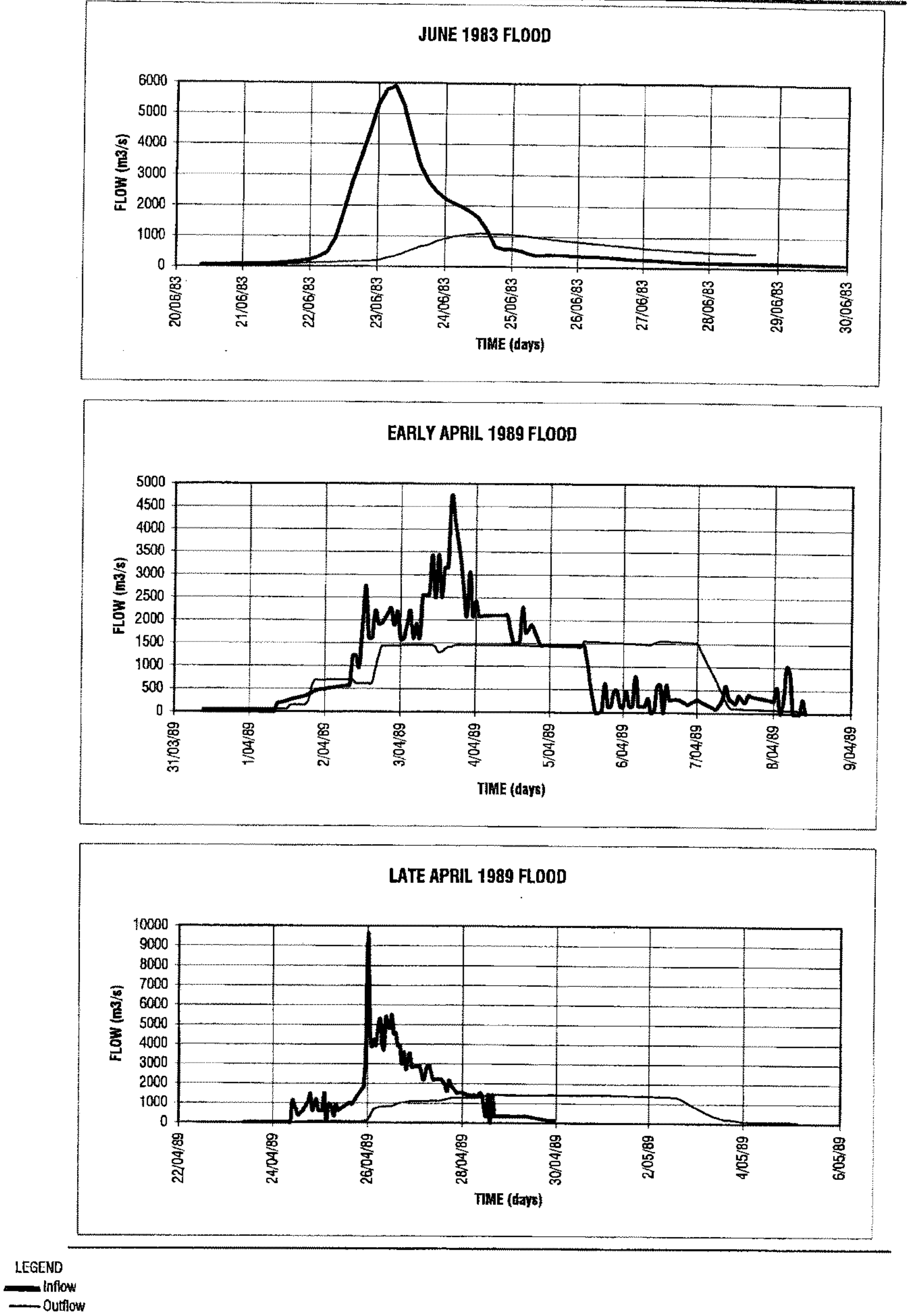
BRISBANE RIVER FLOOD STUDY
RAFTS LAYOUT UPPER BRISBANE RIVER



LIST OF STREAM GAUGES

NODE	GAUGE
COO-OUT	COOYER CREEK AT DAM SITE
LIN-OUT	BRISBANE RIVER AT LINVILLE
GRE18	BRISBANE RIVER AT GREGORS CREEK
EMU-OUT	EMU CREEK AT BOAT MOUNTAIN
GRE7	BRISBANE RIVER AT DEVON HILLS

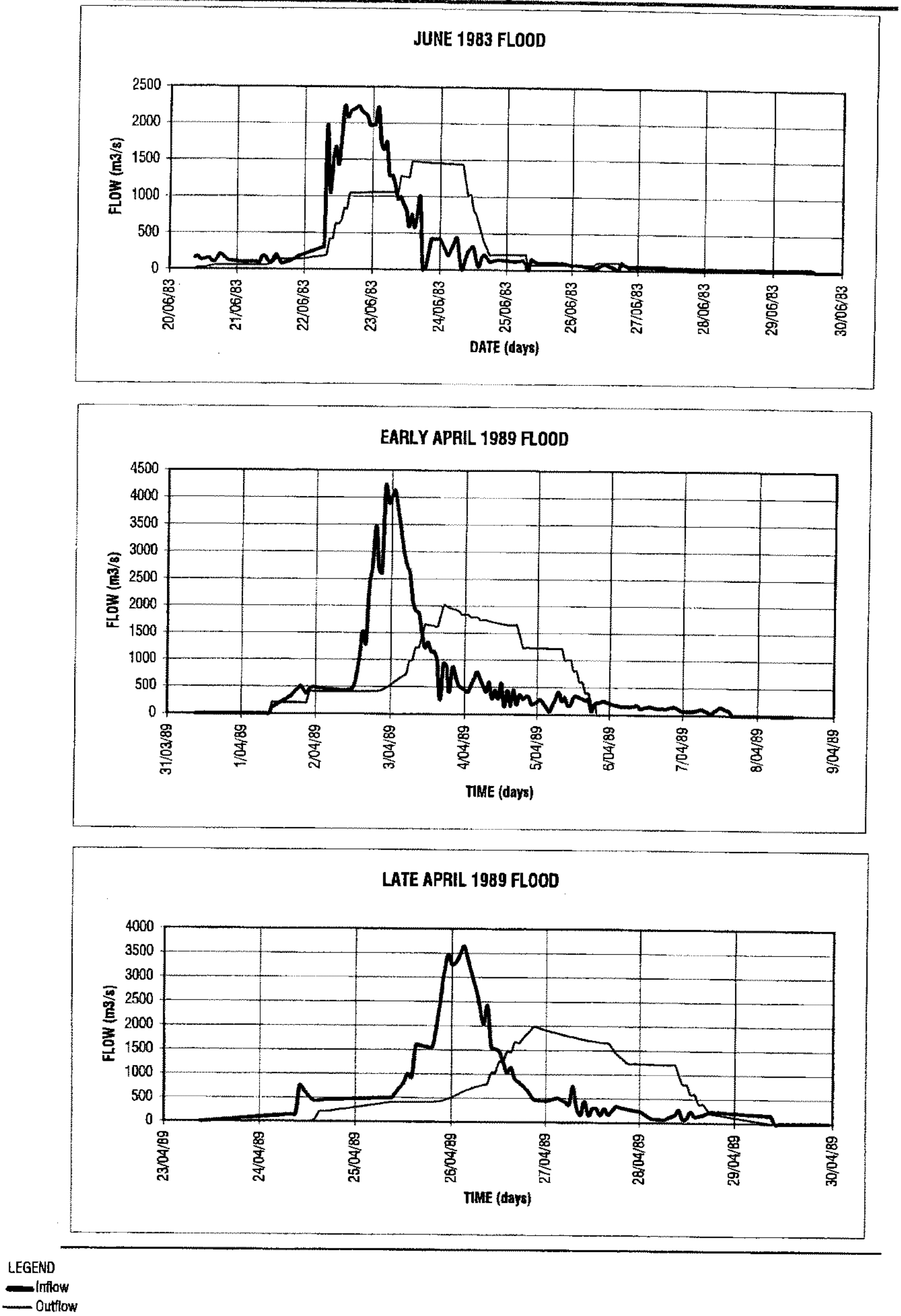
Figure 5-2 - Wivenhoe Dam Discharges


JUNE 1983 FLOOD

EARLY APRIL 1989 FLOOD

LATE APRIL 1989 FLOOD

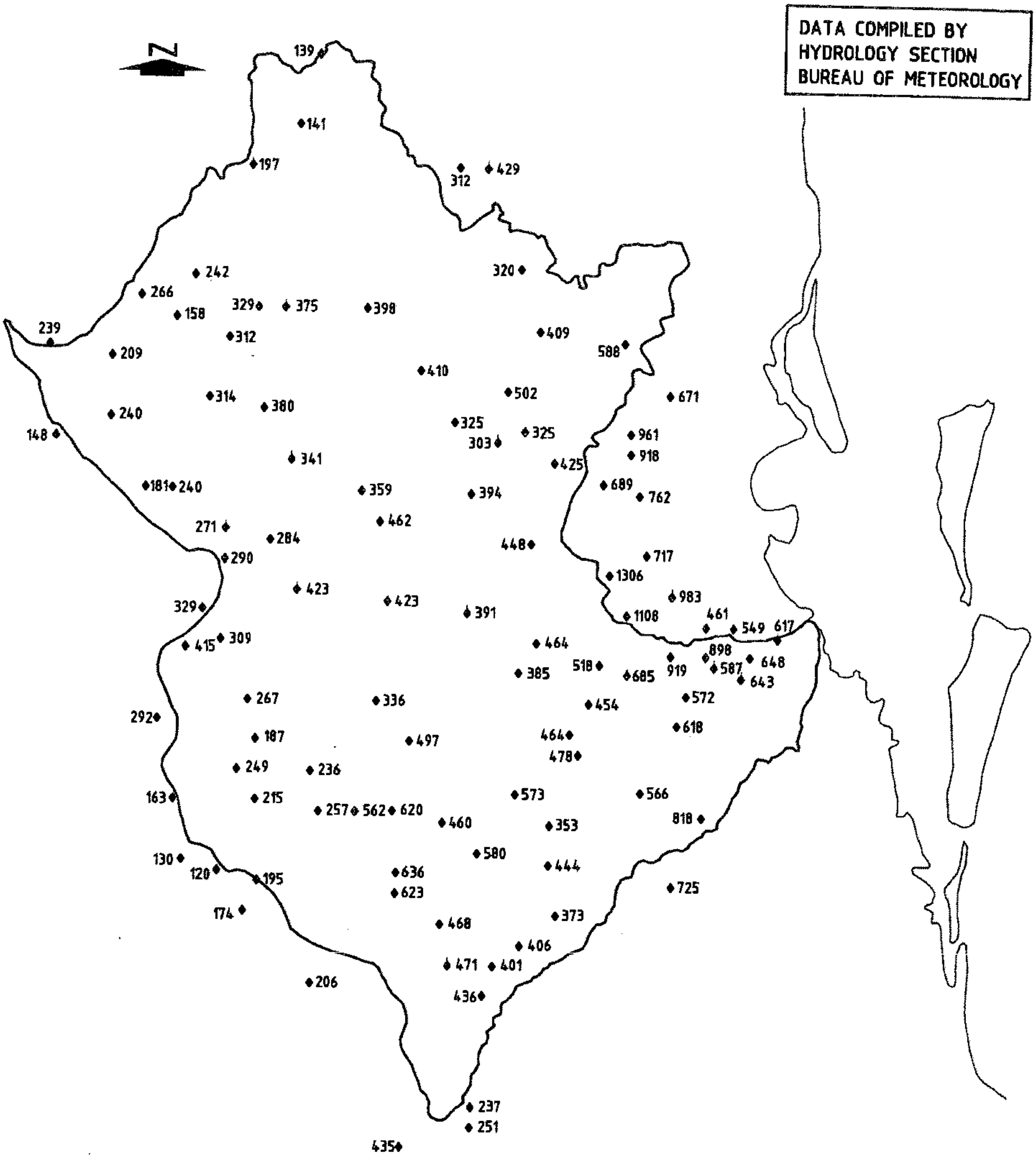
Figure 5-3 - Somerset Dam Discharges



SINCLAIR KNIGHT MERZ

FIGURE 5.4

BRISBANE RIVER FLOOD STUDY
RAINFALL DISTRIBUTION
- JANUARY 1974 STORM



STORM DURATION - 9am 24/01/74 TO 9am 28/01/74

LEGEND

◆ 70 RAINFALL (mm)

0 10 20 30 40 50 km

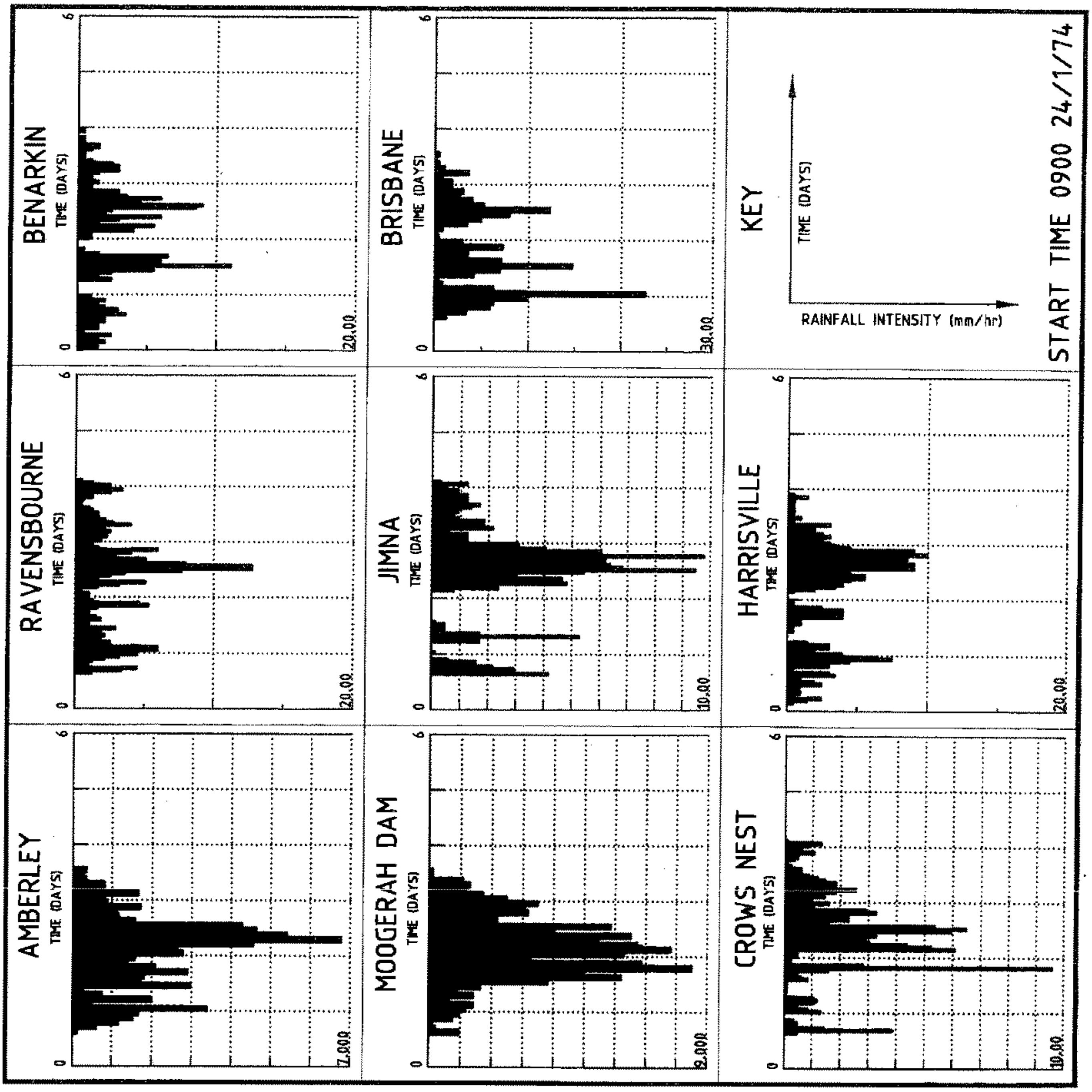
FILE NAME: 04157-09 DISK N°: D:\DWG\BRISBANE N°: T004157 E: 10-3-97

PL ALE:

SINCLAIR KNIGHT MERZ

FIGURE 5.5

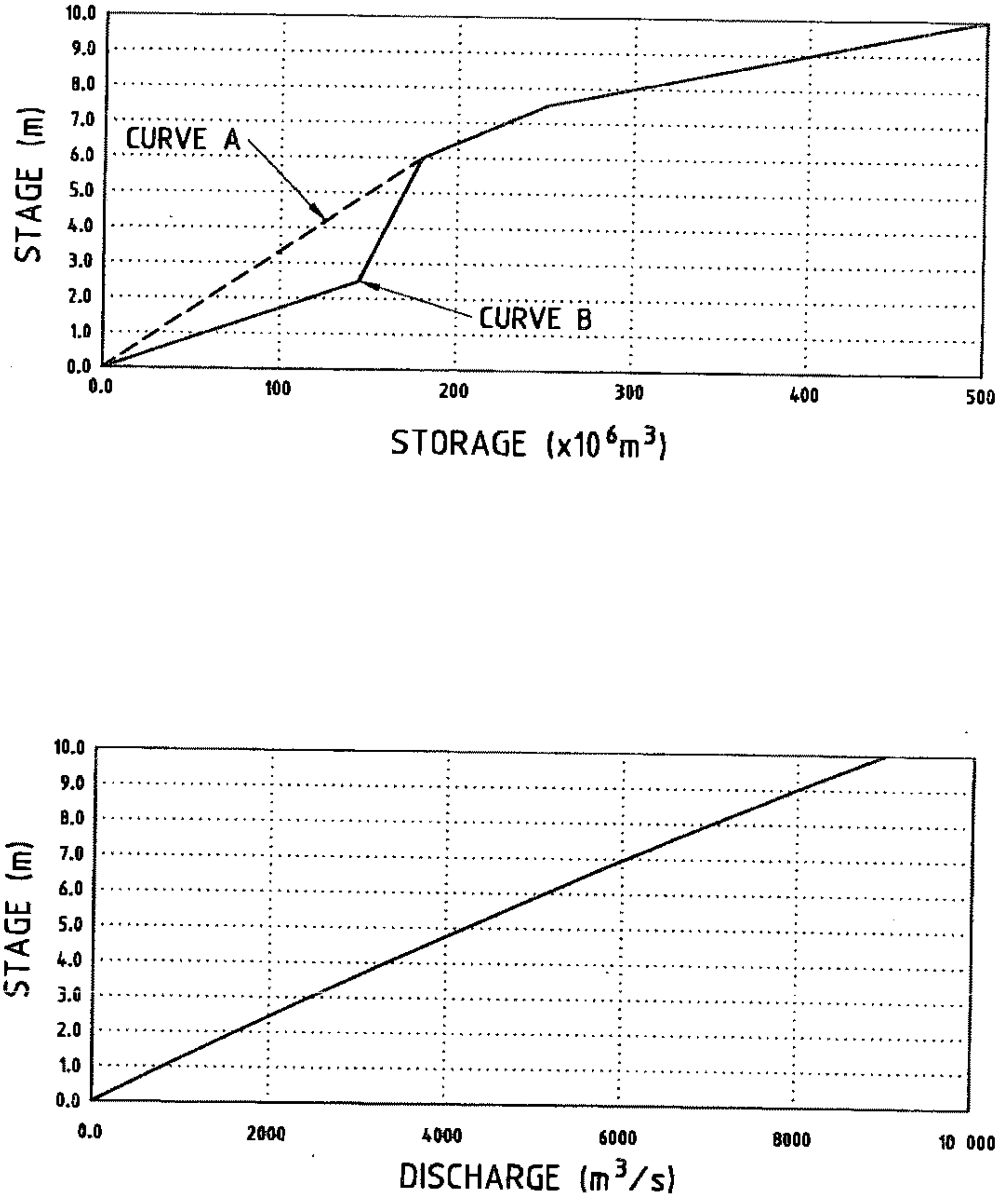
BRISBANE RIVER FLOOD STUDY
REPRESENTATIVE PLUVIOGRAPHS
- JANUARY 1974 STORM



FILE NAME: 04157-10 DISK N°: D:\DWG\BRISBANE N°: TD04157 14/3/97
PLOT SCALE: 1-[illegible]

FIGURE 5.6

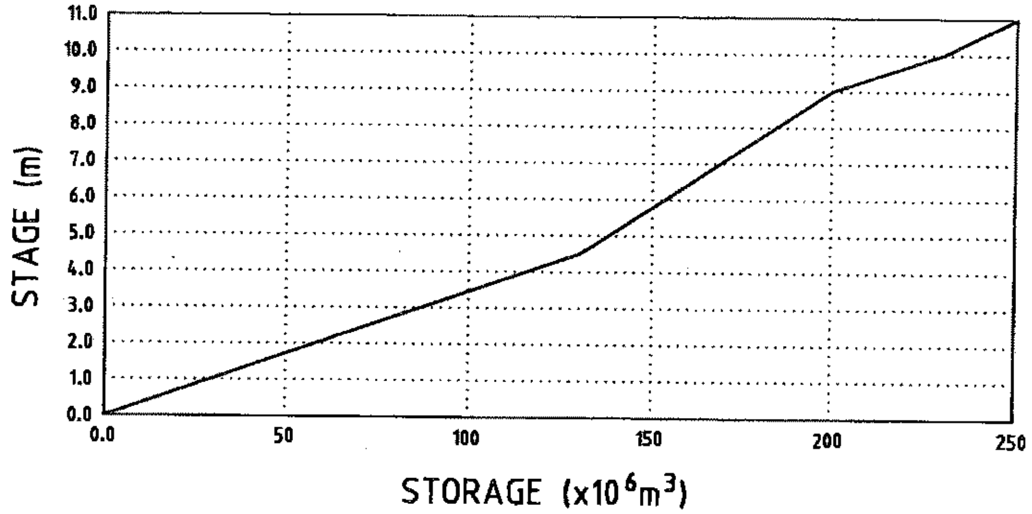
BRISBANE RIVER FLOOD STUDY
CHANNEL STORAGE CURVES AT LOWOOD



FILE NAME: 04157-28 DISK N°: D:\DWG\BRISBANE N°: T004157 : 14/3/97
PL ALE:

FIGURE 5.7

BRISBANE RIVER FLOOD STUDY
CHANNEL STORAGE CURVES AT MOGGILL



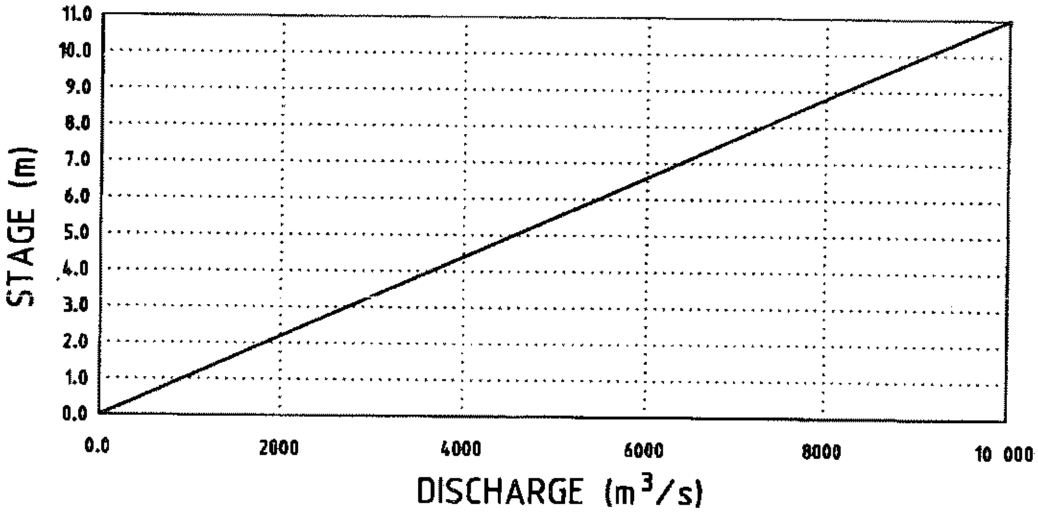
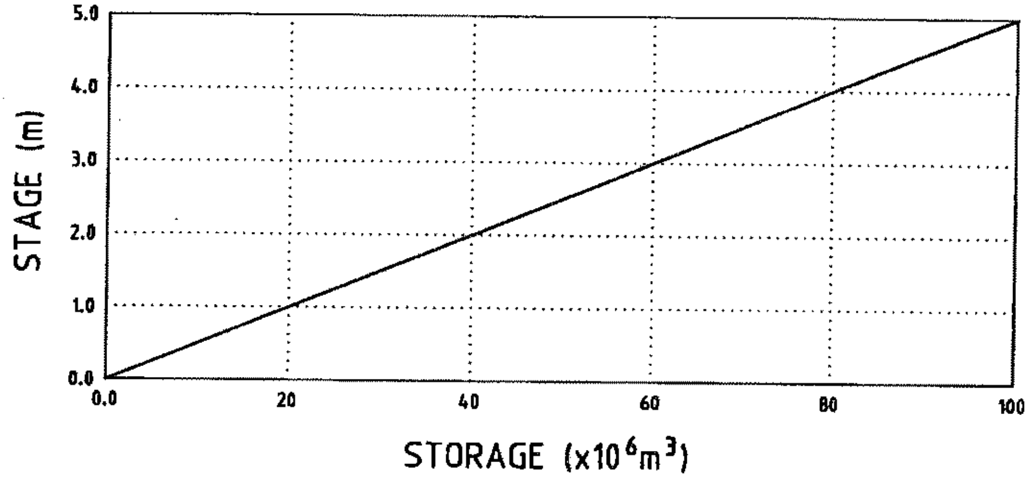
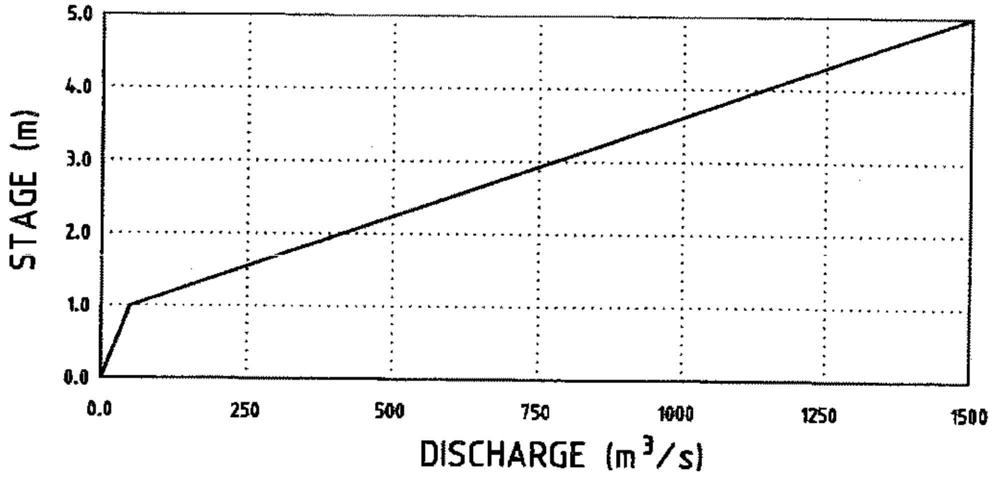


FIGURE 5.8

BRISBANE RIVER FLOOD STUDY
CHANNEL STORAGE CURVES AT HARRISVILLE

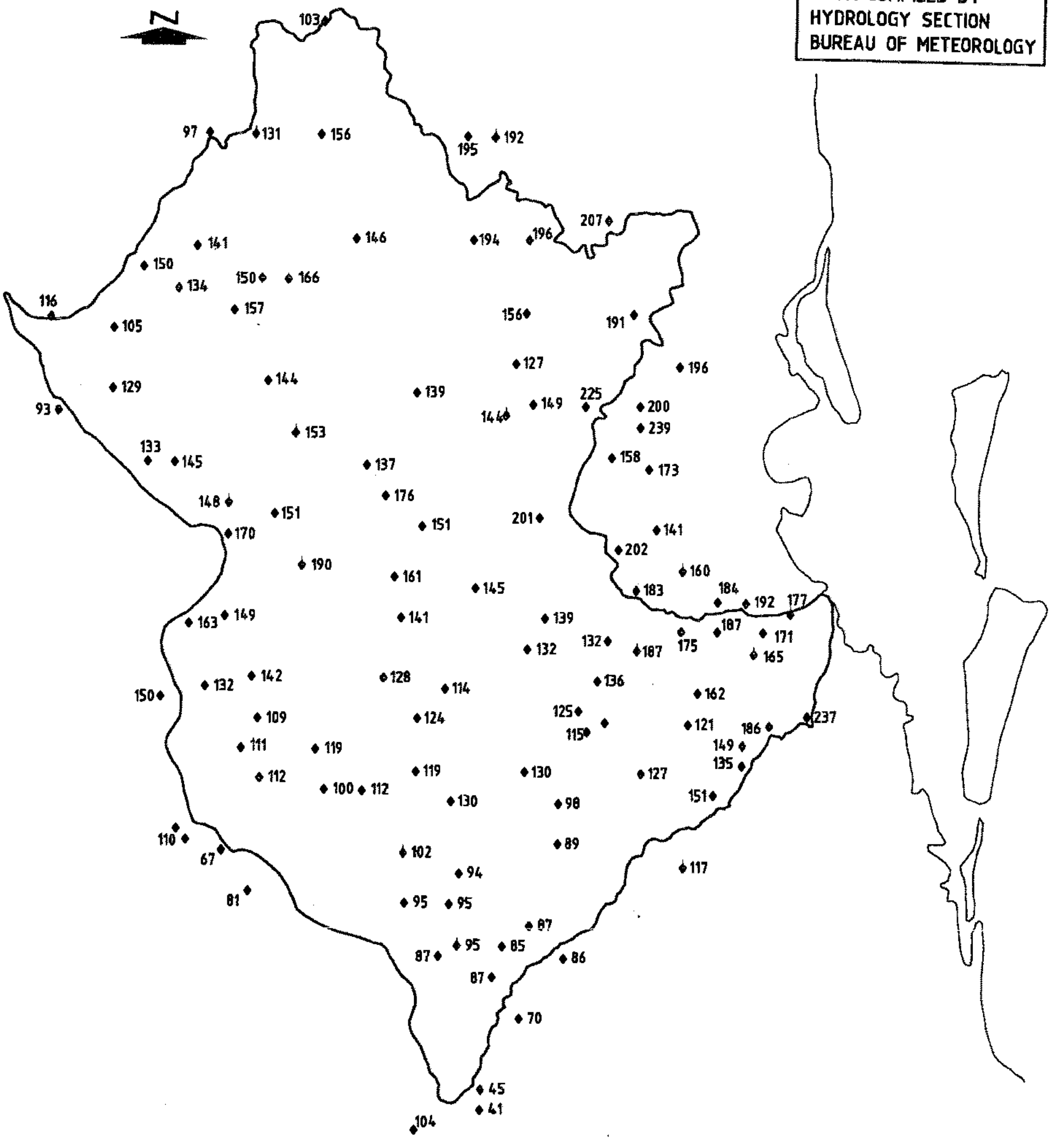




SINCLAIR KNIGHT MERZ

FIGURE 5.9
BRISBANE RIVER FLOOD STUDY
RAINFALL DISTRIBUTION
- JUNE 1983 STORM

DATA COMPILED BY
HYDROLOGY SECTION
BUREAU OF METEOROLOGY



STORM DURATION - 9am 20/06/83 TO 9am 23/06/83

LEGEND

◆ 70 RAINFALL (mm)

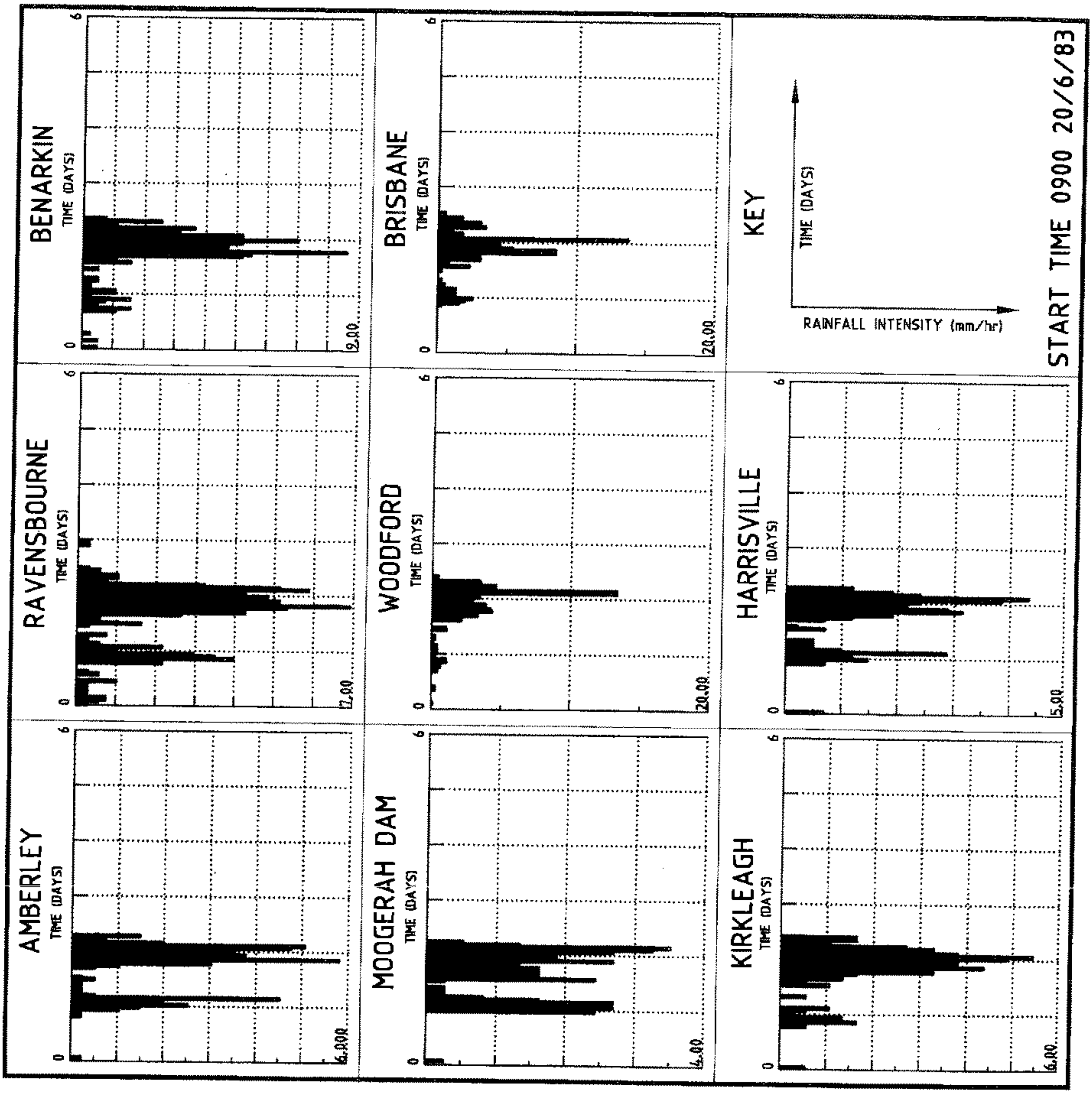
0 10 20 30 40 50 km

FILE NAME: 04157-11 DISK N°: D:\DWG\BRISBANE N°: T004157 : 10-3-97
PL ALE: 1

SINCLAIR KNIGHT MERZ

FIGURE 5.10

BRISBANE RIVER FLOOD STUDY
REPRESENTATIVE PLUVIOGRAPHS
- JUNE 1983 STORM



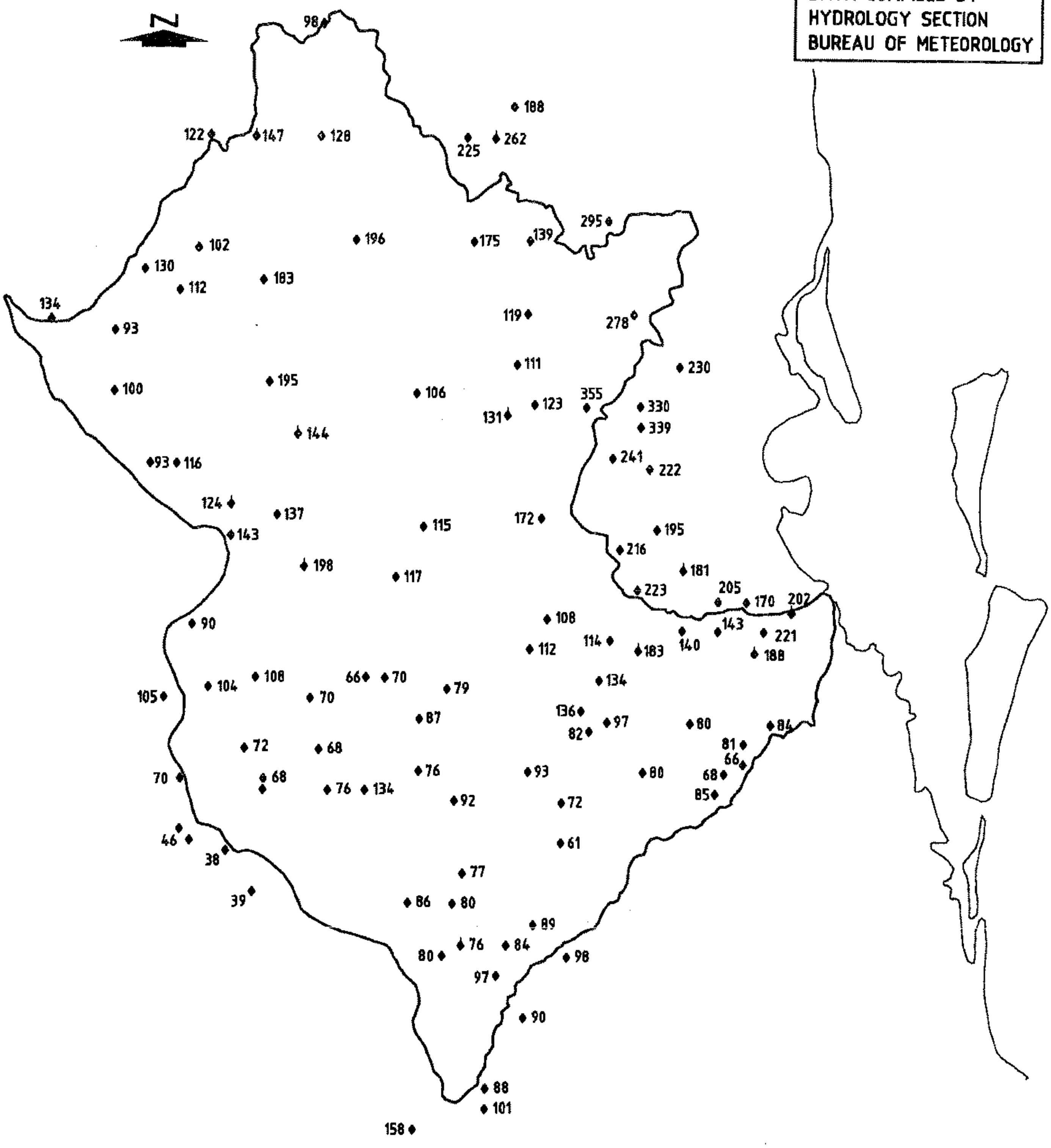
FILE NAME: 04157-12 DISK N°: D:\DWG\BRISBANE N°: T004157 ; 14/3/97
PL ALE:

FIGURE 5.11

BRISBANE RIVER FLOOD STUDY
RAINFALL DISTRIBUTION
- LATE APRIL 1989 STORM

SINCLAIR KNIGHT MERZ

DATA COMPILED BY
HYDROLOGY SECTION
BUREAU OF METEOROLOGY



STORM DURATION - 9am 24/04/89 TO 9am 27/04/89

LEGEND

◆ 70 RAINFALL (mm)

0 10 20 30 40 50 km

FILE NAME: 04157_13
PLOT SCALE: 1:1000

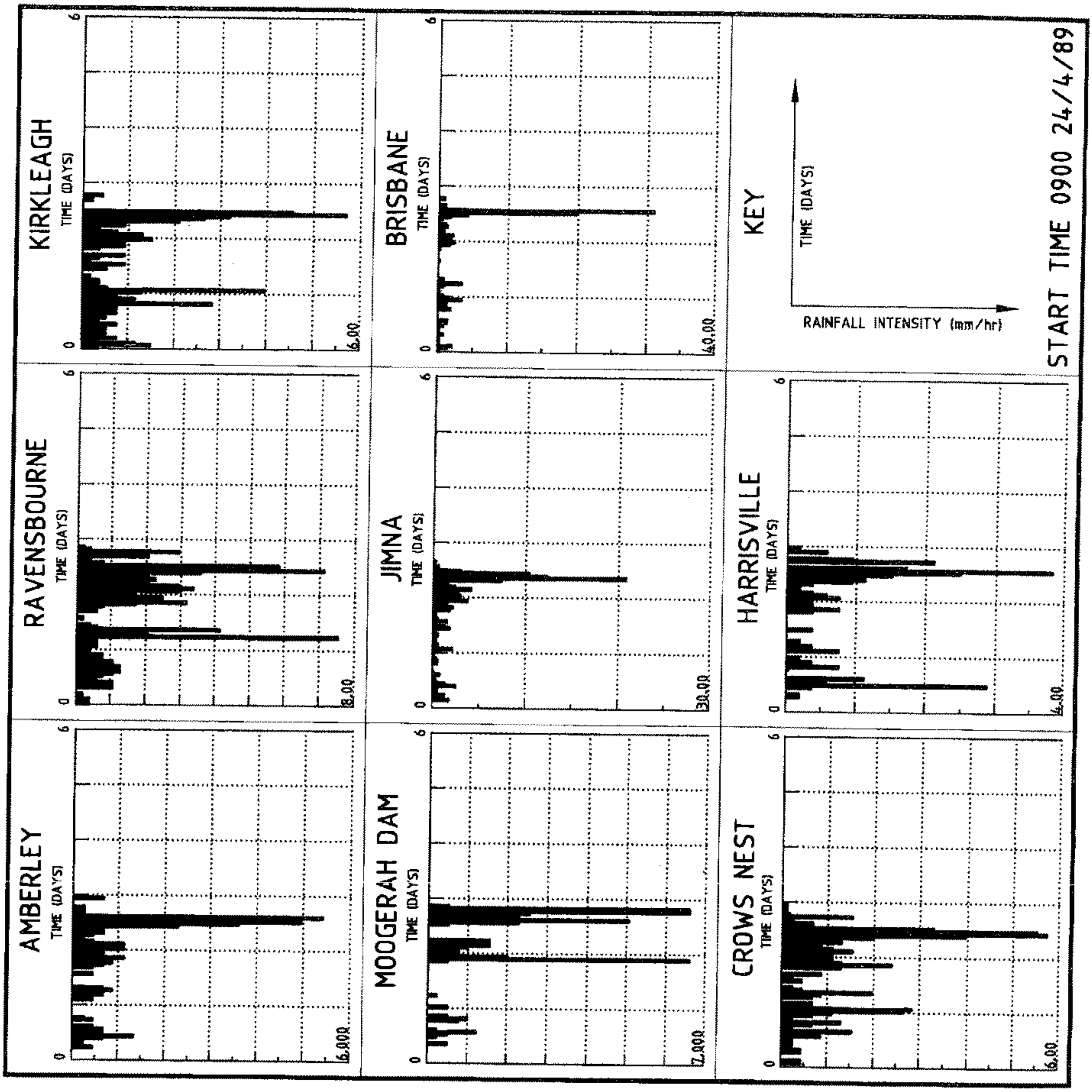
DISK No: D:\DWGS\BRISBANE No. T004157

10-3-97

SINCLAIR KNIGHT MERZ

FIGURE 5.12

BRISBANE RIVER FLOOD STUDY
REPRESENTATIVE PLUVIOGRAPHS
- LATE APRIL 1989 STORM

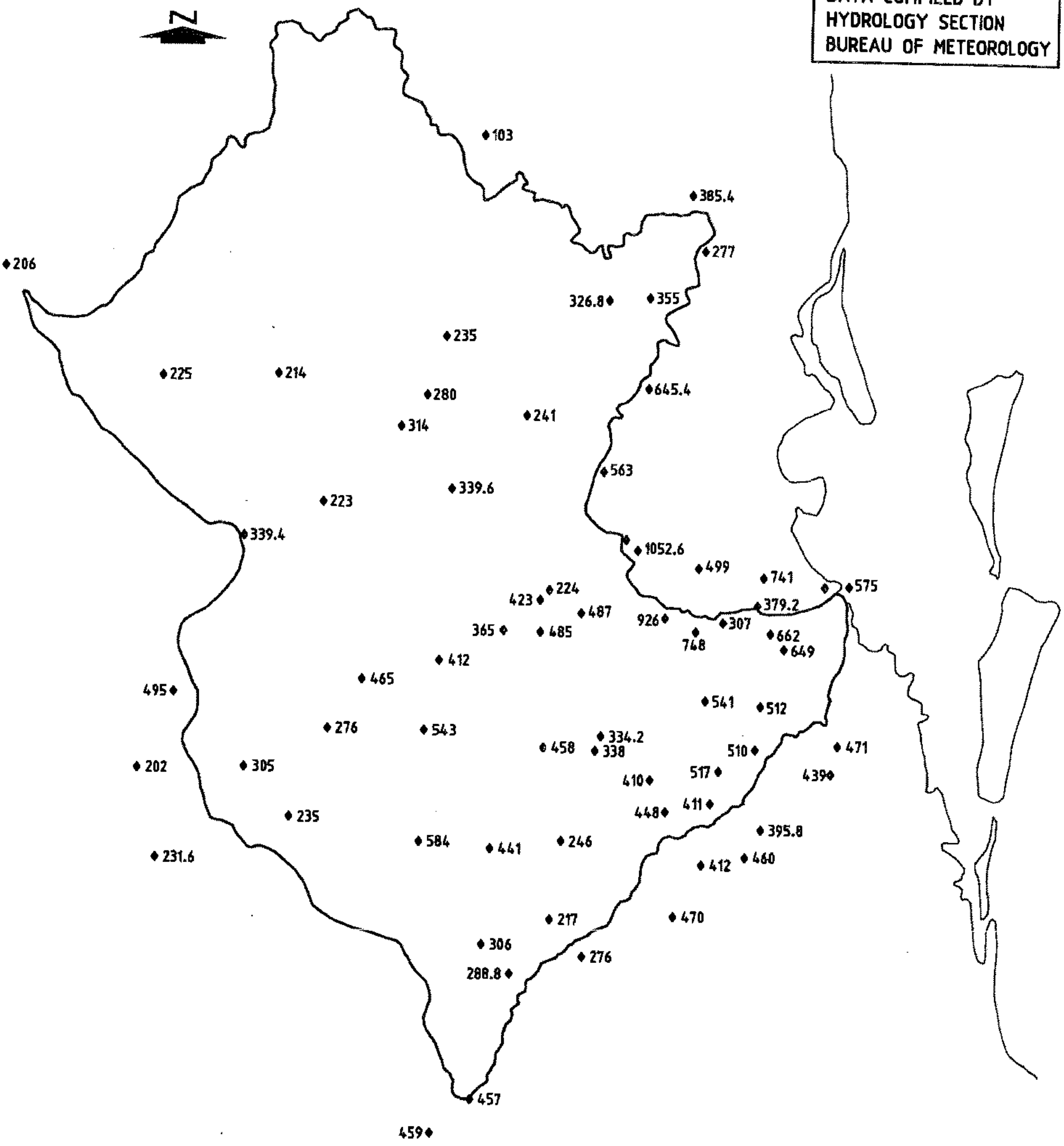


FILE NAME: 04157-14 DISK Nº: D:\DWG\BRISB[illegible] Nº: T00[illegible] 14/2/[illegible]
PLO, SCALE: 1=[illegible]

FIGURE 5.13

BRISBANE RIVER FLOOD STUDY
RAINFALL DISTRIBUTION
- MAY 1996 STORM

DATA COMPILED BY
HYDROLOGY SECTION
BUREAU OF METEOROLOGY



STORM DURATION - 9am 31/04/96 TO 9am 07/05/96

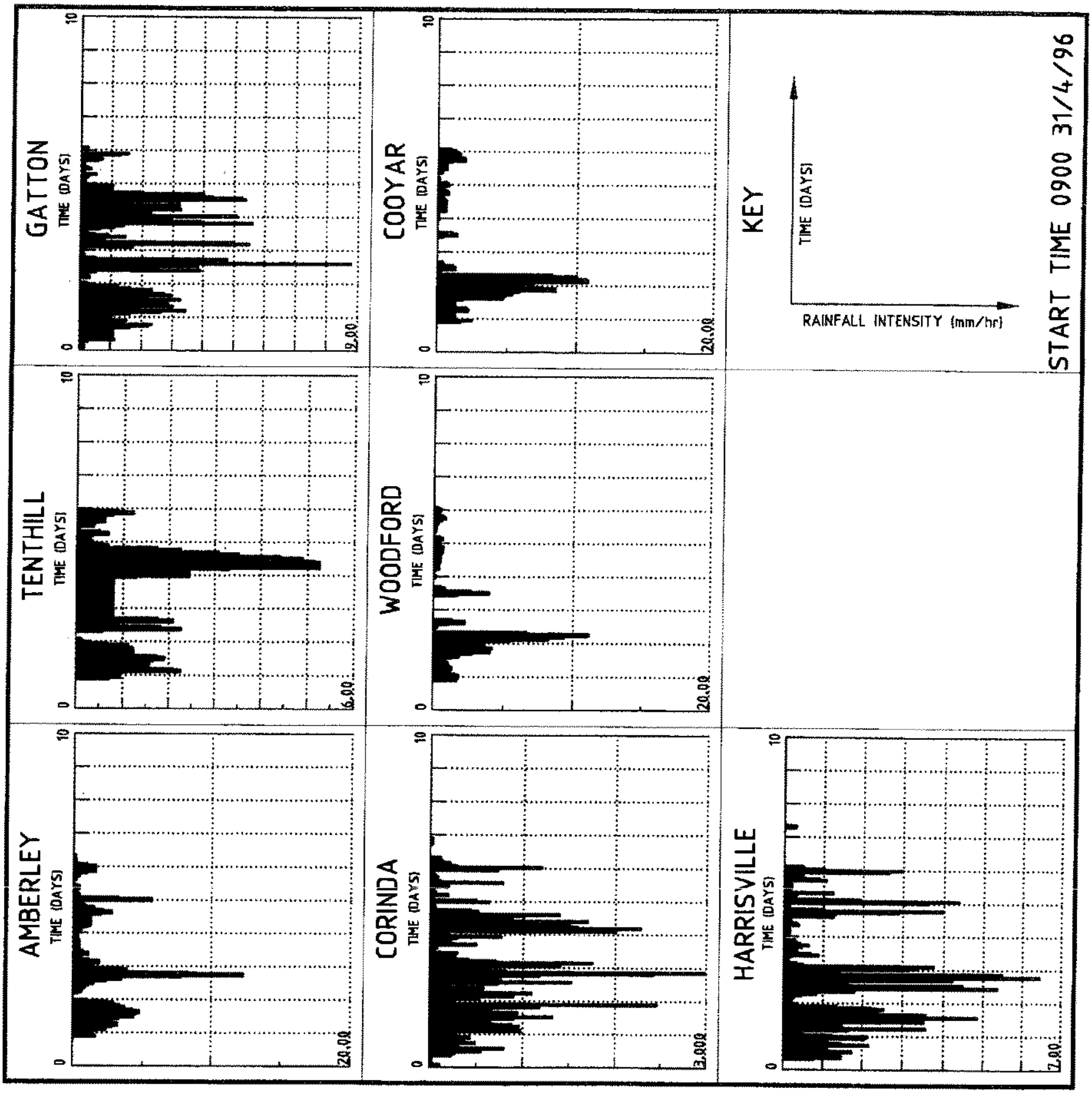
LEGEND

♦ 70 RAINFALL (mm)

SINCLAIR KNIGHT MERZ

FIGURE 5.14

BRISBANE RIVER FLOOD STUDY
REPRESENTATIVE PLUVIOGRAPHS
- MAY 1996 STORM



FILE NAME: 04157-16 DISK N°: D:\DWG\BRISBANE N°: T004157 14/3/97
PLC. SCALE: 1-..

SINCLAIR KNIGHT MERZ

FIGURE 5-15

BRISBANE RIVER FLOOD STUDY
ISOHYETAL MAP - FEBRUARY 1931 STORM

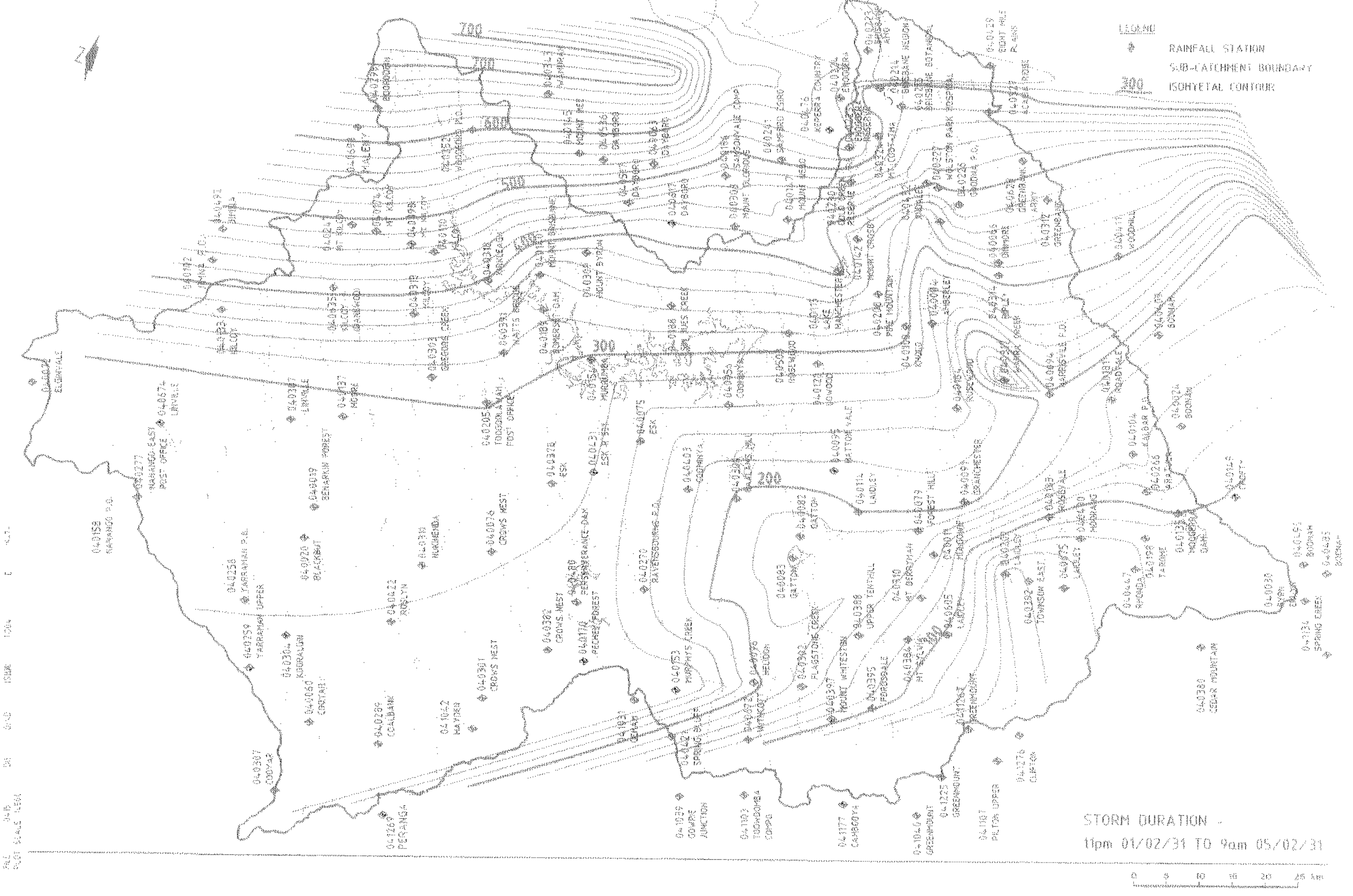
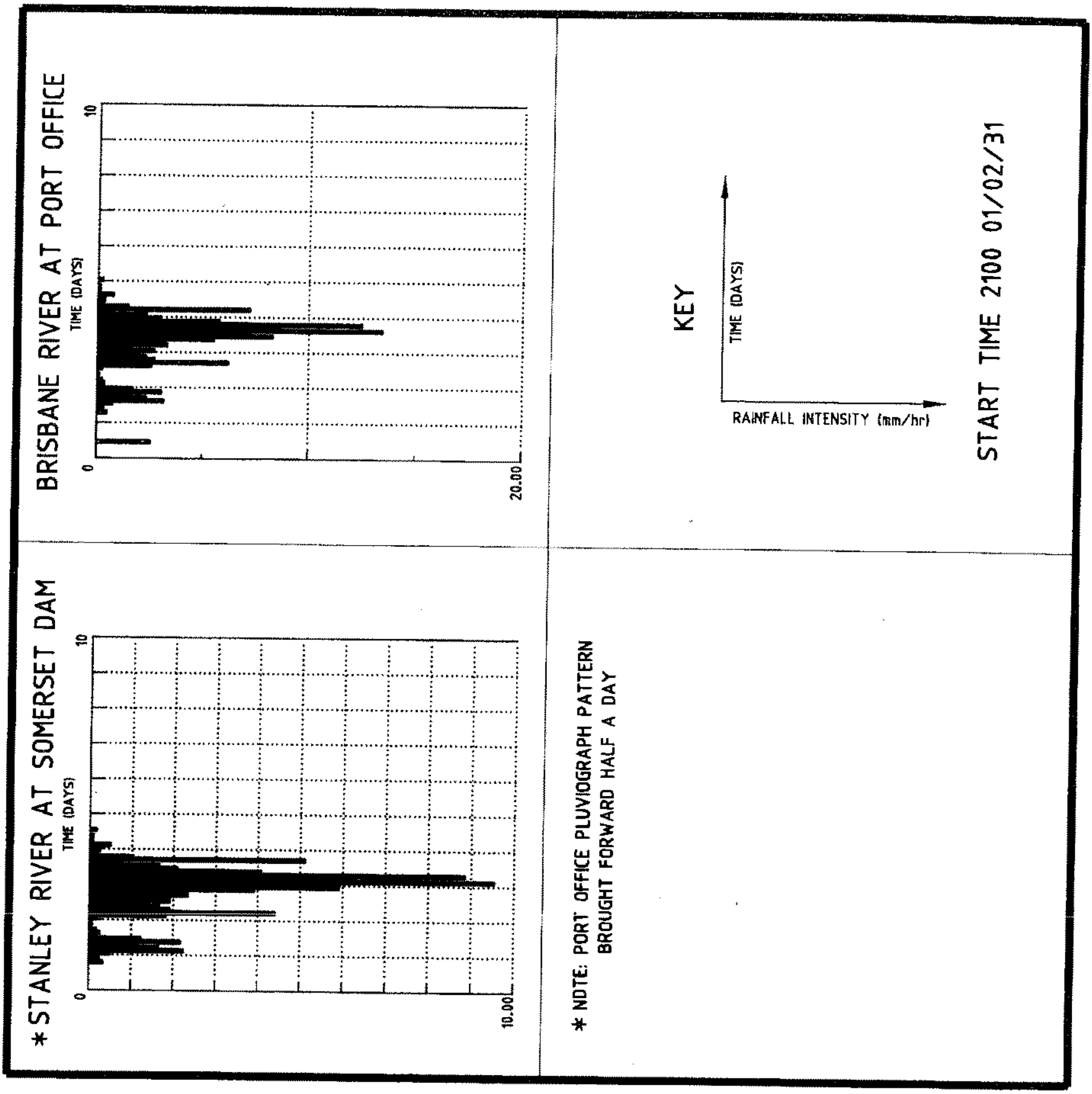


FIGURE 5-16

BRISBANE RIVER FLOOD STUDY
REPRESENTATIVE PLUVIOGRAPHS
- FEBRUARY 1931 STORM



* NOTE: PORT OFFICE PLUVIOGRAPH PATTERN BROUGHT FORWARD HALF A DAY

FIGURE 5-17

BRISBANE RIVER FLOOD STUDY
ISOHYETAL MAP - MARCH 1955 STORM

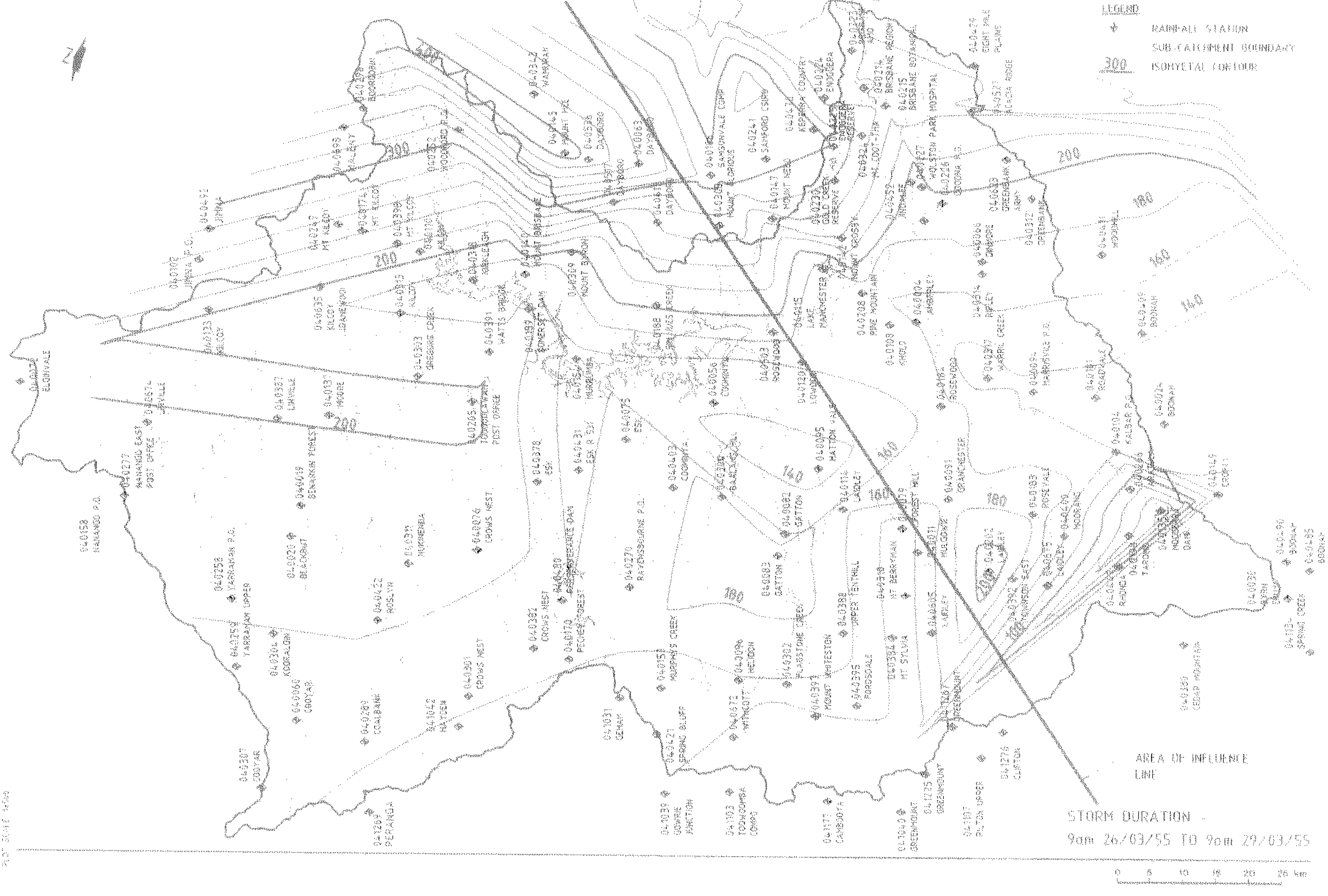
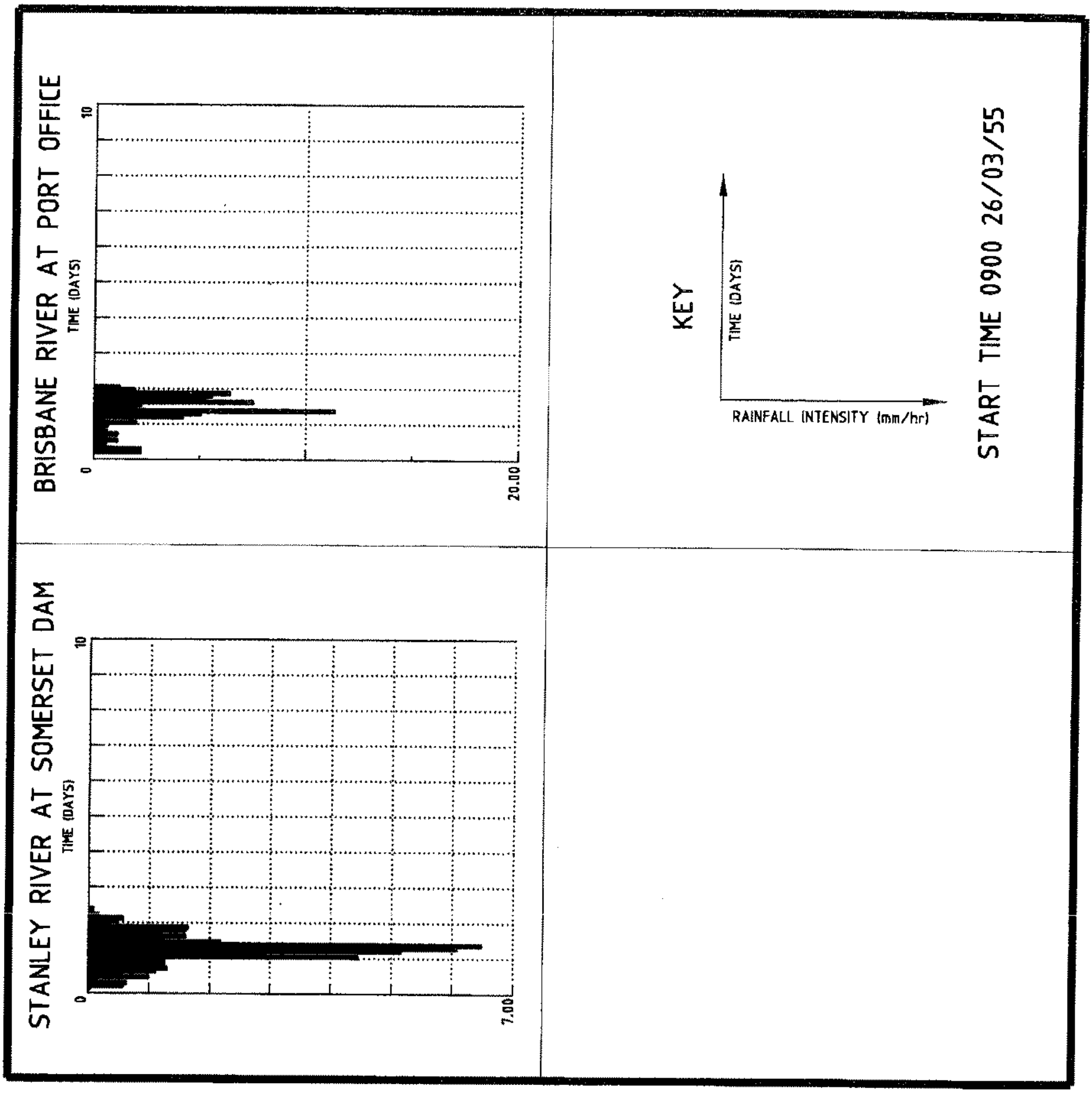


FIGURE 5-18

BRISBANE RIVER FLOOD STUDY
REPRESENTATIVE PLUVIOGRAPHS
- MARCH 1955 STORM



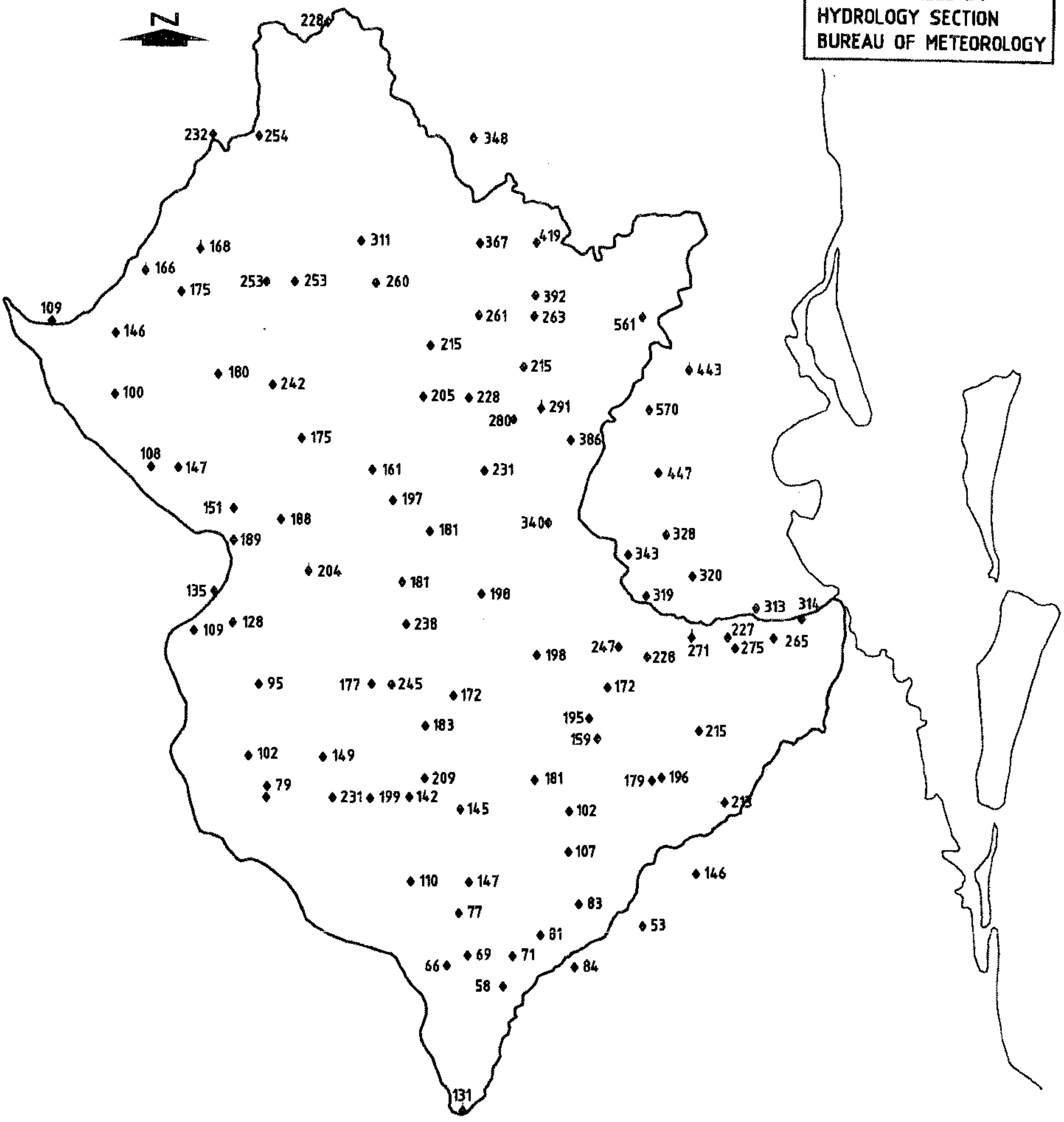
FILE NAME: 04157_5K DISK No: D:\DWGS\BRISBANE No: T00/157 21/8/97
PLOT SCALE: 1=80

FIGURE 5-19

BRISBANE RIVER FLOOD STUDY
RAINFALL DISTRIBUTION
- JULY 1973 STORM

SINCLAIR KNIGHT MERZ

DATA COMPILED BY
HYDROLOGY SECTION
BUREAU OF METEOROLOGY



STORM DURATION - 9am 01/07/73 TO 9am 09/07/73

LEGEND

◆ 70 RAINFALL (mm)

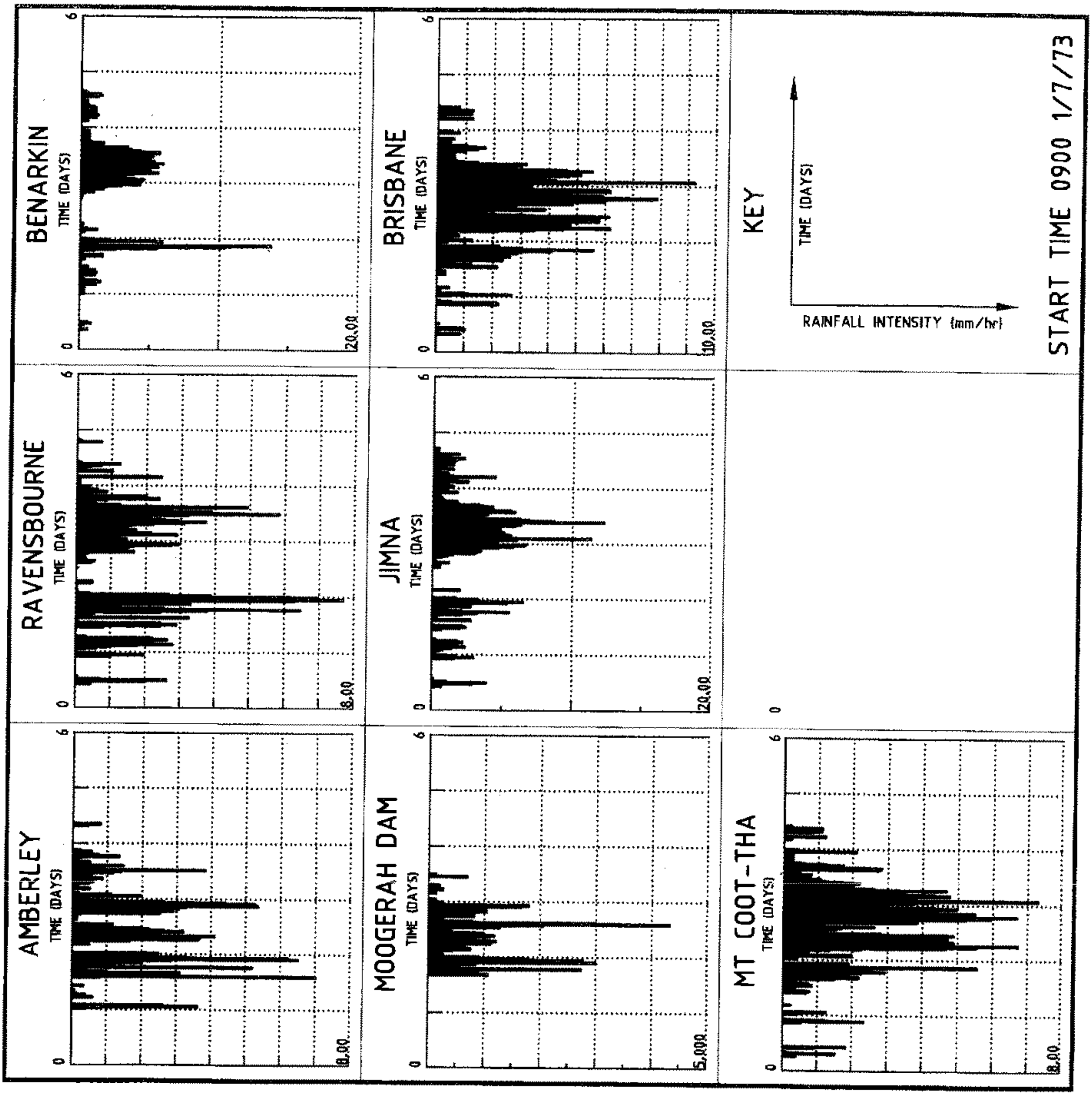
0 10 20 30 40 60 km

FILE NAME: 04157-17 DISK N°: D:\DWG\BRISBANE N°: T004157 10-3-97
PLOT SCALE: 1-1000

SINCLAIR KNIGHT MERZ

FIGURE 5-20

BRISBANE RIVER FLOOD STUDY
REPRESENTATIVE PLUVIOGRAPHS
- JULY 1973 STORM

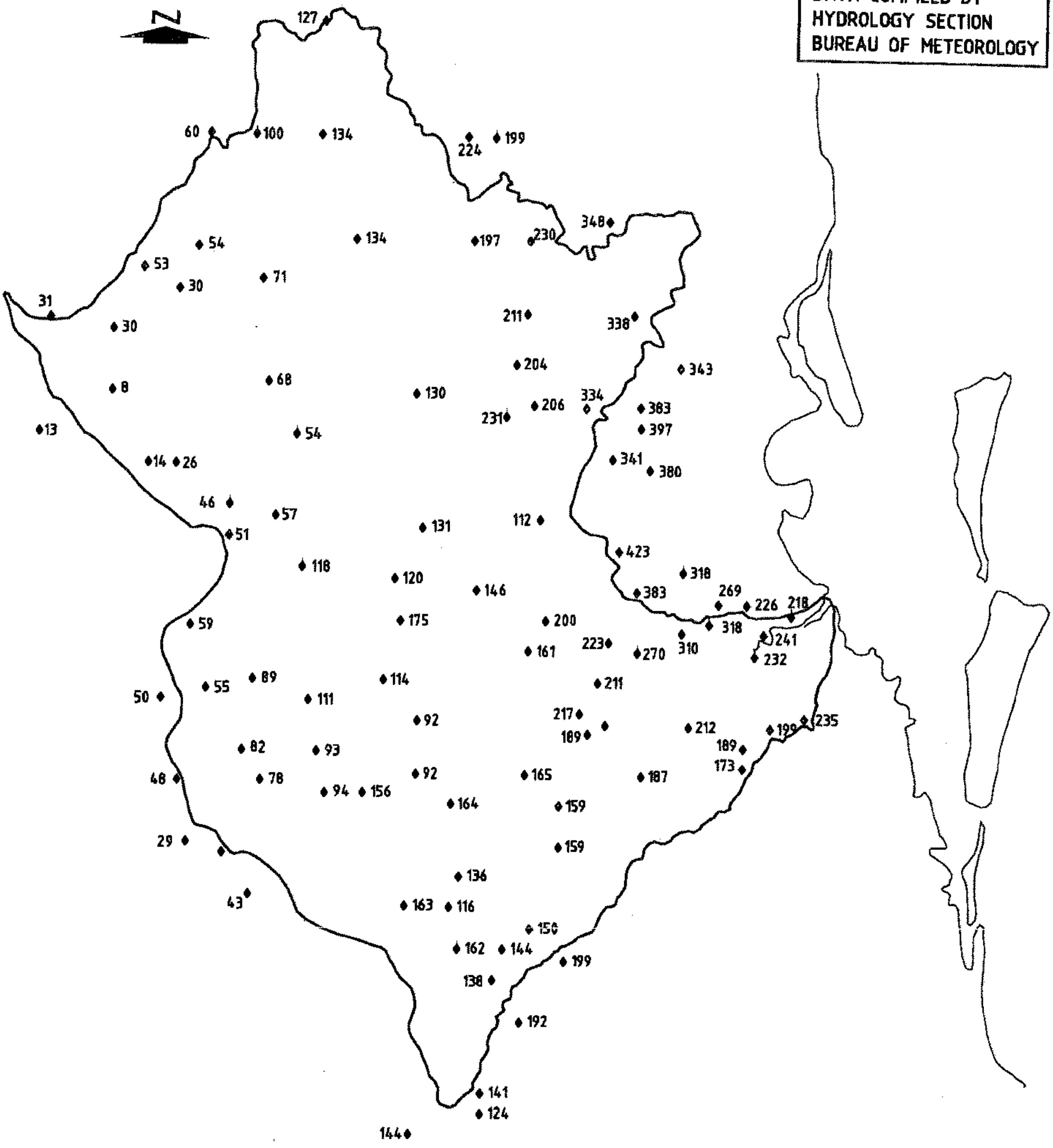


FILE NAME: 04157-18 DISK N°: D:\DWG\BRISBANE N°: T00:157 14/3/97
PLC, SCALE: 1-00

FIGURE 5-21

BRISBANE RIVER FLOOD STUDY
RAINFALL DISTRIBUTION
- EARLY APRIL 1989 STORM

DATA COMPILED BY
HYDROLOGY SECTION
BUREAU OF METEOROLOGY



STORM DURATION - 9am 31/03/89 TO 9am 04/04/89

LEGEND

♦ 70 RAINFALL (mm)

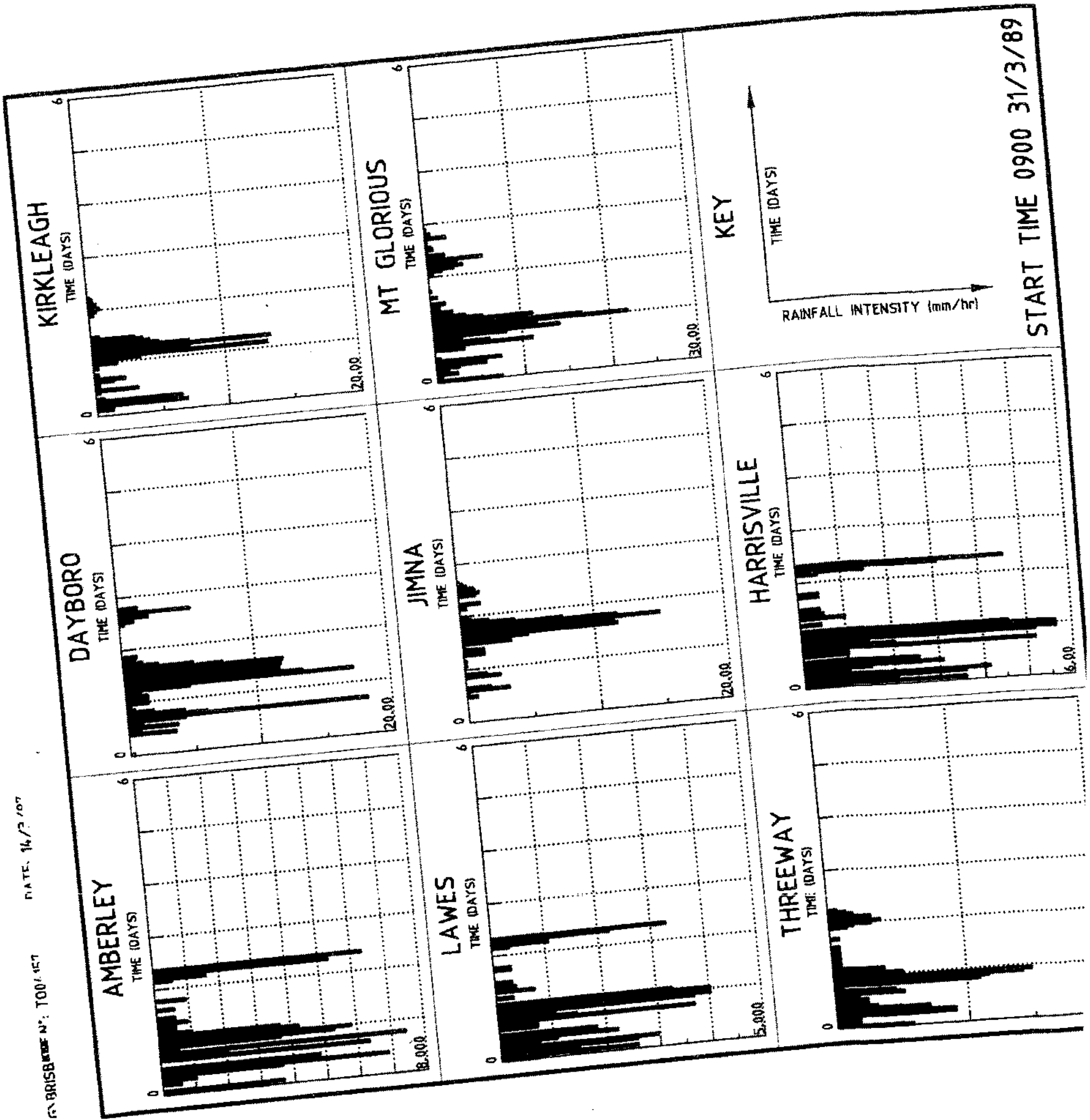
0 10 20 30 40 50 km

FILE NAME: 04157-19 DISK N°: D:\DWG\BRISBANE N°: T004157 10-3-97

PL ALE:

FIGURE 3-22
BRISBANE RIVER FLOOD STUDY
REPRESENTATIVE PLUVIOGRAPHS
- EARLY APRIL 1989 STORM

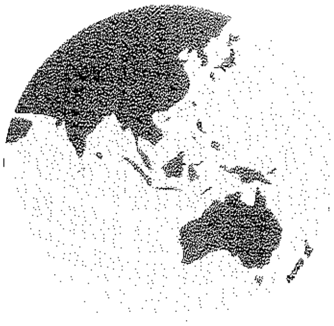
SINCLAIR KNIGHT MERZ



DATE. 14/3/97

DISK Nº: D:\DWG\BRISB DISK Nº: T00457

FILE NAME: 04157-20



6. Hydraulic Model

6. Hydraulic Model

6.1 Overview

The overall purpose of any hydraulic modelling is to describe the movement or behaviour of floods as they pass through the channel system and associated floodplains. Flood levels, extent of inundation and flow velocities at various locations along the study reach are computed in the process.

In order for the model results to be reliable, it is necessary to calibrate and verify the hydraulic model. The calibration process involves the matching of calculated levels with recorded levels for as many recorded events as possible. Characteristics such as channel roughness parameters and appropriate model schematisation are derived in the calibration process.

The next major step after calibrating the model is to test or verify the model by using the model parameters derived during the calibration phase. This process is necessary in order to ensure that the model accurately describes the hydraulic behaviour of the channel system both for recorded events as well as for design events.

The one-dimensional hydrodynamic model, MIKE 11 developed by the Danish Hydraulic Institute was selected for the hydraulic analysis. HEC-RAS, the industry standard steady-state one-dimensional model was used to check the hydraulic behaviour of major structures located along the river in the study area.

This section of the report describes the hydraulic modelling of the Brisbane River system with respect to the calibration and verification processes.

6.2 MIKE 11 Model Description

The MIKE 11 hydrodynamic model was developed by the Danish Hydraulic Institute and it is a one-dimensional unsteady-state model used to simulate flows in channels of various configurations.

The model is based on an implicit finite-difference approach and can be applied to looped networks and quasi two-dimensional flow simulations. The model is capable of simulating sub-critical as well as super-critical flow conditions through a numerical scheme which adapts according to local flow conditions.

Inputs to the model include discharge hydrographs at various inflow points, water level or discharge hydrographs at the downstream boundary of the model, cross-sectional data and channel roughness values.

6.3 HEC-RAS Model Description

HEC-RAS has been developed to predict water surface profiles for steady flow in natural or constructed channels. The computational procedure is based on the solution of the one dimensional energy equation with energy losses due to friction evaluated from Manning's equation. Effects of hydraulic structures such as bridges, culverts and weirs can be readily incorporated. For the purpose of this study, HEC-RAS has been used to check the performance of the MIKE 11 model at bridge structures.

6.4 Model Establishment

6.4.1 Brisbane River System Schematisation

Brisbane River was represented by one main branch in the MIKE 11 model which extends from the Western Inner Bar to the Brisbane City Council boundary which is located approximately 79 km upstream.

Additional branches located at the confluences of the Bremer River, Oxley Creek , Enoggera Creek and Bulimba Creek were included in the model to allow major inflows and storages from these tributaries to be taken into account. Storages associated with smaller tributaries were not considered to be significant and therefore were not included in the model.

This was considered to be a reasonable representation as peak inflows from major tributaries within the hydraulic model reach occur well before peak inflows from the upper Brisbane River catchment (ie. upstream of the Brisbane City Boundary). This allowed floodwater to be backed up into each tributary and provided a simulated storage at each confluence. Model branches and major confluence locations are shown in **Figure 6-1a to 6-1g - MIKE 11 Model Structure**.

Surveyed data provided by Brisbane City Council was used to describe the cross-sectional geometry of the Brisbane River system in the model. The geometry of the adjoining tributaries consisted of Brisbane River survey data (connection to Brisbane River) and derived levels from topographical information for the upstream cross sections. Locations of the cross-sections used in the model are shown in **Figure 6-1a to 6-1g - MIKE 11 Model Structure**. A total of 197 cross-sections were used to represent the geometry of the Brisbane River system and a further 8 cross sections for the four adjoining tributaries being modelled.

6.4.2 Boundary Conditions

Discharge hydrographs simulated by the hydrologic model, RAFTS, for the various recorded events were used as boundary conditions at the upstream ends of the hydraulic model and 4 intermediate locations representing sub-catchment inflows along the creeks. These locations are illustrated on **Figure 6-1a to 6-1g - MIKE 11 Model Structure**.

Recorded water levels in the Brisbane River at the Western Inner Bar were used as the downstream boundary conditions for the events being modelled.

6.4.3 Hydraulic Structures

A total of 8 waterway crossings are located within the Brisbane River study area as shown in **Figure 6-1a to 6-1g - MIKE 11 Model Structure**. Geometry and hydraulic capacity vary considerably between crossings, but they can all be grouped into bridge structure types.

Bridge Structures consist of a road decking supported by piers. This type of structure has the highest capacity to accommodate flood discharges without overtopping. Changes to waterway geometry are usually minor compared to other structures such as culverts, except for the piers and encroachment of the creek by the bridge abutments.

Two types of flow regimes were allowed for in the hydraulic modelling of waterway structures:

Weir Type Flow is the flow over a crest such as a road or top of a pipeline. This occurs when the roadway is overtopped and may be either free flow (low downstream water levels causing critical flow conditions at the structure) or submerged flow (high downstream water levels `drowning' out the weir flow). The weirs for this study were modelled within a separate link branch. This allowed weir flow to be estimated at each bridge structure.

Culvert Type Flow is the flow through a culvert opening. The hydraulics of culvert flow are dependent on factors such as downstream submergence, culvert dimensions and geometry, friction effects and whether the culvert is flowing partially full or is pressurised.

The modelling approach for each bridge structure was a combination of culvert and weir flow. Flows below the bridge deck were assumed to approximate a culvert type regime.

A relationship between water level and available waterway width was developed from cross sectional information. Reductions in waterway area due to piers and bridge skewness were taken into account. The level-width curve was then input into MIKE 11.

This approach was applied to flows below the bridge deck. For overtopping conditions, the road crest geometry was specified directly into MIKE 11 and modelled as a broad crested weir.

A brief description of each structure is provided below.

1. Centenary Bridge - A multi span structure consisting of a constant deck depth with 6 piers and abutments encroaching within the waterway area. During the 1974 flood event a barge was sunk immediately upstream of the bridge to avoid bridge damage occurring. This may have caused a reduction of the conveyance through the waterway.

2. Indooroopilly Bridge - There are three bridges in this location these being the Walter Taylor Bridge and two Indooroopilly Rail Bridges. For modelling purposes these three bridges were combined and assumed to be a composite structure. Anecdotal evidence suggests that the combination of these three structures reduce the waterway area and cause a choking effect.

3. The Merivale Bridge - This rail bridge was constructed after the 1974 flood event. It has been included for all events occurring after 1974.

4. William Jolly Bridge - This bridge is situated approximately 250 m downstream of the Merivale bridge. The bridge is a multi span bridge with arched chords joining the piers at low levels. It is considered that these arched chords may cause some minor afflux to occur due to the reduction in waterway area.

5. Victoria Bridge - The Victoria Bridge is located approximately 700 m downstream of the William Jolly Bridge. The bridge is a solid arch bridge which reduces the waterway area considerably at higher flood levels.

6. Captain Cook Bridge - This bridge is similar to the Victoria Bridge however the reduction in waterway area is less due to the flat arch shape of the deck.

7. Story Bridge - The deck level of the Story Bridge is such that weir flow is unlikely for most floods. Any restriction of flow is due to the piers and abutments only, hence major affluxes at this location are not expected.

8. Gateway Bridge - This bridge was not included in the model as the deck is suspended at a very high level. The effect of the piers on afflux was considered to be negligible due to the extent of waterway area at this location.

A list of the modelled structures and how they were represented in MIKE 11 are presented in **Table 6-1 - List of Hydraulic Structures**.

Table 6-1 - List of Hydraulic Structures

No	Structure Location	Chainage (km)	Structure Description	Modelled in MIKE 11 as:
1	Centenary Highway	1028.720	Major Public Bridge	Irregular culvert + weir
2	Indooroopilly Bridges	1037.110	Major Public Bridge	Irregular culvert + weir
3	Merivale Bridge	1052.37	Major Public Bridge	Irregular culvert + weir
4	William Jolly Bridge	1052.625	Major Public Bridge	Irregular culvert + weir
5	Victoria Bridge	1053.355	Major Public Bridge	Irregular culvert + weir
6	Captain Cook Bridge	1054.660	Major Public Bridge	Irregular culvert + weir
7	Story Bridge	1056.920	Major Public Bridge	Irregular culvert + weir

6.5 MIKE 11 Model Calibration

6.5.1 General

Model calibration involves the selection of appropriate model schematisation and model parameters in order to match simulated and recorded water levels and discharges. This involves an iterative process and the careful selection of roughness parameters which reflect channel and floodplain conditions and an accurate description of flow movement.

Channel roughness values (Manning's `n') selected were primarily based on site visits, examination of aerial photographs and past experience from other flood studies. These were modified in some cases to reflect the hydraulic behaviour of the flood, (such as a change in vegetation or the presence of a sharp bend), as it moved downstream in order to achieve a reasonable match between recorded and predicted flood levels.

Four recorded events covering a variable range of floods, with rainfall and water level data were used to calibrate the hydraulic model. These flood events were;

☐ 24 January 1974
☐ 01 May 1996
☐ 23 April 1989
☐ 20 June 1983

The calibration events can be classified into a large flood event (1974) and small flood events (1983, 1989, and 1996). The peak discharge of the 1974 flood event was approximately 10 000 m^3/s, while the other events discharges range from 1 500 m^3/s to 3 000 m^3/s. Unfortunately no historical records for mid range flood events were available at the time of calibration.

Adopted Manning's 'n' values used in the hydraulic model are shown in **Figure 6-2 - Hydraulic Model Channel Roughness & Relative Resistance Values**. From **Figure 6-2** it can be seen that two sets of Manning's 'n' data were required to achieve a good calibration. The higher set of Manning's 'n' values were required to match the predicted water levels to the recorded water levels for the 1974 flood. Since MIKE 11 does not directly allow for bend losses, Manning's 'n' values had to be increased at bends to account for these losses. Furthermore, the predicted velocities in the 1974 flood were double that of the smaller events, hence increasing bend losses further. To account for the greater bend losses, the Manning's 'n' values had to be increased for the calibration of the 1974 flood event. Further discussion of the adopted Manning's 'n' values is provided later in this report.

Initial roughness estimates were based on site inspection and refined during the calibration process to achieve a best fit across the range of the four calibration events analysed.

Generally, the upper reach of the Brisbane River from MIKE 11 model chainage 1 000 km to 1 040 km consists of mainly open grassed and treed floodplains with severe meanders at various locations. Residential properties are located at various intervals and levels along this reach. These residential properties could be described as being in low density areas.

From chainage 1 040 km to 1 070 km a reach could be described as medium to high density residential areas which include the inner city area. The general shape of the river could be described as severely meandering.

The lower reach of the Brisbane River from 1 070 km to 1 078.66 km is relatively uniform with no major bends. Industry and residential properties line the banks along with mangrove swamps close to the river outlet.

Generally the overall river bed profile could be described as irregular which is probably due to dredging. This form roughness may cause a slight increase to the expected Manning's 'n' values.

The floodplain roughnesses varied significantly along the extent of the Brisbane River. Generally, the Manning's 'n' values varied from 0.025 at the Inner Bar, 0.035 for open grassed floodplains, 0.075 for treed floodplains to 0.47 for complete flow retardation in the inner city area.

Hydrographs exported from the RAFTS model were used as direct inputs into the MIKE 11 model.

Downstream boundary conditions (tailwater) were based on available data for the Brisbane River. Continuous data from the Bureau of Meteorology was used to set tailwater levels. This allowed tidal influences to be included in the modelling however the quality of the data for the late April 1989 and the May 1996 flood events was considered to be poor and water levels had to be derived to complete each of these data sets.

Each of the floods selected for calibration purposes was simulated using the MIKE 11 model. A comparison of recorded and computed flood levels at the gauge and spot level locations is tabulated in **Appendix C - MIKE 11 Model Results - Calibration/Verification (Table C-1 - Predicted & Recorded Flood Levels for Calibration and Verification Events)**. Corresponding discharges are presented in **Table C-2 Predicted Discharges for Calibration/Verification Events**. Longitudinal profiles of peak flood levels for the calibration events are also presented in **Appendix C as Figures C-1a to C1i - Flood Calibration Profiles** and **Drawings W10581 - Sheets 01 to 09.**

6.5.2 January 1974 Flood Event

The January 1974 flood event was the largest flood that has occurred in the Brisbane River in recent times. This event was considered to be the primary calibration event because a large amount of recorded flood level information was available.

At the time of this flood Wivenhoe Dam had not been constructed and this enabled good calibration of the discharge hydrographs to be achieved.

For this calibration the Merivale Bridge was not included in the model as it was not constructed until 1975.

Due to extensive dredging in the river system it was appropriate to compare surveyed cross sections taken directly after the 1974 flood with surveyed cross sections taken in 1995. A number of cross sections were compared at various locations and although each set of the compared sections were not at an exact corresponding location, the general trend suggested that the river system previously had a lower bed level (up to 1.5 m). This was not expected to cause significant differences in flood levels because the additional volume due to the increase in depth would already be accounted for by the tidal prism.

The Manning's 'n' values were input at each cross section using preliminary values obtained from the site inspection. At bend locations these values were increased by a factor of 1.3 (Chow, 1973) to model the additional losses not accounted for in MIKE 11. These parameters were adjusted incrementally until a good calibration was obtained. On completion of this calibration event, generally predicted levels were within 0.1 m of continuous recorded levels and within 0.2 m recorded spot levels.

For continuous records the rise, peak and recession of the hydrographs generally provided a good match to the recorded levels. The recorded spot levels varied significantly depending on whether the level was taken on the outside or inside of a bend. The predicted levels outside the maximum allowable tolerance of 0.2 m were checked and in most cases were deemed to be likely to be due to superelevation at bends or incorrect recorded level information (see **Section 6.10** for further discussion). This was primarily decided by looking at surrounding levels and identifying any outliers in the recorded levels.

A comparison of recorded and predicted hydrographs is given in **Appendix C (Figure C-3a to C-3d - Predicted & Recorded Hydrograph Comparison - January 1974)**.

The Manning's 'n' values adopted for this calibration were considered to be slightly higher than expected. This was considered further during other calibration events.

6.5.3 May 1996 Flood Event

This event was considered to be a small event approximately 10 percent the size of the 1974 flood. Discharge hydrographs calculated by the RAFTS model were used as inflows at each inflow boundary and recorded level information was used as the downstream water level at the downstream boundary. For this event the Merivale Bridge was included in the MIKE 11 model.

Only two continuous recorded water level records and no spot level information were available for the 1996 flood. The continuous recorded water levels were available at Moggill gauging station and the Western Inner Bar. The primary objective of the calibration for this flood was to match the recorded water level at Moggill.

The Manning's 'n' values obtained from 1974 flood calibration were used for the model run where it was found that the predicted water level at Moggill was well above the recorded water levels. The difference in water levels was so great that the Bureau of Meteorology was contacted to check if a datum shift at the Moggill gauge had been overlooked. This was not the case and further investigations revealed the difference was due to lower bend losses caused by lower flow velocities for the smaller floods.

To check that reducing the Manning's 'n' value was a reasonable assumption a MIKE 11 model of one of the Brisbane River bends was set up and a bend loss for three Manning's 'n' values were determined. The three Manning's 'n' values used were;

- 0.07- Value adopted for the 1974 flood at bend.
- 0.05 - Value adopted for the 1996 flood at bend
- 0.035 - Value expected in channel if no bend was present.

The bend loss was considered to be the change in water level from the downstream exit of the bend to the upstream entrance to the bend.

These bend losses were recorded and the following equation was used and a comparison made to check the validity of the adopted roughness values.

Using the bend loss equation:

$$h_b = C_L.V^2/2.g$$

where

$$C_L = 2.b/r$$

and

b = width of flow at bend
r = radius of bend,

the estimated bend losses were calculated for the 1996 flood and the 1974 flood.

The results are presented in **Table 6-2 - Comparison of Bend Losses**.

Table 6-2 - Comparison of Bend Losses

Flood	b (m)	r (m)	C_L	V (m/s)	Calculated h_b (m)	MIKE 11 h_b (m)
1996	250	600	0.8	1.2	0.06	0.07
1974	700	600	2.3	1.8	0.39	0.38

It can be seen from **Table 6-2** that both the coefficient C_L and the velocity increase significantly at the bend for the larger flood. Since MIKE 11 cannot directly account for bend losses it was therefore necessary to reduce the Manning's 'n' value for the lesser flood to achieve a good calibration.

The rise of the recorded level hydrograph at Moggill matched reasonably well with the predicted rising limb calculated by MIKE 11. The predicted peak water level is however 0.28 m above and approximately 18 hours behind the recorded water level at this location. This was the best calibration that could be obtained within MIKE 11 given the RAFTS model calculated boundaries available.

It was therefore considered that the difference between the recorded and predicted levels was due to the predicted inflows at Moggill by the RAFTS model. As the RAFTS model has matched the recorded hydrograph at Moggill (refer **Table 5-11**), it appears that the rating curve at this site is in error in this flow range.

Appendix C (Figure C4 - Predicted & Recorded Hydrograph Comparison - May 1996) illustrates the match of hydrographs achieved.

6.5.4 Late April 1989 Flood Event

Hydrographs generated by the RAFTS model were used at each inflow location and the adopted Manning's 'n' values used for the 1996 calibration event were used for the calibration of this flood. The Merivale Bridge was also included in the MIKE 11 model for this calibration.

The only available flood level data was located at the Moggill gauge and the Western Inner Bar. As shown in **Table C-1** and **Figure C-5 - Predicted & Recorded Hydrograph Comparison - Late April 1989**, the magnitude of the predicted peak flood level was 0.25 m lower than the peak recorded flood level at Moggill.

This flood event included a large component of Wivenhoe Dam outflows which is evident in **Figure B-3b**. It can be seen from this figure that the tail of the hydrograph remains constant for a period of 8 days and that the variation between the recorded and the RAFTS predicted hydrograph is significant. These variations imply that the direct inflow from Wivenhoe Dam input into the RAFTS model does not represent discharges from the dam. The discrepancy in predicted water level determined in MIKE 11 could probably be explained by the predicted discharge hydrograph calculated by the RAFTS model which is heavily influenced by Wivenhoe Dam flows.

6.5.5 June 1983 Flood Event

The Manning's 'n' values adopted for the smaller flood events was again used to calibrate the 1983 flood. Wivenhoe Dam had been constructed and the Merivale Bridge was also included in the model.

Table C-1 and Figure C-6 - Predicted & Recorded Hydrograph Comparison show a good match between MIKE 11 peak predicted levels and levels recorded by the gauge at Moggill. The only recorded level information for this event was located at Moggill and the Western Inner Bar.

The comparison of predicted and recorded hydrographs illustrates that the rising limb of the water level hydrograph matches well with the MIKE 11 predicted rising limb. The peaks occur at virtually the same time and match to within 0.01 m. The recession of the predicted level hydrograph is however well above the recorded levels and this again questions the sensitivity of the Wivenhoe outflow gauging station to dam water levels and release strategies.

6.6 MIKE 11 Model Verification

6.6.1 General

Verification of the hydraulic model was the next phase in the modelling process after calibration. The model was tested by simulating other recorded flood events which were not used to calibrate the model without adjusting model specific parameters. This was done to determine the overall performance and robustness of the model in simulating a range of flood events.

The Brisbane River hydraulic model was verified using the hydraulic parameters derived from the calibration process to simulate the following events;

☐ February 1931
☐ March 1955
☐ 01 April 1989
☐ 04 July 1973.

The 1989 and 1973 events were considered to be small events and the Manning's 'n' values adopted for the calibration of the small events were used for the verification.

The model verification for the 1931 and 1955 flood events was carried out using the calibrated parameters used for the 1974 flood event. These parameters were considered to be the most appropriate as flood waters would be well out of the river proper similar to the 1974 event. It was therefore assumed that bend losses and Manning's n roughnesses would also be similar.

All existing structures detailed in **Table 6-1 - List of Hydraulic Structures** were included in the hydraulic model for the 1989 flood verification event however the Merivale Bridge was removed for the 1973 verification event.

The absence of some structures during the 1931 and 1955 flood events required that the MIKE 11 model be modified. The only structure that was constructed for the 1931 event was the William Jolly Bridge and for the 1955 flood event the in place structures were Indooroopilly Bridge, William Jolly Bridge, Victoria Bridge and the Story Bridge. The MIKE 11 model was adjusted accordingly for each event to account for the absence of the relevant structures.

Model boundaries at Brisbane River for the verification events consisted of RAFTS discharge hydrographs for model inflows and recorded water levels for the tailwater level at the Western Inner Bar.

Recorded and predicted verification flood levels at various locations are tabulated in **Appendix C - MIKE 11 Model Results - Calibration/ Verification**. Longitudinal flood level profiles are also included as **Sheets C.10 to C.18**. A comparison of recorded and computed flood levels at the gauge and spot level locations is tabulated in **Appendix C - MIKE 11 Model Results - Calibration/Verification (Table C-1 - Predicted & Recorded Flood Levels for Calibration and Verification Events)**. Corresponding discharges are presented in **Table C-2 - Predicted Discharges for Calibration/Verification Events**. Longitudinal profiles for the Verification Events are also presented in **Appendix C as Figures C-2a to C-2i - Flood Verification Profiles** and **Drawings W10581 - Sheets 10 to 18.**

6.6.2 February 1931

The February 1931 flood was the second largest recorded flood event used for any of the verification or calibration events.

Calculated hydrographs for this event from the RAFTS model were input into the MIKE 11 model and predicted water levels were computed. The adopted tailwater level at the Western Inner Bar for this event was 1.5 m AHD which was considered to be reasonable. This tailwater level assumes a 2 year ARI storm surge in Moreton Bay (Mallon TD, 1987). Using this tailwater level the predicted water levels are generally within 150 mm which was considered to be a good result given the age of the basic data.

Predicted water levels above the Indooroopilly Bridge are generally within 300 mm below the recorded flood levels however the reliability of these recorded levels are in question due to annotations on recorded flood level maps. These annotations indicate that some form of extrapolation may have been carried out and hence the reliability of this information is questionable.

Time series level data was not available for this event and therefore a hydrograph comparison could not be conducted however **Table C-1 - Predicted & Recorded Flood Levels for Calibration and Verification Events** presents a comparison between recorded peak flood levels and predicted values.

6.6.3 March 1955

The March 1955 flood was the third largest recorded flood event used for the verification or calibration events in this study.

Calculated hydrographs for this event from the RAFTS model were input into the MIKE 11 model and predicted water levels were computed. The adopted tailwater level at the Western Inner Bar for this event was 1.3 m AHD which was considered to be reasonable as this level was below the 1 year ARI storm surge level for Moreton Bay (Mallon TD, 1987). Using this tailwater level the water levels are generally within 150 mm which was considered to be a good result.

Flood Profiles for the 1955 event are presented in **Appendix C (Figures C-7 - Predicted & Recorded Hydrograph comparison - March 1955).**

6.6.4 Early April 1989

The April 1989 flood was the smallest flood used for any of the verification or calibration events.

Calculated hydrographs for this event using the RAFTS model were input to the MIKE 11 model. Computed water levels are summarised in **Table C-1** and indicate a poor level of model performance. Predicted levels were 0.97 m above the recorded level at Moggill. This difference can be attributed to the over estimation of the discharge hydrograph (see **Figure B-8C**) determined by RAFTS at Moggill. This is again probably due to the use of the Wivenhoe Dam recorded outflow as input to the RAFTS model. A comparison between recorded and predicted hydrographs is presented in **Figure C-8 - Predicted and Recorded Hydrograph Comparison - Early April 1989.**

6.6.5 July 1973

The July 1973 event was again classed in the small flood category however a reasonable amount of flood level information was available for the event.

Figure C-9 - Predicted & Recorded Hydrograph Comparison and **Table C-1** illustrates that a level of model performance similar to the calibration process was achieved with this event. Recorded flood levels were matched to within the tolerances specified except for two locations where the maximum difference between recorded and predicted was +0.16 m at Cairncross Dock and 0.2 m at the Port Office Gauge.

6.7 Hydrologic and Hydraulic Model Consistency

Due to the absence of stream gauging data on the Brisbane River, direct comparisons between historical hydrographs and calculated RAFTS and MIKE 11 hydrographs could not be made. To ensure consistency between the hydrologic and hydraulic models direct comparisons of the calculated hydrographs from each model were made at three locations along the creek, these being Moggill, Centenary Bridge and the Port Office.

These comparisons are illustrated in the following figures:

- ☐ **Figure 6-3 - Hydrologic and Hydraulic Model Consistency - January 1974**
- ☐ **Figure 6-4 - Hydrologic and Hydraulic Model Consistency - June 1983**
- ☐ **Figure 6-5 - Hydrologic and Hydraulic Model Consistency - Late April 1989**
- ☐ **Figure 6-6 - Hydrologic and Hydraulic Model Consistency - May 1996**

- **Figure 6-7 - Hydrologic and Hydraulic Model Consistency - February 1931**
- **Figure 6-8 - Hydrologic and Hydraulic Model Consistency - March 1955**
- **Figure 6-9 - Hydrologic and Hydraulic Model Consistency - July 1973**
- **Figure 6-10 - Hydrologic and Hydraulic Model Consistency - Early April 1989.**

Figures 6-3 to **6-10** represent the calculated hydrographs from both models at the three locations along Brisbane River.

Figures 6-3 to **6-10** illustrate that a general consistency between the models has been attained. The variation in peak discharges is generally within ±10% and the timing of the peak is reasonably accurate.

6.8 HEC-RAS Check of Major River Crossings

A total of seven HEC-RAS models were set up for the major structures in the Brisbane River Study area. The location of these structures are listed in **Table 6-1 - List of Hydraulic Structures**.

Each of these HEC-RAS models provide an accurate estimate of headloss through the structure and includes factors such as pier shape and geometry. These models were used to check the MIKE 11 approach to modelling structures, using the following methodology.

- The MIKE 11 model was run for two of the calibration events. Water levels upstream and downstream of the structure and flow discharges were output at the peak of the hydrograph.

- The HEC-RAS model was run using these flow and tailwater conditions. The water levels upstream of the bridge estimated by HEC-RAS were compared against MIKE 11 predictions to check if there was a reasonable match between predicted affluxes.

The results of the HEC-RAS structure afflux check are given in **Table 6-3 - HEC-RAS Check of MIKE 11 on Headloss through Major Structures**. These results illustrates that all of the model comparisons achieved a match to within ±0.12 m.

Table 6-3 - HEC-RAS Check of MIKE 11 on Headloss Through Major Structures

Structure ID		1974 Afflux			1983 Afflux	
Bridge	Mike 11	HEC-RAS	Difference (m)	Mike 11	HEC-RAS	Difference (m)
Centenary	0.15	0.06	-0.07	0.05	0.01	-0.04
Indooroopilly	0.10	0.10	-0.00	0.01	0.02	+0.01
Merivale	-	-	-	0.03	0.01	+0.02
William Jolly	0.54	0.61	+0.07	0.01	0.07	+0.06
Victoria	0.19	0.07	+0.12	0.01	0.02	0.01
Captain Cook	0.08	0.10	+0.02	0.01	0.01	+0.00
Story	0.11	0.04	-0.07	0.03	0.00	-0.03

This match was considered reasonable given the significant differences in the analytical techniques used by MIKE 11 and HEC-RAS. The major model differences that contribute to the variation in headloss through the structures are:

☐ An irregular waterway shape can be specified in MIKE 11 which is useful in modelling bridges spanning natural creeks. By comparison, HEC-RAS simplifies the waterway shape as a trapezoid which will introduce a water level difference at flows below the bridge deck.

☐ Both models assume critical conditions over the bridge deck. However there are considerable differences between the methods employed to determine energy head loss in critical flow. HEC-RAS adopts a standard broad crested weir relationship using an effective weir length (ie assumes MIKE 11 rectangular flow area). MIKE 11 uses the critical flow area over the roadway (ie assumes a variable flow area). The MIKE 11 methodology is considered to be a better technique, especially for overtopping of roads that have a complicated longitudinal profile.

The performance of the MIKE 11 model to match recorded flood levels (where available) in the vicinity of structures and the consistency of MIKE 11 and HEC-RAS results indicates that the MIKE 11 model is adequately reproducing structure hydraulics.

6.9 MIKE 11 Model Performance

Performance of the hydraulic model over the range of calibration events is considered to be reasonable. The brief specified acceptable calibration as matching predicted levels to recorded levels to within the following ranges:

☐ Continuous records, 0.10 m

☐ MHI records, 0.15 m

☐ Other flood levels, 0.20 m.

A summary of the performance of the MIKE 11 model is given in **Table 6-4 - Hydraulic Model Performance Summary** as mean absolute water level differences over the selected calibrated and verification floods. Considering the contents of **Table 6-4** the model generally meets accuracy requirements. Some non-conformances are evident and these were discussed in Section 6.5. These results were achieved on the basis of:

☐ Maintaining realistic channel roughness and variation of roughness along the length of the river. These roughness factors are representative of the current creek configuration, however an adjustment had to be made to reduce the roughness values for smaller flood events, due to reduced bend losses.

☐ The verification events for the 1931 and 1955 flood events generally showed good correlation with recorded flood levels given the changes to the river system over time (ie. dredging).

☐ Satisfactory checks were performed on the hydraulics of the major structures as described in Sections 6.8.

Table 6-4 - Hydraulic Model Performance Summary

Gauge ID	MIKE 11 Chainage (km)	Water Level Difference (m)								Mean Absolute Difference (m)
		Calibration Events				Verification Events				
		1974	1996	1989b	1983	1931	1955	1989a	1973	
Moggill	1006.30	-0.04	0.28	-0.25	0.01	-	-	0.97	0.02	0.26
Goodna Hos	1014.61	-0.02	-	-	-	-	-	-	-0.03	0.03
Mt Ommaney	1026.68	0.00	-	-	-	-	-	-		0.00
Darra Wharf	1031.70	-0.10	-	-	-	-	-	-	-0.06	0.08
Sherwood	1034.89	-0.12	-	-	-	-	-	-	-	0.12
Clarence Rd	1037.29	-0.09	-	-	-	-	-	-	-	0.09
Oxley Ck	1039.57	0.10	-	-	-	-	-	-	-	0.10
King Arthur Tce	1040.09	-0.01	-	-	-	-	-	-	-	0.01
Tennyson PH	1041.46	-0.04	-	-	-	-	-	-	0.04	0.04
Yeronga St	1042.52	-0.11	-	-	-	-	-	-	-	0.11
Sandy Ck	1044.06	0.05	-	-	-	-	-	-	-	0.05
Dutton Pk Cemetery	1046.34	-0.45	-	-	-	-	-	-	-	0.45
Highgate Hill	1047.92	-0.10	-	-	-	-	-	-	-	0.10
St Lucia Ferry	1048.89	-0.01	-	-	-	-	-	-	0.14	0.08
Montague Rd	1053.90	-0.34	-	-	-	-	-	-	-	0.34
Port Office	1055.96	-0.04	-	-	-	-	-	-	0.23	0.14
Cresent Rd	1063.65	0.06	-	-	-	-	-	-	-0.06	0.06
Cairncross Dock	1065.99	0.03	-	-	-	-	-	-	0.16	0.10
Bulimba PH	1069.54	0.00	-	-	-	-	-	-	-	0.00
Western Inner Bar	1078.66	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00

6.10 Superelevation Calculations

Superelevation calculations were performed at three (3) locations to provide an indicative estimate of the magnitude of superelevations at bends. These calculations were performed using:

$$\Delta h = \frac{V^2_{max}}{g}\left[\frac{20r_c}{3b} - \frac{16r_c^{\,3}}{b^3} + \left(\frac{4r_c^2}{b^2} - 1\right)\ln\left\{\frac{2r_c + b}{2r_c - b}\right\}\right]$$

where:

Δh = change in water level (m)

V^2_{max} = maximum velocity at bend (m/s)

g = gravity (9.81 m/s^2)

r_c = radius of bend at centre of river

b = width of river (m) (generally assumed to be the distance between the cadastral boundaries defined for the river corridor)

Table 6-5 - Superelevation Calculations lists the parameters used and results for the three locations where superelevations were predicted.

Table 6-5 - Superelevation Calculations

Location	Cross section No.	MIKE 11 (km)	AMTD (km)	V max (m/s)	rc (m)	b (m)	Δh (mm)
Darra Wharf	1 280	1 031.7	46.96	3.28	410	190	± 270
Indooroopilly Bridge	1 140	1 037.09	41.57	2.68	400	170	± 170
Newstead Park	320	1 063.31	15.35	2.18	580	380	± 170

From **Table 6-5** it can be seen that the bend situated at Darra Wharf has an estimated Δh of ± 270 mm. This assumes that from the centre of the river to the outside of the bend the water level increases by 270 mm. Similarly from the centre of the river to the inside of the bend the water level reduces by 270 mm. Therefore the total change in water level from the inside of the bend to the outside of the bend at Darra Wharf was estimated to be 540 mm.

Recorded water levels and superelevations at these locations have been summarised in **Table 6-6 - Superelevation Comparison**, and compared to the predicted water levels and superelevations, estimated by the superelevations calculations.

Table 6-6 - Superelevation Comparison

Location	Cross section No.	MIKE 11	AMTD	Recorded			Predicted		
		(km)	(km)	Inside (m AHD)	Outside (m AHD)	Δh total (mm)	Inside (m AHD)	Outside (m AHD)	Δh total (mm)
Darra Wharf	1 280	1 031.7	46.96	13.36	13.79	430	13.14	13.68	540
Indooroopilly	1 140	1 037.09	41.57	11.20	11.84	640	11.09	11.43	340
Newstead Park	320	1 063.31	15.35	2.60	3.3	900	2.79	3.13	340

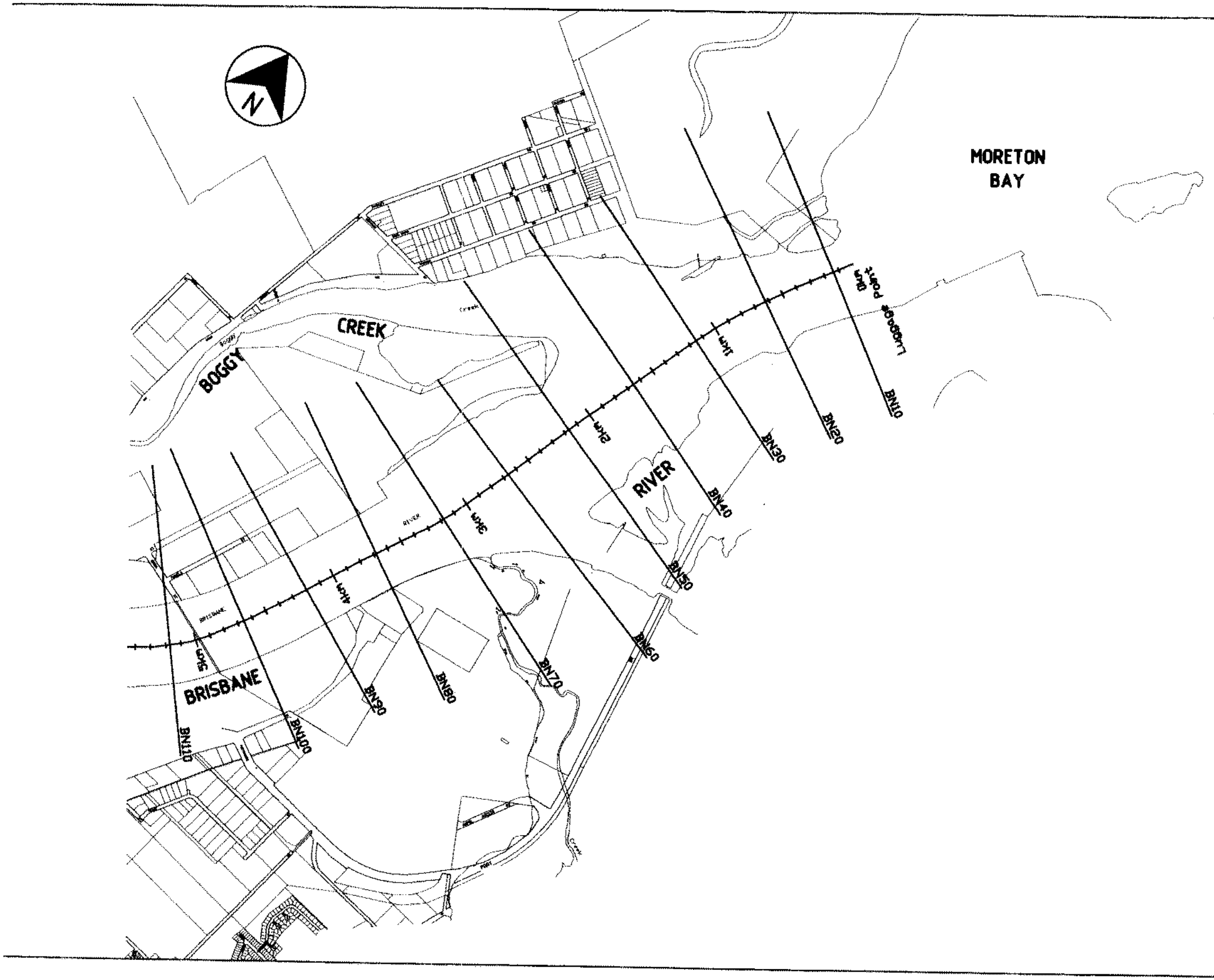
From **Table 6-5** it can be seen that at Darra Wharf the superelevation calculations over predict the total change in water level by approximately 20%. Upstream of Indooroopilly Bridge, the superelevation calculations under predict the total change in water level by 50% and similarly at Newstead Park by 60%.

These calculations indicate that superelevations at bends in the Brisbane River would be significant, however the magnitude of these superelevations predicted by the calculations do not show good correlation to recorded levels on the inside and outside of the investigated bends. These discrepancies are most likely due to the assumed width of the river (ie b) which could effect the calculated superelevation. There may have also been errors in the recording of the actual flood levels.

This exercise demonstrates that significant superelevations can occur along the Brisbane River thus accounting for variations in calibration performance of the model where recorded flood levels are available at the outside and inside of river bends.

SINCLAIR KNIGHT MERZ

FIGURE 6.1a
BRISBANE RIVER FLOOD STUDY
MIKE 11 MODEL STRUCTURE



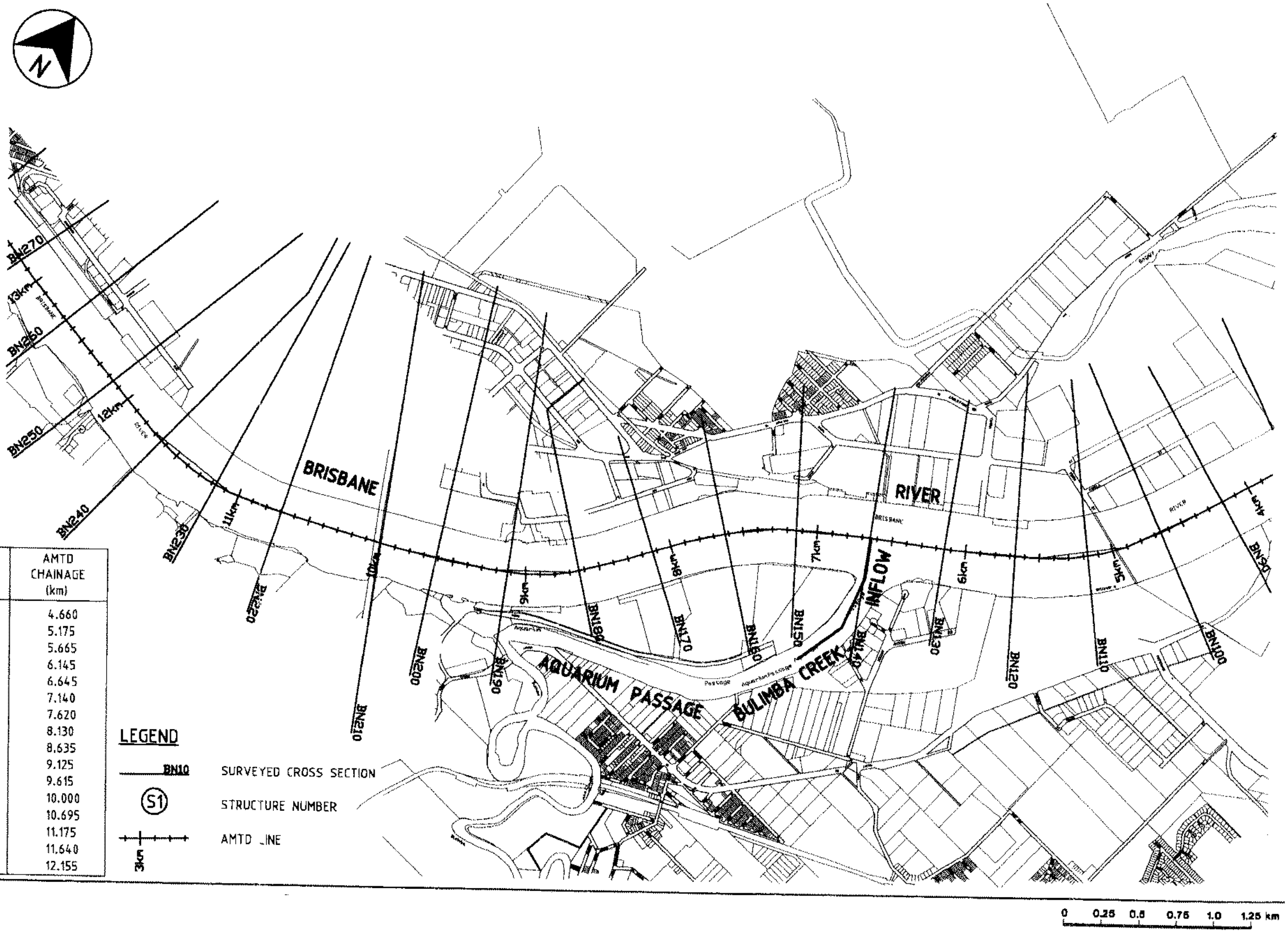
CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 10	1078.525	0.135
BN 20	1078.040	0.620
BN 30	1077.510	1.150
BN 40	1077.010	1.650
BN 50	1076.495	2.165
BN 60	1076.000	2.660
BN 70	1075.480	3.180
BN 80	1074.985	3.675
BN 90	1074.460	4.200
BN 100	1074.000	4.660

LEGEND

BN10	SURVEYED CROSS SECTION
(S1)	STRUCTURE NUMBER
3km	AMTD LINE

FIGURE 6.1b

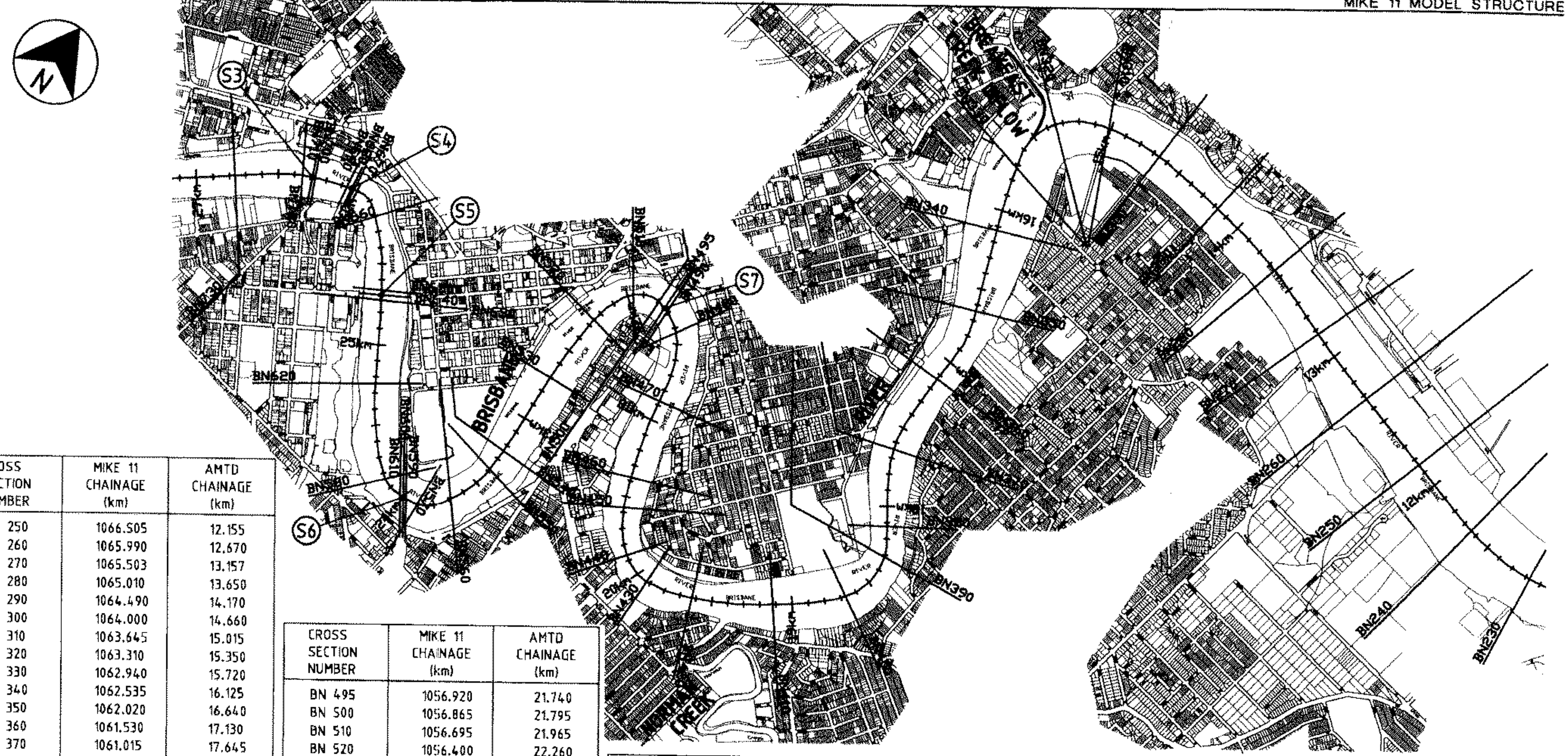
BRISBANE RIVER FLOOD STUDY
MIKE 11 MODEL STRUCTURE



CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 100	1074.000	4.660
BN 110	1073.485	5.175
BN 120	1072.995	5.665
BN 130	1072.515	6.145
BN 140	1072.015	6.645
BN 150	1071.520	7.140
BN 160	1071.040	7.620
BN 170	1070.530	8.130
BN 180	1070.025	8.635
BN 190	1069.535	9.125
BN 200	1069.045	9.615
BN 210	1068.660	10.000
BN 220	1067.965	10.695
BN 230	1067.485	11.175
BN 240	1067.020	11.640
BN 250	1066.505	12.155

PLOT SCALE 1=25

FIGURE 6.1c
BRISBANE RIVER FLOOD STUDY
MIKE 11 MODEL STRUCTURE



CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 250	1066.505	12.155
BN 260	1065.990	12.670
BN 270	1065.503	13.157
BN 280	1065.010	13.650
BN 290	1064.490	14.170
BN 300	1064.000	14.660
BN 310	1063.645	15.015
BN 320	1063.310	15.350
BN 330	1062.940	15.720
BN 340	1062.535	16.125
BN 350	1062.020	16.640
BN 360	1061.530	17.130
BN 370	1061.015	17.645
BN 380	1060.535	18.125
BN 390	1060.345	18.315
BN 400	1059.990	18.670
BN 410	1059.540	19.120
BN 420	1059.035	19.625
BN 430	1058.735	19.925
BN 440	1058.530	20.130
BN 450	1058.230	20.430
BN 460	1058.040	20.620
BN 470	1057.530	21.130
BN 480	1057.090	21.570
BN 490	1056.950	21.710

CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 495	1056.920	21.740
BN 500	1056.865	21.795
BN 510	1056.695	21.965
BN 520	1056.400	22.260
BN 530	1055.960	22.700
BN 540	1055.420	23.240
BN 550	1055.280	23.380
BN 560	1054.970	23.690
BN 570	1054.760	23.900
BN 580	1054.490	24.170
BN 590	1054.680	23.980
BN 600	1054.660	24.000
BN 610	1054.640	24.020
BN 620	1053.900	24.760
BN 630	1053.385	25.275
BN 640	1053.355	25.305

CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 650	1053.320	25.340
BN 660	1052.865	25.795
BN 670	1052.640	26.020
BN 680	1052.625	26.035
BN 690	1052.595	26.065
BN 700	1052.390	26.270
BN 710	1052.370	26.290
BN 720	1052.310	26.350
BN 730	1051.895	26.765

TABLE OF STRUCTURES

STRUCTURE NUMBER	CROSS SECTION NUMBER	STRUCTURE LABEL
S3	BN 710	MERIVALE BRIDGE
S4	BN 680	WILLIAM JOLLY BRIDGE
S5	BN 640	VICTORIA BRIDGE
S6	BN 600	CAPTAIN COOK BRIDGE
S7	BN 495	STOREY BRIDGE

LEGEND

BN10	SURVEYED CROSS SECTION
(S1)	STRUCTURE NUMBER
3km	AMTD LINE

0 0.25 0.5 0.75 1.0 1.25 km

FILE NAME: 06[illegible]
PLOT SCALE: 1:25
Dwg no: D:\[illegible]BRISBANE : T06[illegible]
Date: 14/[illegible]

FIGURE 6.1d

BRISBANE RIVER FLOOD STUDY

MIKE 11 MODEL STRUCTURE

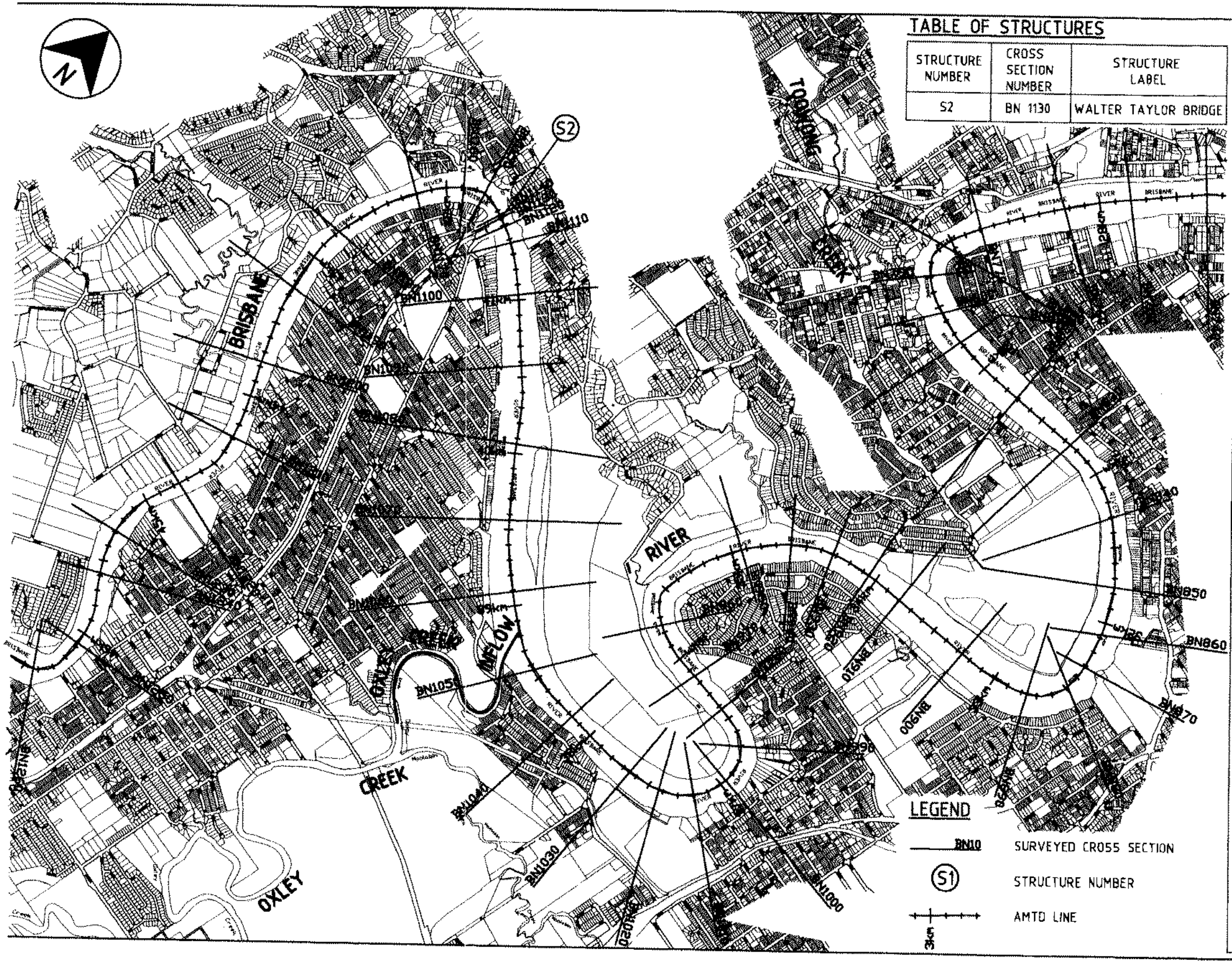


TABLE OF STRUCTURES

STRUCTURE NUMBER	CROSS SECTION NUMBER	STRUCTURE LABEL
S2	BN 1130	WALTER TAYLOR BRIDGE

CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 740	1051.360	27.300
BN 750	1050.860	27.800
BN 760	1050.430	28.230
BN 770	1049.870	28.790
BN 780	1049.590	29.070
BN 790	1049.370	29.290
BN 800	1049.120	29.540
BN 810	1048.890	29.770
BN 820	1048.375	30.285
BN 830	1047.915	30.745
BN 840	1047.350	31.310
BN 850	1046.900	31.760
BN 860	1046.580	32.080
BN 870	1046.340	32.320
BN 880	1046.180	32.480
BN 890	1045.885	32.775
BN 900	1045.400	33.260
BN 910	1044.860	33.800
BN 920	1044.605	34.055
BN 930	1044.340	34.320
BN 940	1044.060	34.600
BN 950	1043.725	34.935
BN 960	1042.910	35.750
BN 970	1042.515	36.145
BN 980	1042.235	36.425
BN 990	1041.960	36.700
BN 1000	1041.700	36.960
BN 1010	1041.460	37.200
BN 1020	1041.230	37.430
BN 1030	1041.010	37.650
BN 1040	1040.490	38.170
BN 1050	1040.090	38.570
BN 1060	1039.565	39.095
BN 1070	1039.100	39.560
BN 1080	1038.600	40.060
BN 1090	1038.085	40.575
BN 1100	1037.625	41.035
BN 1110	1037.285	41.375
BN 1120	1037.175	41.485
BN 1130	1037.110	41.550
BN 1140	1037.090	41.570
BN 1150	1036.915	41.745
BN 1160	1036.770	41.890
BN 1170	1036.460	42.200
BN 1180	1035.900	42.760
BN 1190	1035.414	43.246
BN 1200	1034.890	43.770
BN 1210	1034.370	44.290
BN 1220	1033.900	44.760
BN 1230	1033.370	45.290
BN 1240	1033.080	45.580
BN 1250	1032.585	46.075
BN 1260	1032.230	46.430

LEGEND

BN10	SURVEYED CROSS SECTION
(S1)	STRUCTURE NUMBER
3km	AMTD LINE

FILE NAME: 04[illegible] DISK N°: D:\[illegible]\BRISBANE N°: TOU4.57 DATE: 16/3/97
PLOT SCALE: 1:25

FIGURE 6.1e
BRISBANE RIVER FLOOD STUDY
MIKE 11 MODEL STRUCTURE

CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 1260	1032.230	46.430
BN 1270	1031.995	46.665
BN 1280	1031.700	46.960
BN 1290	1031.260	47.400
BN 1300	1030.870	47.790
BN 1310	1030.220	48.440
BN 1320	1029.680	48.980
BN 1330	1029.200	49.460
BN 1340	1028.760	49.900
BN 1350	1028.720	49.940
BN 1360	1028.680	49.980
BN 1370	1028.180	50.480
BN 1380	1027.680	50.980
BN 1390	1027.160	51.500
BN 1400	1026.900	51.760
BN 1410	1026.680	51.980
BN 1420	1026.170	52.490
BN 1430	1025.590	53.070
BN 1440	1025.360	53.300
BN 1450	1025.070	53.590
BN 1460	1024.563	54.097
BN 1470	1024.080	54.580
BN 1480	1023.570	55.090
BN 1490	1023.040	55.620
BN 1500	1022.575	56.085
BN 1510	1022.105	56.555
BN 1520	1021.895	56.765
BN 1530	1021.715	56.945
BN 1540	1021.539	57.121
BN 1550	1021.095	57.565
BN 1560	1020.830	57.830
BN 1570	1020.525	58.135
BN 1580	1020.115	58.545
BN 1590	1019.865	58.795
BN 1600	1019.490	59.170

TABLE OF STRUCTURES

STRUCTURE NUMBER	CROSS SECTION NUMBER	STRUCTURE LABEL
S1	BN 1350	CENTENARY BRIDGE

LEGEND

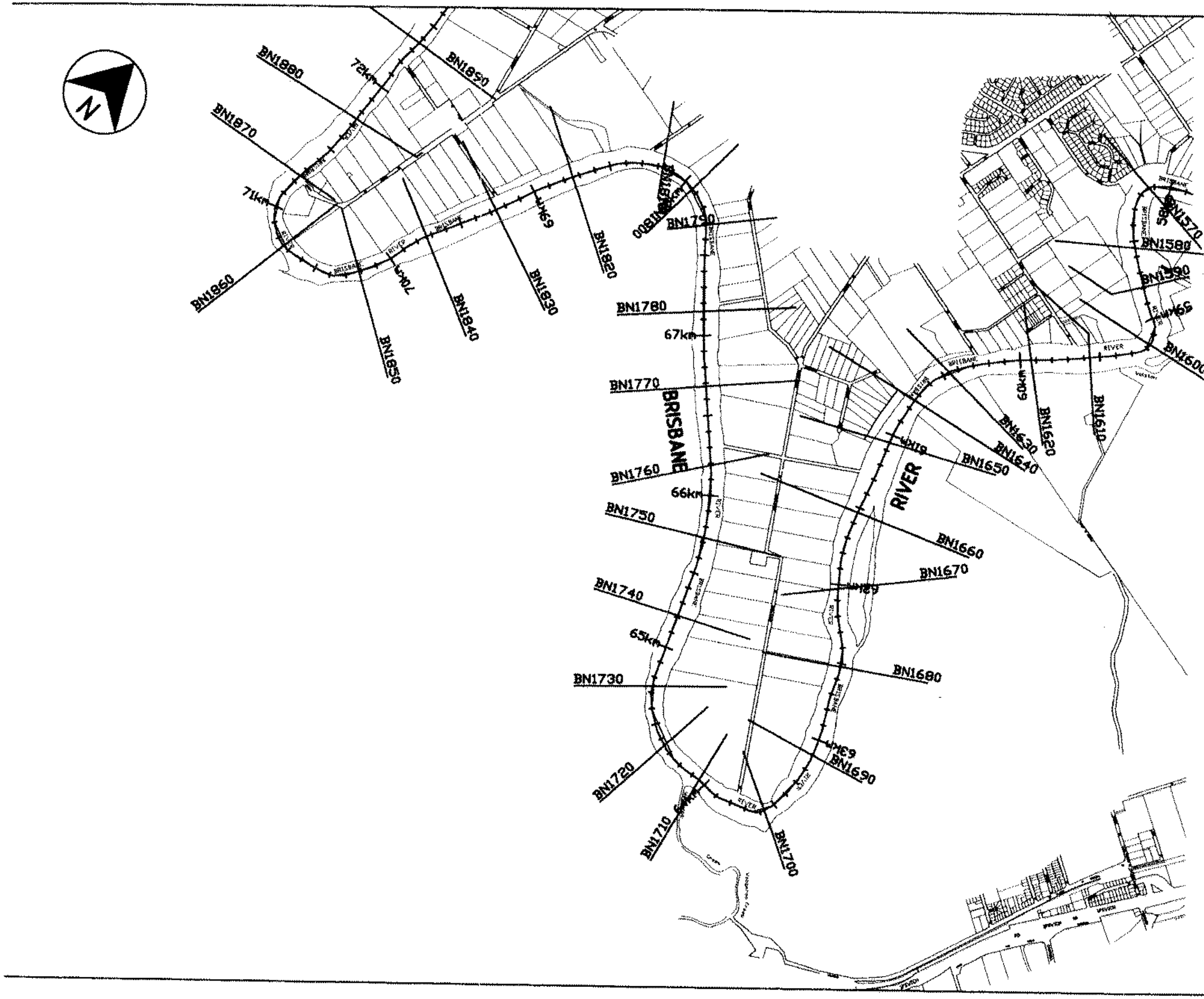
BN10	SURVEYED CROSS SECTION
(S1)	STRUCTURE NUMBER
3km	AMTD LINE

0 0.25 0.5 0.75 1.0 1.25 km

PLOT SCALE 1:25

FIGURE 6.1f

BRISBANE RIVER FLOOD STUDY
MIKE 11 MODEL STRUCTURE



CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 1600	1019.490	59.170
BN 1610	1019.095	59.565
BN 1620	1018.725	59.935
BN 1630	1018.200	60.460
BN 1640	1017.920	60.740
BN 1650	1017.610	61.050
BN 1660	1017.130	61.530
BN 1670	1016.640	62.020
BN 1680	1016.140	62.520
BN 1690	1015.560	63.100
BN 1700	1015.090	63.570
BN 1710	1014.610	64.050
BN 1720	1014.310	64.350
BN 1730	1013.910	64.750
BN 1740	1013.445	65.215
BN 1750	1012.935	65.725
BN 1760	1012.475	66.185
BN 1770	1011.980	66.680
BN 1780	1011.510	67.150
BN 1790	1010.980	67.680
BN 1800	1010.725	67.935
BN 1810	1010.490	68.170
BN 1820	1009.720	68.940
BN 1830	1009.400	69.260
BN 1840	1008.925	69.735
BN 1850	1008.445	70.215
BN 1860	1007.920	70.740
BN 1870	1007.410	71.250
BN 1880	1006.910	71.750

LEGEND

BN10	SURVEYED CROSS SECTION
(S1)	STRUCTURE NUMBER
3km	AMTD LINE

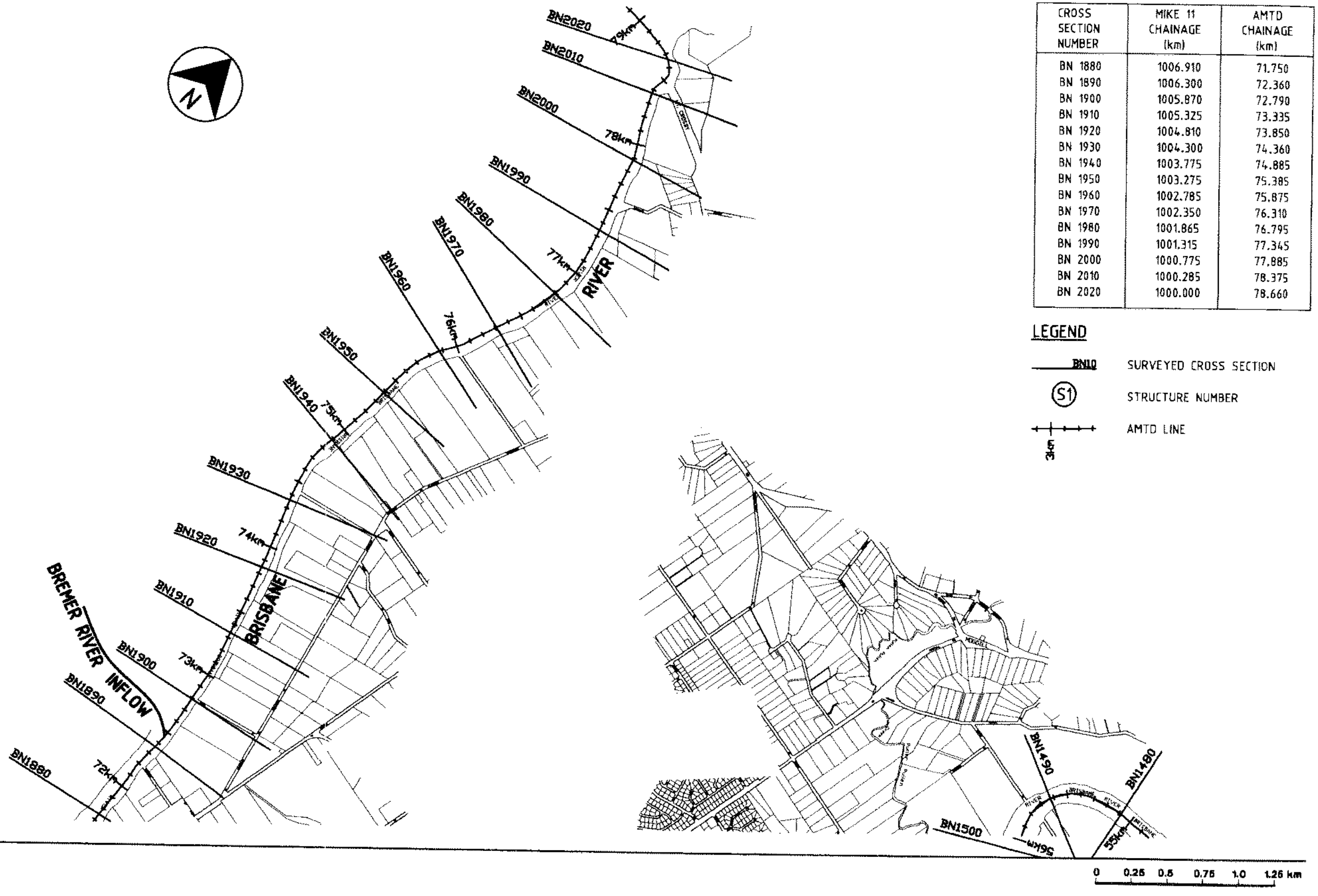
0 0.25 0.5 0.75 1.0 1.25 km

FIGURE 6.1g

BRISBANE RIVER FLOOD STUDY

MIKE 11 MODEL STRUCTURE

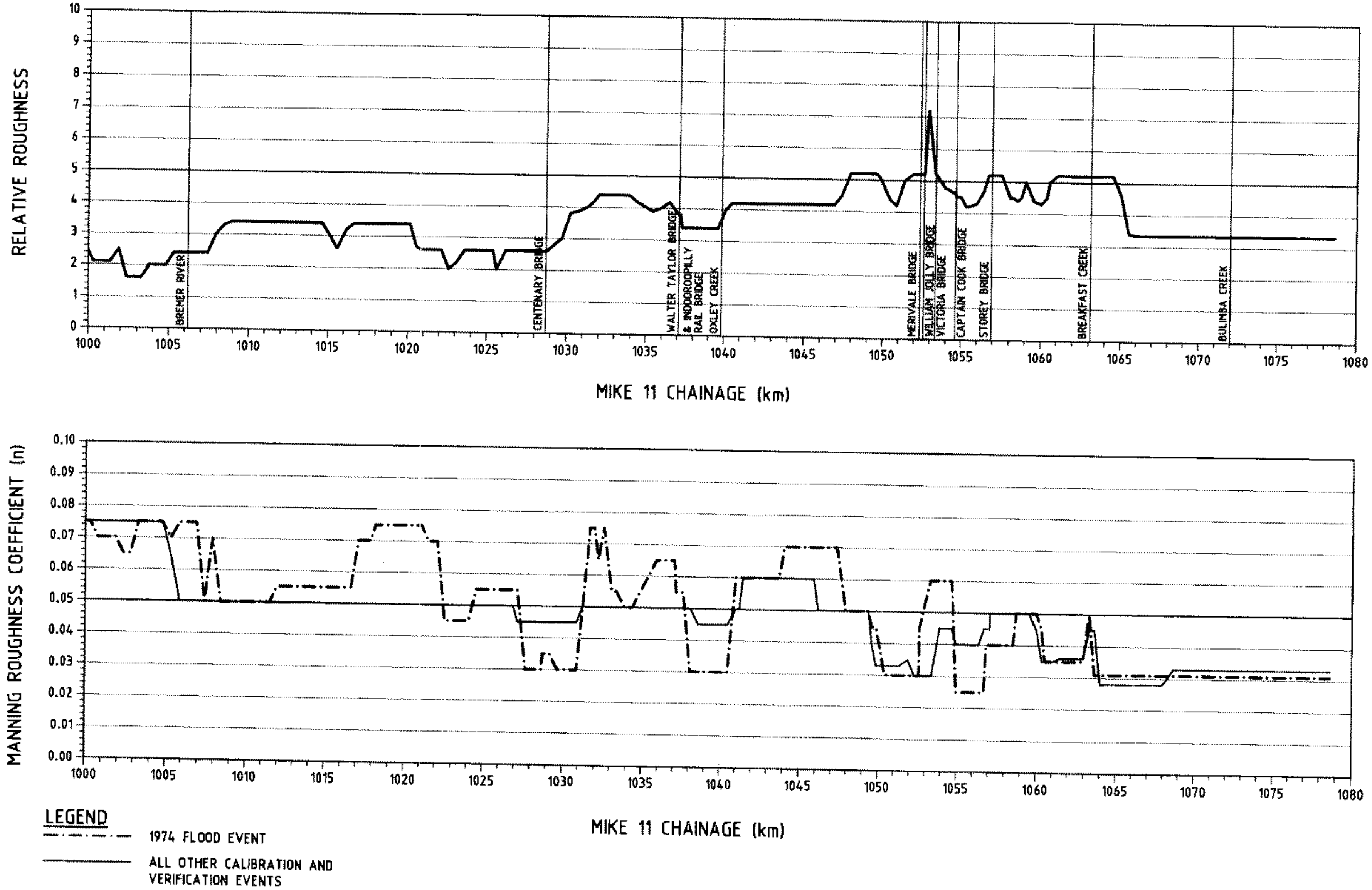
CROSS SECTION NUMBER	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)
BN 1880	1006.910	71.750
BN 1890	1006.300	72.360
BN 1900	1005.870	72.790
BN 1910	1005.325	73.335
BN 1920	1004.810	73.850
BN 1930	1004.300	74.360
BN 1940	1003.775	74.885
BN 1950	1003.275	75.385
BN 1960	1002.785	75.875
BN 1970	1002.350	76.310
BN 1980	1001.865	76.795
BN 1990	1001.315	77.345
BN 2000	1000.775	77.885
BN 2010	1000.285	78.375
BN 2020	1000.000	78.660



PLOT SCALE: 1=25

FIGURE 6.2

BRISBANE RIVER FLOOD STUDY
MANNINGS HYDRAULIC MODEL CHANNEL ROUGHNESS
AND RELATIVE RESISTANCE VALUES



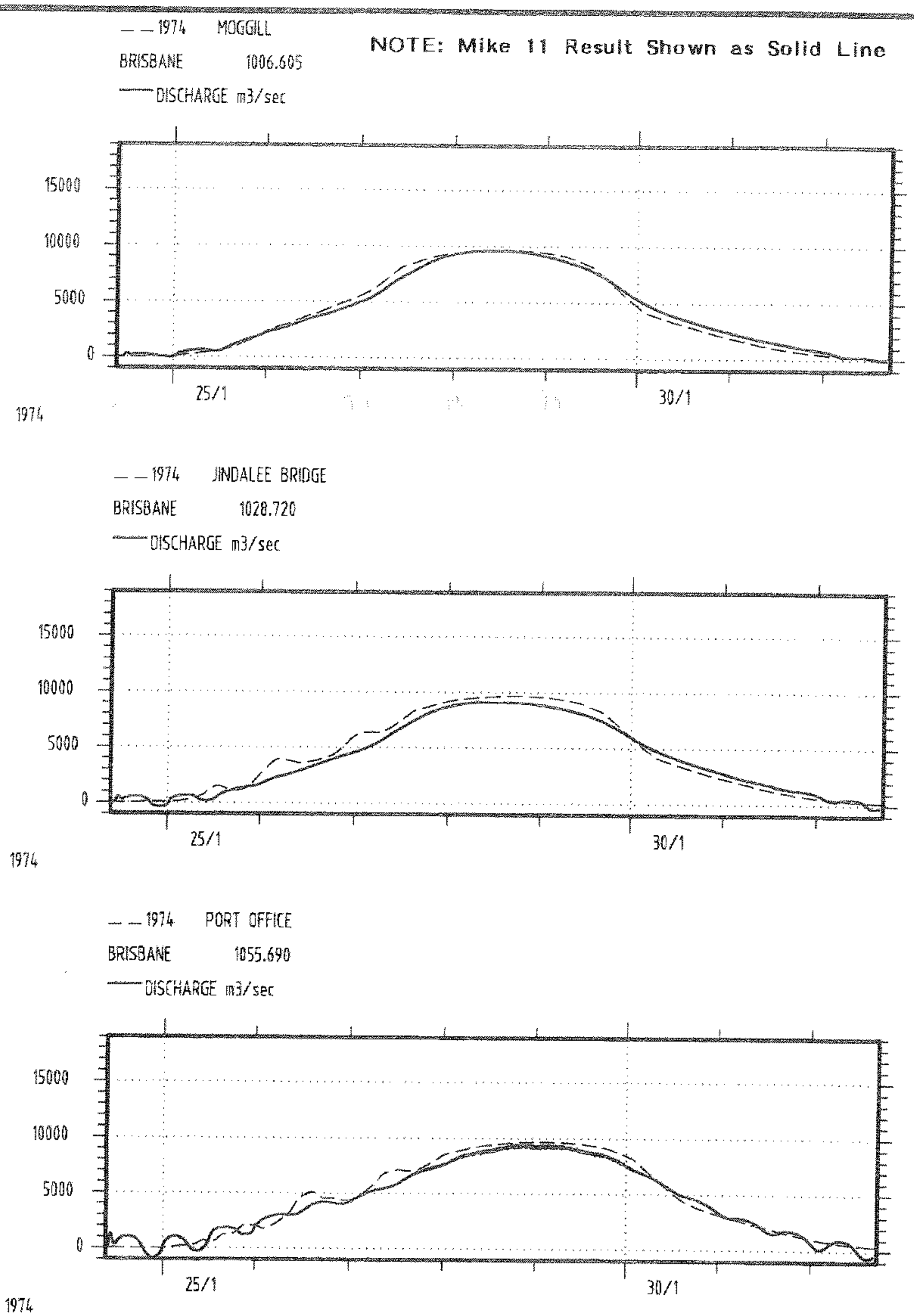
PLOT SCALE 1:250

SINCLAIR KNIGHT MERZ

FIGURE 6-3

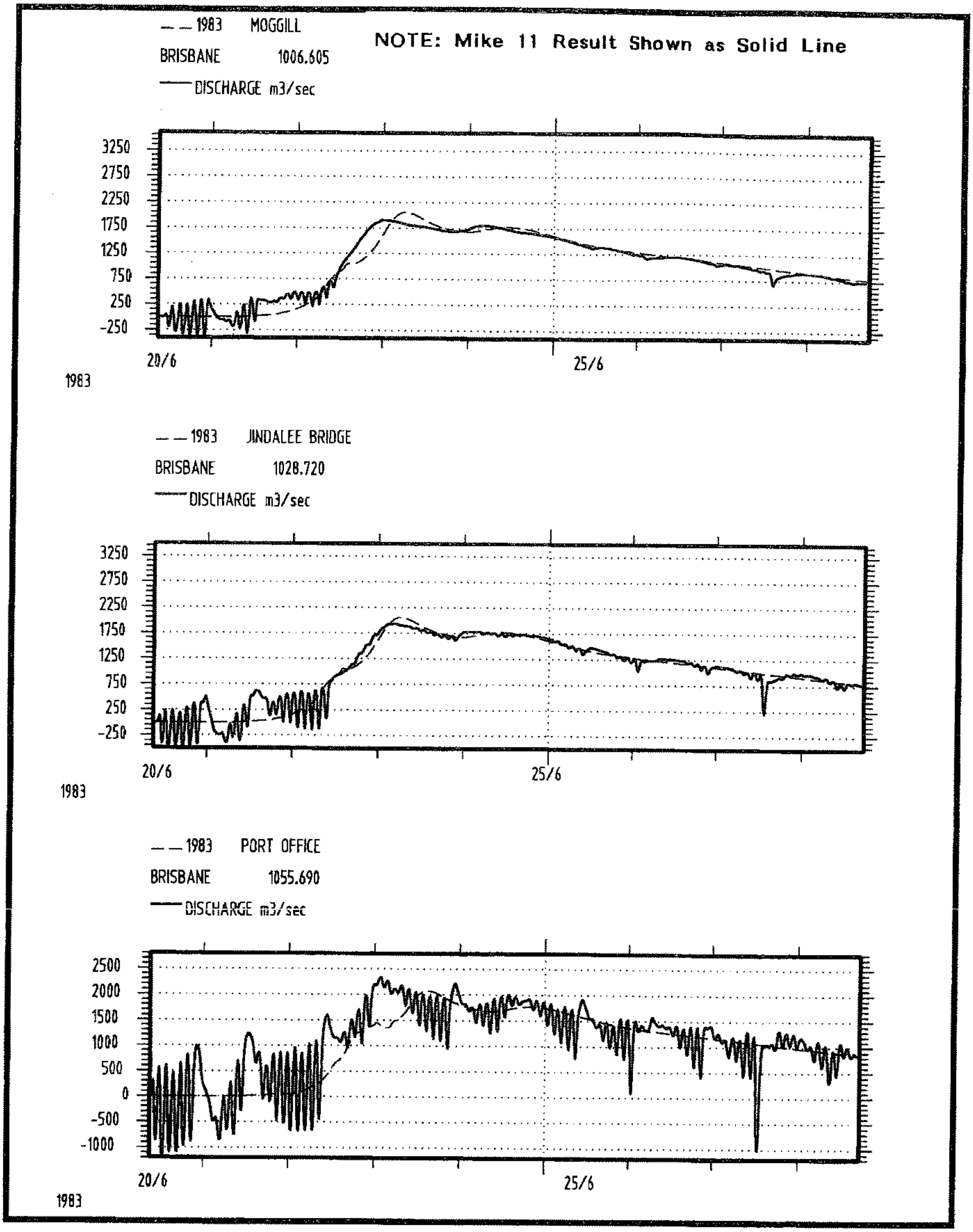
BRISBANE RIVER FLOOD STUDY
HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY
- JANUARY 1974

NOTE: Mike 11 Result Shown as Solid Line



FILE NAME: 4157-222 DISK N°: G:\ JOB N°: T00457 17-2-98
PLOT SCALE: 1:1

FIGURE 6-4
BRISBANE RIVER FLOOD STUDY
HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - JUNE 1983


NOTE: Mike 11 Result Shown as Solid Line

FILE NAME: 4157-223 PL.. SCALE: ..
DISK N°: G:\
JOB N°: T004157
17-7-98

FIGURE 6-5

BRISBANE RIVER FLOOD STUDY
HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY
- LATE APRIL 1989

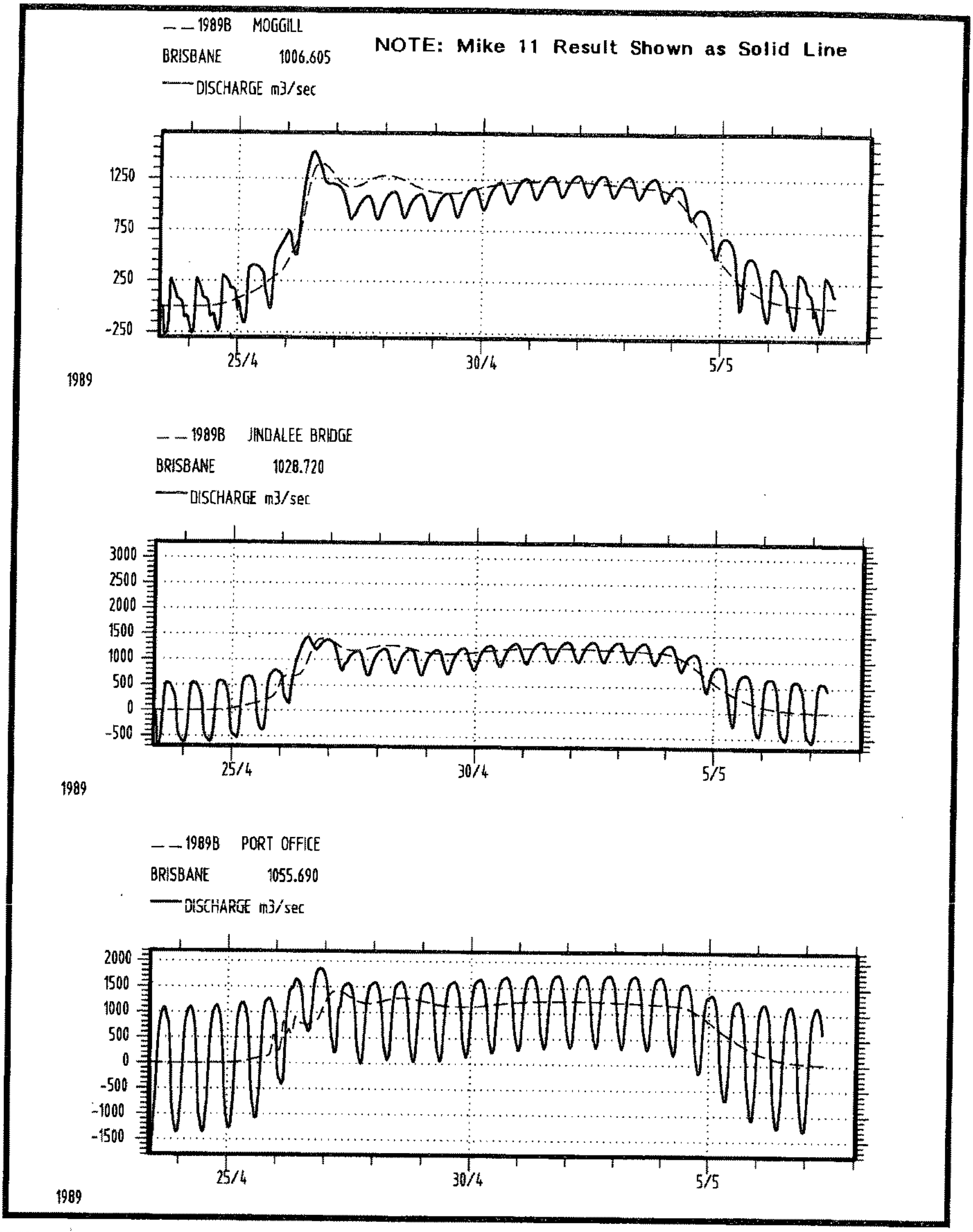
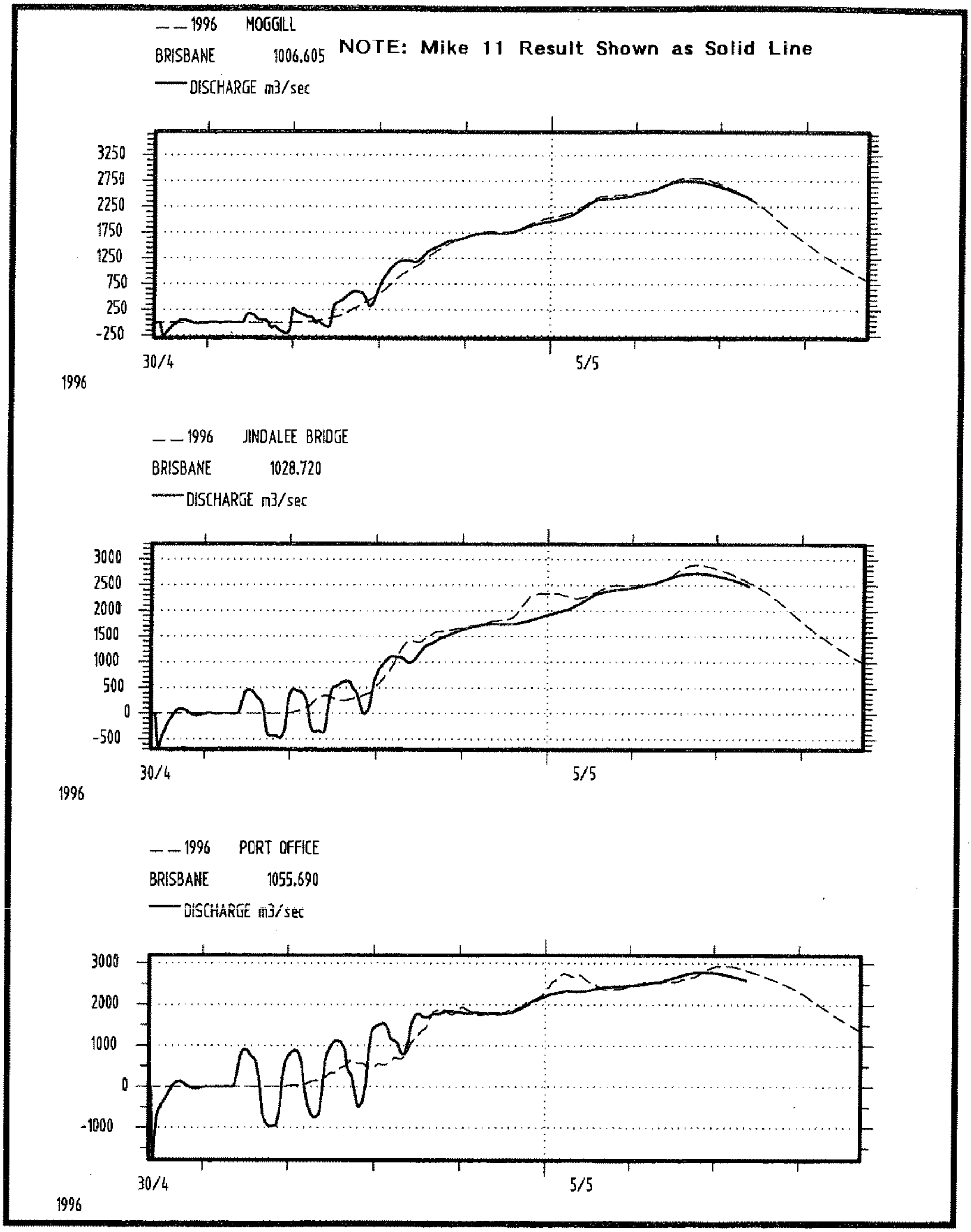


FIGURE 6-6

SINCLAIR KNIGHT MERZ

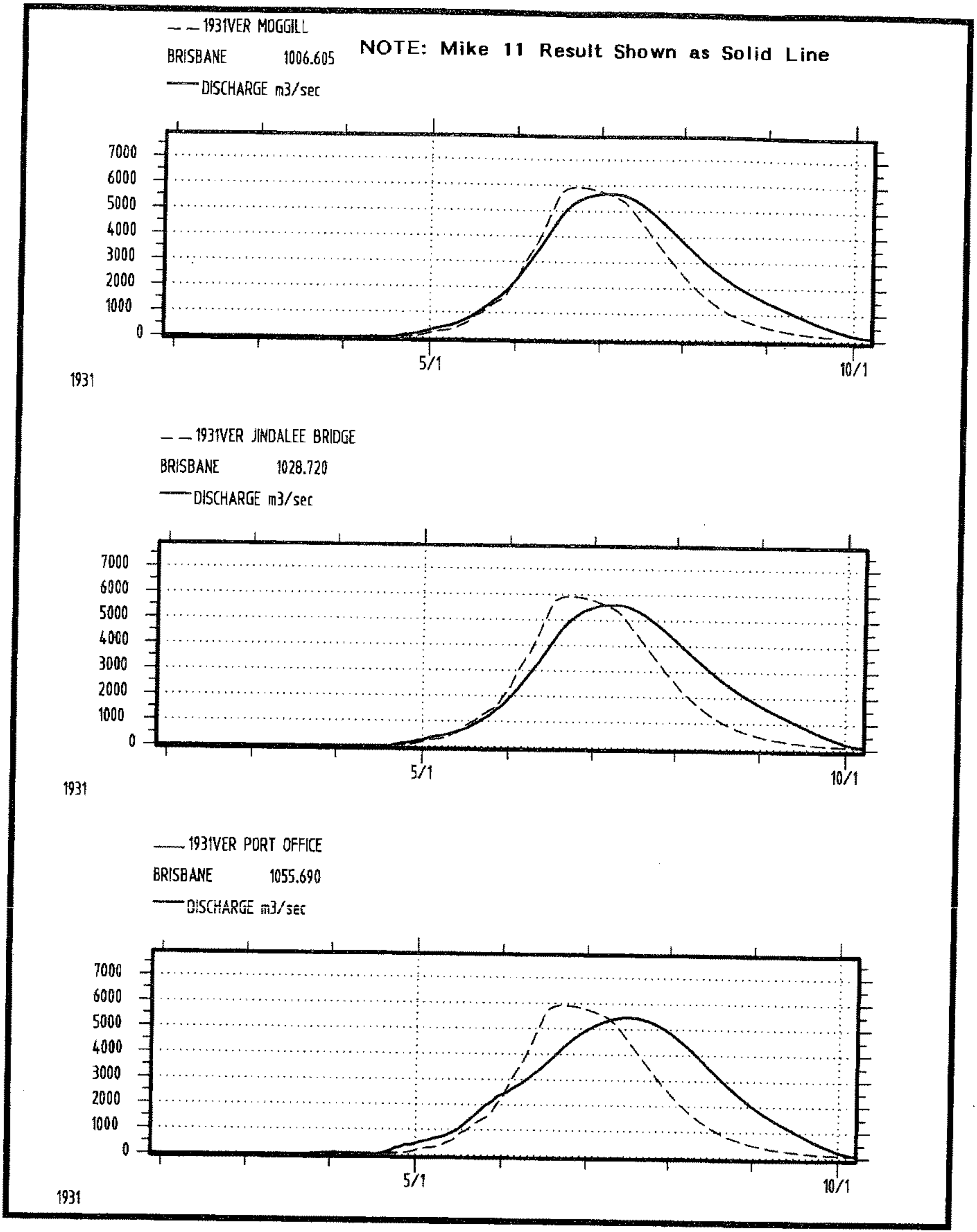
BRISBANE RIVER FLOOD STUDY
HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY
- MAY 1996



FILE NAME: 4157-225 PLOT SCALE: 1=1 DISK No: G:\ JOB No: T0?157 17-?-98

FIGURE 6-7

BRISBANE RIVER FLOOD STUDY
HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY
- FEBRUARY 1931



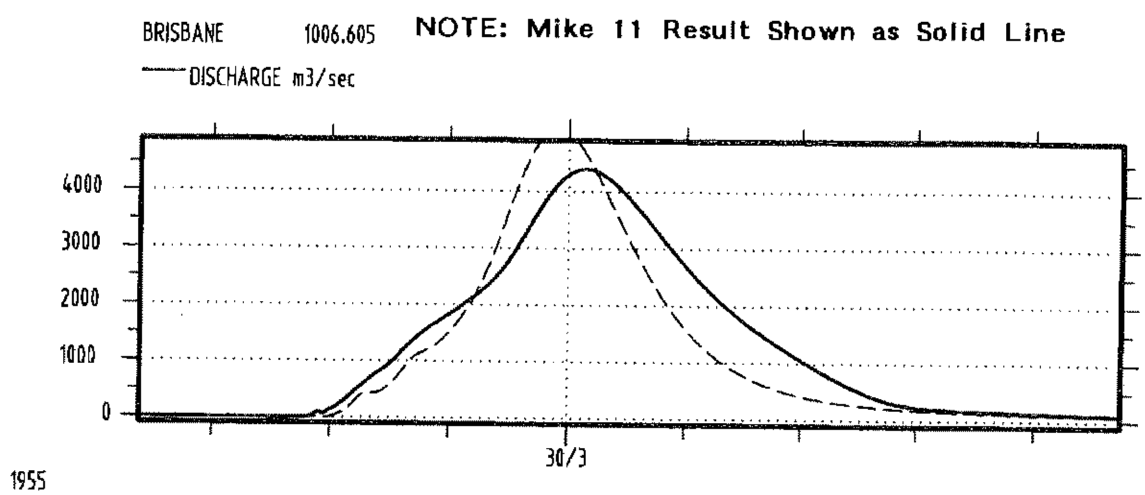
NOTE: Mike 11 Result Shown as Solid Line

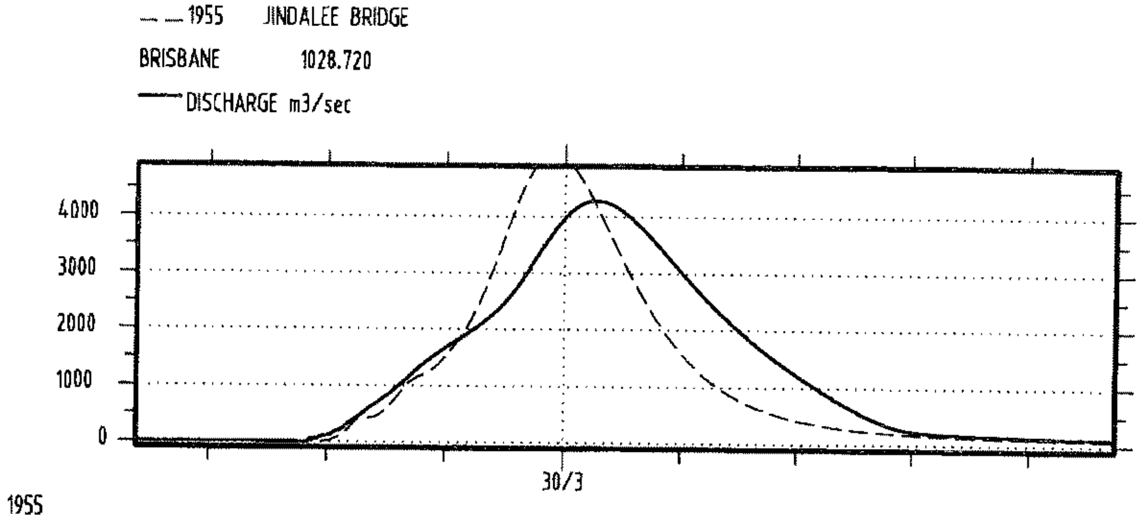
FILE NAME: 4157-226
P CALE:
DISK N°: G:\
JOB N°: T004157
17-7-98

FIGURE 6-8

BRISBANE RIVER FLOOD STUDY
HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY
- MARCH 1955

NOTE: Mike 11 Result Shown as Solid Line





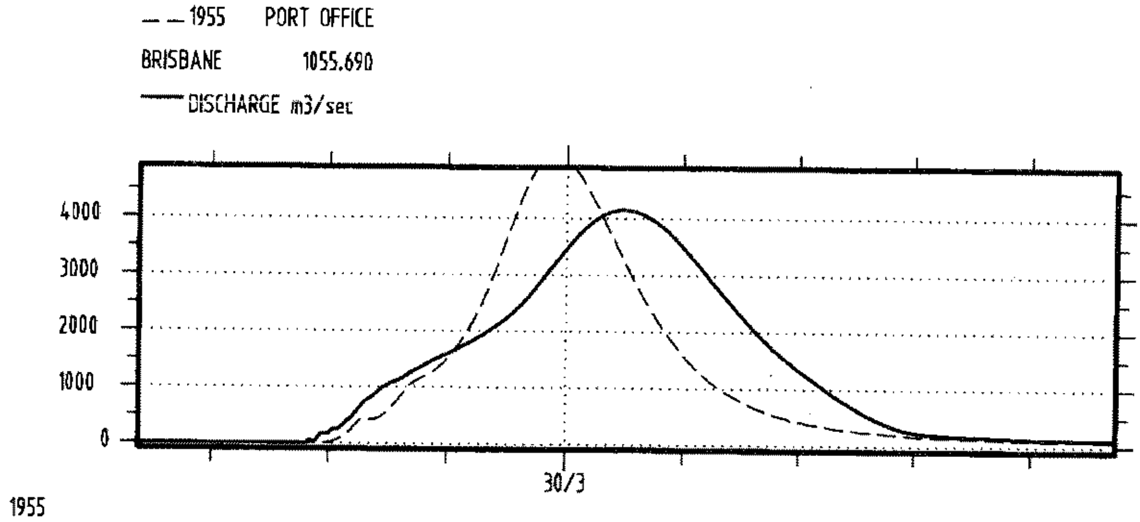
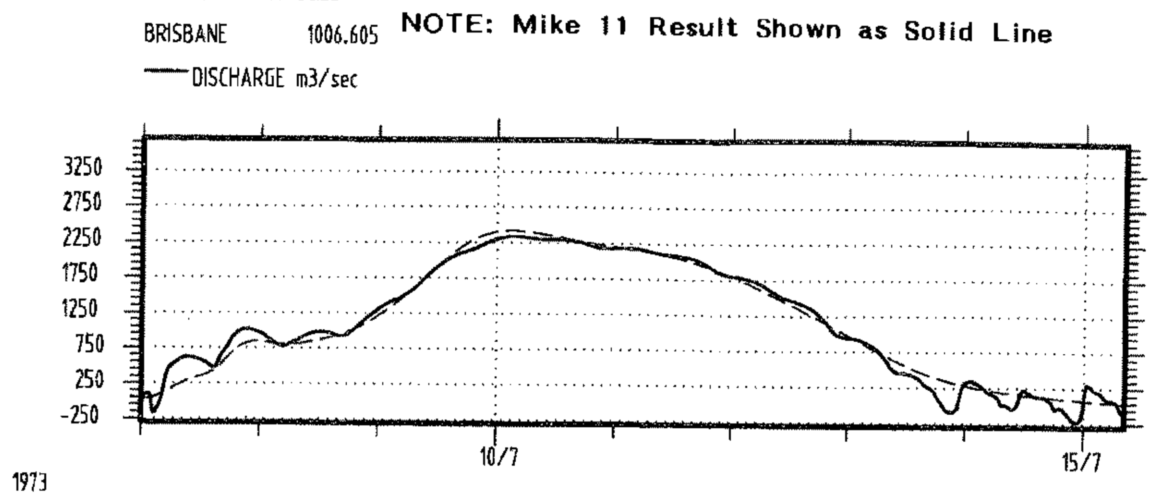


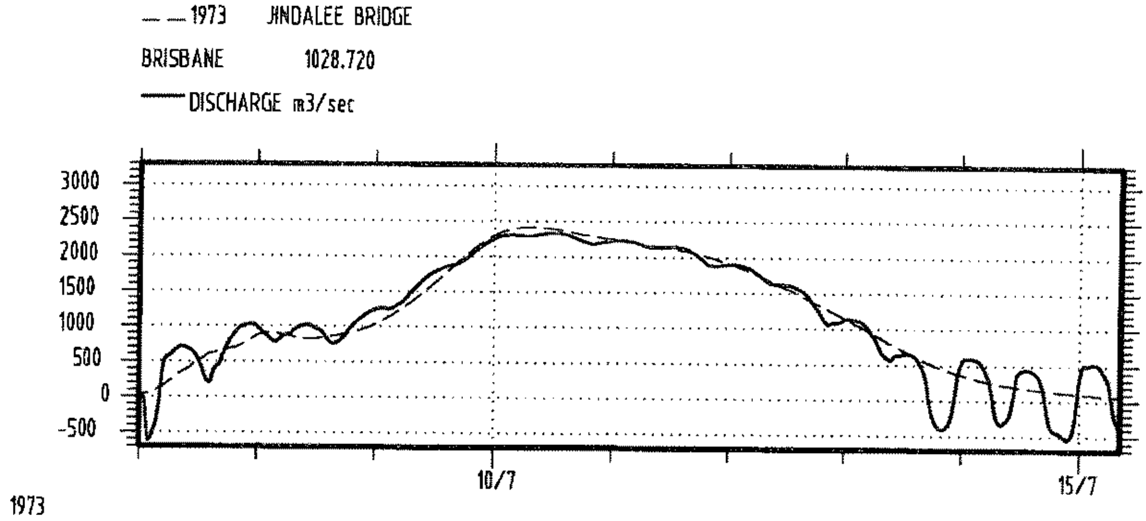
FIGURE 6-9

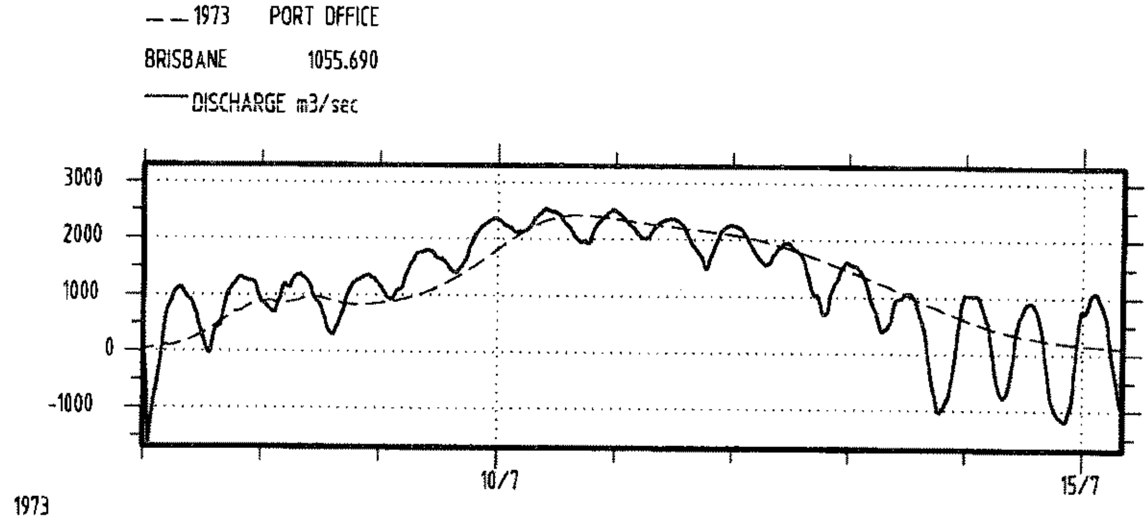
BRISBANE RIVER FLOOD STUDY
HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY
- JULY 1973

SINCLAIR KNIGHT MERZ

NOTE: Mike 11 Result Shown as Solid Line





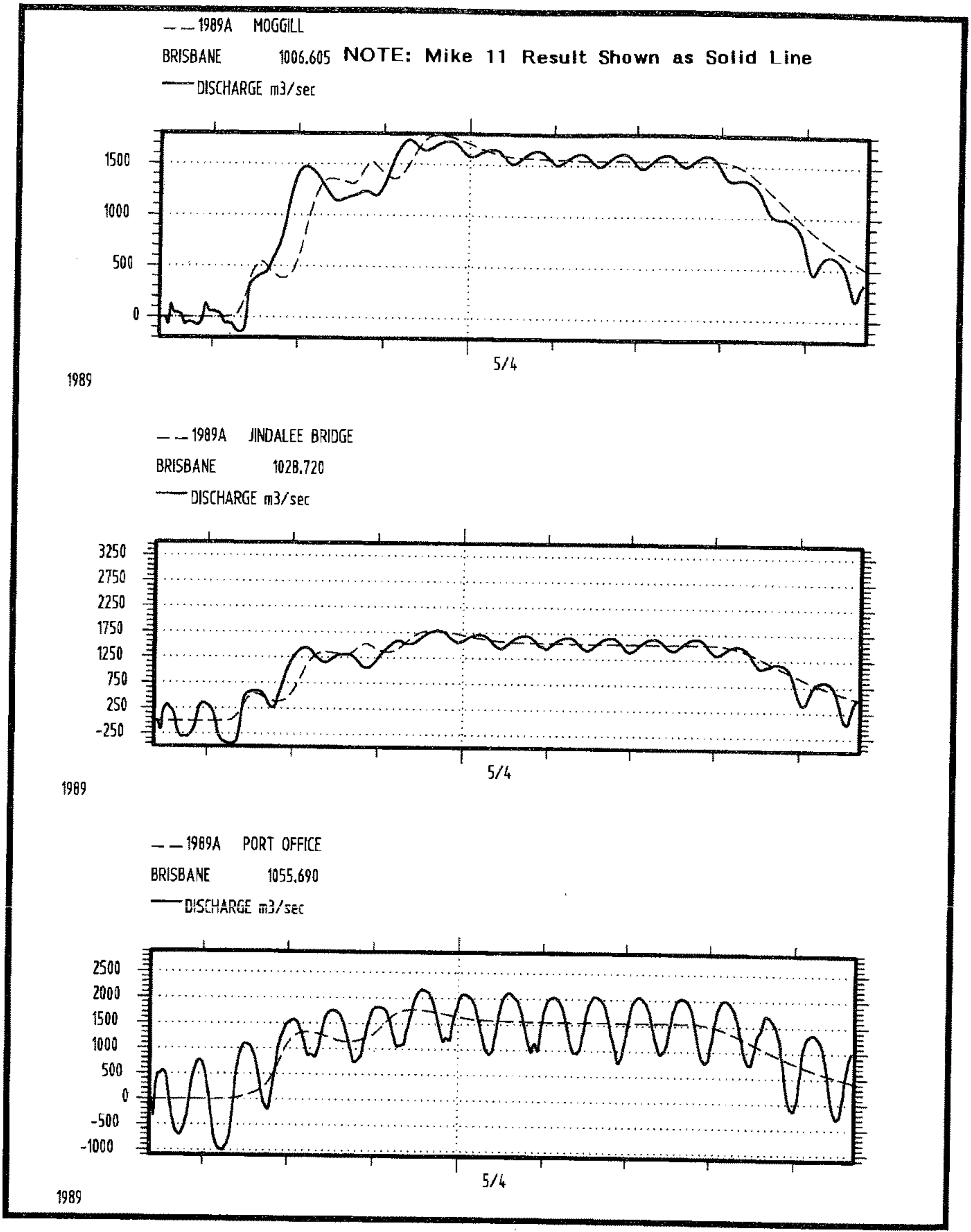


FILE NAME: 4157-228 DISK N°: G:\ JOB N°: T004157 : 17-7-98
PL... SCALE: ...

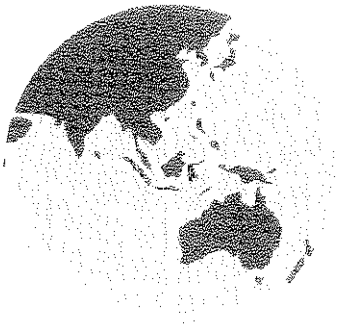
SINCLAIR KNIGHT MERZ

FIGURE 6-10

BRISBANE RIVER FLOOD STUDY
HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - EARLY APRIL 1989



PLOT SCALE: 1:1



7. Design Events Hydrology

7. Design Events Hydrology

7.1 Design Storm Requirements

An analysis of design storm events was performed to establish design flood characteristics in the Brisbane River. A range of average recurrence intervals (ARI) from 1 in 2 years ARI to the Probable Maximum Precipitation (PMP) were assessed. Temporal patterns and rainfall intensities were based on Australian Rainfall and Runoff (1987) guidelines and hydrologic data supplied by the Department of Natural Resources.

This assessment considers only the existing extent of urbanisation for the Brisbane River Catchment.

7.2 Catchment Urbanisation

The majority of the Brisbane River Catchment was considered to be rural and was therefore allocated a zero percent impervious. In the Brisbane Metropolitan area the assumed percentage impervious varied from 20 to 50% to account for the catchment urbanisation.

The potential effect of urbanisation in the middle and upper reaches of the river even in the long term is likely to be negligible. However, there is potential for significant urbanisation in the lower reaches of the river. Future urbanisation in Brisbane and surrounding areas would cause the peak runoff from these areas to occur earlier than at present. As the time of concentration of the Brisbane River as a whole is large compared to that of the urban areas of Brisbane, it is slightly conservative to retain the present level of urbanisation rather than the potential ultimate level.

7.3 Design Event Rainfall

Design Event rainfall data was required to determine inflow hydrographs for the calculation of flood profiles in the Brisbane River. The distribution of rainfall over the catchment for the calibration events identified that significant variations of rainfall occurred over the catchment. This variation in rainfall was attributed to the size and topography of the catchment.

Design rainfall intensities were derived using Intensity-Frequency-Duration (IFD) techniques used in Chapter 2 of Australian Rainfall and Runoff 1987 (AR&R). Design rainfall intensities were derived at 130 rainfall gauge locations throughout the catchment to account for the variation of rainfall. Isoheytal maps for the catchment were derived for recurrence intervals ranging from 2 year ARI to 100 Year ARI using CivilCAD and the calculated design rainfalls.

The following figures present Isoheytal maps and rainfall depths for critical duration storms ranging from 2 year ARI to 100 year ARI.

- ☐ **Figure 7-1 - 2 Year ARI 30 Hour Duration Rainfall Event - Brisbane River Catchment.**
- ☐ **Figure 7-2 - 5 Year ARI 30 Hour Duration Rainfall Event - Brisbane River Catchment.**
- ☐ **Figure 7-3 - 10 Year ARI 30 Hour Duration Rainfall Event - Brisbane River Catchment.**
- ☐ **Figure 7-4 - 20 Year ARI 30 Hour Duration Rainfall Event - Brisbane River Catchment.**
- ☐ **Figure 7-5 - 50 Year ARI 30 Hour Duration Rainfall Event - Brisbane River Catchment.**
- ☐ **Figure 7-6 - 100 Year ARI 30 Hour Duration Rainfall Event - Brisbane River Catchment.**

For large catchments it is unlikely that rainfall intensity will remain constant across the catchment. To account for this variation, AR&R suggests use of an areal reduction factor which reduces the depth of rainfall over the catchment.

The problem with this method is that the areal reduction factor method presented in AR&R is based on work conducted in the United States and virtually no work has been conducted for durations greater than 24 hours or catchments with areas greater than 1 000 km^2.

Since the Brisbane River Catchment is approximately 13 500 km^2 and has a critical duration of approximately 24 hours it was considered that spatial variation would have to be accounted for using an alternate method.

As previously stated design rainfalls were calculated at approximately 130 locations over the entire catchment. These rainfalls were then used to calculate rainfall depths at the centroid of each sub-area (ie approximately 250 locations) using interpolation facilities within CIVILCAD. This method ensured that the majority of rainfall variation was accounted for by a blanket coverage of the catchment which in turn minimised the effects of rainfall variation.

Given that the total catchment area of the Brisbane River is approximately 13 500 km^2 and that this area has been broken down into about 250 sub areas, then the average sub area is around 50 km^2. The areal reduction factor for an area of 50 km^2 (24 hour duration) was determined to be 0.98. Since the areal reduction factor was almost equal to one, areal reduction factors were not applied to any of the sub-areas. The rainfall intensities used in this study are therefore considered to be slightly conservative.

Australian Rainfall and Runoff temporal patterns for zone 3 apply to the Brisbane River Catchment.

The Probable Maximum Precipitation (PMP) rainfall depth and corresponding temporal pattern were provided by the Bureau of Meteorology for the DNR study. The adopted PMP rainfall depth for the Brisbane River Catchment is presented in **Table 7-1 - PMP Rainfall Depth, Brisbane River Catchment.**

Table 7-1 - PMP Rainfall Depth - Brisbane River Catchment

Duration	PMP Rainfall Depth
12	370
24	530
48	680
72	830
96	1010
120	1050
144	1070
168	1160

Review of the relevant reports and files suggested that PMP investigations conducted by the Department of Natural Resources used the total PMP rainfall depth over the entire catchment. This method provides a conservative result which may be applicable when considering dam safety. For this study spatial variation was accounted for by use of **Figure D-1 - Generalised Tropical Storm Method (GTSM) Design Isohyetal Pattern for the Distribution of PMP for Areas > 2 000 km^2**. The procedural method for the GTSM is also provided in **Appendix D - Generalised Tropical Storm Method.**

An analysis to determine the critical duration PMP rainfall event was performed. The critical duration storm for the PMP was found to be 168 hours. Peak discharges for the durations ranging from 24 hour to 168 hour storms are presented in **Table 7-2 - Peak Discharges for PMP at Lowood, Moggill & Port Office**. A plot of these results are presented in **Figure 7-7 - Critical Duration Storms at Lowood, Moggill & Port Office.**

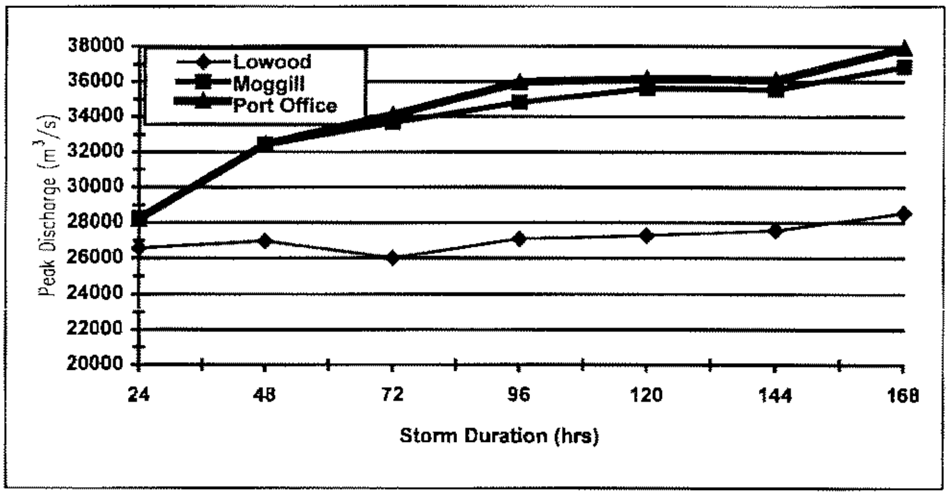
Table 7-2 - Peak Discharges for PMP at Lowood, Moggill & Port Office

Duration (hrs)	Lowood (m^3/s)	Moggill (m^3/s)	Port Office (m^3/s)
24	26580	28230	28230
48	26980	32410	32430
72	26020	33680	34130
96	27100	34830	35960
120a	27290	35620	36160
144a	27580	35570	36110
168c	28560	36860	37910

Note: The subscripts for the 120, 144 and 168 hour duration storms relate to the adopted temporal pattern which produced the peak discharge.

As previously mentioned the critical storm duration for the PMP event was 168 hours with only six percent variation in peak discharges predicted for the range of longer durations from 96 hours to 168 hours. As there was a significant difference between the critical durations found for the 100 year ARI and PMP events, a number of checks were conducted to ensure basic data had been interpreted and applied correctly.

Figure 7-7 - Critical Duration Storms at Lowood, Moggill & Port Office



The average intensities for each PMP duration were examined to ensure that the average rainfall intensity decreased as the storm duration increased.

The maximum rainfall intensity within each duration was checked to make sure that the temporal pattern was reasonably uniform without any uncharacteristic high intensities contained throughout the duration of the rainfall event.

A final check of sensitivity of time increment within the duration was conducted. This made little difference to the peak discharges and therefore it was considered that the effects of time increment were negligible.

The RAFTS model output for these events showed that the larger volumes of water associated with longer duration events caused peak discharges to occur over a longer period of time which resulted in the coincidence of peak discharges at major confluences. Conversely, the coincident peak effects for the shorter duration events were not as pronounced hence resulting in smaller peak discharges for the shorter duration storms.

Previous investigations conducted by the Department of Natural Resources found that the critical duration storm for the PMP was 120 hours and the critical duration storm for the 100 year ARI event was 24 hours. As the DNR found that there was significant differences in duration between the two recurrence intervals, it was considered that this was inherent of the catchment configuration and the rainfall variability in the catchment and the 168 hour event was adopted as the critical duration storm for the PMP event for this study. Initial and continuing losses have been applied which is consistent with the parameter set used for the 100 year ARI storm. Investigations carried out by the DNR used a continuing loss rate of 2.5 mm/hr and found that the peak discharge at the Port Office for the PMP was 31950 m^3/s. A continuing loss of 2.5 mm/hr was applied to the Sinclair Knight Merz model (120 hour storm) and the resulting peak discharge for the PMP at the Port Office was estimated to be 29960 m^3/s. This comparison shows that the Sinclair Knight Merz result is within 7% of the DNR result.

The adoption of the 168 hour duration storm for the PMP presented a problem in the calculation of the intermediate flood events if a rainfall based method was used. Since the critical duration of the PMP differed from the 100 year and 50 year ARI events, an extrapolation to 168 hours would have had to be done for the 100 and 50 year IFD curves. As no recognised methodology was available, the rainfall based calculation of intermediate events was not considered further.

An alternate method was to use peak discharges from the PMP, 100 year and 50 year ARI events using the methodology set down in Australian Rainfall and Runoff (AR&R). This method eliminated the problems associated with varying duration events. The intermediate events were calculated using this method at Lowood, Moggill and Port Office. The following figures illustrate the peak discharges with respect to recurrence interval at Lowood, Moggill and the Port Office.

☐ **Figure 7-8 - Design Peak Discharges at Lowood.**
☐ **Figure 7-9 - Design Peak Discharges at Moggill.**
☐ **Figure 7-10 - Design Peak Discharges at Port Office.**

It should be noted that the stage-storage and stage-discharge curves within RAFTS were extended to account for the larger design flood events. The extension of these curves was done assuming vertical banks and hence the only additional storage was confined to within the creek proper. The stage discharge curves were extended linearly following the general trend of the calibrated curves. These assumptions were considered to be a conservative estimate however given the available information (ie cross sectional and topograpical) these assumptions were considered to be appropriate.

The return period for the PMP was determined to be 100 000 years ARI using **Table 13.1 of AR&R**. This calculation was performed using the Generalised Method with a catchment area of approximately 13 500 km^2.

Figure 7-8 - Design Peak Discharges at Lowood

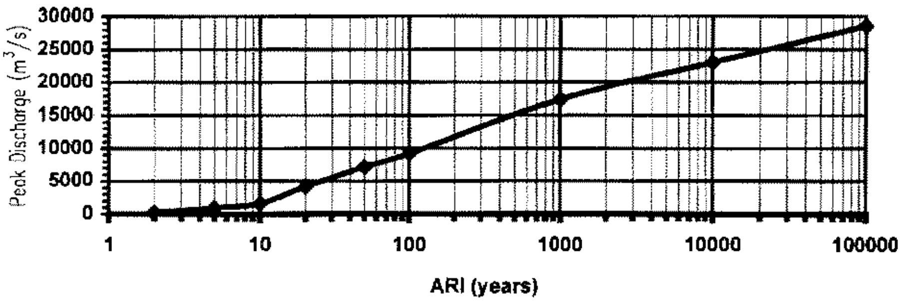


Figure 7-9 - Design Peak Discharges at Moggill

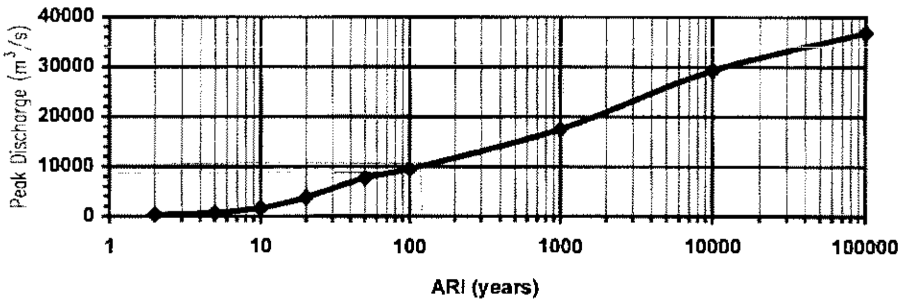
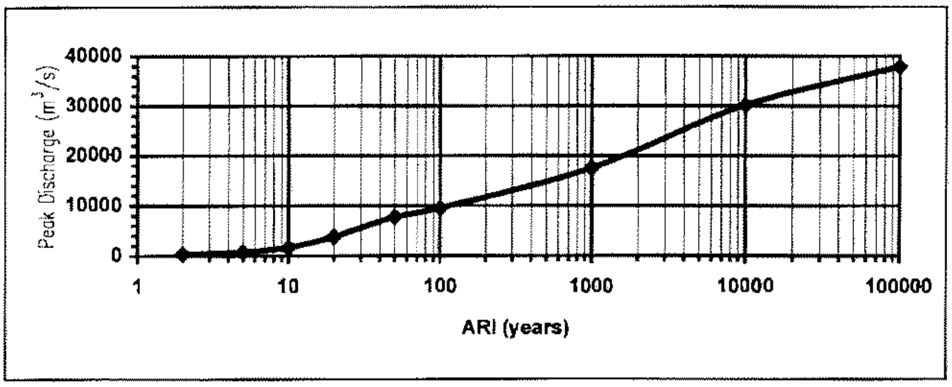


Figure 7-10 - Design Peak Discharges at Port Office



Once the peak discharges for these events were calculated, an average ratio was determined and the PMP rainfall depths were scaled and applied to the catchment. The 168 hour temporal pattern was adopted and the scaled intermediate storms were run through RAFTS. These scaling factors were adjusted for each recurrence interval until a good match between the AR&R peak calculated discharges and the peak RAFTS discharges was achieved. **Table 7-3 - Peak Predicted Discharges for the PMF, 10000, and 2000 Year ARI Events at Lowood, Moggill and Port Office** and **Table 7-4 Peak Predicted Discharges for the 1000, 500 and 200 Year ARI Events at Lowood, Moggill and Port Office** present the outcomes of this analysis.

Table 7-3 - Peak Predicted Discharges for the PMF, 10000 and 2000 Year ARI Events at Lowood, Moggill and Port Office

Location	PMF			10000 Year ARI			2000 Year ARI		
	Calc (m³/s)	RAFTS (m³/s)	% error	Calc (m³/s)	RAFTS (m³/s)	% error	Calc (m³/s)	RAFTS (m³/s)	% error
Lowood	-	28560	-	25090	23020	-8.3	18250	17880	-2.0
Moggill	-	36860	-	28140	29300	+4.1	18660	19490	+4.4
Port Office	-	37910	-	28640	30140	+5.2	18800	19500	+3.7

Table 7-4 - Peak Predicted Discharges for the 1000, 500, 200 Year ARI Events at Lowood, Moggill and Port Office

Location	1000 Year ARI			500 Year ARI			200 Year ARI		
	Calc (m^3/s)	RAFTS (m^3/s)	% error	Calc (m^3/s)	RAFTS (m^3/s)	% error	Calc (m^3/s)	RAFTS (m^3/s)	% error
Lowood	17400	16290	-6.4	12840	11600	-9.7	10100	9420	-6.7
Moggill	17480	17540	+0.4	13080	13910	+6.4	10440	10870	+4.1
Port Office	17580	17550	-0.2	13120	14020	+6.8	10450	10880	+4.1

Table 7-3 and 7-4 show that the calculated discharges are within 10% of the RAFTS predicted discharges at the three locations hence they were considered to be acceptable.

7.4 Flood Frequency Analysis

A flood frequency analysis was performed to ensure consistency between the rainfall and streamflow based estimates of design discharges. The analysis also produced appropriate rainfall loss rates to ensure consistency between the two analysis methods.

Flood frequency analyses were conducted at Moggill, Lowood and Brisbane City at the Port Office Gauge. The omission of Jindalee for the analyses was due to limited available historical information at the site.

The locations for the flood frequency analyses are presented in **Figure 7-11 - Flood Frequency Analysis Location Layout.**

7.5 Historical Data

Historical events were derived from streamflow data recorded at Bureau of Meteorology gauging stations for Brisbane City (Port Office gauge) and Moggill. This data was in the form of peak instantaneous water levels which were converted to discharges using rating curves provided by the Bureau of Meteorology. The data for Lowood was obtained from the Department of Natural Resources in the form of peak instantaneous monthly discharges.

The Brisbane City (Port Office) gauge is influenced by tidal fluctuations and hence rating curves at the Port Office gauge vary to account for the changing tidal conditions. To determine peak discharges during flooding, it was therefore necessary to know the corresponding tide level at the time and date for each event. This information was not available. Discharges were determined by using two rating curves supplied by the Bureau of Meteorology. These rating curves used the following tailwater levels:

(i) -0.15 m AHD, and
(ii) 1.85 m AHD (highest Astronomical Tide +0.15 m).

One of the problems associated with performing the flood frequency analysis for this catchment was the influence that Wivenhoe and Somerset Dams would have on the downstream locations. To minimise these effects the flood frequency analysis was performed using a data series prior to the construction of Wivenhoe Dam (1985).

To account for the effects of Somerset Dam (constructed in 1943), it was necessary to adjust the series of peak discharges. As the adopted data series ended prior to 1985, the effects of Wivenhoe Dam did not need to be considered. However, all data between 1943 and 1985 had to be adjusted to remove the effects of the construction of Somerset Dam.

In order to establish a relationship between the flow upstream of Somerset Dam and flow downstream of the dam site prior to its construction, peak monthly discharges obtained at Woodford (upstream) were plotted against the discharge at the Silverton Gauge (downstream), prior to 1943. A line of best fit was then formulated and a correlation of 91.5% was achieved. This correlation is graphically represented in **Figure E-1 - Relationship Between Discharges of Woodford and Silverton**. The data for Woodford and Silverton used in this study and the resulting adjustment factors due to the construction of Somerset Dam are illustrated in **Appendix E - Adjustment of Historical Streamflows to Account for the Effects of Somerset Dam.** Historical data and adjusted discharges are presented in the following tables:

- **Table E-1 - Calculation of Adjustment Factor for Post Wivenhoe Dam Flows**
- **Table E-2 - Historical Data at Woodford and Silverton (1920 - 1985)**
- **Table E-3 - Historical and Adjusted Data at Moggill (1965 - 1983)**
- **Table E-4 - Historical and Adjusted Data at Port Office (1841 - 1974)**
- **Table E-5 - Historical and Adjusted Discharge at Lowood.**

Each of the corresponding adjusted values were applied at Lowood, Moggill and the Port Office and Flood Frequency Curves were constructed for the no dams effective catchment (ie effects of Wivenhoe and Somerset Dams removed).

7.6 Construction of Flood Frequency Curves

In constructing the flood frequency curves, annual series of peak discharges were utilised in all analyses. An annual series was adopted because of the emphasis of the study in regard to design flood estimation involving ARI's of greater than 10 years. This is in accordance with the recommendations of Chapter 10 of Australian Rainfall and Runoff, (1987).

The flood frequency curves for the annual series data were constructed in accordance with the methods outlined in Australian Rainfall and Runoff, 1987. For each location the historical peak discharges were ranked in descending order and the plotting position for each discharge was then calculated. Using the ranked discharges and their associated plotting positions, the values were plotted on Log Normal paper and the flood frequency curves were then fitted by eye.

A Log-Pearson Type III distribution together with 5% and 95% confidence limits was also fitted to all of the annual series data using the procedures outlined in Chapter 10 of Australian Rainfall and Runoff, 1987. The fit by eye curve was adopted at each location however the Log Pearson Distribution and 5% and 95% confidence limits have been plotted for comparison.

The flood frequency curves generated from the historical annual data series at the three nominated locations are presented in the following figures:

- **Figure 7-12 - Flood Frequency Curve at Lowood - No Dams Effective**
- **Figure 7-13 - Flood Frequency Curve at Moggill - No Dams Effective**
- **Figure 7-14 - Flood Frequency Curve at Port Office (-0.15 m AHD) - No Dams Effective** and
- **Figure 7-15 - Flood Frequency Curve at Port Office (1.85m AHD, Highest Astronomical Tide +0.15 m) - No Dams Effective.**

Results for the fit by eye peak discharge estimates are presented in the following tables:

- **Table 7-5 - Flood Frequency Estimates at Lowood - No Dams Effective**
- **Table 7-6 - Flood Frequency Estimates at Moggill - No Dams Effective**
- **Table 7-7 - Flood Frequency Estimates at Port Office (-0.15 m AHD) - No Dams Effective** and
- **Table 7-8 - Flood Frequency Estimates at Port Office (1.85 m AHD, - Highest Astronomical Tide +0.15 m) - No Dams Effective**

Two flood frequency curves were generated at the Port Office Gauge, incorporating the two tide events mentioned previously.

Table 7-5 - Flood Frequency Estimates at Lowood - No Dams Effective

AEP %	ARI (years)	FFA Fit by Eye Estimate (m^3/s
50	2	800
20	5	2 900
10	10	3 800
5	20	5 100
2	50	6 900
1	100	8 200

Data at the Lowood site was reasonable, with 75 years of data being available and 62 annual floods on record. Again, the annual series had to be adjusted for those years where there was very little or no flow recorded.

Table 7-6 - Flood Frequency Estimates at Moggill - No Dams Effective

AEP %	ARI (years)	FFA Fit by Eye Estimate (m^3/s
50	2	1 630
20	5	4 250
10	10	6 500
5	20	8 500
2	50	11 000
1	100	13 700

Data at the Moggill site was poor. A period of 18 years has been analysed, with only 11 annual floods in this time period recorded. The frequency chart thus had to be adjusted for the years of zero data in accordance with Section 10.7.2 of Australian Rainfall and Runoff, 1987.

Table 7-7 - Flood Frequency Estimates at Port Office (-0.15 m AHD) - No Dams Effective

AEP %	ARI (years)	FFA Fit by Eye Estimate (m^3/s
50	2	500
20	5	3 300
10	10	5 700
5	20	8 100
2	50	11 200
1	100	13 700

Table 7-8 - Flood Frequency Estimates at Port Office (Highest Astronomical Tide) - No Dams Effective

AEP %	ARI (years)	FFA Fit by Eye Estimate (m³/s
50	2	-
20	5	1 000
10	10	3 500
5	20	6 250
2	50	9 750
1	100	12 500

The two flood frequency estimates for the Port Office Gauge are shown in 42 (a 29) **Tables 7-7** and **7-8**. Data from 1841 was available at this site, with 142 years of data being analysed and adjustments made for the years of zero or low flow.

7.7 Initial and Continuing Losses

To determine appropriate initial and continuing loss values, the RAFTS model was run excluding Wivenhoe and Somerset Dams. The critical storm duration was determined by running each ARI without losses.

Once the critical duration was determined initial and continuing losses were applied uniformly over the catchment until the peak discharges produced by RAFTS matched the peak discharges found in the fit by eye flood frequency curves (**Section 7.6**). The adopted loss parameters are presented in **Table 7-9 - Initial and Continuing Losses for Brisbane River Catchment.**

Table 7-9 - Initial and Continuing Losses for Brisbane River Catchment

AEP (Years)	Initial Loss (mm)	Continuing Loss (mm/hr)
PMP	0.0	0.0
10 000	0.0	0.0
2 000	0.0	0.0
1 000	0.0	0.0
500	0.0	0.0
200	0.0	0.0
100	0.0	0.0
50	0.0	1.0
20	20	2.5
10	60	2.5
5	80	2.5
2	80	2.5

A comparison of RAFTS with loss rates applied and fit by eye peak discharges at Lowood, Moggill and Port Office are presented in **Table 7-10 - Peak Discharge Comparison Between RAFTS and Flood Frequency Curves for Lowood, Moggill and Port Office - No Dams Effective** for events up to and including the 100 year ARI.

Table 7-10 - Peak Discharge Comparison Between RAFTS and Flood Frequency Curves for Lowood, Moggill and Port Office - No Dams Effective

	Lowood			Moggill			Port Office *		
ARI (years)	RAFTS (m^3/s)	FFA (m^3/s)	Diff (%)	RAFTS (m^3/s)	FFA (m^3/s)	Diff (%)	RAFTS (m^3/s)	FFA (m^3/s)	Diff (%)
100	12 280	8 200	+33.2	13 590	13 700	-0.8	13 600	13 700	-0.7
50	10 370	6 900	+33.5	11 280	11 120	-1.4	11 120	11 200	-0.7
20	7 510	5 100	+32.1	8 060	8 500	-5.5	8 060	8 100	-0.5
10	5 830	3 800	+34.8	5 770	6 500	-12.7	5 770	5 700	+1.2
5	3 770	2 900	+23.1	3 150	4 500	-30.2	3 150	3 300	-5.1
2	1 060	800	+24.5	1 020	2 000	-51.0	1 020	500	+49.0

Note: (1) Comparison for Port Office conducted for -0.15 m AHD Rating Curve Case.

From **Table 7-10** it can be seen that for Moggill and Port Office the comparison yields a good result however for low flows the percentage difference varies considerably. This variance would be most likely influenced by tidal fluctuations at these sites. As the study objectives are generally related to the large flood events greater importance was placed on results consistency for the 10 year ARI flood and above.

At Lowood RAFTS over estimates flows by between about 23 and 41%. Loss rates above Lowood were increased, however this resulted in a reduction in flows at Moggill and the Port Office. Given that the main aim of this study was to produce development design flood levels within the Brisbane City Boundary it was considered that the loss parameters presented in **Table 7-9** were the most appropriate as they produced the best results at Moggill and Port Office.

7.8 Wivenhoe and Somerset Dam Operations

The RAFTS model was used to predict design hydrographs for the MIKE 11 hydraulic model. Prior to the commencement of the design events modelling, dam operational procedures for Wivenhoe and Somerset dams had to be established. These procedures were developed after discussions with Brisbane City Council and South East Queensland Water Board officers.

Given the complex release procedures for Somerset and Wivenhoe Dams, it was decided that the following assumptions be adopted for this study.

- The starting water level for both dams are assumed to be Wivenhoe RL 67.0 m AHD and Somerset RL 100.5 m AHD which is full supply level and spillway level respectively.

- During a flood event all communication between Wivenhoe and Somerset would be cut. When communications are cut during a flood event, the procedure is to employ uncontrolled releases for both dams.

It is evident that the above assumptions are conservative, however these were considered to be the most appropriate when setting development regulation lines. Storage curves and stage-discharge curves used in this study are presented in **Appendix F - Dam Operations**. These curves were input into the RAFTS model and the design events modelling was conducted.

7.9 Design RAFTS Modelling

Wivenhoe and Somerset Dams were included in the RAFTS model and the 24 hour, 30 hour and 36 hour storms for the 100 year ARI event were rerun. Using no losses it was found that the critical storm duration for the dams effective case was 30 hours which is consistent with the no dams effective case.

Floods ranging from 2 year ARI through to PMP were run assuming loss parameters presented in **Table 7-9**. Peak discharges at Lowood, Moggill and the Port Office are presented in **Table 7-11 - Peak Discharges at Lowood, Moggill and the Port Office - Losses and Dams Effective**. Peak discharges presented in the Department of Natural Resources Report are also presented in **Table 7-11** at the Port Office for comparison.

Table 7-11 - Peak Discharges at Lowood, Moggill and the Port Office - Losses and Dams Effective

ARI (Years)	Lowood SKM (m^3/s)	Moggill SKM (m^3/s)	Port Office SKM (m^3/s)	Port Office DNR (m^3/s)	Difference @ PO (m^3/s)
PMP	28 560	36 860	37 910	31950$^{(1)}$	+5 960
10 000	23 020	29 300	30 140	27560$^{(1)}$	+2 580
2 000	17 880	19 490	19 500	-	-
1 000	16 290	17 540	17 550	20100$^{(1)}$	-2 550
500	11 590	13 910	14 010	17 510$^{(1)}$	-3 500
200	9 420	10 870	10 880	11 840$^{(1)}$	-960
100	9 190	9 650	9 560	9 120$^{(2)}$	+440
50	7 140	7 750	7 750	7 990$^{(2)}$	-240
20	4 190	3 860	3 860	3 950$^{(2)}$	-90
10	1 610	1 680	1 680	2 840$^{(2)}$	-1 160
5	920	760	760	-	-
2	280	320	330	-	-

Note (1) - DNR 120a hour duration storm assuming 2.5 mm/hr continuing loss.
(2) - DNR 24 hour duration storm assuming varying loss rates.

The comparison between the Sinclair Knight Merz (SKM) and Department of Natural Resources (DNR) discharges up to and including the 100 year ARI event are generally within 5%, however, the SKM 10 year ARI flood is approximately 42% below that predicted by the DNR. This is most likely due to the loss parameters used. The loss rates used for the 10 year ARI flood by SKM are, IL = 60 mm, CL = 2.5 mm/hr whereas the losses used by DNR are IL = 22.9 mm and CL = 2.5 mm/hr.

As previously mentioned the PMF and intermediate results from the different sources vary considerably. However when loss rates applied by DNR were applied in the SKM model for the PMF flood event, this resulted in the outcomes for both models being within 7% of each other.

Given that the loss parameters for the no dams effective case generally yield discharges within 1% of the flood frequency analysis at the Port Office gauge (**Table 7-10**), the loss parameters adopted by SKM were considered the most appropriate.

7.10 Comparison of DNR and SKM Discharges

It was proposed that a comparison between design flood hydrographs between DNR and SKM be conducted. Upon determination of the critical duration event, it became evident that the DNR critical duration was estimated at 24 hours whereas the SKM analysis resulted in a critical duration of 30 hours.

This meant that it was not appropriate to compare the two hydrographs as the 24 hour duration storm has a different temporal pattern to that of the 30 hour duration storm, hence a comparison was not conducted.

RAFTS hydrographs for the range of ARI storms at the Brisbane City Boundary, Inflow Boundaries and the Port Office gauge are presented in the following figures:

- **Figure G-1 - Hydrographs for the 2 Year ARI Flood Event**
- **Figure G-2 - Hydrographs for the 5 Year ARI Flood Event**
- **Figure G-3 - Hydrographs for the 10 Year ARI Flood Event**
- **Figure G-4 - Hydrographs for the 20 Year ARI Flood Event**
- **Figure G-5 - Hydrographs for the 50 Year ARI Flood Event**
- **Figure G-6 - Hydrographs for the 100 Year ARI Flood Event**
- **Figure G-7 - Hydrographs for the 200 Year ARI Flood Event**
- **Figure G-8 - Hydrographs for the 500 Year ARI Flood Event**
- **Figure G-9 - Hydrographs for the 1 000 Year ARI Flood Event**
- **Figure G-10 - Hydrographs for the 2 000 Year ARI Flood Event**
- **Figure G-11 - Hydrographs for the 10 000 Year ARI Flood Event**
- **Figure G-12 - Hydrographs for the PMF (100 000 Year ARI Flood Event)**

SINCLAIR KNIGHT MERZ

FIGURE 7-1

BRISBANE RIVER FLOOD STUDY

2 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT

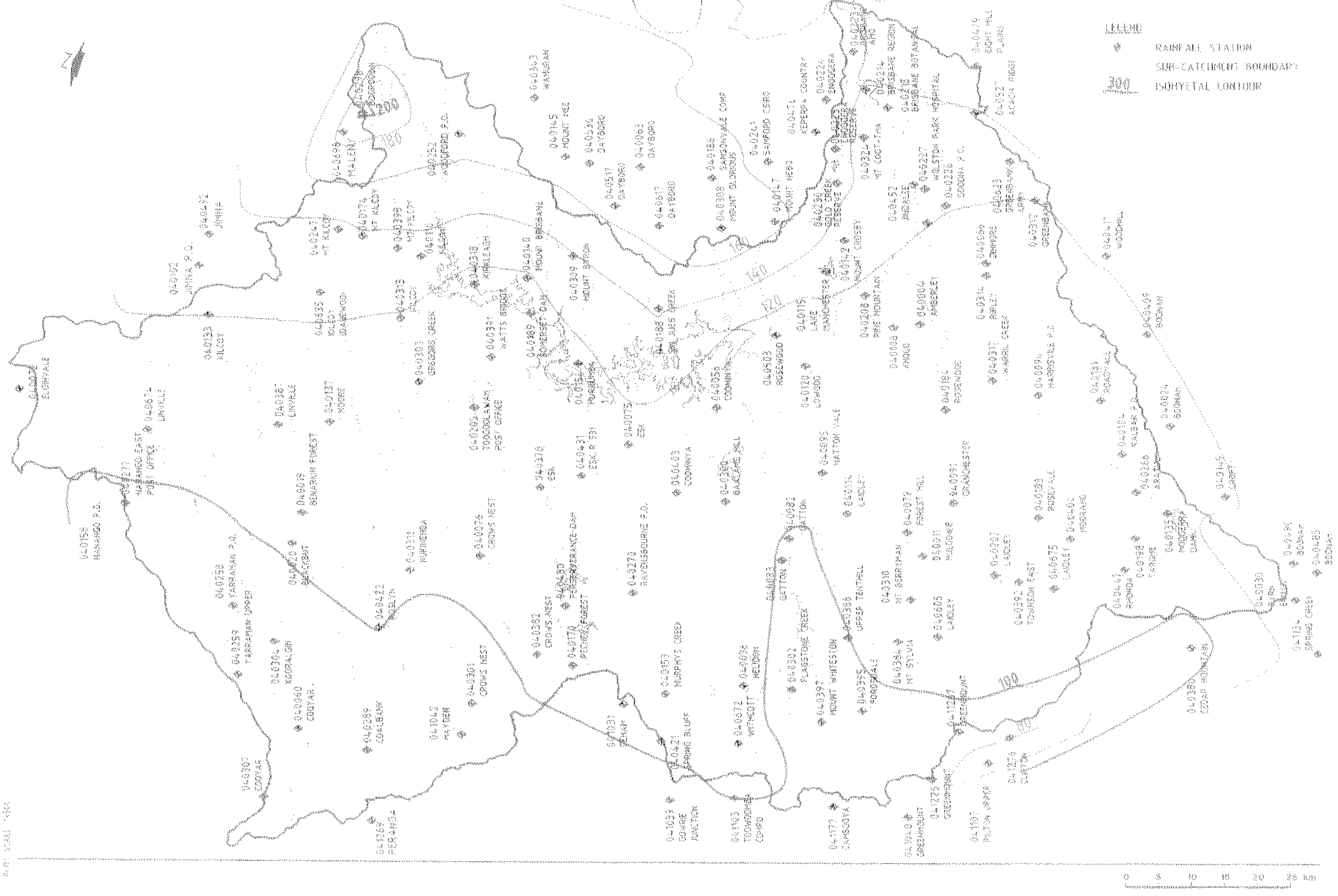


FIGURE 7-2

BRISBANE RIVER FLOOD STUDY

5 YEAR ARI 30 HOUR RAINFALL DURATION RAINFALL EVENT BRISBANE RIVER CATCHMENT

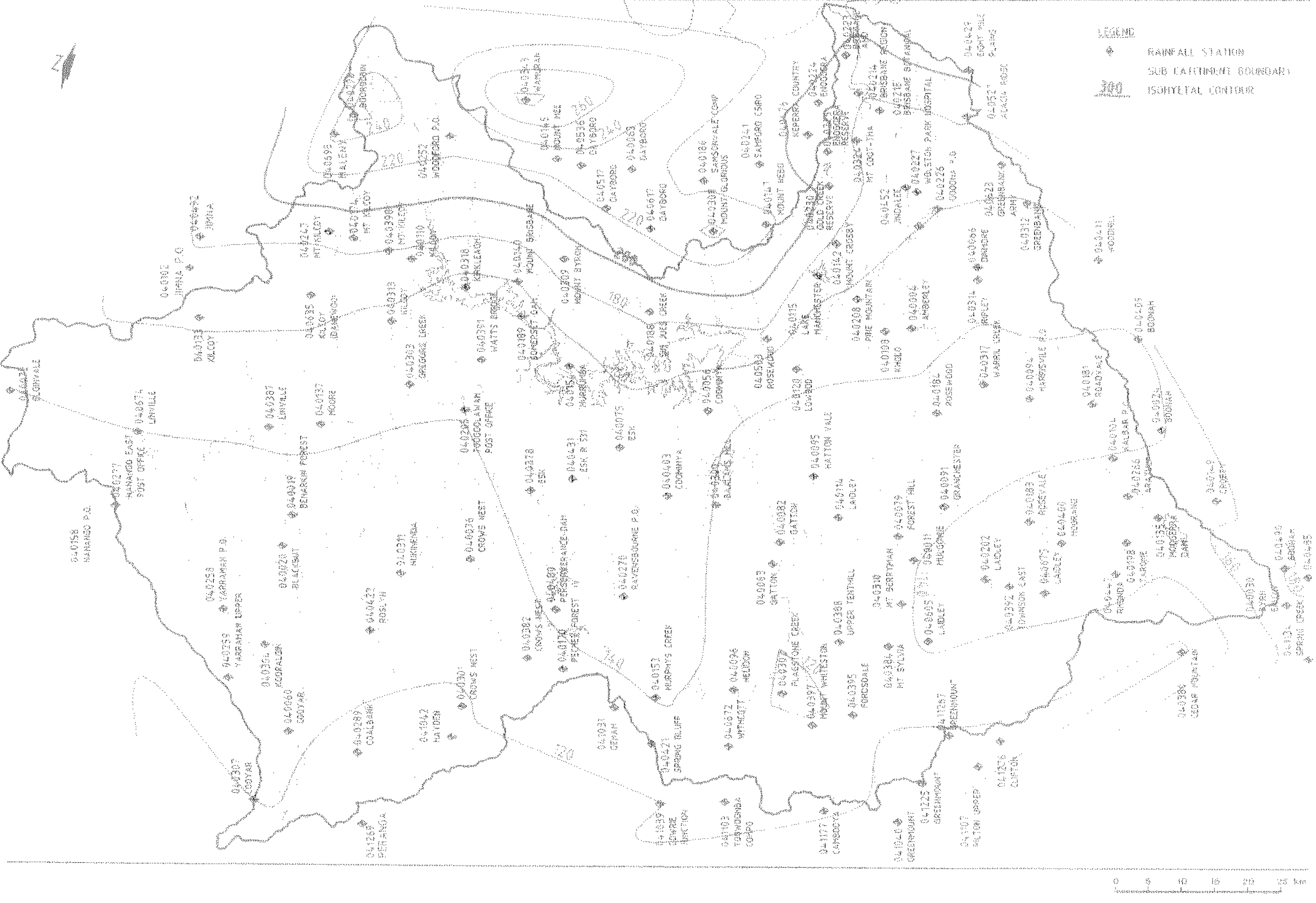


FIGURE 7.3

BRISBANE RIVER FLOOD STUDY

10 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT

FIGURE 7-4

BRISBANE RIVER FLOOD STUDY

20 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT

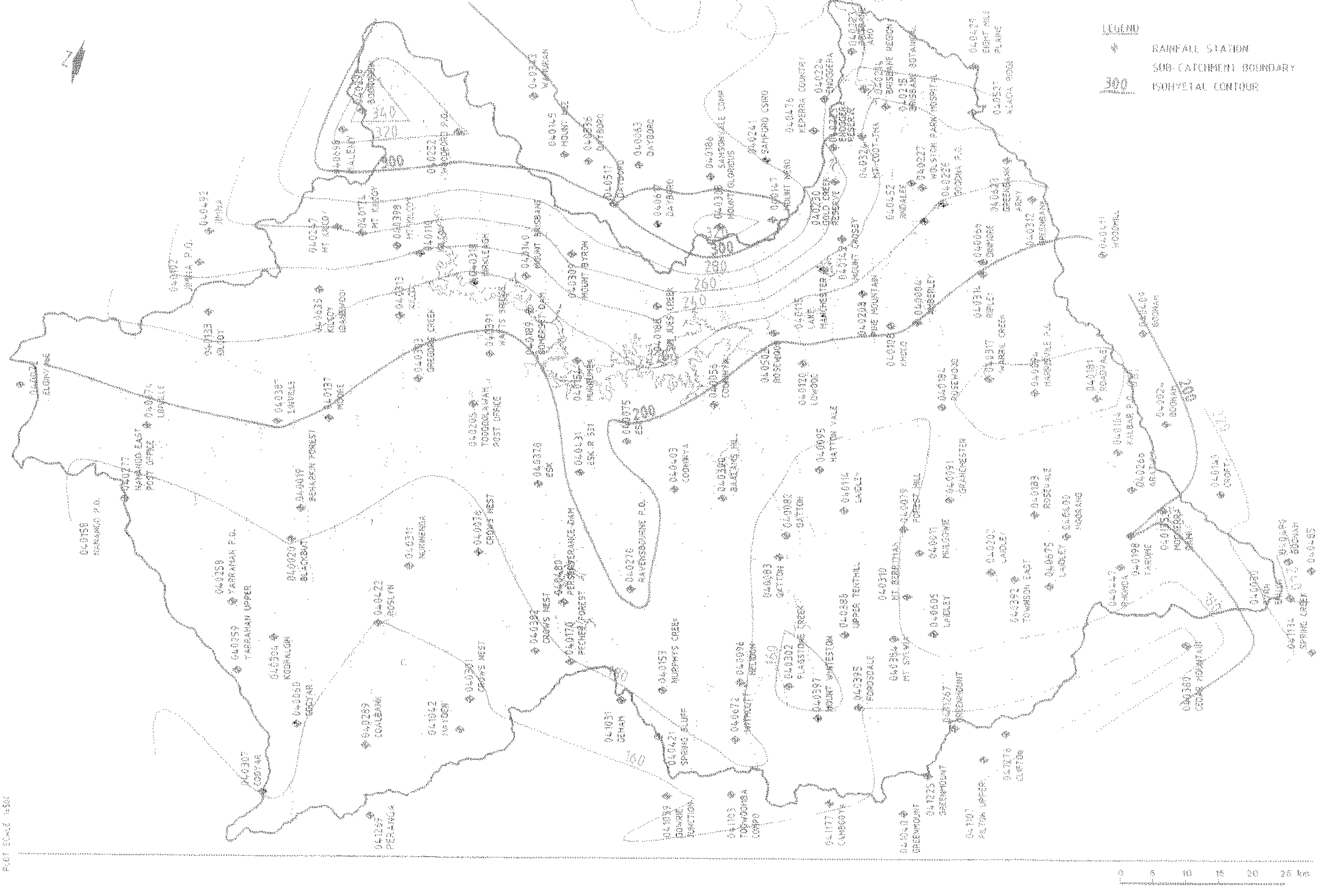


FIGURE 7-5

BRISBANE RIVER FLOOD STUDY

50 YEAR ARI 30 HOUR DURATION RAINFALL EVENT BRISBANE RIVER CATCHMENT

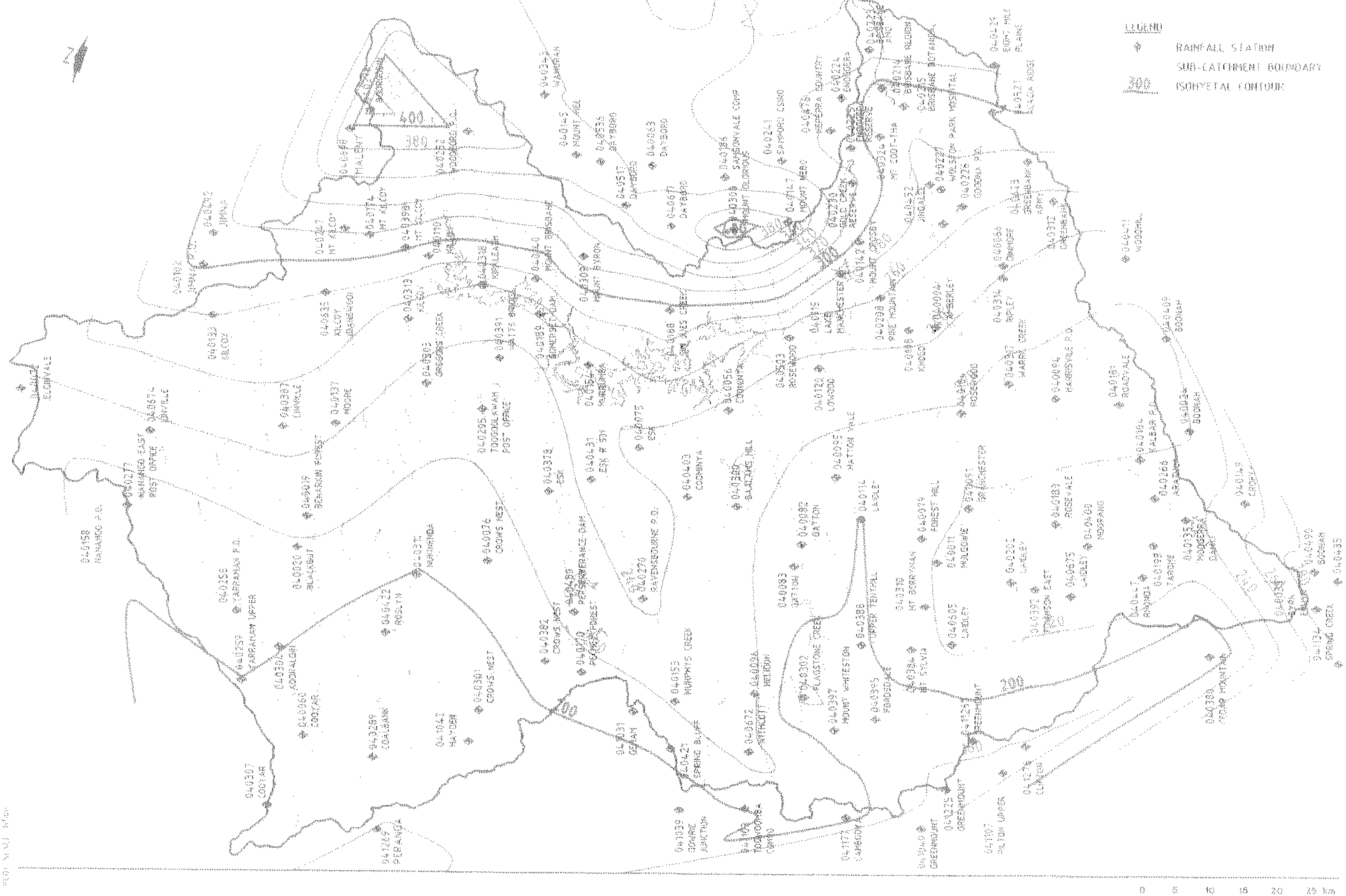


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FIGURE 7.6

BRISBANE RIVER FLOOD STUDY

100 YEAR ARI 30 HOUR DURATION RAINFALL EVENT BRISBANE RIVER CATCHMENT

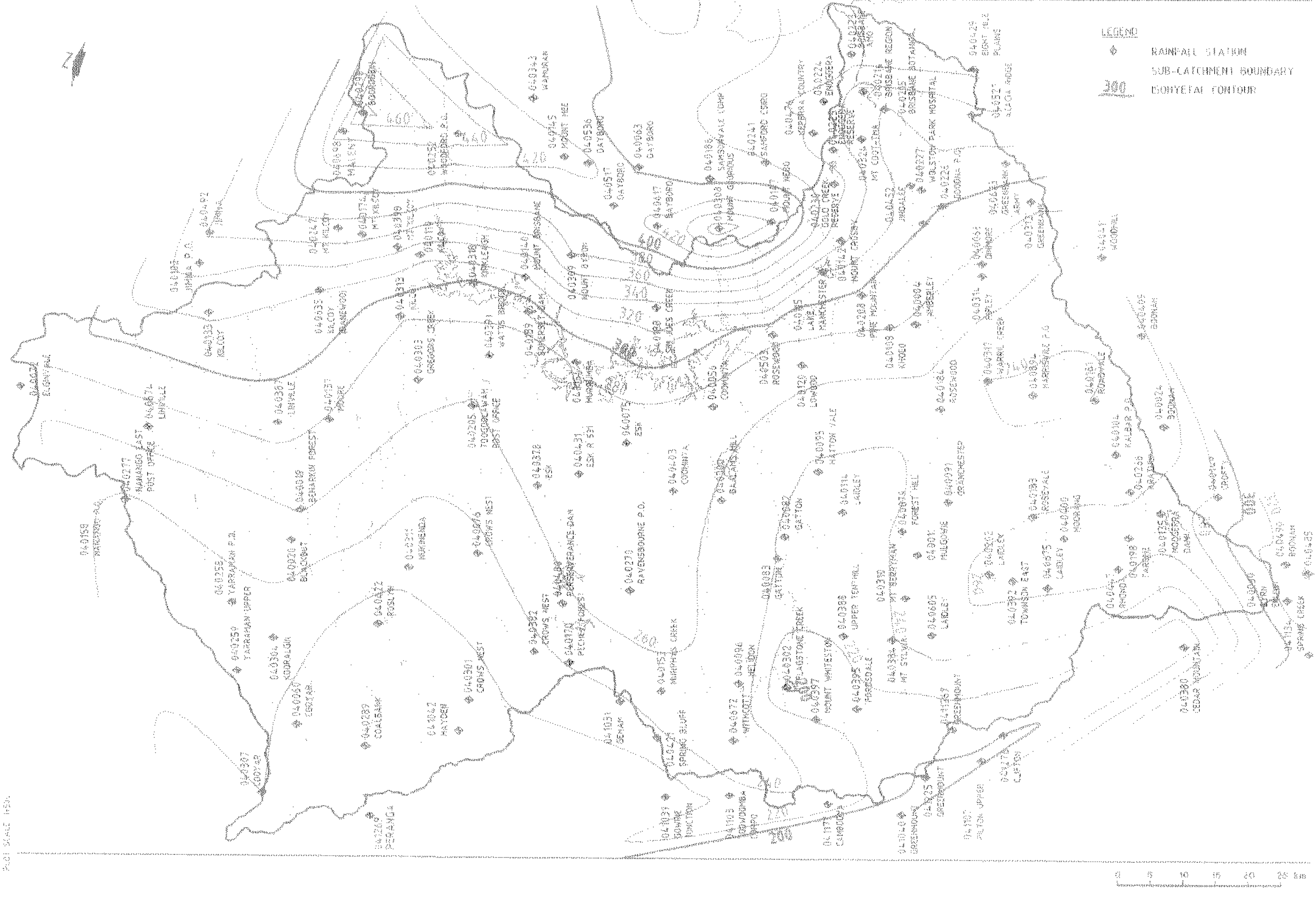

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FIGURE 7-11

BRISBANE RIVER FLOOD STUDY
FLOOD FREQUENCY ANALYSIS LOCATION LAYOUT

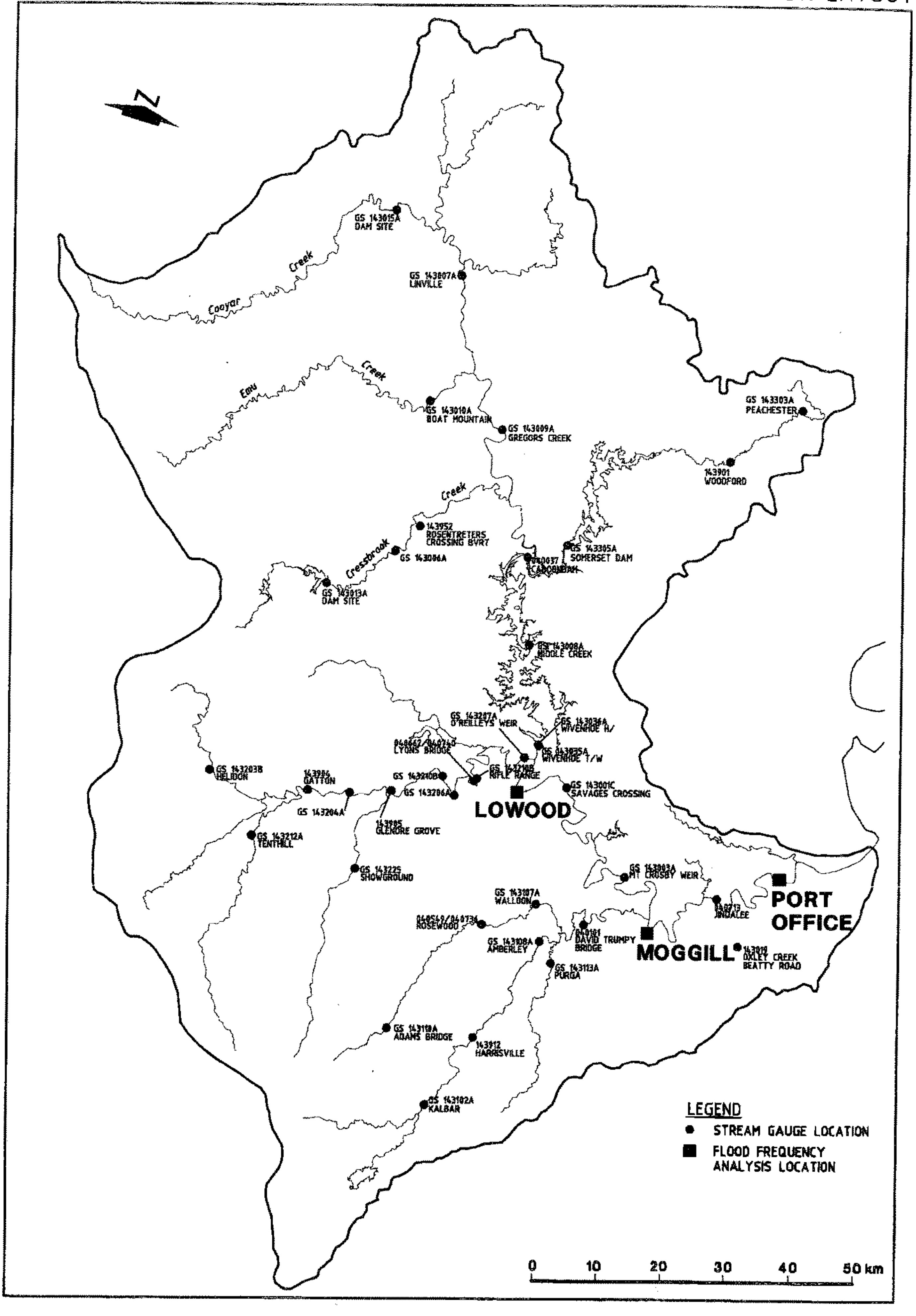

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FIGURE 7-12

BRISBANE RIVER FLOOD STUDY
FLOOD FREQUENCY CURVE AT LOWOOD
- NO DAMS EFFECTIVE

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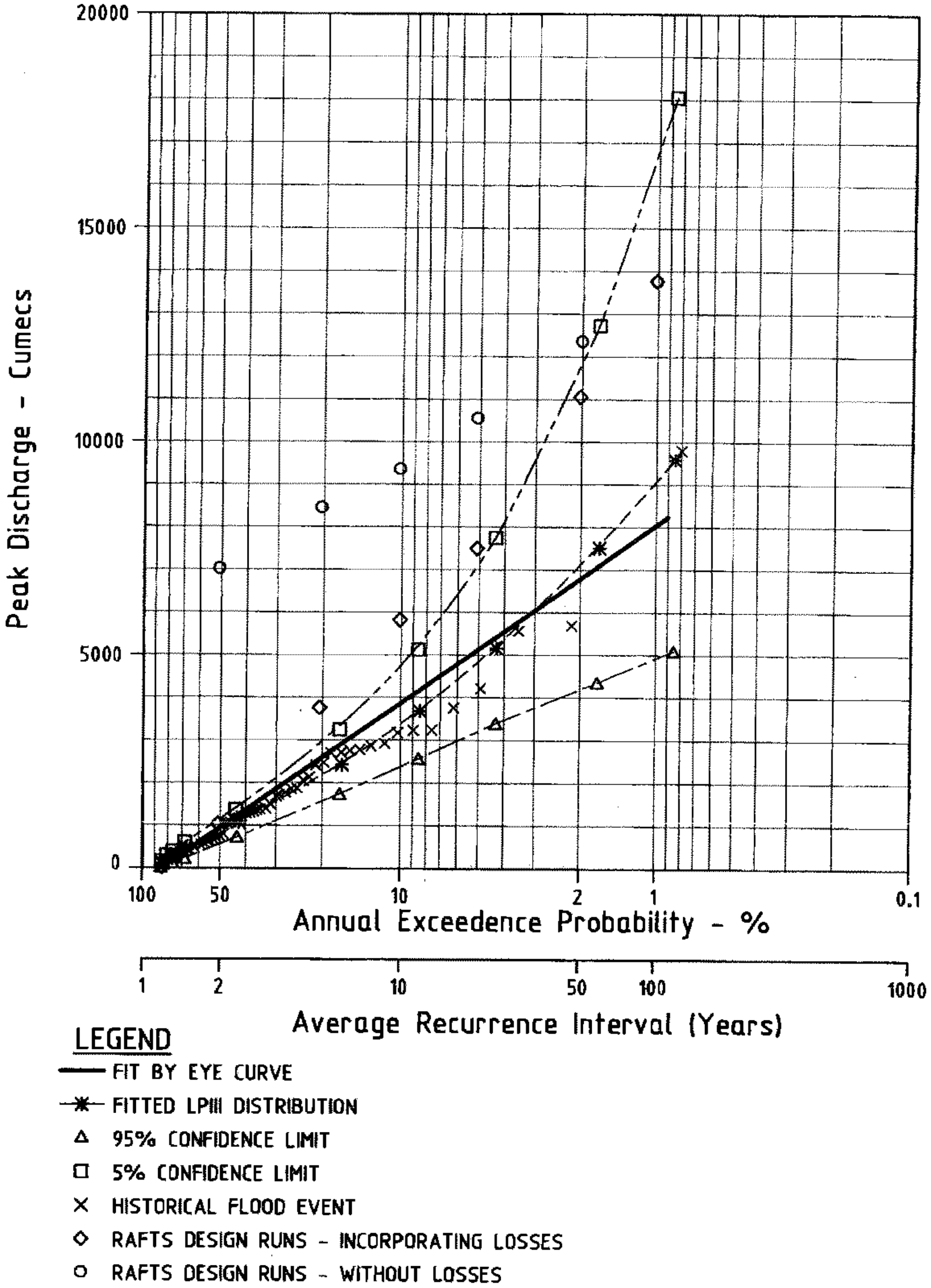

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FIGURE 7-13

BRISBANE RIVER FLOOD STUDY
FLOOD FREQUENCY CURVE AT MOGGILL
- NO DAMS EFFECTIVE

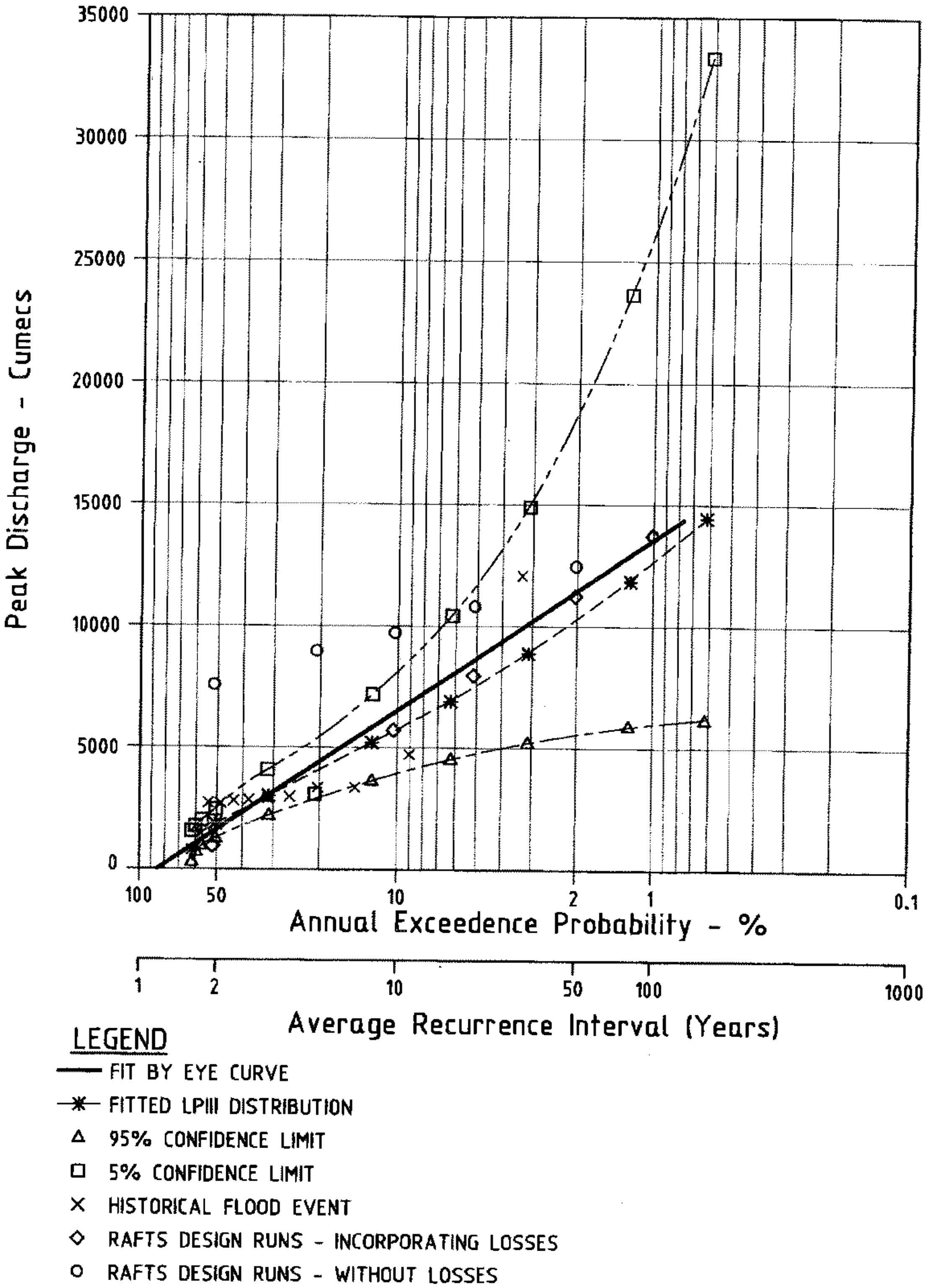

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FIGURE 7-14

BRISBANE RIVER FLOOD STUDY
FLOOD FREQUENCY CURVE AT PORT OFFICE
(-0.15m AHD) - NO DAMS EFFECTIVE

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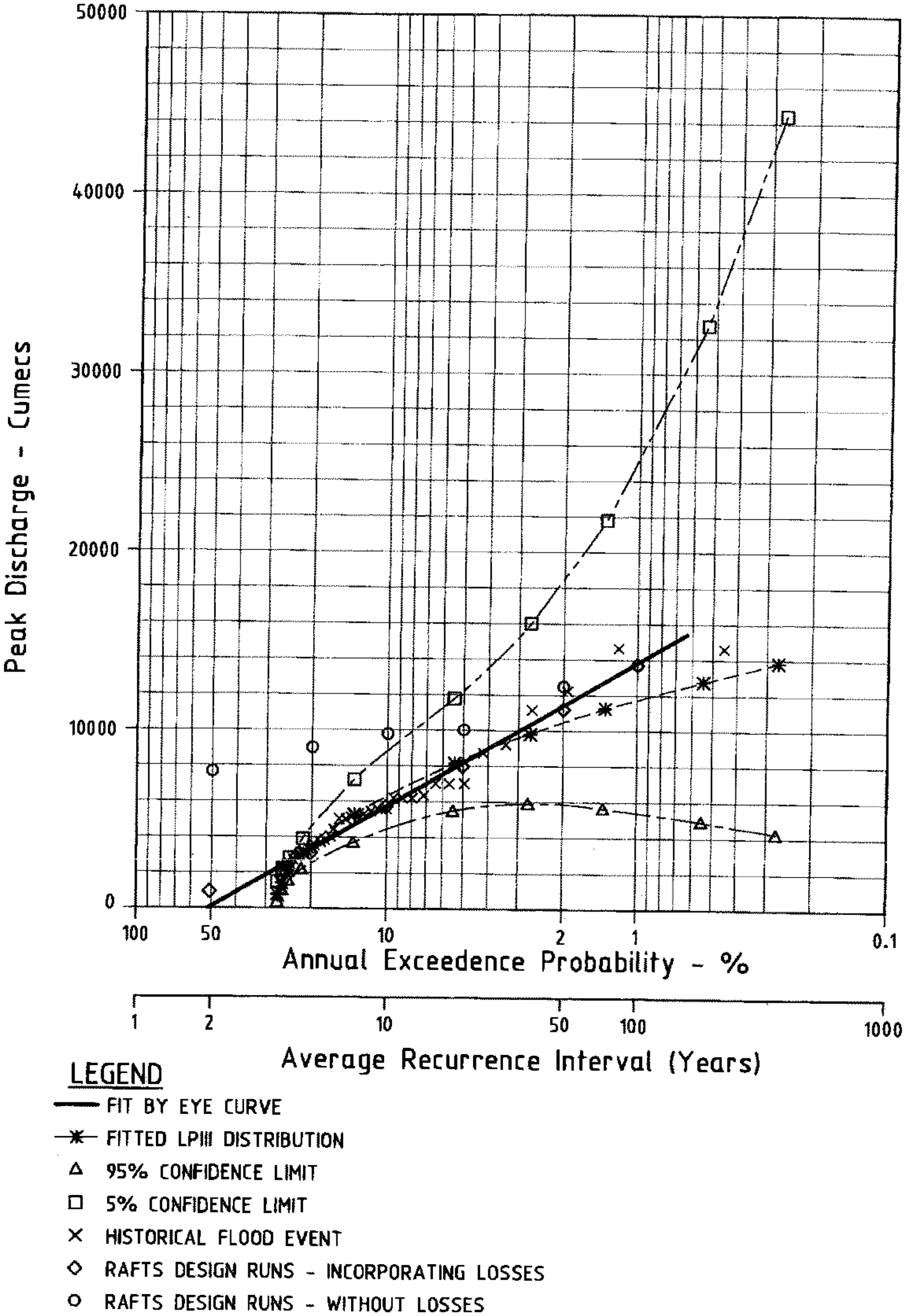

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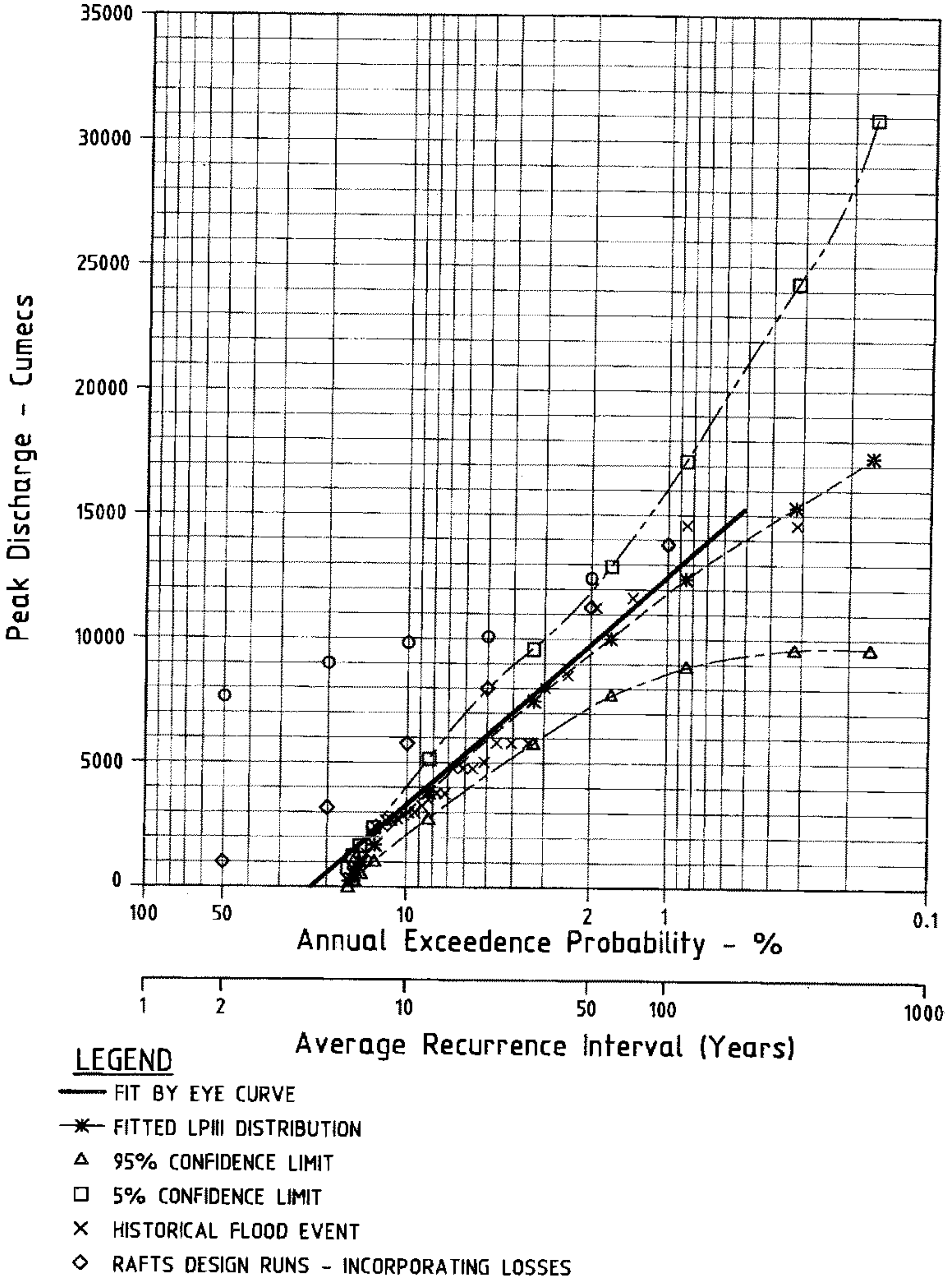
FIGURE 7-15

BRISBANE RIVER FLOOD STUDY
FLOOD FREQUENCY CURVE AT PORT OFFICE
(1.85m AHD, HIGHEST ASTRONOMICAL TIDE +0.15m)
- NO DAMS EFFECTIVE



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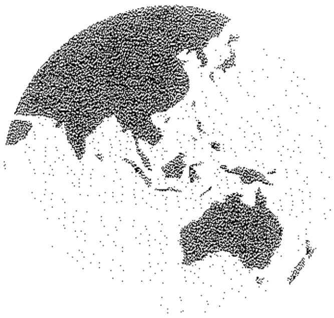


8. Design Event Hydraulics

8. Design Event Hydraulics

8.1 Tailwater Boundary Conditions

Tailwater boundary conditions for design model runs were selected for a number of tidal conditions at the Western Inner Bar. These conditions were:

- Mean High Water Spring Tide (RL 0.92 m AHD) and
- Mean Low Water Spring Tide (RL -0.89 m AHD).

These levels were used at the downstream end of the Brisbane River as boundary conditions for the MIKE 11 hydraulic model.

It was recognised that varying conditions at the mouth of the Brisbane River (Western Inner Bar) may be caused by storm surges in Moreton Bay. These conditions are likely to impact on flood profiles within the lower reaches of the Brisbane River and were therefore investigated. The storm surge conditions analysed in this study were;

(i) 100 year ARI river flood coinciding with a 20 year ARI Moreton Bay storm surge

(ii) 20 year ARI river flood coinciding with a 100 year ARI Moreton Bay storm surge

(iii) 100 year ARI river flood coinciding with a 100 year ARI Moreton Bay storm surge.

Peak storm surge levels for the Western Inner Bar (post Wivenhoe Dam) were supplied by Council and are presented in **Table 8-1 - Western Inner Bar Flood Levels**.

Table 8-1 - Western Inner Bar Flood Levels

Design ARI (years)	Storm Surge Level (m AHD)	Storm Surge Level + Greenhouse Effect Levels (m AHD)
20	1.75	2.10
100	2.14	2.50

Brisbane City Council requires that an allowance of 300 mm be added to storm surge levels to account for Greenhouse effects. Once this level was determined it was rounded up to the nearest 0.1 m as required. Design modelling for this study used the adjusted Greenhouse effect tailwater levels presented in **Table 8-1**.

The predicted flood profiles for the three combined flooding cases are presented in **Figure H-1 - Combined Tailwater and River Flooding Conditions - Moreton Bay Storm Surge**. These results are also tabulated in **Table H-1 - Combined Tailwater and River Flooding Conditions - Moreton Bay Storm Surge** in **Appendix H - MIKE 11 Model Results - Design Events**. The assessment assumed handrails at structures were blocked.

It can be seen that for the first case combining a 100 year ARI river flood with a 20 year ARI Moreton Bay storm surge, the tailwater level at the Western Inner Bar results in a 130 mm increase in flood level at the Walter Taylor Bridge (MIKE 11 model chainage 1037.11 km) when compared to a tailwater level of Mean High Water Spring Tide at the Inner Bar. An increase in water levels was predicted over the entire length of the Brisbane River with an increase at the Brisbane City Boundary of 30 mm.

The second case combined a 20 year ARI river flood with a 100 year ARI Moreton Bay storm surge. This case resulted in a significant increase in water levels throughout the lower Brisbane River reach when compared to the 20 year ARI design flood (MHWS). The increase in flood levels at the Walter Taylor Bridge and the Brisbane City Boundary were estimated to be 790 mm and 150 mm respectively.

The final configuration combined a 100 year ARI river flood with a 100 year Moreton Bay Storm surge. This combination caused an increase in water level of 190 mm at the Walter Taylor Bridge and 40 mm at the Brisbane City Boundary. Again the base case for this comparison was MHWS at the bar. This flooding combination of river flow and storm surge in Moreton Bay resulted in the highest predicted flooding levels throughout the Brisbane City Council Local Government Area of all the flooding cases considered. The joint probability of these events was considered to be in excess of 100 years ARI.

Following review of the cases assessed, due to the uncertainty of a storm surge occurring coincidentally with the peak flow in the river, Council advised that the 100 year ARI flood profile be generated as follows:

☐ Determine the 100 year ARI river flood profile for a mean high water springs tailwater.

☐ Establish the flood profile for the 100 year ARI storm surge level with zero river flow.

☐ Adopt the highest predicted levels from each profile to establish the design flood profile.

8.2 Design Flood Profiles

The inflow hydrographs calculated by the RAFTS model for the full range of design storms were run through the MIKE 11 model for the current extent of urbanisation to generate a series of design flood profiles. The flood profiles for the Brisbane River have been plotted for the range of return periods and are presented in the following figures and drawing sheets:

- ☐ **Figure H-2 - Design Profiles for the Brisbane River - Combined** and **Drawing Sheet W10581-55**
- ☐ **Figures H-3a to H-3i - MIKE 11 Design Flood Profiles for the 5, 20 & 100 Year ARI Events (MHWS)** and **Drawing Sheets W10581-19 to 27.**
- ☐ **Figures H-4a to H-4i - MIKE 11 Design Flood Profiles for the 2, 10 & 50 Year ARI Events (MHWS)** and **Drawing Sheets W10581- 28 to 36.**
- ☐ **Figures H-5a to H-5i - MIKE 11 Design Flood Profiles for the PMF & 10 000 Year ARI Events (MHWS)** and **Drawing Sheets W10581-37 to 45.**
- ☐ **Figures H-6a to H-6i - MIKE 11 Design Flood Profiles for the 2 000, 1 000, 500 & 200 Year ARI Events (MHWS)** and **Drawing Sheets W1058-46 to 54.**

Design flood discharges and peak water levels are presented in **Table H-2 - MIKE 11 Predicted Design Flood Levels (MHWS)** and **Table H-3 - MIKE 11 Predicted Design Discharges (MHWS).** It has been assumed that the handrails at all structures would be fully blocked by debris during the design events. A sensitivity analysis has been performed to test the sensitivity of this assumption and it was found that the effects of blocked handrails were negligible.

8.3 HEC-RAS Model Construction and Calibration

During the model calibration phase of this study, it was decided that the HEC-RAS model would only be used to check the performance of the MIKE 11 model at major river crossings. This process is detailed in **Section 6.8 - HEC-RAS Check of Major Creek Crossings** in the this report.

The construction of the HEC-RAS model involved linking the structures analysed in the calibration phase of this report to the remaining cross sectional information used in the MIKE 11 model. The HEC-RAS and MIKE 11 models are essentially a duplicate of each other in all aspects.

Following the model setup, the 100 year ARI peak water levels and discharges were taken from the MIKE 11 model. The peak discharges varied along the length of the Brisbane River due to attenuation effects and adjoining river branches. To account for this phenomenon discharges were placed at strategic locations in order to accurately represent the river flow regime throughout the model.

To account for the complex interaction of storage within Oxley Creek and the link branches across Indooroopilly Golf course, the Oxley Creek inflow had to be adjusted in the HEC-RAS model. The MIKE 11 model could model this area in a dynamic process, however, as HEC-RAS is only a steady state model flood levels from BN1060 (AMTD 34.935) to BN950 (AMTD 39.095) were significantly underestimated. The flow at Oxley Creek was reduced significantly in MIKE 11 (approx 900 m^3/s), however this was due to storage and the link branch across the floodplain. HEC-RAS is unable to account for storage and automatic flow distribution into link branches cannot be achieved. The flow predicted by MIKE 11 at BN950 was therefore input into HEC-RAS at BN950 and the Oxley Creek inflow was neglected. This produced results within the required tolerances.

Peak water levels extracted from MIKE 11 were inserted at each cross section in the HEC-RAS model. These levels were used in a comparison role during the calibration of the HEC-RAS model. The calibration of the HEC-RAS model was based on altering Manning's n values used in the MIKE 11 model by a constant scaling factor of 0.85.

Using this scaling factor the water levels determined by the HEC-RAS model were generally within 150 mm of that predicted by MIKE 11 with an absolute average difference of 105 mm for the 100 year ARI event and an absolute average difference of 27 mm for the 10 year ARI event. These results are presented in **Appendix I - HEC-RAS Model Results** in **Table I-1 - HEC-RAS Model Calibration**. The roughness coefficients adopted in the HEC-RAS model are summarised in **Table I-2 - Comparison of MIKE 11 & HEC-RAS Manning's n Roughnesses**

8.4 River Hydraulic Characteristics

The HEC-RAS model was used to determine the bank full channel flood by using a range of flows and identifying the bank full flow at each cross section. Bank full flow was considered to be the first low bank which is located above the 2 year ARI flood level. MIKE 11 results for the 100 year ARI and 20 year ARI floods were inserted at strategic locations in the HEC-RAS model to determine the velocities and conveyance at each section.

Left bank, right bank and main channel velocities for the 100 year ARI and bank full flood were determined using HEC-RAS. Conveyances for the left bank, right bank and channel for the 100 year ARI and 20 year ARI floods were determined. The results for velocities and conveyance are tabulated in **Table I-3 - HEC-RAS Predicted Velocities and Table I-4 - HEC-RAS Predicted Conveyances**.

It should be noted that these conveyances and velocities relate to the channel proper being at the extent of the tidal zone. During the calibration phase of the study, the MIKE 11 model was developed by defining the channel proper on the basis of roughness rather than a topographical basis. This was considered to be justified due to the significant differences between the roughness within the tidal zone and the roughness on the river banks and floodplains.

For consistency the calibration of the HEC-RAS model used the same parameters as those adopted by the MIKE 11 model and hence the channel proper is defined by the tidal zone within each cross section. This approach was also considered to be suitable for HEC-RAS as the model defines each cross section into three segments, these being:

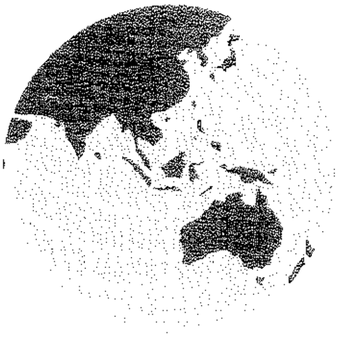
- left overbank,
- channel, and
- right overbank.

Each of these segments define the distinct roughness appropriate to each cross section. This became a problem when the hydraulic characteristics had to be assessed. If the left and right overbanks are placed at bank full condition (based on topographical interpretation), then the HEC-RAS model calculates a composite roughness for the main channel using the formula:

$$n=\Sigma((P_i n_i)^{3/2})/P)^{2/3}$$

Due to both high wetted perimeters and relatively high Manning's n values along the Brisbane River banks, the composite channel roughnesses calculated by the HEC-RAS model were considered to be over estimated. This over estimation caused significant increases in water levels and decreases in conveyances for the entire cross section if roughness values consistent with MIKE 11 were used.

This meant that the HEC-RAS model would have to be calibrated as a stand alone model using a different Manning's n parameter set to that used in MIKE 11. After discussions with Brisbane City Council Officers, it was decided that it was most appropriate to use a consistent parameter set for this investigation.



9. Waterway Management

9. Waterway Management

9.1 General Strategy

This component of the study required application of the calibrated hydraulic model for the lower Brisbane River to determine a revegetation strategy and delineate flood regulation lines.

The brief required that the combined effect of revegetation and rehabilitation, encroachment of development on the floodplain outside the regulation line and crossings of the river (upgraded as necessary) does not increase the 100 year ARI flood level by more than approximately 150 mm. After discussions with council it was decided that increases in water level up to 170 mm would be acceptable in selected locations provided private residences were not significantly effected.

9.2 Collation of Environmental Data

Prior to the commencement of the Waterway Management Strategy it was necessary to liaise with the Bikeway, Transport Planning Section and the Environment Management and Planning Sections of the Brisbane City Council.

Through contact with the Environmental Management and Planning Departments a data sheet containing various names and addresses of Environmental Groups throughout Queensland was obtained.

Specific groups were identified according to their proximity to the Brisbane River and questionnaires were prepared and sent to these groups. Approximately 500 questionnaires to members of the specific community groups were sent however the response was considered poor.

Discussions with the Bikeway, Transport Planning Section revealed that no major works have been planned over the next five years with the exception of the construction of a new bikeway along Coronation Drive between the William Jolly Bridge and Victoria Bridge. These works involve the construction of a structure approximately 4.5 metres in width and about 1 metre above high tide level. The structure is to be built outside the existing freeway structure to avoid problems with freeway foundations.

This structure was not included in the hydraulic modelling as the decrease in conveyance due to the decrease in channel area would be negligible. Similarly due to the location and size of this structure it was considered that the resulting impacts would be negligible as the structure would be drowned out during a 100 year ARI event.

The existing bikeway running adjacent to Coronation Drive is also to be upgraded within the next few years however this project is in the preliminary phase and therefore no information was available.

9.3 Revegetation Strategy

It was proposed that the revegetation strategy would be developed primarily from information supplied by each of the surveyed community groups however due to the poor response limited revegetation locations were identified. Other areas had to therefore be located using photographic maps, topographical information and field surveys.

Most of the locations that have been identified for revegetation are currently open space areas. Revegetation of private residential areas has not been investigated as it was considered that these areas would generally be small and therefore have a negligible effect on the floodplain.

The combination of community groups input and the additional investigation resulted in a proposed revegetation strategy. This proposed revegetation strategy is presented in **Drawings W10581 Sheets 84 to 90**.

Drawings W10581 Sheets 84 to 90 also present locations where significant areas of vegetation currently exist. These locations may or may not represent areas of ecological significance. It is recommended that should development occur at any of the above locations some form of environmental investigation be undertaken to assess the possible ecological impacts.

The approach used to investigate the revegetation strategy for the Brisbane River was to increase mannings n roughness parameters within the calibrated hydraulic model (MIKE 11) to reflect changes imposed by the proposed revegetation.

Since the hydraulic model bank roughnesses at most locations exceeded 0.15 (to allow for bend losses), a sensitivity analysis was conducted to assess the impacts that revegetation would have on the 100 year flood level.

The sensitivity analysis was carried out by reducing the roughness values to 0.15 at the proposed revegetation locations. It was found that this reduction in roughness values caused the existing case 100 year ARI flood levels to decrease by 0 to 20 mm at these locations. The roughness values were then increased to their original values and 0.15 was added. This resulted in an increase in flood levels at these locations of between 0 to 20 mm above the existing 100 year ARI case. It was therefore concluded that the river was not sensitive to changes in bank roughness conditions.

The proposed revegetation strategy applies to locations where revegetation is below the 100 year ARI flood inundation level. Tree planting has been tested in all proposed locations as fully uncontrolled revegetation.

Fully unconstrained revegetation for the Brisbane River was defined as uncontrolled planting where manning roughnesses have been applied in the hydraulic model to a value of 0.15 above those values determined during the calibration of the MIKE 11 hydraulic model.

Extent of revegetation will be discussed on an individual reach basis in **Section 9-5 - Hydraulic Testing of Waterway Strategy Options** of this report.

9.4 Regulation Line Assessment

Regulation lines are used by council as a control on development encroaching onto the floodplains of major creeks and rivers. They are set to ensure that works such as placement of fill does not compromise existing flood immunity.

Interim regulation lines can be defined as offsets from real property boundaries. Interim lines for the Brisbane River have not been previously set by Council, hence regulation lines have been set using the calibrated MIKE 11 hydraulic model results.

This work was principally based on the worst case design scenario of the occurrence of the 100 year ARI flood under current catchment development superimposed with the regulation lines and revegetation strategy in place. The geometry of river cross sections was adjusted to reflect flood conveyance and storage in the areas outside the regulation lines. The combined effect of this encroachment and the revegetation strategy was considered as described in **Section 9-5 - Hydraulic Testing of Waterway Strategy Options** of this report.

In some reaches, several solutions to the regulation line location and revegetation strategy satisfy the hydraulic constraints. In these locations practical regulation lines were adopted after consideration of planning, environmental and economic criteria.

A final check was made to ensure that regulation lines provided a minimum 15 m buffer to the top of the river bank to manage future erosion and sedimentation problems. After discussions with Council it was decided that the top of bank was considered to be the first bank which was above the 2 year ARI flood level.

Development levels were then set at 300 mm above the 100 year ARI flood with the revegetation and regulation lines in place. Where the Moreton Bay 100 year ARI storm surge levels were higher than the 100 year ARI river levels the surge levels were used.

9.5 Hydraulic Testing of Waterway Strategy Options

The regulation lines were finalised on the above basis to produce a reasonable balance between regulation line requirements and water level increases.

Most emphasis was placed on existing developed areas and any recommended zoning adjustments have been based purely on a hydraulic basis and prior to a change of rezoning other factors should be considered.

Placement of the regulation lines are presented in **Drawings W10581 - Sheets 98 to 104** and corresponding flood level information is presented in **Table J-1 - Flood levels for the Regulation Lines and Revegetation Case for Flood Events 100 Year ARI to 2 Year ARI.** Corresponding flows are presented in **Table J-2 - Discharges for the Regulation Lines and Revegetation Case for Flood Events 100 Year ARI to 2 Year ARI.**

The following Tables present affluxes, placement of regulation lines and development levels for the Brisbane River:

- ☐ **Table J-3 - Affluxes Due to Regulation Lines, Revegetation Strategy and Combined Effects for the 100 Year ARI Flood.**
- ☐ **Table J-4 - Development Levels and Location of Regulation Lines for the Brisbane River.**

Flood profiles for the Regulation Lines and Revegetation Strategy are presented in the following figures and Drawings:

- ☐ **Figure J-1a to J1i - MIKE 11 Design Flood Profiles for the 5, 20 and 100 Year ARI Flood Profiles (MHWS) - Regulation Lines and Revegetation Strategy Case** and **Drawings W10581 Sheets 56 to 64**.

- ☐ **Figure J-2a to J2i - MIKE 11 Design Flood Profiles for the 2, 10 and 50 Year ARI Flood Profiles (MHWS) - Regulation Lines and Revegetation Strategy Case** and **Drawings W10581 Sheets 65 to 73**.

- ☐ **Figure J-3a to J3i - Afflux for the 100 Year ARI Design Flood (MHWS) - Regulation Lines and Revegetation Strategy Case** and **Drawings W10581 Sheets 74 to 82.**

During the regulation line assessment, it was found that the hydraulic model was sensitive to the placement of the regulation lines above the Centenary Bridge.

This sensitivity was most likely due to the regulation lines forming a relatively consistent cross section which in turn increased the peak discharges downstream in the order of 200 to 300 m^3/s.

This increase in discharge had a significant impact on flood levels downstream of the Centenary Bridge and hence the moving of regulation line upstream of Centenary Bridge was very restrictive. Generally the amount of fill required at most locations upstream of Centenary Bridge was significant and hence was considered to be impractical.

A summary of the processes involved and the decisions made in preparing the combined regulation line and revegetation strategy is provided in this section. References to potential flooding are based on the 100 year ARI inundation. The assessment is detailed on a reach by reach description.

Reach 1 - Upper Boundary

Cross Sections: BN2020 to BN1980
Chainages: 1000 km to 1001.865 km
AMTD: 78.66 km to 76.795 km

Potential Flooding

No flooding of residences will occur in this reach. Any flooding which does occur will only inundate open space within the Brisbane City Boundary.

Revegetation

- No revegetation was assessed in this reach.
- As there is considerable natural vegetation throughout this reach, the riverbanks could be considered as areas of ecological importance.

Regulation Lines

- Regulation lines were generally set at the extent of inundation as major encroachments onto the floodplain caused an increase in discharge which increased affluxes to greater than 150 mm at the Merivale Bridge and downstream of the Centenary Bridge.
- BN1990 used a combination of moving the regulation line on the one bank and extent of inundation on the other bank to achieve the maximum allowable afflux.
- The range of affluxes in this reach with revegetation and regulation lines in place was from 0 to 30 mm.

Zoning Adjustments

- Current zoning through this reach is predominantly Open Space and Non-Urban. As no private residences are affected by the inundation lines, no rezoning for this reach has been recommended.

Reach 2 - Barellan Point

Cross Sections:	BN1970 to BN1910
Chainages:	1002.35 km to 1005.325 km
AMTD:	76.310 km to 73.335 km

Potential Flooding

From BN1970 to BN1930, flooding will affect those properties along Hawkesbury Road. From BN1920 to BN1910, several properties in Hawkesbury Road, and one in Matfield Street will be affected by flooding during a 100 year ARI flood event.

Revegetation

- ☐ No revegetation was assessed in this reach.
- ☐ As there is considerable natural vegetation throughout this reach, the riverbanks could be considered as areas of ecological importance.

Regulation Lines

- ☐ Regulation lines were generally set at the extent of inundation as major encroachments onto the floodplain caused an increase in discharge which increased affluxes to greater than 150 mm at the Merivale Bridge and downstream of the Centenary Bridge.
- ☐ BN1970 used a combination of moving the regulation line on the one bank and extent of inundation on the other bank to achieve the maximum allowable afflux.
- ☐ The range of affluxes in this reach with revegetation and regulation lines in place was from 0 to 20 mm.

Zoning Adjustments

- ☐ Current zoning throughout this reach is Open Space and Non-Urban. As no private dwellings are affected by the inundation lines, no rezoning for this reach has been recommended.

Reach 3 - Riverview

Cross Sections: BN1900 to BN1870
Chainages: 1005.87 km to 1007.41 km
AMTD: 72.79 km to 71.25 km

Potential Flooding

Properties along Hawkesbury Road, Myora Street, Aitcheson Street and Moggill Road will be partially affected by flooding during a 100 year ARI flood event.

Revegetation

- At BN1870 (reserve at Moggill Ferry), full tree planting was tested with flood level increases of 20 mm.
- All revegetation is to a standard of roughness, n = 0.15
- As there is considerable existing vegetation throughout this reach, the riverbanks could be considered as areas of ecological significance.

Regulation Lines

- Regulation lines were generally set at the extent of inundation as major encroachments onto the floodplain caused an increase in discharge which increased affluxes to greater than 150 mm at the Merivale Bridge and downstream of the Centenary Bridge.
- BN1900, BN1880 and BN1870 used a combination of moving the regulation line on the one bank and extent of inundation on the other bank to achieve the maximum allowable afflux.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from -60 to 0 mm.

Zoning Adjustments

- Zoning in this reach is predominantly Open Space along the riverbank and Future Urban.
- No rezoning has been recommended for this reach.

Reach 4 - Redbank

Cross-Sections: BN1860 to BN1770
Chainages: 1007.920 km to 1011.980 km
AMTD: 70.740 km to 66.680 km

Potential Flooding

The majority of flooding in this reach occurs onto open space.

At BN1860, flooding occurs back onto the start of Moggill Road, however the extent of flooding appears to occur over open space.

From BN1840 to BN1820, a localised area of flooding spreads back into Moggill Road inundating any properties in Aitcheson Street.

Flooding from BN1820 to BN1810 reaches Moggill / Malfield Road, but there does not appear to be any dwellings affected.

Properties along the river side of Prior's Pocket Road will be affected by flooding to some extent.

Revegetation

- No revegetation was assessed in this reach.
- There is considerable existing vegetation along the riverbanks, and also a large patch from BN1770 to BN1820, therefore the riverbanks could be considered zones of ecological significance.

Regulation Lines

- Regulation lines were generally set at the extent of inundation as major encroachments onto the floodplain caused an increase in discharge which increased affluxes to greater than 150 mm at the Merivale Bridge and downstream of the Centenary Bridge.
- BN1860, BN1830, BN1820, BN1780 and BN1770 used a combination of moving the regulation line on the one bank and extent of inundation on the other bank to achieve the maximum allowable afflux.
- From BN1840 to BN1830, regulation lines extend into some rural residential properties and non urban properties to a minor extent.
- From BN1860 to BN1850, regulation lines significantly affect several rural residential properties.
- The range of affluxes in this reach with revegetation and regulation lines in place was from -120 to -60 mm.

Zoning Adjustments

- From BN1860 to BN1850, sections of those Rural Residential zoned properties significantly affected by the regulation lines should be rezoned to Open Space (OS).
- Non Urban properties within this reach should be assessed on an individual basis and rezoned to Open Space if appropriate.

Reach 5 - Goodna

Cross Section:	BN1760 to BN 1720
Chainage:	1012.475 km to 1014.110 km
AMTD:	66.185 km to 64.550 km

Potential Flooding

Considerable flooding will occur during a 100 year ARI event on Prior's pocket.

From BN1750 to BN1710, flooding extends right back to the kink in Priors Pocket Road, covering the entire point, except for two patches of higher ground.

Revegetation

- No revegetation was assessed in this reach.
- Considerable vegetation exists right along the riverbanks in this reach. The riverbanks could be considered as areas of ecological significance.

Regulation Lines

- Regulation lines were generally set at the extent of inundation as major encroachments onto the floodplain caused an increase in discharge which increased affluxes to greater than 150 mm at the Merivale Bridge and downstream of the Centenary Bridge.
- BN1750 used a combination of moving the regulation line on the one bank and extent of inundation on the other bank to achieve the maximum allowable afflux.
- The point at the end of Priors Pocket Road is almost completely inundated from BN1730 to BN1670.
- The range of affluxes in this reach with revegetation and regulation lines in place was from -40 to -20 mm.

Zoning Adjustments

- Properties throughout this reach are generally zoned Open Space.
- Non Urban and Particular Development properties within this reach should be assessed on an individual basis and rezoned to Open Space if appropriate.

Reach 6 - Wacol

Cross Section:	BN1710 to BN 1610
Chainages:	1014.610 km to 1019.095 km
AMTD:	64.050 km to 59.565 km

Potential Flooding

From BN1710 to BN1670, Priors Pocket is flooded back until the kink in Priors Pocket Road.

From BN1660 to BN1650, properties in Priors Pocket Road and part of Avonmore Street will be affected by flooding in a 100 year ARI flood event.

From BN1640 to BN1630, flooding follows an unnamed creek (adjacent Stratford Street), and inundates the rear of several properties west of Livesay Road, inundation spreads north to Ellerby Street.

From BN1620 to BN1610, properties along Vanwall and Zelita Road will suffer inundation to some extent, as will the Department of Primary Industry Land.

Revegetation

- ☐ No revegetation was assessed in the Wacol reach.
- ☐ From BN1610 to BN1700 there is considerable existing vegetation. The riverbanks in these areas could be considered as areas of considerable ecological significance.

Regulation Lines

- ☐ Regulation lines were generally set at extent of inundation as encroachment onto the floodplain caused an increase in flood levels at the Merivale Bridge and downstream of the Centenary Bridge.
- ☐ BN 1690, BN1680, BN 1670 and BN 1660 used a combination of moving the regulation line on the one bank and extent of inundation on the other bank to achieve the maximum allowable afflux.
- ☐ BN 1650, BN1640 and BN 1630 used a combination of moving the regulation line on both banks to achieve the maximum allowable afflux.
- ☐ The range of affluxes in this reach with revegetation and regulation lines in place varies from -60 to 70 mm.

Zoning Adjustments

- ☐ Non Urban and Special Use properties within this reach should be assessed on an individual basis and rezoned to Open Space if appropriate.

Reach 7 - Riverhills

Cross Section: BN1600 to BN1530
Chainage: 1019.49 km to 1021.715 km
AMTD: 59.170 km to 59.945 km

Potential Flooding

At BN1530, a localised area of flooding inundates those properties adjacent to the park bounded by Juba and Zambesi Streets, with flooding extending up into Horizon Drive.

From BN1540 to BN1550, flooding extends over the largely undeveloped areas bounded by Pauluna, Loddon Streets and Westlake Drive. Numerous residences will also be inundated during a 100 year ARI flood event. On the western side of the river properties in Lather Road will suffer some extent of flooding.

From BN1570 to BN1600, an extensive area of flooding occurs in the Moggill Country Club, Booker Place and the swimming pool. However flooding does extend into a significant number of residential areas in Sugarwood Street, Ghost Gum Street up to Moggill Road, Birkin Road and across into Banyan Street.

At BN1600, flooding follows Wolston Creek, however the majority of this flooded area appears to be undeveloped.

Revegetation

- From BN1530 to BN1540 (Juba Street Park), full tree planting was tested with flood level increases of 20 mm.
- All revegetation is to a standard of roughness, n = 0.15
- From BN1560 to BN1600, there is considerable existing vegetation, therefore the riverbanks in this area could be considered zones of ecological significance.

Regulation Lines

- Regulation lines were generally set at the extent of inundation as major encroachments onto the floodplain caused an increase in discharge which increased affluxes to greater than 150 mm at the Merivale Bridge and downstream of the Centenary Bridge.
- BN1600, BN1590, BN1580, BN1570 and BN1540 used a combination of moving the regulation line on the one bank and extent of inundation on the other bank to achieve the maximum allowable afflux.
- BN1560, BN1550 and BN1530 used a combination of the 15 m buffer rule and extent of inundation to achieve the maximum allowable afflux.
- From BN1550 to BN1530, a block of property zoned as Future Urban will be affected considerably by the regulation lines.
- From BN1580 to BN1530, numerous residential properties will be affected by the regulation lines.

- The range of affluxes in this reach with revegetation and regulation lines in place ranges from 40 to 60 mm.

Zoning Adjustments

- The block of Future Urban property from BN1600 to BN1590 should be rezoned to Open Space
- From BN1580 to BN1530, those waterfront Residential A properties in Lather Street and Sumner Road should be rezoned to Open Space (OS).
- From BN1560 to BN1530, sections of those Rural Residential zoned properties significantly affected by the regulation lines should be rezoned to Open Space (OS).

Reach 8 - Westlake

Cross Section: BN1520 to BN1410
Chainages: 1021.895 km to 1026.680 km
AMTD: 56.765 km to 51.980 km

Potential Flooding

From BN1510 to BN1500, flooding generally follows Pullen Pullen Creek, with those properties bordering the creek suffering inundation during a 100 year ARI flood event. This area appears to be largely open space.

From BN1470 to BN1480, those properties in Westlake Drive will experience varying degrees of flooding.

Significant flooding occurs from BN1470 to BN1460, with floodwaters extending into Westlake and the properties surrounding it. Properties as far south as Raeside Street, east to Pending Street and west to the end of Westlake Drive will suffer flooding.

Another very large area of flooding occurs between BN1450 and BN1440 due to Mt Omaney Creek. The McLeod Country Golf Course, park, treatment works and the Jamboree Heights Primary school will all be inundated during a 100 year ARI flood event. Properties into Horizon Drive, Westlake Drive and Arrabri Avenue will also all suffer flooding.

At BN1400 flooding will occur along an unnamed creek (adjacent to Moggill Creek), with floodwaters extending into largely undeveloped land. Properties on the northern side of Moggill Creek will also suffer problems with inundation as will the University of Queensland Veterinary Farm.

Revegetation

- At BN1410 (Jindalee Park), full tree planting was tested with flood level increases of 10 mm.
- All revegetation is to a standard of roughness n = 0.15.
- There is considerable existing vegetation along the riverbanks throughout this reach. Therefore, the banks in this reach could be classified as zones of ecological significance.

Regulation Lines

- The regulation lines at BN1470, BN1430 and BN1420 have been set using the 15 m buffer rule as this is the governing criteria.
- BN1520, BN1510, BN1490, BN1460 and BN1440 used a combination of the 15 m buffer rule and extent of inundation to achieve the maximum allowable afflux.
- BN1500 and BN1450 used a combination of moving the regulation line on the one bank and extent of inundation on the other bank to achieve the maximum allowable afflux.

- BN1500, BN1480 and BN1410 used a combination of the buffer rule on one bank and the moving of the regulation line on the other bank until the maximum allowable afflux was obtained
- The range of affluxes in this reach with revegetation and regulation lines in place varies from -40 to 70 mm.

Zoning Adjustments

- From BN1520 to BN1410, those riverside properties zoned Residential A should be rezoned to Open Space. Those properties in Callabonah Street, Barcoorah Street, Westlake Drive, Carnegie Street, Mt Omaney Drive and Coolaroo Drive will be most effected should rezoning occur.
- From BN1520 to BN1500 those properties zoned Rural Residential should be rezoned to Open Space.
- From BN1490 to BN1410 those properties zoned Special Use should be rezoned to Open Space

Reach 9 - Mermaid Reach

Cross Section: BN1400 to BN1270
Chainages: 1026.900 km to 1031.995 km
AMTD: 51.76 km to 44.665 km

Potential Flooding

Extensive flooding of properties occurs throughout the whole of this reach. Between BN1270 and BN1280, a localised area of flooding inundates properties as far south as Cliveden Avenue with flooding occurring in parts of Teesdale Street, Richmond Street and Oxley Terrace and west to properties in Blackheath Road.

From BN1290 to BN1340, the largely undeveloped area bounded by Seventeen Mile Rocks Road will be inundated during a 100 year ARI flood event. Also in this region, properties in Newland Street and the Fig Tree Pocket Pony Club will also suffer flooding.

From BN1340 to BN1360 flooding occurs through the watercourse (located near Jindalee Bridge) and extends past Oldfield Road. Properties in Yallambee Road, Capitol Drive, Sinnamon Road and parts of Oldfield Road will all be inundated during a 100 year ARI flood event.

From BN1370 to BN1400, a large area of flooding occurs through a highly developed residential area. Flooding will extend as far South as Curragundi Road and into a section of Arabri Avenue between sections BN1380 and BN1390. From BN 1390 to BN1400, this flooding is limited to properties along Mt Omaney Drive and Bareena Avenue. On the northern side of the river, flooding occurs through mostly undeveloped land north into Scenic Road.

Revegetation

- At BN1400 (Jindalee Park), full tree planting was tested with flood level increases 0.01 m. All revegetation is to a standard of roughness, n = 0.15.
- There is considerable existing vegetation throughout this reach and the riverbanks may therefore be considered areas of ecological significance.

Regulation Lines

- The 15 meter buffer rule was generally used for cross sections in this reach.
- BN1400, BN1370 and BN1330 on one bank regulation line used the 15 m buffer rule and the other bank regulation line has been moved until the maximum allowable afflux has been achieved.
- At BN1360 one bank regulation line has been set at inundation and the other bank has been set using the 15 m buffer rule.
- From BN1270 through to BN1300, regulation lines are set along the riverbank affect Residential A and Future Urban areas.

- Regulation lines extend significantly into areas zoned as Residential A and Non Urban between sections BN1330 and BN1320.
- Between BN1300 and BN1310 a significant amount of General Industry land is affected by the regulation lines.
- Between BN1330 and BN1400 significant amounts of Residential A, Future Urban, Rural Residential, Particular Development and CN land is affected by the regulation lines.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from -40 to 120 mm.

Zoning Adjustments

- The property zoned General Industry and Future Industry between sections BN1290 and BN1310, should be rezoned to Open Space, extending back to Sinnamon Road.
- Residential A properties within this reach should be assessed as to the extent to which regulation lines affect the properties and zoned Open Space as appropriate.
- Properties zoned Future Urban should be rezoned to Open Space.
- Particular development and CN properties should be assessed on an individual basis and rezoned to Open Space as appropriate.

Reach 10 - Sherwood Reach

Cross Section: BN1260 to BN1200
Chainage: 1032.230 km to 1034.890 km
AMTD: 46.430 km to 43.770 km

Potential Flooding

From BN1200 to BN1210, properties bounding Cubberla Creek will all suffer flooding during a 100 year ARI flood event, especially those properties in Jesmond Drive, Needham Street, Ningana Street, Aminga Street and Sprenga, Karella and Thiesfield Streets. On the Eastern side of the River, some properties in Molonga Terrace, Long Street and Kianga Streets will all experience flooding.

From BN1220 to BN1230, Sherwood Forest Park and those streets bounding it, will suffer inundation, especially Turner, Jolimont, Ferry and Joseph Streets. On the Western side, some properties in Jesmond road will experience a degree of flooding.

In the 100 year ARI event, extensive flooding into residential areas will occur between BN1240 and BN1260, with only the higher properties in the Cylene Court and Michelangelo / Botticelli Street vicinity being unaffected.

Revegetation

- ☐ From BN1250 to BN1260 (Mandalay Park) and at BN1220 (Sherwood Forest Park), full tree planting was tested with no increase in flood levels.
- ☐ All revegetation is to standard of roughness of $n = 0.15$
- ☐ From BN1240 to BN1260, there is considerable existing vegetation and therefore, the riverbanks may be considered as areas of ecological significance.

Regulation Lines

- ☐ The 15 m buffer rule has been applied to regulation lines throughout this reach.
- ☐ Between BN1200 and BN1210, regulation lines will extend into existing private residences and also into an area of land zoned as Non Urban.
- ☐ From BN1210 to BN1260, numerous private residences will be affected by the regulation lines to a certain extent.
- ☐ The range of affluxes in this reach with revegetation and regulation lines in place varies from 90 to 150 mm.

Zoning Adjustments

- ☐ The property designated as Future Urban should be partially rezoned to incorporate an Open Space corridor to the extent of the regulation lines between BN1210 and BN1220.
- ☐ From BN1200 to BN1260, properties zoned Residential A should be assessed to determine the extent to which regulation lines affect properties. Those properties significantly affected by the regulation lines should be rezoned to Open Space.
- ☐ Special Use, Particular Development and Non Urban properties should be assessed on an individual basis and rezoned as appropriate.

Reach 11 - Chelmer Reach

Cross Section: BN1190 to BN1150
Chainage: 1035.474 km to 1036.915 km
AMTD: 43.246 km to 41.745 km

Potential Flooding

In this reach, flooding is limited to a localised pocket between sections BN1160 and BN1170, with some flooding on the Eastern side.

The localised flooding between sections BN1160 and BN1170 extends as far inwards as Moggill Road and is bounded on the southern side by Boundary Road, with some flooding into Market and Minkara Streets. Flooding on the Northern side generally follows Witton Creek, with flooding extending into Kate Street, Vera Street and Aaron Place. On the eastern side, properties in Longman Terrace, Sutton and Morley Streets will all suffer inundation during a 100 year ARI flood.

Between sections BN1170 and BN1180, another localised area of flooding occurs causing inundation in properties located in Brinkworth Place, Jainba and Jerrang Streets.

From BN1180 to BN1190, properties bounding Cubberla Creek will experience flooding problems, especially those properties in Dobell Street and parts of Clandon and Forlong Streets.

Revegetation

- No revegetation was assessed in this reach.
- As there is considerable existing vegetation throughout this whole reach, the riverbanks and the areas bounding Cubberla Creek, could be considered an area of ecological significance.

Regulation Lines

- The 15 m buffer rule has been applied to regulation lines throughout this reach.
- Throughout this reach, regulation lines will extend significantly into private residential properties. Some properties will be affected by the regulation lines to a greater extent than others.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 110 to 140 mm.

Zoning Adjustments

- Rezone those Residential A and Residential B properties, significantly affected by the regulation lines, to Open Space (OS), especially those properties in Sutton Street and Morley Street.

Reach 12 - Indooroopilly Reach

Cross Section: BN1140 to BN1070
Chainage: 1037.090 km to 1039.100 km
AMTD: 41.570 km to 39.560 km

Potential Flooding

There is an extensive area of flooding of this whole reach, especially on the Chelmer side of the river. From BN1110 to BN1070, flooding occurs as far back as Kitchener / Appel Street with this corridor narrowing at BN1080 to Chanter Street. Chelmer Oval, Faulkner park, Graceville Memorial Park, the Graceville Primary School and a very large number of residences will all be inundated during a 100 year ARI flood event.

On the Eastern side of the river, flooding is limited to Thomas and Sir John Chandler Park, with some properties in Ivy Street, Clarence Road and Glencairn Avenue suffering some flooding.

Revegetation

- No revegetation was assessed in this reach.
- There is considerable existing vegetation throughout this reach, thus the riverbanks could be considered an area of ecological significance.

Regulation Lines

- The 15 m buffer rule has generally been applied to regulation lines throughout this reach.
- BN1140 regulation lines were set using the 15 m buffer rule on one side and adjusted on the other side until the maximum allowable afflux was achieved.
- BN1120 regulation lines were adjusted on both sides until the maximum allowable afflux was achieved.
- Regulation lines at BN1070 used the 15m buffer rule on the left bank and extent of cross section on the right bank due to lack of topographical and cadastral information at this location.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 60 to 150 mm.

Zoning Adjustments

- Rezone Residential A properties in Leybourne Street and Queenscroft Avenue between BN1070 and BN1080 to Open Space (OS).
- Properties in Ivy and Roseberry Streets should be rezoned from Residential A to Open Space.
- Particular Development and Special Use properties should be assessed on an individual basis and rezoned as appropriate.

Reach 13 - Canoe Reach

Cross Section:	BN1060 to BN990
Chainage:	1039.565 km to 1041.960 km
AMTD:	39.095 km to 36.700 km

Potential Flooding

The majority of flooding in this reach is confined to the Oxley Creek / Moolabin Creek areas, with some localised pockets of inundation.

From BN1060 to BN1040, properties bounding Oxley Creek will all suffer inundation with the limits being Tweedale/Blackwood Street to the west and David Street to the east with those higher properties in King Arthur Terrace, Merlin and Camelot Streets being immune to flooding. Sir John Chandler Park and the Indooroopilly Golf Course will be completely inundated during a 100 year ARI flood event.

From BN1020 to BN1010, flooding occurs through the Yeerongpilly Animal Research Institute and floods some properties in Paragon and Ortive Streets. Flooding along Moolabin Creek is also a problem in this area, with the Brisbane Golf Course and properties back to Tennyson Memorial Avenue and Station Road being affected.

From BN1000 to BN990, the main problem areas in a 100 year ARI flood event will be Stevens Street and Nelson Street back to Fairfield Road. Some properties in Yeronga, Feez and Astolat Streets will also be affected by flooding to some extent.

Revegetation

- From BN1020 to BN1030 (adjacent Yeerongpilly Animal Research Institute), full tree planting was tested with flood level increases of the order of 0.01 m.
- All revegetation is to a standard of roughness of n = 0.15.
- There is considerable existing vegetation throughout this reach, thus the riverbanks could be considered an area of ecological significance.

Regulation Lines

- Regulation lines at BN1060 to BN 990 used the 15 m buffer rule on the left bank and extent of cross section on the right bank due to lack of topographical and cadastral information at these locations.
- From BN990 to BN1010 and from BN1030 to BN1050, regulation lines will extend into the rear of numerous private dwellings.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 80 to 130 mm.

Zoning Adjustments

☐ Rezoning of Residential B dwellings in Rome Street south, Astolat Street, Feez, Yeronga and Steven Streets to Open Space (OS) is recommended between BN990 and BN1010.

☐ It is also recommended that from sections BN1040 and BN1060, those Residential A properties in King Arthur Terrace, Verney Road East, Jarda Street and White Street should be rezoned to Open Space (OS).

Reach 14 - Long Pocket Reach

Cross Section: BN980 to BN910
Chainage: 1042.235 km to 1044.860 km
AMTD: 36.425 km to 33.800 km

Potential Flooding

The majority of flooding in this reach is confined to the Indooroopilly Golf Course, with some local flooding in the Yeronga area.

From BN980 to BN970, some minor flooding will occur to properties located in Instow Street and the Yeronga Animal Hospital will also be affected.

From BN960 to BN950, the flooding becomes more widespread with properties along the Esplanade, Diane Street, Ormadale Street, Oriana Crescent and Aranui Street all being affected. Flooding on the eastern side of the river will affect the CSIRO to some extent.

From BN940 to BN930, flooding is limited to Brisbane Corso and Orlando Road with some properties in Otaki and Ormuz Roads also being affected.

In a 100 year ARI flood event, flooding will extend to Hyde Road from BN920 to BN910, affecting properties as far south as Utzon, Grounds and Siedler Streets. Goodwin Park will also be inundated.

Revegetation

- From BN940 to BN960 (Sandy Creek), full tree planting was tested with flood level increases of the order of 10 mm.
- Community Groups suggest that existing vegetation on the banks around the confluence of Sandy Creek should be revegetated using native flora. This has therefore been included in the modelling to the $n = 0.15$ standard.
- There is considerable existing vegetation throughout the whole reach, and the riverbanks could therefore be considered an area of ecological significance.

Regulation Lines

- Regulation lines at BN980 to BN960 used the 15 m buffer rule on the left bank and extent of cross section on the right bank due to lack of topographical and cadastral information at these locations.
- From BN950 to BN910, regulation lines have been set using the 15 m buffer rule.
- Regulation lines will pass through numerous private residences throughout the reach.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 10 to 120 mm.

Zoning Adjustments

- Rezoning of waterfront existing Residential A properties in Brisbane Corso, Ormadale Road and Kadumba Street to Open Space (OS) is recommended throughout this reach.
- Special Use and Particular Development properties should be assessed on an individual basis and rezoned as appropriate.

Reach 15 - Cemetery Reach

Cross Section:	BN900 to BN830
Chainage:	1045.400 km to 1047.915 km
AMTD:	33.260 km to 30.745 km

Potential flooding

There is considerable flooding in this reach from BN870 through to BN900.

At BN900, flooding mainly affects the Downs Oval, Leyshan Park and Fehlberg Oval. In a 100 year ARI flood event, properties as far back as the Railway line, Kadumba Street and a small area as far back as Cowper Street will all be affected by flooding. Properties in William Parade, Turner Avenue and Brougham Street will also suffer inundation.

From BN890 to BN880, a large area of flooding extends as far east as the railway line, south to Fairfield Road / Sydney Street/Cruthley Street and north into the cemetery.

Flooding is limited to the riverbank areas with some properties in Rosecliff and Borva Streets being affected by flooding from BN870 to BN840. It is anticipated that the University of Queensland will be affected by flooding as well. However, additional topographical and cadastral information is required before this can be finalised.

At BN830, a small area of localised flooding occurs during a 100 year flood event. Properties in Athens Street, Dudley Street and Glenfield will all be affected by flooding. On the southern side of the river, flooding extends as far back as to affect properties in Underhill Street.

Revegetation

- ☐ At BN900 (Brisbane Corso Reserve), full tree planting was tested with flood level increases of the order of 0 mm.
- ☐ All revegetation is to a standard of roughness of n = 0.15.
- ☐ There is considerable existing vegetation throughout this reach, and thus the riverbanks may be considered an area of ecological significance.

Regulation Lines

- ☐ The 15 m buffer rule has been applied to regulation lines throughout this reach.
- ☐ BN860 regulation lines have been set using the 15 m buffer rule on one bank and adjusted on the other bank until the maximum allowable afflux was achieved.
- ☐ From BN830 to BN860, regulation lines will extend past the Open Space buffer zone and into the rear of numerous Residential B dwellings. The University of Queensland will also be significantly affected by the regulation lines.

- From BN880 to BN890, the 15 m buffer rule causes regulation lines to extend into private residences.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 60 to 110 mm.

Zoning Adjustments

- Rezone waterfront Residential B dwellings in Dudley Street, Fraser Terrace, Rosecliff and Borva Streets to Open Space (OS).
- From BN880 to BN890, rezone waterfront residences in Brisbane Corso to Open Space (OS).
- Special Use properties within this reach should be assessed on an individual basis and rezoned as appropriate.

Reach 16 - St Lucia Reach

Cross Section:	BN820 to BN810
Chainage:	1048.375 km to 1048.890 km
AMTD:	30.285 km to 29.770 km

Potential Flooding

There is a considerable flooding of residential areas in this reach.

On the St Lucia side, properties as far back as Sixth Avenue at BN820 and Sir Fred Schonell Drive at BN810 are inundated during a 100 year ARI flood event. Parts of Mitre, Durham and Warren Streets are also affected.

On the northern side, flooding extends as far as Jumna Street at BN820 and Cordaeux Street at BN810.

Revegetation

- ☐ At BN810 (Orliegh Park), full tree planting was tested with increases in flood levels of 10 mm.
- ☐ All revegetation is to a standard of roughness of n = 0.15.

Regulation Lines

- ☐ The 15 m buffer rule has been applied to regulation lines throughout this reach.
- ☐ From BN810 to BN820, due to the 15 m buffer rule, regulation lines will extend into numerous residential dwellings.
- ☐ The range of affluxes in this reach with revegetation and regulation lines in place varies from 60 to 80 mm.

Zoning Adjustments

- ☐ Although a zone of Open Space along Orliegh, Avebury and Glenfield Streets has already been defined, this should be extended to include those existing waterfront Residential B properties in these streets.
- ☐ On the St Lucia side, those waterfront Residential B properties in Hiron, Laurence and Macquarie Streets should be rezoned to Open Space (OS).

Reach 17 - Toowong Reach

Cross Section:	BN800 to BN750
Chainage:	1049.120 km to 1050.860 km
AMTD:	29.540 km to 27.800 km

Potential Flooding

Flooding in this reach is concentrated around Toowong Creek and a few small areas of localised flooding. The Hill End / West End side of the River is consistently flooded.

At BN800, a small pocket of flooding occurs as far south as Armadale Street, east to Austral Street and west to Glen Olive Lane. On the northern side of the river, properties back to Drury Street/ Cordeaux Street will suffer inundation.

At BN 790, flooding in a 100 year ARI flood event is concentrated around Toowong Creek. Flooding occurs as far South in places as Whitmore Street and west to Josling Street with some properties in Mayne, Holmes and Herbert Streets being affected.

From BN780 to BN770, the main problems with flooding during a 100 year ARI flood event occurs through Hillend Terrace, Forbes, Drury Streets and Ferry Road. Some properties in Brisbane Street and Glen Road in Toowong will also suffer flooding problems.

From BN760 to BN750 there are large areas of flooding. On the West End side of the river, flooding extends as far back as Montague Road. On the Toowong side, there are two localised flooding areas, one extending along Landsborough Street up to Osyth / Cadell Street and back down to the railway line. The other pocket of flooding extends along Park Avenue to Milton Road and again back to the railway line. Higher properties in the area bounded by Dunmore Terrace, Lang Parade and Chasely Street are immune to flooding.

Revegetation

- ☐ From BN790 to BN800 (Orliegh Park) and at BN750 (Scott Street open Space), full tree planting was tested with no increase in flood levels.
- ☐ All revegetation is to a standard of roughness of n = 0.15.

Regulation Lines

- ☐ The 15 m buffer rule has been applied to regulation lines throughout this reach.
- ☐ BN 770 regulation lines were set using the 15 m buffer rule on one bank and adjusted on the other bank until the maximum allowable afflux was achieved.
- ☐ BN760 regulation lines have been set adjusting both banks until the maximum allowable afflux was achieved.

- At BN750, regulation lines are located at property boundaries.
- From BN 760 to BN790, regulation lines will pass through a block of Residential B dwellings and through numerous properties zoned Special Development.
- At BN800, regulation lines are located at the riverbank.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 15 to 100 mm.

Zoning Adjustments

- From BN760 through to BN790, those waterfront Residential B properties should be rezoned to Open Space (OS), particularly those located in Archer Street, Land Street, Glen Road, Brisbane Street and Sandford Street.
- Particular Development and Special Development properties should be assessed on an individual basis and rezoned as appropriate.

Reach 18 - Milton Reach

Cross Section: BN740 to BN700
Chainage: 1051.360 km to 1052.390 km
AMTD: 27.300 km to 26.270 km

Potential Flooding

Flooding in this reach is mainly concentrated on the West End side of the river, but a lack of contour information limits the determination of the extent of actual flooding.

At BN740, there is a localised area of flooding in Milton, extending back to Milton Road with several properties in Baroona Road being affected. This flooding extends out to Park Street at its worst.

From BN720 to BN700, problems with inundation during a 100 year ARI flood event occur as far back as Oxford Street on the eastern side of the river.

Revegetation

- No revegetation was assessed through this reach.

Regulation Lines

- The 15 m buffer rule has been applied to regulation lines throughout this reach.
- At BN730 the regulation lines were adjusted on both sides until the maximum allowable afflux was achieved.
- From BN720 through to BN740, the regulation lines extend into properties zoned as Special Development.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 80 to 110 mm.

Zoning Adjustments

- The majority of this reach is zoned Special Development, therefore no rezoning of this reach has been recommended.

Reach 19 - South Brisbane Reach

Cross Section: BN690 to BN600
Chainage: 1052.595 km to
AMTD: 26.065 km to

Potential Flooding

Properties along Garden's Point Road and Wharf Road will experience problems with flooding during a 100 year ARI flood event. Southbank will be inundated as will Stanley Street, Grey Street and parts of Melbourne Street.

Revegetation

- ☐ No revegetation was assessed throughout this reach.

Regulation Lines

- ☐ The 15 m buffer rule has been applied throughout this reach.
- ☐ At BN660 the regulation lines were adjusted on both sides until the maximum allowable afflux was achieved.
- ☐ From BN600 through to BN690, regulation lines are generally located at the riverbank.
- ☐ Affluxes in this reach with revegetation and regulation lines in place range from 50 to 160 mm.

Zoning Adjustments

- ☐ As no intrusion into private residences occurs in this reach, no rezoning adjustments are recommended.
- ☐ Special Use and Particular Development properties should be assessed on an individual basis and rezoned as appropriate.

Reach 20 - Town Reach

Cross Section: BN590 to BN500
Chainage: 1054.680 km to 1056.865 km
AMTD: 23.980 km to 21.965 km

Potential Flooding

The major areas of concern with respect to inundation during a 100 year ARI flood in this reach are sections of the city and Kangaroo Point.

From BN590 to BN550, properties along River Terrace, Lower River Terrace and Garden's Point Road will all experience problems with flood inundation.

From BN540 to BN530, the Botanic Gardens will be inundated as will the City back to Charlotte Street, with parts of Mary, Margaret, Albert and Edward Streets experiencing flooding. Properties in Felix and Eagle Streets will experience flooding as will parts of Bright, Thornton and Hamilton Streets.

From BN520 to BN500, properties on Kangaroo Point back to the end of Anderson Street will experience problems with flooding during a 100 year ARI flood. On the City side, properties in Howard Street up to Queen Street will suffer inundation. At BN500, some properties in Bowen Street will experience problems with flooding.

Revegetation

- From BN540 to BN560, full tree planting was tested with flood level increases in the order of 10 mm. All revegetation is to a standard of roughness of n = 0.15.
- At section BN520, there is considerable existing vegetation and may be classified as an area of ecological significance.

Regulation Lines

- The 15 m buffer rule has been applied throughout this reach.
- From BN500 to BN530, regulation lines will pass through existing properties zoned Special Development.
- From BN540 to BN590, regulation lines extend into property already zoned Open Space.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 30 to 70 mm.

Zoning Adjustments

- As the regulation lines do not affect any private residences, no rezoning for this reach has been recommended.
- Special Development, Particular Development and Central Business should be assessed on an individual basis and rezoned as appropriate.

Reach 21 - Shaftston Reach

Cross Section: BN490 to BN440
Chainage: 1056.95 km to 1058.530 km
AMTD: 21.71 km to 20.130 km

Potential Flooding

From BN490 to BN480, properties along Bowen Terrace will suffer problems with inundation during a 100 year ARI flood event. From BN480 to BN460, properties along Dockside and Kangaroo point back to Wharf Street will all suffer flooding with Holman and Anderson Streets being completely inundated.

Flooding will be experienced by properties in Sydney and Griffith Streets from BN440 to BN450.

Revegetation

☐ No revegetation was assessed through this reach.

Regulation Lines

☐ The 15 m buffer rule has been applied throughout this reach.
☐ Through this reach, regulation lines are located through properties zoned as Special Development.
☐ The range of affluxes in this reach with revegetation and regulation lines in place varies from 20 to 40 mm.

Zoning Adjustments

☐ No residential areas are affected by regulation lines through this reach, however consideration should be given to rezoning the considerable number of waterfront Special Development areas throughout this reach to Open Space (especially along Kangaroo Point).

Reach 22 - Humbug Reach

Cross Section: BN430 to BN400
Chainage: 1058.735 km to 1059.990 km
AMTD: 19.925 km to 18.670 km

Potential Flooding

This reach has localised flooding problems associated with Norman Creek.

From BN420 to BN410, there is extensive flooding associated with properties adjacent to Norman Creek. Properties as far northeast as Overend and Wordsworth Streets will experience inundation, as will properties to the west in Barker, Ashfield and Clarendon Streets to Mowbray Terrace.

At BN420, a localised area of flooding occurs in Moray and Sargent Streets to Mountford Road with Oxlade Drive and parts of Hazelwood Street being inundated.

Revegetation

- No revegetation was assessed through this reach.

Regulation Lines

- The 15 m buffer rule has been applied throughout this reach.
- From BN400 to BN410, the 15m buffer rule has resulted in regulation lines being situated through private dwellings.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from 10 to 20 mm.

Zoning Adjustments

- Properties zoned Residential A along Wynnum Road and Wendell Street should be rezoned Open Space.
- Properties currently zoned Special Development should be assessed on an individual basis and rezoned as appropriate.

Reach 23 - Bulimba Reach

Cross Section:	BN390 to BN330
Chainage:	1060.345 km to 1062.940 km
AMTD:	18.315 km to 15.720 km

Potential Flooding

From BN370 to BN350, there is a very large area of flooding primarily covering residential dwellings. The large industrial area bounded by Stuart and Barramul Streets will be flooded and the flooding will extend inwards as far as Riding Road in places, south to Orchard Street and north to Oxford Road.

At BN370, there will be some flooding associated with properties in Gordon, Scott and parts of Malcolm Streets.

From BN350 to BN330, another localised area of flooding extends through a primarily industrial area back to Commercial road, generally following Breakfast Creek Road north to Breakfast Creek. The higher properties in Newstead Avenue and Halford Streets are the exception to the flooding.

Revegetation

- ☐ At BN340 (Newstead Terrace Reserve), full tree planting was tested with no increases in flood level.
- ☐ All revegetation is a standard of roughness of n = 0.15.
- ☐ Sections of BN390 can be considered an area of ecological significance due to the existing vegetation.

Regulation Lines

- ☐ The 15 m buffer rule has been applied throughout this reach.
- ☐ From BN320 through to BN390, regulation lines are situated through numerous private dwellings and properties zoned service trades.
- ☐ The range of affluxes in this reach with revegetation and regulation lines in place varies from -10 to 10 mm.

Zoning Adjustments

- ☐ Blocks of Residential A dwellings along Quay Street, Leura Terrace, Barton Road, Gordon Street, Scott Street, Uhlman Street and Aaron Avenue should be rezoned to Open Space.
- ☐ Consideration to rezoning all waterfront service industries to Open Space should also be given consideration.

Reach 24 - Hamilton Reach

Cross Section:	BN320 to BN260
Chainage:	1068.310 km to 1065.990 km
AMTD:	15.30 km to 12.670 km

Potential Flooding

At BN270, properties in Taylor Street and lower ends of Carbeen, Karthena and Michael Streets will experience flooding during a 100 year ARI flood event.

McConnell Street, Merry Street, Melrose, Cowper, River end of Kenbury, Bulimba, Banya, Johnston, Harrison, Tennyson and Shakespeare Streets will all suffer from flooding.

Revegetation

- ☐ No revegetation has been assessed for this reach.
- ☐ At BN290 there is existing vegetation and, as such, the riverbank in this area could be considered as a zone of ecological significance.

Regulation Lines

- ☐ The 15 m buffer rule has been applied throughout this reach.
- ☐ BN270 and BN 260 include a maximum allowance of allowance of 30 m for wharfs in lieu of the 15 m buffer rule.
- ☐ From BN290 to BN310, the 15m buffer rule has resulted in the regulation lines being situated through private residences along McConnell Street.
- ☐ At BN320, regulation lines are situated along the riverbank edge.
- ☐ The affluxes in this reach with revegetation and regulation lines in place are -20 mm.

Zoning Adjustments

- ☐ Properties zoned residential in McConnell Street between BN290 and BN300 should be rezoned to Open Space.
- ☐ Properties zoned Particular Development, Special Use and General Industry should be assessed on an individual basis and rezoned as appropriate.

Reach 25 - Quarries Reach

Cross Section: BN250 - BN220
Chainage: 1066.505 km to 1067.965 km
AMTD: 12.155 km to 10.695 km

Potential Flooding

At BN250, properties in Riverside Place back to Lytton Street will all suffer from inundation in a 1 in 100 year storm event.

From BN230 to BN220, flooding will occur onto the Royal Queensland Golf Course.

Revegetation

- From BN220 to BN230 (Royal Queensland Golf Course), full tree planting was tested with no increase in flood levels.
- All revegetation is to a standard of roughness of n = 0.15.

Regulation Lines

- Regulation lines in this reach include a maximum allowance of 30m for wharves and associated waterfront development. This is in lieu of the 15 m buffer rule.
- At BN250, regulation lines extend into existing properties. However, the flooding extends into properties zoned waterfront activities and an allowance has been made for wharves in lieu of the 15 m buffer zone.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from -30 to 0 mm.

Zoning Adjustments

- Zoning through this reach is predominantly Waterfront Activities and industrial. As such, no recommendations for rezoning have been made.

Reach 26 - Lytton Reach

Cross Section:	BN210 - BN110
Chainage:	1068.660 km to 1073.485 km
AMTD:	10.00 km to 5.175 km

Potential Flooding

At BN190, flooding during a 100 year ARI flood event will affect those properties along Macarthur Avenue.

From BN170 to BN160, flooding occurs into Unwin Road, Randle Street, parts of Macarthur Avenue and back into the airport.

From BN130 to BN120, flooding only appears to occur in open space areas.

Revegetation

- No revegetation was assessed in this reach.

Regulation Lines

- Regulation lines in this reach include an maximum allowance of 30 m for wharves and associated waterfront development. This is in lieu of the 15 m buffer rule.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from -20 to 60 mm.

Zoning Adjustments

- Properties in this reach are predominantly zoned Industrial or Waterfront Industry. No modifications to the zonings is required.

Reach 27 - Lytton Rocks Reach

Cross Section: BN100 to BN70
Chainage: 1074 km to 1075.480 km
AMTD: 4.660 km to 3.180 km

Potential Flooding

This reach experiences extensive flooding, especially from BN110 to BN90, where floodwaters inundate properties in Pritchard Street, South Street, Lytton Road, Trade Street and Export Street. Flooding also affects properties in Pamela and Tingara Streets all the way through to Boggy Creek.

Revegetation

- At BN70 and BN90, full tree planting was tested with no increase in flood levels.
- All revegetation is a standard of roughness of n = 0.15.
- The occurrence of existing vegetation at section BN80 indicates that the riverbanks in this section could be considered a zone of ecological significance.

Regulation Lines

- Regulation lines in this reach include an maximum allowance of 30 m for wharves and associated waterfront development. This is in lieu of the 15 m buffer rule.
- Regulation lines in this reach generally follow the bank profile. From BN70 to BN80, some intrusion into the bank does occur, however in this instance an allowance has been made for wharves and associated waterfront development.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from -10 to 0 mm.

Zoning Adjustments

- As this reach is predominantly zoned Industrial and Waterfront Development, no rezoning recommendations have been made.

Reach 28 - Pelican Banks Reach

Cross Section: BN60 to BN40
Chainage: 1076 km to 1077.010 km
AMTD: 2.66 km to 1.650 km

Potential Flooding

No developed properties appear to be affected by flooding through this reach, although there will be some flooding throughout existing low lying areas.

Revegetation

- From BN40 to BN60, full tree planting was tested with no increase in flood levels.
- All revegetation is to a standard of roughness of n = 0.15.
- Due to the existing natural vegetation, the riverbanks at section BN40 could be considered a zone of ecological significance.

Regulation Lines

- Regulation lines in this reach include a maximum allowance of 30m for wharves and associated waterfront development from BN60. This is in lieu of the 15 m buffer rule.
- Regulation lines in this reach generally follow the riverbank. Some intrusion into the bank occurs at section BN50, however this is into undeveloped swampy land.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from -10 to 0 mm.

Zoning Adjustments

- This reach is predominantly zoned Industrial and Waterfront Development. As such, no recommendations for rezoning have been made for this reach.

Reach 29 - Lower Reach

Cross Section: BN30 to BN0
Chainage: 1077.510 km to 1078.66 km
AMTD: 1.150 km to 0 km

Potential Flooding

During a 100 year ARI flood event, flooding will affect existing grain and container terminals on Fisherman Island to some extent.

Revegetation

- From BN10 to BN30, full tree planting was tested with no increase in flood levels.
- All revegetation is to a standard of roughness of n = 0.15.

Regulation Lines

- Regulation lines in this reach are generally located in low lying areas.
- The range of affluxes in this reach with revegetation and regulation lines in place varies from -10 to 0 mm.

Zoning Adjustments

- This reach is mainly zoned Industrial or Waterfront Industry. No rezoning through this reach is recommended.

10. Hydraulic Assessment of Structures

10. Hydraulic Assessment of Structures

10.1 Hydraulic Capacity of Crossings

The performances of seven major bridges were individually assessed under design flood conditions. These structures are listed in **Table 10-1 - List of Assessed Hydraulic Structures for Brisbane River**.

Table 10-1 - List of Assessed Hydraulic Structures for Brisbane River

No.	Structure Name	Cross Section Number	MIKE 11 Chainage (km)	AMTD (km)	Structure Description
1	Centenary	BN 1350	1 028.72	49.94	Major Public Bridge
2	Indooroopilly	BN 1130	1 037.11	41.55	Major Public Bridge
3	Merivale	BN 710	1 052.37	26.29	Major Public Bridge
4	William Jolly	BN 680	1 052.63	26.03	Major Public Bridge
5	Victoria	BN 640	1 053.36	25.83	Major Public Bridge
6	Captain Cook	BN 600	1 054.66	24.00	Major Public Bridge
7	Story	BN 495	1 056.92	21.74	Major Public Bridge

Note: All structures were modelled in MIKE 11 as irregular culverts and weirs.

A series of reference sheets were prepared and are compiled in **Appendix K - Hydraulic Structure Reference Sheets**. These are consistent with Council's standard hydraulic structure reference sheets and include:

☐ Location of Structure

☐ Structure description and geometry including dimensions and key levels

☐ Reference to survey data

☐ Construction date and upgrade information

☐ General comments

Additional information has been included on the sheets regarding the hydraulic performance of the structure for design flows ranging from 2 year ARI to 100 year ARI.

Rating curves for the seven major structures were developed using the MIKE 11 hydraulic model for the Brisbane River. These rating curves were determined by taking the peak discharge and peak level for a range of design events directly upstream of each structure. Structure handrails and guardrails were assumed to be fully blocked by debris.

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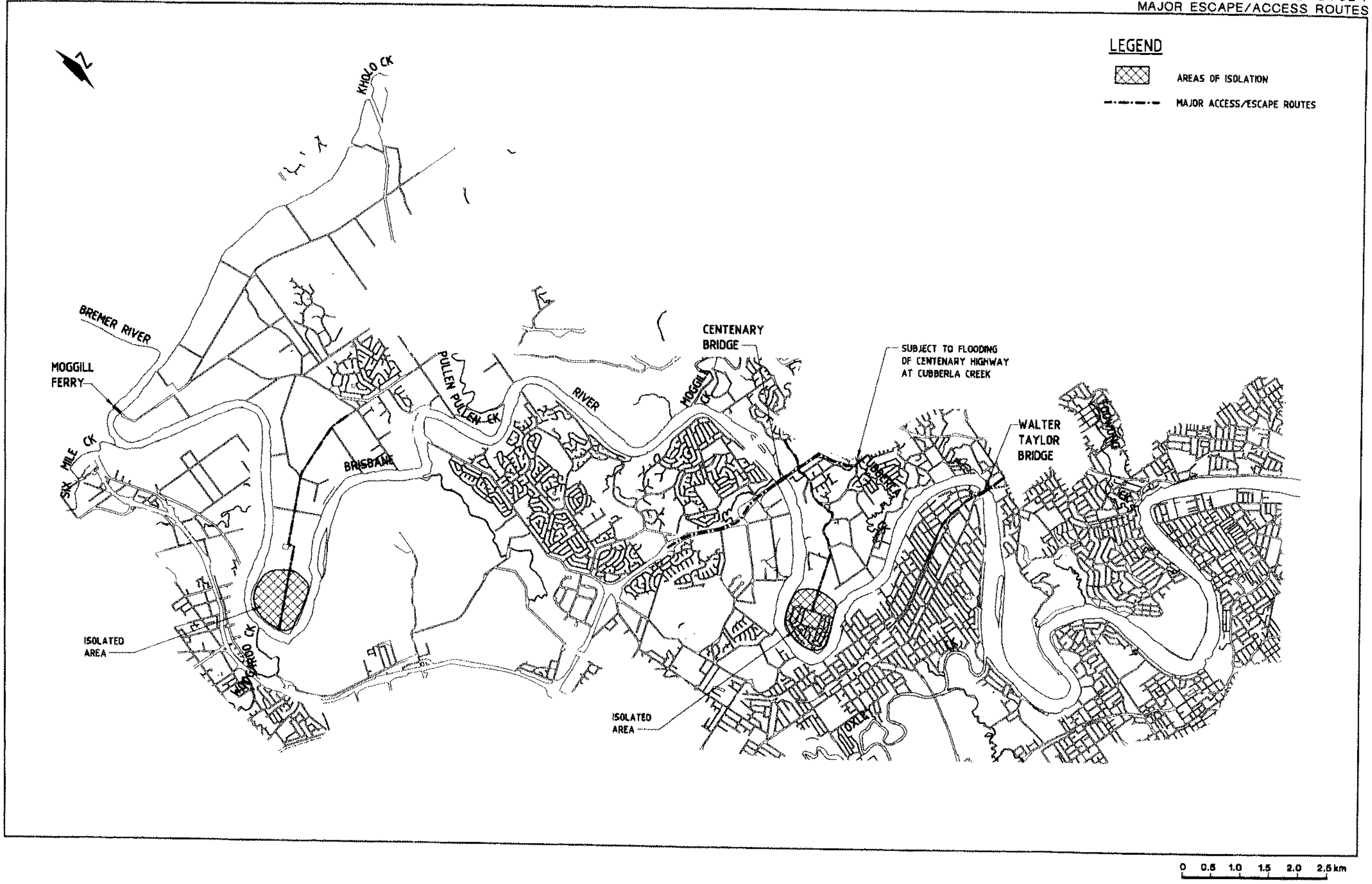
FIGURE 11-2a
BRISBANE RIVER FLOOD STUDY
MAJOR ESCAPE/ACCESS ROUTES



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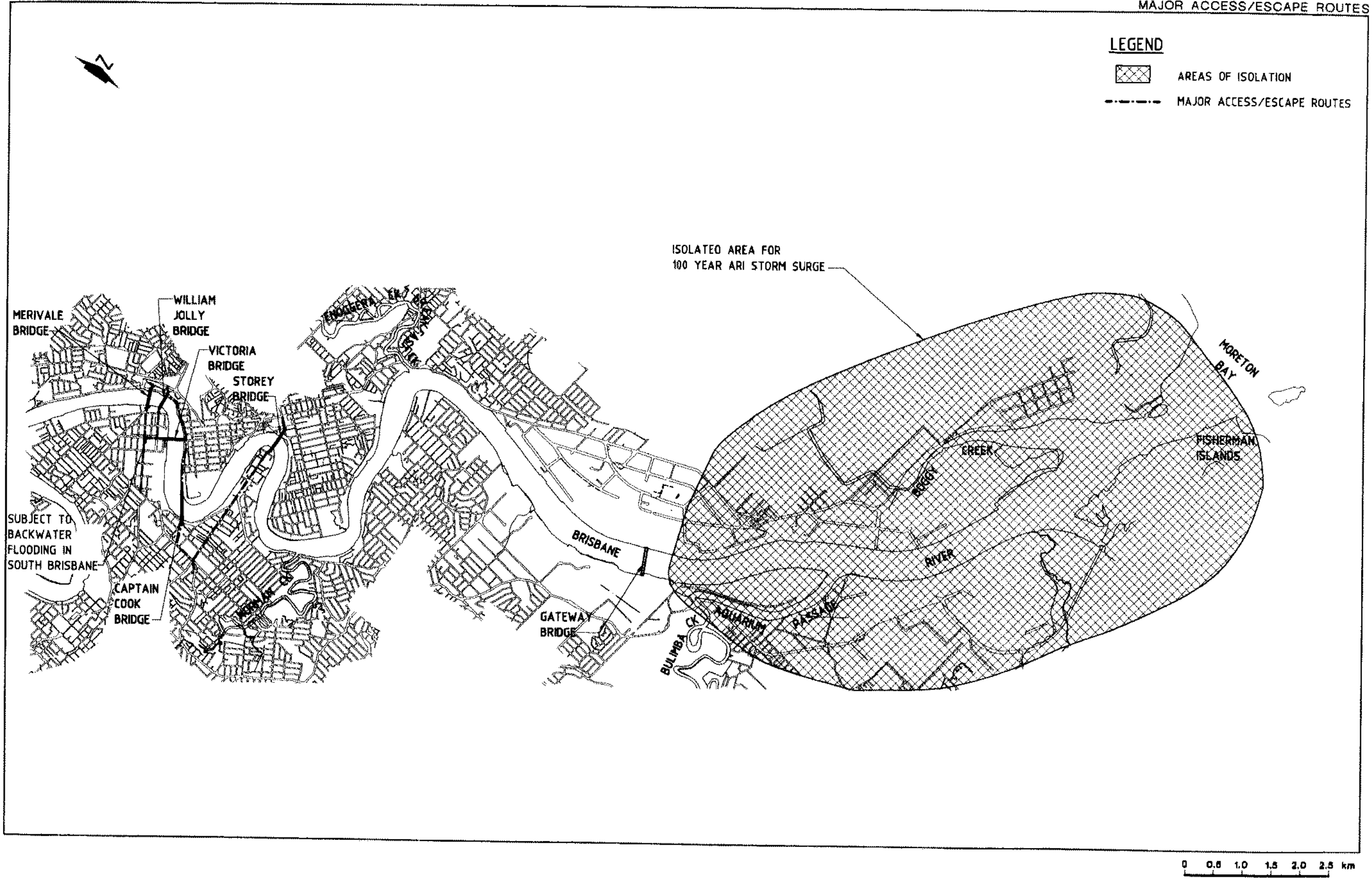
PLOT SCALE 1=60

FIGURE 11-2b
BRISBANE RIVER FLOOD STUDY
MAJOR ACCESS/ESCAPE ROUTES



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A rating curve for the Gateway Bridge was not generated as it was considered that the afflux caused would be negligible because of the width of the section and deck level of the structure.

Rating curves were extracted from the reference sheets for incorporation into the Brisbane River Flood forecasting model which is discussed in **Section 11**.

The rating curves provide an indication of the design flood capacity of the structure (ie design flood that just overtops the roadway) and these are summarised in **Table 10-2 - Design Flood Capacities of Major Structures**. The structure capacity was taken as being the design flow having a peak flood level coincident with the lowest point of the structure weir (assuming unblocked handrails).

Appendix L - Rating Curves at Structures tabulates and plots the rating curves that have been generated. The curves also illustrate the recorded historical flood levels and calibrated discharge at the relevant locations. These curves show that some of the smaller historical events data points do not coincide with the generated rating curves. This is most likely due to tailwater conditions at the time of the events. The design events were run using a constant tailwater level of mean high water springs whereas the historical events were subject to varying tailwater levels which occurred at the time of the events. As expected, these effects are more pronounced for the smaller flood events and the structures closer to the river mouth.

Table 10-2 - Design Flood Capacities of Major Structures

No	Structure Name	Design Capacity (Years ARI)
1	Centenary Bridge	41
2	Indooroopilly Bridge	greater than 100
3	Merivale Bridge	greater than 100
4	William Jolly Bridge	greater than 100
5	Victoria Bridge	greater than 100
6	Captain Cook Bridge	greater than 100
7	Story Bridge	greater than 100

10.2 Upgrading of River Crossings

The upgrading of major river crossings was assessed using the following approach:

- ☐ Identify structures which have a 100 year ARI afflux exceeding 150 mm. In all cases, blocked handrails have been assumed.

- Based on available ground survey data, determine if these selected structures cause flooding of upstream property or houses for events up to the 100 year ARI flood.
- Discussions with council to determine the practical upgrade potential of some structures.
- Test and recommend upgrades of structures that have high affluxes and contribute to upstream flooding impacts.

The hydraulic structure reference sheets compiled in **Appendix K** were reviewed to identify high afflux structures. Affluxes at each structure are listed in **Table 10-3 - High Afflux Public Structures**.

Table 10-3 - High Afflux Public Structures

No.	Structure	100 Year ARI Afflux (mm)
1	Centenary Bridge	150
2	Indooroopilly Bridge	90
3	Merivale Bridge	170
4	William Jolly Bridge	510
5	Victoria Bridge	180
6	Captain Cook Bridge	80
7	Story Bridge	100

Note: Assumes blocked handrails and guardrails.

Table 10-3 demonstrates that the William Jolly Bridge has an afflux significantly greater than 150 mm for the 100 year ARI flood whilst the Merivale and Victoria Bridges just exceed the 150 mm maximum allowable afflux.

Review of the structure reference sheets indicates that the William Jolly Bridge creates a significant afflux for floods greater than 50 years ARI. This flood coincides with the commencement of inundation of the floodplain on the right bank in the vicinity of the structure. Several properties in this area will be affected by the flooding and the affluxes generated by the William Jolly Bridge and the Merivale Bridge. The exact number of properties affected can not be determined as floor survey data was not available.

Options for upgrading the structures in an efficient manner are limited.

For the Merivale Bridge possible options include improving the hydraulic efficiency of the right overbank area adjacent to the approach or raising the bridge structure. Improving the hydraulic efficiency of the right overbank is not practical due to the large number of buildings that would have to be removed and the associated high costs involved. Raising the bridge is also not practical due to design constraints associated with railway operations and the associated high costs of upgrading. Given that the bridge creates an afflux of 170 mm it is considered that the costs associated with upgrading the structure far exceed the benefits.

The William Jolly Bridge also has limited opportunities for upgrading. Improvement of the right floodplains conveyance is not practical due the large number of properties on the floodplain. Major modifications to the bridge structure such as abutment works or raising the deck are unlikely to be accepted due to the heritage value of the structure.

The Victoria bridge also has limited opportunities for upgrading as the costs involved far out weigh the benefits given that the maximum afflux is 180 mm.

Affluxes associated with the other structures were considered to be acceptable as the cost of upgrading these structures would be high.

11. Flood Forecasting Model

11. Flood Forecasting Model

11.1 Overview

The proposed flood forecasting model was to originally consist of a single RAFTS model which included rating curves derived by the MIKE 11 hydraulic model at structures and stream gauges to predict flood levels at these locations. Since RAFTS cannot account for tidal effects it was assumed that a number of rating curves (dependent on tailwater levels at Brisbane River mouth) would be developed at each structure and stream gauge location. Although RAFTS does not have the facility to link rating curves it was initially envisaged that Council would contract WP Software to develop such a facility. This would enable users to select a tailwater level and RAFTS would then select the appropriate rating curve at each location. Due to time restrictions and the availability of WP Software staff, Council decided that this was not an appropriate option and another methodology was developed.

After discussions with Council it was decided that the most appropriate method was to use both the calibrated RAFTS and calibrated MIKE 11 models. The RAFTS model was used to forecast flood discharge hydrographs at inflow locations and these hydrographs were input into the MIKE 11 model along with an appropriate tailwater level. MIKE 11 was then used to predict flood levels at the required locations.

11.2 RAFTS Model Development

The RAFTS flood forecasting model for the Brisbane River was based on the calibrated RAFTS model developed in the calibration/verification phase of the study.

Radio telemetry gauges within the Brisbane City Boundary were used as rainfall input into the hydrologic model. Each of the gauges were assigned a corresponding RAFTS node dependent on the area of influence of the catchment. The area of influence for each of the radio telemetry stations was determined by the application of a Thiessen polygon. **Table 11-1 - Radio Telemetry Rainfall Stations** presents each of the selected radio telemetry rainfall stations along with the assigned RAFTS node. Each RAFTS node has been assigned a primary gauge and a secondary gauge. The secondary rainfall station has been assigned so that in the event of the primary station failing, the secondary gauge can be used. RAFTS does not automatically select the secondary rainfall station if the primary station fails and therefore the secondary station should be selected manually. The RAFTS nodes assigned to the secondary rainfall station are also presented in **Table 11-1**. **Figure 11-1 - Thiessen Polygons For Radio Telemetry Rainfall Stations** illustrate the areas of influence for each rainfall station.

Radio telemetry rainfall stations in the Bremer and Upper catchments are not accessible and hence inflow hydrographs will have to be used for inflows into the RAFTS model. During flood events it is proposed that the DNR will provide these hydrographs as they have a flood forecasting model for these catchments. The locations of these inflow locations are illustrated on **Figure 11-1**. The main advantage of inputting inflow hydrographs at these locations is that the DNR model accounts for Wivenhoe and Somerset Dam operations.

Previous RAFTS modelling has shown that discharges in the lower reach of the Brisbane River (ie downstream of Mt Crosby) are significantly influenced by the operational procedures used for Wivenhoe and Somerset Dams. The primary effect that dam operations have on the lower Brisbane river is that dam discharges influence water levels at the Brisbane and Bremer Rivers confluence. The water level at this location has a profound impact on the discharge below this confluence due to superimposition of flood hydrographs and the storage effects and therefore an accurate assessment of the release discharge from Wivenhoe Dam was required.

The operational procedures for Wivenhoe and Somerset Dams are quite complex and they cannot be accurately modelled in RAFTS (see **Section 7.8**). The Department of Natural Resources has developed a dam operations model that accurately models dam operations and produces discharge hydrographs at the required locations. It was therefore decided that these inflows be used to complete the input to the MIKE 11 flood forecasting model.

The calibrated RAFTS model was truncated upstream of the Brisbane and Bremer River confluence and each of the nodes were assigned their respective primary rainfall station. Discharge hydrographs predicted by the RAFTS model were then extracted at the following locations:

☐ JIN1 - Upstream boundary of Brisbane City
☐ JIN 2 - Bremer River inflow
☐ POG1 - Oxley Creek inflow
☐ ENO-OUT - Enoggera Creek inflow
☐ BUL-OUT - Bulimba Creek inflow

These inflow hydrographs were then used to forecast flood levels using the MIKE 11 hydraulic model.

Table 11-1 - Radio Telemetry Rainfall Stations

	Primary Gauge		Secondary Gauge	
RAFTS Node	Rainfall Station Name	Station Number	Rainfall Station Name	Station Number
JIN1	NA	NA	NA	NA
JIN2	NA	NA	NA	NA
JIN3	Wacol	WSR518	Camira	WGR150
JIN4	Camira	WGR150	Wacol	WSR518
JIN5	Kenmore	GBR017	Kenmore Hills	MVR515
JIN6	Wacol	WSR518	Richlands	BLR116
JIN7	Kenmore Hills	MVR515	Kenmore	GBR017
JIN#	Wacol	WSR518	Camira	WGR150
JIN##	Pullenvale	PLR742	Wacol	WSR518
JIN-OUT	Kenmore	GBR017	Kenmore Hills	MVR515
POG1	Indooroopilly	SIR505	Taringa	TWR027
POG2	Greenbank	OXR104	Forestdale	OXR108
POG3	Forestdale	OXR108	Greenbank	OXR104
POG4	Acacia Ridge	OXR126	Inala	BLR736
POG5	Inala	BLR736	Acacia Ridge	OXR126
POG6	Inala	BLR736	Acacia Ridge	OXR126
POG7	Coopers Plains	SSR130	Calamvale	OXR114
POG8	Corinda	OXR020	Coopers Plains	SSR130
POG9	BAC	BCR015	Taringa	TWR027
POG#	Corinda	OXR020	Coopers Plains	SSR130
POG-OUT	BAC	BCR015	East Brisbane	NMR554
ENO1	Brookfield	GVR718	The Gap	EVR533
ENO2	Brookfield	GVR718	The Gap	EVR533
ENO3	The Gap	EVR533	Brookfield	GVR718
ENO4	The Gap	EVR533	Brookfield	GVR718
ENO5	Mt Coot-tha	IVR512	The Gap	EVR533
ENO6	Alderley	BVR578	Stafford	KVR542
ENO7	Mt Coot-tha	IVR512	The Gap	EVR533
ENO8	Mt Coot-tha	IVR512	Ithana	IVR536
ENO9	Ithana	IVR536	Alderley	BVR578
ENO#	Ithana	IVR536	Alderley	BVR578
ENO##	The Gap	EVR533	Brookfield	GVR718
ENO-OUT	Bowen Hills	BVR524	Toombul	KVR557

Table 11-1 - Radio Telemetry Rainfall Stations (cont)

	Primary Gauge		Secondary Gauge	
RAFTS Node	Rainfall Station Name	Station Number	Rainfall Station Name	Station Number
BUL1	Mt Gravatt	BMR138	Wishart	BMR803
BUL2	Rochedale	BMR709	Wishart	BMR803
BUL3	Carindale	BMR830	Wishart	BMR803
BUL4	Carindale	BMR706	Carindale	BMR830
BUL5	Carindale	BMR706	Morningside	PVR029
BUL6	Hemmant	BMR527	Wynnum	WVR521
BUL7	Hemmant	BMR527	Wynnum	WVR521
BUL#	Wishart	BMR803	Rochedale	BMR709
BUL-OUT	Hemmant	BMR527	Wynnum	WVR521
NRM1	Morningside	PVR029	Bowen Hills	BVR524
NRM2	Hemmant	BMR527	Toombul	KVR557
NRM3	Lytton	BNR739	Hemmant	BMR527

11.3 Conversion of RAFTS Hydrographs to MIKE 11 TXT Format

The Brisbane City Council has supplied the software program RTOM11 which generates a TXT file from the hydrographs exported from the RAFTS model. This RTOM11 program allows users to enter a start date, end date and base flow component and generates a file that can be directly imported into MIKE 11. This file is used to compile boundary series data in MIKE 11.

11.4 Development of the MIKE 11 Flood Forecasting Model

Initially it was conceived that the hydraulic portion of the flood forecasting model would be carried out using HEC-RAS. Preliminary work found that HEC-RAS was unsuitable in this instance due to the dynamic nature of the Brisbane River and hence an alternative approach was sought.

The MIKE 11 hydrodynamic hydraulic model was considered to be the most appropriate model for use as the flood forecasting model for the Brisbane River. The hydraulic flood forecasting model was based on the existing case model developed in the calibration phase of this study. During calibration of this model it was found that two sets of channel roughness parameters had to be adopted, one set for the smaller events and one set for the larger events (**Section 6.5.3**). Basically, two sets of roughness parameters had to be adopted to account for the additional losses at bends during larger flood events.

The requirement to validate the flood forecasting model was to replicate results of two flood events to within 150 mm. This demonstration was to use the largest calibration event since installation of the radio telemetry gauges and one large synthetic event. The two events used for this demonstration were:

- ☐ 100 year ARI design event, and
- ☐ the May 1996 calibration event.

100 Year ARI Event

The inflow hydrographs predicted by the hydrological flood forecasting model were converted and input into the MIKE 11 model at the five locations specified in **Section 2.2** of this report.

The 100 year flood was considered to be a large event and hence the large set of roughness parameters were used. The flood forecasting model predicted flood levels within 10 mm at all locations of those predicted during the design events phase of the study. A comparison of flood levels is presented in **Table M-1 - Flood Forecasting Model Results**.

1996 Calibration Event

The inflow hydrographs predicted by the hydrological flood forecasting model were converted and input into the MIKE 11 model at the five locations specified in **Section 2.2** of this report.

The 1996 flood was considered to be a small flood and hence the small set of roughness parameters were used. This resulted in predicted flood levels to within 80 mm of those predicted during the calibration phase of the study. A comparison of flood levels is presented in **Table M-1 - Flood Forecasting Model Results**. A comparison between peak flood levels and corresponding time of peak time between the recorded and predicted value is presented in **Table 11-2 - Summary of Recorded and Predicted Results for the May 1996 Event.**

Table 11-2 - Summary of Recorded and Predicted Results for the May 1996 Event

	Small Roughness Parameters		Large Roughness Parameters			
Gauge Location	Predicted Peak (m AHD)	Predicted Time of Peak (day)	Predicted Peak (m AHD)	Predicted Time of Peak (day)	Recorded Peak (m AHD)	Recorded Time of Peak (day)
Moggill	7.37	6/5/96 17:30	8.15	6/5/96 16:10	7.09	6/5/96 0:00
Western Inner Bar	1.51	2/5/96 21:00	1.51	2/5/96 21:00	1.51	2/5/96 21:00

From **Table 11-2** it can be seen that if the small roughness parameter set case is compared to the recorded levels that the flood forecasting model over predicts flood levels by 280 mm and is approximately 18 hours behind the recorded flood level at this location. This was also found to be the case during calibration and the problem was attributed to the poor performance of the rating curve at Moggill within this flow range. **Section 6.5.3** discusses this problem in more detail.

This can be justified by the performance of the RAFTS and MIKE 11 models for larger and smaller flows. **Table 11-3 - Summary of Recorded and Predicted Results for the January 1974 and June 1983 Events** shows that for these two events peak flood levels are within 70 mm and the peak flood levels occur within 2 hours.

The large roughness parameter set has been included in **Table 11-2** for completeness

Since the main influence is on inflows from the Bremer River and the Upper Boundary during long events, the RAFTS inflows produce the peak flood levels rather than the runoff calculated by the RAFTS flood forecasting model from the radio telemetry gauges. The smaller tributaries located within Brisbane City (ie. Oxley Creek) have a much smaller time of concentration than the Upper Brisbane River and therefore floods in the lower catchments are finished prior to the Upper Brisbane River flood arriving. Therefore the inflows from the Bremer River and Upper Brisbane River are generally the driving factor as far as peak flood levels and timing are concerned and this enables a comparison between flood forecasting results and calibration/verification results.

Table 11-3 - Summary of Recorded and Predicted Results for the January 1974 and June 1983 Events

Flood Event	Gauge Location	Predicted Peak (m AHD)	Predicted Time of Peak (day)	Recorded Peak (m AHD)	Recorded Time of Peak (day)
1974	Moggill	19.89	28/1/74 13:40	19.93	28/1/74 11:45
1974	Port Office	5.40	29/1/74 2:00	5.44	29/1/74 2:00
1974	Western Inner Bar	1.55	25/1/74 10:45	1.55	25/1/74 10:45
1983	Moggill	5.27	23/6/83 1:30	5.20	23/6/83 3:00
1983	Western Inner Bar	1.14	21/6/83 8:00	1.14	21/6/83 8:00

Note:
1. 1974 event presents flood levels for large roughness parameters.
2. 1983 event presents flood levels for small roughness parameter set.

A sensitivity check was also conducted to identify the impacts on flood levels if the set of large roughness parameters were used to analyse the small floods. For the 1996 event it was found that flood levels were over estimated by up to 850 mm.

Given the limited extent of flooding experienced within the lower Brisbane River in May 1996, most emphasis was placed on the 100 year ARI event as this size event would cause significant flooding throughout the reach.

The problem with the adoption of two sets of roughness parameters is the uncertainty as to what size flood constitutes the use of the large or small roughness parameter set. It was therefore recommended that one set of roughness parameters be adopted for the flood forecasting model and it was considered that it was most appropriate to adopt the large set of roughness parameters as this would ensure a conservative estimate of flood levels for smaller events.

11.5 Isolated Areas and Escape Routes

The effectiveness of the flood forecasting system for the Brisbane River is dependent upon the assessment of when river crossings are cut by flood waters and the duration of closure.

The majority of Brisbane City is urbanised to some extent and is well serviced by access roads from within and outside the City boundary. The major access/escape routes for all areas within the City boundary and the river crossings which are responsible for servicing these routes are shown on **Figure 11-2a** to **Figure 11-2b - Major Access/Escape Routes - Brisbane City.**

A detailed hydraulic analysis has been conducted for the major public bridges/crossings which are located on the access/escape routes.
Flood immunities , lowest weir level and time of inundation for each structure is listed in **Table 11-4 - Design Flood Capacities of Major Structures.** The structure capacity was taken as being the design flow having a peak flood level coincident with the lowest point of the weir structure. (assuming unblocked handrails). The crossing was assumed to be cut once a depth of flow of 300 mm occurred over the road.

Table 11-4 - Design Flood Capacities of Major Structures

Structure ID	Structure Name	Flood Immunity (years)	Lowest Weir Level (m AHD)	Duration of Closure 50 year ARI (hours)	Duration of Closure 100 year ARI (hours)
1	Centenary	41	10.0	29.5	59.5
2	Indooroopilly	>100	15.0	-	-
3	Merivale	>100	15.1	-	-
4	William Jolly	>100	14.3	-	-
5	Victoria	>100	9.2	-	-
6	Captain Cook	>100	8.8	-	-
7	Story	>100	29.8	-	-
8	Gateway	>PMF	>PMF	-	-

Within the Brisbane City Boundary many escape routes are available to the public. From **Table 11-4** it can be seen that all river crossings have a flood immunity of greater than 100 years except for the Centenary Bridge. The following discussion will relate to the 100 year ARI flood event unless otherwise specified.

Should the Centenary Bridge become inundated, escape routes are available in both directions along the Centenary Freeway. Depending on flood levels (ie 41 to 100 years ARI) the Centenary Freeway may become cut at the Cubberla Creek Crossing isolating the stretch of road between the Centenary Bridge and the Cubberla Creek Crossing. For these cases people may have to be evacuated.

The Merivale, William Jolly and Victoria Bridges have a flood immunity of greater than 100 years ARI however due to the detail of level information the immunity of the South Brisbane approaches for these structures is questionable.

Priors Pocket is another location were the public may become isolated during the 100 year ARI flood. Available topographical information shows that Priors Pocket Road is cut at approximately RL 17.0 m AHD. For the 100 year ARI flood this flood level is reached approximately 85 hours after the commencement of the event. Early warning should therefore provide residents with the opportunity to evacuate along Priors Pocket Road.

Another potential area of isolation is Fig Tree Pocket. Again, topographical information shows that Fig Tree Pocket Road is cut at RL 10.0 m AHD. The flood level is reached approximately 72 hours after the beginning of the 100 year ARI flood event. Residents will be able to escape along Fig Tree Pocket Road if given sufficient warning.

Areas between the River mouth and the Gateway Bridge become significantly inundated during the 100 Year ARI Moreton Bay Storm Surge plus Greenhouse Effects Case (Tailwater Level RL 2.5 m AHD). Should these conditions occur major evacuations would be required as possible escape routes are limited.

Backwater flooding for tributaries may cause the flooding of some escape routes in low lying areas. Although road crossing levels at these locations are unknown and beyond the scope of this study, a list of possible locations where this type of flooding may occur are listed below.

- ☐ Breakfast Creek - Kingsford Smith Drive and Breakfast Creek Road.
- ☐ Norman Creek - Stanley Street at East Brisbane.
- ☐ Hawthorne Road - at Hawthorne.
- ☐ South Brisbane - Boundary Road and Grey Street.
- ☐ Sandy Creek - Indooroopilly Road at Indooroopilly.
- ☐ Oxley Creek - Cunningham Arterial Highway at Rocklea.
- ☐ Cubberla Creek - Centenary Highway at Fig Tree Pocket.
- ☐ Moggill Creek - Moggill Road at Kenmore.
- ☐ Pullen Creek - Moggill Road at Bellbowrie.

These crossings should be monitored during periods of significant flooding to ensure that alternate routes are available should the roads listed above should become flooded.

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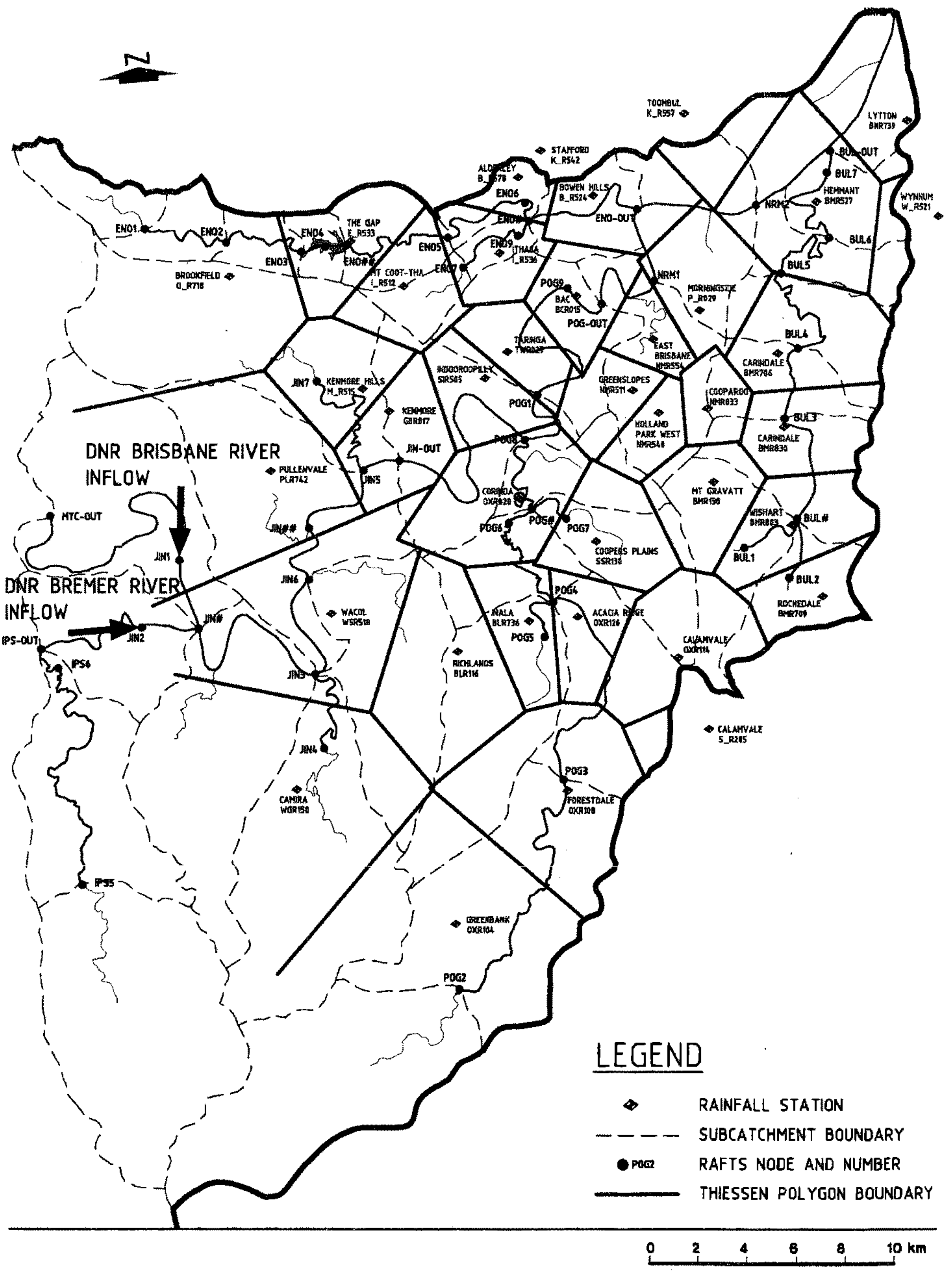
FIGURE 11-1

BRISBANE RIVER FLOOD STUDY
THIESSEN POLYGONS FOR
RADIO TELEMETRY RAINFALL STATIONS



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12. Flood Mapping

12. Flood Mapping

12.1 Overview

Topographical information provided by BIMAP was used for the flood mapping phase of the Brisbane River Flood Study. Inundation lines, flood contours and high/low hazard maps were generated with the aid of this information.

12.2 Design Flood Inundation Mapping

Following completion of the development level, regulation line and revegetation strategy, a series of 1:10000 scale maps were prepared illustrating the extent of inundation for the 100 year ARI and 20 year ARI flood events.

The maps appear as **Drawings W10581 Sheets 105 to 111** accompanying this report.

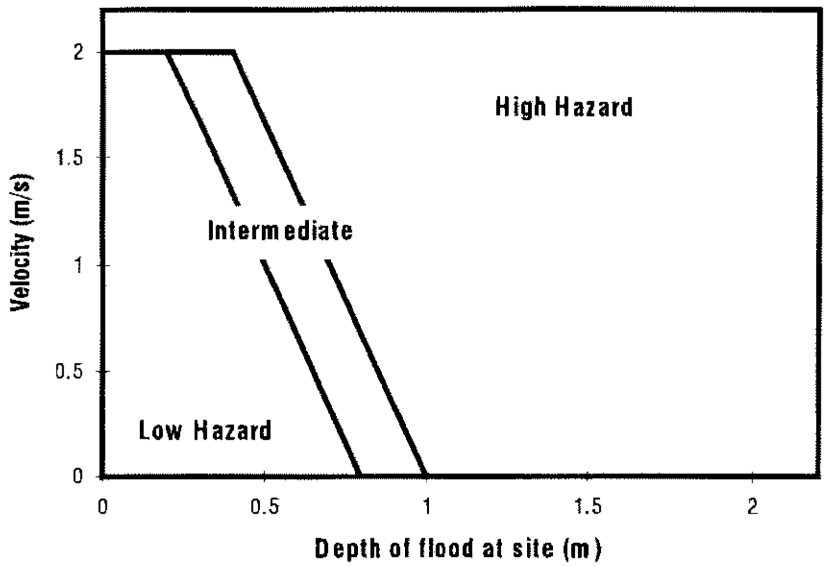
12.3 Flood Hazard Maps

Following the preparation of the HEC-RAS modelling and the inundation maps, the flood hazard mapping was prepared in accordance with the New South Wales Floodplain Development Manual. This manual specifies a depth and velocity criteria which defines whether a water depth and velocity combination is considered high or low flood hazard. **Figure 12-1 - New South Wales Floodplain Hazard Criteria** shows the relationship between depth and velocity when assessing high or low floodplain hazard.

The results from the HEC-RAS model for the 100 year ARI flood show that the overbank velocities are generally below 0.5 m/s with a maximum overbank velocity of 1.1 m/s. At the site where the velocity is 1.1 m/s the maximum allowable depth before the floodplain becomes high hazard according to **Figure 12-1** is approximately 0.75 m. Similarly for velocities below 0.5 m/s the maximum allowable depth before the floodplain becomes high hazard is 0.9 m.

Given these results and the fact that the minimum contour interval on the topographical maps is 1 m, it was considered that depth was the governing factor for high hazard areas on the floodplain. It was therefore assumed that at any site, if the depth of water was 1 m or greater the area was high hazard. This assumption was considered to be slightly conservative.

Figure 12-1 - New South Wales Floodplain Hazard Criteria



The flood hazard maps for the Brisbane River are presented in **Drawings W10581 Sheets 91 to 97** accompanying this report.

12.4 Flood Contouring

Initially the flood contouring phase of the study was to be conducted using the two dimensional hydrodynamic model FasTABS. This model uses digital terrain data (mesh) to generate a two dimensional water surface which can then be output as a DXF file and translated into a flood contour map.

The contour information held in BIMAP was provided in the form of a rectangular mesh over the Brisbane River. As this mesh was based on photogrammetry, no information was available for the river bathometry. In order to form a complete digital terrain model, the BIMAP data was merged with the bathmetric data obtained from the survey of the river.

The merged digital terrain model consisted of approximately 20 000 000 data points which exceeded the number of data points that can be used in the FastTABS model (1 000 000 points). The large amount of data points required for the two dimensional modelling of the Brisbane River, meant that the use of FastTABS would be an inefficient means of predicting two dimensional flow effects and an alternative methodology was developed.

The resulting methodology was to use levels predicted by the MIKE 11 hydraulic model and apply super-elevations at bends to account for the two dimensional flow effects.

Using the flood levels for the 100 year ARI flood event (regulation lines and revegetation in place) flood contours were calculated at 0.1 m flood level intervals along the Lower Brisbane River reach (upper city boundary to the river mouth) using linear interpolation methods between flood levels at model cross sections. These levels were assumed to be located at the AMTD line on the cross section.

Super-elevations at bends were then calculated using the formula (Chow 1959) :

$$\Delta h = V^2_{max}/g[20r_c/3b - 16r_c^3/b^3 + (4r_c^2/b^2 - 1)^2 \ln\{(2r_c + b)/(2r_c - b)\}]$$

where

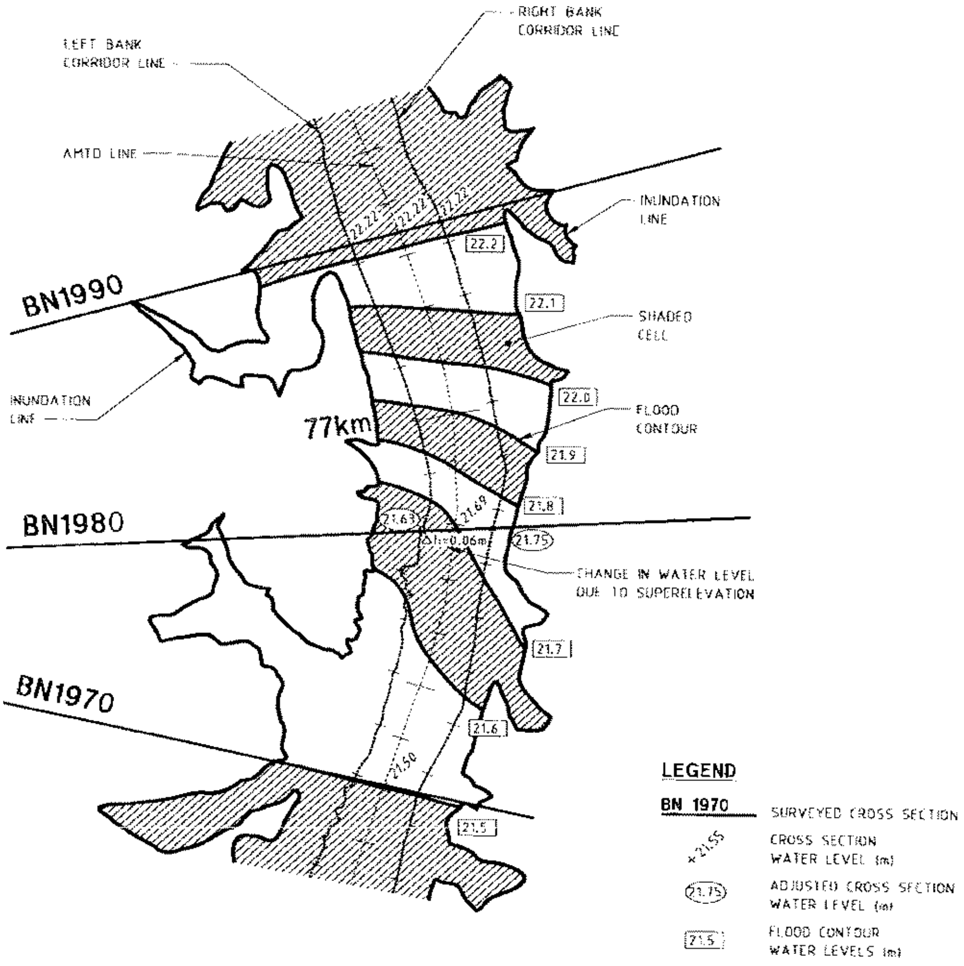
Δh = change in water level (m)
V^2_{max} = maximum velocity at bend (m/s)
g = gravity (9.81 m/s^2)
r_c = radius of bend at center of river (m) (ie AMTD line)
b = width of river (m) (assumed to be the distance between the cadastral boundaries defined for the river corridor)

Once Δh had been calculated this value was added or subtracted to the level at the AMTD line depending on whether the inside or the outside of the bend was being determined.

For example, in **Figure 12-2 - Flood Contouring Example** the MIKE 11 predicted water level at the AMTD line at the mid point of the bend (BN1980) was 21.69 m AHD. At this location a Δh of 0.06 m was calculated and therefore the water level at the inside of the bend was calculated to be 21.63 m AHD and the water level at the outside of the bend was calculated to be 21.75 m AHD. The MIKE 11 predicted water level at BN1990 was calculated to be 22.22 m AHD and this was assumed to be a constant level across the cross section. Water levels at 0.1 m increments were then calculated via linear interpolation between cross sections BN1990 and BN1980 along the left bank creek corridor line, the right bank creek corridor line and the AMTD line. This interpolation was then repeated between cross sections BN1980 and BN1970. Flood contours were then plotted by drawing a line through each point with the same water level along the AMTD, left bank creek corridor line, the right bank creek corridor line. The flood contours were then extended to the inundation lines. This extension of the flood contour lines was based on general trends of the flood contour between the left bank creek corridor line and the right bank creek corridor line.

The above procedure was repeated for each bend from the Brisbane River mouth to the upstream city boundary (BN2020). Flood cells were then formed by shading alternate cells between flood contours to form a database of local flood information.

Figure 12-2 - Flood Contouring Example



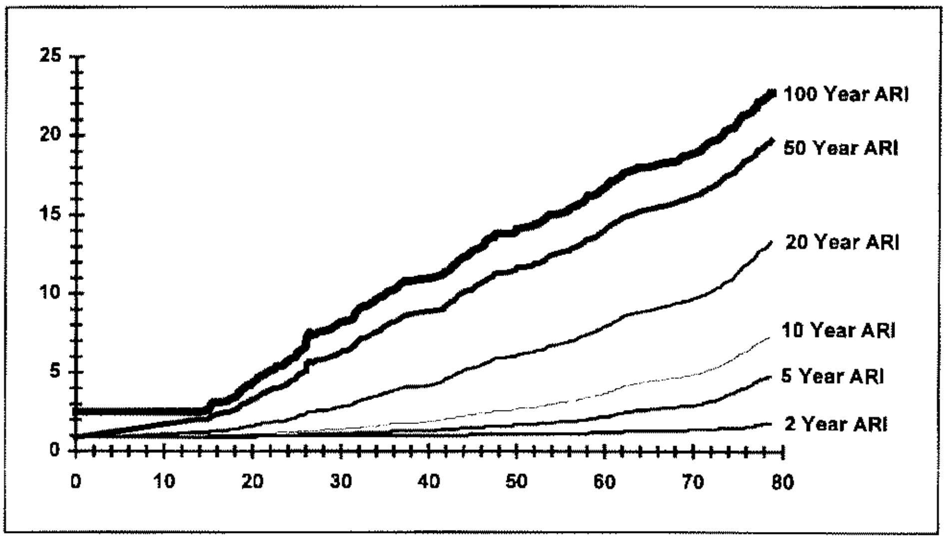
The flood contour maps are presented as **Drawings W10581 Sheets 112 to 121** accompanying this report.

12.5 Applicability of Flood Contours to Smaller Flood Events

The flood contours have been prepared based on the 100 year ARI flood with the regulation lines and revegetation strategy in place. The appropriateness of these contours to the smaller floods (2 year ARI to 50 year ARI) has been determined by comparing each of the respective profiles. **Figure 12-3 - Flood Contour Profile Comparison** illustrates the similarities and differences for the varying ARI flood events.

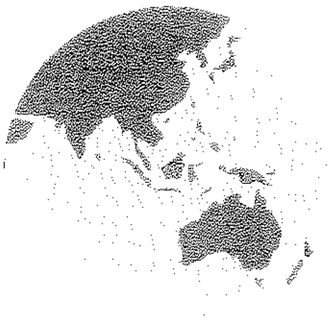
Below AMTD chainage 14 km (0 to 14 km AMTD) the 100 year ARI profile shows a flood contour level of 2.5 m AHD. This flood contour level reflects the 100 year ARI Moreton Bay storm surge flood level (0.21 m AHD) plus an allowance of 0.3 m for future greenhouse effects. From **Figure 12-3** it can be seen that between 0 - 14 km AMTD the adopted flood contours would not be applicable for floods other than the 100 year ARI event.

Figure 12-3 - Flood Contour Profile Comparison



Between AMTD chainage 14 - 78.6 km it can be seen from **Figure 12-3** that the 100 year and 50 year ARI flood levels are similar in characteristics and the adopted flood contours would generally be applicable with the use of an appropriate correction factor.

For the floods with an ARI less than 50 years the predicted profiles illustrate a high degree of derivation from the 100 year profile and therefore the adopted flood contours would not be applicable.



13. Community Consultation

13. Community Consultation

13.1 Information Bulletin

The community consultation activities programmed for the Brisbane River Flood Study were conducted through means of an Information Bulletin/Questionnaire. These bulletins were sent to various community groups along the Brisbane River. A set of plans was provided to each of the groups coordinators to enabled individuals to mark up areas where they believed riverbank rehabilitation or other works were required.

Approximately 500 Bulletins were sent to 13 community groups. These groups were selected based on proximity to the Brisbane River. The idea of targeting local community groups was due to the following factors:

- ☐ The shear number of residents situated close to Brisbane River would require in excess of 100 000 bulletins to be distributed. This would be a study within itself and was beyond the scope of this study.
- ☐ Community Groups have generally already discussed environmental issues within their local area and show a genuine interest in helping their environment. It was therefore considered that these groups would provide the Consultant with a good response to the issues being addressed.

From the five hundred Information Bulletins/Questionnaires sent only five were returned to the Consultant. This was considered to be a poor response however given that a total of thirteen groups were approached and if these bulletins were completed at a group meeting (with all members having an input) four responses could be considered good.

A list of the 11 community groups targeted in this study are presented in **Table 13-1 - Community Groups Bulletin List**. The names and addresses of these groups were supplied by the Brisbane City Council.

Table 13-1 - Community Groups Bulletin List

Community Group Name	No of Responses
BCC - Bushland Care Program	0
Brisbane River Management Group	0
Chelmer Bushcare Group	0
Corinda Bushcare	0
St Lucia Bushland Regeneration Group	2
Norman Creek Flood Action Group	0
Allen Creek Action Group	1
Oxley Creek Environment Group	0
Perrin Creek Bushland Group	1
River Mouth Action Group	1
Tenneriffe Bushland Park Group	0
Toowong Creek Working Group	0
Centenary Riverfront Advisory Committee	0

Note: BCC - Bushland Care Program Bulletin was returned as address not correct. Contact was attempted however messages weren't returned.

A copy of the information Bulletin/Questionnaire is presented in **Appendix N - Community Consultation Information Bulletin/Questionnaire.**

13.2 Issues Raised by Community Groups

The following discussion summarises the responses to the Information Bulletin/Questionnaire for the individual community groups.

River Mouth Action Group - BN 340 to River Mouth

The River Mouth Action Group could not identify any damage that has occurred to the river banks after major storms however had strong opinions that revegetation and rehabilitation was required on both sides of the river bank from the Bulimba-Hamilton Area to the Mouth of River.

A number of other issues concerning the quality of industrial drainage, stormwater drainage and sewerage outlets or overflows that are currently entering the river were raised. The number of wharfs along the river mouth area was also of some concern.

Some additional uses for the river corridor along this section of the river were identified as fishing and access to the river. The response indicated that access to the river has been lost and that the edibility of the fish in this section of river is questionable.

14. References

14. References

1. South East Queensland Water Board, `Brisbane River Flood Hydrology - Runoff Routing Model Calibration', Volumes I and II, Qld DPI-Water Resources, September 1991.

2. Hausler G and Porter N, `Report on the Hydrology of Wivenhoe Dam' Qld DPI-Water Resources, 1977.

3. Weeks W D, `Wivenhoe Dam Design Flood Study', Qld DPI-Water Resources, 1983.

4. Deen A R, Craig R W and Sable I C, `Hawkesbury River Flood Model', Hydrology and Water Resources Symposium, Canberra 1988.

5. Australian Rainfall and Runoff, Institution of Engineers, Australia 1987.

6. South East Queensland Water Board `Brisbane River Flood Hydrology - Interim Report on Design Flood Estimation', by Qld DPI-Water Resources, March 1993.

7. South East Queensland Water Board `Brisbane River Flood Hydrology - Final Report on Downstream Flooding Estimation', by Qld DPI-Water Resources, August 1993.

8. SEQWB `Wivenhoe Dam - Moreton Bay Hydraulic Models. Model Calibration Volume III, Appendix II Derivation of Wivenhoe Dam Releases' by Qld DPI-Water Resources, October 1994.

9. Bureau of Meteorology `Severe Weather and Flooding South East Queensland May 1996' July 1996.

SINCLAIR KNIGHT MERZ

Brisbane City Council
June 1998

Brisbane River Flood Study

FINAL REPORT
Volume 2
Appendices

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Acknowledgments

Sinclair Knight Merz would like to thank the following organisations for their assistance throughout this study.

Department of Natural Resources (DNR)
Bureau of Meteorology (BOM)
South East Queensland Water Board (SEQWB)

In particular, we would like to thank Terry Malone (BOM), John Ruffini (DNR) and Garry Grant (SEQWB) for without their help and supply of information our task would have been much more difficult.

Document History and Status

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Appendix A - Rainfall and Pluviometer Stations

Appendix A - Rainfall and Pluviometer Stations

Table A-1 - Daily Rainfall Stations

Number	Station	Period
040004	Amberley AMO	1941 - Date
040007	Bald Knob	1927 - Date
040019	Benarkin Forestry	1925 - Date
040020	Blackbutt	1900 - Date
040214	Brisbane RO	1840 - Date
040223	Brisbane AMO	1949 - Date
040030	Bryn Euryn	1917 - 1972
040289	Coalbank	1961 - Date
040056	Coominya	1916 - Date
040060	Cooyar	1895 - Date
040382	Crows Nest	1894 - Date
041028	Emu Vale Railway	1893 - Date
040225	Enoggera Reservoir	1870 - Date
040075	Esk	1886 - Date
040083	Gatton PO	1894 - Date
040082	Gatton - Lawes (CSIRO)	1897 - Date
040091	Grandchester	1894 - Date
041042	Haden	1926 - Date
040094	Harrisville	1896 - Date
040096	Helidon	1870 - Date
040101	Ipswich (Composite)	1870 - Date
040102	Jimna	1927 - Date
040104	Kalbar	1897 - Date
040110	Kilcoy	1890 - Date
040318	Kirkleagh	1953 - Date
040114	Laidley	1889 - Date
040115	Lake Manchester	1917 - Date
040120	Lowood	1887 - Date
040121	Maleny PO	1915 - Date
040133	Monsildale	1913 - 1977
040135	Moongerah Dam	1917 - Date
040136	Mooloolah	1926 - Date
040137	Moore	1913 - 1977
040139	Mt Alford	1912 - Date
040140	Mt Brisbane	1890 - Date
040142	Mt Crosby	1894 - Date
040308	Mt Glorious	1962 - Date
040247	Mt Kilcoy (Lindfield)	1923 - Date
040145	Mt Mee	1909 - Date
040147	Mt Nebo	1947 - Date
040153	Murphy's Creek	1895 - Date

Number	Station	Period
040158	Nanango	1882 - Date
040311	Nukinenda	1961 - Date
040169	Peachester	1915 - Date
040270	Ravensbourne PO	1954 - Date
040183	Rosevale	1915 - Date
040184	Rosewood	1894 - Date
040421	Spring Bluff	1895 - Date
040198	Tarome	1912 - Date
041046	The Head (Riverdale)	1913 - Date
041165	The Head (Bonnie Brae)	1913 - Date
040202	Thornton	1915 - Date
040205	Toogoolawah	1909 - Date
041103	Toowoomba (Fire Stn)	1869 - Date
040227	Wacol (Wolston Pk)	1893 - Date
040424	West Haldon	1915 - Date
040252	Woodford	1887 - Date
040258	Yarraman Ck	1913 - Date

Table A-2 - Pluviometers

Number	Station	Agency	Period of Record
040004	Amberley AMO	BM	1961 - Date
040062	Crohamhurst	BM	1960 - Date
040019	Benarkin Forestry	BM	1961 - Date
040020	Blackbutt	BM	Unknown
040214	Brisbane RO	BM	1911 - Date
040223	Brisbane AMO	BM	1950 - Date
541032	Bryn Euryn	DNR	1985 - Date
040382	Crows Nest	TCC	1965 - Date
040531	Deagon	BCC	1973 - Date
040225	Enoggera Reservoir	BCC	1961 - Date
040075	Esk	BCC	1964 - Date
040082	Gatton - Lawes CSIRO	BM	1963 - Date
040094	Harrisville PO	BM	1971 - Date
040101	Ipswich (Composite)	BM	1975 - Date
040102	Jimna PO	BM	1972 - Date
040104	Kalbar	BM	1978 - Date
040318	Kirkleagh	BM	1959 - Date
040115	Lake Manchester	BCC	1961 - Date
040133	Monsildale	BCC	1963 - 1977
040135	Moongerah Dam	BM	1958 - Date
040308	Mt Glorious	BM	1969 - Date
040526	Mt Nebo	BCC	1966 - Date
040674	Mt Stanley	BM	1977 - Date
040480	Perseverance Dam	TCC	1971 - Date
040270	Ravensbourne	TCC	1965 - Date
040076	Robyn Dale	BM	1972 - Date
040503	Rosewood	BM	1977 - Date
040241	Samford (CSIRO)	CSIRO	1967 - Date
040202	Thornton	BM	1970 - Date
040528	Three Way Catchment	BCC	1970 - Date
041467	Toowoomba	TCC	1954 - Date
040675	Townson	BM	1977 - Date
040628	Woodford (BCC)	BCC	1964 - Date
040079	Forest Hill	DNR	1894 - Date
040095	Hatton Vale	DNR	1908- Date
040107	Beaudesert	DNR	1917 - Date
040124	Marburg	DNR	1887 - Date

Table A-2 - Pluviometers (Continued)

Number	Station	Agency	Period of Record
040149	Boonah	DNR	1924 - 1990
040150	Mundoolun	DNR	1881 - Date
040154	Murrumba (Fairview)	DNR	1926 - 1974
040155	Mudtapilly	DNR	1917 - 1957
040156	Innisplain	DNR	1913 - Date
040159	Narangbar	DNR	1920 - 1987
040163	Rathdowney	DNR	1925 - 1972
040170	Crows Nest (Peachy SF)	DNR	1927 - Date
040171	Petrie (Australian Paper Mills)	DNR	1886 - Date
040179	Redbank	DNR	1888 - 1978
040180	Margate	DNR	1886 - Date
040181	Roadvale	DNR	1907 - 1983
040186	Samsonvale Composite	DNR	1919 - Date
040197	Mount Tamborine	DNR	1888 - Date
040208	Pine Mountain	DNR	1925 - Date
040212	Ascot Racecourse	DNR	1920 - Date
040213	Bald Hills	DNR	1895 - 1993
040215	Brisbane Botanic Gardens	DNR	1890 - 1984
040216	Brisbane Show Grounds	DNR	1889 - Date
040226	Goodna	DNR	1870 Date
040224	Enoggera	DNR	1899 - Date

Note:
BM = Bureau of Meteorology
NDR = Department of Natural Resources
TCC = Toowoomba City Council
BCC = Brisbane City Council

DAILY RAINFALL SUMMARY

January 1974 Flood Event

	Daily Rainfall from 9 AM to 9AM (mm)					
Date	**Benarkin Forrest**	**Moogerah Dam**	**Woodford PO**	**Ravensbourne PO**	**Mt Glorious**	**Brisbane Bot**
24/01/74	75.2	10.2	1.2	0.5	237.2	107.3
25/01/74	104.9	158.9	244.4	101.9	293.6	323.1
26/01/74	139.5	227.4	278.0	115.9	394.0	186.6
27/01/74	51.4	39.2	84.3	35.2	120.2	33.2
28/01/74	0.0	0.0	3.1	1.3	0.0	0.0

July 1973 Flood Event

	Daily Rainfall from 9 AM to 9AM (mm)			
Date	**Brisbane Bot**	**Moogerah Dam**	**Benarkin Forest**	**Ravensbourne PO**
4/07/73	17.1	0.0	2.8	8.9
5/07/73	90.1	16.5	65.6	67.5
6/07/73	334.7	41.1	16.8	36.1
7/07/73	193.6	2.4	166.7	82.6
8/07/73	14.5	0.0	17.1	8.0

June 1983 Flood Event

	Daily Rainfall from 9 AM to 9AM (mm)				
Date	**Brisbane Bot**	**Kirkleagh**	**Benarkin Forest**	**Ravensbourne PO**	**Moogerah Dam**
20/06/83	7.5	15.2	14.1	87.6	5.3
21/06/83	89.4	69.1	84.0	188.9	55.9
22/06/83	73.1	83.2	58.7	141.4	24.6
23/06/83	0.0	0.0	0.0	0.0	0.0

Early April1989A Flood Event

	Daily Rainfall from 9 AM to 9AM (mm)				
Date	**Amberley**	**Kirkleagh**	**3 Way Catchment**	**Gatton Lawes**	**Blackbutt**
1/04/89	110.7	63.5	173.3	90.3	7.2
2/04/89	47.5	175.1	31.3	59.7	63.6
3/04/89	38.8	8.6	19.5	0.0	1.2

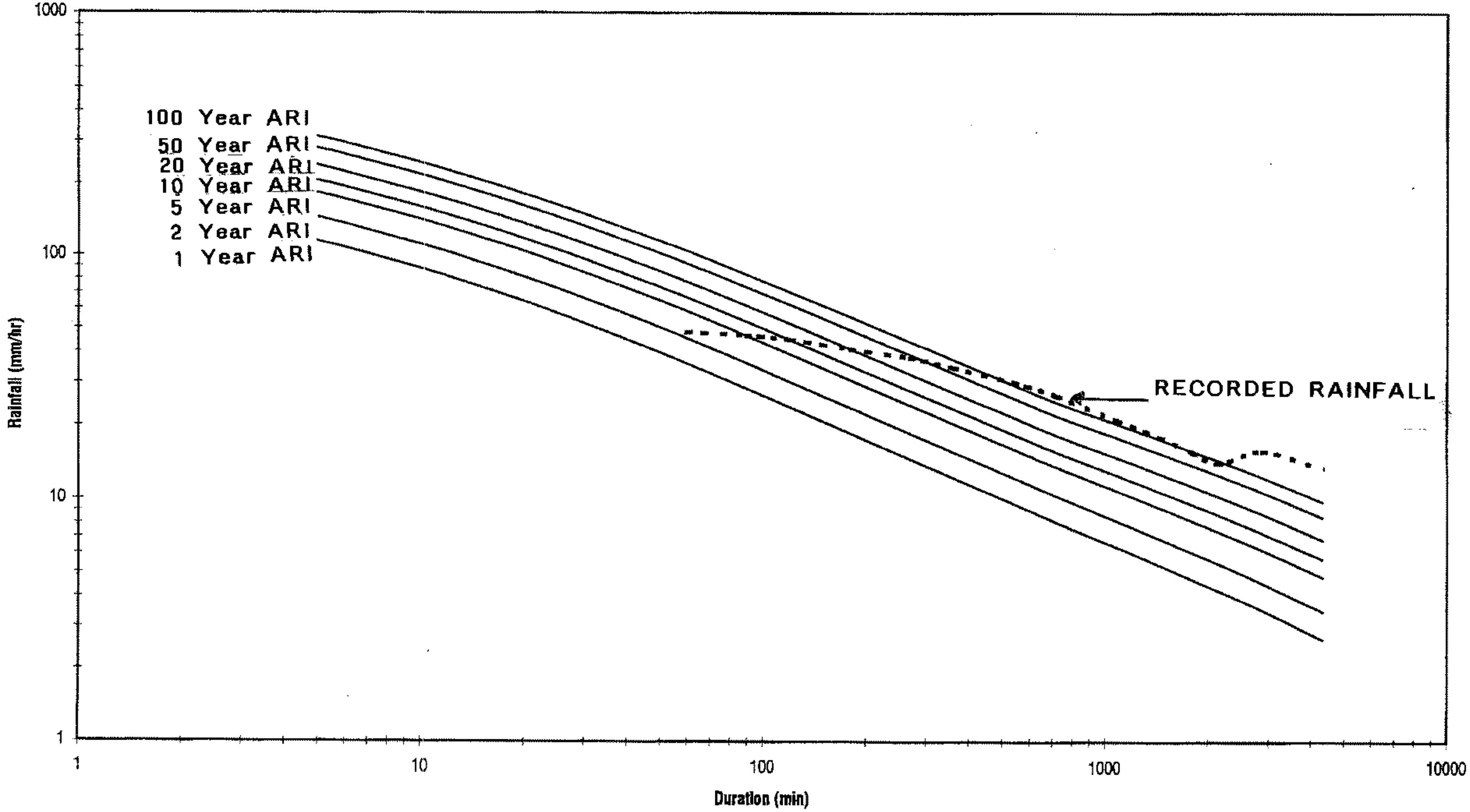
Late April 1989B Flood Event

	Daily Rainfall from 9 AM to 9AM (mm)			
Date	Amberley	Kirkleagh	Moogerah Dam	Ravensbourne PO
23/04/89	12.5	53.4	10.0	30.4
24/04/89	18.1	47.4	19.5	56.1
25/04/89	62.4	91.2	85.4	100.5

May 1996 Flood Event

	Daily Rainfall from 9 AM to 9AM (mm)			
Date	**Brisbane**	**Gatton Lawes**	**Woodford PO**	**Amberley**
30/04/96	47.3	43.5	6.8	5.5
1/05/96	154.8	96.3	96.2	126.7
2/05/96	161.4	80.5	150.9	117.0
3/05/96	79.9	74.8	29.4	29.4
4/05/96	147.0	126.3	21.0	47.9
5/05/96	34.8	16.7	17.9	42.4
6/05/96	24.8	0.9	2.7	9.0

RECORDED RAINFALL/IFD COMPARISON LEGEND



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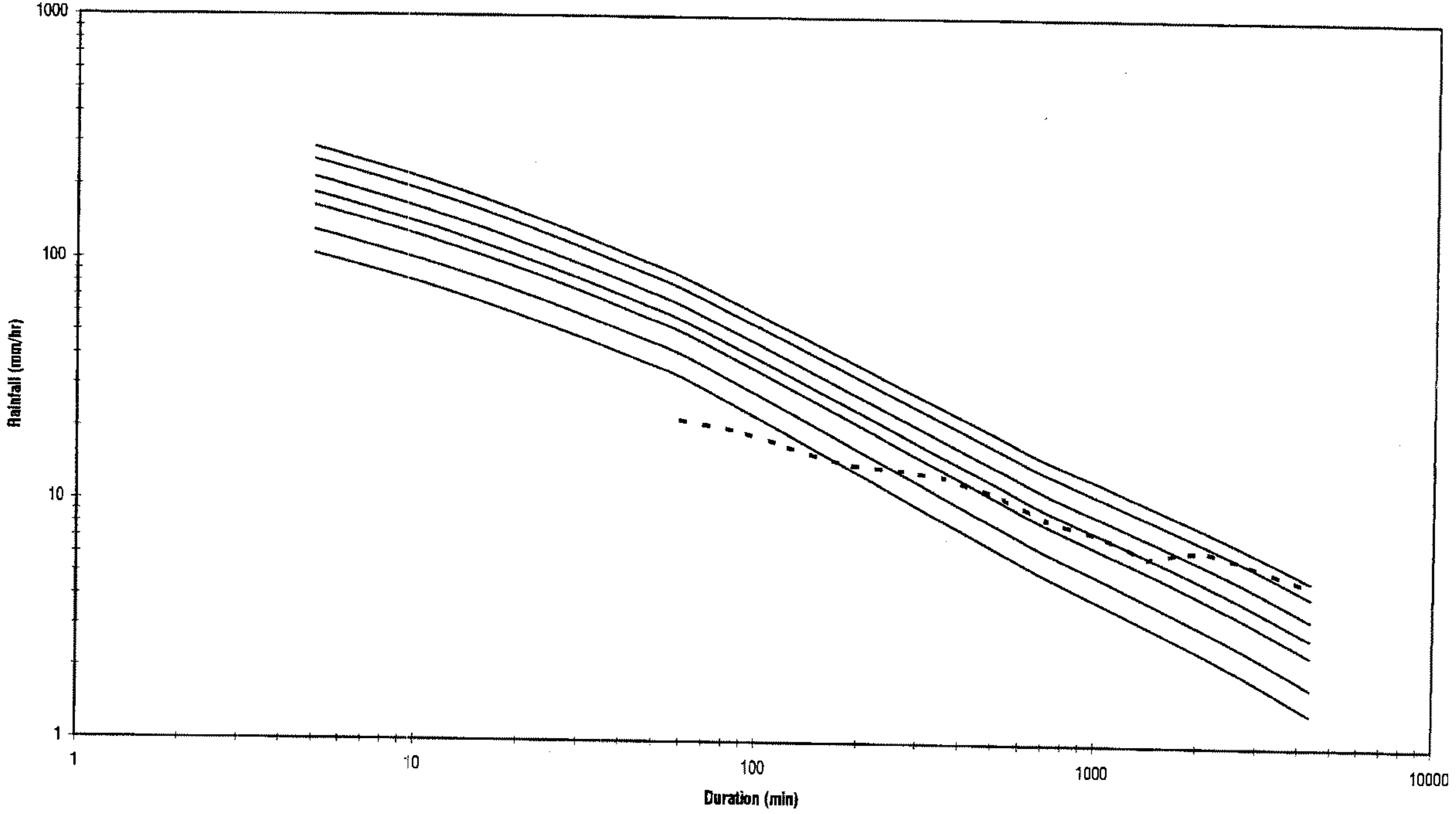

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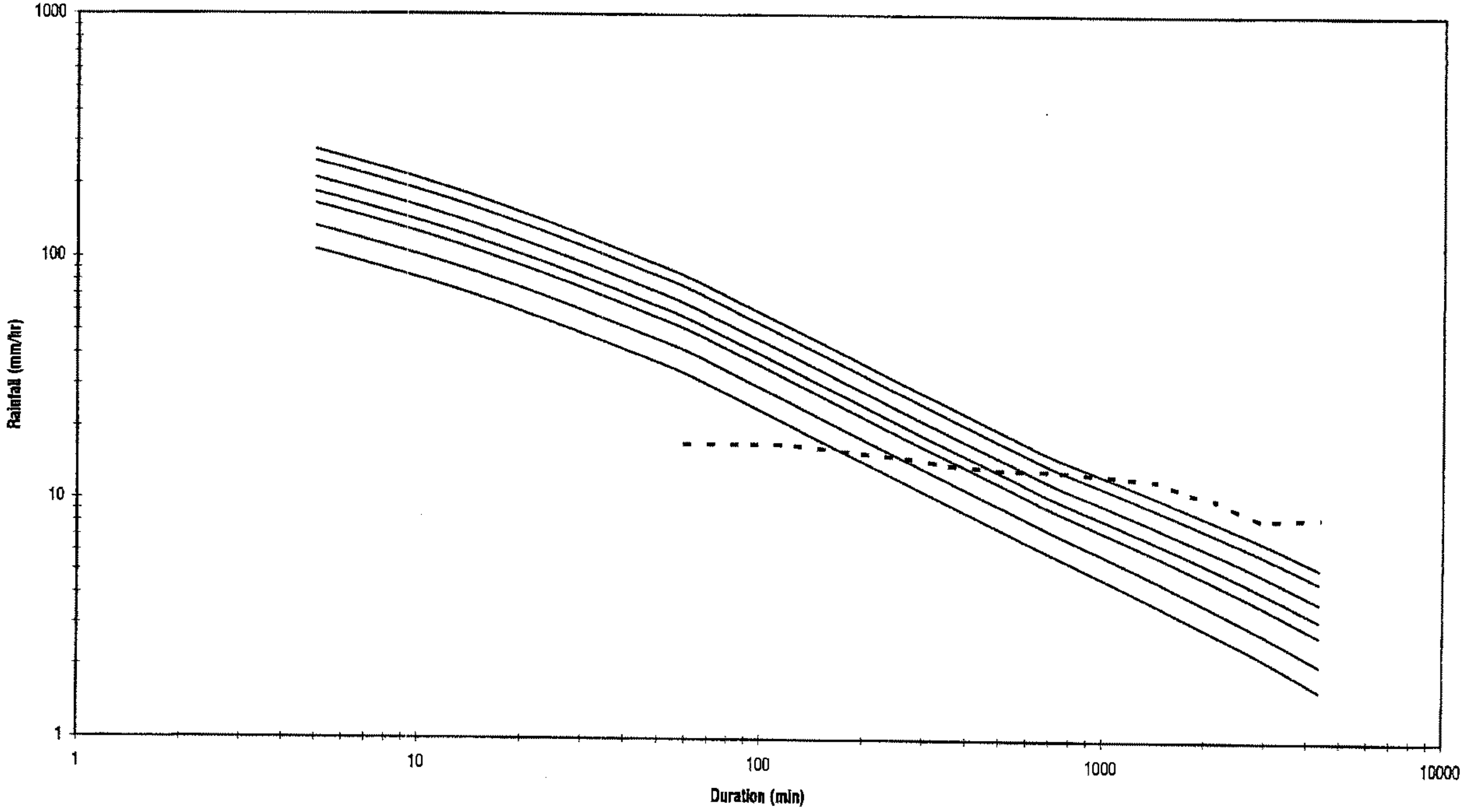

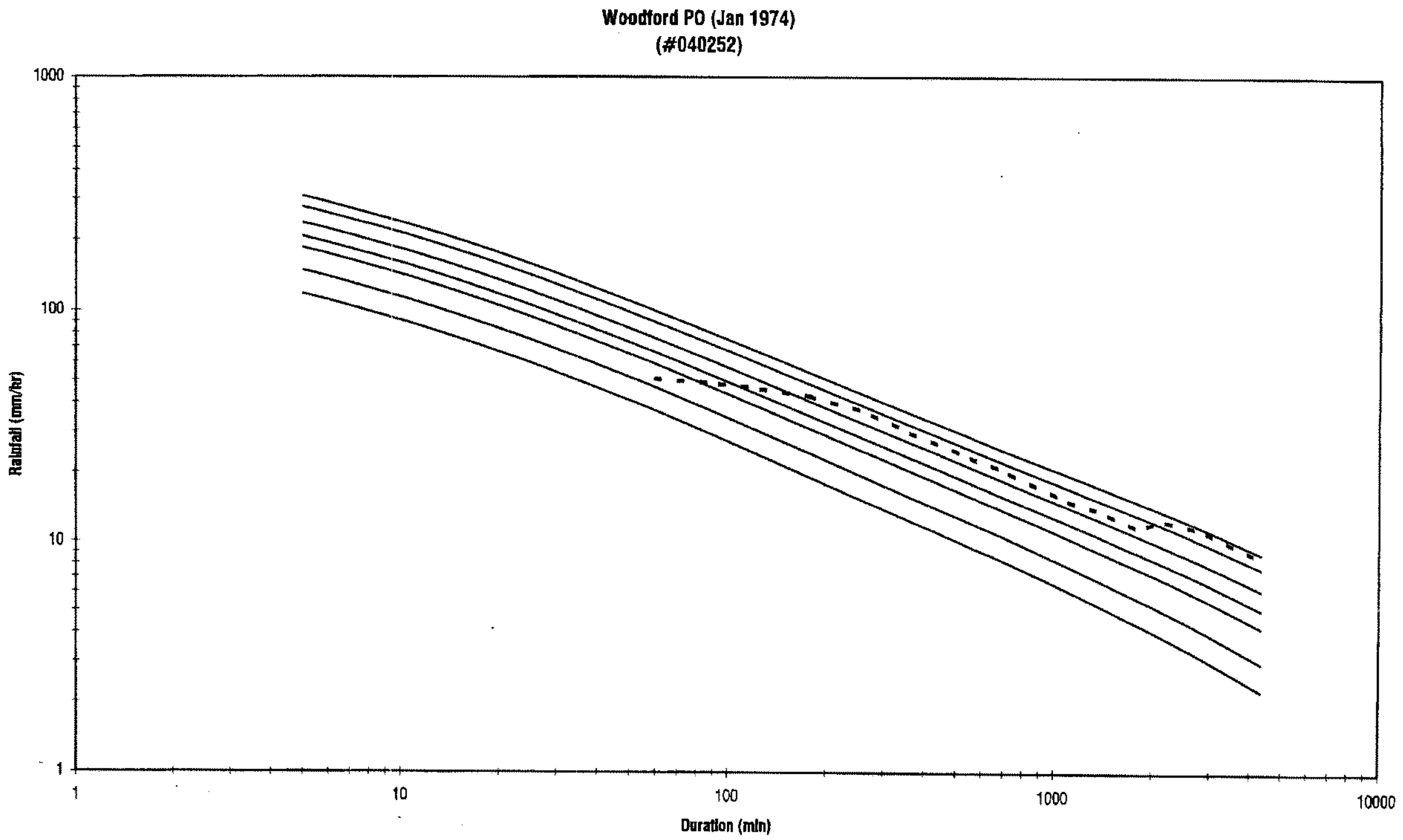
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10
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Duration (min)
1
10
100
1000
10000

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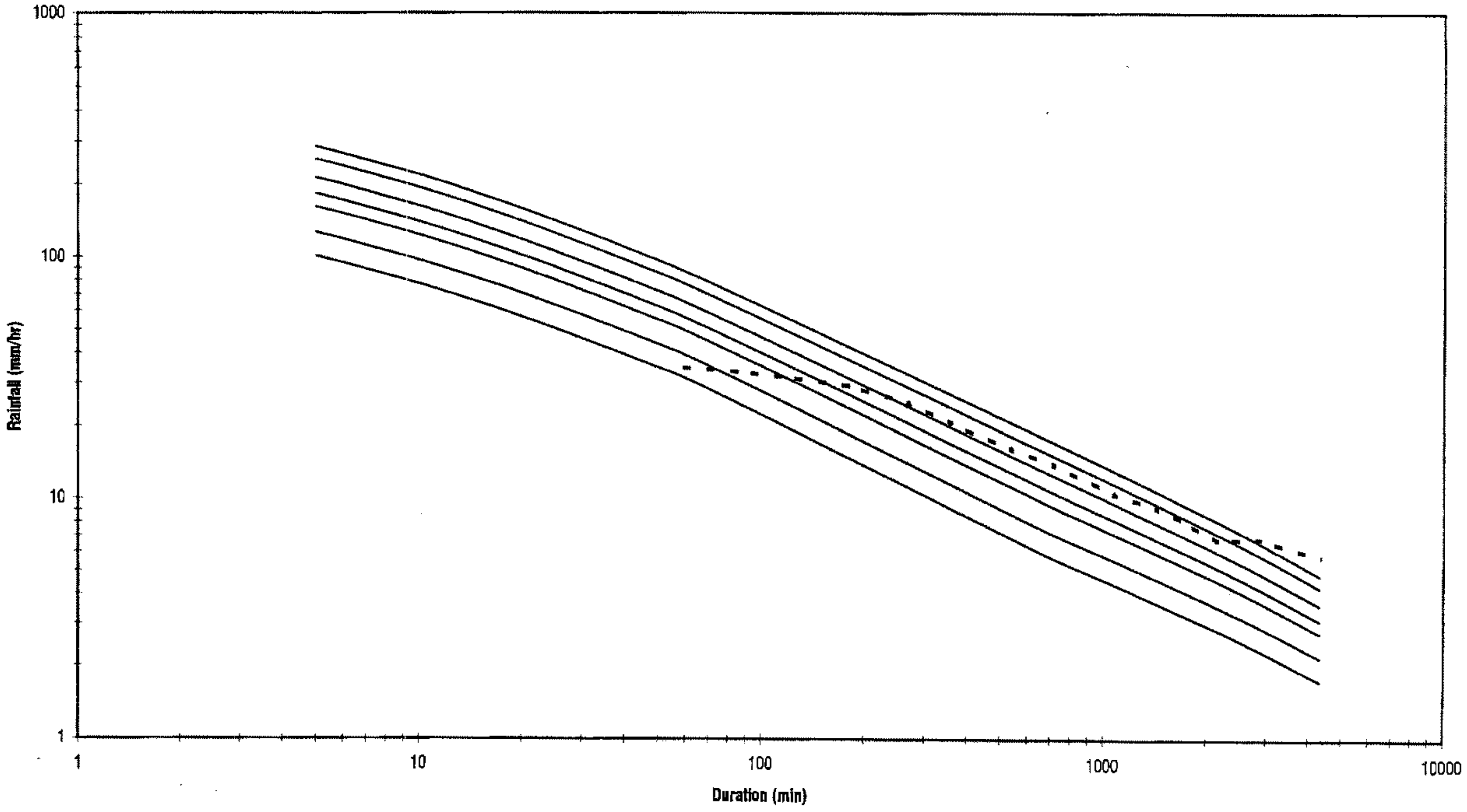
(#040270)



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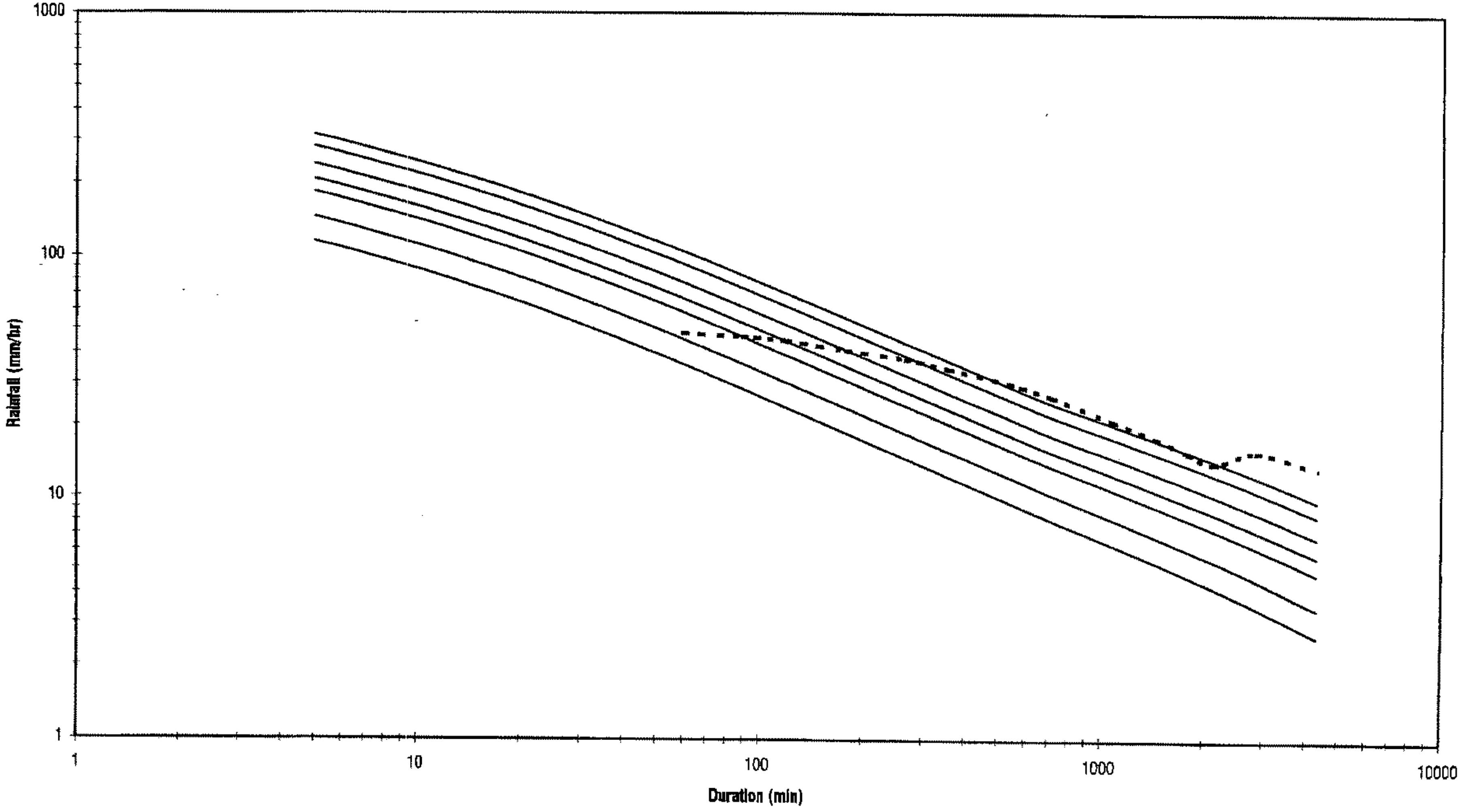

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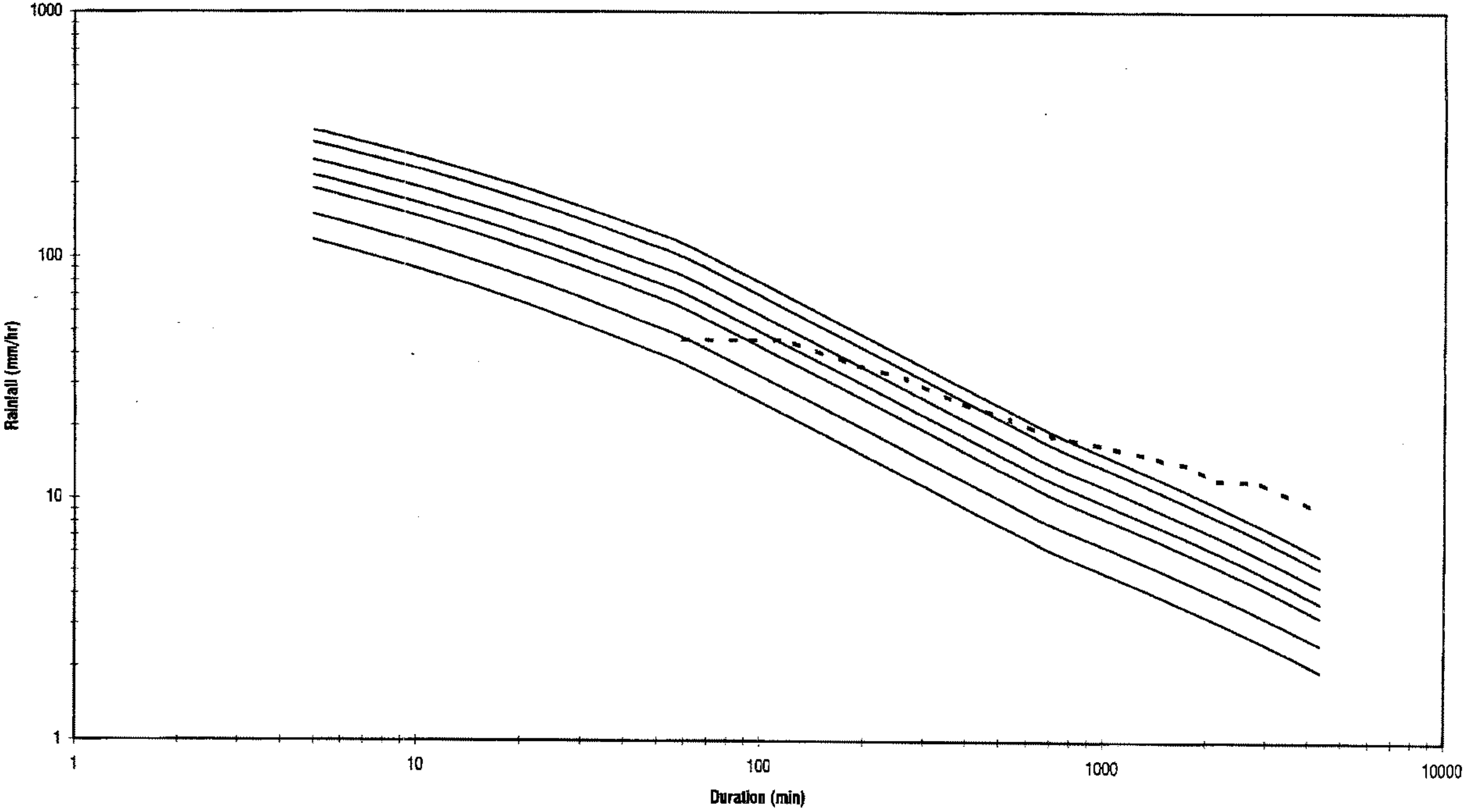

Brisbane (July 1973)
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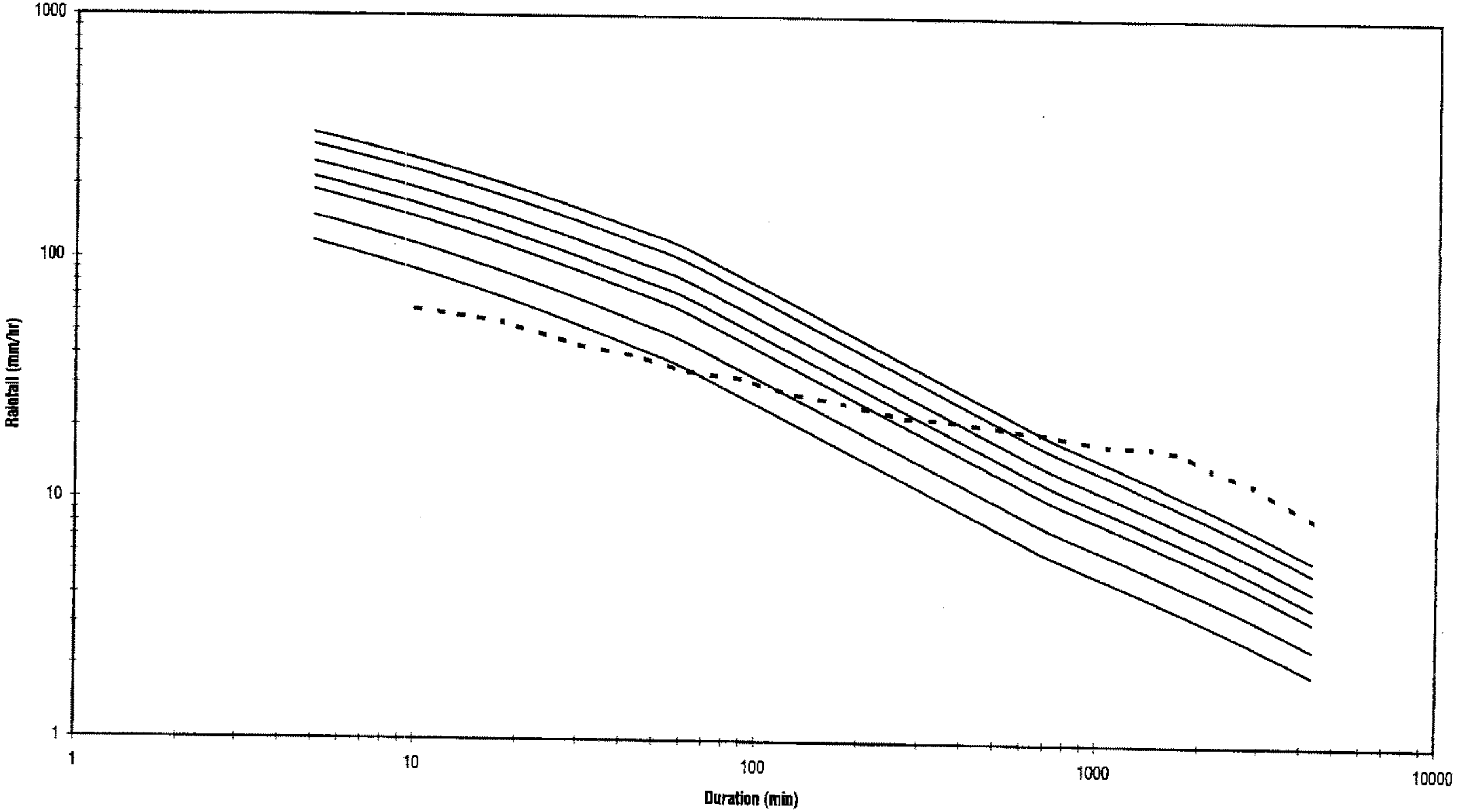

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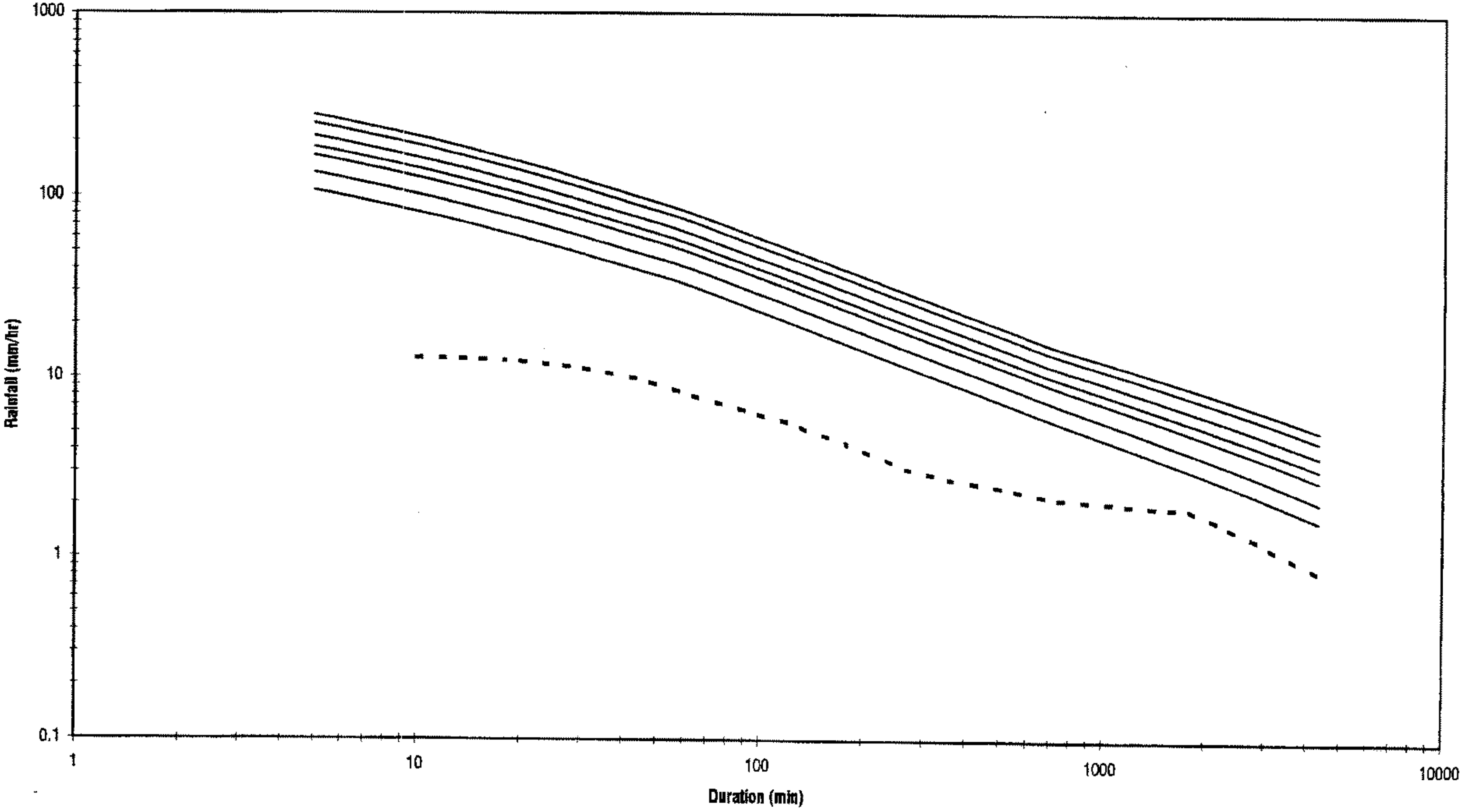

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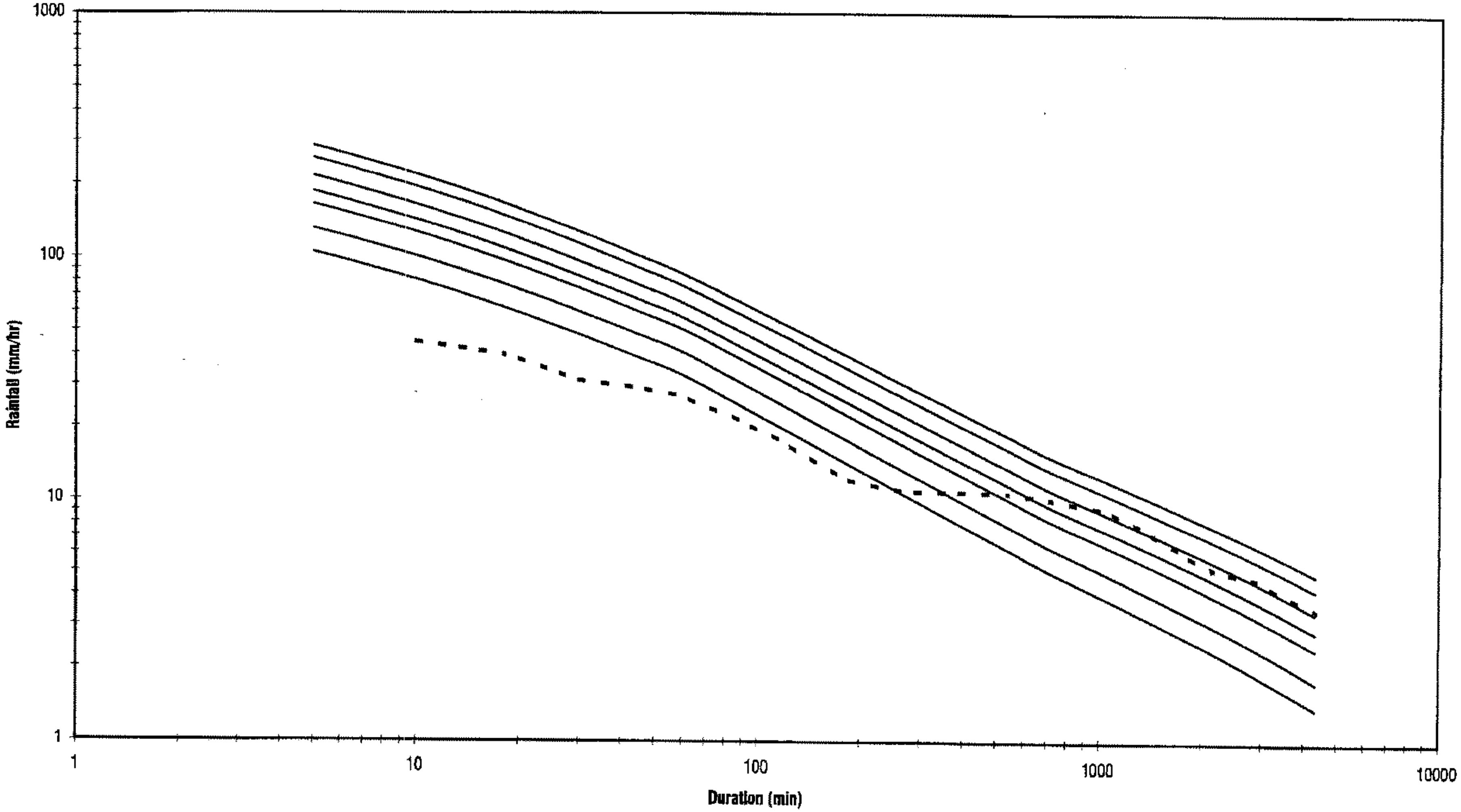

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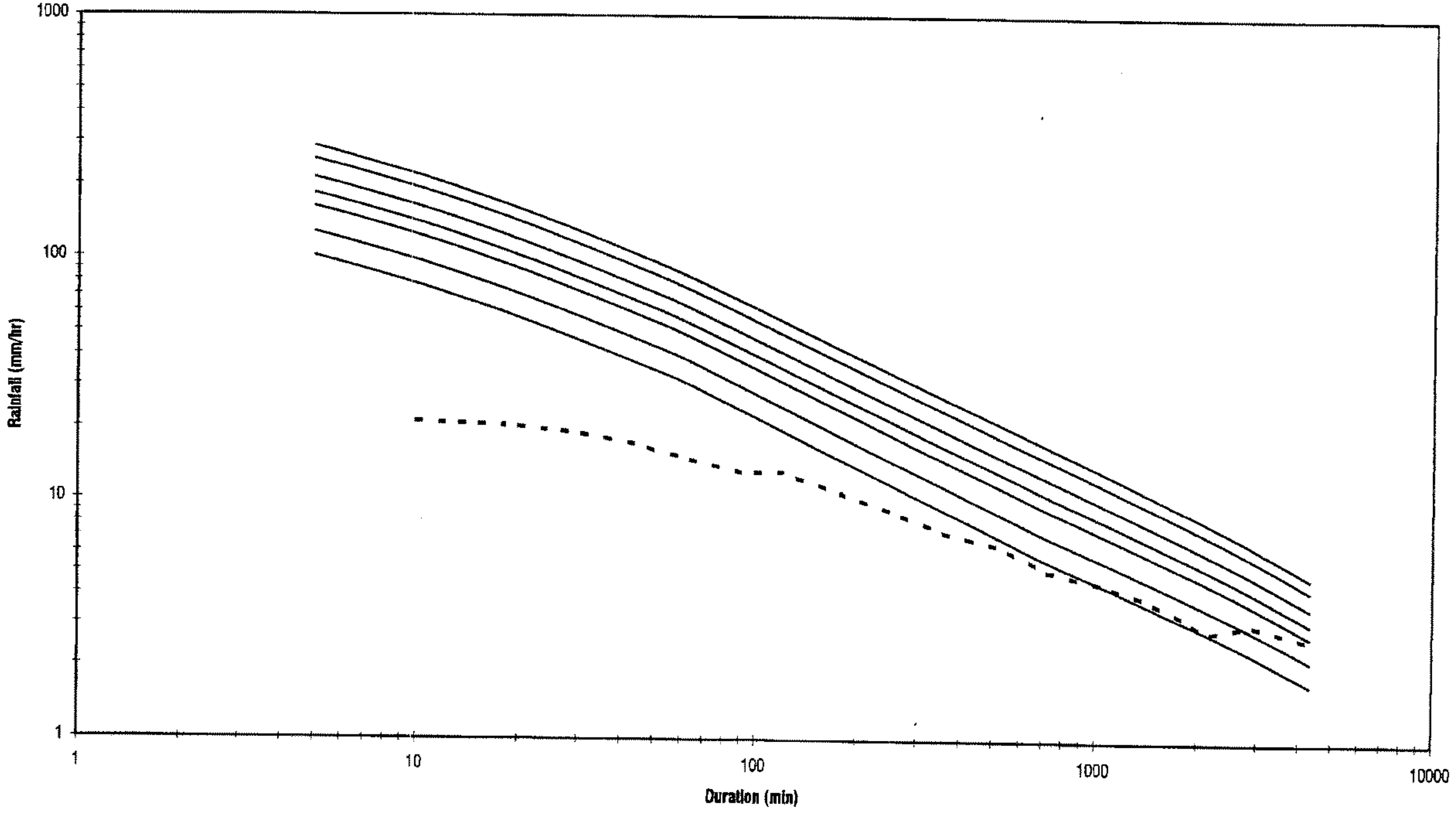

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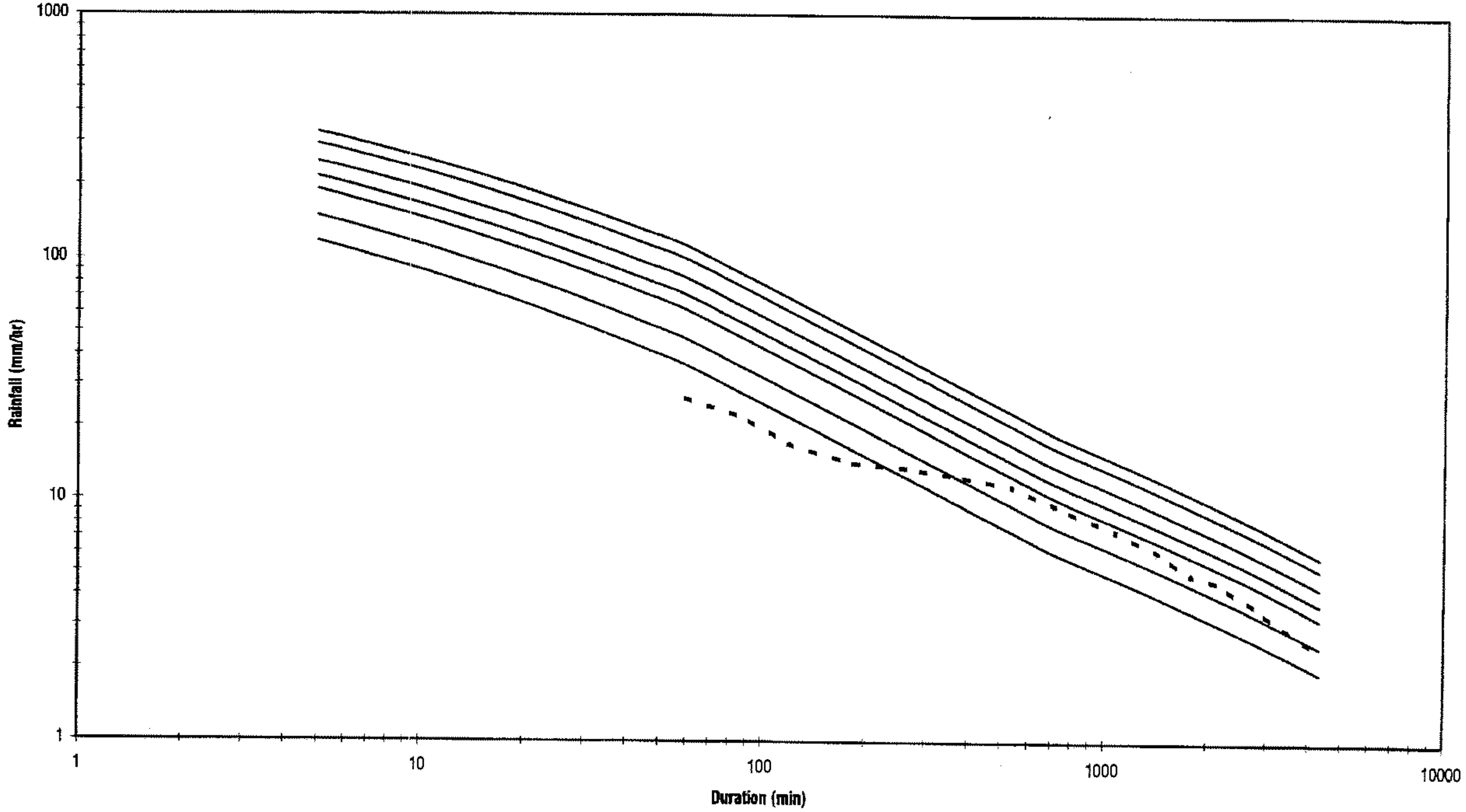

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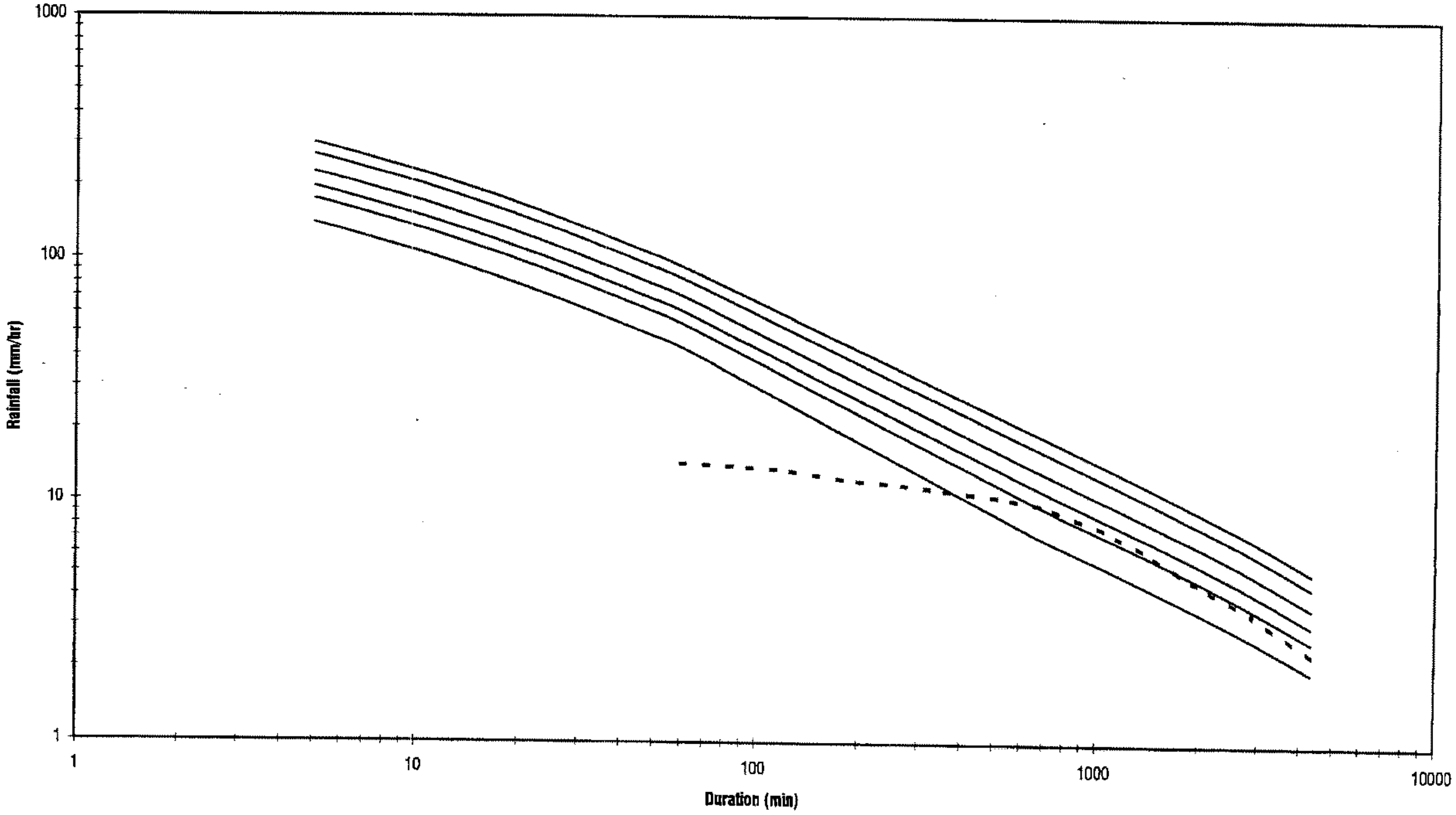

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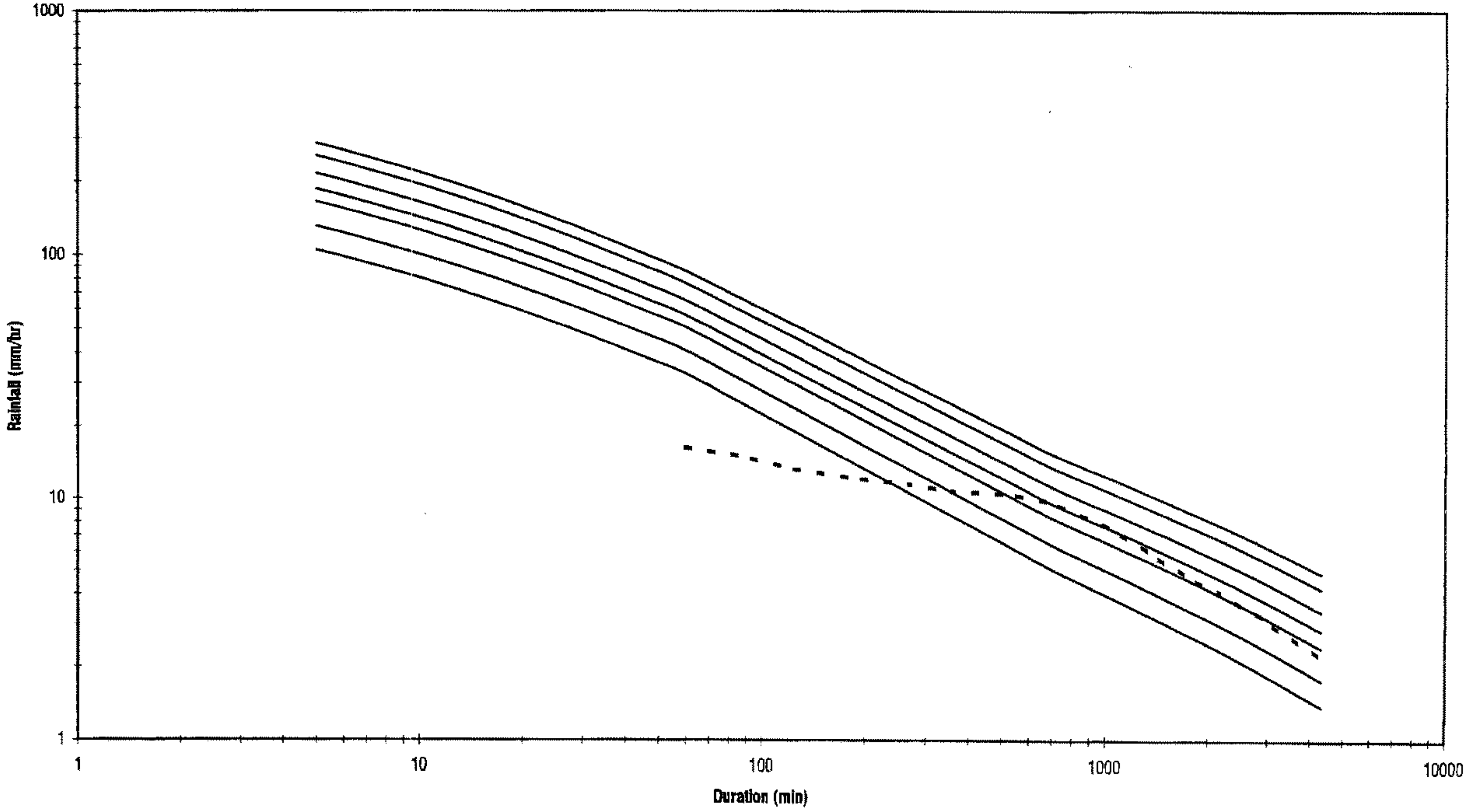

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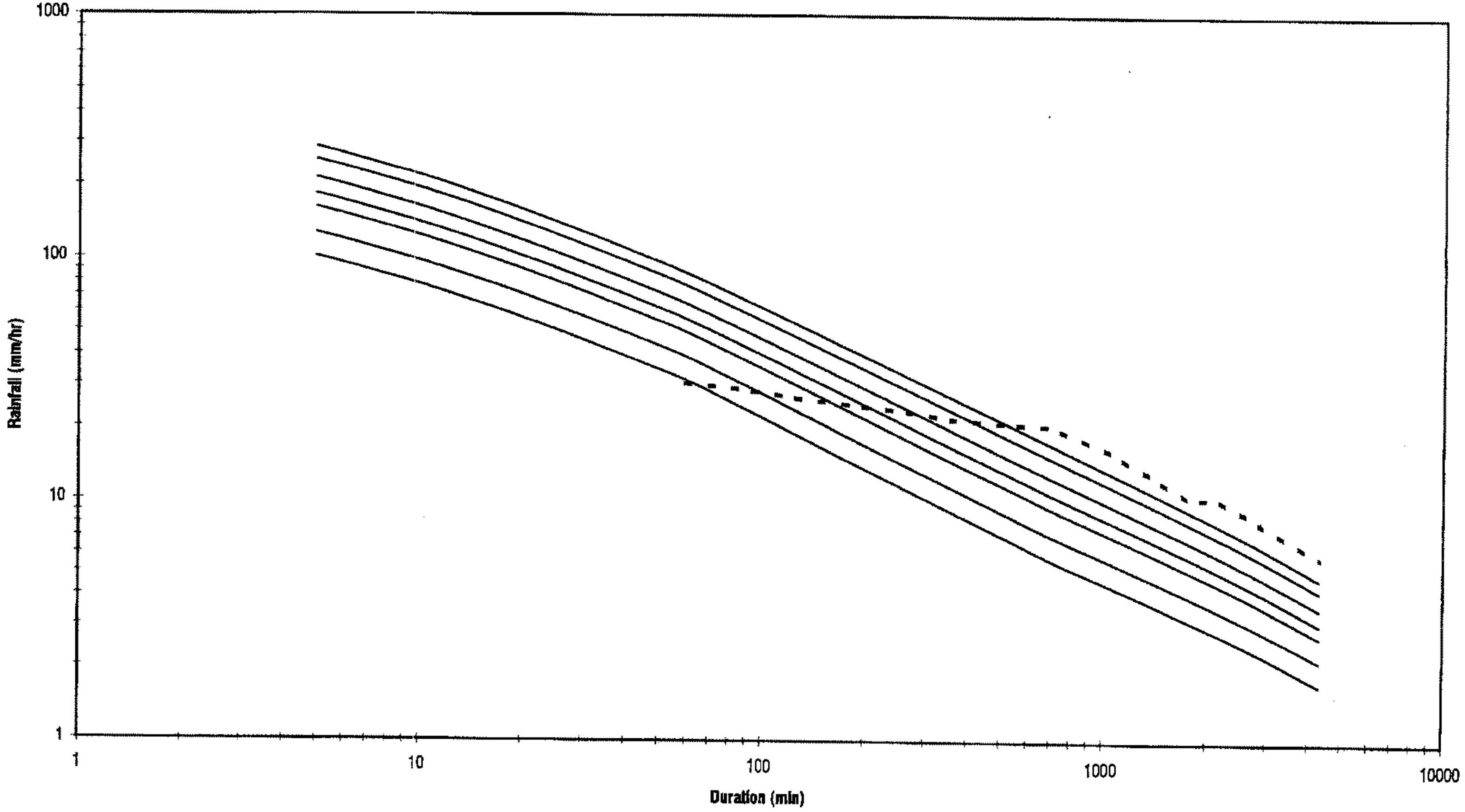

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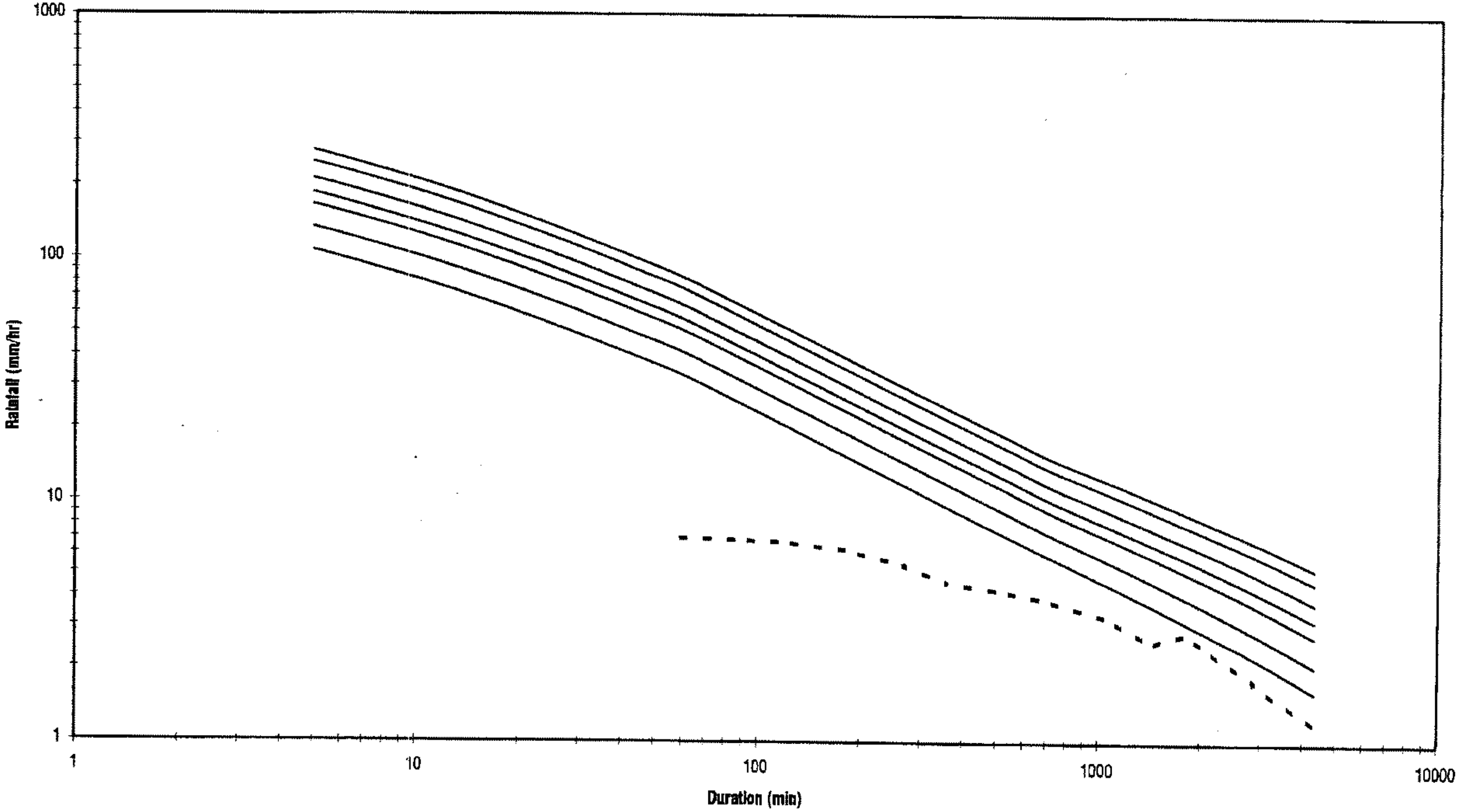

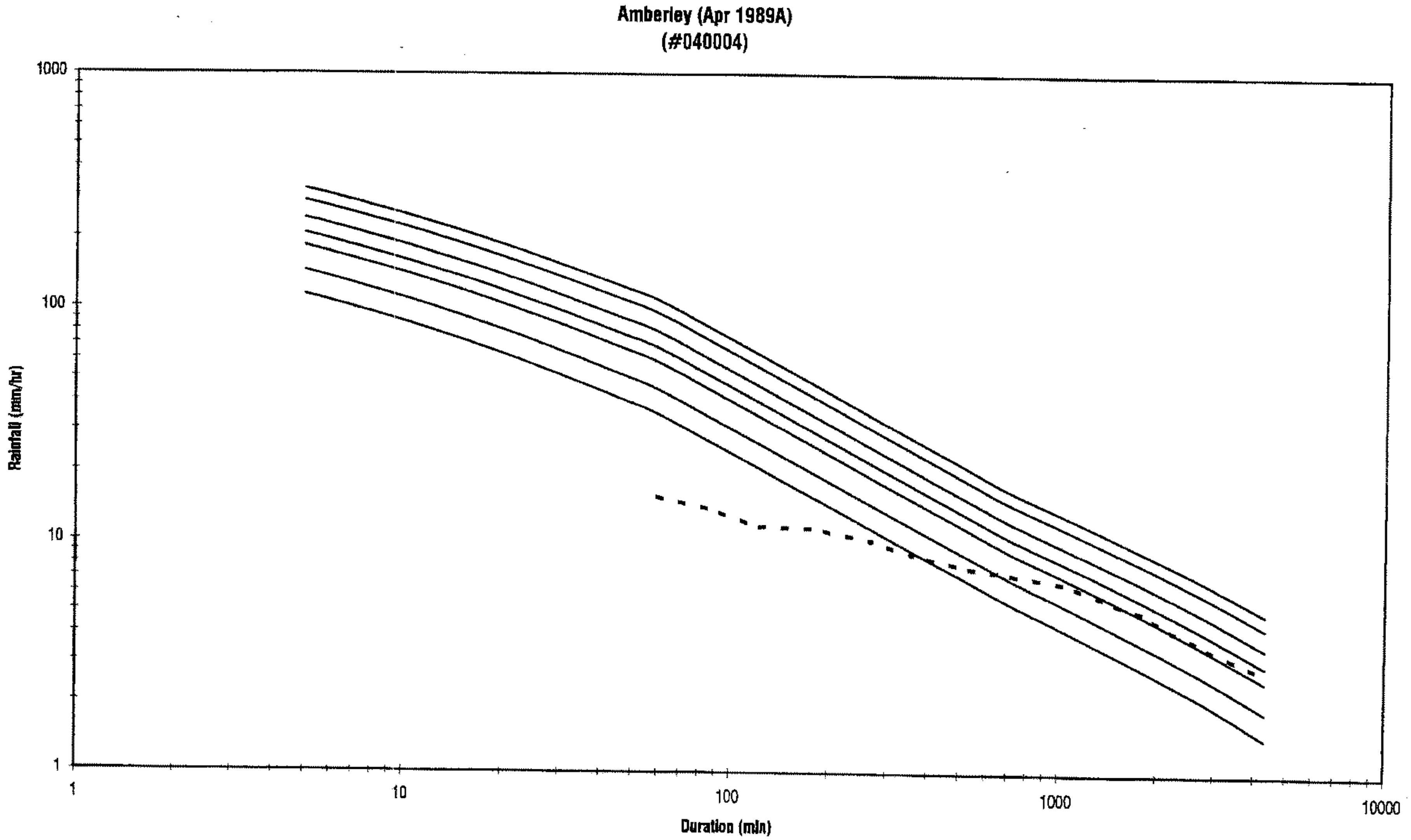
Amberley (Apr 1989A)
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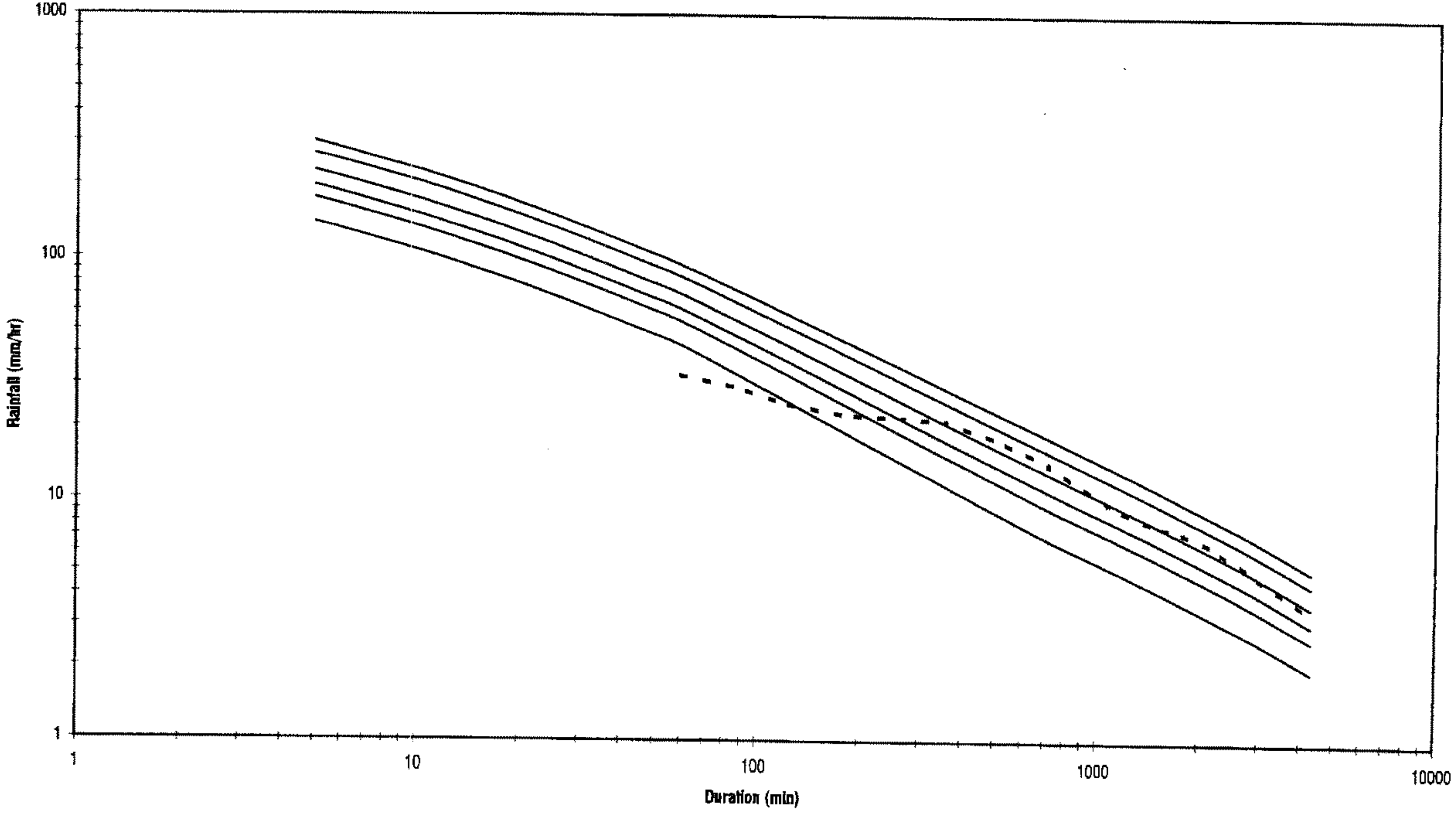
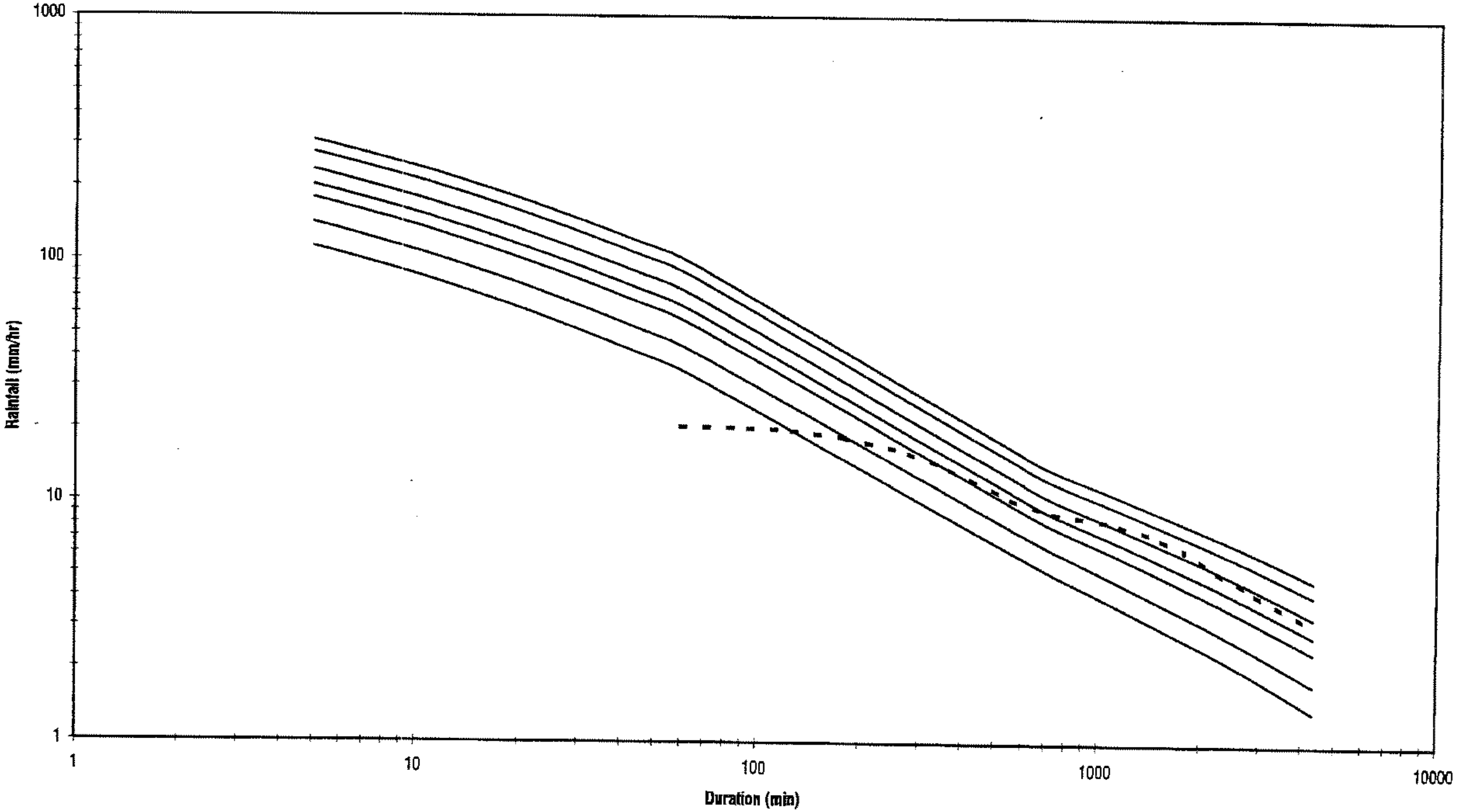
1000
100
10
1
Rainfall (mm/hr)
1
10
100
1000
10000
Duration (min)

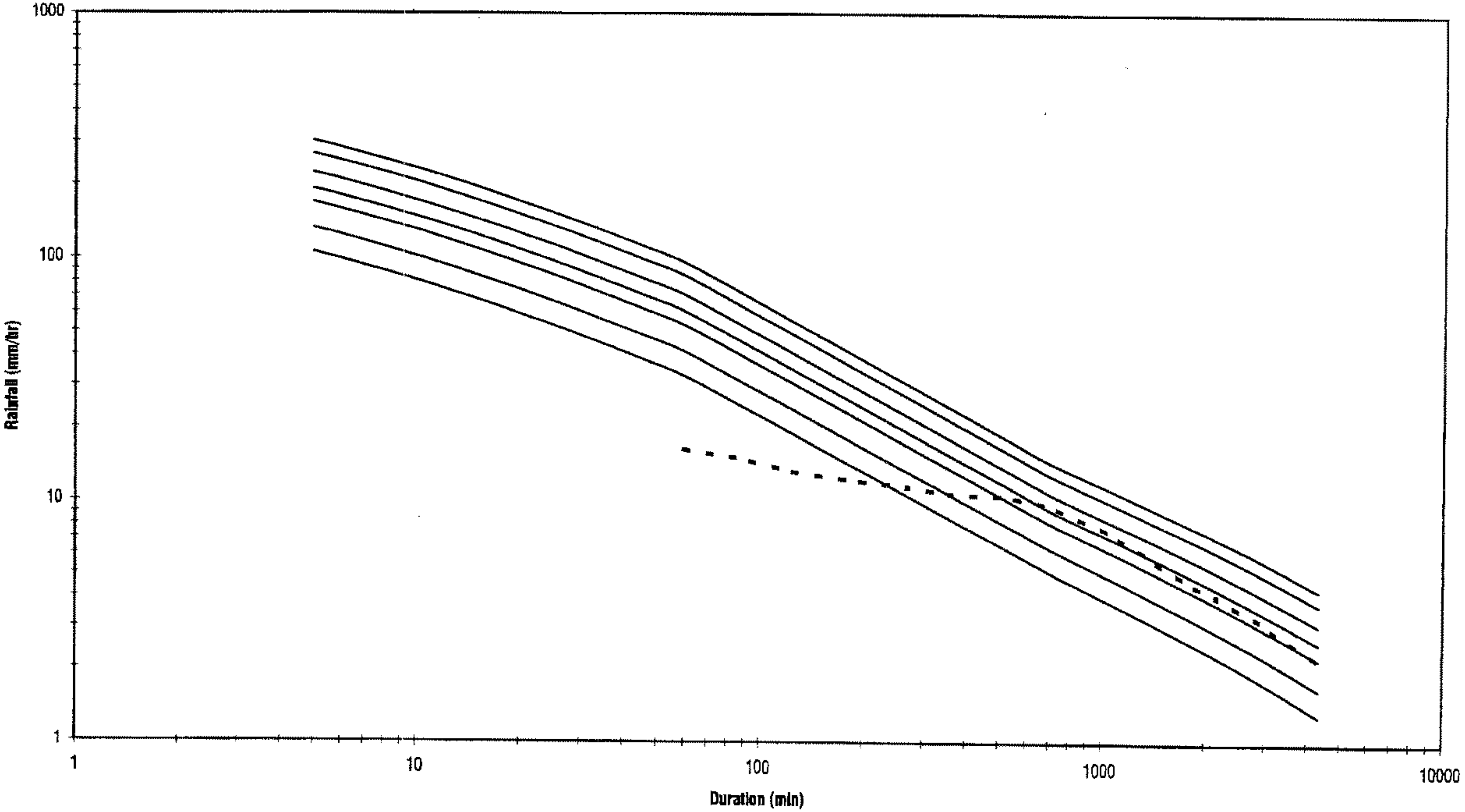
Kirkleagh (Apr 1989A)
(#040318)



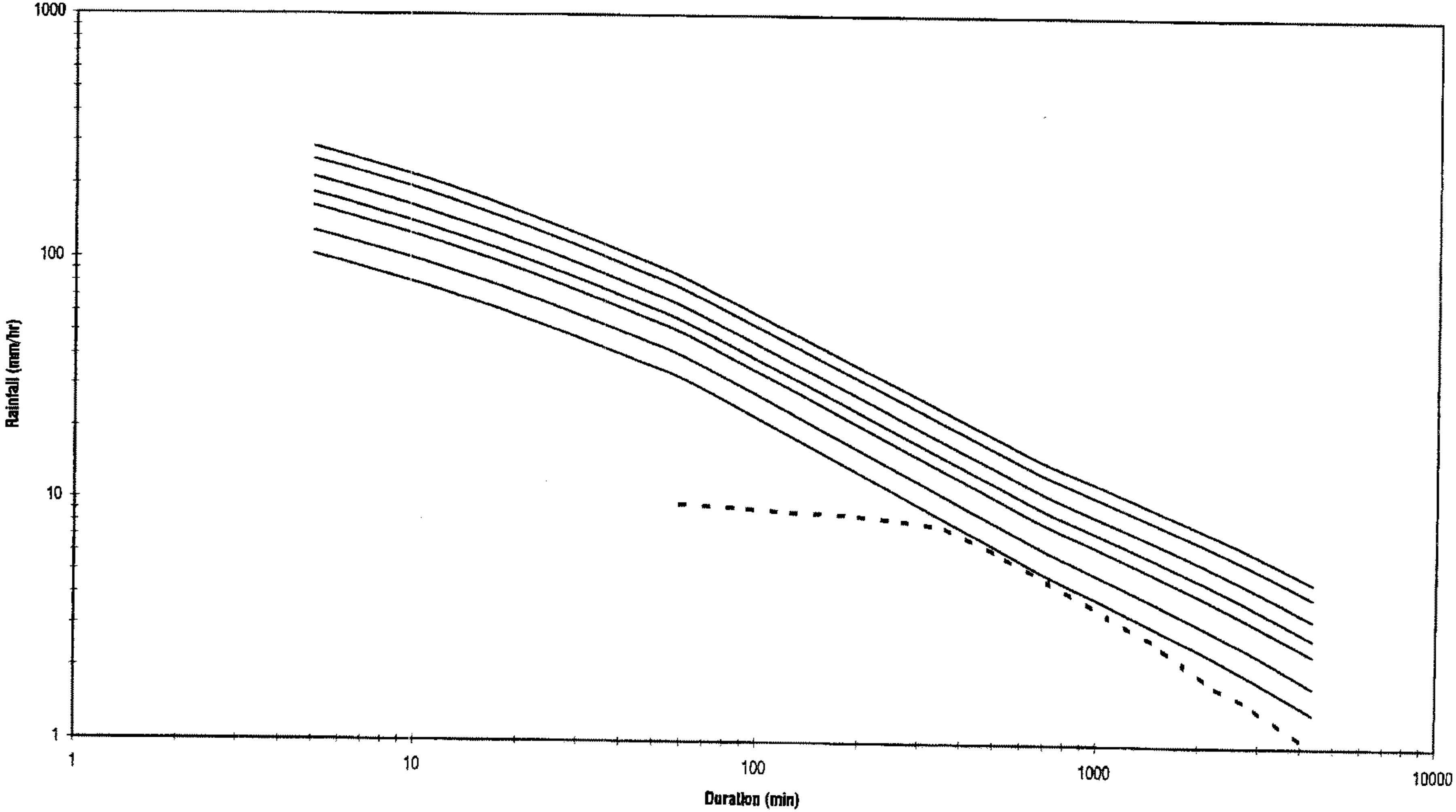
Three Way Catchment (Apr 1989A)
(#040184)



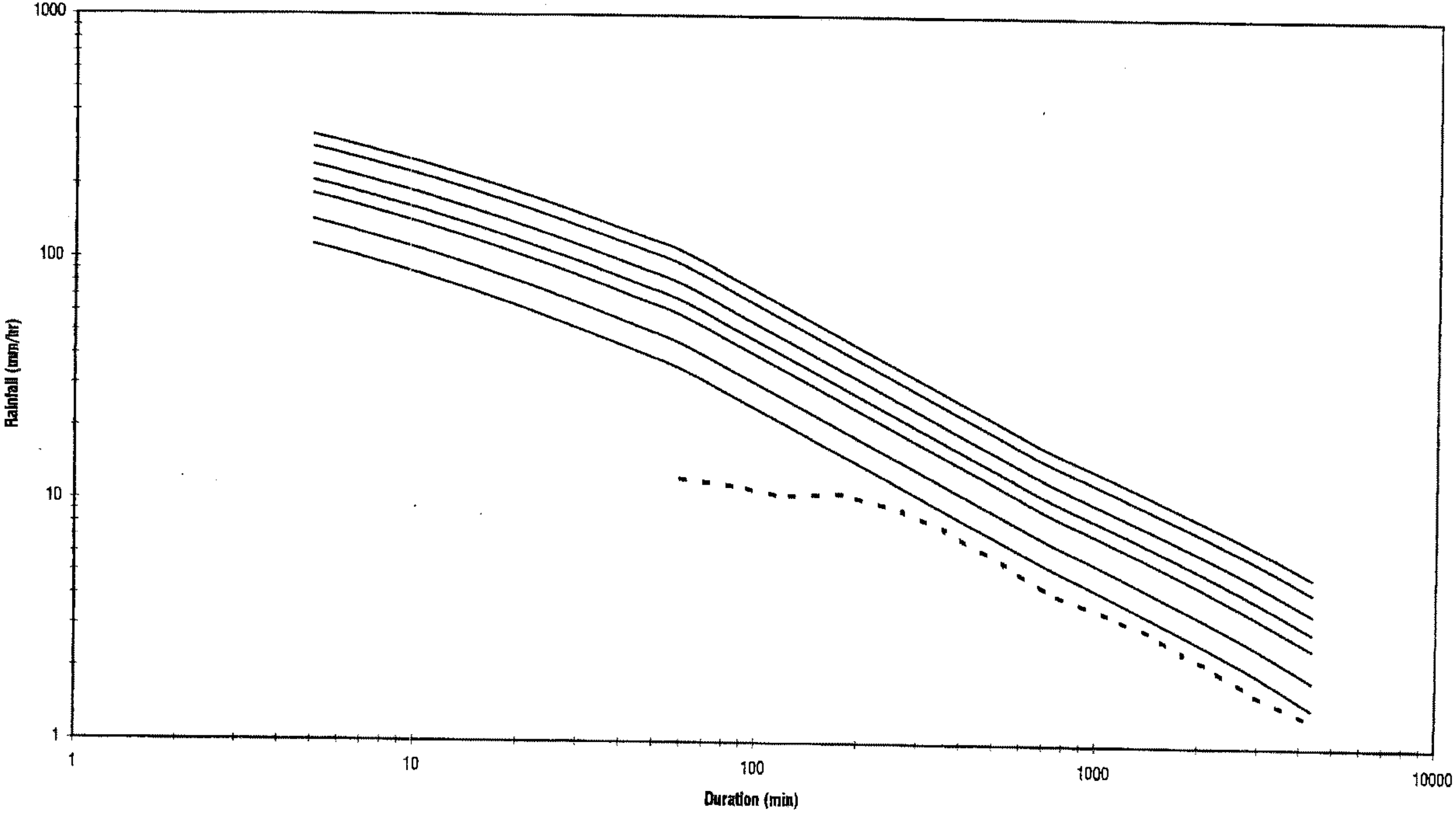
Gatton-Lawes (Apr 1989A)
(#040083)



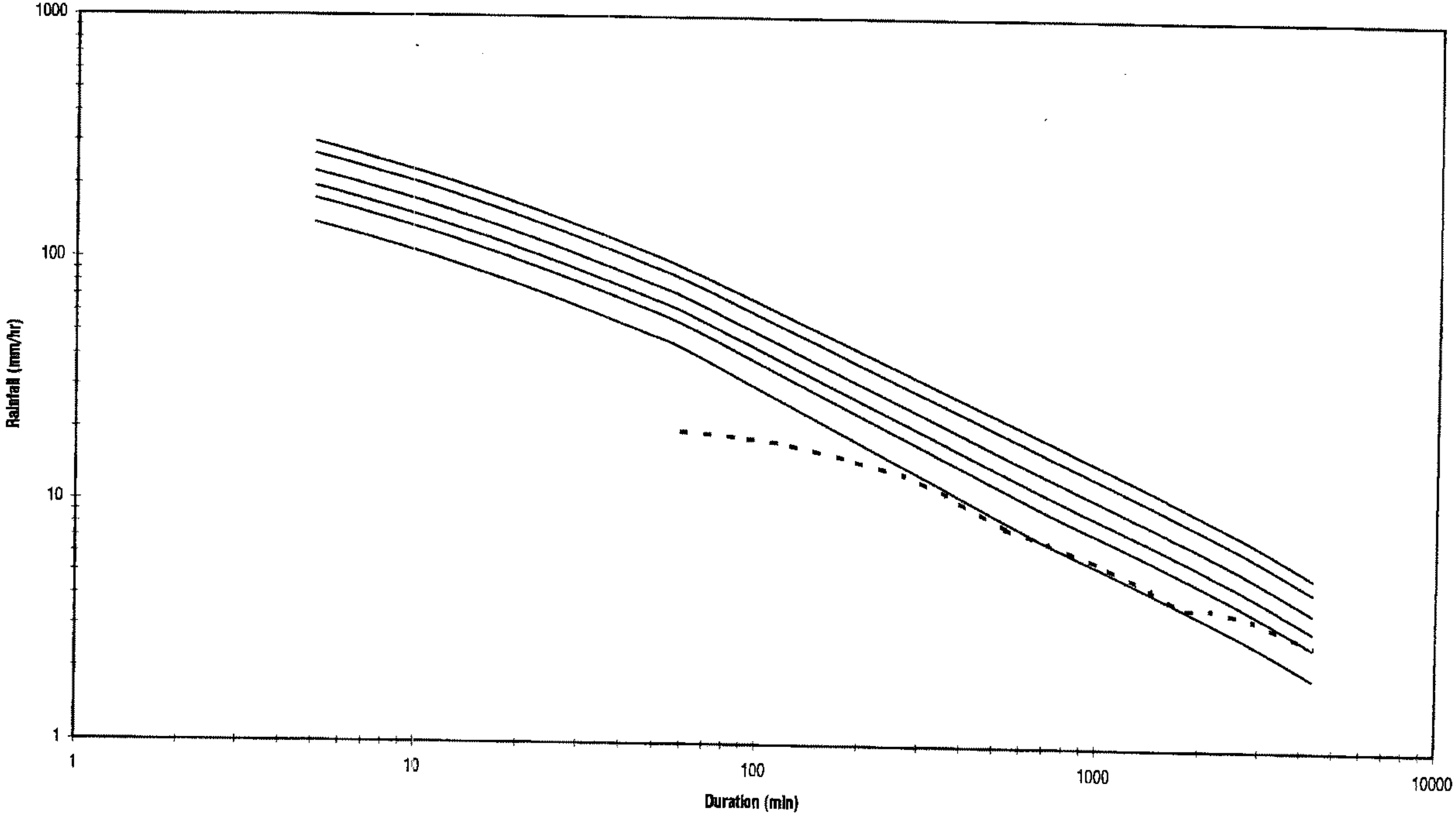
Blackbutt (Apr 1989A)
(#040020)



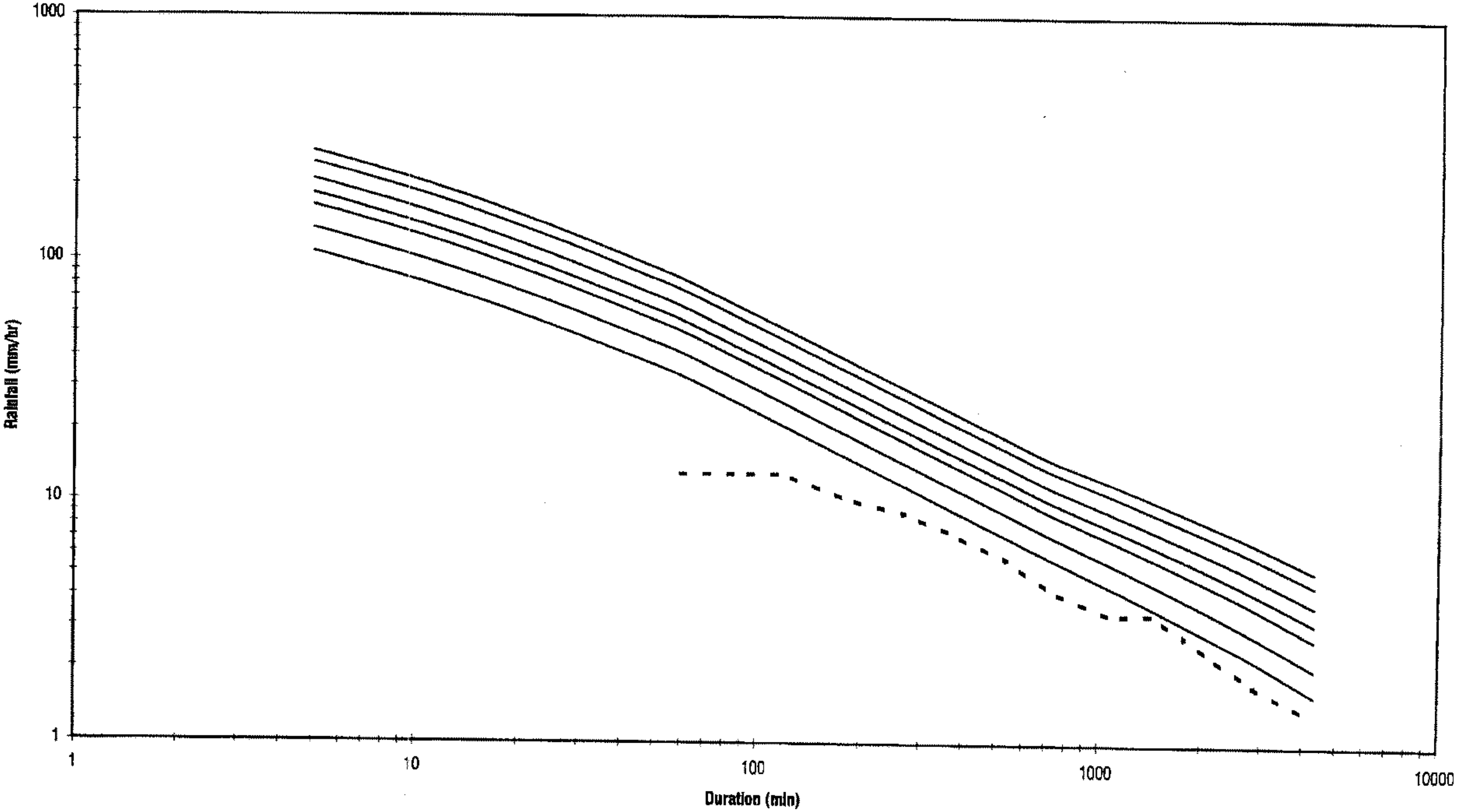
Amberley (Apr 1989B)
(#040004)



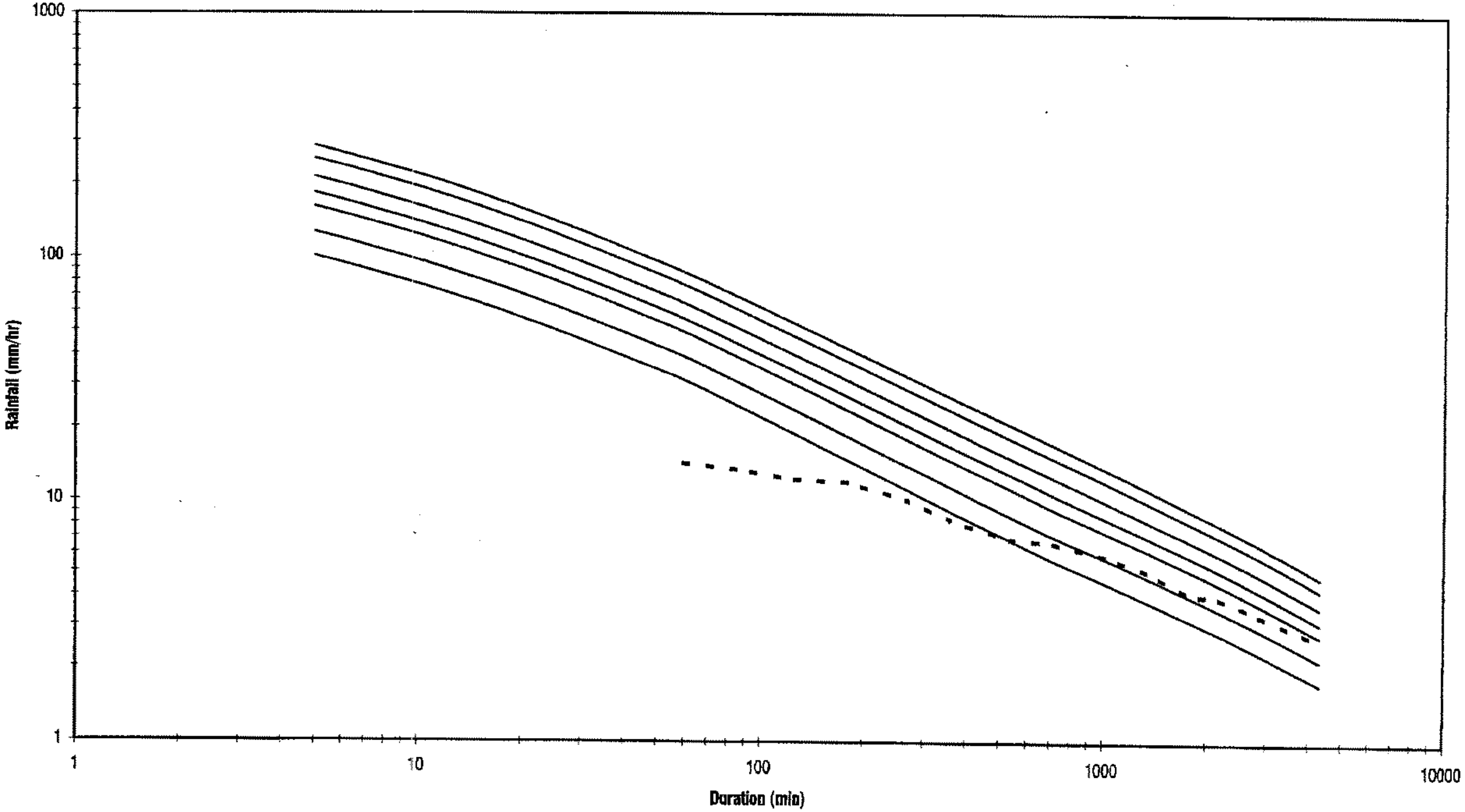
Kirkleagh (Apr 1989B)
(#040318)



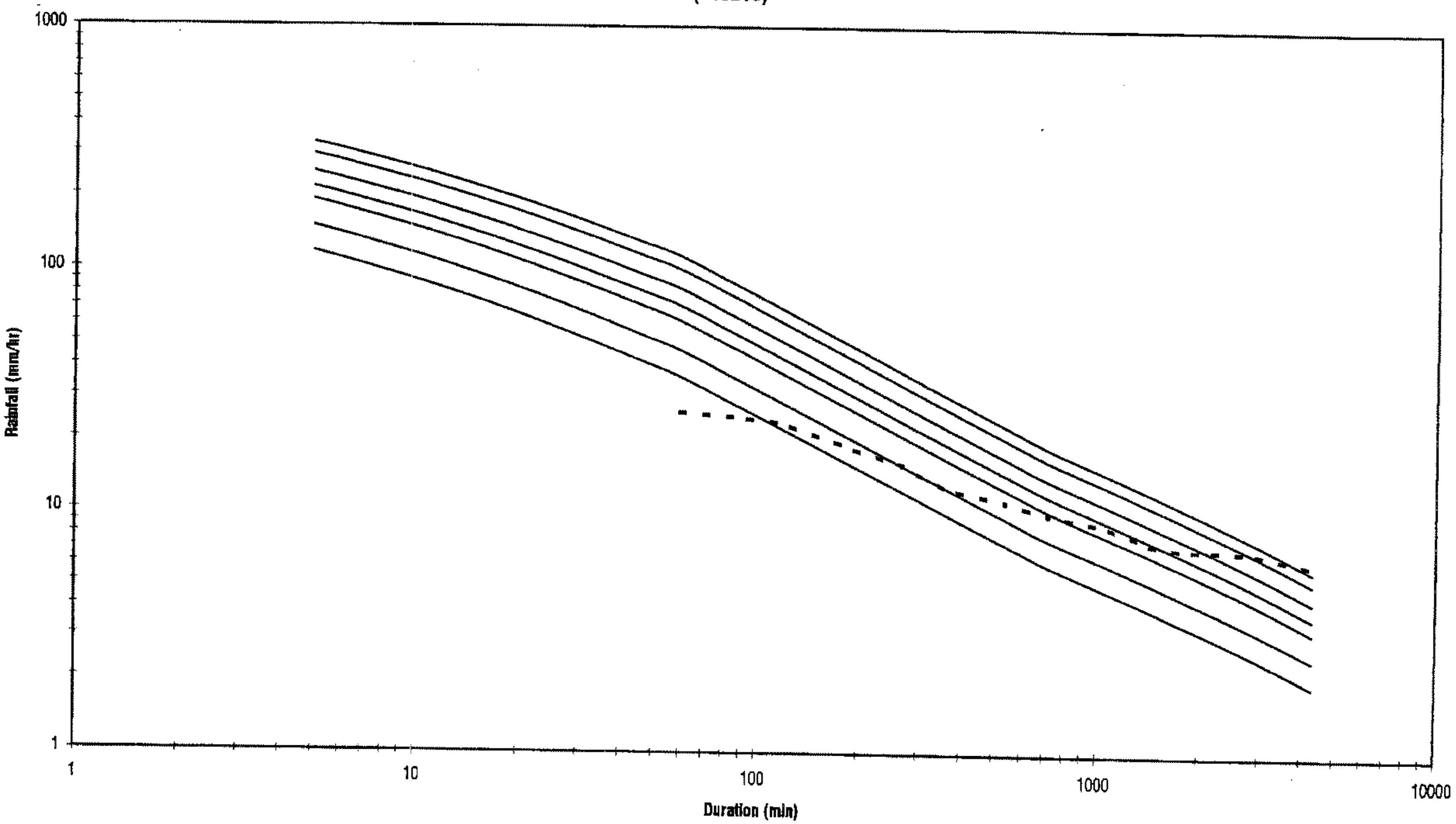
Moogerah Dam (Apr 1989B)
(#040135)



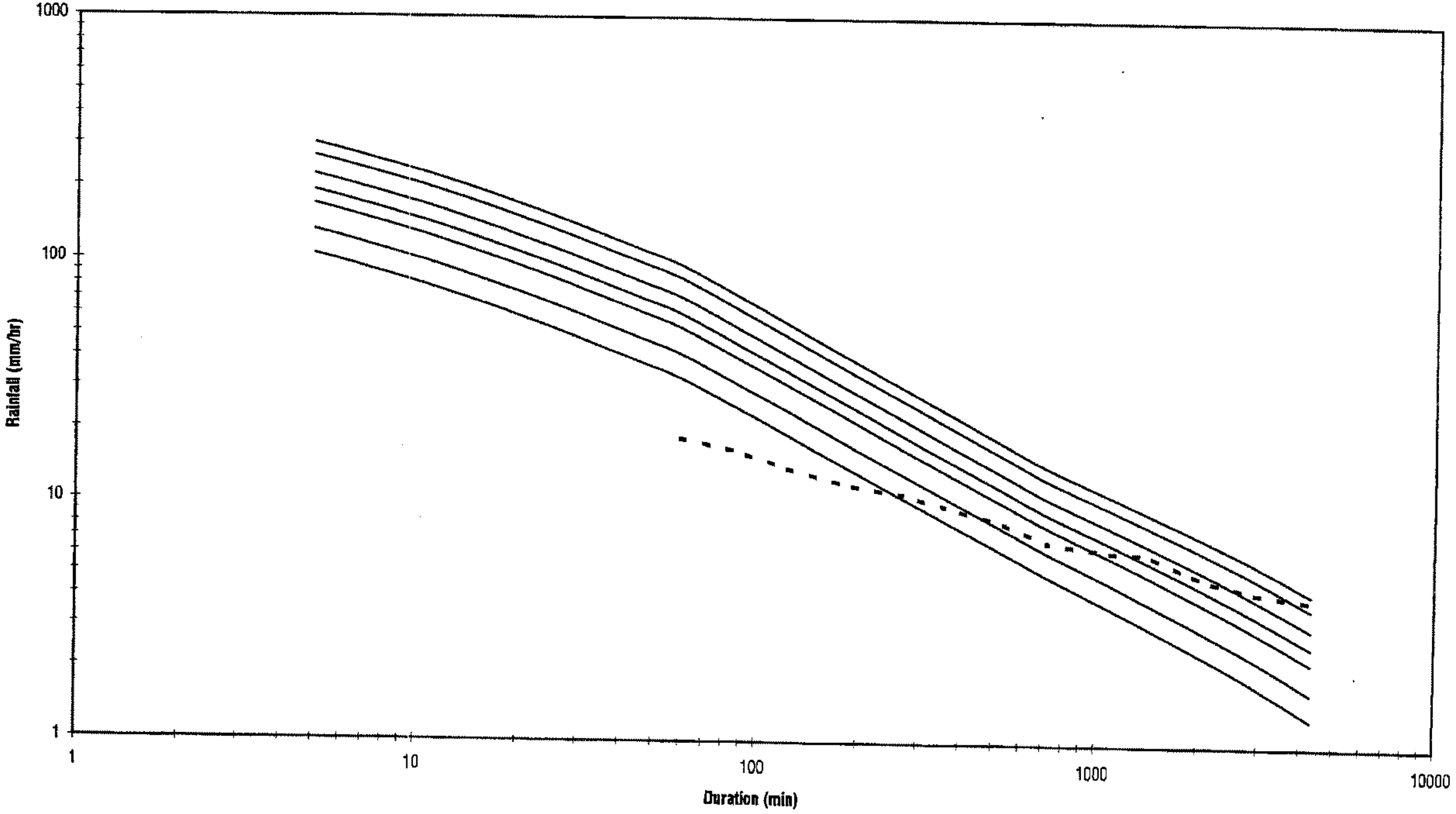
Ravensbourne PO (Apr 1989B)
(#040270)



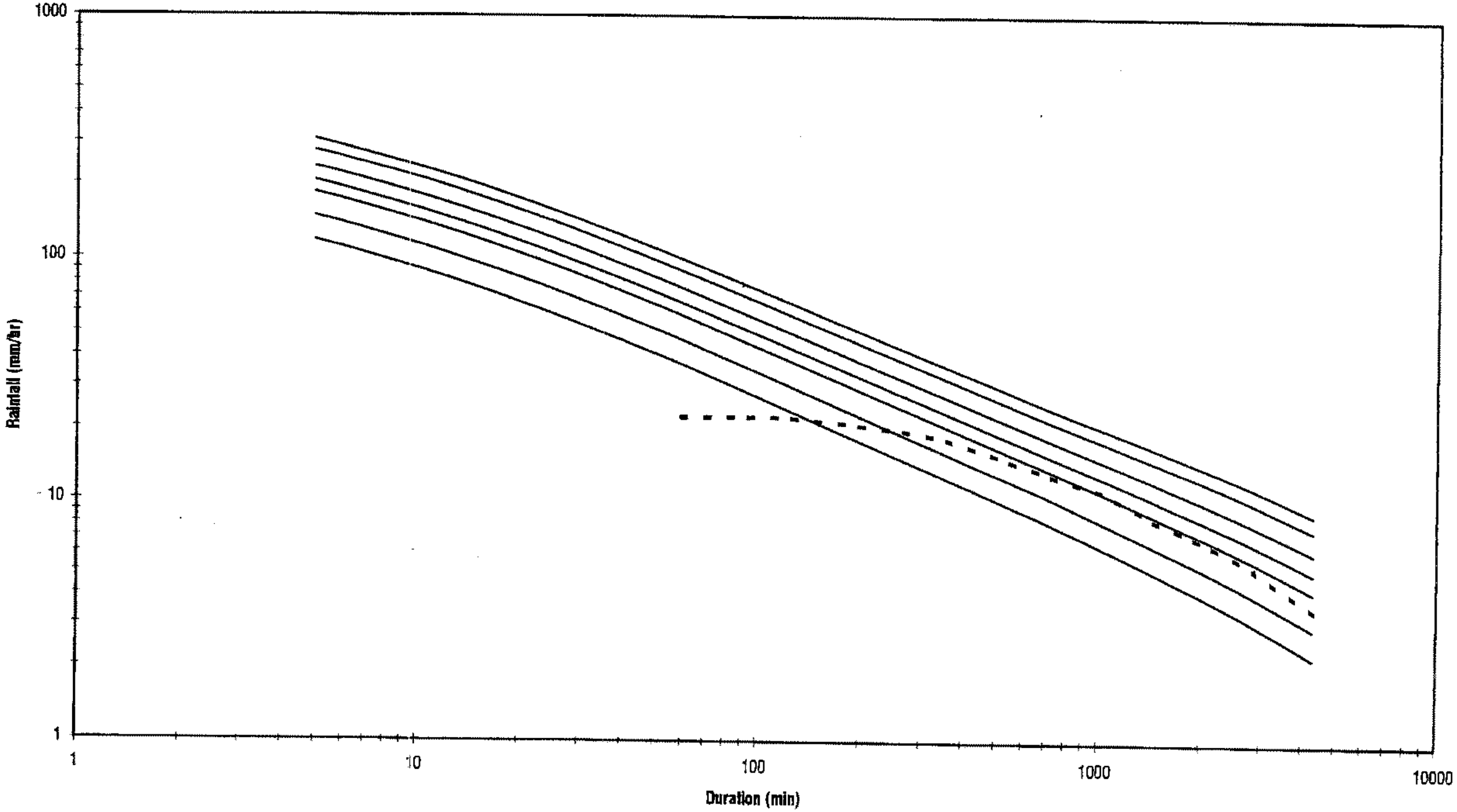
Brisbane (May 1996)
(040215)



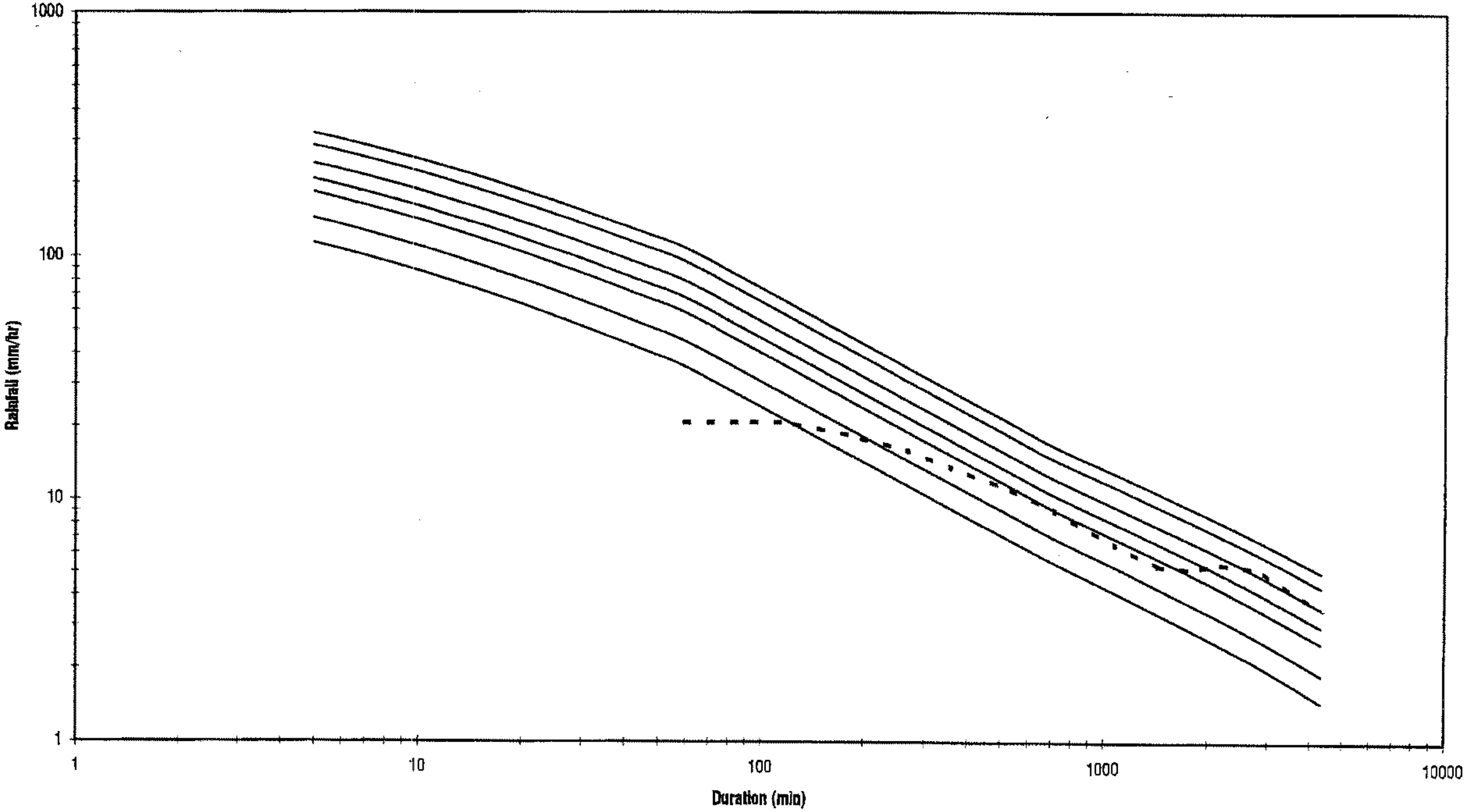
Gatton-Lawes (May 1996)
(#040083)



Woodford PO (May 1996)
(#040252)

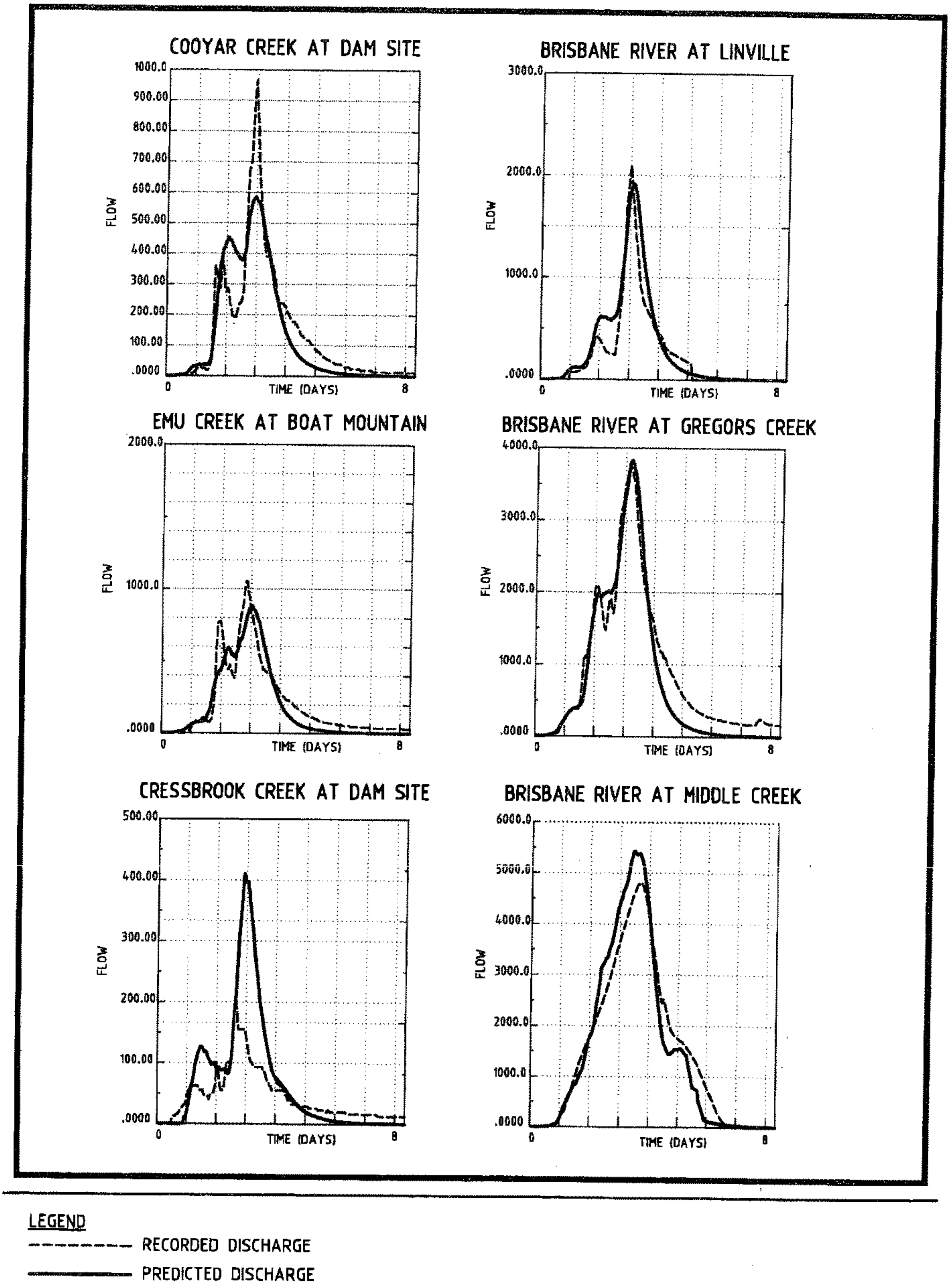


Amberley (May 1996)
(#040004)



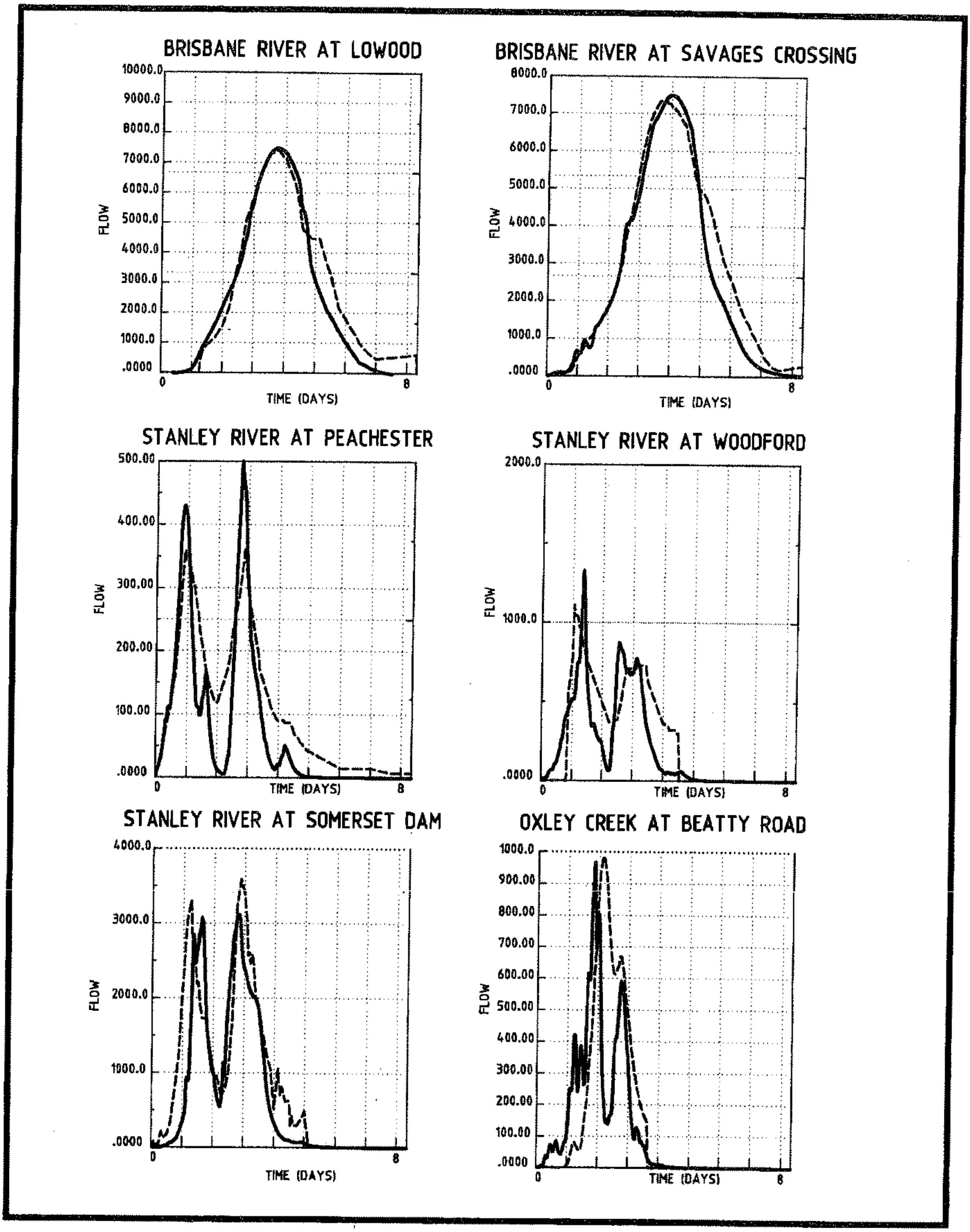
Appendix B - Recorded and RAFTS Predicted Hydrographs

FIGURE B-1a
BRISBANE RIVER FLOOD STUDY
JANUARY 1974 FLOOD HYDROGRAPHS



SINCLAIR KNIGHT MERZ

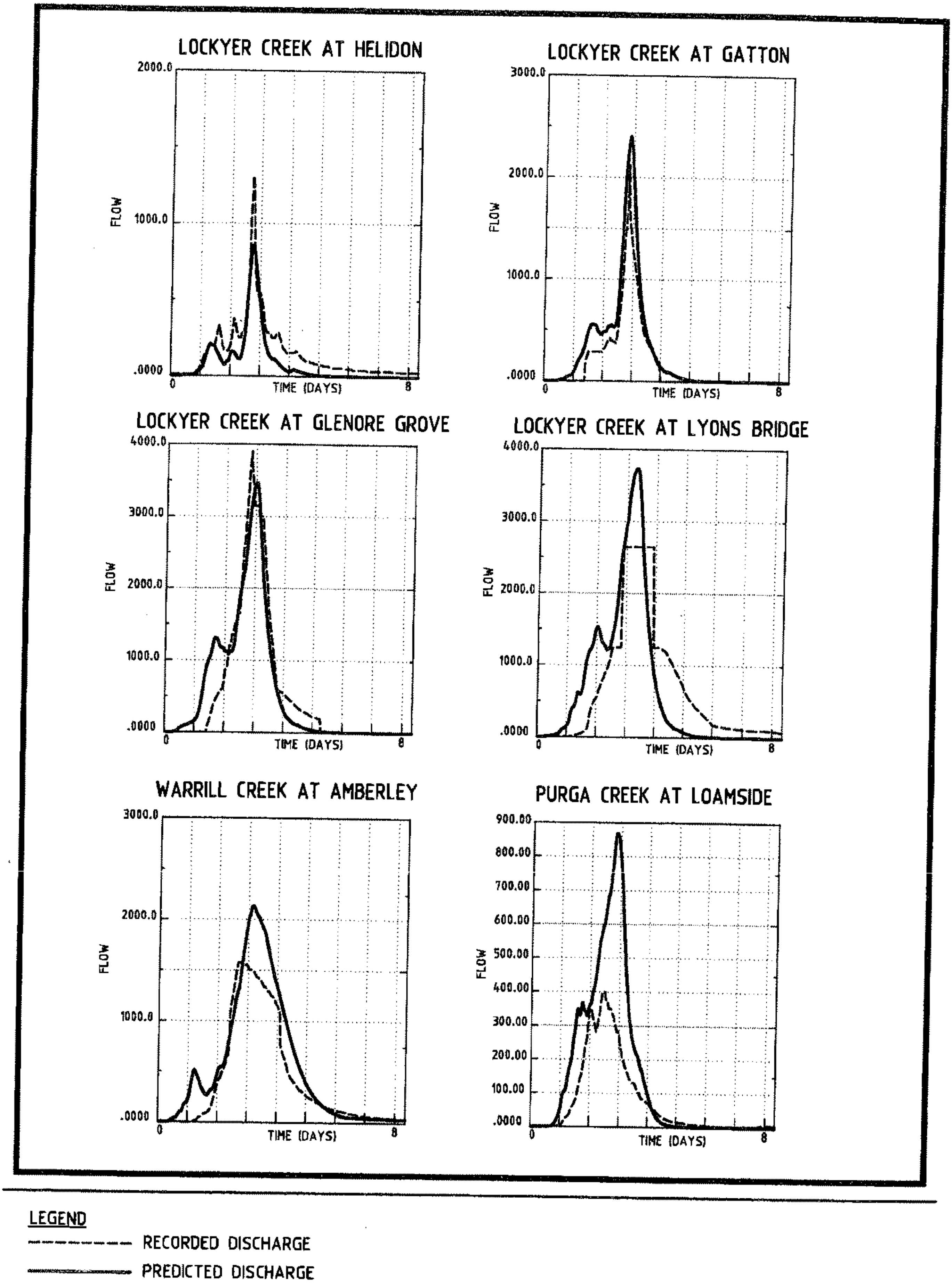
FIGURE B-1b
BRISBANE RIVER FLOOD STUDY
JANUARY 1974 FLOOD HYDROGRAPHS



LEGEND
- - - - - - RECORDED DISCHARGE
———— PREDICTED DISCHARGE

FILE NAME FIG-R1 PLO. SCALE 1=1 DISK No. G:\ JOB No. T00[illegible] 7-2-[illegible]

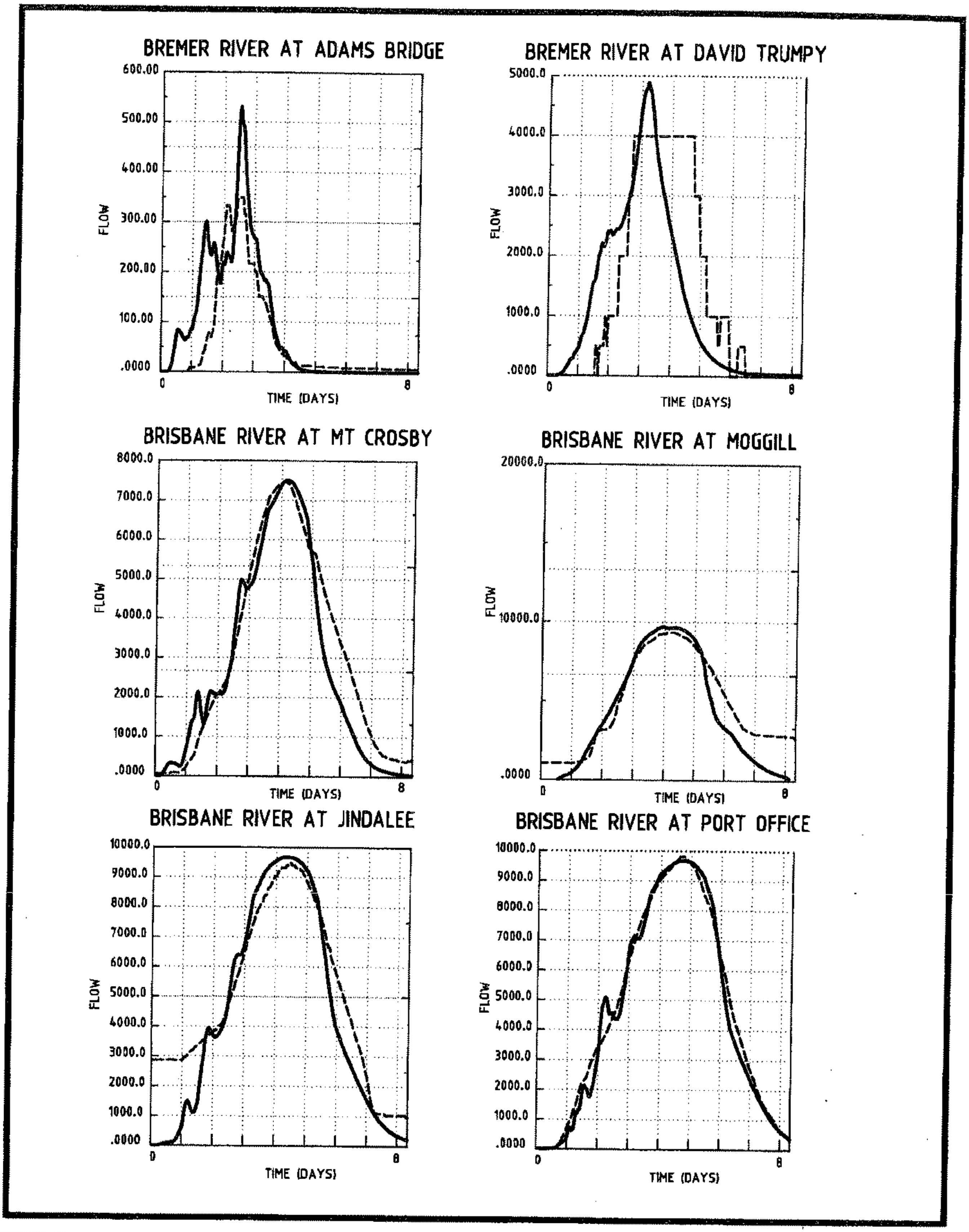
FIGURE B-1c
BRISBANE RIVER FLOOD STUDY
JANUARY 1974 FLOOD HYDROGRAPHS



FILE NAME: FIG-B1 DISK N°: G:\ JOB N°: T004157 17-2-98
PLO LE: 1:

SINCLAIR KNIGHT MERZ

FIGURE B-1d
BRISBANE RIVER FLOOD STUDY
JANUARY 1974 FLOOD HYDROGRAPHS



LEGEND

- - - - - - - - RECORDED DISCHARGE

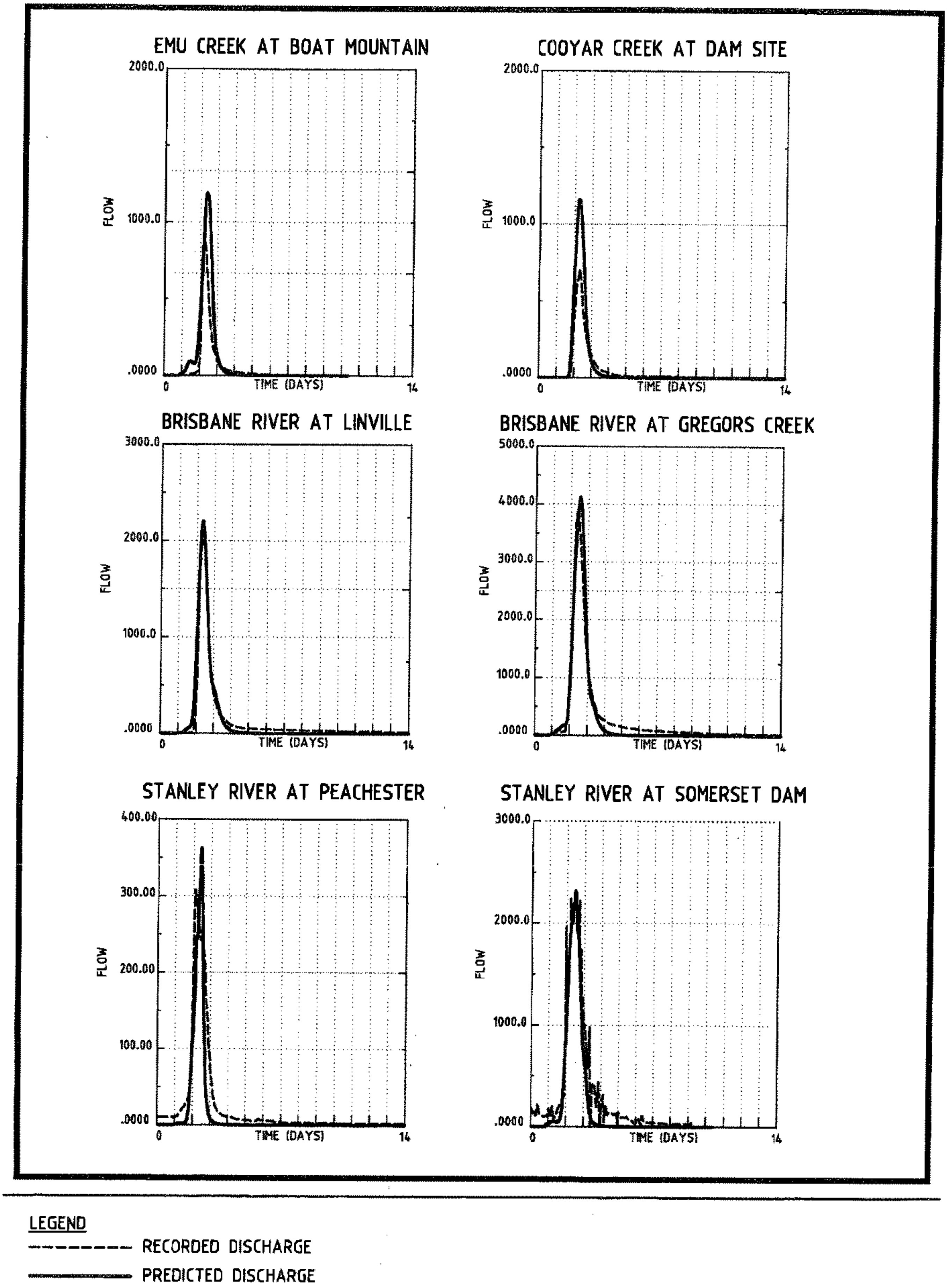
———————— PREDICTED DISCHARGE

FILE NAME: FIG-B1 DISK N°: G:\ JOB N°: T004157 17-2-98

PLO [illegible]

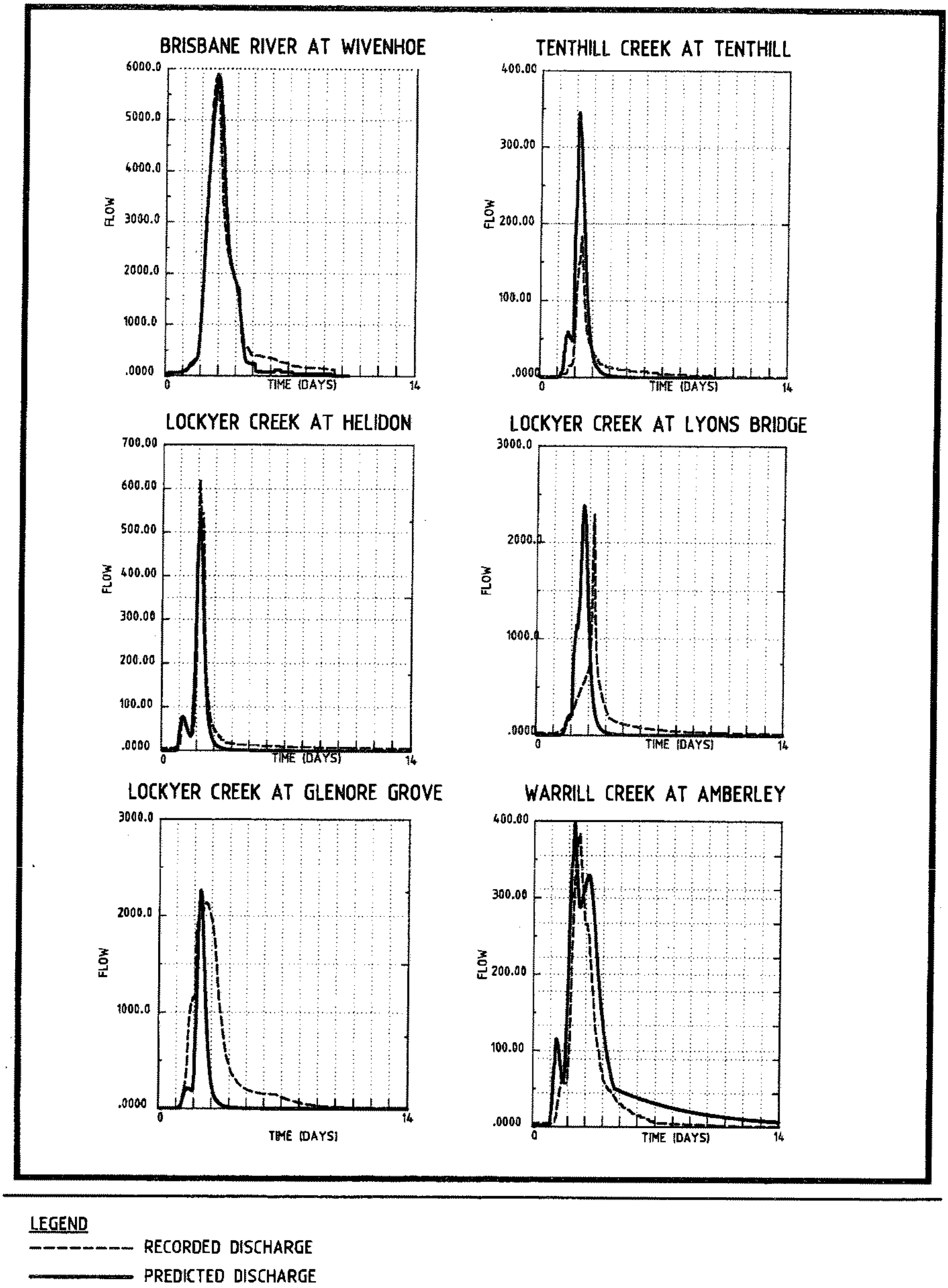
SINCLAIR KNIGHT MERZ

FIGURE B-2a
BRISBANE RIVER FLOOD STUDY
JUNE 1983 FLOOD HYDROGRAPHS



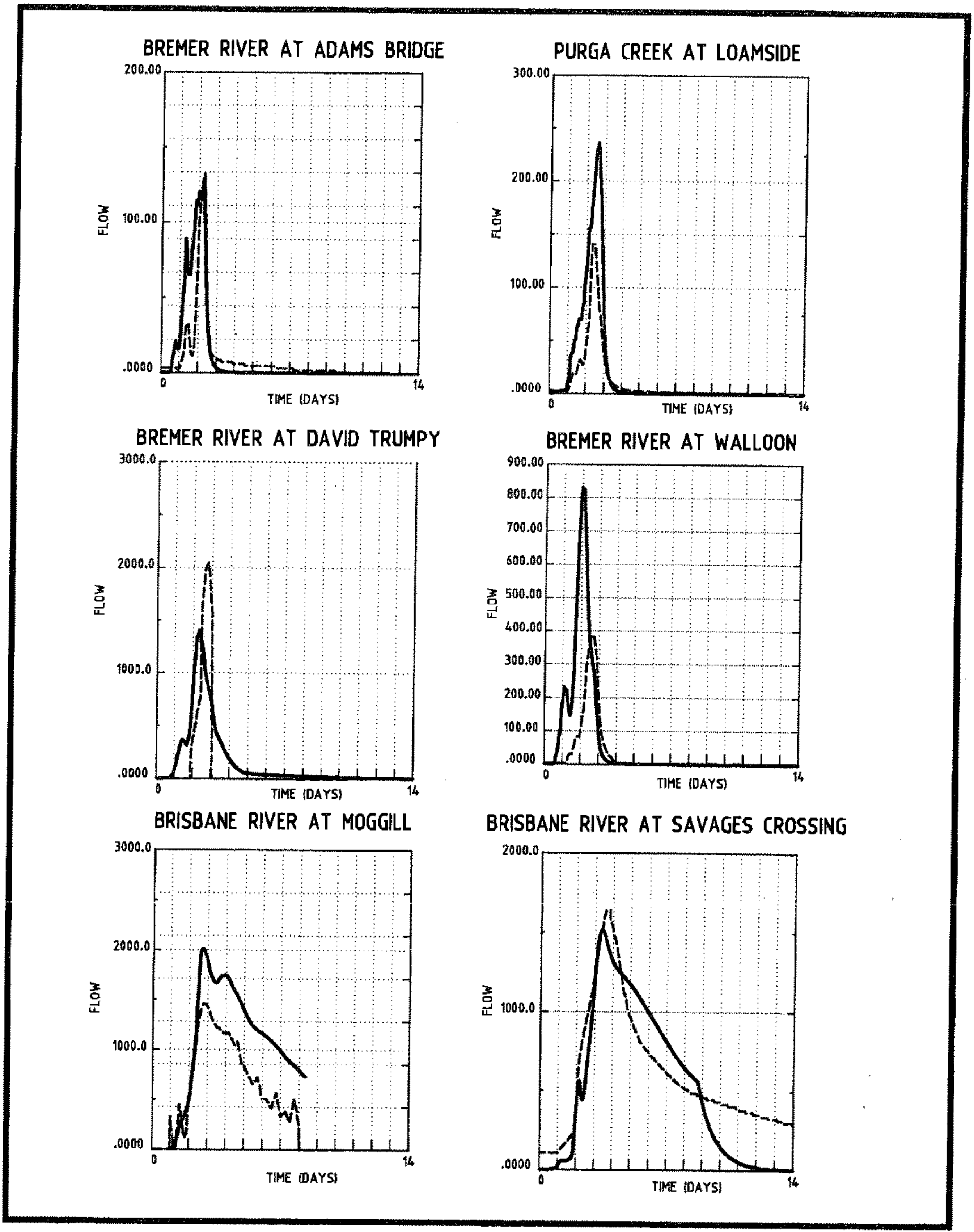
FILE NAME: FIG-B2 DISK N°: G:\ JOB N°: T004157 r 17-2-98
PLO. ...LE: 1=.

FIGURE B-2b
BRISBANE RIVER FLOOD STUDY
JUNE 1983 FLOOD HYDROGRAPHS



FILE NAME: FIG-B2 DISK N°: G:\ JOB N°: T004157 17-2-98
PLO LE 1:

FIGURE B-2c
BRISBANE RIVER FLOOD STUDY
JUNE 1983 FLOOD HYDROGRAPHS



LEGEND

- - - - - - - - RECORDED DISCHARGE

———— PREDICTED DISCHARGE

FILE NAME: FIG-B2 PLO. SCALE: 1=1 DISK N°: G:\ JOB N°: T004157 17-2-98

FIGURE B-3a
BRISBANE RIVER FLOOD STUDY
LATE APRIL 1989 FLOOD HYDROGRAPHS

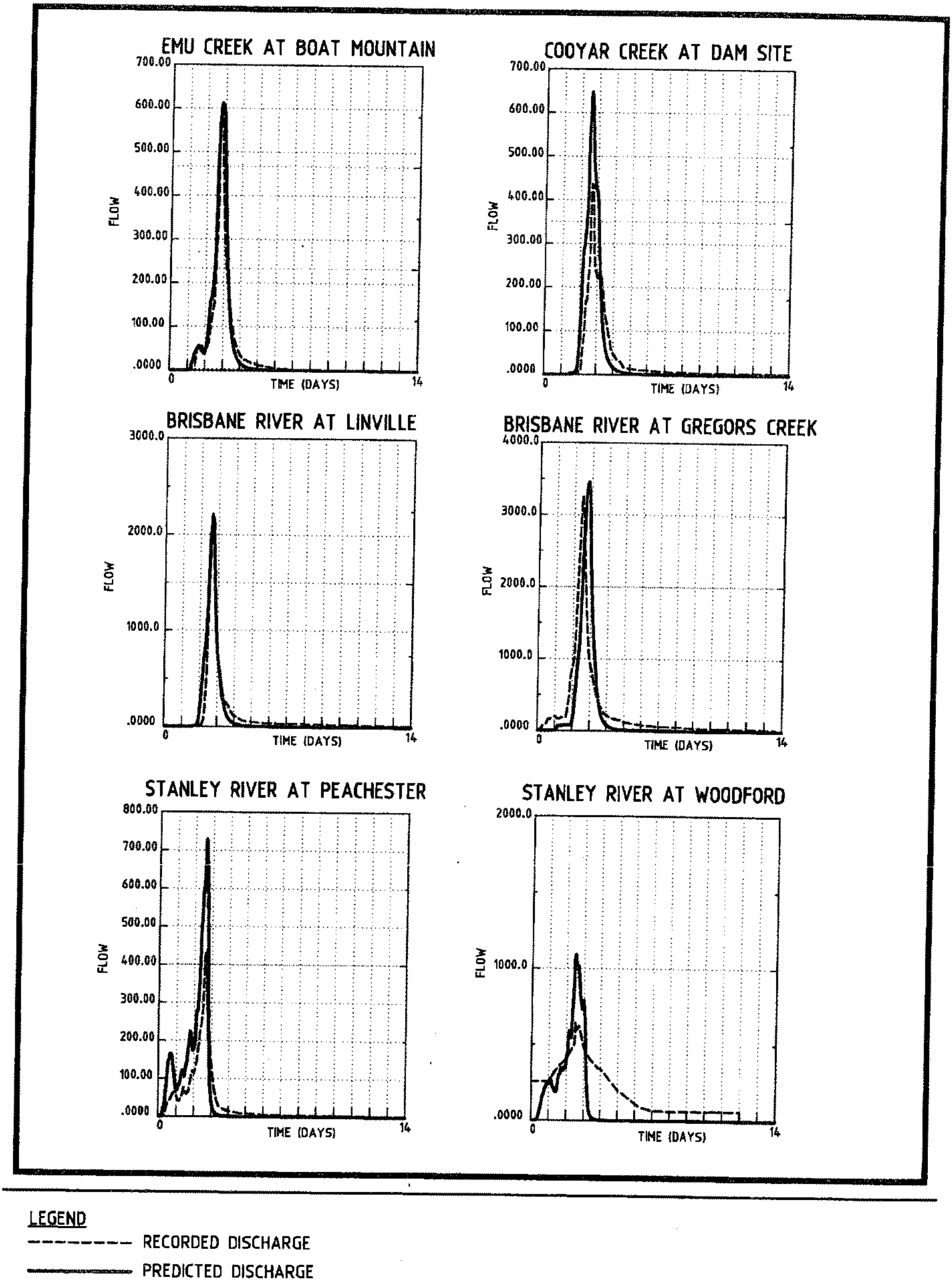
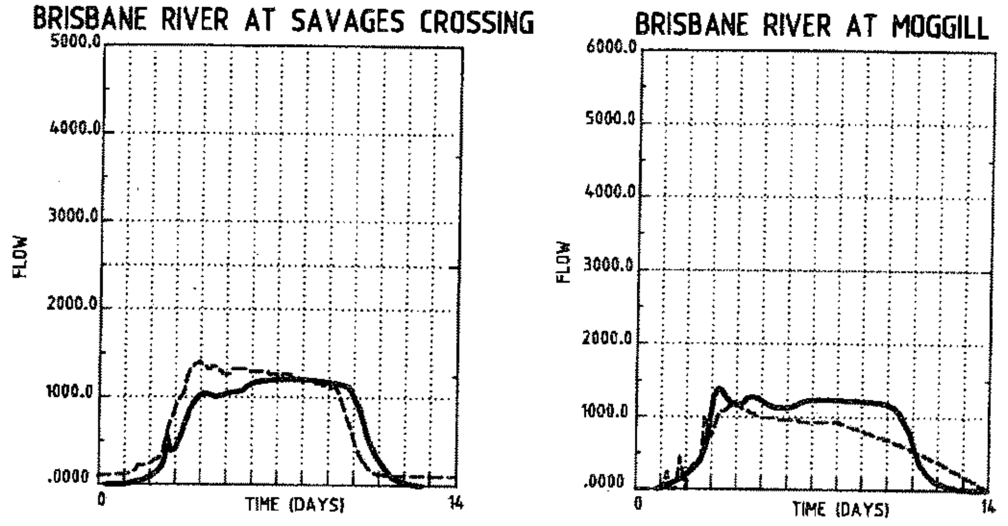
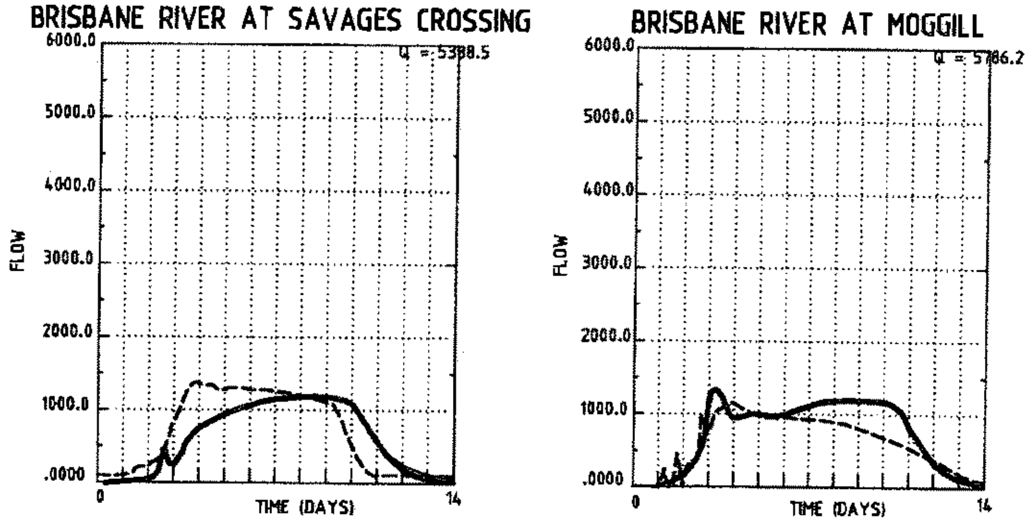


FIGURE B-3b

BRISBANE RIVER FLOOD STUDY
LATE APRIL 1989 FLOOD HYDROGRAPHS



STORAGE CURVE A



STORAGE CURVE B

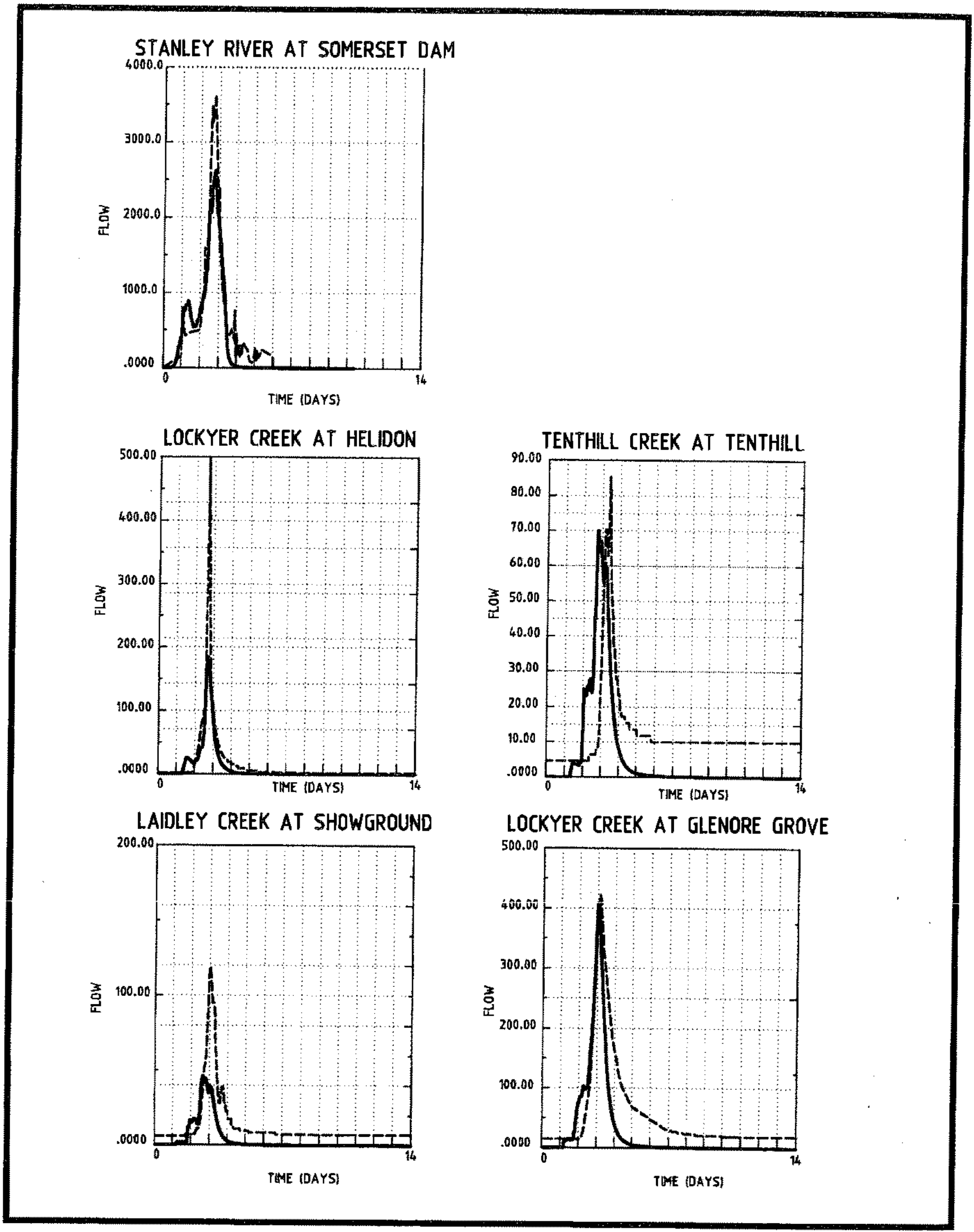
LEGEND

- - - - - - - - RECORDED DISCHARGE

━━━━━━━━ PREDICTED DISCHARGE

FILE NAME: 4157-232
PLOT SCALE: 1:1
DISK Nº: G:\
JOB Nº: T00/157
17-2-98

FIGURE B-3c
BRISBANE RIVER FLOOD STUDY
LATE APRIL 1989 FLOOD HYDROGRAPHS



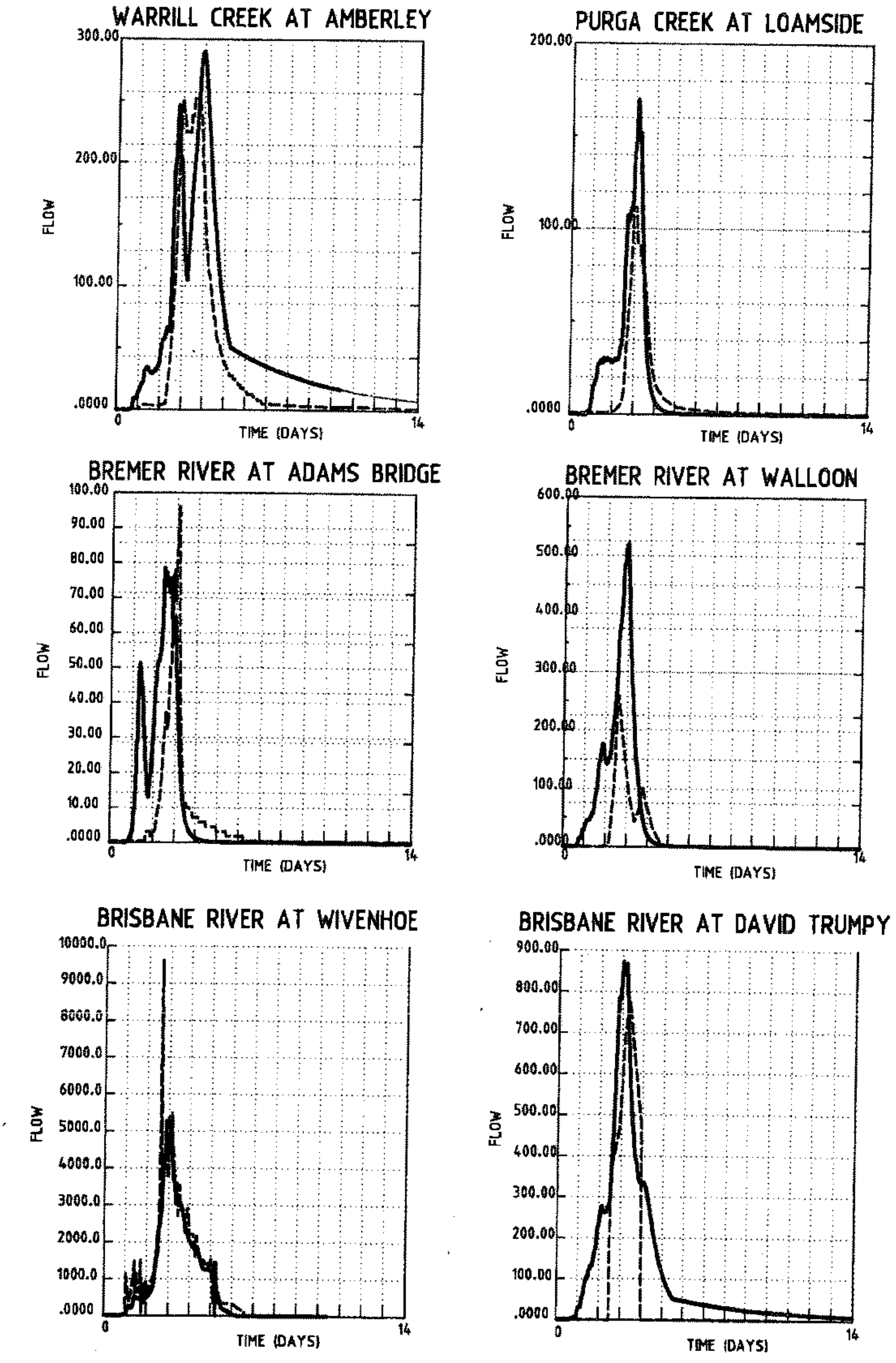
LEGEND

- - - - - - - - RECORDED DISCHARGE

———————— PREDICTED DISCHARGE

FIGURE B-3d

BRISBANE RIVER FLOOD STUDY
LATE APRIL 1989 FLOOD HYDROGRAPHS



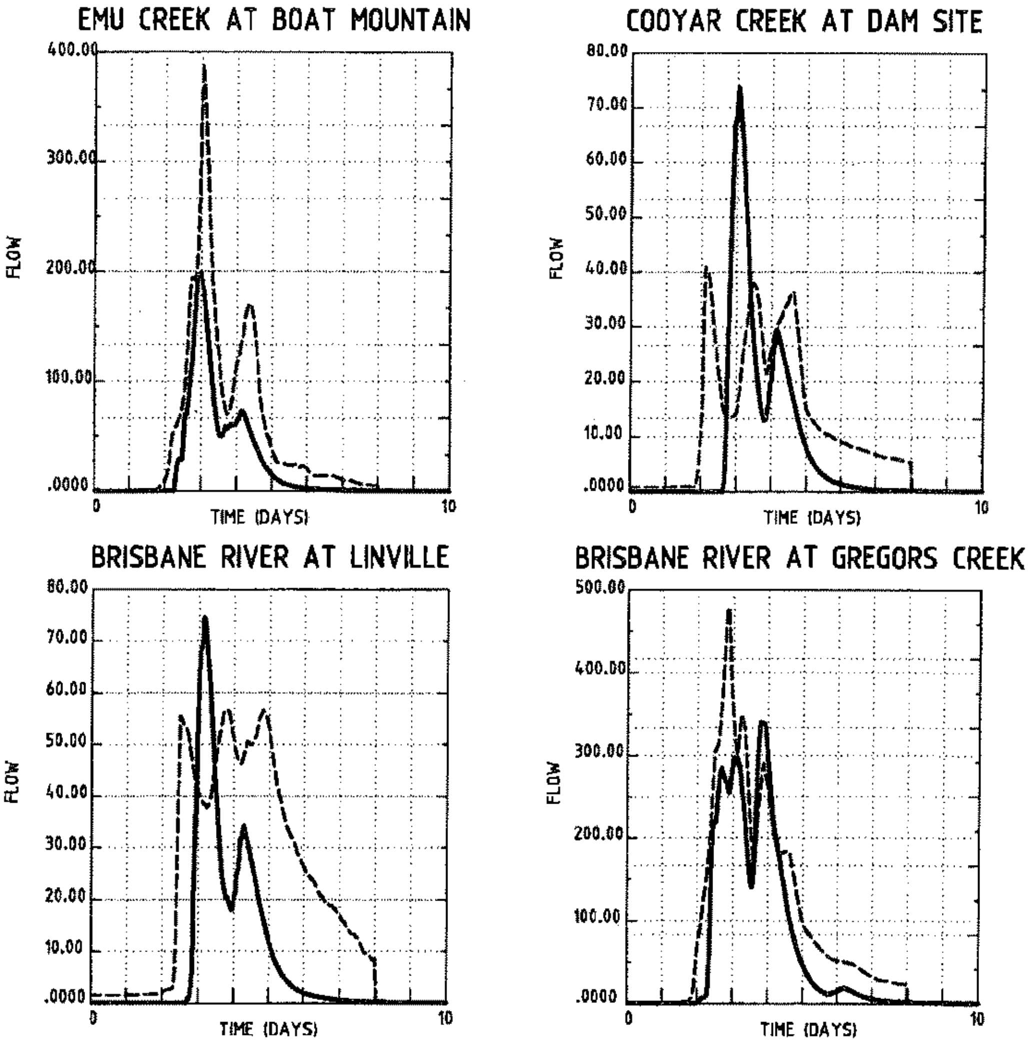
LEGEND
-------- RECORDED DISCHARGE
———— PREDICTED DISCHARGE

FILE NAME: FIG. B[illegible]
PLOT SCALE: 1=1
DISK NO: G:\
JOB NO T00[illegible]
17-2 [illegible]

FIGURE B-4a

SINCLAIR KNIGHT MERZ

BRISBANE RIVER FLOOD STUDY
MAY 1996 FLOOD HYDROGRAPHS



EMU CREEK AT BOAT MOUNTAIN

COOYAR CREEK AT DAM SITE

BRISBANE RIVER AT LINVILLE

BRISBANE RIVER AT GREGORS CREEK

LEGEND

--------- RECORDED DISCHARGE

———— PREDICTED DISCHARGE

FILE NAME: FIG-B4
PLOT SCALE: 1=100
DISK N°: G:\
JOB N°. T004157
17-2-98

FIGURE B-4b
BRISBANE RIVER FLOOD STUDY
MAY 1996 FLOOD HYDROGRAPHS

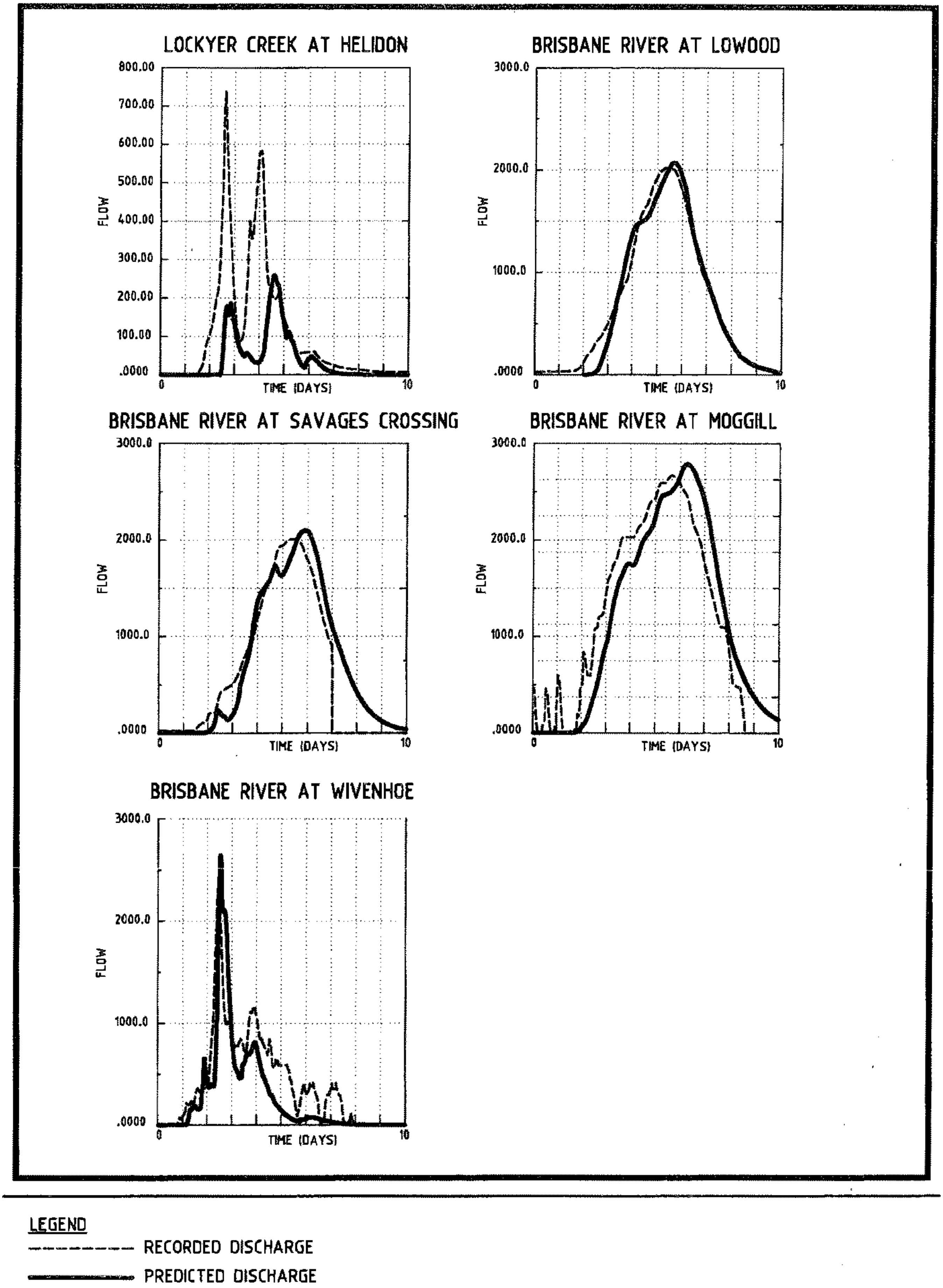
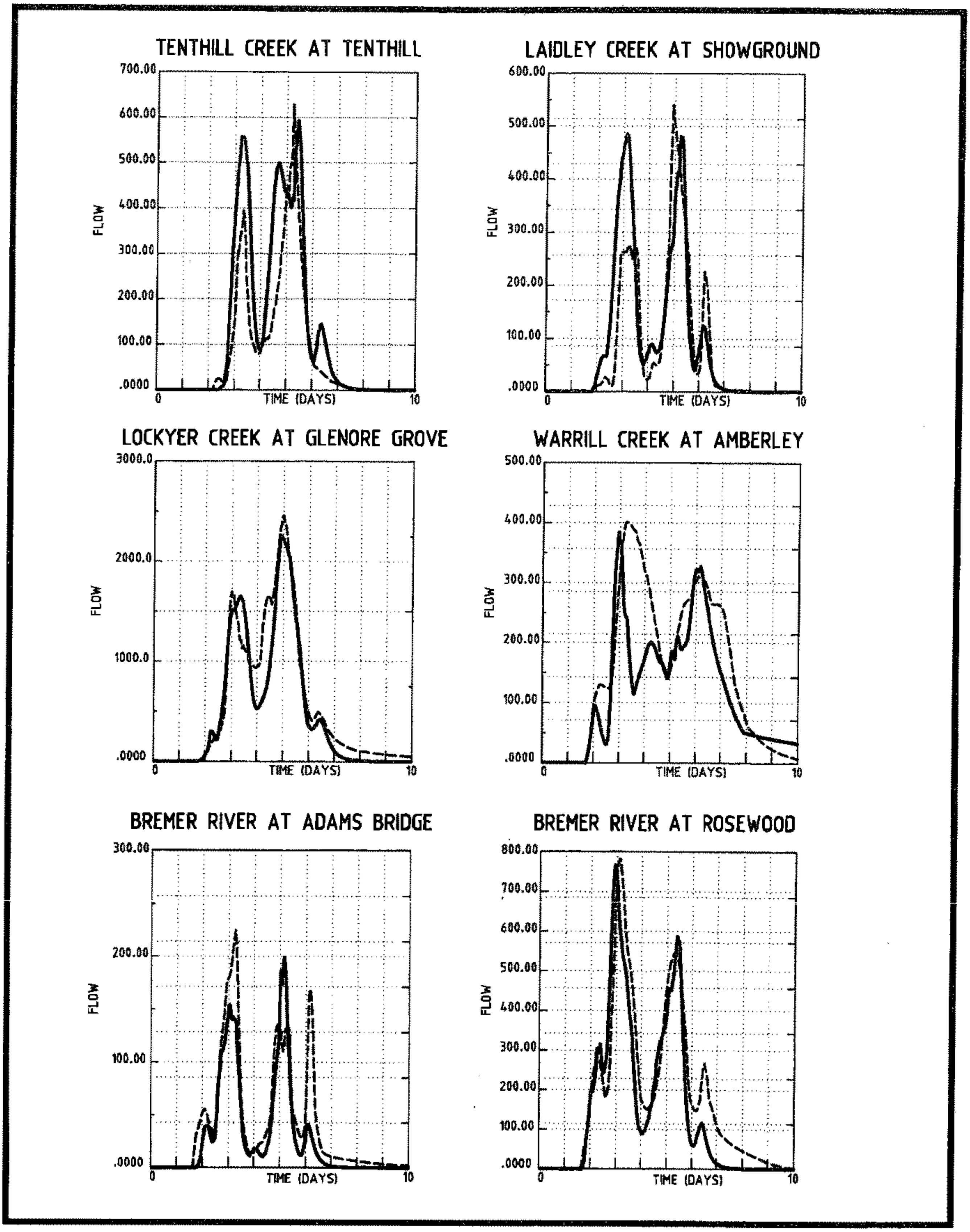


FIGURE B-4c

BRISBANE RIVER FLOOD STUDY
MAY 1996 FLOOD HYDROGRAPHS



LEGEND

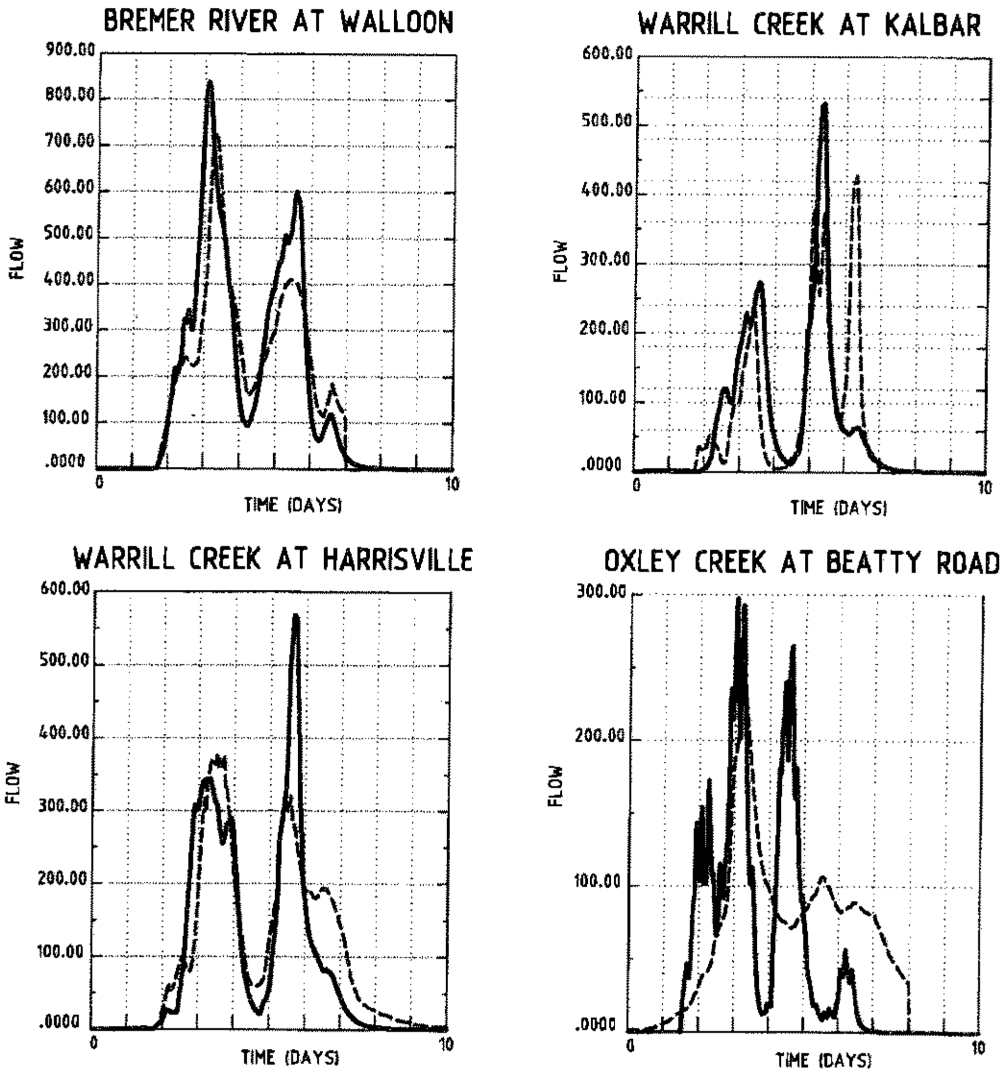
- - - - - - - - RECORDED DISCHARGE

———————— PREDICTED DISCHARGE

FILE NAME: FIG-B4 PLO. SCALE: 1=
DISK N°: G:\ JOB N°: T004157 [17-2-98

SINCLAIR KNIGHT MERZ

FIGURE B-4d
BRISBANE RIVER FLOOD STUDY
MAY 1996 FLOOD HYDROGRAPHS



LEGEND

-------- RECORDED DISCHARGE

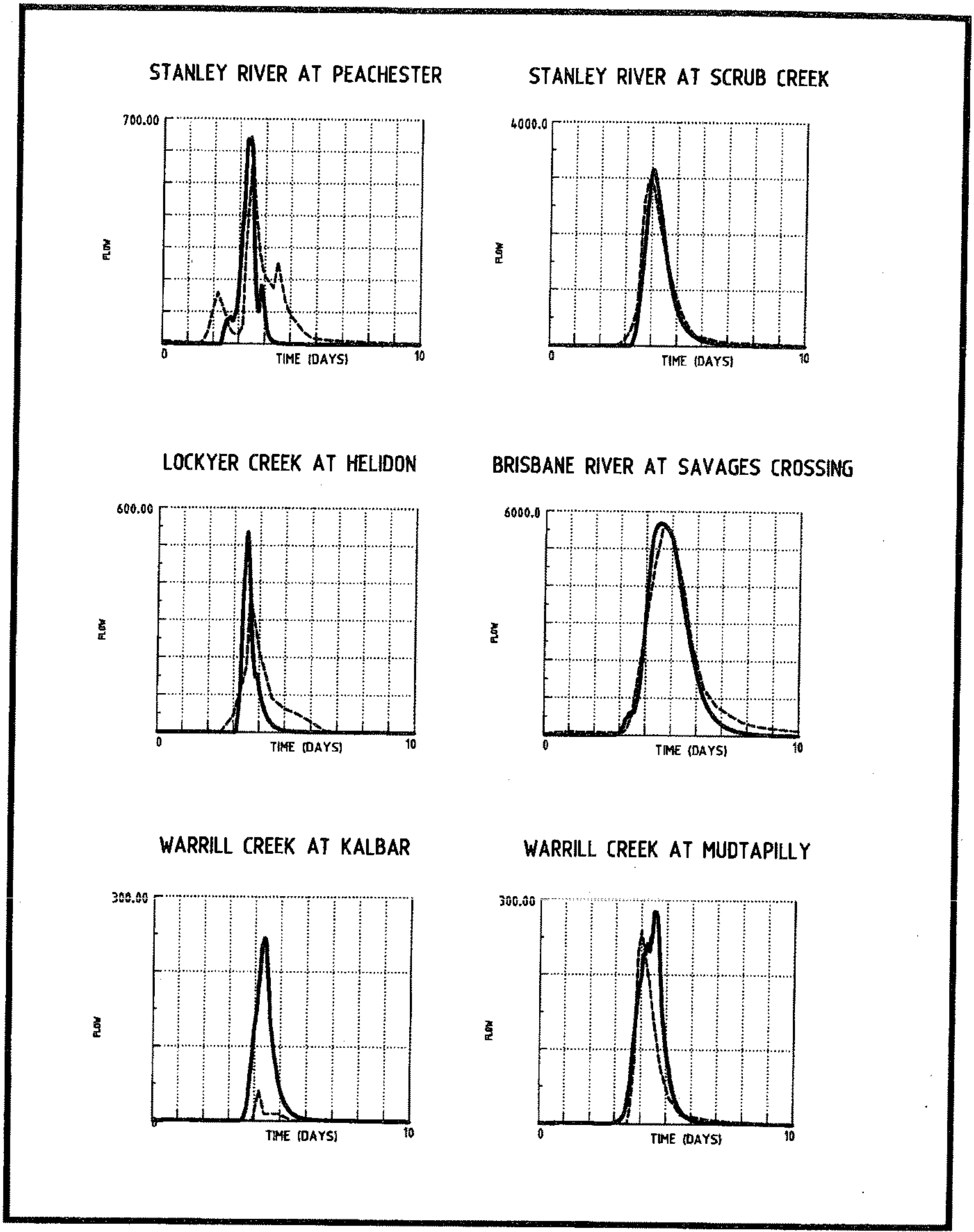
———— PREDICTED DISCHARGE

FILE NAME: FIG-B4
PLOT SCALE: 1=
DISK N°: G:\
JOB N°: T004157
17-2-98

SINCLAIR KNIGHT MERZ

FIGURE B-5

BRISBANE RIVER FLOOD STUDY
FEBRUARY 1931 FLOOD HYDROGRAPHS



LEGEND

- - - - - - - RECORDED DISCHARGE

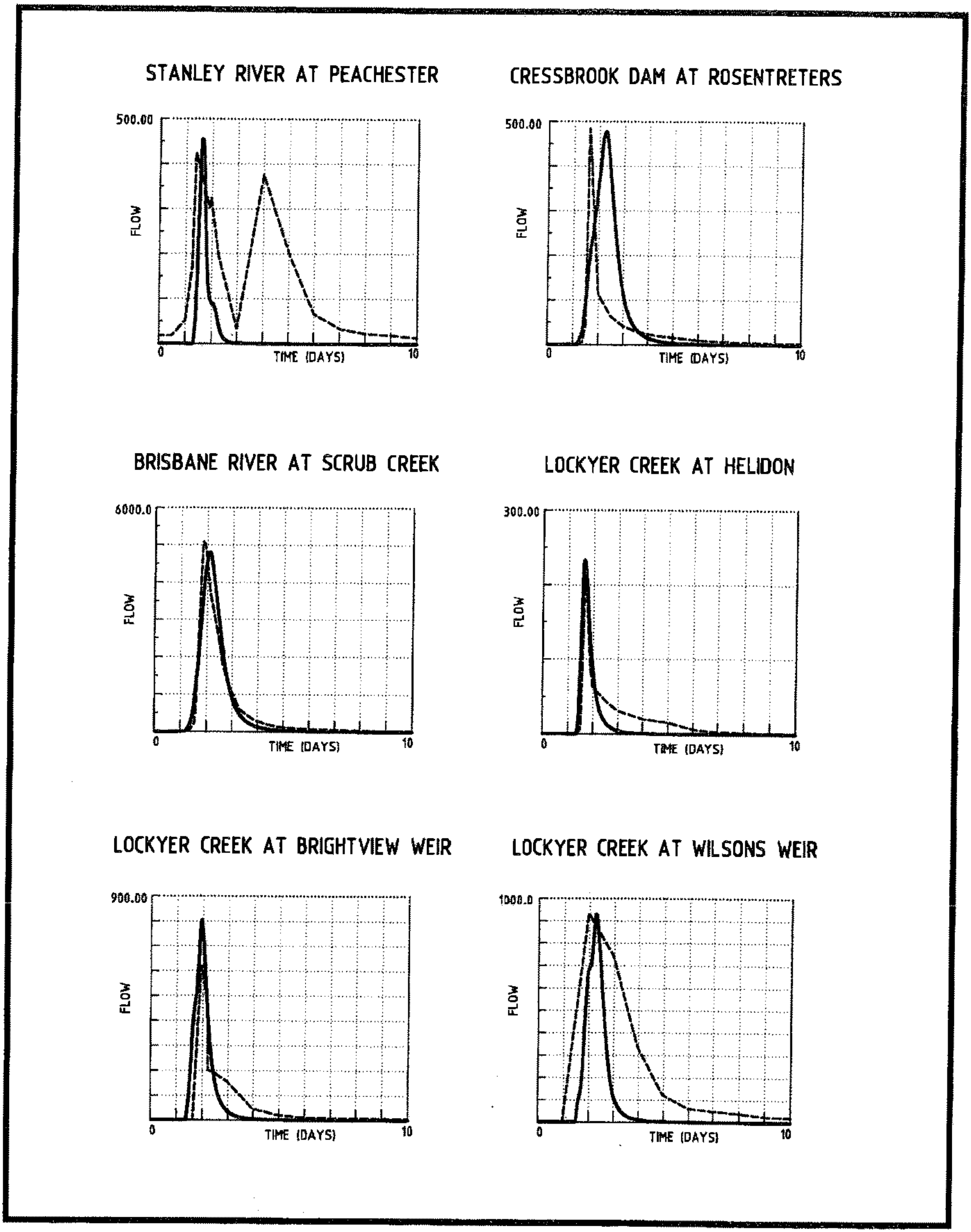
——— PREDICTED DISCHARGE

FILE NAME: 4157-234 DISK N°: G:\ JOB N°: T004157 Γ 17-2-98
PLOT SCALE: 1=

SINCLAIR KNIGHT MERZ

FIGURE B-6a

BRISBANE RIVER FLOOD STUDY
MARCH 1955 FLOOD HYDROGRAPHS

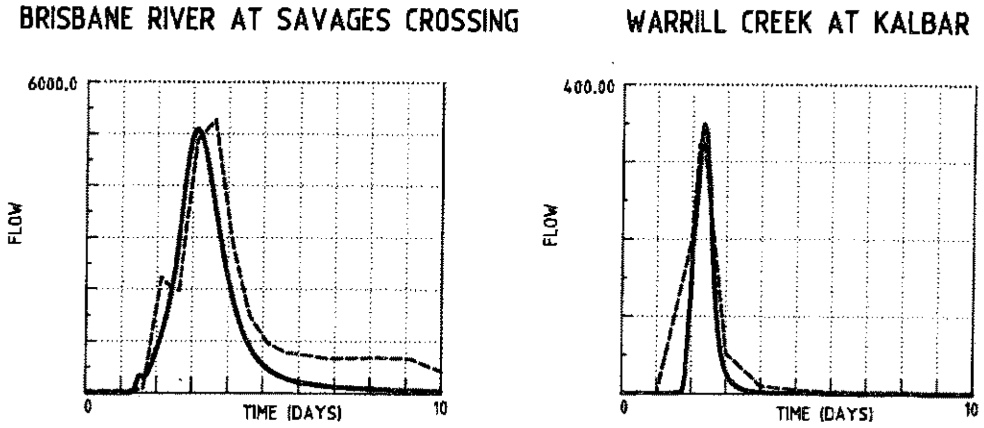


LEGEND
---------- RECORDED DISCHARGE
———— PREDICTED DISCHARGE

FILE NAME: 04157-57 DISK Nº: G:\ JOB Nº: T004157 17-2-98
PLO; SCALE: 1:100

FIGURE B-6b

BRISBANE RIVER FLOOD STUDY
MARCH 1955 FLOOD HYDROGRAPHS


BRISBANE RIVER AT SAVAGES CROSSING

WARRILL CREEK AT KALBAR

LEGEND

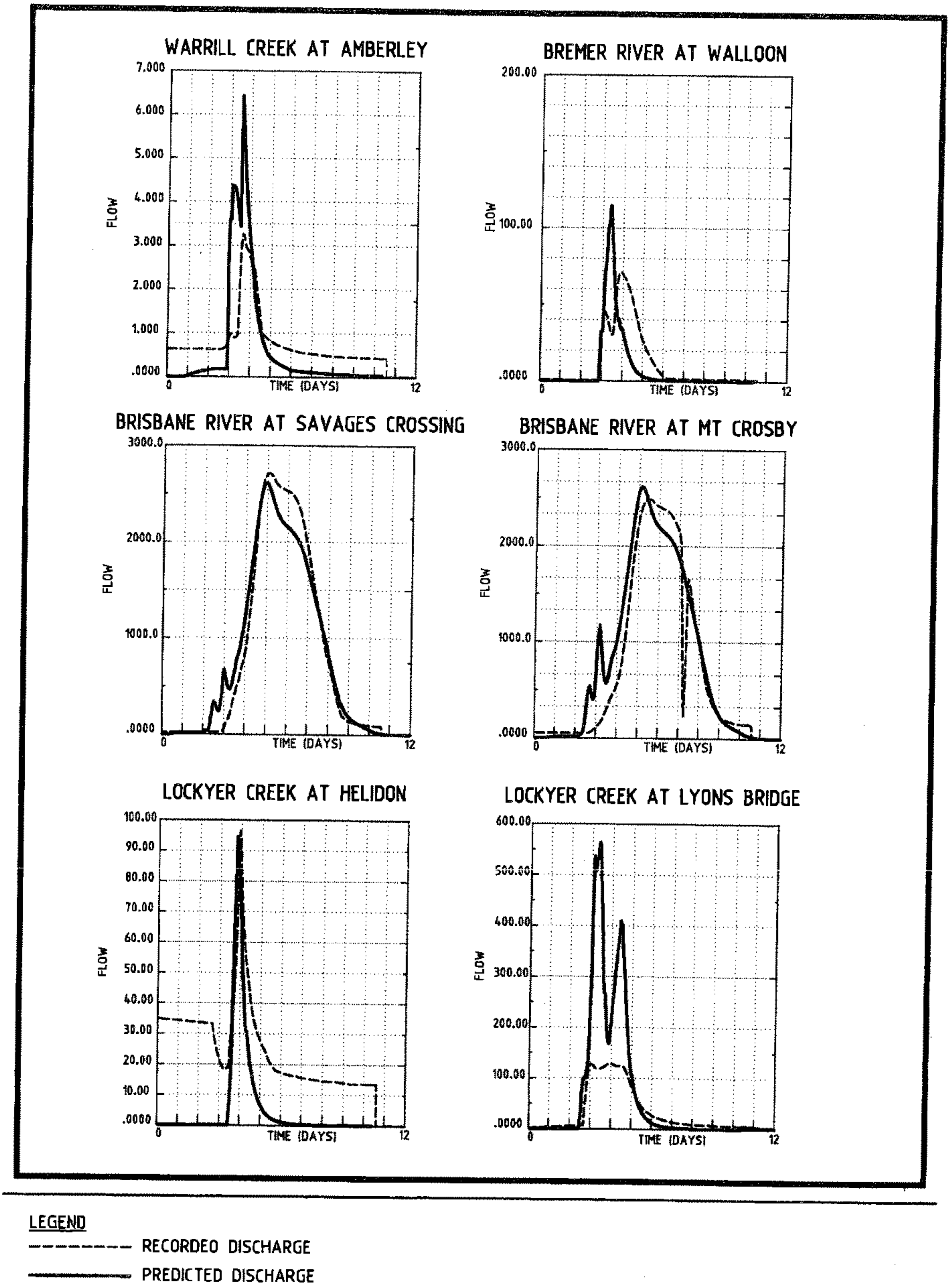
- - - - - - - - RECORDED DISCHARGE

———————— PREDICTED DISCHARGE

FILE NAME: 041 .. PLOT SCALE: 1:100 DISK No: G:\ JOB No: T00 17-2

SINCLAIR KNIGHT MERZ

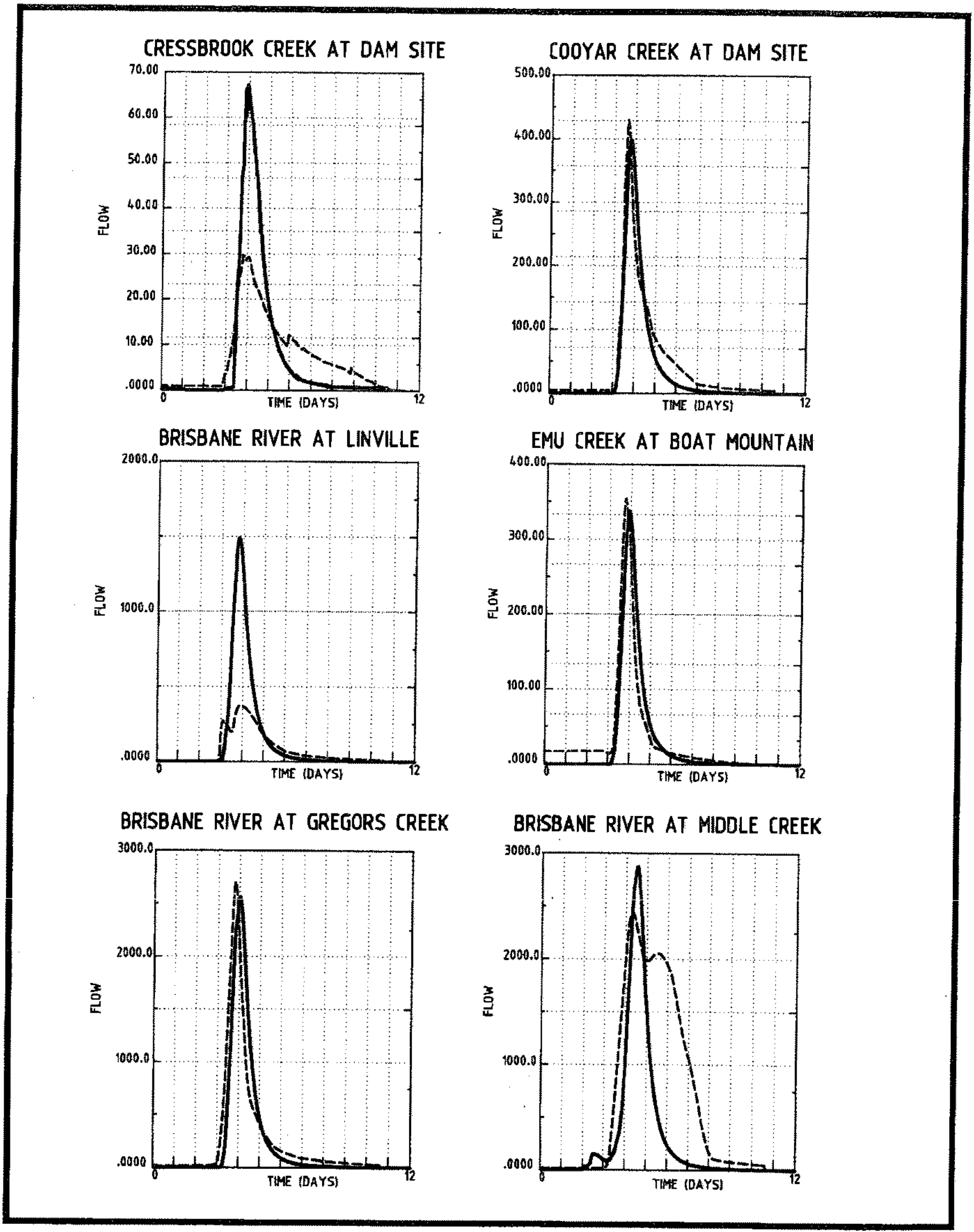
FIGURE B-7a
BRISBANE RIVER FLOOD STUDY
JULY 1973 FLOOD HYDROGRAPHS



FILE NAME: FIG-B7A PLO LE: 1= DISK N°: G:\ JOB N°: T004157 17-2-98

FIGURE B-7b

BRISBANE RIVER FLOOD STUDY
JULY 1973 FLOOD HYDROGRAPHS



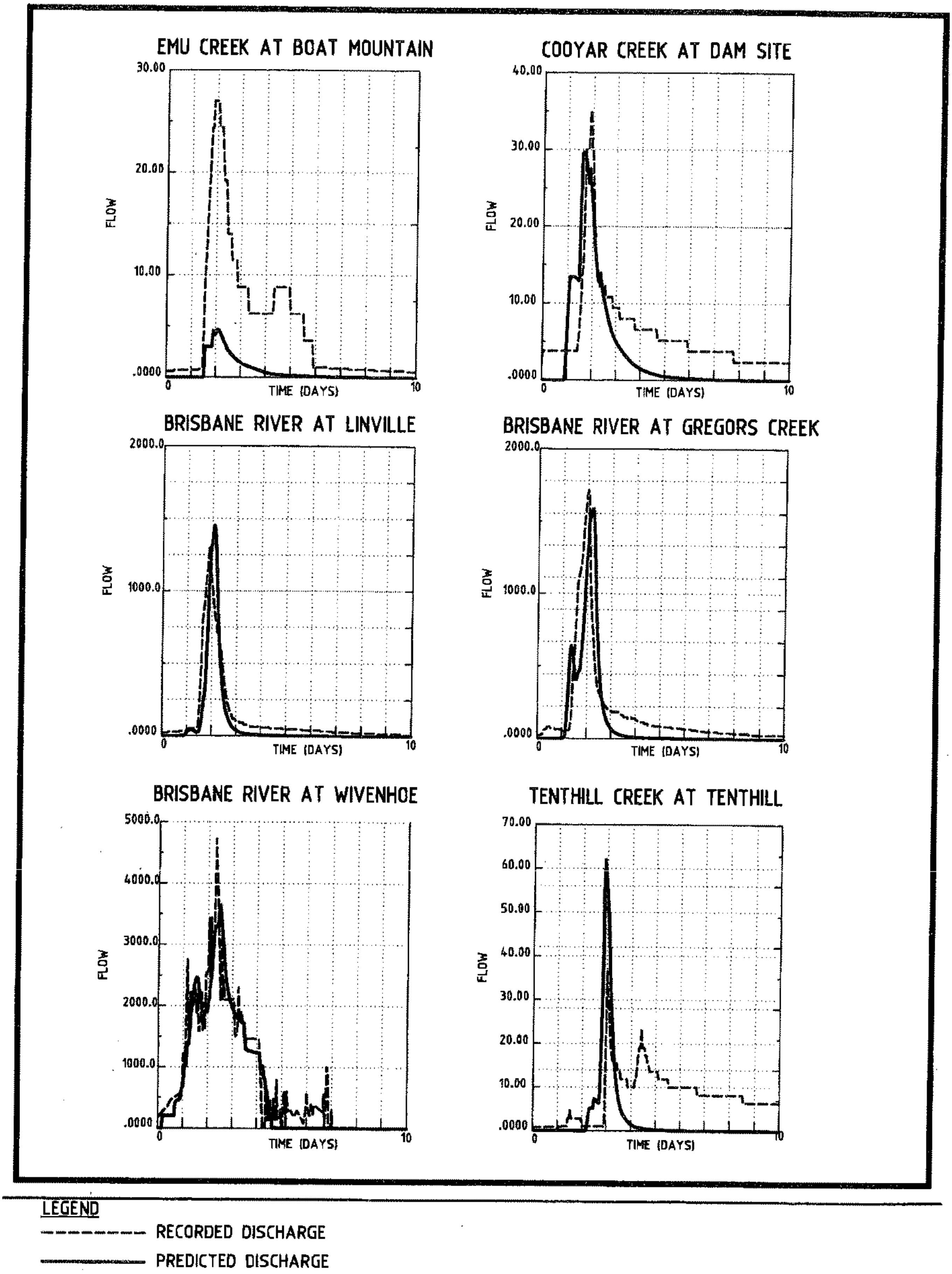
LEGEND

- - - - - - - - RECORDED DISCHARGE

———————— PREDICTED DISCHARGE

FIGURE B-8a

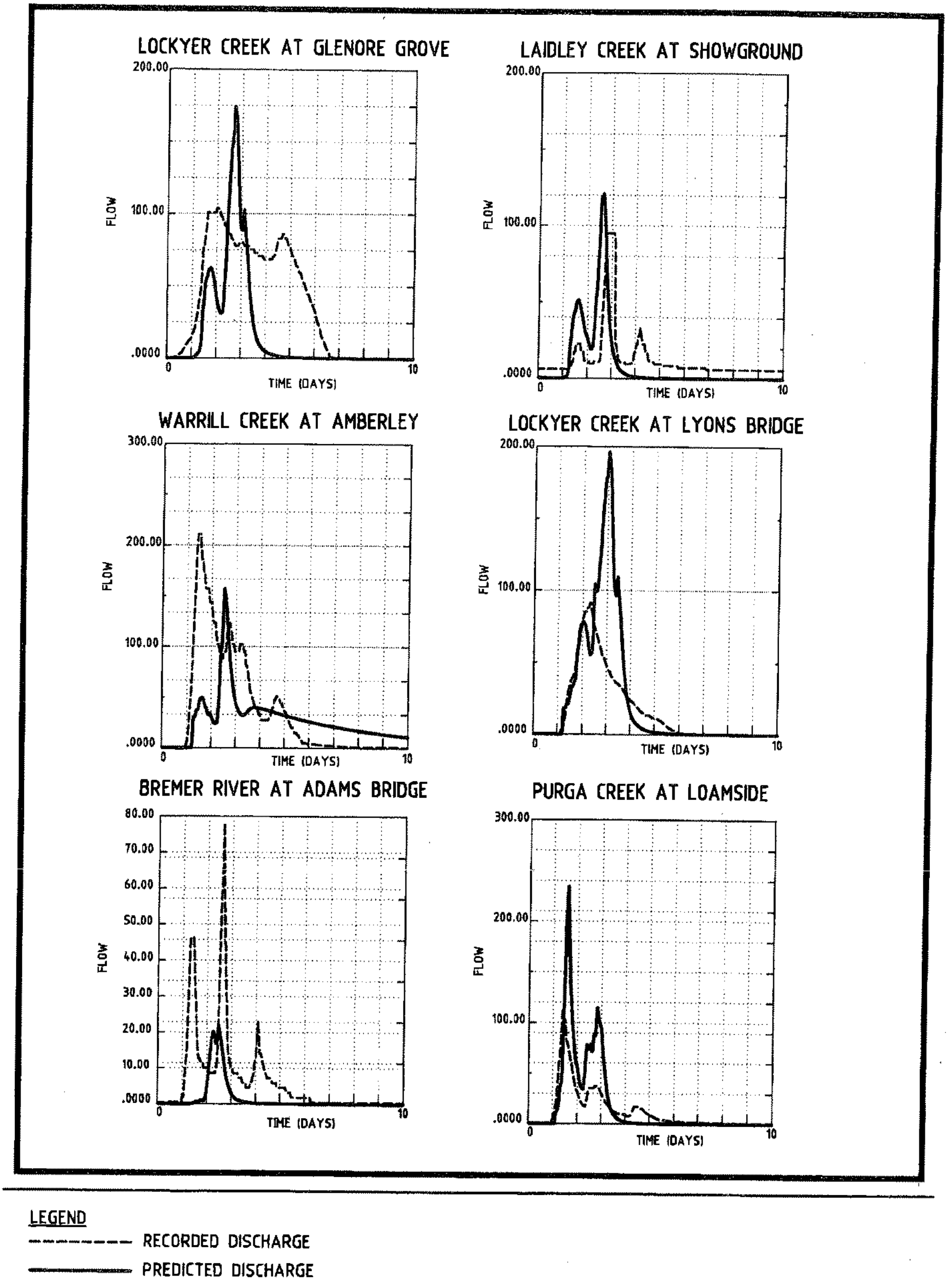
BRISBANE RIVER FLOOD STUDY
EARLY APRIL 1989 FLOOD HYDROGRAPHS



FILE NAME: FIG-B7A
PLO. [illegible] LE: 1=
DISK N°: G:\
JOB N°: T004157
17-2-98

FIGURE B-8b

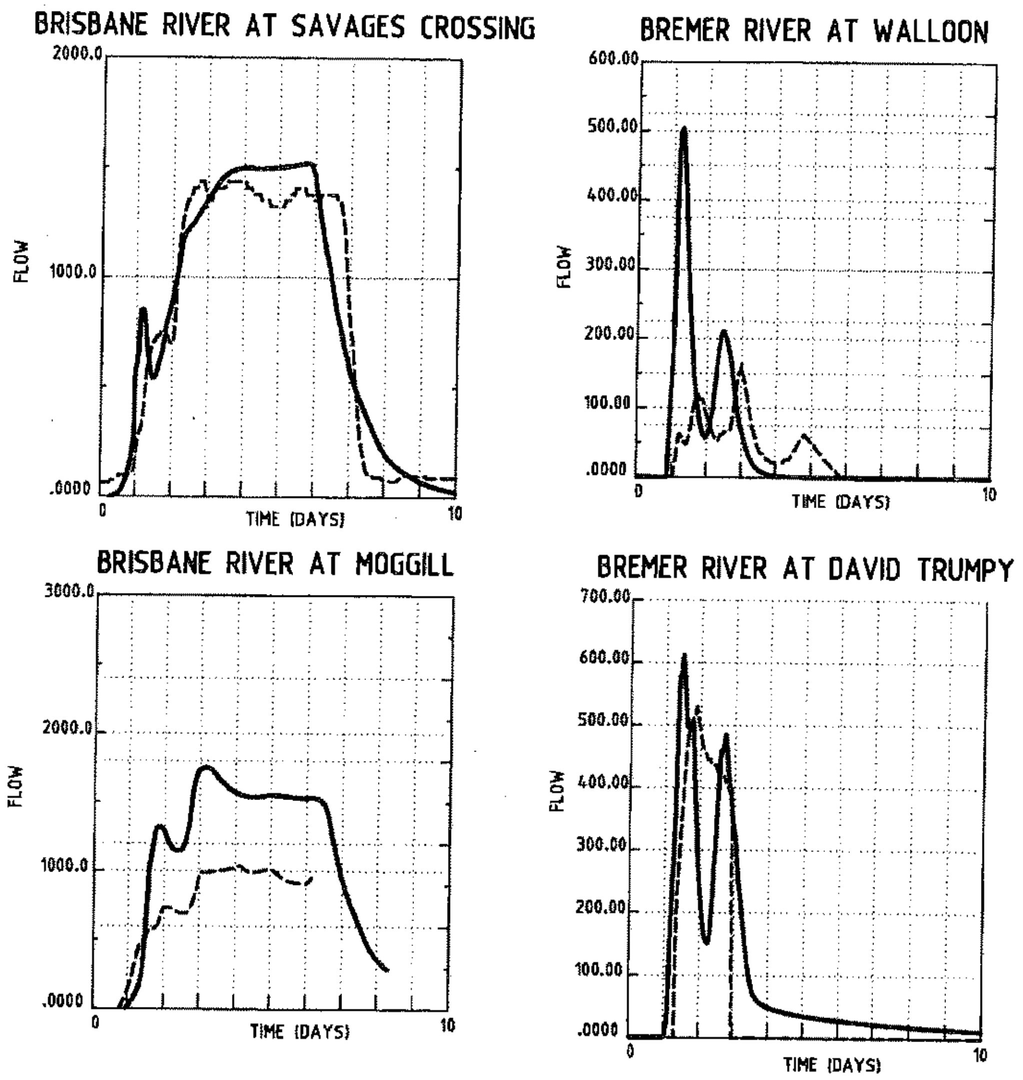
BRISBANE RIVER FLOOD STUDY
EARLY APRIL 1989 FLOOD HYDROGRAPHS



FILE NAME: FIG-B7A PLO. ... LE: 1=. DISK N°: G:\ JOB N°: T004157 17-2-98

FIGURE B-8c

BRISBANE RIVER FLOOD STUDY
EARLY APRIL 1989 FLOOD HYDROGRAPHS



LEGEND

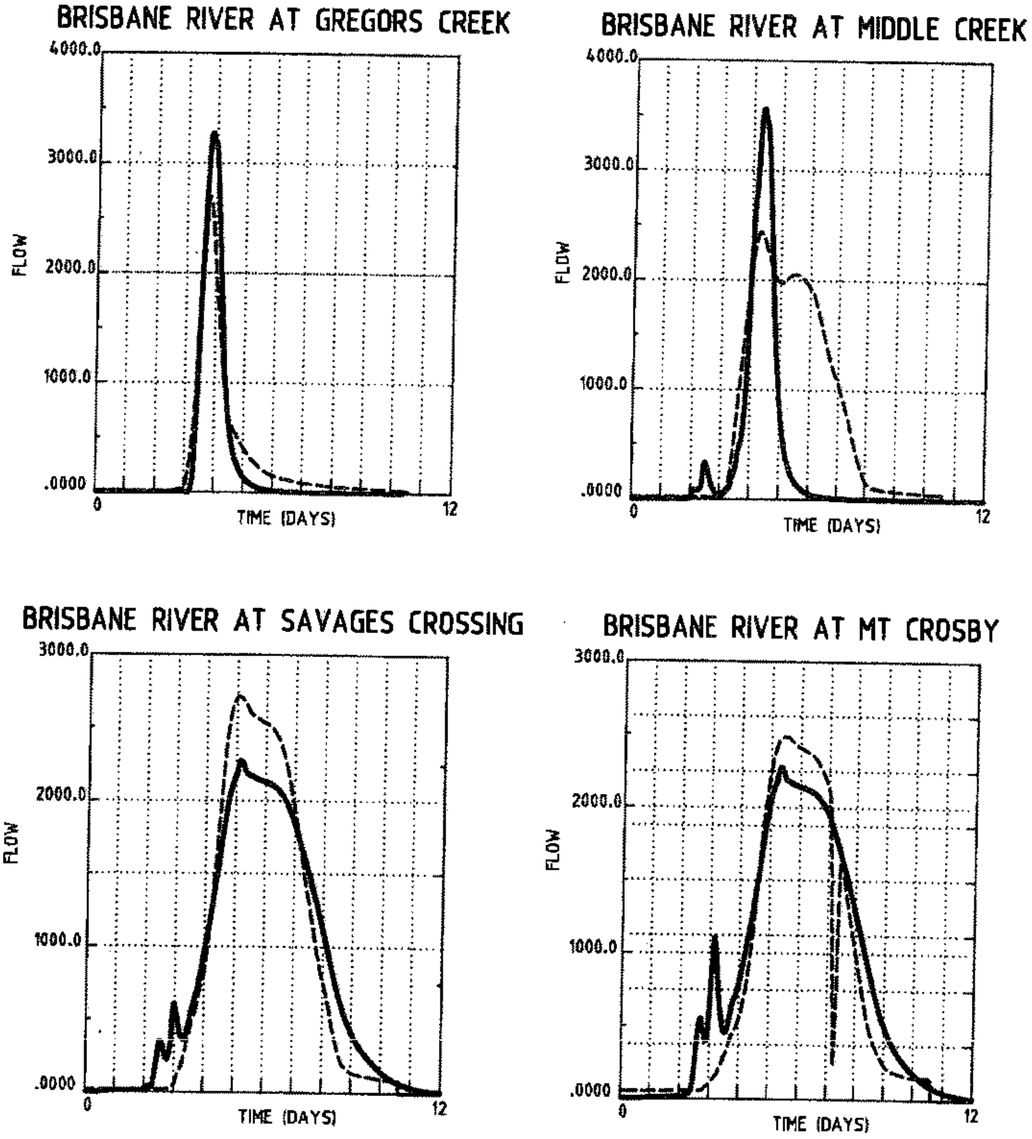
- - - - - - - - RECORDED DISCHARGE

———————— PREDICTED DISCHARGE

FILE NAME: FIG-87A
PLOT SCALE: 1=1
DISK No: G:\
JOB No. T00/
17-2-

FIGURE B-9

BRISBANE RIVER FLOOD STUDY
JULY 1973 FLOOD SENSITIVITY ANALYSIS
POST WIVENHOE PERN VALUES

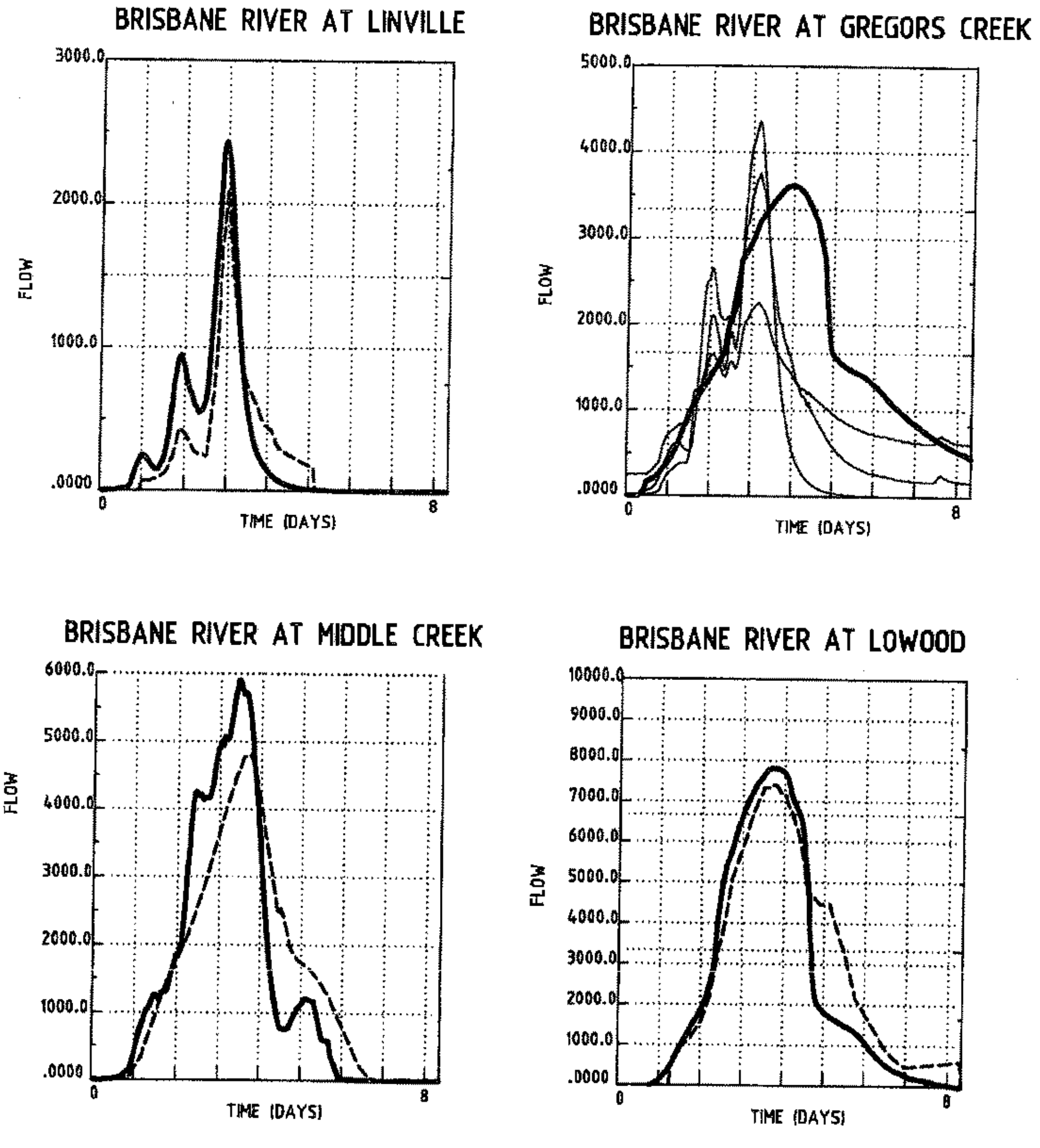


NOTE:
WIVENHOE STORAGE HAS NOT
BEEN MODELLED.

FIGURE B-10a

BRISBANE RIVER FLOOD STUDY
JANUARY 1974 FLOOD SENSITIVITY ANALYSIS
POST WIVENHOE PERN VALUES

SINCLAIR KNIGHT MERZ



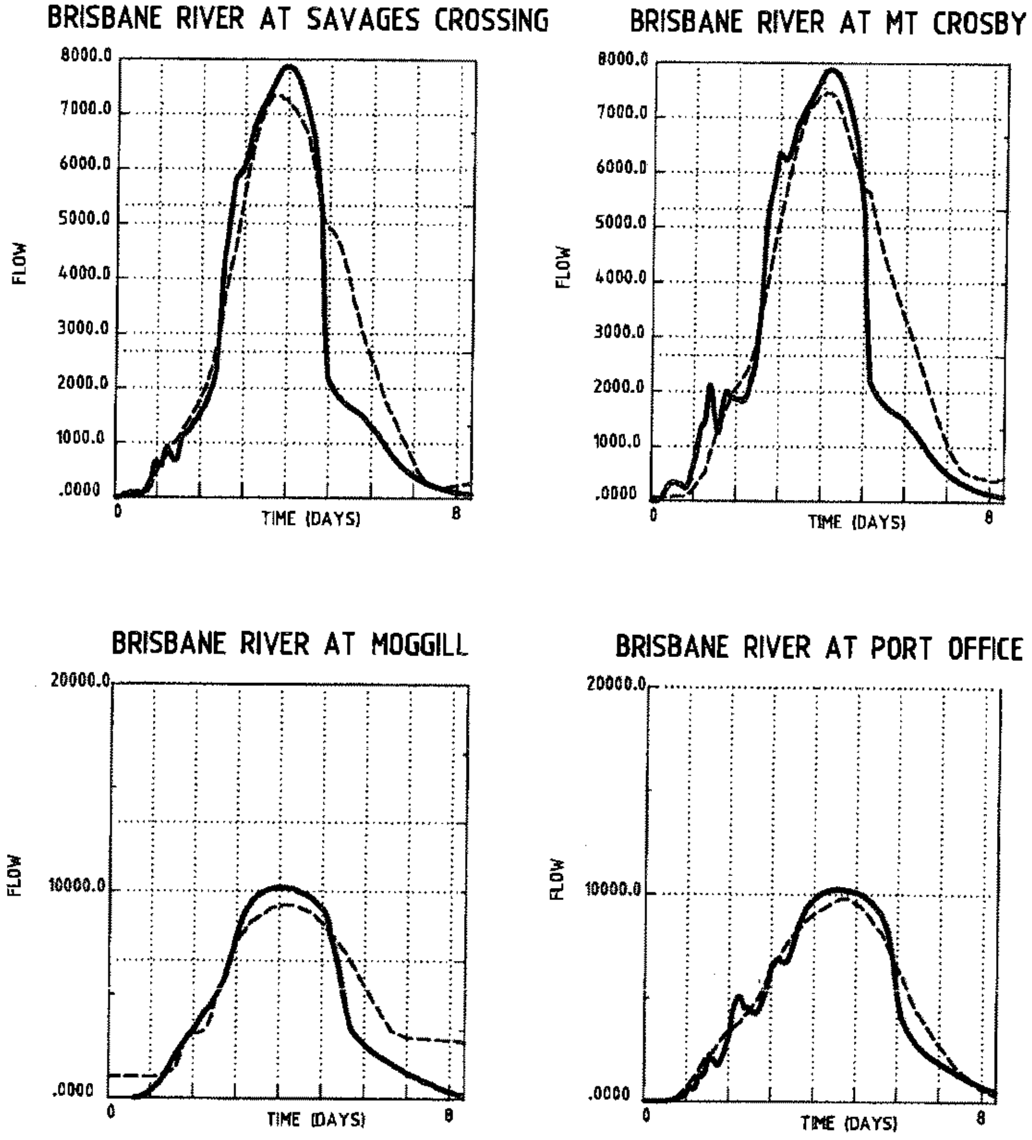
NOTE:
WIVENHOE STORAGE HAS NOT BEEN MODELLED.

LEGEND
- - - - - - - RECORDED DISCHARGE
——————— PREDICTED DISCHARGE

FILE NAME: 4157-239 DISK No: G:\ JOB No: T00/157 17-2-98
PLOT SCALE: 1=1

SINCLAIR KNIGHT MERZ

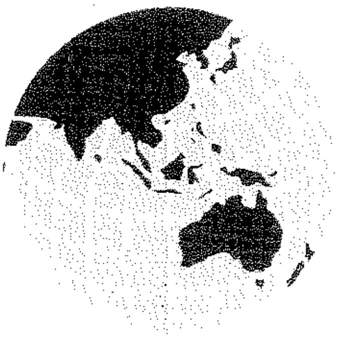
FIGURE B-10b
BRISBANE RIVER FLOOD STUDY
JANUARY 1974 FLOOD SENSITIVITY ANALYSIS
POST WIVENHOE PERN VALUES



NOTE:
WIVENHOE STORAGE HAS NOT
BEEN MODELLED.

LEGEND
--------- RECORDED DISCHARGE
━━━━━━ PREDICTED DISCHARGE

FILE [illegible] 415[illegible]
PLOT SCALE: 1=1
DI[illegible] G:\
J[illegible] T00[illegible]
17-2-[illegible]



Appendix C - Mike 11 Model Results - Calibration/Verification

TABLE C-1 - Predicted & Recorded Flood Levels for Calibration\Verification Events

LOCATION	BRIZ 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE/GAUGE IDENTIFICATION	CALIBRATION EVENTS													VERIFICATION EVENTS											
					1974 PREDICTED WL (m AHD)	1974 RECORDED WL (m AHD)	1974 RECORDED WL (m AHD)	1974 DIFFERENCE (m)	1996 PREDICTED WL (m AHD)	1996 RECORDED WL (m AHD)	1996 DIFFERENCE (m)	1983 PREDICTED WL (m AHD)	1983 RECORDED WL (m AHD)	1983 DIFFERENCE (m)	1989B PREDICTED WL (m AHD)	1989B RECORDED WL (m AHD)	1989B DIFFERENCE (m)	1931 PREDICTED WL (m AHD)	1931 RECORDED WL (m AHD)	1931 DIFFERENCE (m)	1955 PREDICTED WL (m AHD)	1955 RECORDED WL (m AHD)	1955 DIFFERENCE (m)	1973 PREDICTED WL (m AHD)	1973 RECORDED WL (m AHD)	1973 DIFFERENCE (m)	1989A PREDICTED WL (m AHD)	1989A RECORDED WL (m AHD)	1989A DIFFERENCE (m)
BRISBANE	1000	78.66	BN 2020		22.05	22.17		-0.12	9.49			7.02			5.59			17.06			14.91			9.58			6.91		
BRISBANE	1000.285	78.375	BN 2010		21.91	21.92		-0.01	9.4			6.94			5.52			16.91			14.73			9.48			6.82		
BRISBANE	1000.775	77.885	BN 2000		21.70	21.68		0.02	9.23			6.78			5.36			16.67			14.40			9.22			6.64		
BRISBANE	1001.315	77.345	BN 1990		21.63	21.5		0.13	9.09			6.61			5.18			16.55			14.31			9.01			6.46		
BRISBANE	1001.865	76.795	BN 1980		21.26	21.1		0.15	8.84			6.37			4.94			16.11			13.80			8.64			6.18		
BRISBANE	1002.35	76.310	BN 1970		21.12				8.67			6.11			4.70			15.88			13.57			8.23			5.90		
BRISBANE	1002.785	75.875	BN 1960		21.10				8.47			5.98			4.55			15.84			13.51			8.07			5.74		
BRISBANE	1003.275	75.385	BN 1950		20.87				8.25			5.78			4.33			15.53			13.18			7.73			5.54		
BRISBANE	1003.775	74.885	BN 1940		20.68	20.83		-0.15	8.06			5.55			4.15			15.29			12.91			7.43			5.36		
BRISBANE	1004.3	74.360	BN 1930		20.37	20.25		0.12	7.8			5.42			4.00			14.87			12.44			7.04			5.16		
BRISBANE	1004.81	73.850	BN 1920		20.35	20.26	20.25	0.10	7.68			5.37			3.92			14.80			12.34			6.84			5.03		
BRISBANE	1005.325	73.335	BN 1910		20.23				7.53			5.32			3.84			14.63			12.18			6.59			4.88		
BRISBANE	1005.87	72.790	BN 1900		20.02	19.97	19.93	0.05	7.38			5.27			3.78			14.35			11.88			6.35			4.71		
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	19.89	20.04	19.93	-0.04	7.37	7.09	0.28	5.27	5.26	0.01	3.77	4.02	-0.25	14.23			11.75			6.34	6.32	0.02	4.70	3.73	0.97
BRISBANE	1006.91	71.750	BN 1880		19.70				7.27			5.18			3.70			14.02			11.56			6.24			4.62		
BRISBANE	1007.41	71.250	BN 1870		19.67	19.33		0.34	7.21			5.11			3.81			13.97			11.50			6.17			4.55		
BRISBANE	1007.92	70.740	BN 1860		19.38	19.33	19.3	0.05	7.04			4.98			3.51			13.74			11.28			6.02			4.43		
BRISBANE	1008.445	70.215	BN 1850		19.20	19.21	19.48	-0.01	6.99			4.93			3.48			13.62			11.18			5.97			4.39		
BRISBANE	1008.925	69.735	BN 1840		19.14				6.93			4.88			3.44			13.57			11.13			5.92			4.35		
BRISBANE	1009.4	69.260	BN 1830		19.05				6.85			4.82			3.40			13.48			11.04			5.84			4.29		
BRISBANE	1009.72	68.940	BN 1820		19.04	18.88		0.16	6.81			4.79			3.38			13.45			11.01			5.81			4.26		
BRISBANE	1010.49	68.170	BN 1810		18.69	18.69		0.00	6.66			4.67			3.31			13.21			10.81			5.66			4.18		
BRISBANE	1010.725	67.935	BN 1800		18.71				6.65			4.66			3.31			13.22			10.81			5.68			4.15		
BRISBANE	1010.98	67.680	BN 1790		18.63				6.6			4.63			3.29			13.10			10.76			5.62			4.12		
BRISBANE	1011.51	67.150	BN 1780		18.62	18.3	18.63	-0.01	6.54			4.58			3.25			13.13			10.72			5.56			4.08		
BRISBANE	1011.98	66.680	BN 1770		18.62	18.8		-0.18	6.47			4.52			3.22			13.08			10.66			5.50			4.03		
BRISBANE	1012.475	66.185	BN 1760		18.52	18.6	18.63	-0.08	6.39			4.46			3.19			12.99			10.58			5.43			3.97		
BRISBANE	1012.995	65.725	BN 1750		18.42	18.6		-0.18	6.32			4.40			3.14			12.90			10.50			5.37			3.93		
BRISBANE	1013.445	65.215	BN 1740		18.33	18.63		-0.30	6.28			4.35			3.11			12.81			10.41			5.30			3.88		
BRISBANE	1013.91	64.750	BN 1730		18.28			18.28	6.19			4.28			3.06			12.75			10.35			5.23			3.82		
BRISBANE	1014.31	64.350	BN 1720		18.25	18.3		-0.05	6.11			4.22			3.02			12.68			10.28			5.18			3.76		
BRISBANE	1014.61	64.050	BN 1710	Goodna Hospital Gauge	18.28	18.43		-0.15	6.06			4.17			2.99			12.64			10.23			5.11	5.11	0.00	3.72		
BRISBANE	1015.09	63.570	BN 1700		18.14	18.3		-0.16	6.05			4.17			2.99			12.58			10.19			5.11			3.72		
BRISBANE	1015.58	63.100	BN 1690		18.00	18.33	17.96	0.04	5.97			4.11			2.96			12.48			10.10			5.04			3.67		
BRISBANE	1016.14	62.520	BN 1680		17.90	17.78	18.15	0.12	5.91			4.07			2.93			12.40			10.03			4.90			3.63		
BRISBANE	1016.64	62.020	BN 1670		17.80	17.63		0.17	5.8			3.97			2.87			12.28			9.91			4.88			3.56		
BRISBANE	1017.13	61.530	BN 1660		17.57	17.54		0.03	5.60			3.84			2.78			12.09			9.73			4.75			3.44		
BRISBANE	1017.61	61.050	BN 1650		17.45	17.66	17.29	0.16	5.58			3.77			2.74			11.90			9.54			4.66			3.38		
BRISBANE	1017.92	60.740	BN 1640		17.29				5.48			3.71			2.71			11.75			9.40			4.59			3.31		
BRISBANE	1018.2	60.460	BN 1630		17.21	17.26		-0.05	5.49			3.71			2.71			11.71			9.36			4.59			3.33		
BRISBANE	1018.725	59.935	BN 1620		16.89				5.42			3.67			2.69			11.48			9.18			4.54			3.30		
BRISBANE	1019.095	59.565	BN 1610		16.75	16.83		-0.08	5.37			3.63			2.66			11.33			9.05			4.49			3.26		
BRISBANE	1019.49	59.170	BN 1600		16.64	16.65		-0.01	5.33			3.60			2.65			11.24			8.96			4.48			3.24		
BRISBANE	1019.865	58.795	BN 1590		16.34	16.47		-0.13	5.28			3.57			2.63			11.04			8.90			4.41			3.21		
BRISBANE	1020.115	58.545	BN 1580		16.44	16.71	16.56	-0.12	5.28			3.55			2.62			11.07			8.80			4.40			3.20		
BRISBANE	1020.525	58.135	BN 1570		16.42				5.27			3.54			2.61			11.03			8.76			4.39			3.19		
BRISBANE	1020.83	57.830	BN 1560		16.27	17.02		-0.75	5.23			3.51			2.60			10.92			8.67			4.36			3.16		
BRISBANE	1021.095	57.565	BN 1550		16.08	16.28		-0.20	5.18			3.47			2.57			10.77			8.55			4.30			3.13		
BRISBANE	1021.539	57.121	BN 1540		15.89	16.04		-0.15	5.1			3.42			2.55			10.62			8.40			4.25			3.09		
BRISBANE	1021.715	56.945	BN 1530		15.92	15.98		-0.06	5.1			3.42			2.54			10.62			8.39			4.24			3.08		
BRISBANE	1021.895	56.765	BN 1520		15.85	16.74		-0.89	5.00			3.41			2.54			10.57			8.35			4.23			3.08		
BRISBANE	1022.105	56.555	BN 1510		15.73	15.86		-0.13	5.09			3.41			2.54			10.52			8.31			4.23			3.08		
BRISBANE	1022.575	56.085	BN 1500		15.65	15.52		0.13	5.02			3.38			2.51			10.42			8.22			4.17			3.04		
BRISBANE	1023.04	55.620	BN 1490		15.41	15.31		0.10	4.92			3.30			2.48			10.24			8.07			4.10			2.99		
BRISBANE	1023.57	55.090	BN 1480		15.32	15.31		0.01	4.88			3.27			2.46			10.20			8.05			4.06			2.97		
BRISBANE	1024.08	54.580	BN 1470		15.27	15.13		0.14	4.81			3.22			2.44			10.13			7.98			4.00			2.93		
BRISBANE	1024.563	54.097	BN 1460		15.21	15.4		-0.19	4.72			3.15			2.40			10.06			7.90			3.92			2.87		
BRISBANE	1025.07	53.590	BN 1450		15.12	15.19		-0.07	4.67			3.11			2.37			9.97			7.82			3.87			2.84		
BRISBANE	1025.38	53.300	BN 1440		14.97				4.6			3.06			2.35			9.86			7.73			3.81			2.80		
BRISBANE	1025.59	53.070	BN 1430		14.81	14.94		-0.13	4.54			3.02			2.33			9.74			7.63			3.78			2.77		
BRISBANE	1026.17	52.490	BN 1420		14.69	14.64		0.05	4.51			3.00			2.32			9.67	10.74	-1.07	7.57			3.73			2.75		
BRISBANE	1026.68	51.980	BN 1410	Mt Ommaney Gauge	14.58	14.58	14.55	0.00	4.43			2.94			2.29			9.65			7.46			3.66			2.70		
BRISBANE	1026.9	51.760	BN 1400		14.48	14.55	14.24	-0.09	4.38			2.91			2.27			9.45			7.38			3.62			2.68		
BRISBANE	1027.16	51.500	BN 1390		14.32	14.46	14.24	0.08	4.35			2.89			2.26			9.38			7.33			3.60			2.66		
BRISBANE	1027.66	50.980	BN 1380		14.38	14.32		0.06	4.32			2.88			2.24			9.36			7.21			3.56			2.64		
BRISBANE	1028.18	50.480	BN 1370		14.49	14.3	14.12	0.10	4.27			2.83			2.22			9.38			7.30			3.52			2.61		
BRISBANE	1028.68	49.980	BN 1360		14.27				4.17			2.78			2.19			9.27			7.22			3.44			2.55		
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge																									
BRISBANE	1028.78	49.900	BN 1340		14.12				4.08			2.70			2.16			9.27			7.22			3.37			2.51		
BRISBANE	1029.2	49.460	BN 1330		14.01	14.09		-0.08	3.98			2.64			2.13			9.17			7.13			3.30			2.48		
BRISBANE	1029.68	48.980	BN 1320		14.03	13.97		0.06	3.95			2.61			2.11			9.17			7.13			3.27			2.44		
BRISBANE	1030.22	48.440	BN 1310		14.03	13.63		0.40	3.89			2.58			2.10			9.18			7.13			3.22			2.41		
BRISBANE	1030.87	47.790	BN 1300		13.96				3.79			2.51			2.06			9.12	9.40	-0.28	7.08	7.17	-0.09	3.15			2.36		
BRISBANE	1031.26	47.400	BN 1290		13.80	13.73	13.5	0.07	3.71			2.46			2.03			9.02			7.00			3.08			2.32		
BRISBANE	1031.7	46.960	BN 1280	Dams Wharf Gauge	13.41	13.70	13.36	0.05	3.59			2.40			2.00			8.78			6.80			3.00	3.15	-0.15	2.27		
BRISBANE	1031.865	46.665	BN 1270		13.52				3.6			2.39			2.00			8.75			6.78			3.00			2.26		
BRISBANE	1032.23	46.430	BN 1260		13.39	13.18		0.21	3.57			2.38			1.99			8.68	8.99	-0.31	6.70	6.70	0.00	2.96			2.25		
BRISBANE	1032.565	46.075	BN 1250		13.15	13.33	12.9	-0.18	3.62			2.36			1.97			8.52			6.57			2.94			2.23		
BRISBANE	1033.08	45.580	BN 1240		13.00	12.99		0.01	3.48			2.33			1.97			8.39			6.48			2.92			2.21		
BRISBANE	1033.37	45.290	BN 1230		12.89	13.02	12.9	-0.13	3.43			2.30			1.95			8.31	8.67	-0.36	6.40	6.41	-0.01	2.88			2.19		
BRISBANE	1033.9	44.780	BN 1220		12.65	12.96	12.57	0.08	3.35			2.26			1.93			8.16			6.27			2.82			2.15		
BRISBANE	1034.37	44.290	BN 1210		12.49	12.26		0.23	3.29			2.23			1.91			8.05	8.13		6.19	6.23	-0.04	2.78			2.13		
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	12.40	12.52		-0.12	3.23			2.20			1.89			7.95			6.10			2.73			2.10		
BRISBANE	1035.414	43.248	BN 1190		12.14	12.14		0.00	3.15			2.15			1.87			7.78			5.95			2.67			2.06		
BRISBANE	1035.9	42.780	BN 1180		11.86	11.87		-0.01	3.06			2.10			1.84			7.55			5.77			2.60			2.02		
BRISBANE	1036.46	42.200	BN 1170		11.55	11.77	11.74	-0.19	2.98			2.07			1.82			7.33			5.59			2.56			1.99		
BRISBANE	1036.77	41.890	BN 1160		11.47	11.59	11.24	-0.12	2.95			2.06			1.81			7.26	7.69	-0.43	5.52	5.47	0.05	2.53			1.97		
BRISBANE	1036.915	41.745	BN 1150		11.31	11.65	11.32	-0.01	2.92			2.04			1.81			7.16			5.45			2.51			1.98		

TABLE C-1 - Predicted & Recorded Flood Levels for Calibration\Verification Events

					CALIBRATION EVENTS													VERIFICATION EVENTS											
LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE/GAUGE IDENTIFICATION	1974 PREDICTED WL (m AHD)	1974 RECORDED WL (m AHD)	1974 RECORDED WL (m AHD)	1974 DIFFERENCE (m)	1996 PREDICTED WL (m AHD)	1996 RECORDED WL (m AHD)	1996 DIFFERENCE (m)	1983 PREDICTED WL (m AHD)	1983 RECORDED WL (m AHD)	1983 DIFFERENCE (m)	1989B PREDICTED WL (m AHD)	1989B RECORDED WL (m AHD)	1989B DIFFERENCE (m)	1931 PREDICTED WL (m AHD)	1931 RECORDED WL (m AHD)	1931 DIFFERENCE (m)	1955 PREDICTED WL (m AHD)	1956 RECORDED WL (m AHD)	1955 DIFFERENCE (m)	1973 PREDICTED WL (m AHD)	1973 RECORDED WL (m AHD)	1973 DIFFERENCE (m)	1989A PREDICTED WL (m AHD)	1989A RECORDED WL (m AHD)	1989A DIFFERENCE (m)
BRISBANE	1037.09	41.570	BN 1140		11.26	11.84	11.2	0.06	2.93			2.04			1.81			7.14			5.44			2.51			1.96		
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge																									
BRISBANE	1037.175	41.485	BN 1120		11.16	11.47	11.13	0.03	2.79			2.03			1.80			7.13			5.40			2.49			1.96		
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	11.11	11.2		-0.09	2.77			2.01			1.79			7.09	7.46	-0.37	5.38	5.58	-0.20	2.47			1.94		
BRISBANE	1037.625	41.035	BN 1100		11.10	11.1	11.07	0.00	2.73			1.99			1.78			7.05			5.32			2.44			1.92		
BRISBANE	1038.085	40.575	BN 1090		11.12	11.1		0.02	2.72			1.99			1.78			7.02			5.30			2.43			1.92		
BRISBANE	1038.6	40.050	BN 1080		11.10	11.04		0.06	2.63			1.94			1.75			6.99			5.25			2.37			1.88		
BRISBANE	1039.1	39.560	BN 1070		11.10	11.07		0.03	2.54			1.90			1.73			6.95	6.97	-0.02	5.22	5.16	0.06	2.31			1.84		
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	11.11	11.01		0.10	2.49			1.87			1.71			6.94			5.21			2.27			1.82		
BRISBANE	1040.09	38.570	BN 1050	King Arthur Terrace Gauge	11.03	11.04		-0.01	2.46			1.86			1.71			6.92	6.78	0.14	5.20	5.10	0.10	2.25			1.81		
BRISBANE	1040.49	38.170	BN 1040		10.88	11.01		-0.13	2.4			1.83			1.69			6.83			5.13			2.21			1.79		
BRISBANE	1041.01	37.650	BN 1030		10.92	10.89		0.03	2.38			1.82			1.69			6.84	6.62	0.22	5.14	5.02	0.12	2.20			1.78		
BRISBANE	1041.23	37.430	BN 1020		10.88	10.83		0.05	2.36			1.80			1.68			6.80			5.10			2.19			1.77		
BRISBANE	1041.45	37.200	BN 1010	Tennyson Power House Gauge	10.79	10.83		-0.04	2.32			1.78			1.68			6.75			5.06			2.17	2.17	0.00	1.76		
BRISBANE	1041.7	36.960	BN 1000		10.75	10.83		-0.08	2.32			1.78			1.68			6.73			5.04			2.17			1.76		
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	10.60	10.83		-0.23	2.27			1.76			1.66			6.62	6.40	0.22	4.98	4.95	0.01	2.13			1.74		
BRISBANE	1042.235	36.425	BN 980		10.43	10.42		0.01	2.21			1.74			1.65			6.62			4.89			2.10			1.72		
BRISBANE	1042.515	36.145	BN 970		10.42	10.43		-0.01	2.2			1.73			1.65			6.60			4.87			2.09			1.71		
BRISBANE	1042.91	35.750	BN 960		10.35	10.25	10.18	0.10	2.12			1.69			1.63			6.41	6.17	0.24	4.78	4.80	-0.02	2.04			1.68		
BRISBANE	1043.725	34.935	BN 950		10.03	9.95		0.08	1.94			1.62			1.59			6.17			4.59			1.93			1.62		
BRISBANE	1044.08	34.600	BN 940	Sandy Creek Gauge	9.86	9.81		0.05	1.91			1.61			1.59			6.10	6.01	0.09	4.54	4.64	-0.10	1.91			1.61		
BRISBANE	1044.34	34.320	BN 930		9.89	9.81		0.08	1.88			1.59			1.58			5.99			4.45			1.88			1.60		
BRISBANE	1044.605	34.055	BN 920		9.64	9.49		0.15	1.84			1.58			1.57			5.94			4.41			1.87			1.59		
BRISBANE	1044.86	33.800	BN 910		9.60	9.55		0.05	1.81			1.57			1.57			5.89	5.80	0.09	4.37	4.49	-0.12	1.85			1.56		
BRISBANE	1045.4	33.260	BN 900		9.41	9.31		0.10	1.73			1.55			1.55			5.74			4.24			1.81			1.55		
BRISBANE	1045.865	32.775	BN 890		9.28	9.46	9.15	-0.18	1.71			1.52			1.54			5.57			4.10			1.77			1.53		
BRISBANE	1046.18	32.480	BN 880		9.19	9.49		-0.30	1.71			1.52			1.53			5.54			4.09			1.77			1.53		
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	9.12	9.57		-0.45	1.71			1.52			1.53			5.51	5.48	0.03	4.07	4.12	-0.05	1.76			1.53		
BRISBANE	1046.58	32.080	BN 860		9.07				1.7			1.51			1.53			5.47			4.03			1.75			1.52		
BRISBANE	1046.9	31.760	BN 850		8.88	9.03		-0.15	1.7			1.49			1.52			5.34			3.93			1.72			1.50		
BRISBANE	1047.35	31.310	BN 840		8.49	8.61	8.33	-0.12	1.7			1.47			1.51			5.09			3.75			1.69			1.48		
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	8.26	8.36		-0.10	1.7			1.46			1.50			4.94	5.10	-0.16	3.63	3.82	-0.19	1.67			1.47		
BRISBANE	1048.375	30.285	BN 820		8.32	8.3	8.31	0.02	1.69			1.46			1.50			4.96			3.64			1.66			1.47		
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	8.08	8.09		-0.01	1.69			1.42			1.49			4.79			3.50			1.61	1.53	0.08	1.44		
BRISBANE	1049.12	29.540	BN 800		8.02	8.24	8.27	-0.22	1.69			1.41			1.48			4.75			3.48	3.55	-0.07	1.60			1.43		
BRISBANE	1049.37	29.290	BN 790		7.93				1.69			1.39			1.47			4.64	4.76	-0.12	3.40	3.51	-0.11	1.57			1.42		
BRISBANE	1049.59	29.070	BN 780		7.82				1.68			1.39			1.47			4.63	4.73	-0.10	3.39	3.51	-0.11	1.57			1.42		
BRISBANE	1049.87	28.790	BN 770		7.70	7.9	7.57	0.13	1.68			1.38			1.46			4.56			3.34			1.55			1.41		
BRISBANE	1050.43	28.230	BN 760		7.69	7.76		-0.08	1.68			1.37			1.45			4.49			3.28			1.54			1.40		
BRISBANE	1050.86	27.800	BN 750		7.55	7.48	7.57	-0.02	1.67			1.35			1.45			4.42	4.41	0.01	3.23	3.19	0.04	1.52			1.39		
BRISBANE	1051.36	27.300	BN 740		7.55				1.67			1.35			1.45			4.42			3.23			1.51			1.39		
BRISBANE	1051.895	26.785	BN 730		7.37	7.29	7.14	0.08	1.67			1.33			1.43			4.28			3.12			1.47			1.37		
BRISBANE	1052.31	26.350	BN 720		7.47	7.17	7.08	0.30	1.66			1.33			1.43						3.16			1.48			1.37		
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge														4.34											
BRISBANE	1052.39	26.270	BN 700		7.36	7.23		0.13	1.66			1.32			1.43			4.28			3.11			1.46			1.36		
BRISBANE	1052.596	26.065	BN 690		7.26				1.66			1.31			1.42			4.23			3.09			1.46			1.36		
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge																									
BRISBANE	1052.64	26.020	BN 670		6.72	7.05	6.35	-0.33	1.65			1.30			1.42			4.02	4.03	-0.01	3.05	2.81	0.24	1.43			1.35		
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	6.58	6.56		0.02	1.65			1.30			1.41			3.96			3.01			1.43			1.36		
BRISBANE	1053.32	25.340	BN 650		6.50	6.44		0.06	1.65			1.29			1.41			3.91			2.97			1.42			1.35		
BRISBANE	1053.358	25.304	BN 640	Victoria Bridge																									
BRISBANE	1053.385	25.275	BN630		6.31	6.44		-0.13	1.65			1.29			1.40			3.84	3.88	-0.04	2.91	2.66	0.25	1.39			1.33		
BRISBANE	1053.9	24.760	BN 620		5.92	6.04		-0.12	1.64			1.28			1.39			3.59			2.72			1.37			1.32		
BRISBANE	1054.64	24.020	BN 610		5.84				1.64			1.26			1.39			3.52			2.68			1.37			1.32		
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge																									
BRISBANE	1054.68	23.980	BN 590		5.76	5.77	6.26	-0.01	1.64			1.25			1.38			3.52	3.65	-0.13	2.69	2.44	0.25	1.35			1.31		
BRISBANE	1054.97	23.690	BN 580		5.50	5.59		-0.09	1.64			1.23			1.38			3.40			2.59			1.33			1.30		
BRISBANE	1055.28	23.380	BN 550		5.45				1.64			1.22			1.38			3.37			2.57			1.32			1.30		
BRISBANE	1055.42	23.240	BN 540		5.46	5.44		0.02	1.64			1.22			1.37			3.37			2.57			1.32			1.30		
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	5.40	5.44	4.98	-0.04	1.63			1.21			1.37			3.33	3.42	-0.09	2.54	2.26	0.28	1.31	1.11	0.20	1.29		
BRISBANE	1056.4	22.280	BN 520		5.14	5.31	5.3	-0.17	1.63			1.19			1.36			3.20			2.46			1.28			1.28		
BRISBANE	1056.695	21.965	BN 510		5.07				1.63			1.19			1.36			3.16			2.43			1.27			1.28		
BRISBANE	1056.865	21.795	BN 500		5.28	5.4	4.71	-0.12	1.63			1.10			1.38			3.26			2.49			1.26			1.28		
BRISBANE	1056.92	21.740	BN 495	Story Bridge																									
BRISBANE	1056.95	21.710	BN 490		5.17	5.47	4.8	-0.30	1.63			1.19			1.35			3.26			2.46	2.15	0.31	1.27			1.28		
BRISBANE	1057.09	21.570	BN 480		5.01	5.28	4.8	-0.27	1.63			1.18			1.35			3.19			2.41			1.26			1.27		
BRISBANE	1057.53	21.130	BN 470		4.87	4.86		0.01	1.63			1.18			1.35			3.13			2.37			1.25			1.26		
BRISBANE	1058.04	20.620	BN 460		4.61	4.4	4.27	0.21	1.62			1.18			1.34			2.99			2.28			1.22			1.25		
BRISBANE	1058.23	20.430	BN 450		4.53				1.62			1.18			1.34			2.95			2.25			1.21			1.25		
BRISBANE	1058.53	20.130	BN 440		4.39	4.79	4.49	-0.10	1.62			1.18			1.33			2.88			2.21			1.21			1.24		
BRISBANE	1058.735	19.925	BN 430		4.43	4.58	4.22	-0.15	1.62			1.18			1.33			2.90			2.22			1.21			1.24		
BRISBANE	1059.035	19.625	BN 420		4.14	4.03	3.85	0.11	1.62			1.18			1.33			2.78	2.74	0.04	2.14	1.96	0.18	1.21			1.23		
BRISBANE	1059.54	19.120	BN 410		4.09	4.09	3.91	0.00	1.61			1.18			1.33			2.75			2.11			1.21			1.22		
BRISBANE	1059.99	18.670	BN 400		3.88	4	3.46	-0.12	1.61			1.19			1.32			2.65			2.04			1.21			1.22		
BRISBANE	1060.345	18.315	BN 390		3.64	3.27		0.37	1.61			1.19			1.32			2.55	2.59	-0.04	1.98	1.96	0.00	1.21			1.21		
BRISBANE	1060.535	18.125	BN 380		3.48	3.33	3.21	0.15	1.61			1.19			1.32			2.48			1.94			1.21			1.21		
BRISBANE	1061.015	17.645	BN 370		3.44	3.18		0.26	1.61			1.19			1.31			2.45			1.92			1.21			1.20		
BRISBANE	1061.53	17.130	BN 360		3.21				1.6			1.19			1.31			2.36			1.86			1.21			1.20		
BRISBANE	1062.02	16.640	BN 350		3.13	3.15	3.06	-0.02	1.6			1.19			1.30			2.33			1.83			1.21			1.19		
BRISBANE	1062.535	16.125	BN 340		3.09	3.16	2.6	-0.07	1.6			1.19			1.30			2.30	2.36	-0.06	1.81	1.82	-0.01	1.21			1.19		
BRISBANE	1062.94	15.720	BN 330		3.06				1.59			1.19			1.30			2.30			1.81			1.22			1.18		
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	2.96	3.3	2.6	-0.34	1.59			1.19			1.29			2.25	2.28	-0.03	1.78	1.75	0.03	1.22	1.28	-0.06	1.18		
BRISBANE	1063.645	15.015	BN 310	Cresent Road Gauge	2.89	2.83	2.83	0.06	1.59			1.19			1.29			2.13			1.70			1.21			1.17		
BRISBANE	1064	14.680	BN 300		2.65	2.78		-0.13	1.59			1.18			1.29			2.12			1.69			1.21			1.17		
BRISBANE	1064.49	14.170	BN 290		2.53	2.42	2.36	0.11	1.58			1.18			1.28			2.06			1.66			1.21			1.16		
BRISBANE	1065.01	13.650	BN 280		2.55	2.48		0.07	1.58			1.18			1.28			2.07			1.66			1.21			1.16		
BRISBANE	1065.503	13.157	BN 270		2.51	2.51		0.00	1.58			1.17			1.28			2.06			1.65			1.21			1.16		
BRISBANE	1065.99	12.670	BN 260	Cairncross Dock Gauge	2.52	2.49		0.03	1.59			1.17			1.27			2.06			1.66			1.21	1.05	0.16	1.16		

TABLE C-1 - Predicted & Recorded Flood Levels for Calibration\Verification Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	CALIBRATION EVENTS													VERIFICATION EVENTS											
					1974 PREDICTED WL (m AHD)	1974 RECORDED WL (m AHD)	1974 RECORDED WL (m AHD)	1974 DIFFERENCE (m)	1996 PREDICTED WL (m AHD)	1996 RECORDED WL (m AHD)	1996 DIFFERENCE (m)	1983 PREDICTED WL (m AHD)	1983 RECORDED WL (m AHD)	1983 DIFFERENCE (m)	1989B PREDICTED WL (m AHD)	1989B RECORDED WL (m AHD)	1989B DIFFERENCE (m)	1931 PREDICTED WL (m AHD)	1931 RECORDED WL (m AHD)	1931 DIFFERENCE (m)	1955 PREDICTED WL (m AHD)	1955 RECORDED WL (m AHD)	1955 DIFFERENCE (m)	1973 PREDICTED WL (m AHD)	1973 RECORDED WL (m AHD)	1973 DIFFERENCE (m)	1989A PREDICTED WL (m AHD)	1989A RECORDED WL (m AHD)	1989A DIFFERENCE (m)
BRISBANE	1066.505	12.155	BN 250		2.45	2.51		-0.06	1.57			1.17			1.27			2.03			1.84			1.21			1.15		
BRISBANE	1067.02	11.640	BN 240		2.41	2.36	2.42	0.05	1.57			1.16			1.27			2.02			1.83			1.20			1.15		
BRISBANE	1067.485	11.175	BN 230		2.31	2.36	2.42	-0.05	1.57			1.16			1.26			1.97			1.60			1.20			1.15		
BRISBANE	1067.965	10.695	BN 220		2.19	2.02		0.17	1.57			1.16			1.26			1.92			1.57			1.20			1.14		
BRISBANE	1068.66	10.000	BN 210		2.03	2.02		0.01	1.56			1.16			1.26			1.86			1.52			1.20			1.14		
BRISBANE	1069.045	9.615	BN 200		1.98	1.9		0.08	1.56			1.16			1.25			1.83			1.51			1.20			1.14		
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	1.90	1.9		0.00	1.56			1.15			1.26			1.81			1.49			1.20			1.13		
BRISBANE	1070.025	8.635	BN 180		1.84	1.85		-0.01	1.55			1.15			1.24			1.79			1.48			1.20			1.13		
BRISBANE	1070.53	8.130	BN 170		1.75				1.55			1.15			1.24			1.76			1.46			1.20			1.13		
BRISBANE	1071.04	7.620	BN 160		1.67				1.55			1.14			1.23			1.72			1.44			1.20			1.12		
BRISBANE	1071.52	7.140	BN 150		1.70				1.54			1.14			1.23			1.74			1.45			1.20			1.12		
BRISBANE	1072.015	6.645	BN 140		1.81				1.54			1.13			1.23			1.70			1.42			1.19			1.12		
BRISBANE	1072.515	6.145	BN 130		1.86				1.54			1.13			1.22			1.68			1.41			1.19			1.12		
BRISBANE	1072.995	5.665	BN 120		1.60				1.53			1.13			1.22			1.66			1.40			1.19			1.12		
BRISBANE	1073.485	5.175	BN 110		1.59				1.53			1.13			1.22			1.63			1.38			1.19			1.11		
BRISBANE	1074	4.660	BN 100		1.59				1.53			1.13			1.21			1.61			1.37			1.19			1.11		
BRISBANE	1074.46	4.200	BN 90		1.58				1.52			1.13			1.21			1.59			1.35			1.19			1.10		
BRISBANE	1074.985	3.675	BN 80		1.58				1.52			1.12			1.21			1.54			1.33			1.18			1.10		
BRISBANE	1075.48	3.180	BN 70		1.58				1.51			1.12			1.21			1.54			1.33			1.18			1.10		
BRISBANE	1076	2.660	BN 60		1.57				1.51			1.13			1.20			1.54			1.33			1.18			1.10		
BRISBANE	1076.495	2.166	BN 50		1.57				1.51			1.13			1.20			1.51			1.31			1.18			1.10		
BRISBANE	1077.01	1.650	BN 40		1.58				1.51			1.14			1.20			1.51			1.31			1.19			1.10		
BRISBANE	1077.51	1.150	BN 30		1.58				1.51			1.14			1.20			1.52			1.31			1.19			1.10		
BRISBANE	1078.04	0.620	BN 20		1.56				1.51			1.14			1.20			1.51			1.31			1.19			1.10		
BRISBANE	1078.525	0.135	BN 10		1.56				1.51			1.14			1.20			1.50			1.30			1.19			1.10		
BRISBANE	1078.66	0.000	-	Western Inner Bar Gauge	1.55	1.55		0.00	1.51	2.76	0.00	1.14	1.14	0.00	1.20	1.2	0.00	1.50			1.30	1.30	0.00	1.19	1.19	0.00	1.10	1.10	0.00
BREMER	599.4	-	-		19.94				7.37			5.24			3.75			14.25			11.77			6.34			4.70		
BREMER	600	-	-		19.94				7.38			5.27			3.78			14.26			11.77			6.34			4.71		
OXLEY	590.4	-	-		11.07				2.47			1.87			1.71			6.93			5.20			2.28			1.81		
OXLEY	600	-	-		11.07				2.47			1.87			1.71			6.93			5.20			2.28			1.81		
BREAKFAST	599.4	-	-		3.05				1.60			1.19			1.29			2.29			1.80			1.22			1.18		
BREAKFAST	600	-	-		3.05				1.59			1.19			1.29			2.29			1.80			1.22			1.18		
BULIMBA	599.4	-	-		1.81				1.55			1.15			1.23			1.70			1.42			1.20			1.12		
BULIMBA	600	-	-		1.81				1.54			1.13			1.23			1.70			1.42			1.19			1.12		
CENTWEIR	0	-	-		14.27				4.17			2.76			2.19			-			-			3.44			2.55		
CENTWEIR	0.08	-	-		14.12				4.88			2.70			2.16			-			-			3.37			2.51		
INDOORWEIR	0	-	-		11.26				2.93			2.04			1.81			-			5.44			2.51			1.96		
INDOORWEIR	0.065	-	-		11.16				2.79			2.03			1.80			-			5.40			2.49			1.95		
WILLIAMWEIR	0	-	-		7.26				1.86			1.31			1.42			4.23			3.09			1.46			1.36		
WILLIAMWEIR	0.045	-	-		8.72				1.65			1.30			1.42			4.02			3.05			1.43			1.35		
VICTORIAWEIR	0	-	-		6.50				1.65			1.29			1.41			-			-			1.42			1.36		
VICTORIAWEIR	0.065	-	-		6.31				1.66			1.28			1.40			-			-			1.39			1.33		
CAPTAINWEIR	0	-	-		5.84				1.64			1.26			1.39			-			-			1.37			1.32		
CAPTAINWEIR	0.04	-	-		5.76				1.64			1.25			1.38			-			-			1.36			1.31		
STORYWEIR	0	-	-		5.28				1.63			1.19			1.36			-			2.49			1.28			1.28		
STORYWEIR	0.085	-	-		5.17				1.63			1.19			1.35			-			2.46			1.27			1.28		
MERIVALEWEIR	0	-	-		-				1.66			1.33			1.43			-			-			-			1.37		
MERIVALEWEIR	0.08	-	-		-				1.66			1.32			1.43			-			-			-			1.36		
GOODNALINK1	0	-	-		18.39				6.29			4.38			3.13			12.86			10.46			6.34			3.90		
GOODNALINK1	1	-	-		17.71				5.72			3.90			2.82			12.19			9.83			4.80			3.48		
GOODNALINK2	0	-	-		18.31				6.22			4.31			3.08			12.78			10.38			6.20			3.85		
GOODNALINK2	1.07	-	-		17.95				5.85			4.09			2.94			12.44			10.07			6.01			3.66		
STLUCIALINK1	0	-	-		11.10				2.53			1.89			1.73			6.96			5.22			2.30			1.84		
STLUCIALINK1	1.05	-	-		10.27				2.06			1.67			1.62			6.35			4.72			2.00			1.66		
STLUCIALINK2	0	-	-		11.09				2.48			1.87			1.71			6.94			5.21			2.27			1.82		
STLUCIALINK2	1.05	-	-		10.31				2.09			1.68			1.62			6.37			4.75			2.02			1.67		
STLUCIALINK3	0	-	-		10.97				2.44			1.85			1.70			6.89			5.18			2.24			1.80		
STLUCIALINK3	0.85	-	-		10.43				2.2			1.73			1.65			6.50			4.87			2.09			1.71		

TABLE C-2 - Predicted Discharges for Calibration\Verification Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CALIBRATION EVENTS				VERIFICATION EVENTS			
			1974 Q (m^3/s)	1996 Q (m^3/s)	1983 Q (m^3/s)	1989B Q (m^3/s)	1931 Q (m^3/s)	1955 Q (m^3/s)	1973 Q (m^3/s)	1989A Q (m^3/s)
BRISBANE	1000.14	78.52	7504	2159	1518	1190	5919	5104	2613	1606
BRISBANE	1000.53	78.13	7504	2157	1518	1190	5917	5102	2613	1605
BRISBANE	1001.05	77.62	7505	2156	1517	1190	5913	5098	2612	1603
BRISBANE	1001.59	77.07	7506	2153	1517	1191	5908	5094	2610	1599
BRISBANE	1002.11	76.55	7507	2152	1517	1191	5905	5091	2609	1598
BRISBANE	1002.57	76.09	7508	2151	1517	1191	5901	5087	2608	1597
BRISBANE	1003.03	75.63	7508	2150	1517	1192	5897	5083	2607	1595
BRISBANE	1003.53	75.14	7509	2150	1517	1192	5893	5079	2605	1593
BRISBANE	1004.04	74.62	7510	2150	1516	1192	5889	5075	2603	1591
BRISBANE	1004.56	74.11	7511	2150	1516	1193	5884	5070	2602	1589
BRISBANE	1005.07	73.59	7513	2150	1516	1193	5877	5062	2600	1586
BRISBANE	1005.60	73.06	7514	2151	1516	1194	5869	5054	2596	1582
BRISBANE	1006.04	72.63	7516	2151	1516	1195	5863	5047	2594	1579
BRISBANE	1006.25	72.41	9626	2749	1903	1514	5679	4396	2339	1738
BRISBANE	1006.61	72.06	9625	2748	1902	1513	5678	4394	2339	1737
BRISBANE	1007.16	71.50	9623	2748	1899	1512	5676	4391	2339	1734
BRISBANE	1007.67	71.00	9621	2747	1896	1511	5674	4387	2338	1732
BRISBANE	1008.18	70.48	9618	2746	1893	1509	5672	4384	2337	1730
BRISBANE	1008.69	69.98	9617	2746	1892	1508	5671	4382	2337	1730
BRISBANE	1009.16	69.50	9616	2745	1891	1506	5669	4380	2336	1731
BRISBANE	1009.56	69.10	9615	2745	1890	1505	5668	4378	2336	1731
BRISBANE	1010.11	68.56	9612	2744	1890	1504	5666	4374	2336	1732
BRISBANE	1010.61	68.05	9611	2744	1889	1503	5665	4372	2335	1733
BRISBANE	1010.85	67.81	9610	2744	1889	1503	5664	4371	2335	1733
BRISBANE	1011.25	67.42	9609	2744	1889	1502	5663	4370	2335	1734
BRISBANE	1011.75	66.92	9607	2743	1888	1500	5661	4367	2334	1735
BRISBANE	1012.23	66.43	9605	2742	1888	1499	5659	4363	2333	1736
BRISBANE	1012.71	65.96	9602	2742	1888	1497	5657	4360	2333	1737
BRISBANE	1013.06	65.60	9600	2741	1889	1496	5656	4357	2332	1738
BRISBANE	1013.32	65.34	9546	2741	1889	1495	5654	4356	2332	1738
BRISBANE	1013.56	65.10	9544	2741	1889	1494	5653	4354	2332	1739
BRISBANE	1013.80	64.87	9522	2740	1890	1494	5652	4352	2331	1739
BRISBANE	1014.11	64.55	9520	2739	1891	1491	5650	4349	2330	1741
BRISBANE	1014.46	64.20	9517	2739	1892	1489	5648	4346	2330	1743
BRISBANE	1014.85	63.81	9514	2738	1893	1487	5645	4341	2329	1744
BRISBANE	1015.33	63.34	9512	2737	1894	1486	5644	4340	2328	1745
BRISBANE	1015.71	62.96	9511	2737	1895	1485	5643	4338	2328	1746
BRISBANE	1016.00	62.67	9531	2736	1895	1484	5642	4337	2327	1747
BRISBANE	1016.39	62.27	9530	2736	1896	1483	5641	4336	2327	1748
BRISBANE	1016.77	61.90	9528	2735	1897	1481	5640	4334	2326	1749
BRISBANE	1017.01	61.65	9582	2735	1898	1480	5639	4332	2326	1750
BRISBANE	1017.37	61.29	9580	2734	1899	1479	5637	4330	2325	1751
BRISBANE	1017.77	60.90	9578	2734	1899	1478	5636	4328	2324	1752
BRISBANE	1018.06	60.60	9576	2734	1900	1477	5634	4327	2324	1753
BRISBANE	1018.46	60.20	9575	2733	1901	1475	5633	4325	2324	1754
BRISBANE	1018.91	59.75	9573	2733	1902	1474	5632	4324	2323	1755
BRISBANE	1019.29	59.37	9572	2733	1902	1473	5631	4322	2323	1756
BRISBANE	1019.68	58.98	9571	2732	1904	1471	5630	4321	2322	1757
BRISBANE	1019.99	58.67	9570	2732	1904	1470	5629	4320	2321	1758
BRISBANE	1020.32	58.34	9568	2731	1906	1468	5628	4317	2320	1760
BRISBANE	1020.68	57.98	9567	2730	1907	1465	5626	4315	2319	1762
BRISBANE	1020.96	57.70	9566	2730	1908	1464	5626	4314	2319	1763
BRISBANE	1021.32	57.34	9565	2730	1909	1463	5625	4313	2320	1764
BRISBANE	1021.63	57.03	9564	2730	1910	1461	5624	4312	2320	1765
BRISBANE	1021.81	56.86	9564	2729	1910	1460	5624	4311	2321	1766
BRISBANE	1022.00	56.66	9563	2729	1911	1459	5623	4310	2321	1767
BRISBANE	1022.34	56.32	9562	2729	1912	1458	5622	4309	2322	1768
BRISBANE	1022.81	55.85	9561	2729	1913	1456	5621	4307	2323	1770
BRISBANE	1023.31	55.36	9559	2728	1914	1454	5620	4306	2323	1771
BRISBANE	1023.83	54.84	9558	2728	1915	1453	5619	4305	2324	1773
BRISBANE	1024.32	54.34	9557	2728	1916	1451	5618	4303	2325	1774
BRISBANE	1024.82	53.84	9556	2728	1918	1448	5617	4302	2326	1776
BRISBANE	1025.22	53.45	9554	2727	1919	1446	5616	4300	2327	1778
BRISBANE	1025.48	53.19	9553	2727	1920	1445	5615	4299	2327	1779
BRISBANE	1025.88	52.78	9552	2727	1922	1444	5614	4298	2328	1780
BRISBANE	1026.43	52.24	9551	2727	1923	1442	5613	4297	2329	1782
BRISBANE	1026.79	51.87	9550	2727	1925	1441	5612	4296	2329	1784

TABLE C-2 - Predicted Discharges for Calibration\Verification Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CALIBRATION EVENTS				VERIFICATION EVENTS			
			1974 Q (m^3/s)	1996 Q (m^3/s)	1983 Q (m^3/s)	1989B Q (m^3/s)	1931 Q (m^3/s)	1955 Q (m^3/s)	1973 Q (m^3/s)	1989A Q (m^3/s)
BRISBANE	1027.03	51.63	9549	2727	1926	1440	5612	4295	2330	1785
BRISBANE	1027.42	51.24	9548	2727	1927	1438	5611	4294	2330	1786
BRISBANE	1027.93	50.73	9546	2727	1930	1435	5610	4292	2332	1789
BRISBANE	1028.43	50.23	9544	2726	1933	1432	5608	4290	2333	1793
BRISBANE	1028.72	49.94	9147	2726	1934	1431	5607	4289	2334	1794
BRISBANE	1028.98	49.68	9542	2726	1935	1430	5607	4288	2334	1795
BRISBANE	1029.44	49.22	9539	2726	1937	1428	5605	4286	2335	1798
BRISBANE	1029.95	48.71	9535	2726	1939	1426	5604	4285	2337	1800
BRISBANE	1030.55	48.11	9531	2726	1942	1424	5600	4280	2338	1804
BRISBANE	1031.07	47.59	9528	2725	1945	1421	5599	4279	2339	1807
BRISBANE	1031.48	47.18	9527	2725	1947	1420	5598	4278	2340	1809
BRISBANE	1031.85	46.81	9526	2725	1948	1419	5597	4277	2341	1811
BRISBANE	1032.11	46.55	9525	2725	1950	1418	5596	4276	2342	1813
BRISBANE	1032.41	46.25	9523	2725	1951	1422	5595	4275	2343	1815
BRISBANE	1032.83	45.83	9522	2725	1953	1426	5594	4274	2344	1818
BRISBANE	1033.23	45.44	9521	2725	1955	1430	5593	4272	2345	1820
BRISBANE	1033.64	45.03	9519	2725	1957	1435	5592	4271	2346	1822
BRISBANE	1034.14	44.53	9518	2724	1959	1439	5591	4270	2347	1825
BRISBANE	1034.63	44.03	9517	2724	1961	1445	5590	4269	2348	1828
BRISBANE	1035.15	43.51	9514	2724	1964	1450	5588	4267	2350	1832
BRISBANE	1035.66	43.00	9513	2724	1966	1457	5587	4265	2351	1835
BRISBANE	1036.18	42.48	9511	2724	1969	1462	5586	4264	2352	1839
BRISBANE	1036.62	42.05	9510	2724	1971	1467	5585	4263	2353	1842
BRISBANE	1036.84	41.82	9509	2723	1973	1470	5584	4262	2354	1844
BRISBANE	1037.00	41.66	9509	2723	1973	1472	5584	4261	2355	1845
BRISBANE	1037.11	41.55	9508	2723	1974	1473	5583	4261	2355	1846
BRISBANE	1037.23	41.43	9508	2723	1974	1474	5583	4261	2355	1846
BRISBANE	1037.46	41.21	9508	2723	1976	1477	5583	4260	2356	1848
BRISBANE	1037.86	40.81	9506	2723	1978	1483	5582	4259	2357	1852
BRISBANE	1038.34	40.32	9500	2723	1982	1490	5580	4257	2359	1856
BRISBANE	1038.85	39.81	9495	2722	1986	1498	5575	4253	2362	1862
BRISBANE	1039.15	39.51	9492	2723	1989	1504	5572	4250	2364	1866
BRISBANE	1039.38	39.28	9400	2723	1991	1509	5570	4248	2366	1869
BRISBANE	1039.62	39.04	9398	2723	1994	1513	5568	4246	2367	1873
BRISBANE	1039.75	38.91	9324	2723	1996	1516	5567	4245	2368	1875
BRISBANE	1039.96	38.70	9202	2785	2160	1552	5463	4158	2421	1915
BRISBANE	1040.17	38.49	9202	2785	2162	1556	5462	4157	2423	1918
BRISBANE	1040.37	38.29	9139	2785	2164	1560	5462	4157	2424	1921
BRISBANE	1040.75	37.91	9139	2785	2167	1565	5462	4157	2425	1925
BRISBANE	1041.12	37.54	9138	2785	2170	1571	5461	4156	2427	1930
BRISBANE	1041.35	37.32	9137	2785	2173	1576	5461	4156	2429	1934
BRISBANE	1041.58	37.08	9136	2785	2175	1580	5461	4156	2430	1937
BRISBANE	1041.83	36.83	9136	2785	2177	1584	5461	4156	2431	1940
BRISBANE	1042.10	36.56	9135	2785	2179	1588	5461	4156	2433	1943
BRISBANE	1042.37	36.29	9135	2785	2180	1591	5461	4156	2434	1945
BRISBANE	1042.51	36.15	9196	2785	2181	1593	5461	4156	2434	1947
BRISBANE	1042.71	35.95	9196	2785	2183	1596	5460	4156	2435	1949
BRISBANE	1042.96	35.70	9196	2785	2185	1600	5460	4155	2436	1952
BRISBANE	1043.05	35.61	9274	2785	2186	1601	5460	4155	2437	1954
BRISBANE	1043.10	35.57	9274	2785	2186	1602	5460	4155	2437	1954
BRISBANE	1043.42	35.24	9365	2784	2189	1607	5460	4155	2439	1958
BRISBANE	1043.89	34.77	9364	2784	2193	1615	5460	4155	2441	1965
BRISBANE	1044.20	34.46	9364	2784	2195	1621	5460	4155	2443	1969
BRISBANE	1044.47	34.19	9364	2784	2198	1625	5460	4155	2444	1972
BRISBANE	1044.73	33.93	9363	2784	2200	1629	5460	4155	2445	1976
BRISBANE	1045.13	33.53	9364	2784	2205	1637	5459	4155	2448	1983
BRISBANE	1045.64	33.02	9368	2784	2211	1649	5459	4154	2452	1992
BRISBANE	1046.03	32.63	9371	2784	2216	1657	5459	4154	2455	1999
BRISBANE	1046.26	32.40	9372	2784	2219	1662	5459	4154	2456	2003
BRISBANE	1046.46	32.20	9372	2784	2221	1665	5458	4154	2457	2005
BRISBANE	1046.74	31.92	9374	2784	2224	1671	5458	4154	2459	2010
BRISBANE	1047.13	31.54	9374	2784	2228	1679	5458	4154	2462	2017
BRISBANE	1047.63	31.03	9372	2784	2232	1686	5458	4154	2464	2022
BRISBANE	1048.15	30.52	9373	2784	2236	1692	5458	4154	2467	2028
BRISBANE	1048.63	30.03	9376	2784	2241	1702	5458	4154	2470	2036
BRISBANE	1049.01	29.65	9387	2784	2246	1711	5458	4154	2473	2044
BRISBANE	1049.25	29.42	9394	2784	2249	1716	5458	4154	2475	2048

TABLE C-2 - Predicted Discharges for Calibration\Verification Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CALIBRATION EVENTS				VERIFICATION EVENTS			
			1974 Q (m^3/s)	1996 Q (m^3/s)	1983 Q (m^3/s)	1989B Q (m^3/s)	1931 Q (m^3/s)	1955 Q (m^3/s)	1973 Q (m^3/s)	1989A Q (m^3/s)
BRISBANE	1049.48	29.18	9399	2784	2252	1720	5457	4154	2476	2051
BRISBANE	1049.73	28.93	9408	2785	2255	1724	5457	4154	2478	2055
BRISBANE	1050.15	28.51	9418	2785	2260	1731	5457	4153	2481	2061
BRISBANE	1050.65	28.02	9435	2785	2267	1742	5457	4153	2485	2070
BRISBANE	1051.11	27.55	9447	2785	2272	1751	5457	4153	2488	2077
BRISBANE	1051.63	27.03	9471	2786	2278	1760	5457	4153	2492	2085
BRISBANE	1052.10	26.56	9539	2786	2284	1768	5457	4153	2495	2092
BRISBANE	1052.35	26.31	9554	2786	2287	1775	5457	4153	2497	2098
BRISBANE	1052.49	26.17	9566	2786	2289	1777	5457	4153	2498	2100
BRISBANE	1052.63	26.04	9580	2786	2290	1779	5457	4153	2499	2101
BRISBANE	1052.75	25.91	9566	2786	2291	1781	5457	4153	2500	2103
BRISBANE	1053.09	25.57	9559	2787	2294	1786	5457	4153	2502	2107
BRISBANE	1053.36	25.31	9540	2787	2299	1794	5457	4153	2505	2114
BRISBANE	1053.64	25.02	9522	2787	2304	1801	5457	4153	2508	2121
BRISBANE	1054.27.	24.39	9474	2788	2315	1815	5457	4153	2515	2133
BRISBANE	1054.66	24.00	9455	2789	2326	1830	5457	4153	2521	2146
BRISBANE	1054.83	23.84	9448	2789	2330	1835	5457	4153	2523	2151
BRISBANE	1055.13	23.54	9442	2789	2335	1842	5457	4153	2526	2157
BRISBANE	1055.35	23.31	9437	2790	2339	1847	5457	4153	2529	2161
BRISBANE	1055.69	22.97	9430	2790	2344	1854	5457	4153	2532	2168
BRISBANE	1056.18	22.48	9427	2791	2354	1868	5457	4153	2538	2180
BRISBANE	1056.55	22.11	9428	2791	2361	1877	5457	4153	2543	2188
BRISBANE	1056.78	21.88	9427	2791	2364	1882	5457	4153	2545	2192
BRISBANE	1056.92	21.74	9424	2791	2370	1889	5457	4153	2549	2199
BRISBANE	1057.02	21.64	9422	2792	2373	1894	5457	4153	2551	2204
BRISBANE	1057.31	21.35	9419	2792	2378	1901	5457	4153	2555	2210
BRISBANE	1057.79	20.87	9413	2793	2386	1912	5457	4153	2560	2220
BRISBANE	1058.14	20.53	9407	2793	2393	1919	5457	4153	2564	2227
BRISBANE	1058.38	20.28	9403	2793	2398	1925	5457	4153	2567	2233
BRISBANE	1058.63	20.03	9399	2793	2403	1930	5457	4153	2570	2237
BRISBANE	1058.89	19.78	9393	2794	2408	1936	5457	4153	2573	2243
BRISBANE	1059.29	19.37	9387	2794	2414	1943	5457	4153	2576	2249
BRISBANE	1059.77	18.89	9372	2795	2427	1957	5457	4153	2583	2262
BRISBANE	1060.17	18.49	9382	2795	2439	1971	5457	4153	2591	2275
BRISBANE	1060.44	18.22	9387	2796	2444	1976	5457	4153	2594	2280
BRISBANE	1060.78	17.88	9393	2796	2449	1983	5457	4153	2598	2287
BRISBANE	1061.27	17.39	9405	2797	2461	1997	5457	4153	2606	2300
BRISBANE	1061.78	16.88	9413	2797	2472	2009	5457	4153	2614	2312
BRISBANE	1062.28	16.38	9422	2798	2484	2025	5457	4153	2623	2328
BRISBANE	1062.74	15.92	9431	2799	2503	2045	5457	4153	2636	2347
BRISBANE	1063.03	15.63	9436	2800	2517	2058	5457	4153	2645	2361
BRISBANE	1063.22	15.44	9453	2858	2561	2081	5457	4153	2661	2385
BRISBANE	1063.48	15.18	9456	2859	2572	2092	5457	4153	2668	2395
BRISBANE	1063.82	14.84	9460	2859	2583	2103	5457	4153	2675	2406
BRISBANE	1064.25	14.42	9467	2859	2596	2116	5457	4153	2684	2419
BRISBANE	1064.75	13.91	9475	2859	2618	2131	5457	4153	2694	2434
BRISBANE	1065.26	13.40	9486	2859	2648	2149	5457	4153	2706	2453
BRISBANE	1065.75	12.91	9498	2859	2680	2170	5457	4154	2719	2474
BRISBANE	1066.25	12.41	9509	2860	2713	2191	5457	4154	2734	2496
BRISBANE	1066.76	11.90	9520	2860	2745	2212	5457	4154	2749	2517
BRISBANE	1067.25	11.41	9534	2860	2781	2235	5457	4154	2765	2540
BRISBANE	1067.73	10.94	9549	2861	2822	2258	5457	4154	2782	2564
BRISBANE	1068.31	10.35	9563	2861	2862	2282	5457	4154	2798	2587
BRISBANE	1068.85	9.81	9574	2861	2903	2305	5457	4154	2815	2612
BRISBANE	1069.29	9.37	9583	2861	2934	2324	5457	4154	2828	2633
BRISBANE	1069.78	8.88	9594	2861	2971	2346	5457	4154	2843	2658
BRISBANE	1070.28	8.38	9605	2862	3009	2368	5457	4154	2859	2684
BRISBANE	1070.79	7.87	9620	2862	3050	2392	5457	4154	2875	2713
BRISBANE	1071.28	7.38	9636	2862	3091	2416	5457	4154	2892	2741
BRISBANE	1071.77	6.89	9650	2862	3132	2441	5457	4154	2911	2771
BRISBANE	1072.02	6.64	9658	2863	3155	2455	5457	4154	2921	2787
BRISBANE	1072.27	6.39	9794	2937	3426	2971	5458	4154	3034	2973
BRISBANE	1072.76	5.90	9810	2938	3472	2998	5458	4154	3052	3003
BRISBANE	1073.24	5.42	9828	2938	3521	3026	5458	4154	3071	3035
BRISBANE	1073.74	4.92	9848	2938	3574	3056	5458	4154	3091	3069
BRISBANE	1074.23	4.43	9868	2938	3627	3084	5458	4154	3111	3103
BRISBANE	1074.72	3.94	9889	2938	3681	3113	5458	4154	3132	3140

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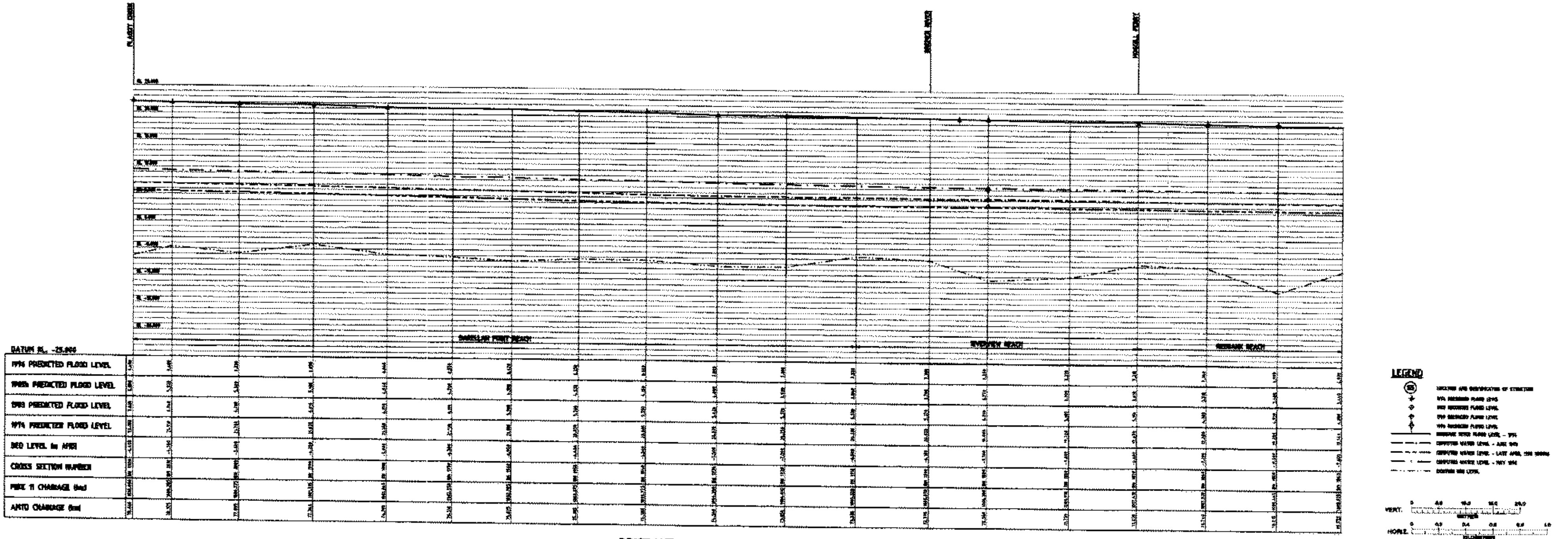
LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CALIBRATION EVENTS				VERIFICATION EVENTS			
			1974 Q (m^3/s)	1996 Q (m^3/s)	1983 Q (m^3/s)	1989B Q (m^3/s)	1931 Q (m^3/s)	1955 Q (m^3/s)	1973 Q (m^3/s)	1989A Q (m^3/s)
BRISBANE	1075.23	3.43	9911	2938	3735	3141	5458	4154	3152	3176
BRISBANE	1075.74	2.92	9949	2938	3816	3185	5458	4154	3184	3232
BRISBANE	1076.25	2.41	9999	2937	3932	3245	5458	4154	3228	3311
BRISBANE	1076.75	1.91	10042	2938	4026	3293	5458	4154	3264	3374
BRISBANE	1077.26	1.40	10107	2938	4166	3365	5458	4154	3317	3469
BRISBANE	1077.78	0.88	10151	2938	4261	3413	5458	4154	3353	3533
BRISBANE	1078.28	0.38	10192	2953	4353	3460	5458	4154	3388	3596
BRISBANE	1078.59	0.07	10207	2963	4386	3476	5458	4154	3400	3617
BREMER	599.70	-	3743	1326	1212	941	1297	1073	367	584
OXLEY	599.70	-	1077	475	382	288	831	297	246	264
BREAKFAST	599.70	-	131	390	221	407	433	211	426	141
BULIMBA	599.70	-	1433	495	554	758	713	337	785	279
CENTWEIR	0.04	-	439	0	0	0	-	-	0	0
INDOORWEIR	0.04	-	0	0	0	0	-	0	0	0
WILLIAMWEIR	0.02	-	0	0	0	0	0	0	0	0
VICTORIAWEIR	0.03	-	0	0	0	0	-	-	0	0
CAPTAINWEIR	0.02	-	0	0	0	0	-	-	0	0
STORYWEIR	0.04	-	0	0	0	0	-	0	0	0
MERIVALEWEIR	0.04	-	-	0	0	0	-	-	-	0
GOODNALINK1	0.50	-	59	0	0	0	0	0	0	0
GOODNALINK2	0.54	-	23	0	0	0	0	0	0	0
STLUCIALINK1	0.53	-	91	0	0	0	0	0	0	0
STLUCIALINK2	0.53	-	79	0	0	0	0	0	0	0
STLUCIALINK3	0.43	-	62	0	0	0	0	0	0	0

SINCLAIR KNIGHT MERZ

FIGURE C-1a
BRISBANE RIVER FLOOD STUDY
MIKE 11 CALIBRATION PROFILE

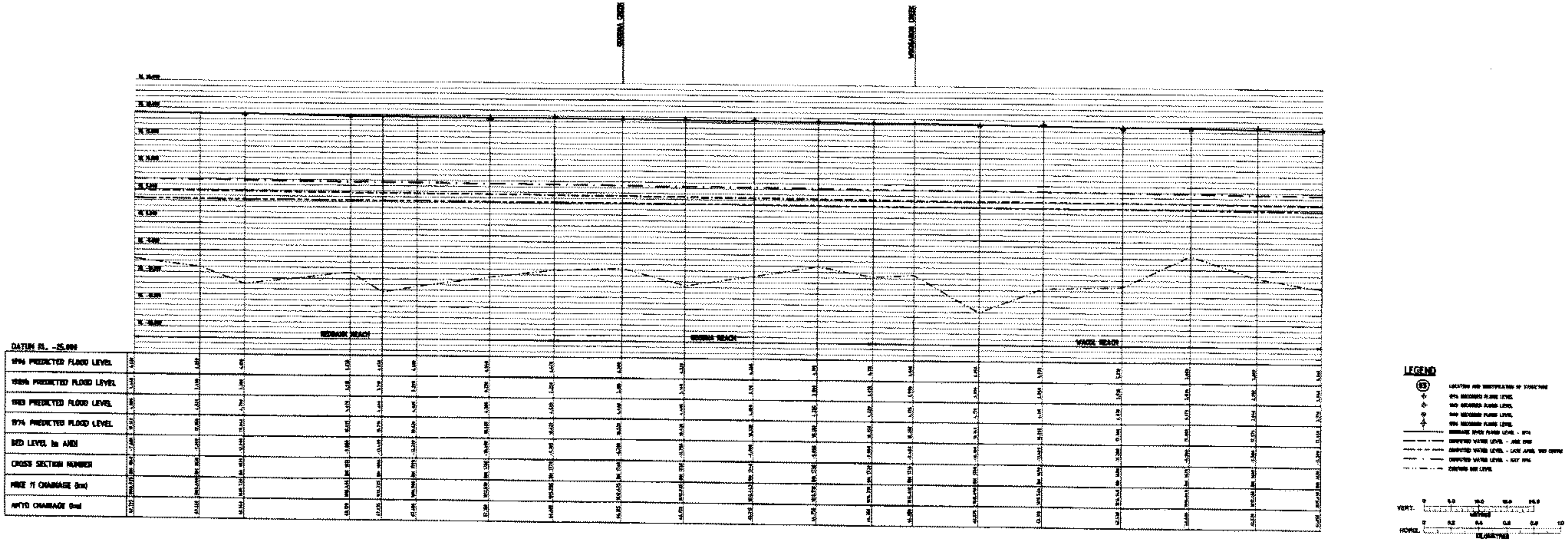


BRISBANE RIVER - BN 2020 TO BN 1840

PLOT SCALE 1=30

SINCLAIR KNIGHT MERZ

FIGURE C-1b
BRISBANE RIVER FLOOD STUDY
MIKE 11 CALIBRATION PROFILE

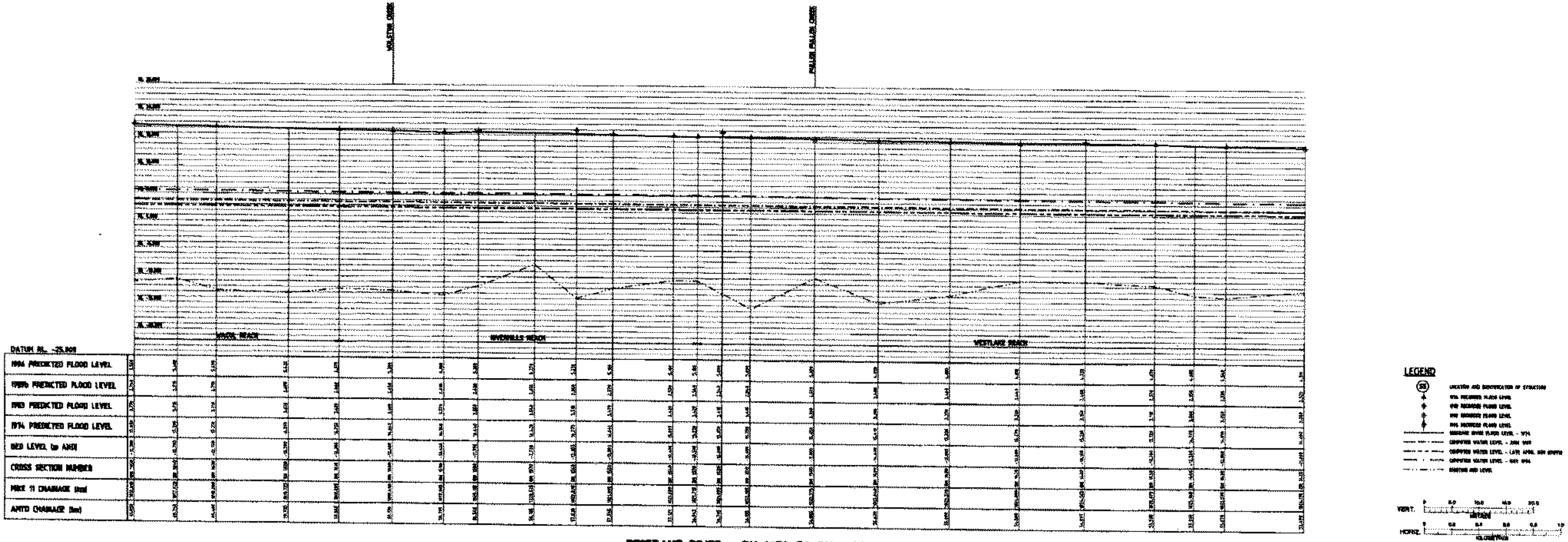


PLOT SCALE 1:30

FIGURE C-1c

BRISBANE RIVER FLOOD STUDY

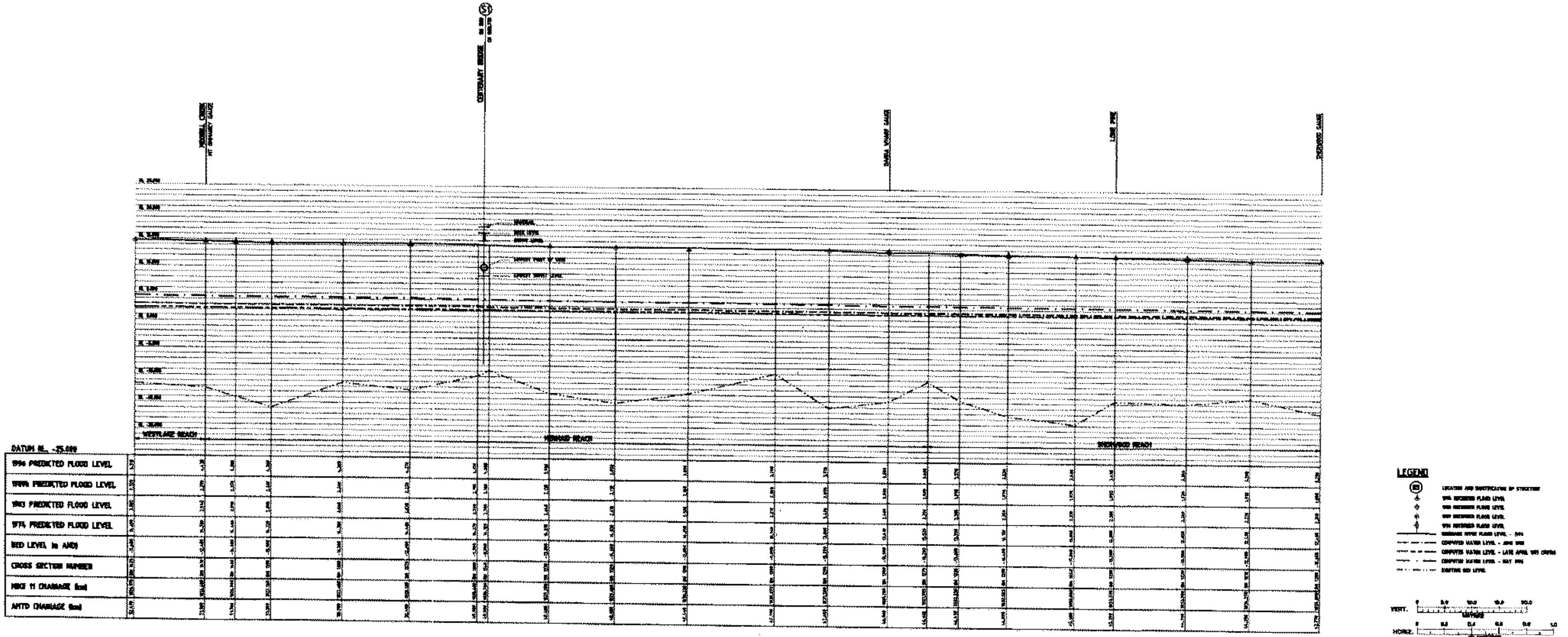
MIKE 11 CALIBRATION PROFILE



BRISBANE RIVER - BN 1650 TO BN 1420

SINCLAIR KNIGHT MERZ

FIGURE C-1d
BRISBANE RIVER FLOOD STUDY
MIKE 11 CALIBRATION PROFILE



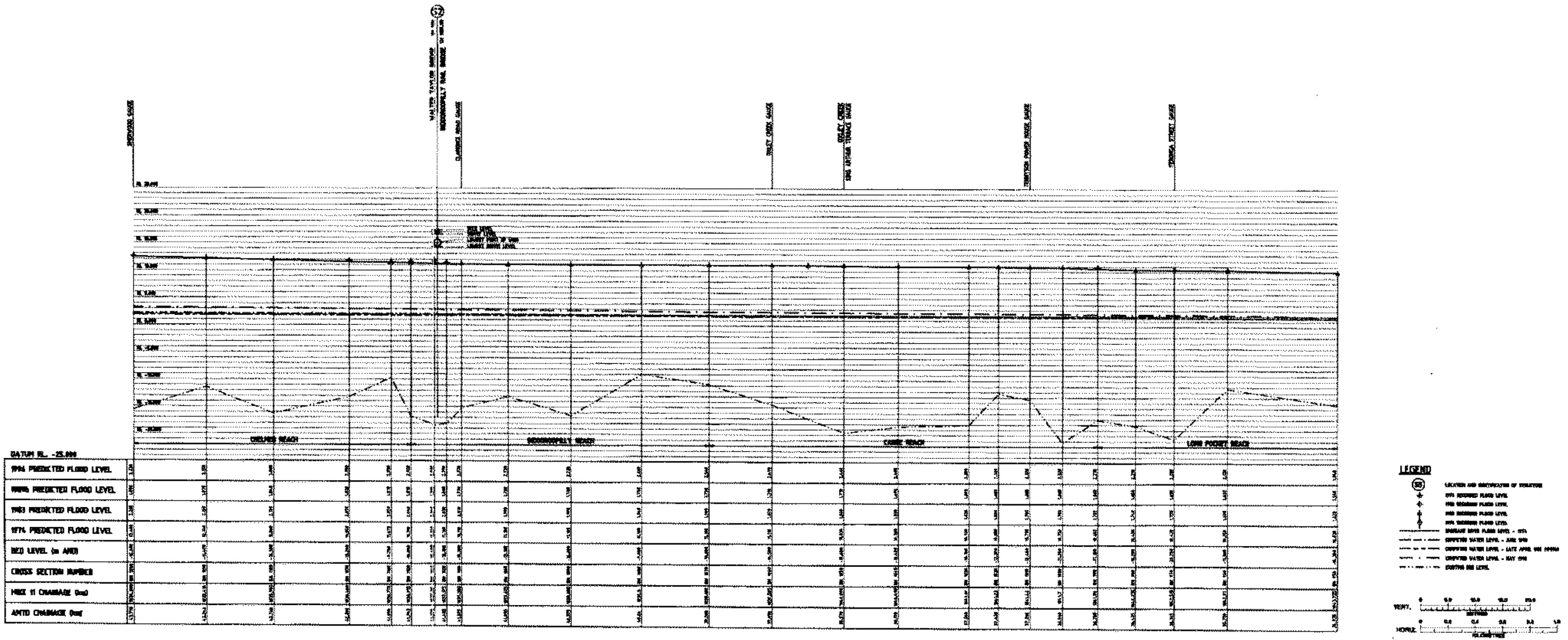
BRISBANE RIVER - BN 1420 TO BN 1200

FILE NAME 415[illegible]
PLOT SCALE 1:30
DWG No. CNL[illegible]
JOB No. T00[illegible]
DATE 23/[illegible]

SINCLAIR KNIGHT MERZ

FIGURE C-1e

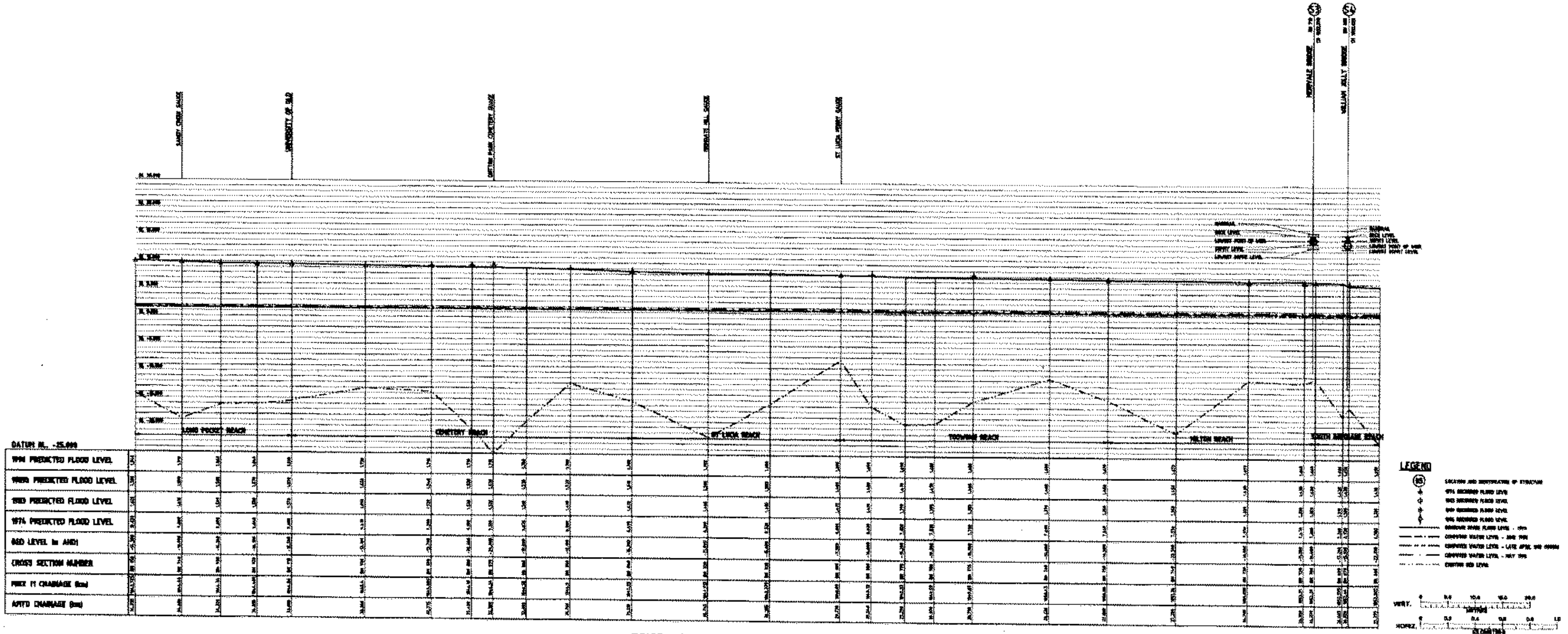
BRISBANE RIVER FLOOD STUDY
MIKE 11 CALIBRATION PROFILE



BRISBANE RIVER - BN 1200 TO BN 950

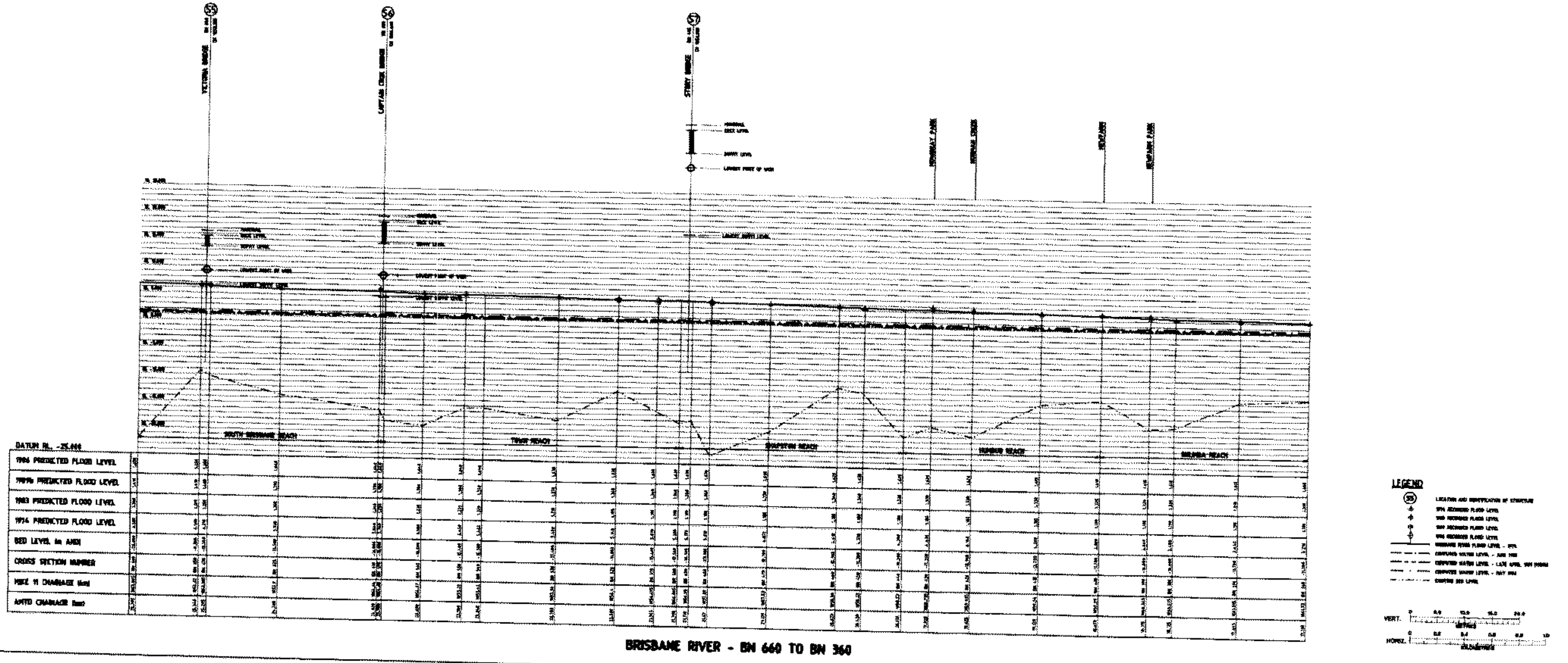
FILE NAME 4157-33[illegible] DISK N: C:\DWG JOB N: T004/57 DATE: 23/3/[illegible]
PLOT SCALE 1=30

FIGURE C-1f
BRISBANE RIVER FLOOD STUDY
MIKE 11 CALIBRATION PROFILE



BRISBANE RIVER - BN 950 TO BN 660

FIGURE C-1g
BRISBANE RIVER FLOOD STUDY
MIKE 11 CALIBRATION PROFILE



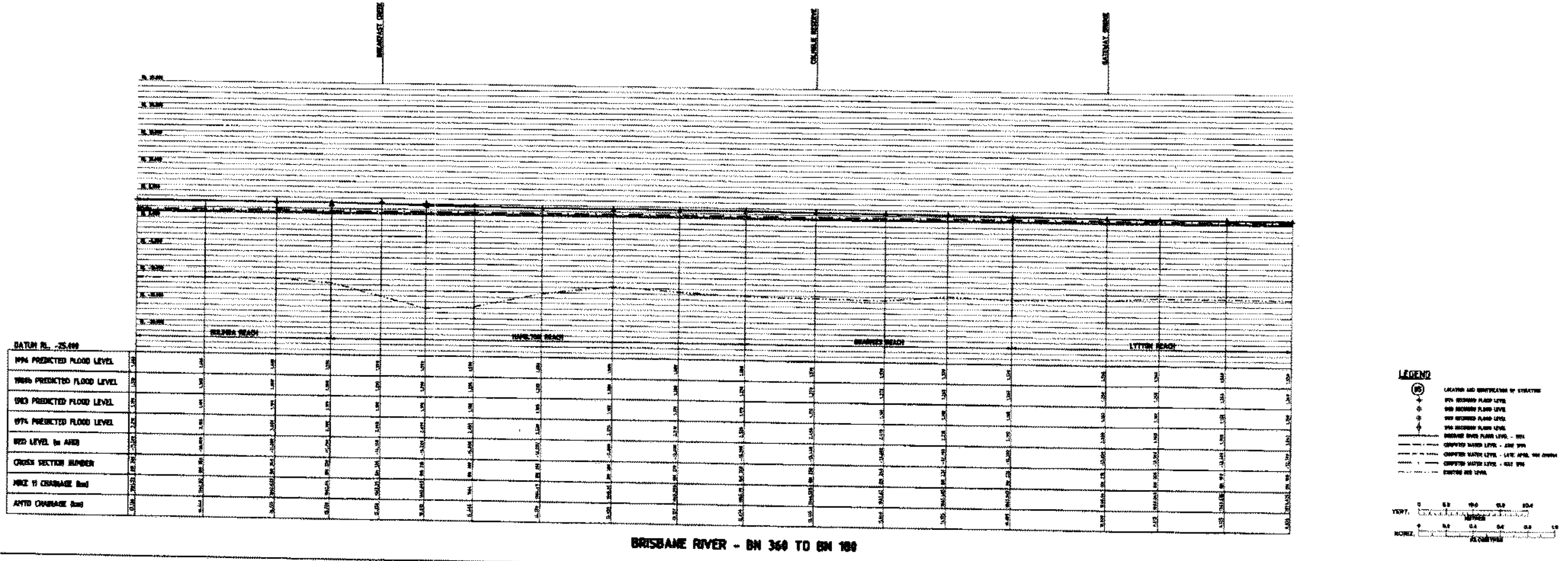
BRISBANE RIVER - BN 660 TO BN 360

PLOT SCALE 1=30

SINCLAIR KNIGHT MERZ

FIGURE C-1h

BRISBANE RIVER FLOOD STUDY
MIKE 11 CALIBRATION PROFILE

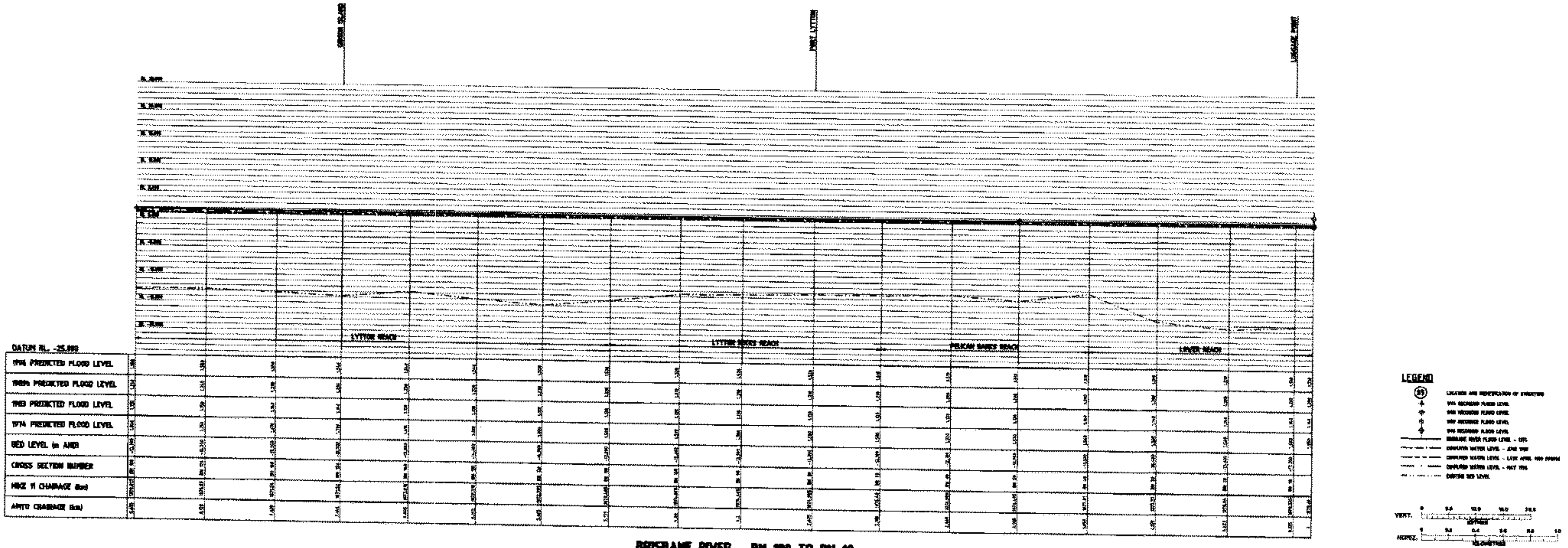


BRISBANE RIVER - BN 360 TO BN 180

FILE NAME 4B7-100 PLOT SCALE 1:30 DISK Nº C:\DWG JOB Nº T00457 DATE: 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE C-1
BRISBANE RIVER FLOOD STUDY
MIKE 11 CALIBRATION PROFILE

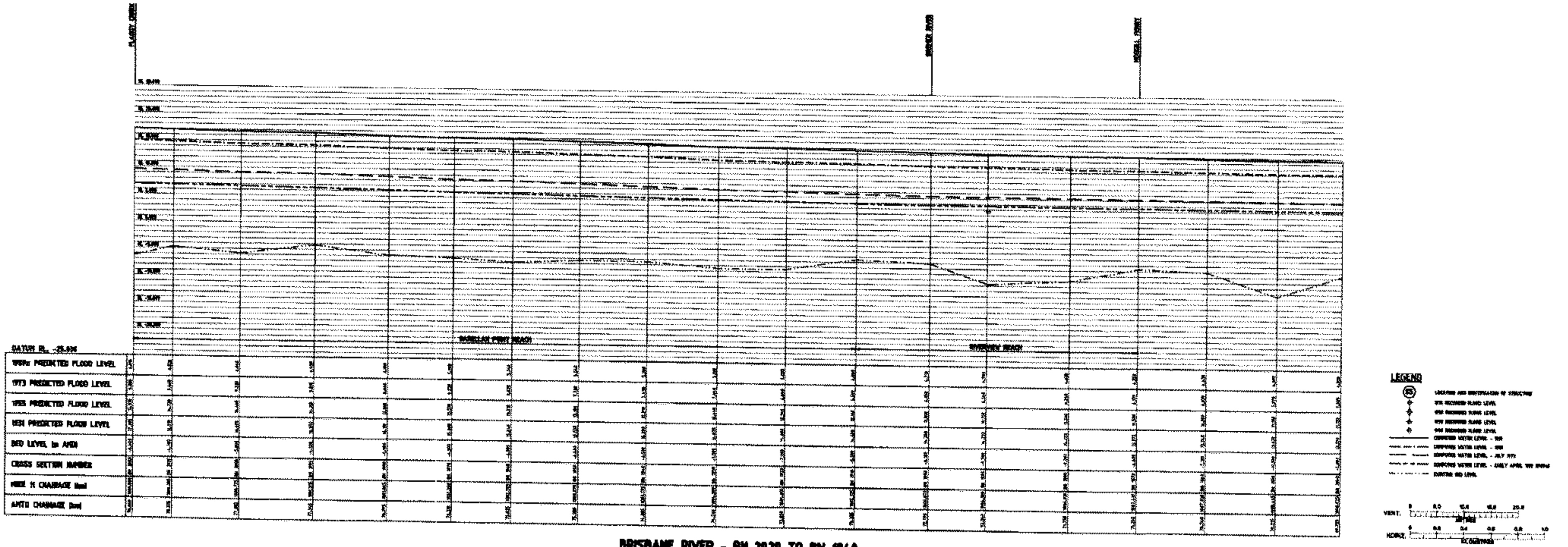


BRISBANE RIVER - BN 180 TO BN 10

PLOT SCALE 1:30

FIGURE C-2a

BRISBANE RIVER FLOOD STUDY
MIKE 11 VERIFICATION PROFILE

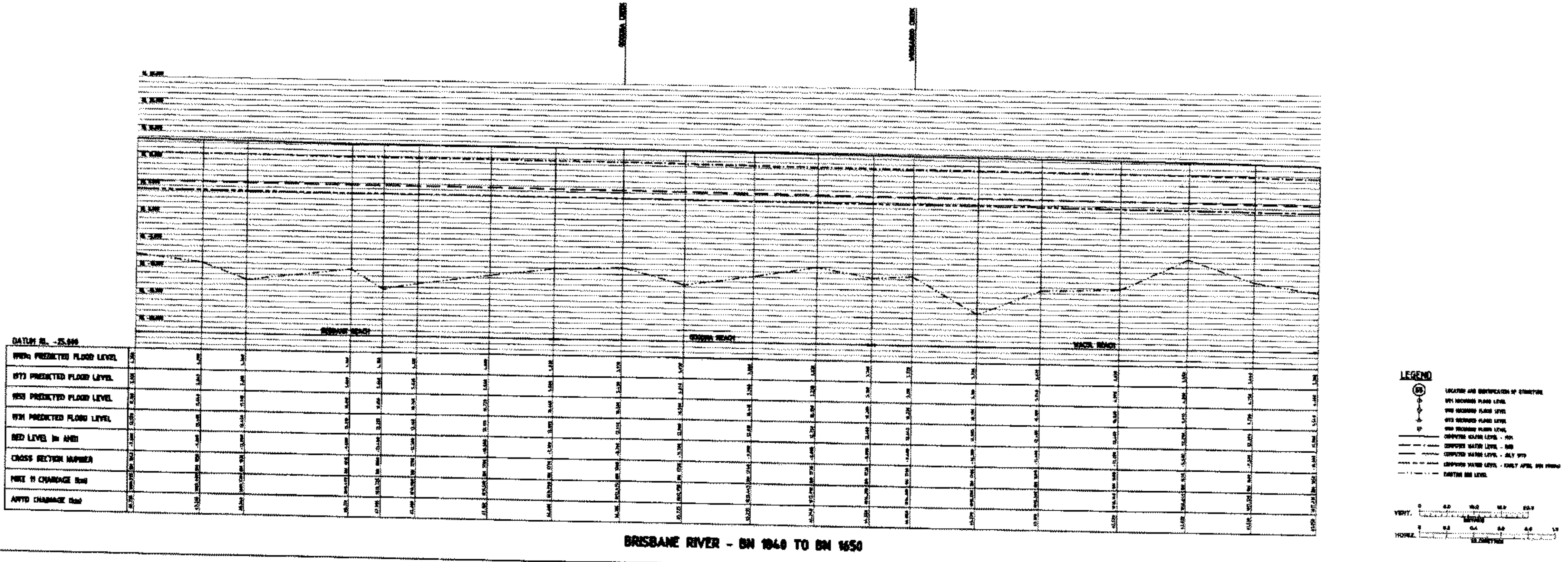


BRISBANE RIVER - BN 2020 TO BN 1840

SINCLAIR KNIGHT MERZ

FIGURE C-2b

BRISBANE RIVER FLOOD STUDY
MIKE 11 VERIFICATION PROFILE

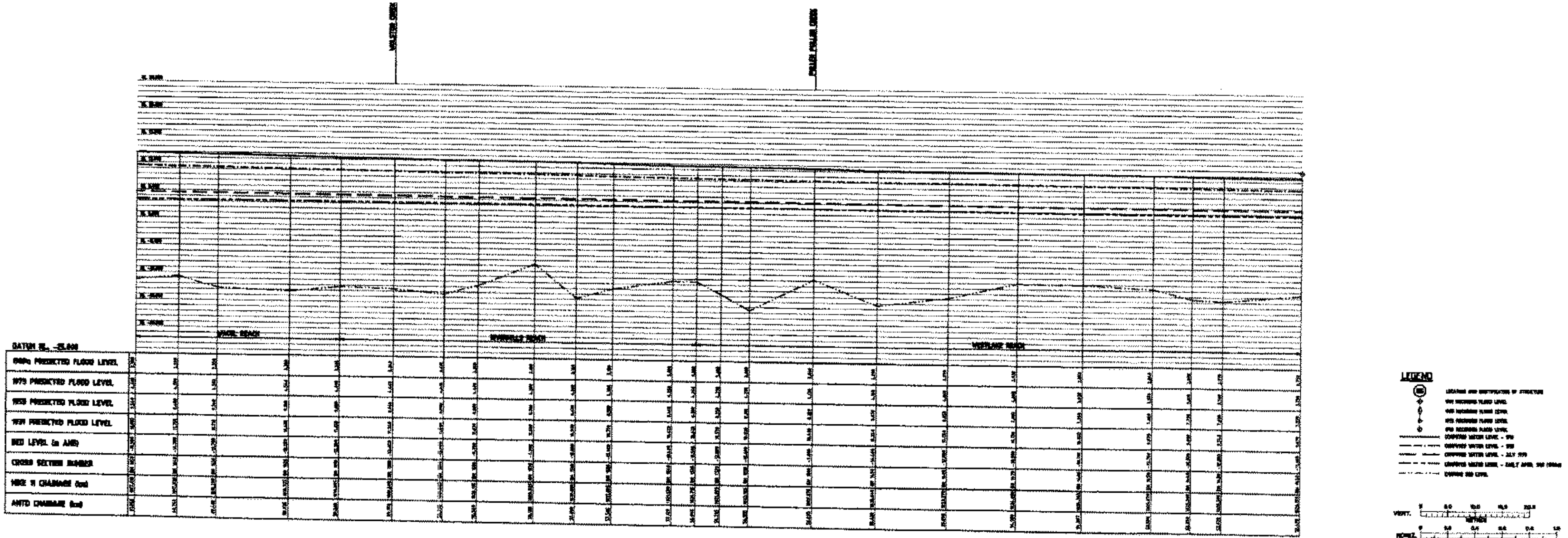


BRISBANE RIVER - BN 1040 TO BN 1650

PLOT SCALE 1:30

FIGURE C-2c

BRISBANE RIVER FLOOD STUDY
MIKE 11 VERIFICATION PROFILE

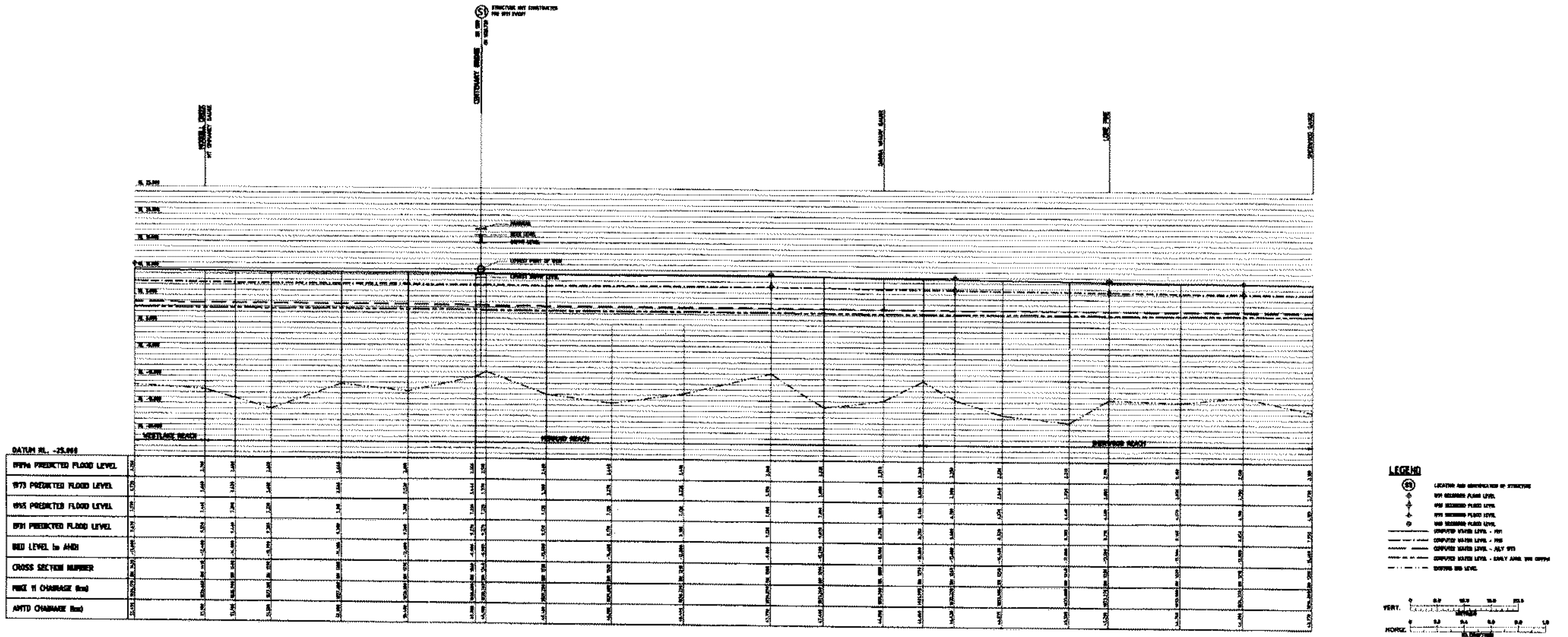


BRISBANE RIVER - BN 1650 TO BN 1420

SINCLAIR KNIGHT MERZ

FIGURE C-2d

BRISBANE RIVER FLOOD STUDY
MIKE 11 VERIFICATION PROFILE

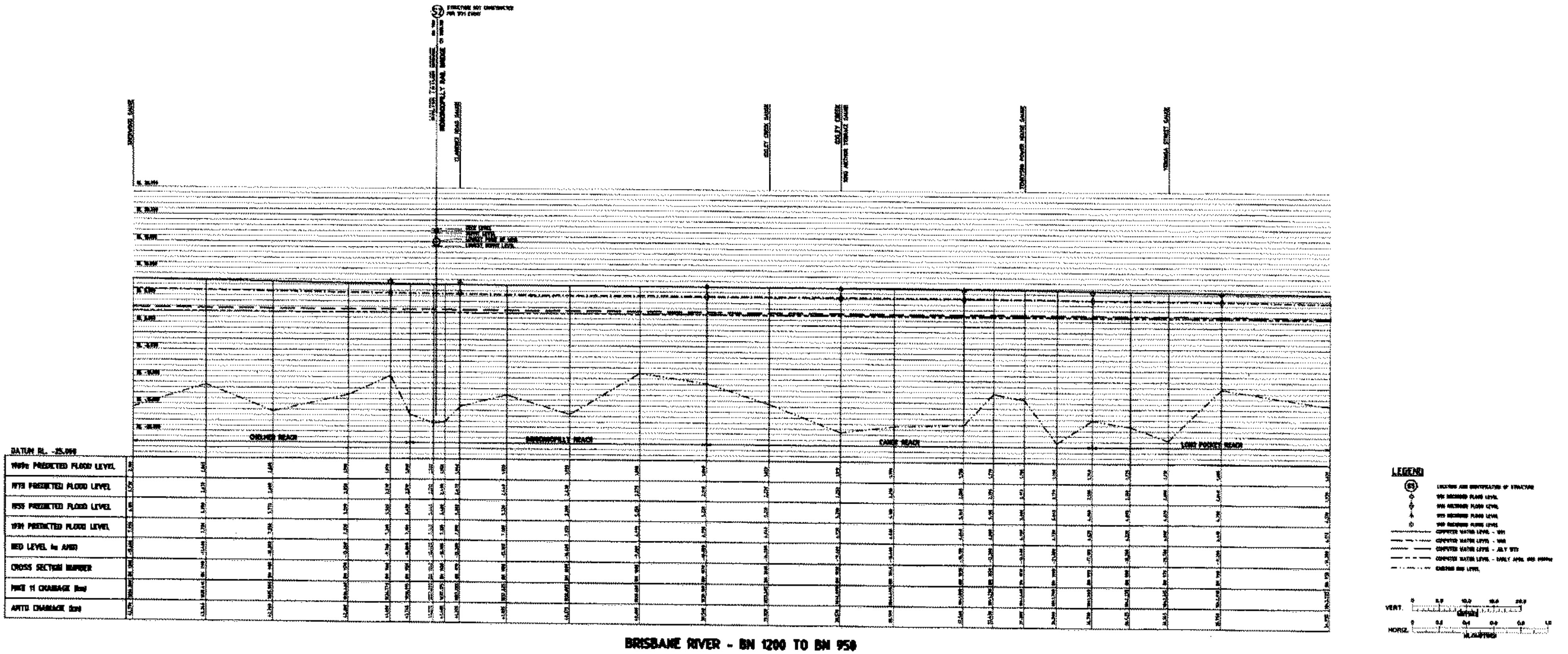


BRISBANE RIVER - BN 14.20 TO BN 1200

FILE NAME 4157-339 DISK N: C:\DWG JOB N: T00457 DATE 23/3/97
PLOT SCALE 1:30

FIGURE C-2e

BRISBANE RIVER FLOOD STUDY
MIKE 11 VERIFICATION PROFILE



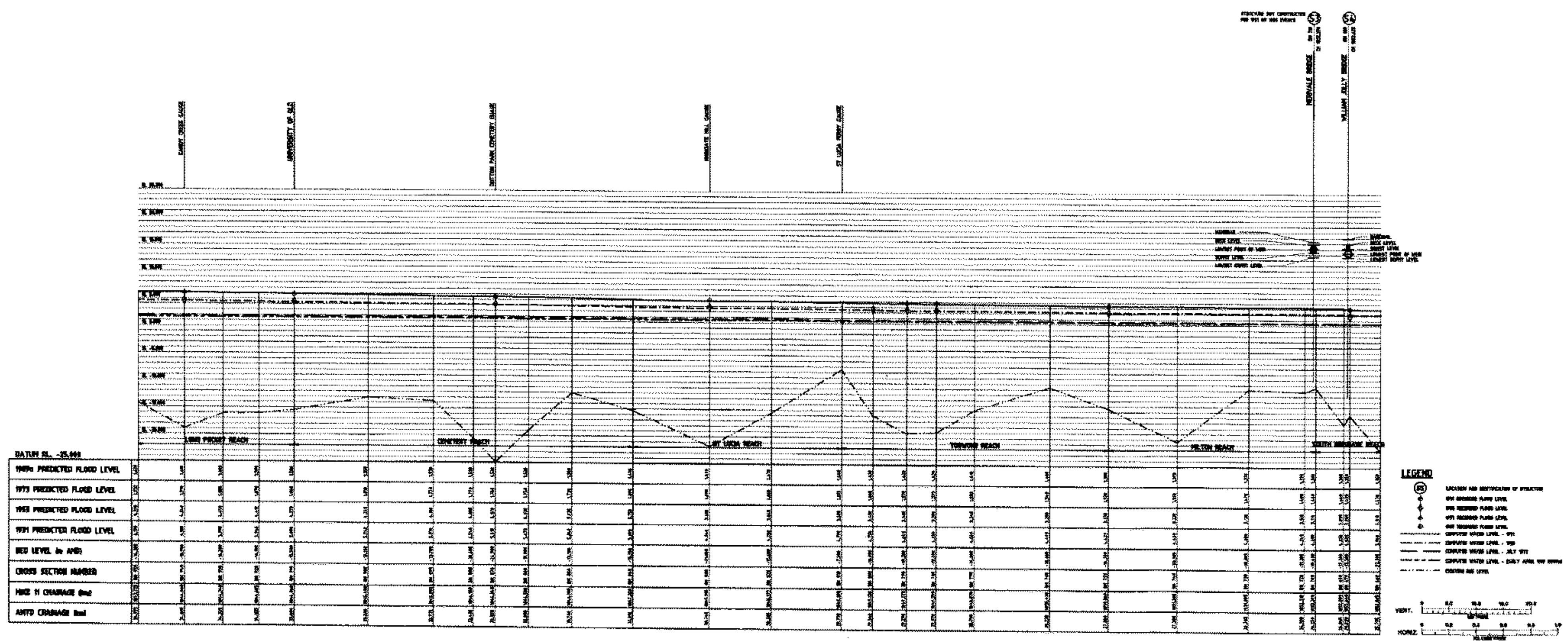
BRISBANE RIVER - BN 1200 TO BN 950

FILE NAME: 4157-540   DISK N: C:\DWG   JOB N: T00415/   DATE: 23/3/??
PLOT SCALE: 1=39

SINCLAIR KNIGHT MERZ

FIGURE C-2f

BRISBANE RIVER FLOOD STUDY
MIKE 11 VERIFICATION PROFILE



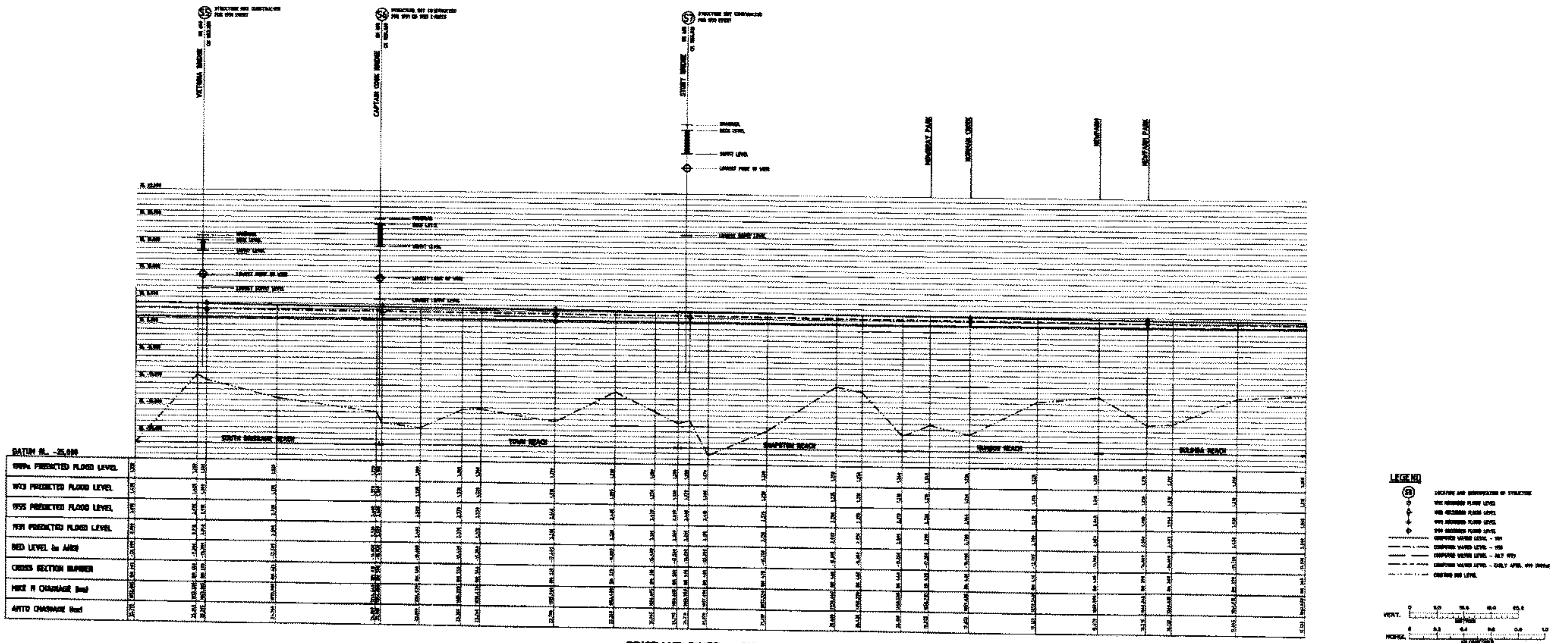
BRISBANE RIVER - BN 950 TO BN 660

FILE NAME 4157-5?? DISK N CADWG JOB N. T0041? DATE 23/3/..
PLOT SCALE 1=30

FIGURE C-2g

BRISBANE RIVER FLOOD STUDY

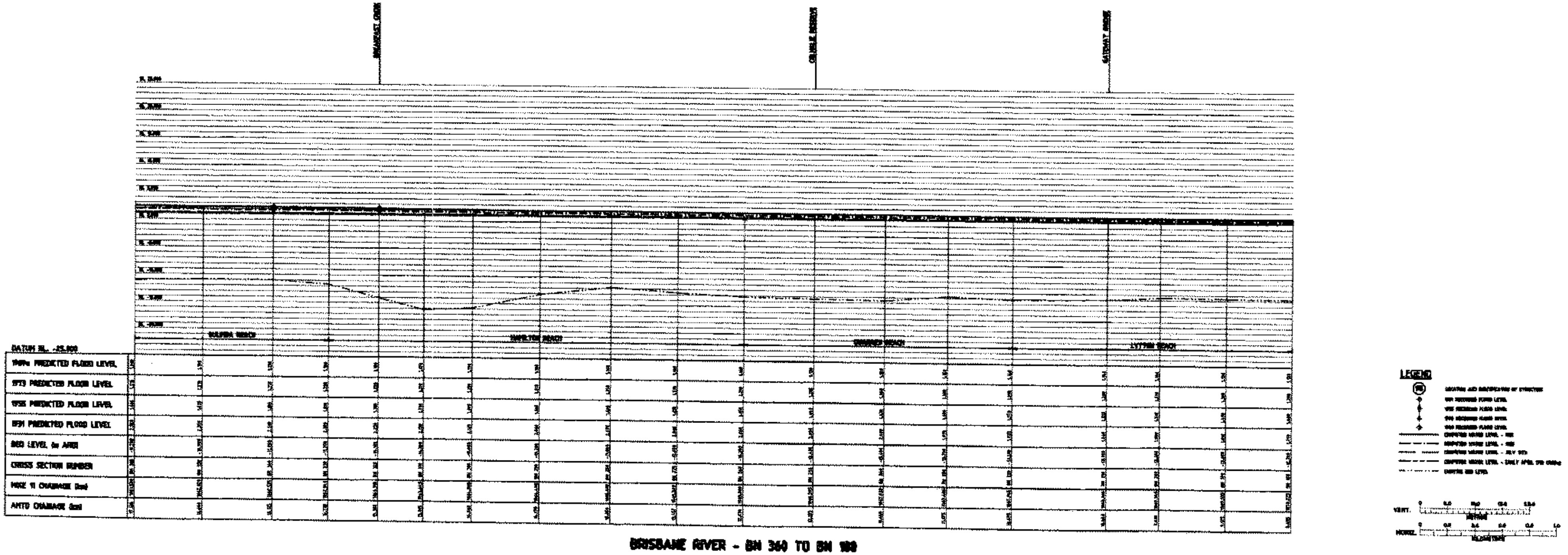
MIKE 11 VERIFICATION PROFILE



BRISBANE RIVER - BN 660 TO BN 360

SINCLAIR KNIGHT MERZ

FIGURE C-2h
BRISBANE RIVER FLOOD STUDY
MIKE 11 VERIFICATION PROFILE

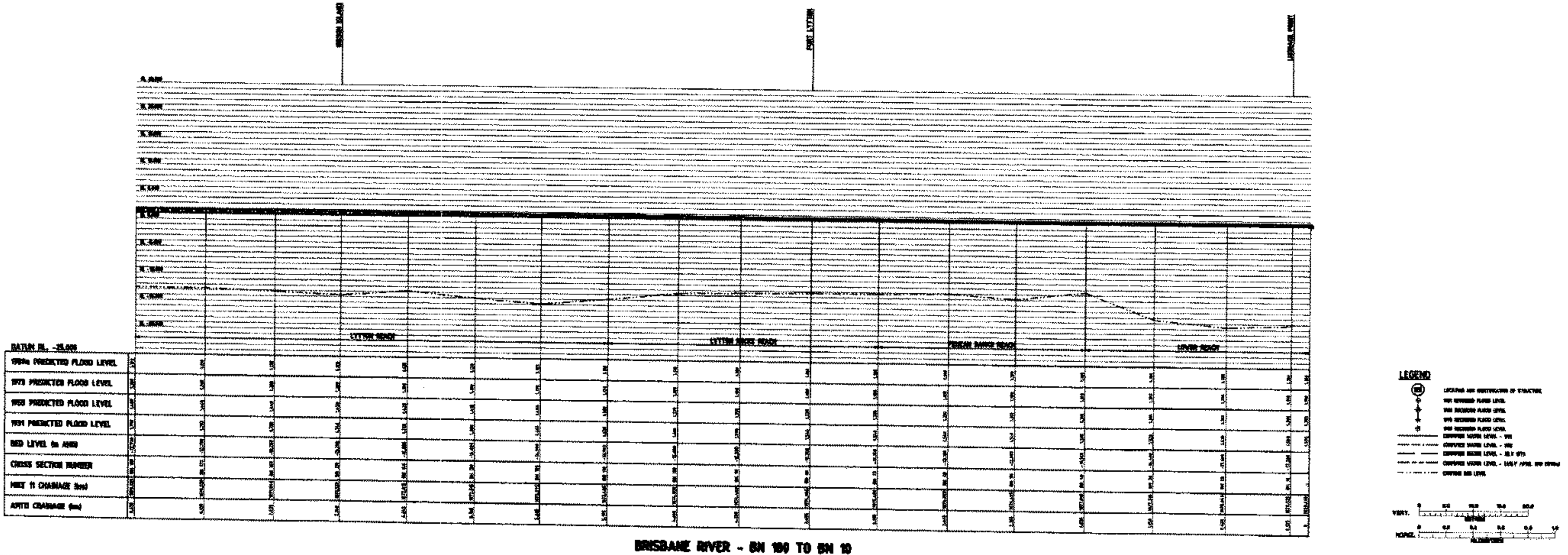


BRISBANE RIVER - BN 360 TO BN 180

FILE NAME: 415F-11?
PLOT SCALE: 1=30
DISK N : C:\DWG
JOB N : T00415?
DATE: 23/3/97

FIGURE C-2i

BRISBANE RIVER FLOOD STUDY
MIKE 11 VERIFICATION PROFILE



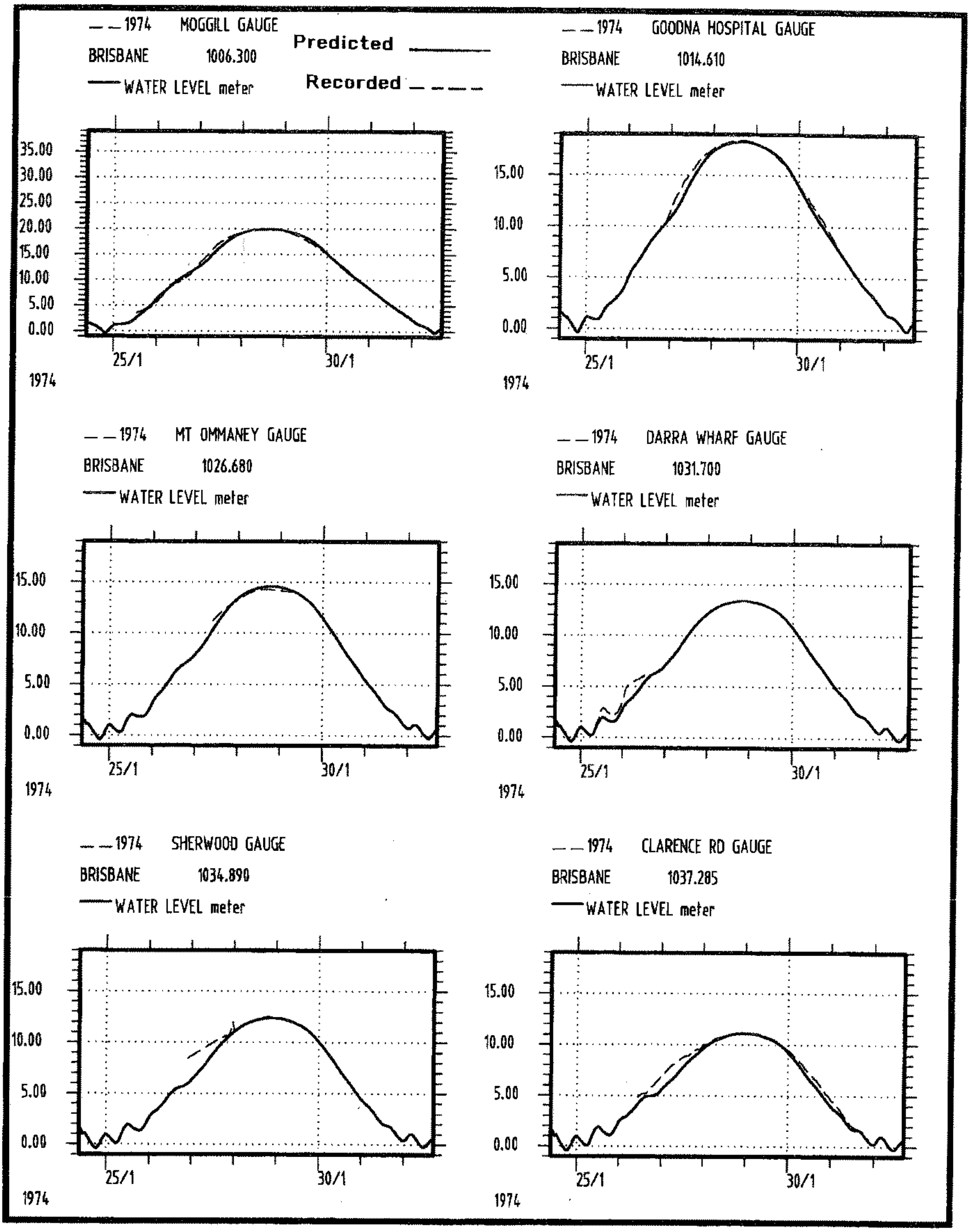
BRISBANE RIVER - BN 180 TO BN 10

PLOT SCALE 1:30

FIGURE C-3a

BRISBANE RIVER FLOOD STUDY
PREDICTED AND RECORDED HYDROGRAPH
COMPARISON - JANUARY 1974

SINCLAIR KNIGHT MERZ

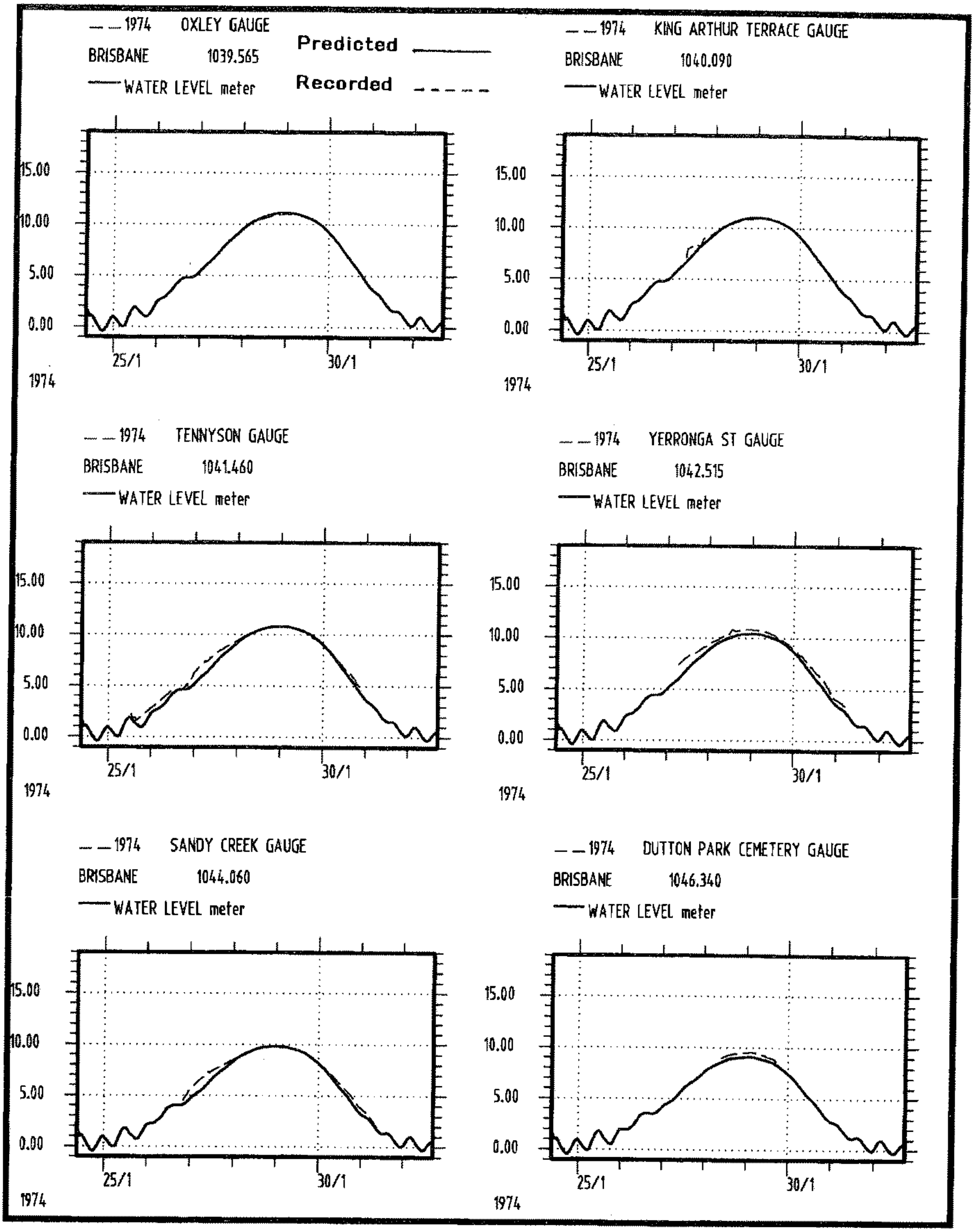


FILE NAME: 4157-240 DISK N°: G:\ JOB N°: T004157 17-2-98
PLC [illegible]

SINCLAIR KNIGHT MERZ

FIGURE C-3b

BRISBANE RIVER FLOOD STUDY
PREDICTED AND RECORDED HYDROGRAPH
COMPARISON - JANUARY 1974



FILE NAME: 4157-241 DISK N°: G:\ JOB N°: T004157 17-2-99
PLL . ..ALE: 1..

FIGURE C-3c

BRISBANE RIVER FLOOD STUDY PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JANUARY 1974

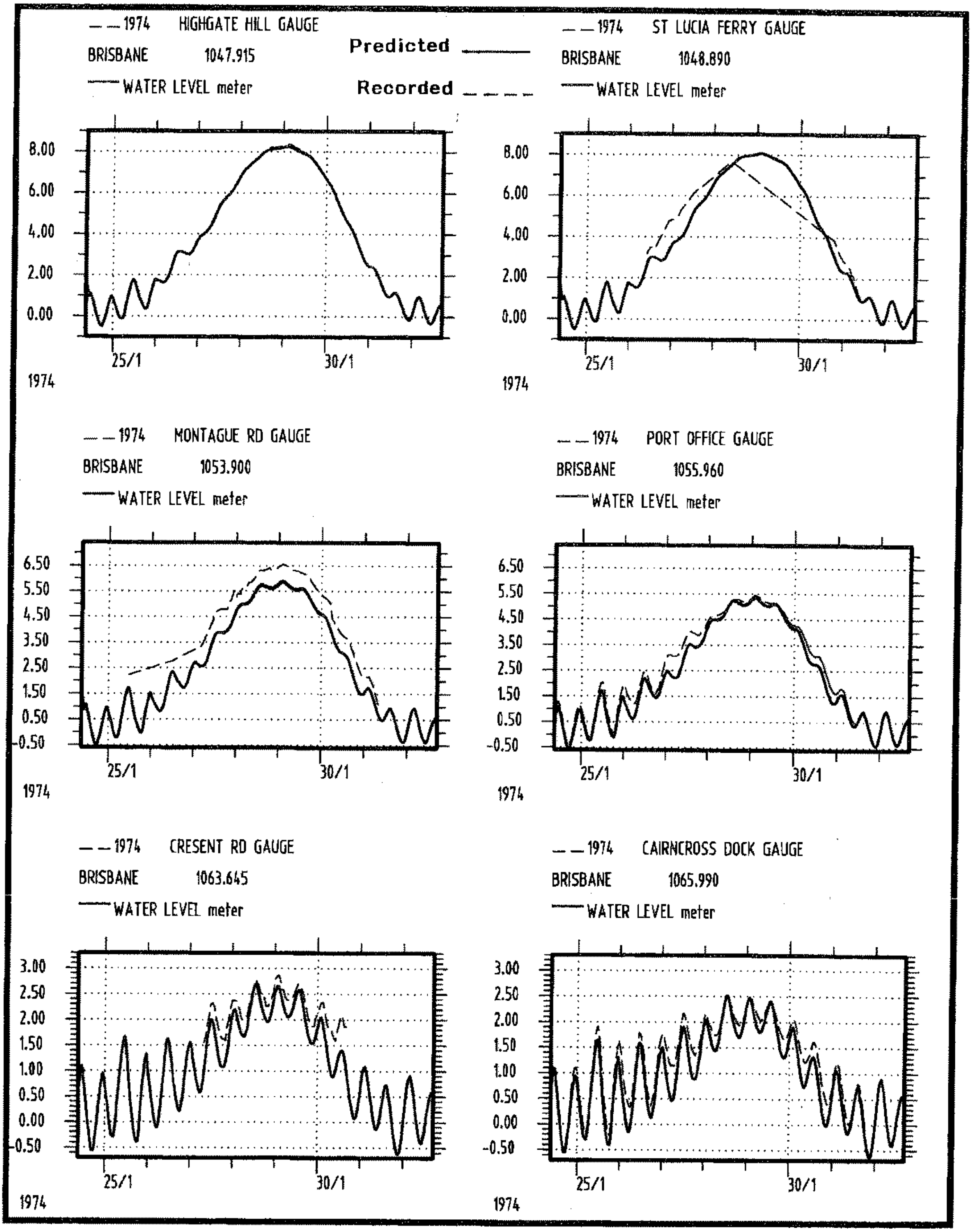


FIGURE C-3d

BRISBANE RIVER FLOOD STUDY
PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JANUARY 1974

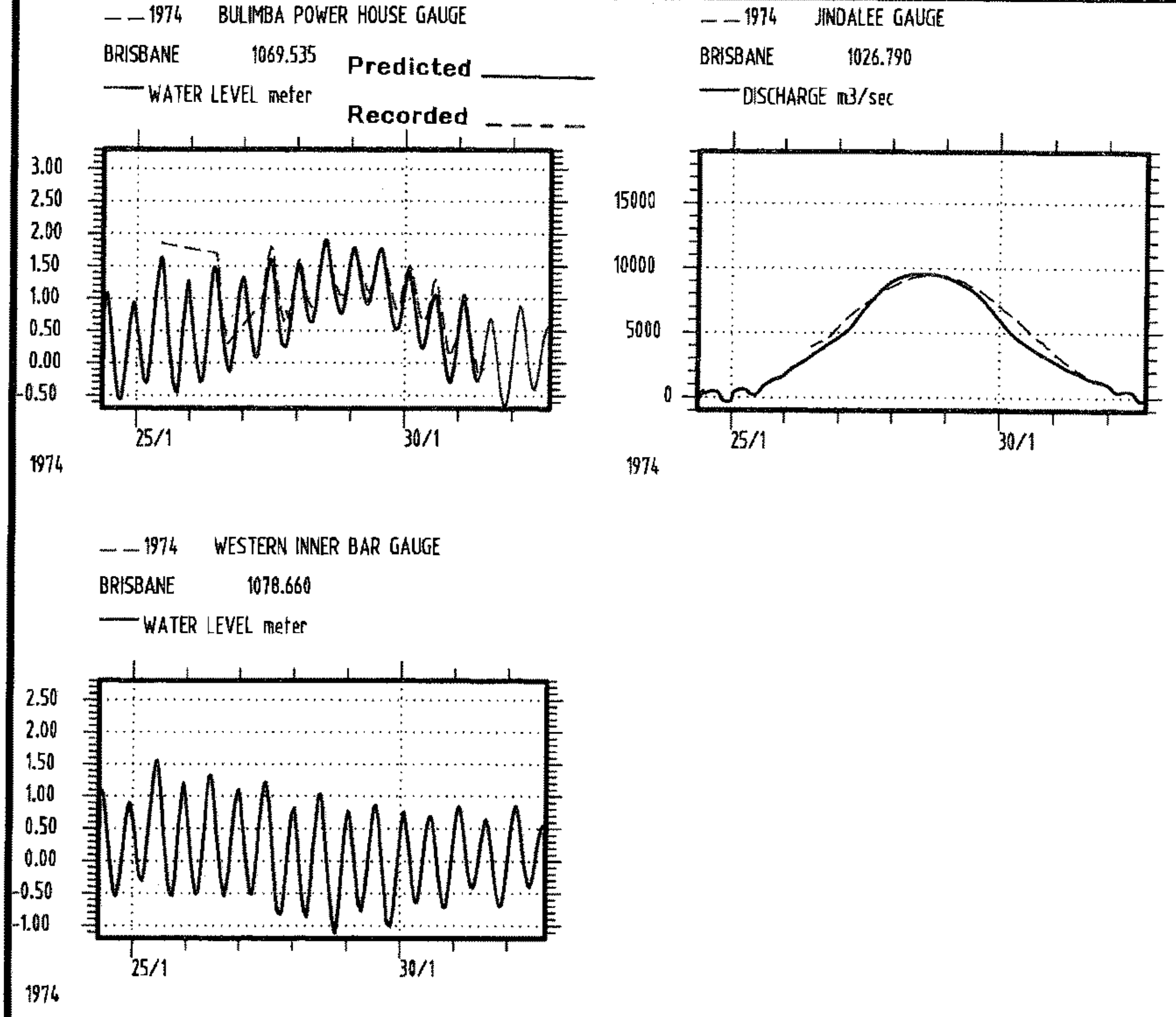
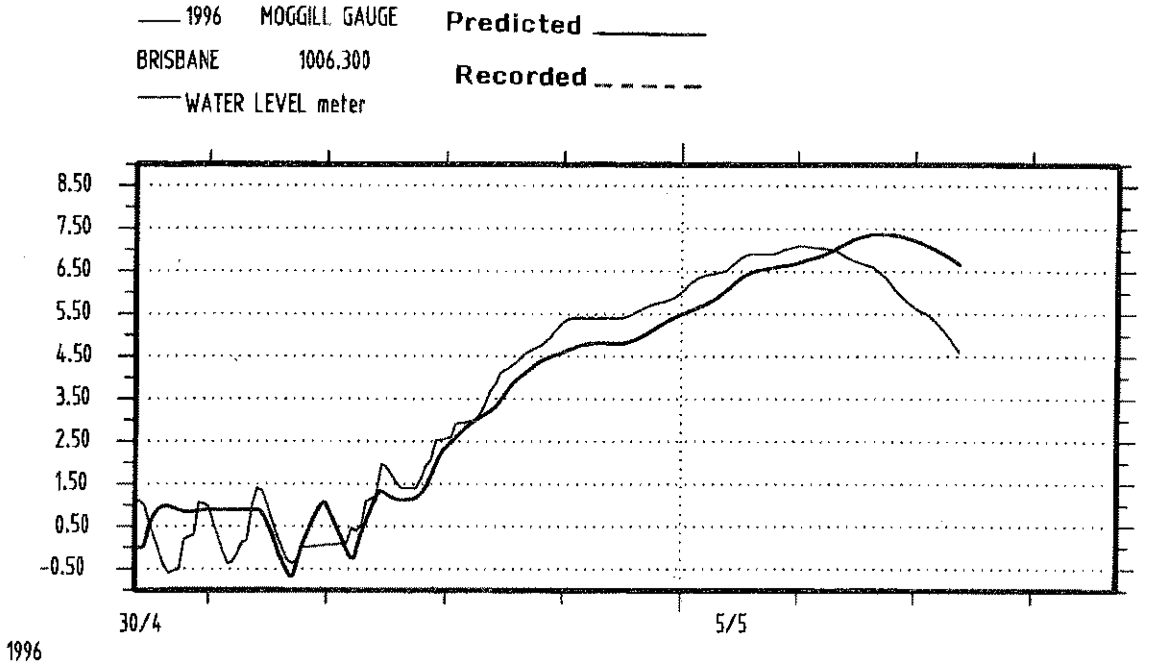
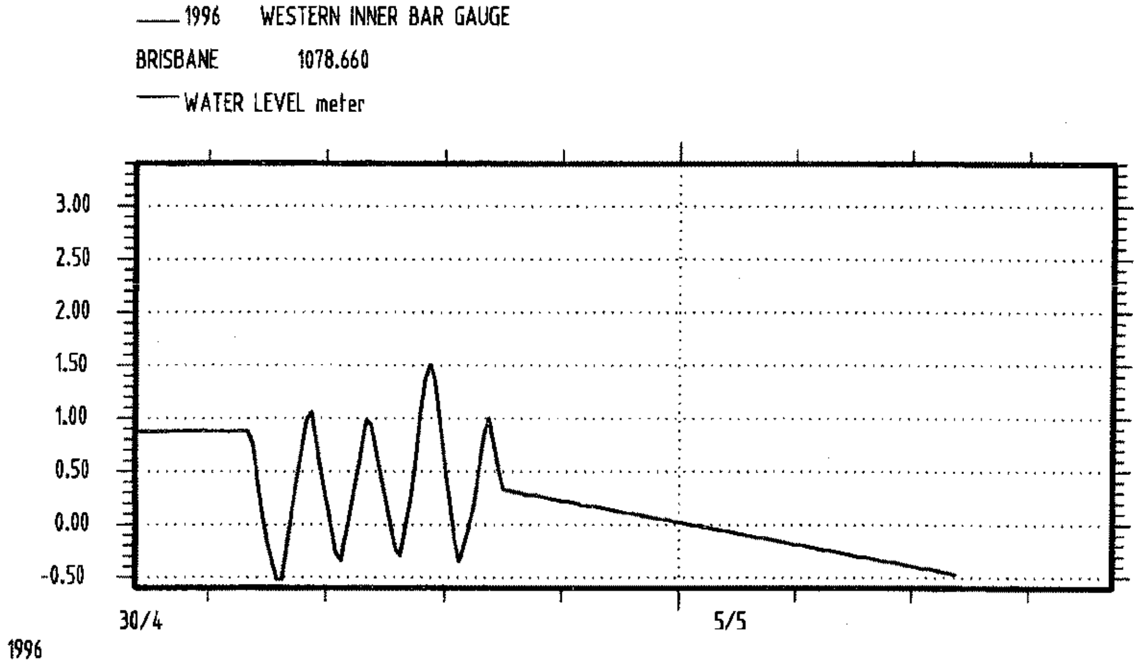


FIGURE C-4

BRISBANE RIVER FLOOD STUDY
PREDICTED AND RECORDED HYDROGRAPH COMPARISON - MAY 1996

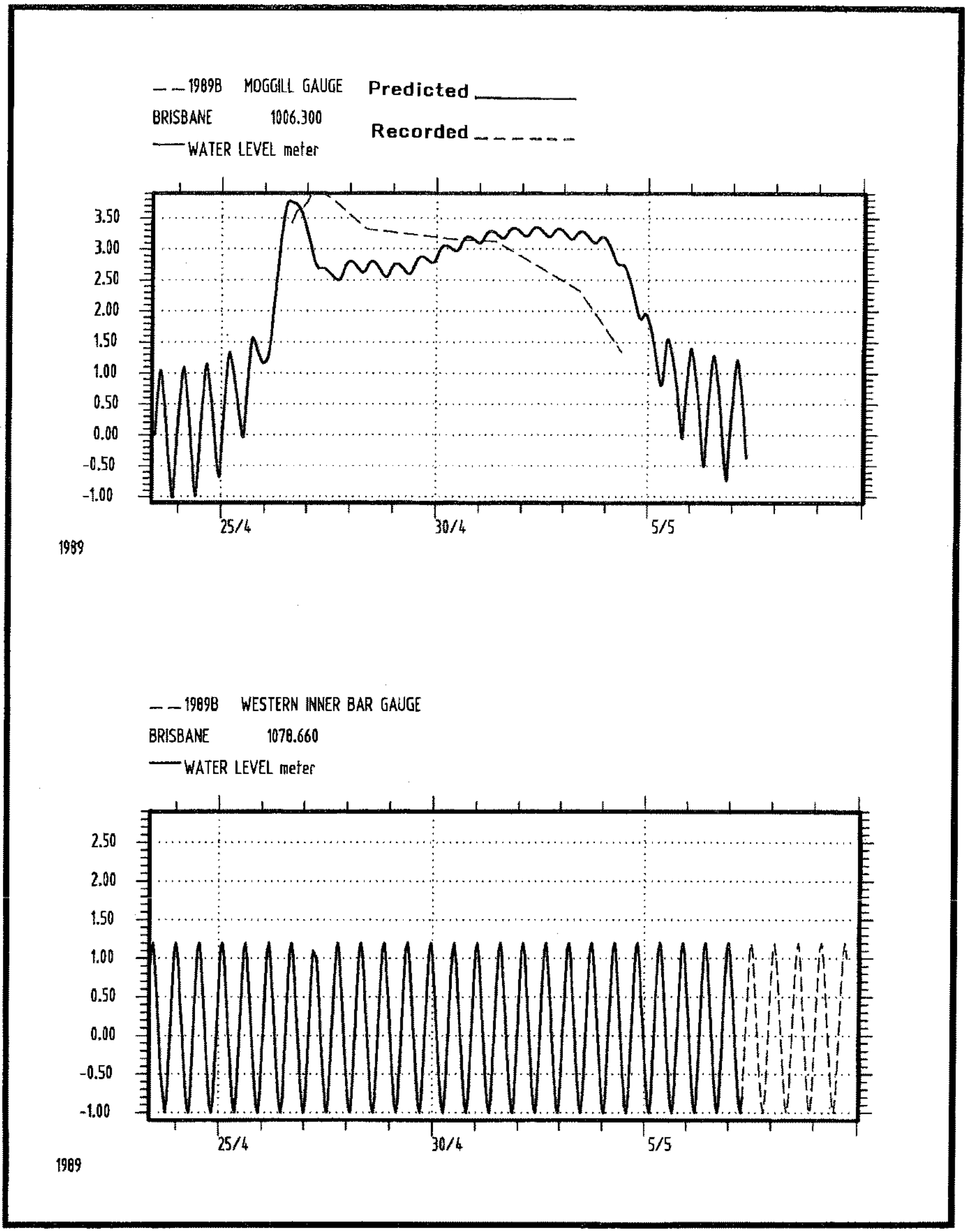




SINCLAIR KNIGHT MERZ

FIGURE C-5

BRISBANE RIVER FLOOD STUDY PREDICTED AND RECORDED HYDROGRAPH COMPARISON - LATE APRIL 1989

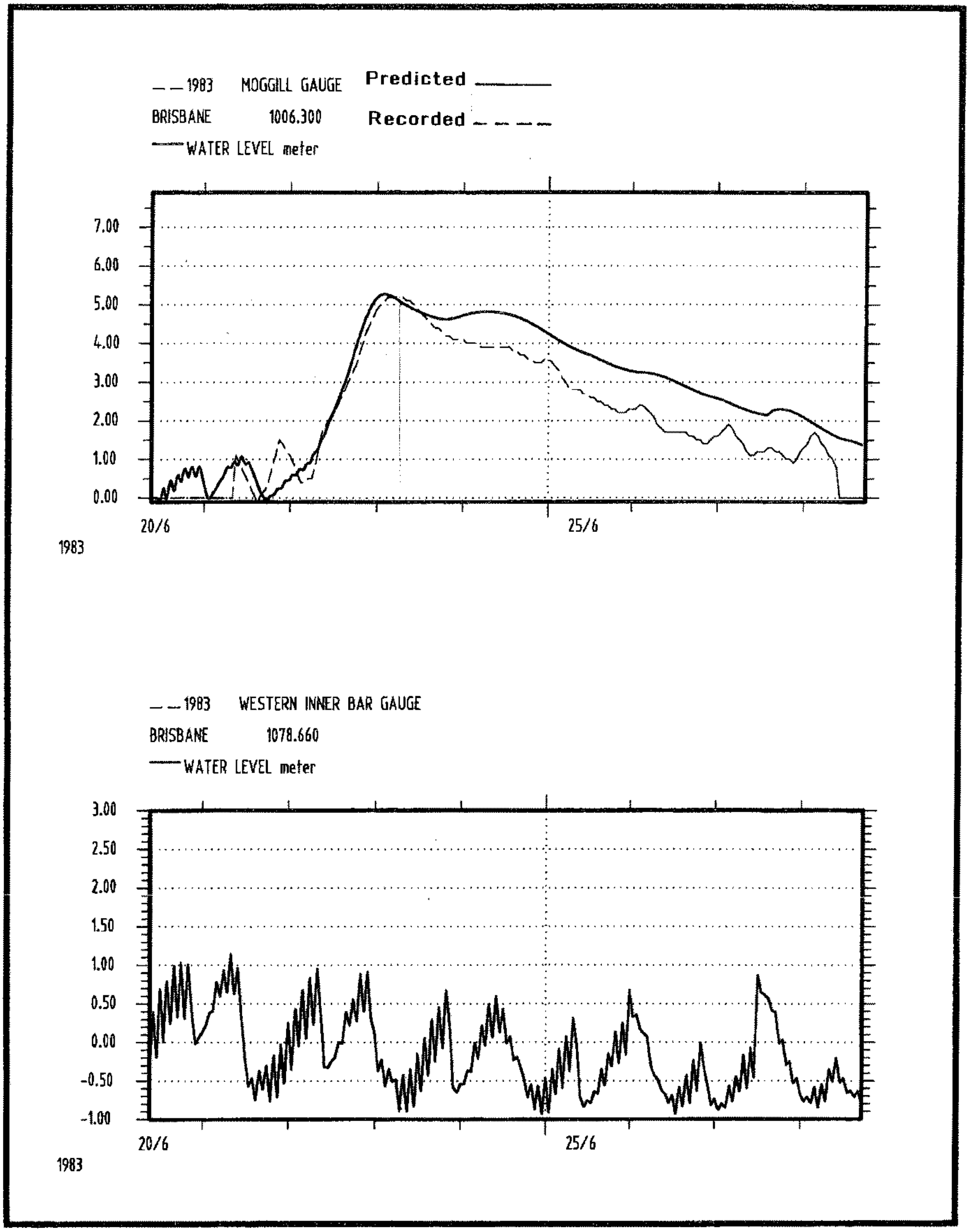


FILE NAME: 4157-2A5 DISK No: G:\ JOB No: T00/457 17-2-98
PLOT SCALE: 1=1

FIGURE C-6

BRISBANE RIVER FLOOD STUDY
PREDICTED AND RECORDED HYDROGRAPH
COMPARISON - JUNE 1983

SINCLAIR KNIGHT MERZ

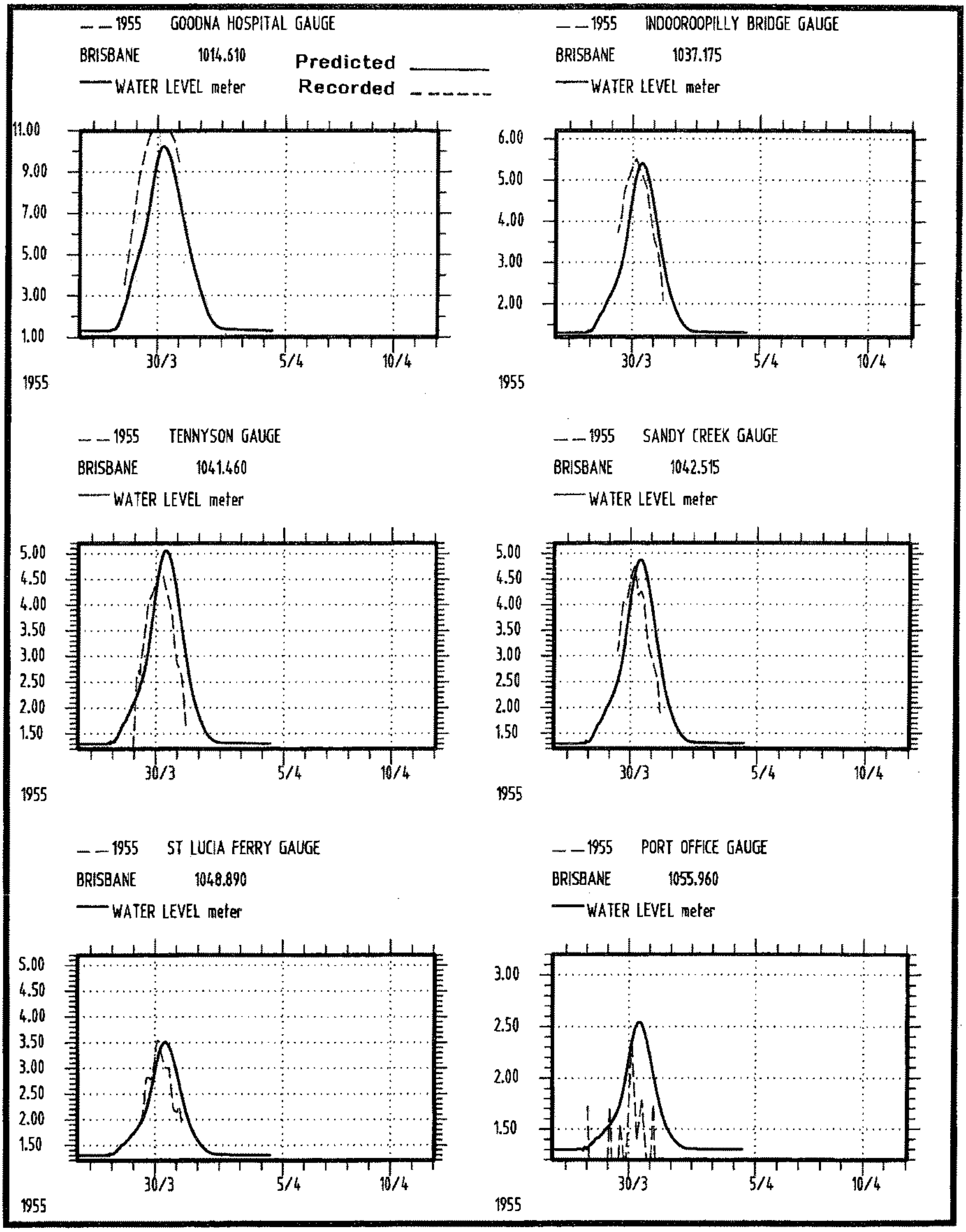


FILE NAME: 4157-7/.K DISK Nº: G:\ JOB Nº. T00/457 D/ 7-2 98
PLOT SCALE: 1=1

FIGURE C-7

BRISBANE RIVER FLOOD STUDY
PREDICTED AND RECORDED HYDROGRAPH
COMPARISON - MARCH 1955

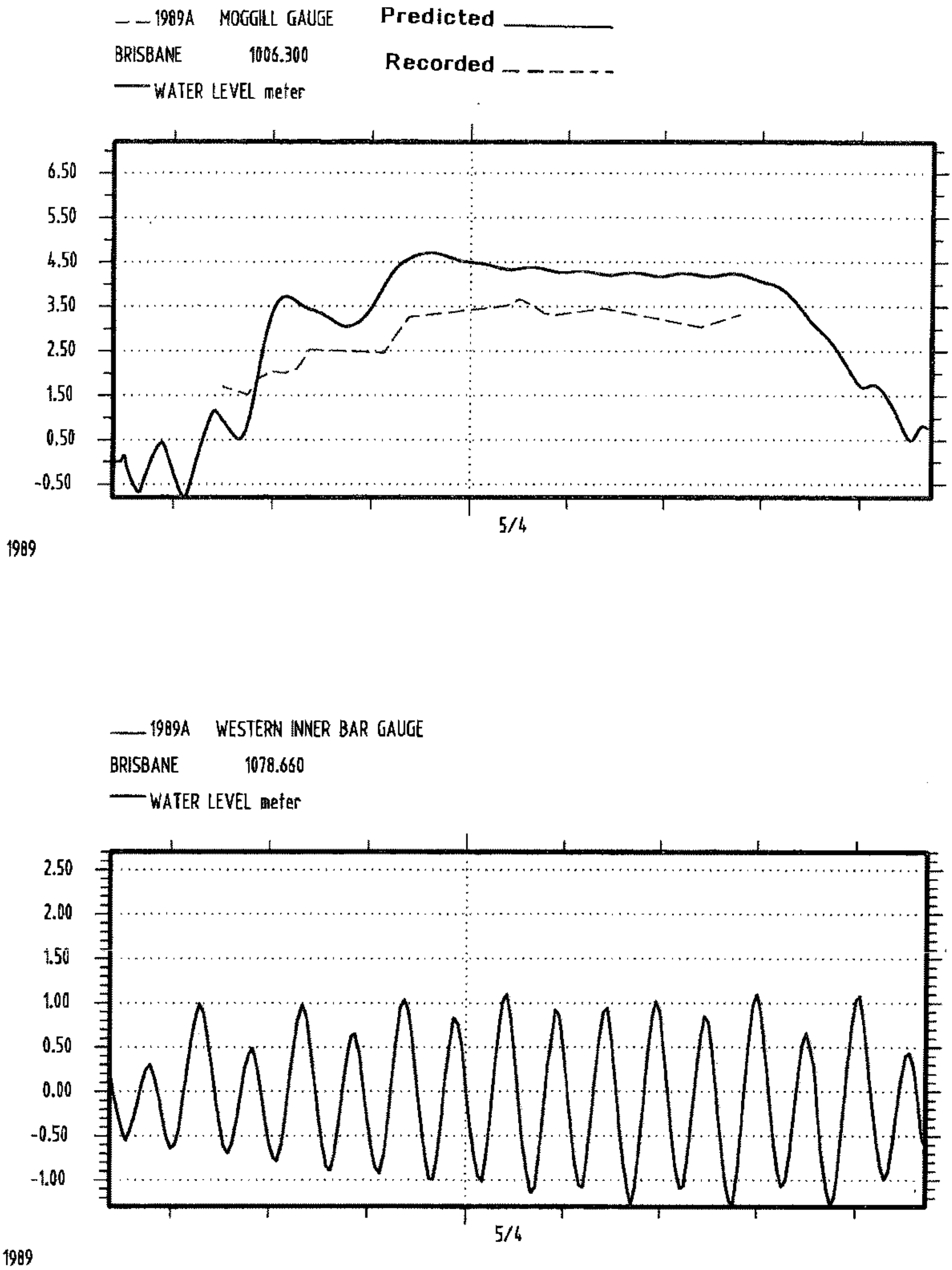
SINCLAIR KNIGHT MERZ



FILE NAME: 4157-2/7 DISK No: G:\ JOB No: T00/457 7-2 ...
PLOT SCALE: 1=1

FIGURE C-8
BRISBANE RIVER FLOOD STUDY
PREDICTED AND RECORDED HYDROGRAPH
COMPARISON - EARLY APRIL 1989

SINCLAIR KNIGHT MERZ



FILE NAME: 4157 718 DISK NO: G:\ JOB NO: T00457 17-7-98
PLOT SCALE: 1=1

FIGURE C-9a
BRISBANE RIVER FLOOD STUDY
PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JULY 1973

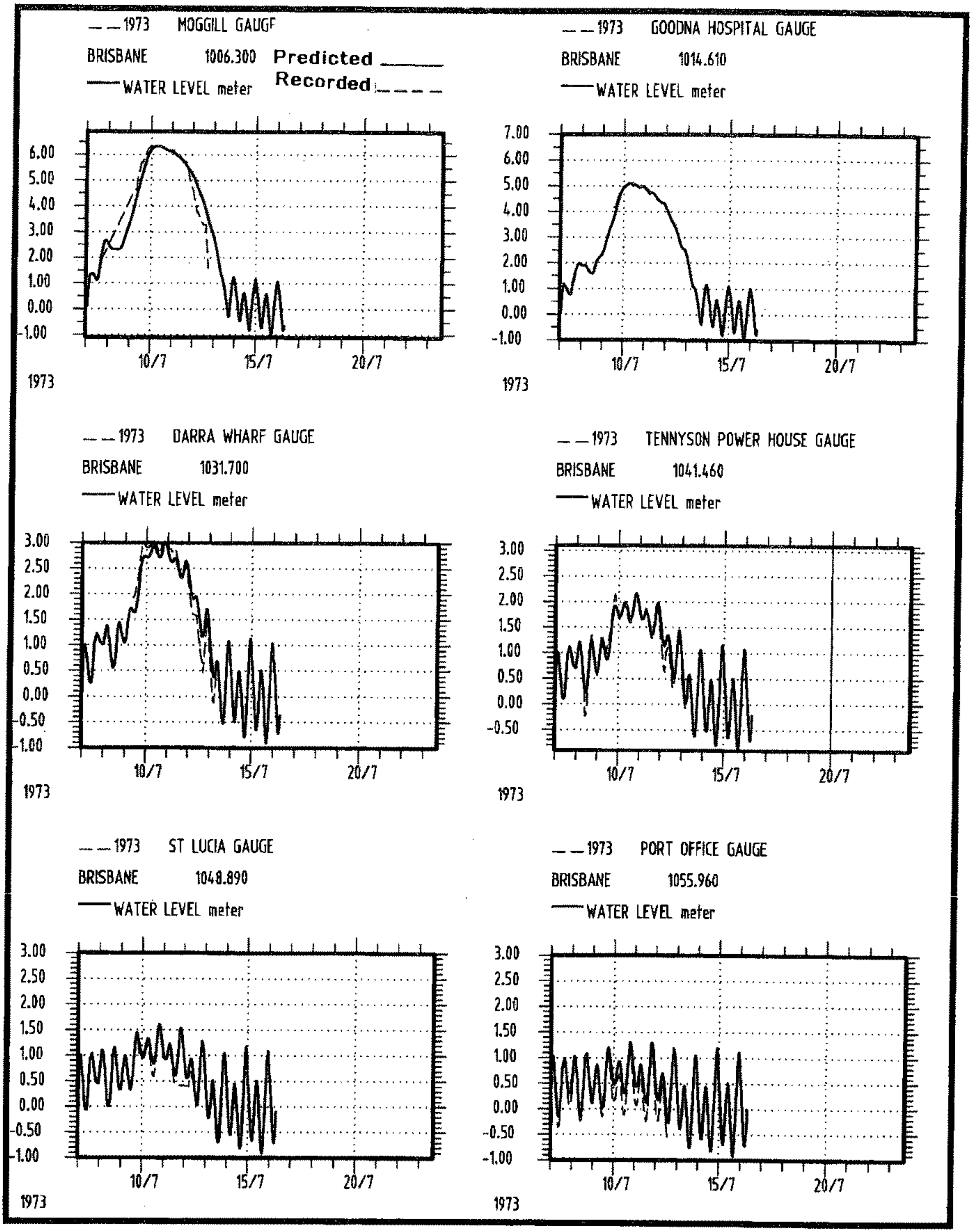
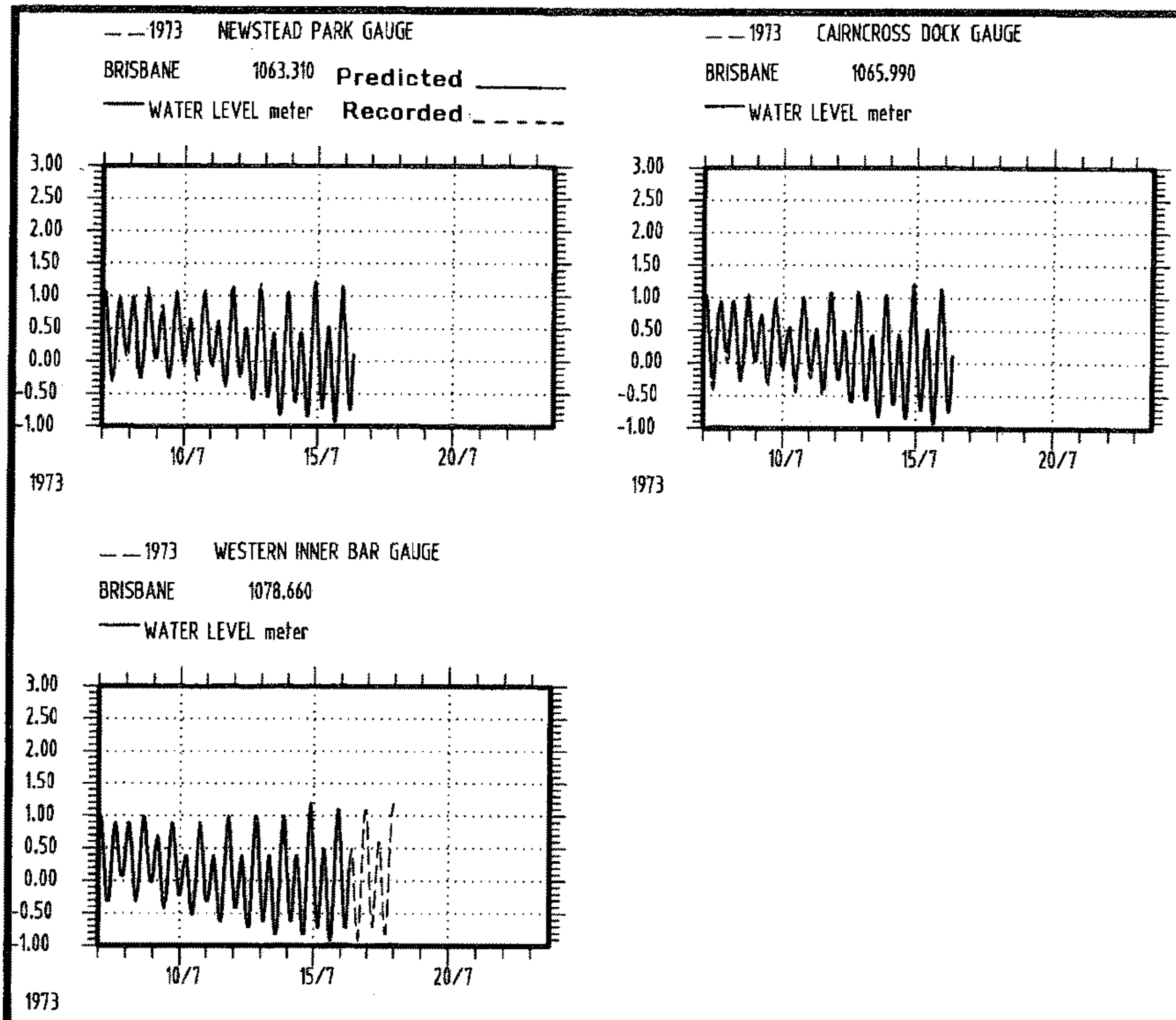


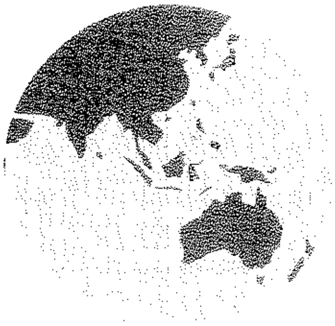
FIGURE C-9b

BRISBANE RIVER FLOOD STUDY PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JULY 1973

SINCLAIR KNIGHT MERZ



FILE NAME: 4157-250 PL. ..ILE: 1 DISK N°: G:\ JOB N°: T004157 D/ '7-2-98



Appendix D - Generalised Tropical Storm Method

INSTRUCTIONS FOR THE USE OF THE GTSM PMP SPATIAL DISTRIBUTION DIAGRAMS

1. Select the appropriate distribution diagram according to whether the area of the catchment is above or below 2000 km^2.

2. Expand or contract the scale of the isohyetal pattern until the outermost isohyet just touches the catchment. Adjust the positioning of the pattern to get an (estimated) highest PMP depth over the catchment. This depends on the shape of the catchment as well as the position of the pattern.

3. Calculate the area of the catchment within the central isohyet, and then between each adjacent pair of isohyets until all these areas have been calculated. A planimeter or other means are suitable methods of doing this.

4. Multiply the percentage assigned to the label on each isohyet by the mean PMP depth for that duration. This gives isohyet labels in millimeters.

5. Multiply these areas by an estimate of the mean rainfall value over that part of the catchment contained in the annulus between each successive pair of isohyets. This will generally not be the arithmetic mean because of the usually irregular shape of the catchment boundary. For the central isohyet a mean value has to be estimated. This will not be critical.

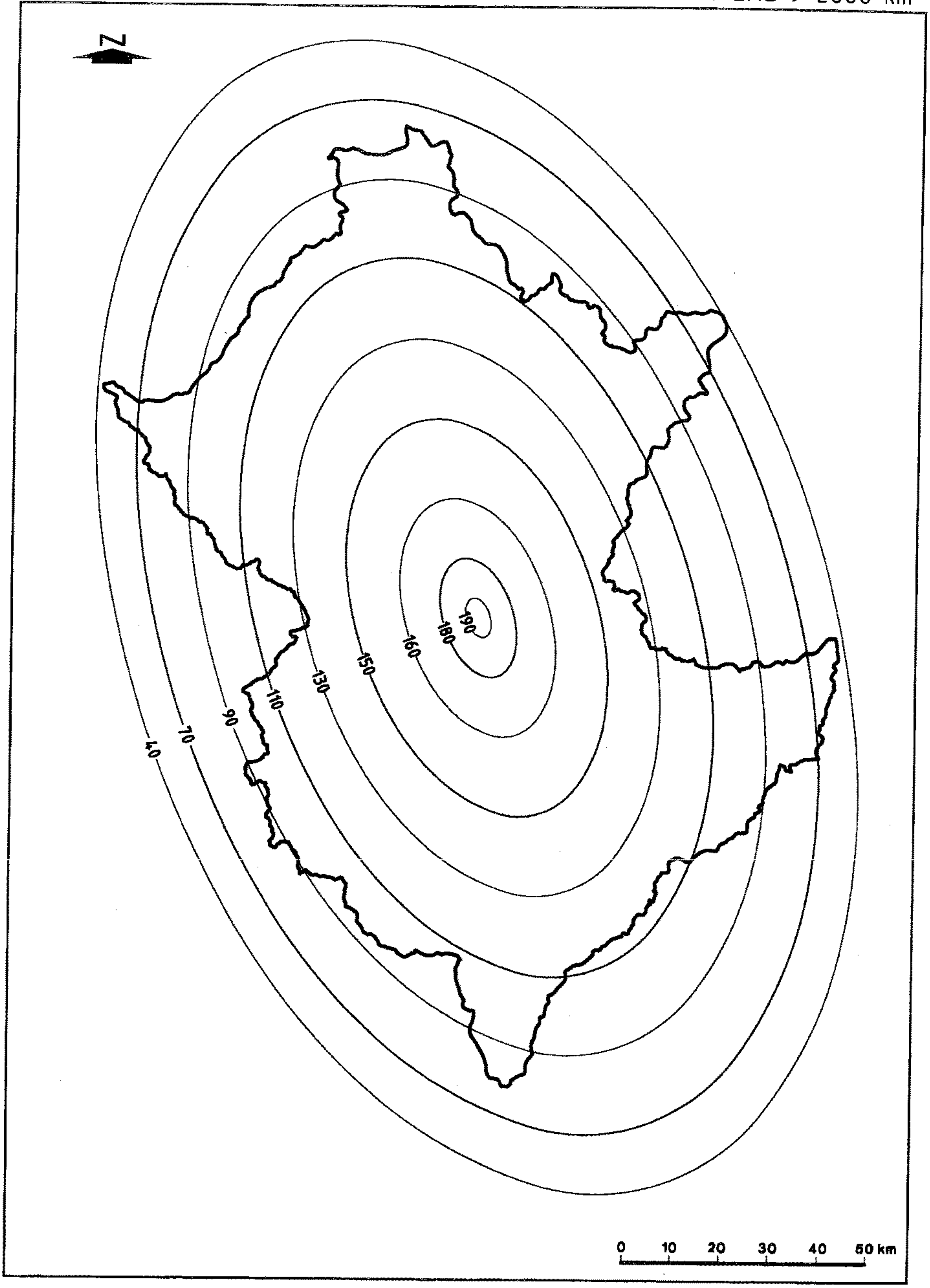
6. The sum of all the above products is divided by the total catchment area to obtain the calculated mean catchment PMP depth. This will usually not be equal to the true PMP depth. The ratio of the actual PMP to the calculated PMP values is then calculated.

7. The values of the isohyetal labels are all multiplied by this ratio (ie a constant scaling factor) to ensure that the isohyetal pattern gives the correct mean PMP depth.

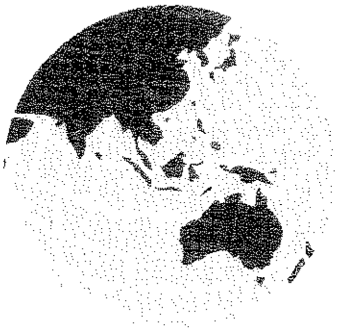
SINCLAIR KNIGHT MERZ

FIGURE D-1

BRISBANE RIVER FLOOD STUDY
GENERALISED TROPICAL STORM METHOD (GTSM) DESIGN ISOHYETAL PATTERN FOR THE DISTRIBUTION OF PMP FOR AREAS > 2000 km²



FILE NAME: 04157_AA DISK No: C:\DWG JOB No: TQ
PLOT SCALE: 1=1000



Appendix E - Adjustment of Historical Streamflows to Account for the Effects of Somerset Dam

Figure E-1 - Relationship Between Discharges at Woodford and Silverton

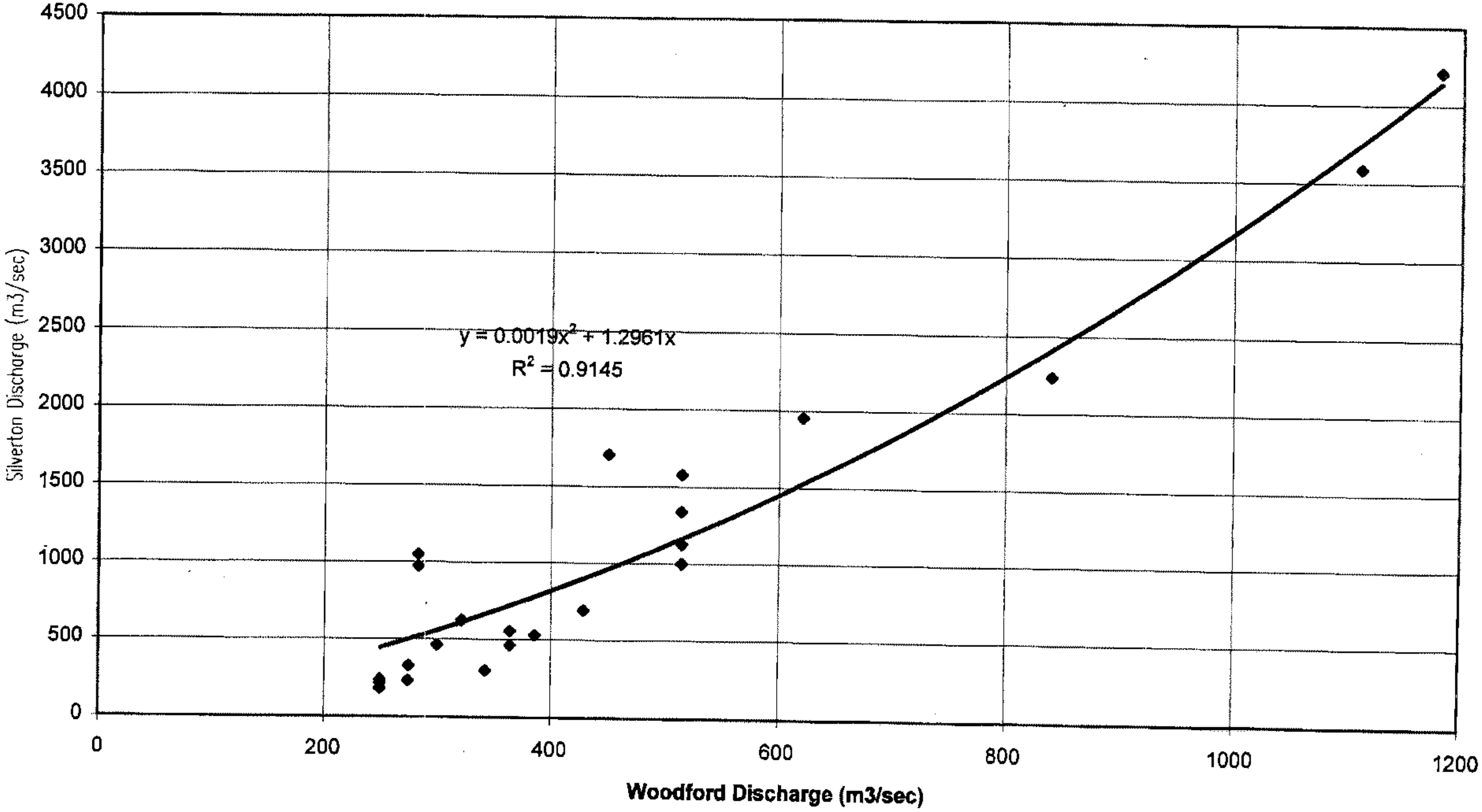


Table E-1 - Calculation of Adjustment Factor for Post Somerset Dam Flows

Date	Recorded Discharge at Woodford (Cumecs)	Calculated Discharge at Somerset Dam (Cumecs)	Recorded Discharge at Somerset Dam (Peak Monthly) (Cumecs)	Adjustment Factor (Calculated - Actual Discharge) (Cumecs)
31/01/44	300	560	241	319
25/03/46	664	1699	1374	325
13/02/47	471	1033	317	716
1/03/47	514	1169	671	498
11/12/47				
1/05/48	429	904	716	188
19/01/50	166	267	115	152
15/02/50	233	405		
18/02/50	233	405		
28/02/50	643	1618	1139	479
1/03/50				
24/06/50				
29/07/50	250	442	352	90
31/01/51	750	2041	1347	694
1/02/51				
21/02/53	879	2605	1506	1099
24/03/53				
13/02/54				
14/07/54	557	1312	46	1266
28/03/55	1041	3407	3078	329
10/02/56				
13/01/56				
15/01/67				
11/02/56				
12/02/56				
11/03/56	536	1240	1397	0
13/03/56				
10/06/58	199	334	84	250
20/12/61	250	442		
2/01/63	258	461		
10/01/63	300	443	215	228
17/03/63	793	2885	1300	1585
8/05/63				
28/03/64	429	904		
23/04/64	124	189		
21/07/65		1243	0	1243
30/01/67	283			
18/03/67	283	1082	1050	32
8/05/67	191	316		
10/06/67	514	1443	1088	355
24/06/67	224	387		
27/06/67	321	613		
12/01/68	450	1894	1491	403
8/12/70	557	1271	0	1271
27/01/71	275	380	285	95
5/02/71				
20/02/71	283	1594	1763	0
24/02/71				
29/12/71	191	316		
12/02/72	1463	444	291	153

Table E-1 - Calculation of Adjustment Factor for Post Somerset Dam Flows

Date	Recorded Discharge at Woodford (Cumecs)	Calculated Discharge at Somerset Dam (Cumecs)	Recorded Discharge at Somerset Dam (Peak Monthly) (Cumecs)	Adjustment Factor (Calculated - Actual Discharge) (Cumecs)
9/03/72	149	3621	1781	1840
3/04/72	664	2270	1175	1095
30/10/72				
8/07/73	879	2605	2070	535
14/01/74	191	4109		
25/01/74	1111	3495	1081	2414
17/02/74	250	442		
12/03/74	579	132	194	0
9/01/75	132	204	0	204
24/12/75	149	235	3	0
20/01/76	514	1200	1098	102
23/02/76	258	461	8	0
3/03/76	224	387	176	0
14/03/76	266	480		
26/03/78	72	103	0	103
2/04/78	60	85	0	85
25/01/79	111	167		
10/02/79	54	76	0	76
8/05/80	195	325	4	0
9/05/80	233	405		
9/02/81			0	0
16/02/81	360	713	0	713
17/02/81	250	442	0	442
8/04/81	54	76	0	76
23/05/81	60	85	6	0
21/01/82	707	1867	0	1867
21/01/82	660	1683	0	1683
4/03/82	90	132	0	132
16/03/82	54	76	0	76
3/05/83	72	103	0	103
24/05/83	224	387	0	387
24/05/83	216	369	0	369
29/05/83				
19/06/83	237	414	0	414
20/06/83	300	560	7	0
22/06/83	729	1953		1953
22/06/83	840	2236	1475	761
7/07/83	36	49	0	49
22/11/83	72	103		103
30/11/83	216	369		369
2/12/83	42	58	0	58
9/04/84	72	103		103
28/07/84	195	325		325
8/11/84	42	58		58
11/03/85	300	560		560
9/07/85	300	560		560

Note: - Calculated discharge at Somerset is based on the flows at Woodford, as illustrated in Figure E-1 - Relationship Between Discharges at Woodford and Silverton

Table E-2 - Historical Data at Woodford and Silverton (1920-1985)

Date	Time	Level (m)	Discharge at Woodford (m^3/s)	Corresponding Discharge at Silverton (DNR) (m^3/s)
8/01/20	1700	4.88	249.60	236.60
7/04/21	600	5.79	364.29	553.70
30/12/21	1600	5.49	300.00	459.70
20/06/25	800	5.94	385.71	528.70
17/12/26	900	5.72	342.86	294.10
24/01/27	1600	6.48	514.29	1127.00
18/02/28	800	6.50	514.29	1000.00
19/04/28	1200	7.01	621.43	1955.00
21/01/29	1000	5.26	283.20	974.70
10/05/30	1930	5.79	364.29	459.70
5/02/31	1500	8.94	1322.22	2022.00
5/04/33	800	5.18	274.80	231.70
16/03/37	2000	5.18	274.80	324.70
20/01/38	730	5.64	321.43	623.20
26/05/38	900	6.10	428.57	694.30
16/03/39	900	4.88	249.60	216.20
19/03/40	900	4.88	249.60	214.90
1/06/41	800	4.88	249.60	181.20
9/02/42	1515	5.79	364.29	
31/01/44	1500	5.46	300.00	
25/03/46	1200	7.16	664.29	
13/02/47	1130	6.25	471.43	
1/03/47	1900	6.48	514.29	
1/05/48		6.10	428.57	
19/01/50		3.91	165.60	
15/02/50	1600	4.72	232.80	
18/02/50		4.72	232.80	
28/02/50	900	7.09	642.86	
29/07/50	900	4.88	249.60	
31/01/51	1230	7.62	750.00	
21/02/53	800	8.23	878.57	
14/07/54	700	6.71	557.14	
28/03/55	330	8.53	1040.74	
11/03/56	1800	6.55	535.71	
10/06/58	900	4.27	199.20	
20/12/61	900	4.88	249.60	
2/01/63	800	5.03	258.00	
10/01/63	1800	5.49	300.00	
17/03/63	900	7.77	792.86	
28/03/64	630	6.10	428.57	
23/04/64	1500	3.35	123.60	
30/01/67	2100	5.33	283.20	
18/03/67	1500	5.33	283.20	1051.00
8/05/67	500	4.22	190.80	
10/06/67	1800	6.50	514.29	1578.00
24/06/67	0	4.57	224.40	
27/06/67	800	5.64	321.43	
12/01/68	1900	6.20	450.00	1708.00
8/12/70	300	6.71	557.14	

Table E-2 - Historical Data at Woodford and Silverton (1920-1985)

Date	Time	Level (m)	Discharge at Woodford (m^3/s)	Corresponding Discharge at Silverton (DNR) (m^3/s)
8/01/20	1700	4.88	249.60	236.60
27/01/71	1500	5.18	274.80	
20/02/71	900	5.33	283.20	
29/12/71	900	4.17	190.80	3587.00
12/02/72	900	9.14	1462.96	
9/03/72	1200	3.68	148.80	
3/04/72	300	7.16	664.29	
8/07/73	300	8.23	878.57	
14/01/74	900	4.20	190.80	
25/01/74	1200	8.60	1111.11	
17/02/74	1500	4.90	249.60	
12/03/74	2100	6.80	578.57	
9/01/75	900	3.50	132.00	
24/12/75	1500	3.70	148.80	
20/01/76	1500	6.50	514.29	
23/02/76	1500	5.00	258.00	
3/03/76	1500	4.60	224.40	
14/03/76	1500	5.10	266.40	
26/03/78	2225	4.68	72.00	
2/04/78	1205	4.50	60.00	
25/01/79	820	5.06	111.00	
10/02/79	1340	4.44	54.00	
8/05/80	2300	5.52	195.00	
9/05/80	900	4.65	232.80	
16/02/81	2115	6.09	360.00	
17/02/81	900	4.90	249.60	
8/04/81	1610	4.36	54.00	
23/05/81	430	4.54	60.00	
21/01/82	1600	7.35	707.14	
21/01/82	1445	6.58	660.00	
4/03/82	955	4.98	90.00	
16/03/82	335	4.40	54.00	
3/05/83	1615	4.73	72.00	
24/05/83	800	4.60	224.40	
24/05/83	0	5.56	216.00	
19/06/83	2100	5.73	237.00	2236.00
20/06/83	1100	5.50	300.00	
22/06/83		7.50	728.57	
22/06/83	1700	6.89	840.00	
7/07/83	300	4.07	36.00	
22/11/83	1245	4.68	72.00	
30/11/83	1355	5.61	216.00	
2/12/83	2005	4.21	42.00	
9/04/84	1415	4.70	72.00	
28/07/84	1055	5.45	195.00	
8/11/84	2245	4.23	42.00	
11/03/85	530	6.03	300.00	
9/07/85	1515	5.97	300.00	

Table E-3 - Historical and Adjusted Data at Moggill (1965-1983)

Date	Time	Level m AHD	Discharge Cumecs	Adjusted Discharge Cumecs
21/07/65	600	5.76	2175.33	3418.33
20/03/67		4.66	1787.00	
12/06/67	1800	7.98	3054.62	3409.60
14/01/68	1100	10.72	4356.11	4759.00
11/12/70	1000	3.82	1485.57	2756.60
4/02/71	1600	6.39	2389.43	
11/02/71	900	3.29	1317.00	
20/02/71	1500	7.50	2846.00	2846.00
24/02/71	1400	3.34	1317.00	
14/02/72	2100	5.14	1919.00	
5/04/72	900	4.84	1820.00	2915.00
10/07/73	730	6.32	2355.57	2891.00
28/01/74	1430	19.93	9745.00	12159.00
9/02/81	1545	2.05	905.52	905.52
22/01/82	1115	3.43	1350.71	3034.00
29/05/83	120	2.24	948.64	
23/06/83	500	5.26	1985.00	2746.00
5/04/89	100	3.73	1451.86	
27/04/89	1200	4.02	1553.00	
18/05/89	0	2.70	1137.75	
13/12/91	300	5.22	1952.00	
17/03/92	1230	2.44	1034.88	
6/05/96	300	7.10	2681.40	

Table E-4 - Historical and Adjusted Data at Port Office (1841-1974)

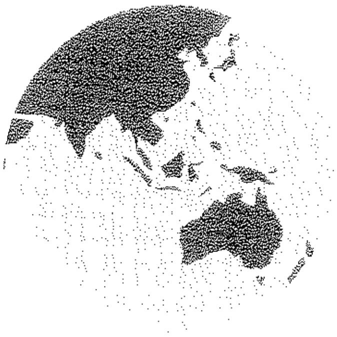
Date	Level (m)	Discharge AHD-0.15m Cumecs	Adjusted AHD -0.15m Cumecs	Discharge HAT+0.15m Cumecs	Adjusted HAT+0.15m Cumecs
14/01/1841	8.43	14655.2	14655.2	14583.3	14583.3
09/06/1843	2.76	4800.0	5428.6	3500.0	3500.0
10/01/1844	7.03	12241.4	12241.4	11666.7	11666.7
16/04/1852	2.91	4800.0	5571.4	3750.0	3750.0
19/05/1857	3.27	6166.7	6166.7	4750.0	4750.0
16/02/1863	3.32	6166.7	6166.7	4750.0	4750.0
20/03/1864	3.78	7000.0	7000.0	5800.0	5800.0
02/04/1867	2.46	4800.0	5000.0	2666.7	2666.7
10/03/1870	2.89	4800.0	5571.4	3750.0	3750.0
18/06/1873	2.69	4800.0	5285.7	3250.0	3250.0
01/03/1875	2.61	4800.0	5142.9	3000.0	3000.0
16/08/1879	2.46	4800.0	5000.0	2666.7	2666.7
23/01/1887	3.78	7000.0	7000.0	5800.0	5800.0
20/05/1889	3.75	7000.0	7000.0	5800.0	5800.0
13/03/1890	5.33	9200.0	9200.0	8500.0	8500.0
05/02/1893	8.35	14655.2	14655.2	14583.3	14583.3
12/02/1893	2.15	4400.0	4400.0	1000.0	1000.0
19/02/1893	8.09	14137.9	14137.9	13958.3	13958.3
12/06/1893	3.63	6666.7	6666.7	5400.0	5400.0
15/02/1896	2	4000.0	4000.0	0.0	0.0
22/02/1896	0.86	2166.7	2166.7	0.0	0.0
29/02/1896	1.85	3833.3	3833.3	0.0	0.0
13/01/1898	5.02	8714.3	8714.3	6833.3	8000.0
09/03/1898	3.27	6166.7	6166.7	4750.0	4750.0
15/03/08	3.35	6333.3	6333.3	5000.0	5000.0
28/01/27	1.7	3500.0	3500.0	0.0	0.0
22/02/28	1.67	3500.0	3500.0	0.0	0.0
21/04/28	2.15	4400.0	4400.0	1000.0	1000.0
24/01/29	1.85	3833.3	3833.3	0.0	0.0
7/02/31	3.32	6166.7	6166.7	4750.0	4750.0
30/03/55	2.36	4800.0	5129.0	2333.3	2662.3
13/01/56	1.75	3666.7	3666.7	0.0	0.0
15/01/56	1.75	3666.7	3666.7	0.0	0.0
11/02/56	1.39	3000.0	3000.0	0.0	0.0
12/02/56	1.31	2833.3	2833.3	0.0	0.0
12/03/56	1.42	3000.0	3000.0	0.0	0.0
13/03/56	1.34	2833.3	2833.3	0.0	0.0
14/03/56	1.29	2833.3	2833.3	0.0	0.0
12/06/67	1.87	3833.3	4188.3	0.0	355.0
15/01/68	1.97	4000.0	4403.0	0.0	403.0
6/02/71	1.47	3166.7	3166.7	0.0	0.0
29/01/74	5.45	8750.0	11164.0	8833.3	11247.3

Table E-5 - Historical and Adjusted Discharge at Lowood

Date	Lowood Discharge Cumecs	Adjusted Lowood Discharge Cumecs
Jan-10	706.3	
Jan-11	1316	
Mar-12	460.7	
Jun-13	416.4	
Feb-14	234.4	
Feb-15	1035	
Dec-16	375.2	
Dec-17	522.2	
Feb-18	379.4	
Dec-21	1280	
Jan-22	1154	
Feb-24	173.2	
Mar-25	673.9	
Jun-25	778.4	
Dec-26	259.5	
Jan-27	2715	
Apr-28	4225	
Jan-29	2064	
Jun-30	749.2	
Feb-31	5574	
Dec-33	446.4	
Feb-34	614.2	
Feb-35	119.9	
Mar-36	138.6	
Mar-37	1102	
May-38	1052	
Mar-39	459.8	
Mar-40	697.3	
Jan-41	425.2	
Feb-42	1360	
Dec-43	1207	
31/01/44	1043	1362
25/03/46	1052	1377
13/02/47	421	1137
1/03/47	803	1302
11/12/47	613	613
1/05/48	544	732
19/01/50	295	448
28/02/50	2451	2930
1/03/50	2298	2298
24/06/50	1043	1043
29/07/50	764	874
31/01/51	2534	3228
1/02/51	2704	2704
21/02/53	764	1863
24/03/53	743	743
13/02/54	2111	2111
14/07/54	1922	3188
28/03/55	5363	5692
10/02/56	1365	1365
11/03/56	2141	2141

Table E-5 - Historical and Adjusted Discharge at Lowood

Date	Lowood Discharge Cumecs	Adjusted Lowood Discharge Cumecs
10/06/58	1520	1770
20/12/61	152	152
10/01/63	230	458
17/03/63	115	1700
8/05/63	502	502
28/03/64	258	258
23/04/64	12	12
21/07/65	1238	2481
30/01/67	254	254
18/03/67	1272	1304
8/05/67	215	215
10/06/67	2351	2706
12/01/68	3363	3766
8/12/70	582	1853
27/01/71	482	577
5/02/71	1071	1071
20/02/71	2779	2779
29/12/71	578	578
12/02/72	1842	1995
9/03/72	266	2106
3/04/72	1665	2760
30/10/72	531	531
8/07/73	2709	3244
25/01/74	7393	9807
17/02/74	835	835
12/03/74	874	874
9/01/75	203	407
24/12/75	520	520
20/01/76	1610	1712
23/02/76	1047	1047
14/03/76	1059	1059
26/03/78	59	162
2/04/78	351	436
25/01/79	298	298
10/02/79	35	110
9/05/80	44	44
16/02/81	765	1478
8/04/81	49	124
23/05/81	10	10
21/01/82	1006	2873
4/03/82	422	554
24/05/83	525	911
22/06/83	1659	2420
7/07/83	409	458
30/11/83	13	381
2/12/83		58
9/04/84	134	237
28/07/84		325
8/11/84	108	166
11/03/85	22	582
9/07/85	63	623



Appendix F - Dam Operations

Figure F-1 - Somerset Dam - Height vs Discharge Curve

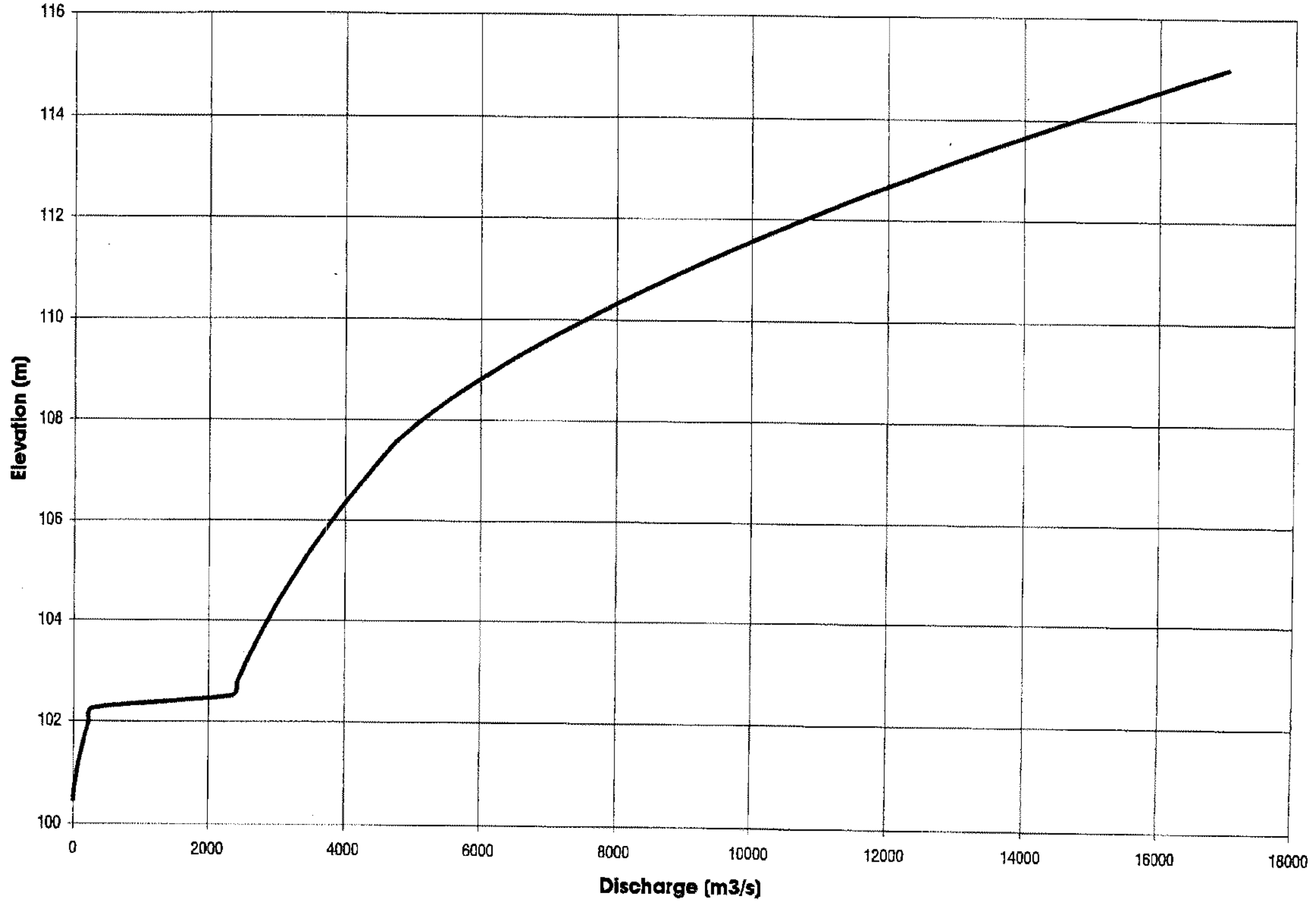
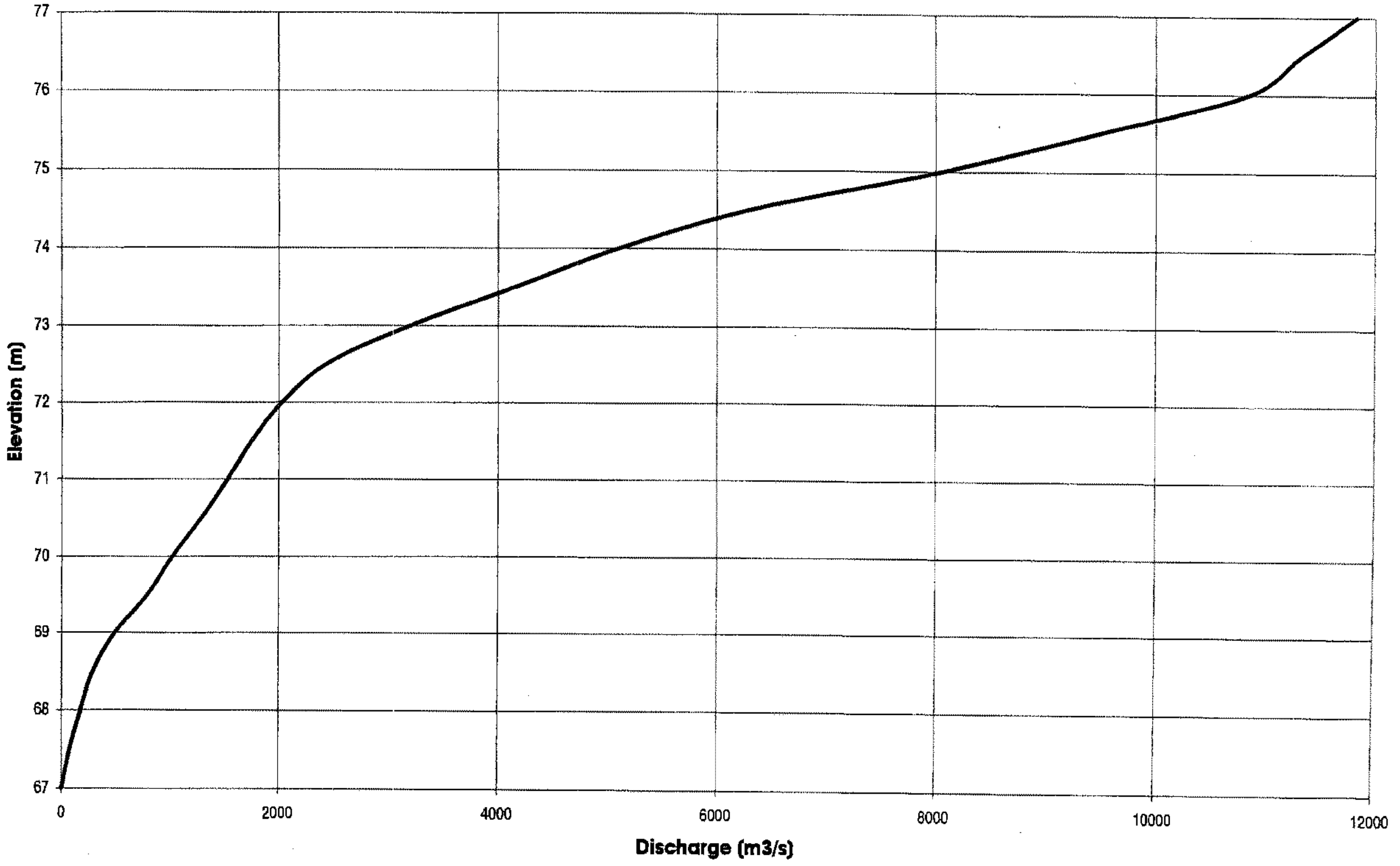
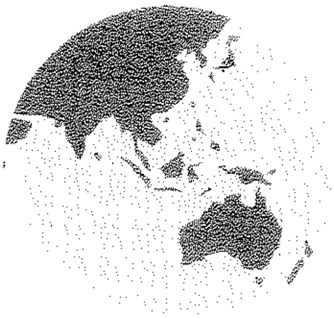


Figure F-2 - Wivenhoe Dam - Height vs Discharge Curve



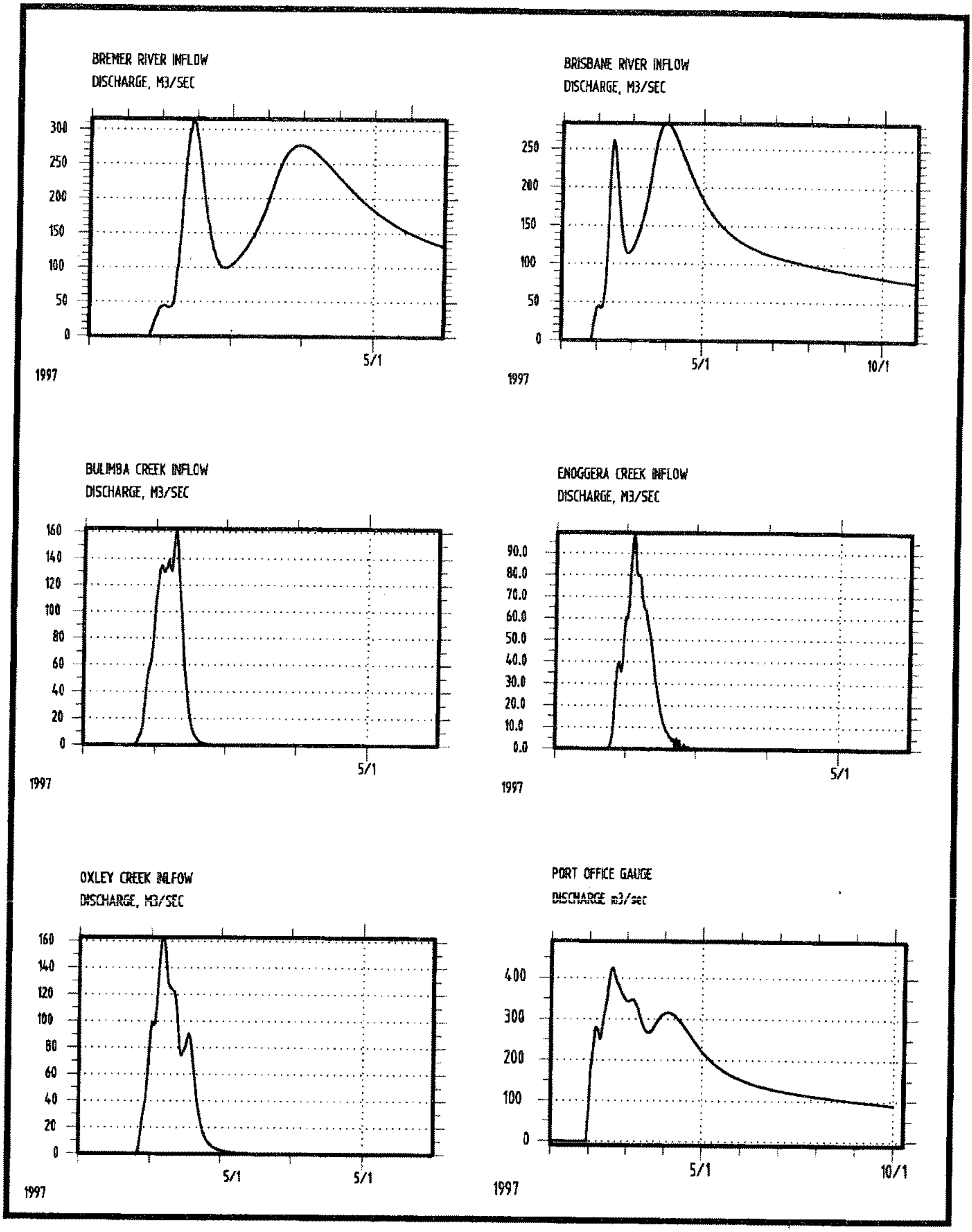


Appendix G - Design Discharge Hydrographs

SINCLAIR KNIGHT MERZ

FIGURE G-1

BRISBANE RIVER FLOOD STUDY
HYDROGRAPHS FOR THE 2 YEAR ARI FLOOD EVENT



FILE NAME: 4157-251
PLOT SCALE: 1=1
DISK No: G:\
JOB No: TOO
17-2

FIGURE G-2
BRISBANE RIVER FLOOD STUDY HYDROGRAPHS FOR THE 5 YEAR ARI FLOOD EVENT

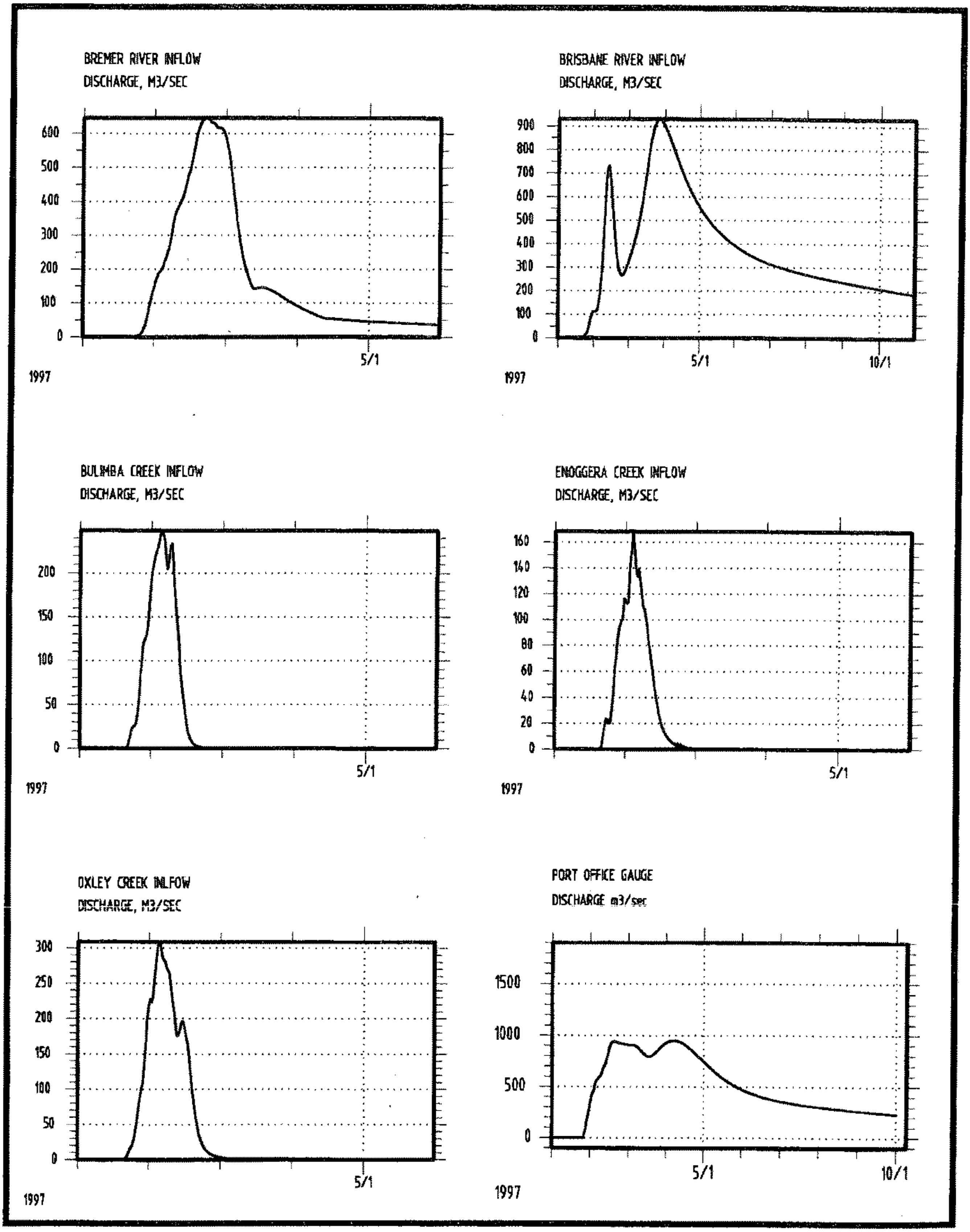


FIGURE G-3

BRISBANE RIVER FLOOD STUDY
HYDROGRAPHS FOR THE 10 YEAR ARI FLOOD EVENT

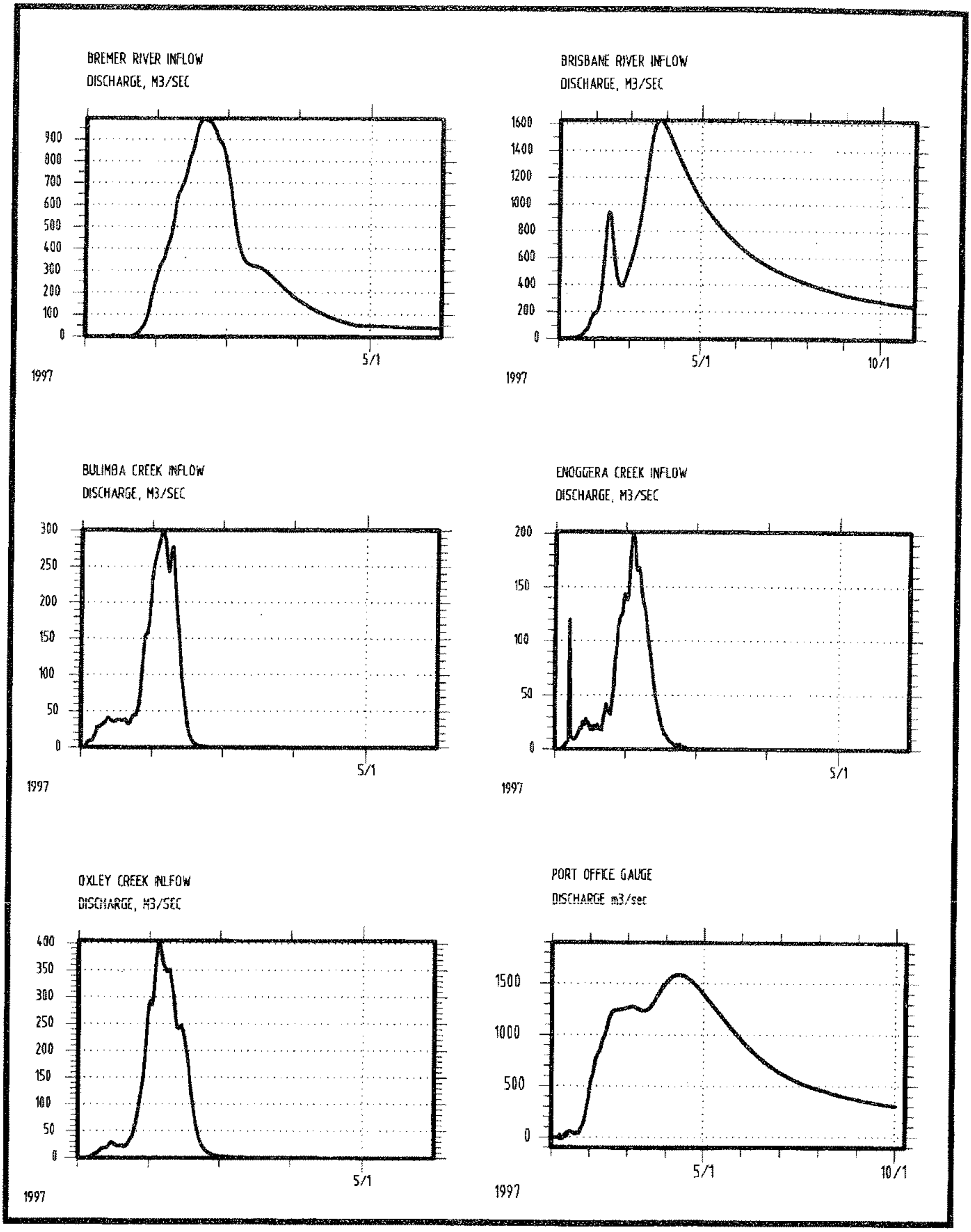
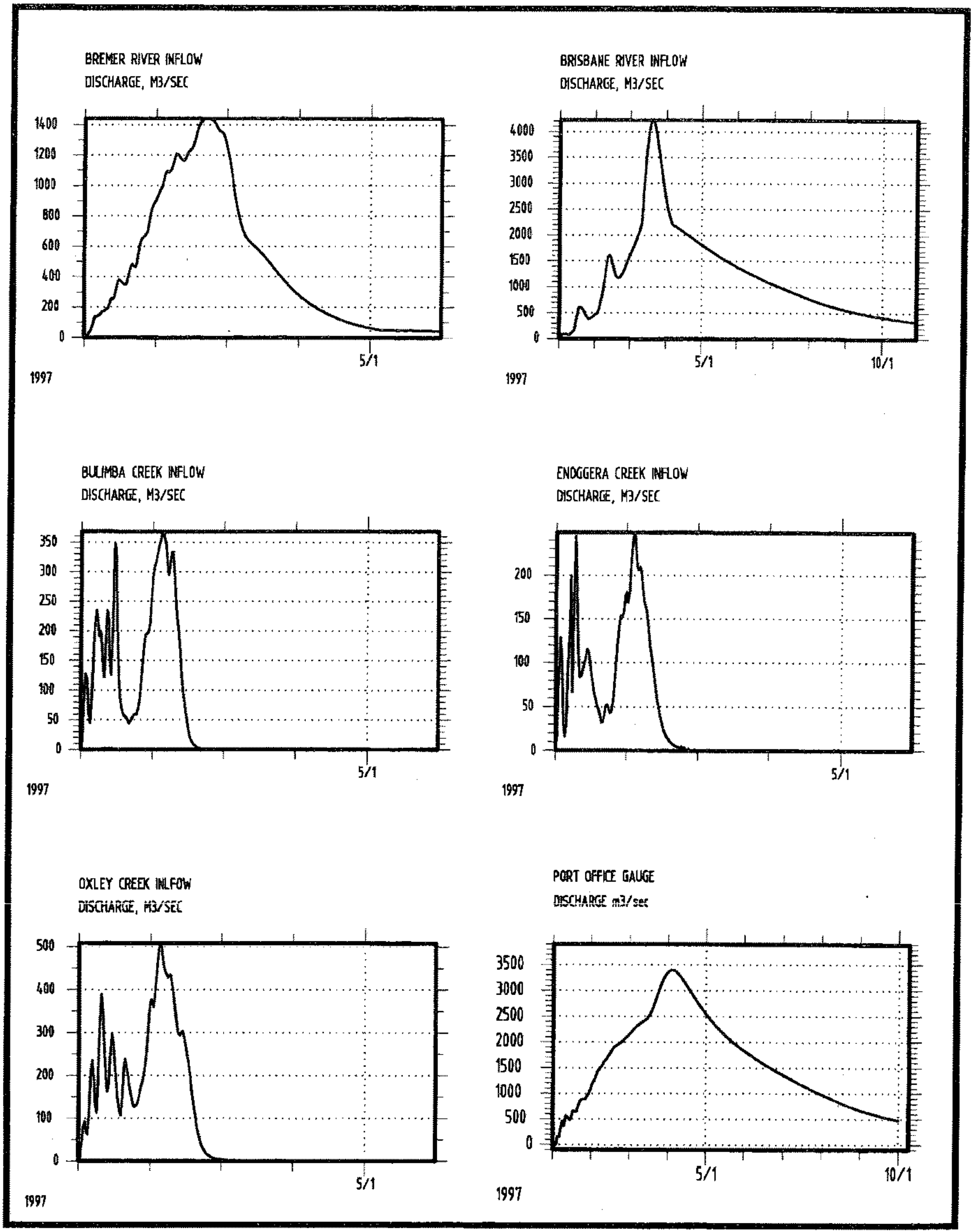


FIGURE G-4

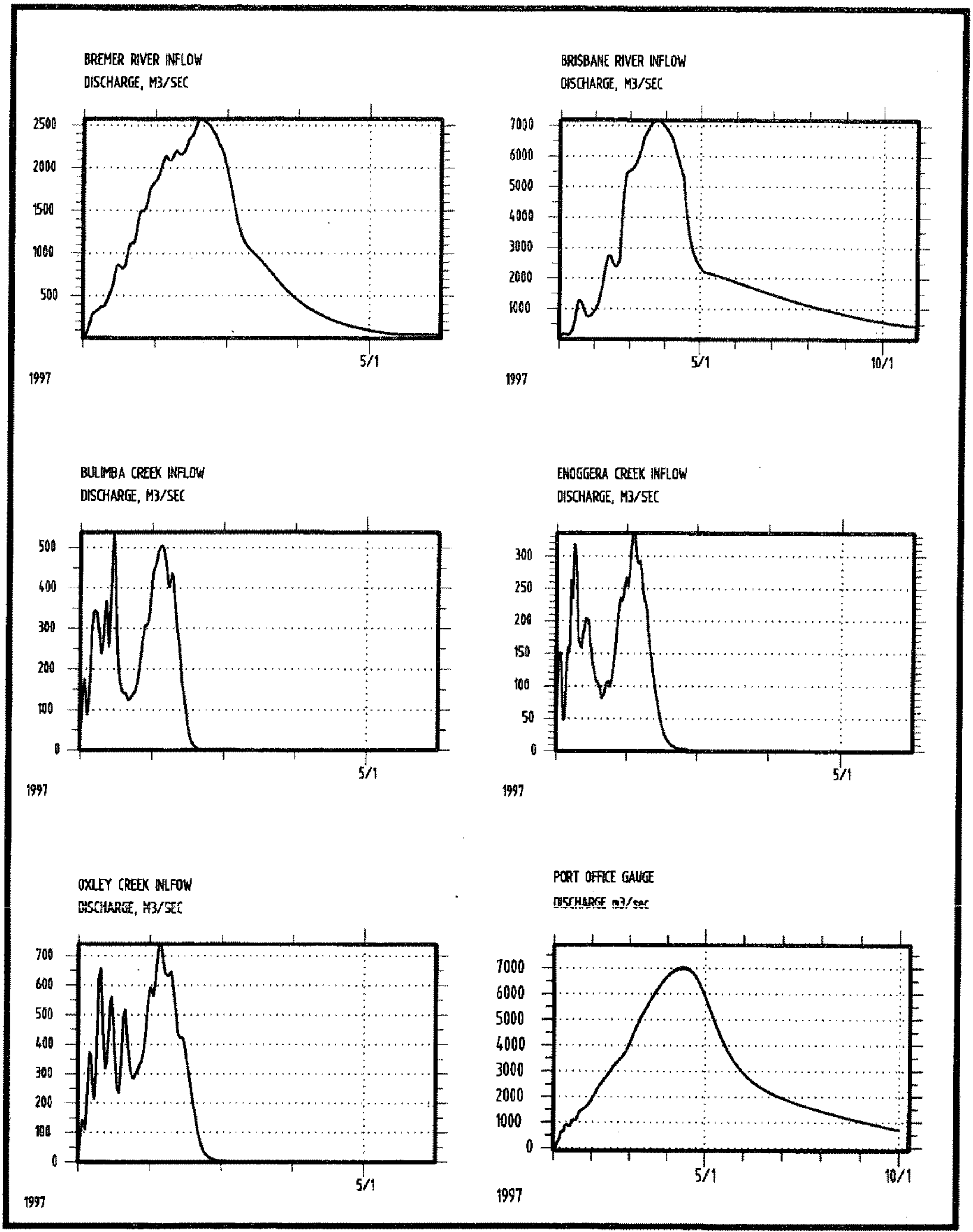
BRISBANE RIVER FLOOD STUDY
HYDROGRAPHS FOR THE 20 YEAR ARI
FLOOD EVENT



FILE NAME: 4157
PLOT SCALE: 1=1
DISK Nº: G:\
JOB Nº: T00457
17-2-98

SINCLAIR KNIGHT MERZ

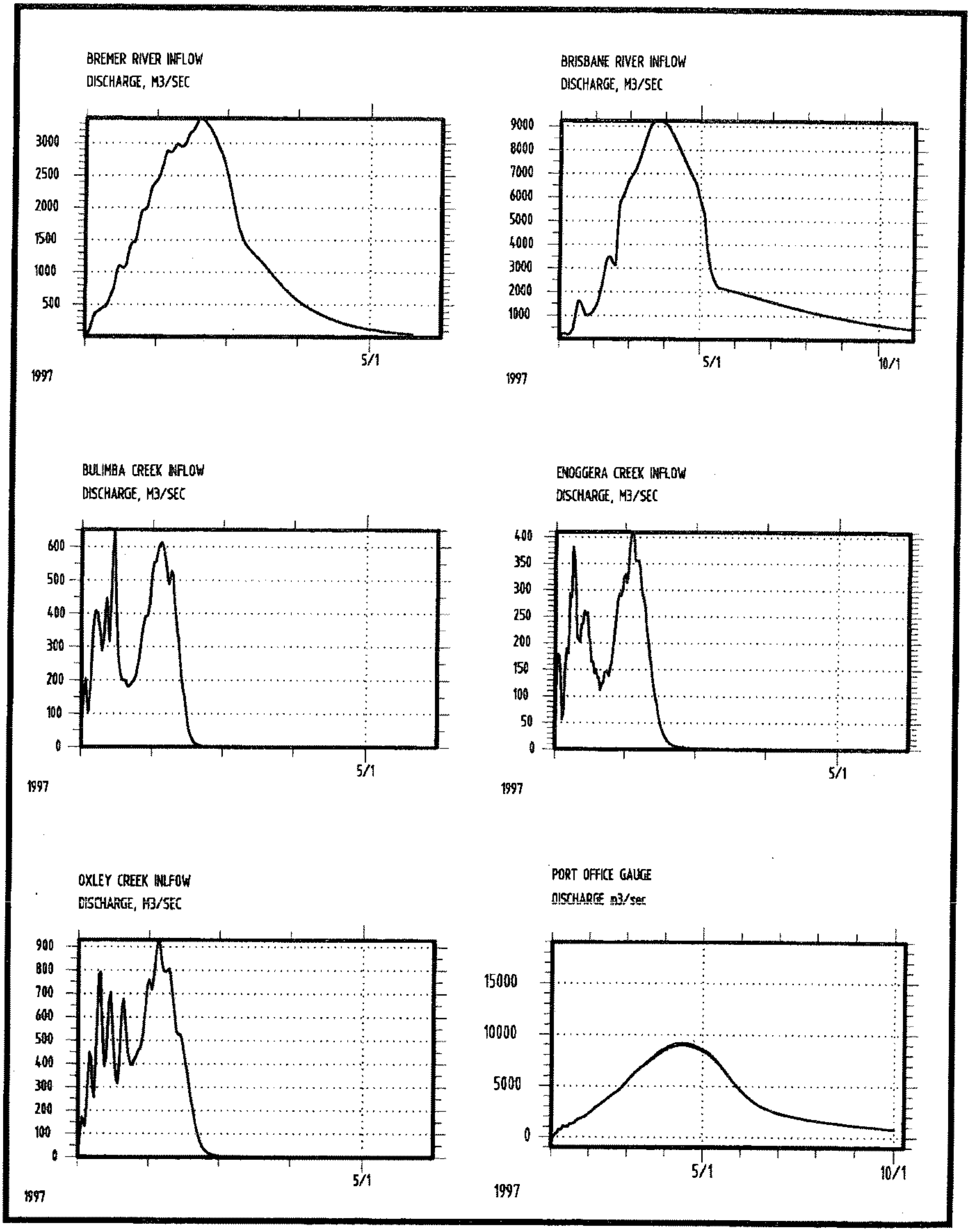
FIGURE G-5
BRISBANE RIVER FLOOD STUDY HYDROGRAPHS FOR THE 50 YEAR ARI FLOOD EVENT



FILE NAME: 4157 ... PLOT SCALE: 1=1 DISK No: G:\ JOB No: T00/157 17-2-98

FIGURE G-6

BRISBANE RIVER FLOOD STUDY
HYDROGRAPHS FOR THE 100 YEAR ARI
FLOOD EVENT

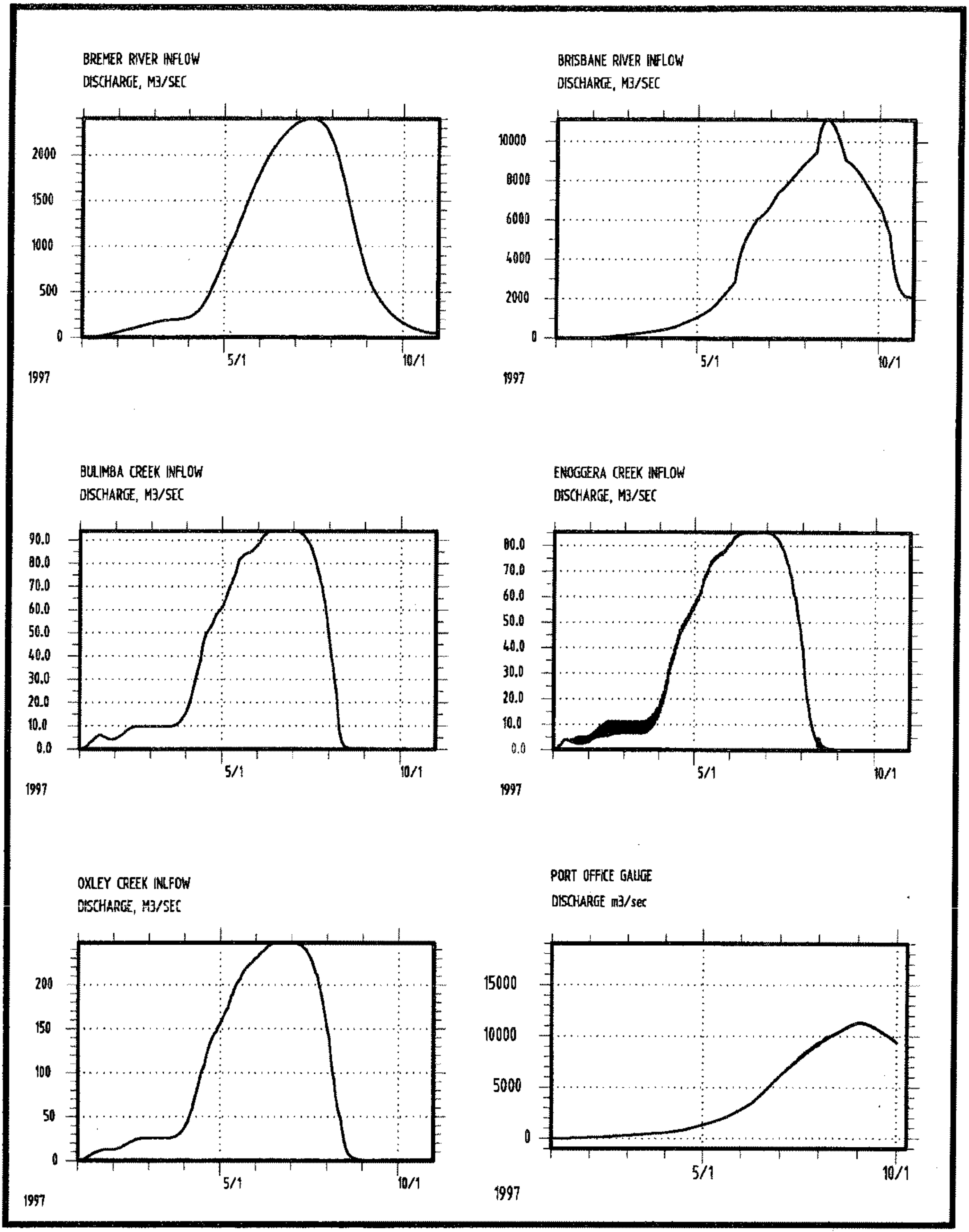


FILE NAME: 4157-256
PL LE: 1
DISK N°: G:\
JOB N°: T004157
D 17-2-98

FIGURE G-7

BRISBANE RIVER FLOOD STUDY HYDROGRAPHS FOR THE 200 YEAR ARI FLOOD EVENT

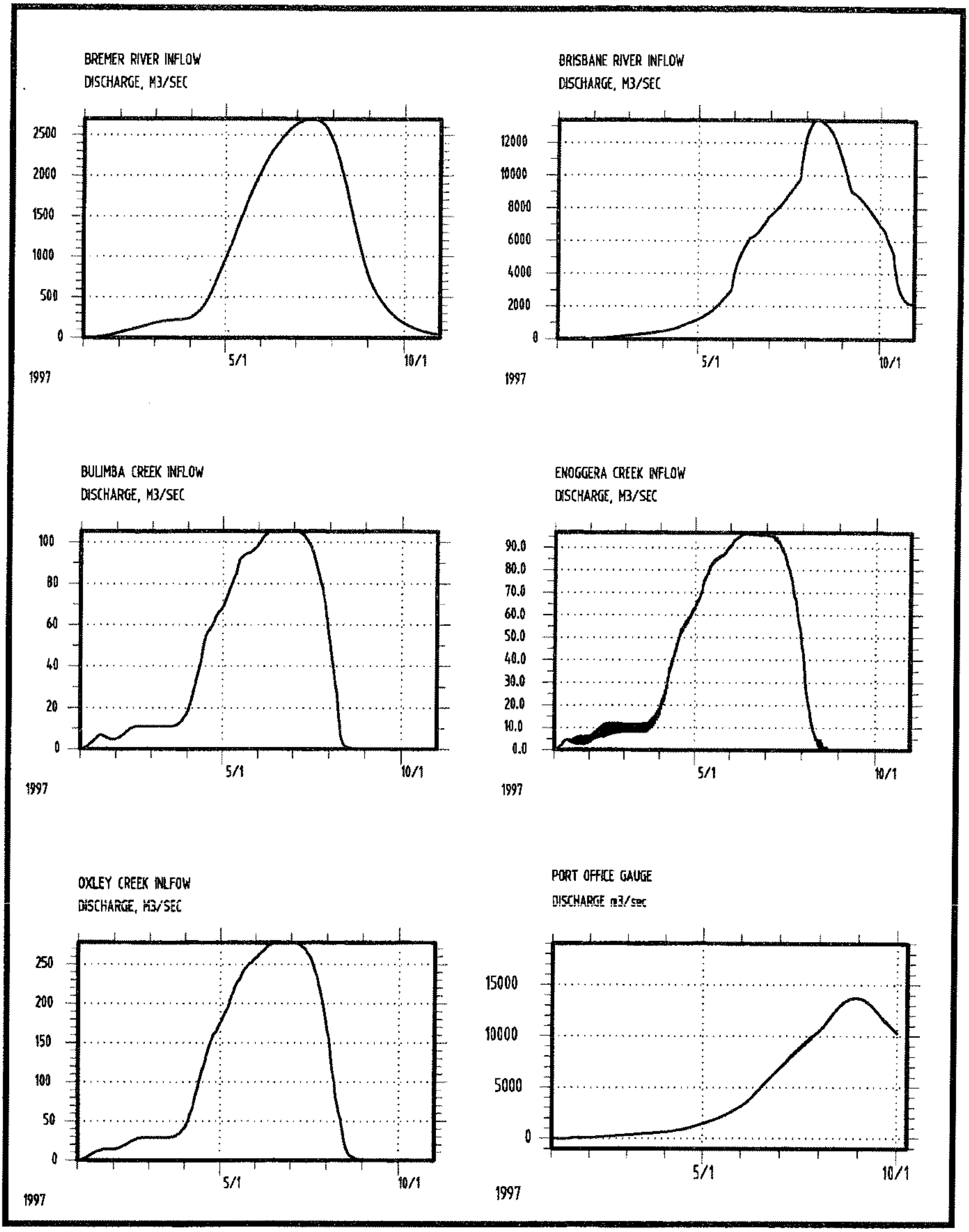
SINCLAIR KNIGHT MERZ



FILE NAME: 4157-257 DISK No: G:\ JOB No: T00457 17-2-98
PLOT SCALE: 1=1

FIGURE G-8

BRISBANE RIVER FLOOD STUDY HYDROGRAPHS FOR THE 500 YEAR ARI FLOOD EVENT

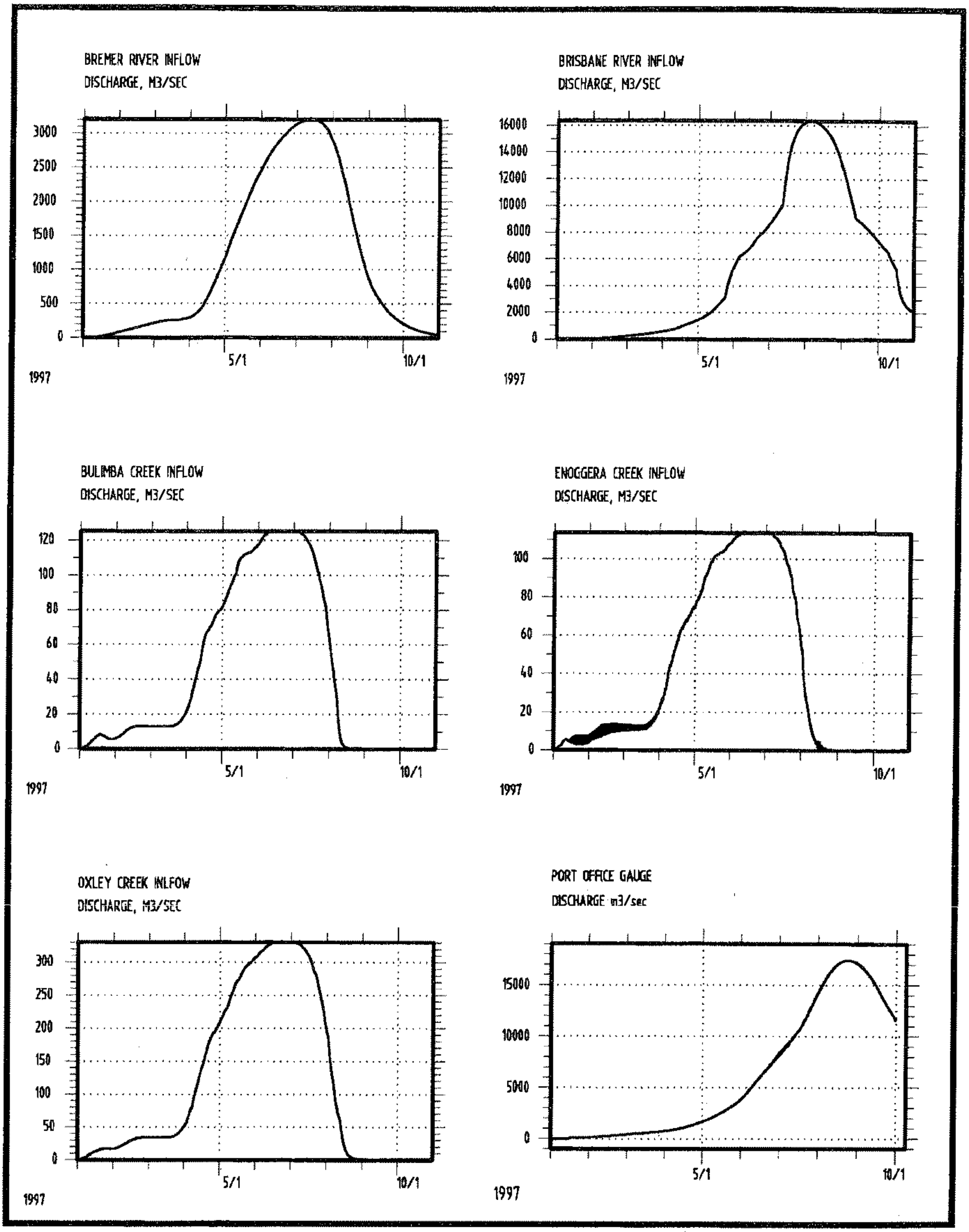


FILE NAME: 4157-258
PLOT SCALE: 1=1
DISK N°: G:\
JOB N°. T00/
17-2-

FIGURE G-9

BRISBANE RIVER FLOOD STUDY
HYDROGRAPHS FOR THE 1000 YEAR ARI
FLOOD EVENT

SINCLAIR KNIGHT MERZ



FILE NAME: 4157
PLOT SCALE: 1=1

FIGURE G-10

BRISBANE RIVER FLOOD STUDY
HYDROGRAPHS FOR THE 2000 YEAR ARI FLOOD EVENT

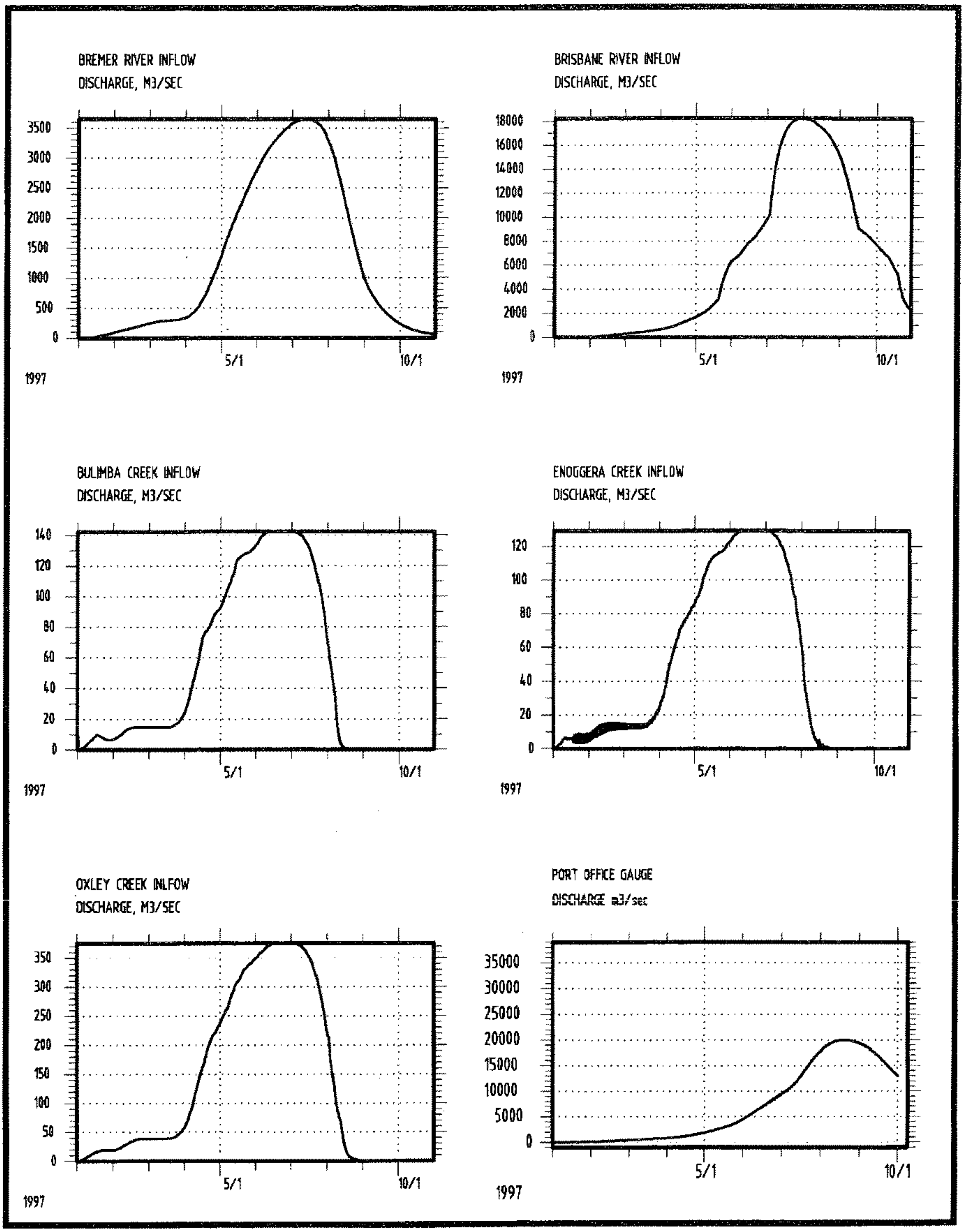


FIGURE G-11
BRISBANE RIVER FLOOD STUDY
HYDROGRAPHS FOR THE 10 000 YEAR ARI FLOOD EVENT

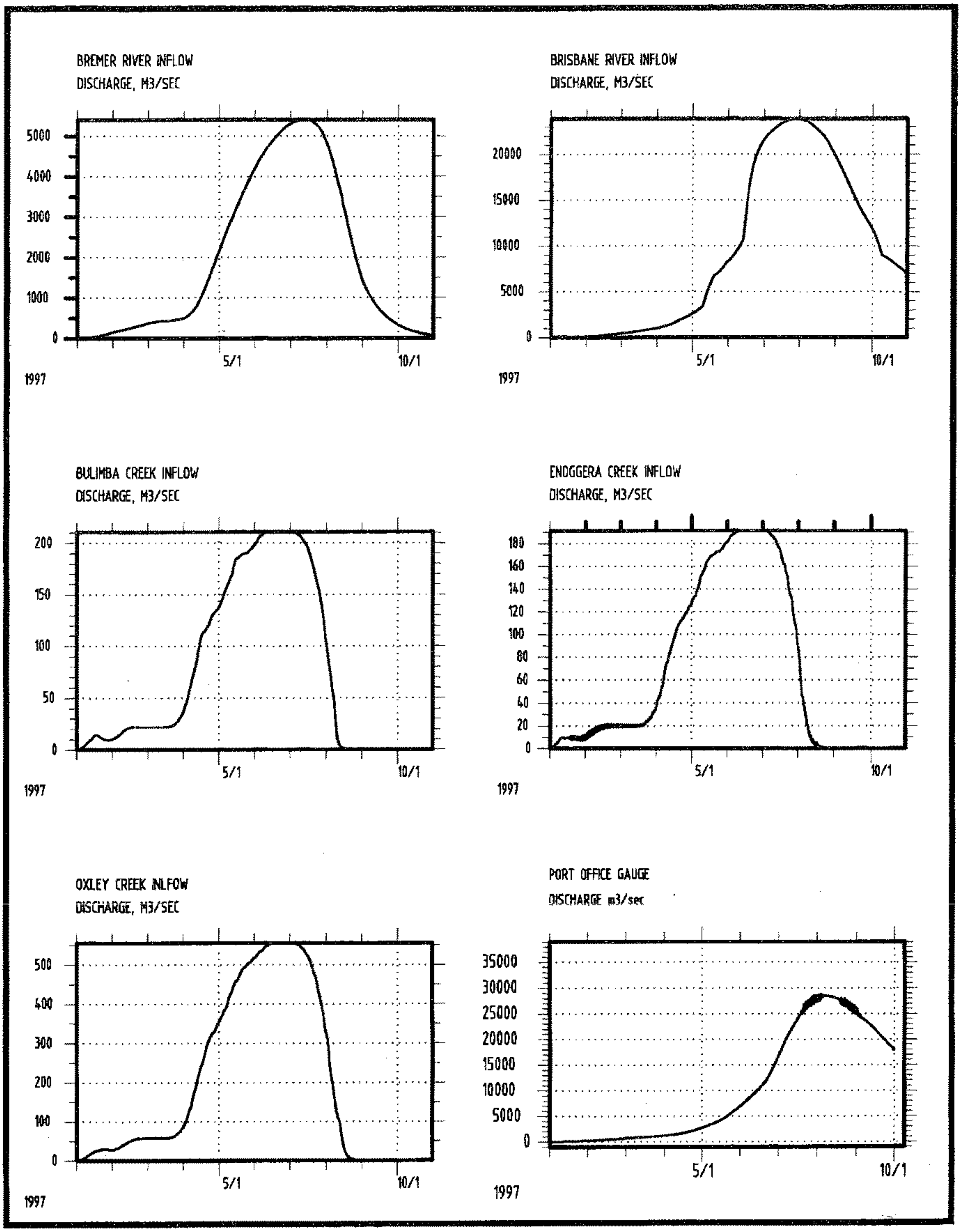
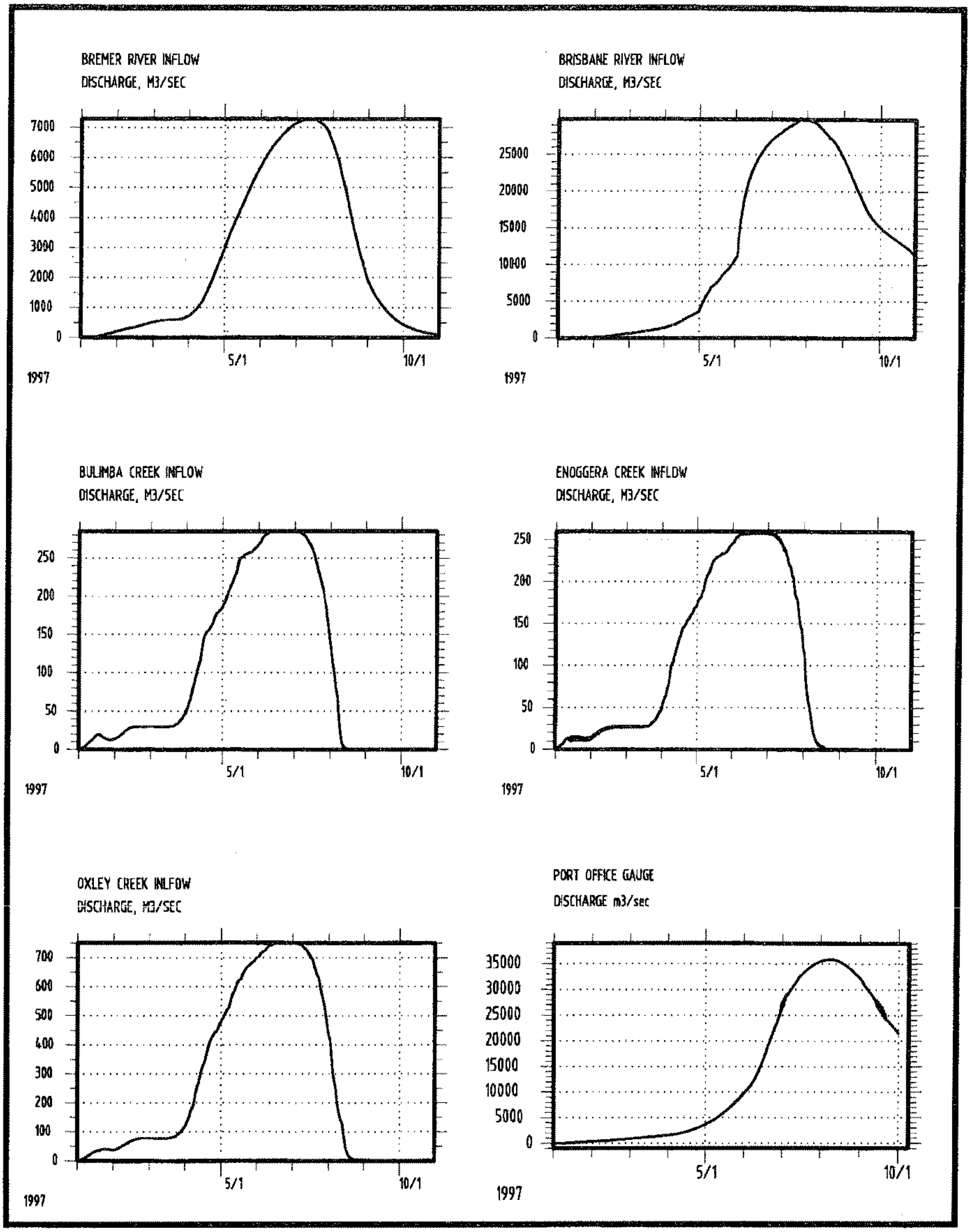


FIGURE G-12

BRISBANE RIVER FLOOD STUDY
HYDROGRAPHS FOR THE PMF
(100 000 YEAR ARI) FLOOD EVENT



Appendix H - Design Hydraulic Modelling Results - Existing Conditions

TABLE H-1 - Combined Tailwater and River Flooding Conditions - Moreton Bay Storm Surge

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	Design Events - Existing Case		
					100 Year ARI Flood 100 Year Moreton Bay Storm Surge (m AHD)	100 Year ARI Flood 20 Year Moreton Bay Storm Surge (m AHD)	20 Year ARI Flood 100 Year Moreton Bay Storm Surge (m AHD)
BRISBANE	1000	78.66	BN 2020		22.80	22.79	13.39
BRISBANE	1000.285	78.375	BN 2010		22.61	22.59	13.23
BRISBANE	1000.775	77.885	BN 2000		22.33	22.32	12.98
BRISBANE	1001.315	77.345	BN 1990		22.24	22.23	12.82
BRISBANE	1001.865	76.795	BN 1980		21.72	21.71	12.42
BRISBANE	1002.35	76.310	BN 1970		21.53	21.51	12.12
BRISBANE	1002.785	75.875	BN 1960		21.51	21.49	12.07
BRISBANE	1003.275	75.385	BN 1950		21.18	21.17	11.76
BRISBANE	1003.775	74.885	BN 1940		20.91	20.90	11.50
BRISBANE	1004.3	74.360	BN 1930		20.46	20.44	11.09
BRISBANE	1004.81	73.850	BN 1920		20.43	20.41	10.98
BRISBANE	1005.325	73.335	BN 1910		20.25	20.24	10.81
BRISBANE	1005.87	72.790	BN 1900		19.95	19.93	10.56
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	19.77	19.76	10.48
BRISBANE	1006.91	71.750	BN 1880		19.57	19.56	10.30
BRISBANE	1007.41	71.250	BN 1870		19.54	19.53	10.24
BRISBANE	1007.92	70.740	BN 1860		19.26	19.24	10.05
BRISBANE	1008.445	70.215	BN 1850		19.08	19.06	9.96
BRISBANE	1008.925	69.735	BN 1840		19.02	19.00	9.92
BRISBANE	1009.4	69.260	BN 1830		18.93	18.91	9.84
BRISBANE	1009.72	68.940	BN 1820		18.92	18.90	9.81
BRISBANE	1010.49	68.170	BN 1810		18.56	18.54	9.64
BRISBANE	1010.725	67.935	BN 1800		18.58	18.56	9.65
BRISBANE	1010.98	67.680	BN 1790		18.51	18.49	9.60
BRISBANE	1011.51	67.150	BN 1780		18.50	18.48	9.56
BRISBANE	1011.98	66.680	BN 1770		18.50	18.48	9.51
BRISBANE	1012.475	66.185	BN 1760		18.40	18.38	9.43
BRISBANE	1012.935	65.725	BN 1750		18.29	18.27	9.36
BRISBANE	1013.445	65.215	BN 1740		18.21	18.19	9.29
BRISBANE	1013.91	64.750	BN 1730		18.15	18.13	9.23
BRISBANE	1014.31	64.350	BN 1720		18.12	18.10	9.17
BRISBANE	1014.61	64.050	BN 1710	Goodna Hospital Gauge	18.16	18.14	9.12
BRISBANE	1015.09	63.570	BN 1700		18.02	18.00	9.09
BRISBANE	1015.56	63.100	BN 1690		17.89	17.87	9.01
BRISBANE	1016.14	62.520	BN 1680		17.79	17.77	8.95
BRISBANE	1016.64	62.020	BN 1670		17.70	17.68	8.85
BRISBANE	1017.13	61.530	BN 1660		17.47	17.45	8.69
BRISBANE	1017.61	61.050	BN 1650		17.35	17.32	8.52
BRISBANE	1017.92	60.740	BN 1640		17.19	17.16	8.40
BRISBANE	1018.2	60.460	BN 1630		17.11	17.09	8.37
BRISBANE	1018.725	59.935	BN 1620		16.79	16.76	8.23
BRISBANE	1019.095	59.565	BN 1610		16.65	16.62	8.12
BRISBANE	1019.49	59.170	BN 1600		16.54	16.52	8.04
BRISBANE	1019.865	58.795	BN 1590		16.25	16.22	7.92
BRISBANE	1020.115	58.545	BN 1580		16.35	16.32	7.91
BRISBANE	1020.525	58.135	BN 1570		16.32	16.29	7.87
BRISBANE	1020.83	57.830	BN 1560		16.17	16.14	7.80
BRISBANE	1021.095	57.565	BN 1550		15.96	15.93	7.70
BRISBANE	1021.539	57.121	BN 1540		15.80	15.76	7.58
BRISBANE	1021.715	56.945	BN 1530		15.82	15.79	7.57
BRISBANE	1021.895	56.765	BN 1520		15.76	15.73	7.54
BRISBANE	1022.105	56.555	BN 1510		15.63	15.60	7.51
BRISBANE	1022.575	56.085	BN 1500		15.56	15.53	7.44
BRISBANE	1023.04	55.620	BN 1490		15.32	15.29	7.33
BRISBANE	1023.57	55.090	BN 1480		15.23	15.19	7.31
BRISBANE	1024.08	54.580	BN 1470		15.18	15.14	7.25
BRISBANE	1024.563	54.097	BN 1460		15.12	15.08	7.18
BRISBANE	1025.07	53.590	BN 1450		15.03	14.99	7.12
BRISBANE	1025.36	53.300	BN 1440		14.88	14.85	7.05
BRISBANE	1025.59	53.070	BN 1430		14.72	14.69	6.97
BRISBANE	1026.17	52.490	BN 1420		14.60	14.57	6.93
BRISBANE	1026.68	51.980	BN 1410	Mt Ommaney Gauge	14.50	14.46	6.84
BRISBANE	1026.9	51.760	BN 1400		14.37	14.34	6.78
BRISBANE	1027.16	51.500	BN 1390		14.23	14.20	6.74
BRISBANE	1027.68	50.980	BN 1380		14.29	14.26	6.72
BRISBANE	1028.18	50.480	BN 1370		14.32	14.28	6.72
BRISBANE	1028.68	49.980	BN 1360		14.19	14.15	6.65
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge			
BRISBANE	1028.76	49.900	BN 1340		14.04	14.00	6.59
BRISBANE	1029.2	49.460	BN 1330		13.93	13.89	6.52
BRISBANE	1029.68	48.980	BN 1320		13.95	13.91	6.52
BRISBANE	1030.22	48.440	BN 1310		13.95	13.91	6.51
BRISBANE	1030.87	47.790	BN 1300		13.88	13.84	6.47
BRISBANE	1031.26	47.400	BN 1290		13.72	13.68	6.41
BRISBANE	1031.7	46.960	BN 1280	Darra Wharf Gauge	13.34	13.30	6.27
BRISBANE	1031.995	46.665	BN 1270		13.45	13.41	6.23
BRISBANE	1032.23	46.430	BN 1260		13.32	13.28	6.18
BRISBANE	1032.585	46.075	BN 1250		13.09	13.04	6.09
BRISBANE	1033.08	45.580	BN 1240		12.94	12.89	6.01
BRISBANE	1033.37	45.290	BN 1230		12.83	12.78	5.96
BRISBANE	1033.9	44.760	BN 1220		12.60	12.56	5.86

TABLE H-1 - Combined Tailwater and River Flooding Conditions - Moreton Bay Storm Surge

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	Design Events - Existing Case		
					100 Year ARI Flood 100 Year Moreton Bay Storm Surge (m AHD)	100 Year ARI Flood 20 Year Moreton Bay Storm Surge (m AHD)	20 Year ARI Flood 100 Year Moreton Bay Storm Surge (m AHD)
BRISBANE	1034.37	44.290	BN 1210		12.45	12.40	5.81
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	12.35	12.30	5.74
BRISBANE	1035.414	43.246	BN 1190		12.11	12.06	5.63
BRISBANE	1035.9	42.760	BN 1180		11.83	11.78	5.50
BRISBANE	1036.46	42.200	BN 1170		11.53	11.48	5.37
BRISBANE	1036.77	41.890	BN 1160		11.46	11.40	5.32
BRISBANE	1036.915	41.745	BN 1150		11.30	11.25	5.27
BRISBANE	1037.09	41.570	BN 1140		11.26	11.20	5.26
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge			
BRISBANE	1037.175	41.485	BN 1120		11.17	11.11	5.12
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	11.12	11.06	5.09
BRISBANE	1037.625	41.035	BN 1100		11.10	11.05	5.06
BRISBANE	1038.085	40.575	BN 1090		11.13	11.07	5.05
BRISBANE	1038.6	40.060	BN 1080		11.11	11.05	5.01
BRISBANE	1039.1	39.560	BN 1070		11.10	11.04	4.99
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	11.12	11.06	4.98
BRISBANE	1040.09	38.570	BN 1050	King Authur Terrace Gauge	11.04	10.98	4.98
BRISBANE	1040.49	38.170	BN 1040		10.91	10.85	4.93
BRISBANE	1041.01	37.650	BN 1030		10.95	10.89	4.93
BRISBANE	1041.23	37.430	BN 1020		10.92	10.85	4.90
BRISBANE	1041.46	37.200	BN 1010	Tennyson Power House Gauge	10.83	10.77	4.87
BRISBANE	1041.7	36.960	BN 1000		10.80	10.74	4.87
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	10.67	10.60	4.81
BRISBANE	1042.235	36.425	BN 980		10.52	10.45	4.76
BRISBANE	1042.515	36.145	BN 970		10.52	10.45	4.74
BRISBANE	1042.91	35.750	BN 960		10.46	10.39	4.68
BRISBANE	1043.725	34.935	BN 950		10.15	10.08	4.55
BRISBANE	1044.06	34.600	BN 940	Sandy Creek Gauge	10.00	9.92	4.51
BRISBANE	1044.34	34.320	BN 930		9.84	9.76	4.46
BRISBANE	1044.605	34.055	BN 920		9.79	9.71	4.42
BRISBANE	1044.86	33.800	BN 910		9.75	9.67	4.40
BRISBANE	1045.4	33.260	BN 900		9.58	9.49	4.31
BRISBANE	1045.885	32.775	BN 890		9.46	9.37	4.22
BRISBANE	1046.18	32.480	BN 880		9.38	9.29	4.21
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	9.31	9.22	4.19
BRISBANE	1046.58	32.080	BN 860		9.26	9.17	4.17
BRISBANE	1046.9	31.760	BN 850		9.08	8.99	4.10
BRISBANE	1047.35	31.310	BN 840		8.72	8.62	3.98
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	8.50	8.40	3.91
BRISBANE	1048.375	30.285	BN 820		8.56	8.46	3.91
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	8.34	8.23	3.83
BRISBANE	1049.12	29.540	BN 800		8.29	8.18	3.81
BRISBANE	1049.37	29.290	BN 790		8.12	8.00	3.76
BRISBANE	1049.59	29.070	BN 780		8.12	8.00	3.76
BRISBANE	1049.87	28.790	BN 770		7.99	7.88	3.72
BRISBANE	1050.43	28.230	BN 760		7.99	7.87	3.69
BRISBANE	1050.86	27.800	BN 750		7.85	7.72	3.66
BRISBANE	1051.36	27.300	BN 740		7.85	7.72	3.66
BRISBANE	1051.895	26.765	BN 730		7.69	7.56	3.59
BRISBANE	1052.31	26.350	BN 720		7.79	7.67	3.62
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge			
BRISBANE	1052.39	26.270	BN 700		7.64	7.50	3.58
BRISBANE	1052.595	26.065	BN 690		7.54	7.41	3.56
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge			
BRISBANE	1052.64	26.020	BN 670		7.05	6.93	3.49
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	6.93	6.80	3.47
BRISBANE	1053.32	25.340	BN 650		6.86	6.73	3.44
BRISBANE	1053.356	25.304	BN 640	Victoria Bridge			
BRISBANE	1053.385	25.275	BN630		6.70	6.57	3.39
BRISBANE	1053.9	24.760	BN 620		6.35	6.21	3.28
BRISBANE	1054.64	24.020	BN 610		6.29	6.14	3.26
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge			
BRISBANE	1054.68	23.980	BN 590		6.22	6.07	3.24
BRISBANE	1054.97	23.690	BN 560		5.99	5.84	3.19
BRISBANE	1055.28	23.380	BN 550		5.94	5.79	3.18
BRISBANE	1055.42	23.240	BN 540		5.95	5.79	3.18
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	5.90	5.74	3.16
BRISBANE	1056.4	22.260	BN 520		5.67	5.51	3.11
BRISBANE	1056.695	21.965	BN 510		5.62	5.45	3.09
BRISBANE	1056.865	21.795	BN 500		5.80	5.64	3.13
BRISBANE	1056.92	21.740	BN 495	Story Bridge			
BRISBANE	1056.95	21.710	BN 490		5.71	5.54	3.11
BRISBANE	1057.09	21.570	BN 480		5.57	5.40	3.08
BRISBANE	1057.53	21.130	BN 470		5.45	5.27	3.06
BRISBANE	1058.04	20.620	BN 460		5.23	5.04	3.00
BRISBANE	1058.23	20.430	BN 450		5.16	4.97	2.99
BRISBANE	1058.53	20.130	BN 440		5.04	4.86	2.97
BRISBANE	1058.735	19.925	BN 430		5.08	4.89	2.97
BRISBANE	1059.035	19.625	BN 420		4.82	4.63	2.92
BRISBANE	1059.54	19.120	BN 410		4.80	4.60	2.91
BRISBANE	1059.99	18.670	BN 400		4.64	4.43	2.87

TABLE H-1 - Combined Tailwater and River Flooding Conditions - Moreton Bay Storm Surge

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	Design Events - Existing Case		
					100 Year ARI Flood 100 Year Moreton Bay Storm Surge (m AHD)	100 Year ARI Flood 20 Year Moreton Bay Storm Surge (m AHD)	20 Year ARI Flood 100 Year Moreton Bay Storm Surge (m AHD)
BRISBANE	1060.345	18.315	BN 390		4.42	4.20	2.84
BRISBANE	1060.635	18.125	BN 380		4.29	4.06	2.81
BRISBANE	1061.015	17.645	BN 370		4.27	4.04	2.80
BRISBANE	1061.53	17.130	BN 360		4.09	3.85	2.77
BRISBANE	1062.02	16.640	BN 350		4.04	3.80	2.76
BRISBANE	1062.535	16.125	BN 340		4.02	3.77	2.75
BRISBANE	1062.94	15.720	BN 330		4.02	3.77	2.76
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	3.92	3.67	2.73
BRISBANE	1063.645	15.015	BN 310	Cresent Road Gauge	3.70	3.43	2.69
BRISBANE	1064	14.660	BN 300		3.67	3.40	2.69
BRISBANE	1064.49	14.170	BN 290		3.57	3.29	2.67
BRISBANE	1065.01	13.650	BN 280		3.61	3.33	2.68
BRISBANE	1065.503	13.157	BN 270		3.57	3.29	2.67
BRISBANE	1065.99	12.670	BN 260	Cairncross Dock Gauge	3.58	3.30	2.67
BRISBANE	1066.505	12.155	BN 250		3.53	3.24	2.66
BRISBANE	1067.02	11.640	BN 240		3.50	3.21	2.66
BRISBANE	1067.485	11.175	BN 230		3.43	3.13	2.65
BRISBANE	1067.965	10.695	BN 220		3.33	3.03	2.65
BRISBANE	1068.66	10.000	BN 210		3.20	2.88	2.64
BRISBANE	1069.045	9.615	BN 200		3.15	2.83	2.64
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	3.11	2.79	2.63
BRISBANE	1070.025	8.635	BN 180		3.06	2.73	2.62
BRISBANE	1070.53	8.130	BN 170		3.00	2.66	2.62
BRISBANE	1071.04	7.620	BN 160		2.95	2.60	2.62
BRISBANE	1071.52	7.140	BN 150		2.97	2.63	2.62
BRISBANE	1072.015	6.645	BN 140		2.89	2.54	2.61
BRISBANE	1072.515	6.145	BN 130		2.85	2.49	2.61
BRISBANE	1072.995	5.665	BN 120		2.82	2.46	2.61
BRISBANE	1073.485	5.175	BN 110		2.75	2.39	2.61
BRISBANE	1074	4.660	BN 100		2.70	2.34	2.62
BRISBANE	1074.46	4.200	BN 90		2.67	2.29	2.62
BRISBANE	1074.985	3.675	BN 80		2.60	2.20	2.59
BRISBANE	1075.48	3.180	BN 70		2.60	2.19	2.60
BRISBANE	1076	2.680	BN 60		2.63	2.20	2.63
BRISBANE	1076.495	2.165	BN 50		2.64	2.19	2.64
BRISBANE	1077.01	1.650	BN 40		2.69	2.21	2.69
BRISBANE	1077.51	1.150	BN 30		2.67	2.20	2.67
BRISBANE	1078.04	0.620	BN 20		2.61	2.16	2.61
BRISBANE	1078.525	0.135	BN 10		2.50	2.10	2.50
BRISBANE	1078.66	0.000	-	Western Inner Bar Gauge	2.50	2.10	2.50
BREMER	599.4	-	-		19.82	19.80	10.50
BREMER	600	-	-		19.82	19.80	10.50
OXLEY	599.4	-	-		11.08	11.02	4.98
OXLEY	600	-	-		11.08	11.02	4.98
BREAKFAST	599.4	-	-		4.00	3.75	2.76
BREAKFAST	600	-	-		4.00	3.74	2.75
BULIMBA	599.4	-	-		2.89	2.54	2.61
BULIMBA	600	-	-		2.89	2.54	2.61
CENTWEIR	0	-	-		14.19	14.15	6.65
CENTWEIR	0.08	-	-		14.04	14.00	6.59
INDOORWEIR	0	-	-		11.26	11.20	5.26
INDOORWEIR	0.085	-	-		11.17	11.11	5.12
WILLIAMWEIR	0	-	-		7.54	7.41	3.56
WILLIAMWEIR	0.045	-	-		7.05	6.93	3.49
VICTORIAWEI	0	-	-		6.86	6.73	3.44
VICTORIAWEI	0.065	-	-		6.70	6.57	3.39
CAPTAINWEIR	0	-	-		6.29	6.14	3.26
CAPTAINWEIR	0.04	-	-		6.22	6.07	3.24
STORYWEIR	0	-	-		5.80	5.64	3.13
STORYWEIR	0.085	-	-		5.71	5.54	3.11
MERIVALEWE	0	-	-		7.79	7.67	3.82
MERIVALEWE	0.08	-	-		7.64	7.50	3.58
GOODNALINK1	0	-	-		18.25	18.23	9.32
GOODNALINK1	1	-	-		17.61	17.58	8.77
GOODNALINK2	0	-	-		18.18	18.16	9.26
GOODNALINK2	1.07	-	-		17.85	17.82	8.98
STLUCIALINK1	0	-	-		11.11	11.05	4.99
STLUCIALINK1	1.05	-	-		10.39	10.31	4.64
STLUCIALINK2	0	-	-		11.10	11.04	4.98
STLUCIALINK2	1.05	-	-		10.42	10.35	4.66
STLUCIALINK3	0	-	-		10.99	10.93	4.96
STLUCIALINK3	0.85	-	-		10.52	10.45	4.74

TABLE H-2 - Predicted Flood Levels for Design Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	DESIGN EVENTS											
					PMF WL (m AHD)	10000 YEAR ARI WL (m AHD)	2000 YEAR ARI WL (m AHD)	1000 YEAR ARI WL (m AHD)	500 YEAR ARI WL (m AHD)	200 YEAR ARI WL (m AHD)	100 YEAR ARI WL (m AHD)	50 YEAR ARI WL (m AHD)	20 YEAR ARI WL (m AHD)	10 YEAR ARI WL (m AHD)	5 YEAR ARI WL (m AHD)	2 YEAR ARI WL (m AHD)
BRISBANE	1000	78.66	BN 2020		40.26	36.04	31.82	30.29	27.56	25.25	22.76	19.70	13.24	7.25	4.72	1.77
BRISBANE	1000.285	78.375	BN 2010		40.31	36.03	31.73	30.17	27.36	25.04	22.57	19.53	13.07	7.16	4.66	1.75
BRISBANE	1000.775	77.885	BN 2000		39.47	35.32	31.19	29.68	26.99	24.73	22.29	19.28	12.81	7.00	4.54	1.71
BRISBANE	1001.315	77.345	BN 1990		39.73	35.49	31.26	29.72	26.98	24.68	22.20	19.17	12.65	6.86	4.40	1.65
BRISBANE	1001.865	76.795	BN 1980		39.00	34.79	30.62	29.10	26.40	24.14	21.68	18.70	12.23	6.64	4.24	1.59
BRISBANE	1002.35	76.310	BN 1970		38.81	34.60	30.44	28.92	26.23	23.95	21.48	18.48	11.92	6.42	4.09	1.56
BRISBANE	1002.785	75.875	BN 1960		39.08	34.76	30.53	28.98	26.24	23.93	21.46	18.46	11.86	6.34	4.01	1.53
BRISBANE	1003.275	75.385	BN 1950		38.72	34.42	30.17	28.61	25.89	23.60	21.13	18.15	11.54	6.16	3.88	1.50
BRISBANE	1003.775	74.885	BN 1940		38.28	34.03	29.85	28.31	25.62	23.34	20.86	17.91	11.26	5.97	3.73	1.48
BRISBANE	1004.3	74.360	BN 1930		38.19	33.79	29.42	27.79	25.13	22.86	20.41	17.49	10.83	5.75	3.59	1.46
BRISBANE	1004.81	73.850	BN 1920		38.06	33.71	29.41	27.82	25.14	22.85	20.37	17.44	10.70	5.63	3.49	1.45
BRISBANE	1005.325	73.335	BN 1910		37.97	33.58	29.23	27.62	24.93	22.67	20.20	17.28	10.53	5.47	3.36	1.44
BRISBANE	1005.87	72.790	BN 1900		37.61	33.21	28.85	27.21	24.59	22.35	19.89	16.98	10.26	5.25	3.18	1.42
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	37.63	33.17	28.74	27.07	24.41	22.18	19.72	16.85	10.18	5.18	3.14	1.42
BRISBANE	1006.91	71.750	BN 1880		37.43	32.94	28.49	26.79	24.17	21.96	19.51	16.64	9.99	5.06	3.06	1.40
BRISBANE	1007.41	71.250	BN 1870		37.41	32.84	28.43	26.76	24.14	21.94	19.48	16.60	9.92	4.97	3.00	1.38
BRISBANE	1007.92	70.740	BN 1860		37.23	32.69	28.24	26.54	23.88	21.82	19.19	16.34	9.73	4.85	2.92	1.36
BRISBANE	1008.445	70.215	BN 1850		37.01	32.42	27.92	26.17	23.60	21.41	19.02	16.20	9.83	4.78	2.87	1.34
BRISBANE	1008.925	69.735	BN 1840		37.16	32.54	27.95	26.14	23.48	21.33	18.96	16.15	9.59	4.74	2.84	1.34
BRISBANE	1009.4	69.260	BN 1830		36.87	32.31	27.84	26.11	23.48	21.27	18.86	16.05	9.50	4.70	2.81	1.33
BRISBANE	1009.72	68.940	BN 1820		37.04	32.44	27.91	26.15	23.48	21.25	18.85	16.03	9.47	4.67	2.80	1.33
BRISBANE	1010.49	68.170	BN 1810		36.41	31.84	27.40	25.65	23.03	20.82	18.50	15.74	9.30	4.59	2.75	1.31
BRISBANE	1010.725	67.935	BN 1800		36.08	31.62	27.20	25.58	23.02	20.86	18.52	15.75	9.30	4.58	2.75	1.31
BRISBANE	1010.98	67.680	BN 1790		35.65	31.27	27.04	25.37	22.88	20.75	18.44	15.69	9.26	4.56	2.73	1.31
BRISBANE	1011.51	67.150	BN 1780		36.34	31.78	27.36	25.62	23.02	20.81	18.43	15.67	9.21	4.52	2.71	1.30
BRISBANE	1011.98	66.680	BN 1770		36.43	31.85	27.40	25.66	23.04	20.83	18.43	15.62	9.15	4.48	2.68	1.30
BRISBANE	1012.475	66.185	BN 1760		36.47	31.85	27.34	25.57	22.90	20.71	18.33	15.53	9.07	4.42	2.65	1.29
BRISBANE	1012.935	65.725	BN 1750		36.46	31.84	27.33	25.57	22.90	20.65	18.22	15.44	8.99	4.38	2.62	1.28
BRISBANE	1013.445	65.215	BN 1740		36.39	31.73	27.16	25.40	22.75	20.54	18.14	15.34	8.92	4.33	2.59	1.28
BRISBANE	1013.91	64.750	BN 1730		36.42	31.78	27.24	25.46	22.76	20.53	18.08	15.29	8.85	4.27	2.55	1.26
BRISBANE	1014.31	64.350	BN 1720		36.41	31.77	27.23	25.44	22.75	20.52	18.05	15.22	8.79	4.22	2.51	1.25
BRISBANE	1014.61	64.050	BN 1710	Goodna Hospital Gauge	36.42	31.77	27.23	25.45	22.76	20.53	18.06	15.25	8.73	4.18	2.49	1.25
BRISBANE	1015.09	63.570	BN 1700		36.34	31.69	27.13	25.34	22.64	20.41	17.94	15.13	8.71	4.17	2.48	1.25
BRISBANE	1015.56	63.100	BN 1690		36.09	31.50	27.01	25.22	22.53	20.29	17.81	15.02	8.62	4.13	2.46	1.24
BRISBANE	1016.14	62.520	BN 1680		36.30	31.66	27.10	25.28	22.54	20.25	17.71	14.93	8.56	4.09	2.44	1.24
BRISBANE	1016.64	62.020	BN 1670		36.38	31.71	27.10	25.27	22.50	20.17	17.62	14.82	8.45	4.01	2.38	1.22
BRISBANE	1017.13	61.530	BN 1660		36.37	31.66	27.01	25.14	22.27	19.94	17.39	14.61	8.27	3.87	2.29	1.20
BRISBANE	1017.61	61.050	BN 1650		36.23	31.40	26.82	24.97	22.17	19.84	17.26	14.44	8.09	3.77	2.23	1.19
BRISBANE	1017.92	60.740	BN 1640		36.11	31.25	26.58	24.75	21.98	19.67	17.10	14.28	7.96	3.69	2.19	1.18
BRISBANE	1018.2	60.460	BN 1630		36.16	31.35	26.68	24.81	21.95	19.59	17.02	14.22	7.93	3.67	2.18	1.18
BRISBANE	1018.725	59.936	BN 1620		35.93	31.09	26.37	24.44	21.53	19.21	16.69	13.94	7.78	3.60	2.14	1.17
BRISBANE	1019.095	59.565	BN 1610		35.87	31.03	26.31	24.37	21.42	19.07	16.56	13.80	7.66	3.54	2.11	1.16
BRISBANE	1019.49	59.170	BN 1600		35.69	30.85	26.16	24.24	21.31	18.95	16.45	13.70	7.58	3.48	2.08	1.16
BRISBANE	1019.865	58.795	BN 1590		35.32	30.47	25.79	23.84	20.88	18.80	16.15	13.46	7.45	3.43	2.05	1.15
BRISBANE	1020.115	58.545	BN 1580		35.65	30.77	26.04	24.09	21.12	18.75	16.25	13.51	7.43	3.40	2.03	1.15
BRISBANE	1020.525	58.135	BN 1570		35.63	30.75	26.00	24.04	21.08	18.73	16.22	13.48	7.39	3.36	2.01	1.14
BRISBANE	1020.83	57.830	BN 1560		35.32	30.45	25.75	23.79	20.86	18.54	16.07	13.36	7.32	3.32	1.99	1.14
BRISBANE	1021.095	57.565	BN 1550		34.89	30.05	25.42	23.47	20.58	18.30	15.86	13.19	7.21	3.27	1.96	1.13
BRISBANE	1021.539	57.121	BN 1540		34.79	29.93	25.28	23.32	20.40	18.12	15.69	13.03	7.08	3.19	1.92	1.13
BRISBANE	1021.715	56.945	BN 1530		34.98	30.08	25.38	23.40	20.46	18.16	15.72	13.03	7.06	3.17	1.91	1.12
BRISBANE	1021.895	56.765	BN 1520		34.82	29.88	25.23	23.27	20.36	18.08	15.65	12.98	7.03	3.15	1.90	1.12
BRISBANE	1022.105	56.555	BN 1510		34.39	29.53	24.98	23.03	20.17	17.92	15.53	12.90	7.00	3.15	1.89	1.12
BRISBANE	1022.575	56.065	BN 1500		34.65	29.69	24.97	23.02	20.14	17.87	15.45	12.80	6.92	3.10	1.87	1.12
BRISBANE	1023.04	55.620	BN 1490		34.60	29.62	24.86	22.82	19.84	17.59	15.21	12.59	6.81	3.07	1.86	1.12
BRISBANE	1023.57	55.090	BN 1480		33.87	29.00	24.46	22.51	19.68	17.48	15.12	12.52	6.78	3.05	1.85	1.11
BRISBANE	1024.08	54.580	BN 1470		34.19	29.08	24.48	22.51	19.65	17.43	15.07	12.46	6.72	3.02	1.83	1.11
BRISBANE	1024.563	54.097	BN 1460		34.15	29.12	24.43	22.42	19.58	17.37	15.01	12.40	6.64	2.97	1.80	1.11
BRISBANE	1025.07	53.590	BN 1450		34.39	29.32	24.54	22.49	19.53	17.29	14.91	12.30	6.58	2.93	1.78	1.10
BRISBANE	1025.36	53.300	BN 1440		33.96	28.85	24.19	22.18	19.31	17.12	14.77	12.19	6.49	2.89	1.76	1.10
BRISBANE	1025.59	53.070	BN 1430		33.59	28.61	24.00	21.99	19.14	16.95	14.61	12.04	6.41	2.85	1.75	1.10
BRISBANE	1026.17	52.490	BN 1420		33.61	28.41	23.77	21.75	18.92	16.78	14.48	11.96	6.36	2.83	1.73	1.09

TABLE H-2 - Predicted Flood Levels for Design Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	DESIGN EVENTS											
					PMF WL (m AHD)	10000 YEAR ARI WL (m AHD)	2000 YEAR ARI WL (m AHD)	1000 YEAR ARI WL (m AHD)	500 YEAR ARI WL (m AHD)	200 YEAR ARI WL (m AHD)	100 YEAR ARI WL (m AHD)	50 YEAR ARI WL (m AHD)	20 YEAR ARI WL (m AHD)	10 YEAR ARI WL (m AHD)	5 YEAR ARI WL (m AHD)	2 YEAR ARI WL (m AHD)
BRISBANE	1026.68	51.960	BN 1410	Mt Ommaney Gauge	33.69	28.56	23.87	21.82	18.92	16.70	14.38	11.84	6.26	2.78	1.71	1.09
BRISBANE	1026.9	51.760	BN 1400		33.62	28.47	23.77	21.70	18.78	16.54	14.25	11.73	6.20	2.75	1.70	1.09
BRISBANE	1027.16	51.500	BN 1390		33.40	28.23	23.53	21.45	18.53	16.38	14.11	11.62	6.15	2.73	1.69	1.09
BRISBANE	1027.68	50.980	BN 1380		33.33	28.22	23.58	21.54	18.66	16.47	14.17	11.64	6.13	2.71	1.68	1.08
BRISBANE	1028.18	50.480	BN 1370		33.51	28.37	23.68	21.62	18.71	16.51	14.19	11.65	6.12	2.70	1.67	1.08
BRISBANE	1028.68	49.980	BN 1360		33.23	28.11	23.48	21.43	18.55	16.36	14.06	11.54	6.05	2.67	1.66	1.08
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge												
BRISBANE	1028.76	49.900	BN 1340		32.66	27.50	22.92	21.18	18.32	16.14	13.91	11.45	5.97	2.63	1.64	1.07
BRISBANE	1029.2	49.460	BN 1330		32.32	27.22	22.76	21.04	18.18	16.00	13.80	11.35	5.90	2.60	1.62	1.07
BRISBANE	1029.68	48.980	BN 1320		32.60	27.44	22.90	21.16	18.26	16.05	13.82	11.34	5.90	2.60	1.62	1.07
BRISBANE	1030.22	48.440	BN 1310		32.70	27.38	22.84	21.11	18.23	16.04	13.82	11.36	5.89	2.58	1.62	1.07
BRISBANE	1030.87	47.790	BN 1300		32.37	27.19	22.72	21.01	18.14	15.96	13.75	11.29	5.84	2.56	1.60	1.07
BRISBANE	1031.26	47.400	BN 1290		31.83	26.75	22.41	20.72	17.92	15.77	13.59	11.17	5.78	2.54	1.59	1.07
BRISBANE	1031.7	46.960	BN 1280	Darra Wharf Gauge	30.69	25.72	21.65	20.04	17.36	15.30	13.21	10.87	5.62	2.47	1.56	1.06
BRISBANE	1031.995	46.665	BN 1270		31.74	26.57	22.20	20.50	17.67	15.51	13.31	10.87	5.57	2.44	1.55	1.06
BRISBANE	1032.23	46.430	BN 1260		31.26	26.12	21.89	20.23	17.46	15.34	13.18	10.79	5.51	2.41	1.53	1.06
BRISBANE	1032.585	46.075	BN 1250		30.52	25.48	21.43	19.81	17.11	15.05	12.94	10.59	5.41	2.37	1.52	1.05
BRISBANE	1033.08	45.580	BN 1240		30.88	25.32	21.27	19.65	16.95	14.89	12.79	10.45	5.32	2.34	1.50	1.05
BRISBANE	1033.37	45.290	BN 1230		30.91	25.52	21.26	19.54	16.81	14.76	12.68	10.36	5.27	2.31	1.49	1.05
BRISBANE	1033.9	44.760	BN 1220		30.67	25.23	20.97	19.22	16.48	14.47	12.45	10.17	5.16	2.28	1.48	1.05
BRISBANE	1034.37	44.290	BN 1210		30.78	25.21	20.66	18.95	16.27	14.29	12.29	10.03	5.10	2.25	1.46	1.05
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	30.85	25.32	20.87	19.06	16.19	14.20	12.19	9.93	5.02	2.22	1.45	1.04
BRISBANE	1035.414	43.246	BN 1190		30.01	24.53	20.30	18.58	15.85	13.90	11.94	9.72	4.90	2.16	1.43	1.04
BRISBANE	1035.9	42.760	BN 1180		29.50	23.98	19.90	18.20	15.50	13.58	11.65	9.47	4.74	2.10	1.40	1.04
BRISBANE	1036.46	42.200	BN 1170		29.54	23.82	19.61	17.84	15.11	13.22	11.35	9.21	4.60	2.05	1.38	1.03
BRISBANE	1036.77	41.890	BN 1160		29.29	23.60	19.50	17.77	15.06	13.16	11.28	9.13	4.54	2.02	1.36	1.03
BRISBANE	1036.915	41.745	BN 1150		28.74	23.04	19.15	17.46	14.81	12.97	11.12	9.01	4.48	2.00	1.36	1.03
BRISBANE	1037.09	41.570	BN 1140		28.88	23.12	19.10	17.35	14.73	12.92	11.07	8.98	4.47	2.00	1.35	1.03
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge												
BRISBANE	1037.175	41.485	BN 1120		26.33	22.93	18.72	17.10	14.54	12.77	10.98	8.90	4.32	1.94	1.33	1.02
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	25.67	22.51	18.59	17.01	14.47	12.71	10.93	8.86	4.29	1.93	1.32	1.02
BRISBANE	1037.625	41.035	BN 1100		25.99	22.72	18.66	17.06	14.48	12.71	10.91	8.83	4.25	1.91	1.31	1.02
BRISBANE	1038.085	40.575	BN 1090		26.56	23.13	18.86	17.22	14.60	12.78	10.93	8.81	4.23	1.90	1.31	1.02
BRISBANE	1038.6	40.060	BN 1080		26.51	23.09	18.83	17.19	14.57	12.75	10.91	8.79	4.18	1.88	1.30	1.02
BRISBANE	1039.1	39.560	BN 1070		26.73	23.26	18.94	17.29	14.64	12.79	10.90	8.76	4.15	1.86	1.29	1.02
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	26.72	23.25	18.93	17.28	14.63	12.79	10.92	8.75	4.14	1.85	1.29	1.02
BRISBANE	1040.09	38.570	BN 1050	King Authur Terrace Gauge	26.67	23.20	18.88	17.22	14.56	12.72	10.84	8.72	4.14	1.86	1.29	1.02
BRISBANE	1040.49	38.170	BN 1040		26.63	23.16	18.81	17.13	14.43	12.57	10.71	8.60	4.08	1.84	1.29	1.02
BRISBANE	1041.01	37.650	BN 1030		26.66	23.19	18.86	17.19	14.50	12.62	10.74	8.62	4.09	1.84	1.29	1.02
BRISBANE	1041.23	37.430	BN 1020		26.66	23.19	18.86	17.19	14.50	12.82	10.71	8.58	4.05	1.83	1.28	1.01
BRISBANE	1041.46	37.200	BN 1010	Tennyson Power House Gauge	26.63	23.16	18.82	17.15	14.44	12.53	10.62	8.51	4.01	1.81	1.27	1.01
BRISBANE	1041.7	36.960	BN 1000		26.62	23.15	18.81	17.13	14.41	12.50	10.58	8.48	4.01	1.81	1.27	1.01
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	26.58	23.09	18.74	17.05	14.30	12.37	10.45	8.36	3.94	1.79	1.27	1.01
BRISBANE	1042.235	36.425	BN 980		26.52	23.04	18.68	16.98	14.21	12.24	10.30	8.23	3.89	1.77	1.26	1.01
BRISBANE	1042.515	36.145	BN 970		26.59	23.11	18.72	16.99	14.20	12.24	10.29	8.21	3.87	1.77	1.26	1.01
BRISBANE	1042.91	35.750	BN 960		26.58	23.10	18.74	17.03	14.21	12.21	10.22	8.13	3.79	1.74	1.24	1.01
BRISBANE	1043.725	34.935	BN 950		26.14	22.71	18.41	16.69	13.85	11.86	9.91	7.85	3.63	1.67	1.22	1.00
BRISBANE	1044.06	34.600	BN 940	Sandy Creek Gauge	25.47	22.18	18.04	16.37	13.59	11.64	9.75	7.75	3.59	1.66	1.21	1.00
BRISBANE	1044.34	34.320	BN 930		25.08	21.85	17.77	16.12	13.37	11.45	9.58	7.61	3.52	1.64	1.21	1.00
BRISBANE	1044.605	34.055	BN 920		25.43	22.01	17.77	16.11	13.34	11.41	9.53	7.55	3.49	1.63	1.20	1.00
BRISBANE	1044.86	33.800	BN 910		25.52	22.00	17.78	16.10	13.31	11.38	9.49	7.51	3.45	1.61	1.20	1.00
BRISBANE	1045.4	33.260	BN 900		25.51	22.01	17.72	16.01	13.12	11.18	9.31	7.34	3.34	1.58	1.18	0.99
BRISBANE	1045.885	32.775	BN 890		25.50	22.00	17.70	15.98	13.09	11.10	9.17	7.15	3.23	1.54	1.17	0.99
BRISBANE	1046.18	32.480	BN 880		25.42	21.93	17.64	15.91	13.01	11.02	9.09	7.10	3.22	1.54	1.16	0.99
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	24.93	21.55	17.36	15.68	12.84	10.90	9.02	7.06	3.20	1.53	1.16	0.99
BRISBANE	1046.58	32.080	BN 860		24.88	21.50	17.33	15.64	12.80	10.85	8.97	7.02	3.18	1.53	1.16	0.99
BRISBANE	1046.9	31.760	BN 850		24.58	21.22	17.07	15.40	12.57	10.64	8.78	6.85	3.09	1.50	1.15	0.99
BRISBANE	1047.35	31.310	BN 840		23.77	20.50	16.48	14.85	12.07	10.20	8.41	6.54	2.95	1.46	1.13	0.98
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	23.48	20.28	16.26	14.61	11.81	9.94	8.17	6.35	2.87	1.43	1.13	0.98
BRISBANE	1048.375	30.285	BN 820		23.77	20.50	16.41	14.75	11.92	10.03	8.23	6.38	2.87	1.43	1.12	0.98
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	23.43	20.19	16.12	14.46	11.64	9.77	8.00	6.18	2.76	1.40	1.11	0.98

TABLE H - 2 - Predicted Flood Levels for Design Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	DESIGN EVENTS											
					PMF WL (m AHD)	10000 YEAR ARI WL (m AHD)	2000 YEAR ARI WL (m AHD)	1000 YEAR ARI WL (m AHD)	500 YEAR ARI WL (m AHD)	200 YEAR ARI WL (m AHD)	100 YEAR ARI WL (m AHD)	50 YEAR ARI WL (m AHD)	20 YEAR ARI WL (m AHD)	10 YEAR ARI WL (m AHD)	5 YEAR ARI WL (m AHD)	2 YEAR ARI WL (m AHD)
BRISBANE	1049.12	29.540	BN 800		23.39	20.07	15.98	14.35	11.55	9.70	7.94	6.14	2.74	1.39	1.11	0.98
BRISBANE	1049.37	29.290	BN 790		23.23	20.01	15.94	14.28	11.44	9.54	7.75	5.99	2.68	1.37	1.10	0.98
BRISBANE	1049.59	29.070	BN 780		23.39	20.13	16.02	14.35	11.48	9.56	7.74	5.97	2.67	1.37	1.10	0.98
BRISBANE	1049.87	28.790	BN 770		23.03	19.79	15.65	14.00	11.21	9.37	7.63	5.88	2.63	1.36	1.10	0.98
BRISBANE	1050.43	28.230	BN 760		23.29	20.02	15.89	14.22	11.34	9.42	7.61	5.82	2.59	1.35	1.09	0.97
BRISBANE	1050.86	27.800	BN 750		22.68	19.55	15.55	13.91	11.09	9.22	7.46	5.73	2.54	1.34	1.09	0.97
BRISBANE	1051.36	27.300	BN 740		22.80	19.53	15.53	13.89	11.08	9.21	7.46	5.72	2.55	1.34	1.09	0.97
BRISBANE	1051.895	26.765	BN 730		22.88	19.53	15.30	13.68	10.87	9.02	7.30	5.57	2.46	1.31	1.08	0.97
BRISBANE	1052.31	26.350	BN 720		22.98	19.72	15.59	13.92	11.06	9.16	7.40	5.65	2.49	1.32	1.08	0.97
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge												
BRISBANE	1052.39	26.270	BN 700		21.93	19.09	15.18	13.60	10.82	8.96	7.23	5.51	2.44	1.30	1.07	0.97
BRISBANE	1052.595	26.065	BN 690		21.33	18.63	14.81	13.29	10.59	8.79	7.14	5.45	2.42	1.30	1.07	0.97
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge												
BRISBANE	1052.64	26.020	BN 670		20.14	16.83	12.85	11.69	9.61	8.14	6.63	5.08	2.34	1.28	1.06	0.96
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	20.03	16.44	12.55	11.44	9.41	7.96	6.49	4.98	2.32	1.28	1.06	0.96
BRISBANE	1053.32	25.340	BN 650		20.07	16.61	12.55	11.42	9.36	7.88	6.42	4.92	2.28	1.26	1.06	0.96
BRISBANE	1053.356	25.304	BN 640	Victoria Bridge												
BRISBANE	1053.385	25.275	BN630		18.15	15.50	12.25	11.04	9.09	7.67	6.24	4.77	2.20	1.24	1.05	0.95
BRISBANE	1053.9	24.760	BN 620		18.08	15.31	11.76	10.55	8.63	7.22	5.85	4.43	2.05	1.20	1.03	0.95
BRISBANE	1054.64	24.020	BN 610		17.86	15.15	11.69	10.48	8.54	7.14	5.78	4.36	2.01	1.19	1.03	0.95
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge												
BRISBANE	1054.68	23.980	BN 590		17.36	14.89	11.54	10.35	8.44	7.05	5.70	4.30	1.98	1.18	1.02	0.95
BRISBANE	1054.97	23.690	BN 560		16.41	14.14	11.01	9.89	8.07	6.74	5.45	4.11	1.92	1.16	1.01	0.95
BRISBANE	1055.28	23.380	BN 550		16.23	14.00	10.91	9.80	8.00	6.68	5.40	4.08	1.90	1.16	1.01	0.95
BRISBANE	1055.42	23.240	BN 540		16.35	14.08	10.95	9.83	8.02	6.69	5.40	4.08	1.90	1.16	1.01	0.95
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	16.51	14.16	10.98	9.82	7.98	6.64	5.34	4.02	1.88	1.15	1.01	0.95
BRISBANE	1056.4	22.260	BN 520		16.23	13.86	10.64	9.49	7.64	6.35	5.09	3.84	1.81	1.13	1.00	0.95
BRISBANE	1056.695	21.965	BN 510		15.70	13.49	10.43	9.33	7.56	6.27	5.03	3.79	1.79	1.13	1.00	0.95
BRISBANE	1056.865	21.795	BN 500		16.59	14.19	10.90	9.74	7.88	6.53	5.22	3.93	1.84	1.14	1.00	0.95
BRISBANE	1056.92	21.740	BN 495	Story Bridge												
BRISBANE	1056.95	21.710	BN 490		16.32	13.95	10.72	9.57	7.73	6.41	5.12	3.85	1.81	1.13	1.00	0.94
BRISBANE	1057.09	21.570	BN 480		15.55	13.35	10.32	9.23	7.47	6.21	4.97	3.75	1.78	1.12	1.00	0.94
BRISBANE	1057.53	21.130	BN 470		15.13	13.00	10.05	8.99	7.28	6.04	4.83	3.65	1.75	1.12	0.98	0.94
BRISBANE	1058.04	20.620	BN 460		14.53	12.49	9.64	8.61	6.94	5.74	4.58	3.45	1.68	1.10	0.99	0.94
BRISBANE	1058.23	20.430	BN 450		14.49	12.40	9.53	8.51	6.85	5.65	4.50	3.39	1.66	1.09	0.98	0.94
BRISBANE	1058.53	20.130	BN 440		13.73	11.77	9.15	8.19	6.61	5.47	4.37	3.30	1.63	1.09	0.98	0.94
BRISBANE	1058.735	19.925	BN 430		14.03	12.01	9.28	8.30	6.69	5.53	4.41	3.32	1.63	1.09	0.98	0.94
BRISBANE	1059.035	19.625	BN 420		12.87	11.00	8.60	7.71	6.23	5.16	4.13	3.12	1.57	1.07	0.98	0.94
BRISBANE	1059.54	19.120	BN 410		13.50	11.43	8.68	7.76	6.23	5.13	4.09	3.08	1.55	1.07	0.97	0.94
BRISBANE	1059.99	18.670	BN 400		12.91	10.97	8.38	7.47	5.97	4.90	3.88	2.92	1.49	1.05	0.97	0.94
BRISBANE	1060.345	18.315	BN 390		11.54	9.91	7.68	6.88	5.53	4.57	3.65	2.76	1.45	1.04	0.97	0.94
BRISBANE	1060.535	18.125	BN 380		10.97	9.46	7.36	6.60	5.30	4.37	3.50	2.86	1.42	1.03	0.96	0.94
BRISBANE	1061.015	17.645	BN 370		11.40	9.72	7.43	6.61	5.29	4.34	3.45	2.62	1.40	1.03	0.96	0.94
BRISBANE	1061.53	17.130	BN 360		10.43	8.95	6.91	6.18	4.94	4.06	3.24	2.47	1.35	1.02	0.96	0.94
BRISBANE	1062.02	16.640	BN 350		10.51	8.97	6.87	6.12	4.87	3.99	3.16	2.41	1.33	1.01	0.96	0.94
BRISBANE	1062.535	16.125	BN 340		10.68	9.06	6.90	6.13	4.85	3.95	3.12	2.37	1.31	1.01	0.95	0.94
BRISBANE	1062.94	15.720	BN 330		10.86	9.12	6.92	6.14	4.85	3.95	3.11	2.36	1.31	1.01	0.95	0.94
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	10.24	8.70	6.63	5.89	4.65	3.79	2.99	2.28	1.28	1.00	0.95	0.94
BRISBANE	1063.645	15.015	BN 310	Cresent Road Gauge	9.08	7.77	5.98	5.32	4.21	3.43	2.72	2.09	1.23	0.99	0.95	0.94
BRISBANE	1064	14.660	BN 300		9.17	7.79	5.95	5.29	4.16	3.38	2.68	2.06	1.22	0.99	0.95	0.94
BRISBANE	1064.49	14.170	BN 290		8.59	7.33	5.63	5.01	3.94	3.21	2.55	1.97	1.19	0.98	0.94	0.94
BRISBANE	1065.01	13.650	BN 280		9.01	7.65	5.81	5.15	4.03	3.26	2.57	1.98	1.20	0.98	0.94	0.94
BRISBANE	1065.503	13.157	BN 270		9.22	7.73	5.76	5.05	3.94	3.19	2.53	1.95	1.19	0.98	0.94	0.94
BRISBANE	1065.99	12.670	BN 260	Cairncross Dock Gauge	8.90	7.54	5.72	5.05	3.95	3.21	2.54	1.96	1.19	0.98	0.94	0.94
BRISBANE	1066.505	12.155	BN 250		9.13	7.64	5.64	4.94	3.85	3.11	2.46	1.91	1.18	0.98	0.94	0.94
BRISBANE	1067.02	11.640	BN 240		8.78	7.39	5.53	4.86	3.79	3.07	2.43	1.88	1.17	0.98	0.94	0.94
BRISBANE	1067.485	11.175	BN 230		8.49	7.14	5.33	4.68	3.63	2.93	2.32	1.81	1.15	0.97	0.94	0.94
BRISBANE	1067.965	10.695	BN 220		7.95	6.69	5.01	4.40	3.41	2.76	2.20	1.73	1.12	0.97	0.94	0.94
BRISBANE	1068.66	10.000	BN 210		7.06	6.00	4.54	4.00	3.10	2.52	2.02	1.61	1.09	0.96	0.93	0.94
BRISBANE	1069.045	9.615	BN 200		7.48	6.21	4.50	3.86	2.97	2.42	1.95	1.56	1.08	0.96	0.93	0.93
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	7.21	5.93	4.28	3.72	2.88	2.34	1.89	1.52	1.07	0.95	0.93	0.93

TABLE H - 2 - Predicted Flood Levels for Design Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	DESIGN EVENTS											
					PMF WL (m AHD)	10000 YEAR ARI WL (m AHD)	2000 YEAR ARI WL (m AHD)	1000 YEAR ARI WL (m AHD)	500 YEAR ARI WL (m AHD)	200 YEAR ARI WL (m AHD)	100 YEAR ARI WL (m AHD)	50 YEAR ARI WL (m AHD)	20 YEAR ARI WL (m AHD)	10 YEAR ARI WL (m AHD)	5 YEAR ARI WL (m AHD)	2 YEAR ARI WL (m AHD)
BRISBANE	1070.025	8.635	BN 180		7.02	5.76	4.07	3.54	2.75	2.25	1.82	1.48	1.06	0.95	0.93	0.93
BRISBANE	1070.53	8.130	BN 170		7.06	5.76	3.99	3.38	2.57	2.11	1.72	1.41	1.04	0.95	0.93	0.93
BRISBANE	1071.04	7.620	BN 160		6.92	5.55	3.72	3.17	2.43	1.99	1.64	1.36	1.03	0.94	0.93	0.93
BRISBANE	1071.52	7.140	BN 150		6.67	5.41	3.74	3.21	2.48	2.04	1.67	1.38	1.03	0.94	0.93	0.93
BRISBANE	1072.015	6.645	BN 140		6.36	5.11	3.44	2.94	2.27	1.88	1.56	1.31	1.01	0.94	0.93	0.93
BRISBANE	1072.515	6.145	BN 130		6.07	4.80	3.24	2.77	2.15	1.79	1.50	1.28	1.01	0.94	0.93	0.93
BRISBANE	1072.995	5.665	BN 120		5.66	4.55	3.09	2.66	2.07	1.73	1.46	1.25	1.00	0.94	0.93	0.93
BRISBANE	1073.485	5.175	BN 110		5.06	4.07	2.77	2.38	1.88	1.59	1.36	1.19	0.98	0.93	0.93	0.93
BRISBANE	1074	4.660	BN 100		4.54	3.68	2.51	2.17	1.73	1.48	1.29	1.14	0.97	0.93	0.93	0.93
BRISBANE	1074.46	4.200	BN 90		4.30	3.33	2.26	1.97	1.59	1.38	1.22	1.10	0.96	0.93	0.93	0.93
BRISBANE	1074.985	3.675	BN 80		3.25	2.50	1.73	1.54	1.31	1.18	1.09	1.02	0.94	0.93	0.93	0.93
BRISBANE	1075.48	3.180	BN 70		2.94	2.29	1.62	1.45	1.25	1.14	1.06	1.00	0.94	0.92	0.92	0.93
BRISBANE	1076	2.660	BN 60		2.84	2.24	1.62	1.46	1.26	1.15	1.07	1.01	0.94	0.92	0.92	0.92
BRISBANE	1076.495	2.165	BN 50		1.89	1.48	1.15	1.08	1.01	0.98	0.96	0.94	0.92	0.92	0.92	0.92
BRISBANE	1077.01	1.650	BN 40		1.65	1.38	1.14	1.08	1.02	0.99	0.96	0.95	0.93	0.92	0.92	0.92
BRISBANE	1077.51	1.150	BN 30		1.57	1.36	1.15	1.10	1.03	1.00	0.97	0.95	0.93	0.92	0.92	0.92
BRISBANE	1078.04	0.620	BN 20		1.31	1.20	1.07	1.04	0.99	0.97	0.95	0.94	0.92	0.92	0.92	0.92
BRISBANE	1078.525	0.135	BN 10		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
BRISBANE	1078.66	0.000	-	Western Inner Bar Gauge	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
BREMER	599.4	-	-		37.65	33.20	28.77	27.11	24.46	22.23	19.76	16.88	10.20	5.20	3.14	1.42
BREMER	600	-	-		37.63	33.18	28.77	27.11	24.46	22.23	19.76	16.87	10.20	5.20	3.14	1.42
OXLEY	599.4	-	-		26.70	23.23	18.91	17.25	14.59	12.76	10.87	8.73	4.14	1.86	1.29	1.01
OXLEY	600	-	-		26.70	23.23	18.91	17.25	14.60	12.76	10.87	8.73	4.14	1.86	1.29	1.02
BREAKFAST	599.4	-	-		10.72	9.05	6.84	6.06	4.79	3.90	3.09	2.34	1.30	1.01	0.95	0.94
BREAKFAST	600	-	-		10.72	9.05	6.84	6.06	4.79	3.90	3.08	2.34	1.30	1.01	0.95	0.94
BULIMBA	599.4	-	-		6.36	5.11	3.43	2.93	2.27	1.88	1.56	1.31	1.01	0.94	0.93	0.93
BULIMBA	600	-	-		6.36	5.11	3.43	2.93	2.27	1.88	1.56	1.31	1.01	0.94	0.93	0.93
CENTWEIR	0	-	-		33.23	28.11	23.48	21.43	18.55	16.36	14.06	11.54	6.05	2.67	1.66	1.08
CENTWEIR	0.08	-	-		32.66	27.50	22.92	21.18	18.32	16.14	13.91	11.45	5.97	2.63	1.64	1.07
INDOORWEIR	0	-	-		28.88	23.12	19.10	17.35	14.73	12.92	11.07	8.98	4.47	2.00	1.35	1.03
INDOORWEIR	0.085	-	-		26.33	22.93	18.72	17.10	14.54	12.77	10.98	8.90	4.32	1.94	1.33	1.02
WILLIAMWEIR	0	-	-		21.33	18.63	14.81	13.29	10.59	8.79	7.14	5.45	2.42	1.30	1.07	0.97
WILLIAMWEIR	0.045	-	-		20.14	16.83	12.85	11.69	9.61	8.14	6.63	5.08	2.34	1.28	1.06	0.96
VICTORIAWEIR	0	-	-		20.07	16.61	12.55	11.42	9.36	7.88	6.42	4.92	2.28	1.26	1.06	0.96
VICTORIAWEIR	0.065	-	-		18.15	15.50	12.25	11.04	9.09	7.67	6.24	4.77	2.20	1.24	1.05	0.95
CAPTAINWEIR	0	-	-		17.86	15.15	11.69	10.48	8.54	7.14	5.78	4.36	2.01	1.19	1.03	0.95
CAPTAINWEIR	0.04	-	-		17.36	14.89	11.54	10.35	8.44	7.05	5.70	4.30	1.98	1.18	1.02	0.95
STORYWEIR	0	-	-		16.59	14.19	10.90	9.74	7.88	6.53	5.22	3.93	1.84	1.14	1.00	0.95
STORYWEIR	0.085	-	-		16.32	13.95	10.72	9.57	7.73	6.41	5.12	3.85	1.81	1.13	1.00	0.94
MERIVALEWEIR	0	-	-		22.98	19.72	15.59	13.92	11.06	9.16	7.40	5.65	2.49	1.32	1.08	0.97
MERIVALEWEIR	0.08	-	-		21.93	19.09	15.18	13.60	10.82	8.96	7.23	5.51	2.44	1.30	1.07	0.97
GOODNALINK1	0	-	-		36.43	31.79	27.26	25.47	22.78	20.57	18.16	15.40	8.95	4.35	2.61	1.28
GOODNALINK1	1	-	-		36.38	31.70	27.08	25.23	22.43	20.07	17.53	14.72	8.36	3.94	2.34	1.21
GOODNALINK2	0	-	-		36.42	31.77	27.22	25.43	22.72	20.52	18.11	15.32	8.88	4.30	2.57	1.27
GOODNALINK2	1.07	-	-		36.18	31.51	26.98	25.19	22.50	20.25	17.77	14.98	8.59	4.11	2.45	1.24
STLUCIALINK1	0	-	-		26.73	23.26	18.94	17.28	14.63	12.79	10.91	8.76	4.15	1.86	1.29	1.02
STLUCIALINK1	1.05	-	-		26.56	23.08	18.71	16.99	14.16	12.14	10.15	8.05	3.74	1.72	1.24	1.00
STLUCIALINK2	0	-	-		26.71	23.24	18.92	17.26	14.62	12.78	10.90	8.73	4.14	1.86	1.29	1.02
STLUCIALINK2	1.05	-	-		26.57	23.09	18.73	17.02	14.19	12.18	10.18	8.09	3.76	1.73	1.24	1.01
STLUCIALINK3	0	-	-		26.65	23.18	18.85	17.18	14.51	12.65	10.79	8.67	4.12	1.85	1.29	1.02
STLUCIALINK3	0.85	-	-		26.58	23.10	18.70	16.98	14.20	12.24	10.29	8.22	3.87	1.77	1.26	1.01

TABLE H-3 - Predicted Discharges for Design Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	DESIGN EVENTS											
			PMF Q (m^3/s)	10000 YEAR ARI Q (m^3/s)	2000 YEAR ARI Q (m^3/s)	1000 YEAR ARI Q (m^3/s)	500 YEAR ARI Q (m^3/s)	200 YEAR ARI Q (m^3/s)	100 YEAR ARI Q (m^3/s)	50 YEAR ARI Q (m^3/s)	20 YEAR ARI Q (m^3/s)	10 YEAR ARI Q (m^3/s)	5 YEAR ARI Q (m^3/s)	2 YEAR ARI Q (m^3/s)
BRISBANE	1000.14	78.52	29818	23872	18246	16373	13372	11115	9235	7185	4225	1627	930	284
BRISBANE	1000.53	78.13	29816	23870	18242	16371	13367	11113	9233	7183	4222	1627	930	284
BRISBANE	1001.05	77.62	29814	23869	18240	16369	13364	11111	9231	7181	4219	1626	929	283
BRISBANE	1001.59	77.07	29812	23867	18237	16367	13360	11108	9229	7179	4214	1624	928	283
BRISBANE	1002.11	76.55	29809	23865	18232	16364	13355	11105	9226	7177	4211	1623	928	283
BRISBANE	1002.57	76.09	29807	23863	18229	16362	13351	11102	9224	7174	4207	1623	927	283
BRISBANE	1003.03	75.63	29801	23859	18223	16358	13345	11099	9222	7172	4202	1622	927	283
BRISBANE	1003.53	75.14	29798	23857	18219	16355	13339	11095	9219	7169	4198	1621	926	283
BRISBANE	1004.04	74.62	29796	23856	18216	16353	13335	11092	9217	7167	4193	1620	926	283
BRISBANE	1004.56	74.11	29793	23853	18210	16350	13329	11089	9214	7164	4189	1619	925	283
BRISBANE	1005.07	73.59	29791	23851	18206	16347	13324	11085	9211	7161	4181	1617	925	283
BRISBANE	1005.60	73.06	29787	23848	18200	16343	13316	11081	9206	7156	4172	1615	923	283
BRISBANE	1006.04	72.63	29785	23846	18196	16341	13311	11077	9203	7153	4165	1614	923	283
BRISBANE	1006.25	72.41	36224	28595	20940	18475	14589	11882	9542	7339	3646	1602	955	367
BRISBANE	1006.61	72.06	36221	28594	20938	18473	14587	11880	9541	7338	3644	1602	955	367
BRISBANE	1007.16	71.50	36217	28590	20933	18469	14584	11877	9538	7335	3640	1601	955	367
BRISBANE	1007.67	71.00	36210	28586	20928	18465	14579	11873	9535	7332	3634	1601	955	367
BRISBANE	1008.18	70.48	36206	28583	20924	18461	14575	11870	9532	7330	3630	1600	954	367
BRISBANE	1008.69	69.98	36202	28579	20920	18456	14571	11866	9531	7329	3628	1600	954	367
BRISBANE	1009.16	69.50	36196	28575	20914	18450	14567	11864	9529	7327	3625	1600	954	368
BRISBANE	1009.56	69.10	36194	28573	20912	18448	14564	11862	9528	7325	3623	1599	954	368
BRISBANE	1010.11	68.56	36189	28569	20906	18443	14559	11858	9525	7322	3618	1599	953	368
BRISBANE	1010.61	68.05	36187	28567	20904	18440	14557	11856	9523	7321	3616	1598	953	368
BRISBANE	1010.85	67.81	36185	28566	20902	18438	14555	11855	9522	7320	3615	1598	953	368
BRISBANE	1011.25	67.42	36183	28564	20900	18437	14554	11853	9521	7319	3613	1598	953	368
BRISBANE	1011.75	66.92	36179	28562	20896	18434	14551	11850	9519	7317	3609	1598	953	368
BRISBANE	1012.23	66.43	36176	28559	20893	18430	14547	11847	9516	7314	3604	1597	953	368
BRISBANE	1012.71	65.96	36170	28555	20887	18424	14542	11843	9513	7311	3599	1597	952	368
BRISBANE	1013.06	65.60	36166	28552	20885	18420	14537	11839	9510	7309	3596	1597	952	368
BRISBANE	1013.32	65.34	31487	24031	17094	15169	12405	10744	9325	7307	3594	1596	952	368
BRISBANE	1013.56	65.10	31484	24028	17090	15165	12401	10740	9322	7305	3593	1596	952	368
BRISBANE	1013.80	64.87	20721	16276	12895	11899	10741	10051	9254	7304	3590	1596	952	368
BRISBANE	1014.11	64.55	20717	16273	12676	11889	10730	10042	9250	7301	3586	1595	952	368
BRISBANE	1014.46	64.20	20712	16269	12658	11880	10718	10033	9245	7298	3582	1595	952	368
BRISBANE	1014.85	63.81	20708	16265	12648	11869	10705	10023	9240	7295	3577	1595	951	368
BRISBANE	1015.33	63.34	20704	16261	12639	11861	10699	10018	9237	7293	3575	1594	951	368
BRISBANE	1015.71	62.96	20702	16260	12636	11858	10696	10015	9236	7292	3573	1594	951	369
BRISBANE	1016.00	62.67	31463	24011	17072	15138	12373	10713	9302	7292	3572	1594	951	369
BRISBANE	1016.39	62.27	31461	24009	17071	15136	12370	10711	9300	7291	3570	1594	951	369
BRISBANE	1016.77	61.90	31458	24007	17069	15132	12366	10706	9297	7289	3568	1593	951	369
BRISBANE	1017.01	61.65	36125	28522	20863	18382	14502	11810	9486	7288	3566	1593	951	369
BRISBANE	1017.37	61.29	36121	28519	20861	18378	14498	11807	9484	7286	3563	1593	951	369
BRISBANE	1017.77	60.90	36114	28515	20857	18372	14493	11803	9480	7284	3561	1593	951	369
BRISBANE	1018.06	60.60	36111	28512	20854	18368	14490	11800	9478	7282	3559	1593	951	369
BRISBANE	1018.46	60.20	36107	28509	20851	18363	14485	11797	9476	7280	3557	1593	951	369
BRISBANE	1018.91	59.75	36103	28506	20848	18359	14481	11795	9474	7279	3556	1592	950	369
BRISBANE	1019.29	59.37	36099	28504	20845	18356	14478	11793	9472	7277	3554	1592	950	369
BRISBANE	1019.68	58.98	36097	28502	20843	18353	14475	11791	9471	7276	3552	1592	950	369
BRISBANE	1019.99	58.67	36095	28501	20843	18352	14473	11790	9470	7275	3551	1592	950	369
BRISBANE	1020.32	58.34	36092	28498	20841	18348	14469	11787	9468	7274	3548	1592	950	369
BRISBANE	1020.68	57.98	36088	28495	20838	18343	14465	11784	9465	7272	3545	1591	950	369
BRISBANE	1020.96	57.70	36086	28494	20837	18342	14463	11783	9464	7271	3544	1591	950	369
BRISBANE	1021.32	57.34	36085	28493	20837	18340	14462	11782	9463	7271	3543	1591	950	369
BRISBANE	1021.63	57.03	36084	28492	20836	18339	14460	11781	9462	7270	3541	1591	950	370
BRISBANE	1021.81	56.86	36082	28491	20835	18338	14459	11781	9461	7269	3540	1591	950	370
BRISBANE	1022.00	56.66	36079	28490	20835	18336	14458	11780	9461	7269	3539	1591	950	370
BRISBANE	1022.34	56.32	36076	28488	20834	18334	14456	11779	9460	7268	3538	1591	950	370
BRISBANE	1022.81	55.85	36073	28486	20832	18331	14453	11777	9458	7267	3536	1590	950	370
BRISBANE	1023.31	55.36	36069	28483	20829	18326	14449	11775	9456	7265	3535	1590	950	370
BRISBANE	1023.83	54.84	36066	28482	20828	18324	14446	11773	9455	7266	3533	1590	950	370

TABLE H-3 - Predicted Discharges for Design Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	DESIGN EVENTS											
			PMF Q (m^3/s)	10000 YEAR ARI Q (m^3/s)	2000 YEAR ARI Q (m^3/s)	1000 YEAR ARI Q (m^3/s)	500 YEAR ARI Q (m^3/s)	200 YEAR ARI Q (m^3/s)	100 YEAR ARI Q (m^3/s)	50 YEAR ARI Q (m^3/s)	20 YEAR ARI Q (m^3/s)	10 YEAR ARI Q (m^3/s)	5 YEAR ARI Q (m^3/s)	2 YEAR ARI Q (m^3/s)
BRISBANE	1024.32	54.34	36062	28479	20825	18320	14443	11771	9453	7267	3532	1590	950	370
BRISBANE	1024.82	53.84	36059	28477	20823	18318	14441	11770	9451	7268	3530	1590	950	370
BRISBANE	1025.22	53.45	36054	28474	20822	18316	14436	11767	9449	7269	3528	1590	950	370
BRISBANE	1025.48	53.19	36053	28473	20822	18315	14434	11766	9448	7270	3527	1590	950	370
BRISBANE	1025.88	52.78	36050	28471	20822	18313	14432	11764	9447	7272	3526	1590	950	370
BRISBANE	1026.43	52.24	36045	28468	20822	18310	14429	11763	9446	7274	3525	1590	949	370
BRISBANE	1026.79	51.87	36043	28466	20822	18308	14426	11761	9444	7276	3523	1589	949	370
BRISBANE	1027.03	51.63	36042	28465	20822	18307	14424	11760	9443	7278	3522	1589	949	370
BRISBANE	1027.42	51.24	36040	28463	20822	18304	14422	11758	9442	7280	3521	1589	949	370
BRISBANE	1027.93	50.73	36036	28461	20821	18301	14418	11756	9440	7285	3519	1589	949	370
BRISBANE	1028.43	50.23	36031	28457	20821	18299	14414	11753	9437	7293	3517	1589	949	371
BRISBANE	1028.72	49.94	14317	14090	13424	12881	11483	10400	9085	7294	3516	1589	949	371
BRISBANE	1028.98	49.68	36027	28454	20820	18294	14409	11750	9434	7293	3515	1589	949	371
BRISBANE	1029.44	49.22	36023	28451	20818	18287	14405	11747	9431	7287	3513	1589	949	371
BRISBANE	1029.95	48.71	36014	28445	20814	18278	14395	11741	9426	7279	3511	1589	949	371
BRISBANE	1030.55	48.11	36003	28438	20807	18263	14386	11736	9421	7266	3507	1588	949	371
BRISBANE	1031.07	47.59	35999	28435	20801	18257	14386	11732	9417	7257	3505	1588	949	371
BRISBANE	1031.48	47.18	35996	28433	20801	18253	14386	11731	9416	7254	3504	1588	949	371
BRISBANE	1031.85	46.81	35995	28432	20802	18251	14386	11730	9415	7252	3503	1588	949	371
BRISBANE	1032.11	46.55	35993	28431	20802	18259	14385	11728	9413	7250	3502	1588	949	371
BRISBANE	1032.41	46.25	35991	28430	20803	18267	14384	11727	9412	7248	3501	1588	949	371
BRISBANE	1032.83	45.83	35989	28428	20805	18272	14383	11725	9410	7246	3500	1588	949	371
BRISBANE	1033.23	45.44	35985	28425	20807	18289	14388	11723	9408	7242	3498	1588	949	371
BRISBANE	1033.64	45.03	35982	28422	20809	18303	14392	11721	9406	7240	3497	1588	949	371
BRISBANE	1034.14	44.53	35979	28420	20814	18314	14397	11720	9405	7237	3496	1588	949	371
BRISBANE	1034.63	44.03	35973	28415	20824	18333	14402	11718	9403	7235	3494	1588	949	371
BRISBANE	1035.15	43.51	35967	28410	20828	18379	14414	11715	9400	7233	3493	1588	949	371
BRISBANE	1035.66	43.00	35964	28407	20831	18387	14423	11713	9398	7232	3491	1588	949	372
BRISBANE	1036.18	42.48	35960	28404	20835	18395	14435	11710	9396	7230	3490	1588	949	372
BRISBANE	1036.62	42.05	35957	28402	20840	18390	14448	11708	9394	7229	3488	1587	949	372
BRISBANE	1036.84	41.82	35955	28401	20847	18401	14455	11707	9393	7228	3487	1587	949	372
BRISBANE	1037.00	41.66	35954	28400	20849	18396	14459	11706	9392	7227	3487	1587	949	372
BRISBANE	1037.11	41.55	29071	26236	20782	18392	14461	11706	9392	7227	3487	1587	949	372
BRISBANE	1037.23	41.43	35953	28400	20856	18375	14464	11705	9391	7226	3486	1587	949	372
BRISBANE	1037.46	41.21	35952	28399	20868	18379	14467	11705	9390	7226	3486	1587	949	372
BRISBANE	1037.86	40.81	35950	28398	20885	18414	14469	11703	9389	7224	3484	1587	949	372
BRISBANE	1038.34	40.32	35940	28391	20843	18427	14446	11694	9379	7218	3482	1587	949	372
BRISBANE	1038.85	39.81	35930	28384	20846	18435	14431	11686	9372	7211	3479	1587	949	372
BRISBANE	1039.15	39.51	35925	28380	20835	18416	14423	11681	9366	7206	3476	1587	949	372
BRISBANE	1039.38	39.28	21512	18356	15682	14411	12305	10725	9205	7153	3474	1587	949	372
BRISBANE	1039.62	39.04	21506	18333	15673	14409	12296	10721	9201	7149	3473	1587	949	372
BRISBANE	1039.75	38.91	17895	16464	14175	13113	11444	10161	9013	7122	3472	1587	949	372
BRISBANE	1039.96	38.70	17424	15016	12345	11489	10377	9658	8673	6928	3402	1586	949	419
BRISBANE	1040.17	38.49	17422	15015	12342	11486	10376	9657	8673	6927	3401	1586	949	419
BRISBANE	1040.37	38.29	11296	10011	9620	9555	9433	9211	8549	6927	3401	1586	949	419
BRISBANE	1040.75	37.91	11293	10011	9605	9543	9425	9208	8549	6926	3401	1586	949	419
BRISBANE	1041.12	37.54	11288	10010	9571	9515	9408	9202	8547	6925	3401	1586	949	420
BRISBANE	1041.35	37.32	11285	10009	9553	9499	9399	9199	8546	6925	3400	1586	949	420
BRISBANE	1041.58	37.08	11284	10008	9542	9490	9393	9197	8546	6924	3400	1586	949	420
BRISBANE	1041.83	36.83	11282	10008	9531	9480	9387	9195	8545	6924	3400	1586	949	420
BRISBANE	1042.10	36.56	11280	10008	9519	9470	9381	9193	8545	6923	3400	1586	949	420
BRISBANE	1042.37	36.29	11278	10007	9508	9462	9375	9191	8544	6923	3400	1586	949	420
BRISBANE	1042.51	36.15	17407	15007	12340	11448	10334	9645	8667	6923	3400	1586	949	420
BRISBANE	1042.71	35.95	17407	15006	12343	11446	10336	9644	8667	6922	3400	1586	949	420
BRISBANE	1042.98	35.70	17407	15005	12345	11445	10340	9643	8667	6922	3400	1586	949	420
BRISBANE	1043.05	35.61	21327	18031	14262	13031	11341	10258	8905	6951	3400	1586	949	420
BRISBANE	1043.10	35.57	21327	18030	14263	13031	11341	10258	8905	6951	3399	1586	949	420
BRISBANE	1043.42	35.24	35879	28548	20038	17464	13776	11332	9099	7009	3399	1586	949	420
BRISBANE	1043.89	34.77	35878	28546	20035	17461	13772	11332	9099	7010	3399	1586	949	421
BRISBANE	1044.20	34.46	35878	28543	20034	17461	13771	11331	9099	7010	3399	1586	949	421

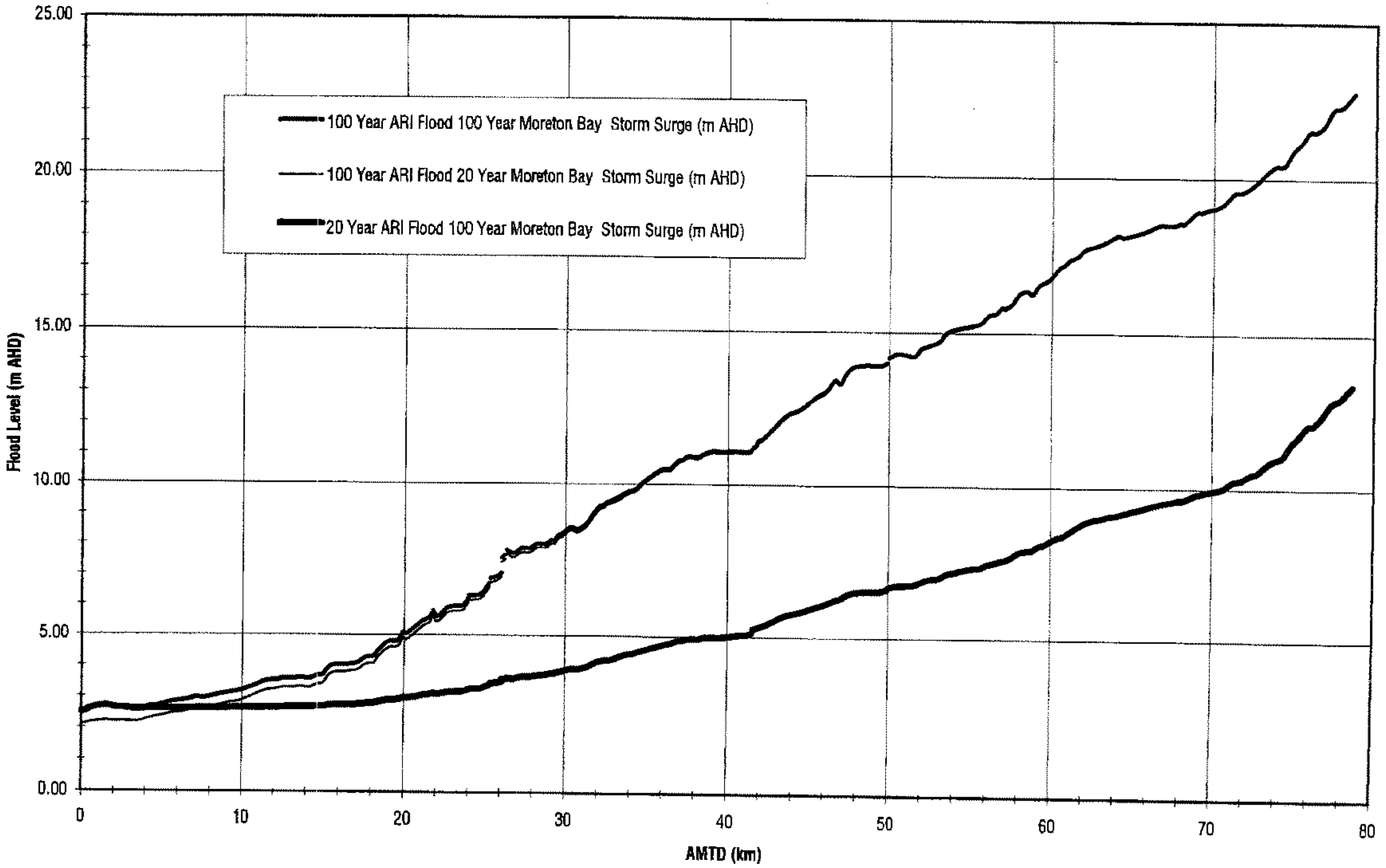
TABLE H-3 - Predicted Discharges for Design Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	DESIGN EVENTS											
			PMF Q (m³/s)	10000 YEAR ARI Q (m³/s)	2000 YEAR ARI Q (m³/s)	1000 YEAR ARI Q (m³/s)	500 YEAR ARI Q (m³/s)	200 YEAR ARI Q (m³/s)	100 YEAR ARI Q (m³/s)	50 YEAR ARI Q (m³/s)	20 YEAR ARI Q (m³/s)	10 YEAR ARI Q (m³/s)	5 YEAR ARI Q (m³/s)	2 YEAR ARI Q (m³/s)
BRISBANE	1044.47	34.19	35877	28540	20034	17460	13770	11331	9098	7010	3399	1586	949	421
BRISBANE	1044.73	33.93	35877	28536	20032	17459	13768	11330	9099	7010	3399	1586	949	421
BRISBANE	1045.13	33.53	35876	28524	20026	17455	13766	11332	9100	7011	3399	1586	949	421
BRISBANE	1045.64	33.02	35874	28509	20024	17449	13761	11333	9103	7012	3398	1586	949	421
BRISBANE	1046.03	32.63	35873	28495	20021	17443	13758	11337	9106	7012	3398	1586	949	421
BRISBANE	1046.26	32.40	35873	28491	20020	17440	13756	11339	9107	7013	3398	1586	949	421
BRISBANE	1046.46	32.20	35872	28494	20019	17439	13756	11339	9108	7013	3398	1586	949	421
BRISBANE	1046.74	31.92	35872	28497	20018	17437	13756	11342	9109	7013	3398	1586	949	421
BRISBANE	1047.13	31.54	35871	28503	20016	17435	13755	11343	9112	7013	3398	1586	949	422
BRISBANE	1047.63	31.03	35870	28513	20014	17433	13754	11340	9115	7013	3398	1586	949	422
BRISBANE	1048.15	30.52	35868	28509	20011	17432	13753	11334	9122	7013	3398	1586	949	422
BRISBANE	1048.63	30.03	35867	28559	20005	17430	13757	11358	9129	7016	3398	1586	949	422
BRISBANE	1049.01	29.65	35866	28619	20004	17429	13756	11357	9131	7019	3398	1586	949	422
BRISBANE	1049.25	29.42	35865	28640	20004	17429	13755	11359	9132	7020	3398	1586	949	422
BRISBANE	1049.48	29.18	35865	28652	20004	17428	13754	11355	9132	7021	3398	1586	949	422
BRISBANE	1049.73	28.93	35865	28667	20004	17428	13755	11359	9132	7022	3398	1586	949	422
BRISBANE	1050.15	28.51	35865	28887	20004	17427	13750	11351	9131	7023	3397	1586	949	422
BRISBANE	1050.65	28.02	35864	28711	20003	17425	13753	11374	9125	7022	3397	1586	949	423
BRISBANE	1051.11	27.55	35864	28720	20002	17423	13745	11369	9121	7032	3397	1586	949	423
BRISBANE	1051.63	27.03	35863	28748	20000	17420	13755	11387	9136	7051	3397	1586	949	423
BRISBANE	1052.10	26.56	35863	28849	19998	17417	13763	11361	9217	7069	3397	1586	949	423
BRISBANE	1052.35	26.31	32954	27406	19989	17416	13779	11386	9250	7079	3397	1586	949	423
BRISBANE	1052.49	26.17	35863	28889	19996	17416	13786	11394	9263	7083	3397	1586	949	423
BRISBANE	1052.63	26.04	32073	28231	19996	17416	13791	11395	9274	7087	3397	1586	949	423
BRISBANE	1052.75	25.91	35863	28908	19996	17416	13773	11368	9269	7081	3397	1586	949	423
BRISBANE	1053.09	25.57	35862	28880	19996	17415	13785	11343	9248	7074	3397	1586	949	423
BRISBANE	1053.36	25.31	32348	27920	19900	17389	13786	11363	9223	7066	3397	1586	949	423
BRISBANE	1053.64	25.02	35862	28820	19995	17415	13789	11389	9240	7058	3397	1586	949	423
BRISBANE	1054.27	24.39	35862	28702	19993	17414	13761	11388	9253	7039	3397	1586	949	424
BRISBANE	1054.66	24.00	33049	27618	19869	17399	13739	11360	9229	7033	3397	1586	949	424
BRISBANE	1054.83	23.84	35862	28704	19992	17414	13740	11350	9221	7031	3397	1586	949	424
BRISBANE	1055.13	23.54	35862	28702	19992	17414	13740	11347	9213	7029	3397	1586	949	424
BRISBANE	1055.35	23.31	35862	28699	19992	17414	13741	11345	9207	7029	3397	1586	949	424
BRISBANE	1055.69	22.97	35862	28695	19992	17413	13742	11342	9198	7031	3397	1586	949	424
BRISBANE	1056.18	22.48	35862	28881	19992	17413	13741	11335	9167	7032	3397	1586	949	424
BRISBANE	1056.55	22.11	35862	28671	19992	17413	13739	11335	9157	7031	3397	1586	949	424
BRISBANE	1056.78	21.88	35862	28665	19991	17413	13738	11333	9151	7030	3397	1586	950	424
BRISBANE	1056.92	21.74	35862	28658	19991	17413	13737	11330	9143	7028	3397	1586	950	424
BRISBANE	1057.02	21.64	35862	28653	19991	17413	13736	11327	9137	7027	3397	1586	950	424
BRISBANE	1057.31	21.35	35862	28644	19991	17412	13734	11325	9126	7025	3397	1586	950	425
BRISBANE	1057.79	20.87	35861	28627	19991	17412	13733	11324	9123	7024	3397	1586	950	425
BRISBANE	1058.14	20.53	35861	28615	19990	17412	13732	11323	9126	7023	3397	1586	950	425
BRISBANE	1058.38	20.28	35861	28603	19990	17412	13732	11321	9128	7023	3397	1586	950	425
BRISBANE	1058.63	20.03	35861	28597	19990	17412	13732	11320	9128	7022	3397	1586	950	425
BRISBANE	1058.89	19.78	35861	28588	19990	17411	13732	11319	9128	7022	3397	1586	950	425
BRISBANE	1059.29	19.37	35861	28580	19989	17411	13732	11319	9128	7021	3397	1586	950	425
BRISBANE	1059.77	18.89	35861	28554	19989	17411	13731	11317	9124	7019	3397	1586	950	425
BRISBANE	1060.17	18.49	35861	28555	19988	17410	13731	11315	9119	7017	3397	1586	950	425
BRISBANE	1060.44	18.22	35861	28559	19988	17410	13731	11314	9117	7018	3397	1586	950	425
BRISBANE	1060.78	17.88	35861	28564	19988	17410	13731	11314	9115	7018	3397	1586	950	425
BRISBANE	1061.27	17.39	35861	28571	19987	17410	13731	11313	9110	7019	3397	1586	950	425
BRISBANE	1061.78	16.88	35861	28575	19987	17410	13731	11312	9107	7020	3397	1586	950	426
BRISBANE	1062.28	16.38	35861	28574	19987	17410	13731	11312	9103	7021	3397	1586	950	426
BRISBANE	1062.74	15.92	35861	28569	19987	17410	13730	11311	9106	7021	3398	1586	950	426
BRISBANE	1063.03	15.63	35861	28570	19986	17409	13730	11311	9107	7020	3398	1586	950	426
BRISBANE	1063.22	15.44	35892	28465	19980	17404	13725	11309	9097	7011	3398	1586	951	434
BRISBANE	1063.48	15.18	35892	28465	19980	17404	13725	11309	9096	7010	3398	1586	951	434
BRISBANE	1063.82	14.84	35892	28464	19980	17403	13725	11309	9095	7010	3398	1586	951	434
BRISBANE	1064.25	14.42	35891	28464	19980	17403	13725	11309	9095	7010	3398	1586	951	434
BRISBANE	1064.75	13.91	35891	28463	19979	17403	13725	11309	9095	7009	3398	1586	951	434

TABLE H-3 - Predicted Discharges for Design Events

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	DESIGN EVENTS											
			PMF Q (m³/s)	10000 YEAR ARI Q (m³/s)	2000 YEAR ARI Q (m³/s)	1000 YEAR ARI Q (m³/s)	500 YEAR ARI Q (m³/s)	200 YEAR ARI Q (m³/s)	100 YEAR ARI Q (m³/s)	50 YEAR ARI Q (m³/s)	20 YEAR ARI Q (m³/s)	10 YEAR ARI Q (m³/s)	5 YEAR ARI Q (m³/s)	2 YEAR ARI Q (m³/s)
BRISBANE	1065.26	13.40	35891	28462	19979	17403	13724	11308	9095	7009	3398	1586	951	434
BRISBANE	1065.75	12.91	35891	28462	19978	17402	13724	11308	9094	7009	3398	1586	952	434
BRISBANE	1066.25	12.41	35891	28461	19978	17402	13724	11308	9094	7009	3398	1586	952	434
BRISBANE	1066.76	11.90	35891	28460	19977	17401	13723	11308	9093	7009	3398	1586	952	434
BRISBANE	1067.25	11.41	35891	28460	19977	17401	13723	11308	9093	7009	3398	1587	952	435
BRISBANE	1067.73	10.94	35891	28459	19977	17401	13723	11308	9093	7009	3398	1587	952	435
BRISBANE	1068.31	10.35	35891	28459	19976	17400	13723	11308	9093	7009	3398	1587	952	435
BRISBANE	1068.85	9.81	35890	28459	19976	17400	13723	11308	9094	7008	3398	1587	952	435
BRISBANE	1069.29	9.37	35890	28459	19976	17400	13722	11306	9094	7008	3398	1587	952	435
BRISBANE	1069.78	8.88	35890	28458	19976	17400	13722	11308	9094	7008	3398	1587	952	435
BRISBANE	1070.28	8.38	35891	28458	19975	17399	13722	11308	9094	7008	3398	1587	952	435
BRISBANE	1070.79	7.87	35891	28457	19975	17399	13722	11308	9095	7008	3398	1587	953	435
BRISBANE	1071.28	7.38	35891	28456	19974	17398	13722	11307	9095	7008	3398	1587	953	435
BRISBANE	1071.77	6.89	35891	28455	19974	17398	13722	11307	9095	7008	3398	1587	953	436
BRISBANE	1072.02	6.84	35891	28455	19974	17398	13722	11307	9095	7008	3398	1587	953	436
BRISBANE	1072.27	6.39	35933	28467	19967	17393	13720	11307	9088	7003	3398	1587	959	503
BRISBANE	1072.76	5.90	35933	28467	19987	17393	13720	11307	9088	7004	3398	1587	959	503
BRISBANE	1073.24	5.42	35933	28467	19967	17393	13720	11307	9088	7004	3398	1587	959	503
BRISBANE	1073.74	4.92	35933	28467	19967	17393	13720	11307	9088	7004	3398	1587	960	504
BRISBANE	1074.23	4.43	35933	28467	19967	17393	13720	11307	9088	7004	3399	1587	960	504
BRISBANE	1074.72	3.94	35933	28467	19967	17393	13720	11307	9088	7004	3399	1587	960	504
BRISBANE	1075.23	3.43	35933	28467	19967	17393	13720	11307	9088	7004	3399	1587	960	504
BRISBANE	1075.74	2.92	35933	28467	19967	17393	13720	11307	9088	7004	3399	1587	960	504
BRISBANE	1076.25	2.41	35933	28467	19967	17393	13720	11307	9088	7004	3399	1587	960	504
BRISBANE	1076.75	1.91	35933	28467	19967	17393	13720	11307	9088	7005	3399	1587	961	505
BRISBANE	1077.26	1.40	35933	28467	19967	17393	13720	11307	9088	7005	3399	1587	961	505
BRISBANE	1077.78	0.88	35933	28467	19967	17393	13720	11307	9088	7005	3399	1587	961	505
BRISBANE	1078.28	0.38	35933	28467	19987	17393	13720	11307	9088	7005	3399	1587	961	505
BRISBANE	1078.59	0.07	35933	28467	19967	17393	13720	11307	9088	7005	3399	1587	961	505
BREMER	599.70	-	6461	4753	2982	2632	2104	1622	2191	1869	960	874	636	230
OXLEY	599.70	-	2263	2440	2476	2080	1279	729	1167	828	474	400	307	164
BREAKFAST	599.70	-	656	570	167	137	103	92	408	335	249	201	168	100
BULIMBA	599.70	-	603	426	222	158	99	90	651	538	368	301	248	162
CENTWEIR	0.04	-	26640	18626	10963	5690	3054	1380	377	9	0	0	0	0
INDOORWEIR	0.04	-	7478	2211	725	10	0	0	0	0	0	0	0	0
WILLIAMWEIR	0.02	-	3790	1057	0	0	0	0	0	0	0	0	0	0
VICTORIAWEIR	0.03	-	3523	961	95	60	0	0	0	0	0	0	0	0
CAPTAINWEIR	0.02	-	2921	1085	124	15	0	0	0	0	0	0	0	0
STORYWEIR	0.04	-	0	0	0	0	0	0	0	0	0	0	0	0
MERIVALEWEIR	0.04	-	2909	1555	8	0	0	0	0	0	0	0	0	0
GOODNALINK1	0.50	-	4922	4522	3795	3255	2151	1122	204	0	0	0	0	0
GOODNALINK2	0.54	-	10763	7755	4493	3333	1732	750	77	0	0	0	0	0
STLUCIALINK1	0.53	-	14552	10519	5869	4462	2459	1077	195	59	0	0	0	0
STLUCIALINK2	0.53	-	3921	3028	1923	1568	1017	618	241	29	0	0	0	0
STLUCIALINK3	0.43	-	6139	5039	3401	2584	1175	474	123	0	0	0	0	0

Figure H-1 - Combined Tailwater & River Flooding Conditions - Moreton Bay Storm Surge

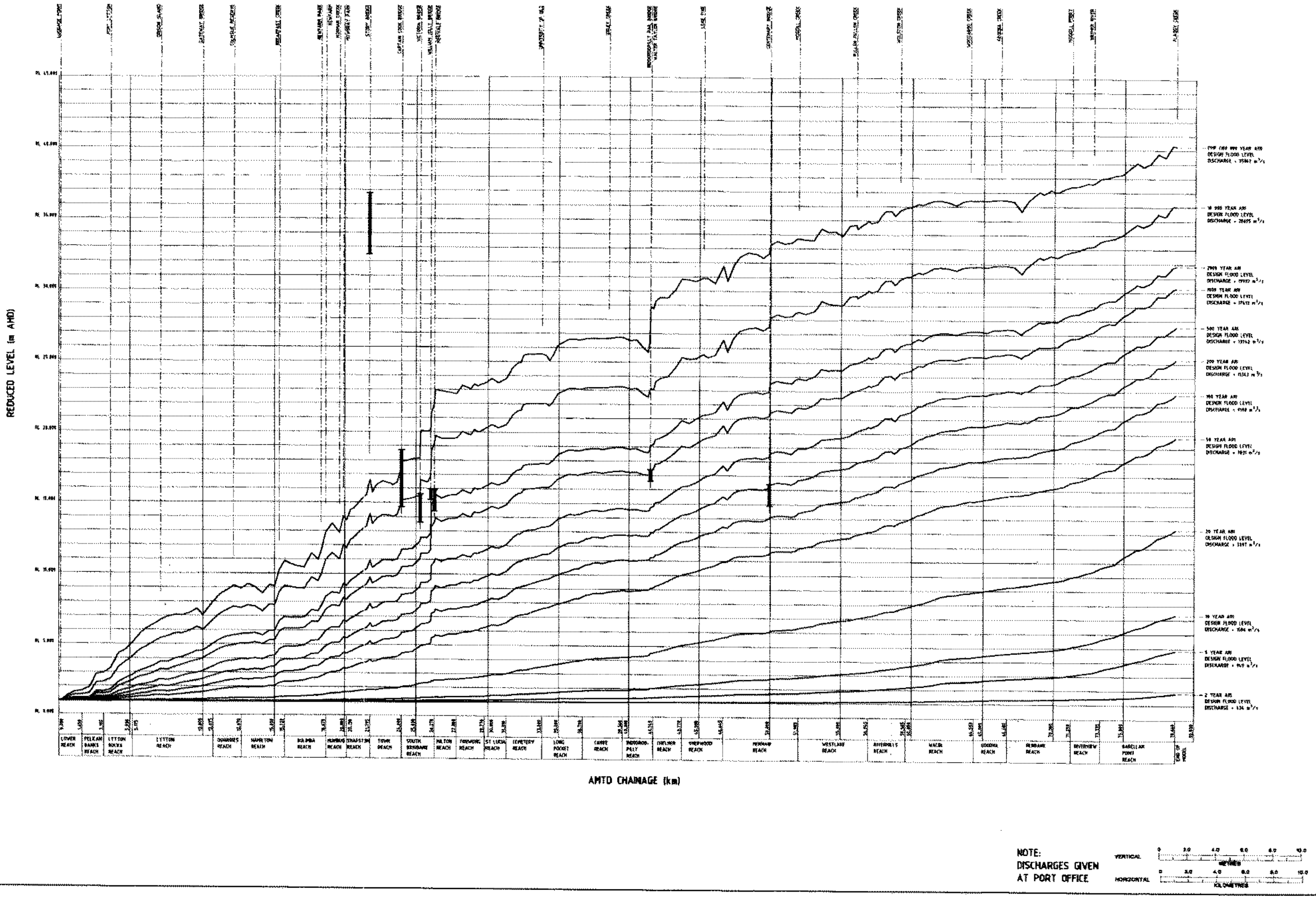


SINCLAIR KNIGHT MERZ

FIGURE H-2

BRISBANE RIVER FLOOD STUDY

DESIGN PROFILES FOR THE BRISBANE RIVER - COMBINED



NOTE:
DISCHARGES GIVEN
AT PORT OFFICE

FILE NAME 4157-263
PLOT SCALE 1=250

DISK N° G\

JOB N° T004157

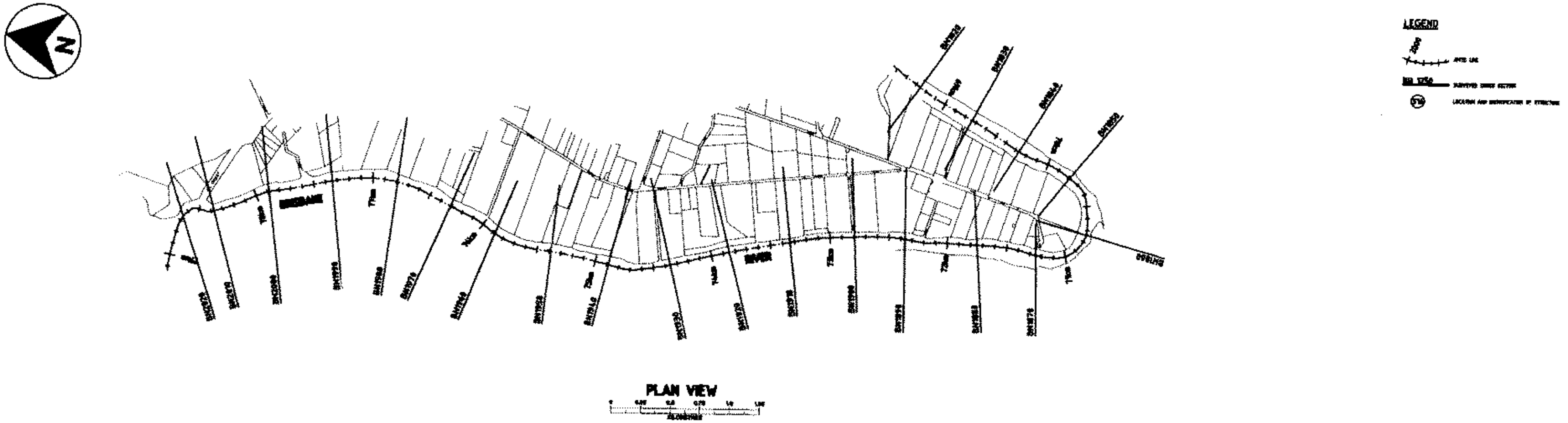
DATE 14-2-98

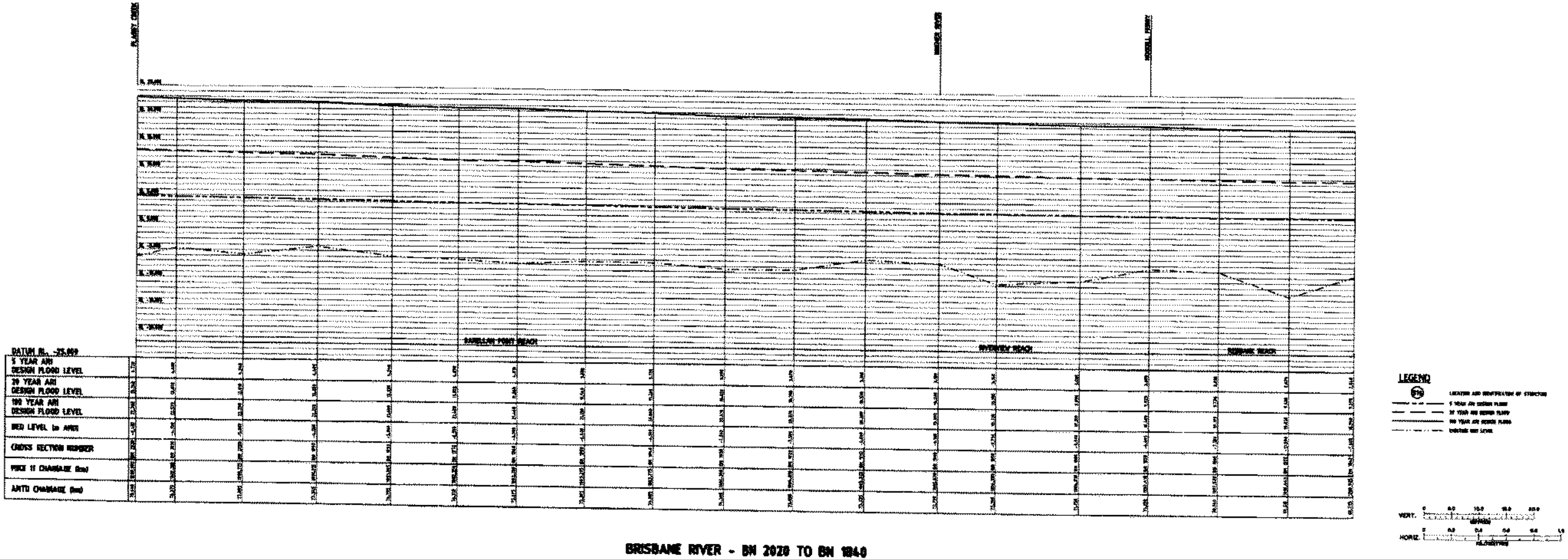
SINCLAIR KNIGHT MERZ

FIGURE H-3a

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS





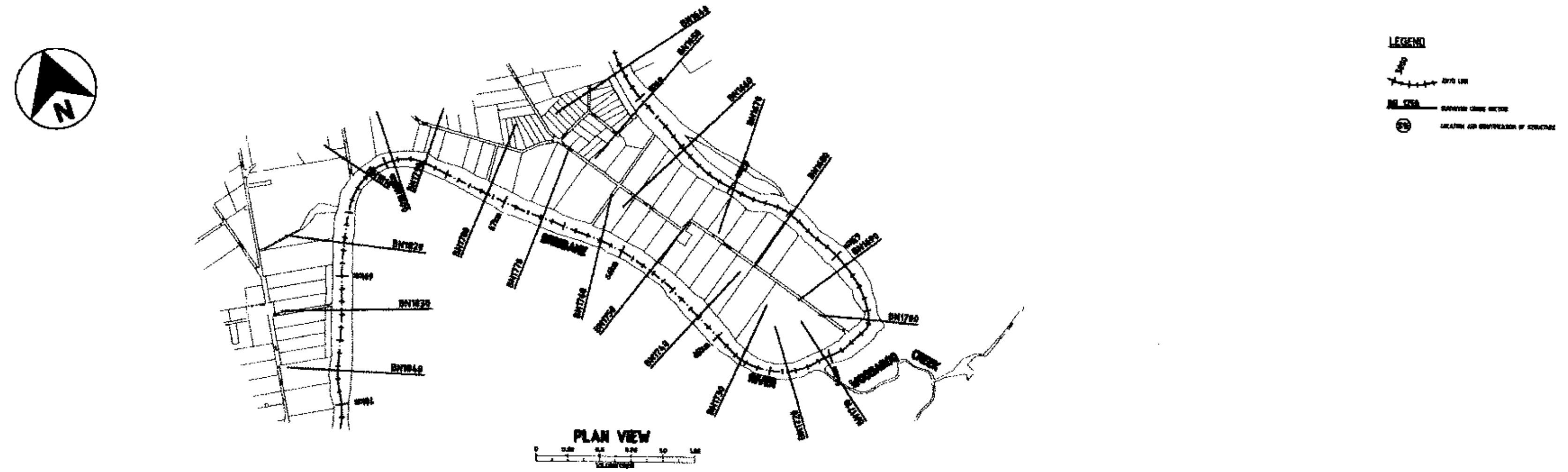
BRISBANE RIVER - BN 2028 TO BN 1840

FILE NAME 4157-119 PLOT SCALE 1:30 DISK N° C:\DWG JOB N° T00457 DATE 23/3/97

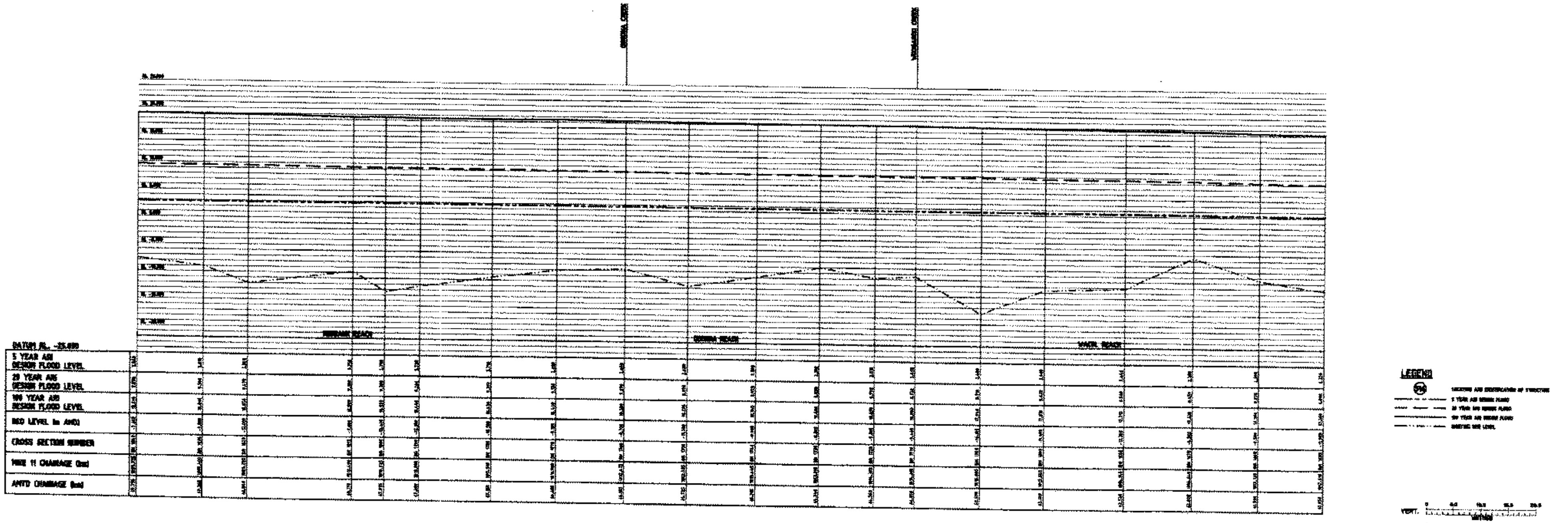
FIGURE H-3b

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW



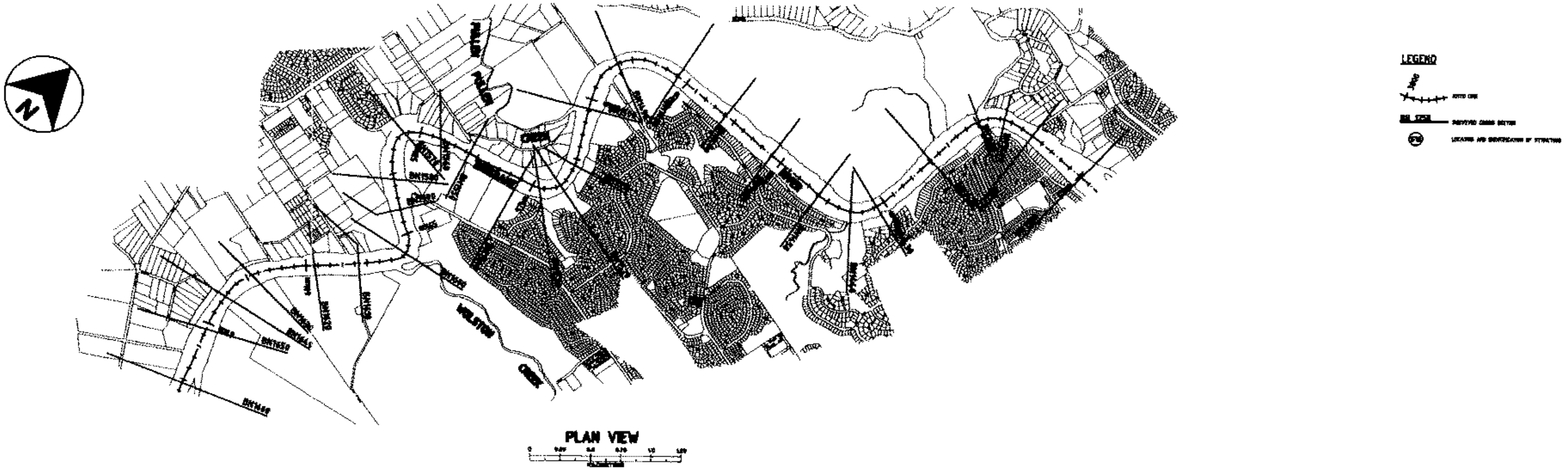
BRISBANE RIVER - BN 1840 TO BN 1650

SINCLAIR KNIGHT MERZ

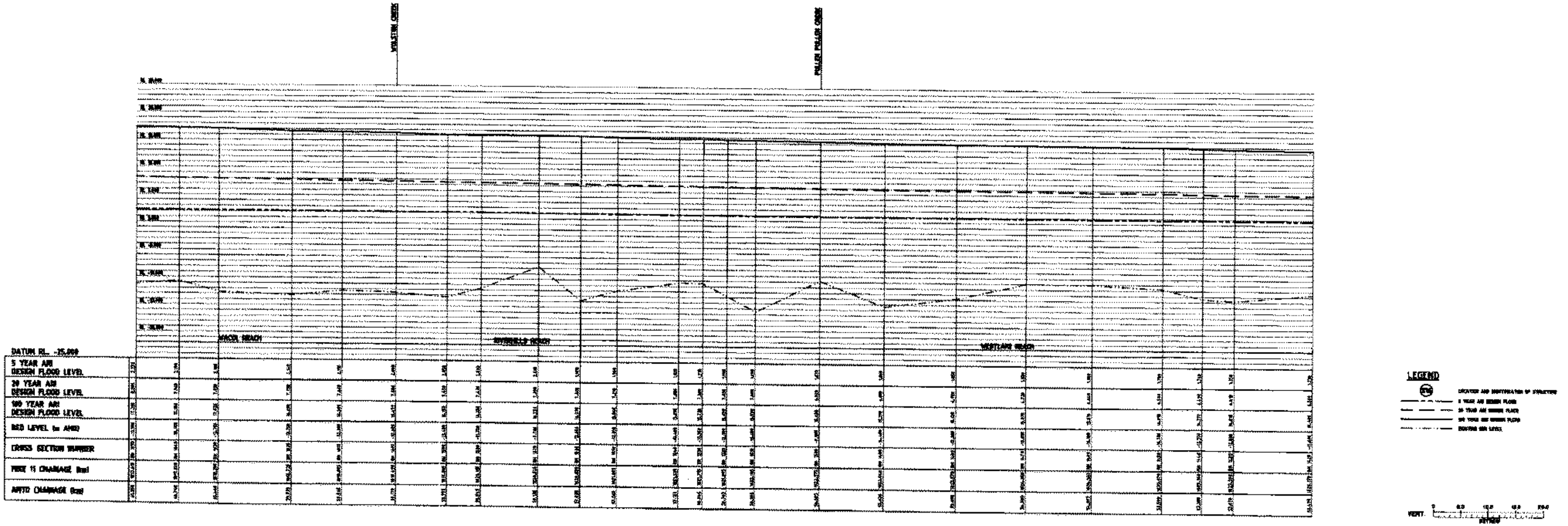
FIGURE H-3c

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW



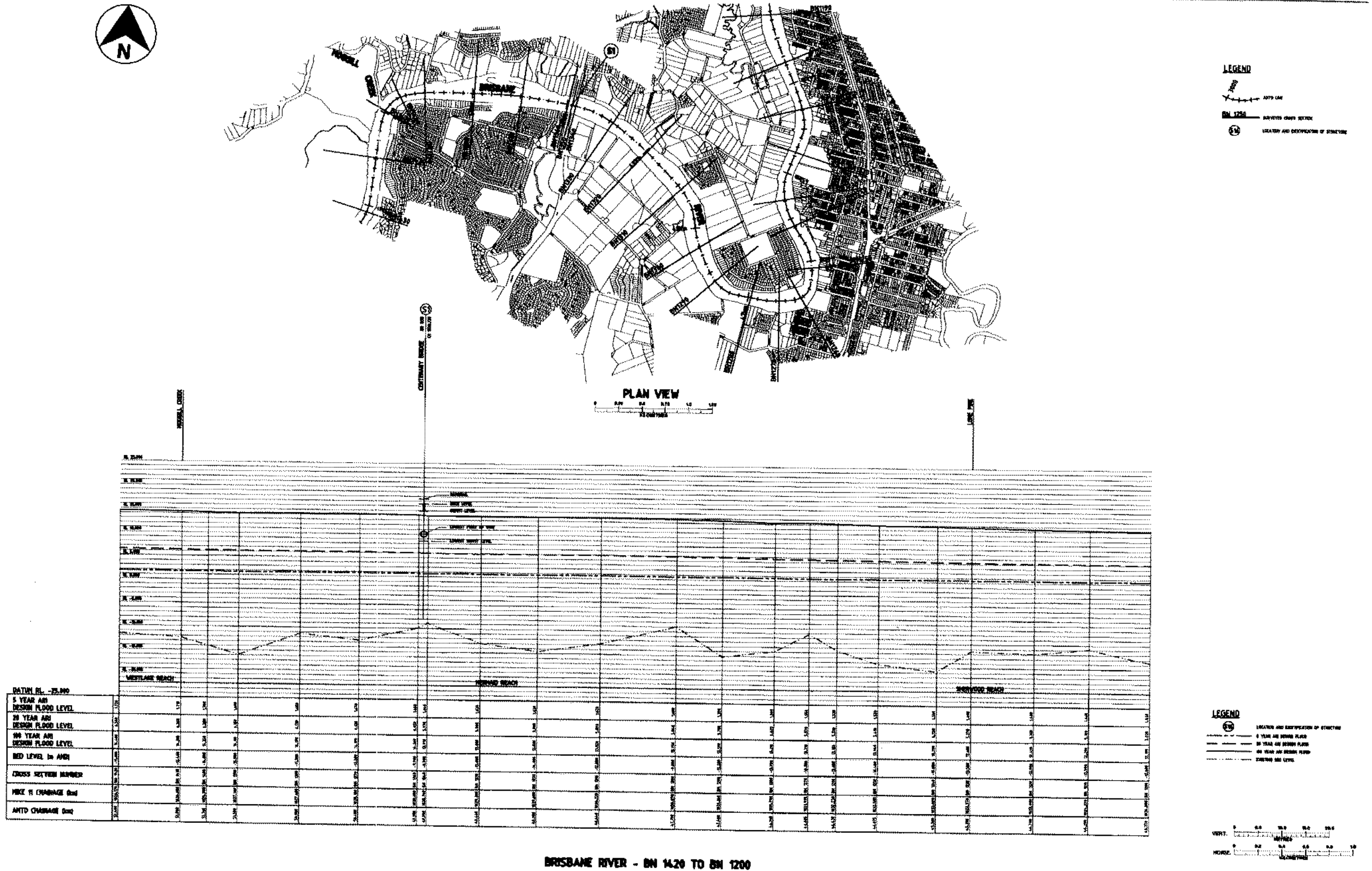
BRISBANE RIVER - BN 1650 TO BN 1420

FILE NAME 4157-121
PLOT SCALE 1:30
DISK N° C:\DWG
JOB N° TC04157
DATE: 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE H-3d

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



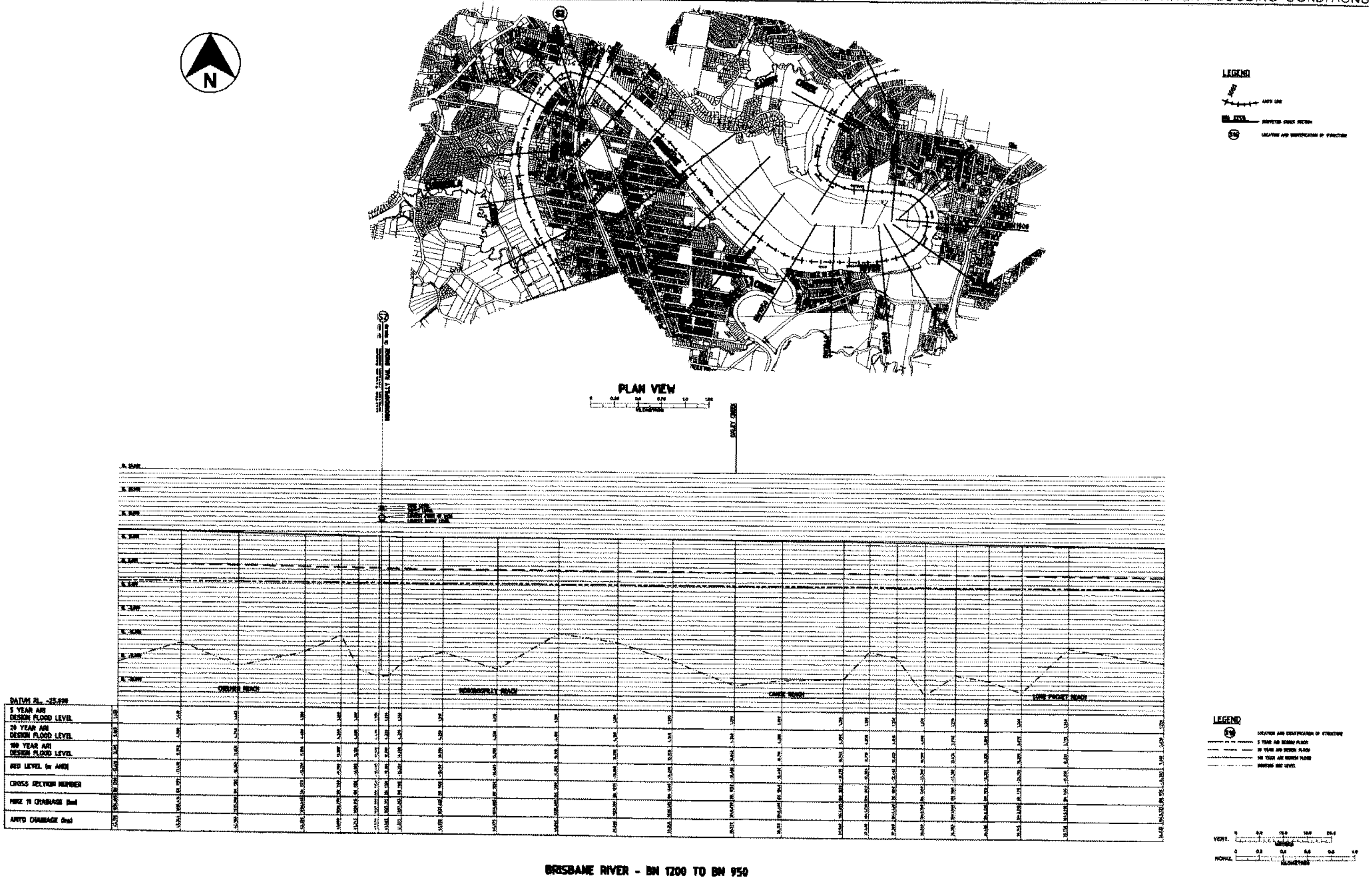
BRISBANE RIVER - BN 1420 TO BN 1200

SINCLAIR KNIGHT MERZ

FIGURE H-3e

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



BRISBANE RIVER - BN 1200 TO BN 950

FILE NAME 415/-123 DISK N° C:\DWG JOB N° T00457 DATE 23/3/97
PLOT SCALE 1=30

SINCLAIR KNIGHT MERZ

FIGURE H-3f

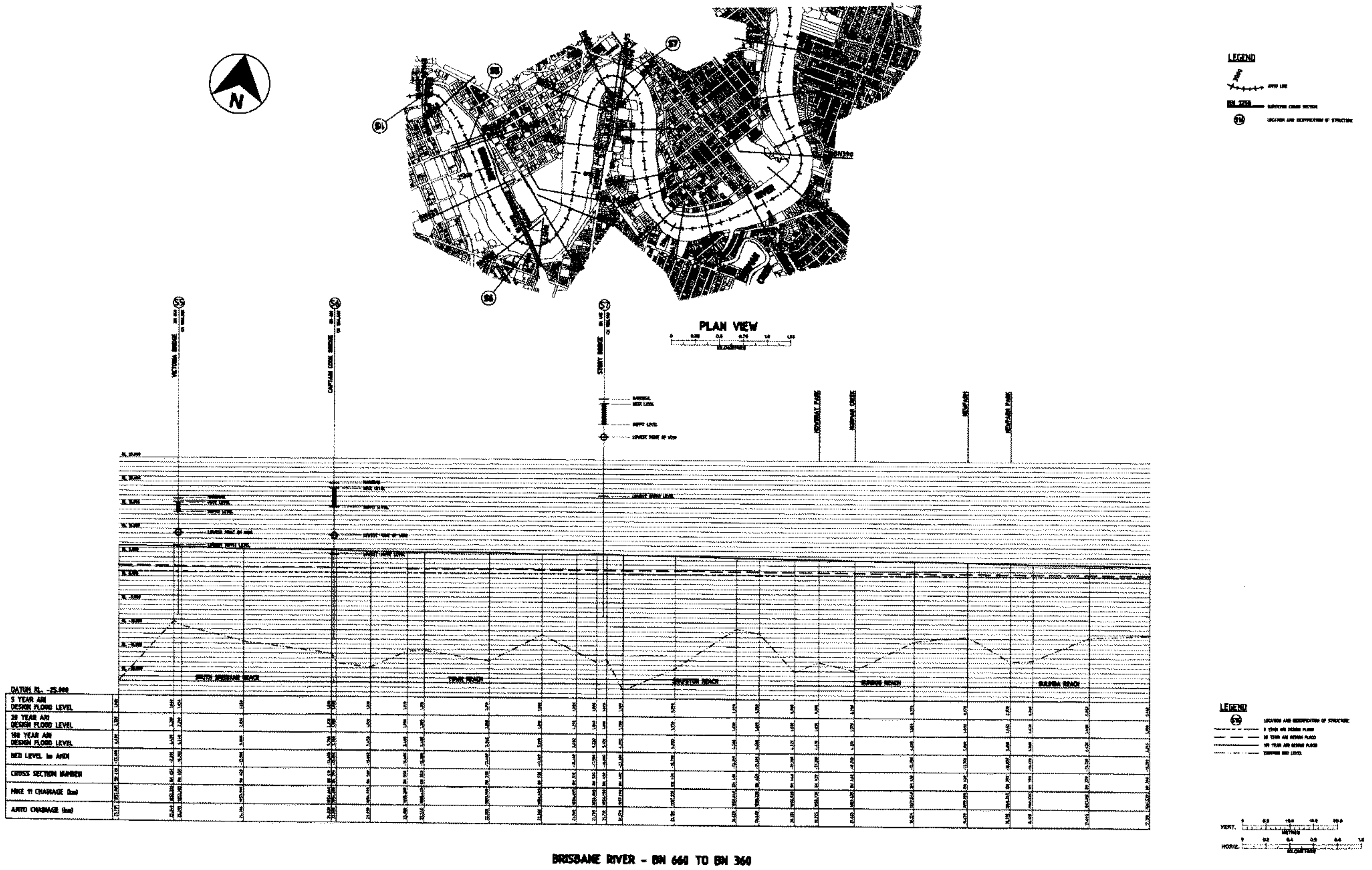
BRISBANE RIVER FLOOD STUDY

MIKE .. EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

FILE NAME 435/-129
PLOT SCALE 1:30
DISK Nº C:\DWG
JOB Nº T0045/
DATE: 23/3/?

FIGURE H-3g

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

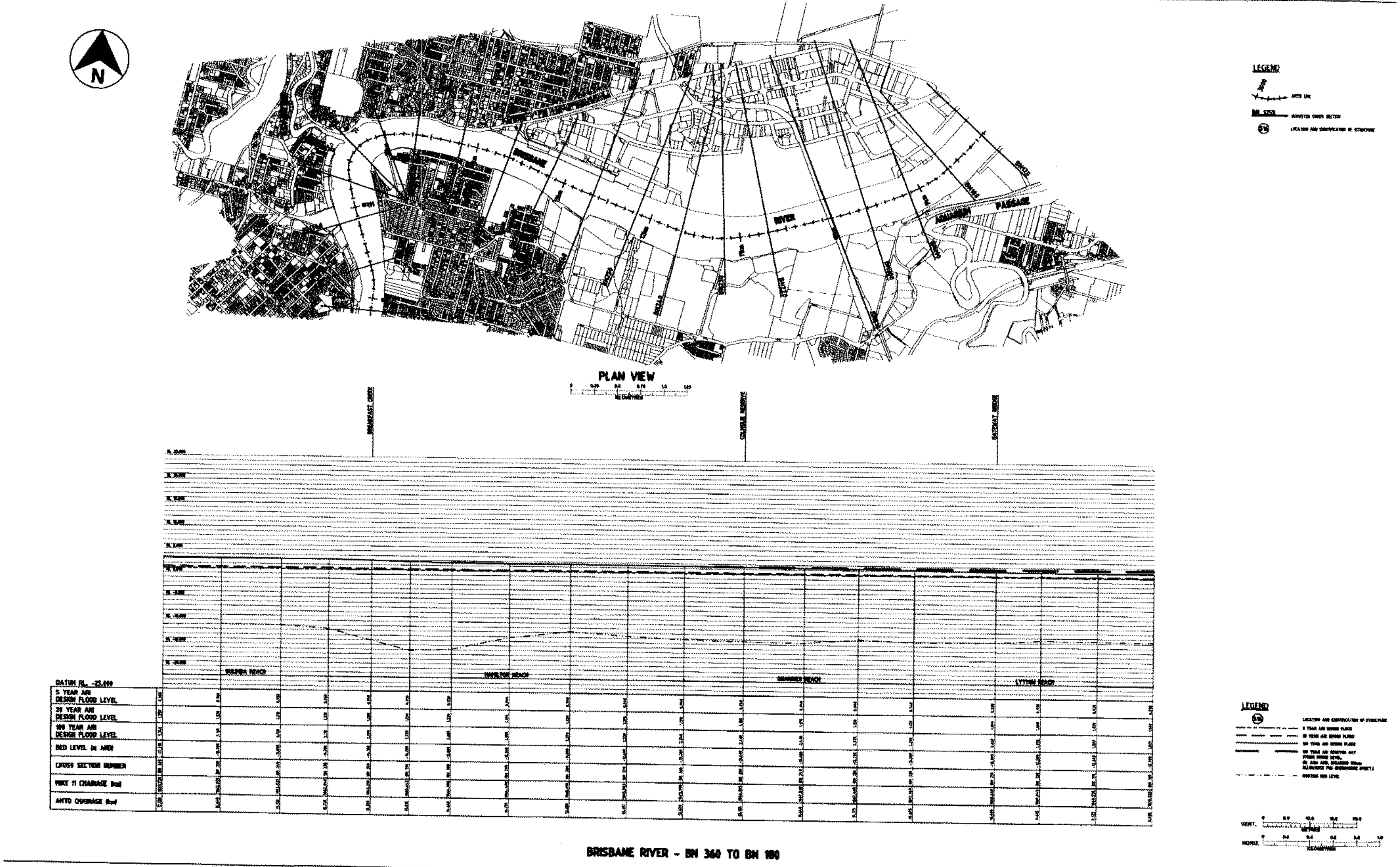


BRISBANE RIVER - BN 660 TO BN 360

SINCLAIR KNIGHT MERZ

FIGURE H-3h

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISITNG DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

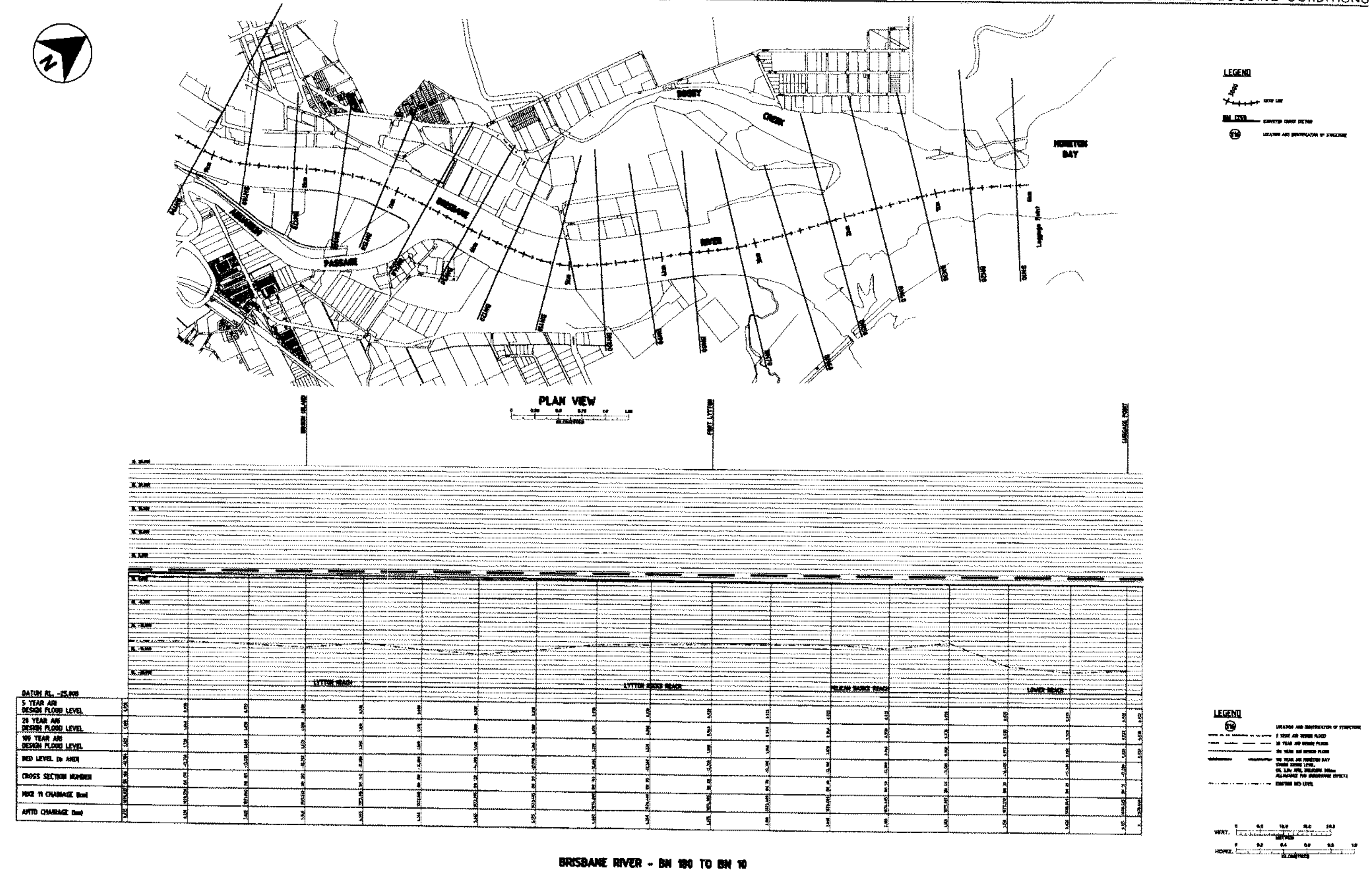


FILE NAME 415-[illegible]
PLOT SCALE 1:30
DWG N. [illegible]
JOB N. T004[illegible]
DATE 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE H-3i

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



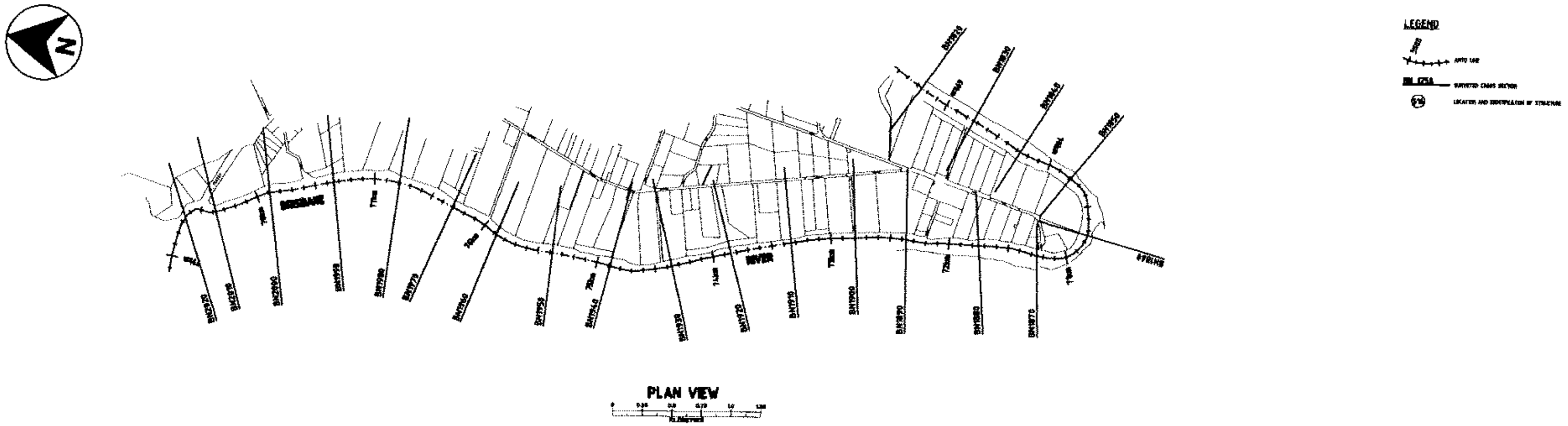
FILE NAME 415[illegible] DISK No: C\DWG JOB No: [illegible] DATE 23/[illegible]
PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

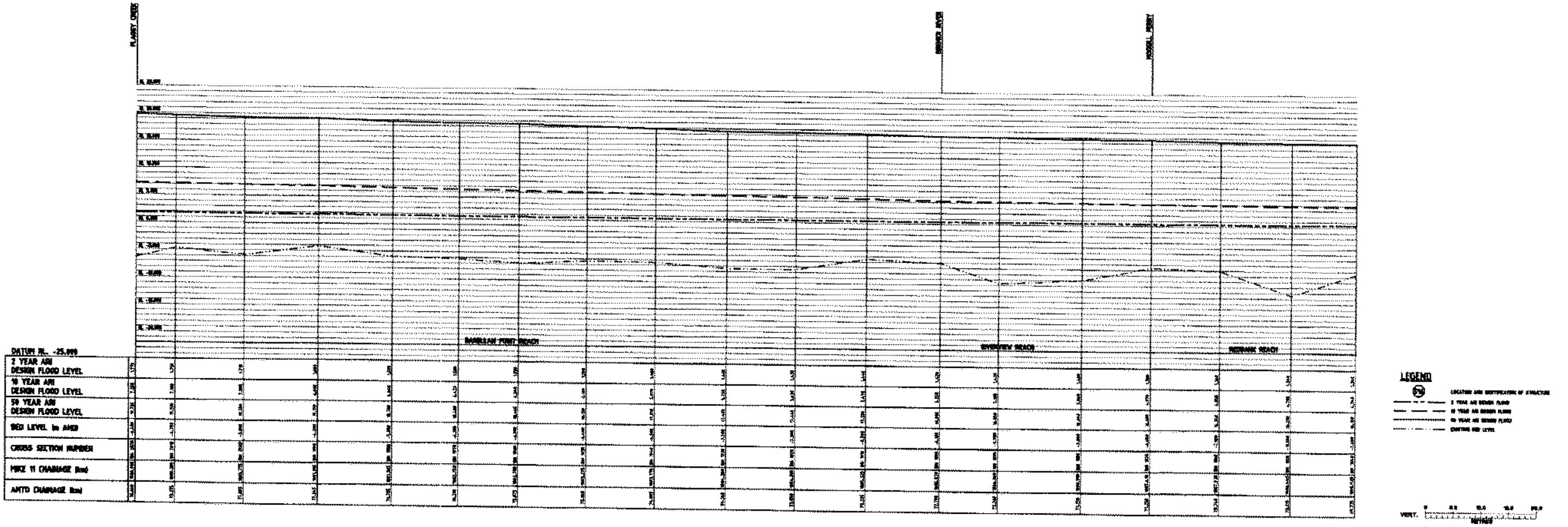
FIGURE H-4a

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW



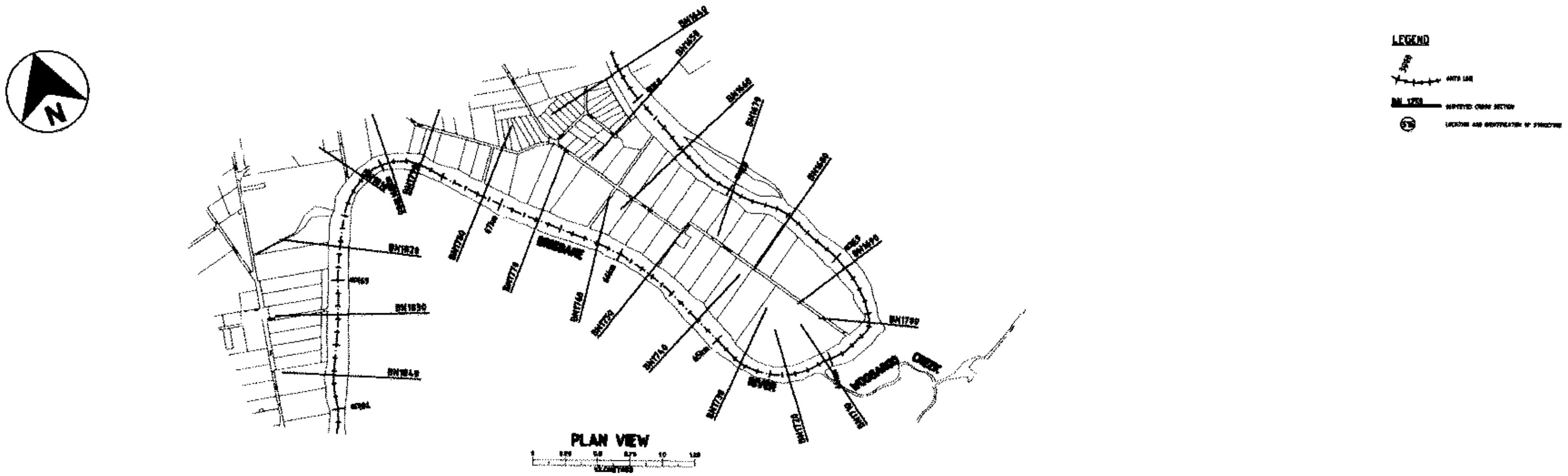
BRISBANE RIVER - BN 2020 TO BN 1840

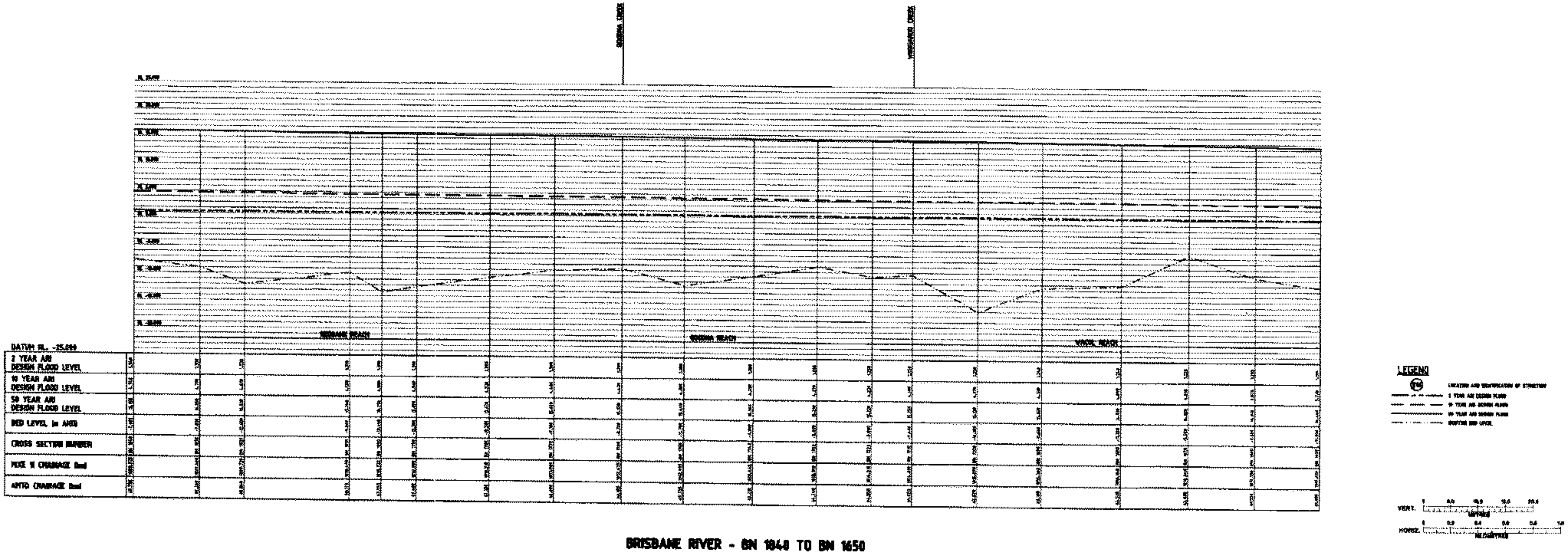
FILE ..... 415 ...
PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

FIGURE H-4b

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS





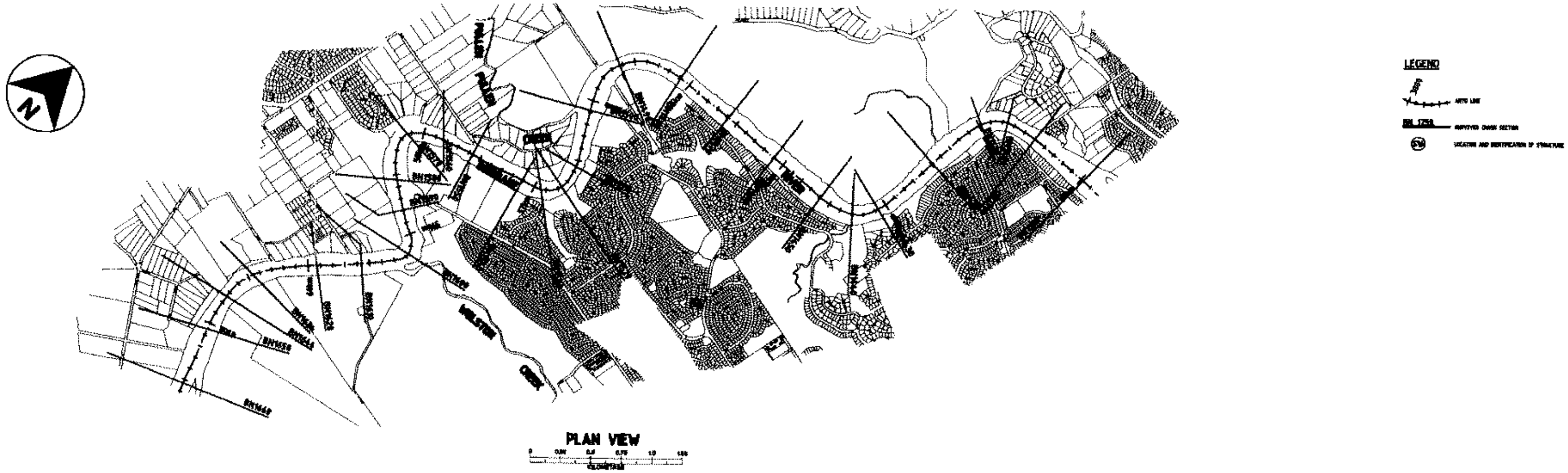
BRISBANE RIVER - BN 1848 TO BN 1650

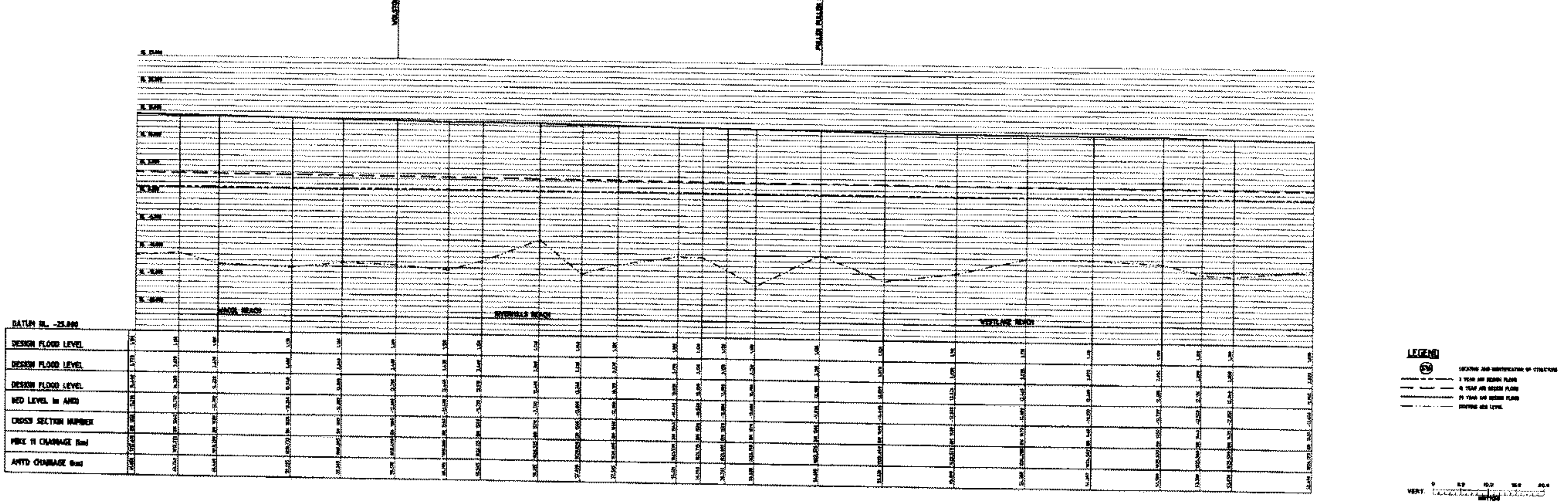
FILE NAME 415/-129
PLOT SCALE 1:30
DISK N° C:\DWG
JOB N T00457
DATE 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE H-4c

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



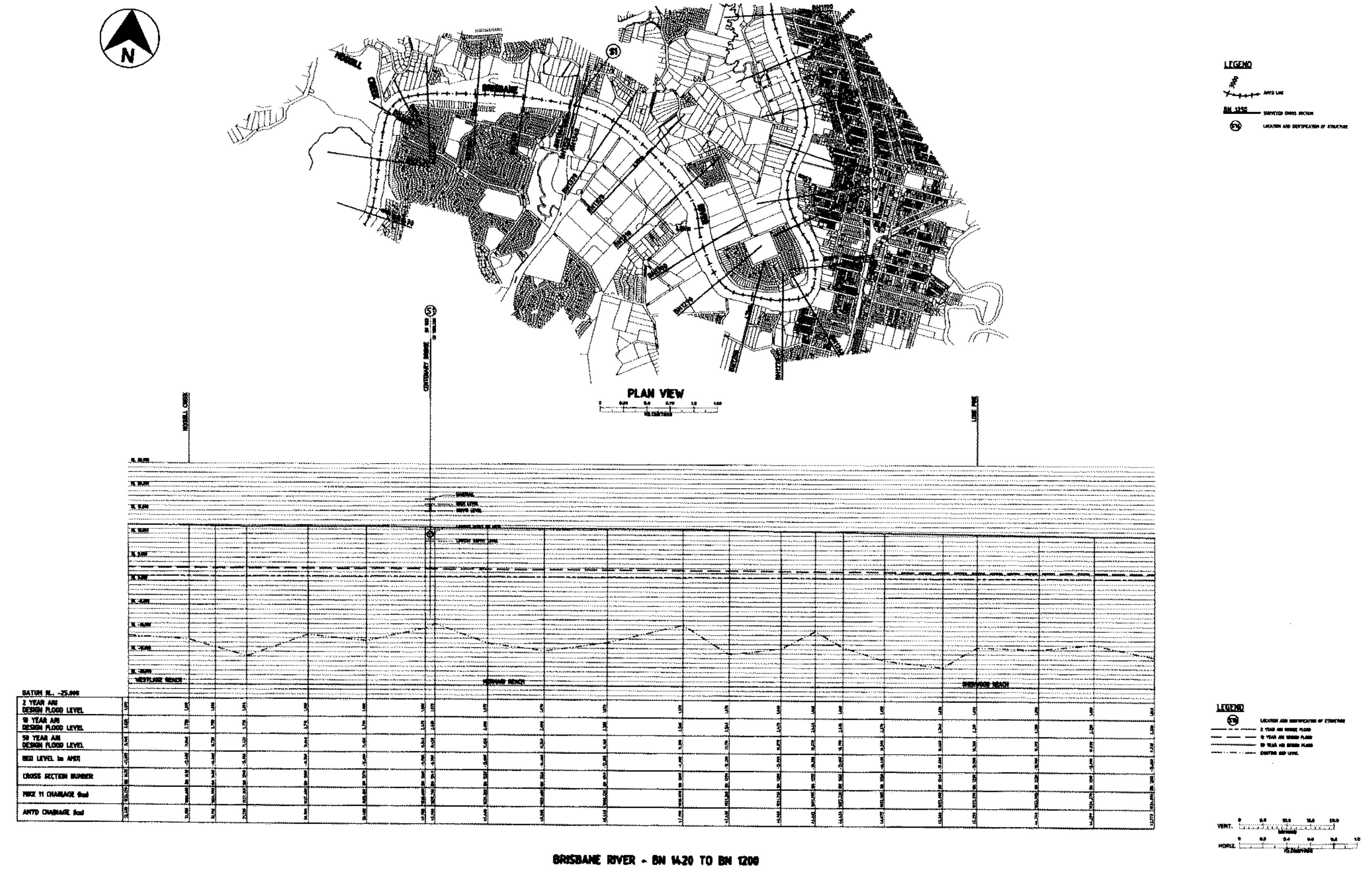


BRISBANE RIVER - BN 1650 TO BN 1420

FIGURE H-4d

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

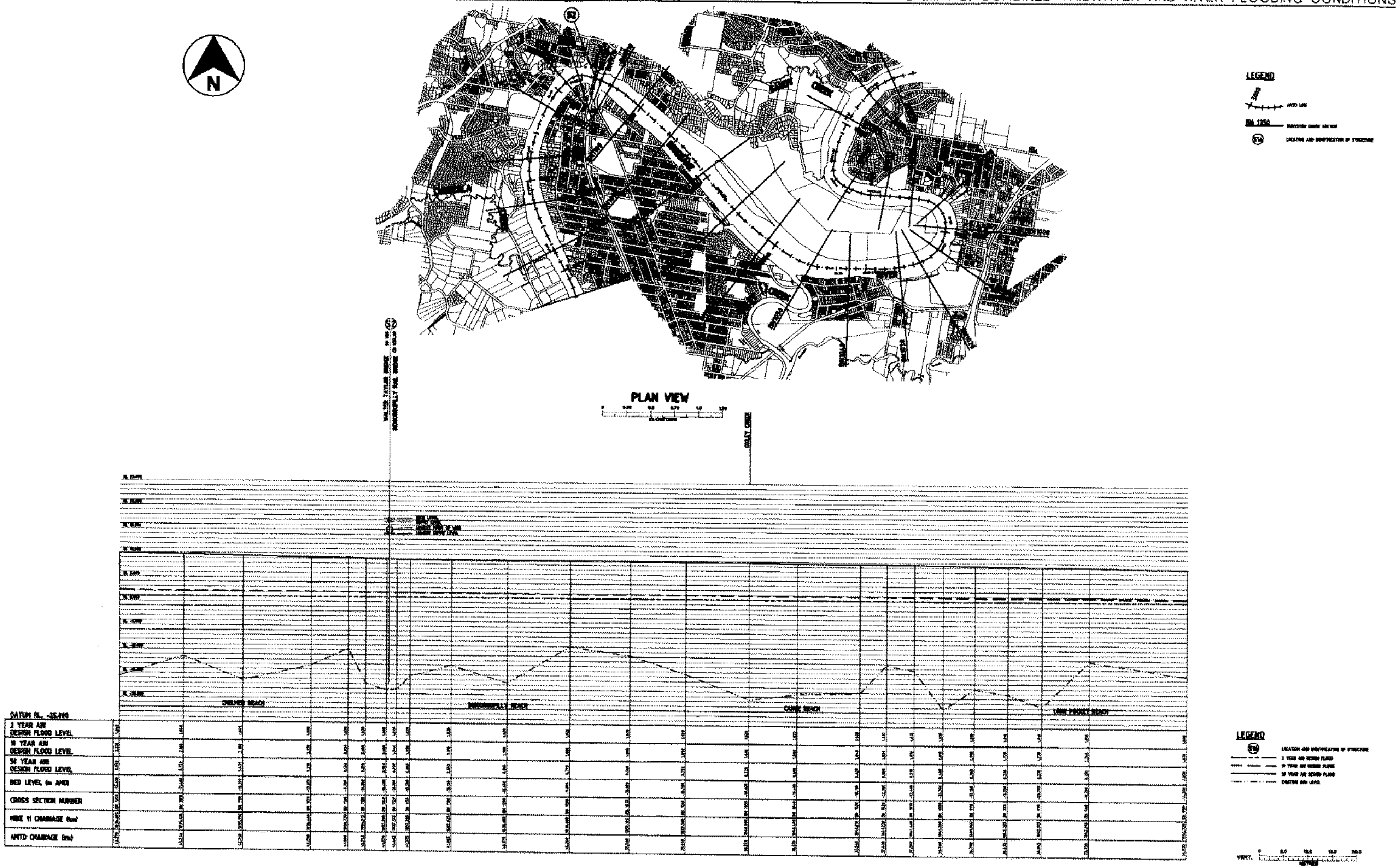


BRISBANE RIVER - BN 1420 TO BN 1200

SINCLAIR KNIGHT MERZ

FIGURE H-4e

BRISBANE RIVER FLOOD STUDY
MIKE .. EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



BRISBANE RIVER - BN 1200 TO BN 950

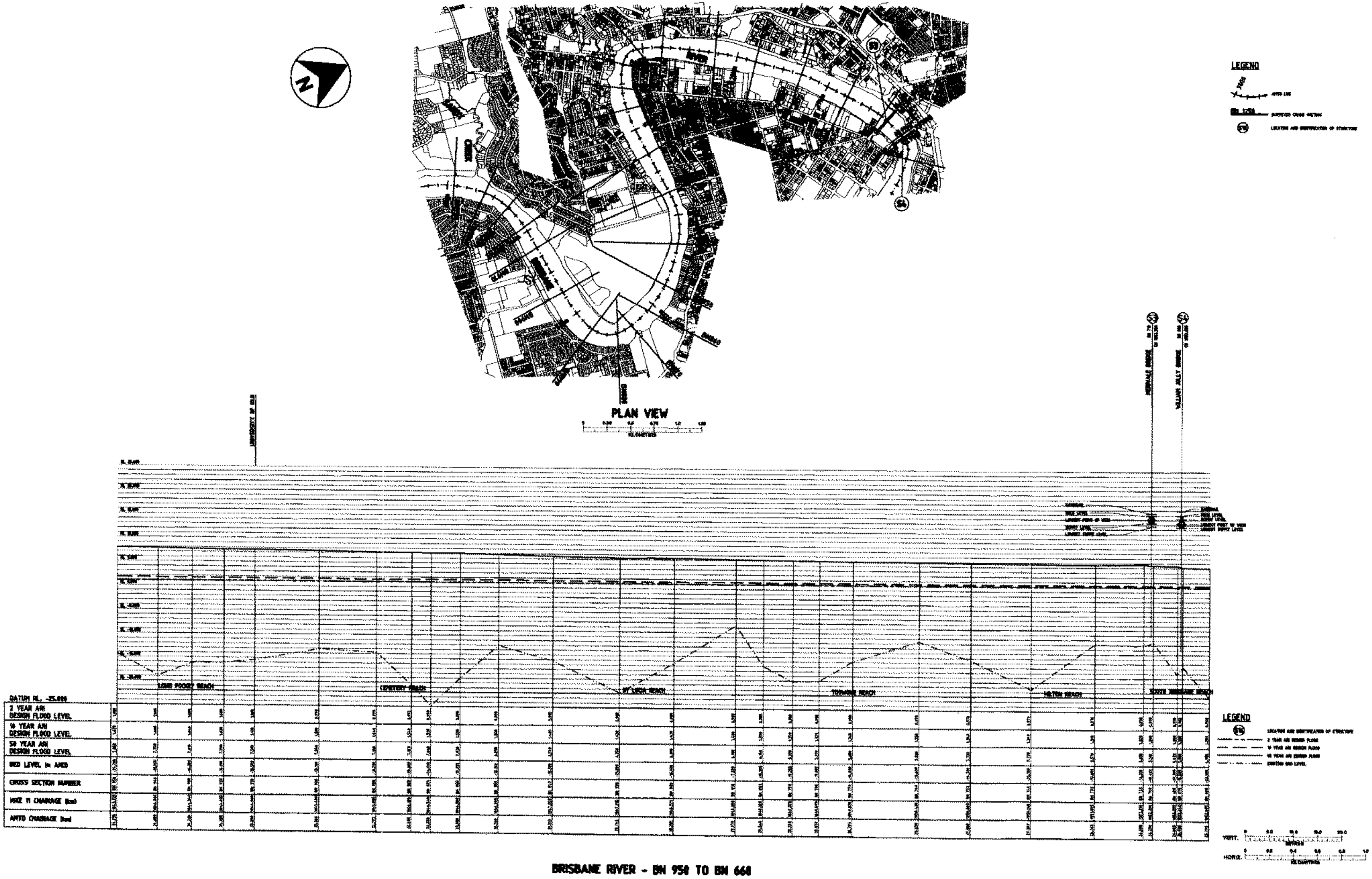
FILE NAME 415/-132 DISK N° C:\DWG JOB N° TD04-3 DATE 23/3/
PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

FIGURE H-4f

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

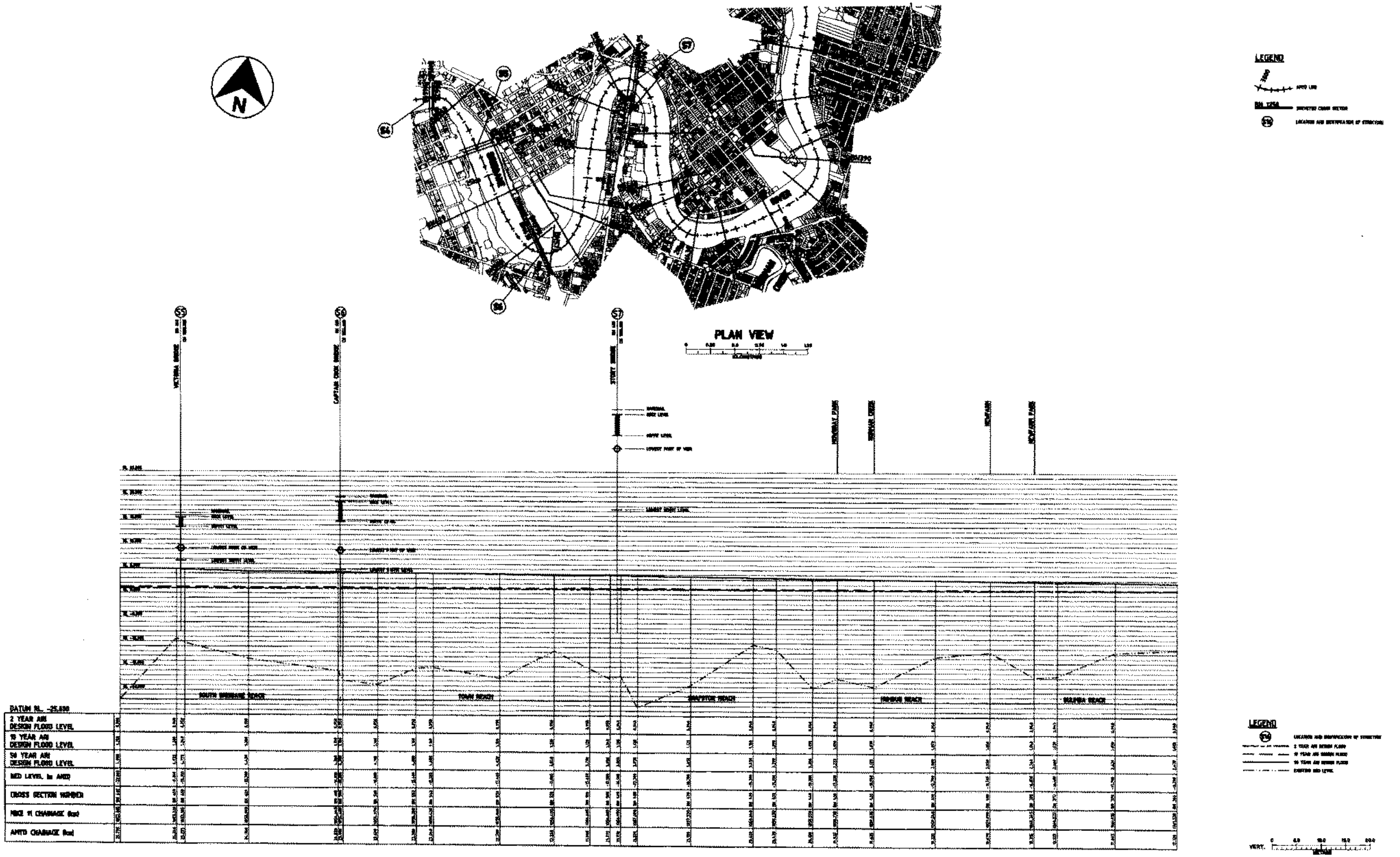


FILE NAME 415?-133 PLOT SCALE 1:30 DISK N: C:\DWG JOB N: T00415? DATE: 23/3/[illegible]

SINCLAIR KNIGHT MERZ

FIGURE H-4g

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



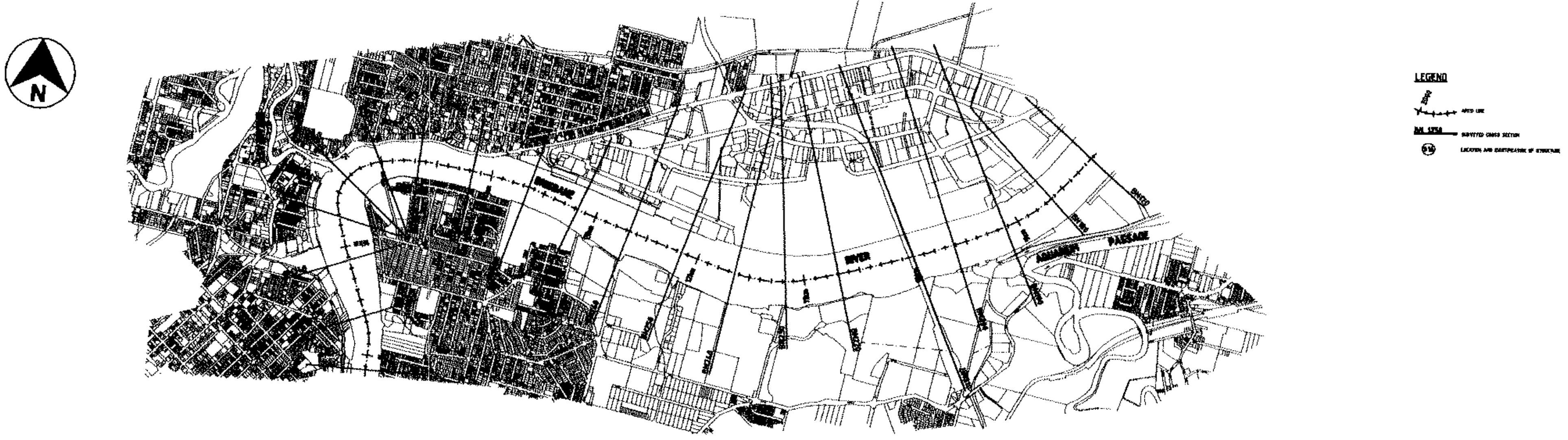
BRISBANE RIVER - BN 660 TO BN 340

PLOT SCALE 1:30

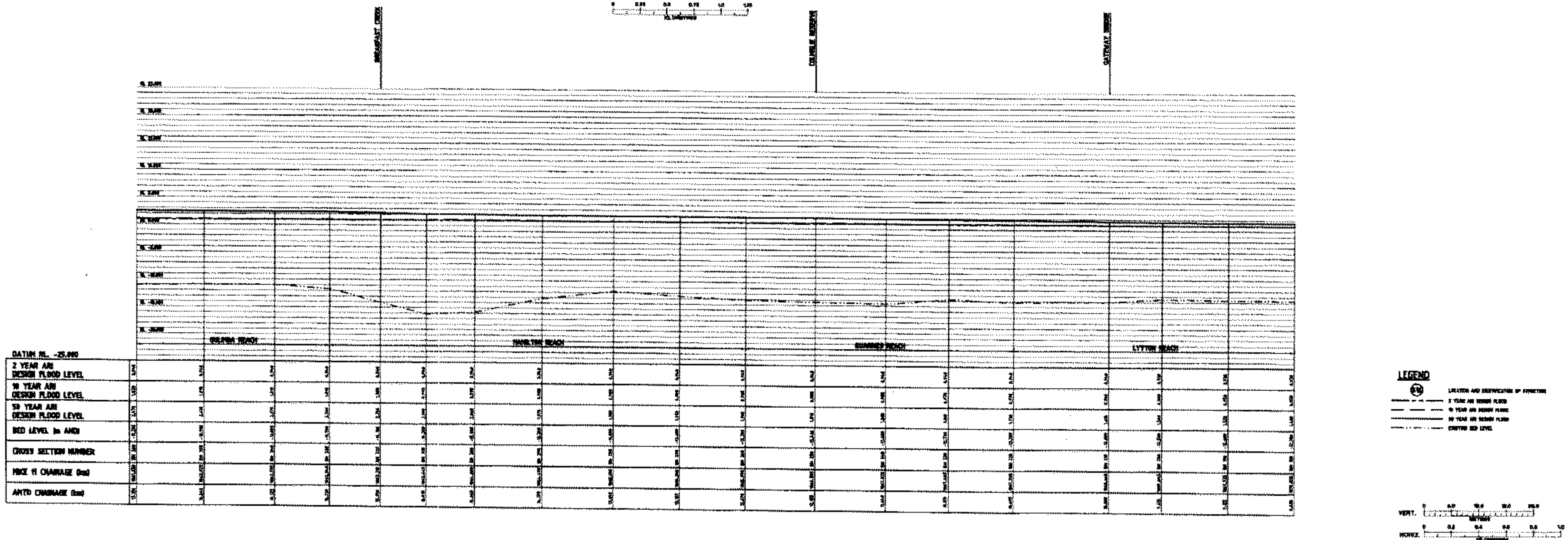
FIGURE H-4h

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10 AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW



BRISBANE RIVER - BN 340 TO BN 180

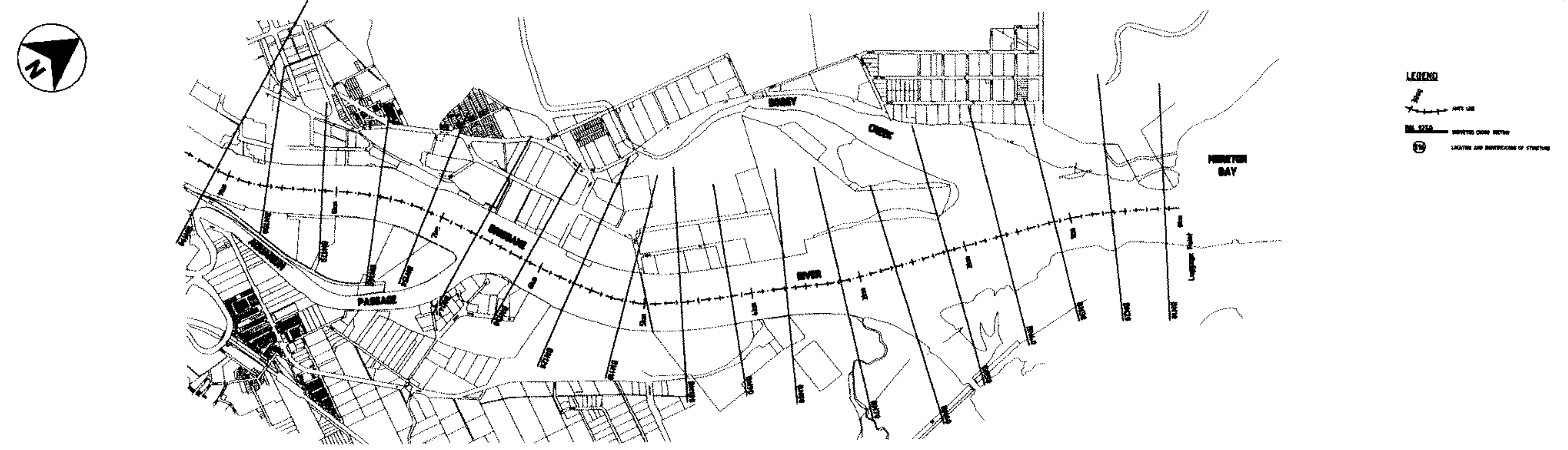
FILE ... 415 ... DATE 23/... JOB ... T004... PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

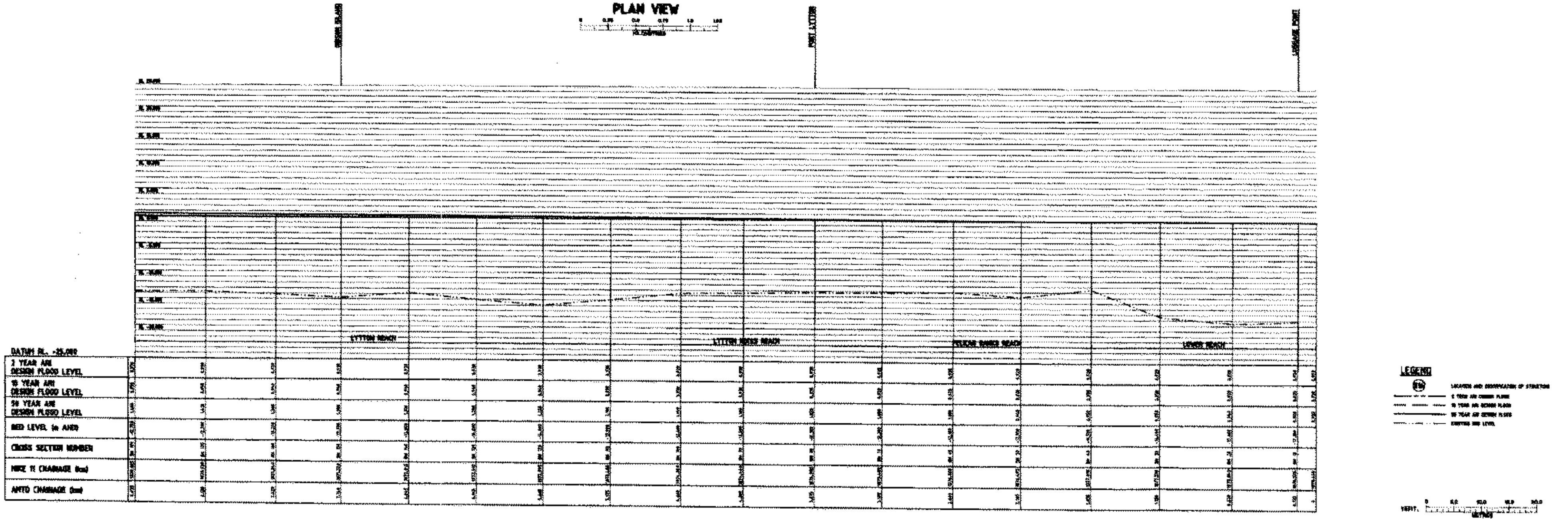
FIGURE H-4i

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW

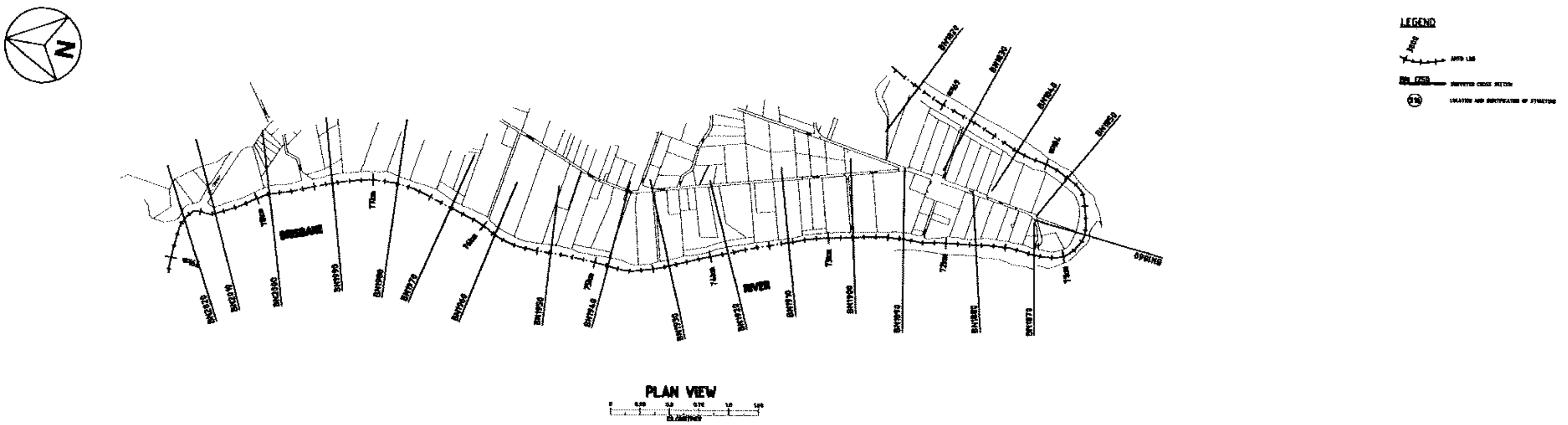


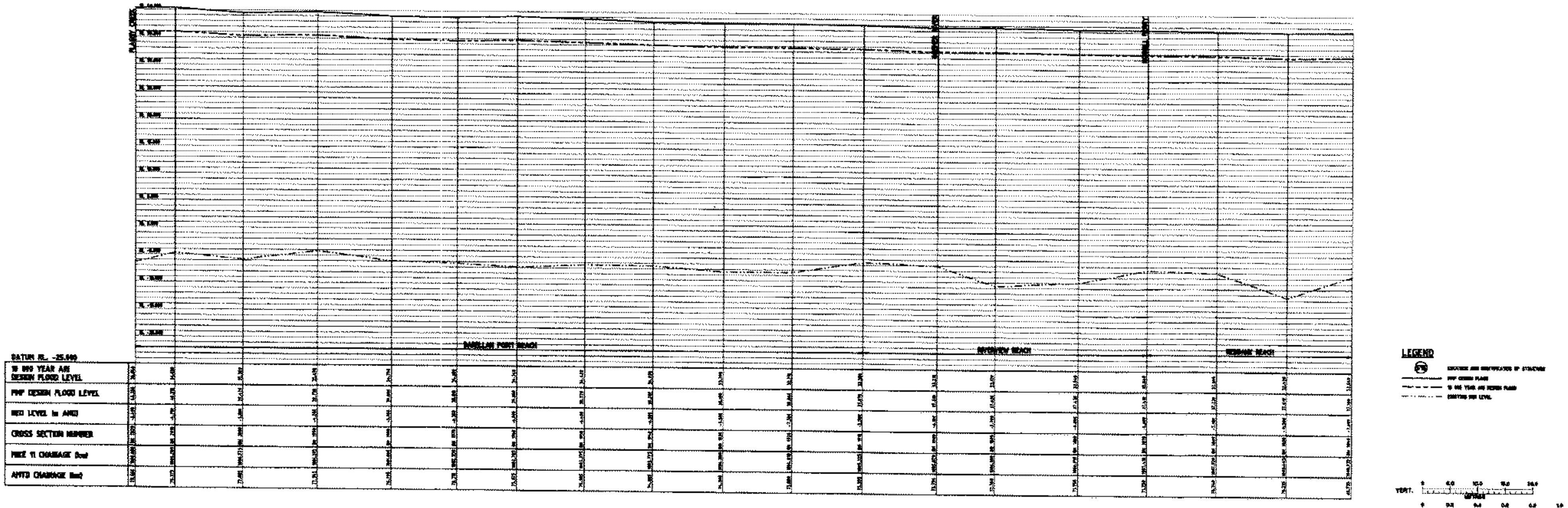
BRISBANE RIVER - BN 180 TO BN 10

SINCLAIR KNIGHT MERZ

FIGURE H-5a

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS





BRISBANE RIVER - BN 2020 TO BN 1840

FILE NAME: 4151-202 PLOT SCALE: 1=30 DISK N: C\DWG JOB N: T00433 DATE: 23/3/??

FIGURE H-5b

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

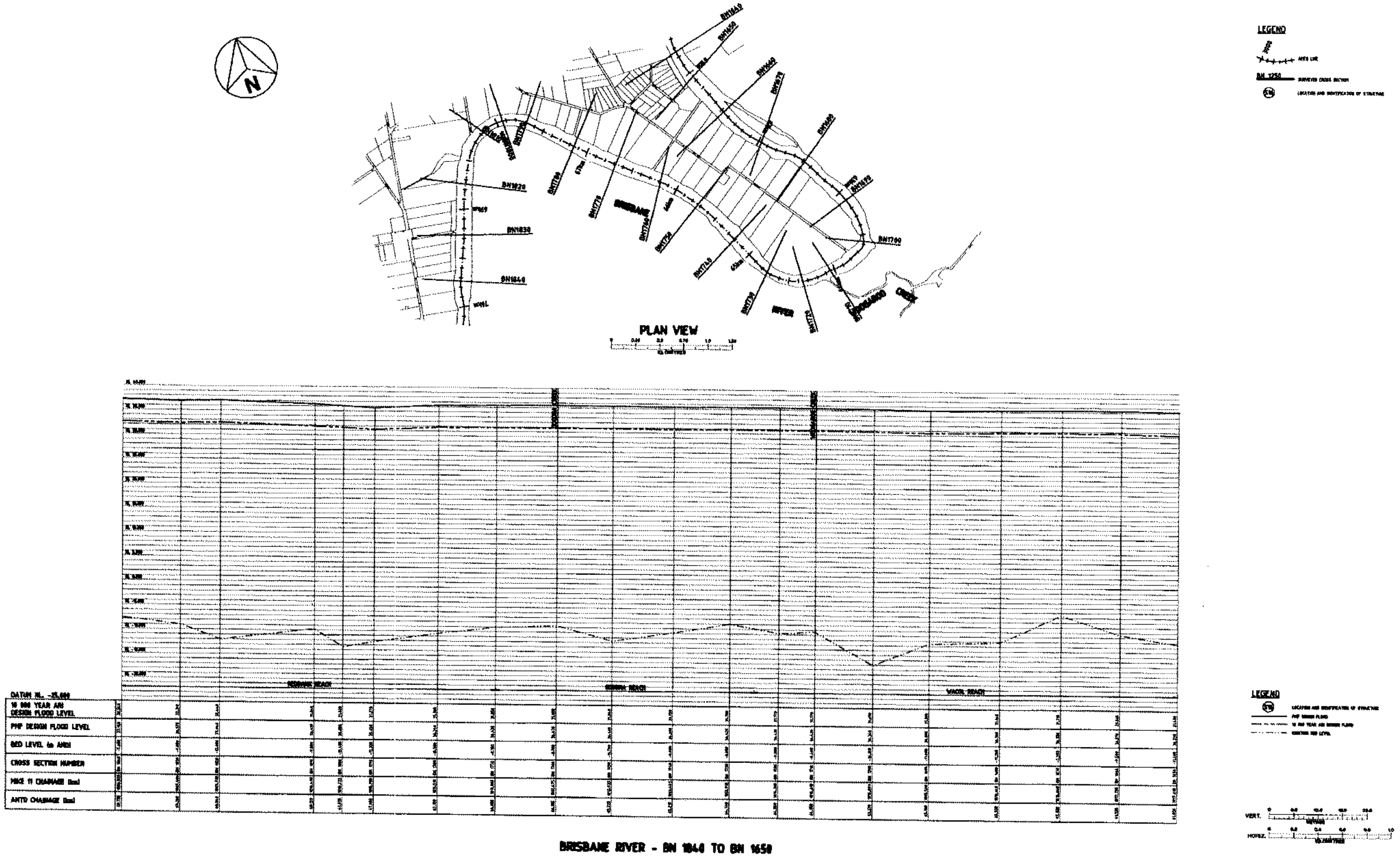
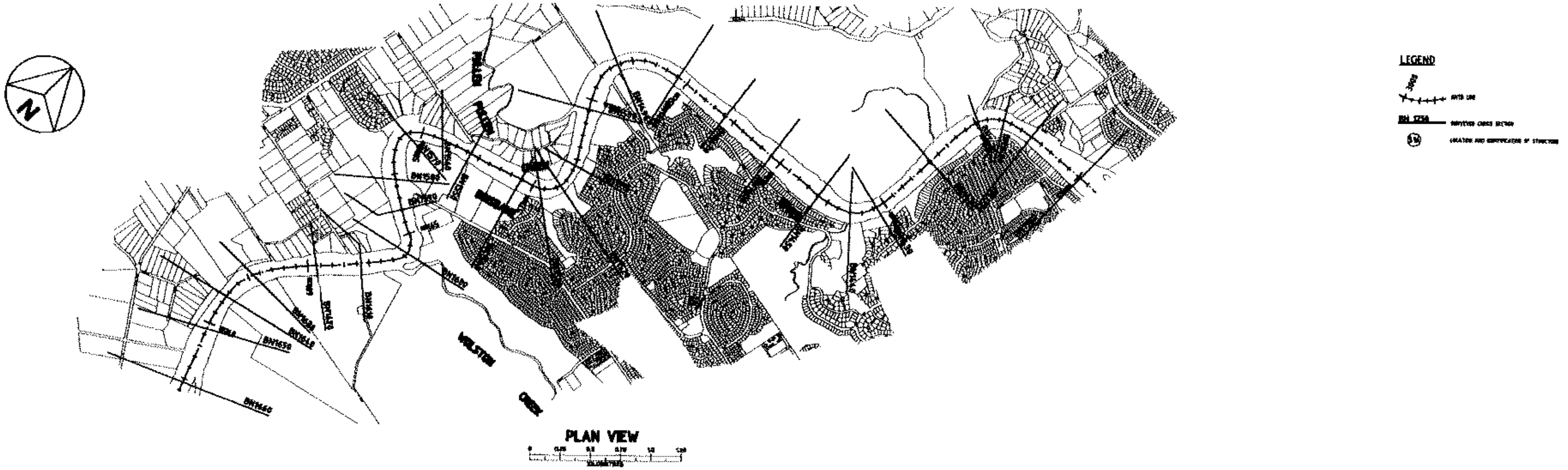
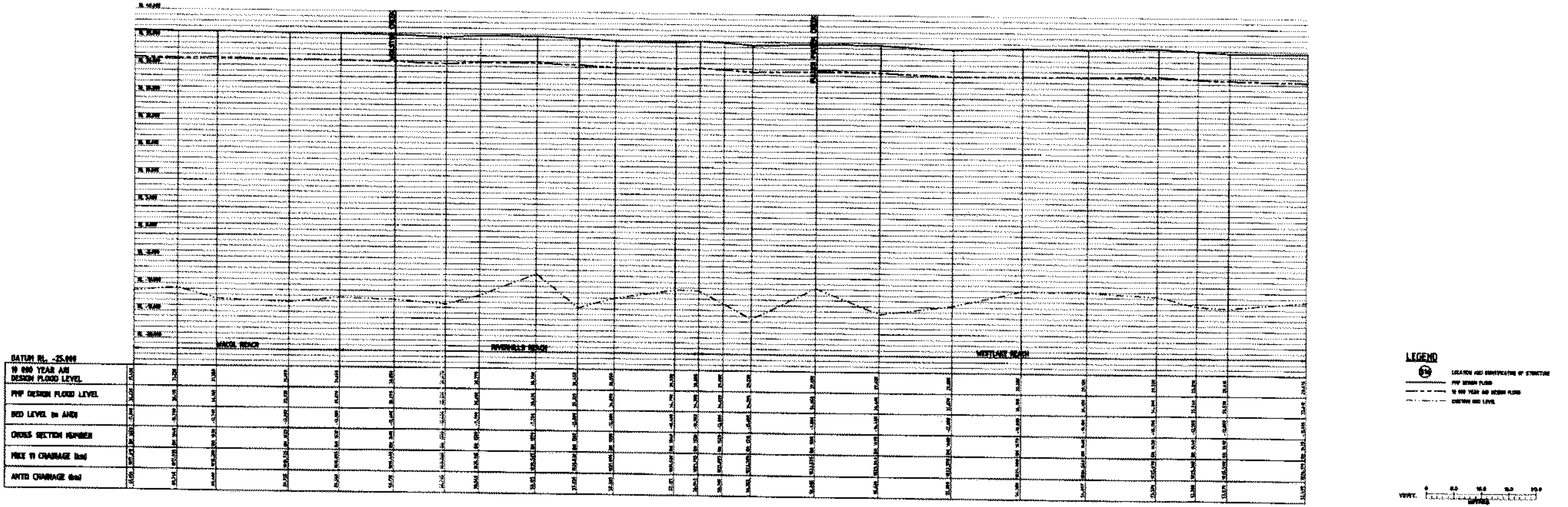


FIGURE H-5c

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



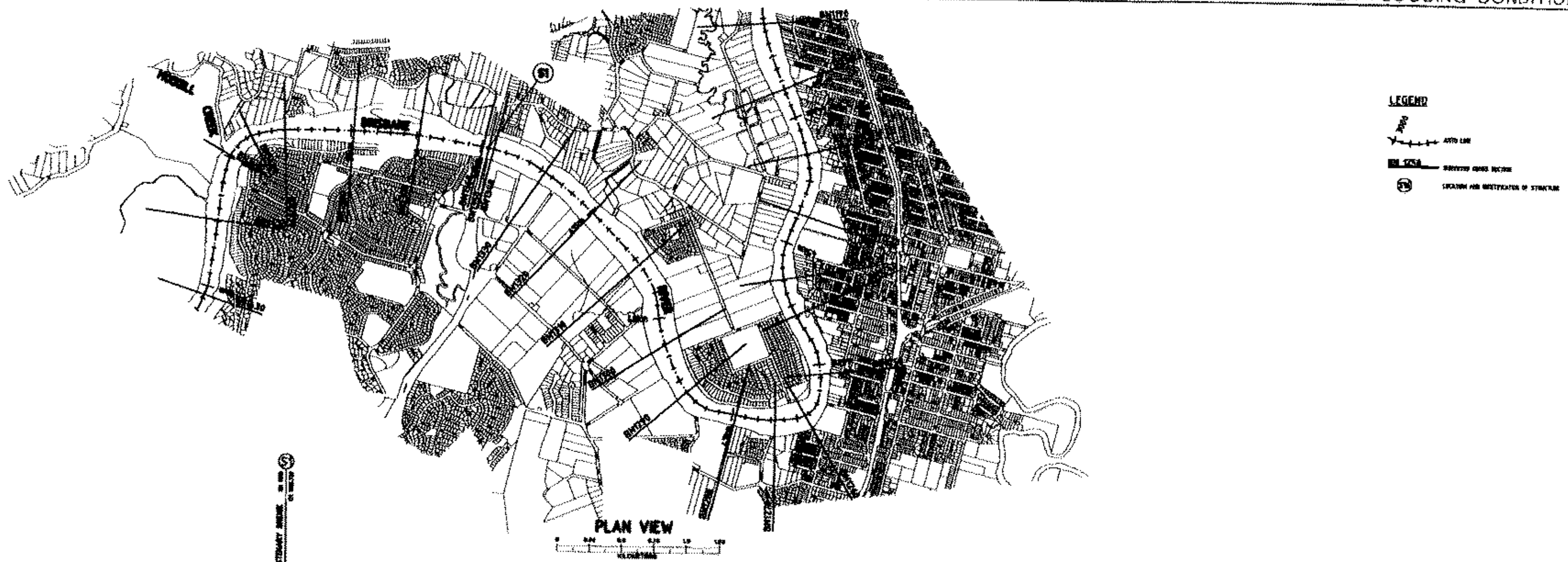
PLAN VIEW



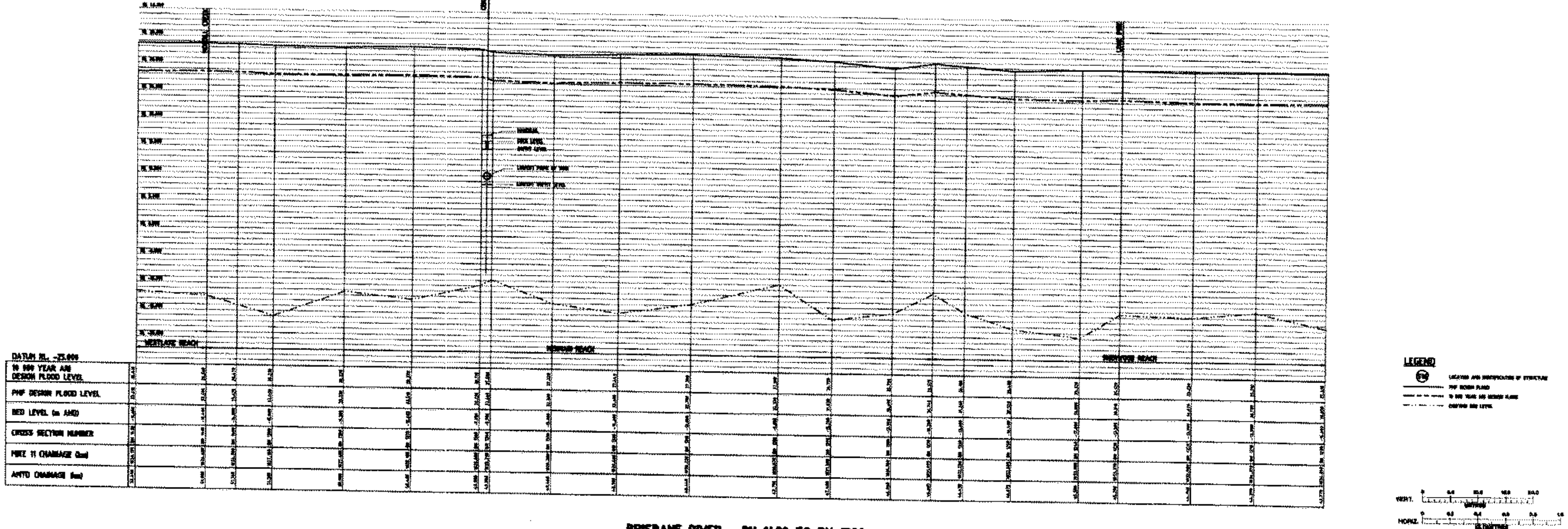
BRISBANE RIVER - BN 1650 TO BN 1420

FIGURE H-5d

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW



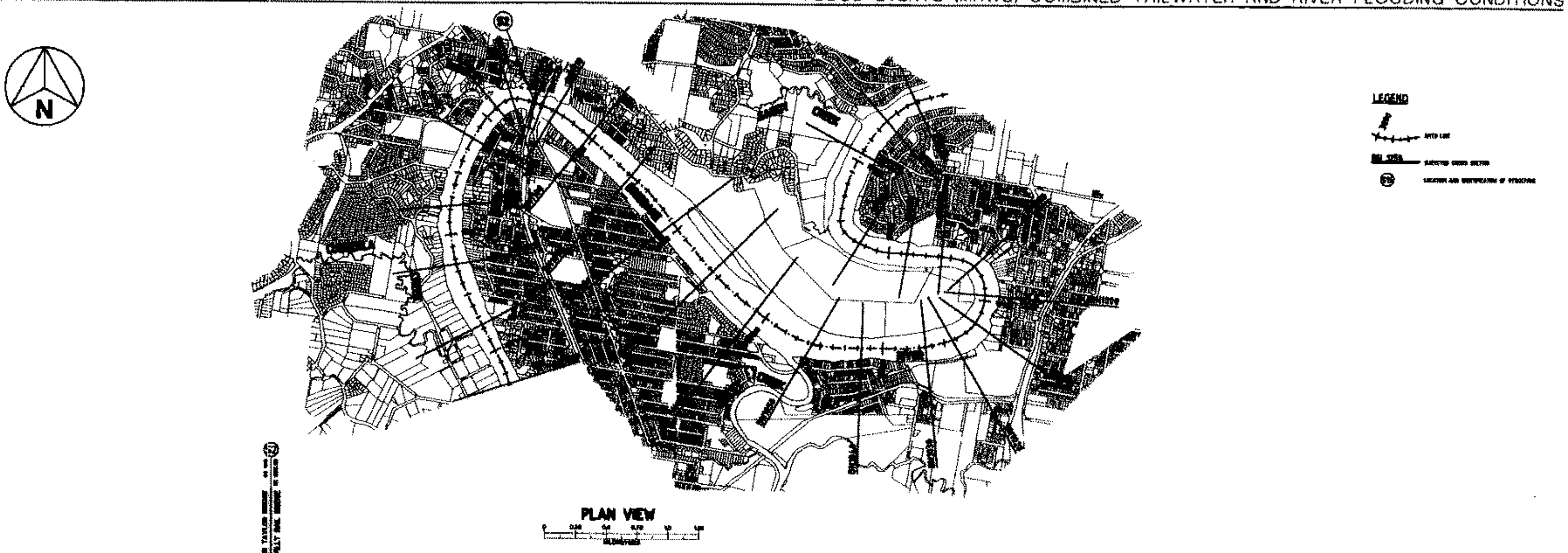
BRISBANE RIVER - BN 1420 TO BN 1200

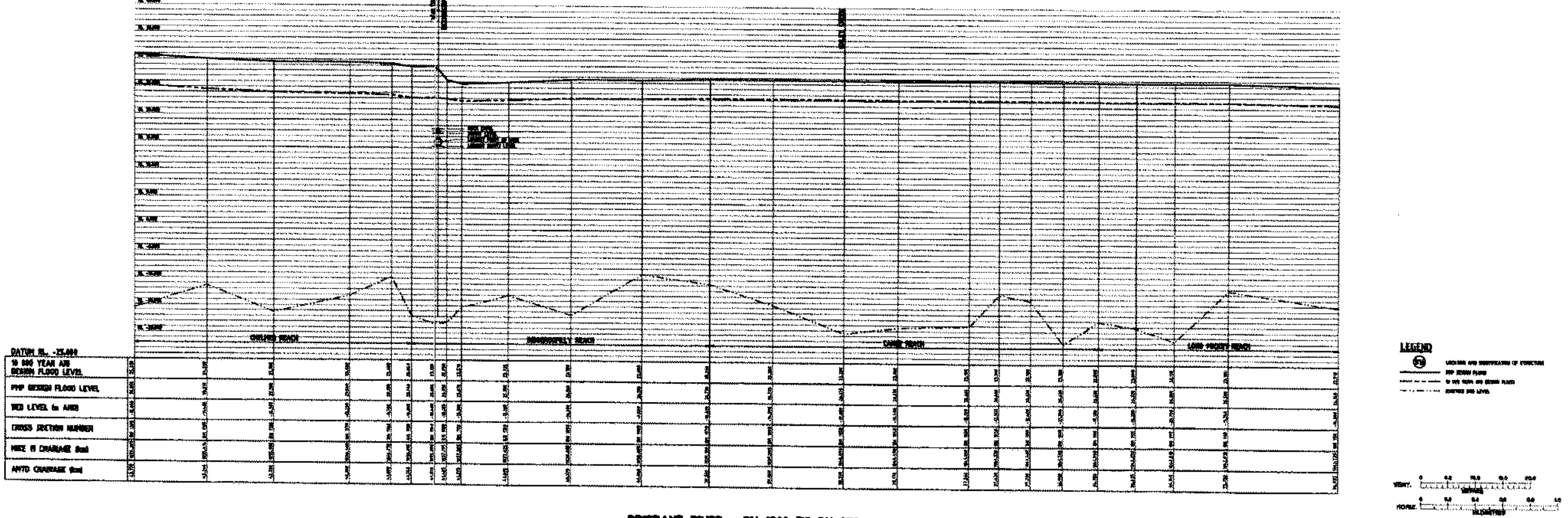
SINCLAIR KNIGHT MERZ

FIGURE H-5e

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS





BRISBANE RIVER - BN 1200 TO BN 950

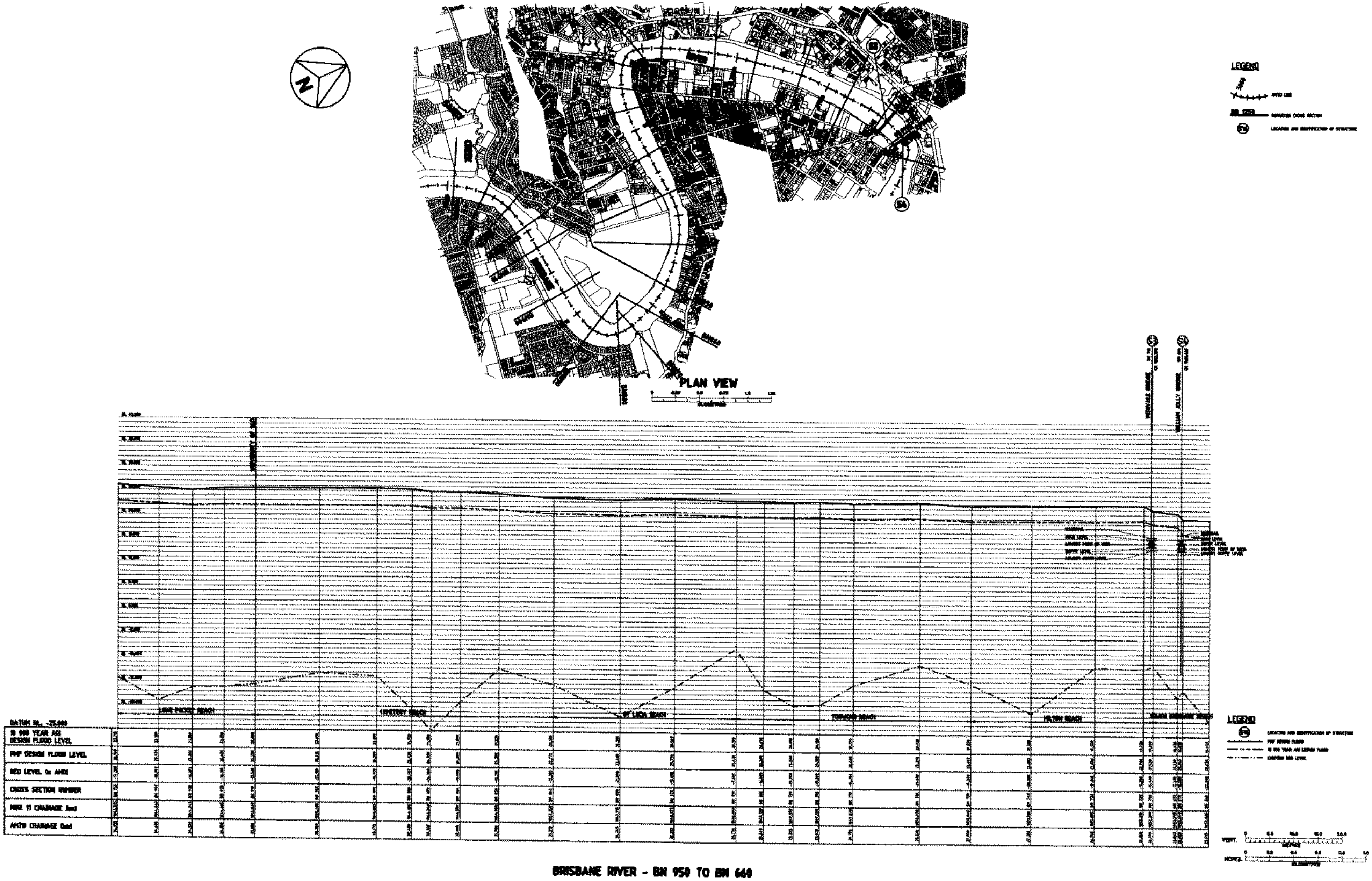
FILE NAME 415/-341
PLOT SCALE 1=30
DISK N° CNDWG
JOB N° T004157
DATE 23/1/97

SINCLAIR KNIGHT MERZ

FIGURE H-5f

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



BRISBANE RIVER - BN 950 TO BN 640

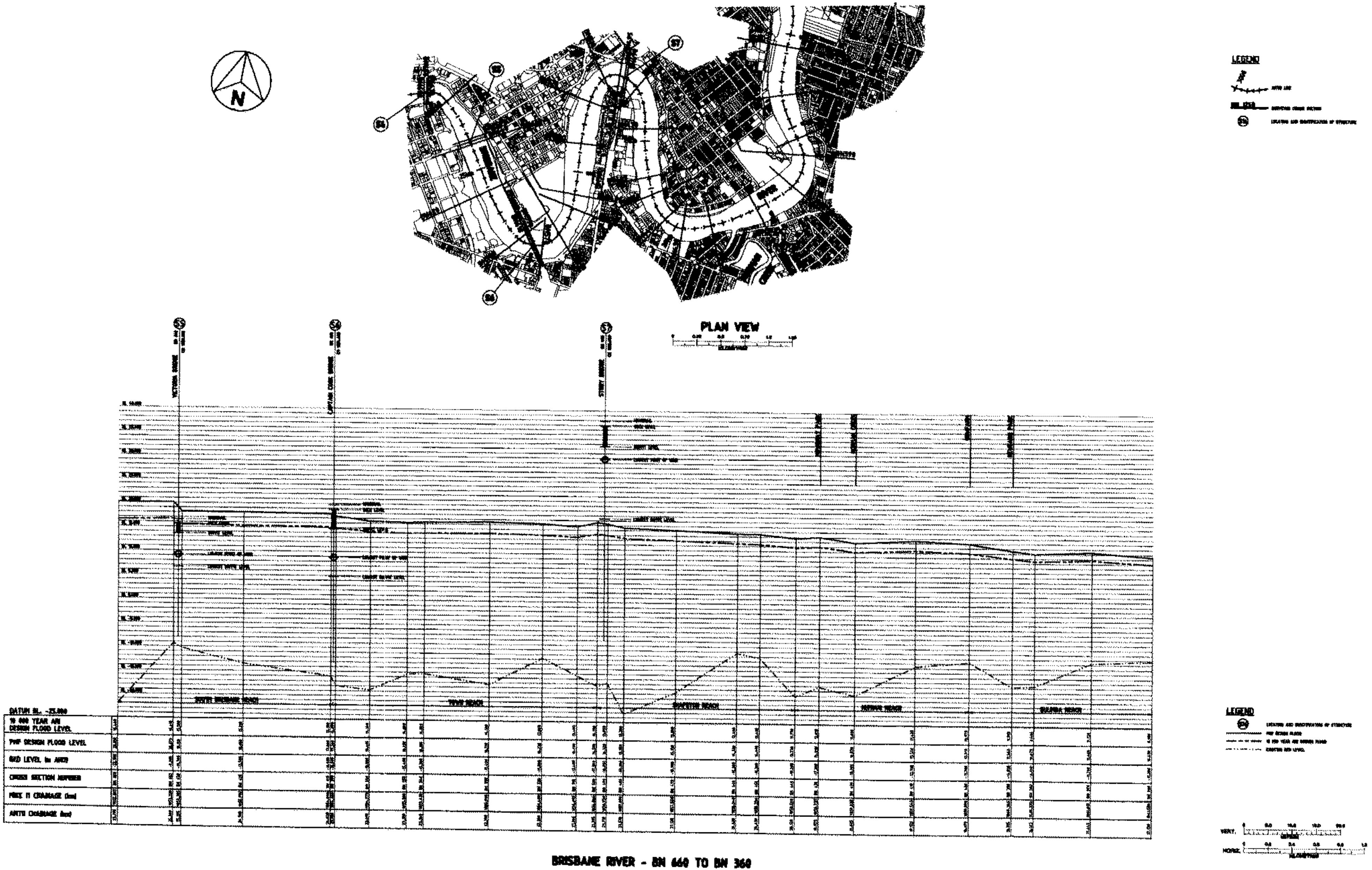
FILE NAME: 415?-142
PLOT SCALE: 1:30
DISK N: C:\DWG
JOB N: T004157
DATE: 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE H-5g

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



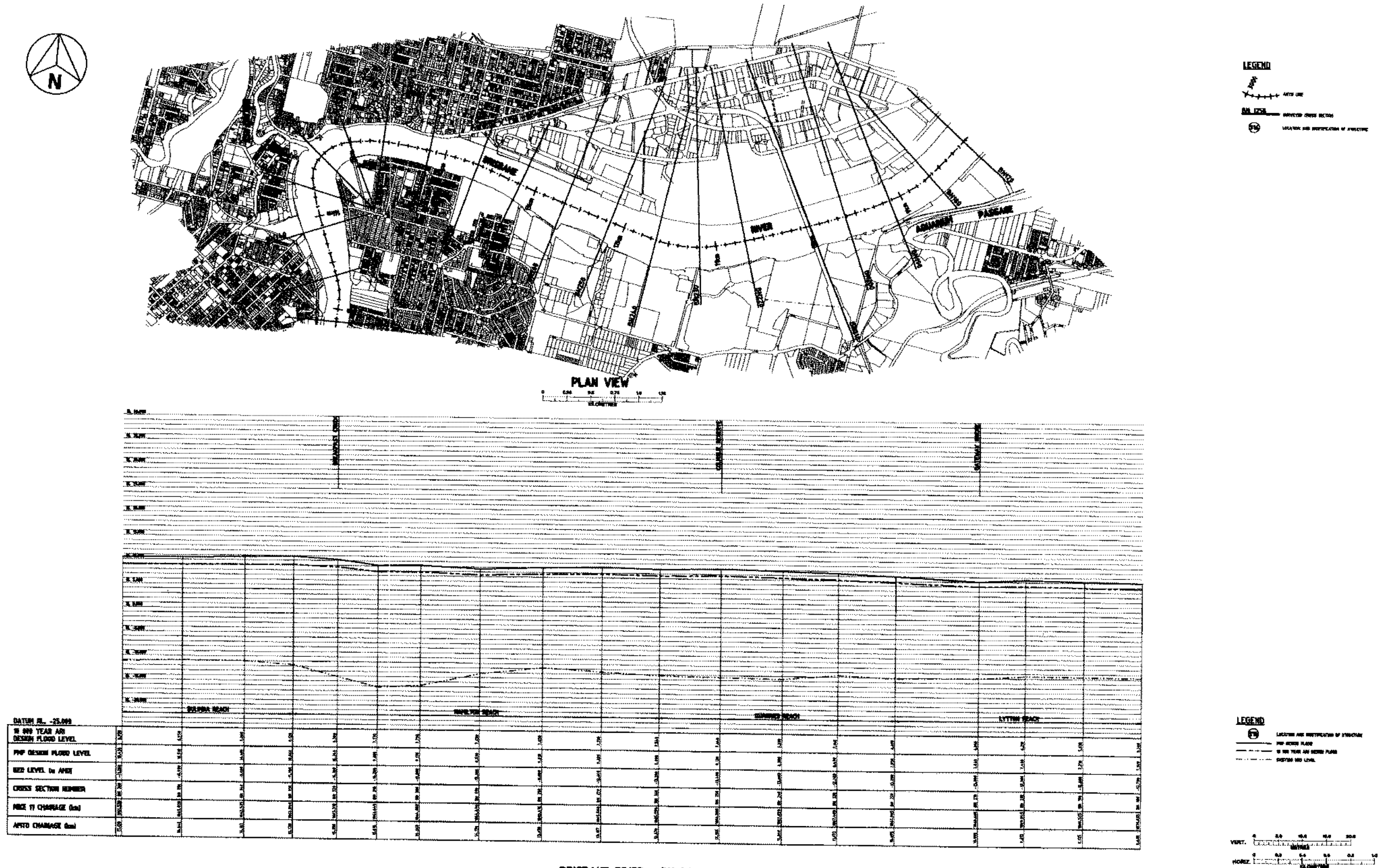
FILE NAME: 41[illegible]
PLOT SCALE: 1=30
DISK N°: C:\DWG
JOB N°: T00415?
DATE: 23/3/?

SINCLAIR KNIGHT MERZ

FIGURE H-5h

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



BRISBANE RIVER - BN 364 TO BN 188

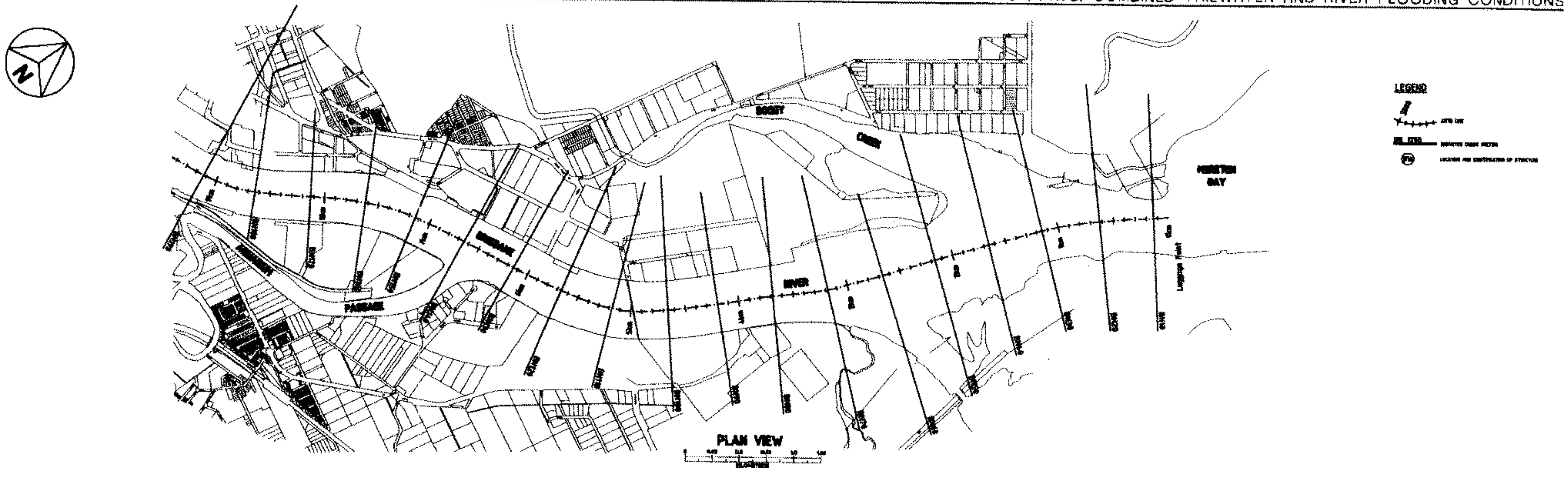
FILE NAME: 415-… PLOT SCALE: 1=30

SINCLAIR KNIGHT MERZ

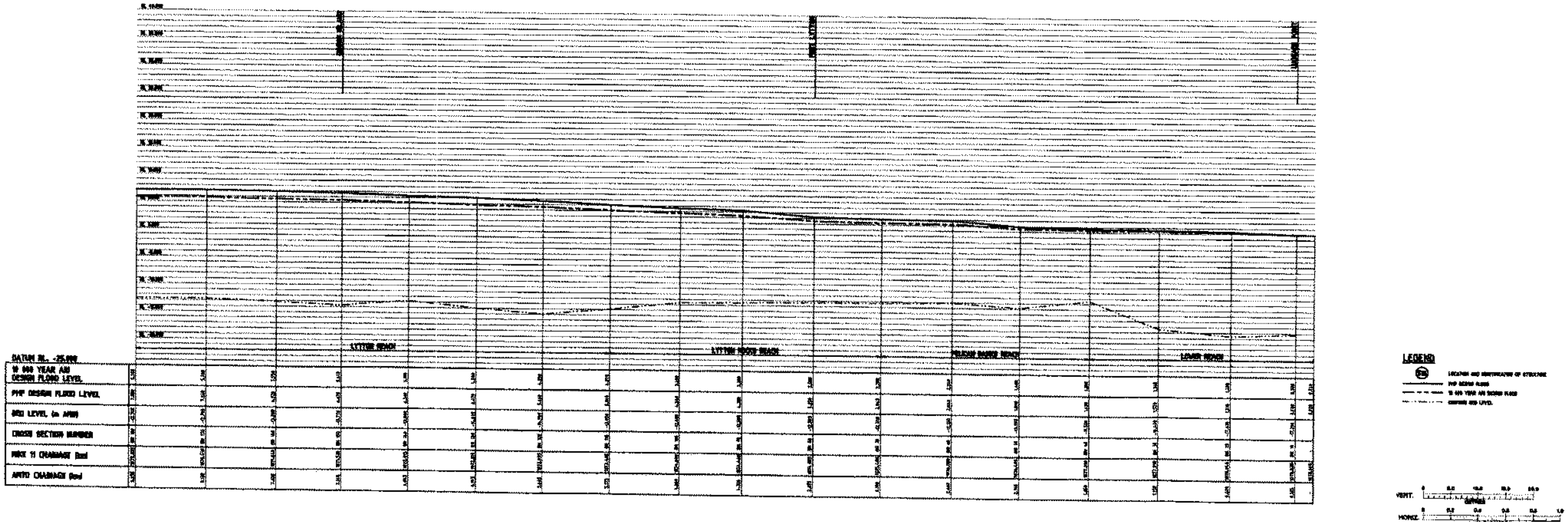
FIGURE H-5i

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF AND 10 000 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW



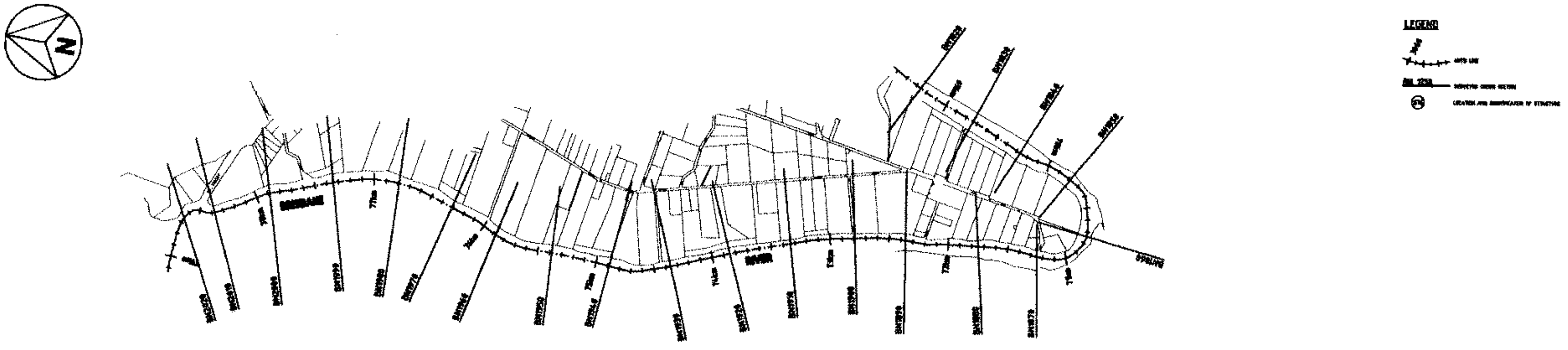
BRISBANE RIVER - BN 169 TO BN 10

FILE NAME 415/-145
PLOT SCALE 1:30
DISK N°: C:\DWG
JOB N° T00415/
DATE: 23/3/97

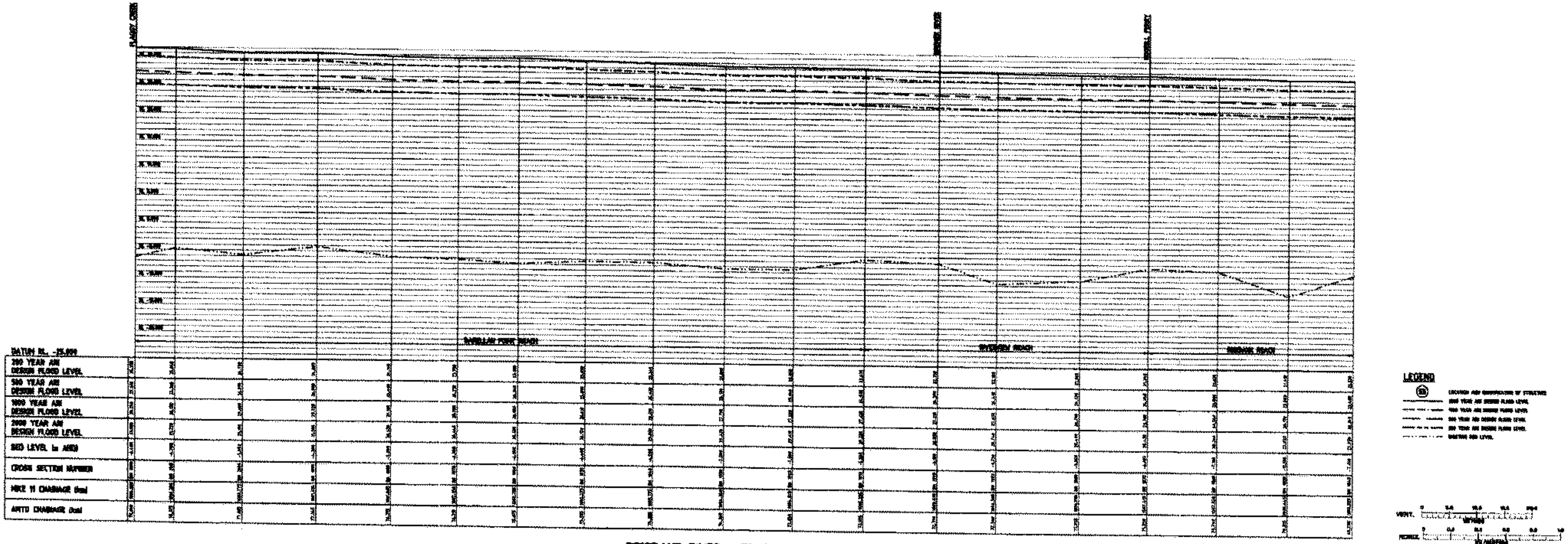
FIGURE H-6a

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW



BRISBANE RIVER - BN 2020 TO BN 1849

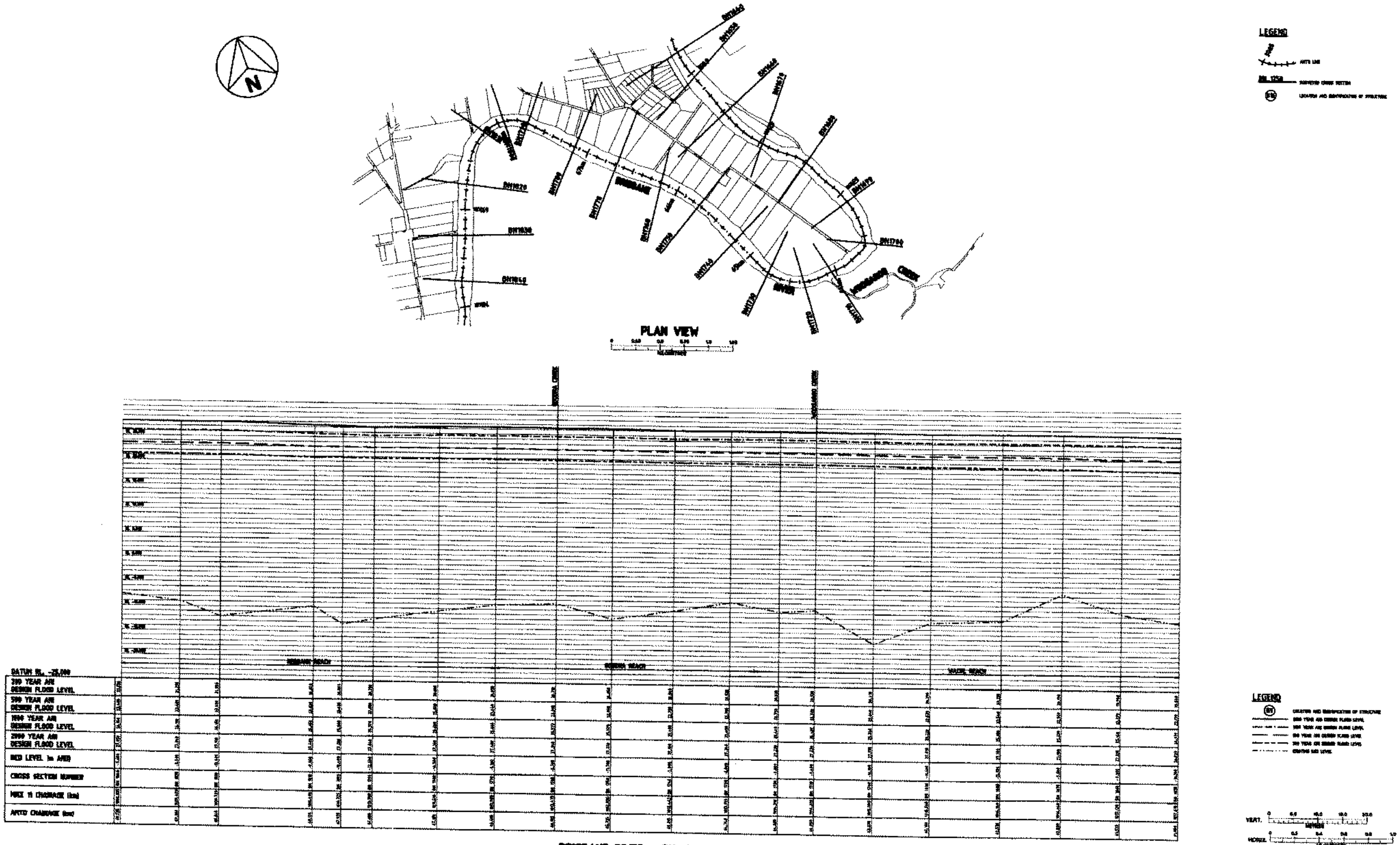
FILE NAME: 4157-146 DISK N°: C:\DWG JOB N°: T00415? DATE: 23/3/?
PLOT SCALE: 1=30

SINCLAIR KNIGHT MERZ

FIGURE H-6b

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITONS



BRISBANE RIVER - BN 1840 TO BN 1650

FILE NAME: 415[illegible]
PLOT SCALE: 1:30

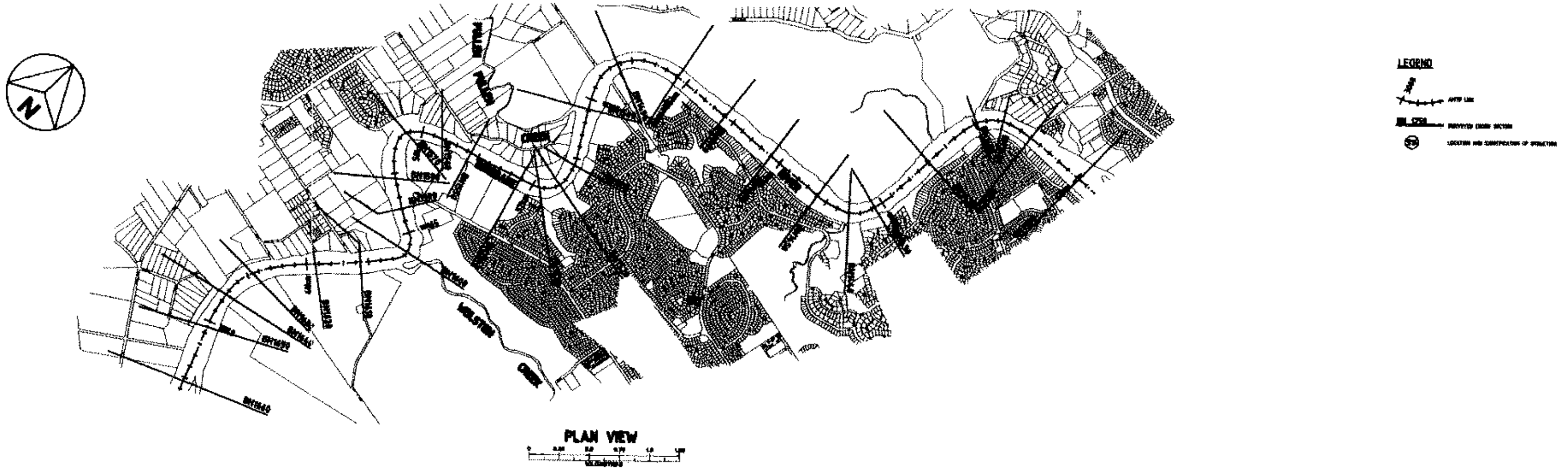
DATE: 23/[illegible]

SINCLAIR KNIGHT MERZ

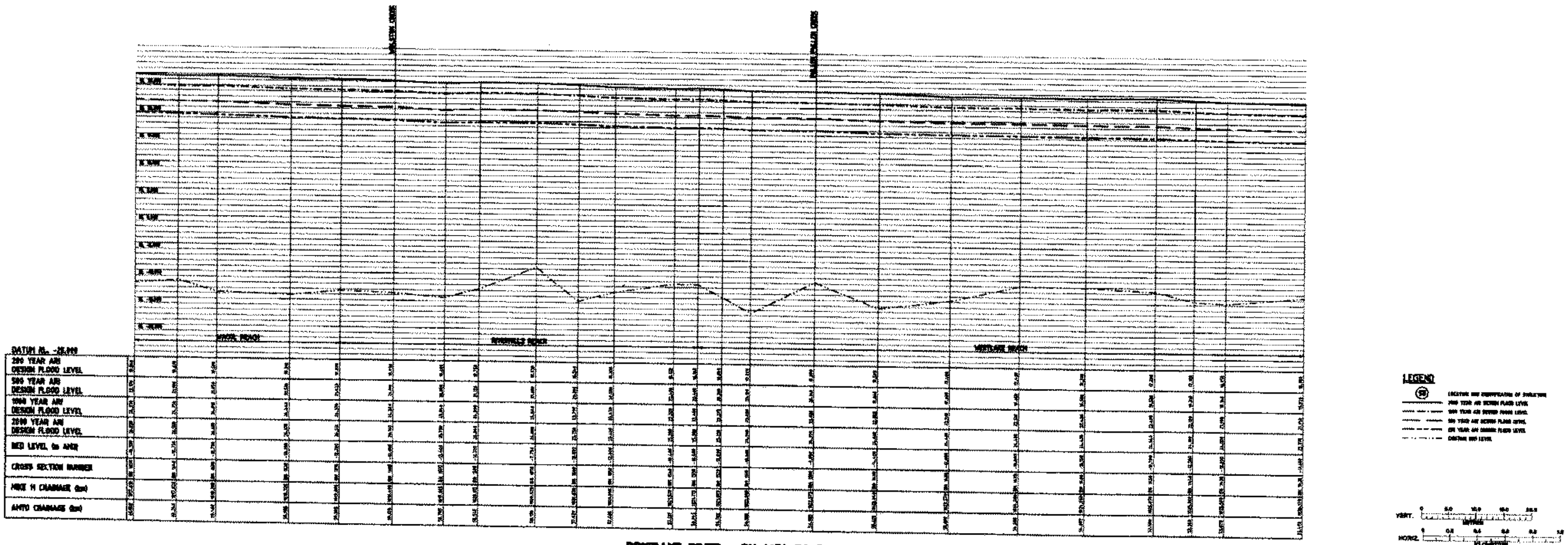
FIGURE H-6c

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW



BRISBANE RIVER - BN 1650 TO BN 1420

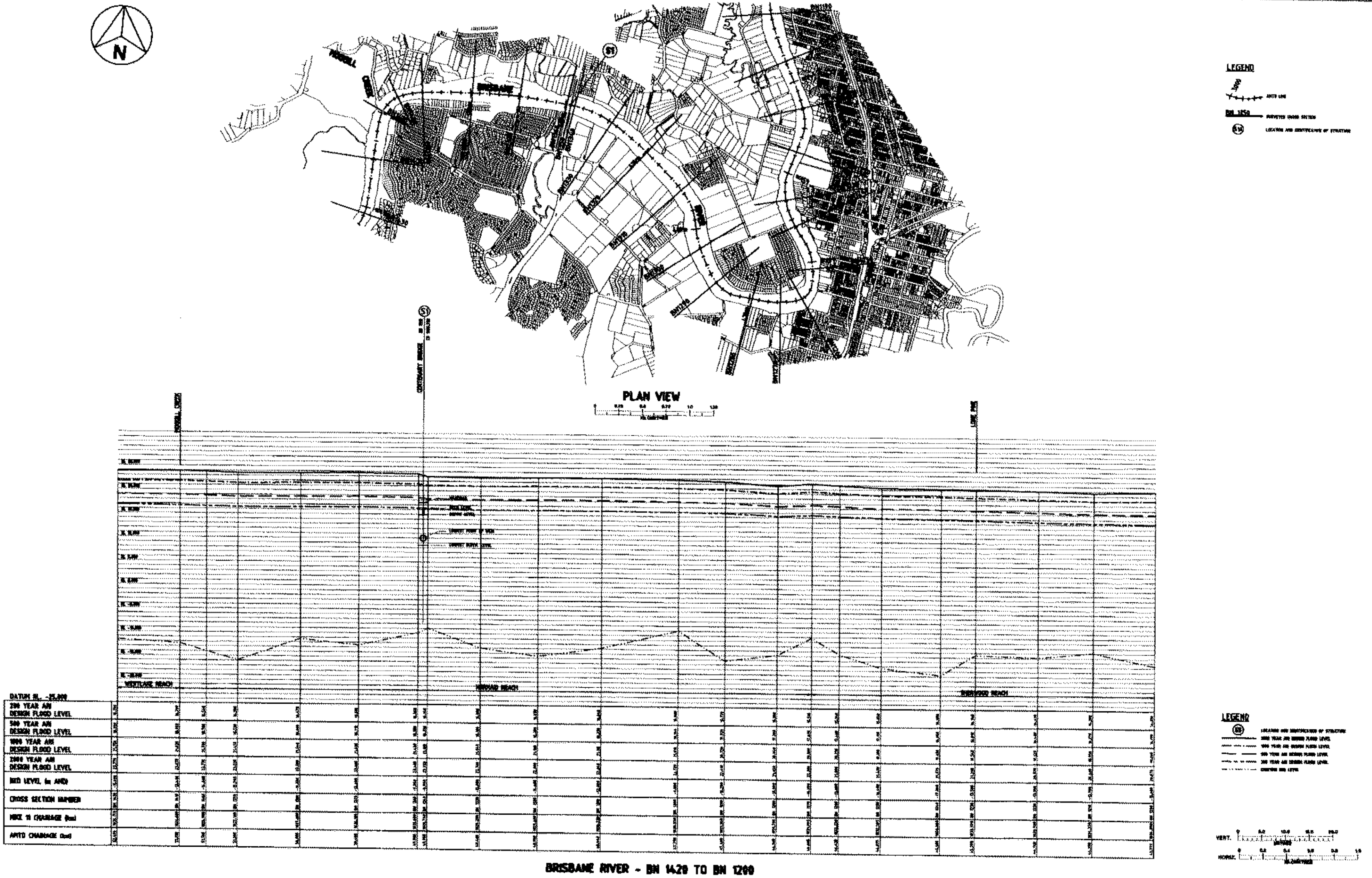
PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

FIGURE H-6d

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



BRISBANE RIVER - BN 1420 TO BN 1200

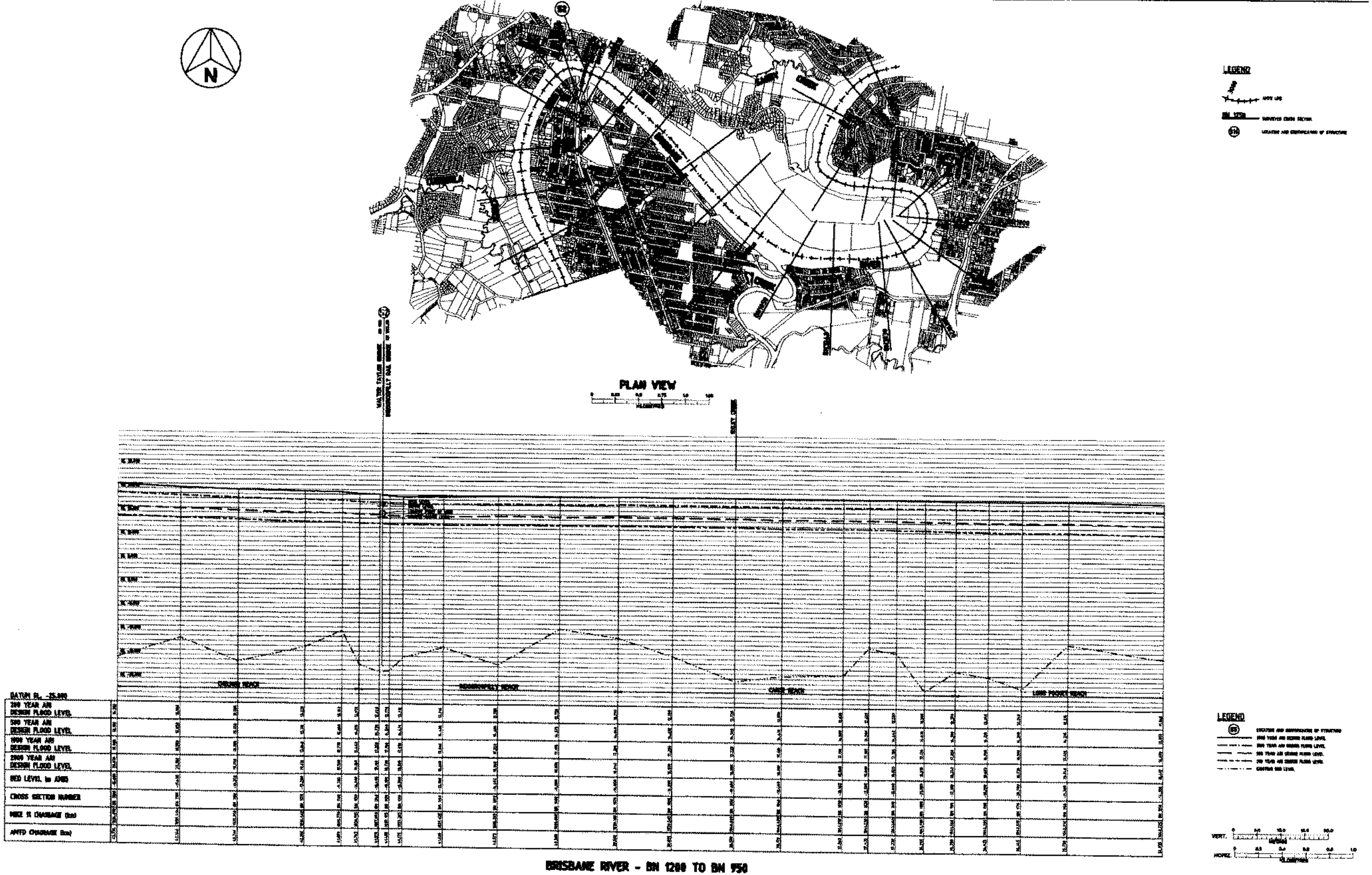
PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

FIGURE H-6e

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

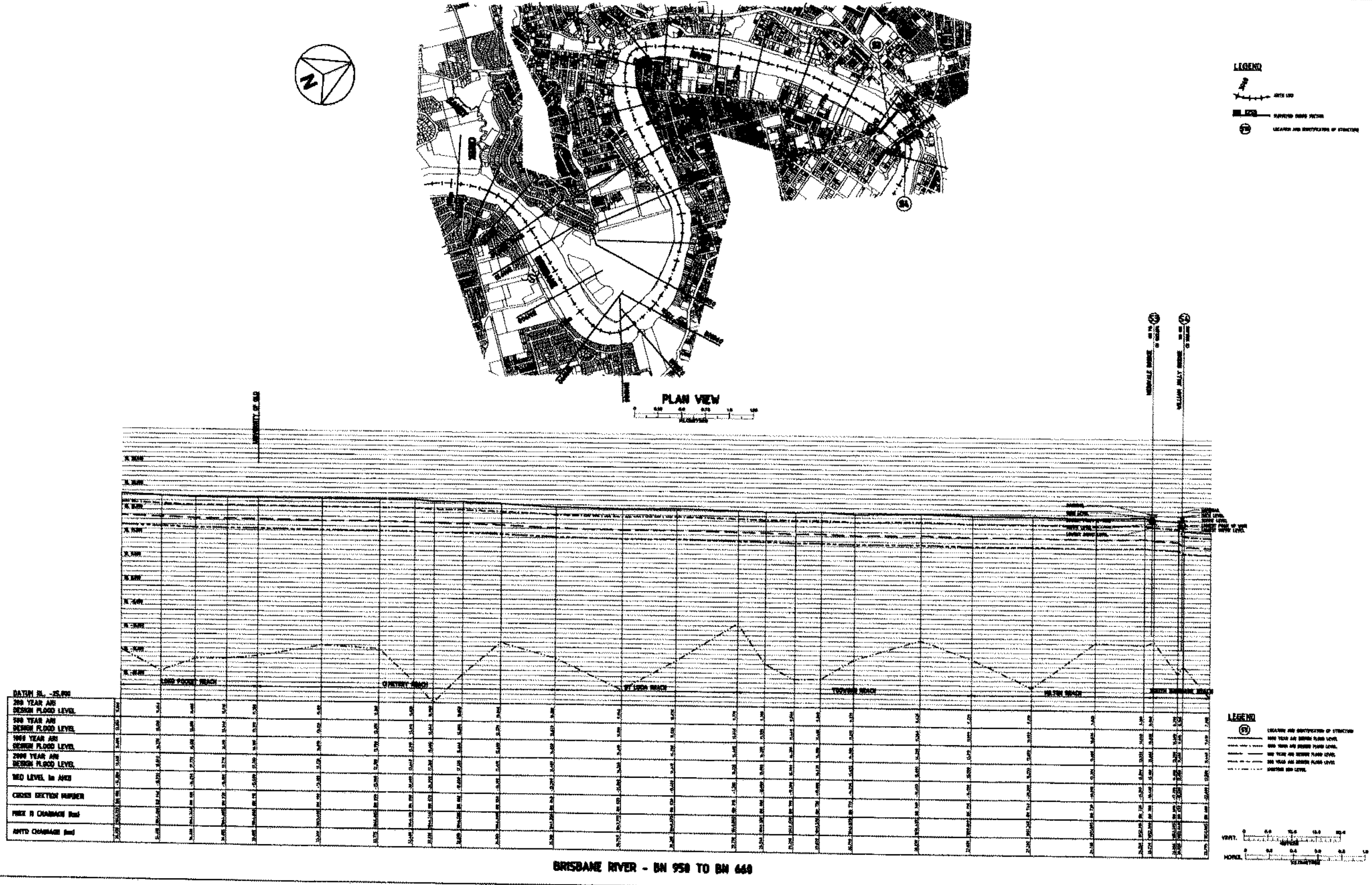


PLOT SCALE 1:30

FIGURE H-6f

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



BRISBANE RIVER - BN 958 TO BN 440

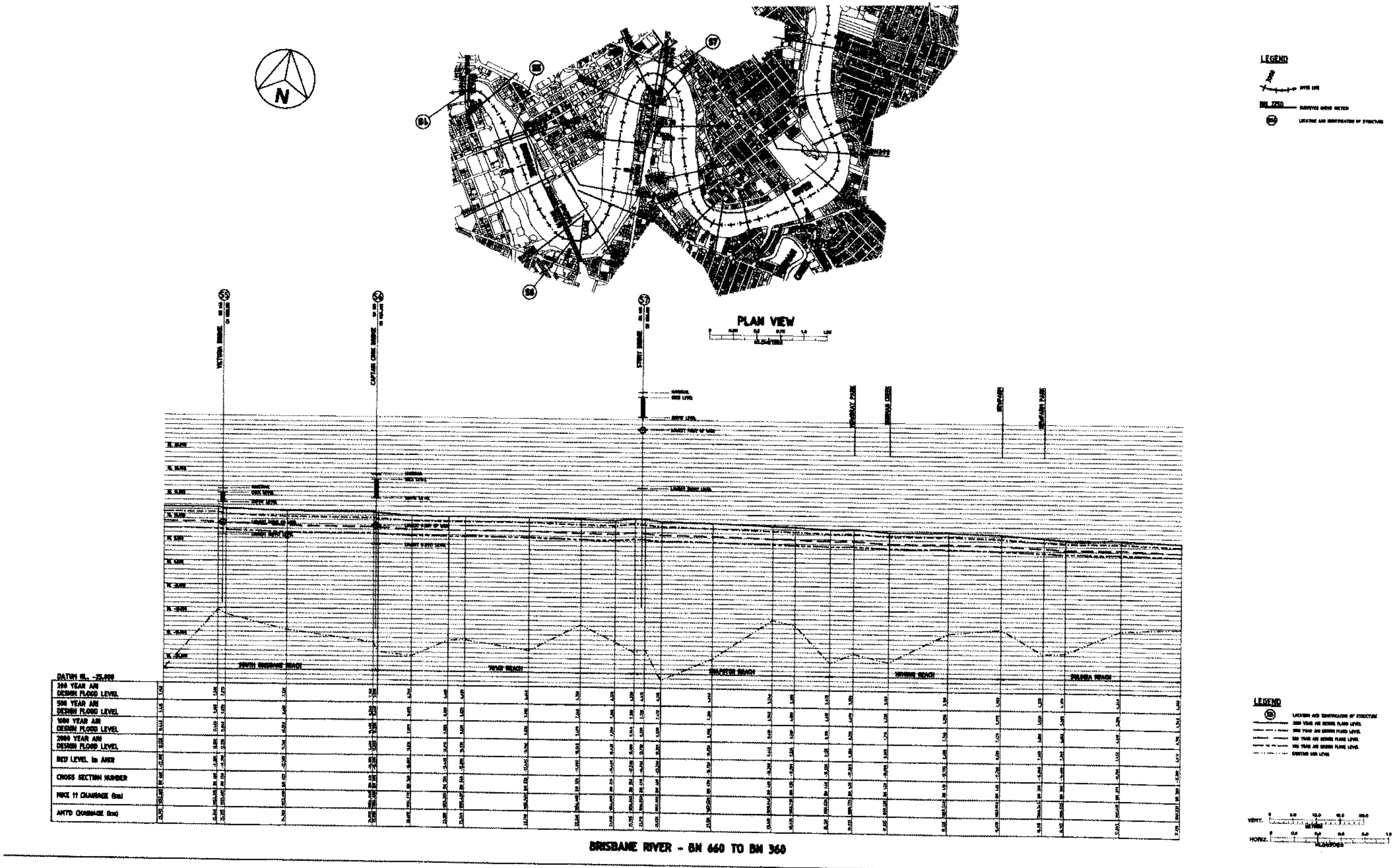
PLOT SCALE 1=30

SINCLAIR KNIGHT MERZ

FIGURE H-6g

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



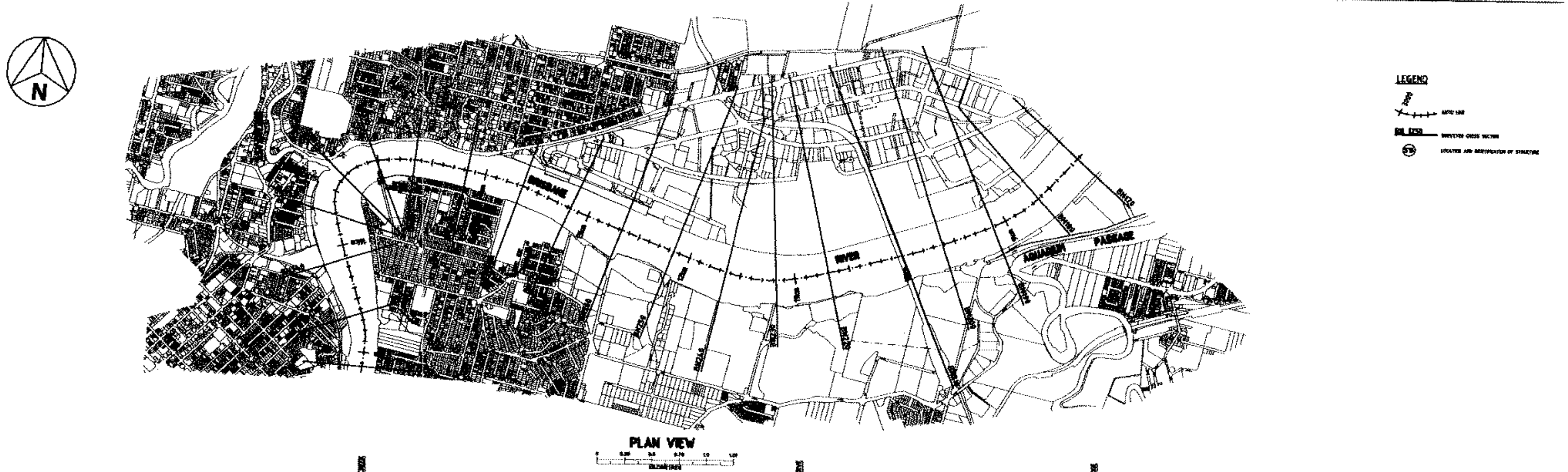
BRISBANE RIVER - BN 660 TO BN 360

FILE NAME 4137-124
PLOT SCALE 1:30
DSN N° CROWD
JOB N° T00415?
DATE 23/3/97

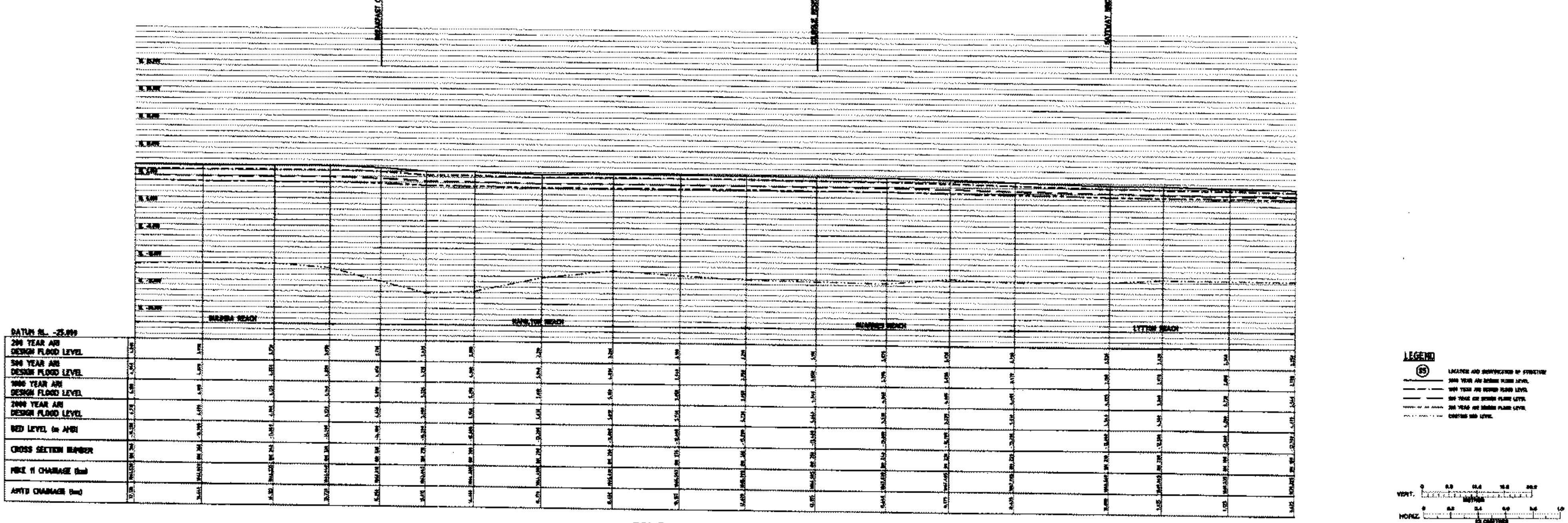
FIGURE H-6h

BRISBANE RIVER FLOOD STUDY

MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



PLAN VIEW

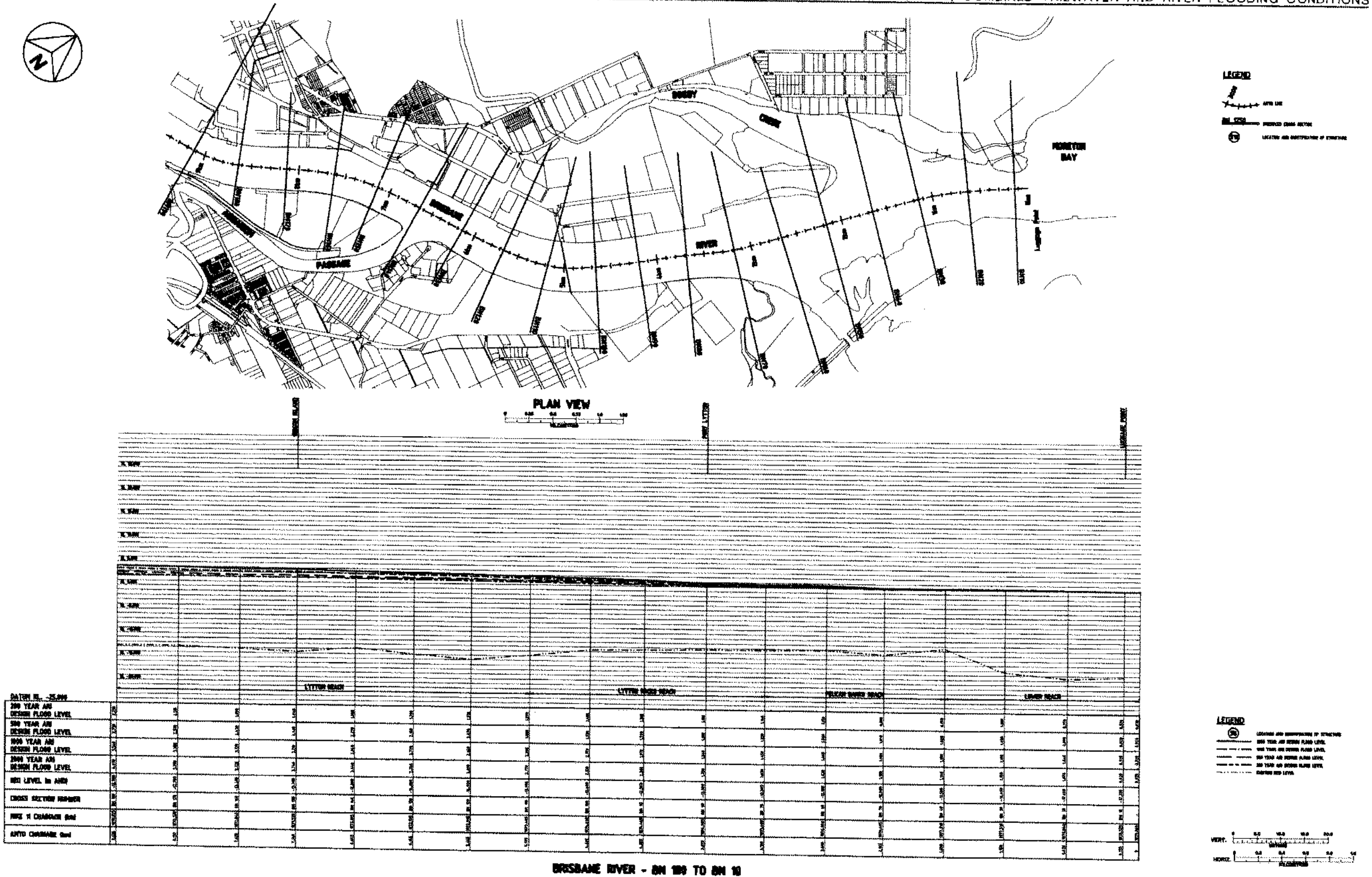


BRISBANE RIVER - BN 360 TO BN 180

SINCLAIR KNIGHT MERZ

FIGURE H-6i

BRISBANE RIVER FLOOD STUDY
MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500, AND 200 YEAR ARI FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS



FILE NAME: 415/-154
PLOT SCALE: 1:30
DISK N°: C:\DWG
JOB N°: T00415?
DATE: 23/3/??

Appendix I - HEC-RAS Hydraulic Model Results

Table I-1 - HEC-RAS Model Calibration

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	MIKE 11 100 YEAR ARI WL (m AHD)	HEC-RAS 100 YEAR ARI WL (m AHD)	100 YEAR ARI DIFFERENCE (m)	MIKE 11 10 YEAR ARI WL (m AHD)	HEC-RAS 10 YEAR ARI WL (m AHD)	10 YEAR ARI DIFFERENCE (m)
BRISBANE	1000	78.66	BN 2020		22.76	22.58	-0.18	7.25	7.14	-0.11
BRISBANE	1000.285	78.375	BN 2010		22.57	22.38	-0.19	7.16	7.04	-0.12
BRISBANE	1000.775	77.885	BN 2000		22.29	22.13	-0.16	7.00	6.91	-0.09
BRISBANE	1001.315	77.345	BN 1990		22.20	22.07	-0.13	6.86	6.77	-0.09
BRISBANE	1001.865	76.795	BN 1980		21.68	21.39	-0.29	6.64	6.51	-0.13
BRISBANE	1002.35	76.310	BN 1970		21.48	21.28	-0.20	6.42	6.33	-0.09
BRISBANE	1002.785	75.875	BN 1960		21.46	21.25	-0.21	6.34	6.25	-0.09
BRISBANE	1003.275	75.385	BN 1950		21.13	20.93	-0.20	6.16	6.08	-0.08
BRISBANE	1003.775	74.885	BN 1940		20.86	20.67	-0.19	5.97	5.89	-0.08
BRISBANE	1004.3	74.360	BN 1930		20.41	20.19	-0.22	5.75	5.65	-0.10
BRISBANE	1004.81	73.850	BN 1920		20.37	20.21	-0.16	5.63	5.53	-0.10
BRISBANE	1005.325	73.335	BN 1910		20.20	20.04	-0.16	5.47	5.35	-0.12
BRISBANE	1005.87	72.790	BN 1900		19.89	19.67	-0.22	5.25	5.09	-0.16
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	19.72	19.55	-0.17	5.18	5.01	-0.17
BRISBANE	1006.91	71.750	BN 1880		19.51	19.38	-0.13	5.06	4.90	-0.16
BRISBANE	1007.41	71.250	BN 1870		19.48	19.34	-0.14	4.97	4.82	-0.15
BRISBANE	1007.92	70.740	BN 1860		19.19	18.99	-0.20	4.85	4.70	-0.15
BRISBANE	1008.445	70.215	BN 1850		19.02	18.89	-0.13	4.78	4.66	-0.12
BRISBANE	1008.925 .	69.735	BN 1840		18.96	18.85	-0.11	4.74	4.62	-0.12
BRISBANE	1009.4	69.260	BN 1830		18.86	18.74	-0.12	4.70	4.59	-0.11
BRISBANE	1009.72	68.940	BN 1820		18.85	18.72	-0.13	4.67	4.55	-0.12
BRISBANE	1010.49	68.170	BN 1810		18.50	18.39	-0.11	4.59	4.48	-0.11
BRISBANE	1010.725	67.935	BN 1800		18.52	18.37	-0.15	4.58	4.48	-0.10
BRISBANE	1010.98	67.680	BN 1790		18.44	18.34	-0.10	4.56	4.46	-0.10
BRISBANE	1011.51	67.150	BN 1780		18.43	18.33	-0.10	4.52	4.42	-0.10
BRISBANE	1011.98	66.680	BN 1770		18.43	18.30	-0.13	4.48	4.39	-0.09
BRISBANE	1012.475	66.185	BN 1760		18.33	18.21	-0.12	4.42	4.34	-0.08
BRISBANE	1012.935	65.725	BN 1750		18.22	18.15	-0.07	4.38	4.30	-0.08
BRISBANE	1013.445	65.215	BN 1740		18.14	18.07	-0.07	4.33	4.26	-0.07
BRISBANE	1013.91	64.750	BN 1730		18.08	18.06	-0.02	4.27	4.20	-0.07
BRISBANE	1014.31	64.350	BN 1720		18.05	17.99	-0.06	4.22	4.16	-0.06
BRISBANE	1014.61	64.060	BN 1710	Goodna Hospital Gauge	18.08	18.02	-0.06	4.18	4.13	-0.05
BRISBANE	1015.09	63.570	BN 1700		17.94	17.82	-0.12	4.17	4.12	-0.05
BRISBANE	1015.56	63.100	BN 1690		17.81	17.66	-0.15	4.13	4.08	-0.05
BRISBANE	1016.14	62.520	BN 1680		17.71	17.59	-0.12	4.09	4.04	-0.05
BRISBANE	1016.64	62.020	BN 1670		17.62	17.60	-0.02	4.01	3.97	-0.04
BRISBANE	1017.13	61.530	BN 1660		17.39	17.31	-0.08	3.87	3.81	-0.06
BRISBANE	1017.61	61.050	BN 1650		17.26	17.17	-0.09	3.77	3.72	-0.05
BRISBANE	1017.92	60.740	BN 1640		17.10	17.02	-0.08	3.69	3.66	-0.03
BRISBANE	1018.2	60.460	BN 1630		17.02	16.98	-0.04	3.67	3.63	-0.04
BRISBANE	1018.725	59.935	BN 1620		16.69	16.61	-0.08	3.60	3.55	-0.05
BRISBANE	1019.095	59.565	BN 1610		16.56	16.53	-0.03	3.54	3.50	-0.04
BRISBANE	1019.49	59.170	BN 1600		16.45	16.46	0.01	3.48	3.45	-0.03
BRISBANE	1019.865	58.795	BN 1590		16.15	16.14	-0.01	3.43	3.38	-0.05
BRISBANE	1020.115	58.546	BN 1580		16.25	16.21	-0.04	3.40	3.35	-0.05
BRISBANE	1020.525	58.135	BN 1570		16.22	16.20	-0.02	3.36	3.32	-0.04
BRISBANE	1020.83	57.830	BN 1560		16.07	16.03	-0.04	3.32	3.29	-0.03
BRISBANE	1021.095	57.565	BN 1550		15.86	15.79	-0.07	3.27	3.23	-0.04
BRISBANE	1021.539	57.121	BN 1540		15.69	15.66	-0.03	3.19	3.17	-0.02
BRISBANE	1021.715	56.945	BN 1530		15.72	15.66	-0.06	3.17	3.14	-0.03
BRISBANE	1021.895	56.765	BN 1520		15.65	15.61	-0.04	3.15	3.12	-0.03
BRISBANE	1022.105	56.555	BN 1510		15.53	15.49	-0.04	3.15	3.11	-0.04
BRISBANE	1022.575	56.085	BN 1500		15.45	15.43	-0.02	3.10	3.06	-0.04
BRISBANE	1023.04	55.620	BN 1490		15.21	15.12	-0.09	3.07	3.01	-0.06
BRISBANE	1023.57	55.090	BN 1480		15.12	15.05	-0.07	3.05	2.98	-0.07
BRISBANE	1024.08	54.580	BN 1470		15.07	14.98	-0.09	3.02	2.94	-0.08
BRISBANE	1024.563	54.097	BN 1460		15.01	14.95	-0.06	2.97	2.90	-0.07
BRISBANE	1025.07	53.590	BN 1450		14.91	14.87	-0.04	2.93	2.86	-0.07
BRISBANE	1025.36	53.300	BN 1440		14.77	14.70	-0.07	2.89	2.82	-0.07
BRISBANE	1025.59	53.070	BN 1430		14.61	14.53	-0.08	2.85	2.78	-0.07
BRISBANE	1026.17	52.490	BN 1420		14.48	14.43	-0.05	2.83	2.74	-0.09
BRISBANE	1026.68	51.980	BN 1410	Mt Ommaney Gauge	14.38	14.32	-0.06	2.78	2.69	-0.09
BRISBANE	1026.9	51.760	BN 1400		14.25	14.20	-0.05	2.75	2.67	-0.08
BRISBANE	1027.16	51.500	BN 1390		14.11	14.08	-0.03	2.73	2.65	-0.08
BRISBANE	1027.68	50.980	BN 1380		14.17	14.15	-0.02	2.71	2.63	-0.08
BRISBANE	1028.18	50.480	BN 1370		14.19	14.15	-0.04	2.70	2.62	-0.08
BRISBANE	1028.68	49.980	BN 1360		14.06	14.01	-0.05	2.67	2.60	-0.07
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge						
BRISBANE	1028.76	49.900	BN 1340		13.91	13.96	0.05	2.63	2.58	-0.05
BRISBANE	1029.2	49.460	BN 1330		13.80	13.82	0.02	2.60	2.56	-0.04
BRISBANE	1029.68	48.980	BN 1320		13.82	13.81	-0.01	2.60	2.55	-0.05
BRISBANE	1030.22	48.440	BN 1310		13.82	13.85	0.03	2.58	2.54	-0.04
BRISBANE	1030.87	47.790	BN 1300		13.75	13.80	0.05	2.56	2.52	-0.04
BRISBANE	1031.26	47.400	BN 1290		13.59	13.64	0.05	2.54	2.50	-0.04
BRISBANE	1031.7	46.960	BN 1280	Darra Wharf Gauge	13.21	13.27	0.06	2.47	2.44	-0.03
BRISBANE	1031.995	46.665	BN 1270		13.31	13.28	-0.03	2.44	2.40	-0.04

Table I-1 - HEC-RAS Model Calibration

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	MIKE 11 100 YEAR ARI WL (m AHD)	HEC-RAS 100 YEAR ARI WL (m AHD)	100 YEAR ARI DIFFERENCE (m)	MIKE 11 10 YEAR ARI WL (m AHD)	HEC-RAS 10 YEAR ARI WL (m AHD)	10 YEAR ARI DIFFERENCE (m)
BRISBANE	1032.23	46.430	BN 1260		13.18	13.21	0.03	2.41	2.38	-0.03
BRISBANE	1032.585	46.075	BN 1250		12.94	12.97	0.03	2.37	2.34	-0.03
BRISBANE	1033.08	45.580	BN 1240		12.79	12.84	0.05	2.34	2.31	-0.03
BRISBANE	1033.37	45.290	BN 1230		12.68	12.76	0.08	2.31	2.28	-0.03
BRISBANE	1033.9	44.760	BN 1220		12.45	12.55	0.10	2.28	2.24	-0.04
BRISBANE	1034.37	44.290	BN 1210		12.29	12.42	0.13	2.25	2.22	-0.03
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	12.19	12.31	0.12	2.22	2.19	-0.03
BRISBANE	1035.414	43.246	BN 1190		11.94	12.11	0.17	2.16	2.14	-0.02
BRISBANE	1035.9	42.760	BN 1180		11.65	11.80	0.15	2.10	2.08	-0.02
BRISBANE	1036.46	42.200	BN 1170		11.35	11.58	0.23	2.05	2.03	-0.02
BRISBANE	1036.77	41.890	BN 1160		11.28	11.52	0.24	2.02	1.99	-0.03
BRISBANE	1036.915	41.745	BN 1150		11.12	11.37	0.25	2.00	1.98	-0.02
BRISBANE	1037.09	41.570	BN 1140		11.07	11.18	0.11	2.00	1.96	-0.04
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge						
BRISBANE	1037.175	41.485	BN 1120		10.98	11.08	0.10	1.94	1.95	0.01
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	10.93	11.10	0.17	1.93	1.95	0.02
BRISBANE	1037.625	41.035	BN 1100		10.91	11.07	0.16	1.91	1.93	0.02
BRISBANE	1038.085	40.575	BN 1090		10.93	11.08	0.15	1.90	1.93	0.03
BRISBANE	1038.6	40.060	BN 1080		10.91	11.07	0.16	1.88	1.90	0.02
BRISBANE	1039.1	39.560	BN 1070		10.90	11.05	0.15	1.86	1.89	0.03
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	10.92	11.04	0.12	1.85	1.88	0.03
BRISBANE	1040.09	38.570	BN 1050	King Authur Terrace Gauge	10.84	10.99	0.15	1.86	1.88	0.02
BRISBANE	1040.49	38.170	BN 1040		10.71	10.81	0.10	1.84	1.86	0.02
BRISBANE	1041.01	37.650	BN 1030		10.74	10.84	0.10	1.84	1.86	0.02
BRISBANE	1041.23	37.430	BN 1020		10.71	10.80	0.09	1.83	1.85	0.02
BRISBANE	1041.46	37.200	BN 1010	Tennyson Power House Gaug	10.62	10.71	0.09	1.81	1.84	0.03
BRISBANE	1041.7	36.960	BN 1000		10.59	10.68	0.09	1.81	1.83	0.02
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	10.45	10.49	0.04	1.79	1.81	0.02
BRISBANE	1042.235	36.425	BN 980		10.30	10.26	-0.04	1.77	1.79	0.02
BRISBANE	1042.515	36.145	BN 970		10.29	10.20	-0.09	1.77	1.78	0.01
BRISBANE	1042.91	35.750	BN 960		10.22	10.03	-0.19	1.74	1.75	0.01
BRISBANE	1043.725	34.935	BN 950		9.91	9.80	-0.11	1.67	1.70	0.03
BRISBANE	1044.06	34.600	BN 940	Sandy Creek Gauge	9.75	9.70	-0.05	1.66	1.69	0.03
BRISBANE	1044.34	34.320	BN 930		9.58	9.52	-0.06	1.64	1.66	0.02
BRISBANE	1044.605	34.055	BN 920		9.53	9.44	-0.09	1.63	1.65	0.02
BRISBANE	1044.86	33.800	BN 910		9.49	9.37	-0.12	1.61	1.64	0.03
BRISBANE	1045.4	33.260	BN 900		9.31	9.22	-0.09	1.58	1.60	0.02
BRISBANE	1045.885	32.775	BN 890		9.17	9.05	-0.12	1.54	1.56	0.02
BRISBANE	1046.18	32.480	BN 880		9.09	8.99	-0.10	1.54	1.56	0.02
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	9.02	8.92	-0.10	1.53	1.55	0.02
BRISBANE	1046.58	32.080	BN 860		8.97	8.88	-0.09	1.53	1.55	0.02
BRISBANE	1046.9	31.760	BN 850		8.78	8.69	-0.09	1.50	1.52	0.02
BRISBANE	1047.35	31.310	BN 840		8.41	8.34	-0.07	1.46	1.48	0.02
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	8.17	8.17	0.00	1.43	1.46	0.03
BRISBANE	1048.375	30.285	BN 820		8.23	8.22	-0.01	1.43	1.46	0.03
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	8.00	8.00	0.00	1.40	1.42	0.02
BRISBANE	1049.12	29.540	BN 800		7.94	7.96	0.02	1.39	1.42	0.03
BRISBANE	1049.37	29.290	BN 790		7.75	7.77	0.02	1.37	1.40	0.03
BRISBANE	1049.59	29.070	BN 780		7.74	7.75	0.01	1.37	1.40	0.03
BRISBANE	1049.87	28.790	BN 770		7.63	7.66	0.03	1.36	1.39	0.03
BRISBANE	1050.43	28.230	BN 760		7.61	7.62	0.01	1.35	1.37	0.02
BRISBANE	1050.86	27.800	BN 750		7.46	7.50	0.04	1.34	1.36	0.02
BRISBANE	1051.36	27.300	BN 740		7.46	7.49	0.03	1.34	1.36	0.02
BRISBANE	1051.895	26.765	BN 730		7.30	7.29	-0.01	1.31	1.34	0.03
BRISBANE	1052.31	26.350	BN 720		7.40	7.27	-0.13	1.32	1.33	0.01
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge						
BRISBANE	1052.39	26.270	BN 700		7.23	7.11	-0.12	1.30	1.32	0.02
BRISBANE	1052.595	26.065	BN 690		7.14	7.04	-0.10	1.30	1.31	0.01
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge						
BRISBANE	1052.64	26.020	BN 670		6.63	6.49	-0.14	1.28	1.28	0.00
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	6.49	6.38	-0.11	1.28	1.27	-0.01
BRISBANE	1053.32	25.340	BN 650		6.42	6.21	-0.21	1.26	1.25	-0.01
BRISBANE	1053.356	25.304	BN 640	Victoria Bridge						
BRISBANE	1053.385	25.276	BN630		6.24	6.13	-0.11	1.24	1.23	-0.01
BRISBANE	1053.9	24.760	BN 620		5.85	5.79	-0.06	1.20	1.19	-0.01
BRISBANE	1054.64	24.020	BN 610		5.78	5.70	-0.08	1.19	1.18	-0.01
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge						
BRISBANE	1054.68	23.980	BN 590		5.70	5.61	-0.09	1.18	1.17	-0.01
BRISBANE	1054.97	23.690	BN 560		5.45	5.29	-0.16	1.16	1.15	-0.01
BRISBANE	1055.28	23.380	BN 550		5.40	5.28	-0.12	1.16	1.15	-0.01
BRISBANE	1055.42	23.240	BN 540		5.40	5.27	-0.13	1.16	1.15	-0.01
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	5.34	5.27	-0.07	1.15	1.15	0.00
BRISBANE	1056.4	22.260	BN 520		5.09	5.06	-0.03	1.13	1.13	0.00
BRISBANE	1056.695	21.965	BN 510		5.03	5.05	0.02	1.13	1.13	0.00
BRISBANE	1056.865	21.795	BN 500		5.22	4.99	-0.23	1.14	1.13	-0.01
BRISBANE	1056.92	21.740	BN 495	Story Bridge						

Table I-1 - HEC-RAS Model Calibration

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	MIKE 11 100 YEAR ARI WL (m AHD)	HEC-RAS 100 YEAR ARI WL (m AHD)	100 YEAR ARI DIFFERENCE (m)	MIKE 11 10 YEAR ARI WL (m AHD)	HEC-RAS 10 YEAR ARI WL (m AHD)	10 YEAR ARI DIFFERENCE (m)
BRISBANE	1056.95	21.710	BN 490		5.12	4.96	-0.16	1.13	1.13	0.00
BRISBANE	1057.09	21.570	BN 480		4.97	4.90	-0.07	1.12	1.12	0.00
BRISBANE	1057.53	21.130	BN 470		4.83	4.77	-0.06	1.12	1.11	-0.01
BRISBANE	1058.04	20.620	BN 460		4.58	4.52	-0.06	1.10	1.10	0.00
BRISBANE	1058.23	20.430	BN 450		4.50	4.45	-0.05	1.09	1.09	0.00
BRISBANE	1058.53	20.130	BN 440		4.37	4.33	-0.04	1.09	1.08	-0.01
BRISBANE	1058.735	19.925	BN 430		4.41	4.32	-0.09	1.09	1.08	-0.01
BRISBANE	1059.035	19.625	BN 420		4.13	4.07	-0.06	1.07	1.07	0.00
BRISBANE	1059.54	19.120	BN 410		4.09	4.02	-0.07	1.07	1.06	-0.01
BRISBANE	1059.99	18.670	BN 400		3.88	3.86	-0.02	1.05	1.05	0.00
BRISBANE	1060.345	18.315	BN 390		3.65	3.63	-0.02	1.04	1.04	0.00
BRISBANE	1060.535	18.125	BN 380		3.50	3.49	-0.01	1.03	1.03	0.00
BRISBANE	1061.015	17.645	BN 370		3.45	3.45	0.00	1.03	1.03	0.00
BRISBANE	1061.53	17.130	BN 360		3.24	3.25	0.01	1.02	1.02	0.00
BRISBANE	1062.02	16.640	BN 350		3.16	3.19	0.03	1.01	1.01	0.00
BRISBANE	1062.535	16.125	BN 340		3.12	3.15	0.03	1.01	1.01	0.00
BRISBANE	1062.94	15.720	BN 330		3.11	3.15	0.04	1.01	1.01	0.00
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	2.99	3.04	0.05	1.00	1.00	0.00
BRISBANE	1063.645.	15.015	BN 310	Cresent Road Gauge	2.72	2.70	-0.02	0.99	0.99	0.00
BRISBANE	1064	14.660	BN 300		2.68	2.68	0.00	0.99	0.99	0.00
BRISBANE	1064.49	14.170	BN 290		2.55	2.56	0.01	0.98	0.98	0.00
BRISBANE	1065.01	13.650	BN 280		2.57	2.58	0.01	0.98	0.98	0.00
BRISBANE	1065.503	13.157	BN 270		2.53	2.56	0.03	0.98	0.98	0.00
BRISBANE	1065.99	12.670	BN 260	Cairncross Dock Gauge	2.54	2.56	0.02	0.98	0.98	0.00
BRISBANE	1066.505	12.155	BN 250		2.46	2.48	0.02	0.98	0.98	0.00
BRISBANE	1067.02	11.640	BN 240		2.43	2.45	0.02	0.98	0.98	0.00
BRISBANE	1067.485	11.175	BN 230		2.32	2.34	0.02	0.97	0.97	0.00
BRISBANE	1067.965	10.695	BN 220		2.20	2.23	0.03	0.97	0.97	0.00
BRISBANE	1068.66	10.000	BN 210		2.02	2.05	0.03	0.96	0.96	0.00
BRISBANE	1069.045	9.615	BN 200		1.95	1.98	0.03	0.96	0.96	0.00
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	1.89	1.92	0.03	0.95	0.95	0.00
BRISBANE	1070.025	8.635	BN 180		1.82	1.87	0.05	0.95	0.95	0.00
BRISBANE	1070.53	8.130	BN 170		1.72	1.78	0.06	0.95	0.95	0.00
BRISBANE	1071.04	7.620	BN 160		1.64	1.71	0.07	0.94	0.94	0.00
BRISBANE	1071.52	7.140	BN 150		1.67	1.73	0.06	0.94	0.95	0.01
BRISBANE	1072.015	6.645	BN 140		1.56	1.62	0.06	0.94	0.94	0.00
BRISBANE	1072.515	6.145	BN 130		1.50	1.57	0.07	0.94	0.94	0.00
BRISBANE	1072.995	5.665	BN 120		1.46	1.53	0.07	0.94	0.94	0.00
BRISBANE	1073.485	5.175	BN 110		1.36	1.44	0.08	0.93	0.93	0.00
BRISBANE	1074	4.660	BN 100		1.29	1.38	0.09	0.93	0.93	0.00
BRISBANE	1074.46	4.200	BN 90		1.22	1.32	0.10	0.93	0.93	0.00
BRISBANE	1074.985	3.675	BN 80		1.09	1.19	0.10	0.93	0.93	0.00
BRISBANE	1075.48	3.180	BN 70		1.06	1.14	0.08	0.92	0.92	0.00
BRISBANE	1076	2.660	BN 60		1.07	1.15	0.08	0.92	0.92	0.00
BRISBANE	1076.495	2.165	BN 50		0.96	1.04	0.08	0.92	0.92	0.00
BRISBANE	1077.01	1.650	BN 40		0.96	1.02	0.06	0.92	0.92	0.00
BRISBANE	1077.51	1.150	BN 30		0.97	1.03	0.06	0.92	0.92	0.00
BRISBANE	1078.04	0.620	BN 20		0.95	1.01	0.06	0.92	0.92	0.00
BRISBANE	1078.525	0.135	BN 10		0.92	0.92	0.00	0.92	0.92	0.00
BRISBANE	1078.66	0.000	-	Western Inner Bar Gauge	0.92	0.92	0.00	0.92	0.92	0.00

Table I-2 - Comparison of MIKE 11 & HEC-RAS Mannings n Roughness

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	MIKE 11 MANNINGS COEFFICIENT CHANNEL	HEC-RAS MANNINGS COEFFICIENT CHANNEL	RATIO CHANNEL	MIKE 11 MANNINGS COEFFICIENT BANKS	HEC-RAS MANNINGS COEFFICIENT BANKS	RATIO BANKS
BRISBANE	1000	78.66	BN 2020		0.075	0.0637	0.85	0.180	0.153	0.85
BRISBANE	1000.285	78.375	BN 2010		0.075	0.0637	0.85	0.158	0.134	0.85
BRISBANE	1000.775	77.885	BN 2000		0.070	0.0595	0.85	0.147	0.125	0.85
BRISBANE	1001.315	77.345	BN 1990		0.070	0.0595	0.85	0.147	0.125	0.85
BRISBANE	1001.865	76.795	BN 1980		0.070	0.0595	0.85	0.175	0.149	0.85
BRISBANE	1002.35	76.310	BN 1970		0.065	0.0552	0.85	0.104	0.088	0.85
BRISBANE	1002.785	75.875	BN 1960		0.065	0.0552	0.85	0.104	0.088	0.85
BRISBANE	1003.275	75.385	BN 1950		0.075	0.0637	0.85	0.120	0.102	0.85
BRISBANE	1003.775	74.885	BN 1940		0.075	0.0637	0.85	0.150	0.128	0.85
BRISBANE	1004.3	74.360	BN 1930		0.075	0.0637	0.85	0.150	0.128	0.85
BRISBANE	1004.81	73.850	BN 1920		0.075	0.0637	0.85	0.150	0.128	0.85
BRISBANE	1005.325	73.335	BN 1910		0.070	0.0595	0.85	0.168	0.143	0.85
BRISBANE	1005.87	72.790	BN 1900		0.075	0.0637	0.85	0.180	0.153	0.85
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	0.075	0.0637	0.85	0.180	0.153	0.85
BRISBANE	1006.91	71.750	BN 1880		0.075	0.0637	0.85	0.180	0.153	0.85
BRISBANE	1007.41	71.250	BN 1870		0.050	0.0425	0.85	0.120	0.102	0.85
BRISBANE	1007.92	70.740	BN 1860		0.070	0.0595	0.85	0.210	0.179	0.85
BRISBANE	1008.445	70.215	BN 1850		0.050	0.0425	0.85	0.165	0.140	0.85
BRISBANE	1008.925	69.735	BN 1840		0.050	0.0425	0.85	0.170	0.145	0.85
BRISBANE	1009.4	69.260	BN 1830		0.050	0.0425	0.85	0.170	0.145	0.85
BRISBANE	1009.72	68.940	BN 1820		0.050	0.0425	0.85	0.170	0.145	0.85
BRISBANE	1010.49	68.170	BN 1810		0.050	0.0425	0.85	0.170	0.145	0.85
BRISBANE	1010.725	67.935	BN 1800		0.050	0.0425	0.85	0.170	0.145	0.85
BRISBANE	1010.98	67.680	BN 1790		0.050	0.0425	0.85	0.170	0.145	0.85
BRISBANE	1011.51	67.150	BN 1780		0.050	0.0425	0.85	0.170	0.145	0.85
BRISBANE	1011.98	66.680	BN 1770		0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1012.475	66.185	BN 1760		0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1012.935	65.725	BN 1750		0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1013.445	65.215	BN 1740		0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1013.91	64.750	BN 1730		0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1014.31	64.350	BN 1720		0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1014.61	64.050	BN 1710	Goodna Hospital Gauge	0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1015.09	63.570	BN 1700		0.055	0.0467	0.85	0.165	0.140	0.85
BRISBANE	1015.56	63.100	BN 1690		0.055	0.0467	0.85	0.143	0.122	0.85
BRISBANE	1016.14	62.520	BN 1680		0.055	0.0467	0.85	0.176	0.150	0.85
BRISBANE	1016.64	62.020	BN 1670		0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1017.13	61.530	BN 1660		0.070	0.0595	0.85	0.238	0.202	0.85
BRISBANE	1017.61	61.050	BN 1650		0.070	0.0595	0.85	0.238	0.202	0.85
BRISBANE	1017.92	60.740	BN 1640		0.070	0.0595	0.85	0.238	0.202	0.85
BRISBANE	1018.2	60.460	BN 1630		0.075	0.0637	0.85	0.255	0.217	0.85
BRISBANE	1018.725	59.935	BN 1620		0.075	0.0637	0.85	0.255	0.217	0.85
BRISBANE	1019.095	59.565	BN 1610		0.075	0.0637	0.85	0.255	0.217	0.85
BRISBANE	1019.49	59.170	BN 1600		0.075	0.0637	0.85	0.255	0.217	0.85
BRISBANE	1019.865	58.795	BN 1590		0.075	0.0637	0.85	0.255	0.217	0.85
BRISBANE	1020.115	58.545	BN 1580		0.075	0.0637	0.85	0.255	0.217	0.85
BRISBANE	1020.525	58.135	BN 1570		0.075	0.0637	0.85	0.203	0.173	0.85
BRISBANE	1020.83	57.830	BN 1560		0.075	0.0637	0.85	0.195	0.166	0.85
BRISBANE	1021.095	57.565	BN 1550		0.075	0.0637	0.85	0.195	0.166	0.85
BRISBANE	1021.539	57.121	BN 1540		0.070	0.0596	0.85	0.182	0.155	0.85
BRISBANE	1021.715	56.945	BN 1530		0.070	0.0595	0.85	0.182	0.155	0.85
BRISBANE	1021.895	56.765	BN 1520		0.070	0.0595	0.85	0.182	0.155	0.85
BRISBANE	1022.105	56.555	BN 1510		0.070	0.0595	0.85	0.182	0.155	0.85
BRISBANE	1022.575	56.085	BN 1500		0.045	0.0382	0.85	0.090	0.077	0.85
BRISBANE	1023.04	55.620	BN 1490		0.045	0.0382	0.85	0.099	0.084	0.85
BRISBANE	1023.57	55.090	BN 1480		0.045	0.0382	0.85	0.117	0.100	0.85
BRISBANE	1024.09	54.560	BN 1470		0.045	0.0382	0.85	0.117	0.100	0.85
BRISBANE	1024.563	54.097	BN 1460		0.055	0.0467	0.85	0.143	0.122	0.85
BRISBANE	1025.07	53.590	BN 1450		0.055	0.0467	0.85	0.143	0.122	0.85
BRISBANE	1025.36	53.300	BN 1440		0.055	0.0467	0.85	0.143	0.122	0.85
BRISBANE	1025.59	53.070	BN 1430		0.055	0.0467	0.85	0.110	0.094	0.85
BRISBANE	1026.17	52.490	BN 1420		0.055	0.0467	0.85	0.143	0.122	0.85
BRISBANE	1026.68	51.980	BN 1410	Mt Ommaney Gauge	0.055	0.0467	0.85	0.143	0.122	0.85
BRISBANE	1026.9	51.760	BN 1400		0.055	0.0467	0.85	0.143	0.122	0.85
BRISBANE	1027.16	51.500	BN 1390		0.055	0.0467	0.85	0.143	0.122	0.85
BRISBANE	1027.68	50.980	BN 1380		0.030	0.0255	0.85	0.078	0.066	0.85
BRISBANE	1028.18	50.480	BN 1370		0.030	0.0255	0.85	0.078	0.066	0.85
BRISBANE	1028.68	49.980	BN 1360		0.030	0.0255	0.85	0.078	0.066	0.85
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge						
BRISBANE	1028.76	49.900	BN 1340		0.035	0.0297	0.85	0.091	0.077	0.85
BRISBANE	1029.2	49.460	BN 1330		0.035	0.0297	0.85	0.098	0.083	0.85
BRISBANE	1029.68	48.980	BN 1320		0.030	0.0255	0.85	0.090	0.077	0.85
BRISBANE	1030.22	48.440	BN 1310		0.030	0.0255	0.85	0.114	0.097	0.85
BRISBANE	1030.87	47.790	BN 1300		0.030	0.0255	0.85	0.117	0.100	0.85
BRISBANE	1031.26	47.400	BN 1290		0.050	0.0425	0.85	0.200	0.170	0.85
BRISBANE	1031.7	46.960	BN 1280	Darra Wharf Gauge	0.075	0.0637	0.85	0.315	0.268	0.85
BRISBANE	1031.995	46.665	BN 1270		0.075	0.0637	0.85	0.330	0.281	0.85
BRISBANE	1032.23	46.430	BN 1260		0.065	0.0552	0.85	0.286	0.243	0.85
BRISBANE	1032.585	46.075	BN 1250		0.075	0.0637	0.85	0.330	0.281	0.85

Table I-2 - Comparison of MIKE 11 & HEC-RAS Mannings n Roughness

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	MIKE 11 MANNINGS COEFFICIENT CHANNEL	HEC-RAS MANNINGS COEFFICIENT CHANNEL	RATIO CHANNEL	MIKE 11 MANNINGS COEFFICIENT BANKS	HEC-RAS MANNINGS COEFFICIENT BANKS	RATIO BANKS
BRISBANE	1033.08	45.580	BN 1240		0.055	0.0467	0.85	0.242	0.206	0.85
BRISBANE	1033.37	45.290	BN 1230		0.055	0.0467	0.85	0.242	0.206	0.85
BRISBANE	1033.9	44.760	BN 1220		0.050	0.0425	0.85	0.220	0.187	0.85
BRISBANE	1034.37	44.290	BN 1210		0.050	0.0425	0.85	0.210	0.179	0.85
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	0.065	0.0552	0.85	0.267	0.227	0.85
BRISBANE	1035.414	43.246	BN 1190		0.060	0.051	0.85	0.234	0.199	0.85
BRISBANE	1035.9	42.760	BN 1180		0.065	0.0552	0.85	0.260	0.221	0.85
BRISBANE	1036.46	42.200	BN 1170		0.065	0.0552	0.85	0.273	0.232	0.85
BRISBANE	1036.77	41.890	BN 1160		0.065	0.0552	0.85	0.260	0.221	0.85
BRISBANE	1036.915	41.745	BN 1150		0.065	0.0552	0.85	0.254	0.216	0.85
BRISBANE	1037.09	41.570	BN 1140		0.065	0.0552	0.85	0.247	0.210	0.85
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge						
BRISBANE	1037.175	41.485	BN 1120		0.055	0.0467	0.85	0.209	0.178	0.85
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1037.625	41.035	BN 1100		0.055	0.0467	0.85	0.187	0.159	0.85
BRISBANE	1038.085	40.575	BN 1090		0.030	0.0255	0.85	0.102	0.087	0.85
BRISBANE	1038.6	40.060	BN 1080		0.030	0.0255	0.85	0.102	0.087	0.85
BRISBANE	1039.1	39.560	BN 1070		0.030	0.0255	0.85	0.102	0.087	0.85
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	0.030	0.0255	0.85	0.102	0.087	0.85
BRISBANE	1040.09	38.570	BN 1050	King Authur Terrace Gauge	0.030	0.0255	0.85	0.120	0.102	0.85
BRISBANE	1040.49	38.170	BN 1040		0.030	0.0255	0.85	0.126	0.107	0.85
BRISBANE	1041.01	37.650	BN 1030		0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1041.23	37.430	BN 1020		0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1041.46	37.200	BN 1010	Tennyson Power House Gauge	0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1041.7	36.960	BN 1000		0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1042.235	36.425	BN 980		0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1042.515	36.145	BN 970		0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1042.91	35.750	BN 960		0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1043.725	34.935	BN 950		0.060	0.051	0.85	0.252	0.214	0.85
BRISBANE	1044.06	34.600	BN 940	Sandy Creek Gauge	0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1044.34	34.320	BN 930		0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1044.605	34.055	BN 920		0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1044.86	33.800	BN 910		0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1045.4	33.260	BN 900		0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1045.885	32.775	BN 890		0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1046.18	32.480	BN 880		0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1046.58	32.080	BN 860		0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1046.9	31.760	BN 850		0.070	0.0595	0.85	0.294	0.250	0.85
BRISBANE	1047.35	31.310	BN 840		0.070	0.0595	0.85	0.315	0.268	0.85
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	0.050	0.0425	0.85	0.260	0.221	0.85
BRISBANE	1048.375	30.285	BN 820		0.050	0.0425	0.85	0.260	0.221	0.85
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	0.050	0.0425	0.85	0.260	0.221	0.85
BRISBANE	1049.12	29.540	BN 800		0.050	0.0425	0.85	0.260	0.221	0.85
BRISBANE	1049.37	29.290	BN 790		0.050	0.0425	0.85	0.260	0.221	0.85
BRISBANE	1049.59	29.070	BN 780		0.045	0.0382	0.85	0.234	0.199	0.85
BRISBANE	1049.87	28.790	BN 770		0.045	0.0382	0.85	0.225	0.191	0.85
BRISBANE	1050.43	28.230	BN 760		0.030	0.0255	0.85	0.132	0.112	0.85
BRISBANE	1050.86	27.800	BN 750		0.030	0.0255	0.85	0.126	0.107	0.85
BRISBANE	1051.36	27.300	BN 740		0.030	0.0255	0.85	0.150	0.128	0.85
BRISBANE	1051.895	26.765	BN 730		0.030	0.0255	0.85	0.156	0.133	0.85
BRISBANE	1052.31	26.350	BN 720		0.030	0.0255	0.85	0.156	0.133	0.85
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge						
BRISBANE	1052.39	26.270	BN 700		0.030	0.0255	0.85	0.156	0.133	0.85
BRISBANE	1052.595	26.065	BN 690		0.030	0.0255	0.85	0.156	0.133	0.85
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge						
BRISBANE	1052.64	26.020	BN 670		0.045	0.0382	0.85	0.234	0.199	0.85
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	0.050	0.0425	0.85	0.360	0.308	0.85
BRISBANE	1053.32	25.340	BN 650		0.060	0.051	0.85	0.312	0.265	0.85
BRISBANE	1053.356	25.304	BN 640	Victoria Bridge						
BRISBANE	1053.385	25.275	BN630		0.060	0.051	0.85	0.312	0.265	0.85
BRISBANE	1053.9	24.760	BN 620		0.060	0.051	0.85	0.288	0.245	0.85
BRISBANE	1054.64	24.020	BN 610		0.060	0.051	0.85	0.276	0.235	0.85
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge						
BRISBANE	1054.68	23.980	BN 590		0.060	0.051	0.85	0.270	0.230	0.85
BRISBANE	1054.97	23.690	BN 560		0.025	0.0212	0.85	0.113	0.096	0.85
BRISBANE	1055.28	23.380	BN 550		0.025	0.0212	0.85	0.105	0.089	0.85
BRISBANE	1055.42	23.240	BN 540		0.025	0.0212	0.85	0.105	0.089	0.85
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	0.025	0.0212	0.85	0.108	0.092	0.85
BRISBANE	1056.4	22.260	BN 520		0.025	0.0212	0.85	0.118	0.100	0.85
BRISBANE	1056.695	21.965	BN 510		0.025	0.0212	0.85	0.130	0.111	0.85
BRISBANE	1056.865	21.795	BN 500		0.040	0.034	0.85	0.208	0.177	0.85
BRISBANE	1056.92	21.740	BN 495	Story Bridge						
BRISBANE	1056.95	21.710	BN 490		0.040	0.034	0.85	0.208	0.177	0.85
BRISBANE	1057.09	21.570	BN 480		0.040	0.034	0.85	0.208	0.177	0.85
BRISBANE	1057.53	21.130	BN 470		0.040	0.034	0.85	0.208	0.177	0.85
BRISBANE	1058.04	20.620	BN 460		0.040	0.034	0.85	0.180	0.153	0.85

Table I-2 - Comparison of MIKE 11 & HEC-RAS Mannings n Roughness

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	MIKE 11 MANNINGS COEFFICIENT CHANNEL	HEC-RAS MANNINGS COEFFICIENT CHANNEL	RATIO CHANNEL	MIKE 11 MANNINGS COEFFICIENT BANKS	HEC-RAS MANNINGS COEFFICIENT BANKS	RATIO BANKS
BRISBANE	1058.23	20.430	BN 450		0.040	0.034	0.85	0.180	0.153	0.85
BRISBANE	1058.53	20.130	BN 440		0.040	0.034	0.85	0.176	0.150	0.85
BRISBANE	1058.735	19.925	BN 430		0.050	0.0425	0.85	0.225	0.191	0.85
BRISBANE	1059.035	19.625	BN 420		0.050	0.0425	0.85	0.250	0.213	0.85
BRISBANE	1059.54	19.120	BN 410		0.050	0.0425	0.85	0.220	0.187	0.85
BRISBANE	1059.99	18.670	BN 400		0.050	0.0425	0.85	0.215	0.183	0.85
BRISBANE	1060.345	18.315	BN 390		0.045	0.0382	0.85	0.203	0.173	0.85
BRISBANE	1060.535	18.125	BN 380		0.035	0.0297	0.85	0.175	0.149	0.85
BRISBANE	1061.015	17.645	BN 370		0.035	0.0297	0.85	0.182	0.155	0.85
BRISBANE	1061.53	17.130	BN 360		0.035	0.0297	0.85	0.182	0.155	0.85
BRISBANE	1062.02	16.640	BN 350		0.035	0.0297	0.85	0.182	0.155	0.85
BRISBANE	1062.535	16.125	BN 340		0.035	0.0297	0.85	0.182	0.155	0.85
BRISBANE	1062.94	15.720	BN 330		0.035	0.0297	0.85	0.182	0.155	0.85
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	0.050	0.0425	0.85	0.260	0.221	0.85
BRISBANE	1063.645	15.015	BN 310	Cresent Road Gauge	0.031	0.0264	0.85	0.161	0.137	0.85
BRISBANE	1064	14.660	BN 300		0.031	0.0264	0.85	0.161	0.137	0.85
BRISBANE	1064.49	14.170	BN 290		0.031	0.0264	0.85	0.161	0.137	0.85
BRISBANE	1065.01	13.650	BN 280		0.031	0.0264	0.85	0.143	0.122	0.85
BRISBANE	1065.503	13.157	BN 270		0.031	0.0264	0.85	0.105	0.089	0.85
BRISBANE	1065.99	12.670	BN 260	Cairncross Dock Gauge	0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1066.505	12.155	BN 250		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1067.02	11.640	BN 240		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1067.485	11.175	BN 230		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1067.965	10.695	BN 220		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1068.66	10.000	BN 210		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1069.045	9.615	BN 200		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1070.025	8.635	BN 180		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1070.53	8.130	BN 170		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1071.04	7.620	BN 160		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1071.52	7.140	BN 150		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1072.015	6.645	BN 140		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1072.515	6.145	BN 130		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1072.995	5.665	BN 120		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1073.485	5.175	BN 110		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1074	4.660	BN 100		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1074.46	4.200	BN 90		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1074.985	3.675	BN 80		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1075.48	3.180	BN 70		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1076	2.660	BN 60		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1076.495	2.165	BN 50		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1077.01	1.650	BN 40		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1077.51	1.150	BN 30		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1078.04	0.620	BN 20		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1078.525	0.135	BN 10		0.031	0.0264	0.85	0.104	0.088	0.85
BRISBANE	1078.66	0.000	-	Western Inner Bar Gauge	0.031	0.026	0.85	0.104	0.088	0.85

Table I-3 - HEC-RAS Predicted Velocities

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI FLOOD AVERAGE VELOCITY m/s	CHANNEL VELOCITY m/s	LEFT BANK VELOCITY m/s	RIGHT BANK VELOCITY m/s	BANK FULL BANK FULL FLOW m^3/s	AVERAGE VELOCITY m/s	CHANNEL VELOCITY m/s	LEFT BANK VELOCITY m/s	RIGHT BANK VELOCITY m/s
BRISBANE	1000	78.66	BN 2020		1.65	2.27	0.44	0.54	6000	1.47	1.87	0.41	0.42
BRISBANE	1000.285	78.375	BN 2010		1.96	2.79	0.71	0.76	6000	1.80	2.38	0.58	0.57
BRISBANE	1000.775	77.885	BN 2000		2.18	2.93	0.78	0.75	750	0.83	0.87	0.21	0.19
BRISBANE	1001.315	77.345	BN 1990		1.59	2.40	0.88	0.53	3500	1.22	1.69	0.55	0.35
BRISBANE	1001.865	76.795	BN 1980		2.58	3.76	0.73	0.68	6000	2.38	3.13	0.65	0.63
BRISBANE	1002.35	76.310	BN 1970		2.36	3.20	0.98	1.10	2000	1.62	1.77	0.63	0.51
BRISBANE	1002.785	75.875	BN 1960		1.85	2.52	0.87	0.86	750	0.81	0.84	0.28	0.08
BRISBANE	1003.275	75.385	BN 1950		2.32	2.98	0.84	0.84	3000	1.74	1.89	0.35	0.63
BRISBANE	1003.775	74.885	BN 1940		2.13	3.11	1.02	0.78	1500	1.15	1.38	0.35	0.42
BRISBANE	1004.3	74.360	BN 1930		2.41	3.64	0.90	0.94	750	0.96	1.03	0.25	0.16
BRISBANE	1004.81	73.850	BN 1920		1.70	2.17	0.58	0.60	3500	1.40	1.54	0.39	0.25
BRISBANE	1005.325	73.335	BN 1910		1.47	2.44	0.72	0.59	2000	1.15	1.47	0.39	0.17
BRISBANE	1005.87	72.790	BN 1900		1.88	3.01	0.75	0.66	750	0.93	1.02	0.18	0.18
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	1.95	2.49	0.80	0.54	750	0.63	0.66	0.08	0.09
BRISBANE	1006.91	71.750	BN 1880		1.55	2.38	0.49	0.56	2500	1.19	1.34	0.19	0.31
BRISBANE	1007.41	71.250	BN 1870		1.22	2.09	0.55	0.38	1000	0.81	0.85	0.15	0.16
BRISBANE	1007.92	70.740	BN 1860		1.83	2.95	0.50	0.42	2000	1.42	1.51	0.19	0.21
BRISBANE	1008.445	70.215	BN 1850		1.99	2.69	0.41	0.38	2500	1.18	1.32	0.19	0.18
BRISBANE	1008.925	69.735	BN 1840		1.92	2.49	0.39	0.37	5000	1.59	1.84	0.29	0.29
BRISBANE	1009.4	69.260	BN 1830		1.71	2.63	0.36	0.35	5000	1.57	1.94	0.29	0.29
BRISBANE	1009.72	68.940	BN 1820		1.43	2.32	0.27	0.32	3000	1.27	1.38	0.18	0.17
BRISBANE	1010.49	68.170	BN 1810		2.34	3.06	0.41	0.44	2000	1.27	1.35	0.14	0.18
BRISBANE	1010.725	67.935	BN 1800		2.17	2.89	0.30	0.36	5000	1.74	2.03	0.29	0.27
BRISBANE	1010.98	67.680	BN 1790		2.12	2.84	0.36	0.45	3000	1.35	1.53	0.22	0.23
BRISBANE	1011.51	67.150	BN 1780		1.53	2.44	0.36	0.46	1000	0.68	0.73	0.08	0.08
BRISBANE	1011.98	66.680	BN 1770		1.27	2.24	0.38	0.27	5000	1.19	1.76	0.21	0.21
BRISBANE	1012.475	66.185	BN 1760		1.16	2.27	0.30	0.28	3000	1.07	1.39	0.17	0.20
BRISBANE	1012.935	65.725	BN 1750		1.30	2.22	0.38	0.21	1000	0.71	0.72	0.06	0.04
BRISBANE	1013.445	65.215	BN 1740		1.24	2.14	0.25	0.21	1500	0.87	0.88	0.08	0.07
BRISBANE	1013.91	64.750	BN 1730		0.87	2.05	0.16	0.47	7000	0.87	1.86	0.12	0.41
BRISBANE	1014.31	64.350	BN 1720		0.85	2.12	0.26	0.45	7000	0.85	1.94	0.18	0.40
BRISBANE	1014.61	64.050	BN 1710	Goodna Hospital Gauge	0.76	1.38	0.28	0.38	1000	0.60	0.80	0.11	0.09
BRISBANE	1015.09	63.570	BN 1700		1.61	2.05	0.36	0.25	1500	0.64	0.66	0.08	0.05
BRISBANE	1015.56	63.100	BN 1690		1.99	2.48	0.41	0.51	5000	1.58	1.81	0.27	0.29
BRISBANE	1016.14	62.520	BN 1680		1.74	2.29	0.40	0.23	3000	1.15	1.26	0.18	0.18
BRISBANE	1016.64	62.020	BN 1670		1.37	1.69	0.25	0.16	3500	1.19	1.24	0.16	0.24
BRISBANE	1017.13	61.530	BN 1660		1.42	2.74	0.43	0.40	4000	1.34	1.98	0.32	0.28
BRISBANE	1017.61	61.050	BN 1650		1.17	2.46	0.31	0.22	3500	1.43	1.66	0.18	0.18
BRISBANE	1017.92	60.740	BN 1640		1.30	2.66	0.34	0.33	750	0.63	0.64	0.04	0.04
BRISBANE	1018.2	60.460	BN 1630		1.44	2.23	0.24	0.33	2000	0.99	1.02	0.08	0.10
BRISBANE	1018.725	59.935	BN 1620		2.08	2.89	0.25	0.47	3000	1.38	1.54	0.19	0.17
BRISBANE	1019.095	59.565	BN 1610		1.69	2.51	0.27	0.27	5000	1.66	1.86	0.21	0.23
BRISBANE	1019.49	59.170	BN 1600		1.40	2.19	0.40	0.28	1500	0.76	0.85	0.10	0.04
BRISBANE	1019.865	58.795	BN 1590		2.17	2.81	0.43	0.40	1000	0.67	0.70	0.07	0.07
BRISBANE	1020.115	58.545	BN 1580		1.09	1.97	0.36	0.28	1000	0.55	0.63	0.07	0.08
BRISBANE	1020.525	58.135	BN 1570		1.01	1.32	0.32	0.19	1000	0.43	0.46	0.08	0.07
BRISBANE	1020.83	57.830	BN 1560		1.52	2.01	0.39	0.38	2000	0.76	0.83	0.15	0.12
BRISBANE	1021.095	57.565	BN 1550		2.14	2.65	0.53	0.48	1500	0.91	0.94	0.14	0.09
BRISBANE	1021.539	57.121	BN 1540		1.87	2.45	0.60	0.45	5000	1.52	1.81	0.41	0.38
BRISBANE	1021.715	56.945	BN 1530		1.82	2.07	0.46	0.31	5000	1.36	1.57	0.36	0.24
BRISBANE	1021.895	56.765	BN 1520		1.64	2.12	0.42	0.46	750	0.45	0.46	0.05	0.06
BRISBANE	1022.105	56.555	BN 1510		2.01	2.35	0.41	0.43	4000	1.38	1.47	0.21	0.22
BRISBANE	1022.575	56.085	BN 1500		1.81	2.21	0.42	0.61	5000	1.49	1.66	0.37	0.50
BRISBANE	1023.04	55.620	BN 1490		2.23	3.11	0.56	0.68	5000	1.99	2.27	0.33	0.48
BRISBANE	1023.57	55.090	BN 1480		2.44	2.84	0.46	0.47	3500	1.60	1.69	0.28	0.23
BRISBANE	1024.08	54.580	BN 1470		2.16	2.78	0.47	0.47	7000	2.00	2.38	0.49	0.40
BRISBANE	1024.563	54.097	BN 1460		1.97	2.35	0.44	0.38	4000	1.51	1.61	0.30	0.28
BRISBANE	1025.07	53.590	BN 1450		1.76	2.20	0.27	0.42	5000	1.49	1.64	0.32	0.29
BRISBANE	1025.36	53.300	BN 1440		2.00	2.66	0.49	0.41	3500	1.49	1.61	0.26	0.25
BRISBANE	1025.59	53.070	BN 1430		2.43	3.01	0.74	0.50	4000	1.83	1.96	0.39	0.35
BRISBANE	1026.17	52.490	BN 1420		2.27	2.65	0.52	0.47	5000	1.77	1.92	0.36	0.30
BRISBANE	1026.68	51.980	BN 1410	Mt Ommaney Gauge	1.93	2.59	0.40	0.37	750	0.50	0.51	0.05	0.06

Table I-3 - HEC-RAS Predicted Velocities

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI FLOOD				BANK FULL				
					AVERAGE VELOCITY m/s	CHANNEL VELOCITY m/s	LEFT BANK VELOCITY m/s	RIGHT BANK VELOCITY m/s	BANK FULL FLOW m³/s	AVERAGE VELOCITY m/s	CHANNEL VELOCITY m/s	LEFT BANK VELOCITY m/s	RIGHT BANK VELOCITY m/s
BRISBANE	1026.9	51.760	BN 1400		2.07	2.85	0.42	0.56	1500	0.89	0.94	0.08	0.13
BRISBANE	1027.16	51.500	BN 1390		2.45	2.93	0.43	0.38	7000	2.19	2.47	0.44	0.30
BRISBANE	1027.68	50.980	BN 1380		1.77	2.25	0.40	0.50	4000	1.32	1.51	0.32	0.31
BRISBANE	1028.18	50.480	BN 1370		1.54	2.11	0.30	0.53	1000	0.58	0.61	0.08	0.08
BRISBANE	1028.68	49.980	BN 1360		1.97	2.49	0.36	0.36	2500	1.29	1.31	0.14	0.14
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge	Bridge				2500				
BRISBANE	1028.76	49.900	BN 1340		1.94	2.52	0.35	0.56	2000	1.14	1.18	0.17	0.16
BRISBANE	1029.2	49.460	BN 1330		1.90	2.88	0.46	0.42	3500	1.60	1.79	0.28	0.23
BRISBANE	1029.68	48.980	BN 1320		1.61	2.72	0.31	0.34	5000	1.63	1.99	0.30	0.25
BRISBANE	1030.22	48.440	BN 1310		1.17	2.30	0.28	0.28	1000	0.62	0.63	0.04	0.05
BRISBANE	1030.87	47.790	BN 1300		1.58	2.24	0.20	0.28	2000	1.04	1.07	0.11	0.09
BRISBANE	1031.26	47.400	BN 1290		2.09	2.67	0.29	0.24	2500	1.29	1.32	0.09	0.10
BRISBANE	1031.7	46.960	BN 1280	Darra Wharf Gauge	2.70	3.30	0.37	0.27	1000	0.71	0.72	0.05	0.04
BRISBANE	1031.995	46.665	BN 1270		1.81	2.46	0.28	0.20	1000	0.58	0.60	0.05	0.04
BRISBANE	1032.23	46.430	BN 1260		1.73	2.37	0.31	0.20	1500	0.75	0.80	0.06	0.08
BRISBANE	1032.585	46.075	BN 1250		2.28	2.73	0.22	0.17	1000	0.56	0.56	0.02	0.03
BRISBANE	1033.08	45.580	BN 1240		1.86	2.58	0.22	0.21	5000	1.68	1.81	0.14	0.16
BRISBANE	1033.37	45.290	BN 1230		2.10	2.63	0.23	0.22	1000	0.59	0.60	0.02	0.04
BRISBANE	1033.9	44.760	BN 1220		2.34	2.87	0.28	0.30	3500	1.54	1.62	0.12	0.14
BRISBANE	1034.37	44.290	BN 1210		2.44	2.89	0.34	0.26	5000	1.85	2.01	0.22	0.20
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	1.88	2.69	0.30	0.24	5000	1.66	1.89	0.17	0.17
BRISBANE	1035.414	43.246	BN 1190		2.31	2.72	0.31	0.29	6000	1.92	2.13	0.27	0.21
BRISBANE	1035.9	42.760	BN 1180		2.41	3.08	0.29	0.38	5000	1.93	2.14	0.21	0.24
BRISBANE	1036.46	42.200	BN 1170		2.41	2.85	0.23	0.34	3000	1.41	1.45	0.10	0.14
BRISBANE	1036.77	41.890	BN 1160		1.97	2.49	0.26	0.30	8000	1.84	2.25	0.28	0.28
BRISBANE	1036.915	41.745	BN 1150		2.40	2.78	0.23	0.29	2500	1.16	1.18	0.06	0.08
BRISBANE	1037.09	41.570	BN 1140		2.70	3.12	0.36	0.29	1000	0.58	0.59	0.03	0.03
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge	Bridge				1000				
BRISBANE	1037.175	41.485	BN 1120		2.71	3.04	0.40	0.30	2500	1.23	1.27	0.10	0.08
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	2.54	2.77	0.37	0.33	1500	0.78	0.79	0.07	0.05
BRISBANE	1037.625	41.035	BN 1100		2.07	2.47	0.40	0.36	3000	1.19	1.28	0.15	0.14
BRISBANE	1038.085	40.575	BN 1090		1.31	2.08	0.17	0.26	1500	0.64	0.64	0.06	0.03
BRISBANE	1038.6	40.060	BN 1080		1.17	2.01	0.25	0.29	1500	0.77	0.78	0.08	0.02
BRISBANE	1039.1	39.560	BN 1070		1.03	2.01	0.25	0.29	5000	1.16	1.62	0.15	0.21
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	1.06	1.83	0.23	0.29	5000	1.14	1.47	0.11	0.18
BRISBANE	1040.09	38.570	BN 1050	King Authur Terrace Gauge	1.32	1.90	0.15	0.24	5000	1.10	1.34	0.10	0.10
BRISBANE	1040.49	38.170	BN 1040		1.70	2.61	0.25	0.30	5000	1.43	1.82	0.14	0.13
BRISBANE	1041.01	37.650	BN 1030		1.40	2.01	0.17	0.20	4000	1.17	1.25	0.07	0.08
BRISBANE	1041.23	37.430	BN 1020		1.24	2.00	0.19	0.18	3000	1.00	1.06	0.09	0.08
BRISBANE	1041.46	37.200	BN 1010	Tennyson Power House Gauge	1.65	2.14	0.27	0.20	3000	1.04	1.10	0.10	0.05
BRISBANE	1041.7	36.960	BN 1000		1.66	2.03	0.14	0.15	1500	0.51	0.51	0.02	0.02
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	1.94	2.55	0.21	0.21	2000	0.89	0.90	0.05	0.05
BRISBANE	1042.235	36.425	BN 980		2.43	2.85	0.20	0.16	2000	0.94	0.95	0.05	0.03
BRISBANE	1042.515	36.145	BN 970		2.01	2.48	0.27	0.19	6000	1.68	1.86	0.18	0.13
BRISBANE	1042.91	35.750	BN 960		2.11	2.61	0.27	0.16	3000	1.27	1.31	0.11	0.10
BRISBANE	1043.725	34.935	BN 950		2.00	2.18	0.15	0.23	5000	1.51	1.56	0.12	0.14
BRISBANE	1044.06	34.600	BN 940	Sandy Creek Gauge	2.00	2.21	0.21	0.19	4000	1.25	1.30	0.11	0.08
BRISBANE	1044.34	34.320	BN 930		2.18	2.44	0.19	0.20	2000	0.84	0.85	0.06	0.04
BRISBANE	1044.605	34.055	BN 920		1.80	2.18	0.17	0.21	1500	0.60	0.61	0.04	0.04
BRISBANE	1044.86	33.800	BN 910		1.42	1.93	0.18	0.20	2500	0.87	0.88	0.07	0.07
BRISBANE	1045.4	33.260	BN 900		1.40	1.89	0.16	0.24	1500	0.57	0.58	0.04	0.04
BRISBANE	1045.885	32.775	BN 890		1.31	1.99	0.18	0.16	1500	0.60	0.62	0.04	0.04
BRISBANE	1046.18	32.480	BN 880		1.36	1.76	0.11	0.10	2500	0.68	0.69	0.04	0.03
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	1.76	1.87	0.10	0.09	3000	0.82	0.83	0.04	0.03
BRISBANE	1046.58	32.080	BN 860		1.60	1.84	0.18	0.11	4000	1.06	1.09	0.09	0.08
BRISBANE	1046.9	31.760	BN 850		1.85	2.25	0.19	0.19	4000	1.39	1.42	0.10	0.12
BRISBANE	1047.35	31.310	BN 840		2.33	2.75	0.18	0.18	6000	2.07	2.15	0.12	0.13
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	2.00	2.67	0.13	0.15	5000	1.71	1.79	0.10	0.06
BRISBANE	1048.375	30.285	BN 820		1.26	1.89	0.11	0.13	1500	0.51	0.51	0.02	0.02
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	2.01	2.39	0.18	0.11	2000	0.95	0.96	0.06	0.05
BRISBANE	1049.12	29.540	BN 800		1.88	2.30	0.14	0.14	2000	0.80	0.81	0.04	0.04
BRISBANE	1049.37	29.290	BN 790		2.34	2.74	0.15	0.16	2500	1.10	1.11	0.06	0.04

Table I-3 - HEC-RAS Predicted Velocities

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI FLOOD				BANK FULL				
					AVERAGE VELOCITY m/s	CHANNEL VELOCITY m/s	LEFT BANK VELOCITY m/s	RIGHT BANK VELOCITY m/s	BANK FULL FLOW m³/s	AVERAGE VELOCITY m/s	CHANNEL VELOCITY m/s	LEFT BANK VELOCITY m/s	RIGHT BANK VELOCITY m/s
BRISBANE	1049.59	29.070	BN 780		2.07	2.59	0.13	0.15	2000	0.83	0.83	0.03	0.09
BRISBANE	1049.87	28.790	BN 770		2.35	2.69	0.15	0.22	3000	1.27	1.28	0.06	0.07
BRISBANE	1050.43	28.230	BN 760		1.94	2.42	0.17	0.22	2000	0.88	0.89	0.04	0.07
BRISBANE	1050.86	27.800	BN 750		2.28	2.70	0.16	0.26	2000	0.92	0.93	0.06	0.05
BRISBANE	1051.36	27.300	BN 740		1.97	2.49	0.12	0.20	3000	1.11	1.14	0.06	0.04
BRISBANE	1051.895	26.765	BN 730		2.27	2.96	0.18	0.18	3000	1.45	1.48	0.08	0.06
BRISBANE	1052.31	26.350	BN 720		2.57	2.76	0.28	0.22	3000	1.36	1.38	0.08	0.06
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge	Bridge				2500				
BRISBANE	1052.39	26.270	BN 700		2.63	2.76	0.33	0.17	2500	1.16	1.18	0.07	0.06
BRISBANE	1052.595	26.065	BN 690		2.73	2.89	0.20	0.15	4000	1.66	1.68	0.10	0.07
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge	Bridge				4000				
BRISBANE	1052.64	26.020	BN 670		2.50	2.64	0.16	0.18	1500	0.62	0.62	0.03	0.01
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	2.57	2.81	0.08	0.10	4000	1.53	1.53	0.03	0.04
BRISBANE	1053.32	25.340	BN 650		2.65	2.67	0.31	0.19	1500	0.72	0.72	0.05	0.03
BRISBANE	1053.356	25.304	BN 640	Victoria Bridge	Bridge				1500				
BRISBANE	1053.385	25.275	BN630		2.58	2.67	0.26	0.20	3000	1.32	1.33	0.09	0.05
BRISBANE	1053.9	24.760	BN 620		2.46	2.72	0.13	0.21	3500	1.42	1.44	0.04	0.11
BRISBANE	1054.64	24.020	BN 610		1.61	1.68	0.11	0.21	3000	0.75	0.77	0.04	0.06
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge	Bridge				3000				
BRISBANE	1054.68	23.980	BN 590		1.73	1.89		0.19	3000	0.81	0.84		0.04
BRISBANE	1054.97	23.690	BN 560		2.44	2.66	0.18	0.23	3000	1.14	1.16	0.06	0.07
BRISBANE	1055.28	23.380	BN 550		2.41	2.56	0.22	0.20	4000	1.40	1.42	0.08	0.09
BRISBANE	1055.42	23.240	BN 540		2.44	2.54	0.19	0.24	5000	1.69	1.71	0.10	0.13
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	2.16	2.27	0.20	0.07	5000	1.52	1.54	0.13	0.02
BRISBANE	1056.4	22.260	BN 520		2.73	2.87	0.18	0.17	5000	1.91	1.95	0.15	0.03
BRISBANE	1056.695	21.965	BN 510		2.57	2.73	0.13	0.13	3500	1.33	1.35	0.08	0.00
BRISBANE	1056.865	21.795	BN 500		2.78	2.84	0.25	0.08	1500	0.62	0.62	0.02	0.03
BRISBANE	1056.92	21.740	BN 495	Story Bridge	Bridge				1500				
BRISBANE	1056.95	21.710	BN 490		2.82	2.86		0.12	7000	2.37	2.38		0.04
BRISBANE	1057.09	21.570	BN 480		2.02	2.14	0.13	0.12	7000	1.70	1.76	0.11	0.07
BRISBANE	1057.53	21.130	BN 470		2.36	2.40	0.11	0.12	5000	1.55	1.55	0.04	0.06
BRISBANE	1058.04	20.620	BN 460		2.78	2.85	0.22	0.18	6000	2.13	2.16	0.15	0.17
BRISBANE	1058.23	20.430	BN 450		2.77	2.88	0.26	0.17	5000	1.87	1.89	0.14	0.07
BRISBANE	1058.53	20.130	BN 440		2.86	2.95	0.15	0.12	4000	1.54	1.55	0.08	0.08
BRISBANE	1058.735	19.925	BN 430		2.52	2.69	0.19	0.17	3000	1.08	1.10	0.06	0.07
BRISBANE	1059.035	19.625	BN 420		3.01	3.09	0.11	0.14	3500	1.41	1.42	0.04	0.04
BRISBANE	1059.54	19.120	BN 410		2.25	2.32	0.09	0.16	6000	1.70	1.72	0.05	0.14
BRISBANE	1059.99	18.670	BN 400		2.26	2.35	0.12	0.17	3500	1.12	1.13	0.08	0.07
BRISBANE	1060.345	18.315	BN 390		2.71	2.73	0.16	0.15	13000	3.45	3.50	0.24	0.21
BRISBANE	1060.535	18.125	BN 380		2.98	3.01	0.15	0.17	11000	3.41	3.46	0.19	0.13
BRISBANE	1061.015	17.645	BN 370		2.59	2.66	0.13	0.10	5000	1.67	1.68	0.07	0.05
BRISBANE	1061.53	17.130	BN 360		2.85	2.89	0.19		5000	1.78	1.79	0.09	0.02
BRISBANE	1062.02	16.640	BN 350		2.55	2.62	0.12	0.16	9000	2.53	2.60	0.14	0.16
BRISBANE	1062.535	16.125	BN 340		2.15	2.23	0.17	0.16	8000	1.97	2.04	0.16	0.16
BRISBANE	1062.94	15.720	BN 330		1.77	1.80	0.12	0.06	8000	1.63	1.65	0.11	0.08
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	1.97	1.99	0.09		6000	1.44	1.44	0.07	0.14
BRISBANE	1063.645	15.015	BN 310	Cresent Road Gauge	2.75	2.91	0.21	0.19	9000	2.73	2.89	0.21	0.18
BRISBANE	1064	14.660	BN 300		2.55	2.69	0.11	0.13	6000	1.86	1.91	0.12	0.08
BRISBANE	1064.49	14.170	BN 290		2.61	2.76	0.07	0.14	3500	1.19	1.20	0.06	0.05
BRISBANE	1065.01	13.650	BN 280		2.11	2.18	0.06	0.15	7000	1.75	1.76	0.08	0.12
BRISBANE	1065.503	13.157	BN 270		1.92	1.96	0.08		6000	1.38	1.39	0.09	0.08
BRISBANE	1065.99	12.870	BN 260	Cairncross Dock Gauge	1.67	1.67			14000	2.27	2.30		0.10
BRISBANE	1066.505	12.155	BN 250		1.80	1.82		0.07	14000	2.14	2.49		0.15
BRISBANE	1067.02	11.640	BN 240		1.64	1.74	0.18	0.11	13000	2.00	2.27	0.30	0.16
BRISBANE	1067.485	11.175	BN 230		1.89	2.06	0.21	0.12	8000	1.75	1.87	0.17	0.13
BRISBANE	1067.965	10.695	BN 220		2.14	2.23	0.13	0.13	6000	1.55	1.58	0.08	0.14
BRISBANE	1068.66	10.000	BN 210		2.37	2.41	0.21	0.24	9000	2.35	2.39	0.20	0.24
BRISBANE	1069.045	9.615	BN 200		2.34	2.39		0.20	7000	1.89	1.92		0.18
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	2.16	2.21		0.14	8000	1.95	1.99		0.18
BRISBANE	1070.025	8.635	BN 180		2.06	2.08	0.06	0.21	19000	3.38	3.60	0.14	0.18
BRISBANE	1070.53	8.130	BN 170		2.11	2.13	0.14	0.11	5000	1.24	1.25	0.08	0.05
BRISBANE	1071.04	7.620	BN 160		2.05	2.09	0.18	0.13	8000	1.84	1.87	0.15	0.13

Table I-3 - HEC-RAS Predicted Velocities

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI FLOOD				BANK FULL				
					AVERAGE VELOCITY m/s	CHANNEL VELOCITY m/s	LEFT BANK VELOCITY m/s	RIGHT BANK VELOCITY m/s	BANK FULL FLOW m^3/s	AVERAGE VELOCITY m/s	CHANNEL VELOCITY m/s	LEFT BANK VELOCITY m/s	RIGHT BANK VELOCITY m/s
BRISBANE	1071.52	7.140	BN 150		1.53	1.55	0.14	0.06	11000	1.79	1.83	0.16	0.08
BRISBANE	1072.015	6.645	BN 140		1.92	1.92		0.07	17000	3.06	3.12		0.11
BRISBANE	1072.515	6.145	BN 130		1.86	1.89	0.13	0.12	750	0.16	0.17	0.01	0.01
BRISBANE	1072.995	5.665	BN 120		1.76	1.77	0.12	0.12	14000	2.54	2.55	0.20	0.18
BRISBANE	1073.485	5.175	BN 110		1.95	1.97	0.14	0.19	14000	2.81	2.85	0.22	0.12
BRISBANE	1074	4.660	BN 100		1.91	1.91	0.13	0.16	13000	2.60	2.62	0.20	0.22
BRISBANE	1074.46	4.200	BN 90		1.89	1.89	0.13	0.13	17000	3.18	3.24	0.27	0.12
BRISBANE	1074.985	3.675	BN 80		2.11	2.12	0.15	0.15	15000	3.31	3.33	0.26	0.24
BRISBANE	1075.48	3.180	BN 70		1.75	1.85	0.12	0.18	12000	2.25	2.39	0.16	0.25
BRISBANE	1076	2.660	BN 60		1.22	1.29	0.09	0.14	26000	2.88	3.11	0.11	0.42
BRISBANE	1076.495	2.165	BN 50		1.67	1.68		0.13	33000	4.95	4.96		0.22
BRISBANE	1077.01	1.650	BN 40		1.17	1.26	0.08	0.14	9000	1.16	1.24	0.08	0.14
BRISBANE	1077.51	1.150	BN 30		0.89	0.89	0.04	0.05	26000	2.36	2.38	0.15	0.15
BRISBANE	1078.04	0.620	BN 20		0.94	0.95	0.05	0.04	19000	1.92	1.95	0.10	0.10
BRISBANE	1078.525	0.135	BN 10		1.43	1.54	0.31	0.07	-	-	-	-	-
BRISBANE	1078.56	0.000	-	Western Inner Bar Gauge					-	-	-	-	-

Table I-4 - HEC-RAS Predicted Conveyances

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI							20 YEAR ARI						
					TOTAL CONVEYANCE (m^3/s)	CHANNEL CONVEYANCE (m^3/s)	LEFT CONVEYANCE (m^3/s)	RIGHT CONVEYANCE (m^3/s)	% CHANNEL CONVEYANCE	% LEFT CONVEYANCE	% RIGHT CONVEYANCE	TOTAL CONVEYANCE (m^3/s)	CHANNEL CONVEYANCE (m^3/s)	LEFT CONVEYANCE (m^3/s)	RIGHT CONVEYANCE (m^3/s)	% CHANNEL CONVEYANCE	% LEFT CONVEYANCE	% RIGHT CONVEYANCE
BRISBANE	1000	78.66	BN 2020		572181	515467	35924	20791	90.1	6.3	3.6	270084	253823	11100	5161	94.0	4.1	1.9
BRISBANE	1000.285	78.375	BN 2010		455798	388138	43063	24598	85.2	9.4	5.4	202694	186709	10941	5043	92.1	5.4	2.5
BRISBANE	1000.775	77.885	BN 2000		469461	411860	39718	17884	87.7	8.5	3.8	217749	201853	10716	5180	92.7	4.9	2.4
BRISBANE	1001.315	77.345	BN 1990		554485	412732	121822	19931	74.4	22.0	3.6	233868	190083	40787	2997	81.3	17.4	1.3
BRISBANE	1001.865	76.795	BN 1980		357587	319736	23561	14290	89.4	6.6	4.0	164502	154529	5846	4127	93.9	3.6	2.5
BRISBANE	1002.35	76.310	BN 1970		444458	368989	34059	41410	83.0	7.7	9.3	184104	170651	6416	7037	92.7	3.5	3.8
BRISBANE	1002.785	75.875	BN 1960		571203	463604	46654	60945	81.2	8.2	10.7	245720	217392	11480	16848	88.5	4.7	6.9
BRISBANE	1003.275	75.385	BN 1950		406807	361847	9137	35824	88.9	2.2	8.8	173581	165191	992	7398	95.2	0.6	4.3
BRISBANE	1003.775	74.885	BN 1940		405133	330959	37474	36700	81.7	9.2	9.1	180955	156906	12572	11477	86.7	6.9	6.3
BRISBANE	1004.3	74.360	BN 1930		346986	286115	16162	44709	82.5	4.7	12.9	149219	137998	4638	6582	92.5	3.1	4.4
BRISBANE	1004.81	73.850	BN 1920		544699	488061	15284	41354	89.6	2.8	7.6	214624	208719	3134	2770	97.2	1.5	1.3
BRISBANE	1005.325	73.335	BN 1910		526655	397545	78527	50583	75.5	14.9	9.6	197653	170400	21596	5658	86.2	10.9	2.9
BRISBANE	1005.87	72.790	BN 1900		399670	322554	64285	12831	80.7	16.1	3.2	154520	139187	13891	1442	90.1	9.0	0.9
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	504765	461286	31034	12445	91.4	6.1	2.5	222266	213474	5849	2943	96.0	2.6	1.3
BRISBANE	1006.91	71.750	BN 1880		540594	463090	59892	17612	85.7	11.1	3.3	222499	211711	5668	5121	95.2	2.5	2.3
BRISBANE	1007.41	71.250	BN 1870		893635	695394	149714	48527	77.8	16.8	5.4	334569	298088	25109	11372	89.1	7.5	3.4
BRISBANE	1007.92	70.740	BN 1860		449763	402046	11866	35851	89.4	2.6	8.0	179494	174897	1353	3245	97.4	0.8	1.8
BRISBANE	1008.445	70.215	BN 1850		735885	690763	19426	25696	93.9	2.6	3.5	346454	336970	4477	5007	97.3	1.3	1.4
BRISBANE	1008.925	69.735	BN 1840		755176	716058	15060	24059	94.8	2.0	3.2	324257	316560	3445	4253	97.6	1.1	1.3
BRISBANE	1009.4	69.260	BN 1830		740203	678317	18305	43581	91.6	2.5	5.9	333301	322307	3982	7012	96.7	1.2	2.1
BRISBANE	1009.72	68.940	BN 1820		811928	734485	21606	55838	90.5	2.7	6.9	344150	338932	2296	2922	98.5	0.7	0.8
BRISBANE	1010.49	68.170	BN 1810		627096	596180	19281	11636	95.1	3.1	1.9	286312	281642	2190	2479	98.4	0.8	0.9
BRISBANE	1010.725	67.935	BN 1800		686738	659438	20898	6402	96.0	3.0	0.9	338551	331315	5276	1960	97.9	1.6	0.6
BRISBANE	1010.98	67.680	BN 1790		691381	653989	25029	12364	94.6	3.6	1.8	329012	320743	4701	3569	97.5	1.4	1.1
BRISBANE	1011.51	67.150	BN 1780		788892	697499	53176	38217	88.4	6.7	4.8	343526	329570	5849	8107	95.9	1.7	2.4
BRISBANE	1011.98	66.680	BN 1770		768693	654241	101958	12494	85.1	13.3	1.6	312344	298728	12369	1247	95.6	4.0	0.4
BRISBANE	1012.475	66.185	BN 1760		754567	646168	99809	8590	85.6	13.2	1.1	310805	294531	14330	1943	94.8	4.6	0.6
BRISBANE	1012.935	65.725	BN 1750		768103	668072	87473	12558	87.0	11.4	1.6	309654	303199	6111	344	97.9	2.0	0.1
BRISBANE	1013.445	65.215	BN 1740		787697	718233	41929	27536	91.2	5.3	3.5	328595	320733	7464	398	97.6	2.3	0.1
BRISBANE	1013.91	64.750	BN 1730		817126	535825	19691	261610	65.6	2.4	32.0	306305	235914	390	70001	77.0	0.1	22.9
BRISBANE	1014.31	64.350	BN 1720		821620	557683	68947	194990	67.9	8.4	23.7	312025	260958	1452	49616	83.6	0.5	15.9
BRISBANE	1014.61	64.050	BN 1710	Goodna Hospital Gauge	953822	710061	77468	166294	74.4	8.1	17.4	264167	218637	8164	37366	82.8	3.1	14.1
BRISBANE	1015.09	63.570	BN 1700		908263	866952	17130	24181	95.5	1.9	2.7	458515	450969	3441	4104	98.4	0.8	0.9
BRISBANE	1015.56	63.100	BN 1690		700452	657474	6447	36532	93.9	0.9	5.2	321989	314905	939	6145	97.8	0.3	1.9
BRISBANE	1016.14	62.520	BN 1680		757002	718828	23969	14205	95.0	3.2	1.9	347313	341501	2696	3113	98.3	0.8	0.9
BRISBANE	1016.64	62.020	BN 1670		862178	831409	25118	5652	96.4	2.9	0.7	284849	282404	469	1977	99.1	0.2	0.7
BRISBANE	1017.13	61.530	BN 1660		466582	384915	77142	4525	82.5	16.5	1.0	181203	166154	14047	1002	91.7	7.8	0.6
BRISBANE	1017.61	61.050	BN 1650		540474	462210	62629	15635	85.5	11.6	2.9	216590	213055	2748	787	98.4	1.3	0.4
BRISBANE	1017.92	60.740	BN 1640		500821	425293	57671	17858	84.9	11.5	3.6	202914	198943	3231	741	98.0	1.6	0.4
BRISBANE	1018.2	60.460	BN 1630		558809	517162	25733	15914	92.5	4.6	2.8	243418	239633	2029	1757	98.4	0.8	0.7
BRISBANE	1018.725	59.935	BN 1620		443699	421059	10679	11960	94.9	2.4	2.7	212911	208765	1954	2193	98.1	0.9	1.0
BRISBANE	1019.095	59.565	BN 1610		495632	466711	21525	7396	94.2	4.3	1.5	222666	220016	1752	898	98.8	0.8	0.4
BRISBANE	1019.49	59.170	BN 1600		560051	500255	38254	21543	89.3	6.8	3.8	242823	231123	8507	3193	95.2	3.5	1.3
BRISBANE	1019.865	58.795	BN 1590		447235	424229	12418	10589	94.9	2.8	2.4	211850	207433	2370	2047	97.9	1.1	1.0
BRISBANE	1020.115	58.545	BN 1580		608911	513384	50467	45061	84.3	8.3	7.4	248374	227858	12290	8226	91.7	4.9	3.3
BRISBANE	1020.525	58.135	BN 1570		855178	786457	50010	18711	92.0	5.8	2.2	331757	313602	10222	7934	94.5	3.1	2.4
BRISBANE	1020.83	57.830	BN 1560		639617	590633	38754	10231	92.3	6.1	1.6	305029	295871	7282	1877	97.0	2.4	0.6
BRISBANE	1021.095	57.565	BN 1550		461838	435820	16841	9177	94.4	3.6	2.0	210823	206740	3066	1017	98.1	1.5	0.5
BRISBANE	1021.539	57.121	BN 1540		522323	478757	24519	19047	91.7	4.7	3.6	227962	218252	5534	4176	95.7	2.4	1.8
BRISBANE	1021.715	56.945	BN 1530		592915	550449	33390	9076	92.8	5.6	1.5	240722	232494	7547	681	96.6	3.1	0.3
BRISBANE	1021.895	56.765	BN 1520		606555	558474	9134	38948	92.1	1.5	6.4	265201	255830	1688	7684	96.5	0.6	2.9
BRISBANE	1022.105	56.555	BN 1510		558098	535869	6262	13968	96.4	1.1	2.5	270233	267706	755	1772	99.1	0.3	0.7
BRISBANE	1022.575	56.085	BN 1500		860388	801411	20169	38809	93.1	2.3	4.5	352180	339315	3330	9535	96.3	0.9	2.7
BRISBANE	1023.04	55.620	BN 1490		670547	609509	45412	15626	90.9	6.8	2.3	322828	315447	4001	3380	97.7	1.2	1.0
BRISBANE	1023.57	55.090	BN 1480		699396	677247	16656	5493	96.8	2.4	0.8	322411	319038	2590	783	99.0	0.8	0.2
BRISBANE	1024.08	54.580	BN 1470		696432	656190	34020	6222	94.2	4.9	0.9	308335	298860	8482	993	96.9	2.8	0.3
BRISBANE	1024.563	54.097	BN 1460		645857	618880	19938	7039	95.8	3.1	1.1	263298	260269	2122	908	98.8	0.8	0.3
BRISBANE	1025.07	53.590	BN 1450		708908	677975	15618	15315	95.6	2.2	2.2	300902	294880	3048	2974	98.0	1.0	1.0
BRISBANE	1025.36	53.300	BN 1440		614681	574135	18687	21859	93.4	3.0	3.6	277822	273368	2826	1628	98.4	1.0	0.6
BRISBANE	1025.59	53.070	BN 1430		534096	502509	16438	15150	94.1	3.1	2.8	243042	239618	2136	1288	98.6	0.9	0.5

Table I-4 - HEC-RAS Predicted Conveyances

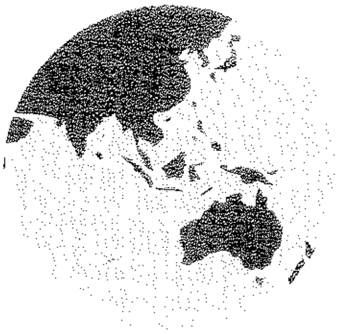
LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI							20 YEAR ARI						
					TOTAL CONVEYANCE (m^3/s)	CHANNEL CONVEYANCE (m^3/s)	LEFT CONVEYANCE (m^3/s)	RIGHT CONVEYANCE (m^3/s)	% CHANNEL CONVEYANCE	% LEFT CONVEYANCE	% RIGHT CONVEYANCE	TOTAL CONVEYANCE (m^3/s)	CHANNEL CONVEYANCE (m^3/s)	LEFT CONVEYANCE (m^3/s)	RIGHT CONVEYANCE (m^3/s)	% CHANNEL CONVEYANCE	% LEFT CONVEYANCE	% RIGHT CONVEYANCE
BRISBANE	1026.17	52.490	BN 1420		603147	580125	10124	12898	96.2	1.7	2.1	273264	269735	1970	1559	98.7	0.7	0.6
BRISBANE	1026.68	51.980	BN 1410	Mt Ommaney Gauge	617600	580004	31627	5968	93.9	5.1	1.0	277543	271816	5019	708	97.9	1.8	0.3
BRISBANE	1026.9	51.760	BN 1400		583010	540872	28929	13210	92.8	5.0	2.3	278512	271580	4203	2729	97.5	1.5	1.0
BRISBANE	1027.16	51.500	BN 1390		562209	543388	16645	2177	96.7	3.0	0.4	277066	273662	3267	236	98.7	1.2	0.1
BRISBANE	1027.68	50.980	BN 1380		1244963	1159168	36323	49472	93.1	2.9	4.0	525222	507354	8713	9155	96.6	1.7	1.7
BRISBANE	1028.18	50.480	BN 1370		1315831	1196068	42133	77631	90.9	3.2	5.9	537048	515977	6018	15053	96.1	1.1	2.8
BRISBANE	1028.68	49.980	BN 1360		1117645	1066603	46106	4936	95.4	4.1	0.4	465833	464263	1073	498	99.7	0.2	0.1
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge	Bridge							Bridge						
BRISBANE	1028.76	49.900	BN 1340		940823	886758	33871	20193	94.3	3.6	2.1	387264	382316	2188	2761	98.7	0.6	0.7
BRISBANE	1029.2	49.460	BN 1330		868088	786563	51851	29674	90.6	6.0	3.4	383289	375322	6037	1930	97.9	1.6	0.5
BRISBANE	1029.68	48.980	BN 1320		1119674	1014903	57329	47442	90.6	5.1	4.2	530062	518847	8835	4380	97.9	1.3	0.8
BRISBANE	1030.22	48.440	BN 1310		1259074	1092284	136363	30428	86.8	10.8	2.4	521416	508113	8928	4374	97.4	1.7	0.8
BRISBANE	1030.87	47.790	BN 1300		1204430	1148975	40184	15272	95.4	3.3	1.3	481932	477740	1813	2380	99.1	0.4	0.5
BRISBANE	1031.26	47.400	BN 1290		634870	614754	14327	5790	96.8	2.3	0.9	283202	282171	579	452	99.6	0.2	0.2
BRISBANE	1031.7	46.960	BN 1280	Darra Wharf Gauge	354950	346986	3041	4924	97.8	0.9	1.4	176430	176253	435	742	99.3	0.2	0.4
BRISBANE	1031.995	46.665	BN 1270		460001	443031	7230	9740	96.3	1.6	2.1	207490	205185	1024	1282	98.9	0.5	0.6
BRISBANE	1032.23	46.430	BN 1260		555440	532132	11046	12263	95.8	2.0	2.2	255504	251530	2016	1958	98.4	0.8	0.8
BRISBANE	1032.585	46.075	BN 1250		441720	435663	892	5164	98.6	0.2	1.2	228701	227858	110	734	99.6	0.0	0.3
BRISBANE	1033.08	45.580	BN 1240		631484	609909	7829	13746	96.6	1.2	2.2	318819	317637	620	562	99.6	0.2	0.2
BRISBANE	1033.37	45.290	BN 1230		589070	575256	5278	8535	97.7	0.9	1.4	278324	276691	463	1170	99.4	0.2	0.4
BRISBANE	1033.9	44.760	BN 1220		606348	591179	9194	5975	97.5	1.5	1.0	299561	298232	478	851	99.6	0.2	0.3
BRISBANE	1034.37	44.290	BN 1210		600024	588048	4493	7482	98.0	0.7	1.2	300095	298163	967	965	99.4	0.3	0.3
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	507150	484222	6947	15981	95.5	1.4	3.2	256096	253753	1162	1181	99.1	0.5	0.5
BRISBANE	1035.414	43.246	BN 1190		506035	494654	9503	1878	97.8	1.9	0.4	239803	237948	1643	212	99.2	0.7	0.1
BRISBANE	1035.9	42.760	BN 1180		428992	415498	9291	4204	96.9	2.2	1.0	217902	216256	864	782	99.2	0.4	0.4
BRISBANE	1036.46	42.200	BN 1170		446921	438687	5043	3191	98.2	1.1	0.7	218914	218150	162	601	99.7	0.1	0.3
BRISBANE	1036.77	41.890	BN 1160		485034	468439	5766	10829	96.6	1.2	2.2	214626	212243	854	1529	98.9	0.4	0.7
BRISBANE	1036.915	41.745	BN 1150		478509	471145	5046	2317	98.5	1.1	0.5	252295	251867	249	180	99.8	0.1	0.1
BRISBANE	1037.09	41.570	BN 1140		429673	421457	7264	1153	98.0	1.7	0.3	232501	231773	608	119	99.7	0.3	0.1
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge	Bridge							Bridge						
BRISBANE	1037.175	41.485	BN 1120		515979	507053	7194	1732	98.3	1.4	0.3	277412	276355	871	186	99.6	0.3	0.1
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	549500	542132	5451	1918	98.7	1.0	0.3	283812	283022	578	211	99.7	0.2	0.1
BRISBANE	1037.625	41.035	BN 1100		593720	572209	17029	4483	96.4	2.9	0.8	285509	282308	2475	726	98.9	0.9	0.3
BRISBANE	1038.085	40.575	BN 1090		1311814	1239753	64049	8013	94.5	4.9	0.6	625041	623041	961	1039	99.7	0.2	0.2
BRISBANE	1038.6	40.060	BN 1080		1220366	1086038	62258	72070	89.0	5.1	5.9	466150	460354	414	5382	98.8	0.1	1.2
BRISBANE	1039.1	39.560	BN 1070		1240656	1053839	53216	133601	84.9	4.3	10.8	471928	459074	1206	11648	97.3	0.3	2.5
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	1359194	1184974	48087	126133	87.2	3.5	9.3	527176	516993	535	9648	98.1	0.1	1.8
BRISBANE	1040.09	38.570	BN 1050	King Authur Terrace Gauge	1483285	1391325	2132	89828	93.8	0.1	6.1	740731	735704	223	4804	99.3	0.0	0.6
BRISBANE	1040.49	38.170	BN 1040		1114236	1038776	3186	72274	93.2	0.3	6.5	582095	577546	353	4197	99.2	0.1	0.7
BRISBANE	1041.01	37.650	BN 1030		682433	651733	10486	20214	95.5	1.5	3.0	333385	332293	239	853	99.7	0.1	0.3
BRISBANE	1041.23	37.430	BN 1020		673236	630535	27366	15335	93.7	4.1	2.3	315679	313795	1064	821	99.4	0.3	0.3
BRISBANE	1041.46	37.200	BN 1010	Tennyson Power House Gauge	629958	607862	8447	13648	96.5	1.3	2.2	307077	305059	1509	510	99.3	0.5	0.2
BRISBANE	1041.7	36.960	BN 1000		762624	749205	1790	11629	98.2	0.2	1.5	444335	443647	199	489	99.8	0.0	0.1
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	553664	537701	5246	10718	97.1	0.9	1.9	293475	292850	414	211	99.8	0.1	0.1
BRISBANE	1042.235	36.425	BN 980		506060	500748	1178	4135	99.0	0.2	0.8	285579	285174	125	280	99.9	0.0	0.1
BRISBANE	1042.515	36.145	BN 970		577911	564948	5083	7881	97.8	0.9	1.4	322682	321439	768	476	99.6	0.2	0.1
BRISBANE	1042.91	35.750	BN 960		500417	488412	10009	1995	97.6	2.0	0.4	249493	248737	500	256	99.7	0.2	0.1
BRISBANE	1043.725	34.935	BN 950		574763	570035	2590	2138	99.2	0.5	0.4	297360	296959	137	265	99.9	0.0	0.1
BRISBANE	1044.06	34.600	BN 940	Sandy Creek Gauge	531749	525826	4971	951	98.9	0.9	0.2	307127	306330	701	97	99.7	0.2	0.0
BRISBANE	1044.34	34.320	BN 930		460849	456230	3992	627	99.0	0.9	0.1	257032	256608	363	62	99.8	0.1	0.0
BRISBANE	1044.605	34.055	BN 920		505540	495677	4987	4877	98.0	1.0	1.0	271950	271277	250	422	99.8	0.1	0.2
BRISBANE	1044.86	33.800	BN 910		542911	522117	18389	2405	96.2	3.4	0.4	273568	272897	499	172	99.8	0.2	0.1
BRISBANE	1045.4	33.260	BN 900		536063	517630	14605	3828	96.6	2.7	0.7	261210	260159	441	609	99.6	0.2	0.2
BRISBANE	1045.885	32.775	BN 890		505967	480626	13986	11355	95.0	2.8	2.2	243150	242254	360	537	99.6	0.1	0.2
BRISBANE	1046.18	32.480	BN 880		690501	677545	8392	4563	98.1	1.2	0.7	419853	419344	409	100	99.9	0.1	0.0
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	666021	663721	1097	1203	99.7	0.2	0.2	423747	423663	60	24	100.0	0.0	0.0
BRISBANE	1046.58	32.080	BN 860		612509	605306	3797	3407	98.8	0.6	0.6	350967	350371	514	82	99.8	0.1	0.0
BRISBANE	1046.9	31.760	BN 850		447127	437991	835	8301	98.0	0.2	1.9	227681	227386	87	208	99.9	0.0	0.1
BRISBANE	1047.35	31.310	BN 840		394397	389382	303	4713	98.7	0.1	1.2	228129	227891	29	209	99.9	0.0	0.1
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	610837	599179	1421	10237	98.1	0.2	1.7	381709	381360	137	211	99.9	0.0	0.1

Table I-4 - HEC-RAS Predicted Conveyances

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI							20 YEAR ARI						
					TOTAL CONVEYANCE (m^3/s)	CHANNEL CONVEYANCE (m^3/s)	LEFT CONVEYANCE (m^3/s)	RIGHT CONVEYANCE (m^3/s)	% CHANNEL CONVEYANCE	% LEFT CONVEYANCE	% RIGHT CONVEYANCE	TOTAL CONVEYANCE (m^3/s)	CHANNEL CONVEYANCE (m^3/s)	LEFT CONVEYANCE (m^3/s)	RIGHT CONVEYANCE (m^3/s)	% CHANNEL CONVEYANCE	% LEFT CONVEYANCE	% RIGHT CONVEYANCE
BRISBANE	1048.375	30.285	BN 820		789939	761835	3780	24324	96.4	0.5	3.1	438190	437986	76	129	100.0	0.0	0.0
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	522367	515928	4228	2212	98.8	0.8	0.4	241955	241703	188	65	99.9	0.1	0.0
BRISBANE	1049.12	29.540	BN 800		609455	600734	5165	3556	98.6	0.8	0.6	331682	331230	249	203	99.9	0.1	0.1
BRISBANE	1049.37	29.290	BN 790		529125	523865	4310	950	99.0	0.8	0.2	306492	306217	227	48	99.9	0.1	0.0
BRISBANE	1049.59	29.070	BN 780		658504	649525	6366	2613	98.6	1.0	0.4	399118	398760	209	149	99.9	0.1	0.0
BRISBANE	1049.87	28.790	BN 770		588985	583373	4040	1572	99.0	0.7	0.3	334946	334650	98	198	99.9	0.0	0.1
BRISBANE	1050.43	28.230	BN 760		910072	891530	13977	4564	98.0	1.5	0.5	469012	468440	187	385	99.9	0.0	0.1
BRISBANE	1050.86	27.800	BN 750		848181	837211	8508	2462	98.7	1.0	0.3	469174	468417	611	146	99.8	0.1	0.0
BRISBANE	1051.36	27.300	BN 740		1013430	998659	11696	3074	98.5	1.2	0.3	618240	617437	583	220	99.9	0.1	0.0
BRISBANE	1051.895	26.765	BN 730		736167	721833	11827	2508	98.1	1.6	0.3	389061	388457	448	157	99.8	0.1	0.0
BRISBANE	1052.31	26.350	BN 720		779061	773012	4525	1524	99.2	0.6	0.2	410680	410220	357	103	99.9	0.1	0.0
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge	Bridge							Bridge						
BRISBANE	1052.39	26.270	BN 700		776336	772353	2789	1195	99.5	0.4	0.2	415844	415262	472	110	99.9	0.1	0.0
BRISBANE	1052.595	26.065	BN 690		801070	797902	2665	503	99.6	0.3	0.1	472383	472131	217	36	99.9	0.0	0.0
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge	Bridge							Bridge						
BRISBANE	1052.64	26.020	BN 670		599039	596645	1319	1076	99.6	0.2	0.2	380066	379791	199	76	99.9	0.1	0.0
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	527861	526418	1334	109	99.7	0.3	0.0	352647	352628	8	12	100.0	0.0	0.0
BRISBANE	1053.32	25.340	BN 650		362628	362357	43	228	99.9	0.0	0.1	194123	194087	10	27	100.0	0.0	0.0
BRISBANE	1053.356	25.304	BN 640	Victoria Bridge	Bridge							Bridge						
BRISBANE	1053.385	25.275	BN630		356090	354925	818	347	99.7	0.2	0.1	186868	186753	95	20	99.9	0.1	0.0
BRISBANE	1053.9	24.760	BN 620		372589	369592	531	2466	99.2	0.1	0.7	217250	216909	4	338	99.8	0.0	0.2
BRISBANE	1054.64	24.020	BN 610		617361	614118	307	2935	99.5	0.0	0.5	370375	369714	31	630	99.8	0.0	0.2
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge	Bridge							Bridge						
BRISBANE	1054.68	23.980	BN 590		579194	573121		6073	99.0	0.0	1.0	367689	366954		735	99.8	0.0	0.2
BRISBANE	1054.97	23.690	BN 560		972507	964703	1494	6311	99.2	0.2	0.6	629645	628799	142	705	99.9	0.0	0.1
BRISBANE	1055.28	23.380	BN 550		1011175	1005454	4394	1327	99.4	0.4	0.1	658020	657449	401	171	99.9	0.1	0.0
BRISBANE	1055.42	23.240	BN 540		961915	958317	1491	2107	99.6	0.2	0.2	596027	595638	67	322	99.9	0.0	0.1
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	1051042	1047576	2568	898	99.7	0.2	0.1	643082	642634	448		99.9	0.1	0.0
BRISBANE	1056.4	22.260	BN 520		801994	799122	2534	338	99.6	0.3	0.0	491617	491070	547		99.9	0.1	0.0
BRISBANE	1056.695	21.965	BN 510		917018	914137	2733	148	99.7	0.3	0.0	598695	598141	554	0	99.9	0.1	0.0
BRISBANE	1056.865	21.795	BN 500		572493	571311	1144	38	99.8	0.2	0.0	395262	395081	180		100.0	0.0	0.0
BRISBANE	1056.92	21.740	BN 495	Story Bridge	Bridge							Bridge						
BRISBANE	1056.95	21.710	BN 490		596689	596329		361	99.9	0.0	0.1	425017	425017			100.0	0.0	0.0
BRISBANE	1057.09	21.570	BN 480		852010	848957	1010	2044	99.6	0.1	0.2	623767	623217	244	307	99.9	0.0	0.0
BRISBANE	1057.53	21.130	BN 470		671781	671294	369	118	99.9	0.1	0.0	461470	461432	23	15	100.0	0.0	0.0
BRISBANE	1058.04	20.620	BN 460		507478	506652	338	488	99.8	0.1	0.1	330855	330696	50	109	100.0	0.0	0.0
BRISBANE	1058.23	20.430	BN 450		509576	508102	707	767	99.7	0.1	0.2	338824	338632	151	41	99.9	0.0	0.0
BRISBANE	1058.53	20.130	BN 440		547876	547129	283	464	99.9	0.1	0.1	394732	394843	48	40	100.0	0.0	0.0
BRISBANE	1058.735	19.925	BN 430		476336	474166	542	1628	99.5	0.1	0.3	340108	339642	76	390	99.9	0.0	0.1
BRISBANE	1059.035	19.625	BN 420		421711	421198	135	380	99.9	0.0	0.1	313671	313645	9	17	100.0	0.0	0.0
BRISBANE	1059.54	19.120	BN 410		508420	507309	54	1056	99.8	0.0	0.2	357728	357476	3	249	99.9	0.0	0.1
BRISBANE	1059.99	18.670	BN 400		466569	465238	260	1071	99.7	0.1	0.2	318768	318578	88	103	99.9	0.0	0.0
BRISBANE	1060.345	18.315	BN 390		513249	512957	172	120	99.9	0.0	0.0	390772	390727	30	16	100.0	0.0	0.0
BRISBANE	1060.535	18.125	BN 380		604669	604251	170	248	99.9	0.0	0.0	470170	470089	29	52	100.0	0.0	0.0
BRISBANE	1061.015	17.645	BN 370		604381	603570	776	34	99.9	0.1	0.0	443928	443843	79	6	100.0	0.0	0.0
BRISBANE	1061.53	17.130	BN 360		563580	562977	602		99.9	0.1	0.0	432709	432537	172		100.0	0.0	0.0
BRISBANE	1062.02	16.640	BN 350		616367	615458	689	219	99.9	0.1	0.0	468560	468115	385	60	99.9	0.1	0.0
BRISBANE	1062.535	16.125	BN 340		645217	643290	605	1322	99.7	0.1	0.2	463831	463203	195	433	99.9	0.0	0.1
BRISBANE	1062.94	15.720	BN 330		800826	800063	440	323	99.9	0.1	0.0	577162	576827	154	182	99.9	0.0	0.0
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	538186	536038	148		100.0	0.0	0.0	406440	406413	27		100.0	0.0	0.0
BRISBANE	1063.645	15.015	BN 310	Cresent Road Gauge	621278	618467	2145	666	99.5	0.3	0.1	500465	499424	816	224	99.8	0.2	0.0
BRISBANE	1064	14.660	BN 300		670769	669123	1515	131	99.8	0.2	0.0	541442	540879	532	31	99.9	0.1	0.0
BRISBANE	1064.49	14.170	BN 290		635085	634070	888	127	99.8	0.1	0.0	515419	515158	229	32	99.9	0.0	0.0
BRISBANE	1065.01	13.650	BN 280		813116	812164	689	263	99.9	0.1	0.0	660492	660314	73	105	100.0	0.0	0.0
BRISBANE	1065.503	13.157	BN 270		919610	918778	832		99.9	0.1	0.0	758023	757863	160		100.0	0.0	0.0
BRISBANE	1065.99	12.670	BN 260	Cairncross Dock Gauge	1086542	1086542			100.0	0.0	0.0	904860	904860			100.0	0.0	0.0
BRISBANE	1066.505	12.155	BN 250		976146	975637		509	99.9	0.0	0.1	811936	811905		31	100.0	0.0	0.0
BRISBANE	1067.02	11.640	BN 240		1036259	1030838	2121	3300	99.5	0.2	0.3	857339	856200	724	414	99.9	0.1	0.0
BRISBANE	1067.485	11.175	BN 230		766947	762205	645	4097	99.4	0.1	0.5	617834	616266	173	1395	99.7	0.0	0.2
BRISBANE	1067.965	10.895	BN 220		724184	722411	38	1735	99.8	0.0	0.2	598741	598108	12	622	99.9	0.0	0.1

Table I-4 - HEC-RAS Predicted Conveyances

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI							20 YEAR ARI						
					TOTAL CONVEYANCE (m^3/s)	CHANNEL CONVEYANCE (m^3/s)	LEFT CONVEYANCE (m^3/s)	RIGHT CONVEYANCE (m^3/s)	% CHANNEL CONVEYANCE	% LEFT CONVEYANCE	% RIGHT CONVEYANCE	TOTAL CONVEYANCE (m^3/s)	CHANNEL CONVEYANCE (m^3/s)	LEFT CONVEYANCE (m^3/s)	RIGHT CONVEYANCE (m^3/s)	% CHANNEL CONVEYANCE	% LEFT CONVEYANCE	% RIGHT CONVEYANCE
BRISBANE	1068.66	10.000	BN 210		628796	627875	220	701	99.9	0.0	0.1	524757	524407	60	291	99.9	0.0	0.1
BRISBANE	1069.045	9.615	BN 200		653733	652569		1164	99.8	0.0	0.2	558390	557846		545	99.9	0.0	0.1
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	703154	701974		1180	99.8	0.0	0.2	605729	604998		731	99.9	0.0	0.1
BRISBANE	1070.025	8.635	BN 180		775320	774695	4	621	99.9	0.0	0.1	676164	675859	2	303	100.0	0.0	0.0
BRISBANE	1070.53	8.130	BN 170		718031	717738	274	19	100.0	0.0	0.0	627123	627018	103	3	100.0	0.0	0.0
BRISBANE	1071.04	7.620	BN 160		731226	730142	364	720	99.9	0.0	0.1	646346	645727	153	466	99.9	0.0	0.1
BRISBANE	1071.52	7.140	BN 150		1209461	1208298	749	414	99.9	0.1	0.0	1107901	1107385	420	95	100.0	0.0	0.0
BRISBANE	1072.015	6.645	BN 140		772750	772747		3	100.0	0.0	0.0	690071	690071		0	100.0	0.0	0.0
BRISBANE	1072.515	6.145	BN 130		908334	907136	1096	102	99.9	0.1	0.0	835138	834481	606	50	99.9	0.1	0.0
BRISBANE	1072.995	5.665	BN 120		918726	918552	65	109	100.0	0.0	0.0	842304	842214	35	55	100.0	0.0	0.0
BRISBANE	1073.485	5.175	BN 110		775434	774716	79	639	99.9	0.0	0.1	715218	714754	44	419	99.9	0.0	0.1
BRISBANE	1074	4.660	BN 100		795478	795207	96	175	100.0	0.0	0.0	740730	740558	56	115	100.0	0.0	0.0
BRISBANE	1074.46	4.200	BN 90		803353	803217	76	60	100.0	0.0	0.0	754708	754623	48	38	100.0	0.0	0.0
BRISBANE	1074.985	3.675	BN 80		666783	666654	55	75	100.0	0.0	0.0	636100	636009	39	53	100.0	0.0	0.0
BRISBANE	1075.48	3.180	BN 70		740283	735674	61	4548	99.4	0.0	0.6	709723	706016	46	3661	99.5	0.0	0.5
BRISBANE	1076	2.660	BN 60		1086764	1080048	86	6630	99.4	0.0	0.6	1041255	1035731	64	5459	99.5	0.0	0.5
BRISBANE	1076.495	2.165	BN 50		695470	695416		53	100.0	0.0	0.0	678503	678457		46	100.0	0.0	0.0
BRISBANE	1077.01	1.650	BN 40		1037931	1028392	533	9007	99.1	0.1	0.9	1016981	1008152	465	8364	99.1	0.0	0.8
BRISBANE	1077.51	1.150	BN 30		1921670	1921328	26	316	100.0	0.0	0.0	1894493	1894202	22	269	100.0	0.0	0.0
BRISBANE	1078.04	0.620	BN 20		2148044	2146871	1045	128	99.9	0.0	0.0	2128242	2127217	917	108	100.0	0.0	0.0
BRISBANE	1078.525	0.135	BN 10		1320378	1295085	25237	57	98.1	1.9	0.0	1320378	1295085	25237	57	98.1	1.9	0.0
BRISBANE	1078.66	0.000	-	Western Inner Bar Gauge	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Appendix J - Design Hydraulic Model Results

TABLE J-1 - Flood Levels for the Regulation Lines & Revegetation Case for Flood Events 100 Year ARI to 2 Year ARI

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	REGULATION LINES & REVEGETATION IN PLACE					
					100 YEAR ARI WL (m AHD)	50 YEAR ARI WL (m AHD)	20 YEAR ARI WL (m AHD)	10 YEAR ARI WL (m AHD)	5 YEAR ARI WL (m AHD)	2 YEAR ARI WL (m AHD)
BRISBANE	1000	78.66	BN 2020		22.79	19.75	13.30	7.34	4.83	1.83
BRISBANE	1000.285	78.375	BN 2010		22.57	19.56	13.12	7.24	4.76	1.80
BRISBANE	1000.775	77.885	BN 2000		22.31	19.32	12.87	7.08	4.63	1.76
BRISBANE	1001.315	77.345	BN 1990		22.22	19.21	12.71	6.94	4.50	1.70
BRISBANE	1001.865	76.795	BN 1980		21.69	18.74	12.29	6.71	4.32	1.63
BRISBANE	1002.35	76.310	BN 1970		21.50	18.53	11.98	6.49	4.17	1.59
BRISBANE	1002.785	75.875	BN 1960		21.48	18.51	11.92	6.42	4.09	1.56
BRISBANE	1003.275	75.385	BN 1950		21.15	18.19	11.60	6.24	3.96	1.52
BRISBANE	1003.775	74.885	BN 1940		20.88	17.95	11.34	6.05	3.82	1.50
BRISBANE	1004.3	74.360	BN 1930		20.42	17.54	10.91	5.84	3.68	1.49
BRISBANE	1004.81	73.850	BN 1920		20.39	17.49	10.79	5.72	3.58	1.48
BRISBANE	1005.325	73.335	BN 1910		20.20	17.32	10.63	5.58	3.46	1.47
BRISBANE	1005.87	72.790	BN 1900		19.88	17.04	10.37	5.38	3.30	1.45
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	19.72	16.90	10.27	5.29	3.23	1.44
BRISBANE	1006.91	71.750	BN 1880		19.52	16.69	10.08	5.16	3.15	1.42
BRISBANE	1007.41	71.250	BN 1870		19.42	16.60	9.99	5.06	3.08	1.40
BRISBANE	1007.92	70.740	BN 1860		19.09	16.33	9.79	4.94	3.00	1.38
BRISBANE	1008.445	70.215	BN 1850		18.96	16.21	9.70	4.88	2.95	1.36
BRISBANE	1008.925	69.735	BN 1840		18.89	16.14	9.63	4.83	2.92	1.35
BRISBANE	1009.4	69.260	BN 1830		18.79	16.04	9.56	4.79	2.89	1.35
BRISBANE	1009.72	68.940	BN 1820		18.73	16.00	9.53	4.77	2.86	1.34
BRISBANE	1010.49	68.170	BN 1810		18.43	15.75	9.36	4.68	2.83	1.33
BRISBANE	1010.725	67.935	BN 1800		18.44	15.75	9.37	4.68	2.82	1.33
BRISBANE	1010.98	67.680	BN 1790		18.38	15.69	9.33	4.66	2.81	1.33
BRISBANE	1011.51	67.150	BN 1780		18.37	15.68	9.28	4.62	2.79	1.32
BRISBANE	1011.98	66.680	BN 1770		18.36	15.63	9.23	4.58	2.76	1.32
BRISBANE	1012.475	66.185	BN 1760		18.31	15.56	9.16	4.53	2.73	1.31
BRISBANE	1012.935	65.725	BN 1750		18.20	15.47	9.08	4.48	2.70	1.30
BRISBANE	1013.445	65.215	BN 1740		18.11	15.38	9.01	4.44	2.67	1.29
BRISBANE	1013.91	64.750	BN 1730		18.05	15.31	8.94	4.38	2.63	1.28
BRISBANE	1014.31	64.350	BN 1720		18.01	15.25	8.88	4.34	2.60	1.27
BRISBANE	1014.61	64.050	BN 1710	Goodna Hospital Gauge	18.05	15.27	8.83	4.30	2.58	1.27
BRISBANE	1015.09	63.570	BN 1700		17.91	15.16	8.80	4.29	2.57	1.27
BRISBANE	1015.56	63.100	BN 1690		17.75	15.03	8.71	4.25	2.55	1.26
BRISBANE	1016.14	62.520	BN 1680		17.67	14.95	8.65	4.21	2.53	1.26
BRISBANE	1016.64	62.020	BN 1670		17.60	14.87	8.56	4.13	2.47	1.24
BRISBANE	1017.13	61.530	BN 1660		17.37	14.66	8.38	3.98	2.37	1.22
BRISBANE	1017.61	61.050	BN 1650		17.26	14.47	8.21	3.87	2.30	1.20
BRISBANE	1017.92	60.740	BN 1640		17.14	14.34	8.09	3.80	2.26	1.19
BRISBANE	1018.2	60.460	BN 1630		17.08	14.29	8.05	3.77	2.25	1.19
BRISBANE	1018.725	59.935	BN 1620		16.76	14.01	7.88	3.68	2.20	1.18
BRISBANE	1019.095	59.565	BN 1610		16.62	13.87	7.77	3.63	2.17	1.17
BRISBANE	1019.49	59.170	BN 1600		16.49	13.76	7.66	3.57	2.14	1.17
BRISBANE	1019.865	58.795	BN 1590		16.22	13.53	7.54	3.50	2.10	1.16
BRISBANE	1020.115	58.545	BN 1580		16.29	13.57	7.53	3.48	2.09	1.16
BRISBANE	1020.525	58.135	BN 1570		16.26	13.54	7.49	3.44	2.06	1.15
BRISBANE	1020.83	57.830	BN 1560		16.11	13.41	7.41	3.40	2.04	1.15
BRISBANE	1021.095	57.565	BN 1550		15.91	13.24	7.31	3.36	2.02	1.14
BRISBANE	1021.539	57.121	BN 1540		15.74	13.09	7.19	3.29	1.98	1.14
BRISBANE	1021.715	56.945	BN 1530		15.78	13.10	7.17	3.27	1.97	1.13
BRISBANE	1021.895	56.765	BN 1520		15.69	13.04	7.13	3.24	1.95	1.13
BRISBANE	1022.105	56.555	BN 1510		15.49	12.87	7.02	3.19	1.93	1.13
BRISBANE	1022.575	56.085	BN 1500		15.52	12.87	7.01	3.18	1.92	1.12
BRISBANE	1023.04	55.620	BN 1490		15.23	12.64	6.89	3.14	1.90	1.12
BRISBANE	1023.57	55.090	BN 1480		15.17	12.60	6.85	3.11	1.88	1.12
BRISBANE	1024.08	54.580	BN 1470		15.12	12.54	6.79	3.07	1.87	1.11
BRISBANE	1024.583	54.097	BN 1460		15.05	12.47	6.72	3.02	1.84	1.11
BRISBANE	1025.07	53.590	BN 1450		14.95	12.38	6.65	2.96	1.81	1.10
BRISBANE	1025.36	53.300	BN 1440		14.80	12.25	6.57	2.94	1.80	1.10
BRISBANE	1025.59	53.070	BN 1430		14.61	12.10	6.48	2.91	1.78	1.10
BRISBANE	1026.17	52.490	BN 1420		14.50	11.99	6.40	2.86	1.75	1.09
BRISBANE	1026.68	51.980	BN 1410	Mt Ommaney Gauge	14.38	11.87	6.30	2.81	1.73	1.09
BRISBANE	1026.9	51.760	BN 1400		14.21	11.75	6.24	2.79	1.72	1.09
BRISBANE	1027.16	51.500	BN 1390		14.12	11.68	6.20	2.77	1.71	1.09
BRISBANE	1027.68	50.980	BN 1380		14.19	11.70	6.18	2.75	1.70	1.08
BRISBANE	1028.18	50.480	BN 1370		14.19	11.70	6.17	2.74	1.69	1.08
BRISBANE	1028.68	49.980	BN 1360		14.10	11.62	6.11	2.71	1.68	1.08
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge						
BRISBANE	1028.76	49.900	BN 1340		13.97	11.49	6.02	2.67	1.66	1.08
BRISBANE	1029.2	49.460	BN 1330		13.80	11.37	5.95	2.64	1.65	1.07
BRISBANE	1029.68	48.980	BN 1320		13.80	11.37	5.95	2.64	1.64	1.07
BRISBANE	1030.22	48.440	BN 1310		13.85	11.35	5.93	2.62	1.64	1.07
BRISBANE	1030.87	47.790	BN 1300		13.81	11.33	5.89	2.60	1.63	1.07
BRISBANE	1031.26	47.400	BN 1290		13.69	11.24	5.83	2.57	1.61	1.07
BRISBANE	1031.7	46.960	BN 1280	Darra Wharf Gauge	13.33	10.95	5.68	2.51	1.58	1.06
BRISBANE	1031.995	46.665	BN 1270		13.41	10.96	5.63	2.47	1.57	1.06
BRISBANE	1032.23	46.430	BN 1260		13.28	10.86	5.57	2.44	1.55	1.06
BRISBANE	1032.585	46.075	BN 1250		13.03	10.67	5.47	2.41	1.54	1.05
BRISBANE	1033.08	45.580	BN 1240		12.90	10.53	5.38	2.37	1.52	1.05
BRISBANE	1033.37	45.290	BN 1230		12.83	10.45	5.32	2.34	1.51	1.05
BRISBANE	1033.9	44.760	BN 1220		12.57	10.25	5.22	2.30	1.49	1.05
BRISBANE	1034.37	44.290	BN 1210		12.42	10.13	5.14	2.27	1.48	1.05
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	12.32	10.02	5.07	2.24	1.46	1.04

TABLE J-1 - Flood Levels for the Regulation Lines & Revegetation Case for Flood Events 100 Year ARI to 2 Year ARI

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	REGULATION LINES & REVEGETATION IN PLACE					
					100 YEAR ARI WL (m AHD)	50 YEAR ARI WL (m AHD)	20 YEAR ARI WL (m AHD)	10 YEAR ARI WL (m AHD)	5 YEAR ARI WL (m AHD)	2 YEAR ARI WL (m AHD)
BRISBANE	1035.414	43.246	BN 1190		12.08	9.82	4.95	2.19	1.44	1.04
BRISBANE	1035.9	42.760	BN 1180		11.76	9.55	4.79	2.13	1.41	1.04
BRISBANE	1036.46	42.200	BN 1170		11.46	9.30	4.64	2.07	1.39	1.03
BRISBANE	1036.77	41.890	BN 1160		11.39	9.21	4.58	2.03	1.37	1.03
BRISBANE	1036.915	41.745	BN 1150		11.23	9.10	4.52	2.01	1.36	1.03
BRISBANE	1037.09	41.570	BN 1140		11.20	9.07	4.51	2.01	1.36	1.03
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge						
BRISBANE	1037.175	41.485	BN 1120		11.10	9.00	4.35	1.95	1.34	1.02
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	11.04	8.94	4.32	1.94	1.33	1.02
BRISBANE	1037.625	41.035	BN 1100		11.02	8.92	4.28	1.92	1.32	1.02
BRISBANE	1038.085	40.575	BN 1090		10.99	8.88	4.26	1.91	1.32	1.02
BRISBANE	1038.6	40.060	BN 1080		10.98	8.84	4.21	1.89	1.31	1.02
BRISBANE	1039.1	39.560	BN 1070		11.05	8.90	4.21	1.87	1.30	1.02
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	11.00	8.83	4.17	1.86	1.30	1.02
BRISBANE	1040.09	38.570	BN 1050	King Authur Terrace Gauge	10.93	8.79	4.17	1.86	1.30	1.02
BRISBANE	1040.49	38.170	BN 1040		10.80	8.68	4.11	1.85	1.29	1.01
BRISBANE	1041.01	37.650	BN 1030		10.86	8.70	4.11	1.85	1.29	1.01
BRISBANE	1041.23	37.430	BN 1020		10.80	8.65	4.08	1.83	1.29	1.01
BRISBANE	1041.46	37.200	BN 1010	Tennyson Power House Gauge	10.72	8.59	4.04	1.82	1.28	1.01
BRISBANE	1041.7	36.960	BN 1000		10.69	8.56	4.04	1.82	1.28	1.01
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	10.58	8.43	3.97	1.80	1.27	1.01
BRISBANE	1042.235	36.425	BN 980		10.41	8.30	3.91	1.78	1.27	1.01
BRISBANE	1042.515	36.145	BN 970		10.40	8.29	3.90	1.78	1.26	1.01
BRISBANE	1042.91	35.750	BN 960		10.23	8.14	3.82	1.75	1.25	1.01
BRISBANE	1043.725	34.935	BN 950		9.98	7.91	3.67	1.69	1.23	1.00
BRISBANE	1044.06	34.600	BN 940	Sandy Creek Gauge	9.86	7.82	3.63	1.68	1.22	1.00
BRISBANE	1044.34	34.320	BN 930		9.69	7.68	3.56	1.65	1.21	1.00
BRISBANE	1044.605	34.055	BN 920		9.65	7.63	3.52	1.64	1.21	1.00
BRISBANE	1044.86	33.800	BN 910		9.59	7.57	3.49	1.63	1.20	1.00
BRISBANE	1045.4	33.260	BN 900		9.40	7.40	3.39	1.59	1.19	0.99
BRISBANE	1045.885	32.775	BN 890		9.23	7.21	3.28	1.56	1.17	0.99
BRISBANE	1046.18	32.480	BN 880		9.17	7.17	3.26	1.55	1.17	0.99
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	9.11	7.13	3.25	1.55	1.17	0.99
BRISBANE	1046.58	32.080	BN 860		9.08	7.08	3.22	1.54	1.17	0.99
BRISBANE	1046.9	31.760	BN 850		8.87	6.91	3.14	1.52	1.16	0.99
BRISBANE	1047.35	31.310	BN 840		8.47	6.60	2.99	1.47	1.14	0.98
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	8.24	6.40	2.91	1.45	1.13	0.98
BRISBANE	1048.375	30.285	BN 820		8.29	6.43	2.91	1.45	1.13	0.98
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	8.08	6.24	2.80	1.41	1.12	0.98
BRISBANE	1049.12	29.540	BN 800		8.03	6.20	2.78	1.40	1.12	0.98
BRISBANE	1049.37	29.290	BN 790		7.85	6.05	2.72	1.39	1.11	0.98
BRISBANE	1049.59	29.070	BN 780		7.82	6.03	2.71	1.39	1.11	0.98
BRISBANE	1049.87	28.790	BN 770		7.70	5.94	2.67	1.37	1.10	0.98
BRISBANE	1050.43	28.230	BN 760		7.66	5.89	2.62	1.38	1.10	0.97
BRISBANE	1050.86	27.800	BN 750		7.53	5.79	2.58	1.34	1.09	0.97
BRISBANE	1051.36	27.300	BN 740		7.54	5.78	2.58	1.35	1.09	0.97
BRISBANE	1051.895	26.765	BN 730		7.37	5.62	2.50	1.32	1.08	0.97
BRISBANE	1052.31	26.350	BN 720		7.51	5.71	2.52	1.33	1.09	0.97
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge						
BRISBANE	1052.39	26.270	BN 700		7.31	5.57	2.47	1.31	1.08	0.97
BRISBANE	1052.595	26.065	BN 690		7.22	5.50	2.45	1.31	1.08	0.97
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge						
BRISBANE	1052.64	26.020	BN 670		6.69	5.13	2.37	1.29	1.07	0.96
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	6.54	5.03	2.34	1.28	1.07	0.96
BRISBANE	1053.32	25.340	BN 650		6.47	4.95	2.29	1.27	1.06	0.96
BRISBANE	1053.356	25.304	BN 640	Victoria Bridge						
BRISBANE	1053.385	25.275	BN630		6.40	4.90	2.27	1.26	1.05	0.96
BRISBANE	1053.9	24.760	BN 620		5.96	4.54	2.11	1.21	1.03	0.95
BRISBANE	1054.64	24.020	BN 610		5.86	4.42	2.03	1.19	1.03	0.95
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge						
BRISBANE	1054.68	23.980	BN 590		5.76	4.34	2.00	1.18	1.02	0.95
BRISBANE	1054.97	23.690	BN 580		5.52	4.15	1.93	1.16	1.01	0.95
BRISBANE	1055.28	23.380	BN 550		5.44	4.11	1.92	1.16	1.01	0.95
BRISBANE	1055.42	23.240	BN 540		5.43	4.09	1.91	1.16	1.01	0.95
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	5.38	4.05	1.89	1.15	1.01	0.95
BRISBANE	1056.4	22.260	BN 520		5.13	3.86	1.82	1.14	1.00	0.95
BRISBANE	1056.695	21.965	BN 510		5.06	3.81	1.80	1.13	1.00	0.95
BRISBANE	1056.865	21.795	BN 500		5.27	3.95	1.85	1.14	1.00	0.95
BRISBANE	1056.92	21.740	BN 495	Story Bridge						
BRISBANE	1056.95	21.710	BN 490		5.16	3.88	1.82	1.13	1.00	0.95
BRISBANE	1057.09	21.570	BN 480		5.01	3.77	1.79	1.12	0.99	0.95
BRISBANE	1057.53	21.130	BN 470		4.87	3.67	1.76	1.12	0.99	0.95
BRISBANE	1058.04	20.620	BN 460		4.61	3.47	1.68	1.10	0.98	0.95
BRISBANE	1058.23	20.430	BN 450		4.53	3.40	1.66	1.09	0.98	0.95
BRISBANE	1058.53	20.130	BN 440		4.39	3.31	1.63	1.09	0.98	0.94
BRISBANE	1058.735	19.925	BN 430		4.42	3.32	1.63	1.09	0.98	0.94
BRISBANE	1059.035	19.625	BN 420		4.15	3.13	1.57	1.07	0.97	0.94
BRISBANE	1059.54	19.120	BN 410		4.11	3.09	1.55	1.07	0.97	0.94
BRISBANE	1059.99	18.670	BN 400		3.90	2.92	1.49	1.05	0.97	0.94
BRISBANE	1060.345	18.315	BN 390		3.64	2.74	1.43	1.04	0.96	0.94
BRISBANE	1060.535	18.125	BN 380		3.50	2.65	1.41	1.03	0.96	0.94
BRISBANE	1061.015	17.645	BN 370		3.46	2.61	1.39	1.03	0.96	0.94
BRISBANE	1061.53	17.130	BN 360		3.24	2.46	1.35	1.02	0.96	0.94

TABLE J-1 - Flood Levels for the Regulation Lines & Revegetation Case for Flood Events 100 Year ARI to 2 Year ARI

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	REGULATION LINES & REVEGETATION IN PLACE					
					100 YEAR ARI WL (m AHD)	50 YEAR ARI WL (m AHD)	20 YEAR ARI WL (m AHD)	10 YEAR ARI WL (m AHD)	5 YEAR ARI WL (m AHD)	2 YEAR ARI WL (m AHD)
BRISBANE	1062.02	16.640	BN 350		3.16	2.40	1.32	1.01	0.95	0.94
BRISBANE	1062.535	16.125	BN 340		3.12	2.36	1.31	1.01	0.95	0.94
BRISBANE	1062.94	15.720	BN 330		3.11	2.35	1.30	1.01	0.95	0.94
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	2.99	2.26	1.28	1.00	0.95	0.94
BRISBANE	1063.645	15.015	BN 310	Cresent Road Gauge	2.70	2.06	1.22	0.99	0.95	0.94
BRISBANE	1064	14.660	BN 300		2.66	2.04	1.21	0.99	0.94	0.94
BRISBANE	1064.49	14.170	BN 290		2.53	1.95	1.19	0.98	0.94	0.94
BRISBANE	1065.01	13.650	BN 280		2.55	1.96	1.19	0.98	0.94	0.94
BRISBANE	1065.503	13.157	BN 270		2.51	1.93	1.18	0.98	0.94	0.94
BRISBANE	1065.99	12.670	BN 260	Cairncross Dock Gauge	2.54	1.95	1.19	0.98	0.94	0.94
BRISBANE	1066.505	12.155	BN 250		2.46	1.90	1.17	0.98	0.94	0.94
BRISBANE	1067.02	11.640	BN 240		2.41	1.86	1.16	0.97	0.94	0.94
BRISBANE	1067.485	11.175	BN 230		2.29	1.78	1.14	0.97	0.94	0.94
BRISBANE	1067.965	10.695	BN 220		2.18	1.71	1.12	0.96	0.94	0.94
BRISBANE	1068.66	10.000	BN 210		2.00	1.59	1.09	0.96	0.93	0.94
BRISBANE	1069.045	9.615	BN 200		1.93	1.55	1.08	0.95	0.93	0.94
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	1.87	1.51	1.06	0.95	0.93	0.93
BRISBANE	1070.025	8.635	BN 180		1.80	1.46	1.05	0.95	0.93	0.93
BRISBANE	1070.53	8.130	BN 170		1.70	1.40	1.04	0.95	0.93	0.93
BRISBANE	1071.04	7.620	BN 160		1.62	1.34	1.02	0.94	0.93	0.93
BRISBANE	1071.52	7.140	BN 150		1.66	1.37	1.03	0.94	0.93	0.93
BRISBANE	1072.015	6.645	BN 140		1.62	1.35	1.02	0.94	0.93	0.93
BRISBANE	1072.515	6.145	BN 130		1.50	1.27	1.00	0.94	0.93	0.93
BRISBANE	1072.995	5.665	BN 120		1.46	1.25	1.00	0.94	0.93	0.93
BRISBANE	1073.485	5.175	BN 110		1.36	1.18	0.98	0.93	0.93	0.93
BRISBANE	1074	4.660	BN 100		1.28	1.14	0.97	0.93	0.93	0.93
BRISBANE	1074.46	4.200	BN 90		1.23	1.10	0.96	0.93	0.93	0.93
BRISBANE	1074.985	3.675	BN 80		1.09	1.02	0.94	0.93	0.92	0.93
BRISBANE	1075.48	3.180	BN 70		1.05	1.00	0.94	0.92	0.92	0.92
BRISBANE	1076	2.660	BN 60		1.07	1.01	0.94	0.92	0.92	0.92
BRISBANE	1076.495	2.165	BN 50		0.95	0.94	0.92	0.92	0.92	0.92
BRISBANE	1077.01	1.650	BN 40		0.97	0.95	0.93	0.92	0.92	0.92
BRISBANE	1077.51	1.150	BN 30		0.97	0.95	0.93	0.92	0.92	0.92
BRISBANE	1078.04	0.620	BN 20		0.95	0.94	0.92	0.92	0.92	0.92
BRISBANE	1078.525	0.135	BN 10		0.92	0.92	0.92	0.92	0.92	0.92
BRISBANE	1078.66	0.000	-	Western Inner Bar Gauge	0.92	0.92	0.92	0.92	0.92	0.92
BREMER	599.4	-	-		19.76	16.93	10.29	5.31	3.24	1.44
BREMER	600	-	-		19.76	16.93	10.29	5.31	3.24	1.45
OXLEY	599.4	-	-		10.96	8.80	4.17	1.86	1.30	1.01
OXLEY	600	-	-		10.96	8.80	4.17	1.86	1.30	1.02
BREAKFAST	599.4	-	-		3.06	2.31	1.29	1.00	0.95	0.94
BREAKFAST	600	-	-		3.06	2.31	1.29	1.00	0.95	0.94
BULIMBA	599.4	-	-		1.62	1.35	1.02	0.94	0.93	0.93
BULIMBA	600	-	-		1.62	1.35	1.02	0.94	0.93	0.93
CENTWEIR	0	-	-		14.10	11.62	6.11	2.71	1.68	1.08
CENTWEIR	0.08	-	-		13.97	11.49	6.02	2.67	1.66	1.08
INDOORWEIR	0	-	-		11.20	9.07	4.51	2.01	1.36	1.03
INDOORWEIR	0.085	-	-		11.10	9.00	4.35	1.95	1.34	1.02
WILLIAMWEIR	0	-	-		7.22	5.50	2.45	1.31	1.08	0.97
WILLIAMWEIR	0.045	-	-		6.69	5.13	2.37	1.29	1.07	0.96
VICTORIAWEIR	0	-	-		6.47	4.95	2.29	1.27	1.06	0.96
VICTORIAWEIR	0.065	-	-		6.40	4.90	2.27	1.26	1.05	0.96
CAPTAINWEIR	0	-	-		5.86	4.42	2.03	1.19	1.03	0.95
CAPTAINWEIR	0.04	-	-		5.76	4.34	2.00	1.18	1.02	0.95
STORYWEIR	0	-	-		5.27	3.95	1.85	1.14	1.00	0.95
STORYWEIR	0.085	-	-		5.16	3.88	1.82	1.13	1.00	0.95
MERIVALEWEIR	0	-	-		7.51	5.71	2.52	1.33	1.09	0.97
MERIVALEWEIR	0.08	-	-		7.31	5.57	2.47	1.31	1.08	0.97
GOODNALINK1	0	-	-		18.16	15.43	9.05	4.47	2.69	1.30
GOODNALINK1	1	-	-		17.50	14.78	8.48	4.06	2.42	1.23
GOODNALINK2	0	-	-		18.08	15.34	8.98	4.41	2.65	1.29
GOODNALINK2	1.07	-	-		17.71	14.99	8.68	4.23	2.54	1.26
STLUCIALINK1	0	-	-		11.04	8.89	4.20	1.87	1.30	1.02
STLUCIALINK1	1.05	-	-		10.22	8.11	3.78	1.73	1.24	1.00
STLUCIALINK2	0	-	-		10.99	8.81	4.17	1.86	1.30	1.02
STLUCIALINK2	1.05	-	-		10.24	8.13	3.79	1.74	1.25	1.01
STLUCIALINK3	0	-	-		10.88	8.76	4.15	1.86	1.30	1.02
STLUCIALINK3	0.85	-	-		10.40	8.29	3.90	1.78	1.26	1.01

TABLE J-2 - Discharges for the Regulation Lines & Revegetation Case for the Flood Events 100 Year ARI to 2 Year ARI

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	DESIGN EVENTS (REG LINE & REVEG CASE)					
			100 YEAR ARI Q (m^3/s)	50 YEAR ARI Q (m^3/s)	20 YEAR ARI Q (m^3/s)	10 YEAR ARI Q (m^3/s)	5 YEAR ARI Q (m^3/s)	2 YEAR ARI Q (m^3/s)
BRISBANE	1000.14	78.52	9235	7185	4225	1627	930	284
BRISBANE	1000.53	78.13	9234	7184	4223	1627	930	283
BRISBANE	1001.05	77.62	9232	7182	4219	1626	929	283
BRISBANE	1001.59	77.07	9229	7179	4214	1624	928	283
BRISBANE	1002.11	76.55	9227	7177	4211	1623	928	283
BRISBANE	1002.57	76.09	9225	7175	4207	1623	927	283
BRISBANE	1003.03	75.63	9223	7172	4202	1622	927	283
BRISBANE	1003.53	75.14	9220	7170	4198	1621	926	283
BRISBANE	1004.04	74.62	9218	7167	4193	1619	926	283
BRISBANE	1004.56	74.11	9215	7165	4189	1618	925	283
BRISBANE	1005.07	73.59	9212	7161	4181	1617	924	283
BRISBANE	1005.60	73.06	9208	7157	4172	1615	923	283
BRISBANE	1006.04	72.63	9206	7154	4165	1614	923	283
BRISBANE	1006.25	72.41	9570	7354	3648	1598	952	365
BRISBANE	1006.61	72.06	9570	7353	3646	1598	952	365
BRISBANE	1007.16	71.50	9569	7351	3642	1597	951	365
BRISBANE	1007.67	71.00	9567	7349	3637	1597	951	365
BRISBANE	1008.18	70.48	9567	7347	3634	1596	951	365
BRISBANE	1008.69	69.98	9566	7346	3631	1596	951	365
BRISBANE	1009.16	69.50	9565	7344	3629	1596	951	365
BRISBANE	1009.56	69.10	9565	7343	3626	1595	950	365
BRISBANE	1010.11	68.56	9563	7341	3623	1595	950	365
BRISBANE	1010.61	68.05	9563	7340	3621	1594	950	365
BRISBANE	1010.85	67.81	9562	7339	3620	1594	950	365
BRISBANE	1011.25	67.42	9562	7338	3618	1594	950	365
BRISBANE	1011.75	66.92	9561	7335	3614	1594	949	365
BRISBANE	1012.23	66.43	9559	7332	3610	1593	949	365
BRISBANE	1012.71	65.96	9557	7328	3605	1593	949	365
BRISBANE	1013.06	65.60	9555	7326	3602	1593	949	365
BRISBANE	1013.32	65.34	9363	7324	3600	1592	949	365
BRISBANE	1013.56	65.10	9362	7323	3598	1592	949	365
BRISBANE	1013.80	64.87	9290	7322	3596	1592	949	365
BRISBANE	1014.11	64.55	9289	7321	3592	1591	948	365
BRISBANE	1014.46	64.20	9287	7319	3588	1591	948	365
BRISBANE	1014.85	63.81	9284	7317	3583	1590	948	365
BRISBANE	1015.33	63.34	9283	7317	3581	1590	948	365
BRISBANE	1015.71	62.96	9282	7316	3579	1590	948	366
BRISBANE	1016.00	62.67	9352	7316	3578	1590	948	366
BRISBANE	1016.39	62.27	9351	7315	3576	1590	947	366
BRISBANE	1016.77	61.90	9349	7314	3574	1589	947	366
BRISBANE	1017.01	61.65	9538	7313	3572	1589	947	366
BRISBANE	1017.37	61.29	9537	7313	3570	1589	947	366
BRISBANE	1017.77	60.90	9536	7312	3568	1589	947	366
BRISBANE	1018.06	60.60	9535	7311	3566	1589	947	366
BRISBANE	1018.46	60.20	9534	7310	3564	1589	947	366
BRISBANE	1018.91	59.75	9532	7309	3563	1588	947	366
BRISBANE	1019.29	59.37	9531	7308	3561	1588	947	366
BRISBANE	1019.68	58.98	9529	7307	3560	1588	947	366
BRISBANE	1019.99	58.67	9528	7307	3559	1588	947	368
BRISBANE	1020.32	58.34	9527	7306	3557	1588	947	366
BRISBANE	1020.68	57.98	9525	7304	3554	1587	947	366
BRISBANE	1020.96	57.70	9524	7304	3553	1587	947	366
BRISBANE	1021.32	57.34	9523	7303	3552	1587	946	366
BRISBANE	1021.63	57.03	9523	7302	3550	1587	946	366
BRISBANE	1021.81	56.86	9523	7302	3549	1587	946	366
BRISBANE	1022.00	56.66	9522	7301	3548	1587	946	367
BRISBANE	1022.34	56.32	9522	7301	3547	1587	946	367
BRISBANE	1022.81	55.85	9522	7301	3545	1586	946	367
BRISBANE	1023.31	55.36	9522	7300	3544	1586	946	367
BRISBANE	1023.83	54.84	9522	7300	3543	1586	946	367
BRISBANE	1024.32	54.34	9521	7300	3541	1586	946	367
BRISBANE	1024.82	53.84	9521	7301	3539	1586	946	367
BRISBANE	1025.22	53.45	9521	7301	3538	1586	946	367

TABLE J-2 - Discharges for the Regulation Lines & Revegetation Case for the Flood Events 100 Year ARI to 2 Year ARI

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	DESIGN EVENTS (REG LINE & REVEG CASE)					
			100 YEAR ARI Q (m^3/s)	50 YEAR ARI Q (m^3/s)	20 YEAR ARI Q (m^3/s)	10 YEAR ARI Q (m^3/s)	5 YEAR ARI Q (m^3/s)	2 YEAR ARI Q (m^3/s)
BRISBANE	1025.48	53.19	9521	7301	3537	1586	946	367
BRISBANE	1025.88	52.78	9521	7302	3536	1586	946	367
BRISBANE	1026.43	52.24	9522	7304	3534	1585	946	367
BRISBANE	1026.79	51.87	9523	7305	3533	1585	946	367
BRISBANE	1027.03	51.63	9524	7307	3532	1585	946	367
BRISBANE	1027.42	51.24	9525	7308	3531	1585	946	367
BRISBANE	1027.93	50.73	9526	7312	3529	1585	946	367
BRISBANE	1028.43	50.23	9526	7317	3526	1585	946	367
BRISBANE	1028.72	49.94	9258	7315	3525	1585	946	367
BRISBANE	1028.98	49.68	9527	7318	3524	1585	946	367
BRISBANE	1029.44	49.22	9527	7313	3523	1585	946	367
BRISBANE	1029.95	48.71	9526	7308	3521	1585	946	368
BRISBANE	1030.55	48.11	9524	7302	3519	1584	946	368
BRISBANE	1031.07	47.59	9522	7298	3517	1584	946	368
BRISBANE	1031.48	47.18	9520	7295	3516	1584	946	368
BRISBANE	1031.85	46.81	9519	7293	3515	1584	946	368
BRISBANE	1032.11	46.55	9518	7291	3514	1584	946	368
BRISBANE	1032.41	46.25	9516	7289	3513	1584	946	368
BRISBANE	1032.83	45.83	9514	7287	3512	1584	946	368
BRISBANE	1033.23	45.44	9512	7285	3511	1584	946	368
BRISBANE	1033.64	45.03	9510	7282	3509	1584	946	368
BRISBANE	1034.14	44.53	9508	7279	3508	1584	946	368
BRISBANE	1034.63	44.03	9506	7277	3507	1584	946	368
BRISBANE	1035.15	43.51	9503	7274	3505	1584	946	368
BRISBANE	1035.66	43.00	9501	7272	3503	1584	946	368
BRISBANE	1036.18	42.48	9498	7269	3502	1584	946	368
BRISBANE	1036.62	42.05	9497	7268	3500	1583	946	368
BRISBANE	1036.84	41.82	9495	7267	3500	1583	946	368
BRISBANE	1037.00	41.66	9495	7266	3499	1583	946	369
BRISBANE	1037.11	41.55	9494	7266	3499	1583	946	369
BRISBANE	1037.23	41.43	9494	7265	3498	1583	946	369
BRISBANE	1037.46	41.21	9493	7264	3498	1583	945	369
BRISBANE	1037.86	40.81	9491	7263	3496	1583	945	369
BRISBANE	1038.34	40.32	9489	7261	3494	1583	945	369
BRISBANE	1038.85	39.81	9486	7258	3491	1583	945	369
BRISBANE	1039.15	39.51	9482	7254	3488	1583	945	369
BRISBANE	1039.38	39.28	9286	7195	3486	1583	945	369
BRISBANE	1039.62	39.04	9281	7192	3485	1583	945	369
BRISBANE	1039.75	38.91	9086	7164	3484	1583	945	369
BRISBANE	1039.96	38.70	8723	6963	3412	1582	946	414
BRISBANE	1040.17	38.49	8723	6962	3412	1582	946	414
BRISBANE	1040.37	38.29	8595	6962	3411	1582	946	414
BRISBANE	1040.75	37.91	8595	6961	3411	1582	946	414
BRISBANE	1041.12	37.54	8594	6960	3411	1582	946	415
BRISBANE	1041.35	37.32	8594	6960	3410	1582	946	415
BRISBANE	1041.58	37.08	8594	6959	3410	1582	946	415
BRISBANE	1041.83	36.83	8593	6959	3410	1582	946	415
BRISBANE	1042.10	36.56	8593	6959	3410	1582	946	415
BRISBANE	1042.37	36.29	8592	6959	3410	1582	946	415
BRISBANE	1042.51	36.15	8719	6959	3410	1582	946	415
BRISBANE	1042.71	35.95	8718	6959	3410	1582	946	415
BRISBANE	1042.96	35.70	8717	6959	3410	1582	946	415
BRISBANE	1043.05	35.61	8975	6991	3410	1582	946	415
BRISBANE	1043.10	35.57	8975	6991	3410	1582	946	415
BRISBANE	1043.42	35.24	9200	7057	3409	1582	946	415
BRISBANE	1043.89	34.77	9201	7057	3409	1582	946	415
BRISBANE	1044.20	34.46	9202	7057	3409	1582	946	415
BRISBANE	1044.47	34.19	9203	7058	3409	1582	946	416
BRISBANE	1044.73	33.93	9204	7058	3409	1582	946	416
BRISBANE	1045.13	33.53	9206	7058	3409	1582	946	416
BRISBANE	1045.64	33.02	9210	7059	3409	1582	946	416
BRISBANE	1046.03	32.63	9215	7059	3408	1582	946	416
BRISBANE	1046.26	32.40	9217	7060	3408	1582	946	416

TABLE J-2 - Discharges for the Regulation Lines & Revegetation Case for the Flood Events 100 Year ARI to 2 Year ARI

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	DESIGN EVENTS (REG LINE & REVEG CASE)					
			100 YEAR ARI Q (m^3/s)	50 YEAR ARI Q (m^3/s)	20 YEAR ARI Q (m^3/s)	10 YEAR ARI Q (m^3/s)	5 YEAR ARI Q (m^3/s)	2 YEAR ARI Q (m^3/s)
BRISBANE	1046.46	32.20	9218	7060	3408	1582	946	416
BRISBANE	1046.74	31.92	9220	7060	3408	1582	946	416
BRISBANE	1047.13	31.54	9222	7060	3408	1582	946	416
BRISBANE	1047.63	31.03	9223	7060	3408	1582	946	417
BRISBANE	1048.15	30.52	9223	7060	3408	1582	946	417
BRISBANE	1048.63	30.03	9221	7060	3408	1582	946	417
BRISBANE	1049.01	29.65	9218	7061	3408	1582	946	417
BRISBANE	1049.25	29.42	9217	7062	3408	1582	946	417
BRISBANE	1049.48	29.18	9215	7063	3408	1582	946	417
BRISBANE	1049.73	28.93	9212	7064	3408	1582	946	417
BRISBANE	1050.15	28.51	9212	7066	3408	1582	946	417
BRISBANE	1050.65	28.02	9225	7075	3408	1582	946	417
BRISBANE	1051.11	27.55	9238	7083	3408	1582	946	418
BRISBANE	1051.63	27.03	9253	7093	3408	1582	946	418
BRISBANE	1052.10	26.56	9301	7102	3408	1582	946	418
BRISBANE	1052.35	26.31	9335	7110	3408	1582	946	418
BRISBANE	1052.49	26.17	9348	7113	3408	1582	946	418
BRISBANE	1052.63	26.04	9360	7119	3408	1582	946	418
BRISBANE	1052.75	25.91	9356	7111	3408	1582	946	418
BRISBANE	1053.09	25.57	9347	7104	3408	1582	946	418
BRISBANE	1053.36	25.31	9327	7098	3408	1582	946	418
BRISBANE	1053.64	25.02	9309	7090	3408	1582	946	418
BRISBANE	1054.27	24.39	9329	7086	3407	1582	946	418
BRISBANE	1054.66	24.00	9314	7084	3407	1582	946	419
BRISBANE	1054.83	23.84	9310	7084	3407	1582	946	419
BRISBANE	1055.13	23.54	9304	7084	3407	1582	946	419
BRISBANE	1055.35	23.31	9300	7083	3407	1582	946	419
BRISBANE	1055.69	22.97	9291	7082	3407	1582	946	419
BRISBANE	1056.18	22.48	9270	7080	3408	1582	946	419
BRISBANE	1056.55	22.11	9260	7078	3408	1582	946	419
BRISBANE	1056.78	21.88	9254	7077	3408	1582	946	419
BRISBANE	1056.92	21.74	9245	7075	3408	1582	946	419
BRISBANE	1057.02	21.64	9241	7074	3408	1582	946	419
BRISBANE	1057.31	21.35	9235	7073	3408	1582	946	419
BRISBANE	1057.79	20.87	9225	7070	3408	1582	946	419
BRISBANE	1058.14	20.53	9219	7068	3408	1582	946	420
BRISBANE	1058.38	20.28	9221	7067	3408	1582	946	420
BRISBANE	1058.63	20.03	9223	7066	3408	1582	946	420
BRISBANE	1058.89	19.78	9224	7064	3408	1582	946	420
BRISBANE	1059.29	19.37	9225	7063	3408	1582	946	420
BRISBANE	1059.77	18.89	9222	7064	3408	1582	946	420
BRISBANE	1060.17	18.49	9219	7066	3408	1582	946	420
BRISBANE	1060.44	18.22	9218	7066	3408	1582	946	420
BRISBANE	1060.78	17.88	9217	7066	3408	1582	946	420
BRISBANE	1061.27	17.39	9213	7067	3408	1582	946	420
BRISBANE	1061.78	16.88	9210	7067	3408	1582	946	420
BRISBANE	1062.28	16.38	9206	7067	3408	1582	946	420
BRISBANE	1062.74	15.92	9205	7066	3408	1582	946	421
BRISBANE	1063.03	15.63	9206	7065	3408	1582	946	421
BRISBANE	1063.22	15.44	9200	7055	3408	1582	946	428
BRISBANE	1063.48	15.18	9198	7054	3408	1582	946	428
BRISBANE	1063.82	14.84	9197	7054	3408	1582	946	428
BRISBANE	1064.25	14.42	9197	7053	3408	1582	946	428
BRISBANE	1064.75	13.91	9197	7053	3408	1582	946	429
BRISBANE	1065.26	13.40	9197	7053	3408	1582	946	429
BRISBANE	1065.75	12.91	9197	7053	3408	1582	946	429
BRISBANE	1066.25	12.41	9197	7053	3408	1582	946	429
BRISBANE	1066.76	11.90	9197	7053	3408	1582	946	429
BRISBANE	1067.25	11.41	9197	7052	3408	1582	946	429
BRISBANE	1067.73	10.94	9197	7052	3408	1582	946	429
BRISBANE	1068.31	10.35	9197	7052	3408	1582	946	430
BRISBANE	1068.85	9.81	9197	7053	3408	1582	946	430
BRISBANE	1069.29	9.37	9198	7053	3408	1582	946	430

TABLE J-2 - Discharges for the Regulation Lines & Revegetation Case for the Flood Events 100 Year ARI to 2 Year ARI

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	DESIGN EVENTS (REG LINE & REVEG CASE)					
			100 YEAR ARI Q (m^3/s)	50 YEAR ARI Q (m^3/s)	20 YEAR ARI Q (m^3/s)	10 YEAR ARI Q (m^3/s)	5 YEAR ARI Q (m^3/s)	2 YEAR ARI Q (m^3/s)
BRISBANE	1069.78	8.88	9198	7053	3408	1582	946	430
BRISBANE	1070.28	8.38	9198	7054	3408	1582	946	430
BRISBANE	1070.79	7.87	9198	7054	3408	1583	946	430
BRISBANE	1071.28	7.38	9199	7054	3408	1583	946	430
BRISBANE	1071.77	6.89	9199	7054	3408	1583	946	430
BRISBANE	1072.02	6.64	9199	7054	3409	1583	946	430
BRISBANE	1072.27	6.39	9191	7051	3409	1583	951	504
BRISBANE	1072.76	5.90	9191	7051	3409	1583	951	504
BRISBANE	1073.24	5.42	9191	7051	3409	1583	952	504
BRISBANE	1073.74	4.92	9191	7051	3409	1583	952	504
BRISBANE	1074.23	4.43	9191	7051	3409	1583	952	505
BRISBANE	1074.72	3.94	9191	7051	3409	1583	952	505
BRISBANE	1075.23	3.43	9191	7051	3409	1583	952	505
BRISBANE	1075.74	2.92	9191	7051	3409	1583	953	505
BRISBANE	1076.25	2.41	9191	7052	3409	1583	953	505
BRISBANE	1076.75	1.91	9192	7052	3409	1583	953	505
BRISBANE	1077.26	1.40	9192	7052	3409	1583	953	506
BRISBANE	1077.78	0.88	9192	7052	3409	1583	953	506
BRISBANE	1078.28	0.38	9192	7052	3409	1583	953	506
BRISBANE	1078.59	0.07	9192	7052	3409	1583	953	506
BREMER	599.70	-	2204	1890	951	862	628	230
OXLEY	599.70	-	1195	849	474	400	307	164
BREAKFAST	599.70	-	408	335	249	201	168	99
BULIMBA	599.70	-	651	538	368	301	249	162
CENTWEIR	0.04	-	582	11	0	0	0	0
INDOORWEIR	0.04	-	0	0	0	0	0	0
WILLIAMWEIR	0.02	-	0	0	0	0	0	0
VICTORIAWEIR	0.03	-	0	0	0	0	0	0
CAPTAINWEIR	0.02	-	0	0	0	0	0	0
STORYWEIR	0.04	-	0	0	0	0	0	0
MERIVALEWEIR	0.04	-	0	0	0	0	0	0
GOODNALINK1	0.50	-	201	0	0	0	0	0
GOODNALINK2	0.54	-	75	0	0	0	0	0
STLUCIALINK1	0.53	-	226	66	0	0	0	0
STLUCIALINK2	0.53	-	259	31	0	0	0	0
STLUCIALINK3	0.43	-	127	0	0	0	0	0

TABLE J-3 - Affluxes Due to Regulation Lines and Revegetation Combined Effects for the 100 Year ARI Flood

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI DESIGN WL (m AHD)	100 YEAR ARI REG LINES + REVEG WL (m AHD)	100 YEAR ARI REG LINES	100 YEAR ARI REVEGETATION	REVEGETATION AFFLUX (mm)	REG LINES AFFLUX (mm)	REG + REVEG AFLUX (mm)
BRISBANE	1000	78.66	BN 2020		22.76	22.79	22.78	22.77	10	20	30
BRISBANE	1000.285	78.375	BN 2010		22.57	22.57	22.56	22.58	10	-10	0
BRISBANE	1000.775	77.885	BN 2000		22.29	22.31	22.30	22.30	10	10	20
BRISBANE	1001.315	77.345	BN 1990		22.20	22.22	22.21	22.21	10	10	20
BRISBANE	1001.865	76.795	BN 1980		21.68	21.69	21.68	21.69	10	0	10
BRISBANE	1002.35	76.310	BN 1970		21.48	21.50	21.49	21.49	10	10	20
BRISBANE	1002.785	75.875	BN 1960		21.46	21.48	21.47	21.47	10	10	20
BRISBANE	1003.275	75.385	BN 1950		21.13	21.15	21.14	21.14	10	10	20
BRISBANE	1003.775	74.885	BN 1940		20.86	20.88	20.87	20.87	10	10	20
BRISBANE	1004.3	74.360	BN 1930		20.41	20.42	20.41	20.42	10	0	10
BRISBANE	1004.81	73.850	BN 1920		20.37	20.39	20.37	20.39	20	0	20
BRISBANE	1005.325	73.335	BN 1910		20.20	20.20	20.19	20.21	10	-10	0
BRISBANE	1005.87	72.790	BN 1900		19.89	19.88	19.87	19.90	10	-20	-10
BRISBANE	1006.3	72.360	BN 1890	Moggill Gauge	19.72	19.72	19.71	19.73	10	-10	0
BRISBANE	1006.91	71.750	BN 1880		19.51	19.52	19.50	19.53	20	-10	10
BRISBANE	1007.41	71.250	BN 1870		19.48	19.42	19.42	19.48	0	-60	-60
BRISBANE	1007.92	70.740	BN 1860		19.19	19.09	19.09	19.19	0	-100	-100
BRISBANE	1008.445	70.215	BN 1850		19.02	18.96	18.96	19.02	0	-60	-60
BRISBANE	1008.925	69.735	BN 1840		18.96	18.89	18.89	18.96	0	-70	-70
BRISBANE	1009.4	69.260	BN 1830		18.86	18.79	18.79	18.86	0	-70	-70
BRISBANE	1009.72	68.940	BN 1820		18.85	18.73	18.73	18.85	0	-120	-120
BRISBANE	1010.49	68.170	BN 1810		18.50	18.43	18.43	18.50	0	-70	-70
BRISBANE	1010.725	67.935	BN 1800		18.52	18.44	18.44	18.52	0	-80	-80
BRISBANE	1010.98	67.680	BN 1790		18.44	18.38	18.38	18.44	0	-60	-60
BRISBANE	1011.51	67.150	BN 1780		18.43	18.37	18.37	18.43	0	-60	-60
BRISBANE	1011.98	66.680	BN 1770		18.43	18.36	18.36	18.43	0	-70	-70
BRISBANE	1012.475	66.185	BN 1760		18.33	18.31	18.31	18.33	0	-20	-20
BRISBANE	1012.935	65.725	BN 1750		18.22	18.20	18.19	18.23	10	-30	-20
BRISBANE	1013.445	65.215	BN 1740		18.14	18.11	18.11	18.14	0	-30	-30
BRISBANE	1013.91	64.750	BN 1730		18.08	18.05	18.05	18.08	0	-30	-30
BRISBANE	1014.31	64.350	BN 1720		18.05	18.01	18.01	18.05	0	-40	-40
BRISBANE	1014.61	64.050	BN 1710	Goodna Hospital Gauge	18.08	18.05	18.04	18.09	10	-40	-30
BRISBANE	1015.09	63.570	BN 1700		17.94	17.91	17.90	17.95	10	-40	-30
BRISBANE	1015.56	63.100	BN 1690		17.81	17.75	17.75	17.81	0	-60	-60
BRISBANE	1016.14	62.520	BN 1680		17.71	17.67	17.66	17.72	10	-50	-40
BRISBANE	1016.64	62.020	BN 1670		17.62	17.60	17.60	17.62	0	-20	-20
BRISBANE	1017.13	61.530	BN 1660		17.39	17.37	17.37	17.39	0	-20	-20
BRISBANE	1017.61	61.050	BN 1650		17.26	17.26	17.25	17.27	10	-10	0
BRISBANE	1017.92	60.740	BN 1640		17.10	17.14	17.14	17.10	0	40	40
BRISBANE	1018.2	60.460	BN 1630		17.02	17.08	17.07	17.03	10	50	60
BRISBANE	1018.725	59.935	BN 1620		16.69	16.76	16.75	16.70	10	60	70
BRISBANE	1019.095	59.565	BN 1610		16.56	16.62	16.62	16.56	0	60	60
BRISBANE	1019.49	59.170	BN 1600		16.45	16.49	16.49	16.45	0	40	40
BRISBANE	1019.865	58.795	BN 1590		16.15	16.22	16.22	16.15	0	70	70
BRISBANE	1020.115	58.545	BN 1580		16.25	16.29	16.29	16.25	0	40	40
BRISBANE	1020.525	58.135	BN 1570		16.22	16.28	16.27	16.23	10	50	60
BRISBANE	1020.83	57.830	BN 1560		16.07	16.11	16.11	16.07	0	40	40
BRISBANE	1021.095	57.565	BN 1550		15.86	15.91	15.90	15.87	10	40	50
BRISBANE	1021.539	57.121	BN 1540		15.69	15.74	15.73	15.70	10	40	50
BRISBANE	1021.715	56.945	BN 1530		15.72	15.78	15.78	15.72	0	60	60
BRISBANE	1021.895	56.765	BN 1520		15.65	15.69	15.68	15.66	10	30	40
BRISBANE	1022.105	56.555	BN 1510		15.53	15.49	15.48	15.54	10	-50	-40
BRISBANE	1022.575	56.065	BN 1500		15.45	15.52	15.51	15.46	10	60	70
BRISBANE	1023.04	55.620	BN 1490		15.21	15.23	15.22	15.22	10	10	20
BRISBANE	1023.57	55.090	BN 1480		15.12	15.17	15.17	15.12	0	50	50
BRISBANE	1024.08	54.580	BN 1470		15.07	15.12	15.12	15.07	0	50	50
BRISBANE	1024.563	54.097	BN 1460		15.01	15.05	15.05	15.01	0	40	40
BRISBANE	1025.07	53.590	BN 1450		14.91	14.95	14.94	14.92	10	30	40
BRISBANE	1025.36	53.300	BN 1440		14.77	14.80	14.80	14.77	0	30	30
BRISBANE	1025.59	53.070	BN 1430		14.61	14.61	14.61	14.61	0	0	0
BRISBANE	1026.17	52.490	BN 1420		14.48	14.50	14.49	14.49	10	10	20
BRISBANE	1026.68	51.980	BN 1410	Mt Ommaney Gauge	14.38	14.38	14.38	14.38	0	0	0
BRISBANE	1026.9	51.760	BN 1400		14.25	14.21	14.20	14.26	10	-50	-40

TABLE J-3 - Affluxes Due to Regulation Lines and Revegetation Combined Effects for the 100 Year ARI Flood

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI DESIGN WL (m AHD)	100 YEAR ARI REG LINES + REVEG WL (m AHD)	100 YEAR ARI REG LINES	100 YEAR ARI REVEGETATION	REVEGETATION AFFLUX (mm)	REG LINES AFFLUX (mm)	REG + REVEG AFLUX (mm)
BRISBANE	1027.16	51.500	BN 1390		14.11	14.12	14.11	14.12	10	0	10
BRISBANE	1027.68	50.980	BN 1380		14.17	14.19	14.18	14.18	10	10	20
BRISBANE	1028.18	50.480	BN 1370		14.19	14.19	14.18	14.20	10	-10	0
BRISBANE	1028.68	49.980	BN 1360		14.06	14.10	14.09	14.07	10	30	40
BRISBANE	1028.72	49.940	BN1350	Centenary Bridge			0.00		0	0	0
BRISBANE	1028.78	49.900	BN 1340		13.91	13.97	13.96	13.92	10	50	60
BRISBANE	1029.2	49.460	BN 1330		13.80	13.80	13.80	13.80	0	0	0
BRISBANE	1029.68	48.980	BN 1320		13.82	13.80	13.80	13.82	0	-20	-20
BRISBANE	1030.22	48.440	BN 1310		13.82	13.85	13.85	13.82	0	30	30
BRISBANE	1030.87	47.790	BN 1300		13.75	13.81	13.81	13.75	0	60	60
BRISBANE	1031.26	47.400	BN 1290		13.59	13.69	13.68	13.60	10	90	100
BRISBANE	1031.7	46.960	BN 1280	Darra Wharf Gauge	13.21	13.33	13.33	13.21	0	120	120
BRISBANE	1031.995	46.665	BN 1270		13.31	13.41	13.41	13.31	0	100	100
BRISBANE	1032.23	46.430	BN 1260		13.18	13.28	13.28	13.18	0	100	100
BRISBANE	1032.585	46.075	BN 1250		12.94	13.03	13.03	12.94	0	90	90
BRISBANE	1033.08	45.580	BN 1240		12.79	12.90	12.90	12.79	0	110	110
BRISBANE	1033.37	45.290	BN 1230		12.68	12.83	12.83	12.68	0	150	150
BRISBANE	1033.9	44.760	BN 1220		12.45	12.57	12.58	12.44	-10	130	120
BRISBANE	1034.37	44.290	BN 1210		12.29	12.42	12.42	12.29	0	130	130
BRISBANE	1034.89	43.770	BN 1200	Sherwood Gauge	12.19	12.32	12.32	12.19	0	130	130
BRISBANE	1035.414	43.246	BN 1190		11.94	12.08	12.08	11.94	0	140	140
BRISBANE	1035.9	42.760	BN 1180		11.65	11.76	11.75	11.66	10	100	110
BRISBANE	1036.46	42.200	BN 1170		11.35	11.46	11.46	11.36	0	110	110
BRISBANE	1036.77	41.890	BN 1160		11.28	11.39	11.39	11.28	0	110	110
BRISBANE	1036.915	41.745	BN 1150		11.12	11.23	11.23	11.12	0	110	110
BRISBANE	1037.09	41.570	BN 1140		11.07	11.20	11.19	11.08	10	120	130
BRISBANE	1037.11	41.550	BN 1130	Indooroopilly Bridge			0.00		0	0	0
BRISBANE	1037.175	41.485	BN 1120		10.98	11.10	11.10	10.98	0	120	120
BRISBANE	1037.285	41.375	BN 1110	Clarence Road Gauge	10.93	11.04	11.04	10.93	0	110	110
BRISBANE	1037.625	41.035	BN 1100		10.91	11.02	11.01	10.92	10	100	110
BRISBANE	1038.085	40.575	BN 1090		10.93	10.99	10.98	10.94	10	50	60
BRISBANE	1038.6	40.060	BN 1080		10.91	10.98	10.98	10.91	0	70	70
BRISBANE	1039.1	39.560	BN 1070		10.90	11.05	11.04	10.91	10	140	150
BRISBANE	1039.565	39.095	BN 1060	Oxley Creek Gauge	10.92	11.00	11.00	10.92	0	80	80
BRISBANE	1040.09	38.570	BN 1050	King Authur Terrace Gauge	10.84	10.93	10.93	10.84	0	90	90
BRISBANE	1040.49	38.170	BN 1040		10.71	10.80	10.80	10.71	0	90	90
BRISBANE	1041.01	37.650	BN 1030		10.74	10.86	10.86	10.74	0	120	120
BRISBANE	1041.23	37.430	BN 1020		10.71	10.80	10.81	10.70	-10	100	90
BRISBANE	1041.46	37.200	BN 1010	Tennyson Power House Gauge	10.62	10.72	10.72	10.62	0	100	100
BRISBANE	1041.7	36.960	BN 1000		10.59	10.69	10.69	10.59	0	100	100
BRISBANE	1041.96	36.700	BN 990	Yeronga Street Gauge	10.45	10.58	10.58	10.45	0	130	130
BRISBANE	1042.235	36.425	BN 980		10.30	10.41	10.41	10.30	0	110	110
BRISBANE	1042.515	36.145	BN 970		10.29	10.40	10.39	10.30	10	100	110
BRISBANE	1042.91	35.750	BN 960		10.22	10.23	10.22	10.23	10	0	10
BRISBANE	1043.725	34.935	BN 950		9.91	9.98	9.98	9.91	0	70	70
BRISBANE	1044.06	34.600	BN 940	Sandy Creek Gauge	9.75	9.86	9.86	9.75	0	110	110
BRISBANE	1044.34	34.320	BN 930		9.58	9.69	9.68	9.59	10	100	110
BRISBANE	1044.605	34.055	BN 920		9.53	9.65	9.65	9.53	0	120	120
BRISBANE	1044.86	33.800	BN 910		9.49	9.59	9.58	9.50	10	90	100
BRISBANE	1045.4	33.260	BN 900		9.31	9.40	9.40	9.31	0	90	90
BRISBANE	1045.885	32.775	BN 890		9.17	9.23	9.23	9.17	0	60	60
BRISBANE	1046.18	32.480	BN 880		9.09	9.17	9.17	9.09	0	80	80
BRISBANE	1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	9.02	9.11	9.11	9.02	0	90	90
BRISBANE	1046.58	32.080	BN 860		8.97	9.08	9.08	8.97	0	110	110
BRISBANE	1046.9	31.760	BN 850		8.78	8.87	8.87	8.78	0	90	90
BRISBANE	1047.35	31.310	BN 840		8.41	8.47	8.47	8.41	0	60	60
BRISBANE	1047.915	30.745	BN 830	Highgate Hill Gauge	8.17	8.24	8.24	8.17	0	70	70
BRISBANE	1048.375	30.285	BN 820		8.23	8.29	8.28	8.24	10	50	60
BRISBANE	1048.89	29.770	BN 810	St Lucia Ferry Gauge	8.00	8.08	8.09	7.99	-10	90	80
BRISBANE	1049.12	29.540	BN 800		7.94	8.03	8.04	7.93	-10	100	90
BRISBANE	1049.37	29.290	BN 790		7.75	7.85	7.85	7.75	0	100	100
BRISBANE	1049.59	29.070	BN 780		7.74	7.82	7.82	7.74	0	80	80
BRISBANE	1049.87	28.790	BN 770		7.63	7.70	7.70	7.63	0	70	70

TABLE J-3 - Affluxes Due to Regulation Lines and Revegetation Combined Effects for the 100 Year ARI Flood

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI DESIGN WL (m AHD)	100 YEAR ARI REG LINES + REVEG WL (m AHD)	100 YEAR ARI REG LINES	100 YEAR ARI REVEGETATION	REVEGETATION AFFLUX (mm)	REG LINES AFFLUX (mm)	REG + REVEG AFLUX (mm)
BRISBANE	1050.43	28.230	BN 760		7.61	7.66	7.66	7.61	0	50	50
BRISBANE	1050.86	27.800	BN 750		7.46	7.53	7.53	7.46	0	70	70
BRISBANE	1051.36	27.300	BN 740		7.46	7.54	7.54	7.46	0	80	80
BRISBANE	1051.895	26.765	BN 730		7.30	7.37	7.37	7.30	0	70	70
BRISBANE	1052.31	26.350	BN 720		7.40	7.51	7.51	7.40	0	110	110
BRISBANE	1052.37	26.290	BN 710	Merivale Bridge			0.00		0	0	0
BRISBANE	1052.39	26.270	BN 700		7.23	7.31	7.31	7.23	0	80	80
BRISBANE	1052.595	26.065	BN 690		7.14	7.22	7.22	7.14	0	80	80
BRISBANE	1052.607	26.053	BN 680	William Jolly Bridge			0.00		0	0	0
BRISBANE	1052.64	26.020	BN 670		6.63	6.69	6.69	6.63	0	60	60
BRISBANE	1052.865	25.795	BN 660	Montague Road Gauge	6.49	6.54	6.54	6.49	0	50	50
BRISBANE	1053.32	25.340	BN 650		6.42	6.47	6.47	6.42	0	50	50
BRISBANE	1053.356	25.304	BN 640	Victoria Bridge			0.00		0	0	0
BRISBANE	1053.385	25.275	BN630		6.24	6.40	6.40	6.24	0	160	160
BRISBANE	1053.9	24.760	BN 620		5.85	5.98	5.98	5.85	0	130	130
BRISBANE	1054.64	24.020	BN 610		5.78	5.86	5.87	5.77	-10	90	80
BRISBANE	1054.66	24.000	BN 600	Captain Cook Bridge			0.00		0	0	0
BRISBANE	1054.88	23.980	BN 590		5.70	5.76	5.76	5.70	0	60	60
BRISBANE	1054.97	23.690	BN 560		5.45	5.52	5.52	5.45	0	70	70
BRISBANE	1055.28	23.380	BN 550		5.40	5.44	5.44	5.40	0	40	40
BRISBANE	1055.42	23.240	BN 540		5.40	5.43	5.43	5.40	0	30	30
BRISBANE	1055.96	22.700	BN 530	Port Office Gauge	5.34	5.38	5.38	5.34	0	40	40
BRISBANE	1056.4	22.260	BN 520		5.09	5.13	5.13	5.09	0	40	40
BRISBANE	1056.695	21.965	BN 510		5.03	5.06	5.07	5.02	-10	40	30
BRISBANE	1056.865	21.795	BN 500		5.22	5.27	5.27	5.22	0	50	50
BRISBANE	1056.92	21.740	BN 495	Story Bridge			0.00		0	0	0
BRISBANE	1056.95	21.710	BN 490		5.12	5.16	5.16	5.12	0	40	40
BRISBANE	1057.09	21.570	BN 480		4.97	5.01	5.01	4.97	0	40	40
BRISBANE	1057.53	21.130	BN 470		4.89	4.87	4.87	4.83	0	40	40
BRISBANE	1058.04	20.620	BN 460		4.58	4.61	4.61	4.58	0	30	30
BRISBANE	1058.23	20.430	BN 450		4.50	4.53	4.53	4.50	0	30	30
BRISBANE	1058.53	20.130	BN 440		4.37	4.39	4.39	4.37	0	20	20
BRISBANE	1058.735	19.925	BN 430		4.41	4.42	4.42	4.41	0	10	10
BRISBANE	1059.035	19.625	BN 420		4.13	4.15	4.15	4.13	0	20	20
BRISBANE	1059.54	19.120	BN 410		4.09	4.11	4.11	4.09	0	20	20
BRISBANE	1059.99	18.670	BN 400		3.88	3.90	3.90	3.88	0	20	20
BRISBANE	1060.345	18.315	BN 390		3.65	3.64	3.64	3.65	0	-10	-10
BRISBANE	1060.535	18.125	BN 380		3.50	3.50	3.50	3.50	0	0	0
BRISBANE	1061.015	17.645	BN 370		3.45	3.46	3.46	3.45	0	10	10
BRISBANE	1061.53	17.130	BN 360		3.24	3.24	3.24	3.24	0	0	0
BRISBANE	1062.02	16.640	BN 350		3.16	3.16	3.16	3.16	0	0	0
BRISBANE	1062.535	16.125	BN 340		3.12	3.12	3.12	3.12	0	0	0
BRISBANE	1062.94	15.720	BN 330		3.11	3.11	3.11	3.11	0	0	0
BRISBANE	1063.31	15.350	BN 320	Newstead Park Gauge	2.99	2.99	2.99	2.99	0	0	0
BRISBANE	1063.645	15.015	BN 310	Cresent Road Gauge	2.72	2.70	2.70	2.72	0	-20	-20
BRISBANE	1064	14.660	BN 300		2.68	2.66	2.66	2.68	0	-20	-20
BRISBANE	1064.49	14.170	BN 290		2.55	2.53	2.53	2.55	0	-20	-20
BRISBANE	1065.01	13.650	BN 280		2.57	2.55	2.55	2.57	0	-20	-20
BRISBANE	1065.503	13.157	BN 270		2.53	2.51	2.51	2.53	0	-20	-20
BRISBANE	1065.99	12.670	BN 260	Cairncross Dock Gauge	2.54	2.54	2.54	2.54	0	0	0
BRISBANE	1066.505	12.155	BN 250		2.46	2.46	2.46	2.46	0	0	0
BRISBANE	1067.02	11.640	BN 240		2.43	2.41	2.41	2.43	0	-20	-20
BRISBANE	1067.485	11.175	BN 230		2.32	2.29	2.29	2.32	0	-30	-30
BRISBANE	1067.965	10.695	BN 220		2.20	2.18	2.18	2.20	0	-20	-20
BRISBANE	1068.66	10.000	BN 210		2.02	2.00	2.00	2.02	0	-20	-20
BRISBANE	1069.045	9.615	BN 200		1.95	1.93	1.93	1.95	0	-20	-20
BRISBANE	1069.535	9.125	BN 190	Bulimba Power House Gauge	1.89	1.87	1.87	1.89	0	-20	-20
BRISBANE	1070.025	8.635	BN 180		1.82	1.80	1.80	1.82	0	-20	-20
BRISBANE	1070.53	8.130	BN 170		1.72	1.70	1.70	1.72	0	-20	-20
BRISBANE	1071.04	7.620	BN 160		1.64	1.62	1.82	1.64	0	-20	-20
BRISBANE	1071.52	7.140	BN 150		1.67	1.66	1.66	1.67	0	-10	-10
BRISBANE	1072.015	6.645	BN 140		1.56	1.62	1.62	1.56	0	60	60
BRISBANE	1072.515	6.145	BN 130		1.50	1.50	1.50	1.50	0	0	0

TABLE J-3 - Affluxes Due to Regulation Lines and Revegetation Combined Effects for the 100 Year ARI Flood

LOCATION	MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	100 YEAR ARI DESIGN WL (m AHD)	100 YEAR ARI REG LINES + REVEG WL (m AHD)	100 YEAR ARI REG LINES	100 YEAR ARI REVEGETATION	REVEGETATION AFFLUX (mm)	REG LINES AFFLUX (mm)	REG + REVEG AFLUX (mm)
BRISBANE	1072.995	5.665	BN 120		1.46	1.46	1.46	1.46	0	0	0
BRISBANE	1073.485	5.175	BN 110		1.36	1.36	1.36	1.36	0	0	0
BRISBANE	1074	4.660	BN 100		1.29	1.28	1.28	1.29	0	-10	-10
BRISBANE	1074.46	4.200	BN 90		1.22	1.23	1.23	1.22	0	10	10
BRISBANE	1074.985	3.675	BN 80		1.09	1.09	1.09	1.09	0	0	0
BRISBANE	1075.48	3.180	BN 70		1.06	1.05	1.05	1.06	0	-10	-10
BRISBANE	1076	2.660	BN 60		1.07	1.07	1.07	1.07	0	0	0
BRISBANE	1076.495	2.165	BN 50		0.96	0.95	0.95	0.96	0	-10	-10
BRISBANE	1077.01	1.650	BN 40		0.96	0.97	0.97	0.96	0	10	10
BRISBANE	1077.51	1.150	BN 30		0.97	0.97	0.97	0.97	0	0	0
BRISBANE	1078.04	0.620	BN 20		0.95	0.95	0.95	0.95	0	0	0
BRISBANE	1078.525	0.135	BN 10		0.92	0.92	0.92	0.92	0	0	0
BRISBANE	1078.66	0.000	-	Western Inner Bar Gauge	0.92	0.92	0.92	0.92	0	0	0
BREMER	599.4	-	-		19.76	19.76	19.75	19.77	10	-10	0
BREMER	600	-	-		19.76	19.76	19.75	19.77	10	-10	0
OXLEY	599.4	-	-		10.87	10.96	10.95	10.88	10	80	90
OXLEY	600	-	-		10.87	10.96	10.95	10.88	10	80	90
BREAKFAST	599.4	-	-		3.09	3.06	3.07	3.08	-10	-20	-30
BREAKFAST	600	-	-		3.08	3.06	3.06	3.08	0	-20	-20
BULIMBA	599.4	-	-		1.56	1.62	1.62	1.56	0	60	60
BULIMBA	600	-	-		1.56	1.62	1.62	1.56	0	60	60
CENTWEIR	0	-	-		14.06	14.10	14.09	14.07	10	30	40
CENTWEIR	0.08	-	-		13.91	13.97	13.96	13.92	10	50	60
INDOORWEIR	0	-	-		11.07	11.20	11.19	11.08	10	120	130
INDOORWEIR	0.085	-	-		10.98	11.10	11.10	10.98	0	120	120
WILLIAMWEIR	0	-	-		7.14	7.22	7.22	7.14	0	80	80
WILLIAMWEIR	0.045	-	-		6.63	6.69	6.69	6.63	0	60	60
VICTORIAWEIR	0	-	-		6.42	6.47	6.47	6.42	0	50	50
VICTORIAWEIR	0.065	-	-		6.24	6.40	6.40	6.24	0	160	160
CAPTAINWEIR	0	-	-		5.78	5.86	5.87	5.77	-10	90	80
CAPTAINWEIR	0.04	-	-		5.70	5.76	5.76	5.70	0	60	60
STORYWEIR	0	-	-		5.22	5.27	5.27	5.22	0	50	50
STORYWEIR	0.085	-	-		5.12	5.16	5.16	5.12	0	40	40
MERIVALEWEIR	0	-	-		7.40	7.51	7.51	7.40	0	110	110
MERIVALEWEIR	0.08	-	-		7.23	7.31	7.31	7.23	0	80	80
GOODNALINK1	0	-	-		18.18	18.16	18.16	18.18	0	-20	-20
GOODNALINK1	1	-	-		17.53	17.50	17.50	17.53	0	-30	-30
GOODNALINK2	0	-	-		18.11	18.08	18.08	18.11	0	-30	-30
GOODNALINK2	1.07	-	-		17.77	17.71	17.71	17.77	0	-60	-60
STLUCIALINK1	0	-	-		10.91	11.04	11.04	10.91	0	130	130
STLUCIALINK1	1.05	-	-		10.15	10.22	10.22	10.15	0	70	70
STLUCIALINK2	0	-	-		10.90	10.99	10.99	10.90	0	90	90
STLUCIALINK2	1.05	-	-		10.18	10.24	10.24	10.18	0	60	60
STLUCIALINK3	0	-	-		10.79	10.88	10.88	10.79	0	90	90
STLUCIALINK3	0.85	-	-		10.29	10.40	10.39	10.30	10	100	110

Legend

In - Regulation Lines set at Extent of Inundation
A - Regulation Lines adjusted until Maximum Afflux Achieved
B - Regulation Lines Set at 15 m Buffer Zone
E - Regulation Lines set at Extent of Cross Section
W - Regulation Lines set at 30 m for Wharfs in Lieu of 15 m Buffer Zone

J-4 - Development Levels & Locationof Regulation Lines for the Brisbane River

WATER LEVEL Location	MIKE 11 Chainage (km)	AMTD Chainage (km)	Cross Section Number	Reach No. and Name	100 Year ARI Development Levels (m AHD)	Limiting Factor Left Bank	Regulation Line Chainage Left (m)	Regulation Line Chainage Right (m)	Limiting Factor Right Bank
BRISBANE	1000.00	78.66	BN 2020	Reach 1 - Upper Boundary	23.09	In	446.7	772.6	In
BRISBANE	1000.29	78.38	BN 2010		22.87	In	644.2	892.1	In
BRISBANE	1000.78	77.89	BN 2000		22.61	In	790	1009.7	In
BRISBANE	1001.32	77.35	BN 1990		22.52	In	782.7	1088.80	A
BRISBANE	1001.87	76.80	BN 1980		21.99	In	823	1067.1	In
BRISBANE	1002.35	76.31	BN 1970	Reach 2 - Barellan Point	21.80	A	745.5	1001.0	In
BRISBANE	1002.79	75.88	BN 1960		21.78	In	664.5	972.1	In
BRISBANE	1003.28	75.39	BN 1950		21.45	In	517.8	787.0	In
BRISBANE	1003.78	74.89	BN 1940		21.18	In	705.5	960.5	In
BRISBANE	1004.30	74.36	BN 1930		20.72	In	540.5	785.6	In
BRISBANE	1004.81	73.85	BN 1920		20.69	In	498.3	817.6	In
BRISBANE	1005.33	73.34	BN 1910		20.50	In	461.3	826.1	In
BRISBANE	1005.87	72.79	BN 1900	Reach 3 - Riverview	20.18	A	430.4	717.4	In
BRISBANE	1006.30	72.36	BN 1890		20.02	In	531.6	776.4	In
BRISBANE	1006.91	71.75	BN 1880		19.82	A	387.1	812.2	In
BRISBANE	1007.41	71.25	BN 1870		19.72	In	350.2	765.60	A
BRISBANE	1007.92	70.74	BN 1860	Reach 4 - Redbank	19.39	In	580.3	840.1	A
BRISBANE	1008.45	70.22	BN 1850		19.26	In	583.3	866.2	In
BRISBANE	1008.93	69.74	BN 1840		19.19	In	517.7	814.4	In
BRISBANE	1009.40	69.26	BN 1830		19.09	In	550.7	823.30	A
BRISBANE	1009.72	68.84	BN 1820		19.03	In	405.5	738.3	A
BRISBANE	1010.49	68.17	BN 1810		18.73	In	30.8	284.6	In
BRISBANE	1010.73	67.94	BN 1800		18.74	A	265.5	504.3	In
BRISBANE	1010.98	67.68	BN 1790		18.68	In	73.4	335.2	In
BRISBANE	1011.51	67.15	BN 1780		18.67	In	296.6	695.80	A
BRISBANE	1011.98	66.68	BN 1770		18.66	A	250.2	766.1	In
BRISBANE	1012.48	66.19	BN 1760	Reach 5 - Goodna	18.61	In	767.2	1528.3	In
BRISBANE	1012.94	65.73	BN 1750		18.50	In	327.1	898.90	A
BRISBANE	1013.45	65.22	BN 1740		18.41	In	159.6	1004.1	In
BRISBANE	1013.91	64.74	BN 1730		18.35	In	204.9	1135.0	In
BRISBANE	1014.31	64.55	BN 1720		18.31	In	0	896.7	In
BRISBANE	1014.61	64.05	BN 1710	Reach 6 - Wacol	18.35	In	0	923.7	In
BRISBANE	1015.09	63.57	BN 1700		18.21	In	239.6	643.6	In
BRISBANE	1015.56	63.10	BN 1690		18.05	In	249.8	508.20	A
BRISBANE	1016.14	62.52	BN 1680		17.97	A	405	803.9	In
BRISBANE	1016.64	62.02	BN 1670		17.90	A	352.5	959.2	In
BRISBANE	1017.13	61.53	BN 1660		17.67	A	463.2	870.7	In
BRISBANE	1017.61	61.05	BN 1650		17.56	A	398.9	851.9	A
BRISBANE	1017.92	60.74	BN 1640		17.44	A	502.6	905.20	A
BRISBANE	1018.20	60.46	BN 1630		17.38	A	407.3	809.0	A
BRISBANE	1018.73	59.94	BN 1620		17.06	In	768.7	1141.0	In
BRISBANE	1019.10	59.57	BN 1610		16.92	In	124.2	648.9	In
BRISBANE	1019.49	59.17	BN 1600	Reach 7 - Riverhills	16.79	A	435.5	836.0	In
BRISBANE	1019.87	58.80	BN 1590		16.52	In	131.8	441.90	A
BRISBANE	1020.12	58.55	BN 1580		16.59	In	62.9	613.10	A
BRISBANE	1020.53	58.14	BN 1570		16.58	In	136.5	656.0	A
BRISBANE	1020.83	57.83	BN 1560		16.41	In	103.8	395.80	B
BRISBANE	1021.10	57.57	BN 1550		16.21	B	297	548.9	In
BRISBANE	1021.54	57.12	BN 1540		16.04	A	685	998.3	In
BRISBANE	1021.72	56.95	BN 1530		16.08	B	676	1012.4	In
BRISBANE	1021.90	56.77	BN 1520	Reach 8 - Westlake	15.99	In	828.4	1178.70	B
BRISBANE	1022.11	56.56	BN 1510		15.79	B	371.4	905.60	In
BRISBANE	1022.58	56.09	BN 1500		15.82	B	292.9	603.5	A
BRISBANE	1023.04	55.62	BN 1490		15.53	In	258	618.10	B
BRISBANE	1023.57	55.09	BN 1480		15.47	A	353.9	565.00	B
BRISBANE	1024.08	54.58	BN 1470		15.42	B	212.5	444.30	B
BRISBANE	1024.56	54.10	BN 1460		15.35	B	295.7	591.9	In
BRISBANE	1025.07	53.59	BN 1450		15.25	A	380.5	680.4	In
BRISBANE	1025.36	53.30	BN 1440		15.10	B	480.6	810.6	In
BRISBANE	1025.59	53.07	BN 1430		14.91	B	271.4	606.50	B
BRISBANE	1026.17	52.49	BN 1420		14.80	B	373.1	669.70	B
BRISBANE	1026.68	51.98	BN 1410		14.68	B	155	491.70	A
BRISBANE	1026.90	51.76	BN 1400	Reach 9 - Mermaid Reach	14.51	A	200.6	462.30	B
BRISBANE	1027.16	51.50	BN 1390		14.42	B	599.6	853.20	B
BRISBANE	1027.68	50.98	BN 1380		14.49	B	561.4	901.8	B
BRISBANE	1028.18	50.48	BN 1370		14.49	B	445.1	905.60	B
BRISBANE	1028.68	49.98	BN 1360		14.40	In	350.6	613.7	A
BRISBANE	1028.76	49.90	BN 1340		14.27	B	350.6	613.7	B

Legend

In - Regulation Lines set at Extent of Inundation
A - Regulation Lines adjusted until Maximum Afflux Achieved
B - Regulation Lines Set at 15 m Buffer Zone
E - Regulation Lines set at Extent of Cross Section
W - Regulation Lines set at 30 m for Wharfs in Lieu of 15 m Buffer Zone

J-4 - Development Levels & Locationof Regulation Lines for the Brisbane River

WATER LEVEL Location	MIKE 11 Chainage (km)	AMTD Chainage (km)	Cross Section Number	Reach No. and Name	100 Year ARI Development Levels (m AHD)	Limiting Factor Left Bank	Regulation Line Chainage Left (m)	Regulation Line Chainage Right (m)	Limiting Factor Right Bank
BRISBANE	1029.20	49.46	BN 1330		14.10	A	735.9	1023.80	B
BRISBANE	1029.68	48.98	BN 1320		14.10	B	744.3	1030.80	B
BRISBANE	1030.22	48.44	BN 1310		14.15	B	746.3	1119.9	B
BRISBANE	1030.87	47.79	BN 1300		14.11	B	525.5	804.5	B
BRISBANE	1031.26	47.40	BN 1290		13.99	B	457.5	682.5	B
BRISBANE	1031.70	46.96	BN 1280		13.63	B	703.4	923.40	B
BRISBANE	1032.00	46.67	BN 1270		13.71	B	682.7	985.7	B
BRISBANE	1032.23	46.43	BN 1260	Reach 10 - Sherwood Reach	13.58	B	576.1	919.70	B
BRISBANE	1032.59	46.08	BN 1250		13.33	B	473.1	769.70	B
BRISBANE	1033.08	45.58	BN 1240		13.20	B	730.3	972.3	B
BRISBANE	1033.37	45.29	BN 1230		13.13	B	671.1	941.3	B
BRISBANE	1033.90	44.76	BN 1220		12.87	B	678.7	925.20	B
BRISBANE	1034.37	44.29	BN 1210		12.72	B	465	707.60	B
BRISBANE	1034.89	43.77	BN 1200		12.62	B	533.8	792.20	B
BRISBANE	1035.41	43.25	BN 1190	Reach 11 - Chelmer Reach	12.38	B	504.6	788.80	B
BRISBANE	1035.90	42.76	BN 1180		12.06	B	424.8	682.40	B
BRISBANE	1036.46	42.20	BN 1170		11.76	B	443.8	674.40	B
BRISBANE	1036.77	41.89	BN 1160		11.69	B	150.3	451.8	B
BRISBANE	1036.92	41.75	BN 1150		11.53	B	420.5	683.90	B
BRISBANE	1037.09	41.57	BN 1140	Reach 12 - Indooroopilly Reach	11.50	B	49.2	271.40	A
BRISBANE	1037.18	41.49	BN 1120		11.40	A	103.8	318.90	A
BRISBANE	1037.29	41.38	BN 1110		11.34	B	239	523.10	B
BRISBANE	1037.63	41.04	BN 1100		11.32	B	576.3	943.20	B
BRISBANE	1038.09	40.58	BN 1090		11.29	B	892.8	1178.80	B
BRISBANE	1038.60	40.08	BN 1080		11.28	B	867.6	1280.00	B
BRISBANE	1039.10	39.56	BN 1070		11.35	B	845.9	1729.3	E
BRISBANE	1039.57	39.05	BN 1060	Reach 13 - Canoe Reach	11.30	B	868	1622.5	E
BRISBANE	1040.09	38.57	BN 1050		11.23	B	634.7	1201.9	E
BRISBANE	1040.49	38.17	BN 1040		11.10	B	870	1369.50	E
BRISBANE	1041.01	37.56	BN 1030		11.16	B	810	1344.7	E
BRISBANE	1041.23	37.43	BN 1020		11.10	B	861.4	1434.8	E
BRISBANE	1041.46	37.20	BN 1010		11.02	B	728.3	1277.10	E
BRISBANE	1041.70	36.96	BN 1000		10.99	B	925.1	1401.20	E
BRISBANE	1041.96	36.70	BN 990		10.88	B	633.9	1077.30	E
BRISBANE	1042.24	36.43	BN 980	Reach 14 - Long Pocket Reach	10.71	B	404.8	813.90	E
BRISBANE	1042.52	36.15	BN 970		10.70	B	322.5	808.70	E
BRISBANE	1042.91	35.75	BN 960		10.53	B	346	871.00	E
BRISBANE	1043.73	34.94	BN 950		10.28	B	199.6	490.70	B
BRISBANE	1044.06	34.60	BN 940		10.16	B	428.4	703.00	B
BRISBANE	1044.34	34.32	BN 930		9.99	B	374.6	624.30	B
BRISBANE	1044.61	34.06	BN 920		9.95	B	333.2	652.8	B
BRISBANE	1044.86	33.80	BN 910		9.89	B	408	726.4	B
BRISBANE	1045.40	33.26	BN 900	Reach 15 - Cemetery Reach	9.70	B	362.3	1026.20	B
BRISBANE	1045.89	32.78	BN 890		9.53	B	507.6	1179.1	B
BRISBANE	1046.18	32.48	BN 880		9.47	B	584.6	1086.5	B
BRISBANE	1046.34	32.32	BN 870		9.41	B	621.7	939.5	B
BRISBANE	1046.58	32.08	BN 860		9.38	B	661.2	1154.9	A
BRISBANE	1046.90	31.76	BN 850		9.17	B	284.7	778.40	B
BRISBANE	1047.35	31.31	BN 840		8.77	B	257.3	518.30	B
BRISBANE	1047.92	30.75	BN 830		8.64	B	302.6	535.6	B
BRISBANE	1048.38	30.29	BN 820	Reach 16 - St Lucia Reach	8.59	B	394.9	737.90	B
BRISBANE	1048.89	29.77	BN 810		8.38	B	593.1	950.6	B
BRISBANE	1049.12	29.54	BN 800	Reach 17 - Toowong Reach	8.33	B	180.8	455.4	B
BRISBANE	1049.37	29.29	BN 790		8.15	B	177.6	415.0	B
BRISBANE	1049.59	29.07	BN 780		8.12	B	816.4	1146.8	B
BRISBANE	1049.87	28.79	BN 770		8.00	B	200.3	468.60	A
BRISBANE	1050.43	28.23	BN 760		7.96	A	571.8	880.70	A
BRISBANE	1050.86	27.80	BN 750		7.83	B	614.3	873.5	B
BRISBANE	1051.38	27.30	BN 740	Reach 18 - Milton Reach	7.84	B	747	990.6	B
BRISBANE	1051.90	26.77	BN 730		7.67	A	895.9	1160.5	A
BRISBANE	1052.31	26.35	BN 720		7.81	B	125.9	398.00	B
BRISBANE	1052.39	26.27	BN 700		7.61	B	41.7	330.0	B
BRISBANE	1052.60	26.07	BN 690	Reach 19 - South Brisbane Reach	7.52	B	10.7	245.80	B
BRISBANE	1052.64	26.02	BN 670		6.99	B	0	261.10	B
BRISBANE	1052.87	25.80	BN 660		6.84	A	153.5	378.80	A
BRISBANE	1053.32	25.34	BN 650		6.77	B	0	365.20	B
BRISBANE	1053.39	25.80	BN 630		6.70	B	252.4	616.00	B
BRISBANE	1053.90	24.76	BN 620		6.28	B	630.5	935.4	B

Legend

In - Regulation Lines set at Extent of Inundation
A - Regulation Lines adjusted until Maximum Afflux Achieved
B - Regulation Lines Set at 15 m Buffer Zone
E - Regulation Lines set at Extent of Cross Section
W - Regulation Lines set at 30 m for Wharfs in Lieu of 15 m Buffer Zone

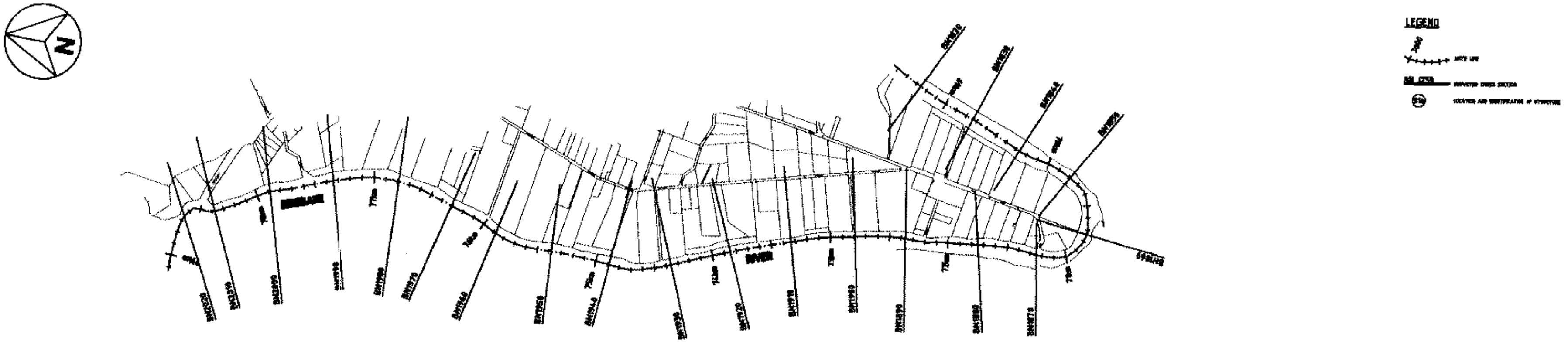
J-4 - Development Levels & Locationof Regulation Lines for the Brisbane River

WATER LEVEL Location	MIKE 11 Chainage (km)	AMTD Chainage (km)	Cross Section Number	Reach No. and Name	100 Year ARI Development Levels (m AHD)	Limiting Factor Left Bank	Regulation Line Chainage Left (m)	Regulation Line Chainage Right (m)	Limiting Factor Right Bank
BRISBANE	1054.64	24.02	BN 610		6.16	B	65.9	567.40	B
BRISBANE	1054.68	23.98	BN 590	Reach 20 - Town Reach	6.06	B	52.4	467.6	B
BRISBANE	1054.97	23.69	BN 560		5.82	B	269.4	588.8	B
BRISBANE	1055.28	23.38	BN 550		5.74	B	325.1	631.20	B
BRISBANE	1055.42	23.24	BN 540		5.73	B	271.6	615.60	B
BRISBANE	1055.96	22.70	BN 530		5.68	B	85.1	444.60	B
BRISBANE	1056.40	22.26	BN 520		5.43	B	109.9	414.10	B
BRISBANE	1056.70	21.97	BN 510		5.36	B	120	405.00	B
BRISBANE	1056.87	21.80	BN 500		5.57	B	1084.8	1345.00	B
BRISBANE	1056.95	21.71	BN 490	Reach 21 - Shaftston Reach	5.46	B	1058.7	1345.00	B
BRISBANE	1057.09	21.57	BN 480		5.31	B	100	407.80	B
BRISBANE	1057.53	21.13	BN 470		5.17	B	149.6	462.60	B
BRISBANE	1058.04	20.82	BN 460		4.91	B	271.4	613.00	B
BRISBANE	1058.23	20.43	BN 450		4.83	B	217	511.40	B
BRISBANE	1058.53	20:13	BN 440		4.69	B	273	519.70	B
BRISBANE	1058.74	19.93	BN 430	Reach 22 - Humbug Reach	4.72	B	184.8	474.90	B
BRISBANE	1059.04	19.63	BN 420		4.45	B	431.3	657.00	B
BRISBANE	1059.54	19.12	BN 410		4.41	B	455	805.00	B
BRISBANE	1059.99	18.67	BN 400		4.20	B	320	703.30	B
BRISBANE	1060.35	18.32	BN 390	Reach 23 - Bulimba Reach	3.94	B	386.2	676.70	B
BRISBANE	1060.54	18.13	BN 380		3.80	B	308.7	577.20	B
BRISBANE	1061.02	17.65	BN 370		3.76	B	634	955.00	B
BRISBANE	1061.53	17.13	BN 360		3.54	B	442	743.00	B
BRISBANE	1062.02	16.64	BN 350		3.46	B	315	673.10	B
BRISBANE	1062.54	16.13	BN 340		3.42	B	240.4	732.50	B
BRISBANE	1062.94	15.72	BN 330		3.41	B	326.6	868.00	B
BRISBANE	1063.31	15.35	BN 320	Reach 24 - Hamilton Reach	3.29	B	529.6	1001.00	B
BRISBANE	1063.65	15.02	BN 310		3.00	B	538	885.10	B
BRISBANE	1064.00	14.66	BN 300		2.96	B	483.2	845.60	B
BRISBANE	1064.49	14.17	BN 290		2.83	B	479.7	827.70	B
BRISBANE	1065.01	13.65	BN 280		2.85	B	722.2	1101.80	B
BRISBANE	1065.50	13.16	BN 270		2.81	W	671.9	1071.90	W
BRISBANE	1065.99	12.67	BN 260		2.84	W	590	1101.80	W
BRISBANE	1066.51	12.16	BN 250	Reach 25 - Quarries Reach	2.76	W	565.8	1051.70	W
BRISBANE	1067.02	11.64	BN 240		2.71	W	739.7	1169.10	W
BRISBANE	1067.49	11.18	BN 230		2.59	W	399.8	829.3	W
BRISBANE	1067.97	10.70	BN 220		2.50	W	462.5	906.80	W
BRISBANE	1068.66	10.00	BN 210	Reach 26 - Lytton Reach	2.50	W	1062.9	1520.30	W
BRISBANE	1069.05	9.62	BN 200		2.50	W	591.4	1015.70	W
BRISBANE	1069.54	9.13	BN 190		2.50	W	526.9	984.30	W
BRISBANE	1070.03	8.64	BN 180		2.50	W	206.3	656.20	W
BRISBANE	1070.53	8.13	BN 170		2.50	W	417	874.9	W
BRISBANE	1071.04	7.62	BN 160		2.50	W	608	1081.9	W
BRISBANE	1071.52	7.14	BN 150		2.50	W	451.4	938.70	W
BRISBANE	1072.02	6.65	BN 140		2.50	W	171.7	1074.10	W
BRISBANE	1072.52	6.15	BN 130		2.50	W	435.8	893.30	W
BRISBANE	1073.00	5.67	BN 120		2.50	W	571.9	1063.20	W
BRISBANE	1073.49	5.18	BN 110		2.50	W	494	991.40	W
BRISBANE	1074.00	4.66	BN 100	Reach 27 - Lytton Rocks Reach	2.50	W	658.7	1127.40	W
BRISBANE	1074.46	4.20	BN 90		2.50	W	667.4	1183.00	W
BRISBANE	1074.99	3.68	BN 80		2.50	W	825.4	1338.30	W
BRISBANE	1075.48	3.18	BN 70		2.50	W	994.7	1796.30	W
BRISBANE	1076.00	2.66	BN 60	Reach 28 - Pelican Banks Reach	2.50	W	927.8	2006.00	W
BRISBANE	1076.50	2.17	BN 50		2.50	W	748.5	1641.70	W
BRISBANE	1077.01	1.65	BN 40		2.50	W	418.7	2026.30	W
BRISBANE	1077.51	1.15	BN 30	Reach 29 - Lower Reach	2.50	W	621.6	1596.40	W
BRISBANE	1078.04	0.62	BN 20		2.50	W	618.9	1399.70	W
BRISBANE	1078.53	0.14	BN 10		2.50	W	691.5	1218.70	W
BRISBANE	1078.66	-	-		2.50		0	644.2	

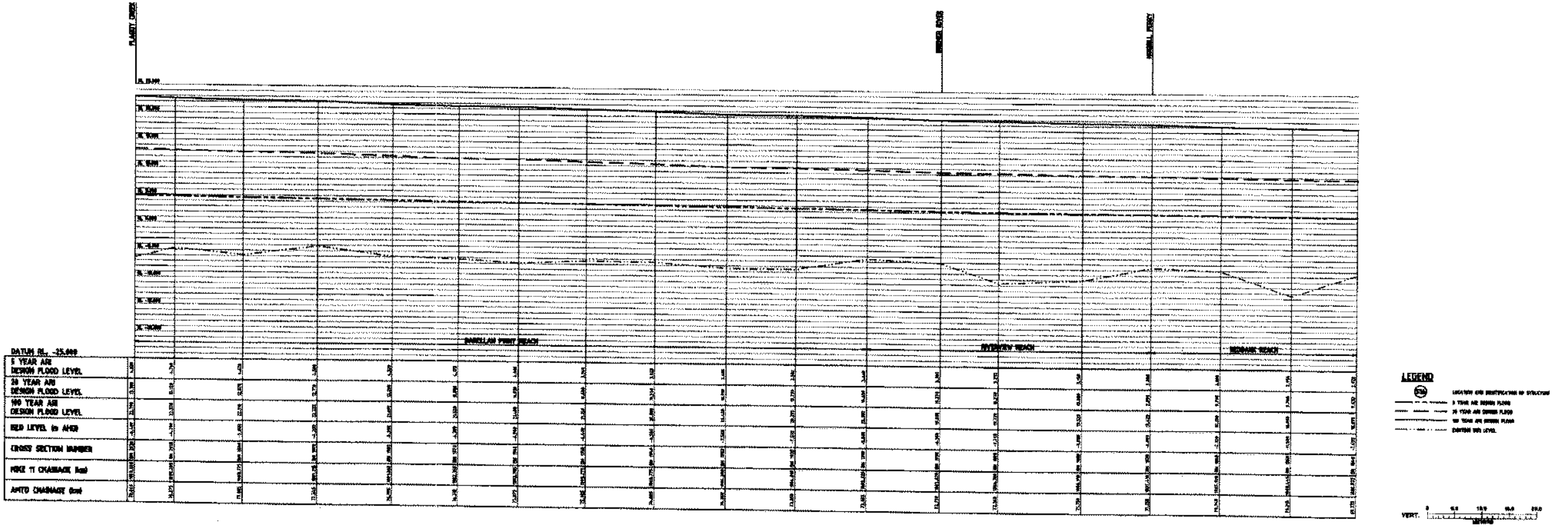
SINCLAIR KNIGHT MERZ

FIGURE J-1a

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



PLAN VIEW



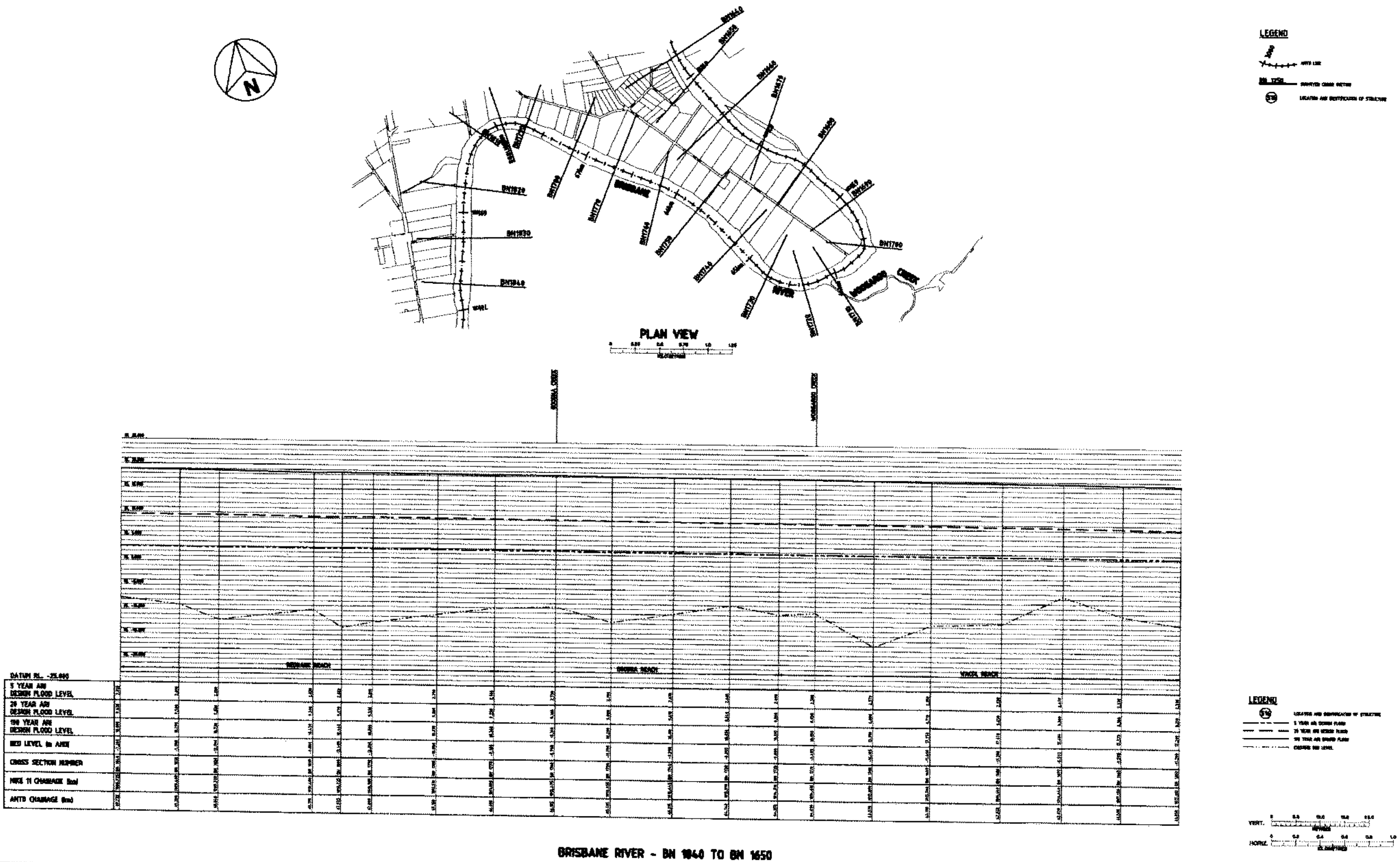
BRISBANE RIVER - BN 2020 TO BN 1840

FILE NAME 415/-156
PLOT SCALE 1=30
DISK N°. C\DWG
JOB N. T00415/
DATE: 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE J-1b

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE

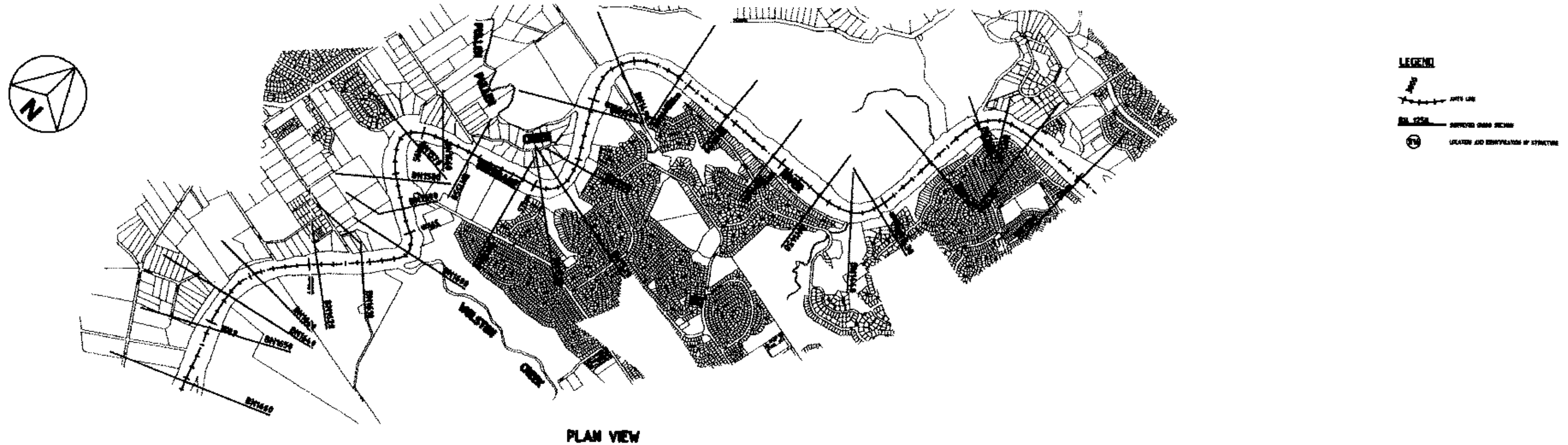


FILE NAME: 415/-15/ PLOT SCALE: 1=30 DISK N°: C:\DWG JOB N°: T00415/ DATE: 23/3/97

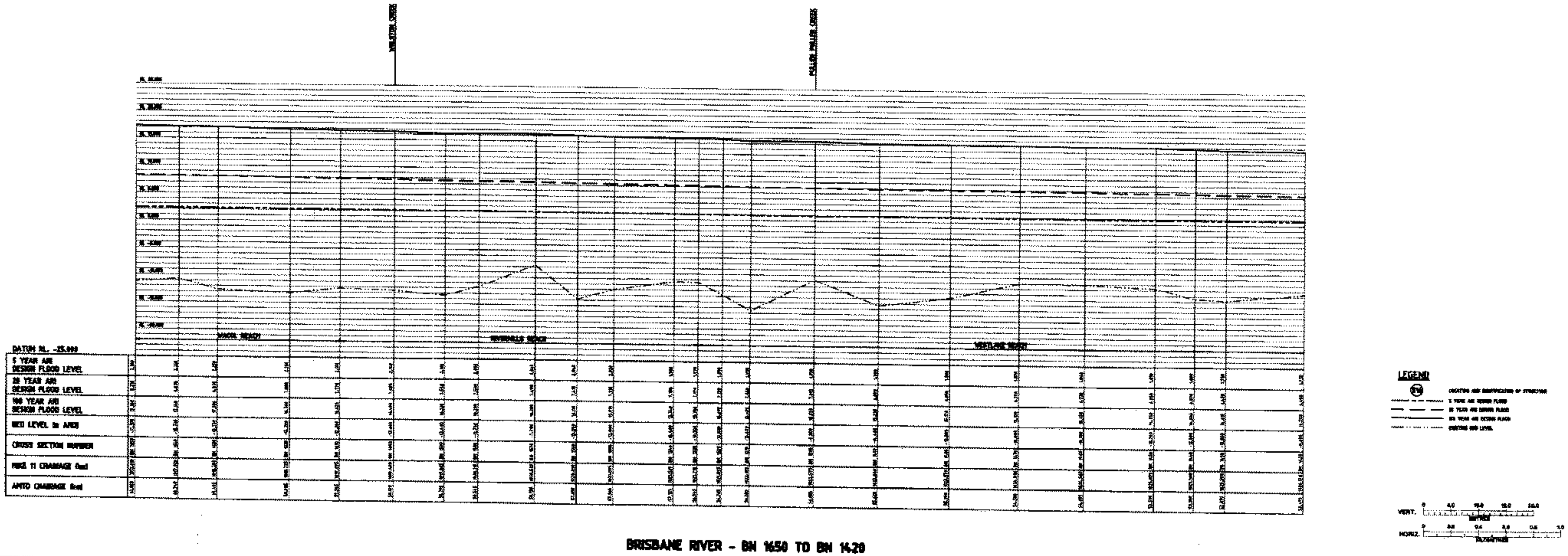
SINCLAIR KNIGHT MERZ

FIGURE J-1c

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 10, AND 20 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



PLAN VIEW



BRISBANE RIVER - BN 1650 TO BN 1420

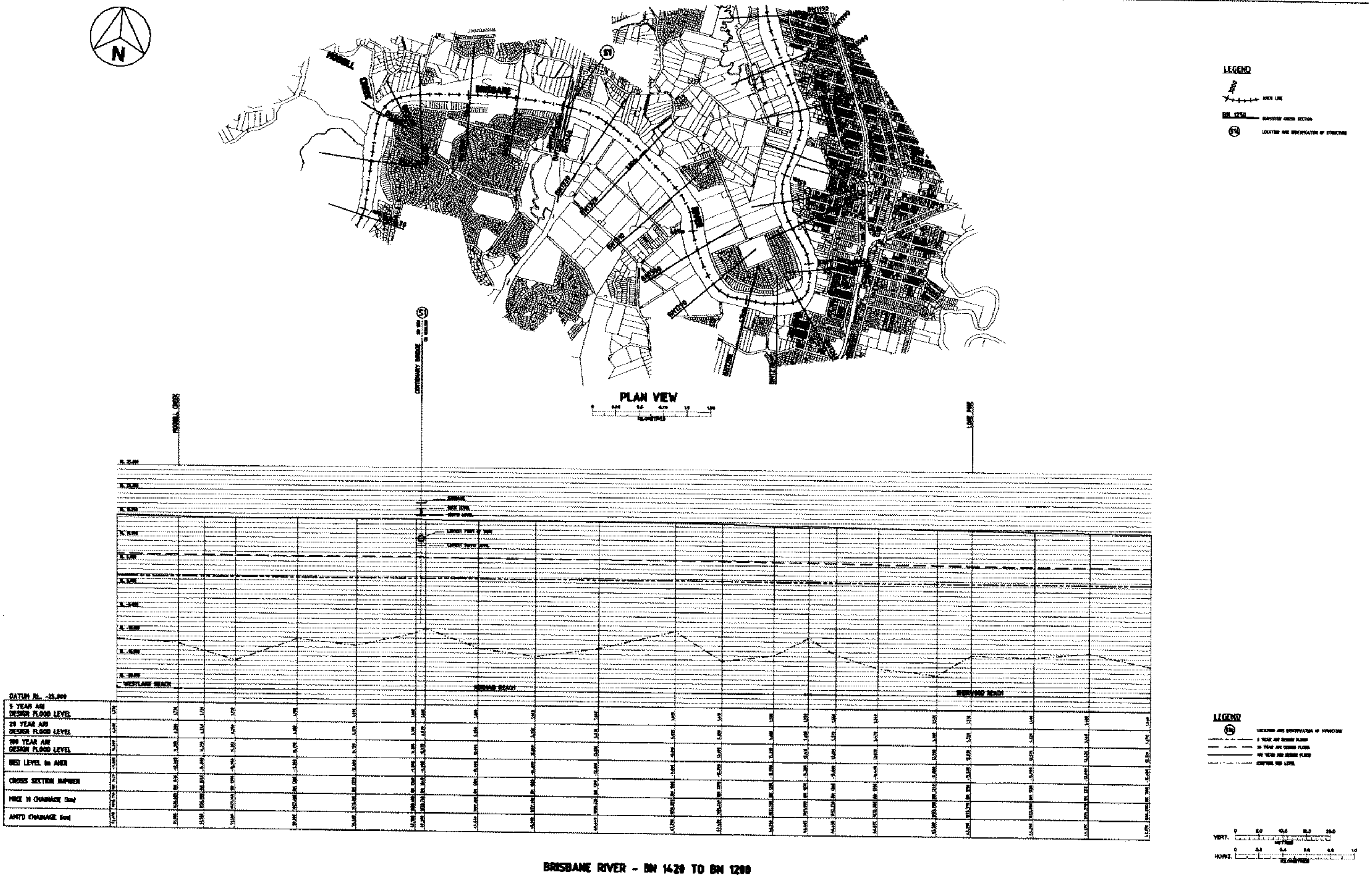
FILE NAME: 4157-158 DISK N°: C:\DWG JOB N°: T00415/ DATE: 23/3/97
PLOT SCALE: 1=30

SINCLAIR KNIGHT MERZ

FIGURE J-1d

BRISBANE RIVER FLOOD STUDY

MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



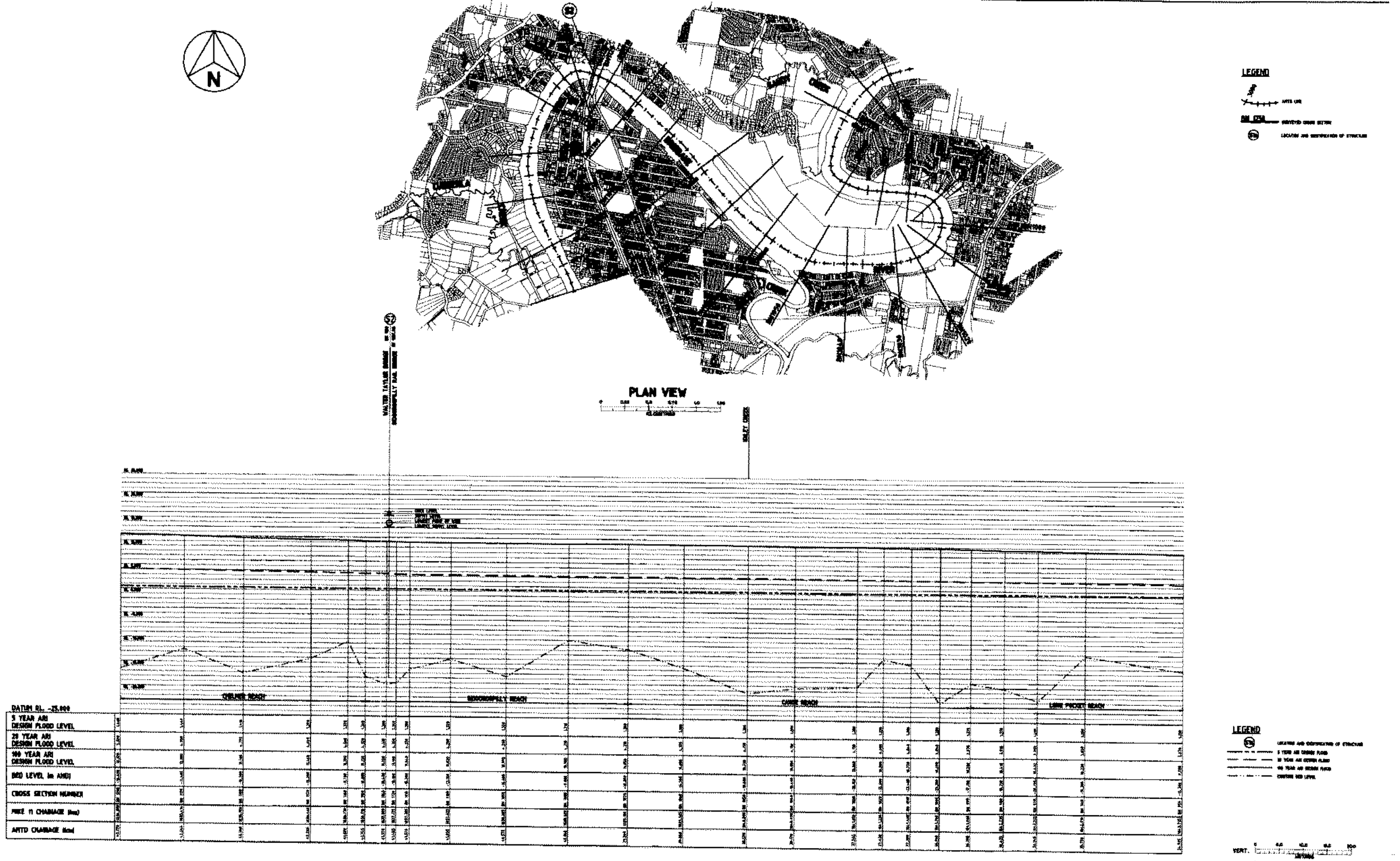
BRISBANE RIVER - BN 1420 TO BN 1200

FILE NAME 4157-J03 DISK N : C:\DWG JOB N : T004157 DATE: 23/3/97
PLOT SCALE: 1=30

SINCLAIR KNIGHT MERZ

FIGURE J-1e

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



BRISBANE RIVER - BN 1200 TO BN 950

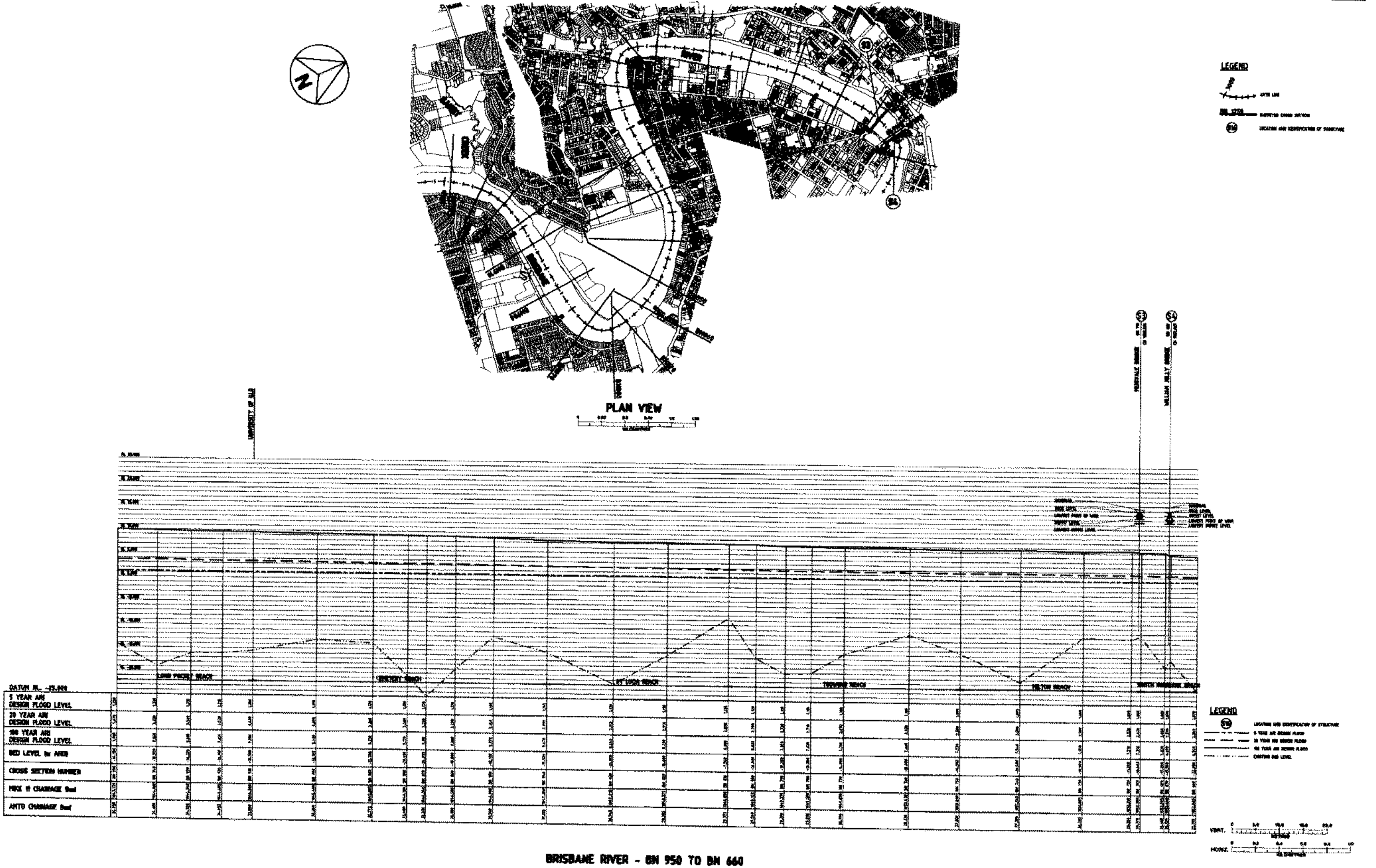
FILE NAME 4157-160
PLOT SCALE 1:30
DISK N° C:\DWG
JOB N° F004157
DATE 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE J-1f

BRISBANE RIVER FLOOD STUDY

MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



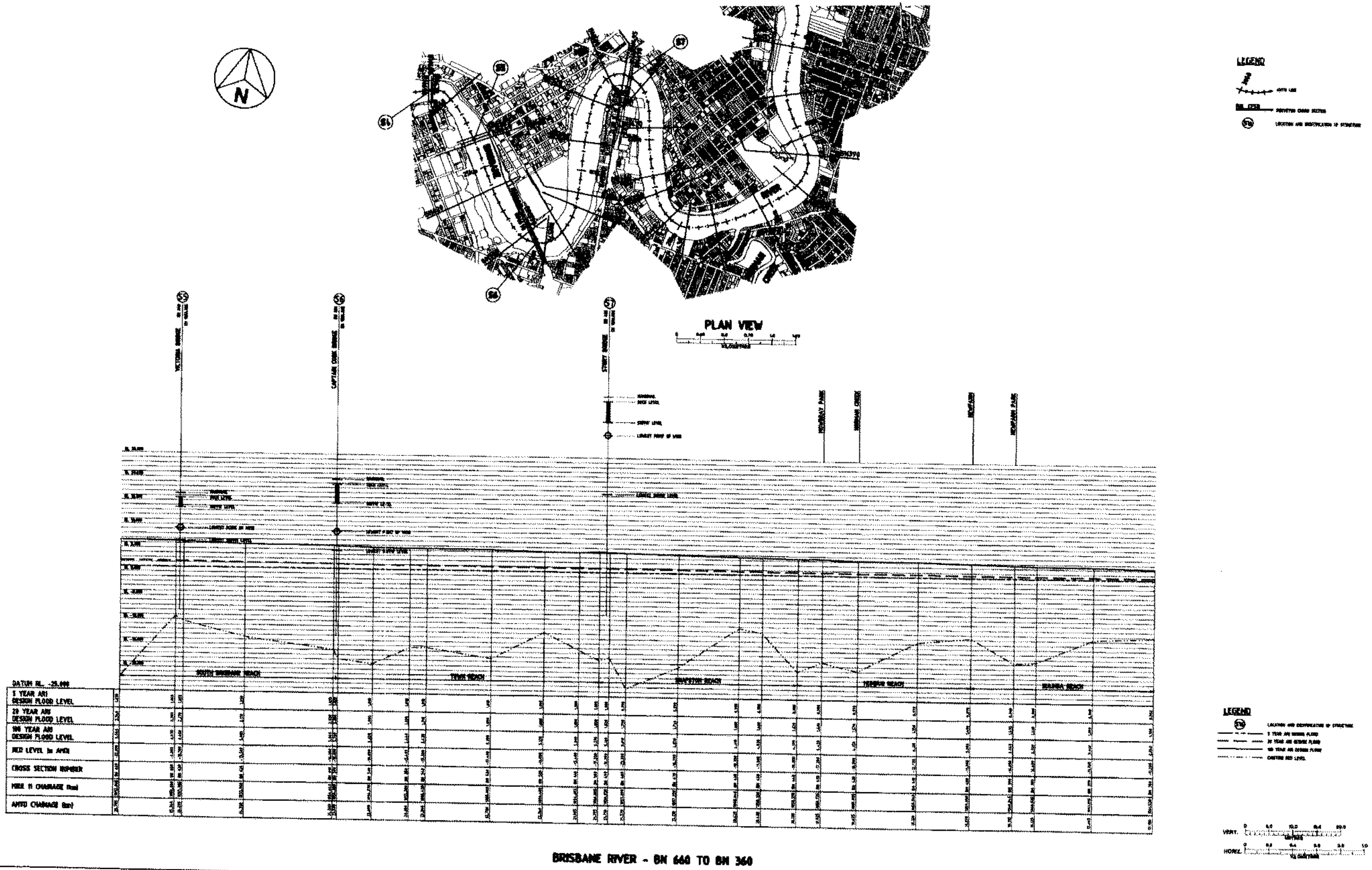
BRISBANE RIVER - BN 950 TO BN 640

PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

FIGURE J-1g

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



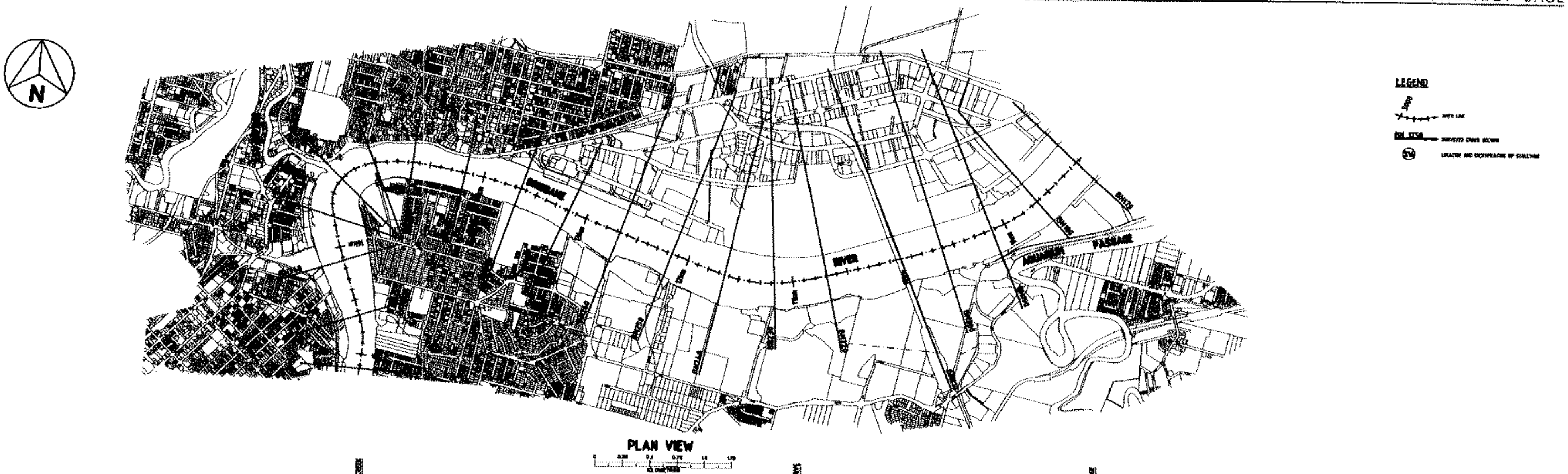
BRISBANE RIVER - BN 660 TO BN 360

PLOT SCALE 1:30

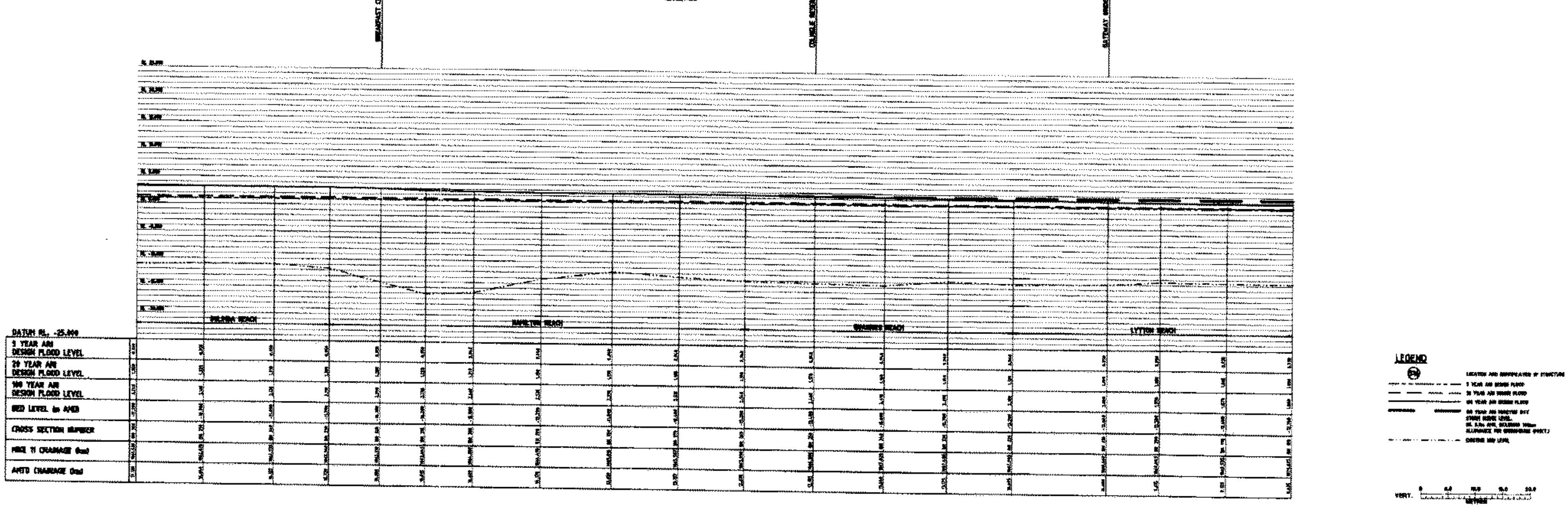
SINCLAIR KNIGHT MERZ

FIGURE J-1h

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



PLAN VIEW



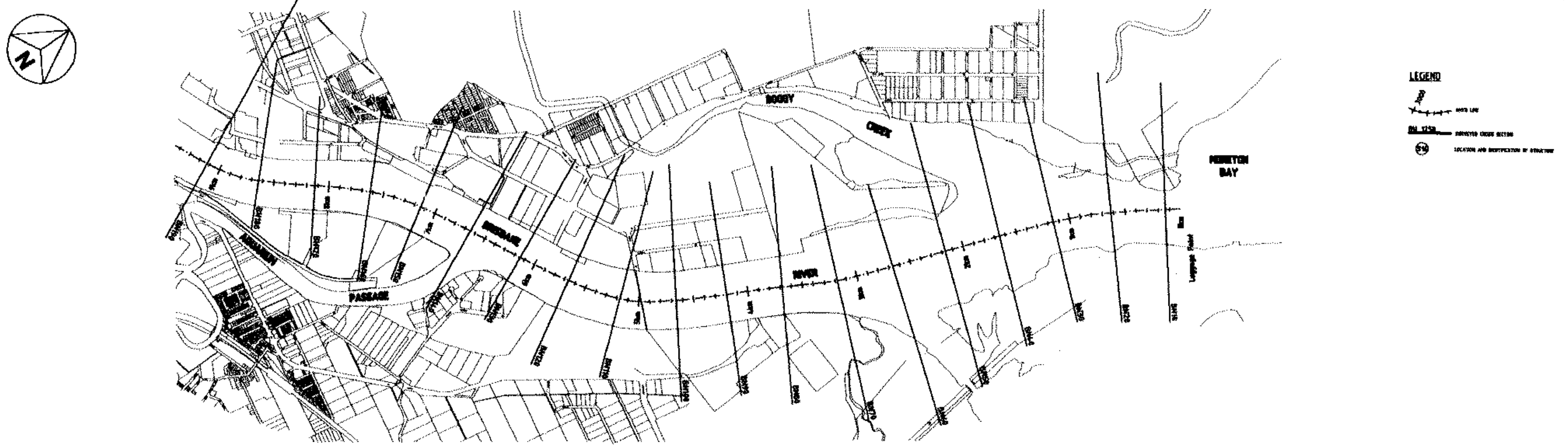
BRISBANE RIVER - BN 360 TO BN 180

PLOT SCALE: 1=30

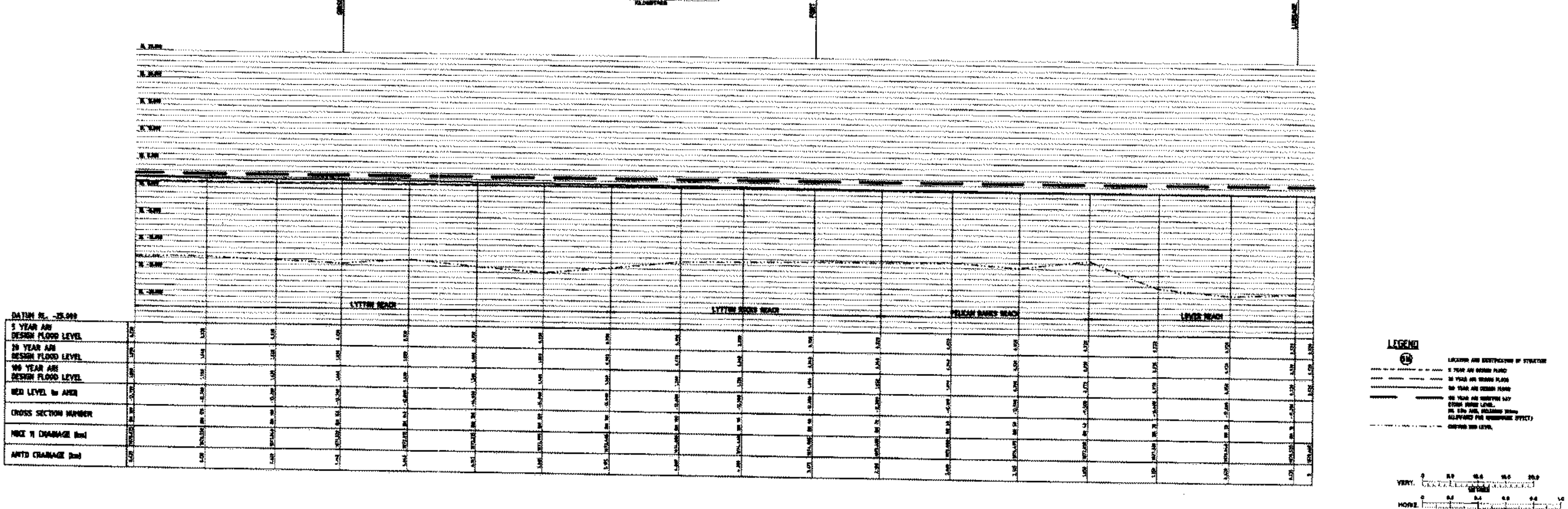
SINCLAIR KNIGHT MERZ

FIGURE J-1i

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20, AND 100 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



PLAN VIEW



BRISBANE RIVER - BN 180 TO BN 10

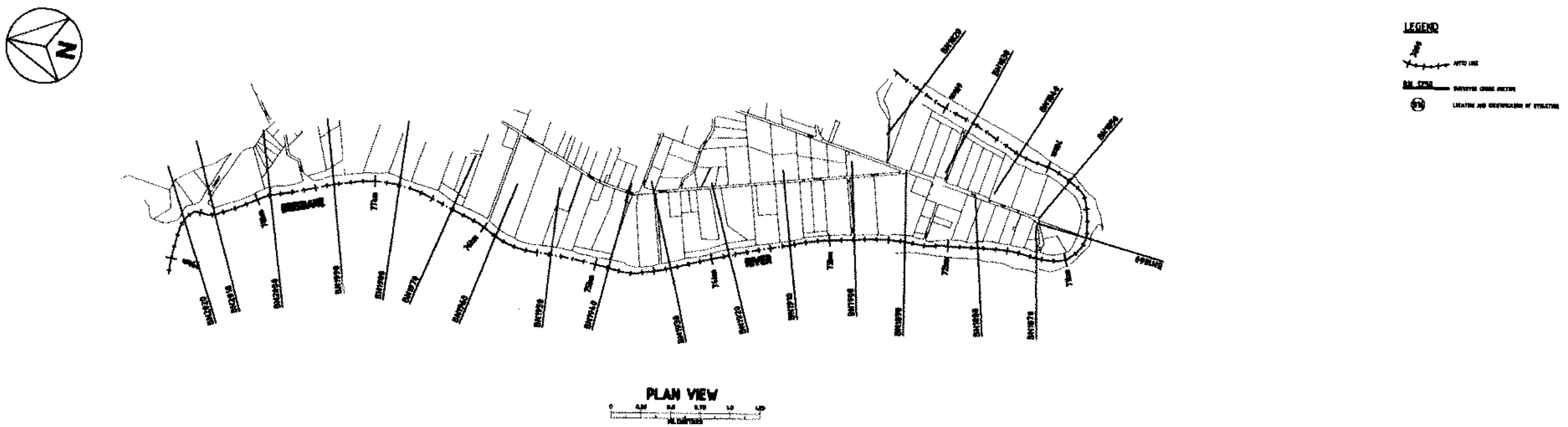
FILE NAME 415/-308 PLOT SCALE 1=30 DISK N: CNUWU JOB N: T00415/ DATE 23/3/9/

SINCLAIR KNIGHT MERZ

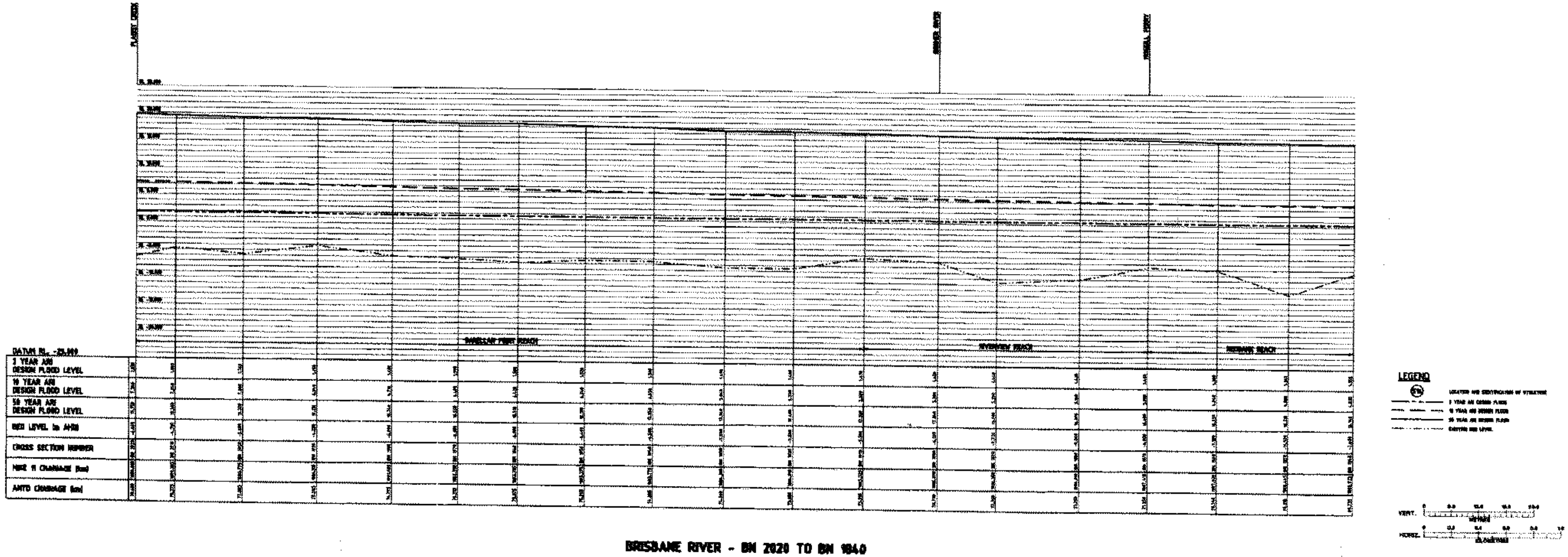
FIGURE J-2a

BRISBANE RIVER FLOOD STUDY

MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



PLAN VIEW



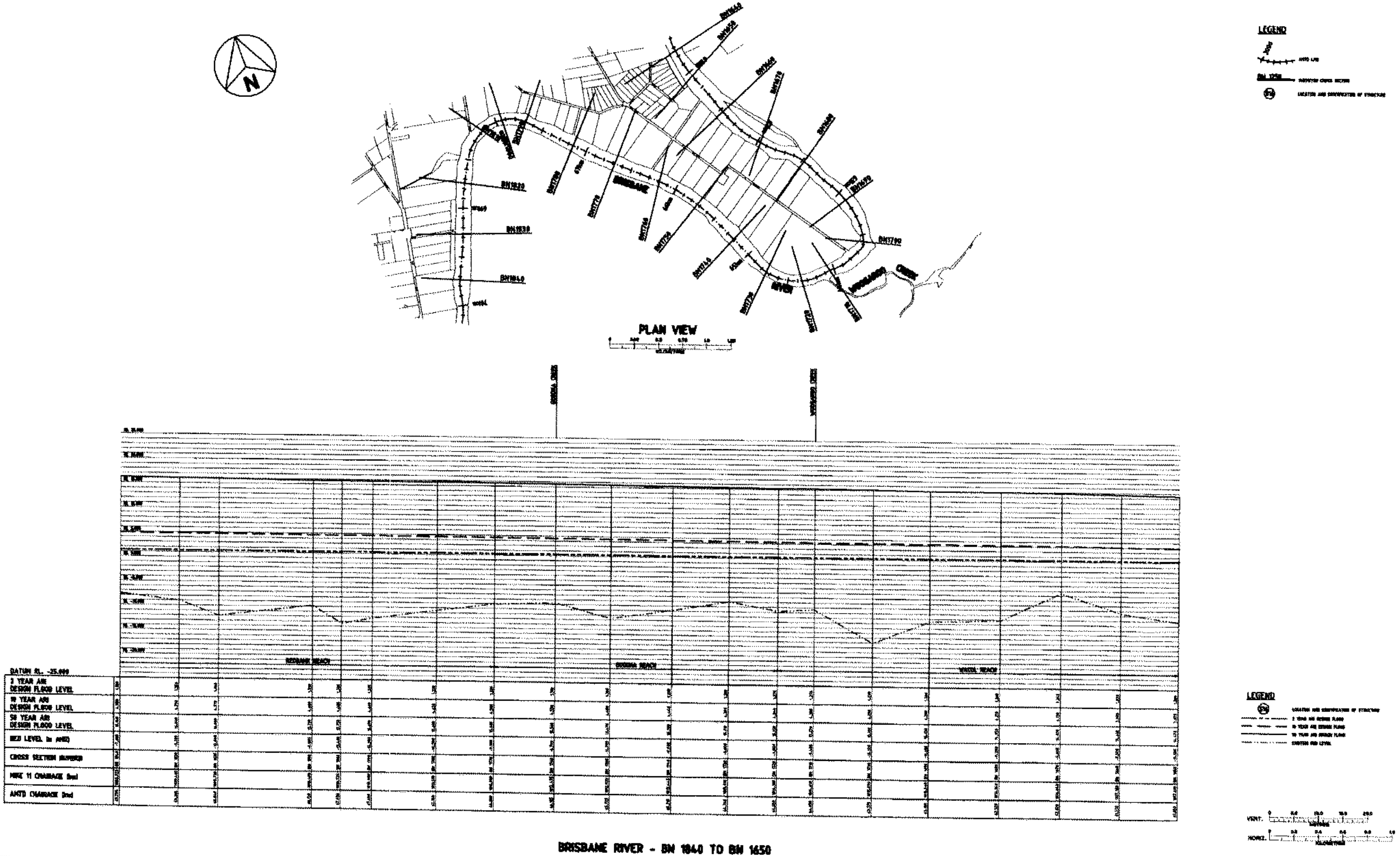
BRISBANE RIVER - BN 2020 TO BN 1840

FILE NAME 415/-165
PLOT SCALE 1:30
DISK N° C:\JWU
JOB N° T00415/
DATE: 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE J-2b

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



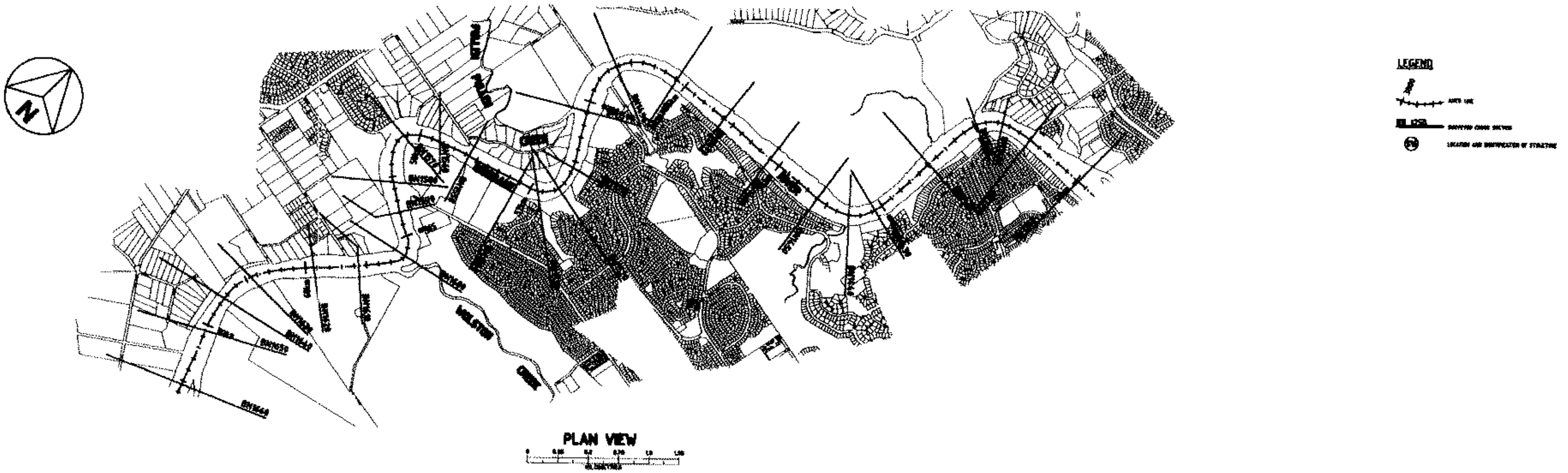
FILE NAME 4[illegible] DWG No [illegible] JOB No T00+[illegible] DATE: 23/3/[illegible]
PLOT SCALE 1:30

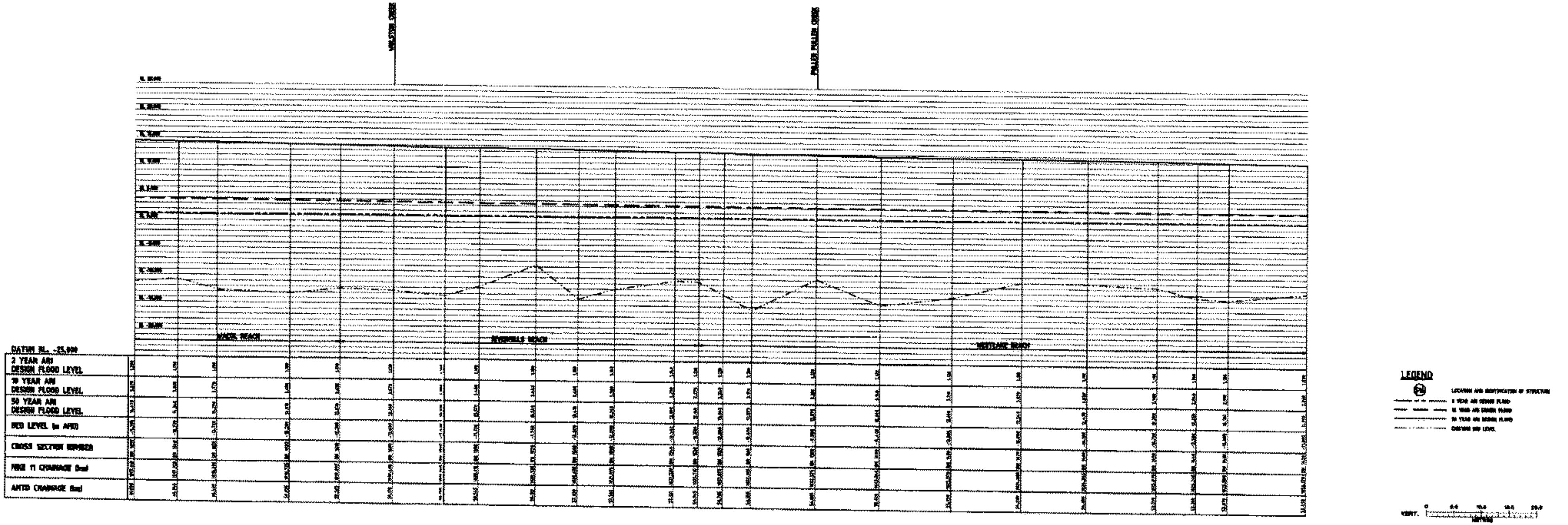
SINCLAIR KNIGHT MERZ

FIGURE J-2c

BRISBANE RIVER FLOOD STUDY

MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE





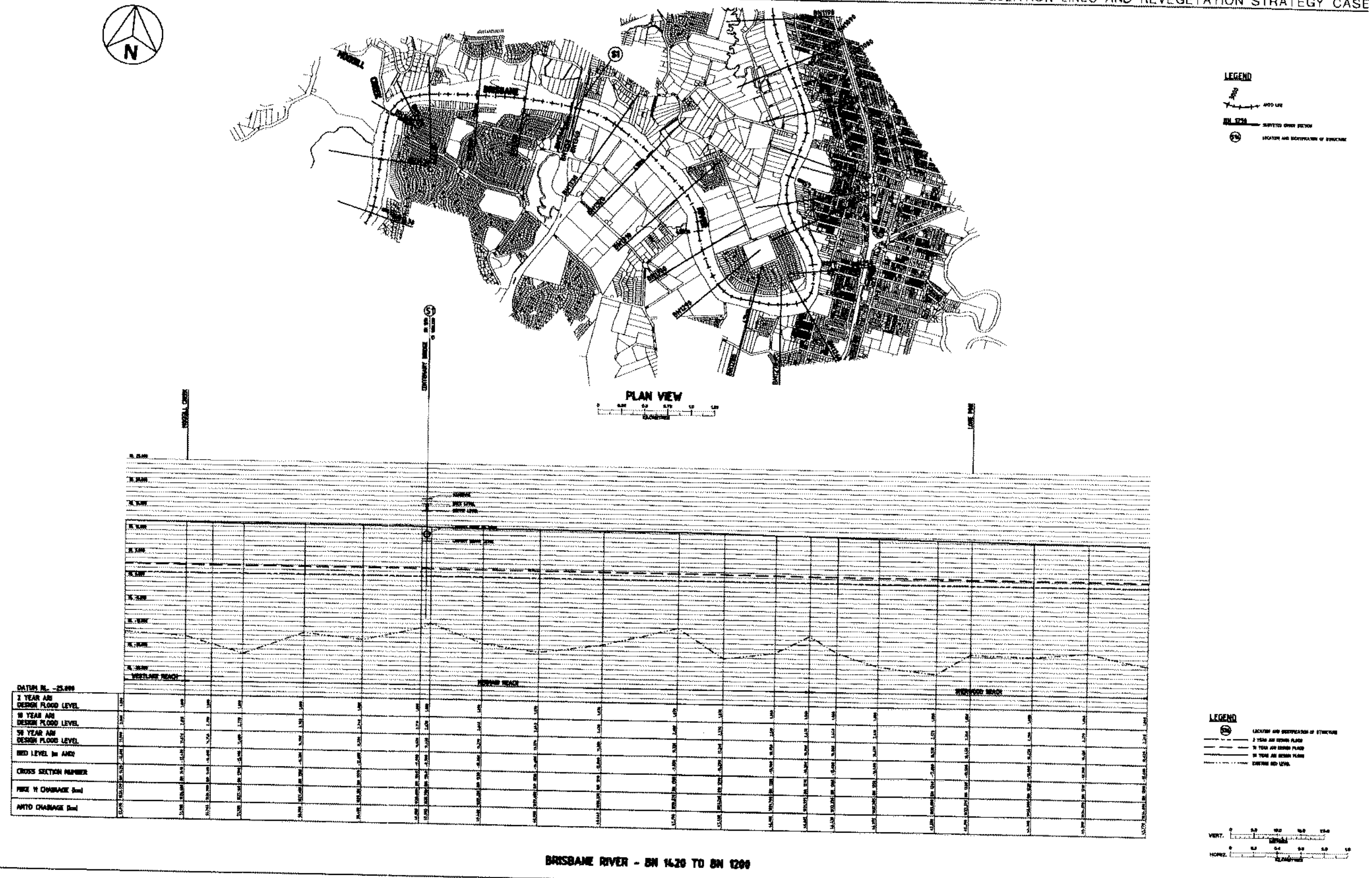
BRISBANE RIVER - BN 1650 TO BN 1420

FILE NAME 415… PLOT SCALE 1=30

SINCLAIR KNIGHT MERZ

FIGURE J-2d

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



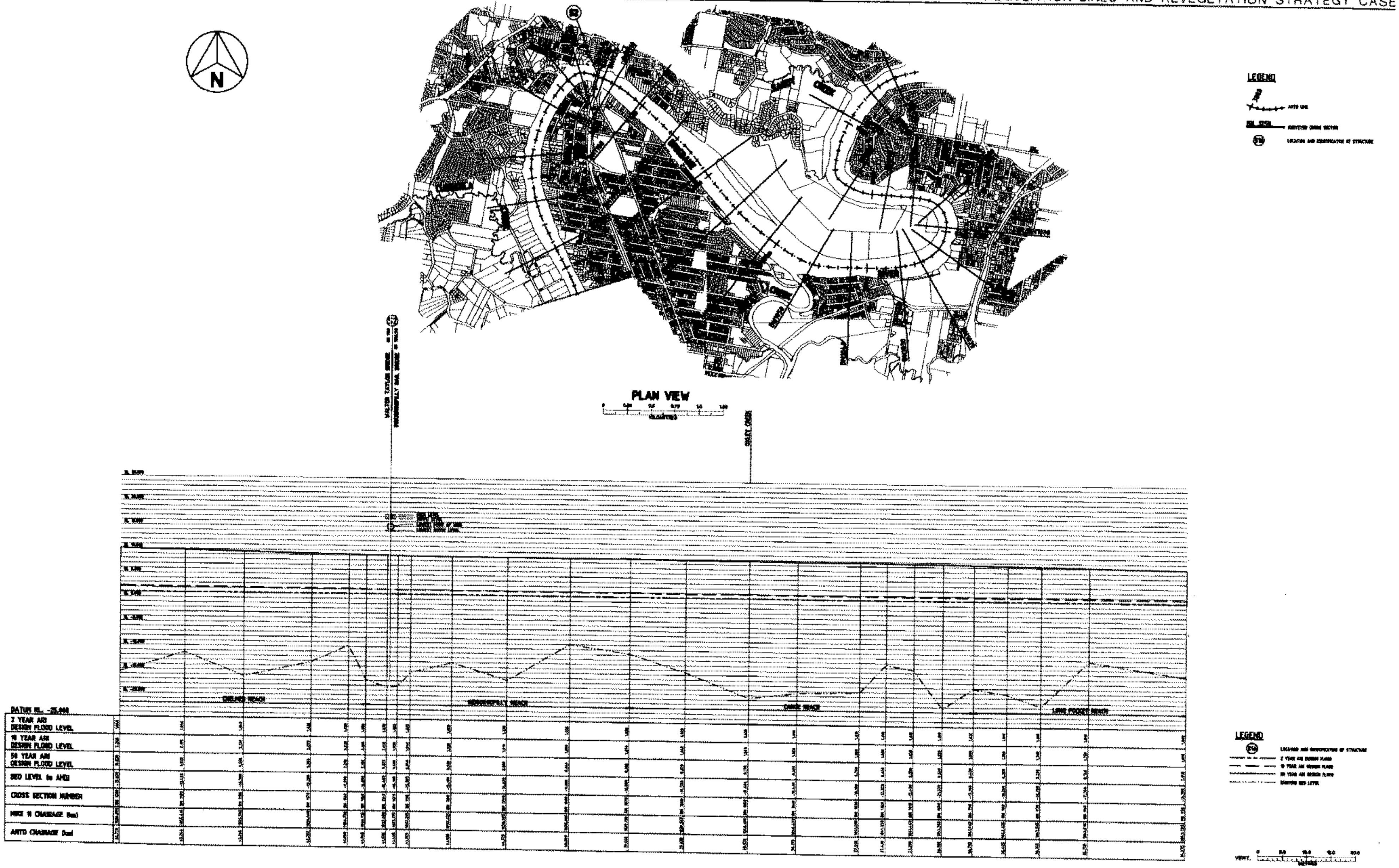
PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

FIGURE J-2e

BRISBANE RIVER FLOOD STUDY

MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE

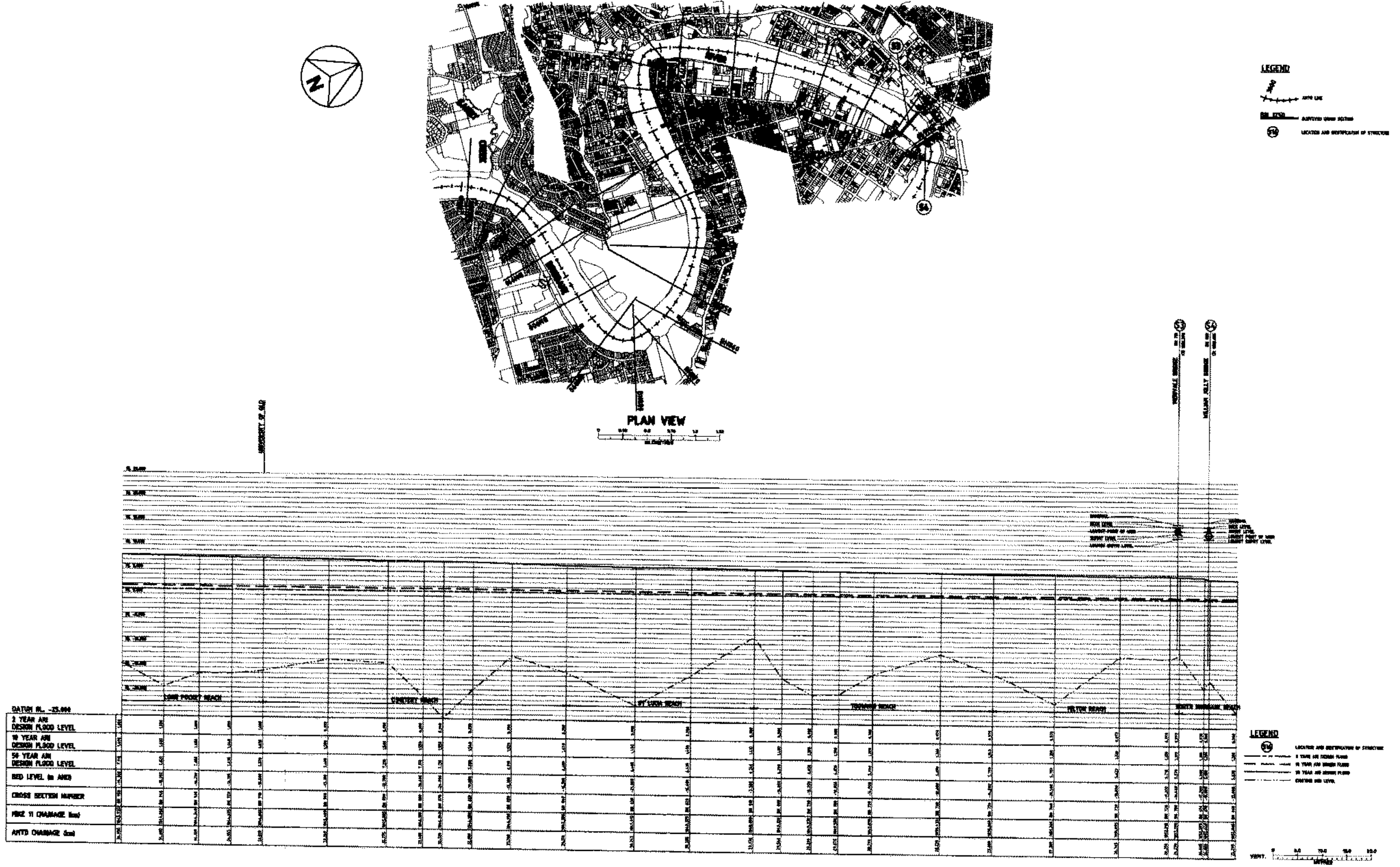


BRISBANE RIVER - BN 1200 TO BN 950

FILE NAME 4157-/97 DISK N° CN/WO JOB N° T00457 DATE 23/3/97
PLOT SCALE 1:30

FIGURE J-2f

BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



BRISBANE RIVER - BN 950 TO BN 660

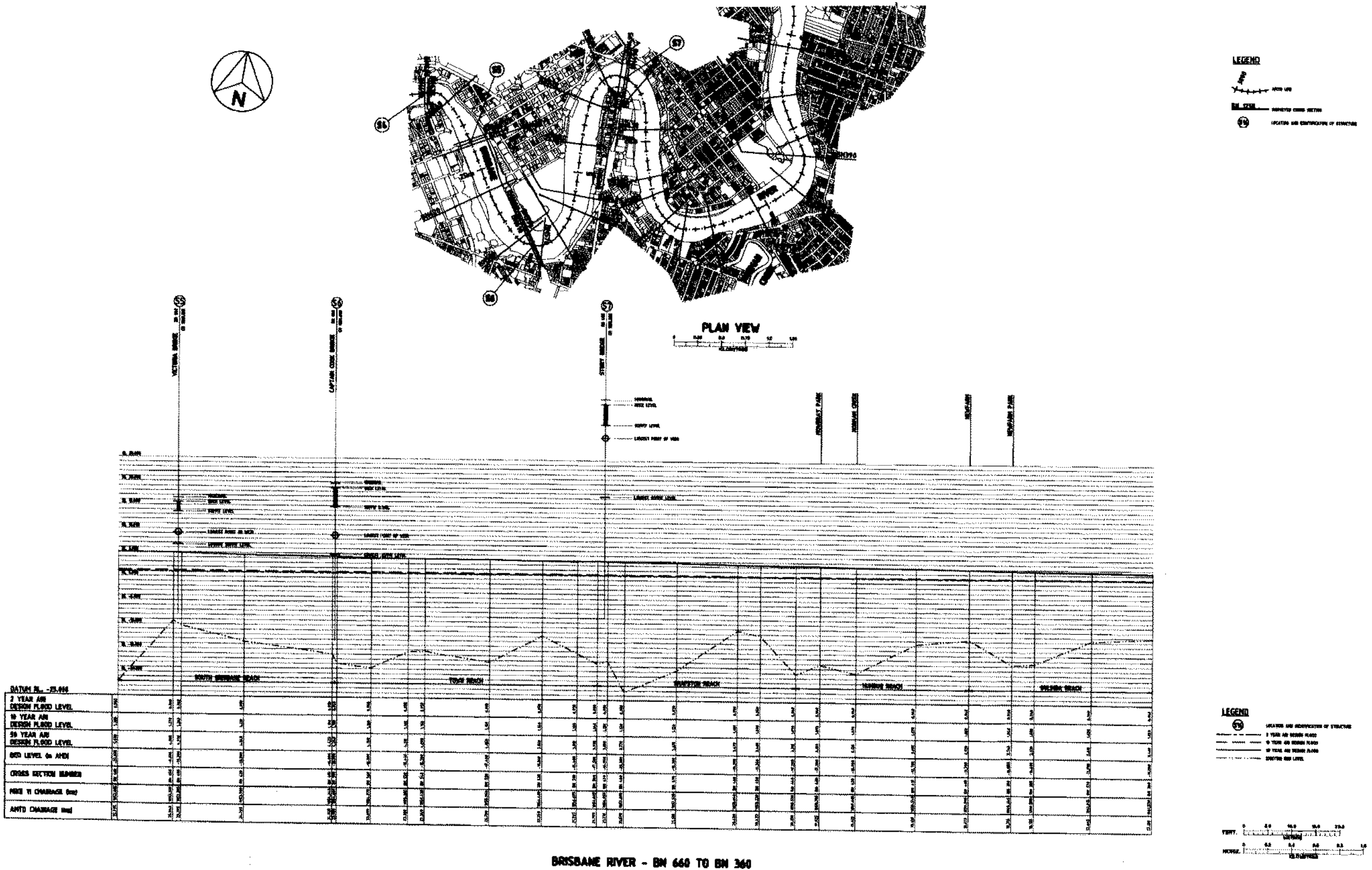
PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

FIGURE J-2g

BRISBANE RIVER FLOOD STUDY

MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



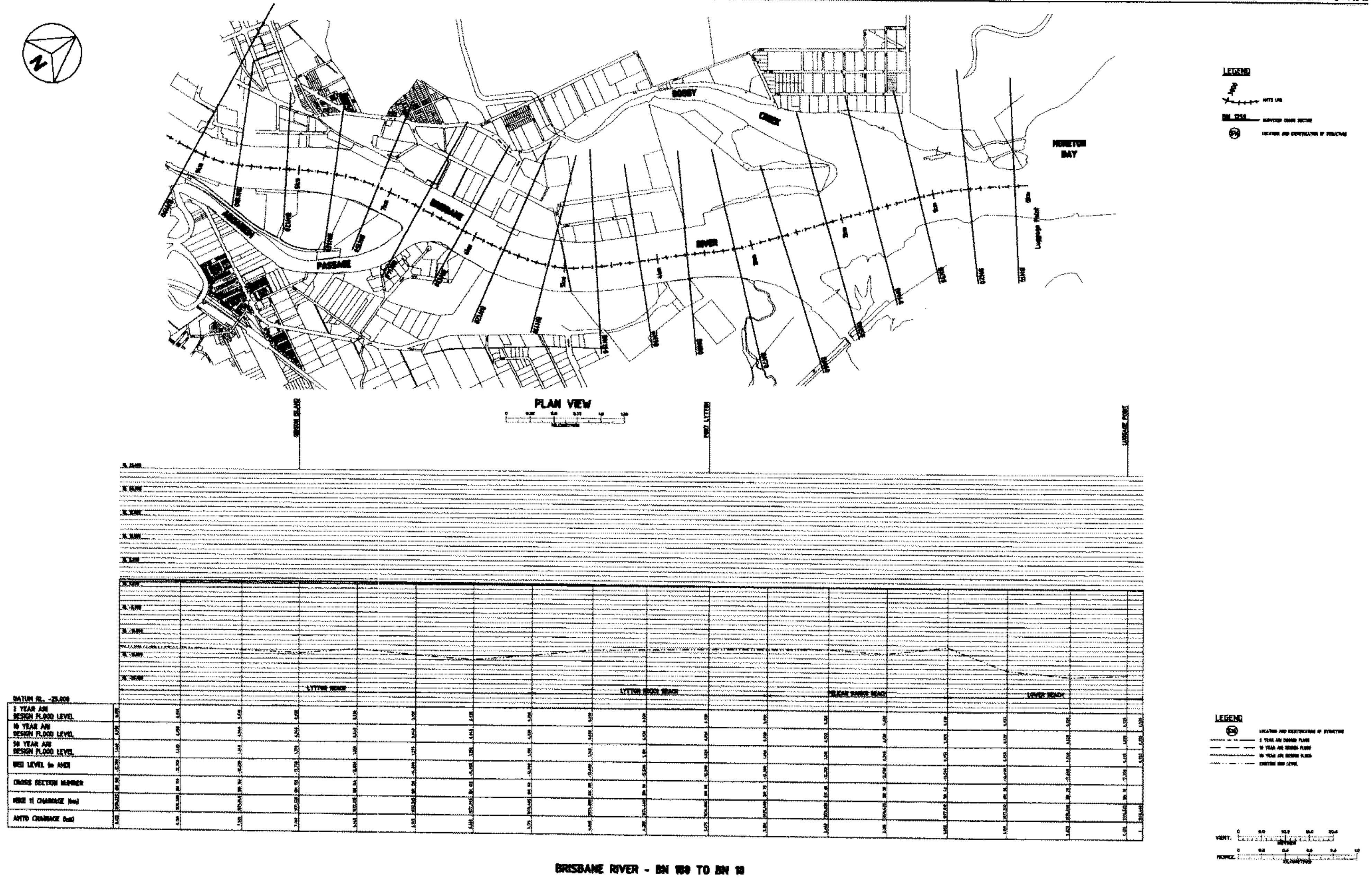
BRISBANE RIVER - BN 660 TO BN 360

FILE NAME 415/-1/1
PLOT SCALE 1:30
DISK N° C:\DWG
JOB N° T00435?
DATE 23/3/97

SINCLAIR KNIGHT MERZ

FIGURE J-2i

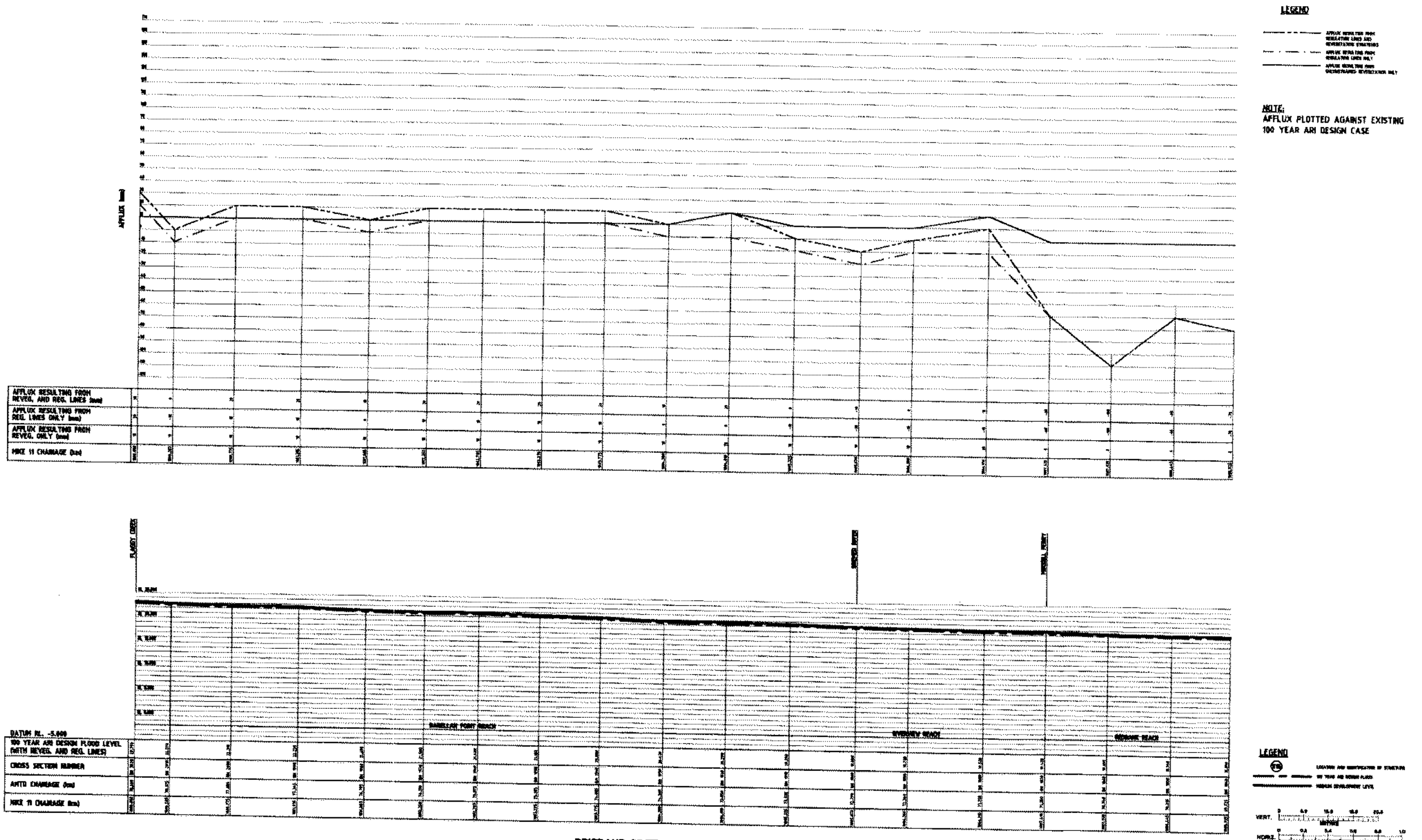
BRISBANE RIVER FLOOD STUDY
MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, AND 50 YEAR ARI
FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
- REGULATION LINES AND REVEGETATION STRATEGY CASE



FILE NAME 4157-1/13 DISK N° C:\DWG JOB N° T004157 DATE: 23/3/97
PLOT SCALE 1:30

FIGURE J-3a

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS - REGULATION LINES AND REVEGETATION STRATEGY CASE



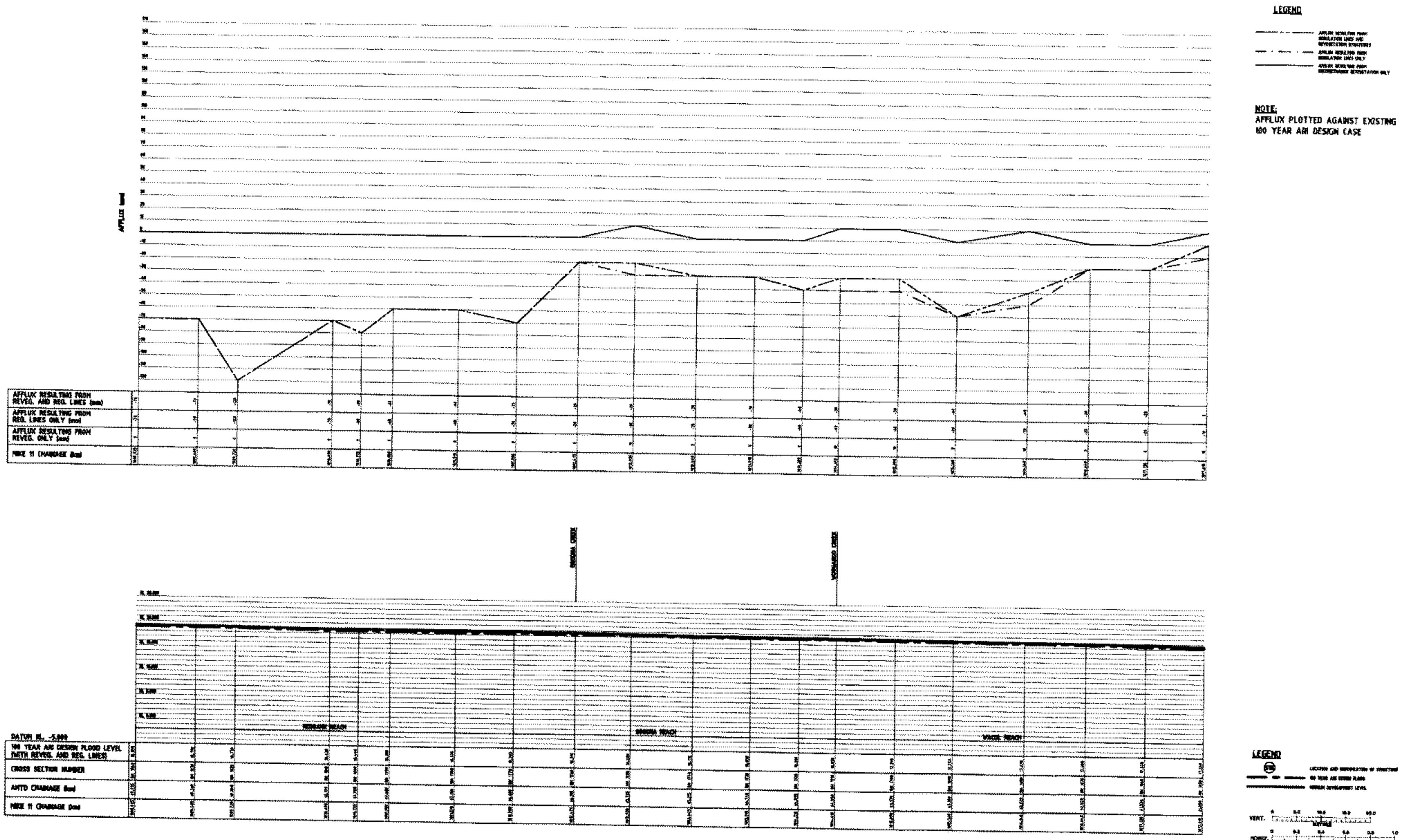
NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE

BRISBANE RIVER - BN 2020 TO BN 1840

FIGURE J-3b

BRISBANE RIVER FLOOD STUDY

AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE

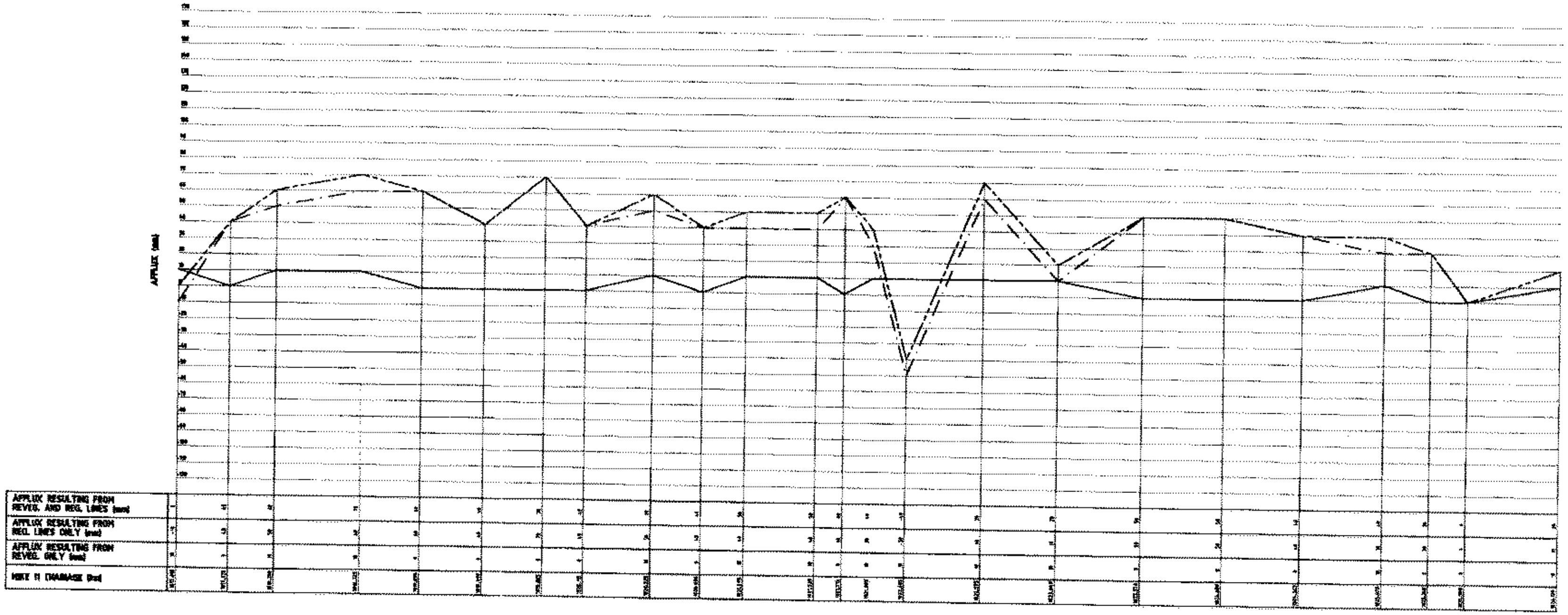


NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE

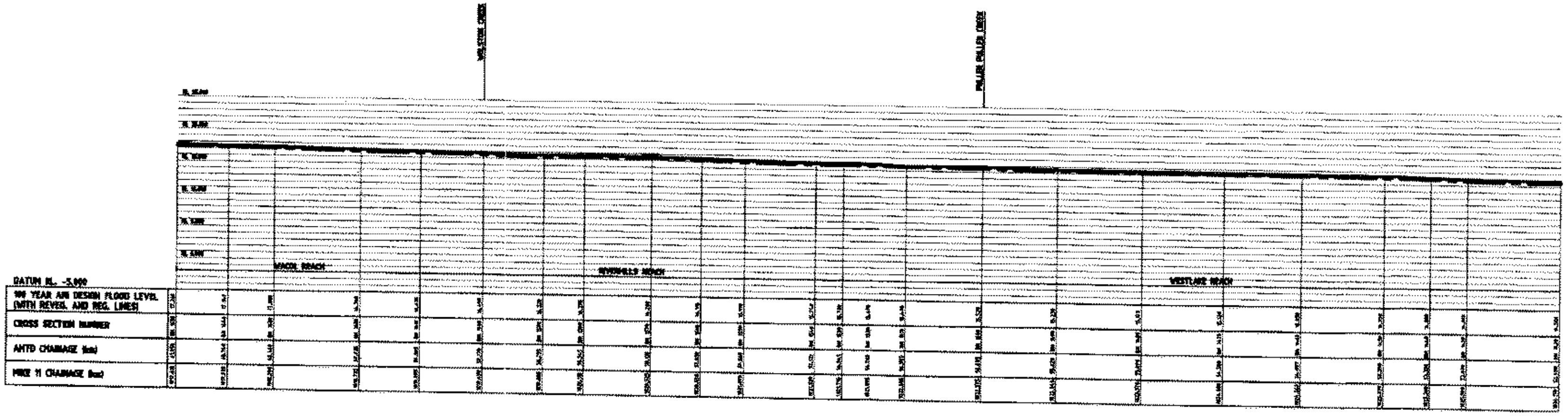
BRISBANE RIVER - BN 1840 TO BN 1650

FIGURE J-3c

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE



NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE

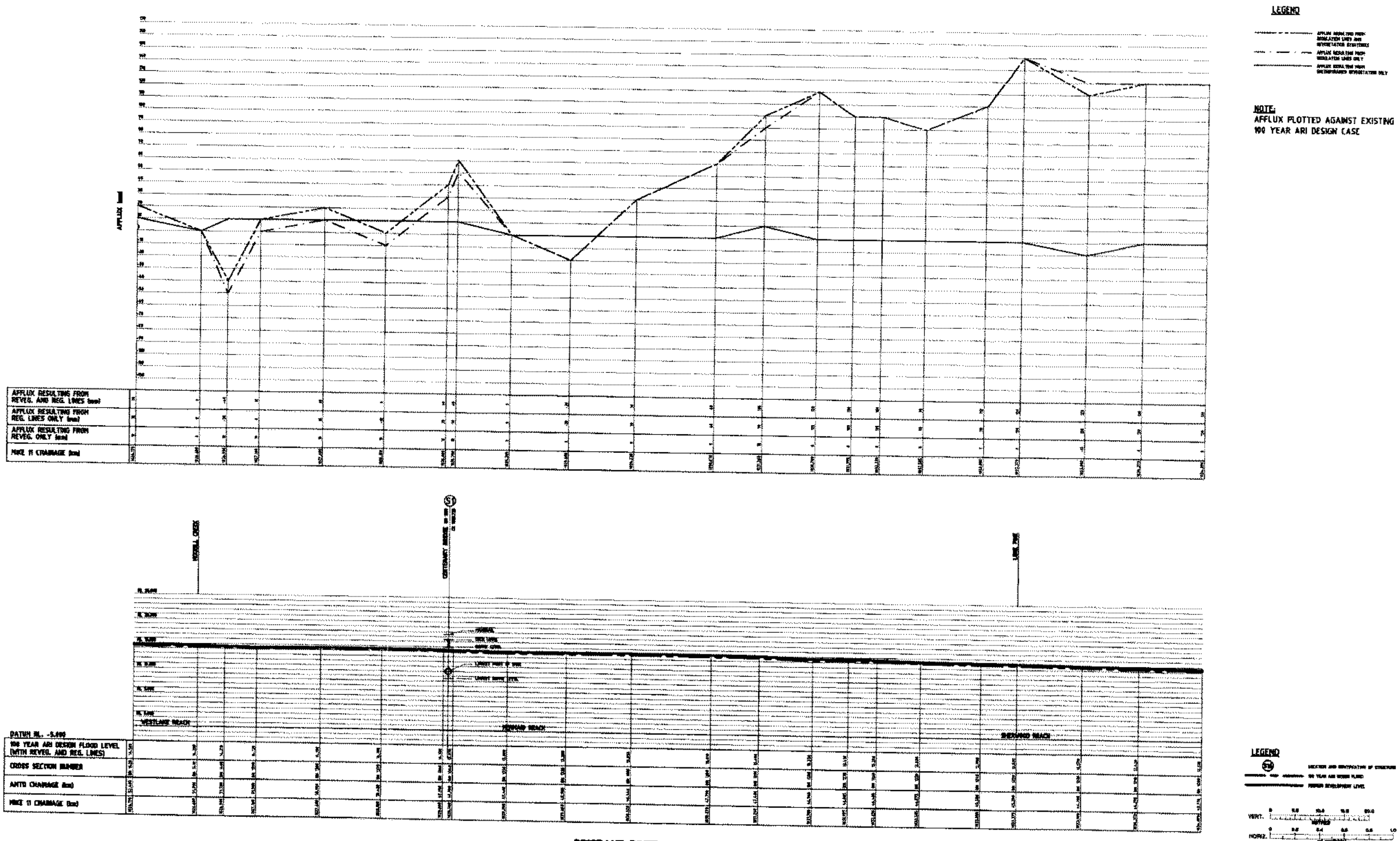


BRISBANE RIVER - BN 1450 TO BN 1420

SINCLAIR KNIGHT MERZ

FIGURE J-3d

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE



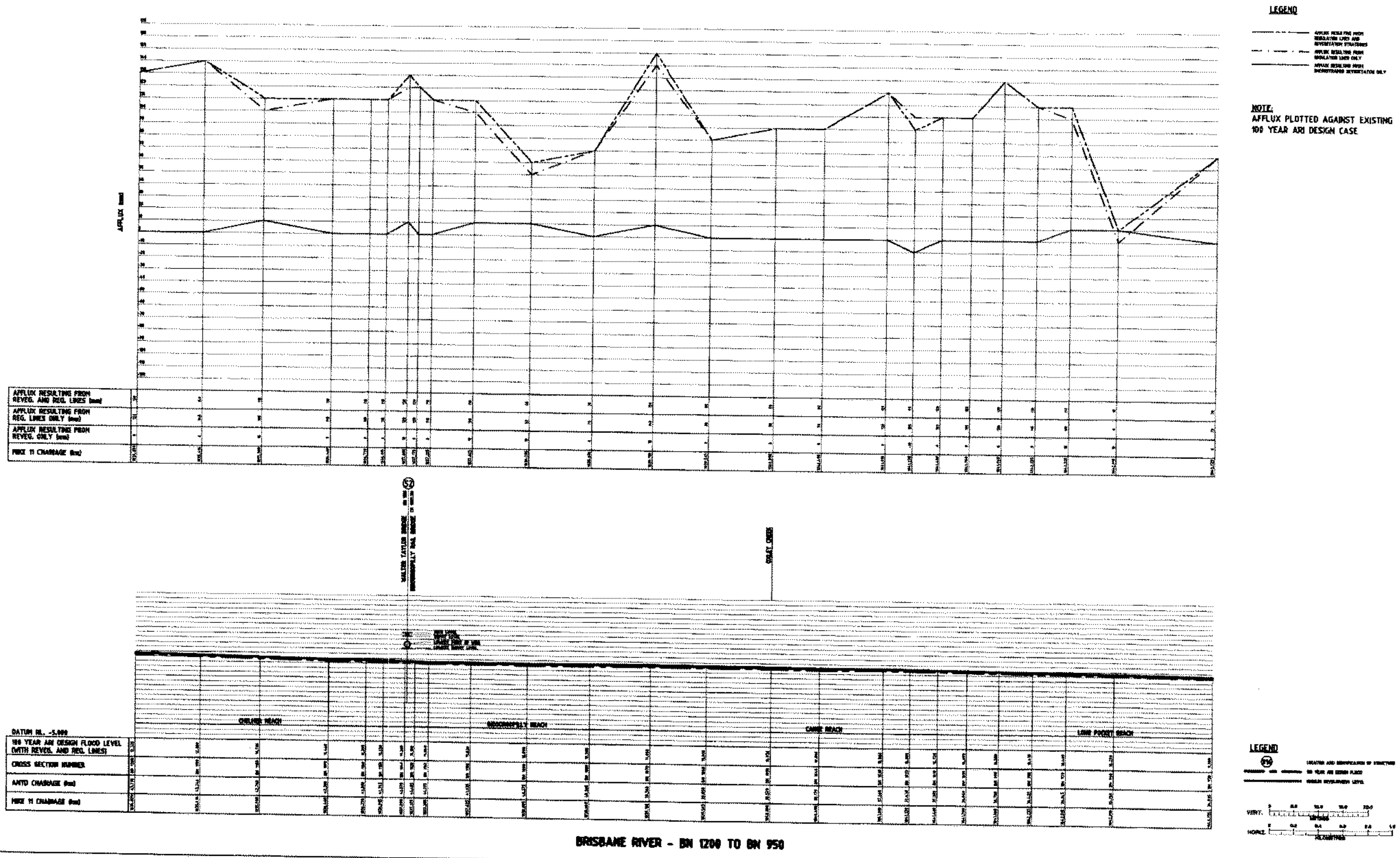
NOTE:
AFFLUX PLOTTED AGAINST EXISTING
100 YEAR ARI DESIGN CASE

BRISBANE RIVER - BN 1420 TO BN 1200

FILE NAME 435/[illegible] DISK N° [illegible] JOB N° T00407 DATE: 23/[illegible]
PLOT SCALE 1:30

SINCLAIR KNIGHT MERZ

FIGURE J-3e
BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE

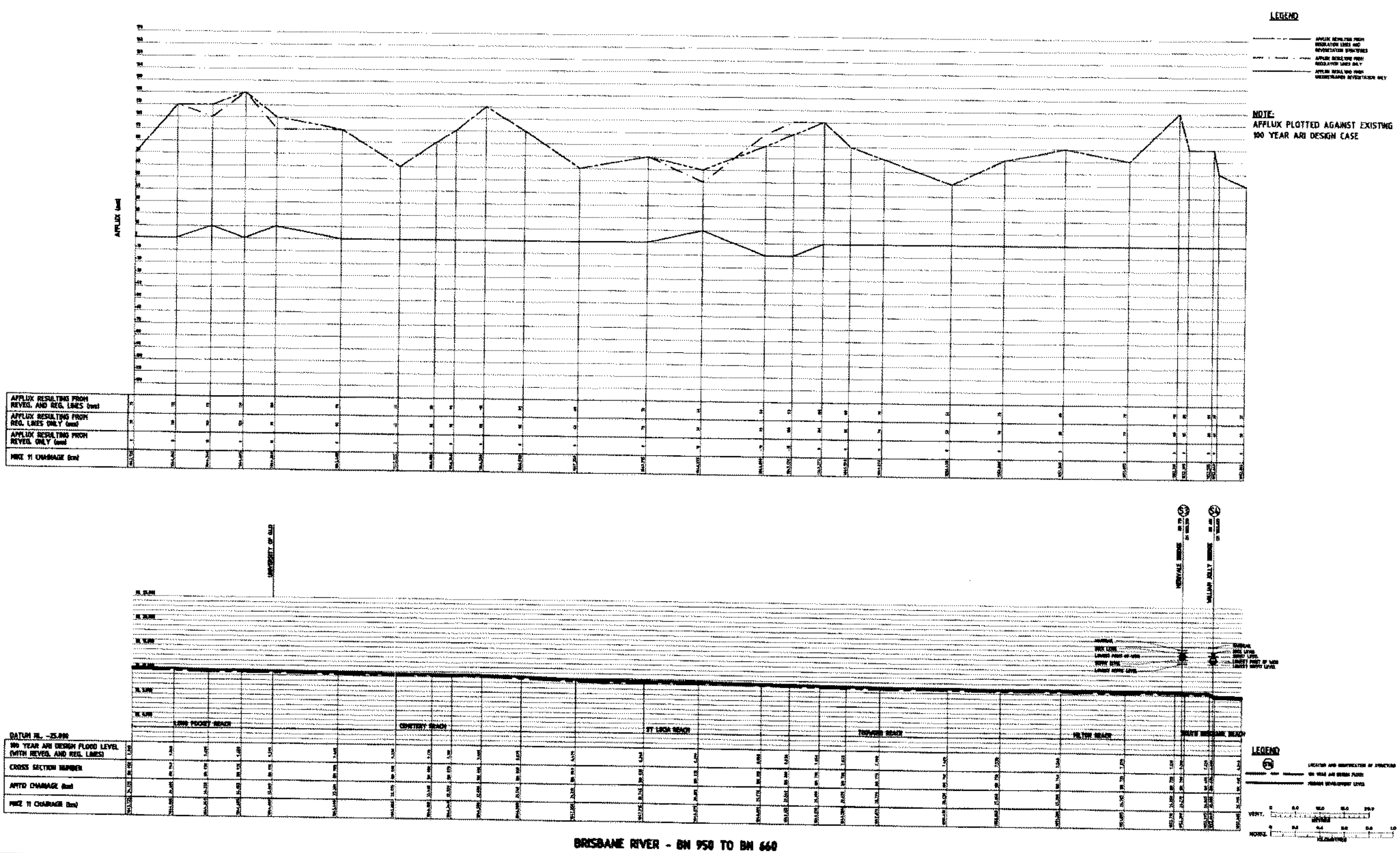


PLOT SCALE 1=30

SINCLAIR KNIGHT MERZ

FIGURE J-3f

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD - REGULATION LINES AND REVEGETATION STRATEGY CASE

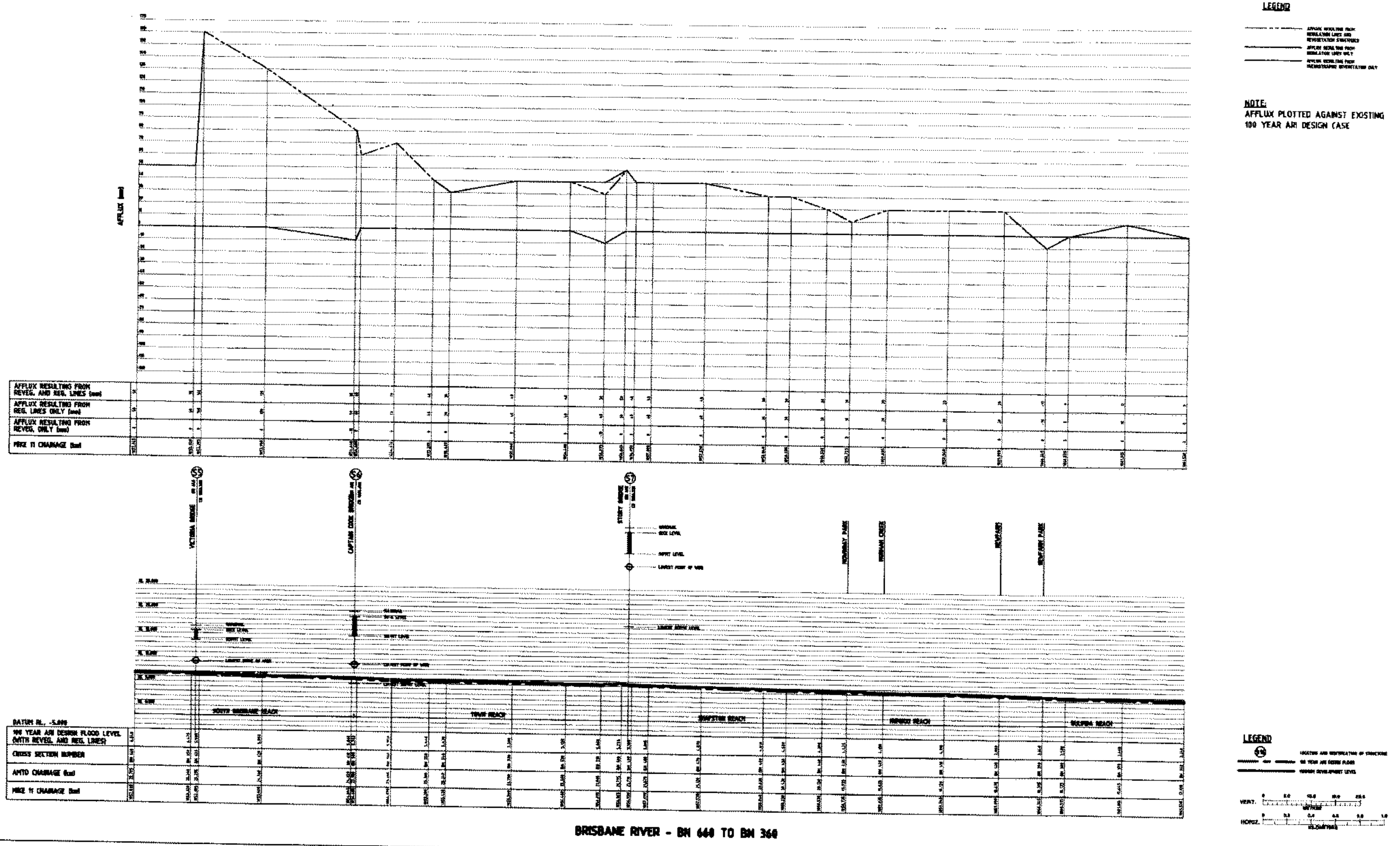


NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE

SINCLAIR KNIGHT MERZ

FIGURE J-3g

BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD
- REGULATION LINES AND REVEGETATION STRATEGY CASE



NOTE:
AFFLUX PLOTTED AGAINST EXISTING 100 YEAR ARI DESIGN CASE

BRISBANE RIVER - BN 640 TO BN 360

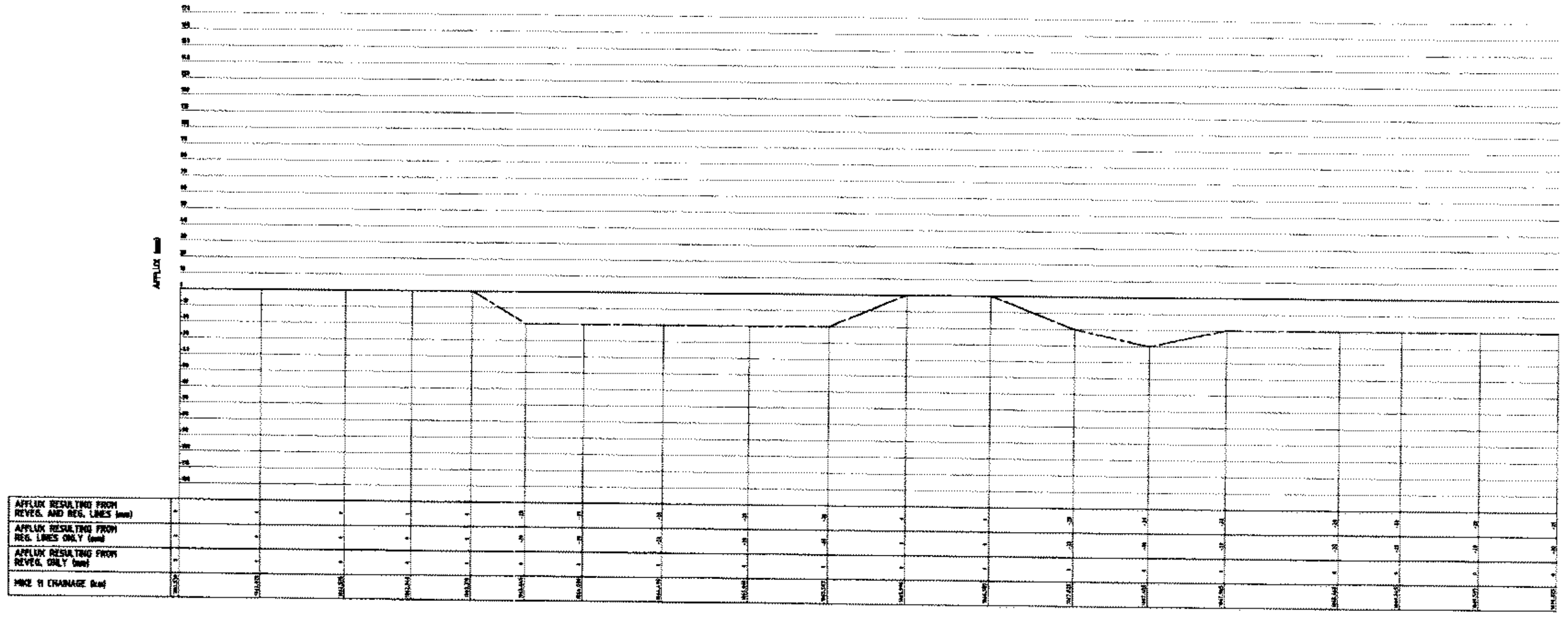
PLOT SCALE: 1:30

SINCLAIR KNIGHT MERZ

FIGURE J-3h

BRISBANE RIVER FLOOD STUDY

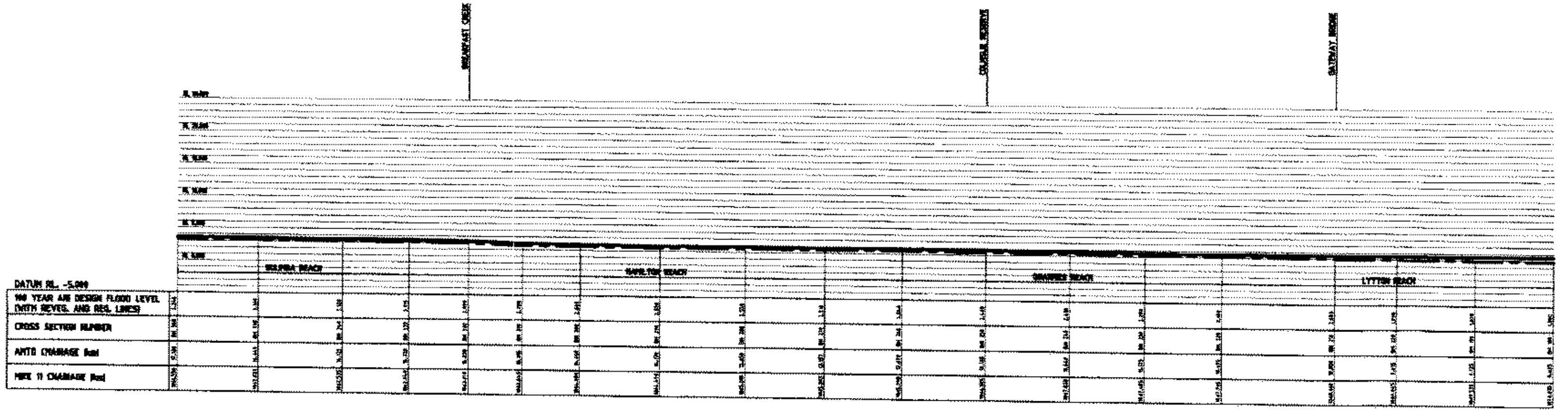
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD
- REGULATION LINES AND REVEGETATION STRATEGY CASE



LEGEND

- AFFLUX RESULTING FROM REGULATION LINES AND REVEGETATION STRATEGIES
- AFFLUX RESULTING FROM REGULATION LINES ONLY
- AFFLUX RESULTING FROM UNCONSTRAINED REVEGETATION ONLY

NOTE:
AFFLUX PLOTTED AGAINST EXISTING
100 YEAR ARI DESIGN CASE



BRISBANE RIVER - BN 360 TO BN 180

LEGEND

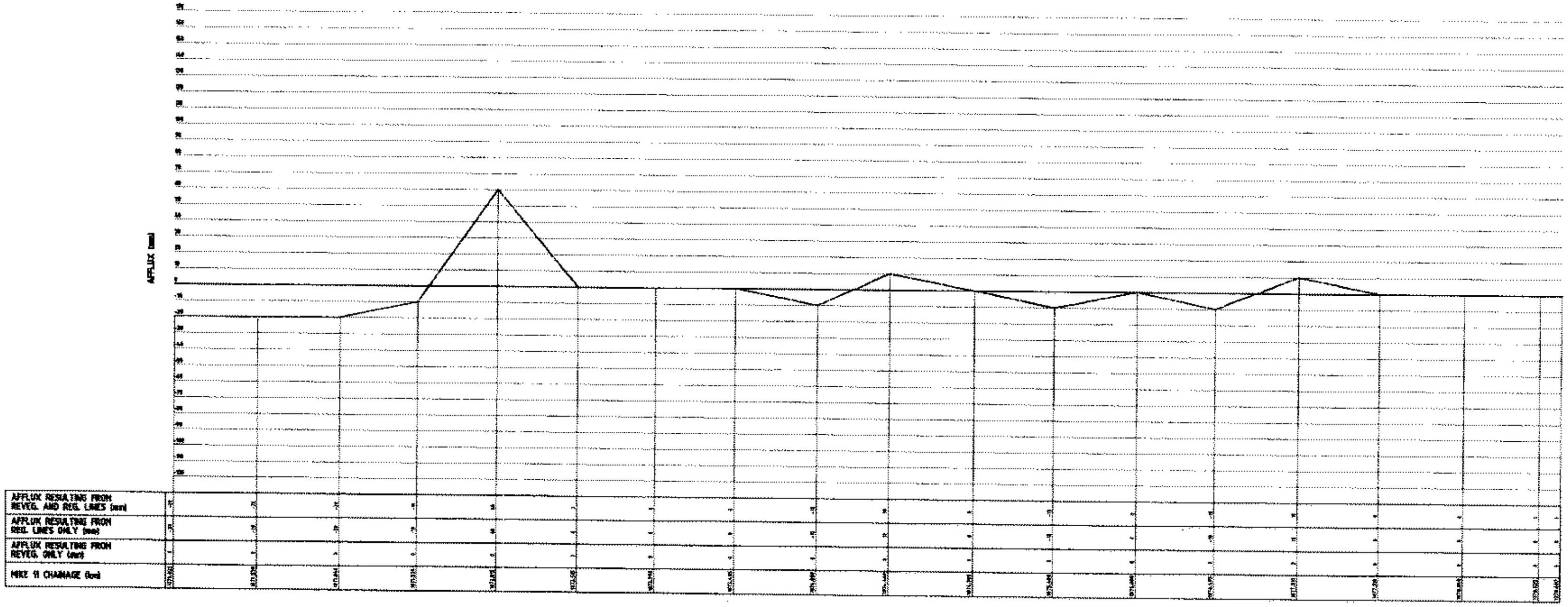
- LOCATION AND CONFIGURATION OF STRUCTURE
- 100 YEAR ARI DESIGN FLOOD

VERT. 0 5.0 10.0 15.0 20.0 METRES

HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

FIGURE J-3i

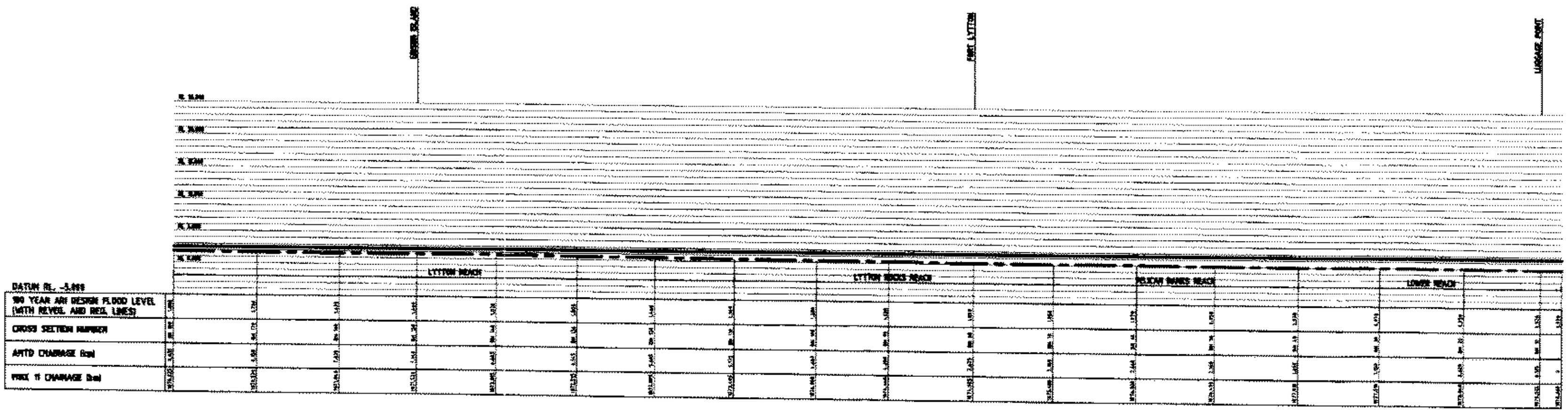
BRISBANE RIVER FLOOD STUDY
AFFLUX FOR THE 100 YEAR ARI DESIGN FLOOD
- REGULATION LINES AND REVEGETATION STRATEGY CASE



LEGEND

- AFFLUX RESULTING FROM REGULATION LINES AND REVEGETATION STRATEGIES
- AFFLUX RESULTING FROM REGULATION LINES ONLY
- AFFLUX RESULTING FROM REVEGETATION ONLY

NOTE:
AFFLUX PLOTTED AGAINST EXISTING
100 YEAR ARI DESIGN CASE



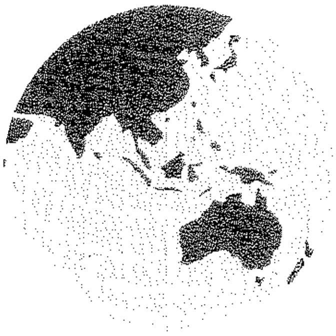
BRISBANE RIVER - BN 100 TO BN 10

LEGEND

- LOCATION AND IDENTIFICATION OF STRUCTURE
- 100 YEAR ARI DESIGN FLOOD
- MINIMUM DEVELOPMENT LEVEL

VERT. 0 5.0 10.0 15.0 20.0 METRES
HORIZ. 0 0.2 0.4 0.6 0.8 1.0 KILOMETRES

FILE ... 415. ... D... CAD ... TOOL ... 23/3.
PLOT SCALE 1=30



Appendix K - Hydraulic Structure Reference Sheets

CENTENARY BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY:	Mar-95
LOCATION:	Centenary Highway	UBD REF:	177 Q17
AERIAL PHOTO No:	Film BCC100, Sheet 5	STRUCTURE ID	S1
BCC XS No:	BN 1350	AMTD(m):	49 940

STRUCTURE DESCRIPTION: Bridge; Concrete Piers and Superstructure

STRUCTURE SIZE: 4 Spans @ 42.3m; 1 Span @ 48.3m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL: 8.5

DOWNSTREAM INVERT LEVEL: -15.9 DOWNSTREAM OBVERT LEVEL: 8.5
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? YES - XSECTION BN1350
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 10.6m LOWEST POINT OF WEIR (m AHD): 10.0m PIER WIDTH: 0.76m
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

Posts:	102mm x 102mm
Verticals:	16mm dia
Handrails:	102 x 52 TFC

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1963 PLAN NUMBER:

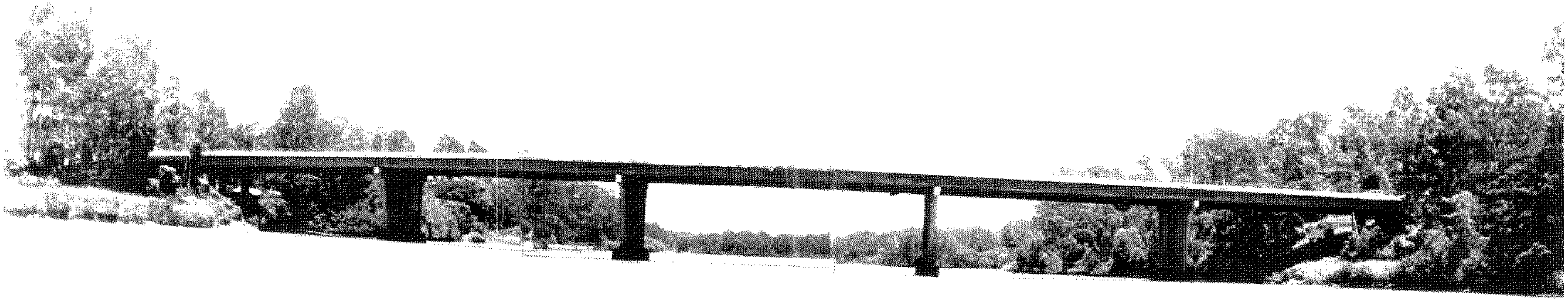
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Structure has approximately 41 year ARI flood Immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER SURFACE ELEVATION	MAX AFFLUX	AREA		VELOCITY	
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	(m AHD)	(mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	26640	14317	33.23	570	8904	3389	2.95	4.3
10 000	18626	14090	28.11	610	6597	3316	2.8	4.3
2 000	10963	13424	23.48	560	4006	3306	2.65	4.08
1 000	5690	12881	21.43	250	3193	3289	1.7	3.9
500	3054	11483	18.55	230	1908	3265	1.6	3.45
200	1380	10400	16.36	220	999	3256	1.48	3.1
100	377	9085	14.06	150	418	3301	1	2.7
50	9	9294	11.54	90	17	2866	1.4	2.5
20	-	3516	6.05	80	-	1812	-	1.9
10	-	1589	2.67	40	-	1307	-	1.2
5	-	949	1.66	20	-	1140	-	0.82
2	-	371	1.08	10	-	1058	-	0.5

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 1-CENTENARY BRIDGE (LOOKING UPSTREAM)

INDOOROOPILLY - WALTER TAYLOR BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	Mar-95
LOCATION:	Honour Avenue	UBD REF:	178 K7
AERIAL PHOTO No:	Film BCC100, Sheet 4	STRUCTURE ID	S2
BCC XS No:	BN 1130	AMTD(m):	41 550

STRUCTURE DESCRIPTION: Single span suspension bridge; concrete towers; steel girders; timber decking.

STRUCTURE SIZE: Span: 152.4m
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL: 14.2

DOWNSTREAM INVERT LEVEL: -15.7 DOWNSTREAM OBVERT LEVEL: 14.2
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? YES - XSECTION BN1130
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 10.3m LOWEST POINT OF WEIR (m AHD): 15.0m PIER WIDTH: 10.1m
(In the direction of flow, ie. distance from u/s face to d/s face) (Base of tower)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.
Galv. steel chain fencing

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1936 PLAN NUMBER:

HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI flood immunity

NB Walter Taylor Bridge & Albert Bridge modelled as a single bridge

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER SURFACE ELEVATION	MAX AFFLUX	AREA		VELOCITY	
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	(m AHD)	(mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	7487	29071	28.88	2055	1249	4170	6.5	6.6
10 000	2211	26236	23.12	190	809	4088	5.25	5.9
2 000	725	20782	19.1	380	219	4065	2	4.9
1 000	10	18392	17.35	250	19	4046	1.7	4.4
500	-	14461	14.73	190	-	3892	-	3.6
200	-	11706	12.92	150	-	3700	-	3.1
100	-	9392	11.07	90	-	3181	-	2.9
50	-	7227	8.98	80	-	2833	-	2.5
20	-	3487	4.47	150	-	2041	-	1.67
10	-	1587	2	60	-	1741	-	0.9
5	-	949	1.35	20	-	1583	-	0.59
2	-	372	1.03	10	-	1511	-	0.35

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.

INDOOROOPILLY - RAIL BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	NA
LOCATION:	Railway crossing, Indooroopilly	UBD REF:	178 K7
AERIAL PHOTO No:	Film BCC100, Sheet 4	STRUCTURE ID	S2
BCC XS No:	BN 1130	AMTD(m):	41 550

STRUCTURE DESCRIPTION: Truss bridge; Steel superstructure; Concrete piers.

STRUCTURE SIZE: 2 Spans @ 104.2m
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL: -15.7 DOWNSTREAM OBVERT LEVEL:
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? NO
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 8.4m LOWEST POINT OF WEIR (m AHD): 15.0m PIER WIDTH:
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

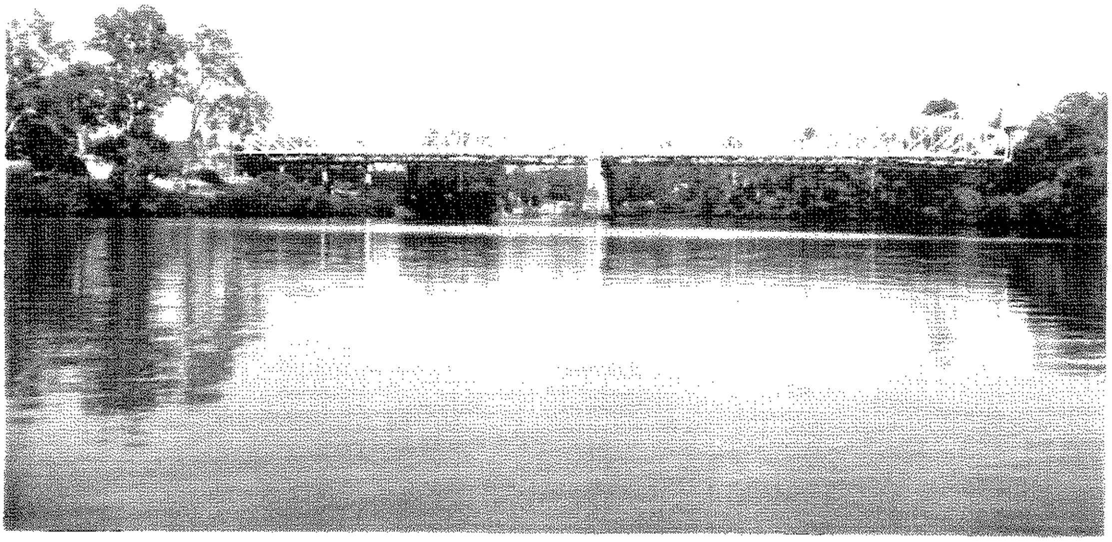
The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1952 PLAN NUMBER:

HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

NB Walter Taylor Bridge & Albert Bridge modelled as a single bridge



STRUCTURE 2-INDOOROOPILLY BRIDGES (LOOKING UPSTREAM)

STRUCTURE 2-INDOOROOPILLY BRIDGES (LOOKING DOWNSTREAM)

MERIVAL BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	Mar-95
LOCATION:	Railway Link: South Brisbane - Roma Street	UBD REF:	159 J11
AERIAL PHOTO No:	Film BCC100, Sheet 3	STRUCTURE ID	S3
BCC XS No:	BN 710	AMTD(m):	26 290

STRUCTURE DESCRIPTION: Single span arch bridge and approaches; Concrete deck & piers.

STRUCTURE SIZE: Centre span: 132.9m; Approach spans either side: 33.45m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL: 14.1

DOWNSTREAM INVERT LEVEL: -15.4 DOWNSTREAM OBVERT LEVEL: 14.1
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? YES - XSECTION BN710
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 13.4m LOWEST POINT OF WEIR (m AHD): 15.1m PIER WIDTH: Varies
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1981 PLAN NUMBER:

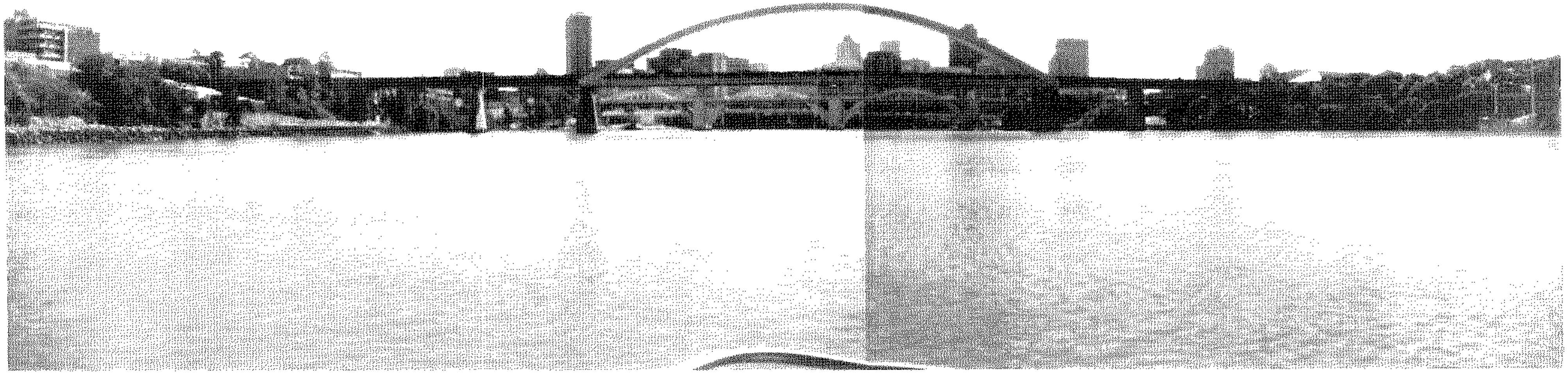
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI (years)	DISCHARGE		WATER SURFACE ELEVATION (m AHD)	MAX AFFLUX (mm)	AREA		VELOCITY	
	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)			WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	2909	32954	22.98	1050	648	4414	5.2	7.2
10 000	1555	27406	19.72	630	415	4412	4.1	6
2 000	8	19989	15.59	410	62	3525	2	5.6
1 000	-	17416	13.92	320	-	3132	-	5.5
500	-	13779	11.06	240	-	2456	-	5
200	-	11386	9.16	200	-	2366	-	4.7
100	-	9250	7.4	270	-	2023	-	4.45
50	-	7079	5.65	160	-	1761	-	3.9
20	-	3397	2.49	50	-	1508	-	2.2
10	-	1586	1.32	20	-	1491	-	1.05
5	-	949	1.08	10	-	1444	-	0.68
2	-	423	0.97	0	-	1425	-	0.4

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 3-MERIVALE BRIDGE (LOOKING DOWNSTREAM)

WILLIAM JOLLY BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	Mar-95
LOCATION:	Grey Street	UBD REF:	159 K11
AERIAL PHOTO No:	Film BCC100, Sheet 3	STRUCTURE ID	S4
BCC XS No:	BN 680	AMTD(m):	26 035

STRUCTURE DESCRIPTION: Arch bridge with approaches; Concrete and granite piers, steel girders, concrete deck.

STRUCTURE SIZE: 3 spans @ 72.5m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9
UPSTREAM OBVERT LEVEL: 13.5

DOWNSTREAM INVERT LEVEL: -15.4
For culverts give floor level.
DOWNSTREAM OBVERT LEVEL: 13.5
For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? YES - XSECTION BN680
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 20.1m LOWEST POINT OF WEIR (m AHD): 14.3m PIER WIDTH: 6.6m
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.
Concrete balustrade

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge Including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1927 PLAN NUMBER:

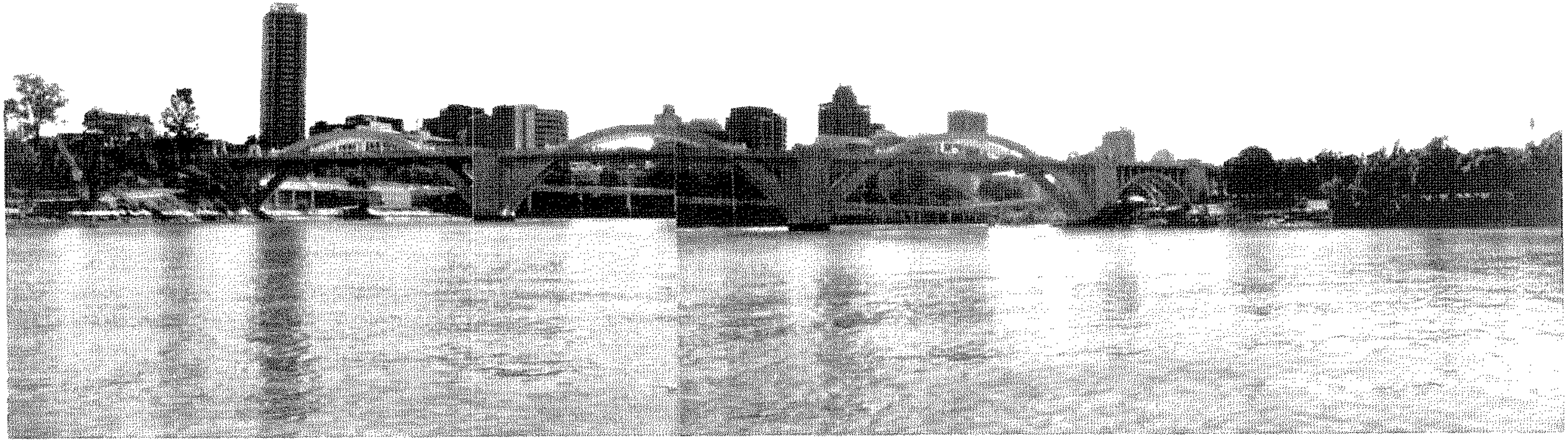
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER		AREA		VELOCITY	
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	SURFACE ELEVATION (m AHD)	MAX AFFLUX (mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	2909	32954	22.98	1050	648	4414	5.2	7.2
10 000	1555	27406	19.72	630	415	4412	4.1	6
2 000	8	19989	15.59	410	62	3525	2	5.6
1 000	-	17416	13.92	320	-	3132	-	5.5
500	-	13779	11.06	240	-	2456	-	5
200	-	11386	9.16	200	-	2366	-	4.7
100	-	9250	7.4	270	-	2023	-	4.45
50	-	7079	5.65	160	-	1761	-	3.9
20	-	3397	2.49	50	-	1508	-	2.2
10	-	1586	1.32	20	-	1491	-	1.05
5	-	949	1.08	10	-	1444	-	0.68
2	-	423	0.97	0	-	1425	-	0.4

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 4-WILLIAM JOLLY BRIDGE (LOOKING DOWNSTREAM)

SINCLAIR KNIGHT MERZ

VICTORIA BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	Mar-95
LOCATION:	Melbourne Street	UBD REF:	159 M12
AERIAL PHOTO No:	Film BCC100, Sheet 3	STRUCTURE ID	S5
BCC XS No:	BN 640	AMTD(m):	25 305

STRUCTURE DESCRIPTION: Concrete bridge; Single span with cantilever ends resting on abutments.

STRUCTURE SIZE: Centre span: 136.1m; End contilevers: 85.3m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL: 6.76

DOWNSTREAM INVERT LEVEL: -15.4 DOWNSTREAM OBVERT LEVEL: 6.76
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? YES - XSECTION BN640
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 21.9m LOWEST POINT OF WEIR (m AHD): 9.2m PIER WIDTH: 4.0m (Base)
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1960 PLAN NUMBER:

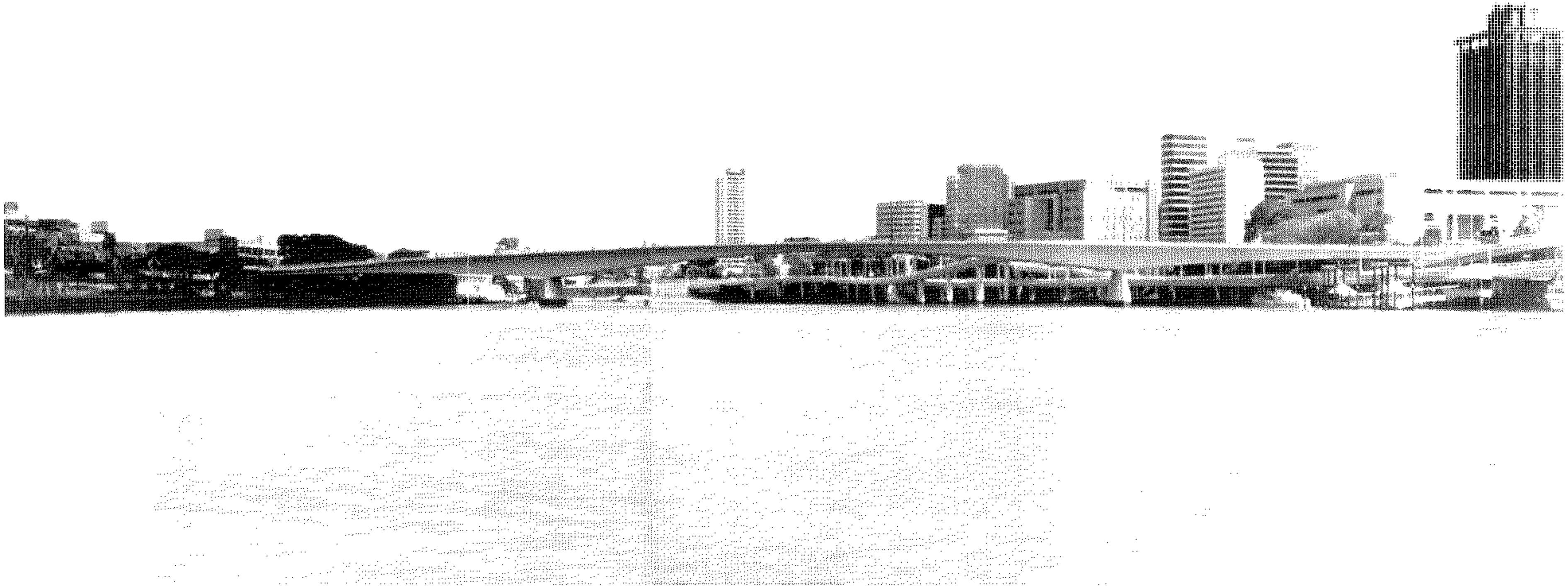
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER SURFACE ELEVATION	MAX AFFLUX	AREA		VELOCITY	
(years)	QWEIR (m³/s)	QSTRUCTURE (m³/s)	(m AHD)	(mm)	WEIR (m²)	STRUCTURE (m²)	WEIR (m/s)	STRUCTURE (m/s)
PMF	3523	32348	20.07	1920	931	4217	5.6	7.1
10 000	961	27920	16.61	110	271	4174	5.5	6.4
2 000	95	19900	12.55	300	93	4148	1.8	4.7
1 000	60	17389	11.42	380	42	4072	1.2	4.2
500	-	13786	9.36	270	-	3688	-	3.6
200	-	11363	7.88	210	-	3497	-	3.15
100	-	9223	6.42	180	-	3335	-	2.7
50	-	7066	4.92	150	-	2985	-	2.3
20	-	3397	2.28	80	-	2288	-	1.45
10	-	1586	1.26	20	-	2061	-	0.76
5	-	949	1.06	10	-	1964	-	0.5
2	-	423	0.96	10	-	1966	-	0.29

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 5-VICTORIA BRIDGE (LOOKING UPSTREAM)

CAPTAIN COOK BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	Mar-95
LOCATION:	Riverside Expressway	UBD REF:	159 R16
AERIAL PHOTO No:	Film BCC100, Sheet 3	STRUCTURE ID	S6
BCC XS No:	BN 600	AMTD(m):	24 000

STRUCTURE DESCRIPTION: Bridge; Concrete piers, girders and deck.

STRUCTURE SIZE: 1 @ 42.7m; 1 @ 182.9m; 1 @ 146.3m; 1 @ 109.7m; 1 @ 73.2m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9
UPSTREAM OBVERT LEVEL: 4.8

DOWNSTREAM INVERT LEVEL: -15.4
For culverts give floor level.
DOWNSTREAM OBVERT LEVEL: 4.8
For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? YES - XSECTION BN600
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 27.1m LOWEST POINT OF WEIR (m AHD): 8.8m PIER WIDTH: 5.6m (Base)
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1968 PLAN NUMBER:

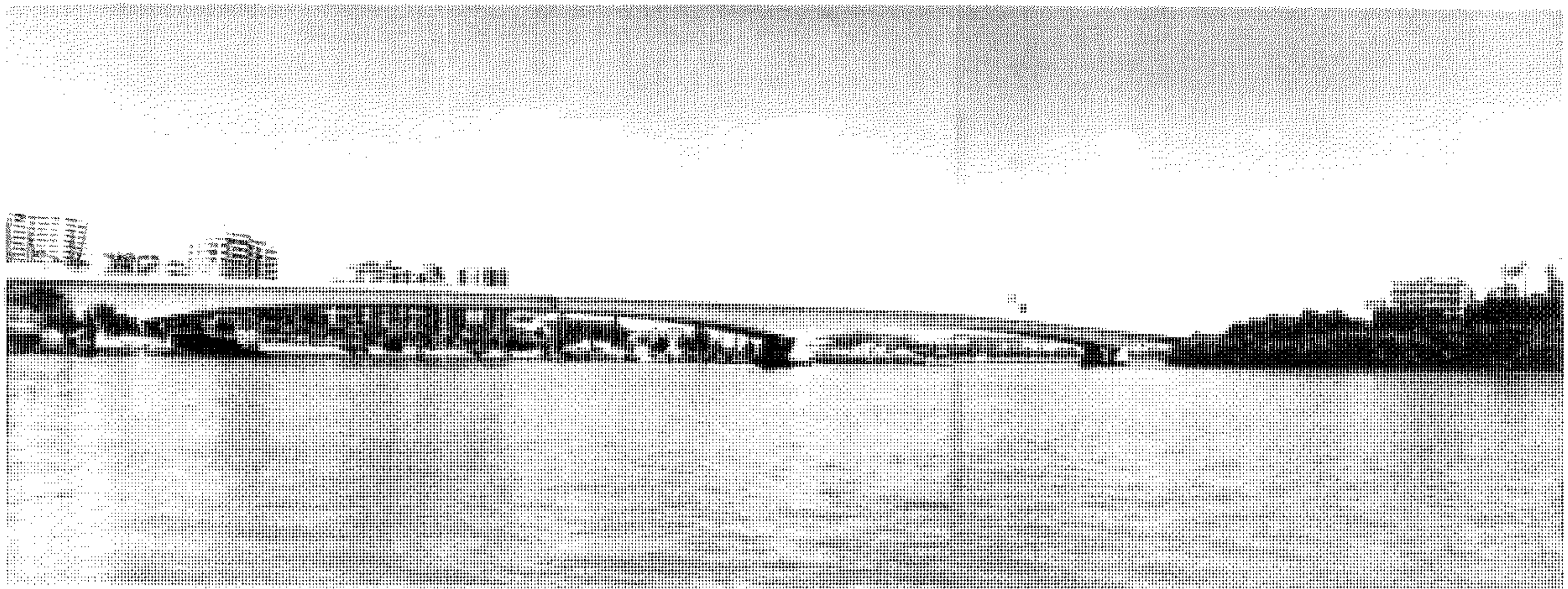
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER SURFACE ELEVATION	MAX AFFLUX	AREA		VELOCITY	
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	(m AHD)	(mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	2921	33049	17.86	500	1450	7332	2.5	4.3
10 000	1085	27618	15.15	260	794	7277	1.9	3.65
2 000	124	19869	11.69	150	117	6680	1.8	2.9
1 000	15	17399	10.48	120	56	6385	1.1	2.65
500	-	13739	8.54	100	-	5530	-	2.4
200	-	11360	7.14	90	-	5137	-	2.15
100	-	9229	5.78	80	-	4494	-	2
50	-	7033	4.36	60	-	3913	-	1.75
20	-	3397	2.01	30	-	3015	-	1.1
10	-	1586	1.19	10	-	2747	-	0.57
5	-	949	1.03	10	-	2654	-	0.37
2	-	424	0.95	0	-	2719	-	0.21

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 6-CAPTAIN COOK BRIDGE (LOOKING UPSTREAM)

STORY BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK:	Brisbane River	DATE OF SURVEY	Mar-95
LOCATION:	Bradfield Highway	UBD REF:	160 B9
AERIAL PHOTO No:	Film BCC100, Sheet 3	STRUCTURE ID	S7
BCC XS No:	BN 495	AMTD(m):	21 740

STRUCTURE DESCRIPTION: Suspension bridge; Steel superstructure, concrete piers.
Single span with cantilever ends and an extensive southern approach.

STRUCTURE SIZE: Centre span: 281.6m; Cantilever ends: 82.1m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL: -15.9 UPSTREAM OBVERT LEVEL: 17.4

DOWNSTREAM INVERT LEVEL: -15.5 DOWNSTREAM OBVERT LEVEL: 17.4
For culverts give floor level. For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? YES - XSECTION BN495
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 28.2m LOWEST POINT OF WEIR (m AHD): 29.8m PIER WIDTH: 9.6m (Base)
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1935 PLAN NUMBER:

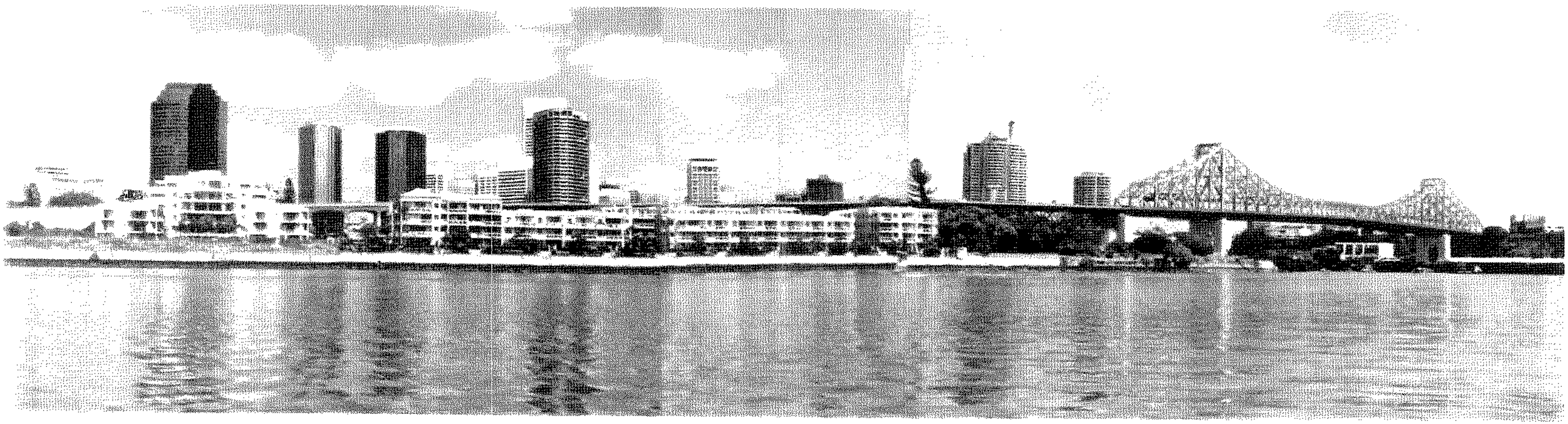
HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity

SUMMARY OF STRUCTURE CHARACTERISTICS

ARI	DISCHARGE		WATER SURFACE ELEVATION	MAX AFFLUX	AREA		VELOCITY	
(years)	QWEIR (m^3/s)	QSTRUCTURE (m^3/s)	(m AHD)	(mm)	WEIR (m^2)	STRUCTURE (m^2)	WEIR (m/s)	STRUCTURE (m/s)
PMF	-	35862	16.59	270	-	7479	-	4.7
10 000	-	28658	14.19	240	-	6472	-	4.3
2 000	-	19991	10.9	180	-	5128	-	3.8
1 000	-	17413	9.74	170	-	4585	-	3.7
500	-	13737	7.88	150	-	4021	-	3.3
200	-	11330	6.53	120	-	3550	-	3.1
100	-	9143	5.22	100	-	3179	-	2.8
50	-	7028	3.93	80	-	2851	-	2.4
20	-	3397	1.84	30	-	2369	-	1.4
10	-	1586	1.14	10	-	2175	-	0.72
5	-	950	1	0	-	2137	-	0.46
2	-	424	0.95	10	-	2119	-	0.27

Note: Qweir & Qstructure are the maximum discharges through the structure and maynot occur at the same time.



STRUCTURE 7-STORY BRIDGE (LOOKING UPSTREAM)

GATEWAY BRIDGE

HYDRAULIC STRUCTURE REFERENCE SHEET - VERS 3.1

CREEK: Brisbane River		DATE OF SURVEY	NA
LOCATION: Gateway Motorway		UBD REF:	141 M20
AERIAL PHOTO No:	Film BCC100, Sheet 2	STRUCTURE ID	
BCC XS No:	BN210	AMTD(m):	10 000

STRUCTURE DESCRIPTION: Bridge; Concrete piers, girders and deck.
Single span with cantilever ends and extensive north and south approachs.

STRUCTURE SIZE: Centre span: 260m; Contilever ends: 130m.
For Culverts: Number of cells/pipes & sizes For Bridges: Number of Spans & their lengths.

UPSTREAM INVERT LEVEL:
UPSTREAM OBVERT LEVEL:

DOWNSTREAM INVERT LEVEL:
For culverts give floor level.
DOWNSTREAM OBVERT LEVEL:
For bridges give bed level.

For Culverts
LENGTH OF CULVERT BARREL AT INVERT (m):

LENGTH OF CULVERT BARREL AT OBVERT (m):

TYPE OF LINING:
(e.g. concrete, stones, brick, corrugated iron)

IS THERE A SURVEYED WEIR PROFILE? NO
If yes give details ie. plan number and/or survey book number.
Note This Section should be the highest part of the road eg crown, kerb, hand rails guard rails whichever is higher.

WEIR WIDTH (m): 21.9m LOWEST POINT OF WEIR (m AHD): >PMF Flood Level PIER WIDTH: 13.5m
(In the direction of flow, ie. distance from u/s face to d/s face)

HEIGHT OF GUARD RAILS: 1067 mm

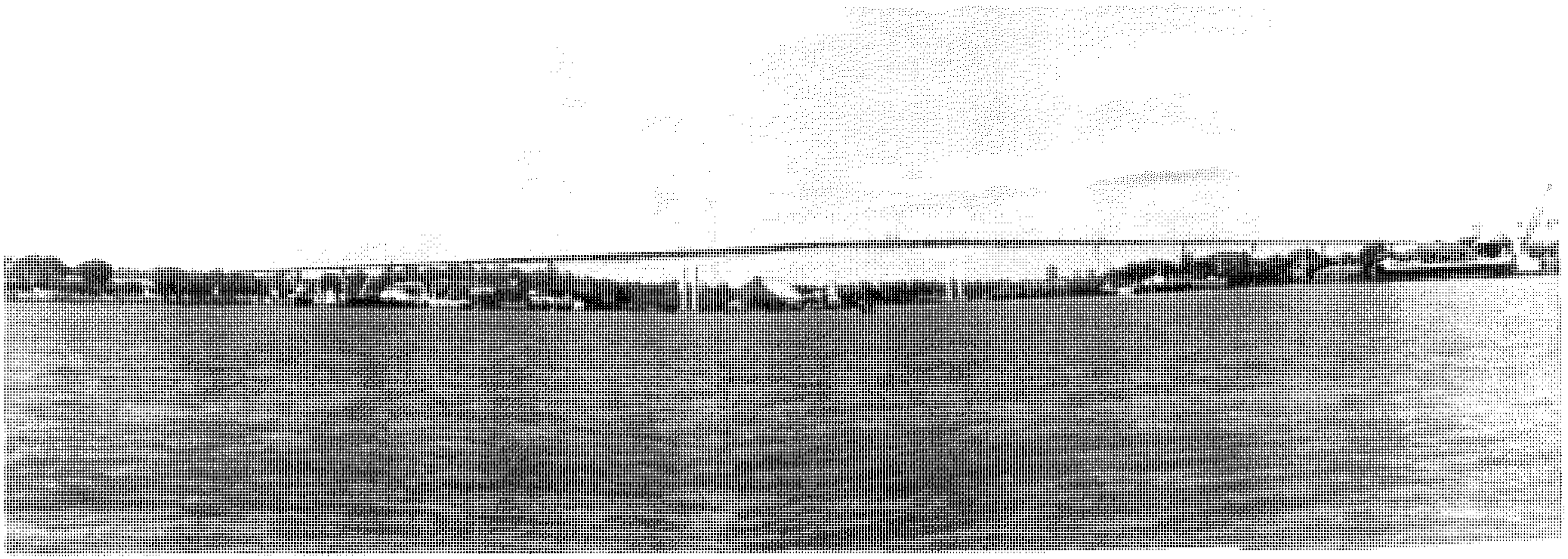
DESCRIPTION OF ALL HAND AND GAURD RAILS AND HEIGHTS TO TOP AND UNDERSIDE OF GUARD RAILS.

The following should also be provided.
Wingwall and Headwall details, entrance details eg pipe flush with embankment or projecting, socket or square end, details of entrance rounding, levels.
For Bridges, details of piers and section under bridge including abutment details.
Specify Survey Book No.

CONSTRUCTION DATE OF CURRENT STRUCTURE: 1981 PLAN NUMBER: .

HAS THE STRUCTURE BEEN UPGRADED? No
If yes, explain type and date of upgrade. Include plan number and location if applicable.

ADDITIONAL COMMENTS: Greater than 100 year ARI immunity



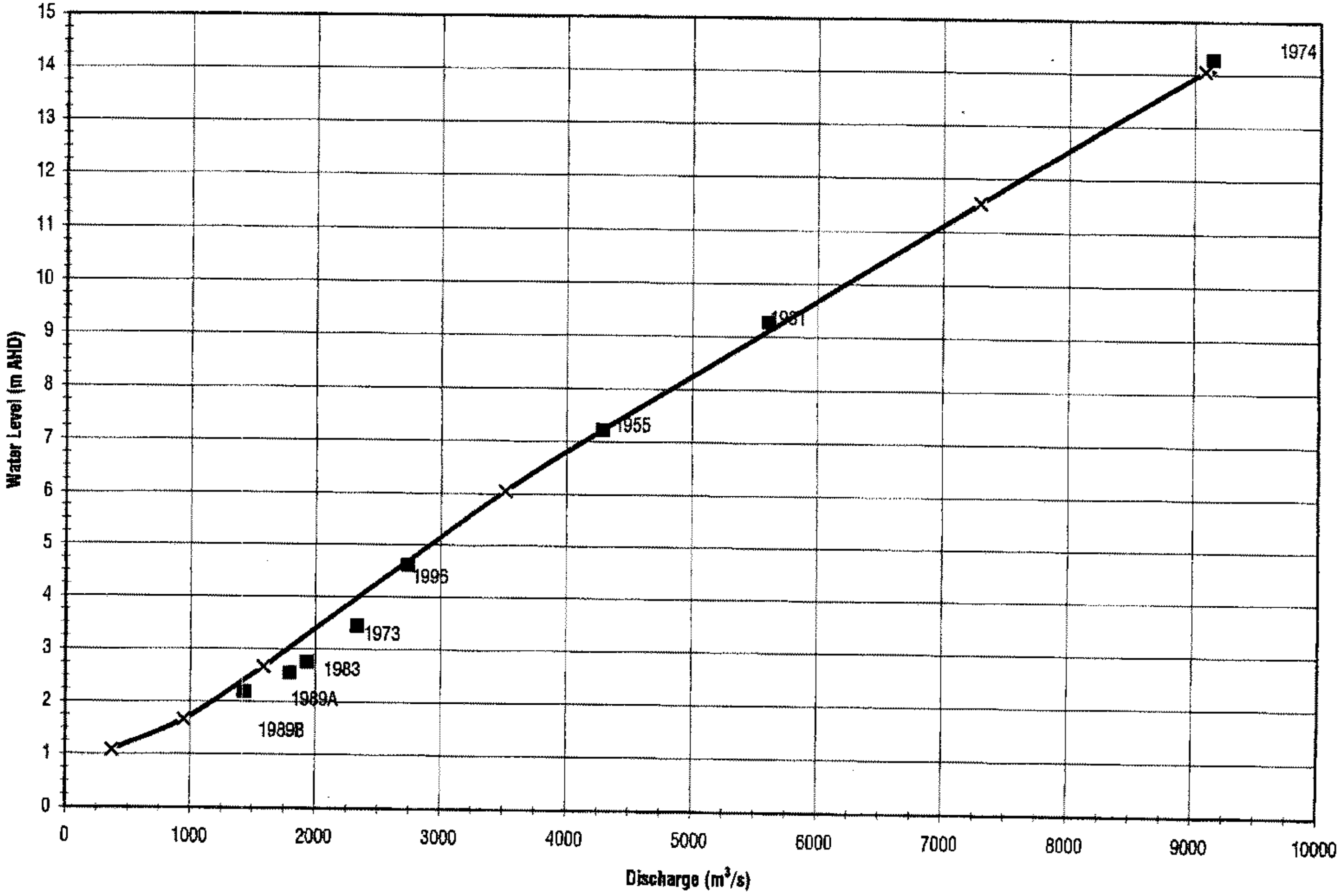
STRUCTURE 8-GATEWAY BRIDGE (LOOKING UPSTREAM)

Appendix L - Rating Curves at Structures

Centenary Bridge
CH 1028.72

Q (m³/s)	Design WL (m AHD)
371	1.08
949	1.66
1587	2.67
3516	6.05
7294	11.54
9085	14.06

Figure L-1 - Centenary Bridge Rating Curve (CH 1028.72 km)



Indooroopilly Bridge
1037.11

Q (m^3/s)	Design WL (m AHD)
372	1.03
949	1.35
1587	2
3487	4.47
7227	8.98
9392	11.07

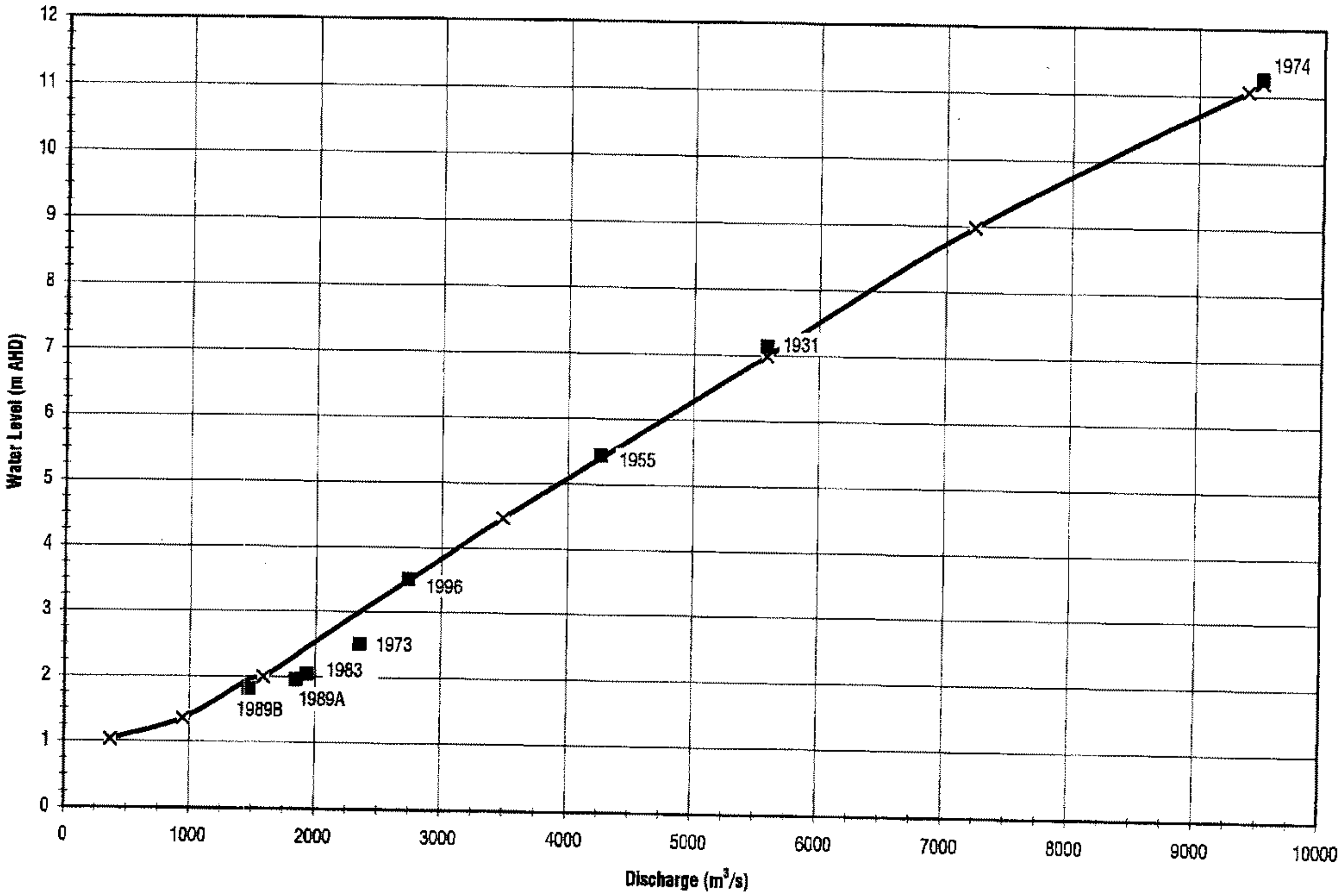


Figure L-2 - Indooroopilly Bridge Rating Curve (CH 1037.11 km)

Merivale Bridge
1052.37

Q (m³/s)	Design WL (m AHD)
423	0.97
949	1.08
1586	1.32
3397	2.49
7079	5.65
9250	7.40

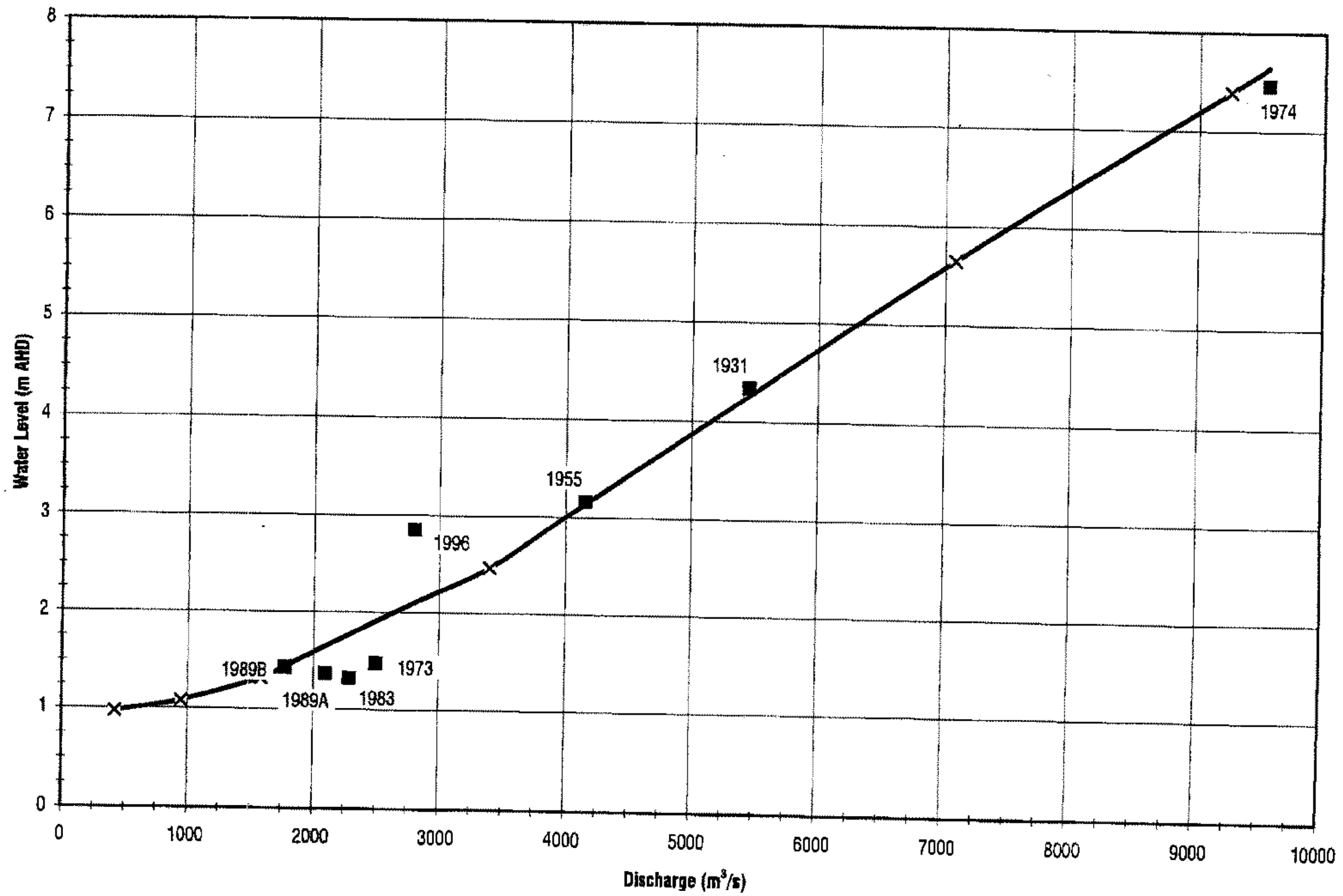
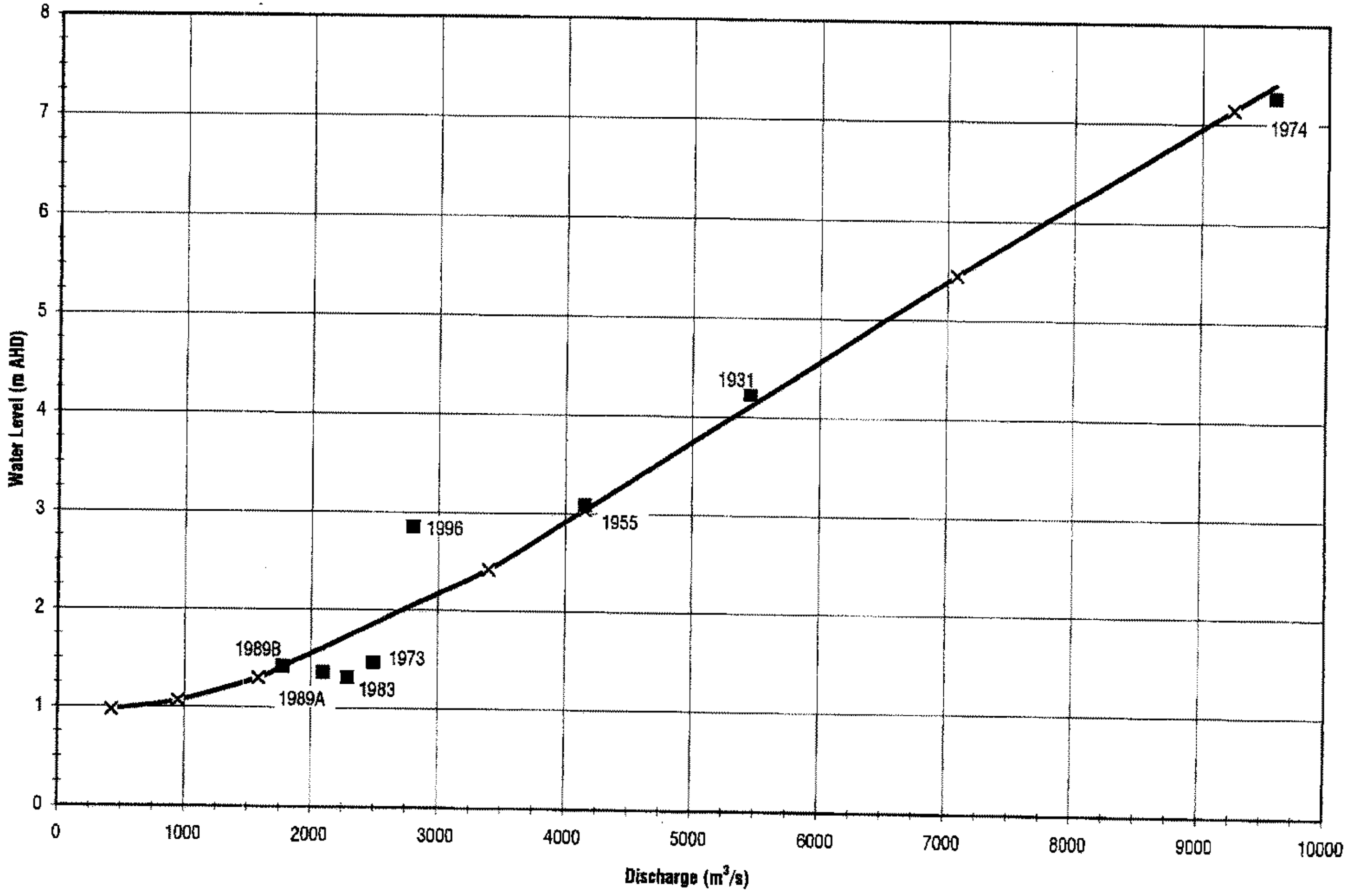


Figure L-3 - Merivale Bridge Rating Curve (CH 1052.37 km)

William Jolly Bridge
1052.625

Q (m³/s)	Design WL (m AHD)
423	0.97
949	1.07
1586	1.30
3397	2.42
7074	5.45
9248	7.14

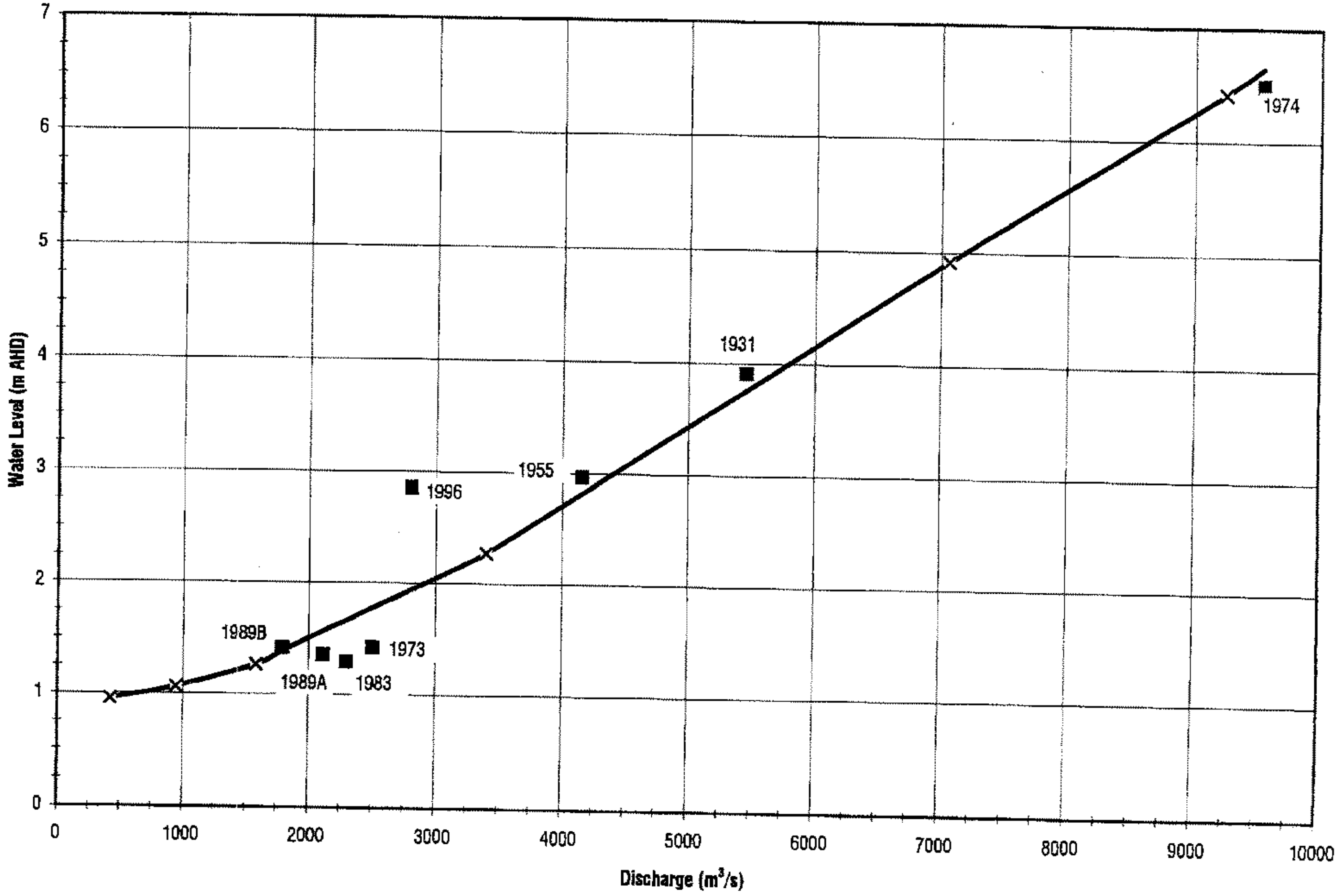
Figure L-4 - William Jolly Bridge Rating Curve (CH 1052.63 km)



Victoria Bridge
1053.355

Q (m³/s)	Design WL (m AHD)
423	0.95
949	1.06
1586	1.26
3397	2.28
7066	4.92
9240	6.42

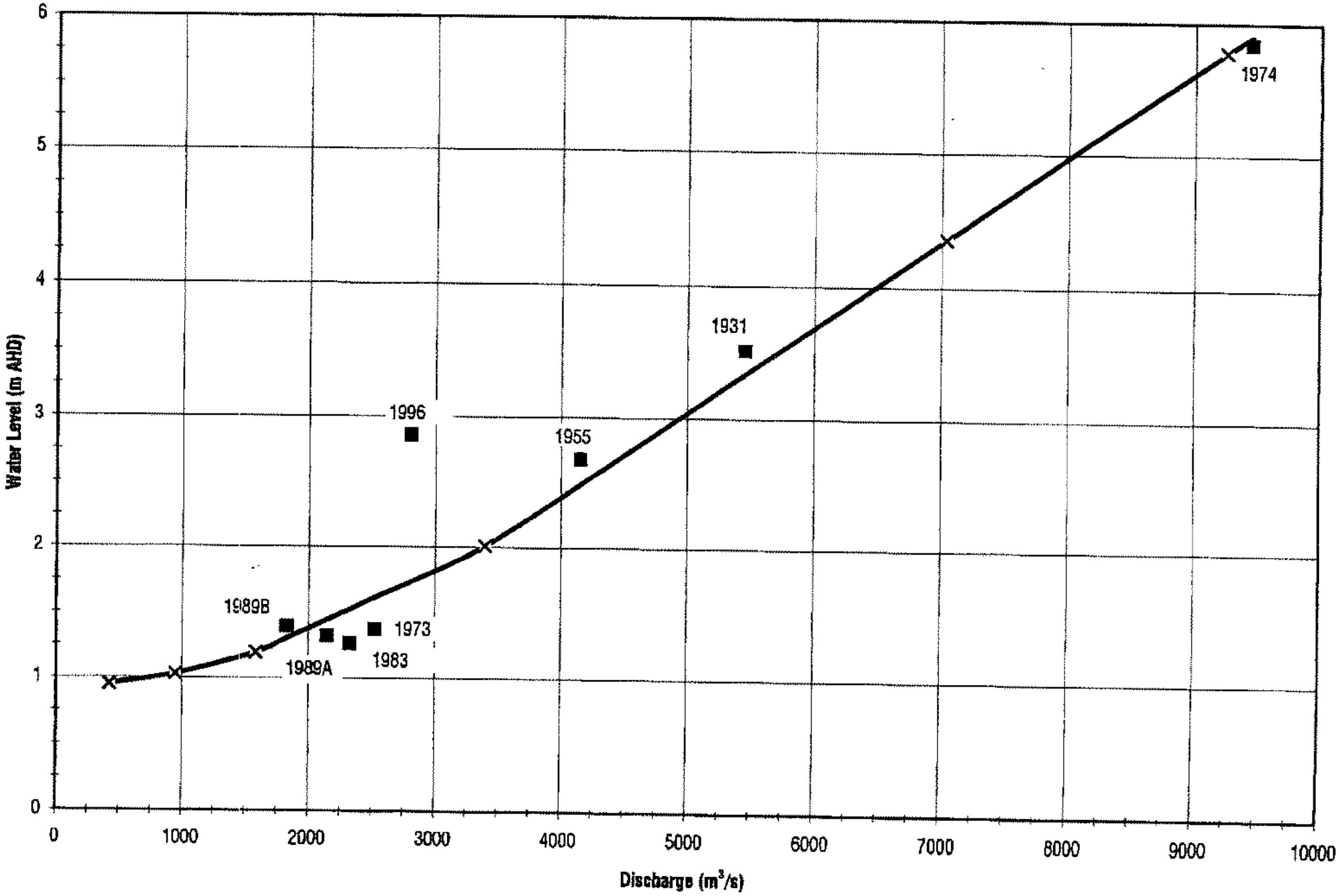
Figure L-5 - Victoria Bridge Rating Curve (CH 1053.36 km)



Captain Cook Bridge
1054.66

Q (m^3/s)	Design WL (m AHD)
424	0.95
949	1.03
1586	1.19
3397	2.01
7039	4.36
9253	5.78

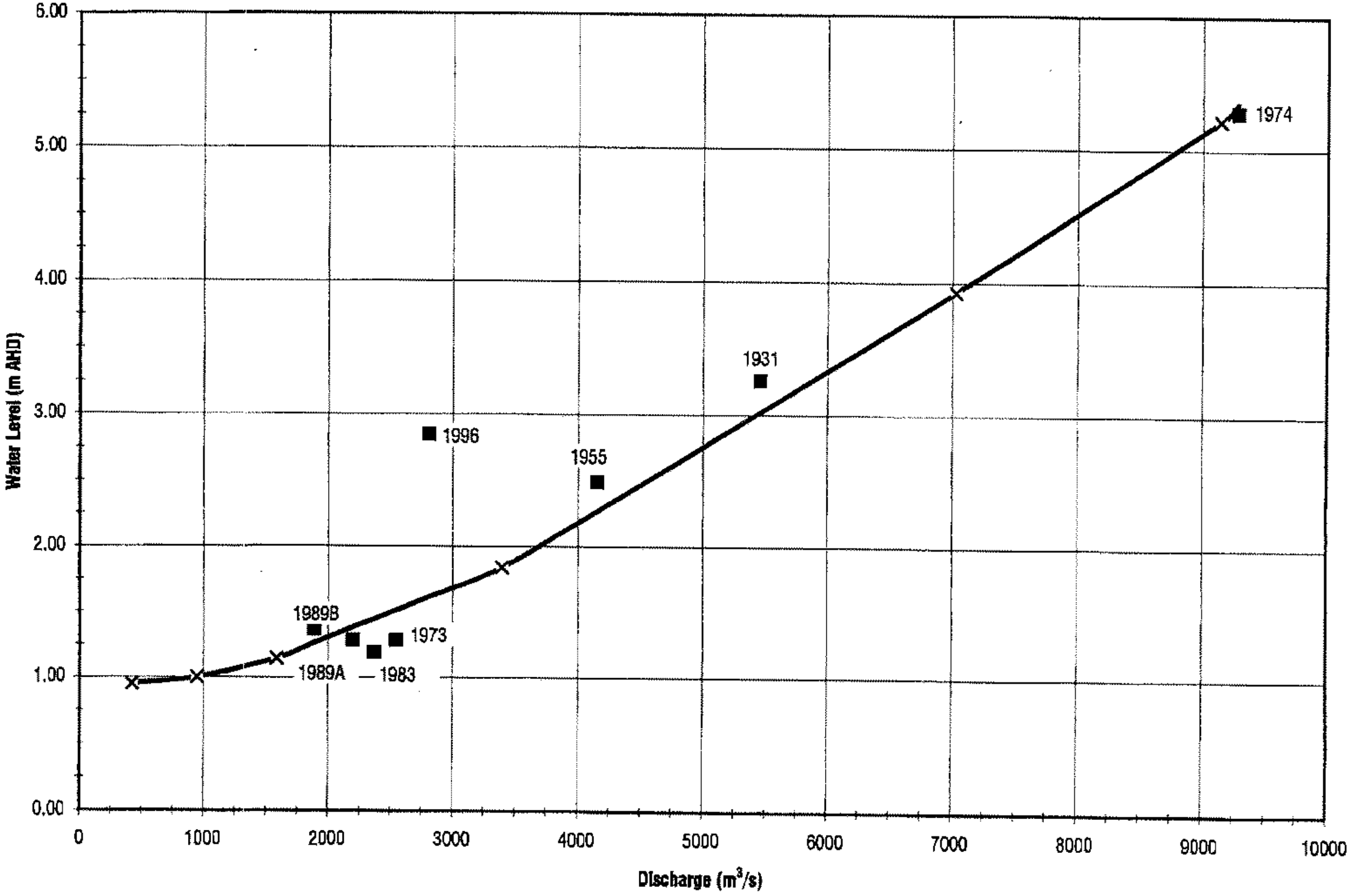
Figure L-6 - Captain Cook Bridge Rating Curve (CH 1054.66 km)

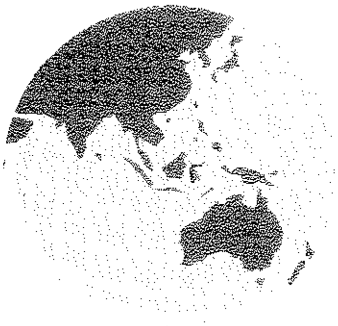


Story Bridge
1056.92

Q (m^3/s)	Design WL (m AHD)
424	0.95
950	1.00
1586	1.14
3397	1.84
7028	3.93
9143	5.22

Figure L-7 - Story Bridge Rating Curve (CH 1056.92 km)





Appendix M - Flood Forecasting Model Results

TABLE M-1 - Flood Forecasting Model Results

				1996 Flood Event					100 Year ARI Event		
MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	Small "n" MIKE 11 WL (m AHD)	Small "n" FF Model WL (m AHD)	Small "n" Difference (m)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)	Large "n" MIKE 11 WL (m AHD)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)
1000	78.66	BN 2020		9.49	9.5	0.01	9.9	0.41	22.76	22.76	0.00
1000.285	78.375	BN 2010		9.40	9.41	0.01	9.82	0.42	22.57	22.57	0.00
1000.775	77.885	BN 2000		9.23	9.24	0.01	9.68	0.45	22.29	22.29	0.00
1001.315	77.345	BN 1990		9.09	9.1	0.01	9.58	0.49	22.20	22.20	0.00
1001.865	76.795	BN 1980		8.84	8.85	0.01	9.38	0.54	21.68	21.68	0.00
1002.35	76.310	BN 1970		8.57	8.58	0.01	9.19	0.62	21.48	21.48	0.00
1002.785	75.875	BN 1960		8.47	8.48	0.01	9.15	0.68	21.46	21.46	0.00
1003.275	75.385	BN 1950		8.25	8.26	0.01	8.99	0.74	21.13	21.13	0.00
1003.775	74.885	BN 1940		8.06	8.07	0.01	8.84	0.78	20.86	20.86	0.00
1004.3	74.360	BN 1930		7.80	7.82	0.02	8.62	0.82	20.41	20.41	0.00
1004.81	73.850	BN 1920		7.68	7.69	0.01	8.53	0.85	20.37	20.38	0.01
1005.325	73.335	BN 1910		7.53	7.55	0.02	8.41	0.88	20.20	20.20	0.00
1005.87	72.790	BN 1900		7.38	7.39	0.01	8.23	0.85	19.89	19.89	0.00
1006.3	72.360	BN 1890	Moggill Gauge	7.37	7.39	0.02	8.17	0.80	19.72	19.72	0.00
1006.91	71.750	BN 1880		7.27	7.28	0.01	8	0.73	19.51	19.51	0.00
1007.41	71.250	BN 1870		7.21	7.22	0.01	7.91	0.70	19.48	19.48	0.00
1007.92	70.740	BN 1860		7.04	7.05	0.01	7.75	0.71	19.19	19.19	0.00
1008.445	70.215	BN 1850		6.99	7.01	0.02	7.66	0.67	19.02	19.02	0.00
1008.925	69.735	BN 1840		6.93	6.95	0.02	7.61	0.68	18.96	18.96	0.00
1009.4	69.260	BN 1830		6.85	6.87	0.02	7.54	0.69	18.86	18.86	0.00
1009.72	68.940	BN 1820		6.81	6.83	0.02	7.51	0.70	18.85	18.85	0.00
1010.49	68.170	BN 1810		6.65	6.67	0.02	7.37	0.72	18.50	18.50	0.00
1010.725	67.935	BN 1800		6.65	6.66	0.01	7.37	0.72	18.52	18.52	0.00
1010.98	67.680	BN 1790		6.60	6.62	0.02	7.33	0.73	18.44	18.44	0.00
1011.51	67.150	BN 1780		6.54	6.56	0.02	7.28	0.74	18.43	18.43	0.00
1011.98	66.680	BN 1770		6.47	6.49	0.02	7.22	0.75	18.43	18.43	0.00
1012.475	66.185	BN 1760		6.39	6.41	0.02	7.14	0.75	18.33	18.33	0.00
1012.935	65.725	BN 1750		6.32	6.34	0.02	7.07	0.75	18.22	18.22	0.00
1013.445	65.215	BN 1740		6.26	6.28	0.02	7.01	0.75	18.14	18.14	0.00
1013.91	64.750	BN 1730		6.19	6.21	0.02	6.94	0.75	18.08	18.08	0.00
1014.31	64.350	BN 1720		6.11	6.13	0.02	6.87	0.76	18.05	18.05	0.00
1014.61	64.050	BN 1710	Goodna Hospital Gauge	6.06	6.08	0.02	6.82	0.76	18.08	18.08	0.00
1015.09	63.570	BN 1700		6.05	6.07	0.02	6.8	0.75	17.94	17.95	0.01
1015.56	63.100	BN 1690		5.97	6	0.03	6.73	0.76	17.81	17.81	0.00
1016.14	82.520	BN 1680		5.91	5.94	0.03	6.67	0.76	17.71	17.72	0.01
1016.64	62.020	BN 1670		5.80	5.82	0.02	6.57	0.77	17.62	17.62	0.00
1017.13	61.530	BN 1660		5.66	5.68	0.02	6.4	0.74	17.39	17.39	0.00
1017.61	61.050	BN 1650		5.56	5.58	0.02	6.23	0.67	17.26	17.26	0.00
1017.92	60.740	BN 1640		5.48	5.51	0.03	6.12	0.64	17.10	17.10	0.00
1018.2	60.460	BN 1630		5.49	5.51	0.02	6.08	0.59	17.02	17.03	0.01
1018.725	59.935	BN 1620		5.42	5.45	0.03	5.96	0.54	16.69	16.70	0.01
1019.095	59.565	BN 1610		5.37	5.39	0.02	5.86	0.49	16.56	16.56	0.00
1019.49	59.170	BN 1600		5.33	5.36	0.03	5.78	0.45	16.45	16.45	0.00
1019.865	58.795	BN 1590		5.28	5.31	0.03	5.68	0.40	16.15	16.15	0.00
1020.115	58.545	BN 1580		5.28	5.3	0.02	5.64	0.36	16.25	16.25	0.00
1020.525	58.135	BN 1570		5.27	5.3	0.03	5.6	0.33	16.22	16.22	0.00
1020.89	57.830	BN 1560		5.23	5.25	0.02	5.53	0.30	16.07	16.07	0.00
1021.095	57.565	BN 1550		5.16	5.19	0.03	5.45	0.29	15.86	15.86	0.00
1021.539	57.121	BN 1540		5.10	5.13	0.03	5.33	0.23	15.69	15.69	0.00
1021.715	56.945	BN 1530		5.10	5.13	0.03	5.31	0.21	15.72	15.72	0.00
1021.895	56.765	BN 1520		5.09	5.12	0.03	5.28	0.19	15.65	15.65	0.00
1022.105	56.555	BN 1510		5.09	5.11	0.02	5.26	0.17	15.53	15.53	0.00
1022.575	56.085	BN 1500		5.02	5.05	0.03	5.18	0.16	15.45	15.46	0.01
1023.04	55.620	BN 1490		4.92	4.95	0.03	5.1	0.18	15.21	15.21	0.00
1023.57	55.090	BN 1480		4.88	4.91	0.03	5.08	0.20	15.12	15.12	0.00
1024.08	54.580	BN 1470		4.81	4.84	0.03	5.02	0.21	15.07	15.07	0.00
1024.563	54.097	BN 1460		4.72	4.75	0.03	4.94	0.22	15.01	15.01	0.00
1025.07	53.590	BN 1450		4.67	4.7	0.03	4.88	0.21	14.91	14.91	0.00
1025.36	53.300	BN 1440		4.60	4.64	0.04	4.81	0.21	14.77	14.77	0.00
1025.59	53.070	BN 1430		4.54	4.57	0.03	4.74	0.20	14.61	14.61	0.00
1026.17	52.490	BN 1420		4.51	4.54	0.03	4.7	0.19	14.48	14.49	0.01
1026.68	51.980	BN 1410	Mt Ommaney Gauge	4.43	4.46	0.03	4.61	0.18	14.38	14.38	0.00
1026.9	51.760	BN 1400		4.38	4.42	0.04	4.56	0.18	14.25	14.25	0.00
1027.16	51.500	BN 1390		4.35	4.39	0.04	4.52	0.17	14.11	14.11	0.00
1027.68	50.980	BN 1380		4.32	4.36	0.04	4.5	0.18	14.17	14.17	0.00
1028.18	50.480	BN 1370		4.27	4.31	0.04	4.48	0.21	14.19	14.20	0.01
1028.68	49.980	BN 1360		4.17	4.21	0.04	4.43	0.26	14.06	14.06	0.00
1028.72	49.940	BN1350	Centenary Bridge								
1028.76	49.900	BN 1340		4.08	4.12	0.04	4.35	0.27	13.91	13.91	0.00
1029.2	49.460	BN 1330		3.98	4.03	0.05	4.29	0.31	13.80	13.80	0.00
1029.68	48.980	BN 1320		3.95	3.99	0.04	4.28	0.33	13.82	13.82	0.00
1030.22	48.440	BN 1310		3.89	3.93	0.04	4.26	0.37	13.82	13.82	0.00
1030.87	47.790	BN 1300		3.79	3.84	0.05	4.23	0.44	13.75	13.75	0.00
1031.26	47.400	BN 1290		3.71	3.76	0.05	4.18	0.47	13.59	13.59	0.00
1031.7	46.960	BN 1280	Darra Wharf Gauge	3.59	3.65	0.06	4.04	0.45	13.21	13.21	0.00
1031.995	46.665	BN 1270		3.60	3.65	0.05	3.99	0.39	13.31	13.31	0.00
1032.23	46.430	BN 1260		3.57	3.62	0.05	3.94	0.37	13.18	13.18	0.00
1032.585	46.075	BN 1250		3.52	3.57	0.05	3.85	0.33	12.94	12.94	0.00
1033.08	45.580	BN 1240		3.48	3.54	0.06	3.79	0.31	12.79	12.79	0.00
1033.37	45.290	BN 1230		3.43	3.49	0.06	3.73	0.30	12.68	12.68	0.00
1033.9	44.760	BN 1220		3.35	3.41	0.06	3.65	0.30	12.45	12.45	0.00
1034.37	44.290	BN 1210		3.29	3.35	0.06	3.6	0.31	12.29	12.29	0.00
1034.89	43.770	BN 1200	Sherwood Gauge	3.23	3.29	0.06	3.53	0.30	12.19	12.19	0.00

TABLE M-1 - Flood Forecasting Model Results

				1996 Flood Event					100 Year ARI Event		
MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	Small "n" MIKE 11 WL (m AHD)	Small "n" FF Model WL (m AHD)	Small "n" Difference (m)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)	Large "n" MIKE 11 WL (m AHD)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)
1035.414	43.246	BN 1190		3.15	3.21	0.06	3.42	0.27	11.94	11.94	0.00
1035.9	42.760	BN 1180		3.06	3.12	0.06	3.29	0.23	11.65	11.66	0.01
1036.46	42.200	BN 1170		2.98	3.05	0.07	3.17	0.19	11.35	11.35	0.00
1036.77	41.890	BN 1160		2.95	3.02	0.07	3.11	0.16	11.28	11.28	0.00
1036.915	41.745	BN 1150		2.92	2.99	0.07	3.06	0.14	11.12	11.12	0.00
1037.09	41.570	BN 1140		2.93	2.99	0.06	3.06	0.13	11.07	11.07	0.00
1037.11	41.550	BN 1130	Indooroopilly Bridge								
1037.175	41.485	BN 1120		2.79	2.86	0.07	2.93	0.14	10.98	10.98	0.00
1037.286	41.375	BN 1110	Clarence Road Gauge	2.77	2.84	0.07	2.9	0.13	10.93	10.93	0.00
1037.826	41.035	BN 1100		2.73	2.81	0.08	2.86	0.13	10.91	10.91	0.00
1038.085	40.575	BN 1090		2.72	2.79	0.07	2.85	0.13	10.93	10.93	0.00
1038.6	40.060	BN 1080		2.63	2.71	0.08	2.8	0.17	10.91	10.91	0.00
1039.1	39.560	BN 1070		2.54	2.62	0.08	2.77	0.23	10.90	10.90	0.00
1039.565	39.095	BN 1060	Oxley Creek Gauge	2.49	2.57	0.08	2.76	0.27	10.92	10.92	0.00
1040.09	38.570	BN 1050	King Author Terrace Gauge	2.46	2.55	0.09	2.76	0.30	10.84	10.84	0.00
1040.49	38.170	BN 1040		2.40	2.48	0.08	2.71	0.31	10.71	10.71	0.00
1041.01	37.650	BN 1030		2.38	2.46	0.08	2.71	0.33	10.74	10.75	0.01
1041.23	37.430	BN 1020		2.36	2.44	0.08	2.68	0.32	10.71	10.71	0.00
1041.46	37.200	BN 1010	Tennyson Power House Gauge	2.32	2.4	0.08	2.64	0.32	10.62	10.62	0.00
1041.7	36.960	BN 1000		2.32	2.4	0.08	2.64	0.32	10.59	10.59	0.00
1041.96	36.700	BN 990	Yeronga Street Gauge	2.27	2.34	0.07	2.58	0.31	10.45	10.45	0.00
1042.235	36.425	BN 980		2.21	2.29	0.08	2.53	0.32	10.30	10.30	0.00
1042.515	36.145	BN 970		2.20	2.28	0.08	2.52	0.32	10.29	10.29	0.00
1042.91	35.750	BN 960		2.12	2.19	0.07	2.44	0.32	10.22	10.23	0.01
1043.725	34.935	BN 950		1.94	2.01	0.07	2.28	0.34	9.91	9.91	0.00
1044.06	34.600	BN 940	Sandy Creek Gauge	1.91	1.98	0.07	2.24	0.33	9.75	9.75	0.00
1044.34	34.320	BN 930		1.86	1.92	0.06	2.18	0.32	9.58	9.59	0.01
1044.605	34.055	BN 920		1.84	1.9	0.06	2.15	0.31	9.53	9.53	0.00
1044.86	33.800	BN 910		1.81	1.87	0.06	2.11	0.30	9.49	9.50	0.01
1045.4	33.260	BN 900		1.73	1.79	0.06	2.01	0.28	9.31	9.31	0.00
1045.885	32.775	BN 890		1.71	1.72	0.01	1.9	0.19	9.17	9.17	0.00
1046.18	32.460	BN 880		1.71	1.72	0.01	1.89	0.18	9.09	9.09	0.00
1046.34	32.320	BN 870	Dutton Park Cemetery Gauge	1.71	1.72	0.01	1.88	0.17	9.02	9.02	0.00
1046.58	32.080	BN 860		1.70	1.72	0.02	1.85	0.15	8.97	8.97	0.00
1046.9	31.760	BN 850		1.70	1.71	0.01	1.77	0.07	8.78	8.78	0.00
1047.35	31.310	BN 840		1.70	1.71	0.01	1.72	0.02	8.41	8.41	0.00
1047.915	30.745	BN 830	Highgate Hill Gauge	1.70	1.71	0.01	1.72	0.02	8.17	8.17	0.00
1048.375	30.285	BN 820		1.69	1.7	0.01	1.72	0.03	8.23	8.24	0.01
1048.89	29.770	BN 810	St Lucia Ferry Gauge	1.69	1.7	0.01	1.71	0.02	8.00	8.00	0.00
1049.12	29.540	BN 800		1.69	1.7	0.01	1.71	0.02	7.94	7.94	0.00
1049.37	29.290	BN 790		1.69	1.69	0.00	1.71	0.02	7.75	7.76	0.01
1049.59	29.070	BN 780		1.68	1.69	0.01	1.7	0.02	7.74	7.74	0.00
1049.87	28.790	BN 770		1.68	1.69	0.01	1.7	0.02	7.63	7.63	0.00
1050.43	28.230	BN 760		1.68	1.68	0.00	1.7	0.02	7.61	7.61	0.00
1050.86	27.800	BN 750		1.67	1.68	0.01	1.69	0.02	7.46	7.46	0.00
1051.38	27.300	BN 740		1.67	1.68	0.01	1.69	0.02	7.46	7.46	0.00
1051.895	26.765	BN 730		1.67	1.67	0.00	1.68	0.01	7.30	7.30	0.00
1052.31	26.350	BN 720		1.66	1.67	0.01	1.68	0.02	7.40	7.41	0.01
1052.37	26.290	BN 710	Merivale Bridge								
1052.39	26.270	BN 700		1.66	1.66	0.00	1.68	0.02	7.23	7.23	0.00
1052.595	26.065	BN 690		1.66	1.66	0.00	1.67	0.01	7.14	7.14	0.00
1052.607	26.053	BN 680	William Jolly Bridge								
1052.64	26.020	BN 670		1.65	1.66	0.01	1.67	0.02	6.63	6.63	0.00
1052.865	25.795	BN 660	Montague Road Gauge	1.65	1.66	0.01	1.67	0.02	6.49	6.49	0.00
1053.32	25.340	BN 650		1.65	1.65	0.00	1.67	0.02	6.42	6.42	0.00
1053.356	25.304	BN 640	Victoria Bridge								
1053.385	25.275	BN630		1.65	1.65	0.00	1.66	0.01	6.24	6.24	0.00
1053.9	24.760	BN 620		1.64	1.65	0.01	1.66	0.02	5.85	5.85	0.00
1054.64	24.020	BN 610		1.64	1.64	0.00	1.65	0.01	5.78	5.78	0.00
1054.66	24.000	BN 600	Captain Cook Bridge								
1054.68	23.980	BN 590		1.64	1.64	0.00	1.65	0.01	5.70	5.70	0.00
1054.97	23.690	BN 560		1.64	1.64	0.00	1.65	0.01	5.45	5.45	0.00
1055.28	23.380	BN 550		1.64	1.64	0.00	1.65	0.01	5.40	5.40	0.00
1055.42	23.240	BN 540		1.64	1.64	0.00	1.64	0.00	5.40	5.40	0.00
1055.96	22.700	BN 530	Port Office Gauge	1.63	1.63	0.00	1.64	0.01	5.34	5.34	0.00
1056.4	22.260	BN 520		1.63	1.63	0.00	1.64	0.01	5.09	5.09	0.00
1056.695	21.965	BN 510		1.63	1.63	0.00	1.63	0.00	5.03	5.03	0.00
1056.865	21.795	BN 500		1.63	1.63	0.00	1.63	0.00	5.22	5.22	0.00
1056.92	21.740	BN 495	Story Bridge								
1056.95	21.710	BN 490		1.63	1.63	0.00	1.63	0.00	5.12	5.12	0.00
1057.09	21.570	BN 480		1.63	1.63	0.00	1.63	0.00	4.97	4.97	0.00
1057.53	21.130	BN 470		1.63	1.62	-0.01	1.63	0.00	4.83	4.83	0.00
1058.04	20.620	BN 460		1.62	1.62	0.00	1.63	0.01	4.58	4.58	0.00
1058.23	20.430	BN 450		1.62	1.62	0.00	1.63	0.01	4.50	4.50	0.00
1058.53	20.130	BN 440		1.62	1.62	0.00	1.62	0.00	4.37	4.37	0.00
1058.735	19.925	BN 430		1.62	1.62	0.00	1.62	0.00	4.41	4.41	0.00
1059.035	19.625	BN 420		1.62	1.61	-0.01	1.62	0.00	4.13	4.13	0.00
1059.54	19.120	BN 410		1.61	1.61	0.00	1.62	0.01	4.09	4.09	0.00
1059.99	18.670	BN 400		1.61	1.61	0.00	1.61	0.00	3.88	3.88	0.00
1060.345	18.315	BN 390		1.61	1.61	0.00	1.61	0.00	3.65	3.65	0.00
1060.535	18.125	BN 380		1.61	1.61	0.00	1.61	0.00	3.50	3.50	0.00
1061.015	17.645	BN 370		1.61	1.6	-0.01	1.61	0.00	3.45	3.45	0.00
1061.53	17.130	BN 360		1.60	1.6	0.00	1.6	0.00	3.24	3.24	0.00

TABLE M-1 - Flood Forecasting Model Results

				1998 Flood Event					100 Year ARI Event		
MIKE 11 CHAINAGE (km)	AMTD CHAINAGE (km)	CROSS SECTION NUMBER	STRUCTURE\GAUGE IDENTIFICATION	Small "n" MIKE 11 WL (m AHD)	Small "n" FF Model WL (m AHD)	Small "n" Difference (m)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)	Large "n" MIKE 11 WL (m AHD)	Large "n" FF Model WL (m AHD)	Large "n" Difference (m)
1062.02	16.640	BN 350		1.60	1.6	0.00	1.6	0.00	3.16	3.16	0.00
1062.535	16.125	BN 340		1.60	1.59	-0.01	1.6	0.00	3.12	3.12	0.00
1062.94	15.720	BN 330		1.59	1.59	0.00	1.59	0.00	3.11	3.11	0.00
1063.31	15.350	BN 320	Newstead Park Gauge	1.59	1.59	0.00	1.59	0.00	2.99	3.00	0.01
1063.645	15.015	BN 310	Cresent Road Gauge	1.59	1.59	0.00	1.59	0.00	2.72	2.72	0.00
1064	14.660	BN 300		1.59	1.58	-0.01	1.59	0.00	2.68	2.68	0.00
1064.49	14.170	BN 290		1.58	1.58	0.00	1.58	0.00	2.55	2.55	0.00
1065.01	13.650	BN 280		1.58	1.58	0.00	1.58	0.00	2.57	2.57	0.00
1065.503	13.157	BN 270		1.58	1.57	-0.01	1.58	0.00	2.53	2.53	0.00
1065.99	12.670	BN 260	Cairncross Dock Gauge	1.58	1.57	-0.01	1.58	0.00	2.54	2.54	0.00
1066.505	12.155	BN 250		1.57	1.57	0.00	1.57	0.00	2.46	2.46	0.00
1067.02	11.640	BN 240		1.57	1.57	0.00	1.57	0.00	2.43	2.43	0.00
1067.485	11.175	BN 230		1.57	1.57	0.00	1.57	0.00	2.32	2.32	0.00
1067.965	10.695	BN 220		1.57	1.56	-0.01	1.57	0.00	2.20	2.20	0.00
1068.66	10.000	BN 210		1.56	1.56	0.00	1.56	0.00	2.02	2.02	0.00
1069.045	9.615	BN 200		1.56	1.56	0.00	1.56	0.00	1.95	1.95	0.00
1069.535	9.125	BN 190	Bulimba Power House Gauge	1.56	1.56	-0.01	1.55	-0.01	1.89	1.89	0.00
1070.025	8.635	BN 180		1.55	1.55	0.00	1.55	0.00	1.82	1.82	0.00
1070.53	8.130	BN 170		1.55	1.55	0.00	1.55	0.00	1.72	1.72	0.00
1071.04	7.620	BN 160		1.55	1.54	-0.01	1.54	-0.01	1.64	1.64	0.00
1071.52	7.140	BN 150		1.54	1.54	0.00	1.54	0.00	1.67	1.67	0.00
1072.015	6.645	BN 140		1.54	1.54	0.00	1.54	0.00	1.56	1.56	0.00
1072.515	6.145	BN 130		1.54	1.53	-0.01	1.53	-0.01	1.50	1.50	0.00
1072.995	5.665	BN 120		1.53	1.53	0.00	1.53	0.00	1.46	1.46	0.00
1073.485	5.175	BN 110		1.53	1.53	0.00	1.53	0.00	1.36	1.36	0.00
1074	4.660	BN 100		1.53	1.52	-0.01	1.53	0.00	1.29	1.29	0.00
1074.46	4.200	BN 90		1.52	1.52	0.00	1.52	0.00	1.22	1.22	0.00
1074.985	3.675	BN 80		1.52	1.52	0.00	1.52	0.00	1.09	1.09	0.00
1075.48	3.180	BN 70		1.51	1.51	0.00	1.51	0.00	1.06	1.06	0.00
1076	2.660	BN 60		1.51	1.51	0.00	1.51	0.00	1.07	1.07	0.00
1076.495	2.165	BN 50		1.51	1.51	0.00	1.51	0.00	0.96	0.96	0.00
1077.01	1.650	BN 40		1.51	1.51	0.00	1.51	0.00	0.96	0.96	0.00
1077.51	1.150	BN 30		1.51	1.51	0.00	1.51	0.00	0.97	0.97	0.00
1078.04	0.620	BN 20		1.51	1.51	0.00	1.51	0.00	0.95	0.95	0.00
1078.525	0.135	BN 10		1.51	1.51	0.00	1.51	0.00	0.92	0.92	0.00

Appendix N - Community Consultation Information Bulletin/Questionnaire

Brisbane River Flood Study

Brisbane City

Our Brisbane - A Better Brisbane

We Need Your Help

About the study

As part of Brisbane City Council's ongoing commitment to the enhancement of Brisbane's waterways, a flood study is currently being undertaken of the Brisbane River from Moreton Bay to the City boundary at Moggill.

The aims of the study are to :

- calculate design flood levels along the length of the river;
- develop a flood forecasting model;
- set flood regulation lines along the river; and
- develop a revegetation strategy.

What is revegetation?

Brisbane City Council wants to enhance the urban amenity and environmental value of the waterways within Brisbane by identifying areas along river and creek corridors which are suitable for revegetation with endemic native trees and shrubs.

Revegetation however, is limited by local ownership and flooding constraints. It may only occur where flood levels on private properties are not increased due to tree planting. It is anticipated that in the future, the Brisbane River may support a range of vegetation communities varying in type, form and density along the river banks, forming an ecological corridor. Significant areas at the top of the river bank may also be available for revegetation.

Why we need your help

Copies of this flyer will be distributed to environmental groups situated along the Brisbane River corridor. Due to the length of the Brisbane River, an A1 size plan of the study area has been provided to your Group Coordinator.

Community groups such as yours possess valuable knowledge about the river's history and areas which are of ecological significance. We want to collect any comments you may have about the Brisbane River so it can be managed effectively and areas suitable for revegetation investigated in the flood study. You can help by taking a few moments to complete the attached questionnaire and return it to:

Reply Paid Permit 11
Sinclair Knight Merz
PO Box 246
SPRING HILL QLD 4004

Please note that responses to the questionnaire will be confidential. You may distribute this questionnaire to any parties you feel may contribute to this study. The closing date for submissions is Friday 29 August, 1997. If you have any enquiries relating to the study or to information contained in this flyer, please contact Scott Abbey on phone (076) 398 400 or fax (076) 398 490.

Brisbane City Council
June 1998

Brisbane River Flood Study

User Guide

Sinclair Knight Merz Pty Ltd
A.C.N. 001 024 095
49 Annand Street
PO Box 839
Toowoomba QLD
Australia 4350
Telephone: (07) 4639 8400
Facsimile: (07) 4639 8490

SINCLAIR KNIGHT MERZ

Contents

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Copy 1 - ....

Copy 2 - ....

Copy 3 - ....

Copy 4 - ....

Copy 5 - ....

Copy 6 - ....

BRISBANE RIVER FLOOD STUDY - At a Glance

Engineering consultants Sinclair Knight Merz were commissioned by the Brisbane City Council on the 5 November 1996 to undertake the Brisbane River Flood Study. This study was completed in June 1998.

The **primary objectives** of the study were:
- ☐ To provide technically based flood development levels along the length of the Brisbane River within the confines of the Brisbane City Boundary.
- ☐ Develop a Flood Forecasting Model.

The **secondary objectives** of the study were to:
- ☐ set flood regulation lines, and
- ☐ develop a revegetation strategy compatible with hydraulic constraints.

Calibrated historic events were:	**Verification** Events were:
January 1974	February 1931
June 1983	March 1955
Late April 1989	July 1973
May 1996	Early April 1989

The computer models used for the assessment were:
- ☐ **RAFTS Version 5.1** - hydrological model
- ☐ **MIKE 11 Version 3.2b** - hydrodynamic hydraulic model
- ☐ **HEC-RAS Version 2.0** - steady state hydraulic model.

Predicted design events and corresponding discharges were derived for the PMP, 10 000 year, 2 000 year, 1 000 year, 500 year, 200 year, 100 year, 50 year, 20 year, 10 year, 5 year and 2 year ARI flood events.

Copies of predicted flood levels and corresponding design events are located:-

1. in the Brisbane River Flood Study Report Volumes 1 & 2 - 6 paper copies;
2. in the digital copy of the Brisbane River Flood Study report;
3. on film copies of plans W10581 Sheets 1 to 121 registered with the plan custodian.

Note: that the 20 year and 100 year ARI inundation lines are on Bimap.

Detailed hydraulic analysis of the river crossings was undertaken, and the predicted results are presented on hydraulic structure sheets in **Appendix K** of the Brisbane River Flood Study report.

A Master Copy of this Handover Guide is controlled by:-

Key Study Results

Section	Report Reference	Description
Design Flood Levels	Table H-2 Figure H-2a to H-2l Figure H-3a to H-3l Figure H-4a to H-4l Figure H-5a to H-5l Figure H-6a to H-6l	Tables and plots of design flood levels for the PMF, 10 000 year, 2 000 year, 1 000 year, 500 year, 200 year, 100 year, 50 year, 20 year, 10 year, 5 year and 2 year ARI flood events.
Regulation Line Assessment	Sections 9.4 and 9.5 Drawings 10581 Sheets 74 to 82 & 98 to 104 Figure J-3a to J-3l	Reach by reach assessment of regulation lines and plot of regulation line afflux.
Revegetation Strategy	Sections 9.3 and 9.5 Drawings 10581 Sheets 84 to 90	Delineation of zones of revegetation locations.
Hydraulic Assessment of Crossings	Section 10.2	Summary of Upgrade Assessment
Minimum Development Levels	Section 9.4 Table J-4 Drawings 10581 Sheets 84 to 90 Figure J-3a to J-3l	Tabulation of the 100 year ARI flood (regulation lines & revegetation in place) + 300 mm for each cross section and plot.
Flood Forecasting Model	Section 11.2 Section 11.3 Section 11.4	Description of Models

1. Scope

1. Scope

1.1 Introduction

This guide summarises the locations of key information including model results. The Brisbane River Flood Study was presented to the Waterways Section in June 1998.

1.2 Limits of the Brisbane River Hydrologic Model

The Brisbane River Catchment has an area of approximately 13570 km^2 and is bounded to the west by the Great Dividing Range and by a number of smaller coastal ranges to the east and north. The majority of the catchment is rural with the exception of the Brisbane and Ipswich metropolitan areas and various small rural townships.

Figure 1.1: Brisbane River Catchment Locality Plan illustrates the catchment boundary.

1.3 Limits of the Brisbane River Hydraulic Model

The limits of the hydraulic model are as follows:

- ☐ Brisbane River from the river mouth to the upstream city boundary.
- ☐ Bremer River from the confluence of the Brisbane River to four hundred metres upstream.
- ☐ Oxley Creek from the confluence of the Brisbane River to four hundred metres upstream.
- ☐ Breakfast Creek from the confluence of the Brisbane River to four hundred metres upstream.
- ☐ Bulimba Creek from the confluence of the Brisbane River to four hundred metres upstream.

Figure 1.1 illustrates the inflow boundary locations of the hydraulic model.

1.4 Waterway Management Methodology

The main change in the study scope and methodology from previous studies was that a maximum afflux of 150 mm was allowed (due to a combination of regulation lines and revegetation strategy) throughout the extent of the Brisbane River from the river mouth to the upstream city boundary. Previously if properties were inundated with flood water for the 100 year ARI flood event no increase in flood levels were permitted in that section of the reach.

The regulation lines and revegetation strategy recommendations have been developed reaching a balance between the two mechanisms until a satisfactory afflux was achieved. This has been done on a reach by reach basis taking account of issues such as community expectations (assessed from a questionnaire as part of community consultation), flood susceptibility of private property, existing areas of ecological significance and existing revegetation activities.

1.4.1 Waterway Revegetation

Revegetation locations were identified using the process outlined in section 9.3 of the Final Flood Study Report. Revegetation was assessed within the MIKE 11 hydraulic model by adjusting roughness parameters at the proposed revegetation locations.

Since the model bank roughnesses at most locations exceeded 0.15 (to allow for bend losses), a sensitivity analysis was conducted to assess the impacts that revegetation would have within the river corridor and associated floodplain. At the proposed revegetation locations the relevant cross sections were adjusted by ±0.15 to assess the sensitivity of the proposed revegetation. In all locations the impacts were within ±20 mm of existing river corridor conditions.

A roughness value of 0.15 was therefore added to the existing bank roughness as this would represent the worst case (density of revegetation) with respect to flooding impacts. The maximum increase in flood levels due to revegetation was 20 mm.

1.4.2 Regulation Lines

The regulation lines have been set using the hydraulic model with the revegetation strategy in place. Interim regulation lines for the Brisbane River had not been previously set.

The regulation lines have been set by most emphasis being placed on areas that are currently developed. The maximum allowable afflux resulting from the combined effect of revegetation and placement of regulation lines was 150 mm.

1.5 Scope of Handover Guide

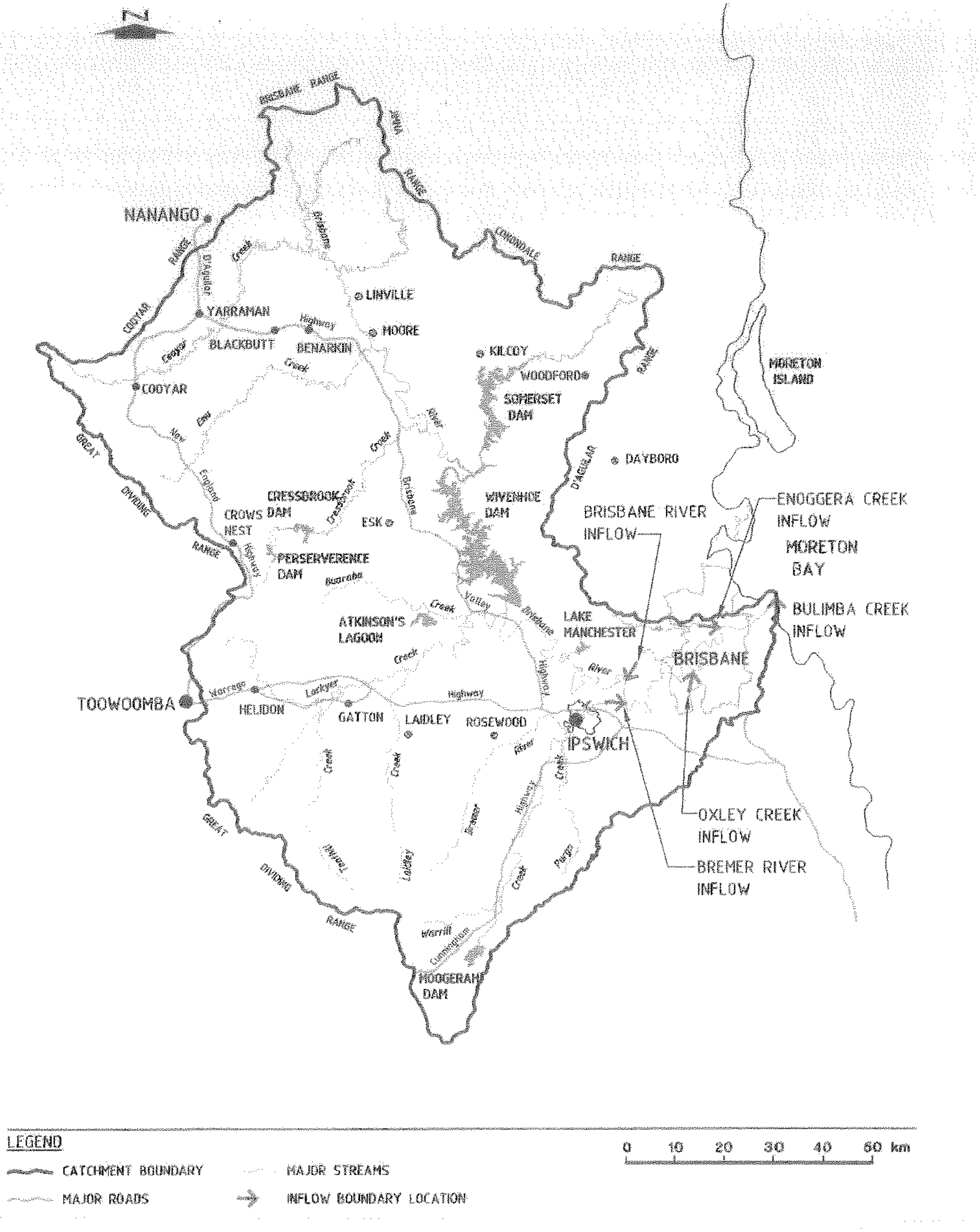
The contents of this guide are:

Section 2	-	A list of the major components of the study and where to find them.
Section 3	-	Study recommendations.
Section 4	-	A guide to running the Models of the Brisbane River.
Section 5	-	A directory listing of computer files.
Section 6		A directory of drawing files.

Appendix A - Handling Inquiries
Appendix B - Recommendations for the continued management of the Brisbane River Flood Study.
Appendix C - Feedback Form.

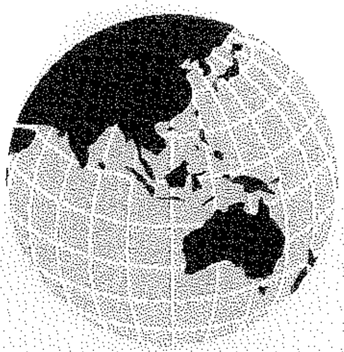
SINCLAIR KNIGHT MERZ

FIGURE 1-1
BRISBANE RIVER FLOOD STUDY
BRISBANE RIVER CATCHMENT
LOCALITY PLAN



FILE NAME: 04157.20 DISK NO. D:\DWG\BRISBANE NO. T004157
PLOT SCALE 1:1000

0-3-97



2. Major Components of the Brisbane River Flood Study

2. Major Components of the Brisbane River Flood Study

Table 2.1: Major Components of the Brisbane River Flood Study outlines major components and outputs resulting from the study along with comments and references relevant to each component.

Table 2.1: Major Components of the Brisbane River Flood Study

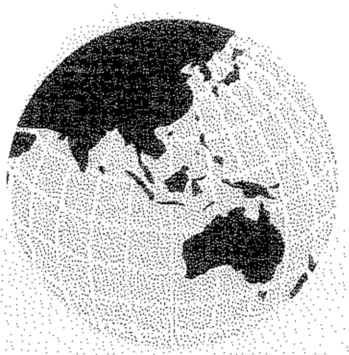
Component/Output	✓/x	Report Reference	Drawing Reference W10581	Comments
Survey Information:				
• Aerial	✓			• Aerial Photographs and overlays - 1:10000, themes - cross sections, cadastra and contours.
• Cross Sections	✓			• Cross section plots: - paper copy provided - digital copy located in survey section
Report:				
• Paper Copy	✓			• 6 copies (1 to remain in Waterways Library)
• Digital Copy	✓			• See Section 4.7 - Guide to Viewing the Digital Version of the Brisbane River Flood Study Report
Hydrologic Model:				
• RAFTS Calibration	✓	Section 5		• Results on CD ROM, see directories G:\BRISRIV\RAFTS\CAL_VER.
		Section 5.9 - 5.19	1-18	• ARI of Calibration Events
• RAFTS Model	✓			• See Section 4.1 - RAFTS Hydrologic Model Guide
		Figure 5.1a - 5.1d		• Catchment Plan
Hydraulic Model:				
• MIKE 11 Calibration	✓	Section 6 & Appendix C		• Peak Water Level Profiles for calibration events • Results on CD ROM
		Figure 6.1a - 6.1g		• MIKE 11 Inflow Locations
		Figure 6.2 & Table I.2		• Main channel and floodplain roughness
• MIKE 11 Model	✓			• See Section 4.3 - Guide to Running the Brisbane River MIKE 11 Model
		Figure 6.1a - 6.1g		• Floodplain Schematisation
		Figure 6.1a - 6g		• Model Structure
• HEC-RAS Model	✓	Section 8.3 Appendix I		• Calibrated HEC-RAS model see Section 4.4 - HEC-RAS Model Guide
Design Events:	✓			
Tabulated Results:		Sections 7 & 8		• Results on CD ROM, see directories G:\BRISRIV\REPORT\TABLES
• Predicted Flow Rates	✓	Table 7.11		• See Section 4.7 - Guide to Viewing the Digital Version of the Brisbane River Flood Study Report
• Predicted Water Levels	✓	Appendix I		

Component/Output	✓/x	Report Reference	Drawing Reference W10581	Comments
• Minimum Development Levels	✓	Table J4		• Moreton Bay Storm Surge Levels control minimum fill level in lower reaches
Flood Regulation Line Development:	✓ ✓	Section 9		• Lines on Bimap - Theme: Flood Regulation Lines • 1 set of working copies provided (unregistered/uncontrolled) • Reach by reach analysis
Revegetation Strategy:	✓	Section 9.3	84-90	• Delineation of zones of allowable revegetation density
Hydraulic Assessment of Crossings:		Section 10		
• Structure Reference Sheets	✓	Appendix K		• Hydraulic Structure Reference Sheets • Capacity of Structures, Structure Afflux
Waterway Corridor:	✓	Section 9.5	98-104	• Regulation line placement
Rezoning Recommendations:	✓	Section 9.5		• Proposed areas of rezoning
Longitudinal Profiles:	✓			• Plans registered with plan custodian (film copies)
		Appendix H	19-55	• Existing Conditions
		Appendix J	56-82	• Regulation line and Revegetation Strategy Case
Anticipated 100 year ARI Inundation Line	✓	Section 12.2	105 - 111	• On Bimap - Theme: Anticipated 100 year ARI Event • Plans registered with Plan Custodian (A0 copies)
Anticipated 20 year ARI Inundation Line:	✓	Section 12.2	105-111	• On Bimap - Theme: Anticipated 20 year ARI Event • Plans registered with Plan Custodian (A0 copies)
Hazard Category:	✓	Section 12.3	91-97	• Delineation of High Hazard Areas
Flood Contouring:	✓	Section 12.4	113-121	• Plans included (A0 copies)
Community Consultation	✓	Section 13		Audit of Questionnaire response
Directory Listing	✓			Network directories, see Section 5
Guide to Running the Models		✓		See Section 4 - Guide to running the models of the Brisbane River

Additional Items[1] (Post Handover)	Date	Comments	Responsible Officer

---

Note: 1. See Appendix D - Recommendations - All sources/copies of data should be updated when amendments are made.



3. Study Recommendations/Actions Required

3. Study Recommendations/Actions Required

Recommendations and Actions resulting from the Brisbane River Flood Study are summarised in **Table 3.1: Recommendations/Actions Required.**

Table 3.1: Recommendations/Actions Required

Issue	Recommendation/Actions Required	Report Reference
Revegetation Strategy	Advise Bushland Rehabilitation Unit	Section 9.3
Proposed Zoning Changes	Advise Town Planning Branch	Section 9.5

4. Guide to Running the Models of the Brisbane River

4. Guide to Running the Models of the Brisbane River

4.1 RAFTS Hydrologic Model Guide

The hydrologic model for the Brisbane River was developed by Sinclair Knight Merz using RAFTS Version 5.1. The procedure outlined below is a guide to running the hydrological model.

1. Select the working directory C:\WPS\WORK\
2. Select the event which you want to run or modify eg. 100 year ARI Design Event - Existing Conditions.

```
From Directory Tree Listing (see Section 5)

G:\BRISRIV
          └RAFTS
                 └DESIGN
                         └PMF
                         └10000ari
                         └2000ari
                         └ect.
```

3. Copy the *.XP and *.HIS files to your working directory. For example, to run the 100 year ARI model copy the G:\BRISRIV\RAFTS\DESIGN\DESIGN.XP and G:\BRISRIV\RAFTS\DESIDN\100ARI\T100Y30h.HIS to C:\WPS\WORK\DESIGN.XP and C:\WPS\WORK\T100Y30h.HIS respectively.

   Note: - the *.OUT files are the published results.

4. Rename the *.HIS file to FLOOD1.HIS. eg. C:\WPS\WORK\T100Y30H.HIS to C:\WPS\WORK\FLOOD1.HIS.
5. These files may now be edited to generate new results or run as is to reproduce the published results.

   Note: - When running the RAFTS model be sure to select a node upstream of JIN1 as the model may crash if a node below this point is selected.

4.2 RAFTS to MIKE 11

Results from the RAFTS model were converted to MIKE 11 format using a program called RTOM11, written by Brisbane City Council - Waterways Section (August 1997). This program takes the results of the RAFTS output file and produces a TXT file that can be specified in Menu B of MIKE 11 for use of the calculation of inflow hydrographs.

The RTOM11 is a program which provides a fast and simple means of producing a MIKE 11 TXT file from RAFTS output files. The program allows for the conversion of both total and local hydrographs produced by RAFTS and also has the facility to generate a base flow prior to the event to introduce water into the MIKE 11 model.

The procedure outlined below is a guide to running the RTOM11 program:

1. Load the executable RTOM11.EXE and EXAMPLE.BAT files into your working Directory.

2. Edit the EXAMPLE.BAT file. This file gives a detailed description of how to construct the command line. The command line can then be input into the EXAMPLE.BAT file on the very last line. This file allows for the user to specify details such as the input and output file names and whether total or local RAFTS hydrographs are to be used.

3. Once the command line has been completed, save the EXAMPLE.BAT file.

4. Run the EXAMPLE.BAT file. This will automatically start the RTOM11 program using the command line specified in the EXAMPLE.BAT file. This will result in a TXT file that can be used in Menu B of MIKE 11.

5. Run MIKE 11 and open Menu B6-8. Convert TXT file to a Database.

6. Enter the TXT file name.

7. Identify the Database name. MIKE 11 will read the hydrographs at the specified locations.

8. Set up a boundary series file using the time series information.

4.3 MIKE 11 Hydraulic Model Guide

The hydraulic model for the Brisbane River was developed using MIKE 11 Version 3.2b. MIKE 11 requires a number of files to be developed during the model set up stage. These are classified in menus in the MIKE 11 model, and are as follows:

River/channel network	contains branches, branch lengths, reference to associated cross section file name, structure details and other model geometry.
Boundaries/time series	contains boundaries for the analysis, such as time series hydrographs and tailwater conditions.
Supplementary data	contains computational factors, Mannings Coefficients, initial conditions and output specifications.

The file extension system used by MIKE 11 is as follows:

River/channel network - *.RDF
Boundaries/time series - *.BSF
Supplementary data - *.SSF

Result files	-	water levels and flows	-	*.RRF
	-	velocities (if requested)	-	*.VRF

The file naming system used for Brisbane River is shown on the following pages.

In order to run the Brisbane River model the appropriate files must be copied from the network directory to a working directory.

Copying the relevant files to a working directory

1. On your local drive, create a working directory ie. \TEST. This directory will eventually contain the relevant files to produce a model run for a particular catchment condition.

2. Go to the Brisbane River Network Area, G:\BRISRIV\MIKE11.

3. Go to the directory, \design or \reglines, depending on the case to be analysed.

4. Copy the following files from the g:\BRISRIV\MIKE11 directory.

   BRIS97.IX0 |
   BRIS97.IX1 | .... Cross sectional data base files
   BRIS97.PST |

5. Determine the return period (ARI) to be analysed. Copy the *.RDF and *.BSF file for this event, and all the directories and files from beneath the G:\BRISRIV\MIKE11\DESIGN\100DEFF Directory. For example, if you are running the 100 year ARI design event you will need to copy all the following files to your working directory (in addition to the files listed in 4).

   ...\DESIGN\100ARI\AF74FIN.RDF
   ...\DESIGN\100ARI\100MHWS.BSF
   ...\DESIGN\100ARI\100DEFF*.*
   ...\DESIGN\100ARI\MHWS.SSF

Once the above files have been transferred to a working directory, MIKE 11 can be started, amendments made to the model, and the model rerun.

NOTE - Time step

The time step used for all models was 10 mins
on all Brisbane River Models.

CALIBRATION EVENTS

EVENT	*.IX0/IX1/PST	*.RDF	*.BSF	*.SSF	*.RRF/VRF	INITIAL CONDITIONS	TIME STEP	DESCRIPTION OF RUN
Jan-74	BRIS97	1974ST	1974	1974STOR	1974STOR	PARAMETER FILE (2)	10	Calibration Event
Jun-83	BRIS97	AF74FIN	1983	BRSMALL	1983	PARAMETER FILE (2)	10	Calibration Event
Late Apr - 89	BRIS97	AF74FIN	1989B	BRSMALL	1989B	PARAMETER FILE (2)	10	Calibration Event
May-96	BRIS97	AF74FIN	1996	BRSMALL	1996	PARAMETER FILE (2)	10	Calibration Event
Feb-31	BRIS97	1931LINK	1931VER	1931	1931	PARAMETER FILE (2)	10	Verification Event
Mar-55	BRIS97	1955LINK	1955VER	1955	1955	PARAMETER FILE (2)	10	Verification Event
Jul-73	BRIS97	1974ST	1973	BRSMALL	1973	PARAMETER FILE (2)	10	Verification Event
Early Apr-89	BRIS97	AF74FIN	1989A	BRSMALL	1989A	PARAMETER FILE (2)	10	Verification Event

FLOOD FORECAST EVENTS

EVENT	*.IX0/IX1/PST	*.RDF	*.BSF	*.SSF	*.RRF/VRF	INITIAL CONDITIONS	TIME STEP	DESCRIPTION OF RUN
May-96	BRIS97	FORECAST	FCAST96	FORECAST	FFCAST96	PARAMETER FILE (2)	10	Flood Forecast Event - HISTORICAL
100 YEAR ARI	BRIS97	FORECAST	FCAST100	FORECAST	FCAST100	PARAMETER FILE (2)	10	Flood Forecast Event - DESIGN

STORM SURGE EVENTS

EVENT	*.IX0/IX1/PST	*.RDF	*.BSF	*.SSF	*.RRF/VRF	PARAMETER FILE (2)	TIME STEP	DESCRIPTION OF RUN
100 YEAR ARI	BRIS97	REVEG	100MHWS	MHWS	REVEG	PARAMETER FILE (2)	10	Design Event - REVEGETATION
100 YEAR ARI	BRIS97	AF74FIN	100R20ST	MHWS	100R20ST	PARAMETER FILE (2)	10	Design Event - 20 YEAR ARI STORM SURGE
100 YEAR ARI	BRIS97	AF74FIN	100ST100	MHWS	100ST100	PARAMETER FILE (2)	10	Design Event - 100 YEAR ARI STORM SURGE
20 YEAR ARI	BRIS97	AF74FIN	20-100ST	MHWS	20-100ST	PARAMETER FILE (2)	10	Design Event - 100 YEAR ARI STORM SURGE

DESIGN EVENTS

EVENT	*.IX0/IX1/PST	*.RDF	*.BSF	*.SSF	*.RRF/VRF	INITIAL CONDITIONS	TIME STEP	DESCRIPTION OF RUN
PMF	BRIS97	AF74FIN	PMFMHWS	MHWS	PMFMHWS	PARAMETER FILE (2)	10	Design Event - EXIST
10000 YEAR ARI	BRIS97	AF74FIN	10000MHW	MHWS	10000MHW	PARAMETER FILE (2)	10	Design Event - EXIST
2000 YEAR ARI	BRIS97	AF74FIN	2000MHWS	MHWS	2000MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
1000 YEAR ARI	BRIS97	AF74FIN	1000MHWS	MHWS	1000MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
500 YEAR ARI	BRIS97	AF74FIN	500MHWS	MHWS	500MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
200 YEAR ARI	BRIS97	AF74FIN	200MHWS	MHWS	200MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
100 YEAR ARI	BRIS97	AF74FIN	100MHWS	MHWS	100MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
50 YEAR ARI	BRIS97	AF74FIN	50MHWS	MHWS	50MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
20 YEAR ARI	BRIS97	AF74FIN	20MHWS	MHWS	20MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
10 YEAR ARI	BRIS97	AF74FIN	10MHWS	MHWS	10MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
5 YEAR ARI	BRIS97	AF74FIN	5MHWS	MHWS	5MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
2 YEAR ARI	BRIS97	AF74FIN	2MHWS	MHWS	2MHWS	PARAMETER FILE (2)	10	Design Event - EXIST
100 YEAR ARI	BRIS97	REGLINES	100MHWS	MHWS	100REG	PARAMETER FILE (2)	10	Design Event - REG + REVEG
50 YEAR ARI	BRIS97	REGLINES	50MHWS	MHWS	50REG	PARAMETER FILE (2)	10	Design Event - REG + REVEG
20 YEAR ARI	BRIS97	REGLINES	20MHWS	MHWS	20REG	PARAMETER FILE (2)	10	Design Event - REG + REVEG
10 YEAR ARI	BRIS97	REGLINES	10MHWS	MHWS	10REG	PARAMETER FILE (2)	10	Design Event - REG + REVEG
5 YEAR ARI	BRIS97	REGLINES	5MHWS	MHWS	5REG	PARAMETER FILE (2)	10	Design Event - REG + REVEG
2 YEAR ARI	BRIS97	REGLINES	2MHWS	MHWS	2REG	PARAMETER FILE (2)	10	Design Event - REG + REVEG

4.4 HEC-RAS Model Guide

A calibrated HEC-RAS model has been calibrated for the 100 year ARI and 10 year ARI design events **ONLY**. Analysis during the calibration event stage was used only as a check of major creek crossings.

The model was set up to accept changes to the peak flows at selected locations. Cross section numbering is consistent with the Brisbane City Numbering convention. (ie. BN2020).

Note that to achieve calibration of the HEC-RAS model, values of Mannings 'n' were adjusted by a constant factor of 0.85. A listing of the Mannings 'n' values for both the HEC-RAS and MIKE 11 models can be found in the Brisbane River Flood Study Report, Table 4.2. Results of the calibration are listed in Table I1. Some difficulties were experienced during the calibration of the HEC-RAS model. These difficulties were due to the complex flow interactions at the Oxley Creek confluence and across the Indooroopilly Golf Course.

As HEC-RAS could not account for these interactions, the inflow point of Oxley Creek had to be input into the model at a downstream location (ie. BN950). This allowed for the overland flow and storage effects at this location to be accounted for.

The procedure outlined below is a guide to running the HEC-RAS model:

1. Go to the G:\BRISRIV\HECRAS directory

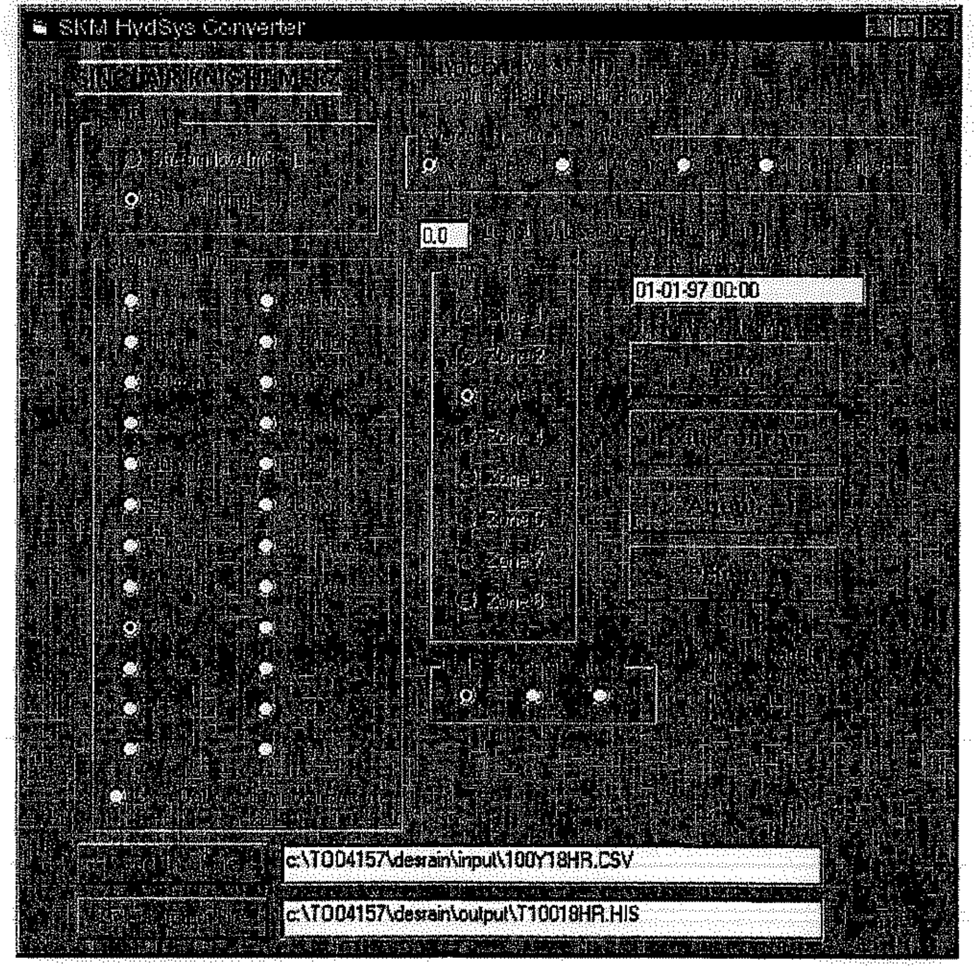
2. Copy the required HEC-RAS BRISBANE.PRJ, BRISBANE.g**, BRISBANE.o**, BRISBANE.p**, BRISBANE.f** and BRISBANE.r** files from G:\HECRAS to your working directory.

Once the above files have been transferred to a working directory, HEC-RAS can be started, amendments made to the model, and the model rerun.

4.5 A Guide to Running the HYDCON Program

HYDCON was developed by Sinclair Knight Merz for the Brisbane River Flood Study. The program applies Australian Rainfall and Runoff and BOM (PMP events) temporal patterns to calculated rainfall depths and produces an output file in HYDSYS format. This file can then be directly used in the RAFTS model.

The user interface for this program and a brief discussion of each component in the is presented below.



0.0

01-01-97 00:00

c:\TO04157\desrain\input\100Y18HR.CSV

c:\TO04157\desrain\output\T10018HR.HIS

Data Type Box - In Version 1.0 only rainfall data can be selected (ie. program will only produce a rainfall HYDSYS output file).

Storm Duration Box - This is the location where the duration of storm is selected and the program applies the standard AR&R temporal patterns for those storm durations of 72 hours and less. Events of durations ranging from 96 hours to 168 hours have been provided by the Bureau of Meteorology and these events have more than one temporal pattern (See PMP Temporal Pattern). **User Defined Temporal Pattern** allows users to enter a non standard temporal pattern if required. If this switch is selected then the file called UD.TEM must be edited to reflect the required temporal pattern.

Average Recurrence Interval Box - The user should select the appropriate storm.

- ☐ For events less than or equal to 30 years ARI the corresponding switch should be selected.
- ☐ For events greater than 30 years ARI the corresponding switch should be selected.
- ☐ For events of greater than 100 year ARI the PMP switch should be selected.
- ☐ If a user defined temporal pattern is being used (ie. Storm Duration Box), then the user defined switch should be selected.

ARR Zone Box - Version 1.0 only allows the use of Zone 3 temporal patterns.

PMP Temporal Pattern - For storm durations greater than 120 hours a number of temporal patterns exist. Select temporal Pattern A, B or C for each of the temporal patterns.

Select Input File - allows users to select the input file. This file contains the rainfall depth and the corresponding rainfall station name. Note: this file has to be in *.CSV format (comma delimited format).

Select Output File - Allows users to specify the name and location of the hydsys file that is being produced by the program. The output file can be used directly by the RAFTS program as input.

Run - once the desired parameters have been selected click once on the run button and the program will execute.

Exit - To exit the program click on the exit button.

Note: The HYDCON Program was specifically developed for the Brisbane River Flood Study. As such, Sinclair Knight Merz takes no responsibility for any errors that may be inherent in the HYDCON program if used for other purposes.

4.6 Flood Forecasting Models

The Brisbane River Flood Forecasting Models consist of a modified RAFTS hydrological model and the MIKE 11 hydraulic model.

To run the Flood Forecasting Models the following steps should be followed:

1. Obtain inflow hydrographs from the Department of Natural Resources for the Brisbane and Bremer Rivers to input in the RAFTS model at JIN1 and JIN2. These hydrographs should be in hydsys format so they can be directly input into the RAFTS Flood Forecasting model. **Note:** the node JIN1 represents the boundary of the hydraulic model and JIN2 represents the Bremer inflow just upstream of the Brisbane and Bremer Rivers junction.

2. Obtain relevant Brisbane City rainfall from radio telemetry gauges and input into the RAFTS model.

3. Run the RAFTS model to obtain discharge hydrographs at the following locations.

JIN1 - Upstream Brisbane River boundary for the hydraulic model.
JIN2 - Inflow boundary for the Brisbane River.
POG# - Inflow boundary for Oxley Creek
ENO# - Inflow boundary for Enoggera Creek
BUL7 - Inflow boundary for Bulimba Creek.

4. Use the RTOM11 program to convert RAFTS hydrographs at the above locations to *.TXT format.

5. Import the TXT file into MIKE 11 using the B.6.8 menu into an appropriate Database. Modify *.BSF file to use the appropriate database and change the tailwater level at the downstream boundary to reflect the current Moreton Bay Flood Tide level.

6. Run MIKE 11 using a 10 minute time step saving once every 10 minutes.

4.7 Guide to Viewing the Digital Version of the Brisbane River Flood Study Report

The Brisbane River Flood Study Final Report was provided in **Word Perfect for Windows Version 5.x format**. To increase your mobility through this document City Design have saved this document **in Word Perfect for Windows Version 6.1** format and added a *hypertext* to key headings throughout the document. The *hypertext* feature means that the user can point and click (once) to move to various parts of the document.

The digital copy and *hypertext* linking have been provided as a simple and convenient tool for retrieving information regarding the text associated with the Brisbane River Flood Study Final Report. Note that plans and graphs do not appear in the digital copy. Please refer to one of the six published final reports for this information. A list of locations of the six published reports can be found on page (iii) of this Handover Guide.

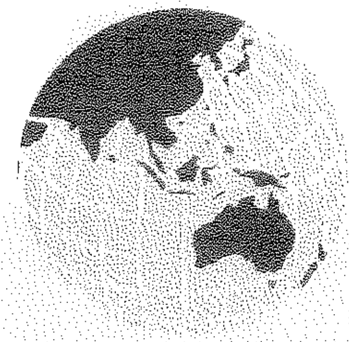
For the Brisbane River Flood Study, any text which appears in **blue** has been linked to some other relevant part of the document. Simply place your mouse cursor over the underlined word or sentence and click once, and the cursor will move to that part of the document.

Be patient as the document is rather cumbersome and it may take 5 or 10 seconds to relocate itself depending on the speed of the computer.

If nothing happens, please check if the *hypertext* function has been activated in your Word Perfect document. A simple check for this is to check if your cursor changes shape (ie. from an I bar to an arrow) when you point to the blue underlined text. If there is no change you will need to activate the hypertext function by choosing <Tools> from the pull down menu bar the <Hypertext> and then click on the "Active" button.

WARNING

This digital copy contains the published results for the existing and future design event profiles. In any event of any revision to the models associated with the Brisbane River Flood Study please ensure the published tables are all updated. Page i of the Brisbane River Flood Study Handover Guide lists the locations of the tabulated results.



5. Directory and File Listings

5. Directory and File Listings

5.1 Explanation of Files on G:\

Files located on G:\BRISRIV are the original files provided by the consultant. A list of computer files with a brief description of each of these files are presented on the following pages.

WARNING - MIKE 11 Model

MIKE 11 cross sections located on the Bremer River, Oxley Creek, Enoggera Creek and Bulimba Creek have additional storage areas associated with them. Please do not process cross sectional data at these locations.

Table 5.1: MIKE 11 Input Files

File Name	Description
River Data Files (*.RDF)	
1974ST	1974 /1973 events. All structures excluding Merivale and Gateway Bridges were included and the handrails were assumed to be fully blocked.
AF74FIN	All events after 1974 and existing design events. All structures excluding the Gateway Bridge were included and the handrails were assumed to be fully blocked.
1931LINK	1931 event - William Jolly Bridge-assumed handrails blocked was the only structure included.
1955LINK	1935 event - William Jolly, Story & Indooroopilly Bridges-assumed handrails blocked were the only structures included
REGLINES	Design events with regulation lines and revegetation strategy in place. All structures excluding the Gateway Bridge were included and the handrails were assumed to be fully blocked.
REVEG	Design events with unconstrained revegetation strategy in place. All structures excluding the Gateway Bridge were included and the handrails were assumed to be fully blocked
Boundary Series Files (*.BSF)	
1974	Calibration Event - January 1974
1983	Calibration Event - June 1983
1989B	Calibration Event - Late April 1989
1996	Calibration Event - May 1996
1931VER	Verification Event - February 1931
1955VER	Verification Event - March 1955
1973	Verification Event - July 1973
1989A	Verification Event - Early April 1989
PMFMHWS	PMF Flood Event - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
10000MHW	10000 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
2000MHWS	2000 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
1000MHWS	1000 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
500MHWS	500 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
200MHWS	200 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
100MHWS	100 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
50MHWS	50 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
20MHWS	20 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
10MHWS	10 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
5MHWS	5 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
2MHWS	2 Year ARI - Existing Catchment Conditions & MHWS TW assumed at Western Inner Bar
100R20ST	100 Year ARI - Existing Catchment Conditions & 20 year ARI Storm Surge at Western Inner Bar
100ST100	100 Year ARI - Existing Catchment Conditions & 100 year ARI Storm Surge at Western Inner Bar
20-100ST	20 Year ARI - Existing Catchment Conditions & 100 year ARI Storm Surge at Western Inner Bar
Cross Sectional Database (*.IX0, *.IX1, *.PST)	
BRIS97	Contains existing River conditions, River conditions with regulation lines and unconstrained revegetation in place and River conditions with Unconstrained revegetation in place.

File Name	Description
Supplementary Files (*.SSF)	
1974STOR	General ie. initial conditions and roughnesses for the 1974 calibration and 1973 verification events
BRSMALL	General ie. initial conditions and roughnesses for the 1983, 1989B & 1996 calibration and the 1989A and 1973 verification events
1931	General ie. initial conditions and roughnesses for the 1931 verification events
1955	General ie. initial conditions and roughnesses for the 1955 verification events
MHWS	General ie. initial conditions and roughnesses for all design events including regulation lines and revegetation strategy in place.

Table 5.2: MIKE 11 Output Files

File Name	Description
Calibration/Verification Events (*.RRF, *.VRF)	
1974STOR	Predicted Water Level, Discharge and Velocity information for the 1974 Flood Event
1983	Predicted Water Level, Discharge and Velocity information for the 1983 Flood Event
1989B	Predicted Water Level, Discharge and Velocity information for the 1989B Flood Event
1996	Predicted Water Level, Discharge and Velocity information for the 1996 Flood Event
1931	Predicted Water Level, Discharge and Velocity information for the 1931 Flood Event
1955	Predicted Water Level, Discharge and Velocity information for the 1955 Flood Event
1973	Predicted Water Level, Discharge and Velocity information for the 1973 Flood Event
1989A	Predicted Water Level, Discharge and Velocity information for the 1989A Flood Event
Design Events - Existing Conditions (*.RRF, *.VRF)	
PMFMHWS	Predicted Water Level, Discharge and Velocity information for the PMF Design Event - Existing Conditions.
10000MHW	Predicted Water Level, Discharge and Velocity information for the 10000 Year ARI Design Event - Existing Conditions.
2000MHWS	Predicted Water Level, Discharge and Velocity information for the 2000 Year ARI Design Event - Existing Conditions.
1000MHWS	Predicted Water Level, Discharge and Velocity information for the 1000 Year ARI Design Event - Existing Conditions.
500MHWS	Predicted Water Level, Discharge and Velocity information for the 500 Year ARI Design Event - Existing Conditions.
200MHWS	Predicted Water Level, Discharge and Velocity information for the 200 Year ARI Design Event - Existing Conditions.
100MHWS	Predicted Water Level, Discharge and Velocity information for the 100 Year ARI Design Event - Existing Conditions.
50MHWS	Predicted Water Level, Discharge and Velocity information for the 50 Year ARI Design Event - Existing Conditions.
20MHWS	Predicted Water Level, Discharge and Velocity information for the 20 Year ARI Design Event - Existing Conditions.
10MHWS	Predicted Water Level, Discharge and Velocity information for the 10 Year ARI Design Event - Existing Conditions.
5MHWS	Predicted Water Level, Discharge and Velocity information for the 5 Year ARI Design Event - Existing Conditions.
2MHWS	Predicted Water Level, Discharge and Velocity information for the 2 Year ARI Design Event - Existing Conditions.

File Name	Description
100R20ST	Predicted Water Level, Discharge and Velocity information for the 100 Year ARI Design Event with 20 Year ARI Moreton Bay Storm Surge - Existing Conditions.
100ST100	Predicted Water Level, Discharge and Velocity information for the 100 Year ARI Design Event with 100 Year ARI Moreton Bay Storm Surge - Existing Conditions.
20-100ST	Predicted Water Level, Discharge and Velocity information for the 20 Year ARI Design Event with 100 Year ARI Moreton Bay Storm Surge - Existing Conditions.
Design Events - Regulation Lines and Revegetation Strategy in place (*.RRF, *.VRF)	
100REG	Predicted Water Level, Discharge and Velocity information for the 100 Year ARI Design Event - Regulation lines and Unconstrained Revegetation in place
50REG	Predicted Water Level, Discharge and Velocity information for the 50 Year ARI Design Event - Regulation lines and Unconstrained Revegetation in place
20REG	Predicted Water Level, Discharge and Velocity information for the 20 Year ARI Design Event - Regulation lines and Unconstrained Revegetation in place
10REG	Predicted Water Level, Discharge and Velocity information for the 10 Year ARI Design Event - Regulation lines and Unconstrained Revegetation in place
5REG	Predicted Water Level, Discharge and Velocity information for the 5 Year ARI Design Event - Regulation lines and Unconstrained Revegetation in place
2REG	Predicted Water Level, Discharge and Velocity information for the 2 Year ARI Design Event - Regulation lines and Unconstrained Revegetation in place

Table 5.3: RAFTS Calibration/Verification Files

File Name	Description
RAFTS Network Files (*.XP)	
Bris31	Hydrologic network for the Feb 1931 flood event
Bris55	Hydrologic network for the Mar 1955 flood event
Bris73	Hydrologic network for the Jul 1973 flood event
Bris74	Hydrologic network for the Jan 1974 flood event
Bris83	Hydrologic network for the Jun 1983 flood event
Bris89a	Hydrologic network for the Early Apr 1989 flood event
Bris89b	Hydrologic network for the Late Apr 1989 flood event
Bris96	Hydrologic network for the May 1996 flood event
Rainfall & Stream Gauge Files (*.HIS)	
1931	Rainfall and Stream Gauge inputs for the Feb 1931 flood event
1955	Rainfall and Stream Gauge inputs for the Mar 1931 flood event
1973	Rainfall and Stream Gauge inputs for the Jul 1973 flood event
1974	Rainfall and Stream Gauge inputs for the Jan 1974 flood event
1983	Rainfall and Stream Gauge inputs for the Jun 1983 flood event
1989a	Rainfall and Stream Gauge inputs for the Early Apr 1989 flood event
1989b	Rainfall and Stream Gauge inputs for the Late Apr 1989 flood event
1996	Rainfall and Stream Gauge inputs for the May 1996 flood event

File Name	Description
RAFTS Output Hydrographs (*.TOT)	
Bris31	Output Hydrographs for the Feb 1931 flood event
Bris55	Output hydrographs for the Mar 1931 flood event
Bris73	Output hydrographs for the Jul 1973 flood event
Bris74	Output hydrographs for the Jan 1974 flood event
Bris83	Output hydrographs for the Jun 1983 flood event
Bris89a	Output hydrographs for the Early Apr 1989 flood event
Bris89b	Output hydrographs for the Late Apr 1989 flood event
Bris96	Output hydrographs for the May 1996 flood event
RAFTS Output Files (*.OUT)	
Bris31	Total output for the Feb 1931 flood event
Bris55	Total output for the Mar 1931 flood event
Bris73	Total output for the Jul 1973 flood event
Bris74	Total output for the Jan 1974 flood event
Bris83	Total output for the Jun 1983 flood event
Bris89a	Total output for the Early Apr 1989 flood event
Bris89b	Total output for the Late Apr 1989 flood event
Bris96	Total output for the May 1996 flood event

Table 5.4: RAFTS Design Event Files

File Name	Description
RAFTS Network File (*.XP)	
design	RAFTS model network for the design events (includes dams)
designnd	RAFTS model network for the design events (no dams)
Rainfall Files (*.HIS)	
PMP*	Rainfall files of varying duration for PMP
10000	Rainfall files of varying duration for 10000 Year ARI event
2000	Rainfall files of varying duration for 2000 Year ARI event
1000	Rainfall files of varying duration for 1000 Year ARI event
500	Rainfall files of varying duration for 500 Year ARI event
200	Rainfall files of varying duration for 200 Year ARI event
T100y*	Rainfall files of varying duration for 100 Year ARI event
T50y*	Rainfall files of varying duration for 50 Year ARI event
T20y*	Rainfall files of varying duration for 20 Year ARI event
T10y*	Rainfall files of varying duration for 10 Year ARI event
T5y*	Rainfall files of varying duration for 5 Year ARI event
T2y*	Rainfall files of varying duration for 2 Year ARI event

File Name	Description
RAFTS Output Hydrographs (*.TOT)	
PMP	Output Hydrographs for the PMP event
10000	Output Hydrographs for the 10000 Year ARI event
2000	Output Hydrographs for the 2000 Year ARI event
1000	Output Hydrographs for the 1000 Year ARI event
500	Output Hydrographs for the 500 Year ARI event
200	Output Hydrographs for the 200 Year ARI event
100	Output Hydrographs for the 100 Year ARI event
50	Output Hydrographs for the 50 Year ARI event
20	Output Hydrographs for the 20 Year ARI event
10	Output Hydrographs for the 10 Year ARI event
5	Output Hydrographs for the 5 Year ARI event
2	Output Hydrographs for the 2 Year ARI event
RAFTS Output Files (*.OUT)	
PMP	Total output files of varying duration for PMP
10000	Total output files of varying duration for 10000 Year ARI event
2000	Total output files of varying duration for 2000 Year ARI event
1000	Total output files of varying duration for 1000 Year ARI event
500	Total output files of varying duration for 500 Year ARI event
200	Total output files of varying duration for 200 Year ARI event
100*	Total output files of varying duration for 100 Year ARI event
50*	Total output files of varying duration for 50 Year ARI event
20*	Total output files of varying duration for 20 Year ARI event
10*	Total output files of varying duration for 10 Year ARI event
5*	Total output files of varying duration for 5 Year ARI event
2*	Total output files of varying duration for 2 Year ARI event

Table 5.5: Flood Forecasting Model Files

File Name	Description
RAFTS Files	
FCST96.XP	RAFTS network model for the 1996 flood event
1996.HIS	Rainfall input for the 1996 flood event
1996.INT	Inflow hydrographs for Bremer and Brisbane Rivers for the 1996 flood event
1996.TOT	Output hydrographs for the 1996 flood event
1996.OUT	Total output for the 1996 flood event
FCST100.XP	RAFTS network model for the 100 Year ARI flood event
100.HIS	Rainfall input for the 100 Year ARI flood event
100.INT	Inflow hydrographs for Bremer and Brisbane Rivers for the 100 Year ARI flood event
100.TOT	Output hydrographs for the 100 Year ARI flood event
100.OUT	Total output for the 100 Year ARI flood event
MIKE 11 Files	
BRIS97.IX)	Cross sectional data base files
BRIS97.IX1	Cross sectional data base files
BRIS97.PST	Cross sectional data base files
FORECAST.RDF	Flood forecasting hydraulic river network
FCAST96.BSF	Boundary file for the 1996 flood event
FCAST100.BSF	Boundary file for the 100 Year ARI flood event
FORECAST.SSF	Parameter file for the flood forecasting model
FFCAST96.*RF	Result files for the 1996 flood event
FFCAST100.*RF	Result files for the 100 Year ARI flood event

Table 5.6: HEC-RAS Model Files

File Name	Description
Brisbane.prj	Contains all Brisbane River files for project
*.p14	Calibration events Q_{100}, Q_{10} and Q_{20}
*.p25	Story Bridge plan
*.p21	Merivale Bridge plan
*.p20	Indooroopilly Bridge plan
*.p19	Centenary Bridge plan
*.p22	William Jolly Bridge plan
*.p23	Victoria Bridge plan
*.p24	Captain Cook Bridge plan

Note: each plan contains the necessary files to run each case.

Table 5.7: Miscellaneous Files

File Name	Description
Final Report	G:\BRISRIV\REPORT\FINREP*.*
PROFILES.xls	Contains Tables C-1, J-1, J-2, J-3, J-4, h_1, & M-1
DAYRAIN.xls	Contains Daily rainfalls at representative locations
FFA.xls	Contains Table E-1 to E-5
HECRAS.xls	Contains Tables I-1 to I-4
DAMHvsQ.xls	Contains Figure F-1 to F-2
FIGH1.xls	Contains Figure H-1
RATCURVE.xls	Contains Figures L-1 to L-7
73IFDPLV.xls	Contains Critical intensities overlayed on IFD curves at selected locations for 1973 event
74IFDPLV.xls	Contains Critical intensities overlayed on IFD curves at selected locations for 1974 event
83IFDPLV.xls	Contains Critical intensities overlayed on IFD curves at selected locations for 1983 event
89aIFDP.xls	Contains Critical intensities overlayed on IFD curves at selected locations for 1989a event
89bIFDP.xls	Contains Critical intensities overlayed on IFD curves at selected locations for 1989b event
96IFDP.xls	Contains Critical intensities overlayed on IFD curves at selected locations for 1996 event
RP349M.*	Final report in Word and Word Perfect format
User Guide	**G:\BRISRIV\REPORT\FINREP*.***
UGTAB.xls	Contains a listing of the MIKE11 files required to run each model
TABLE6-1.xls	Contains Table 6-1 of the user guide - Figures
TABLE6-1.xls	Contains Table 6-2 of the user guide - Drawings
4157-29.dwg	Contains Figure 1.1 of the user guide
RP379M.*	User guide report in Word & word perfect format
Structure Reference Sheets G:\BRISRIV\HSRS*.*	
STRUCREF.xls	Contains a structure reference sheets
CAPTAIN.bmp	Contains a picture of the Captain Cook Bridge
CENT.bmp	Contains a picture of the Centenary Bridge
GATEWAY.bmp	Contains a picture of the Gateway Bridge
INDOOR.bmp	Contains a picture of the Indooroopilly Bridges
INDOORA.bmp	Contains a picture of the Indooroopilly Bridges
MERIVALE.bmp	Contain a picture of the Merivale Bridge
STORY.bmp	Contains a picture of the Story Bridge
VICTORIA.BMP	Contains a picture of the Victoria Bridge
WILLJOLL.bmp	Contains a picture of the William Jolly Bridge

File Name	Description
IFD Data	**G:\BRISRIV\IFD*.***
.	contains calculated IFD information at each rainfall station within the Brisbane River Catchment
HYDCON	**G:\BRISRIV\HYDCON*.***
..\INPUT*.csv	Rainfall depths calculated at each RAFTS node
..\OUTPUT*.his	Rainfall patterns calculated by HYDCON at each RAFS node
HYDCON.exe	The HYDCON program
DATABASE	**G:\BRISRIV\DATABASE*.***
BRIVDB.xls	Contains the required database information

6. Drawing Files

6. Drawing Files

6.1 Explanation of Drawing Files

Figures from the report have been saved in .DWG format. Refer to **Table 6.1** for list.

Drawings have been saved in .DWG format and thematic information (overlays) have been saved in .DXF format for importation into BIMAP. Refer to **Table 6.2** for list.

6.2 Explanation of Layer Names and AutoCAD Drawing XREFS for Thematic Overlay Plans

6.2.1 Revegetation Strategy

Drawing Nos. WIO581 - 184 to 190

Layer Name		Layer content
11a	-	Amtd Chainage
12	-	Amtd Line
BCCA0	-	Titleblock information
Co-ords	-	AMG Co-ordinates
Exist-vege	-	Existing vegetation
New-reveg	-	New revegetation
Q100-inundat	-	100 Year inundation line
Text	-	Text

X-Refs: Base 1 to Base 7
Cadastral information, X-Sections, AMTD Line.
Insertion point 0,0

6.2.2 Hazard Mapping

Drawing Nos. W10581-191 to 197

Layer Name		Layer content
11a	-	Amtd chainage
12	-	Amtd Line
BCCA0	-	Titleblock Information
Co-ords	-	AMG Co-ordinates
High-hatch	-	High hazard area hatching
High-hazard	-	High hazard area outline
Low-hatch	-	Low hazard area hatching
Low-hazard	-	Low hazard area outline
Q100-inundation	-	100 year inundation line
Text	-	Text

X-Refs:

- Base-1 to Base 7
  Cadastral information, X-Sections, AMTD Line
  Insertion point 0, 0

- Contsht 1 to Contsht 2
  1 m contours
  Insertion point 0, 0

6.2.3 Regulation Lines

Drawing Nos. WIO581 - 198 to 204

Layer Name		Layer content
11a	-	Amtd chainage
12	-	Amtd Line
BCCA0	-	Titleblock Information
Co-ords	-	AMG Co-ordinates
Q100-inundation	-	100 year inundation line
Reg-dims	-	Regulation line dimensions
Regline	-	Regulation line
*Rezone-.....	-	Areas identified for possible rezoning
Text	-	Text
Trib-regline	-	Tributary regulation lines

* Rezoning layers have been included for information only and have been frozen.

X-Refs:

- Base 1 to Base 7
  Cadastral information, X-Sections, AMTD Line
  Insertion point 0, 0

6.2.4 Inundation Lines

Drawing Nos. WIO581 - 205 to 211

Layer Name		Layer content
11a	-	Amtd chainage
12	-	Amtd Line
BCCA0	-	Titleblock Information
Co-ords	-	AMG Co-ordinates
Q100 - inundation	-	100 year inundation line
Q20 - inundation	-	20 year inundation line
Text	-	Text

X-Refs:

- Base 1 to Base 7
  Cadastral information, X-Sections, AMTD Line
  Insertion point 0, 0

- Contsht 1 to Contsht 2
  1 m contours
  Insertion point 0, 0

6.2.5 Flood Contour Plans

Drawing Nos. WIO581 - 213 to 221

A drawing file of the flood contours only has been included. Refer to Section 6.2.6.

6.2.6 Flood Contour Plan for Importation into BIMAP

Drawing Name: FL-CONT

Layer Name		Layer content
Fl - contours	-	Flood contours
Hatch	-	Hatching
Co-ords	-	AMG Coordinates
Outline	-	Hatch outline
Q100 - inundation	-	100 year inundation line

6.3 Explanation of PEN Weights

Colour No.	Pen Weight	Pen No.
1	0.2	Black (7)
2	0.35	Black (7)
3	0.6	Black (7)
4	0.15	Black (7)
5	0.7	Black (7)
6	0.5	Black (7)
7	0.3	Black (7)
8	0.12	Black (7)
9	0.12	Black (7)
250	Shaded 4%	250
251	Shaded 15%	251
252	Hatched 45°/Spacing 1 mm	252

6.4 Sheet Coordinates for Overlay Sheets

Sheet Number	Coordinates	
	Bottom Left	Top Right
Sheet 1 of 7 sheets	514 810, 6 964 860	517 760, 6 975 470
Sheet 2 of 7 sheets	509 075, 6 960 845	512 025, 6 971 455
Sheet 3 of 7 sheets	503 340, 6 956 830	506 290, 6 967 440
Sheet 4 of 7 sheets	498 300, 6 951 680	499 360, 6 962 640
Sheet 5 of 7 sheets	493 350, 6 946 730	494 410, 6 957 690
Sheet 6 of 7 sheets	487 870, 6 941 250	488 930, 6 952 210
Sheet 7 of 7 sheets	485 095, 6 947 320	486 155, 6 958 280

Plus **Table 6.1** and **Table 6.2**.

TABLE 6.1

FILE NAME	FIGURE	No.	FIGURE TITLE
04157-29.DWG	FIGURE	1-1	BRISBANE RIVER CATCHMENT LOCALITY PLAN
04157-06.DWG	FIGURE	2-1	LOCALITY PLAN
04157-48.DWG	FIGURE	2-2	BRISBANE RIVER SUB-CATCHMENTS
04157-05.DWG	FIGURE	3-1	STREAM GAUGE LOCATIONS
04157-08.DWG	FIGURE	3-3	RAINFALL STATION LOCATIONS
04157-07.DWG	FIGURE	3-4	PLUVIOMETER LOCATIONS
04157-01.DWG	FIGURE	5-1a	RAFTS LAYOUT - BREMER RIVER AND LOWER BRISBANE
04157-02.DWG	FIGURE	5-1b	RAFTS LAYOUT - LOCKYER
04157-03.DWG	FIGURE	5-1c	RAFTS LAYOUT - SOMERSET & WIVENHOE
04157-04.DWG	FIGURE	5-1d	RAFTS LAYOUT - UPPER BRISBANE
04157-09.DWG	FIGURE	5-4	RAINFALL DISTRIBUTION - JANUARY 1974 STORM
04157-10.DWG	FIGURE	5-5	REPRESENTATIVE PLUVIOGRAPHS - JANUARY 1974 STORM
04157-28.DWG	FIGURE	5-6	CHANNEL STORAGE CURVES AT LOWOOD
04157-28.DWG	FIGURE	5-7	CHANNEL STORAGE CURVES AT MOGGILL
04157-28.DWG	FIGURE	5-8	CHANNEL STORAGE CURVES AT HARRISVELLE
04157-11.DWG	FIGURE	5-9	RAINFALL DISTRIBUTION - JUNE 1983 STORM
04157-12.DWG	FIGURE	5-10	REPRESENTATIVE PLUVIOGRAPHS - JUNE 1983 STORM
04157-13.DWG	FIGURE	5-11	RAINFALL DISTRIBUTION - LATE APRIL 1989 STORM
04157-14.DWG	FIGURE	5-12	REPRESENTATIVE PLUVIOGRAPHS - LATE APRIL 1989 STORM
04157-15.DWG	FIGURE	5-13	RAINFALL DISTRIBUTION - MAY 1996 STORM
04157-16.DWG	FIGURE	5-14	REPRESENTATIVE PLUVIOGRAPHS - MAY 1996 STORM
04157-53.DWG	FIGURE	5-15	ISOHYETAL MAP - FEBRUARY 1931 STORM
04157-56.DWG	FIGURE	5-16	REPRESENTATIVE PLUVIOGRAPHS - FEBRUARY 1931 STORM
04157-52.DWG	FIGURE	5-17	ISOHYETAL MAP - MARCH 1955 STORM
04157-56.DWG	FIGURE	5-18	REPRESENTATIVE PLUVIOGRAPHS - MARCH 1955 STORM
04157-17.DWG	FIGURE	5-19	RAINFALL DISTRIBUTION - JULY 1973 STORM
04157-18.DWG	FIGURE	5-20	REPRESENTATIVE PLUVIOGRAPHS - JULY 1973 STORM
04157-19.DWG	FIGURE	5-21	RAINFALL DISTRIBUTION - EARLY APRIL 1989 STORM
04157-20.DWG	FIGURE	5-22	REPRESENTATIVE PLUVIOGRAPHS - EARLY APRIL 1989 STORM
04157-21.DWG	FIGURE	6-1a	MIKE 11 MODEL STRUCTURE (SHEET 1 OF 7)
04157-22.DWG	FIGURE	6-1b	MIKE 11 MODEL STRUCTURE (SHEET 2 OF 7)
04157-23.DWG	FIGURE	6-1c	MIKE 11 MODEL STRUCTURE (SHEET 3 OF 7)
04157-24.DWG	FIGURE	6-1d	MIKE 11 MODEL STRUCTURE (SHEET 4 OF 7)
04157-25.DWG	FIGURE	6-1e	MIKE 11 MODEL STRUCTURE (SHEET 5 OF 7)
04157-26.DWG	FIGURE	6-1f	MIKE 11 MODEL STRUCTURE (SHEET 6 OF 7)
04157-27.DWG	FIGURE	6-1g	MIKE 11 MODEL STRUCTURE (SHEET 7 OF 7)
04157-49.DWG	FIGURE	6-2	HYDRAULIC MODEL CHANNEL ROUGHNESS & RELATIVE RESISTANCE VALUES
4157-222.DWG	FIGURE	6-3	HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - JANUARY 1974
4157-223.DWG	FIGURE	6-4	HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - JUNE 1983
4157-224.DWG	FIGURE	6-5	HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - LATE APRIL 1989

TABLE 6.1

4157-225.DWG	FIGURE	6-6	HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - MAY 1996
4157-226.DWG	FIGURE	6-7	HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - FEBRUARY 1931
4157-227.DWG	FIGURE	6-8	HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - MARCH 1955
4157-228.DWG	FIGURE	6-9	HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - JULY 1973
4157-229.DWG	FIGURE	6-10	HYDROLOGIC AND HYDRAULIC MODEL CONSISTENCY - EARLY APRIL 1989
04157-32.DWG	FIGURE	7-1	2 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT
04157-33.DWG	FIGURE	7-2	5 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT
04157-34.DWG	FIGURE	7-3	10 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT
04157-35.DWG	FIGURE	7-4	20 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT
04157-36.DWG	FIGURE	7-5	50 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT
04157-37.DWG	FIGURE	7-6	100 YEAR ARI 30 HOUR DURATION RAINFALL EVENT - BRISBANE RIVER CATCHMENT
04157-30.DWG	FIGURE	7-11	FLOOD FREQUENCY ANALYSIS LOCATION LAYOUT
04157-31.DWG	FIGURE	7-12	FLOOD FREQUENCY CURVE AT LOWOOD - NO DAMS EFFECTIVE
04157-31.DWG	FIGURE	7-13	FLOOD FREQUENCY CURVE AT MOGGILL - NO DAMS EFFECTIVE
04157-31.DWG	FIGURE	7-14	FLOOD FREQUENCY CURVE AT PORT OFFICE (-0.15m AHD) - NO DAMS EFFECTIVE
04157-31.DWG	FIGURE	7-15	FLOOD FREQUENCY CURVE AT PORT OFFICE (1.85m AHD, HIGHEST ASTRONOMICAL TIDE +0.15m) - NO DAMS EFFECTIVE
4157-345.DWG	FIGURE	11-1	THIESSEN POLYGONS FOR RADIO TELEMETRY RAINFALL STATIONS
4157-346.DWG	FIGURE	11-2a	MAJOR ESCAPE/ACCESS ROUTES
4157-347.DWG	FIGURE	11-2b	MAJOR ESCAPE/ACCESS ROUTES
4157-230.DWG	FIGURE	B-1a TO B-1d	JANUARY 1974 HYDROGRAPHS
4157-231.DWG	FIGURE	B-2a TO B-2c	JUNE 1983 FLOOD HYDROGRAPHS
4157-232.DWG	FIGURE	B-3a TO B-3d	LATE APRIL 1989 FLOOD HYDROGRAPHS
4157-233.DWG	FIGURE	B-4a TO B-4d	MAY 1996 FLOOD HYDROGRAPHS
4157-234.DWG	FIGURE	B-5	LATE FEBRUARY 1931 FLOOD HYDROGRAPHS
4157-235.DWG	FIGURE	B-6a TO B-6b	MARCH 1955 FLOOD HYDROGRAPHS
4157-236.DWG	FIGURE	B-7a TO B-7b	JULY 1973 FLOOD HYDROGRAPHS
4157-237.DWG	FIGURE	B-8a TO B-8c	EARLY APRIL 1989 FLOOD HYDROGRAPHS
4157-238.DWG	FIGURE	B-9	JULY 1973 - POST WIVENHOE
4157-239.DWG	FIGURE	B-10a TO B-10b	JANUARY 1974 - POST WIVENHOE
4157-327.DWG	FIGURE	C-1a	FLOOD CALIBRATION PROFILES
4157-328.DWG	FIGURE	C-1b	FLOOD CALIBRATION PROFILES
4157-329.DWG	FIGURE	C-1c	FLOOD CALIBRATION PROFILES
4157-330.DWG	FIGURE	C-1d	FLOOD CALIBRATION PROFILES
4157-331.DWG	FIGURE	C-1e	FLOOD CALIBRATION PROFILES
4157-332.DWG	FIGURE	C-1f	FLOOD CALIBRATION PROFILES
4157-333.DWG	FIGURE	C-1g	FLOOD CALIBRATION PROFILES
4157-334.DWG	FIGURE	C-1h	FLOOD CALIBRATION PROFILES
4157-335.DWG	FIGURE	C-1i	FLOOD CALIBRATION PROFILES
4157-336.DWG	FIGURE	C-2a	FLOOD VERIFICATION PROFILES
4157-337.DWG	FIGURE	C-2b	FLOOD VERIFICATION PROFILES
4157-338.DWG	FIGURE	C-2c	FLOOD VERIFICATION PROFILES

TABLE 6.1

4157-339.DWG	FIGURE	C-2d	FLOOD VERIFICATION PROFILES
4157-340.DWG	FIGURE	C-2e	FLOOD VERIFICATION PROFILES
4157-341.DWG	FIGURE	C-2f	FLOOD VERIFICATION PROFILES
4157-342.DWG	FIGURE	C-2g	FLOOD VERIFICATION PROFILES
4157-343.DWG	FIGURE	C-2h	FLOOD VERIFICATION PROFILES
4157-344.DWG	FIGURE	C-2i	FLOOD VERIFICATION PROFILES
4157-240.DWG	FIGURE	C-3a	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JANUARY 1974
4157-241.DWG	FIGURE	C-3b	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JANUARY 1974
4157-242.DWG	FIGURE	C-3c	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JANUARY 1974
4157-243.DWG	FIGURE	C-3d	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JANUARY 1974
4157-244.DWG	FIGURE	C-4	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - MAY 1996
4157-245.DWG	FIGURE	C-5	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - LATE APRIL 1989
4157-246.DWG	FIGURE	C-6	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JUNE 1983
4157-247.DWG	FIGURE	C-7	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - MARCH 1955
4157-248.DWG	FIGURE	C-8	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - EARLY APRIL 1989
4157-249.DWG	FIGURE	C-9a	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JULY 1973
4157-250.DWG	FIGURE	C-9b	PREDICTED AND RECORDED HYDROGRAPH COMPARISON - JULY 1973
04157-64.DWG	FIGURE	D-1	GENERALISED TROPICAL STORM METHOD (GTSM) DESIGN ISOHYETAL PATTERN
			FOR THE DISTRIBUTION OF PMP FOR AREAS > 2000 km2
4157-251.DWG	FIGURE	G-1	HYDROGRAPHS FOR THE 2 YEAR ARI FLOOD EVENT
4157-252.DWG	FIGURE	G-2	HYDROGRAPHS FOR THE 5 YEAR ARI FLOOD EVENT
4157-253.DWG	FIGURE	G-3	HYDROGRAPHS FOR THE 10 YEAR ARI FLOOD EVENT
4157-254.DWG	FIGURE	G-4	HYDROGRAPHS FOR THE 20 YEAR ARI FLOOD EVENT
4157-255.DWG	FIGURE	G-5	HYDROGRAPHS FOR THE 50 YEAR ARI FLOOD EVENT
4157-256.DWG	FIGURE	G-6	HYDROGRAPHS FOR THE 100 YEAR ARI FLOOD EVENT
4157.257.DWG	FIGURE	G-7	HYDROGRAPHS FOR THE 200 YEAR ARI FLOOD EVENT
4157-258.DWG	FIGURE	G-8	HYDROGRAPHS FOR THE 500 YEAR ARI FLOOD EVENT
4157-259.DWG	FIGURE	G-9	HYDROGRAPHS FOR THE 1000 YEAR ARI FLOOD EVENT
4157-260.DWG	FIGURE	G-10	HYDROGRAPHS FOR THE 2000 YEAR ARI FLOOD EVENT
4157-261.DWG	FIGURE	G-11	HYDROGRAPHS FOR THE 10000 YEAR ARI FLOOD EVENT
4157-262.DWG	FIGURE	G-12	HYDROGRAPHS FOR THE PMF (100000 YEAR ARI) FLOOD EVENT
4157-263.DWG	FIGURE	H-2	DESIGN PROFILES FOR THE BRISBANE RIVER - COMBINED
4157-264.DWG	FIGURE	H-3a	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-265.DWG	FIGURE	H-3b	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-266.DWG	FIGURE	H-3c	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-267.DWG	FIGURE	H-3d	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-268.DWG	FIGURE	H-3e	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

TABLE 6.1

4157-269.DWG	FIGURE	H-3f	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-270.DWG	FIGURE	H-3g	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-271.DWG	FIGURE	H-3h	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-272.DWG	FIGURE	H-3i	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-273.DWG	FIGURE	H-4a	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-274.DWG	FIGURE	H-4b	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-275.DWG	FIGURE	H-4c	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-276.DWG	FIGURE	H-4d	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-277.DWG	FIGURE	H-4e	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-278.DWG	FIGURE	H-4f	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-279.DWG	FIGURE	H-4g	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-280.DWG	FIGURE	H-4h	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-281.DWG	FIGURE	H-4i	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-282.DWG	FIGURE	H-5a	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-283.DWG	FIGURE	H-5b	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-284.DWG	FIGURE	H-5c	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-285.DWG	FIGURE	H-5d	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-286.DWG	FIGURE	H-5e	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-287.DWG	FIGURE	H-5f	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-288.DWG	FIGURE	H-5g	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-289.DWG	FIGURE	H-5h	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS

TABLE 6.1

4157-290.DWG	FIGURE	H-5i	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-291.DWG	FIGURE	H-6a	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-292.DWG	FIGURE	H-6b	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-293.DWG	FIGURE	H-6c	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-294.DWG	FIGURE	H-6d	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-295.DWG	FIGURE	H-6e	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-296.DWG	FIGURE	H-6f	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-297.DWG	FIGURE	H-6g	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-298.DWG	FIGURE	H-6h	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-299.DWG	FIGURE	H-6i	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
4157-300.DWG	FIGURE	J-1a	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-301.DWG	FIGURE	J-1b	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-302.DWG	FIGURE	J-1c	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-303.DWG	FIGURE	J-1d	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-304.DWG	FIGURE	J-1e	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-305.DWG	FIGURE	J-1f	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-306.DWG	FIGURE	J-1g	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-307.DWG	FIGURE	J-1h	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI

TABLE 6.1

			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-308.DWG	FIGURE	J-1i	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-309.DWG	FIGURE	J-2a	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-310.DWG	FIGURE	J-2b	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-311.DWG	FIGURE	J-2c	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-312.DWG	FIGURE	J-2d	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-313.DWG	FIGURE	J-2e	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-314.DWG	FIGURE	J-2f	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-315.DWG	FIGURE	J-2g	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-316.DWG	FIGURE	J-2h	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-317.DWG	FIGURE	J-2i	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI
			FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS
			REGULATION LINES AND REVEGETATION STRATEGY CASE
4157-318.DWG	FIGURE	J-3a	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE
4157-319.DWG	FIGURE	J-3b	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE
4157-320.DWG	FIGURE	J-3c	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE
4157-321.DWG	FIGURE	J-3d	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE
4157-322.DWG	FIGURE	J-3e	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE

TABLE 6.1

4157-323.DWG	FIGURE	J-3f	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE
4157-234.DWG	FIGURE	J-3g	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE
4157-325.DWG	FIGURE	J-3h	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE
4157-326.DWG	FIGURE	J-3i	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS
			REGULATION LINE AND REVEGETATION STRATEGY CASE

TABLE 6.2

FILE NAME	DRAWING No.	DRAWING TITLE	.DXF CREATED
4157-100.dwg		LIST OF DRAWINGS	
4157-101.DWG	W10581-01	FLOOD CALIBRATION PROFILES - SHEET 1 OF 9	
4157-102.DWG	W10581-02	FLOOD CALIBRATION PROFILES - SHEET 2 OF 9	
4157-103.DWG	W10581-03	FLOOD CALIBRATION PROFILES - SHEET 3 OF 9	
4157-104.DWG	W10581-04	FLOOD CALIBRATION PROFILES - SHEET 4 OF 9	
4157-105.DWG	W10581-05	FLOOD CALIBRATION PROFILES - SHEET 5 OF 9	
4157-106.DWG	W10581-06	FLOOD CALIBRATION PROFILES - SHEET 6 OF 9	
4157-107.DWG	W10581-07	FLOOD CALIBRATION PROFILES - SHEET 7 OF 9	
4157-108.DWG	W10581-08	FLOOD CALIBRATION PROFILES - SHEET 8 OF 9	
4157-109.DWG	W10581-09	FLOOD CALIBRATION PROFILES - SHEET 9 OF 9	
4157-110.DWG	W10581-10	FLOOD VERIFICATION PROFILES - SHEET 1 OF 9	
4157-111.DWG	W10581-11	FLOOD VERIFICATION PROFILES - SHEET 2 OF 9	
4157-112.DWG	W10581-12	FLOOD VERIFICATION PROFILES - SHEET 3 OF 9	
4157-113.DWG	W10581-13	FLOOD VERIFICATION PROFILES - SHEET 4 OF 9	
4157-114.DWG	W10581-14	FLOOD VERIFICATION PROFILES - SHEET 5 OF 9	
4157-115.DWG	W10581-15	FLOOD VERIFICATION PROFILES - SHEET 6 OF 9	
4157-116.DWG	W10581-16	FLOOD VERIFICATION PROFILES - SHEET 7 OF 9	
4157-117.DWG	W10581-17	FLOOD VERIFICATION PROFILES - SHEET 8 OF 9	
4157-118.DWG	W10581-18	FLOOD VERIFICATION PROFILES - SHEET 9 OF 9	
4157-119.DWG	W10581-19	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 1 OF 9	
4157-120.DWG	W10581-20	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 2 OF 9	
4157-121.DWG	W10581-21	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 3 OF 9	
4157-122.DWG	W10581-22	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 4 OF 9	
4157-123.DWG	W10581-23	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 5 OF 9	
4157-124.DWG	W10581-24	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 6 OF 9	
4157-125.DWG	W10581-25	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 7 OF 9	

TABLE 6.2

4157-126.DWG	W10581-26	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 8 OF 9	
4157-127.DWG	W10581-27	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 5, 20, & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 9 OF 9	
4157-128.DWG	W10581-28	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 1 OF 9	
4157-129.DWG	W10581-29	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 2 OF 9	
4157-130.DWG	W10581-30	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 3 OF 9	
4157-131.DWG	W40581-31	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 4 OF 9	
4157-132.DWG	W10581-32	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 5 OF 9	
4157-133.DWG	W10581-33	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 6 OF 9	
4157-134.DWG	W10581-34	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 7 OF 9	
4157-135.DWG	W10581-35	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 8 OF 9	
4157-136.DWG	W10581-36	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 9 OF 9	
4157-137.DWG	W10581-37	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 1 OF 9	
4157-138.DWG	W10581-38	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 2 OF 9	
4157-139.DWG	W10581-39	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 3 OF 9	

TABLE 6.2

4157-140.DWG	W10581-40	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 4 OF 9	
4157-141.DWG	W10581-41	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 5 OF 9	
4157-142.DWG	W10581-42	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 6 OF 9	
4157-143.DWG	W10581-43	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 7 OF 9	
4157-144.DWG	W10581-44	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 8 OF 9	
4157-145.DWG	W10581-45	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE PMF & 10 000 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 9 OF 9	
4157-146.DWG	W10581-46	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 1 OF 9	
4157-147.DWG	W10581-47	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 2 OF 9	
4157-148.DWG	W10581-48	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 3 OF 9	
4157-149.DWG	W10581-49	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 4 OF 9	
4157-150.DWG	W10581-50	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 5 OF 9	
4157-151.DWG	W10581-51	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 6 OF 9	
4157-152.DWG	W10581-52	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 7 OF 9	
4157-153.DWG	W10581-53	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 8 OF 9	

TABLE 6.2

4157-154.DWG	W10581-54	MIKE 11 EXISTING DESIGN FLOOD PROFILES FOR THE 2000, 1000, 500 & 200 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		SHEET 9 OF 9	
4157-155.DWG	W10581-55	DESIGN PROFILES FOR THE BRISBANE RIVER - COMBINED	
4157-156.DWG	W10581-56	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 1 OF 9	
4157-157.DWG	W10581-57	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 2 OF 9	
4157-158.DWG	W10581-58	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 3 OF 9	
4157-159.DWG	W10581-59	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 4 OF 9	
4157-160.DWG	W10581-60	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 5 OF 9	
4157-161.DWG	W10581-61	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 6 OF 9	
4157-162.DWG	W10581-62	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 7 OF 9	
4157-163.DWG	W10581-63	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 8 OF 9	
4157-164.DWG	W10581-64	MIKE 11 DESIGN FLOOD PROFILES FOR THE 5, 20 & 100 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 9 OF 9	
4157-165.DWG	W10581-65	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	

TABLE 6.2

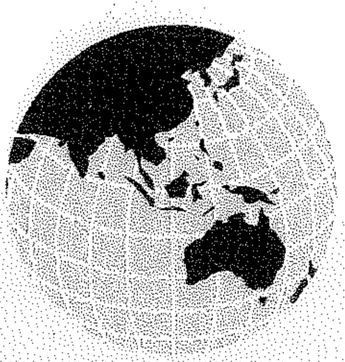
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 1 OF 9	
4157-166.DWG	W10581-66	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 2 OF 9	
4157-167.DWG	W10581-67	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 3 OF 9	
4157-168.DWG	W10581-68	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 4 OF 9	
4157-169.DWG	W10581-69	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 5 OF 9	
4157-170.DWG	W10581-70	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 6 OF 9	
4157-171.DWG	W10581-71	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 7 OF 9	
4157-172.DWG	W10581-72	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 8 OF 9	
4157-173.DWG	W10581-73	MIKE 11 DESIGN FLOOD PROFILES FOR THE 2, 10, & 50 YEAR ARI	
		FLOOD EVENTS (MHWS) COMBINED TAILWATER AND RIVER FLOODING CONDITIONS	
		REGULATION LINES AND REVEGETATION STRATEGY CASE	
		SHEET 9 OF 9	
4157-174.DWG	W10581-74	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	
		SHEET 1 OF 9	
4157-175.DWG	W10581-75	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	
		SHEET 2 OF 9	
4157-176.DWG	W10581-76	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	

TABLE 6.2

		SHEET 3 OF 9	
4157-177.DWG	W10581-77	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	
		SHEET 4 OF 9	
4157-178.DWG	W10581-78	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	
		SHEET 5 OF 9	
4157-179.DWG	W10581-79	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	
		SHEET 6 OF 9	
4157-180.DWG	W10581-80	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	
		SHEET 7 OF 9	
4157-181.DWG	W10581-81	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	
		SHEET 8 OF 9	
4157-182.DWG	W10581-82	AFFLUX FOR THE 100 YEAR ARI DESIGN FLOODS	
		REGULATION LINE AND REVEGETATION STRATEGY CASE	
		SHEET 9 OF 9	
4157-183.DWG	W10581-83	KEY MAP TO OVERLAY PLANS	
4157-184.DWG	W10581-84	REVEGETATION STRATEGY PLAN - SHEET 1 OF 7	4157-184.DXF
4157-185.DWG	W10581-85	REVEGETATION STRATEGY PLAN - SHEET 2 OF 7	4157-185.DXF
4157-186.DWG	W10581-86	REVEGETATION STRATEGY PLAN - SHEET 3 OF 7	4157-186.DXF
4157-187.DWG	W10581-87	REVEGETATION STRATEGY PLAN - SHEET 4 OF 7	4157-187.DXF
4157-188.DWG	W10581-88	REVEGETATION STRATEGY PLAN - SHEET 5 OF 7	4157-188.DXF
4157-189.DWG	W10581-89	REVEGETATION STRATEGY PLAN - SHEET 6 OF 7	4157-189.DXF
4157-190.DWG	W10581-90	REVEGETATION STRATEGY PLAN - SHEET 7 OF 7	4157-190.DXF
4157-191.DWG	W10581-91	HAZARD MAPPING PLAN - SHEET 1 OF 7	4157-191.DXF
4157-192.DWG	W10581-92	HAZARD MAPPING PLAN - SHEET 2 OF 7	4157-192.DXF
4157-193.DWG	W10581-93	HAZARD MAPPING PLAN - SHEET 3 OF 7	4157-193.DXF
4157-194.DWG	W10581-94	HAZARD MAPPING PLAN - SHEET 4 OF 7	4157-194.DXF
4157-195.DWG	W10581-95	HAZARD MAPPING PLAN - SHEET 5 OF 7	4157-195.DXF
4157-196.DWG	W10581-96	HAZARD MAPPING PLAN - SHEET 6 OF 7	4157-196.DXF
4157-197.DWG	W10581-97	HAZARD MAPPING PLAN - SHEET 7 OF 7	4157-197.DXF
4157-198.DWG	W10581-98	REGULATION LINES PLAN - SHEET 1 OF 7	4157-198.DXF
4157-199.DWG	W10581-99	R3GULATION LINES PLAN - SHEET 2 OF 7	4157-199.DXF
4157-200.DWG	W10581-100	REGULATION LINES PLAN - SHEET 3 OF 7	4157-200.DXF
4157-201.DWG	W10581-101	REGULATION LINES PLAN - SHEET 4 OF 7	4157-201.DXF
4157-202.DWG	W10581-102	REGULATION LINES PLAN - SHEET 5 OF 7	4157-202.DXF
4157-203.DWG	W10581-103	REGULATION LINES PLAN - SHEET 6 OF 7	4157-203.DXF
4157-204.DWG	W10581-104	REGULATION LINES PLAN - SHEET 7 OF 7	4157-204.DXF
4157-205.DWG	W10581-105	INUNDATION LINES PLAN - SHEET 1 OF 7	4157-205.DXF

TABLE 6.2

4157-206.DWG	W10581-106	INUNDATION LINES PLAN - SHEET 2 OF 7	4157-206.DXF
4157-207.DWG	W10581-107	INUNDATION LINES PLAN - SHEET 3 OF 7	4157-207.DXF
4157-208.DWG	W10581-108	INUNDATION LINES PLAN - SHEET 4 OF 7	4157-208.DXF
4157-209.DWG	W10581-109	INUNDATION LINES PLAN - SHEET 5 OF 7	4157-209.DXF
4157-210.DWG	W10581-110	INUNDATION LINES PLAN - SHEET 6 OF 7	4157-210.DXF
4157-211.DWG	W10581-111	INUNDATION LINES PLAN - SHEET 7 OF 7	4157-211.DXF
4157-212.DWG	W10581-112	KEY MAP TO FLOOD CONTOURS PLANS	
4157-213.DWG	W10581-113	FLOOD CONTOURS PLAN - SHEET 1 OF 9	
4157-214.DWG	W10581-114	FLOOD CONTOURS PLAN - SHEET 2 OF 9	
4157-215.DWG	W10581-115	FLOOD CONTOURS PLAN - SHEET 3 OF 9	
4157-216.DWG	W10581-116	FLOOD CONTOURS PLAN - SHEET 4 OF 9	
4157-217.DWG	W10581-117	FLOOD CONTOURS PLAN - SHEET 5 OF 9	
4157-218.DWG	W10581-118	FLOOD CONTOURS PLAN - SHEET 6 OF 9	
4157-219.DWG	W10581-119	FLOOD CONTOURS PLAN - SHEET 7 OF 9	
4157-220.DWG	W10581-120	FLOOD CONTOURS PLAN - SHEET 8 OF 9	
4157-221.DWG	W10581-121	FLOOD CONTOURS PLAN - SHEET 9 OF 9	
FL-CONT.DWG		FLOOD CONTOURS PLAN COVERING ENTIRE STUDY AREA	FL-CONT.DXF



Appendix A - Handling Enquiries

Appendix A - Handling Enquires

This section is only intended as a guide to help new users familiarise themselves with the data locations for some typical enquires.

Flood Level Enquiry

To advise your client of an anticipated design event Q100 flood level with the regulation lines and revegetation strategy in place.

Firstly, locate the position of your clients enquiry and identify the nearest relevant cross section(s) by either using the Bimap access system or by referring to the hard copy plots (Drawing 10581 No.56 - 73).

Once you now have identified the relevant cross section(s) there are several choices available to view the published results:

(i) Use the digital copy of the report through Word Perfect, utilising the *hypertext* function.

(ii) Use one of the six hard copy reports and look up the results in **Appendix J - Table J-1.**.

(iii) Use the hard copy profiles. (Drawing 10581 No. 56-73)

Flood Regulation Line Location

To advise your client of the location of the flood regulation line.

☐ Regulation lines for the Brisbane River Flood Study have been installed onto Bimap and may be viewed using the Flood Regulation Line theme.

☐ The hard copy plots (Drawings 10581 No 98-104) show both the proposed flood regulation lines.

Creek Crossings and Upgrades

☐ Check the existing crossing immunity.

☐ Refer to the Hydraulic Structure Reference Sheet in **Appendix K** of the Brisbane River Flood Study for hydraulic properties of the structure.

☐ Utilise either the MIKE 11 hydraulic model or HEC-RAS hydraulic model to investigate alternative configurations.

Preliminary Assessment of Regulation Line Relocation

- Drawings 10581 No 74-82 show the most flood sensitive reaches of the creek and the relative afflux from the regulation lines and revegetation strategy which is useful for making preliminary assessment.

Tree Planting Enquires

- View Drawings 10581 No 84-90 from the Brisbane River Flood Study Report Drawings or the Bimap system.
- For preliminary assessment, determine in which of the three revegetation strategy zones the application lies.
- For detailed analysis, limit increases in roughness by density or extent to meet the allowable afflux limit shown on Drawings 10581 No84-90.

Appendix B - Recommendations for Continued Management of Brisbane River Flood Study

Appendix B - Recommendations for Continued Management of Brisbane River Flood Study

It is recommended that:

(i) Quality assurance procedures for the updating of model data and results files be undertaken to ensure continued confidence in the model results. A particular issue which will need to be addressed is the timing of updating the model or result files based upon works which are proposed but not yet undertaken or complete.

(ii) A caretaker be appointed as the liaison officer for changes to the model data or results files. This person may double as the nominated custodian of the master copy of the handover guide. Remembering that the master copy contains a check sheet which may be used for recording any changes to the model data or results.

(iii) A record of the locations of the six hard copies of the final report be kept up to date to ensure that any revisions or inclusions are kept consistent across all copies. Note there is no current master copy for the Brisbane River Flood Study Final Report.

(iv) Discussions be held to determine how changes to the regulation lines will be implemented and who will be responsible for this implementation.

Appendix C - Example of a checklist for Amendments to Brisbane River Flood Study

Appendix C - Example of a Checklist for Amendments to Brisbane River Flood Study*

Recommendations - All sources/copies of data should be updated when amendments are made.

This is an example of the type of information which should be on a Quality Assurance checklist. (*Explain in Presentation - that they can use ours or use their own). There should be one master copy which everybody knows is the controlled copy. All other copies are uncontrolled and include the date.

Date	Description of Amendment to Flood Study	Files Affected	Responsible Officer	Approval Given by Person Responsible for Model's Maintenance	Checklist Altered in Computer (ie master copy) (tick)
Example	Alteration to cross section Ch10.002	Bris97.ix0 Bris97.ix1 Bris97.pst	Ms X	1. Update-model	✓

Master Copy controlled by:

BRISBANE RIVER FLOOD STUDY BRIEF

Department of Works
Brisbane City Council

1. PURPOSE OF STUDY

The primary outcomes from the study will be to provide design flood levels along the river and develop a flood forecasting model.

Secondary outcomes of the study will be to set flood regulation lines, and develop a revegetation strategy compatible with hydraulic constraints.

The Consultant must provide study outputs in a format which will integrate with Council database facilities. The Study results must be able to be reproduced within the Council.

2. CATCHMENT DESCRIPTION

The Brisbane Valley has a total catchment area of 13,570 km^2. The valley is bounded by the Great Dividing Range to the west and by a number of smaller coastal ranges to the east and north. Most of the Brisbane River catchment lies to the west of the coastal ranges. Refer to the locality plan in Figure 1.

The Brisbane River system consists of the Brisbane River and its six major tributaries. From its headwaters in the Brisbane and Jimna Ranges, the Brisbane River flows in a generally south-easterly direction, before running almost north-easterly into Moreton Bay.

Cooyar Creek, Emu Creek and Cressbrook Creek are the major tributaries of the Upper Brisbane River that flow eastward from the Great Dividing Range. The most northerly of the Upper Brisbane River tributaries is Cooyar Creek. Cooyar Creek has a catchment area of around 1,065 km^2 and its catchment is regarded as the driest of the Brisbane River tributaries. Emu Creek, located immediately to the south of Cooyar Creek also flows in a north-easterly direction and it also has a catchment area of about 1,000 km^2. The remaining major tributary of the Upper Brisbane River, Cressbrook Creek, has a catchment area of 620 km^2.

The Stanley River is the only major tributary of the Brisbane River that flows westwards from the Conondale and D'Aguilar Ranges near the coast. The Stanley River catchment is situated in the steepest and wettest part of the whole Brisbane Valley.

Somerset Dam is situated on the Stanley River some 7 km upstream from its confluence with the Brisbane River. The catchment area of the dam is approximately 1,330 km^2. Lake Somerset dominates the Lower Stanley River catchment extending some 40 km upstream and having a surface area at full supply level of out 44 km^2.

Somerset Dam is a multi-purpose dam, being used as a water supply for the cities of Brisbane and Ipswich and a number of surrounding shires; in addition it has major flood mitigation capabilities and it is used for recreational activities. It also has minor hydro-electric power generation capabilities.

The dam is a mass gravity concrete structure that has a capacity at full supply level of 369,750 ML with a further 524,000 ML of flood storage available. The spillway is equipped with eight radial sector gates, whilst other outlet works consist of eight low level sluice gates and four fixed dispersion cone valve regulators. Design of the dam commenced in the late 1930's but construction was not completed until 1959 because of wartime delays.

Wivenhoe Dam is also a multi-purpose dam that has similar functions to that of Somerset Dam, although it is also used in conjunction with Splityard Creek Dam for hydro-electricity generation. Wivenhoe Dam commands over half of the whole Brisbane River catchment, having a catchment area of about 7,040 km^2, (including the catchment of Somerset Dam). At full supply level the dam has a capacity of 1,150,000 ML with an additional 1,450,000 ML of flood storage available.

Wivenhoe Dam differs from Somerset Dam in that it has a zoned earth and rockfill type embankment. The spillway of Wivenhoe Dam is equipped with five radial gates, whilst low level releases are made through two fixed dispersion cone valve regulators. Construction on Wivenhoe Dam commenced in 1979 and the dam was completed in 1985.

Splityard Creek Dam is located in Pryde Creek and it has a capacity of 28,600 ML and a catchment area of only 3.6 km². The dam is the upper storage of a pumped storage scheme.

Lockyer Creek flows east from the great Dividing Range to join the Brisbane River just downstream of Wivenhoe Dam. Lockyer Creek has a catchment area of about 3,000 km² making it the largest tributary of the Brisbane River in terms of catchment area.

The last of the major Brisbane River tributaries is the Bremer River. The Bremer River rises in the Little Liverpool Range and its catchment is generally hilly and lightly forested. A major tributary of the Bremer River is Warrill creek, which flows from the great Dividing Range in the south to join the Bremer River in its lower reaches just upstream from the outskirts of Ipswich city. Warrill creek, at its confluence with the Bremer River, has a catchment area of about 900 km², whereas the Bremer River is only 600 km² in area at this point.

From its confluence with the Bremer River, the Brisbane River meanders its way to Moreton Bay in a generally north-easterly direction. The city of Brisbane encompasses almost the whole of the lower Brisbane River flood plain from this point.

3. DATA

3.1 Physical Data

A recent survey of the river and flood plains is available. (Port of Brisbane survey and aerial Survey of Flood Plains late '95 early '96.) Cross section data will be provided on disk (in ASCII format) and on hard copy plots. Base maps (hard copy and digital format) will be provided showing cadastral information, the location of cross sections, State Government (1981) contours and an AMTD (assumed middle thread distance) line. All chainages and cross section labels used in the hydraulic model must be consistent with this line. Historical oss sectional data is also available including a survey in 1974 (HEC2 format).

A Department of Primary Industries Rubicon Model contains the latest survey at the time of that study. (Refer Section 3.6)

Aerial photography will be provided for the waterway corridor within Brisbane (1:10,000). Stereo photography of the waterway corridor will also be provided (1:15,000). Earlier aerial photography is also available.

The State Government contours are also available (DXF format). Council 40 ft to 1 in sewerage detail plans are also available.

3.2 Significant Flood Events

Events for which data is available are as follows:

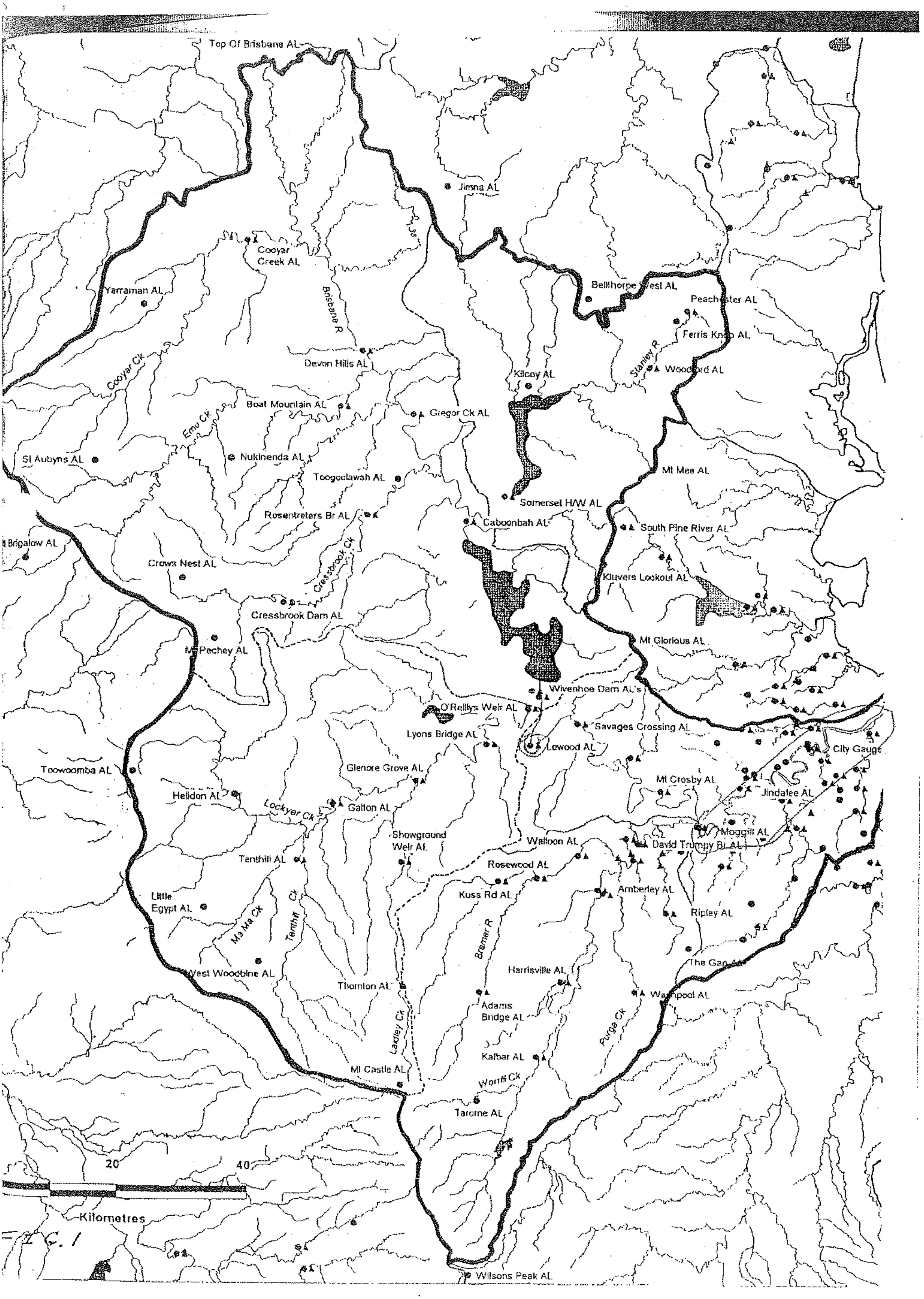

Top Of Brisbane AL
Jimna AL
Cooyar Creek AL
Yarraman AL
Brisbane R
Bellthorpe West AL
Peachester AL
Ferris Knob AL
Devon Hills AL
Cooyar Ck
Stanley R
Woodford AL
Kilcoy AL
Boat Mountain AL
Gregor Ck AL
Emu Ck
St Aubyns AL
Nukinenda AL
Toogoolawah AL
Mt Mee AL
Somerset H/W AL
Rosentreters Br AL
Caboonbah AL
South Pine River AL
Brigalow AL
Crows Nest AL
Cressbrook Ck
Kluvers Lookout AL
Cressbrook Dam AL
Mt Pechey AL
Mt Glorious AL
Wivenhoe Dam AL's
O'Reillys Weir AL
Savages Crossing AL
Lyons Bridge AL
Lowood AL
City Gauge
Toowoomba AL
Glenore Grove AL
Mt Crosby AL
Helidon AL
Lockyer Ck
Gatton AL
Jindalee AL
Showground Weir AL
Walloon AL
Moggill AL
David Trumpy Br AL
Tenthill AL
Rosewood AL
Amberley AL
Kuss Rd AL
Little Egypt AL
Ma Ma Ck
Tenthill Ck
Ripley AL
Bremer R
West Woodbine AL
The Gap AL
Harrisville AL
Thornton AL
Warrapool AL
Adams Bridge AL
Purga Ck
Laidley Ck
Kalbar AL
Mt Castle AL
Warrill Ck
Tarome AL
20
40
Kilometres
Wilsons Peak AL

FIG. 1

- * January 1974 ✓
- March 1955
- May 1996
- January 1968
- June 1967 (2 events 12 & 22 June)
- February 1971
- * July 1973 ✓
- * April 1989 (2 events early & late April) ✓

* Events used for calibration of Department of Primary Industries model. (Refer Section 3.6)

Limited data is available for the 1931 and 1893 events.

3.3 Meteorological Data

Data from some of the more significant events is summarised below. Further details and maps of station locations are available from the Bureau of Meteorology.

LOCATION	**1/74**		**1/68**		**12/6/67**		**22/6/67**	
	Hourly Rain	**Chart**	**Hourly Rain**	**Chart**	**Hourly Rain**	**Chart**	**Hourly Rain**	**Chart**
Crohamhurst	x	x	x		x		x	
Kirkleagh	x		x	x	x	x	x	
Monsildale	x		x	x	x	x	x	
Woodford	x		x	x	x	x	x	
Mt Mee	x		x		x			
Plainview			x		x			
Kilcoy	x		x		x			
Bald Knob	x		x		x			
Peachester	x		x		x			
Somerset Dam	x		x		x			
Esk	x	x						
Mt Stanley	x							
Benarkin	x	x						
Harrisville	x	x						
Amberley	x							
Moogerah Dam	x							
Samford		x						

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LOCATION	1/74		1/68		12/6/67		22/6/67	
	Hourly Rain	**Chart**	**Hourly Rain**	**Chart**	**Hourly Rain**	**Chart**	**Hourly Rain**	**Chart**
Brisbane	x		x		x	x		
Enoggera Res						x		
Mt Nebo						x		

More extensive data is available for the May 1996 event from the Brisbane Valley Flood Warning Network and the Metropolitan Brisbane Flood Warning Network.

Data from a network of daily rainfall stations is also available.

The Council can provide data from the Metropolitan Brisbane Flood Warning Network.

3.4 Historical Flood Data

Historical flood level data up to 1993 is summarised in Department of Primary Industries Report No 19 (Refer Section 3.6).

Data is also available for the May 1996 event.

Records for this event within the metropolitan reaches are as follows:

NAME	NO.	OWNER	TYPE
Moggill	040545	CBM	BVRT
Moggill	040819	CBM	Tele
Centenary Bridge	040713	CBM/BCC	S
Port Office	040690	DOT	Tele
Port Office		SEQWB	Alert
Gateway Arterial		DOT	TG
West Inner Bar	046001	DOT	TG

TG - Tide Gauge
S - manually read staff gauge
CBM - Bureau of meteorology
DOT - Department of Transport
SEQWB - South East Queensland Water Board

3.5 Bimap Data Base

BRISBANE CITY COUNCIL

Data is available from the Council's Geographic Information System (Bimap). Themes available include:

BCC Controlled Land
Bushland
Cadastre
Contours (1m, 5m, 10m)
Drainage Plan Nos
Environment Status
Flood Regulation Lines
Flood Search Flags
House Numbers
Orthophoto grid
Parks
Public areas
Stormwater drainage
Suburb boundaries
Streets
Survey Marks
Riparian Vegetation
Waterway corridors
Vegetation Protection Ordinance Affected Areas
Unauthorised fill
Waterways Strategy Plan Planning Units
Wetlands
Creek Cross Section locations
Town Plan Zoning

Data can be provided in DXF, DGN or DWG format. It would also be possible for the Consultant to have 'on line' access to the Council's Bimap Access System (BAS) for the duration of the study. The themes listed in this section are available on BAS. BAS also provides access to the following

- Property Data Base
- Environment Management Information System

3.6 Previous Studies

Relevant previous studies include the following:

1) Studies by the Department of Primary Industries in 1993 and 1994 for the South East Queensland Water Board including:

    - development of a hydraulic model (Rubicon) of the Brisbane River from Moreton Bay to Wivenhoe Dam
    - development of a runoff routing model (WT42) of the Brisbane River catchment
    - development of a flood forecasting model for the Brisbane River
    - design flood estimation

2) Flood frequency analysis by the Brisbane City Council (1976) and the Department of Primary Industries (1984).

3) The Bureau of Meteorology has converted the WT42 model to URBS and carried out further

development.

4) The Brisbane City Council has a preliminary URBS model of the Brisbane River Catchment and a preliminary backwater model (HEC2) based on 1974 topography.

List of Relevant Reports to December 1994

DPI
Report
No

1 **REAL TIME FLOOD OPERATIONS MODEL REPORT**
Final Draft Report on the Feasibility of a Real Time Flood Warning Model.
November 1990 *(Cream)*

2 **BRISBANE RIVER AND PINE RIVER HYDRAULIC MODEL REPORT**
Final Draft Report on Review and Evaluation of Hydraulic Models.
November 1990 *(Salmon)*

3 **REAL TIME FLOOD OPERATIONS MODEL REPORT**
Final Draft Report on the Evaluation of Available Hardware Platforms.
May 1991 *(Magenta)*

6 **BRISBANE RIVER AND PINE RIVER FLOOD HYDROLOGY REPORT**
Final Draft Report on Warragamba Dam EIS Flood Study.
April 1992 *(Green)*

7a **BRISBANE RIVER FLOOD HYDROLOGY REPORT** VOLUME I ✓
Final Draft Report on Runoff-Routing Model Calibration.
September 1992 *(Yellow)*

b **BRISBANE RIVER FLOOD HYDROLOGY REPORT** VOLUME II ✓
Appendix A Comparative Plots
September 1992 *(Yellow)*

c **BRISBANE RIVER FLOOD HYDROLOGY REPORT** VOLUME III ✓
Appendix B Runoff-Routing Model Layouts.
September 1992 *(Yellow)*

d **BRISBANE RIVER FLOOD HYDROLOGY REPORT** VOLUME IV
Appendix C Runoff-Routing Model Data Files.
September 1992 *(Yellow)*

8a **BRISBANE RIVER FLOOD HYDROLOGY REPORT** VOLUME I
Final Draft Report on Design Flood Estimation.
March 1993 *(Light Blue)*

b **BRISBANE RIVER FLOOD HYDROLOGY REPORT** VOLUME II

Appendix A Probable Maximum Precipitation Estimates
March 1993 *(Light Blue)*

c **BRISBANE RIVER FLOOD HYDROLOGY REPORT** VOLUME III
Appendix B Flood Frequency Analysis Results
March 1993 *(Light Blue)*

d **BRISBANE RIVER FLOOD HYDROLOGY REPORT** VOLUME IV
Appendix C Runoff-Routing Model Layouts
March 1993 *(Light Blue)*

12 **BRISBANE RIVER AND PINE RIVER HYDRAULIC MODEL REPORT**
Draft Report on Validation of RUBICON Hydrodynamic Modelling System.
June 1993

13 **BRISBANE RIVER FLOOD HYDROLOGY REPORT**
Final Draft Report on Downstream Flooding.
August 1993 *(Plum)*

16a **BRISBANE RIVER SOIL MOISTURE ACCOUNTING MODEL REPORT** VOLUME I
Final Draft Report on Model Calibration.
November 1993 *(Brown)*

b **BRISBANE RIVER SOIL MOISTURE ACCOUNTING MODEL REPORT** VOLUME II
Appendix I Daily Streamflow Plots.
November 1993 *(Brown)*

c **BRISBANE RIVER SOIL MOISTURE ACCOUNTING MODEL REPORT** VOLUME III
Appendix II Daily and Monthly Flow Duration Curves and Monthly Scatter Diagrams
November 1993 *(Brown)*

17a **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME I
Final Draft Report on Somerset Dam to Wivenhoe Dam Hydraulic Model Calibration
May 1994 *(Olive)*

b **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME II
Appendix I Cross-Sectional data
May 1994 *(Olive)*

c **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME III
Appendix II Calibration Event - Time Series Plots
May 1994 *(Olive)*

d **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME IV
Appendix III Somerset Dam to Wivenhoe Dam Hydraulic Model Rubicon Data Files
May 1994 *(Olive)*

18 **BRISBANE RIVER AND PINE RIVER FLOOD HYDROLOGY REPORT**
Final Draft Report on Regional Loss Model Relationships.

June 1994 *(Crimson)*

19 **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** (VOL I & II)

Final Draft Report on historical Flood Data
June 1994 *(Dark Yellow)*

20 **BRISBANE RIVER SYSTEM HYDRAULIC MODEL**
Final Draft Report on Somerset Dam - Dam Failure Modes
June 1994 *(Aqua)*

21a **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME I
Final Draft Report on Somerset Dam - Dam Failure Analysis
June 1994 *(Gold)*

b **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME II
Appendix A Flood Height Profiles and Inundation Maps.
June 1994 *(Gold)*

c **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME III
Appendix B Time Series Plots
June 1994 *(Gold)*

d **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME IV
Appendix C Somerset Dam to Wivenhoe Dam Hydraulic Model Rubicon Data Files
June 1994 *(Gold)*

22 **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT**
Final Draft Report on Wivenhoe Dam - Dam Failure Modes.
July 1994 *(Grey)*

23a **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME I
Final Draft Report on Wivenhoe Dam to Moreton Bay Hydraulic Model Calibration.
October 1994 *(Tan)*

✓ b **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME II
Appendix I Volume of A3 Figures.
October 1994 *(Tan)*

c **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME III
Appendix II Derivation of Wivenhoe Dam Discharges
October 1994 *(Tan)*

d **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME IV
Appendix III Cross-Sectional Data
October 1994 *(Tan)*

e **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME V
Appendix IV Wivenhoe Dam to Moreton Bay Hydraulic Model Rubicon Data Files

October 1994 *(Tan)*

24a **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT**
Final Draft Report on Wivenhoe Dam - Dam Failure Analysis
December 1994 *(Dark Blue)*

b **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME II
Appendix A Volume of A3 Figures.
December 1994 *(Dark Blue)*

c **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME II
Appendix B Wivenhoe Dam Wind Set Up and Wave Run Up.
Appendix C Time Series Plots
December 1994 *(Dark Blue)*

d **BRISBANE RIVER SYSTEM HYDRAULIC MODEL REPORT** VOLUME II
Appendix D Rubicon Data Files
December 1994 *(Dark Blue)*

25 **BRISBANE RIVER AND PINE RIVER HYDRAULIC MODEL REPORT**
Initial Draft Report on Brisbane River and Pine River Geographic Information System
(In Preparation)

26 **BRISBANE RIVER AND PINE RIVER FLOOD STUDY REPORT**
Draft Executive Summary Report.
(In Preparation)

27 **REAL TIME FLOOD OPERATIONS MODEL REPORT 'FLOOD' USERS MANUAL**
User Manual and System Manual.
(In Preparation)

Other References

MANUAL OF OPERATIONAL PROCEDURE FOR FLOOD MITIGATION FOR WIVENHOE DAM AND SOMERSET DAM - SOUTH EAST QUEENSLAND WATER BOARD.

SEVERE WEATHER AND FLOODING SOUTH EAST QUEENSLAND, BUREAU OF METEOROLOGY - May 1996

NEW BRISBANE AIRPORT DEVELOPMENT
HISTORICAL STUDY OF STORM TIDES IN MORETON BAY, APRIL 1979
STORM SURGE AND TIDE INVESTIGATION, FEBRUARY 1979
STUDY OF PROBABILITY OF COMBINED RAINFALL, TIDE AND STORM SURGE, MAY 1979
Blain, Bremmer & Williams Pty Ltd

MALLON TD (1987) REPORT ON LOW LEVEL DEVELOPMENT IN REDCLIFFE, REDCLIFFE CITY COUNCIL.

REPORT ON SEAWALLS

4. HYDROLOGIC AND HYDRAULIC MODELLING

4.1 Scope

Initially it will be necessary to review previous studies and make recommendations on the need for and extent of further hydrologic and hydraulic model calibration and verification. The May 1996 event is the most significant event since completion of previous studies.

Detailed hydraulic modelling is required on the Brisbane River from Moreton Bay to the Brisbane City limits at Moggill.

4.2 Preferred Model Types and Requirements

The aim of the hydrologic and hydraulic modelling of the river is to reproduce historical flood events. When the models have been calibrated to historical data they will be extrapolated to estimate design floods for various design storms and to set flood regulation lines along the river.

It is critical to the study that hydrologic and hydraulic consistency is achieved, ie. the results obtained from hydrologic model, hydraulic model, and flood frequency analysis are consistent. Essential to obtaining this will be the accuracy of rating curve determination and extrapolation, and the consistency of the hydrologic and hydraulic channel routing. The model parameters adopted are to reproduce recorded data for a wide range of flows and storm types and must be realistic and within normal bounds.

4.2.1 Hydrologic Model

The preferred hydrologic model is RAFTS.

Where other hydrologic programs such as URBS or WBNM are to be used, the Consultant must subsequently convert the calibrated model to RAFTS format, achieving the same level of calibration. Both models must be submitted to the Council.

4.2.2 Hydraulic Model

The preferred hydraulic model is MIKE-11

Where an alternate model is proposed it will be necessary to convert the data and calibrate to the preferred model.

The version number of the software used must be specified.

Any software developed (including source) or acquired by the Consultant to interface data from the hydrologic model to the hydraulic model and to preprocess data into a format required by these models or post process data to the required output format is to be supplied to the Council as part of the Study.

In calibrating the model, facility for the roughness coefficient to be varied across the section is required. The method of deriving the composite roughness estimate for the cross section should be clearly defined. Where interaction between main channel and flood plain flow is likely to be significant a method which takes account of the momentum transfer between main channel and flood plain flow should be used. Details of the methodology and its application should be provided. The method of managing instabilities where shallow flow occurs over a flat flood plain should be described.

A summary of the hydraulic modelling process is also required. This would include details such as development of the model structure, assumptions in setting up the model, problems encountered and how they were overcome, unconventional adjustments to data, how various facilities in the modelling program were used, etc.

In addition to the unsteady hydraulic model, the Consultant is also required to prepare and calibrate a HECRAS hydraulic model. The same cross section data must be used by both models. The affluxes calculated by both models at bridges, must be consistent. The Manning's n used in each model must be as consistent as possible. A global factoring of Mannings n values may be used to account for differences in model methodology.

4.3 Calibration of Hydrologic & Hydraulic Models

At least four floods are to be used to calibrate the models. These must include the January 1974 flood, with the other floods covering as large a range as possible. At least another two floods must be used to validate the model. The Council is to be advised of the selected floods before proceeding with modelling.

Routing parameters should not be varied for different historical flood events. That is, one set of parameters must ultimately be adopted for the entire range of flood events analysed. Similarly, the assumed values of Manning's n used in the hydraulic model should not be altered for different flood events, unless it can be proved that this reflects actual changes in the river and floodplain over time. The only exception to this requirement is the value of initial loss used in the hydrologic model. This may be varied to match the start of the rising limb of the recorded hydrograph.

The hydrologic model channel routing parameters should generally be set to match the output of the hydraulic model to the Muskingum model. The calibration should achieve:

Match criteria 4 sites

- matching rising and falling limbs of the hydrograph by gradient and timing
- matching peaks with computed levels within 150mm of maximum height records, 100mm of continuous flood level records and 200mm of other established flood records.
- computed volume of runoff should be within 10% of recorded runoff volume.

Acceptable calibration is achieved when hydrologic and hydraulic consistency is achieved with peak flood levels at all reach boundaries predicted by the RAFTS and MIKE II models within 150mm.

For each historical event, physical data should be varied as necessary to simulate the configuration applicable for the event. Earlier sources of ground level and bridge data may be required accordingly.

Additional cross section data may be required to adequately simulate constrictions in some locations.

Presentation of Results

Model results should include:

(a) Discussion of hydrologic behaviour of the catchment. Discuss all model parameters.

(b) Summary of the available historical rainfall data.

(c) List of the historical events which were modelled, and the reasons for selecting these events. Any assumptions used in the models must be stated and justified.

(d) Description of the models used, and a summary of the calibrated model parameters.

(e) Discussion of the determination and testing of rating curves.

(f) Discussion of the consistency and robustness of the calibrated models.

(g) Recorded and calculated hydrographs (from both the hydrologic and hydraulic models) overlayed for each historical storm. The same parameters must be used throughout all events for both models.

(h) A catchment map indicating the hydrologic subdivision for the catchment (hardcopy and digital format).

(i) A catchment map indicating the location and name of all rainfall gauging stations used in the model. All labels must be easily readable. This map must be at the same scale as (h) above. (hardcopy and digital format).

J The original rating curve(s) (if any) and the one adopted in the model at each gauging station location, extrapolated to cover all design flows.

k) A table showing, for each modelled event, recorded and modelled flood levels at each cross section, and the difference between them (if recorded level is available).

l) Flood profiles for each historical storm with all recorded levels superimposed. Gauge locations are to be labelled. The scale of these profiles must be such that levels can easily and accurately be interpolated for any location along the river. Typical scales are 1:100 (vertical) and 1:10000 (horizontal) (hardcopy and digital format)..

m) A map indicating the hydraulic model structure. All cross sections and river crossings must be clearly labelled.

ı) Summary of all data used in the models for all flood events i.e. pluviograph and daily rainfall data for each station, maximum height gauge data, etc. The pluviograph data must be overlayed onto the IFD curves for each flood event. Crossing details are to be summarised on Hydraulic Structure Reference Sheets (refer Table 1). Include a photograph of the structure.

ı) Summary of hydraulic modelling processes, ie. assumptions in setting up the model, etc (as described previously).

) A table showing the flood levels calculated by the unsteady model and the HECRAS model and the difference in level. Creek crossing and gauge locations are to be shown.

4 Flood Frequency Analysis and Design Event Modelling

itially it will be necessary to review previous studies and available data and make recommendations for ther analysis. The proposed methodology for development of synthetic rainfall and flood flows is to be omitted in detail.

e results of the flood frequency analysis must be consistent with those statistical estimates obtained from flow c

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running the design storms in the hydrologic and hydraulic models.

The frequency analysis is required at the following locations:-

Lowood, Moggill Gauge, Centenary Gauge, Brisbane City Gauge

4.5 Design Event Modelling

The design storms to be modelled are to have the following average recurrence intervals: 2, 5, 10, 20 100, 200, 500, 1,000, 2,000, 10,000, and 100,000 years and the Probable Maximum Flood (PMF).

Synthetic storms based on the Australian Rainfall and Runoff Intensity-Frequency-Duration (IFD) c should be used to model the design events. The method of derivation and identification of critical should be used to model the design events. The method of derivation and identification of critical duration should be presented in the submission.

For the tidal component of the model, the starting conditions must cover a tidal range between the Mear Water Springs and Mean High Water Springs. This boundary condition is to be phased so as to ac maximum river flood levels.

The joint probabilities of Moreton Bay Storm Surge and Brisbane River Flooding should be considered method of assessment should be described. As a minimum requirement the following two cases sho examined.

(i) 100 year ARI river flood coinciding with a 20 year storm surge.

(ii) 20 year ARI river flood coinciding with a 100 year storm surge.

Presentation of Results

(a) Discuss the reliability of the flood frequency analysis and its consistency with the hydrau hydrologic model results.

(b) Tabulate and plot the results of the flood frequency analysis together with those estimates o from the hydrologic and hydraulic models at all river crossings and gauging stations. Where this plot must also include the maximum recorded flow and level. Plots must be on Distribution graph paper.

(c) Tabulate the discharges and levels at each cross section for the full range of design events river crossings and tributary confluences.

(d) Tabulate, the main channel and left and right overbank flood velocities for each cross sectio 100 year flood.

(e) Plot the anticipated flood profiles for all the design events. Groups of flood profiles shou separate sheets as follows:

- PMF 100,000, 10,000 year
- 2,000, 1,000, 500, 200 year

- 100, 20, 5 year
- 50, 10, 2 year.

Flood profiles are to be in the bottom half of each drawing and show:

- water levels at AMTD corresponding to model cross sections
- maximum flood level
- cross section locations and labels
- river crossing locations and labels.

A plan view is to be provided in the top half of each drawing showing cadastre, streets regulation lines, AMT marked at 100 metre intervals and cross section locations and labels. The scale of the profiles are to be such that levels can easily and accurately be interpolated for any location along the river. The locations of gauge boards are also to be shown and labelled on these plans. A separate plot is to be provided of all design events at a scale which shows the whole model on a single sheet. Each profile is to be labelled with the ARI and discharge. The depiction of the maximum height gauges must show the range of levels which these gauges read, ie. the actual gauge height is plotted to scale. (hardcopy and digital format required).

(d) Define and map the high and low hazard areas as defined in the New South Wales Flood Plain Development Manual.

(e) Plot and tabulate the stage-discharge relationships for all crossings. These are to be derived from the peak discharges and levels calculated from design events. The recorded historical flood levels and calibrated discharges are to be superimposed on these plots.

(f) For the 20 year and 100 year floods tabulate for each cross-section the percentage of the total conveyance of each flood plain and the main channel.

5. WATERWAY MANAGEMENT

5.1 Introduction

This component of the study requires application of the model to determine a revegetation strategy, flood regulation lines and to assess river crossings which cause excessive constriction. The limits for this component of the study are from Moreton Bay to the City boundary at Moggill.

The waterway refers to the river bed and banks and adjacent flood plains.

The flood model is to be used to study waterway management issues and define requirements to meet the following objectives.

1. To determine a revegetation proposal which will not significantly increase flood levels.
2. Set Flood Regulation Lines so that future development on the floodway fringe will not significantly increase flood levels.
3. Identify river crossings which create excessive afflux and the required modifications so as not to significantly increase flood levels.

Details are to be determined to meet the requirements that the combined effect of revegetation, encroachment of development on the flood plain outside the regulation line and crossings of the river (upgraded as necessary) does not increase the 100 year ARI flood level by more than 150mm.

This requirement would generally be varied in the following circumstances:

(a) Where private property is not affected, the total afflux may be increased.

(b) Where developed private property is affected, the Waterway Management Plan should aim for no increase in flood level.

Any zoning changes recommended to achieve compatibility with proposed regulation lines.

5.2 Waterway Revegetation

This component of the study requires the development of a revegetation study.

The strategy should confirm zones of ecological significance and establish areas which can be revegetated without increasing flooding on private property.

In assessing roughness of revegetated areas the likely standard of maintenance of grassed areas within the planted area should be considered. The Strategy should include where possible provision of a continuous corridor of vegetation along the river banks and adjacent area. Other factors to be considered in developing a revegetation strategy include flood velocity and frequency of inundation and the possibility of future stream rehabilitation, sand mining rehabilitation and bikeway proposals.

Revegetation may increase flow interaction between the channel and flood plains requiring a method of analysis as discussed in Section 4.1.

In addition to the vegetated corridor any areas of low conveyance suitable for high density planting should also be identified.

It will be necessary to liaise with the Environment Management Branch, Environmental Planning Section and the Bikeway Planning Section for this component of the study.

Presentation of Results

(a) A report detailing areas suitable for revegetation. The assumptions used to modify the hydraulic model must be clearly defined.

(b) A map (hard copy and digital format) delineating existing vegetation and areas proposed for revegetation. The map should delineate areas where:

  - A revegetation strategy can be applied consistent with a Manning's n of 0.15.
  - A higher density of planting is permissible.
  - A lower density of planting is permissible.
  - Revegetation density is to be sufficiently low so as to cause no increase in flood level on developed private property.

5.3 Flood Regulation Lines (and Development Level) Assessment

It is proposed to delineate flood regulation lines to facilitate sound management of development on the fringes of the flood plain.

The requirement of this component of the study is to use the calibrated model to set Flood Regulation Lines using the 100 year ARI flood and to determine synthetic flood profiles with the regulation lines in place. The model geometry is modified to simulate encroachment on the flood fringe which will remove effective flood conveyance and storage on the area outside the regulation lines. The combined effect of this encroachment, the revegetation strategy and afflux from crossings is to be considered as described in Section 5.1.

As several solutions to the regulation line location satisfying the hydraulic constraint may exist, other criteria such as environmental, economic and planning criteria should be considered in arriving at the recommended regulation lines.

Regulation lines are to be set over all reaches of waterway within Brisbane City limits.

Each Regulation Line is to be dimensioned from real property boundaries on the same side of the river.

Development levels are to be set 300mm above the 100 year ARI flood with the revegetation strategy and regulation lines in place. Where 100 year Moreton Bay surge levels are higher these levels are used.

Regulation lines should be set to provide a minimum 15 metre buffer to the top of the river bank to manage future erosion and sedimentation problems. The recommended regulation lines should be consistent with the flood plain encroachment simulated in the model.

Where flood storage is important in the lower reaches of tributaries, the regulation line analysis and delineation should include these areas.

Presentation of Results

(a) A report describing in detail the assumptions and method used to delineate the location of the regulation lines. Recommendations for zoning adjustment should also be documented.

(b) Regulation line maps (1:10000) are to overlay aerial photo maps and be provided in hard copy and digital format (separate layer for each item). Dimensions to real property boundaries of the proposed regulation lines are to be included. The 100 year ARI flood inundation with revegetation strategy, existing crossings and regulation lines set are also to be overlayed. Rezoning recommendations should be shown on these plans. The regulation lines should also be delineated in tabular form as chainages along each cross section. This table should also show the 100 year ARI flood level and the ground level at each regulation line.

(c) Flood profiles of the 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 10000, 100000 years ARI events and the PMF, with revegetation strategy, regulation lines set and existing crossings. The profiles are to show each cross section and river crossing.

(d) On a separate plot of the 100 year ARI profile (as above) a plot of the afflux resulting from setting of the regulation lines, revegetation strategy and existing crossings is required. Individual and cumulative afflux from each of the three sources (regulation lines set, revegetation strategy and existing crossings) is required. The profile with upgraded crossings (see next section) should be shown as a dashed line. The afflux should be plotted at an expanded vertical scale.

(e) Tabulate the discharges and levels at each cross section for the full range of design events (with the revegetation strategy and regulation lines in place). This should be on the same tabulation described in Section 4.4 to facilitate comparison. Label all river crossings and tributary confluences.

(f) Tabulate the minimum development levels at each cross section (300mm above the 100 year ARI flood) and provide minimum development levels on a long section plot referred to in (d).

5.4 Hydraulic Assessment of Crossings

A hydraulic assessment of major bridges, where the combined afflux (bridge, regulation lines and revegetation strategy) is greater than 150mm is to be provided. The assessment must also include recommendations for the size of the upgrade of these structures to meet the requirement that the afflux (combined effect of revegetation strategy, regulation lines and all crossings) does not exceed 150 mm for the full range of design events. An estimate of the number of properties benefiting from the proposed upgrades is required. A separate estimate is required for properties affected above habitable floor level.

Presentation of Results

A list of structures, their dimensions and recommended upgrade to satisfy the 150mm afflux criteria. Quantities and estimates of costs are not required.

6. FLOOD MAPPING

6.1 Flood Contouring

Flood contours at 0.1 metre intervals are to be developed using the 1 in 100 year ARI flood. A method which requires a minimum of subjective interpretation and manual intervention is required to minimise dispute. Possible methods are as follows:

(a) Post processing of one dimensional hydraulic model results using a two dimensional hydrodynamic model to produce a two dimensional flood surface. The Council has the FastTABS program which is suitable for this method.

(b) Applying at the outset a more detailed model schematisation so that model branches are sufficiently prismatic that the computed flood level can be applied along the length of a cross section. The model results are then contoured with a CAD program.

Tenders should discuss alternatives and provide details of methodology proposed.

Presentation of Results

- contours are to be smooth
- the band between each contour represents a cell; alternate cells are to be shaded and clear
- for each cell the following data is to be stored:
  - AMTD of mid point along AMT line
  - a tabulation of design flood levels (rounded to nearest 0.1m) for the full range of ARI's for the mid point of each flood cell
  - the highest recorded flood level at this AMTD (rounded to the nearest 0.1m) and a code identifying the flood profile

The cell data and associated flood database is to be in a form that can be directly imported to the BIMAP system

Plans are to provide the following:

- A map key
- Flood contours are to be in the top half of the drawing and be superimposed on the topographical and cadastral databases with the assumed middle thread line shown and marked at 100 metre intervals. Each contour should intersect in plan the AMT line at the chainage defined in the longitudinal plan (referred to below).
- The longitudinal maximum water surface level envelope for the relevant reach is to be in the bottom half of the drawing. Water levels are to be plotted to nearest 0.05m (stepwise). The profile block is to show:
  - the AMTD of the mid point (along the AMT line) of each cell
  - the average maximum flood level for the 100 year ARI flood (rounded to 0.1m) of each cell
  - verticals on profile are to match water level contour locations

Hard copy plans are required at the following scales.

- Flood contours, topographic and cadastral database 1:5000.
- Longitudinal profiles 1:5000 horizontally and 1:50 vertically.

Plans are to be provided in digital (DXF) format.

6.2 Flood Inundation Maps

It is necessary that inundation maps be consistent with the flood contours ie. inundation maps should be derived from the flood contours. Inundation maps (scale 1:10000) are required for the one in 20 and one in 100 year ARI floods for the fully developed case ie. ultimate catchment development with regulation lines and revegetation strategy in place. The consultant should point out any areas where it is considered the flood contours based on the one in 100 year flood are inappropriate for the smaller flood.

The inundation maps are to overlay the aerial photo maps and also be provided in digital format with a separate layer for each theme.

7. FLOOD FORECASTING MODEL

A RAFTS flood forecasting model is to be developed from the calibrated model for the catchment downstream from Lowood.

The model is required to provide a forecast hydrograph at the following locations:

- all river crossings
- all continuous stream gauge locations (all agencies)
- all creek confluences

Rating curves for these locations are to be derived from the hydraulic model.

For some locations in the lower reaches, several rating curves will be required for a range of tidal levels.

For rainfall input the model must use only those rainfall stations with radio telemetry.

The combined use of the hydrologic model and derived rating curves must be capable of replicating the results of the hydraulic model to within 150mm at all locations. This should be demonstrated for the largest calibration event since installation of the radio telemetry gauges and also one large synthetic event.

The level and frequency at which all major roads are cut are to be determined.

Presentation of Results

(a) Provide the flood forecasting model and calibration data.

(b) Plot hydrographs produced by the flood forecast model and the hydraulic model. (Overlayed; at all locations for each of the two events.)

(c) At all continuous stream gauges provide for each calibration and verification event since installation of radio telemetry stations a plot overlaying

- the hydrograph produced by the forecast model
- the measured hydrograph

On each plot summarise the forecast model parameters including the losses for each event.

(d) Detail levels and frequency at which all major road crossings are cut.

(e) A catchment map showing the hydrologic model sub-areas, and rainfall and flood level stations.

8. COMMUNITY CONSULTATION

The following activities are to be included in the study:

- place an advertisement in the newspaper informing the community of the purpose of the study, study outcomes and opportunities for community input
- receive and process community input of relevant flood data and other information.
- present draft study results to the community prior to finalisation of the study

It is envisaged that a wall display including the following would be required with the draft report:

- estimated one in 100 year ARI flood profile
- estimated one in 100 year ARI inundation map
- proposed flood regulation lines
- revegetation strategy
- assessment of crossings

Community input should be invited and results incorporated into the final study results.

9. DOCUMENTATION REQUIREMENTS

REPORTS

Two (2) copies of all draft plans and reports are required. Two (2) copies of all final plans and six (6) copies of the report must be submitted. The report must include a 2 page executive summary.

The reports must also be submitted on disk, preferably in Word Perfect format. The hypertext feature should be applied to aid use of the digital report.. All tables prepared for the report must also be submitted on disk, eg. as a Lotus or Quattro Pro spreadsheet.

DRAWINGS/PLANS

Final drawings must be on A0, NON DIAZO FILM (no sepia or diazo prints), preprinted with the standard Council title block with Council drawing number. Please note that these drawings will be in accordance with the standard drawing approval procedures of the Department. Drawings must first be submitted in draft for approval. Information will be provided to complete the title block. If there is more than one drawing, then the first drawing shall contain an index to all sheets. All flood profiles, catchment maps, inundation maps, regulation line maps and revegetation strategy maps are to be submitted in digital (DWG or DGN) format.

To maintain data integrity and allow the timely importing of this data, it is preferred that the data be in either AutoCAD .dwg files or Microstation .dgn files and have the following properties:

use cartographic format (NO rotated or scaled data use metres as the unit of measure. Plans to be drawn using AMG coordinates)
Microstation files to have a Global Origin of 0.0, -6 500 000.0

In addition, include an index containing; sheet coordinates, sheet information and its symbology for each file and file level.

New information that is to be extracted should be in a separate file (preferably without any existing information such as cadastre) which includes indexing marks with AMG coordinates and each type of new information on a unique level. Example, Q100, Q50 and Q20 inundation lines can be supplied in the same file but with a separate level for each inundation line.

INPUT/OUTPUT DATA

All input and output data used in the study is to be submitted to Council. All computer files and directories must be fully indexed and submitted on 3½" floppy disk or other agreed media, such as CD-ROM. The structure of files is to be in accordance with Table 2 attached. The Council must be able to re-run all computer models, reproducing the Consultant's results.

WATERWAYS DATABASE

The Study data must also be submitted in tabular form suitable to be imported into the Department's Waterway Database. The format of these tables is shown in Table 3 attached.

PRESENTATION

A technical presentation session is to be scheduled. The presentation is to inform council officers of adopted methodologies, contents of the study, published results and recommendations.

USER GUIDES

Develop user guides on:

- how to use the hydrologic model prepared in the flood study
- how to use the hydraulic model prepared in the flood study
- any other models eg. Model interfaces
- flood contouring the waterway corridor
- the directory structure of all files, and a description of each file
- guide to viewing the digital version of the report.

10. PROGRESS PLANNING AND REPORTING

At least four progress draft reports are to be submitted by the Consultant during the course of the study. These are:

(i) Calibration Report

(ii) Design Event Report

(iii) Waterway Management

(iv) Flood Mapping

Study progress will be reviewed with submission of each of these reports.

Each report must be accepted by the Council prior to proceeding to the next stage of the study.

A detailed and executive report must be presented after the satisfactory completion of all of these stages. The detailed report must contain at least all of the previous reports, with amendments made where required.

The Executive Report must be concise and to the point, stating clearly the objectives, outcomes and implications of the study. The detailed report must be prepared with the technical user in mind. Tables, charts and drawings must be of sufficient detail to be employed as working documents which meet the day to day business needs of the Council. The structure of the detailed report should meet the following requirements:

- separate sections on Hydrologic modelling, Hydraulic modelling, Design Hydrology, Design Hydraulics, Waterway Management, Flood Mapping, Input and Output Data, Indexing Description, Instructions for preparation of and execution of all components off the models and access to and presentation of results.

It is also anticipated that monthly meetings will be held with the consultant to discuss progress and technical issues. These meetings will be held at Council's offices.

A study program is to be submitted for agreement prior to commencement. Activity descriptions listed in Table 4 are to be used. The program is to show the location and duration of each task and critical path and value points assigned to each activity (as a percentage of the whole study). Two weeks is to be allowed for Council to assess each reporting stage.

At each meeting the following are to be submitted:

- a tabulation showing activities completed since the previous meeting
- a plot of target and actual progress (cumulative value points) against time (horizontal axis).

11. ADDITIONAL SURVEY

Additional survey may be required to properly simulate constrictions, provide details of crossings or other features which have changed since the date of survey.

The consultant should identify additional survey requirements and refer them to the Council for agreement. The survey will be carried out by the Council or a request will be made to carry out the survey at agreed rates and charges.

12. INFORMATION TO BE INCLUDED IN THE SUBMISSION

The Consultant's submission should:

(a) Address specific requirements of the brief.

(b) Query any deficiency of the brief or need for clarification.

(c) Where considered desirable, suggest alternative methodology or presentation.

(d) Detail any aspects of the proposal which are at variance to the specification.

(e) Include discussion of all key methodologies recommended by the Consultants, including modelling of urbanisation and forested areas, composite roughness coefficient estimation, assessment of bridges and culverts, setting of regulation lines, revegetation strategy, flood mapping, and presentation of results.

(f) Provide details of the key personnel that will be directly involved in the project. Their extent of involvement including the experience of these personnel in the area of urban hydrology and hydraulics is of particular interest as well as a history of past projects undertaken by the nominated personnel.

(g) Any change in personnel during the life of the project will require agreement from the Council as it is considered that the study team nominated by the Consultant is a key criterion which the Council uses in its selection process.

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Telephone: (076) 39 8400
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The Town Clerk
Brisbane City Council
69 Ann Street
BRISBANE QLD 4000

11 October 1996
TOP7022\SAA:L434P.DOC

Attention: Mr Ken Morris

Dear Sir

CONTRACT NO W.18/96/97 BRISBANE RIVER FLOOD STUDY
PROPOSAL FOR CONSULTING SERVICES

We are pleased to respond to your invitation to submit a proposal for the Brisbane River Flood Study. Sinclair Knight Merz offers a proven methodology and a committed and experienced study team to meet the objectives of the Brisbane River Flood Study.

Our experience on the Moggill Creek Flood Study and Cubberla Creek Flood Study provides the study team with an understanding of Council's standards and requirements and several methodologies which will result in increased efficiencies without sacrificing quality.

Features resulting from the engagement of Sinclair Knight Merz are;
☐ response to all key issues (as detailed throughout the proposal)
☐ completion within an allocated timeframe (see page 42)
☐ an experienced and multi-skilled team (see page 32)
☐ proven quality assurance (see page 43)

Because of the uncertainty of the scope of works of hydrological aspects of the study we offer two lump sum fees for the contract. These are:

☐ Offer 1 - $179 000.00 (Task 1A Additional Design Events Hydrology NOT required)

☐ Offer 2 - $194 000.00 (Task 1A Additional Design Events Hydrology IS required)

Details of these offers are provided on page 51.

Sinclair Knight Merz Pty. Limited. A.C.N. 001 024 095
Principals P Dougas (MD), E Aslaksen, D Barnes, L Black, T Boyle, R Brayshaw, P Cassell, A Condon, J Curran, B Dadd A Davie, J Duffy, R Emslie, T Fiedler, A Gale, R Graham, R Halloran, A Harper, P Heath, M Holden, I Housley, D Howarth, P Huckerby, D Hunter, A Hurd, C Jelley, G Katari, W Kellermann, J Kelly, J Knight, W Lawson, K Levey, G Lewis, S Linforth, I Maitland, D Mathlin, N Mayo, A Milner, R Morrison, L Moseley, J Moss, P Oliver, C Popple, R Pryor, I Purcell, M Read, G Rees, G Richardson, B Robertson, G Sharpley, O Stacy, J Stapleton, R Steele, M Thomas AM, I Thompson, W Toohey, J Tranter, R Turland, B Urwin, P Vaughan, T Whitington, J Winton, R Winton, T Winton, K Young **Associates** C Adam, T Addison, J Alban, G Alexander, P Alexander, L Appelgren, J Armstrong, R Barclay, P Baudish, C Beard, J Bell, L Benson, A Blackman, S Bond, C Bower, B Brown, K Brown, G Bullock, K Burgess, J Buttenshaw, J Campbell, J Carrabott, N Case, P Casey, D Cecil, L Chapple, B Chute, M Clarke, W Currey, I Cutler, P Dimmitt, K Dobrich, R Dunkley, B Dunn, R Dusting, T Ellis, P Erlanger, R Evans, B Fitts, T Fox, D Franklin, J French, S Gillespie, P Gillinan, D Glasson, J Green, M Greenway, P Griffin, T Hanson, M Hewitt, J Hinton, G Hoxley, F Kavanagh, R Kearton, R Keessen, C Kell, B Kettle, D Kilsby, D Kinder, N King, J Kirkland, P Kruger, G Layton, G Linke, M Mahon, A Maltby, J McEvoy, J Martin, P Minahan, S Misra, L Morris, J Mulkearns, G Mullen, R Nathan, C Needham, J Nichols, N Nielsen, D Pain, J Perks, A Petersen, J Porter, A Prout, C Pulbrook, A Prince, K Robinson, P Robson, J Russel, O Scott, M Simpson, G Sleeman, W Soong, R Taylor, Z Tonkovic, R Treacy, W Watson, M Waugh, W Wight, J Woodbury, M Young, P Zahnleiter, R Zauner. **Consultant** B Sinclair AM

The study offers Brisbane City Council an opportunity to strengthen its waterways and floodplain management strategies through building on the combined innovations achieved on the Moggill and Cubberla Creeks Flood Studies. We assure you that the Hydraulic Studies Group of Sinclair Knight Merz is totally committed to making this a successful project.

We look forward to the opportunity to discuss our proposal further. If you require any additional information please contact the Project Manager Mr Scott Abbey on (076) 398400.

Yours faithfully

TL Fiedler
Principal
Manager - Toowoomba

Enclosure

SINCLAIR KNIGHT MERZ

Brisbane City Council
October 1996

Contract No. W.18/96/97
Brisbane River Flood Study

Proposal for Consulting Services

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Brisbane City Council
October 1996

Contract No. W.18/96/97
Brisbane River Flood Study

Proposal for Consulting Services

Contents

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Name of Document:	Proposal for Consulting Services
Name of Organisation:	Brisbane City Council
Document Version:	Rev 0
Job Number:	11/10/96 TOP7022/SAA

1. Key Issues

In responding to Council's invitation to submit a proposal to carry out a flood study of the Brisbane River, we have undertaken the following activities:

- ☐ Met with Mr Ken Morris and Mr John Wallace of the Waterways Technical Section to discuss and get feedback on our performance on the Cubberla Creek Flood Study.
- ☐ Read the brief issued with the invitation to submit and review available reports from previous studies.
- ☐ Discussed aspects of the Brisbane River catchment hydrology with Department of Natural Resources (DNR) staff.
- ☐ Drawn on our previous experience with flood studies for Waterway, viz Cubberla Creek and Moggill Creek.
- ☐ Secured the same key personnel as used on previous studies for this study.

Several key issues relevant to successful completion of this study have been addressed in our proposal.

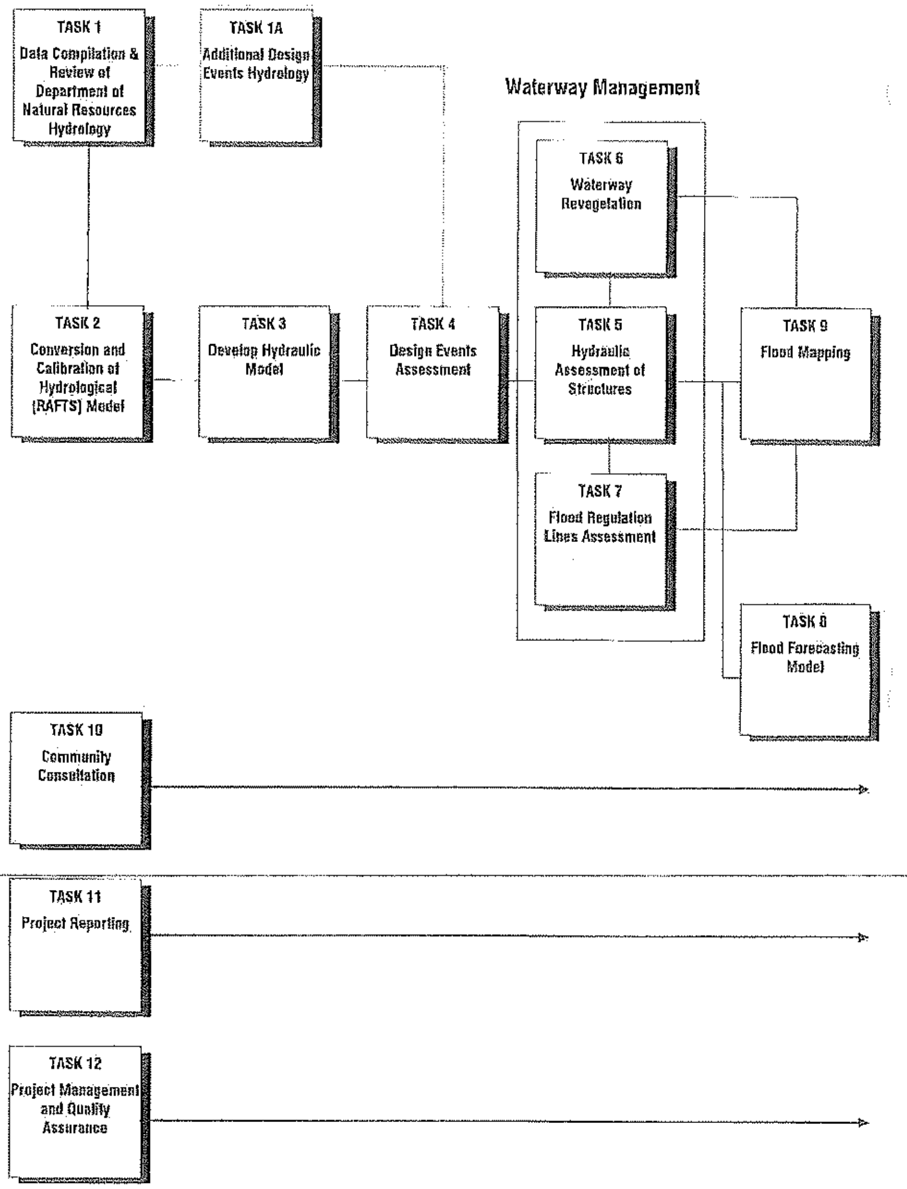
These issues and the section of the proposal where the issue is addressed is summarised below.

	Issue	Response
1.	Suitability of previous hydrology	Section 2
2.	Appropriate methodology for the study	Section 2
3.	Experienced study team	Section 3
4.	Timely performance	Section 4
5.	Production of a quality product	Section 5

2. Methodology

The extent of works which Sinclair Knight Merz will carry out under this contract has been separated into specific tasks which are individually described in **Section 2.1 - Scoping of Tasks**. A flowchart has been prepared for the study to illustrate the inter-relationships between each of the tasks in order that the study may be successfully completed. This is shown in **Figure 2.1 - Task Interface Diagram**.

Figure 2.1 - Task Interface Diagram



2.

The program for this study is discussed in detail in **Section 4 - Study Program**.

2.1 Scoping of Tasks

As mentioned above the project has been broken down into detailed tasks to ensure that all work, which must be performed under the brief is assessed and properly scoped. For each task the following information is provided;

☐ task purpose
☐ inputs necessary to carry out the task
☐ description of activities to be completed
☐ output in terms of drawings, calculations and reports
☐ any assumptions associated with the task.

In addition to this, specific references are made to more detailed explanations of aspects of the methodology under the heading - Interpretation of the Brief.

Any activities of work not described in the tasks contained in this section of the proposal would be considered as additional work in terms of this contract. The detailed tasks follow hereafter.

Task 1	Data Compilation and Review of Department of Natural Resources Hydrology
Task 1A	Additional Design Events Hydrology
Task 2	Conversion and Calibration of Hydrological (RAFTS) Model
Task 3	Develop Hydraulic Model
Task 4	Design Events Assessment
Task 5	Hydraulic Assessment of Structures
Task 6	Waterway Revegetation
Task 7	Flood Regulation Lines Assessment
Task 8	Flood Forecasting Model
Task 9	Flood Mapping
Task 10	Community Consultation
Task 11	Project Reporting
Task 12	Project Management and Quality Assurance.

2.

TASK 1 - DATA COMPILATION AND REVIEW OF DEPARTMENT OF NATURAL RESOURCES HYDROLOGY

☐ **Purpose:** To compile available data and review Department of Natural Resources (DNR) Hydrology to asses suitability for this study.

☐ **Input:**
- Council technical data
- previous study data from DNR
- previous studies from other agencies.

☐ **Interpretation of the Brief:**
The most significant previous study of the catchment was carried out by the Department of Primary Industries (now the Department of Natural Resources [DNR]) for the South East Queensland Water Board in 1993 and 1994.

A preliminary review of this study document and liaison with DNR staff during the preparation of this proposal has indicated that investigations into the hydrology of the catchment has been extensive, including the following activities;
- close scrutiny and validation of all calibration data
- setting up and calibration of 21 linked runoff-routing models simulating the catchment
- determination of design storms for the catchment accounting for subcatchment interaction, effects of dam operation scenarios and partial area storm effects.

Considerable time and effort was put into this analysis.

From this preliminary assessment, it appears that considerable parts of the previous studies results may be suitable for use in this study. It is proposed to critically review the previous DNR work using Review Specialist, Dr Rory Nathan. Dr Nathan will consider such issues as the ~~joint probability of subcatchment rainfalls, design rainfall temporal patterns~~ and the special variability of the design rainfalls considering the historical rainfall patterns.

A key objective of this study is to obtain consistency between discharge estimates from the hydrologic model, hydraulic model and flood frequency analysis for the range of recurrence intervals. The most likely variations are anticipated to occur between the DNR rainfall based design flood estimates and flood frequency analysis results. The consistency between these methods will be checked at this early stage by analysing the available DNR results from the two methods at key locations. The consistency of the previous work will be assessed and performance in terms of correlation or variance documented.

2.

Based on this review recommendations with respect to the need for additional hydrological assessment will be made.

☐ **Description:** Task 1 activities are:

Sub-Task 1.01 - Start Up Meetings
- collect available data from BCC and DNR.

Sub-Task 1.02 - Review of DNR Hydrology
- check WT42 model structures
- review calibration data and performance including rainfall patterns and streamflow reproduction
- examine flood frequency analysis at key locations
- compare hydrological model rainfall based design flow estimates with available flood frequency analysis estimates at key locations (Lowood, Moggill, Centenary and Port office).

Sub-Task 1.03 - Summary of Review Outcomes
- document outcomes of review
- prepare recommendations with respect to additional hydrologic modelling.

☐ **Output:**
- summary of available hydrometric data
- summary of review of DNR hydrology and recommendation of its suitability.

Note: It has been assumed that any costs associated with the provision of DNR held data would be borne directly by Brisbane City Council.

2.

TASK 1A - ADDITIONAL DESIGN EVENTS HYDROLOGY

☐ **Purpose:** To modify available design event hydrology for the Brisbane River Catchment in order to improve the consistency of model estimates of discharge. To check the sensitivity of design flow variations with respect to flood level variations.

☐ **Input:**
- previous study data from DNR
- Brisbane River Rating curves
- Brisbane River streamflow data.

☐ **Interpretation of the Brief:**
This task will be implemented only if the review of previous hydrology concludes the additional work is necessary.

The actual scope of works for this task will not be clearly defined until the detailed review of the DNR studies identified in Task 1 has been completed.

If the review identified major inconsistencies between flow estimates then the available hydrology will not meet Council's acceptance criteria. Major inconsistencies between flow estimates would likely be due to an error in the previous work. If this is the case it has been anticipated that the key stakeholders in the previous work (DNR, South East Queensland Water Board and BCC) would want to review and revise the hydrology themselves in order to ensure the outcomes from their study is correct. It has been therefore assumed that if the previous work is found to contain significant anomalies, the catchment hydrology would be reviewed by DNR and updated results supplied to this study.

In the event that the DNR hydrology is found to be close to meeting Council's acceptance criteria, a methodology will be employed to investigate the significance of the variation with respect to design flood levels and assess the possibilities of using some type of global catchment correction factor to improve correlation.

The significance of the variation in design flow estimates on flood levels will be assessed through the documentation of the sensitivity of flood levels to flow rate. This will be done at Moggill, Centenary and the Port office gauge sites. The sensitivity analysis will use available rating curves plus information from the DNR hydraulic model. It is anticipated that some flow variation will be tolerable due to the relatively large storage available during high stages of flooding in the river.

2.

The possibility of improving consistency between rainfall based flow estimates and flood frequency based estimates will be assessed with the intent of trying to develop a series of correction factors which may be applied to design rainfall depths. This factor would be similar to the factor used on the Cubberla Creek Flood Study during the design event modelling. The success of this approach will depend on the correlation of the existing design flows in the reach of the river covered in the hydraulic model.

☐ **Description:** The scope of work identified in this task would only be carried out if the review of DNR work finds the existing hydrology unacceptable. If the previous hydrology is found acceptable the methodology detailed in **Task 4 - Design Events Assessment** will be applied. Task 1A activities may include the following;
  - document rating curves at Moggill, Centenary and Port office gauges
  - predict likely variation in design flood levels with variations in design flows
  - discuss findings with BCC (close liaison will be essential)
  - assess correlation between variation in flows due to the method of prediction
  - if a consistent adjustment factor can be found, revise rainfall based estimates of flow for use in the hydraulic model.

☐ **Output:**
  - modified design flow hydrographs for use in the hydraulic model.

Note: This work would be carried out in conjunction with the development of the hydraulic model.

2.

TASK 2 - CONVERSION AND CALIBRATION OF HYDROLOGICAL (RAFTS) MODEL

☐ **Purpose:** To set up and validate an XP-RAFTS model of the Brisbane river catchment for use in flood hydrograph estimation and flood forecasting.

☐ **Interpretation of the Brief:**
In order to efficiently convert the existing hydrological models, developed by DNR, to the RAFTS model it is proposed to locate the appropriate Sinclair Knight Merz team member in the offices of DNR during the development. (This has been discussed with DNR and approved). This will allow the study team direct access to the raw data files during model conversion. Liaison with DNR officers, particularly with respect to the dam operating rules, will also be possible at the most appropriate time.

Consistency between the channel storage in the RAFTS model and the MIKE 11 model will be established utilising the Muskingum-Cunge routing model within the RAFTS package. This model allows actual cross-sections to be inserted into the RAFTS model. A series of hydrographs will be routed through the reaches of both the MIKE 11 and RAFTS models and attenuation effects established. RAFTS model parameters will be adjusted until hydrograph shapes and peaks are matched. The impacts of intermediate flows into the main Brisbane River reach on model consistencies will also be considered.

☐ **Input:**
- catchment topographic details from DNR
- 21 DNR WT42 models for the Brisbane River catchment
- DNR rainfall, loss models, hydrograph and flood data for available calibration events.

☐ **Description:** Task 2 activities are:

Sub-Task 2.01 - Setup RAFTS Model
- ~~review the 21 DNR WT42 models for the Brisbane River catchment~~
- simplify the catchment breakup from the 263 sub-areas and 284 reaches in the 21 DNR models
- setup a single XP-RAFTS model with approximately 30 to 50 sub-areas utilising subcatchment, fraction impervious and reach length data from the DNR models. Somerset Dam and Wivenhoe Dam will be included in the model as appropriate.

Sub-Task 2.02 - RAFTS Reach Storage Analysis
- input typical cross-sections from the MIKE 11 model for the Brisbane River within the study area to utilise the Muskingum-Cunge channel routing model within XP-RAFTS

2.

- verify that the XP-RAFTS routing is consistent with the MIKE 11 model routing and modify model parameters as required.

Sub-Task 2.03 - Calibrate XP-RAFTS Model

- format the DNR rainfall and stream flow data used for calibration of their 21 WT42 models, for use in the XP-RAFTS model calibration
- calibrate the XP-RAFTS model to the four DNR calibration events, ie; July 1973, January 1974, early April 1989 and late April 1989. This task will be done in conjunction with Task 3.03 - Calibrate MIKE 11 model. This will also involve an examination of the rating curves used to convert recorded flood heights to recorded discharges. A comparison of the XP-RAFTS calibration will be made with the DNR WT42 calibration.
  (Note: Model parameters will not be varied between flood, except for the initial rainfall loss.)
- verification of the model will be carried out with available suitable events (May 1996)

☐ **Output:**

- list of historical events used for XP-RAFTS validation
- validated XP-RAFTS model for the Brisbane River catchment
- flood hydrographs for MIKE 11 model validation
- plots of DNR and adopted rating curves
- plots of calculated and recorded stage and discharge hydrographs
- catchment plan showing sub-areas, rainfall stations and calibration points
- plots of pluviograph data on IFD curves for different locations throughout the catchment.

Note: It has been assumed that any costs associated with the provision of DNR held data would be borne directly by Brisbane City Council.

2.

TASK 3 - DEVELOP HYDRAULIC MODEL

☐ **Purpose:** To setup and validate the MIKE 11 model of the Brisbane River for use in hydraulic analysis and flood mapping.

☐ **Interpretation of the Brief:**
Specific methodologies relating to the development of the Brisbane River Hydraulic model are as follows:

- MIKE 11 (Version 3.11c) and HECRAS (Version 1.2) will be used in this study.

- Main Channel and Floodplain Flow Interaction

In areas where it is likely that this interaction will be significant the floodplain areas will be modelled as a separate branch to the main channel linked with a weir structure representing the top of the creek bank. This will enable the model to accurately simulate the differences in conveyance and velocity between the channel and floodplain. Impacts of reducing conveyance through filling or revegetation will be modelled more accurately using this method. The sensitivity of model results to the configuration of the model in these areas will be tested.

- Shallow Floodplain Flows

In these areas model stability will be maintained by utilising the MIKE 11 autoslot routine. Where this is not effective narrow slots will be introduced into the branch with the slot inverts being similar to the channel inverts. Slot widths will be set to zero to maintain correct storage, while the roughness within the slot will be high to minimise conveyance. Flow to and from the floodplains will be controlled by weirs. This approach has been used successfully in the Cubberla Creek Flood Study.

- Composite Roughness Co-efficient Estimation

The MIKE 11 hydraulic model will be used to represent the Brisbane River system. An inspection of the river indicated that almost all of the waterway ~~is a natural channel with varying development floodplain, ie irregular cross~~ sections. As such the MIKE 11 model's techniques for calculation of hydraulic parameters will be best suited for this situation. The Manning's roughness parameter and the integral method of calculation of hydraulic radius will be used in MIKE 11. As such roughness due to an excavated channel bed or treed river bank or fully developed floodplain can be easily simulated into one section.

The model offers the capability to vary the value of channel roughness both horizontally and vertically through a cross-section, resulting in a composite roughness for each cross-section.

2.

- Model Calibration

As storage and attenuation of flows may be significant in the Brisbane River, calibration will be an iterative process using both the hydrologic and hydraulic models. RAFTS reach storage properties will be simulated using Muskingum-Cunge method to match MIKE 11 routing predictions. This analysis will be done at several locations along the Brisbane River. The analysis will be done for a large and small flood hydrograph to test the sensitivity of the selection of parameters over the range of floods to be analysed. By matching travel times and storage properties modelled dynamically in MIKE 11 a preliminary set of RAFTS model coefficients will be established.

Detailed model calibration will use available stream gauging records and MHI information from BCC and DNR. Model parameters in both RAFTS and MIKE 11 will be adjusted to match the timing, shape and peak of recorded hydrographs. Consistency between the RAFTS and MIKE 11 models will also be assessed. Structure hydraulics will be checked in both MIKE 11 and HECRAS. Model parameters will remain consistent for each flood event used (4 calibration events) and only adjusted at the completion of each iteration. This process will result in one set of model parameters appropriate for all floods tested.

The consistency of MIKE 11 model parameters between events will be closely considered as the condition of the Brisbane River bed may have altered over the period of available calibration data (ie 1973 to 1996). This will be done by comparing the current river cross-sections taken by BCC with a set collected in 1974 which were used by DNR. Substantial variations between sections may require model parameter alterations or even section alterations.

The iterative calibration process detailed above will result in an effective validation of the hydrologic and hydraulic process models.

☐ **Input:**

- ~~1:10 000 aerial mapping~~
- historical aerial photographs
- data compiled as part of Task 1
- output from DNR hydraulic modelling.

☐ **Description:** Task 3 includes the following activities:

Sub-Task 3.01 - MIKE 11 Model Setup

- setup MIKE 11 branches using Council cross-sections referred to AMTD
- incorporate initial set of Mannings n values based on site inspection and DNR modelling.

2.

Sub-Task 3.02 - MIKE 11 Hydraulic Structures
- incorporate effects of bridges into MIKE 11 model.

Sub-Task 3.03 - Calibrate MIKE 11 Model
- in tandem with **Sub-Task 2.03 - Calibrate XP-RAFTS Model**, calibrate MIKE 11 model against four historical events (most likely 1974, 1973, early 1989 and late 1989). Assumed values of Mannings n will not be altered for different floods
- acceptable calibration is achieved when predicted levels are within 150 mm of maximum height records, 100 mm of continuous flood level records and 200 mm of other sources of flood levels.

Sub-Task 3.04 - Verify MIKE 11 Model
- in tandem with **Sub-Task 2.03 - Calibrate XP-RAFTS Model**, verify the performance of the calibrated MIKE 11 model by an independent check against available verification data.

Sub-Task 3.05 - Assess RAFTS/MIKE 11 Consistency
- a check of the consistency between RAFTS and MIKE 11 predictions shall be done by comparing discharge hydrographs from both models at selected structure locations and confluences.

Sub-Task 3.06 - HECRAS Check of Hydraulic Structures
- in tandem with **Sub-Task 3.02 - MIKE 11 Hydraulic Structures**
- incorporate effects of major bridges in HECRAS model
- rerun calibration events using HECRAS structure models to check afflux predictions made by MIKE 11
- check structure hydraulics using CULVERTW

☐ **Output:**
- validated MIKE 11 model of Brisbane River
- comparison of recorded and predicted hydrographs at key locations
- HECRAS structure models consistent with the MIKE 11 model structures
- ~~tables of recorded and MIKE 11 predicted flood levels (including~~ differences)
- map showing hydraulic model structure
- tables summarising hydrometric data used for MIKE 11 validation
- rating curves at each gauging station
- calculated discharges at creek crossings and tributary confluences
- drawings of MIKE 11 predicted flood profiles and historical levels
- calculated hydrographs at creek crossings.

2.

TASK 4 - DESIGN EVENTS ASSESSMENT

☐ **Purpose:** To predict design event hydrographs and establish design flood profiles, define flood hazard areas and document river flooding characteristics for the Brisbane River.

☐ **Interpretation of the Brief:**
Two options for design event hydrology for the Brisbane River Catchment are presented in this proposal. If the review of the DNR studies identify that the current hydrology is acceptable then the methodology presented in Task 4 will be used. If further work is required then the methodology detailed in Task 1A - Additional Design Event Hydrology will be used in conjunction with the hydraulic aspects of this task.

The design flood hydrographs will be calculated by applying the design rainfall and temporal patterns generated by DNR to the calibrated RAFTS model. It will be necessary to develop rainfall data for the 2, 5 and 2 000 year ARI events as DNR did not investigate these floods. The catchment rainfall scenarios applied to similar return period events by DNR will be applied to these new events with some sensitivity of variation tested.

The flood frequency analysis will be carried out on available historic streamflow data. This data provides the best indication of the probability of recurrence of flood levels in the Brisbane River naturally accounting for the variability of rainfall over the catchment. The assessment will be performed on both recorded levels and estimated discharges. The influence of the construction and operation of the dams within the catchment will be included. This will involve liaison with DNR officers and advice from review specialist Dr Rory Nathan.

☐ **Input:**
- validated RAFTS and MIKE 11 models
- DNR design event hydrological data (if applicable)
- output from Task 1A (if required)
- ~~Australian Rainfall and Runoff, 1987~~
- tide boundary statistics
- stormtide statistics.

☐ **Description:** Task 4 activities include:

Sub-Task 4.01 - Document Design Rainfall Scenarios
- document design rainfall and temporal patterns used by DNR for 10, 20, 50, 100, 200, 500, 1 000, 10 000, 100 000 and PMF events
- generate 2, 5 and 2 000 year ARI rainfall data based on DNR scenarios.

2.

Sub-Task 4.02 - Flood Frequency Analysis

- using historical streamflow data available from DNR perform a flood frequency analysis at Lowood, Moggill, Centenary and Brisbane City gauges, with allowance for the construction of Wivenhoe and Somerset Dams.

Sub-Task 4.03 - RAFTS Model Adjustment

- adjust calibrated event RAFTS model to include appropriate design operating rules for Wivenhoe and Somerset Dams.

Sub-Task 4.04 - Design Flood Hydrographs

- run design event rainfall documented in Sub-Task 4.01 to generate design event hydrographs for the MIKE 11 hydraulic model
- compare results with DNR design hydrographs
- compare peak discharges with flood frequency/analysis results for consistency

Sub-Task 4.05 - Design Flood Profiles

- generate flood profiles using inflow hydrographs generated in Sub-Task 4.04
- Moreton Bay storm surge shall be timed to achieve maximum river flood levels
- the following joint probabilities will be considered
    - 100 year ARI river flood coinciding with a 20 year storm surge
    - 20 year ARI river flood coinciding with a 100 year storm surge.
- model sensitivity to Moreton Bay conditions will be tested by modelling a 100 year ARI river flood coinciding with a 100 year storm surge.

Sub-Task 4.06 - Setup and Calibration of HECRAS Model

- setup a HECRAS model of the river system using the cross-sectional and roughness data from the calibrated MIKE 11 model
- calibrate the HECRAS model to match the MIKE 11 model flood profiles for the 10 and 100 year ARI events (using the mixed flow option)
- document calibration results and adopted roughness parameters.

Sub-Task 4.07 - Define High and Low Hazard

- document variations in flood hazard based on velocity depth criteria as specified in the NSW floodplain development manual.

Sub-Task 4.08 - Rating Curves

- plot and tabulate stage-discharge relationships for major crossings based on design events
- superimpose historical flood levels and calibrated discharges on rating curve plots.

2.

Sub-Task 4.09 - Document Flooding Characteristics

- tabulate main channel, left and right over bank velocities for the 100 year ARI flood and the full channel flood
- tabulate 20 year and 100 year flood percentage of total conveyance for main channel and left and right overbank.

☐ **Output:**

- flood frequency curves and tables on normal distribution paper for Lowood, Moggill Gauge, Centenary Gauge, Brisbane City Gauge
- drawings of design flood profiles, grouped as in the brief
- high and low hazard areas to be mapped for existing conditions
- tables of discharges and levels for full range of design events at each cross-section
- table of 100 year ARI flood velocities
- table of percent conveyance for 20 year and 100 year floods
- rating curve plots and tables for all road crossings.

2.

TASK 5 - HYDRAULIC ASSESSMENT OF STRUCTURES

☐ **Purpose:** To document structure affluxes for the range of design floods for the major crossing of the Brisbane River.

☐ **Interpretation of the Brief:**
The assessment of structures in the Brisbane River will be established using the calibrated MIKE 11 model of the river and individual HECRAS models.

It is anticipated that copies of all relevant hydraulic structure drawings will be made available by Brisbane City Council with an indication of the datum adopted for each drawing. This information will be used to establish the hydraulic geometry of each structure during setup and calibration of the models.

During model setup the MIKE 11 model will be modified at each structure location by inserting a culvert structure in the main flow branch to represent flow under the bridge. The geometry of the MIKE 11 culvert will be consistent with the effective waterway area under the structure. The head-discharge relationship for the culvert will be calculated using the broad crested weir and orifice equations. An additional flow path will be included in the model to represent flows over the top of the structure with flow in this branch being controlled by one of the MIKE 11 weir functions. This will allow the determination of weir flow over the structure as appropriate.

The HECRAS model will then be used to calculate affluxes for the range of design flows at each structure location. The resulting range of calculated affluxes will then be used to modify the MIKE 11 model to match the HECRAS results. This will be achieved by adjusting the head loss factors until affluxes are within 20 mm of those calculated by HECRAS.

This process will be repeated for each structure in the river.

The afflux of each structure for the range of design flows will be documented on the structure reference sheets. Upgrading of structures will be investigated, however the size and likely cost of the upgrades may result in such works being uneconomic given the benefits received.

☐ **Input:**
- nil.

☐ **Description:** Task 5 activities include:
- document afflux conditions for the structures for the range of design flows
- document the potential for upgrade of individual structures.

2.

☐ **Output:**
  - list of structures, dimensions and afflux for the range of design floods
  - documentation of upgrade opportunities.

2.

TASK 6 - WATERWAY REVEGETATION

☐ **Purpose:** To document zones of ecological significance and identify areas which can be revegetated without significant hydraulic impacts.

☐ **Interpretation of the Brief:**
A revegetation strategy will initially be based on existing studies and feedback from the relevant Council sections. Areas which have been earmarked for revegetation will be identified. The model cross-sections at these locations will be modified to represent the change in roughness due to the revegetation. This will be done by identifying the portion of the cross-section which is impacted on by tree planting and modify "Mannings" n. The hydraulic model will then alter the conveyance of the cross-section in accordance with the changes roughness. The model will then be re-run and the results compared with the acceptance criteria. This will be an iterative process of increasing and reducing tree planting areas along the river.

The proposed revegetation strategy will apply to areas both within and beyond the Waterway Corridors. Tree planting will be examined for areas beyond the Waterway Corridors to the extent of the proposed regulation lines because private landholders may revegetate these areas. This will generally create the worst case scenario.

The creek corridor will be delineated according to the following revegetation criteria.

(i) Fully Unconstrained Revegetation over the whole corridor (to a Manning's `n' roughness of 0.15).

(ii) Constrained Revegetation (by roughness or extent of planting).

(iii) Low Density Revegetation (causing no measurable afflux).

~~The process of ranking each reach of Brisbane River according to the~~ abovementioned revegetation criteria will use the following methodology:

- Identify reaches of the river that have adjacent houses subject to confirmed or potential inundation during the 100 year ARI design flood. Implementation of a revegetation strategy should not increase flood levels in these areas.

- Identification of the waterway corridor width for each cross-section in the hydraulic model. Revegetation must be considered for this minimum width and any other areas to the extent of the proposed regulation lines if possible.

2.

- Full revegetation should include ground cover, understorey and canopy vegetation with a Manning's `n' coefficient of 0.15.

The final modelling will set a strategy which results in acceptable hydraulic impacts. The strategy will be developed in conjunction with the regulation lines as in interactive process. Areas where various densities of tree planting can be achieved will be identified along with areas which should not be revegetated due to adverse hydraulic impact.

☐ **Input:**
- existing reports relating to the environmental status of Brisbane River
- validated MIKE 11 model
- design events data for the catchment
- Environmental Management Branch, Environmental Planning Section and the Brisbane Planning Section requirements
- field notes
- 1:10 000 scale aerial photography
- feedback from contacted interest groups.

☐ **Description:** Task 6 activities include:

Sub-Task 6.01 - Collation of Environmental Data
- review available environmental studies of the creek corridor
- document areas requiring rehabilitation measures
- liaise with Environment Management Branch/Environment Planning Section and Bikeway Planning Section for requirements.

Sub-Task 6.02 - Hydraulic Testing of Revegetation Options
- identify extent of desirable waterway corridor in MIKE 11 model and apply revegetation strategy
- identify low conveyance areas and apply dense revegetation strategy
- test desirable waterway corridor using the 1 in 100 year ARI flood and document impacts
- revise revegetation strategy until acceptable hydraulic impacts are achieved.

Sub-Task 6.03 - Waterway Corridor Delineation
- discuss preliminary results with relevant Council sections and modify as required
- document basic corridor location along the creek system
- document areas of high density planting
- document areas of lower density planting
- document areas which should not be planted.

☐ **Output:**
- a map of the waterways corridor location and allowable planting density
- recommended zoning changes to achieve the corridor.

2.

TASK 7 - FLOOD REGULATION LINES ASSESSMENT

☐ **Purpose:** To determine flood regulation lines using the calibrated hydraulic model incorporating the revegetation strategy and crossing afflux). Derive minimum development levels.

☐ **Interpretation of the Brief:**
The procedure for setting regulation lines on Brisbane River will be based on what was done in the Cubberla Creek Flood Study. The process will be interactive with revegetation strategy impacts being accounted for. The impacts of regulation lines previously established in the flood storage areas adjacent to Bulimba Creek, Oxley Creek, Moggill Creek etc will be accounted for in the assessment.

As a first cut, interim regulation lines, will be tested and results assessed. Areas where houses are currently inundated in a 1 in 100 year flood will be identified as high risk areas and flood levels will be maintained as for existing conditions (ie no afflux permitted). Areas where regulation line affluxes are greater than 150 mm will be modified. The requirements of the 15 metre buffer from the top of the river bank will be applied along with the requirement that areas of the river with more than one metre of flooding can not be developed. Placement of regulation lines will also be influenced by interim regulation line locations and road reserves, cadastral boundaries and parkland. Several iterations will be trailed with adjustment made until the 150 mm afflux is optimised or other constraints limit the regulation line location. To ensure an acceptable final location is achieved liaison with Council following each major change in configuration will be necessary.

☐ **Input:**
- interim regulation lines.

☐ **Description:** Task 7 activities include:

Sub-Task 7.01 - Set Regulation Lines
- determine regulation lines in accordance to the specified afflux criteria using 100 year ARI flood (ultimate conditions, that is including revegetation strategy and crossing afflux)
- amend regulation line locations based on minimum (15 m) environmental buffer requirements
- produce flood levels and discharges for full range of design events for ultimate conditions with regulation lines in place.

Sub-Task 7.02 - Set Development Levels
- define minimum flood development levels along river.

2.

Sub-Task 7.03 - Regulation Line Mapping and Profiles

- map location of preliminary regulation line
- liaise with waterways section on configuration and location of lines
- map location of final regulation lines and dimension from real property boundaries
- prepare flood profiles for the 2, 5, 10, 20, 50 and 100 year ARI floods
- illustrate regulation line afflux.

☐ **Output:**

- 1:10 000 plans of proposed regulation lines superimposed on interim regulation lines (includes inundation and rezoning recommendations)
- table of regulation line position, 100 year flood level and existing ground level at each regulation line for each cross-section
- tables of discharges and levels for full range of design events for ultimate conditions (regulation lines in place)
- design flood profiles for the 2, 5, 10, 20, 50 and 100 year ARI events
- afflux plot

2.

TASK 8 - FLOOD FORECASTING

☐ **Purpose:** To develop a flood forecasting model of Brisbane River downstream of Moggill.

☐ **Input:**
- validated RAFTS model
- major crossing details.

☐ **Description:** Task 8 activities include:

Sub-Task 8.01 - Setup Forecasting Model
- adjust calibrated RAFTS model to simulate the catchment downstream of Lowood and incorporate rating curves at major crossings, stream gauges and confluences between Moggill and the river mouth. The forecasting model will use rainfall stations equipped with radio telemetry.
- compare predictions of peak flood levels and times of flooding from flood forecasting model with MIKE 11 model.

Sub-Task 8.02 - River Crossing Immunities
- determine levels and frequencies at which key road crossings are cut by flooding
- determine the duration of closure of road crossing.

☐ **Output:**
- RAFTS flood forecasting model for Brisbane River
- table of comparison between flood forecasting model and MIKE 11 model results
- table of levels and frequency at which road crossings are cut
- plan showing RAFTS sub-areas, rainfall stations, Thiessen polygons, and crossing locations.

2.

TASK 9 - FLOOD MAPPING

☐ **Purpose:** To prepare flood contour and inundation maps of the Brisbane River System.

☐ **Interpretation of Brief:**
The flood mapping developed in conjunction with BCC Waterways as part of the Cubberla Creek Flood Study will be applied to the Brisbane River. As the flow regime of the river is expected to be subcritical, the FastTABS model and process will be applicable.

The two-dimensional hydrodynamic model FastTABS will be used to post-process the one-dimensional hydraulic model results producing a two-dimensional flood surface of Brisbane River.

The 100 year inundation line will be used to define the extremity of the finite element mesh developed to define the bathymetry of the reach being modelled. This mesh will be digitised into XYZ co-ordinates and imported into FastTABS to create a geometry file describing the nodes and elements on the mesh.

A boundary condition file associated with a particular geometry file will be developed containing data describing boundary conditions, material properties and other analysis parameters.

Continuity strings of nodes will be drawn across the mesh at boundaries and at various locations where circulation of flow could be expected. During the calculations a mass balance of flow will be performed at these locations. A good result is achieved if the mass balance equals approximately 90-110% at all locations.

The two-dimensional flood surface of Brisbane River will be calculated using RMA-2. RMA-2 is a two-dimensional, depth-averaged, free surface, finite element program for solving hydrodynamic problems. RAM-2 is used to compute water surface elevations and flow velocities at nodal points in a finite element mesh representing a body of water.

The flood contour information calculated will exported in DXF format from FastTABS and imported to AutoCAD as a separate theme overlaying the cadastral data, ground surface contours.

The flood contours will be smoothed and amended to form a series of individual cells representing a database of local flood information.

During key milestones in this process we propose to have the project engineer responsible for flood mapping located in the offices of BCC waterways to facilitate close liaison.

2.

☐ **Input:**
- hydraulic modelling results
- survey cross-sections
- contour data base
- FastTABS program.

☐ **Description:** Task 9 involves the following activities:

Sub-Task 9.01 - Flood Contouring and Mapping

The main requirement of this sub-task is to prepare 100 year ARI flood contour mapping at 0.1 m intervals with a minimum of subjective interpretation and manual intervention. This will involve the following activities;
- setup uncalibrated FastTABS models for individual reaches of Brisbane River. These models would be approximate and are not intended for use in full 2D modelling, but in the post processing of MIKE 11 results.
- run each model with the MIKE 11 predicted water levels specified at the upstream and downstream boundaries. FastTABS will generate water levels at intermediate points that would be representative of the generalised shape of the flood surface. FastTABS will be used to produce flood level contours within the waterway reach.
- these contours will then be made `true' by assigning a corresponding MIKE 11 flood level to each of the representative contour predicted by FastTABS
- the `true' contours would then be triangulated to generate intermediate contours at 0.1 m intervals
- a series of flood contour plans (1:5 000 scale) shall be produced in accordance to the formats and requirements specified in the study brief. This shall include provision of plans in hard copy form and in digital (DXF) format.

Sub-Task 9.02 - Flood Inundation Mapping
- prepare 1:10 000 inundation maps for the 20 year and 100 year ARI floods for ultimate catchment development with regulation lines and revegetation strategy in place.
- determine if the 100 year ARI flood contours are appropriate for the 20 year ARI flood.

☐ **Output:**
- flood contour cell database for importation into Council BIMAP system
- 1:5000 scale flood contour plans and longitudinal profiles to Council specifications (hard copy and DXT form)
- 1:10 000 scale 20 year and 100 year ARI inundation maps (hard copy and digital form).

2.

☐ **Assumptions:**
  - Council to make available to Sinclair Knight Merz their copy of FastTABS for use during the study duration.

2.

TASK 10 - COMMUNITY CONSULTATION

☐ **Purpose:** To enable specific community input into the Brisbane River Flood Study.

☐ **Interpretation of the Brief:**
A detailed community consultation process as part of this study is not considered appropriate given the nature of the study and the available timeframe. It would be more appropriate to consider the flooding issues of the river as part of a much broader consultation process which may address such issues as catchment land use, flora and fauna and water quality.

On the Cubberla Creek Flood Study valuable information was received from specific environmental groups which aided in development of the revegetation strategy. A similar process is proposed for the Brisbane River.

In order that direct feedback on study outcomes be received it is proposed to provide a display in the visitors centre of the BAC for a period of say around 4 weeks. The newspaper advertisement would advise of the locality and purpose of the display and the method of receiving submissions.

Following a review with Council officers of the submissions received, appropriate adjustments to the study will be made.

☐ **Description:** Task 10 activities are as follows:
- liaise with Bushland Rehabilitation Unit of Council to identify revegetation interest groups along the river
- prepare a brief questionnaire including map and send to these groups requesting feedback with respect to possible revegetation strategies
- following the completion of draft regulation lines and design flood levels place an advertisement in the "Courier Mail" notifying of the display of proposed design flood levels and regulation lines
- prepare a colour plot of 100 year ARI flood profiles
- prepare a colour plot of regulation line amendments
- prepare a colour plot of revegetation strategy
- seek written submissions on study outcomes via a display of study findings in the Council information centre for a period prior to report finalisation
- document feedback from the community
- discuss feedback with Council and identify changes required to produce final reports.

2.

☐ **Output:**
- documentation of community response to the study
- findings for the completion of the final report.

2.

TASK 11 - PROJECT REPORTING

☐ **Purpose:** To prepare progress and final reports for submission to Council.

☐ **Interpretation of the Brief:**
Reporting on this project will be generally in accordance with the brief. The style of output from the study will be similar to that produced for the Cubberla Creek Flood Study. Innovations in data presentation and transfer developed during the Cubberla Creek study such as the revegetation mapping and direct data transfer via the use of a laptop to Council's network will be applied and developed further on the study.

As the output from this study must be user-friendly, considerable effort will be put into the format and presentation of drawings and reports.

The general format of the AutoCAD (.DWG) files will be as follows:

- Layer names will be unique and specific to the purpose of the drawing. For example;
  - maximum height indicators will be in a layer named "MHI"
  - new regulation lines will be in a layer named "NEW-REGLINE"
  - interim regulation lines will be in layer named "INTERIM-REGLINE"
  - 100 year inundation line will be in a layer named "a100-INUNDATION" and so on.

All drawings from Council will remain unchanged in layer names and line types. All new drawings will be done in line types and colours by layer so data can easily be adapted to suit the BIMAP system when imported.

The origin of profile drawings will be dominated by profiles and not by the plans in top half of the sheet. A separate fie will be issued for any new data shown on the plans.

Separate files of each overlay theme (eg regulation lines, flood contouring, revegetation, etc) will be supplied for all new data for entire extent of study as well as files for each drawing as it appears. Any rotation of drawing display will be in model space/paper space. No drawing content will deviate from AMG co-ordinates (or as supplied by BCC).

2.

A preliminary list of major drawings is given below:

Proposed Drawing List

Item	No. of Sheets	Scale
Plan Index	1	
Locality Plan	1	1:100 000
Calibration Profiles	9	1:10 000(H) 1:100(V)
Verification Profiles	9	1:10 000(H) 1:100(V)
Design Profiles existing conditions PMF, 100 000, 10 000 year ARI	9	1:10 000(H) 1:100(V)
Design Profiles existing conditions 2 000, 1 000, 500, 200 year ARI	9	1:10 000(H) 1:100(V)
Design Profiles existing conditions 100, 20, 5 year ARI	9	1:10 000(H) 1:100(V)
Design Profiles existing conditions 50, 10, 2 year ARI	9	1:10 000(H) 1:100(V)
Amalgamation of all Design Events on one sheet	1	1:100 000(H) 1:50(V)
Revegetation Plans	7	1:10 000
Regulation Line and Rezoning Plans	7	1:10 000
Design Profiles Ultimate Conditions 100, 20, 5 year ARI	9	1:10 000(H) 1:100(V)
Design Profiles Ultimate Conditions 50, 10, 2 year ARI	9	1:10 000(H) 1:100(V)
Afflux Plots	9	
Flood Contour Plans	18	1:5 000
Approximately 116 plans		

Some examples of the results presentation is given in **Appendix D - Results Presentation Examples**. Further examples can be seen in the Cubberla Creek Flood Study.

☐ **Input:**
- output from previous tasks.

☐ **Description:** Task 11 activities include:

Sub-Task 11.01 - Progress Reports
- preparation of progress reports during the course of the study including;
  - calibration report
  - design event report
  - waterway management report
  - flood mapping report
  - preparation of status reports for each meeting.

2.

Sub-Task 11.02 - Final Reports (detailed and executive)
- preparation of final detailed report using progress reports as a base
- preparation of an executive summary for inclusion in the final report
- preparation of computer files for Council handover via direct data transfer to the BCC network

Sub-Task 11.03 - Input to Council Waterways Database
- preparation of study data in tabular form for input into Council Waterways Database.

Sub-Task 11.04 - User Guide Development
- prepare a user guide detailing operation of the models used in the study
- document the flood contouring operations
- provide a directory structure of all files and a description of the files
- provide a guide to viewing the digital version of the report.

Sub-Task 11.05 - Model Handover and Training
- the MIKE 11, HECRAS and RAFTS models will be progressively handed over to Council during the course of the study
- an allowance has been made for a technical presentation to Council staff to explain study details and highlight features of the user guide.

☐ **Output:**
- 2 copies of progress reports and draft plans
- 6 copies of final report
- 2 copies of final plans (1 copy on non diazo film A0 and 1 copy on paper)
- DXF files of all plans
- study data in ASCII format for Council Waterways Database
- computer files transferred to Council's network
- report text in WordPerfect format using the hypertext feature
- report tables in Lotus/Quattro Pro format.

2.

TASK 12 - PROJECT MANAGEMENT AND QUALITY ASSURANCE

☐ **Purpose:** To ensure completion of the study on time within budget, incorporating all issues and with the required quality. To facilitate effective liaison between the project team and the client.

☐ **Description:** Task 12 activities are:

Sub-Task 12.01 - Quality Assurance
- preparation of Quality Assurance Plan for Brisbane River Flood Study
- implementation of plan including Quality technical and practice reviews.

Sub-Task 12.02 - Project Control
- budget and schedule control using TIMELINE
- team co-ordination meetings.

Sub-Task 12.03 - Council Meetings
- meeting with Council on a monthly basis at Brisbane (two weekly meetings during significant periods of the study have been included).

☐ **Output:**
- Quality Assurance Plan
- TIMELINE schedule and control
- minutes of Council meetings.

Refer to **Section 5 - Management of The Study** for more details.

3. Study Team

Perusal of the "Brisbane River Flood Study Brief" highlights a strong relationship between the methodologies and outcomes of this study and previous Council flood studies.

Core members of the Sinclair Knight Merz team have satisfied Brisbane City Council requirements for previous flood studies, viz;

☐ Cubberla Creek Flood Study (1995/96)

☐ Moggill Creek Flood Study (1993/94).

During these studies, our team has worked with the Waterways Technical Section team to develop new methodologies, presentation of results and flood study briefs reflecting Council's desired outcomes.

We desire to utilise this experience by committing our core team from previous studies to the Brisbane River Flood Study. This commitment includes a goal to continue to improve on our standards, level of service and liaison/feedback to Council officers.

Through our previous work, our team has demonstrated their skills in the key tasks of:

☐ Hydrologic and Hydraulic Modelling

☐ Waterway Management

☐ Flood Mapping

☐ Flood Forecasting Modelling

☐ Community Consultation

☐ Documentation.

We note Waterways preference for the hydrologic model, RAFTS, for these studies instead of the URBS model used in previous studies. Our team has been utilising RAFTS more frequently, particularly on catchments where suitable stream gauging information is available for calibration. We are finding that RAFTS is more suitable for obtaining the required criteria of the hydrologic and hydraulic consistency.

2.

The specified hydraulic models, MIKE 11 and HECRAS are the core models used by our team. We also ensure that the project engineers attend training courses in these models to ensure an understanding of their methodology and capability.

The technologies and methodologies developed by Scott Abbey and Fiona Delforce in conjunction with Waterways Technical Section for Waterway Management and Flood Mapping would be applied to the Brisbane River Study. Having acquired the skills in the application of FastTABS to the flood contouring and an understanding of Council's requirements, we consider FastTABS to be an appropriate model for this task.

Our team is very experienced with the URBS flood forecasting model. Combining this experience with their RAFTS hydrologic modelling expertise will deliver Council's requirements.

For community consultation, the procedures implemented by Waterways, Scott Abbey and Fiona Delforce for the Cubberla Creek Flood Study provided a satisfactory outcome. We would use similar procedures for this study whilst being aware of the need to respond constructively to any particular issue that appears to be of major concern to that community.

Documentation of the flood study outcomes is a major task and of significant importance to Waterways Technical Section, hence Brisbane City Council. Our team has virtually worked as an extension of the Waterways Section during the documentation of the Cubberla Creek and Moggill Creek flood studies. Scott Abbey, Fiona Delforce and our project drafter, Julie Humrich, have been able to develop a standard of presentation which reportedly sets the benchmark of these studies. They acknowledge there is always room for improvement, hence look forward to the opportunity to provide a better standard in future studies.

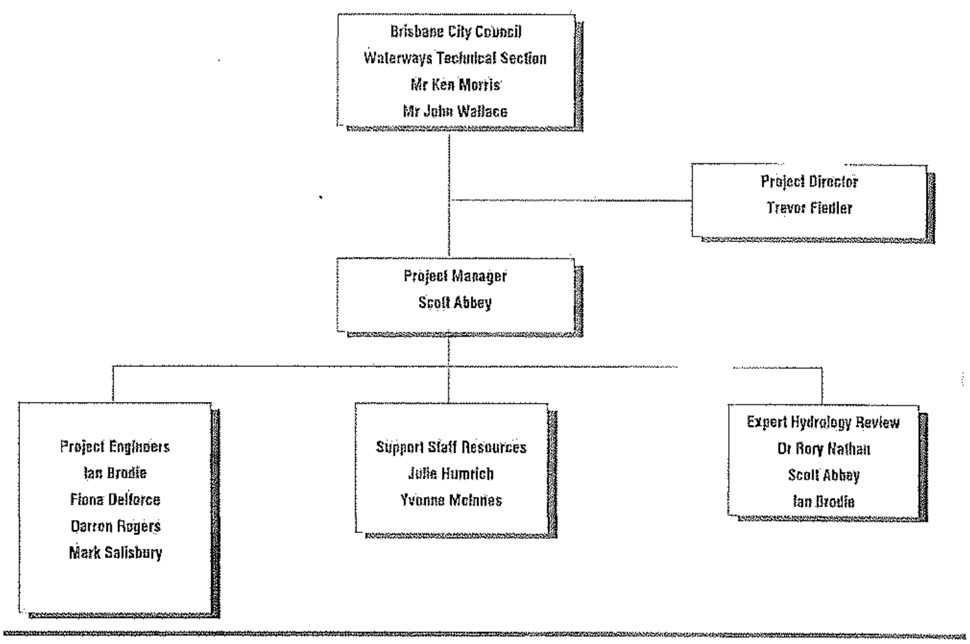
Summing up the required skills of the flood study team, we see a thorough understanding of Council's technical requirements and documentation standards as being paramount. We also understand there will be a need (or at least a desire) to complete this study in a shortened timeframe. With our team having the experience of two recent Brisbane City Council flood studies under their belt, we believe we are able to perform by "getting it right the first time", hence avoiding delays on the study.

We therefore propose to commit our core team members to this flood study as first priority. This action will ensure a quality product completed with Council's desired timeframe.

The proposed study team and its organisation structure for the flood study of the Brisbane River is shown in **Figure 3.1 - Study Team**.

2.

Figure 3.1 - Study Team



The key aspects of each team member's experience and their proposed role on the study are summarised below. Curricula vitae of the team members are included in **Appendix A - Curricula Vitae.**

☐ **Trevor Fiedler - Project Director**
Trevor is a Principal of Sinclair Knight Merz and Manager of Toowoomba office. The Toowoomba office functions as the Technical Centre for flood studies, major drainage studies, water quality modelling and irrigation design for the Queensland Branch of Sinclair Knight Merz.

In his role as Project Director, Trevor retains full corporate responsibility for the performance of the team. He will undertake Quality Assurance Reviews as detailed in the Quality Plan.

Trevor has 24 years experience in water related studies and has specialist skills in flood studies and floodplain management. His involvement with the following projects provide relevant experience for this study:

☐ Project Director - Cubberla Creek Flood Study (1995-96)

☐ Project Director - Yandina Bypass Flood Study (1995-96)

☐ Project Director - West Creek (Toowoomba) Conduit Study (1994)

☐ Project Director - Lismore Levee Scheme Detailed Study (1994-96)

2.

☐ Project Director - Moggill Creek Flood Study (1993-94)

☐ Project Director - Lismore Floodplain Management Study (1990-94)

☐ Project Manager - Pine Waters Flood and Tidal Study (1990).

For the Cubberla Creek and Moggill Creek flood studies, Trevor's role also extended to being a mentor and technical adviser to the team. He assisted with the development of procedures and team members. During the Cubberla Creek study, he kept a vigilant eye on the progress of the study to ensure timelines were met and our documentation goals were met.

☐ **Scott Abbey - Project Manager**
Scott is a Senior Project Manager with Sinclair Knight Merz with 10 years engineering experience, the last 7 years directly relating to hydrologic and hydraulic investigations. Scott was the Project Manager for two recent flood studies for Council, viz Cubberla Creek and Moggill Creek. He has been a key player in the development of methodologies, technologies and documentation standards for these studies. Because of this experience and background, Scott will be the Project Manager for this study. It is anticipated that Scott will have a high input into this project given the issues and complexities identified during the preparation of this proposal.

In his role as Project Manager, Scott is responsible to the Project Director and is the direct point of contact with Council's representative, Mr Ken Morris. He is accountable for the day to day management and execution of this project. This includes managing costs and scheduling and the application of the quality system.

Scott's recent experience is directly applicable to the Brisbane River Food Study and is briefly detailed below.

☐ Project Manager - Cubberla Creek Flood Study (1995-96). Scott was Project Manager on our most recent study for the Waterways Technical Section of Brisbane City Council. Scott directed the calibration and verification of the URBS and MIKE 11 models to satisfy Council's requirements of hydrologic and hydraulic consistency. Various tasks which followed were completed under Scott's guidance and input. Important amongst these were the development of the HEC-2 model and flood contouring using FastTABS. Because the Brisbane River study has similar requirements, Scott is ideally placed to bring the Cubberla Creek experience to this study.

2.

- Project Manager - Lismore Levee Scheme Detailed Study (1994-96). Scott managed the detailed hydraulic investigations of the levee scheme being proposed for Lismore. Using the MIKE 11 model issues such as hydraulic impacts, levee overtopping effects, evacuation route closures and internal flooding control were assessed and documented for the scheme EIS. The stringent requirements of the EIS has resulted in a high level of investigation and documentation of the investigations. His experience on this project would be a valuable asset to the Brisbane River Flood Study.

- Review Specialist - Yandina Bypass Flood Study (1995-96). Scott filled the role of review specialist for the RORB and MIKE 11 modelling on this project. As study results were subjected to intense public scrutiny, it was essential that the study methodology and model's applications were appropriate for the hydrologic and hydraulic conditions being modelled.

- Project Manager - Moggill Creek Flood Study (1993-94). Scott was Project Manager on our first study for the Waterways Technical Section of Brisbane City Council. The study utilised the URBS and MIKE 11 models in an interactive calibration mode. The study required rigorous calibration of the process models to ensure their reliability when used for considering floodplain management issues such as the determination of allowable filling of the floodplain via the setting of regulation lines and considering a tree planting strategy for the creek corridor.

- Project Manager - Lismore Floodplain Management Study (1990-94). This major flood mitigation project proposed for Lismore (estimated cost $22 million) involved detailed hydrologic and hydraulic investigation based on models calibrated during the preceding flood study.

- **Ian Brodie - Hydrologic and Hydraulic Engineer**

Ian is a senior water studies engineer with 12 years experience in water resources planning, water quality and flood investigations. Ian is very familiar with Waterways requirements from his involvement in the Cubberla Creek and Moggill Creek flood studies. Ian was the Practice Reviewer under the Quality Assurance plan for Cubberla Creek, hence reviewed the technical correctness of the work. For Moggill Creek, he was a key project team member.

Ian will provide specialist input at various phases of this study, especially in the set-up and calibration of the hydrologic and hydraulic models. Ian has been a prime user of the RAFTS model and acts as technical adviser/mentor for this program for project engineers. Ian will also have a key role in the review of the Brisbane River catchment hydrology and the design event modelling which follows.

2.

Ian's recent experience that is applicable to the Brisbane River Flood Study is briefly detailed below.

☐ Project Manager - Strategic Planning of Stormwater Pollution Control Devices (1996, current) for Brisbane City Council. Ian is responsible for developing a three year strategic plan which identifies the locations and types of pollution control measures in Brisbane.

☐ Water Studies Engineer - Caloundra Maroochy Wastewater Management Plan (1996, current). Ian is responsible for developing a MIKE 11 hydraulic and water quality model of the Maroochy River estuary for assessment of sewage effluent disposal options.

☐ Practice Reviewer - Cubberla Creek Flood Study. Ian was responsible for reviewing all of the key/milestone technical activities for this study.

☐ Project Manager - Yandina Bypass Flood Study (1995). Responsible for the development and calibration of RORB and MIKE 11 models of the North and South Maroochy Rivers. The study established design flood characteristics, defined bridge waterway requirements and assessed impacts on flooding of a major bypass route.

☐ Hydraulic Study Manager - West Creek Conduit Study (1994). Responsible for the conceptual design of a major supercritical conduit system and hydraulic structures to convey 100 year ARI flood discharges in West Creek Toowoomba. The study involved the RORB model and extensive HEC-2 modelling.

☐ Project Engineer - Moggill Creek Flood Study (1993-1994). Ian's activities covered calibration of the MIKE 11 model and obtaining hydrologic and hydraulic consistency between models. Consideration of floodplain management issues and documentation followed.

☐ Project Engineer - Trinity Inlet Water Quality Consultancy (1994). Responsible for MIKE 11 model development to predict tidal movement within the Trinity Inlet estuary. The dynamics of the estuary was complex due to its close looped shape and the presence of a null point (zone of zero velocity) migrating throughout the waterway during the tide cycle. This behaviour was accurately reproduced aided with tidal flow data collected using ADCP technology.

☐ **Darren Rogers - Hydrologic and Hydraulic Engineer**
Darren has committed himself to the Sinclair Knight Merz study team for the Brisbane River Flood Study.

2.

Darren will have the task of setting up and calibrating the RAFTS model and generating design hydrographs under the close guidance of the project manager and Ian Brodie. He will also be responsible for the flood frequency analysis development of the flood forecasting model and the setup and calibration of the HECRAS model.

Darren has 7 years experience as a civil engineer specialising in the hydrologic and hydraulic analysis of both rural and residential catchments. As a member of the Sinclair Knight Merz Hydraulic Studies Group, he gained experience in runoff routing and hydrodynamic modelling of a range of rural catchments.

Darren is currently working as a contractor to the Brisbane City Council Works Department. His primary role is being involved with the checking of development applications with major drainage components. Whilst at Council, he has been involved in project management, hydrologic and hydraulic modelling and report preparation for the Cabbage Tree Creek Flood Study Upgrade.

Specific projects which provide relevant experience for the pending study are:

- Project Manager - Cabbage Tree Creek Flood Study Upgrade (1996). Darren was responsible for upgrading the existing MIKE 11 model of Cabbage Tree Creek for the 1991 flood study. The work included setting up and calibrating an URBS hydrologic model and review the MIKE 11 model set-up and calibration. Darren then reanalysed the design events and prepared a study report.

- Project Engineer - Moggill Creek Flood Study. Darren's role on this project was the establishment and calibration of the URBS and MIKE 11 models and developing the methodology to ensure hydrologic and hydraulic consistency.

- Project Engineer - Lismore Flood Study. Darren was part of the team which developed the RORB hydrologic model of the Wilsons River and MIKE 11 hydraulic model of the Wilsons River, Wilson Creek, Leycester Creek and the associated complex floodplain.

- **Mark Salisbury - Project Engineer**

Mark is a graduate working in our Hydraulic Studies Group. Under the direction of Scott Abbey and Ian Brodie, Mark will setup and run the MIKE 11 model during the study. His experience in modifying and using the complex Lismore Floodplain MIKE 11 model will be directly applicable to the Waterway Management phase of the study. Relevant experience includes:

2.

☐ Project Engineer - Lismore Levee Scheme (1996). Mark has been involved in running the complex MIKE 11 model of the Lismore floodplain to assess various levee options. He has also worked on several associated studies looking at floodway encroachment and filling of flood storage for private development.

☐ Project Engineer - Goonoo Waterharvesting (1996). Mark was responsible for the hydraulic analysis of 25 km of the Comet River to determine flow distributions and attenuations using the MIKE 11 model. The river system contained complex interactions between the river, floodplain, anabranched and adjoining tributaries.

☐ Project Engineer - Danpork Weir Project (1996). Mark was responsible for developing and calibrating a HECRAS model for a 5 km reach of the Condamine River to assess the impacts of a proposed weir.

☐ Project Engineer - Mt Nathan Hydraulic Assessment (1996). Mark was responsible for determining flood inundation levels using HEC-2 for a proposed urban development.

☐ **Fiona Delforce - Hydrologic and Hydraulics Engineer**
Fiona is a project water studies engineer with 4 years experience in water and environmental studies. Fiona was the project engineer for the recently completed Cubberla Creek Flood Study. Her personal commitment to reaching the study goals played a significant part in producing the final outcomes and documentation.

Fiona is currently on leave whilst undertaking an overseas tour. She expects to work in the UK (possibly Wessex Water) from September 1996 to March 1997 and to rejoin our team in April 1997. Given that timeframe and the duration of the Brisbane River Flood Study, we are confident that Fiona will be available to make a significant contribution to the study, particularly in the area of flood mapping.

Studies which Fiona has been involved in which are relevant to this study are:

☐ Project Engineer (Assistant Project Manager) - Cubberla Creek Flood Study (1995-96). Fiona was the principal project engineer for the duration of this project. Her activities covered calibration of URBS and MIKE 11 models, development and use of HEC-2 and FastTABS models as required and the assessment of the impacts of tree planting and flood regulation lines. She was responsible for overseeing all documentation.

☐ Project Engineer - Yandina Bypass Flood Study (1995). Fiona was responsible for calibrating the RORB models of the North and South Maroochy Rivers. Following calibration, these models were used to generate design discharge boundary conditions for the MIKE 11 hydraulic model.

2.

☐ Project Engineer - Woongoolba Drainage Study (1994). Fiona was responsible for hydrologic and hydraulic modelling of this agricultural site. RORB (runoff-routing model) was initially utilised to determine the ultimate design floods from the catchment. The drains, culverts and outlet structures were then analysed using the MIKE 11 model.

☐ Project Engineer - Stanbroke Irrigation Design (1994). Following extensive field work, Fiona was responsible for the hydraulic modelling of a reach of the Condamine River and adjacent floodplains using MIKE 11. The results indicated the likely impact of a proposed large irrigation dam adjacent to the river, upon flooding in the river and on the floodplain. The model results were used in a preliminary design of the dam wall and spillway.

☐ **Dr Rory Nathan - Expert Hydrology Reviewer**
Dr Nathan is an hydrologist playing a leading role in statistical analysis, yield estimation and design flood estimation. He has highly developed skills in the development of purpose-built computer applications and catchment modelling.

Dr Nathan has 14 years experience in the field of engineering hydrology, including 7 years as a consultant in hydrology and the assessment of surface water resources. He has been responsible for estimation of extreme and design floods, streamflow extension, salinity and drainage feasibility investigations, stochastic data generation, extreme low flow estimation, catchment modelling, flood mitigation studies and mine dewatering analyses, focussing on surface water hydrology and the modelling of catchment processes.

Rory will play a key role in the review of the DNR Hydrology and possible development of alternative design hydrology.

☐ **Julie Humrich - Project Drafter**
Julie is a highly experienced project drafter in our Hydraulic Studies Group. She has a wide experience with flood and related mapping within AUTOCAD Release 12 and the knowledge of the features of MAPINFO.

Julie was the project drafter on the Cubberla Creek and Moggill Creek Flood Studies. She was responsible for the preparation of design flood profiles, flood inundation plans, all base mapping and figures for these studies. She has been a key team member in developing the standard of documentation reached to date. Her interaction and innovation will be a key to delivering high quality documentation for the Brisbane River Flood Study.

2.

☐ **Yvonne McInnes - Word Processor**
Yvonne is an experienced word processor who controls the overall quality of final documentation. She was responsible for processing the Cubberla Creek and Moggill Creek flood studies and will continue that role on this study.

☐ **Additional Resources**
Both the New South Wales and Victorian Branches of Sinclair Knight Merz provide hydrologic and hydraulic modelling services to a broad range of clients. If it was necessary, we could draw on assistance from these Branches to support the nominated study team. This support can be either in the form of additional manpower or technical support.

4. Study Program

The Brisbane River Flood Study Brief stipulates that the completion date for services should be 30 June 1997. Discussions with Council officers indicated that this was the desirable date of completion and not a fixed date.

Our experience on the two previous flood studies completed for Council has been that in order to meet Council's acceptance criteria with respect to project quality and presentation a certain process must be followed. This process contains steps which are dependant on other tasks and it is very difficult to accelerate this process without some reduction in the quality of service. It is with this in mind that we offer to complete the Brisbane River Flood Study in the minimum time required to achieve the desired level of quality required by Council.

A program for the execution of the study is shown at the end of this Section as **Figure 4.1 - Brisbane River Flood Study Project Control Schedule.**

The program for Offer 2 (Task 1A included) has been illustrated.

With the tasking identified in this proposal the study can be completed once commissioned as follows:

Offer 1	(If Task 1A is excluded)	48 weeks
Offer 2	(If Task 1A is included)	50 weeks

Milestones for the completion of this project (Offer 2) are as follows:

☐	Week 16	Completion of calibration report
☐	Week 26	Completion of design event report
☐	Week 38	Completion of waterways management report
☐	Week 44	Completion of flood mapping report
☐	Week 50	Completion of final report and data handover.

5. Management of the Study

5.1 Quality Assurance

Sinclair Knight Merz's Quality System has been in a constant state of development and refinement since its inception. The relevant standard for quality systems is AS 3901-1987/ISO 9001:1987 - "Quality Systems for Design/Development, Production, Installation and Servicing". The Sinclair Knight Merz system has been certified by Standards Australia as meeting the requirements of AS 3901/ISO 9001 (see attached certificates). The system is documented in Sinclair Knight Merz's:

- Quality Manual - this sets out policy, the organisational structure and a description of how Sinclair Knight Merz will implement the requirements of the Quality Standard AS 3901.
- Quality Procedures - these describe "who does what, when, where and why". These procedures are the foundation of Sinclair Knight Merz's quality planning.
- Reference Manuals including Proposals, Presentations and Project Planning, Project Management, Engineering, Drafting, Word Processing and Document Preparation, and Construction - these include operational procedures, practice notes, work instructions, standards and guidelines. These tell "how".
- Records of projects including, reports, plans, specifications and files, standards and master specifications.

A separate Quality System has been established in Sinclair Knight Merz with trained personnel

The system is supported and implemented by all levels of our staff. In each branch, a quality manager reports directly to the Technology Director. These personnel work not only with Sinclair Knight Merz project managers, but with quality representatives from client organisations.

5.2 Project Quality

For each project, the key steps which must be covered to ensure that quality is achieved are:

Project quality requires an initial project review, preparation of a Quality Plan at the commencement of the project and meeting the requirements of the plan throughout the project.

- **Prior to the commencement of the project** - a review is made by the Project Director of the contract arrangements between Sinclair Knight Merz and the client. This review is to ensure that client requirements are defined, ambiguities resolved and the resources are available as specified.
- **At the commencement of the project** - preparation of a Quality Assurance Plan by the Project Manager under the direction of the Project Director. This Quality Assurance Plan lists the responsibility and timing for undertaking Quality Assurance Reviews, Technical Reviews and Engineering Practice Reviews.

2.

- ☐ **During the project** - the reviews defined in the Quality Assurance Plan are undertaken together with task reviews covering variations in scope, actions resulting from the reviews and task sign-off noting comments on the tasks and non-conformances. These reviews are documented and, as appropriate, audits are carried out as required by the Quality System.

Regular audits of the systems performance is carried out by both internal and external (independent) auditing. The most recent external audit of the system in the Toowoomba office was performed in April 1996.

Copies of the relevant Certificates of Registration appear at the end of this section.

5.3 Project Management

Sinclair Knight Merz has developed a set of comprehensive procedures for project managing its services for clients. Adherence to these procedures enables Sinclair Knight Merz to achieve the project objectives and to fulfil its contractual obligations through careful planning and scoping of the tasks, mobilising the best talent to undertake these tasks, monitoring and controlling progress and performance throughout the project and maintaining and documenting appropriate project records.

Project managing a service has some subtle differences from project managing a construction project. It is important that the project management systems reflect these subtleties and focus on the needs of service. Sinclair Knight Merz's project management systems are targeted to assist our project managers to manage this service and to achieve their project objectives. **Figure 5.1 - Sinclair Knight Merz Project Management Systems** illustrates some of the project management systems and facilities available in-house. These are applied as appropriate to each project whether it be a small flood study or the design and construction supervision of a major project.

2.

Figure 5.1 - Sinclair Knight Merz Project Management Systems

Sinclair Knight Merz has developed reference manuals covering each of these systems. Most projects can be clearly defined to have up to five main functional streams, these being engineering, project controls, project contracts and procurement, project construction and quality. The organisation of complex projects generally includes a person managing each of these stream with overall responsibility carried by the project manager. For this project, the project manager will in addition to his duties as project manager, fill the roles for the project controls and quality streams.

In addition, a sophisticated job cost/control system has been set up to handle 5 000 projects live at any time. This system generates timely project control information for the project manager in the form of job reports, staff utilisation, job history and period summary reports to control against project schedule and budget.

As on the Cubberla Creek Flood Study, the progress of the job will be monitored using the TIMELINE program and a points/progress chart. The chart plots actual progress with respect to target progress using a cumulative value points system.

5.4 Commitment

The commitment of the Sinclair Knight Merz team to a successful outcome for the study can be gauged by our performance on previous studies for the Waterway Technical Section.

2.

The completion of studies on time is a major goal at the commencement of any project. However, we also keep this within balance given the uncertainties associated with hydrologic and hydraulic studies. Quality of the product and service cannot be comprised, hence timing has to tolerate some flexibility while recognising that Council has commitments to its stakeholders.

Over previous studies we have developed a strong working relationship with the officers of the Waterways Section. This has been developed through frequent and open communication between client and consultant. We look upon our working relationship closely following the partnering philosophy where everyone works towards the most desirable outcome.

Our commitment to our Quality Assurance System provides the security that our performance will continue to improve because our projects are not complete until we have client feedback. We are committed to implementing changes to improve service. Our Quality Assurance system also required regular Project Director reviews to ensure client liaison and progress is maintained as documented in our proposal.

5.5 Backup

Our proposed study team was outlined in **Section 4 - Study Team**. The bulk of the work will be carried out by Scott Abbey, Darren Rogers, Mark Salisbury and Julie Humrich. Firstly, this provides sufficient additional resources to undertake the Wynnum Creek Flood Study with Council's timeframe and specified quality. Secondly, the depth of our team is such that the Project Manager, Scott Abbey means that he can call upon a variety of backup resources.

Since the acquisition of the HydroTechnology group of the Rural Water Commission by Sinclair Knight Merz, our Toowoomba office has continued to develop a working relationship with similarly skilled resources in Melbourne and Tatura. Recent exchanges have occurred on recent projects, hence we are confident of being able to access additional backup resources, if required.

As we put the teams together for this and the Wynnum Creek study, we were very conscious of demonstrating to Council our capacity to supply the right team with sufficient backup. The inclusion in our team of Darren Rogers who has valuable experience in this type of work is an important strengthening of our overall team.

6. Relevant Experience of the Firm

Since the formation of the Hydraulic Studies Technical Centre in our Toowoomba office approximately 10 years ago, Sinclair Knight Merz has completed a number of significant flood and related studies. While the primary technology has been RORB/URBS, HEC-2 and MIKE 11, the group has expanded its technology base to take on skills in other models, eg RAFTS, HECRAS, FastTABS, etc.

Section 3 - Study Team has highlighted a number of the significant studies undertaken by our Group in Queensland. Because of the longevity of our core water studies team, most of the studies relevant to the pending studies have been mentioned. We have included project highlights of 6 relevant projects in this section to demonstrate the depth of experience in our Group.

The project highlights have been selected on the following basis:

- ☐ Cubberla Creek Flood Study - the most recent study for Brisbane City Council and our benchmark standard for future work.
- ☐ Moggill Creek Flood Study - our first study for Brisbane City Council which pioneered a number of system and technologies in use today.
- ☐ Catchment D Stormwater Management Plan - the increasing use of RAFTS hydrologic model.
- ☐ Study to Underground West Creek, Toowoomba - innovation in solving complex hydraulic issues.
- ☐ East Creek Hydraulic Study - the use of the most appropriate technology to meet study requirements.
- ☐ Lismore Flood Study and Floodplain Management Study - the biggest flood study carried out by the firm done by the Toowoomba office.

The information on a large number of studies provided to this point ~~demonstrates the extensive background in flood studies and floodplain~~ management studies possessed by our study team and our Toowoomba group. Rather than provide a long list of further projects, a concise summary of relevant project experience of our Toowoomba group is given in **Figure 6.1 - Relevant Experience of the Firm**.

Nationally and internationally, Sinclair Knight Merz and its hydrologic and hydraulic engineers have been involved in a vast variety of flood studies which also have relevance to the pending studies. We have identified the need to access others experience in large catchment hydrology. Dr Rory Nathan's experience in this field is covered in Section 2 and 3 and also in his shortened curriculum vitae in **Appendix A**.

2.

The wide range of flood study/floodplain management study commission undertaken by Sinclair Knight Merz and its staff demonstrates the firm's capability to carry out the flood study of the Brisbane River.

2.

Figure 6.1 - Relevant Experience of the Firm

Capabilities Required for Project **Relevant Project**	Design flood assessment (RORB/URBS/RAFTS)	Design flood parameters (MIKE 11/HEC-2/HECRAS/FastTABS)	Waterway & Floodplain Management	Flood Mapping/Flood Forecasting	Community Consultation	**Relevance to this Project**
Cubberla Ck Flood Study (1995-96)	☐	☐	☐	☐	☐	Recently completed covering similar tasks - the "benchmark".
Catchment D Stormwater Management Plan (1996)	☐	☐	☐			Use of RAFTS and HECRAS.
Danpork Weir (Condamine R) Investigations (1996)	☐	☐	☐		☐	Hydraulic structures in major river.
East Ck Hydraulic Study (1995)	☐	☐	☐			Modelling of hydraulic structures
Yandina Bypass Flood Study (1995)	☐	☐	☐			Calibration of Models Determination of hydraulic impacts.
West Ck Conduit Study (1994)	☐	☐	☐			Complex structure hydraulics
Lismore Levee Scheme Detailed Study (1994)	☐	☐	☐	☐	☐	Detailed hydraulic modelling & results interpretation
Moggill Ck Flood Study (1993/94)	☐	☐	☐	☐	☐	Consistency of hydrologic & hydraulic models
Woongoolba Drainage Study (1994)	☐	☐	☐		☐	Drainage in tidal reaches
Stanbroke Irrigation Design (1994)	☐	☐	☐		☐	Interaction between major river, floodplain & sub-catchments.
Samford Downs Drainage Studies (1992-1996)	☐	☐	☐	☐		Flood inundation plans.
Ross River Dam Flood Warning System (1994)				☐		Installation of Prophet flood forecasting system.
Newport Waterways Hydraulic Analysis (1995)	☐	☐	☐			Flood and tidal hydraulics.
Russell & Mulgrave River Drainage Review (1994-95)	☐	☐	☐		☐	Managing floodplain development for major river system.
Lismore Flood Study (1991/92)	☐	☐	☐	☐	☐	Complex hydrology & hydraulics
Lismore Floodplain Management Study (1991-1994)		☐	☐	☐	☐	Effects of floodplain works

2.

Figure 6.1 - Relevant Experience of the Firm (Continued)

Capabilities Required for Project

Relevant Project	Design flood assessment (RORB/URBS/RAFTS)	Design flood parameters (MIKE 11/HEC-2/HECRAS/FastTABS)	Waterway & Floodplain Management	Flood Mapping/Flood Forecasting	Community Consultation	Relevant to this Project
Leichhardt River Flood Level Study (1992)	☐	☐	☐	☐		Flood regulation lines
Gold Coast Highway Upgrading - Coombabah Ck Flood Study (1992)	☐	☐	☐			Hydraulic Modelling of development in tidal areas
Mirage Grand Prix Complex Hydraulic Study (1992)			☐	☐		Review flood regulation lines
Pine Waters Flood & Tidal Study (1984 & 1990)	☐	☐	☐	☐		Interaction of design floods & tides.
Weyba Ck Hydraulic Study (1990)	☐	☐	☐			Bridge waterway hydraulics
Oakey Ck Hydraulic Study (1991)	☐	☐	☐	☐		Floodplain drainage important
Sunshine Motorway Hydraulic Analysis (1991)	☐	☐	☐	☐		Culvert configuration on floodplain
Euri Ck Flood & Tidal Study (1991)	☐	☐	☐	☐		Effect of development on flood & tides.
Aqua Del Rey Hydraulic Study (1989-1992)	☐	☐	☐	☐		Optimisation of waterways.
Ross River & Bohle River Flood Study (1989)	☐	☐	☐	☐	☐	Modelling of large floods
Albany Creek Hydraulic Study (1990)	☐	☐	☐	☐		Regulation lines for development
West Ck Stream Improvement Study (1987)	☐	☐	☐	☐		Reduction of flood levels by stream works.
Burdekin River Hydraulic Study (1989)	☐	☐	☐	☐		Effects of development on flood levels
South Pine River Flood Study (1990)	☐	☐	☐			Levels and extent of flooding

7. Terms of Agreement and Remuneration

7.1 Terms of Agreement

Sinclair Knight Merz Terms of Agreement for Professional Services (April 1994) based on the ACEA guidelines apply for this proposal. A copy is attached in **Appendix B**.

7.2 Remuneration

Council's brief calls for a lump sum submission to conduct the Brisbane River Flood Study.

Based on the scope of works detailed in this proposal two (2) lump sum fees are offered as follows:

Offer 1 If Task 1A (Additional Design Events Hydrology) is not required the **lump sum fee** is **$179 000.00**.

Offer 2 If Task 1A (Additional Design Events Hydrology) is required the **lump sum fee** is **$194 000.00**.

The actual lump sum fee which will be applicable to the study can only be determined following the completion of **Task 1 - Data Compilation and Review of Department of Natural Resources Hydrology**.

Details of the cost structure of the study is given in **Table 7.1 - Fee Structure**.

Table 7.1 - Fee Structure

	Fee	
Activity	**Offer 1**	**Offer 2**
Models Development and Calibration	$56 500.00	$56 500.00
Design Events Assessment	$32 900.00	$47 900.00
Waterway Management	$34 100.00	$34 100.00
Flood Mapping	$24 100.00	$24 100.00
~~Community Consultation~~	~~$10 400.00~~	~~$10 400.00~~
Reporting and Data Transfer	$21 000.00	$21 000.00
TOTAL	$179 000.00	$194 000.00

It has been assumed that Brisbane City Council would provide all data held by Council and the DNR as detailed in the brief at no cost to the consultant.

As specified in the brief, additional survey costs associated with hydraulic model cross-sections, crossings etc have not been included in the fee offered.

2.

7.3 Project Personnel Hourly Rates

Proposed hourly rates for project personnel are detailed in **Table 7.2 - Project Personnel Hourly Rates.**

Table 7.2 - Project Personnel Hourly Rates

Team Member	Hourly Rate
Project Director	$120.00
Project Manager	$90.00
Senior Hydraulic Engineer	$90.00
Experienced Engineer	$60.00
Hydraulics Engineer	$50.00
Civil Drafter	$50.00
CAD Drafter	$50.00
Word Processor	$40.00

Appendix A - Curricula Vitae

Appendix B - Terms of Agreement for Professional Services (April 1994)

Appendix C - Brisbane City Council Brief

Appendix D - Results Presentation Examples

Brisbane City Council
GPO Box 1434
Brisbane Qld 4001

Brisbane City

Contact name:	Mrs T Parsons
Telephone:	3403 4371
Fax (direct):	3403 4373
Our ref:	243/95-18/96/97 TKP:TKP

5 November 1996

SINCLAIR KNIGHT MERZ
REC'D -6 NOV 1996 P.MGR
WHO ACTION SIGNATURE
[redacted] [illegible]
Abbey noted Job # [redacted] /11/96
Fredk 19/11/96
JOB No 0744597 FILE

The Manager
Sinclair Knight Merz Pty Ltd
1 Chandos Street
ST LEONARDS NSW 2065

Dear Sir/Madam

CONTRACT NO. W.18/96/97
BRISBANE RIVER FLOOD STUDY

ACCEPTANCE

Council has decided to accept your Company's tender dated 11 October 1996 for the Brisbane River Flood Study for the sum of $194,000.00 and for the rates set out in the Schedule of Rates which accompanied your Company's Tender.

CONTRACT DOCUMENTS

Work under this contract is to be carried out in accordance with the Contract Schedule and documents listed therein.

COMPLETION OF WORK

The work is to be completed within fifty (50) weeks from the date hereof.

Didn't receive letter until 18/11/96

Suggest start date = 18/11/96.

SALES TAX EXEMPTION

The goods, materials or equipment required to be incorporated in the work under this Contract will be so used as to satisfy an Exemption Item in Schedule 1 to the Sales Tax (Exemptions and Classifications) Act 1992. The Exemption Item Number is 127(1)(a). This exemption does not extend to the purchase of your own equipment, except in limited circumstances. I make this declaration as an authorised representative of Brisbane City Council.

CLAIMS FOR PAYMENT AND CORRESPONDENCE

Correspondence and invoices or claims for payment, must include the contract number shown above and be forwarded to the:-

Engineer in Charge, Waterways Section
Brisbane City Council
13th Floor, B.A.C. Building
69 Ann Street
BRISBANE QLD 4000

With the exception that any notice which is to be issued to or served upon the Principal is to be addressed to:-

The General Manager
Brisbane City Council
GPO Box 1434
BRISBANE QLD 4001

CONTRACT AGREEMENT

As a formal instrument of agreement is not required, it is proposed to rely on council's Contract Schedule and the documents listed therein, together with this letter of acceptance as forming the contract.

Yours faithfully

[redacted]

GENERAL MANAGER

BRISBANE CITY COUNCIL
ANNEXURE to the Interim Australian Standard
General conditions for
engagement of consultants AS 4122(Int) - 1993

PART A

This Annexure shall be read as part of the Contract.

The annexure refers to the Brisbane River Flood Study.

The Principal: (Clause 1)	Brisbane City Council (the Council)
The address of the Principal: (Clause 4.1(a))	GPO Box 1434 Brisbane 4001
The Consultant: (Clause 1)	
The address of the Consultant: (Clause 4.1(b))	
The Project: (Clause 1)	Flood study of the Brisbane River.
The engagement is as a Primary/Specialist Consultant: (Clause 2)	Primary
The Contract shall be governed by and construed with reference to the laws for the time being in force in: (Clause 2(c))	Queensland
Schedule of Documents: (Clause 2(d))	
Title to Intellectual Property, patents and documents under the Contract shall vest upon their creation in: (Clause 9.1)	Brisbane City Council
The Limits of Liability shall be: (Clause 10(c))	Unlimited
The Principal's Representative: (Clause 14.1)	Engineer in Charge, Waterways Section
The address of the Principal's Representative: Facsimile No:	C/- Brisbane City Council GPO Box 1434 Brisbane 4001 (07) 340 39902
The Consultant's Representative: (Clause 14.2)	
The address of the Consultant's Representative: Facsimile No:	
Time for submission of the program for the Services: (Clause 15.1)	Required prior to commencement of work.

The completion date for the Services: (Clause 15.1)	30 June 1997	
The Project Cost Limitations: (Clause 15.5)		
Quality system shall be in accordance with the following Standard: (Clause 15.6)	AS 3901	
The nominated person for resolution of disputes: (Clause 16.2)		
An arbitrator shall be nominated by: (Clause 16.2)	The national president of the Institute of Arbitrators, Australia.	
Day of month for submission of Progress Claim by Consultant:	No Progress Claims other than these specified in Clause 17.2	
	<u>Stage</u>	<u>Percentage of fee applicable</u>
The stages for the delivery of the Service and the percentage of the fee applicable to each stage: (Clause 17.2)	Payment will be made in stages on receipt from the Consultant satisfactory detailed stage reports which include the requested results. The terms of Payment are as follows: $194000 (i) After calibration and design event analysis (ii) Waterway Management (iii) Flood Mapping (iv) Completion	 40% of tender 30% of tender 10% of tender 20% of tender
The Lump Sum Fee: (Clause 17.3)	As tendered	
	<u>Level of task</u>	<u>Rate pr hour ($)</u>
Time Charge Fees where applicable shall be: (Clause 17.4)	As tendered	As tendered
The cost of computer time: (Clause 17.5)	Nil. Computer charges are included in the fees generally.	
Period for payment of Progress Claims: (Clause 17.6)	30 days	
Interest on overdue payments: (Clause 17.6)	The Westpac "indicator lending rate" published in the "Courier Mail" and current at the time of settlement.	
The Final Completion Date: (Clause 17.7)	3 months after the tendered date for completion of services.	
Professional indemnity insurance cover shall be not less than: (Clause 18.1)	$1 000 000	
On site public liability insurance shall be not less than: (Clause 18.2)	$5 000 000	

5030

TELEPHONE MESSAGE

38 alter.

JOB BRISBANE RIVER -

FILE T08457

PHONE CALL TO/[✓ FROM] Martin Giles -

TIME

OF

PHONE [redacted]

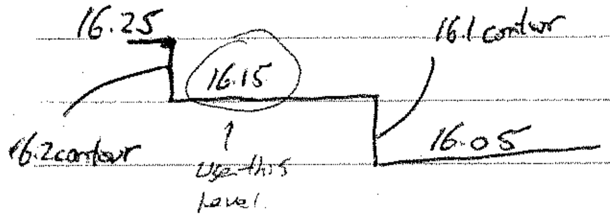
DATE 8/1/97

DETAILS OF MESSAGE:

☐ 100 year inundation + 1m line is required plus associated flood contours
not in brief or proposal so this is a variation and an estimate of cost & approval is needed.

☐ modify flood contours as shown on the plans SKM agrees with approach -
(some notation in report should be made of methodology).

☐ level at centre of cell depict as shown



☐ for Cells not on AMTD line consider use of offset.

BY:

☐ flood regulation lines generally ok. Shorten some of the dimensions >500m.

CIRCULATION & ACTION

NAME	ACTION REQUIRED	INIT'	DATE
☐ Need update	of program to complete + finish date		
[redacted]			

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	BRISBANE CITY COUNCIL	**From:**	Scott Abbey
Attention:	MARTIN GILES	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	23 January 1997
Copies:		**No of Pages:**	5
Subject:	BRISBANE RIVER FLOOD STUDY PROGRAM		

Martin

Please find attached a copy of our Timeline program for the Brisbane River Flood Study.

I have sent it through as a series of A4 sheets so you have some chance of reading it.

Regards

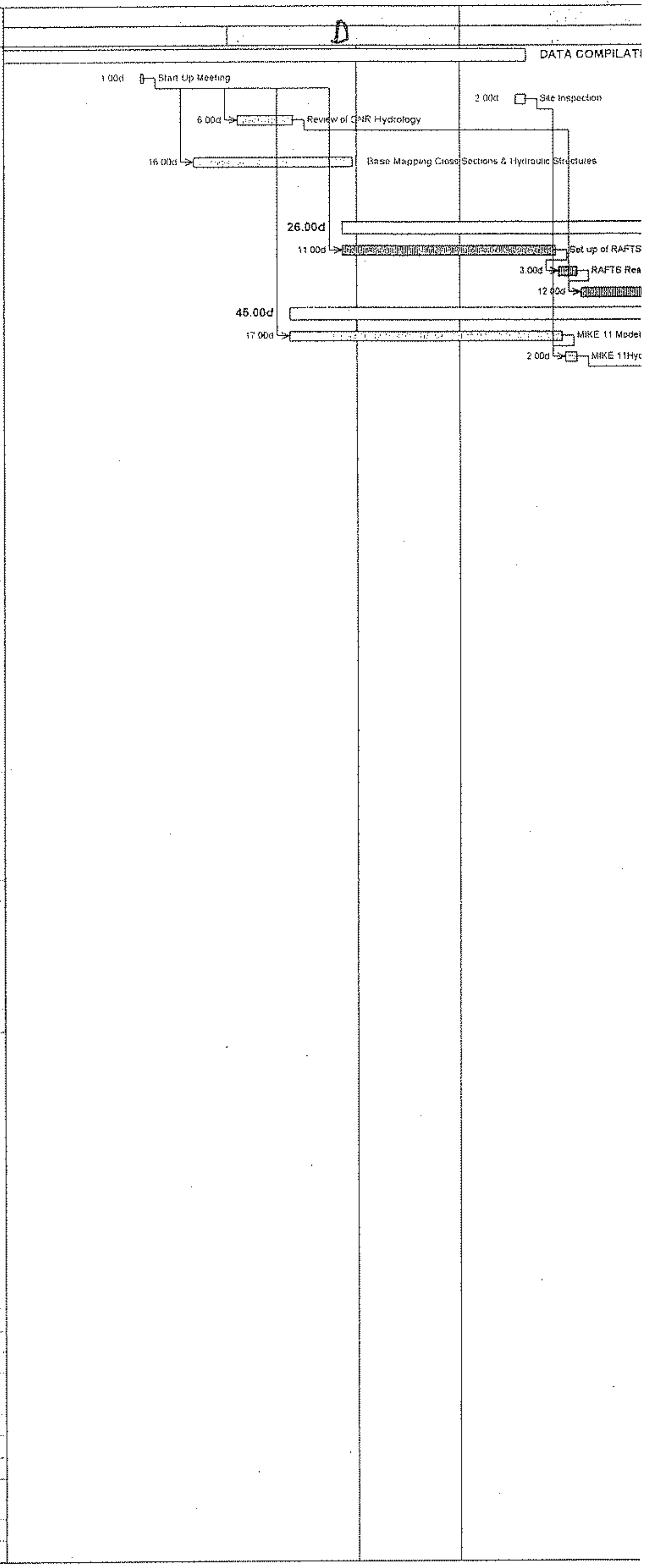
[redacted]

Project Manager

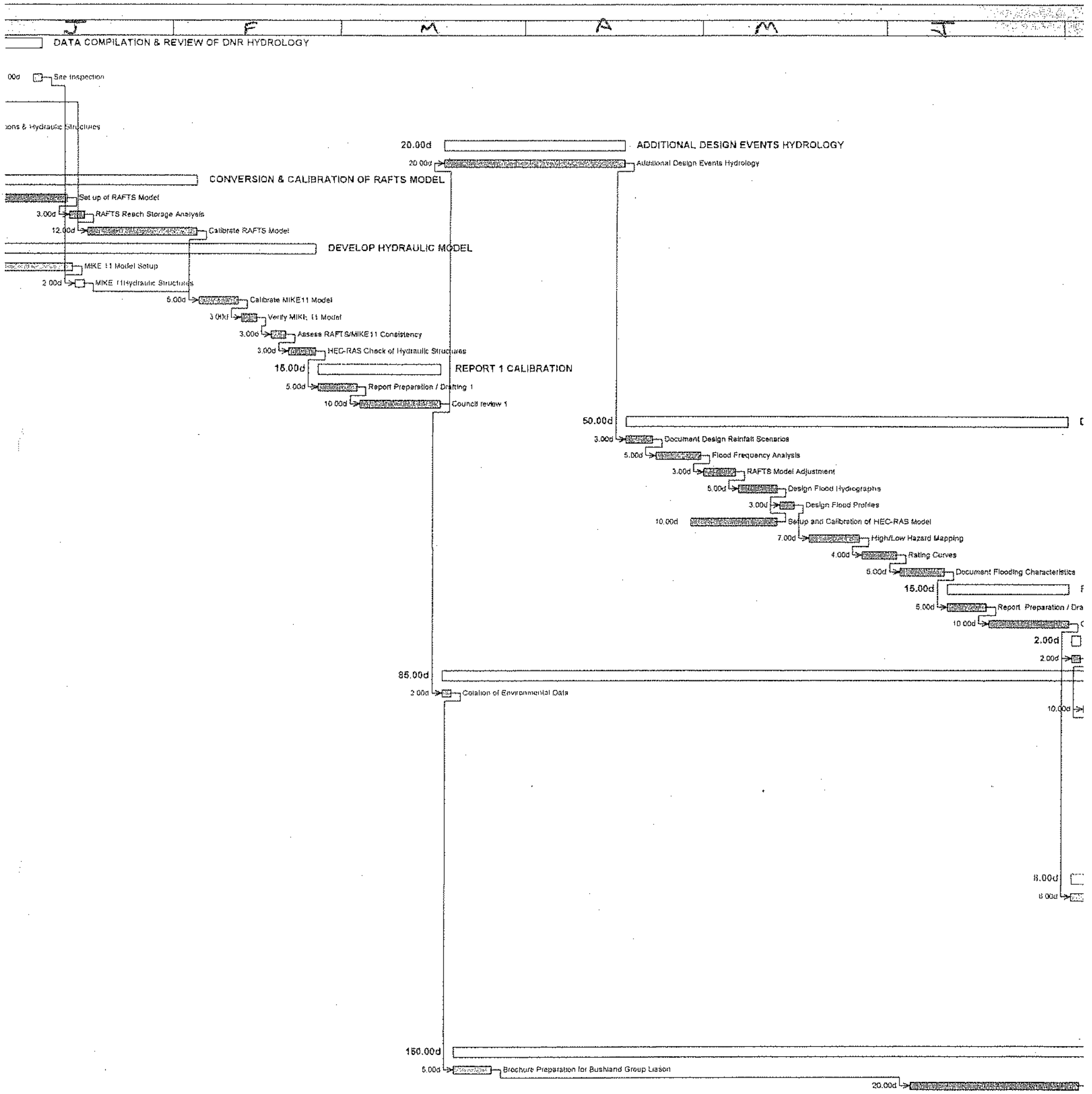
\\TOBA1\DATA\HSIG\BCCDNR.DOC

Sinclair Knight Merz Pty Ltd A.C.N. 001 024 095
307 Peel Street, Tamworth NSW, Australia 2340.
Telephone: +61 67 66 9439
Fax: +61 67 66 2710

00	DATA COMPILATION & REVIEW OF DNR HYDROLOGY	11/10/96	55.00d	9/01/97
1.01	Start Up Meeting	19/11/96	1.00d	19/11/96
1.02	Site Inspection	8/01/97	2.00d	9/01/97
1.03	Review of DNR Hydrology	2/12/96	6.00d	9/12/96
1.04	Summary of Review Outcomes	11/10/96	1.00d	11/10/96
1.05	Base Mapping Cross Sections & Hydraulic Structures	26/11/96	16.00d	17/12/96
TASK 1 A	**ADDITIONAL DESIGN EVENTS HYDROLOGY**	**18/03/97**	**20.00d**	**17/04/97**
1A.01	Additional Design Events Hydrology	18/03/97	20.00d	17/04/97
TASK 2	**CONVERSION & CALIBRATION OF RAFTS MODEL**	**16/12/96**	**26.00d**	**4/02/97**
2.02	Set up of RAFTS Model	16/12/96	11.00d	13/01/97
2.03	RAFTS Reach Storage Analysis	14/01/97	3.00d	16/01/97
2.04	Calibrate RAFTS Model	17/01/97	12.00d	4/02/97
TASK 3	**DEVELOP HYDRAULIC MODEL**	**9/12/96**	**45.00d**	**24/02/97**
3.01	MIKE 11 Model Setup	9/12/96	17.00d	14/01/97
3.02	MIKE 11Hydraulic Structures	15/01/97	2.00d	16/01/97
3.03	Calibrate MIKE11 Model	5/02/97	5.00d	11/02/97
3.04	Verify MIKE 11 Model	12/02/97	3.00d	14/02/97
3.05	Assess RAFTS/MIKE11 Consistency	17/02/97	3.00d	19/02/97
3.06	HEC-RAS Check of Hydraulic Structures	20/02/97	3.00d	24/02/97
TASK 4	**REPORT 1 CALIBRATION**	**25/02/97**	**15.00d**	**17/03/97**
4.01	Report Preparation / Drafting 1	25/02/97	5.00d	3/03/97
4.02	Council review 1	4/03/97	10.00d	17/03/97
TASK 5	**DESIGN EVENTS ASSESSMENT**	**18/04/97**	**50.00d**	**1/07/97**
5.01	Document Design Rainfall Scenarios	18/04/97	3.00d	22/04/97
5.02	Flood Frequency Analysis	23/04/97	5.00d	30/04/97
5.	RAFTS Model Adjustment	1/05/97	3.00d	6/05/97
5.	Design Flood Hydrographs	7/05/97	5.00d	13/05/97
5.05	Design Flood Profiles	14/05/97	3.00d	16/05/97
5.06	Setup and Calibration of HEC-RAS Model	29/04/97	10.00d	13/05/97
5.07	High/Low Hazard Mapping	19/05/97	7.00d	27/05/97
5.08	Rating Curves	28/05/97	4.00d	2/06/97
5.09	Document Flooding Characteristics	3/06/97	5.00d	10/06/97
TASK 6	**REPORT 2 - DESIGN EVENTS**	**11/06/97**	**15.00d**	**1/07/97**
6.01	Report Preparation / Drafting 2	11/06/97	5.00d	17/06/97
6.02	Council Review 2	18/06/97	10.00d	1/07/97
TASK 7	**HYDRAULIC ASSESSMENT OF STRUCTURES**	**2/07/97**	**2.00d**	**3/07/97**
7.01	Document Afflux Conditions & Upgrade Potential	2/07/97	2.00d	3/07/97
TASK 8	**WATERWAY REVEGETATION**	**18/03/97**	**85.00d**	**22/07/97**
8.01	Colation of Environmental Data	18/03/97	2.00d	19/03/97
8.02	Hydraulic Testing of Reveg Options	4/07/97	10.00d	17/07/97
8.03	Waterway Corridor Delineation	18/07/97	3.00d	22/07/97
TASK 9	**FLOOD REGULATION LINES ASSESSMENT**	**23/07/97**	**20.00d**	**19/08/97**
9.01	Set Regulation Lines	23/07/97	15.00d	12/08/97
9.02	Establish Development Levels	13/08/97	1.00d	13/08/97
9.03	Regulation Line Mapping and Profiles	14/08/97	4.00d	19/08/97
TASK 10	**REPORT 3 - WATERWAYS MANAGEMENT**	**13/08/97**	**20.00d**	**9/09/97**
10.01	Report Preparation 3	20/08/97	5.00d	26/08/97
10.02	Report Drafting 3	13/08/97	12.00d	28/08/97
10.03	Council Review 3	27/08/97	10.00d	9/09/97
TASK 11	**FLOOD FORECASTING MODEL**	**2/07/97**	**8.00d**	**11/07/97**
1	Set Up Flood Forecasting Model and Test	2/07/97	6.00d	9/07/97
11	River Crossing Immunities	10/07/97	2.00d	11/07/97
TASK 12	**FLOOD MAPPING**	**29/08/97**	**38.00d**	**21/10/97**
12.01	Flood Contouring and Mapping	29/08/97	14.00d	17/09/97
12.02	Flood Inundation Mapping	18/09/97	3.00d	22/09/97
TASK 13	**REPORT 4 - FLOOD MAPPING**	**5/09/97**	**33.00d**	**21/10/97**
13.01	Report Preparation 4	23/09/97	5.00d	29/09/97
13.02	Report Drafting 4	5/09/97	23.00d	7/10/97
13.03	Council Review 4	8/10/97	10.00d	21/10/97
TASK 14	**COMMUNITY CONSULTATION**	**20/03/97**	**150.00d**	**23/10/97**
14.01	Brochure Preparation for Bushland Group Liason	20/03/97	5.00d	26/03/97
14.02	Bushland Group Liason	5/06/97	20.00d	3/07/97
14.03	Display Preparation	10/09/97	5.00d	16/09/97
14.04	Public Display	17/09/97	20.00d	14/10/97
14.05	Review of Submissions	22/10/97	2.00d	23/10/97
TASK 15	**FINAL REPORT / DATA HAND OVER**	**22/10/97**	**18.00d**	**14/11/97**
15.01	Final Report Preparation	24/10/97	5.00d	30/10/97
15.02	Final Report Drafting	22/10/97	17.00d	13/11/97
15.03	Input to Council Waterways Database	31/10/97	10.00d	13/11/97
15.04	User Quide Preparation	31/10/97	5.00d	6/11/97
15.05	Model Handover & Training	14/11/97	1.00d	14/11/97



BRISBANE RIVER FLOOD STUDY



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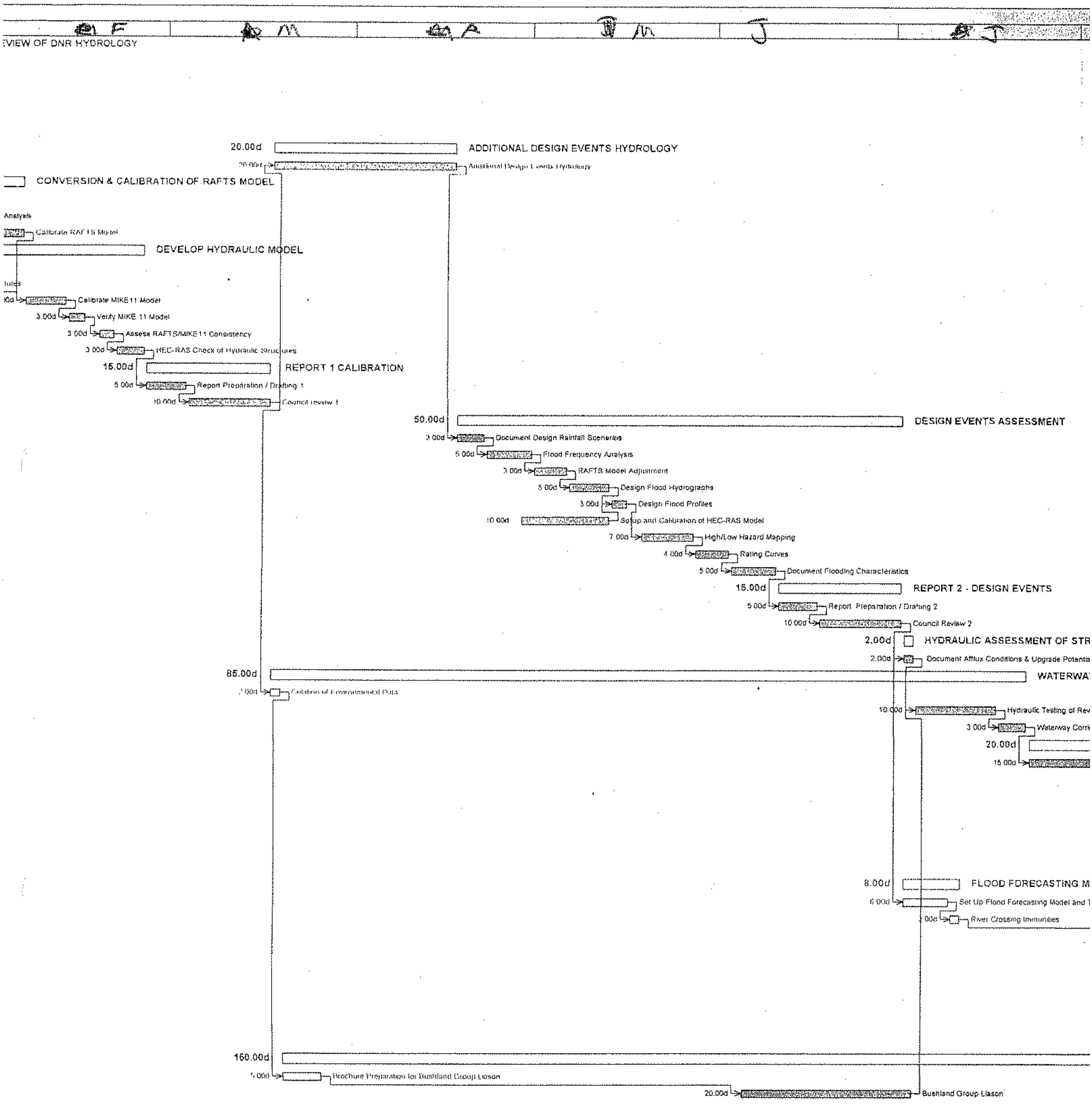
BRISBANE RIVER FLOOD STUDY



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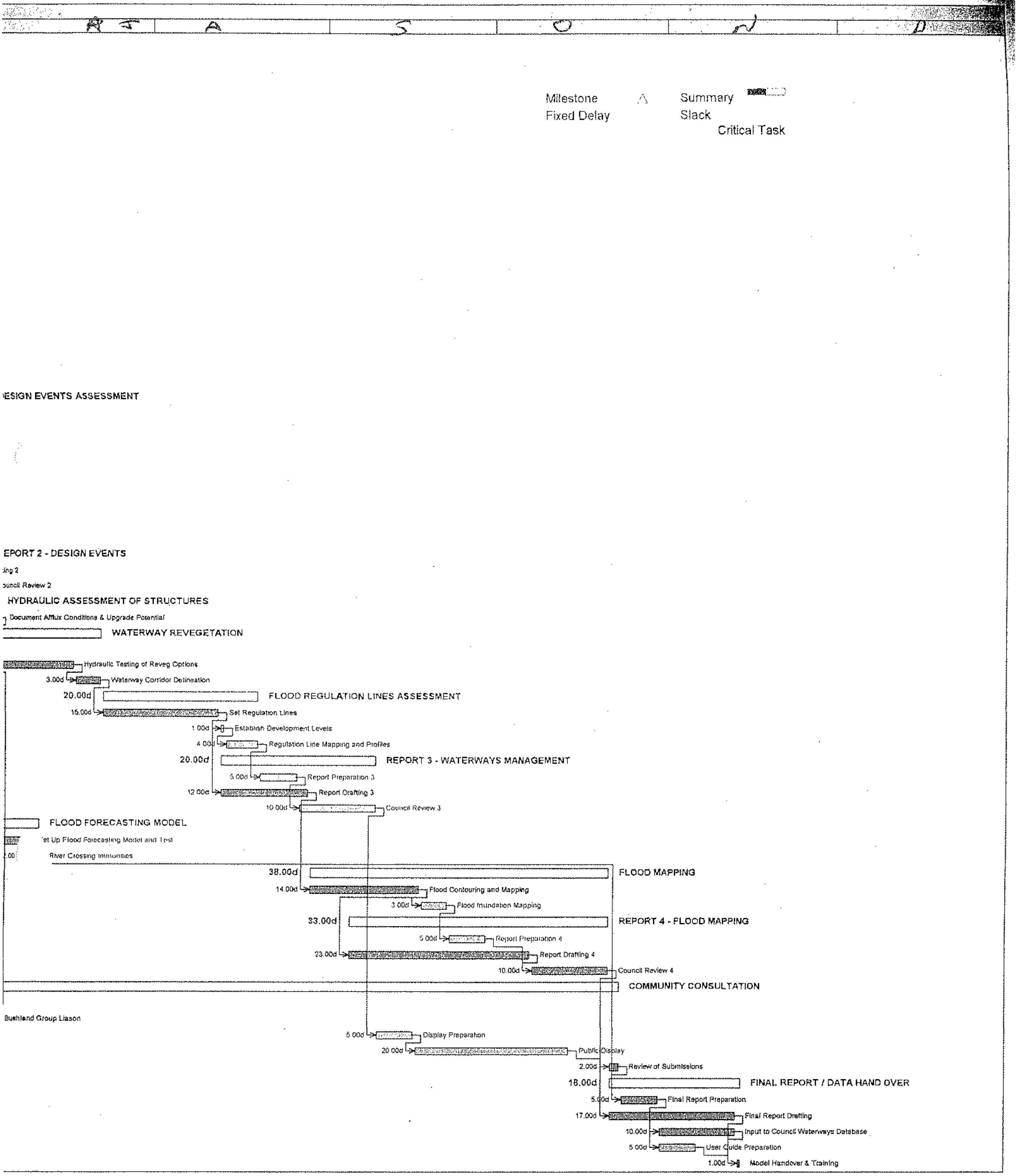
A J A S O N D
Milestone
Summary
Fixed Delay
Slack
Critical Task
ESIGN EVENTS ASSESSMENT
EPORT 2 - DESIGN EVENTS
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ouncil Review 2
HYDRAULIC ASSESSMENT OF STRUCTURES
Document Afflux Conditions & Upgrade Potential
WATERWAY REVEGETATION
Hydraulic Testing of Reveg Options
3.00d Waterway Corridor Delineation
20.00d FLOOD REGULATION LINES ASSESSMENT
15.00d Set Regulation Lines
1.00d Establish Development Levels
4.00d Regulation Line Mapping and Profiles
20.00d REPORT 3 - WATERWAYS MANAGEMENT
5.00d Report Preparation 3
12.00d Report Drafting 3
10.00d Council Review 3
FLOOD FORECASTING MODEL
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.00 River Crossing Immunities
38.00d FLOOD MAPPING
14.00d Flood Contouring and Mapping
3.00d Flood Inundation Mapping
33.00d REPORT 4 - FLOOD MAPPING
5.00d Report Preparation 4
23.00d Report Drafting 4
10.00d Council Review 4
COMMUNITY CONSULTATION
Bushland Group Liason
5.00d Display Preparation
20.00d Public Display
2.00d Review of Submissions
18.00d FINAL REPORT / DATA HAND OVER
5.00d Final Report Preparation
17.00d Final Report Drafting
10.00d Input to Council Waterways Database
5.00d User Guide Preparation
1.00d Model Handover & Training

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	BRISBANE CITY COUNCIL	**From:**	Scott Abbey
Attention:	MARTIN GILES	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	23 January 1997
Copies:		**No of Pages:**	5
Subject:	BRISBANE RIVER FLOOD STUDY PROGRAM		

Martin

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I have sent it through as a series of A4 sheets so you have some chance of reading it.

Regards

[redacted]

Scott Abbey
Project Manager

\\TOBA1\DATA\HSIG\BCCDNR.DOC

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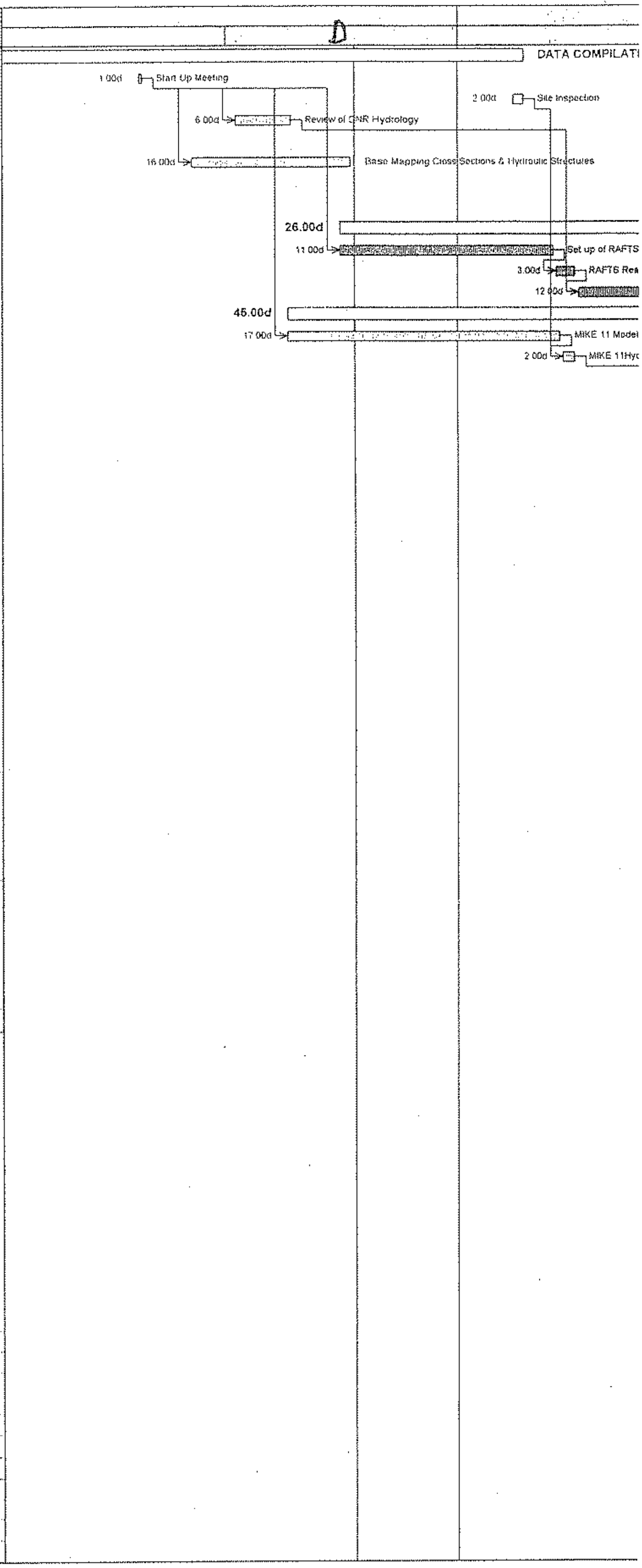
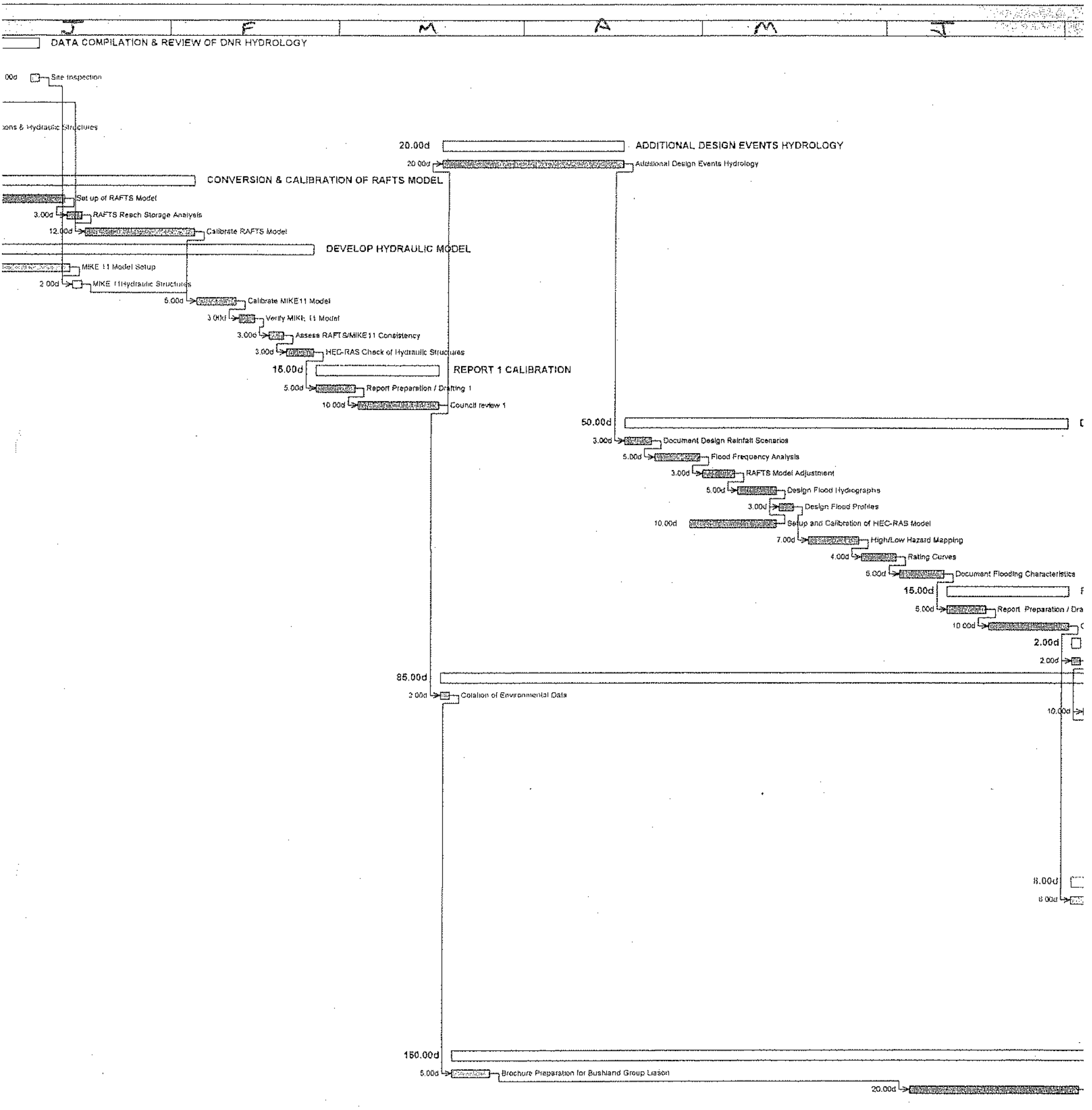
2.03	RAFTS Reach Storage Analysis	14/01/97	3.00d	16/01/97
2.04	Calibrate RAFTS Model	17/01/97	12.00d	4/02/97
TASK 3	**DEVELOP HYDRAULIC MODEL**	**9/12/96**	**45.00d**	**24/02/97**
3.01	MIKE 11 Model Setup	9/12/96	17.00d	14/01/97
3.02	MIKE 11Hydraulic Structures	15/01/97	2.00d	16/01/97
3.03	Calibrate MIKE11 Model	5/02/97	5.00d	11/02/97
3.04	Verify MIKE 11 Model	12/02/97	3.00d	14/02/97
3.05	Assess RAFTS/MIKE11 Consistency	17/02/97	3.00d	19/02/97
3.06	HEC-RAS Check of Hydraulic Structures	20/02/97	3.00d	24/02/97
TASK 4	**REPORT 1 CALIBRATION**	**25/02/97**	**15.00d**	**17/03/97**
4.01	Report Preparation / Drafting 1	25/02/97	5.00d	3/03/97
4.02	Council review 1	4/03/97	10.00d	17/03/97
TASK 5	**DESIGN EVENTS ASSESSMENT**	**18/04/97**	**50.00d**	**1/07/97**
5.01	Document Design Rainfall Scenarios	18/04/97	3.00d	22/04/97
5.02	Flood Frequency Analysis	23/04/97	5.00d	30/04/97
5.0	RAFTS Model Adjustment	1/05/97	3.00d	6/05/97
5.	Design Flood Hydrographs	7/05/97	5.00d	13/05/97
5.05	Design Flood Profiles	14/05/97	3.00d	16/05/97
5.06	Setup and Calibration of HEC-RAS Model	29/04/97	10.00d	13/05/97
5.07	High/Low Hazard Mapping	19/05/97	7.00d	27/05/97
5.08	Rating Curves	28/05/97	4.00d	2/06/97
5.09	Document Flooding Characteristics	3/06/97	5.00d	10/06/97
TASK 6	**REPORT 2 - DESIGN EVENTS**	**11/06/97**	**15.00d**	**1/07/97**
6.01	Report Preparation / Drafting 2	11/06/97	5.00d	17/06/97
6.02	Council Review 2	18/06/97	10.00d	1/07/97
TASK 7	**HYDRAULIC ASSESSMENT OF STRUCTURES**	**2/07/97**	**2.00d**	**3/07/97**
7.01	Document Afflux Conditions & Upgrade Potential	2/07/97	2.00d	3/07/97
TASK 8	**WATERWAY REVEGETATION**	**18/03/97**	**85.00d**	**22/07/97**
8.01	Colation of Environmental Data	18/03/97	2.00d	19/03/97
8.02	Hydraulic Testing of Reveg Options	4/07/97	10.00d	17/07/97
8.03	Waterway Corridor Delineation	18/07/97	3.00d	22/07/97
TASK 9	**FLOOD REGULATION LINES ASSESSMENT**	**23/07/97**	**20.00d**	**19/08/97**
9.01	Set Regulation Lines	23/07/97	15.00d	12/08/97
9.02	Establish Development Levels	13/08/97	1.00d	13/08/97
9.03	Regulation Line Mapping and Profiles	14/08/97	4.00d	19/08/97
TASK 10	**REPORT 3 - WATERWAYS MANAGEMENT**	**13/08/97**	**20.00d**	**9/09/97**
10.01	Report Preparation 3	20/08/97	5.00d	26/08/97
10.02	Report Drafting 3	13/08/97	12.00d	28/08/97
10.03	Council Review 3	27/08/97	10.00d	9/09/97
TASK 11	**FLOOD FORECASTING MODEL**	**2/07/97**	**8.00d**	**11/07/97**
1	Set Up Flood Forecasting Model and Test	2/07/97	6.00d	9/07/97
11	River Crossing Immunities	10/07/97	2.00d	11/07/97
TASK 12	**FLOOD MAPPING**	**29/08/97**	**38.00d**	**21/10/97**
12.01	Flood Contouring and Mapping	29/08/97	14.00d	17/09/97
12.02	Flood Inundation Mapping	18/09/97	3.00d	22/09/97
TASK 13	**REPORT 4 - FLOOD MAPPING**	**5/09/97**	**33.00d**	**21/10/97**
13.01	Report Preparation 4	23/09/97	5.00d	29/09/97
13.02	Report Drafting 4	5/09/97	23.00d	7/10/97
13.03	Council Review 4	8/10/97	10.00d	21/10/97
TASK 14	**COMMUNITY CONSULTATION**	**20/03/97**	**150.00d**	**23/10/97**
14.01	Brochure Preparation for Bushland Group Liason	20/03/97	5.00d	26/03/97
14.02	Bushland Group Liason	5/06/97	20.00d	3/07/97
14.03	Display Preparation	10/09/97	5.00d	16/09/97
14.04	Public Display	17/09/97	20.00d	14/10/97
14.05	Review of Submissions	22/10/97	2.00d	23/10/97
TASK 15	**FINAL REPORT / DATA HAND OVER**	**22/10/97**	**18.00d**	**14/11/97**
15.01	Final Report Preparation	24/10/97	5.00d	30/10/97
15.02	Final Report Drafting	22/10/97	17.00d	13/11/97
15.03	Input to Council Waterways Database	31/10/97	10.00d	13/11/97
15.04	User Quide Preparation	31/10/97	5.00d	6/11/97
15.05	Model Handover & Training	14/11/97	1.00d	14/11/97



BRISBANE RIVER FLOOD STUDY



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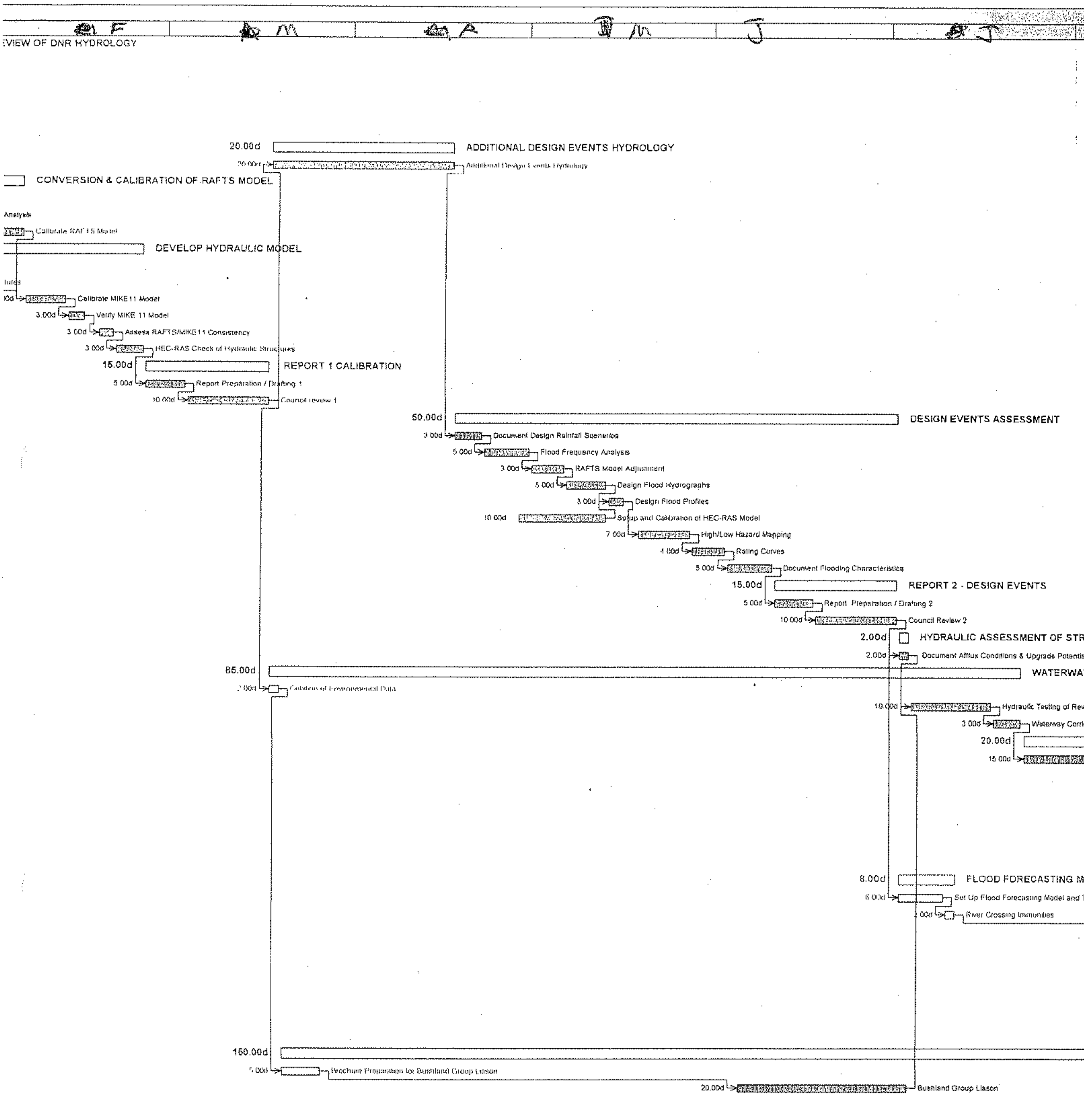
BRISBANE RIVER FLOOD STUDY



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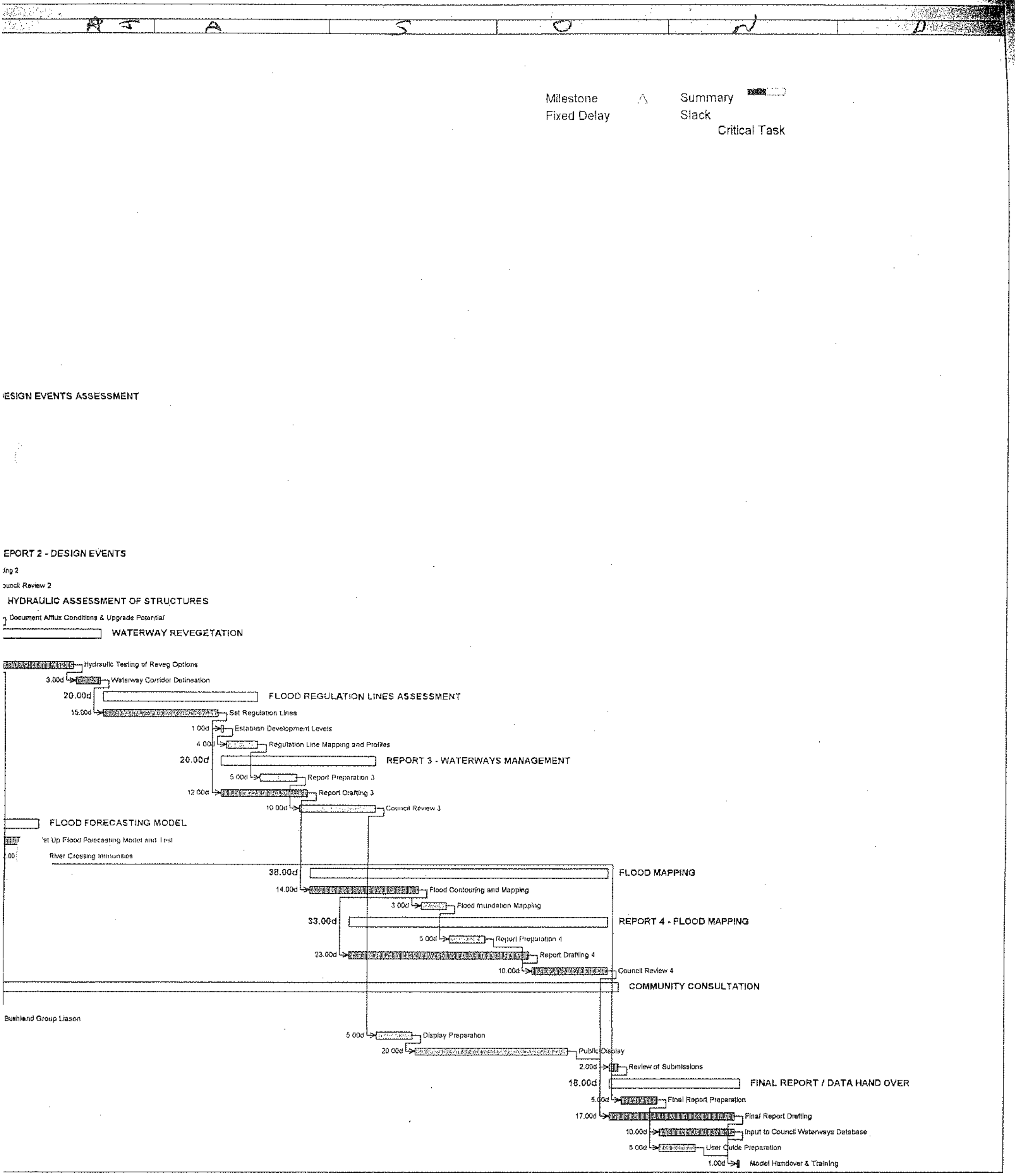

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REPORT 3 - WATERWAYS MANAGEMENT
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Report Preparation 3
12.00d
Report Drafting 3
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18.00d
FINAL REPORT / DATA HAND OVER
5.00d
Final Report Preparation
17.00d
Final Report Drafting
10.00d
Input to Council Waterways Database
5.00d
User Guide Preparation
1.00d
Model Handover & Training

01

SINCLAIR KNIGHT MERZ

24 / 6 / 97 **Facsimile Transmission**

To:	BCC	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	24 January 1997
Copies:	1	**No of Pages:**	3
Subject:	BRISBANE RIVER DESIGN EVENTS		

Martin

We are in the process of running some design events for the no dams effective case for comparison with the flood frequency analysis. By comparison between the flood frequency analysis and RAFTS output appropriate losses will be adopted. The following discussion relates to these losses.

Attached is a plot of the results from the flood frequency analysis at Port Office Gauge. From this plot it can be seen that for the 100 year ARI flood the Log Pearson III distribution is estimated to be about 11900 m^3/s and the fit by eye value is estimated to be 13600 m^3/s. This results in a variation of approximately 1700 m^3/s. For Lowood and Moggill the fit by eye and LP III correspond reasonably well and hence are not included in this discussion.

A number of loss scenarios have been run in RAFTS for the critical duration storm (30 hours) and the results at the Port Office and have been compared to the flood frequency analysis results. This comparison is tabulated below.

Note: Initial Loss = 0 for all Cases

Bremer River C.L. (mm/hr)	**Other C.L (mm/hr)**	**RAFTS Flow @ PO (m^3/s)**	**Difference FFA Log Pearson III @ PO (m^3/s)**	**Difference FFA Fit by Eye @ PO (m^3/s)**
0	0	13630	+1730	+30
2.5	2.5	10980	-920	-2620
2.0	2.0	11430	-470	-2170
1.5	1.5	11920	+20	-1680
0.0	2.5	11400	-500	-2200
0.0	2.0	11775	-125	-1825
0.0	1.5	12190	+290	-1410

The assumption for a continuing loss of zero in the Bremer River Catchment was based on similar loss rates found in the calibration/verification phase of this study.

Sinclair Knight Merz Pty Ltd A.C.N. 001 024 095
49 Annand Street, Toowoomba QLD, Australia 4350.
Telephone: +61 76 39 8400
Fax: +61 76 39 8490

From the above table it can be seen that if an initial loss and continuing loss of zero is used, then the fit by eye and the RAFTS result corresponds well. In the past it has been councils policy to adopt the fit by eye flood frequency curve which for our RAFTS modelling assumes no losses occur.

If however the LP III distribution is considered satisfactory a more appropriate loss rate can be assumed. Could you please advise of which of the flood frequency curves you would like us to use.

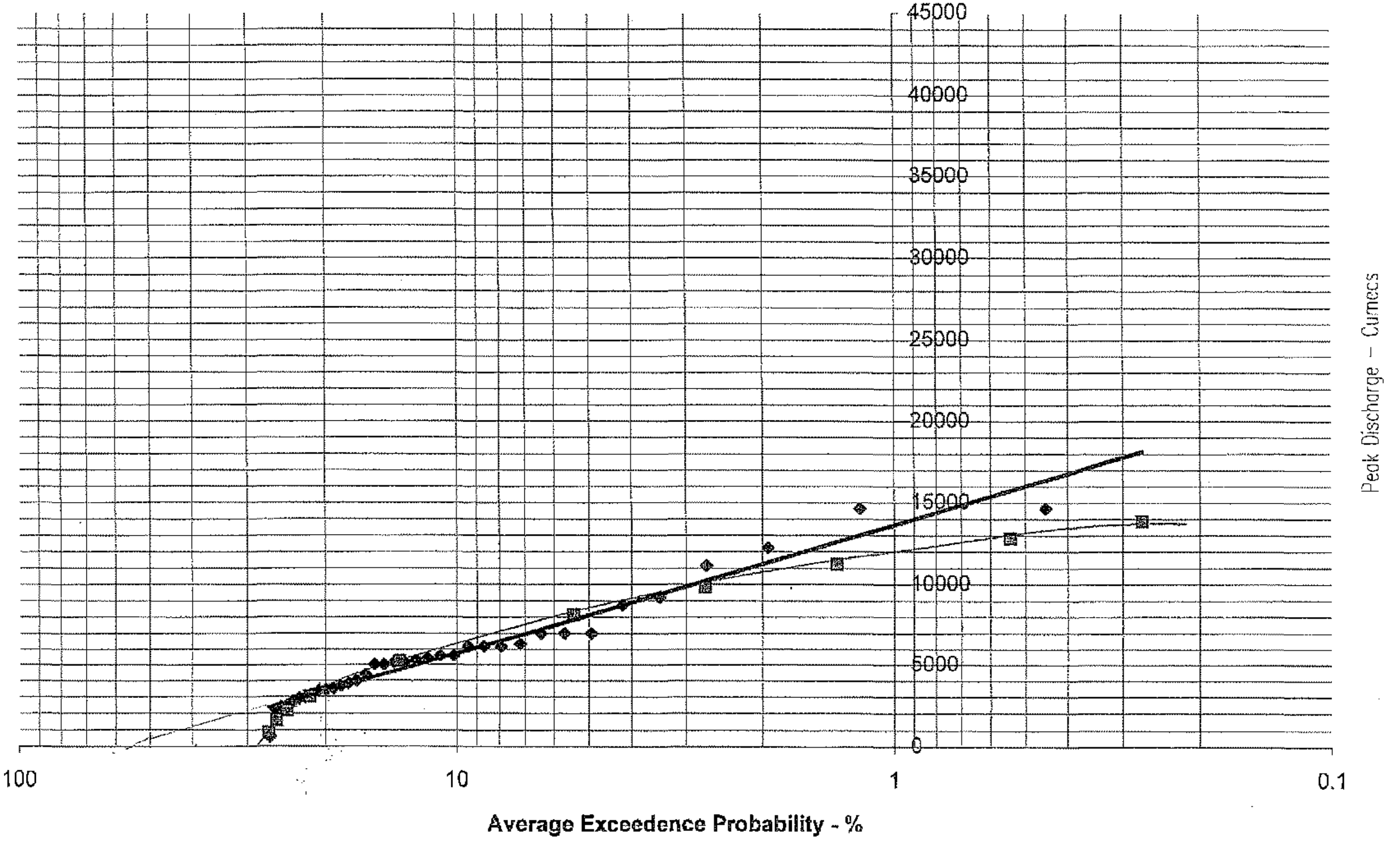
If you have any queries could you please contact me on [redacted]

Regards

[redacted]

Scott Abbey
Project Manager

Adjusted Frequency Curve at Port Office Guage, AHD N=36



SINCLAIR KNIGHT MERZ

FAXED
DATE: 4 / 2 / 97

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	4 February 1997
Copies:		**No of Pages:**	1
Subject:	BRISBANE RIVER FLOOD STUDY		

Martin

Below are the datum's which we require to be converted to m AHD as discussed with Mark Salisbury.

Datum	Bridge	Date of Drawing
Mean High Water & Mean Low Water	Centenary Bridge	3/9/63
LWOST	Victoria Bridge	16/10/68
LWOST	Captain Cook Bridge	11/9/68
LWST	Indooroopilly Rail Bridge	14/3/52
LLWST	Grey St Bridge	9/12/27
Highwater-Brisbane River	Indooroopilly Bridge	24/6/69
LWMS	Storey Bridge	19/1/35

If you have any queries regarding this request could you please contact me on [redacted]

Regards

[redacted]

Scott Abbey
Project Engineer

02

Brisbane City Council
69 Ann Street
Brisbane, Queensland
GPO Box 1434
Brisbane
Australia 4001
Facsimile 229 1168
Brisbane City

Contact name: Mr Martin Giles
Telephone: (07) 3403 6987
Fax (direct): (07) 3403 9902
Your ref.:
Our ref.:

25 February 1997

Recd 26/2/97

Sinclair Knight Merz
PO Box 839
TOOWOOMBA QLD 4350

ATTENTION: Mr Scott Abbey

Dear Scott,

BRISBANE RIVER FLOOD STUDY
TARGET DATES

We have reviewed the work program submitted for the above project and wish to confirm the following target dates for the submission of reports:

• Calibration Report	10 March 1997
• Design Event Report	17 June 1997
• Waterway Management Report	28 August 1997
• Flood Mapping Report	7 October 1997
• Community Consultation	23 October 1997
• Final Report/Handover	14 November 1997

Due to recent initiatives within Council to improve its performance, the effectiveness of the Waterways Section is now assessed with reference to the successful completion of projects within specified time frames. The above dates have been set for the Brisbane River flood study.

Given Councils' increased focus upon timeliness, it is imperative that each component of the flood study be completed by the specified date. Due to the outstanding performance of your firm on previous projects, it is considered that you will have little difficulty in meeting the deadlines specified for the project.

Please find attached a list of suggestions for improving the quality of the flood studies produced by Sinclair Knight Merz. Please view the comments as being suggestions for the improvement of an already good product rather than a direct criticism of your earlier work.

If you have any queries in relation to any of the above, please do not hesitate to contact us.

Yours faithfully,

[redacted]

for Ken Morris
Engineer in Charge,
Waterways Section, Department of Works.

Facsimile transmission from
BRISBANE CITY COUNCIL
WATERWAYS SECTION
Floor 13, Brisbane Administration Centre

SINCLAIR
RECD
WHO | ACTION
[redacted] Noted
JOB D04157 FILE

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
5 March 1997

To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Mr Scott Abbey		No. of Pages *(including this page)* 1
From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]

Re

BRISBANE RIVER FLOOD STUDY
STREAM GAUGE INFORMATION

Hopefully, you should have received the information that is available in digital format for Oxley Creek, Bulimba Creek and Breakfast Creek by E-mail.

As far as I can tell, the stream gauges on Bulimba Creek (Doughboy Parade) and Breakfast Creek (Mann Park) were installed in 1994. Consequently, you now have all the available information on these gauges.

For Oxley Creek, information for the 1973 event could be obtained from DNR. The gauge numbers are as follows:

Beatty Road (Oxley Creek)	GS143019
King Avenue (Blunder Creek)	GS143027
Stable Swamp Creek	GS143022

Council holds the charts for the April 1989 events. Unfortunately, these charts have not been digitised and are in storage. Further, our hydrographer is away until 11 March. Rather than providing you with possibly incorrect conversion information (i.e. gauge zero and page range), I will wait until he returns before sending you the April 1989 information. Please advise if this presents an obstacle to the completion of the flood study.

I trust that the information forwarded to you by E-mail is satisfactory. If you have any queries in relation to any matter, please do not hesitate to contact us.

Regards

[redacted]

H:\

Facsimile transmission from

BRISBANE CITY COUNCIL

WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

MERZ
RECD 11
ACTION
CIRCULATE
JOB No.

Date 11 March 1997	
To Sinclair Knight Merz	**Facsimile No.** [redacted]
Attention Mr Ian Brodie/ Mr Scott Abbey	**No. of Pages** 2 *(including this page)*
From Martin Giles	**Phone No.** [redacted]
	Facsimile No [redacted]
Re **BRISBANE RIVER FLOOD STUDY- MAY 1996 FLOOD**	

As requested in your fax of 7 March I have attempted to find the discharge data for the Bulimba Creek and Breakfast Creek gauges for the 1996 event.

Unfortunately, as both gauges are relatively new, no rating is available in relation to the gauges. Consequently, it is not possible to directly convert levels recorded at gauges to equivalent flow rates.

As a flood study of Bulimba Creek was completed in 1992, I tried to derive rating curve information for the Doughboy Parade gauge based on the results of modelling. Based on the peak flow recorded for each of the design events, the rating curve for the gauge is as follows:

Event	Height (m AHD)	Flow (m^3/s)
100 Year	2.96	508
50 Year	2.83	457
20 Year	2.74	382
10 Year	2.34	373
5 Year	2.16	329
2 Year	1.96	271

As levels for the 1996 event appear to be less than RL 1.96 m AHD, the above rating curve is probably useless to you.

Although the Bulimba Creek study considered the 1974, 1983, and 1989 events for calibration purposes, the only result files I could find were for the 1974 event. I will E-mail you the height and flow table calculated by RUBICON at the Doughboy Parade gauge (UBD ref 20 L8). As far as I can tell, the time of 05:00:00:00 in the output file is equal to 2400 hours on 24 January 1974. However, I am unsure whether 2400 hours on the 24th means 0000 hours on the 24th or 0000 hours on the 25th. Your guess is as good as mine.

I tried converting the height and flow values calculated by RUBICON to a rating curve but the influence of tailwater makes the resultant rating curve essentially useless. It can be noted that the design events for Bulimba Creek were given starting tailwater levels of RL 1.9 m AHD or higher so cannot be used for low flow rating curve derivation purposes.

DNR operates a gauge on Bulimba Creek at Wecker Road. Although this gauge may be located too far upstream to be of use, DNR probably has a rating curve for the gauge. Council also has a gauge very close to the DNR gauge for which levels are available for the 1996 event. However, as we have had a number of problems in relation to DNR gauge datums, I would hesitate applying a DNR rating curve to Council gauge results. If you are interested in data from this gauge, I would suggest that you contact DNR for both stream and rating curve data for the gauge.

This is probably as far as we can get with respect to gauge data for Bulimba Creek and Breakfast Creek. If you would like the 1974 results for any other part of Bulimba Creek or can suggest an approach I have not tried, please do not hesitate to contact me.

Regards

[redacted]

①SAA

SINCLAIR KNIGHT MERZ

49 Annand Street
PO Box 839
Toowoomba QLD
Australia 4350
Telephone: (076) 39 8400
Facsimile: (076) 39 8490

Brisbane City Council
GPO Box 1434
BRISBANE QLD 4001

2 April 1997
TO04157/SAA:L607M.DOC

Attention: Martin Giles

Dear Sir

BRISBANE RIVER FLOOD STUDY
CATCHMENT HYDROLOGY ADDITIONAL WORK

Attached is a Memorandum of Fees for the additional work required to complete the calibration of the RAFTS model for the Brisbane River Flood Study.

Initially it was proposed that the series of WT42PC hydrologic models developed by the Department of Natural Resources (DNR) would be converted into a single RAFTS model using DNR parameters. After a review of these models, it was considered that the RAFTS model should be developed virtually from first principles. The delineation of sub-catchment areas was considered to be acceptable and hence these areas were used in the RAFTS model.

The DNR model review also found that the catchment storage parameter k was varied within each WT42PC model for each flood event generating an extensive set of k values. The brief required that a single RAFTS model using a single set of parameters be developed hence a new catchment storage relationship had to be determined.

In addition to this, loss rates varied significantly between both individual models for the same storm and over the range of storms that were modelled. Loss rates are somewhat governed by antecedent catchment conditions however the variations found in the DNR modelling were found to be unreasonable in some instances.

After a review of the rainfall data used in the DNR models it was evident that there were significant variations between DNR rainfall data and Bureau of Meteorology (BOM) data. Extensive comparisons were conducted and it was considered that the BOM rainfall was the most reliable. This meant that additional BOM rainfall data had to be obtained, reviewed and manipulated to an acceptable format for use in the RAFTS model.

Our proposal states that from a preliminary assessment, it appears that considerable parts of the previous studies may be suitable for use in the Brisbane River Flood Study. This however was not the case and a considerable amount of additional effort has been undertaken to complete the calibration of the hydrological model.

We estimate that the above tasks have added approximately four weeks to the time we have allocated to complete the calibration process. We therefore request additional fee of $7 950 to compensate for the extra work required to complete the calibration of the hydrologic model to Councils standards as detailed in the brief.

If you have any queries regarding this request could you please contact me at this office.

Yours faithfully

[redacted]

Scott Abbey
Project Manager

Enclosure

49 Annand Street
Toowoomba QLD 4350
Telephone: (076) 39 8400
Facsimile: (076) 39 8490

Engineer in Charge Waterways Section
Brisbane City Council
GPO Box 1434
BRISBANE QLD 4001

Memorandum of Fees

Invoice No:
Claim No: Variation 1
Date of Issue: 2 April 1997
Our Ref: TO04157
Your Ref: W18/96/97

Due Date for Payment: 16 April 1997

Attention: Mr Ken Morris

CONTRACT NO. W18/96/97 **BRISBANE RIVER FLOOD STUDY**	**$**	**$**
VARIATION NO. 1		
To: Professional services in connection with the above project. Additional work required for the calibration of the hydrologic model. As detailed in the letter of 2/4/97	7 950.00	
Fees in Period Sub-Total		7 950.00
PLEASE PAY THIS AMOUNT		**$7 950.00**

The company, Sinclair Knight Merz Pty Limited A.C.N. 001 024 095 holds approval, in force from 1 February 1996 to 31 January 1999, to quote Reporting Exemption Approval Number RJ1086N.

There is, therefore, no requirement in regard to the payment made for this claim to deduct tax, to complete deduction forms or to report to the Taxation Office.

Terms of Payment: Payment in full on or before the due date of this invoice which is fourteen days after the date of issue.
No Statement will be issued. Interest is payable on overdue accounts, calculated on daily overdue balances, at the current CBA Corporate Overdraft Reference Rate plus 2%.

SINCLAIR KNIGHT MERZ

FAXED

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TOO4157
Fax No:	[redacted]	**Date:**	14 April 1997
Copies:		**No of Pages:**	~~8~~ 11
Subject:	Discharges at Moggill		

Martin,

We have undertaken further analysis at the Brisbane River gauge at Moggill, given the mismatch between predicted and recorded discharges for some of the calibration floods at this location. These differences are summarised below, based on the draft Model Calibration Report:

Flood	RAFTS Q	Gauge Q	Diff Q (%)	MIKE11 H	Gauge H	Diff H (m)
1974	9663	9346	+3	19.88	19.93	-0.09
1983	2029	1457	+39	5.18	5.26	-0.08
1989b	1400	1200	+17	3.67	4.02	-0.35
1996	2807	2792	0	7.50	7.09	+0.41
1973	2618	?	?	6.23	6.32	-0.09
1989a	1773	1080	+64	4.60	3.73	+0.87

Using the RAFTS discharges, the MIKE11 model provides a good prediction of recorded gauge levels for the 1974, 1983, and 1973 floods (ie pre-Wivenhoe floods). For the 1989a, 1989b and 1996 floods (post-Wivenhoe), the difference in predicted and recorded gauge levels exceed 0.1m. There are significant differences in RAFTS and gauged flows, especially for the smaller floods (say less than 2500 cumecs) and an adjustment of the gauge rating maybe required. This adjustment is supported by other evidence(eg the Moggill hydrograph volume for the 1983 flood is substantially less than that for the upstream Savages Creek gauge).

Revised Moggill Rating Curve

The MIKE11 model was used to generate a rating curve at Moggill. This was done by a series of model runs assuming steady state inflows upstream of Moggill ranging from 1000 to 11000 cumecs. The downstream boundary condition was the Western Inner Bar tide levels used for the 1974 calibration. For each run, the level at Moggill was extracted to derive a rating curve as shown on Figure 1 attached. It should be noted that a significant Moggill water level variation was detected for lower flows (less than 2000 cumecs) due to tidal effects. For example for a constant inflow of 1000 cumecs, the Moggill water level ranged from 2.79m to 2.53m.

A comparison between RAFTS and gauged flows using the MIKE11 generated rating curve is shown below.

Flood	RAFTS Q	Gauge Q	Diff Q (%)
1974	9663	9745	-1
1983	2029	1982	+2
1989b	1400	1553	-11
1996	2807	2668	+5
1973	2618	?	?
1989a	1773	1459	+22

For floods in which the MIKE11 model has predicted Mogill water levels to within 0.1m (ie 1974, 1983), the RAFTS and revised gauged flows are within 1-2% indicating a good consistency between RAFTS, MIKE11 and recorded data for these particular events.

For the remaining floods, a mismatch is present but a consistent trend is apparent (ie both RAFTS and MIKE11 are overestimating discharges/levels for 1989a and 1996 floods and vice versa for the 1989b flood). These events were regulated by Wivenhoe Dam and as outlined in the Model Calibration Report, there are differences between DNR and BCC on the estimated Wivenhoe Dam releases. A summary of Wivenhoe Dam outflows is given below.

Flood	DNR Q (cumecs)	BCC Q (cumecs)
1989a	1329	1566
1989b	1231	1455
1996	0	0

Based on the available data during the model calibration, we applied the BCC hydrograph for 1989a and the DNR hydrograph for 1989b floods. We have rerun RAFTS using DNR flows for 1989a and BCC flows for 1989b and all of the results are compiled as:

- ☐ Figure 2a - 1989a Flood - BCC Wivenhoe outflows
- ☐ Figure 2b - 1989a Flood - DNR Wivenhoe outflows
- ☐ Figure 3a - 1989b Flood - BCC Wivenhoe outflows
- ☐ Figure 3b - 1989b Flood - DNR Wivenhoe outflows

The figures show predicted and recorded hydrographs (using MIKE11 rating at Moggill) for Savages Crossing (SAV-OUT) and Moggill (JIN#).

Early April 1989 Flood (1989a)

Moggill hydrographs using BCC and DNR estimates of Wivenhoe Dam outflows are shown on Figures 2a and 2b respectively. The BCC outflows give a better match at Savages Crossing but tend to overestimate flows at Moggill. The DNR estimates underestimate flows at Savages Crossing but reproduce the Moggill discharges when Wivenhoe dam releases dominate (ie after about Day 4). The higher RAFTS flows at Moggill prior to Day 4 are associated with Bremer River inflows.

The RAFTS flows using DNR Wivenhoe outflows were imputed into MIKE11 and a comparison between recorded and predicted water levels are shown in Figure 4. Peak MIKE11 level is reduced to 4.24 m giving a difference between recorded and predicted levels of 0.51m. After Day 4 (ie Wivenhoe releases only), the difference is of the order of 0.1-0.2m.

Late April 1989 Flood (1989b)

Figures 3a and 3b show Moggill hydrographs using BCC and DNR Wivenhoe Dam release estimates, respectively. BCC estimates appear to give a better match at Savages Crossing but tends to overestimate flows at Moggill after Day 6 (when Wivenhoe Dam releases dominate). This is a similar trend as the 1989a flood.

The RAFTS flows using the BCC Wivenhoe outflows were imputed into MIKE11 and a comparison between recorded and predicted water levels are shown in Figure 4. There is not a significant improvement in the calibration if BCC outflows are used instead of DNR outflows.

May 1996 Flood

No Wivenhoe Dam releases were recorded for this flood. We have not reanalysed this event, except for regenerating the Moggill gauged hydrograph using the MIKE11 rating curve. The 'old' hydrographs presented in the Model Calibration Report and the 'new' hydrographs are shown in Figures 5a and 5b. As previously outlined in this memo, the RAFTS peak discharges overestimate the 'new' gauged peaks by about 5%.

Note that to achieve a match to within 0.1m on the 'new' Moggill rating curve at the range corresponding to the May 1996 flood magnitude requires RAFTS predictions to within about 40 cumecs (or 1.5%)

Summary

The water level range recorded by the Moggill gauge for the floods that have been analysed is of the order of 20m. To achieve a match between MIKE11 and gauge level to within 0.1m at this location requires RAFTS flow estimates to within an accuracy of 1-2%. This appears to have been achieved for 3 of the 6 floods described in the Model Calibration Report.

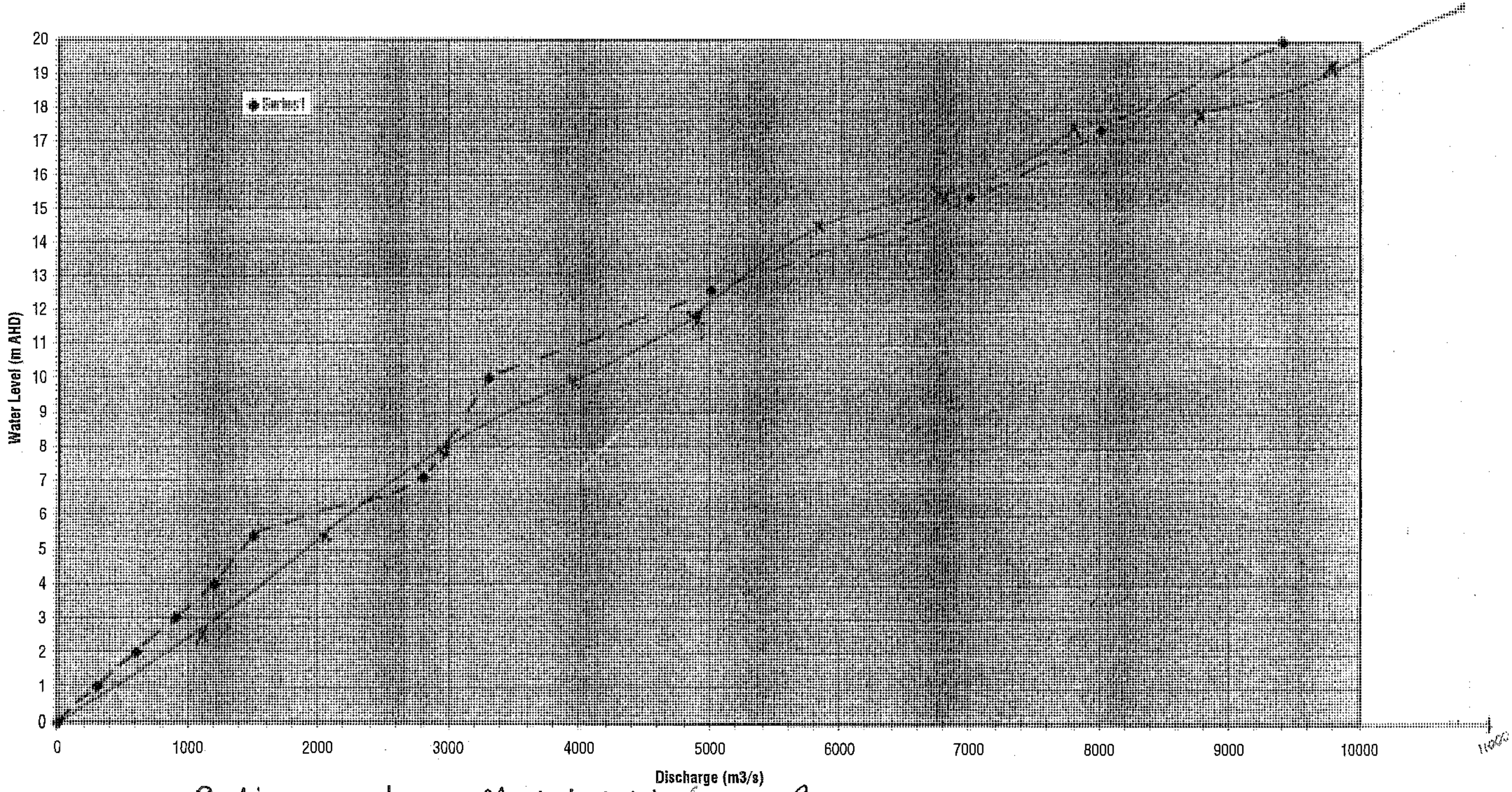
For the remaining 3 floods:
- No Wivenhoe Dam releases were recorded in the May 1996 flood and RAFTS predicted peak flows to within 5%. This translates to about a 0.4m mismatch in MIKE11 and gauged levels at Moggill.
- Wivenhoe Dam releases occurred for the early and late April 1989 floods. Estimates by DNR and BCC of Wivenhoe outflows differ by about 15% and this accounts for much of the discrepancy between RAFTS and gauged flows at Moggill (particularly for the 1989a flood). These floods are also relatively minor events.

It is suggested that:
- BCC check if there has been any improvements/modifications to the estimation methods associated with Wivenhoe Dam releases since the work done by DNR (this is documented in Ref 8 in Model Calibration Report)
- The April 1989 floods are minor events and the gauged flows in this range are subject to downstream tidal effects. It is suggested that RAFTS be upgraded to handle dependant rating curves to allow for this effect. This may be another source of error associated with these floods.

Regards [redacted]

Scott Abbe

Rating Curve (BOM) 1006.3 km

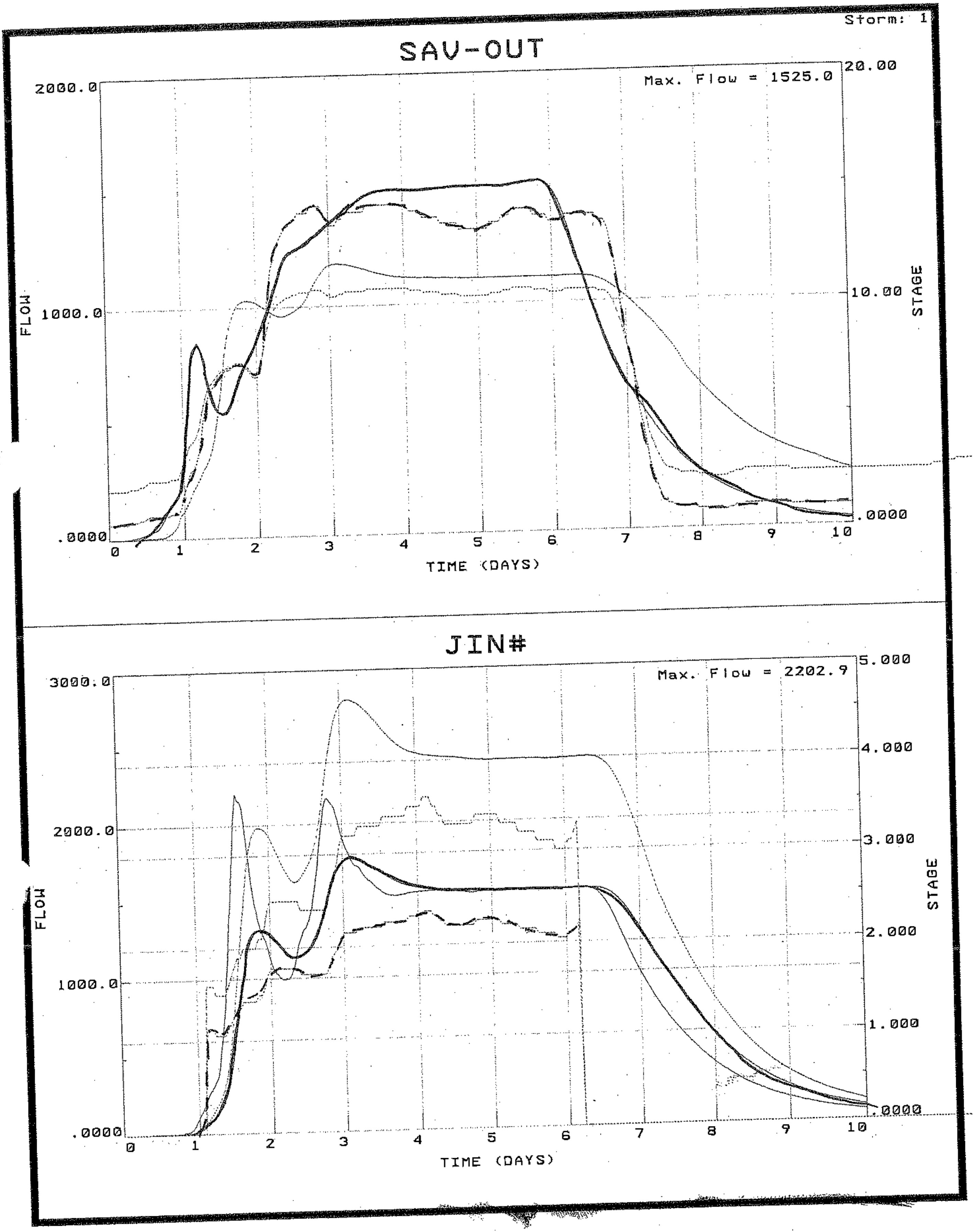


- - - Rating used in Model calibration Report

—— Revised rating based on MIKE11

MOGGILL RATING CURVES

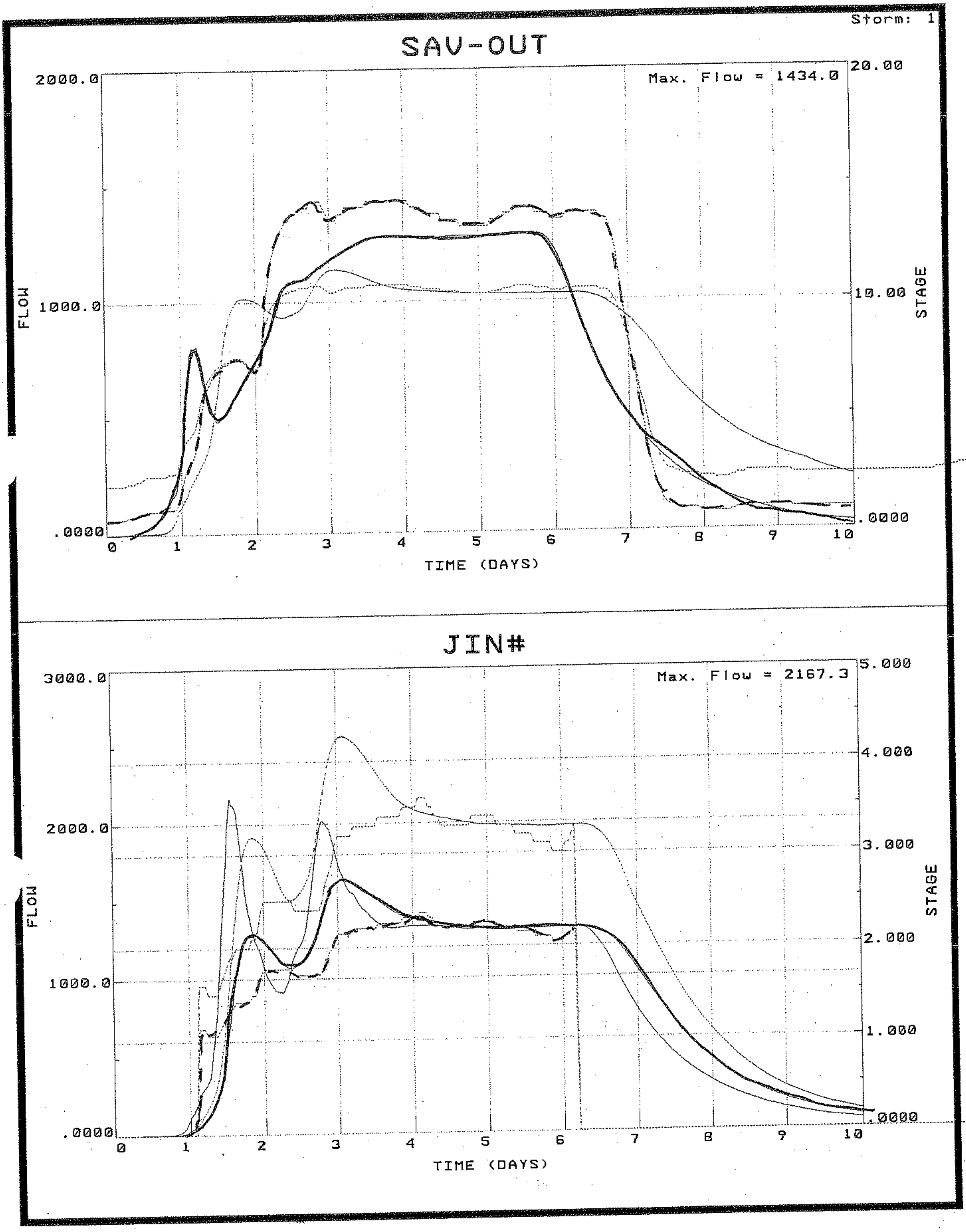
Figure 1



- - - - Gauge (Revised Rating)
—— RAFTS

1989a Flood – BCC
Wivenhoe Discharge

Figure 2A

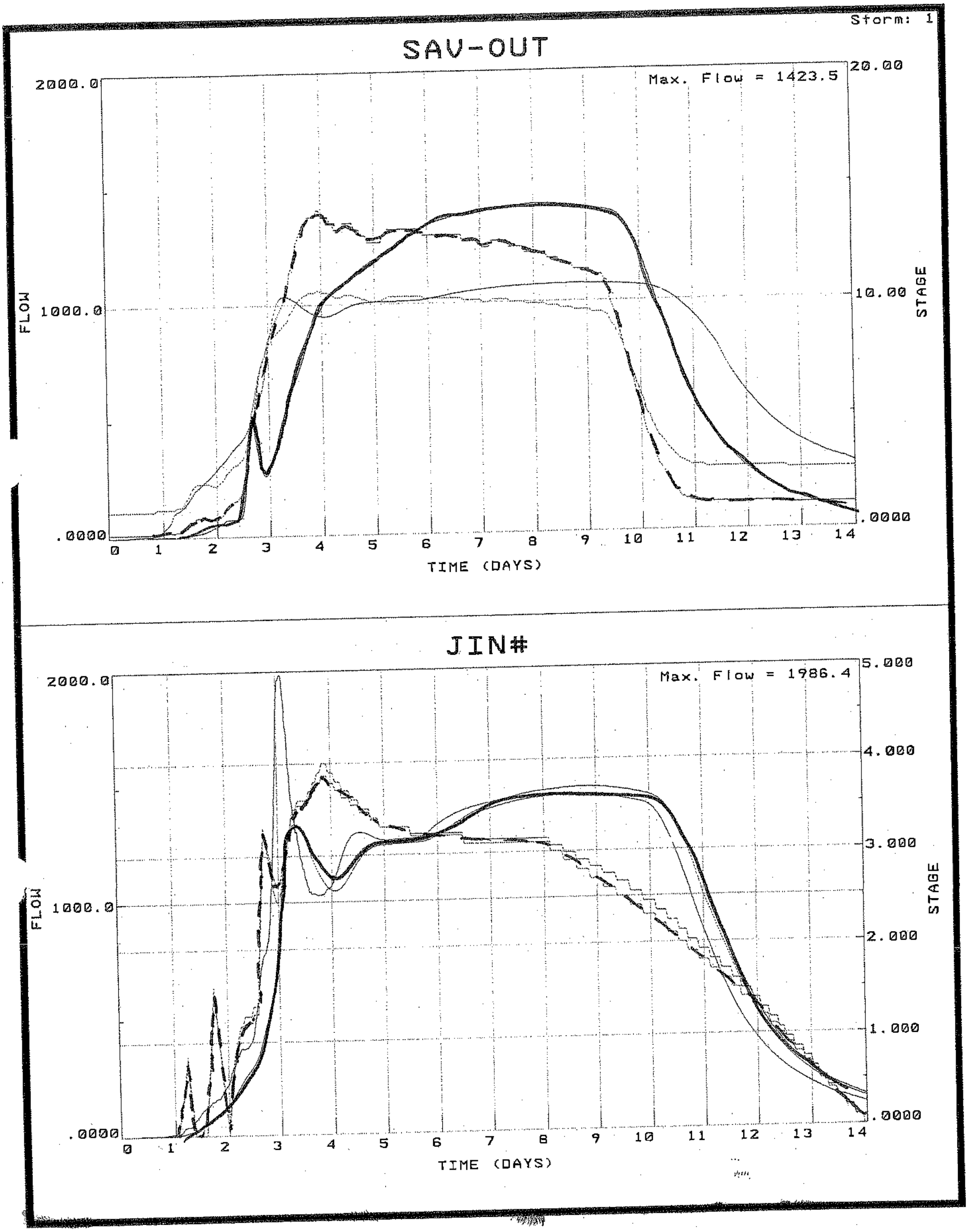


--- Gauge (Revised Rating)

—— RAFTS

1989a Flood – DNR
Wivenhoe Discharge

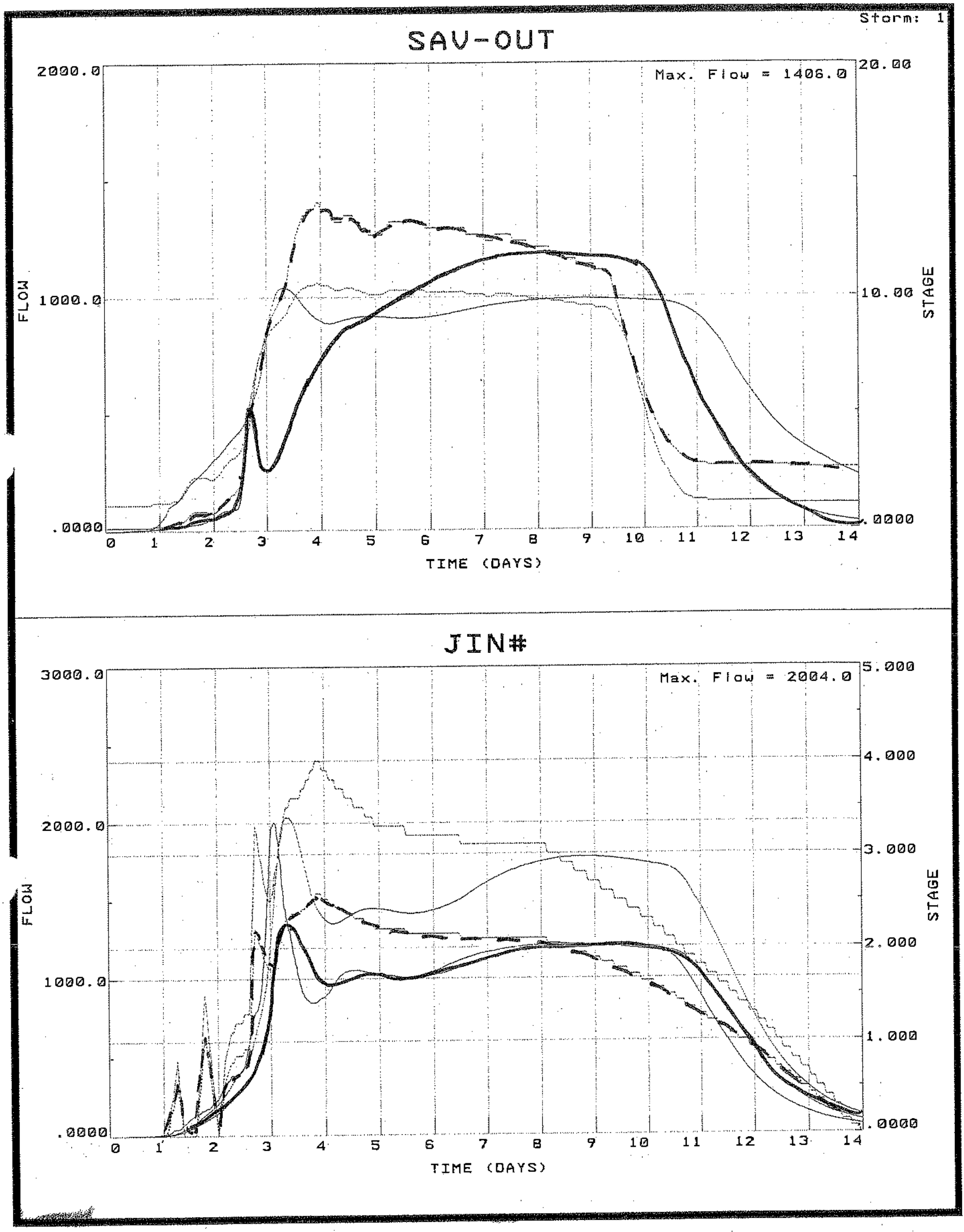
Figure 2B



---- Gauge (Revised rating)

—— RAFTS

1989b Flood - BCC
Wivenhoe Discharges
FIGURE 3A

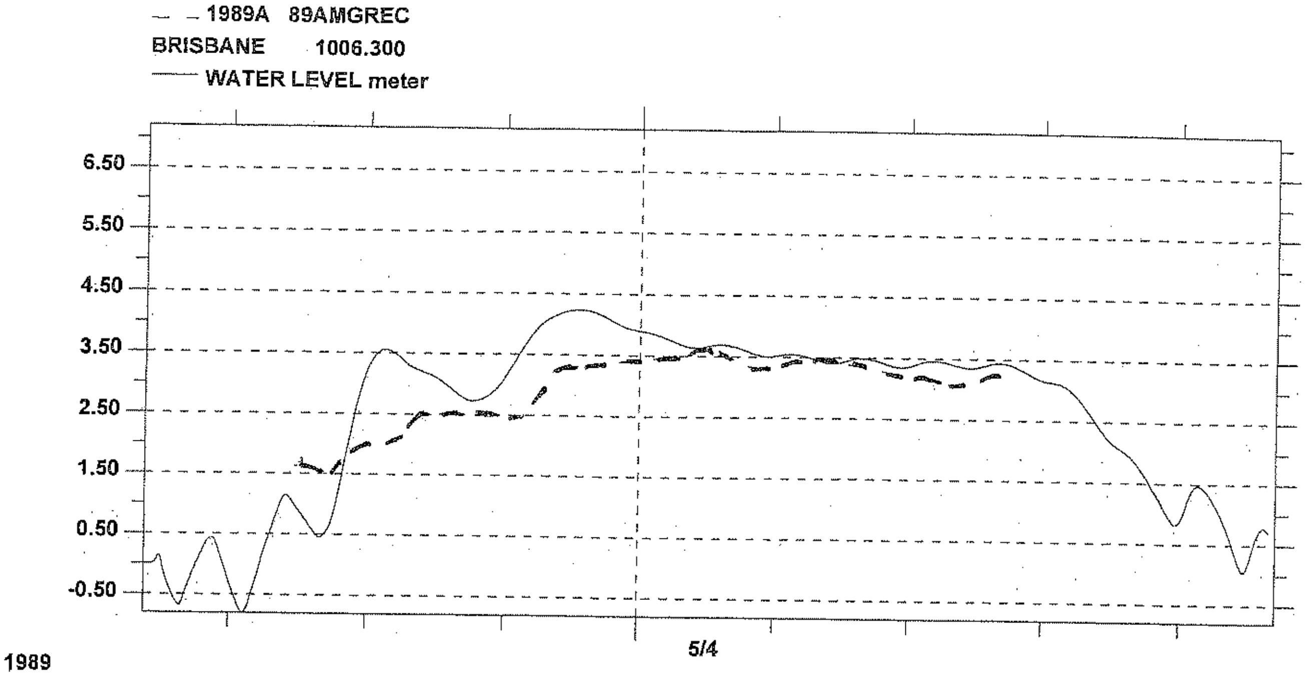


- - - Gauge (Raised Rating)

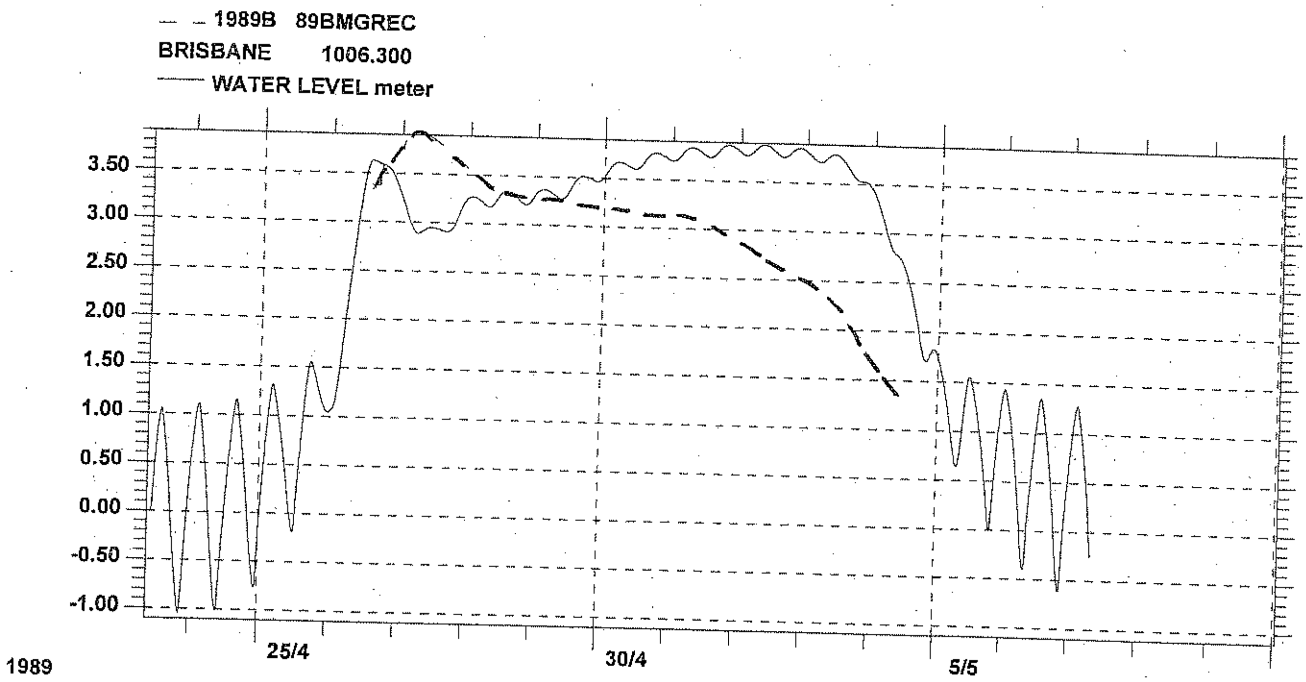
—— RAFTS

1989b Flood - DNR
Wivenhoe Discharges

Figure 3B



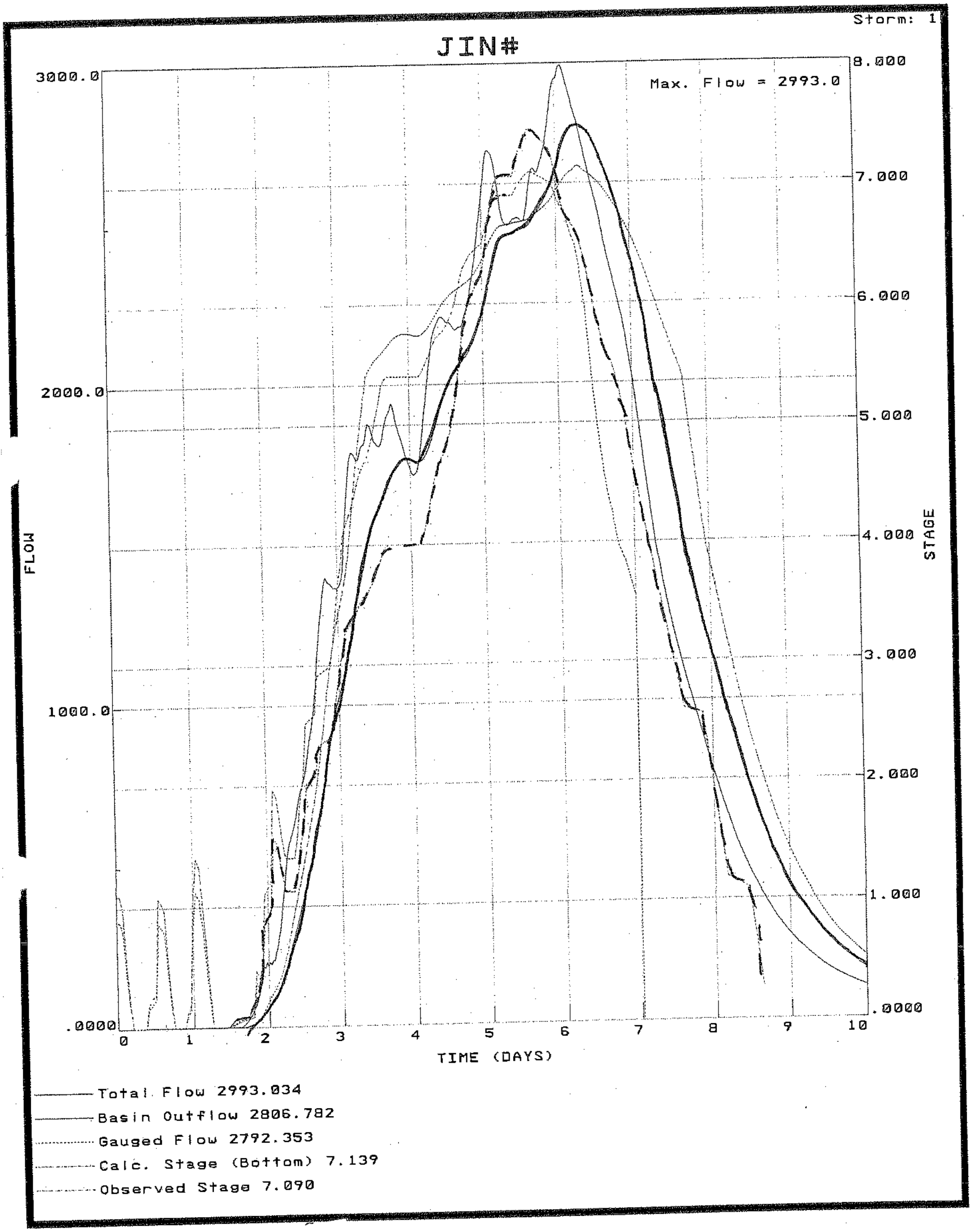
Early April 1989 - DNR Wivenhoe Flows



Late April 1989 - BCC Wivenhoe Flows

Moggill gauged and MIKE11
Water Levels - April 1989 Floods

Figure 4

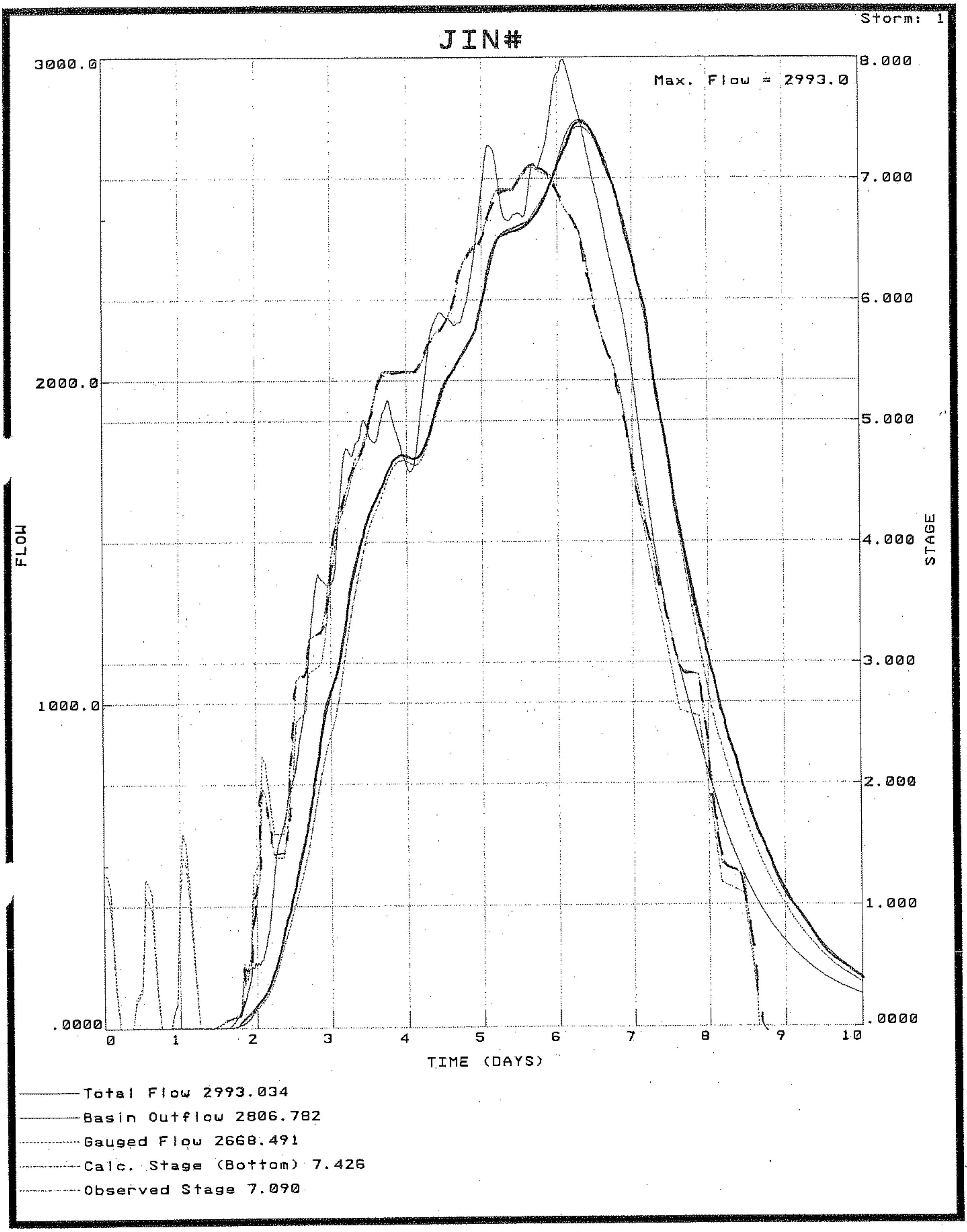


--- Gauge ('Old' Rating)

—— RAFTS

May 1996 Flood - 'Old' Moggill Rating

Figure 5a



--- Gauge ('New' Rating)

— RAFTS

May 1996 Flood – 'New' Moggill Rating

Figure 56

Facsimile transmission from

BRISBANE CITY COUNCIL

WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

		Date 16 April 1997
To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Mr Mark Salisbury/ Mr Scott Abbey		No. of Pages 2 *(including this page)*
From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]
Re **BRISBANE RIVER FLOOD STUDY- FLOOD FREQUENCY ANALYSIS**		

As requested in your fax of 9 April 1997, I have endeavoured to obtain a copy of the 1976 BCC (Hegarty) report that you requested. Discussions with Brisbane Water have indicated that the document was fairly brief and that the only remaining copies are buried deep in a basement filing area. Consequently, it is unlikely that a copy of the document could be readily found within Council even though it is referenced in subsequent reports.

However, I was able to locate a November 1975 SMEC report regarding Brisbane River flooding and the flood frequency analysis contained in the report may be fairly close to the work completed by Hegarty. I am forwarding an excerpt of the 1975 report by mail and request that if the information in the report is of interest that the results of the frequency analysis be checked against those presented in the old Brisbane River flood maps for consistency.

Beyond the SMEC report, it would appear that no other flood frequency analysis has been completed for which you do not already posses the reports. I will continue checking to see if any other analyses were completed.

With regard to the dam operating rules for Wivenhoe and Somerset Dams it appears that no change has been made to the operating rules in recent times. As you may be aware, in 1996 Brisbane Water lost the contract for the operation of Wivenhoe and Somerset Dams. As the operating manuals are controlled documents, copies of the manuals were returned by Council at the end of Councils' operating contract. I have contacted the South East Queensland Water Board and requested that a copy of the operating manuals be forwarded to Council. The copies are expected shortly.

SINCLAIR K MERZ
RECD

[redacted] Noted
Noted await
Data [redacted] 17/4/97

TO04157

Your telephone request regarding flow information for a gauge at Centenary has caused some problems. Council does not operate a gauge at Centenary (only a board) and the closest gauge is the one at Jindalee (which appears to be a Water Resources gauge- is this the one you are interested in?). I am presently checking with the South East Queensland Water Board to see if they operate any gauges in the area and expect a response by Friday.

MDS
Impacts
of THIS

I trust that the above information satisfactorily meets your requirements at present. If you have any queries in relation to the above or require further information, please do not hesitate to contact me.

Regards

Contact name: Mr Martin Giles
Telephone: (07) 3403 6987
Fax (direct): (07) 3403 9902
Your ref.:
Our ref.:

Brisbane City Council
69 Ann Street
Brisbane
Queensland
GPO Box 1434
Brisbane
Australia 4001
Facsimile 229 1168
Brisbane City

17 April 1997

Sinclair Knight Merz
PO Box 839
TOOWOOMBA QLD 4350

SINCLAIR KNIGHT MERZ
REC'D 18 APR 1997 GMGR
WHO [redacted] ACTION ok for use SIGN/DATE [redacted] 28/4/97.
JOB No. T00457 FILE

ATTENTION: Mr Scott Abbey

Dear Scott,

BRISBANE RIVER FLOOD STUDY
WIVENHOE AND SOMERSET DAMS OPERATING MANUAL

As requested, please find enclosed an uncontrolled copy of the *Manual of Operating Procedures for Flood Mitigation for Wivenhoe Dam and Somerset Dam.*

Sorry that I have not had time to have the document rebound but I did not want to miss the post. If you have any queries in relation to the manual or any other matter, please do not hesitate to contact me.

Yours faithfully,

[redacted]

Martin Giles
Engineer Waterways Section, Department of Works.

Encl. *Manual of Operational Procedures for Flood Mitigation for Wivenhoe Dam and Somerset Dam,* DPI, October 1992.

Facsimile transmission from
BRISBANE CITY COUNCIL
WATERWAYS SECTION
Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

SINCL [illegible] MERZ
RECD 21 APR 1997
ACTION
WHO
CONT/DATE
JOB No.
FILE

		Date 21 April 1997
To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Mr Scott Abbey		No. of Pages 5 *(including this page)*
From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]
Re **BRISBANE RIVER FLOOD STUDY- CALIBRATION REPORT**		

Thank you for your draft model calibration report and subsequent facsimile of 14 April 1997. You are commended on the general standard of the report. Further, the facsimile helped to clarify certain issues.

The following aspects of the report have been identified as being worthy of further discussion or consideration:

- **RAFTS Parameters Used in Calibration**

The brief requires that a consistent set of parameters be applied to all calibration and verification events. While you have justifiably altered parameters for certain areas following the construction of Wivenhoe Dam, it is noted that curve A was used to model the basin node storage at Lowood for pre-Wivenhoe dam conditions and curve B for post Wivenhoe conditions. As Lowood is downstream of Wivenhoe, it is considered that either a single curve should be used for all events (regardless of whether Wivenhoe Dam was constructed) or an explanation made in the report with regard to the acceptability of altering the storage curve at Lowood for pre and post Wivenhoe events. Does not change much. USE Postwivenhoe See page 35

- **Influence of Bremer River on Calibration**

Your facsimile of 14 April 1997 indicated the need for revision of the Moggill rating curve and detailed the improvement that the use of a MIKE11 derived rating curve could provide. However, as you noted, the remaining discrepancy between gauged and recorded flow hydrographs is still sufficient for the difference between recorded and predicted (MIKE11) levels at the Moggill gauge to be considerable.

As the facsimile notes, the discrepancy is most apparent for the events which have occurred following the construction of the Wivenhoe Dam (i.e. 1989a, 1989b, and 1996). Upon consideration of the results presented in the Calibration Report, it appears possible that runoff from the Bremer River catchment may be the cause of the general overestimation of flow rate at the Moggill gauge.

The construction of the Wivenhoe Dam, which commands over 50 percent of the Brisbane River catchment, would be expected to increase the sensitivity of the peak flow at Moggill gauge to runoff from the Bremer River and Lockyer Creek catchments. For calibration purposes, quite reasonably stream gauges (such as the Bremer River at Walloon) with drainage areas less than 5 percent of the Brisbane River catchment area were not considered in detail. However, following the construction of the Wivenhoe Dam, gauges in the Bremer River and Lockyer Creek catchments command up to twice the previous percentage catchment area.

For instance, for the 1996 event, there were no releases from Wivenhoe Dam and so the effective catchment area at the Moggill gauge was that area located below the dam wall. In such cases, the gauge on the Bremer River at Walloon drains about 10 percent of the catchment area contributing runoff to the Moggill gauge and so is worthy of consideration for calibration of the RAFTS model. Even for the 1989 events where discharge from the dam did occur, the gauges on the Bremer River and Lockyer Creek represent proportionally greater catchment areas than prior to the construction of the dam. ✓ but small floods

For the 1974 event, the runoff from the Brisbane River upstream of the present dam site was sufficient to dominate the levels recorded at the Moggill gauge. If runoff from the Bremer River and possibly Lockyer Creek was overestimated by the RAFTS model, it is likely that the impact of the overestimation would have been small on the overall hydrograph. However, for lesser events governed by runoff from areas downstream of the dam, it is likely that the overestimation of runoff would produce high levels at the Moggill gauge.

The following table lists the results of the calibration and verification events at selected Bremer River and Warrill Creek gauges, with the results obtained at the Moggill gauge included for comparative purposes.

43
108

143107

Event	Location	Recorded		Predicted	
	900m	Flow (m³/s)	Volume (m³)	Flow (m³/s)	~~Flow~~ Vol (m³/s)
1989a	Warrill Ck at Amberley	227 211	32 33	157 ↓	24 ↓ R.f.
	Bremer R at Walloon	164 ?	24 ?	503 ↑	36 ↑
	Bremer R at David Trumpy Br	530	61	612 ↑	83 ↑
	Moggill Gauge	1460 1080	382	1773	840
1996	Warrill Ck at Amberley	402	129	384 5%	100 22 ✓
	Bremer R at Walloon	726	127	837 +15	140 +10
	Moggill Gauge	2792 ✓	761	2807 ✓	1028 +35%
1989b	Warrill Ck at Amberley	148 252	18 41	290 +15	64
	Bremer R at Walloon	281 259	20	521 +200	~~51~~ 30%
	Bremer R at David Trumpy Br	773	74	873 +13	139
	Moggill Gauge	1200	752	1400	931

Details linked
[illegible]

394 42

1983	Warrill Ck at Amberley	383	50	398 ↑	79
	Bremer R at Walloon	387	33	830 ↑	72
	Bremer R at David Trumpy Br	1457	119	1405	184 ✓
	Moggill Gauge	2045	450	2029	855 ✓
1974	Warrill Ck at Amberley	1942 1576	294 260	2132	385
	Bremer R at David Trumpy Br	4000	994	4891	876
	Moggill Gauge	9346	3472	9663	2971
1973	Warrill Ck at Amberley	3.3	0.7	6.4	0.6
	Bremer R at Walloon	71	10	114	7.3

It can be noted that the gauge on Warrill Creek at Amberley drains about 7 percent of the total catchment area of the Brisbane River and the gauge on the Bremer River at Walloon about 5 percent.

Although it is dangerous to draw conclusions from values such as those listed above due to the number of factors affecting the magnitude and timing of flow (including catchment size and shape, rainfall patterns and location of subcatchment relative to remainder of catchment) it appears that the flow predicted at the Bremer River at Walloon is greater than that recorded by an amount similar to that by which the predicted flow at Moggill is greater than that recorded. Also, the volume of flow recorded at the Walloon gauge seems high in comparison to that recorded at Amberley. ?

For the 1974 event, the discrepancy in flow has minimal impact due to the magnitude of the flow from that part of the catchment above the Bremer River. For the lesser events, it is suspected that the discrepancy in flow could have a considerable impact on the peak flow at Moggill.

If the flow at Walloon (and therefore the Bremer River) were to be reduced, then the possibility of a good agreement exists for the 1989a and 1996 events. Given that the predicted flow for the 1989b event is already less than that recorded (for the revised Moggill rating curve), a reduction in flow would cause the agreement for this event to be worsened. However, as the flows are relatively low for this event, this may not be of too great a concern due to the demonstrated dependency of gauge levels upon tailwater levels for such flows.

Further, inspection of the hydrographs recorded at the Moggill gauge indicates that the peak flow for the 1996 event occurred towards the end of the event, the peak flow for the 1989a event towards the middle of the event, with only the peak flow for the 1989b event occurring near the beginning of the event. For Bremer River flows to influence those recorded at Moggill (as hypothesised above), it would be expected that the peak flow for each event occurred near the beginning of the event indicating that relatively fast response catchments such as the Bremer River govern the peak flow for the event. However, the hydrographs do not appear to support this.

In any case, you may have reviewed the gauges noted above and found them to be unreliable. If this is the case, the above argument can be ignored. Need to check reliability of ratings at Warrill & Amberley

Your comments in relation to this appraisal of the behaviour of the catchment would be welcomed.

- **Bed Level for 1974 Event**

On page 43 of the draft report, you make a comparison between 1974 and 1995 cross sections, noting that the river system had a lower bed level. It is suggested that this sentence be rewritten to indicate for which date the river system was lower as the sentence does not make matters totally clear. ? When x Sections were taken.)

- **Superelevation**

On page 44 of the draft report, it is noted that superelevation could be the cause of some of the discrepancies between recorded and predicted levels. Although we agree with this finding, it would probably help if you could provide an indicative estimate of the magnitude of the superelevation (for say the 1974 event) to help quantify the likely difference in level which could be expected at bends. ✓ agree. similar to bend losses.

- **Modelling of Bend Losses**

On page 45 of the draft report you state that MIKE11 cannot account for bend losses. MIKE11 can be made to account for bend losses by adding a broad crested weir and specifying a bend loss which is a factor of the velocity head. As you have demonstrated that no single factor can be applied to the velocity head to model bend losses (Table 6-2 indicates a likely range of 0.8 to 2.3), it is suggested that the sentence concerned be rewritten to indicate that bend losses cannot be accounted for implicitly in MIKE11 in this case due to the variation in applicable bend loss coefficient. ✓

- **RAFTS Model Schematisation**

Figure 5.1 of the draft report indicates subcatchments with nodes located at the centroid of the subcatchment. As you are aware, although such a schematisation is applicable for URBS and RORB type models, RAFTS models require the placement of nodes at the downstream boundary of subcatchments. We would appreciate your explanation with regard to the use of centroidally based nodes for the RAFTS model (e.g. compatibility with URBS, use of zero link lengths to catchment boundary etc). Not what is in model d/s nodes actually used. Needs clarity. Comment about.

- **Minor Typographical Errors**

The following utterly trivial typographical errors were also picked up:

p14, para 5	The first line does not make sense
p15, para 1	Hydrograph should be plural
p15, para 6	'Imputed' should be 'input'
p19, para 1	'A' should be 'an'
p20, para 1	Hydrograph should be singular
p20, para 2	'Is' should be 'are'
p21, table 5-5	Difference in last line should be negative
p30, table 5-12	May 1996 should read July 1973
p32, para 6	'Plots or' should read 'Plots of'
p33, para 1	'Parameter' should be plural
p40, point 3.	'Merival' should be 'Merivale' (also in other places)
p40, point 6.	'Due to flat' should read 'due to the flat'
p45, table 6-2	The units for velocity should be m/s
p46, para 5	'Form' should read 'from'
p49, para 2	The word 'the' is probably unnecessary prior to 'two'
p50, para 4	The tolerance for continuous records is 0.10 m

In conclusion, the general standard of the report is excellent and the extent of work involved in both RAFTS modelling and report preparation is acknowledged. It is hoped that these comments are of assistance. We look forward to receiving your response.

If you have any queries in relation to the above or require further information, please do not hesitate to contact me.

Regards

[redacted]

DATE ..../......./.......

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	2 May 1997
Copies:	1	**No of Pages:**	3
Subject:	BRISBANE RIVER FLOOD STUDY		

Martin

This is an update to let you know how the design events section for the Brisbane River Flood Study is progressing. I have attached a points table\chart for you information.

We have calculated the design storms for the 100, 50, 20, 10, 5, and 2 year ARI flood events for the 250 sub areas. This was achieved by the generation of isohyetal maps using Civilcad. The software program HYDCON was developed to convert the isohyets into design storms using standard zone 3 temporal patterns. HYDCON produces a hydsys file that is suitable for input into the RAFT's model. Each of these events have been input into the RAFT's model and we are ready to commence the modelling.

We have formulated stage-discharge relationships for Somerset and Wivenhoe Dams based on emergency operating procedures set down in the relevant guidelines. Prior to commencement of modelling we need to arrange a meeting between yourself an[redacted]from the South East Queensland water board to ensure our adopted procedures fo nd Wivenhoe Dams are satisfactory.

Data for the flood frequency analysis is very limited especially information concerning Somerset Dam. We are[redacted]ng to obtain release information for Somerset Dam however this has been very difficult a rant has been uncontactable for over a week.

We have completed as much work as we can, and we now need some input from the South East Water Board if this section of the work is to be completed on time.

We would like to arrange a meeting between yourself an[redacted]early this week (preferably tomorrow) to discuss the above points. Could you please let me know when you are available so that some arrangements can be made with Gary when he can be contacted.

If you have any questions concerning the above, could you please contact me at this office.

Regards

[redacted]

Scott Abbey
Project Manager

Week Ending	Proposed Progress	Actual Progress
17/11/96	0	0
24/11/96	6	0
1/12/96	6	3
8/12/96	22	3
15/12/96	22	3
22/12/96	67	3
29/12/96	67	3
5/01/97	67	3
12/01/97	73	9
19/01/97	165	40
26/01/97	165	88
2/02/97	165	133
9/02/97	199	133
16/02/97	221	139
23/02/97	238	147
2/03/97	238	147
9/03/97	252	181
16/03/97	252	201
23/03/97	256	217
30/03/97	272	233
6/04/97	272	233
13/04/97	272	233
20/04/97	328	233
27/04/97	336	233
4/05/97	350	233
11/05/97	359	269
18/05/97	409	269
25/05/97	409	269
1/06/97	429	269
8/06/97	440	
15/06/97	454	
22/06/97	466	
29/06/97	468	
6/07/97	529	
13/07/97	552	
20/07/97	580	
27/07/97	588	
3/08/97	588	
10/08/97	588	
17/08/97	633	
24/08/97	644	
31/08/97	692	
7/09/97	692	
14/09/97	692	
21/09/97	745	
28/09/97	754	
5/10/97	768	
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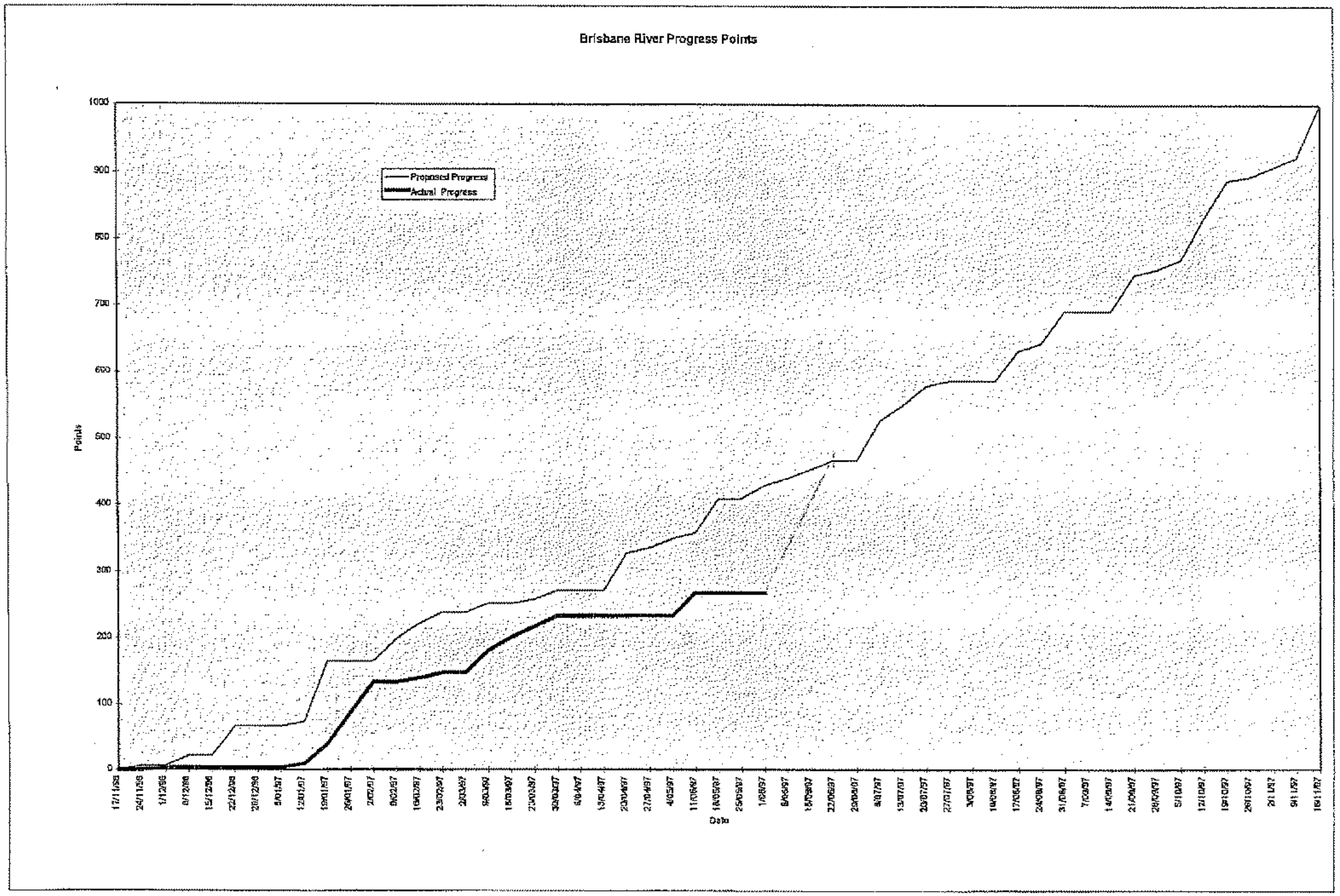
19/10/97	888	
26/10/97	894	
2/11/97	908	
9/11/97	922	
16/11/97	1000	



04

SINCLAIR KNIGHT MERZ

DATE......./......./......

Facsimile Transmission

To:	South East Queensland Water Board	**From:**	Scott Abbey
Attention:	Gary Grant	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	2 May 1997
Copies:	1	**No of Pages:**	1
Subject:	BRISBANE RIVER FLOOD STUDY		

Gary

We are currently conducting a study on the Brisbane River and require some input from you regarding stage-discharge relationships for Somerset and Wivenhoe Dams.

Stage-discharge curves have been generated based on emergency operating procedures however we would like to hear any comments that you may have regarding Wivenhoe Dam and more particularly Somerset Dam.

In addition we would appreciate if you could provide us with some release details for Somerset Dam after 1959. From preliminary discussions with your department I understand that release data is available although it is not in a digital format. If this is the case could you please provide us with a copy of this information to use in our flood frequency analysis.

I have spoken to Martin Giles and he has indicated that he is available Wednesday morning. Could you please advise if you are available so that we can organise a meeting. This information is critical to completing this phase of the study within the specified time frame and we would appreciate your assistance.

If you have any queries I can be contacted at this office on [redacted]

Regards

[redacted]

Scott Abbey
Project Manager

D:\TO04157\GARYGRNT.DOC

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05

SINCLAIR KNIGHT MERZ

DATE ____/____/____

Facsimile Transmission

To: Brisbane City Council
Attention: Martin Giles
Fax No: [redacted]
Copies:
Subject: Brisbane River Flood Frequency Analysis

From: Scott Abbey
Job No: TO04157
Date: 8 May 1997
No of Pages: 3

Martin,

Follows is a description of our proposed methodology for the flood frequency analysis for your review and approval. Most of the elements of this approach is based on work by Rory Nathan at the CRC Catchment Hydrology.

Objective

To check the consistency between RAFTS design discharge estimates and flood frequency analysis based on historical streamgauge data.

Constraints

Longterm streamgauge data is available but the historical record is 'mixed' and includes post-Somerset Dam (substantially constructed by 1943 but not completed until 1959) and post Wivenhoe Dam (completed in 1985) effects. Key tributary gauges on Lockyer Creek at Lyons Bridge and Bremer River at David Trumpy Bridge have poor rating curves due to Brisbane River backwater effects.

A potential source of error is expected to be in adjusting the historical record to derive a set of discharges representative of post-dam conditions.

On this basis it is recommended that to check RAFTS model performance, a comparison be made between RAFTS design flows and flood frequency analysis under *pre-dam conditions* given that:

- ☐ the preferred method to be used to adjust the historical streamflows to get post-dam flows would be the same as that applied in RAFTS design flood estimation (ie it will not be an independent check)
- ☐ alternative methods to adjust the historical streamflows would be more simplistic and would potentially introduce a source of error (ie the check would not be an accurate one)
- ☐ the bulk of the available historical records relates to pre-dam conditions or has the effect of Somerset Dam only

Methodology

This methodology is based on deriving a flood frequency analysis for pre-dam conditions at key Brisbane River gauges. (Lowood, Moggill and Port Office gauges- it is suggested that Centenary gauge be excluded as historical data at this location is short-term and patchy and the FFA results would be similar to Moggill)

Our prime aim is to maximise the length of record and to incorporate significant floods (eg 1974 and 1893) wherever possible. This is considered important in improving the accuracy of the FFA. It is thus proposed to incorporate the post Somerset dam only period (1943-1985) in the FFA to cover the 1974 flood. This requires adjusting the historical data to remove the effect of Somerset Dam but this is considered to be a relatively small adjustment. (ie it was considered better to include a modified dataset from 1943 to 1985 rather than truncate the period of pre-dam record to 1959)

The basic methodology is:
- ☐ obtain a series of monthly instantaneous peak discharge for period of record up to 1985
- ☐ adjust the post-Somerset Dam record(after 1943) to get pre-dam flows
- ☐ undertake FFA on the adjusted record. Use line of best fit to define distribution

This methodology can be explained further using Lowood as an example.

Daily levels are available at Lowood since 1909 and it maybe possible to extend the record back to 1893 based on historical flood records. This potentially provides a period of record from 1893 to 1985 to work with.

To make the adjustment to get pre-Somerset Dam flows after 1943 it is proposed to:

- ☐ plot peak Woodford discharges against Somerset Dam discharges prior to dam construction.
- ☐ develop a regression relationship of the above
- ☐ use this regression relationship to derive synthetic pre-dam Somerset Dam discharges for after 1943
- ☐ compare the pre-dam estimates with recorded post-dam discharges from Somerset Dam gauge
- ☐ determine the difference in pre and post dam discharges and adjust flows at Lowood accordingly.

The FFA at Lowood would then be based on the adjusted discharge sequence.

A similar approach shall be taken at Moggill and Port Office. The FFA at Moggill is not expected to be as sound as Lowood because the historical record is not as long (starting 1965). By comparison the record at Port Office is extensive (starting 1841) but a source of error may be the tidal dependence of the rating curve at this location

In this methodology we have tried to reduce the amount of adjustment of historical streamflow data to get a 'truer' FFA and thus provide a better basis to check the performance of the RAFTS model in estimating design flows (the next step is developing an appropriate methodology for design flood estimation taking into account joint probability of dam storage levels, coincident rainfall etc and we are working with Rory Nathan to do this)

Can you please provide some feedbak on this methodology ASAP so we can proceed with investigations.

Regards

[redacted]

Scott Abbey

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	8 May 1997
Copies:		**No of Pages:**	3
Subject:	Comments on Calibration Report		

Martin,

In response to your review of the Brisbane River Flood Study - Calibration Report, we provide the following discussion on your comments:

RAFTS Parameters Used in Calibration

The results of running RAFTS with Curve B at Lowood for the 1973 and 1974 pre-Wivenhoe floods were discussed on pages 34 and 35 of Calibration Report. At the inflow point to MIKE11, the difference between recorded and RAFTS peak flows was between 8 to 12%. On this basis, it is suggested that a single curve (Curve B) be used in the design flood estimation plus maybe a sensitivity check on the effect of using Curve A on design flows.

Influence of Bremer River on Calibration

We have looked at the issue of Bremer River flows being potentially overestimated for some of the smaller floods (especially 1989a and 1996 events) due to predicted flows being higher than gauged at Walloon.

The following is a description of the Bremer River gauge at Walloon (DNR Report 7a):

> "The gauging site is situated on a good permanent waterhole which has clear uniform stable banks that contain the majority of flows, except for the more extreme floods. The control was a mud and ti-tree lined constriction along the right bank but this has been replaced by a low flow control weir. The highest streamflow measurement at this site was made in June 1988 at a flow of 406 m^3/s. The immediate banks are overtopped at a gauge height of 9.5m(=830 m^3/s) and the rating has not been extended above this level."

This description suggests that the gauging station is OK up to bankfull which covers the range of the 1989a and 1989b floods.

We looked back at the DNR work (Report 7a) and a summary of recorded peak discharge was given (Table 5.27) which gives a discharge of 401 m^3/s for the 1989b flood. No discharge was given for the 1989a flood. This compares with 259 m^3/s based on a rating curve supplied by BOM which was used in the Calibration Report. This suggests that the BOM rating maybe low and if the DNR curve is applied, we would get a better match between RAFTS and recorded flows. We shall obtain the DNR rating and check this.

Influence of Warrill Creek on Calibration

We have looked at the performance of the calibration at the Warrill Creek gauge at Amberley especially in the smaller events.

The following is a description of the gauge site form the DNR Report 7a:

> "This station is located at a small but permanent waterhole. The site is not very confined with the right bank being comparatively steep and moderately timbered and the left bank being lower, sparsely timbered and much more gradually sloped. Total width of the section at a gauge height of 9 metres is about 200 metres, whilst at a gauge height of 11 metres the width of the section extends to some 800 metres. A low flow control weir has been constructed at the station but prior to this the control consisted of a reasonably stable mud and weed restriction.
>
> A peak stream flow measurement of 412 m^3/s was made in February 1971, whereas the highest recorded flow is 2 104 m^3/s in January 1974. The rating curve above the highest measured value has been extended by straight line extrapolation on log-log paper which was checked by area - velocity methods."

Most of the minor floods recorded peak discharges are less than the peak stream flow measurement of 412 m^3/s, therefore the rating curve in this range can probably be considered as reliable.

Review of the DNR work (Report 7a) and the peak discharge data from RAFTS using the BOM rating curves gave the following comparisons.

Flood	Recorded Peak Flows (m^3/s)		Predicted Flows (m^3/s)
	BOM Curve	DNR Curve	
1989a	211	227	157
1996	402	Not available	384
1989b	252	148	290
1983	383	394	398
1974	1 576	1 942	2 132
1973	3.3	Not available	6.4

These results again suggest the BOM curves may be a little low, except for the strange results for the 1989b flood. Again based on this data it is not possible to identify any obvious trends in our modelling. If anything, the results would be much better if the DNR curve was used (ie 1983 and 1974). Overall there is no justification to revisit the model structure based on these results. For the 1989 floods some modification of loss rates in this catchment may improve the match at this gauge. However, this is likely to have little impact at Moggill. The accuracy of the rating at Moggill and the estimates of dam outflows would have more significant impact.

Bed Level for 1974 Event

Sentence shall be rewritten to add in relevant dates

Superelevation

Estimates of superelevation shall be provided at 3 locations where gauge levels differ from spot height levels on the opposite side of the river.

RAFTS Model Schematisation

The majority of nodes are schematised in RAFTS format (subcatchment to subcatchment) but as you noted there are some exceptions;

- at the catchment headwaters where there are 2 subareas joining together (eg WAL1 and WAL2 compared to KAL8 which is a single headwater subarea). In this case, the link lags are set to zero but a link is shown on Figure 5.1 for clarity.
- dummy nodes (zero catchment area) were inserted between RAFTS nodes and these are shown as intermediate nodes. An example is MTC### which is used to sum hydrographs.

The RAFTS model is based on a RORB type model which as you noted is centroid to centroid based. During the model setup we converted the RORB type link lags to a RAFTS subarea boundary to subarea boundary type. (This involved measuring the river reach distance between subarea boundaries and then checking if the total tributary length is the same as what DNR estimated).

Regards

[redacted]

Scott Abbey

[illegible]
DATE……/……/……

06

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	15 May 1997
Copies:	1	**No of Pages:**	4

Subject: BRISBANE RIVER FLOOD STUDY PROGRESS REPORT

Martin

Attached is a program of the proposed work for the flood frequency analysis and design flood events. This program shows that we expect to complete the design events report by the initial deadline of 19 June 1997.

We are currently awaiting information from the Department of Natural Resources regarding the Wivenhoe and Somerset Dam operating rules model and expect a reply within the next couple of days. Once a review of this model has been conducted we will either modify this model or develop our own model using Visual Basic so that it is compatible with RAFTS input/output.

On review of the Department of Natural Resources design events hydrology, a number of issues were raised concerning the actual placement of design rainfalls over the catchment. Our original investigations indicated that a weighted average was calculated for four (4) sub-catchments and applied upon their respective areas. Further inspection of the final WT42 models supplied by the DNR found that a constant depth of rainfall was applied over the entire catchment. We are awaiting clarification of the final design events configuration used by DNR before we proceed with our design events modelling.

The flood frequency analysis should be completed towards the end of next week depending on the supply of streamflow information. We have assumed that the methodology outlined in our fax dated the 8 May 1997 is appropriate.

The HEC-RAS hydraulic model set up has been completed and it will be calibrated once the hydrologic design events have been determined. Once calibration has been achieved rating curves at structures, low/high hazard areas and flooding characteristics can be extracted.

The completion of this section of work is largely dependent on the supply of information by the Department of Natural Resources. Should there be any hold ups we will contact you and discuss an appropriate course of action.

I have also attached a copy of the points table for your information.

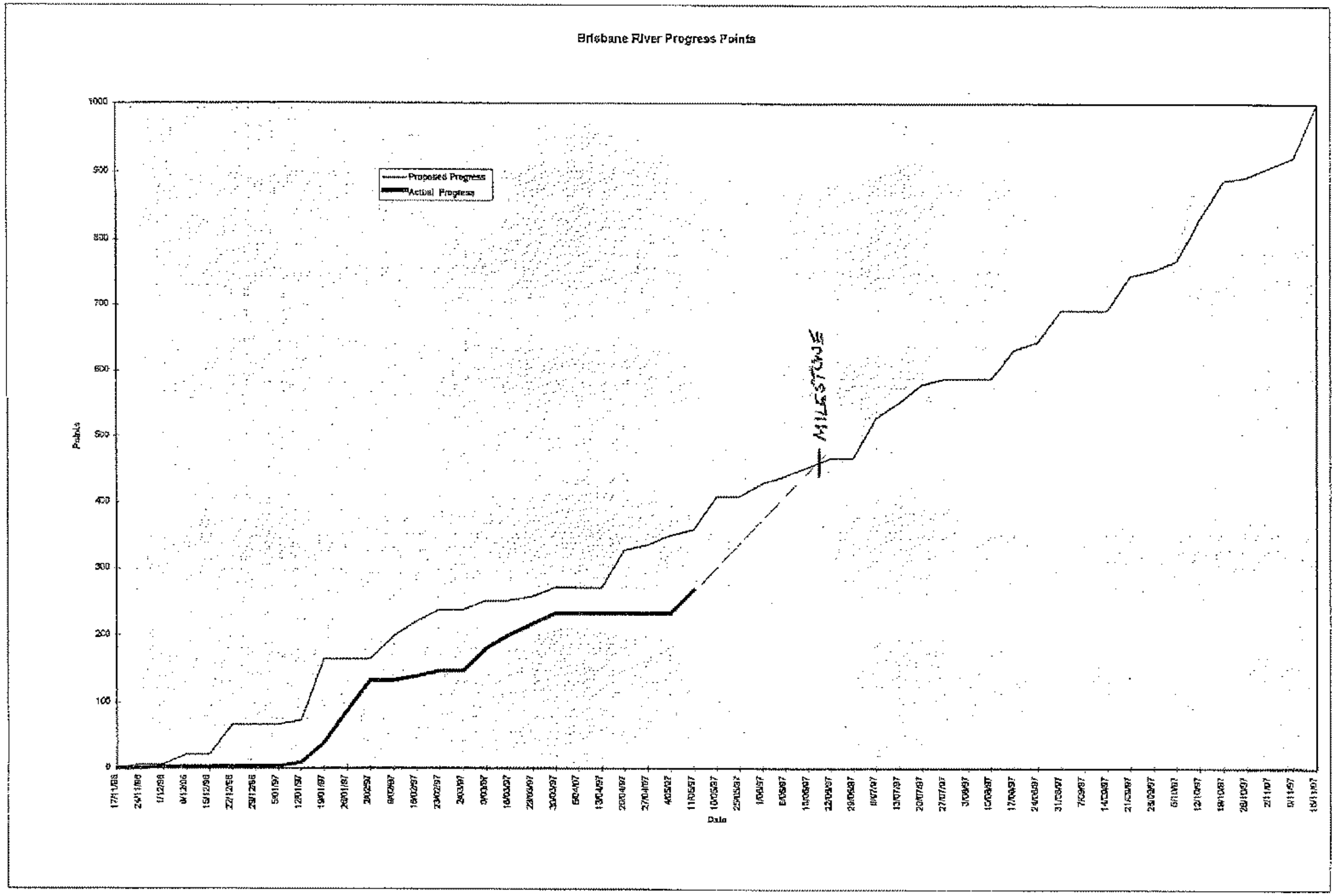
I hope to further discuss the above issues at next weeks meeting however should you have any queries prior to this meeting please contact me at this office.

Regards

[redacted]

Scott Abbey
Project Manager

Week Ending	Proposed Progress	Actual Progress
17/11/96	0	0
24/11/96	6	0
1/12/96	6	3
8/12/96	22	3
15/12/96	22	3
22/12/96	67	3
29/12/96	67	3
5/01/97	67	3
12/01/97	73	9
19/01/97	165	40
26/01/97	165	88
2/02/97	165	133
9/02/97	199	133
16/02/97	221	139
23/02/97	238	147
2/03/97	238	147
9/03/97	252	181
16/03/97	252	201
23/03/97	258	217
30/03/97	272	233
6/04/97	272	233
13/04/97	272	233
20/04/97	328	233
27/04/97	336	233
4/05/97	350	233
11/05/97	359	269
18/05/97	409	
25/05/97	409	
1/06/97	429	
8/06/97	440	
15/06/97	454	
22/06/97	468	
29/06/97	468	
6/07/97	529	
13/07/97	552	
20/07/97	580	
27/07/97	588	
3/08/97	588	
10/08/97	588	
17/08/97	633	
24/08/97	644	
31/08/97	692	
7/09/97	692	
14/09/97	692	
21/09/97	745	
28/09/97	754	
5/10/97	768	
12/10/97	832	
19/10/97	888	
26/10/97	894	
2/11/97	908	
9/11/97	922	
16/11/97	1000	



BRISBANE RIVER FLOOD STUDY DESIGN ASSESSMENTS

15/05/97 10:46

T004157

MDS

	May-97																		Jun-97																		
	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
RAFTS Design Floods	■	■	■						■																												
Flood Frequency Analysis				░	░	■	■	■																													
HEC-RAS Calibration										■	░	░	■														■										
Final Design Events (Dams inc)														■	■	■	■	░	░	■	■	■	■	■	░	░											
Rating Curves, High/low Hazard, Flood Characteristics																												■	■	■	■						
Reporting																															■	░	░	■	■	■	■

07

DATE ____/____/____

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	BRISBANE CITY COUNCIL	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	20 May 1997
Copies:		**No of Pages:**	2

Subject: BRISBANE RIVER FLOOD STUDY DESIGN EVENTS ASSESSMENT

Martin

Thankyou for arranging the meeting for tomorrow, there are several issues which we need to discuss with you in order to progress the study. These issues are detailed in the following sections.

1. **Dam Operations Modelling.**

We have been looking at the best way to handle the operations of the Wivenhoe and Somerset dams in the generation of design hydrographs and flood forecasting operations. Due to the limited capabilities of the current RAFTS model to handle complex operating rules associated with these dams it was decided that a separate dam operations model would be appropriate. (The model may be able to be incorporated into RAFTS at a later date by WP Software.)

DNR developed a model as part of their study. We have contacted DNR trying to get the model but we were advised to take the matter up directly with the SEQWB. On contacting [redacted] of the Water Board he advised that the Board would be very reluctant to release the dam ops model to anybody. This is due to possible liability issues associated with dam ops that may be discovered by the other user. He advised that he thought the Board would be more comfortable if an independent model was set up. In that way they would have no responsibility for the model or the results that it would produce. [redacted] also advised that the basis of any models, the actual operating rules, are currently being reviewed and any existing model may not be reliable. He commented that regardless of the written ops rules the dam operator may elect to alter these rules based on conditions at the time.

This probably leaves us with the option of developing our own model based on the published operating rules, which may change due to the current revision. It would have been helpful to at least have access to some aspects of the DNR model such as storage routing functions etc to make our job a bit easier.

An alternative would be to have the DNR run a series of dam inflow hydrograph simulations using their model to produce outflow hydrograph estimates for the dams which could then be input directly into the RAFTS model for analysis. This approach would be cumbersome during the assessment of the design events due to the range of inflow hydrographs and dam storage level combinations to be assessed. However in a flood forecasting mode this is most likely the most practical approach. That is you would be getting real time data from the actual dam operators for use in the model. This is what BOM do for their flood forecasting model.

From this it can be seen that the approach to the best handling of dam operations is not clear and has the potential to delay the progress of our study.

[redacted]EQWB) made the comment that he was a little disturbed that there would ultimately be three models of the Brisbane River (DNR, BOM, BCC) and that there has been no co ordination of effort between each of the parties concerned and SKM.

2 Design Events Rainfall Modelling.

For the modelling of the design events rainfall it was assumed that we would base this on the work done previously. On review of the DNR work we have found that the data files supplied to us and the actual data published in the reports were not consistent. I have tried to get this matter clarified through [redacted] at DNR however due to his high workload and other higher priorities his responses have not been very helpful. Given that it is unlikely that we will get any high priority support from [redacted] in the near future, in order to keep the project moving along it would be best for us to generate our own rainfall data .

We will discuss the methodology for doing this with you tomorrow and will be looking for some advice and direction.

Regards

[redacted]

Project Manager

BRISBANE RIVER 21/5/97

Ken Morris

• Design Events Assessment Martin Giles

SAA / TLF

→ Pre-dam vs Post-dam

↳ down to arrangements
as what to do.

→ Refer to fax of 20/5/97.

Ⓐ Brisbane R Flood Forecasting

– some are to decide on ROM

– ROM – d/s of Wivenhoe

– may only run bottom part of the
model with an u/s hydrograph

– not expected to look @ a myriad
of operating rules

• Standard Operating Rule – somewhere
determine one.

– 4 locations for OR

→ take a big flood.

Outcome: May not need black box
May be able to do something in RAFTS.

If can't get Water Board OR model, but
have the OR.

BCC have to make decisions on what is
happening in the Brisbane R, based on what
the Board is doing!!

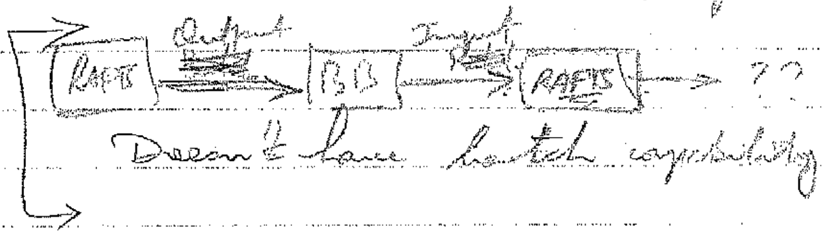
Q: Can we get a minimum set of OR?
Board has to be aware of what BCC
is doing & the use of the flood land
for development in the future.
⇒ Compensation of OR changes & FL increase

Suggestion : Joint Meeting of SEQ WB / DCC / SKM to discuss the objectives of this study and ~~#~~ rationalisation of various parties

- Normal operation → inputting hydrograph @ Maggiolo
  → Has to be very good for the prediction of FL's.
- Maggiolo to Dam → has to be of suitable quality.
- Dam w/o → Black Box OK.
- RAFTS update → Black Box → Visual basic.
  — Microsoft Access —

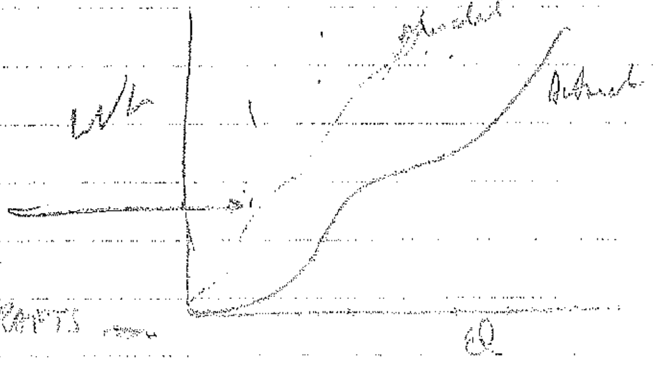
RAFTS → Notoriously hard
→ Links to blackbox, [illegible]

KM → to make enquiries about the possibility of linking to another program.



Doesn't have batch capability

- Storage level @ start of Flood will determine the OR implemented.
  ie Need OR rule which covers this minimum influence.



Have to generate this OR curve & implement in the RAFTS model.

③

KM – Happy to use this ~~result~~ approach in the model for flood forecasting.

Outcome: life has been made a lot easier.
Meeting: RCC happy to attend with SEQWB.

DNR DESIGN EVENTS OUTPUT / AUDIT

o Focussed on Pine river area.
o Mean design event data
  – doesn't match recorded rainfall
o don't have time to wait for DNR
o DNR priority
o SKM – [illegible] [illegible] [illegible] over [illegible]
  is using all basin of [illegible]
  on the fringe.

→ Design event.

o One day rain & one day rainfall

o Storage level? Fall? Probability?

1974 flood → revised from Sept 72.

Patrick [illegible]

Q: What is the sensitivity???
  – covers 50% of the catchment.

1800 km² → 7000 km²   7000 km² [illegible] Catchment.

1/3 (110) [illegible]

④

* Extra Data

⊛ BCC Data
Subtract 3.77 ft to convert to metres

1955 → Significance
Also flood level based on 1955
because of Somerset Dam.
Ignore 1800's floods because of S.D.

Q: Do we go through recalibrating
the 1955 flood ??
SM → Calibration to data
– 2 sets of "…"
high floods / low floods.

→ Hydrology → better data than hydraulics
because of poor rating &
backwater effect.
1974 – very good
1973 – OK

Discard

2nd set
↓
1974 – highly losses

If ignore second set & use, gives
higher flood level for more
frequent floods.

• 1955 (others) → concerns about not using
all available data.
If Critical Duration = 24 hrs, need at
least 6 h recordings.

(5)

KM => use only as verification flood ?
=> assess what recording by ?
=> any evidence ?
=> add on – cost ?

=> Std => Flood Engineering => Handbook

• Merivale Railway Bridge – point out the effects of this on the flood levels

TMB – Volume 1 of Waterway Management ??

* 1955/1931 → Flood profile plot : may be of use.

Program → cleaning 19/6/97 deadline
→ Be on time or please
→ [illegible] again on Friday
→ Stagnated a lot this week → Due staffs etc
→ Data deadline.

End of meeting

• Pullen Pullen Ck Study => Frances.
What to do? => Draft for KM to review & get feedback.
=> Providers will learn from it each responsibility.

• Workload => Brisbane
Tingalpa – $240 – 00 } for Pullen Ck Frances
TWB –

TO84157

21/3/97

BRIS RIVER

MEETING TLF/SAA/ Ken Morriss / Martin Giles

- dam ops → Most likely scenario only / from the Board.
  → need Meetg with SEQWB. ASAP SAA

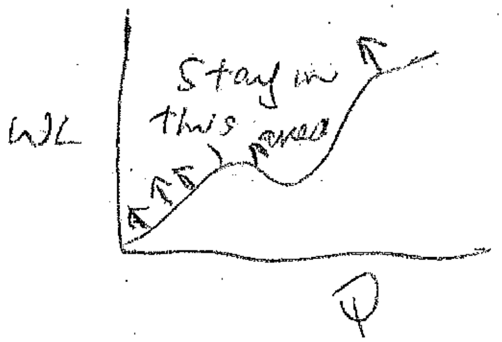
Black box for most likely OPS Rule
check 74 relationship. to determine [illegible]

Floodforecast at Moggill Gauge.

Flood Forecast Hierachy
Works well from Moggil D/S.
reasonable rnd part model — Model to Dam
Dam → upwards only if absolutely necessary.

Input/out via Microsoft Access. is this possible.

Generate Dam ops rule
as a WL vs Q input into RAFTS.

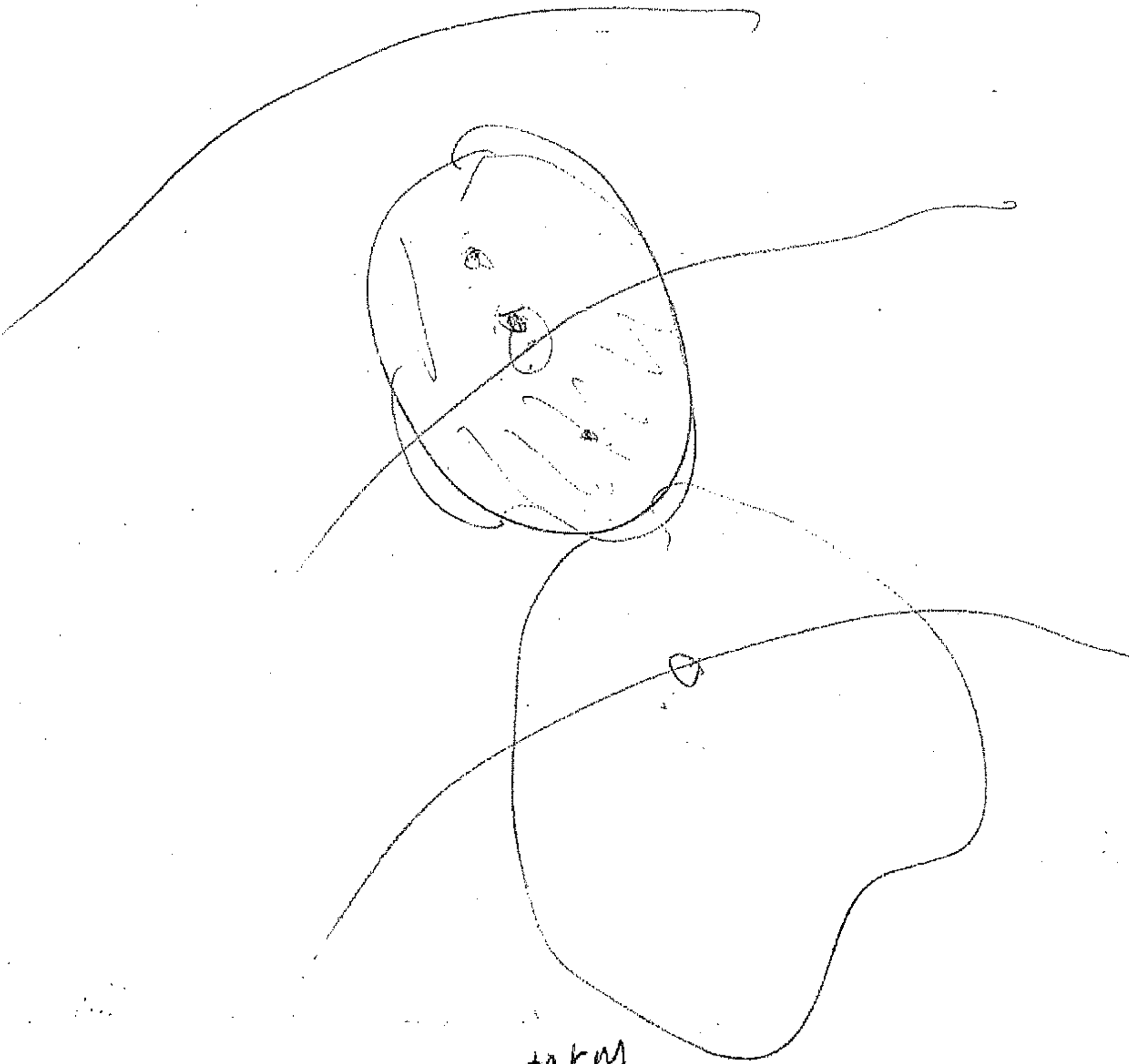


Likely sensitivity of dam level.

check Synthetic record Dam levels

Check RF say 3 months prior
to main events.

check with Santina: VOL 1 STAT PLAN MANAGEMENT
BRIS WATERWAYS.



① Draft of letter to KM wrt Rolling Pullen Pullen Ck!

② NUNDAH [want to start. (End of July]. Start up of Nundah Study

→ Start work end October finish 30/6/96
must put in Trunk lines Tingalpa
and Bris River.

meet client requirements expansion of resources.
Table Bris River Bid + Nundah Bid
also Status of current Jobs -

FAXED

DATE:......../........./.........

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	22 May 1997
Copies:		**No of Pages:**	2
Subject:	BRISBANE RIVER 1931 AND 1955 FLOODS		

Martin,

We have reviewed the scope of work and the data availability associated with the RAFTS/MIKE11 verification using the 1955 and 1931 floods.

Data Availability

☐ Flood levels - as per Refidex books supplied by Council

☐ Streamflows - based on discussions with Paul Martin at DNR, there would be roughly 10 to 15 gauges where manual stage readings would be available. These may be 9am readings and depending on the diligence of the reader,some may have extra levels during the flood.

☐ Rainfall depths - the daily read rainfall network for the 1931 and 1955 storms is reasonable with roughly 50 to 60 gauges in the catchment that were installed prior to 1930.

☐ Pluviographs - this data is limited to one station (Brisbane RO) in 1931 and two stations (Brisbane RO and Toowomba) in 1955. This is a major limitation to the RAFTS verification work.

Scope of Work

The scope of work would include:

1. extract the 1931 and 1955 flood levels from Refidex and assign corresponding MIKE11 chainage.
2. obtain daily read rainfalls from Bureau of Meteorology , produce isohyetal plans and assign rainfall depths to each RAFTS node.
3. obtain pluviographs from Bureau of Meteorology (assume these are available) and incorporate into RAFTS model
4. obtain streamflow data from DNR and incorporate into RAFTS model
5. run RAFTS for 1931 and 1955 storms (adjusting initial and continuing losses as appropriate and retaining pre-Wivenhoe RAFTS parameters) to match historical discharges
6. input RAFTS hydrographs into MIKE11, run MIKE11 and compare predicted and recorded flood levels.
7. prepare brief report of verification outcomes. This includes figures similar to those given in the Model Calibration Report and QA review. This report would be later incorporated into the final study report.

Estimated Fees

The estimated fees for this work (excluding any charges that DNR and BOM may apply) are given below. These are based on hourly rates detailed in our proposal.

Task	**Fee($)**
RAFTS modelling (Items 2,3,4,5)	$3280
MIKE11 modelling (Items 1,6)	$1440
Brief report (Item 7)	$2440
TOTAL	$7160

Alternative Approach

The above work relates to RAFTS and MIKE11 verification against the 1931 and 1955 data. This may be limited by the lack of pluviograph data and the "next best" activity would be to check the MIKE11 model using inflow hydrographs based on historical streamflow data(ie no RAFTS modelling). As the available flow data would most likely consist of a few points on the flood hydrograph, some assumptions would be required to synthesize MIKE11 hydrographs from the historical data (eg use data from upstream gauges if possible). We would need to obtain and review the available streamgauge data from DNR to determine if this is a reasonable approach.

Assuming data is OK, the MIKE11 verification using synthetic inflow hydrographs based on historical streamgauge data would involve:

1. extract the 1931 and 1955 flood levels from Refidex and assign corresponding MIKE11 chainage
2. obtain streamflow data from DNR and synthesize MIKE11 inflow hydrographs
3. run MIKE11 and compare predicted and recorded flood levels
4. prepare brief report (fax format) and QA review

The estimated fees for this alternative approach would be $ 3000.

We will continue with the design events assessment and await your advise on the course of action for the use of the 1931 and 1955 flood data.

Regards

[redacted]

Scott Abbey

Facsimile transmission from

BRISBANE CITY COUNCIL
WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
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Australia 4001

File:

Date
03 June 1997

To Sinclair Knight Merz		**Facsimile No.** [redacted]
Attention Mr Scott Abbey		**No. of Pages** *(including this page)*
From Martin Giles	**Phone No.** [redacted]	**Facsimile No.** [redacted]

Re
BRISBANE RIVER FLOOD STUDY- COMMENTS BY NEV GIBSON

Due to his knowledge of every waterway in Brisbane, I asked [redacted] for his comments in relation to the calibration report for the flood study. His comments/ suggestions were as follows:

- The Brisbane River as a natural levee along its banks. Has the effect of this levee been included in the MIKE11 model? Flooding behind the levee results from backflow through the pipe system. No effective flow occurs until the levee is overtopped. For example, New Farm Park and surrounds.
- A roughness value of 0.47 appears high but could be as a result of levees (as described above) not being properly accounted for.
- At Indooroopilly, there are actually three bridges (2 rail and 1 road) rather than the two stated in the report.
- With regard to modelling of the 1931 or 1955 floods, it may be the case that only the Victoria Bridge was in place in 1931. In any event, the present bridge was constructed during the 1960's, with the previous bridge in place until the completion of the new bridge. The old bridge had shorter spans and therefore more piers. The most recent rail bridge at Indooroopilly was completed in the early sixties. The Hydraulic Structure Reference Sheets should provide details of construction dates.

I trust that the above information is of some value for modelling. If you have any queries in relation to this information, please do not hesitate to contact me.

Regards

[redacted]

Martin Giles
Engineer Waterways

09

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	12 June 1997
Copies:	1	**No of Pages:**	2
Subject:	BRISBANE RIVER FLOOD STUDY DESIGN REPORT		

Martin

This is just a progress report to let you know what is happening with the Brisbane River Flood Study Design Report.

We are still having discussions with South East Queensland Water Board about emergency release procedures for Somerset Dam and are confident that we have proposed a final release configuration. We should know within the next couple of days if this configuration is satisfactory.

The design rainfalls have been determined using Civilcad and we have derived isohyetal rainfall depths using standard temporal patterns. These isohyetal rainfall depths were derived using the HYDSYS software that we have developed. The resulting output is that we have isohyetal rainfall depths for approximately 250 locations. The logic behind the derivation of this many rainfall depths was to account for the spatial variation since little work has been done with areal reduction factors for catchments of this size.

The problem we have found using this procedure is that RAFTS will not allow us to input 250 rainfall stations although it is a 500 node model. WP Software were not able help us pinpoint the problem as they indicated that the model should be able to handle up to 500 rainfall stations. We have wasted almost a week tracking down the problem however, we have identified that RAFTS will only handle approximately 200 rainfall stations. We are currently in the process of trying to get WP Software to increase the array size in their software, which will allow us to input the required amount of rainfall stations.

We have almost completed the flood frequency analysis and the HEC-RAS model has been developed however, since the remaining work is based on the results produced by RAFTS ,we are unable to continue until WP Software has fixed the problem. WP Software are aware that this is a matter of urgency and I am expecting a call this afternoon to let me know if they can fix the problem.

This has put us a week behind schedule and therefore we request an extension from the 19 June to the 27 June to complete the draft design events report. Should WP not be able to rectify the problem by next Tuesday other arrangements will have to be made.

Prior to the completion of the design events assessment, a decision from you whether you require us to use the 1931 and 1955 floods as verification events is also required as this may impact on the model structure and the timing of delivery of results. Details for this assessment is contained in our fax dated 22 May 1997. Your consideration of our request for the milestone date extension and advice on the 1931 and 1955 floods would be appreciated.

We will keep you informed of any further developments and if you have any other problems could you please contact me on [redacted]

Regards

[redacted]

Scott Abbey
Project Manager

Facsimile transmission from
BRISBANE CITY COUNCIL
WATERWAYS SECTION
Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
16 June 1997

To
Sinclair Knight Merz

[redacted] Noted [redacted] [illegible] [redacted]

Facsimile No.
[redacted]

Attention
Mr Mark Salisbury/ Scott Abbey T0Ø4157

No. of Pages 1
(including this page)

From
Martin Giles

Phone No.
3403 6987

Facsimile No.
[redacted]

Re

BRISBANE RIVER FLOOD STUDY- CALIBRATION REPORT

As requested in your facsimile of 16 June 1997, the following storm surge levels are applicable in Moreton Bay:

1 Year	RL 1.47 m AHD
2 Year	RL 1.50 m AHD
5 Year	RL 1.55 m AHD
10 Year	RL 1.60 m AHD
20 Year	RL 1.75 m AHD
50 Year	RL 1.88 m AHD
100 Year	RL 2.14 m AHD (see note below)

When giving out storm surge level information to determine minimum floor levels, a 300 mm allowance is made for the Greenhouse effect. With rounding to the nearest 0.1 metre, this means that a Storm Surge level of RL 2.5 m AHD is quoted for the 100 year event in Moreton Bay. It is considered that this latter figure should be used for modelling purposes.

2.4

The above storm surge levels were taken from Mallon, T.D. *Report on Low Level Development in Redcliffe*, Redcliffe City Council (1987) and have been used in the Bulimba Creek and Kedron Brook flood studies.

No Greenhouse related increase in level is necessary for the 20 year event.

I trust that this answers your query adequately. If you have any further queries, please do not hesitate to contact me.

Regards

[redacted]

Martin Giles
Engineer Waterways

Facsimile transmission from

BRISBANE CITY COUNCIL
WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
17 June 1997

To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Mr Mark Salisbury/ Scott Abbey		No. of Pages 1 *(including this page)*
From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]

Re

BRISBANE RIVER FLOOD STUDY- 1931 AND 1955 FLOOD EVENTS

We have reviewed your facsimile of 22 May 1997. Please proceed with modelling of the 1931 and 1955 events for the full scope of work outlined in your facsimile (i.e. the $7,160 alternative).

It is intended that the events will be added to the other calibration and verification events for the final report.

We would prefer it if the work associated with the modelling could be billed for the period ending 30 June 1997.

If you have any queries in relation to this matter, please do not hesitate to contact me.

Regards

[redacted]

Martin Giles
Engineer Waterways

SINCLAIR KNIGHT M
REC'D 17 1997
ACT
[redacted] [redacted] Noted
Noted include in Workplan
JOB NO. T004157

5030

TELEPHONE MESSAGE

JOB BRISBANE RIVER. FILE T094157.

PHONE CALL TO/[✓ FROM] MARTIN GILES TIME

OF PHONE DATE 21/6.

DETAILS OF MESSAGE:

- Bill additional $7160 ASAP
(already Done)

- Proceed ASAP with rising events.
Complete analysis but hold on final profile drafting
Present data in spreadsheet form.
Complete drafting after validation event complete and status of MIKE11 Calibration is confirmed.

- Timing & advised should be available
≈ 4/July 97

BY: [redacted]

CIRCULATION & ACTION

NAME	ACTION REQUIRED	INIT'	DATE
[redacted]	To Note.		

DATE: / /

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To: BCC

Attention: Martin Giles

Fax No: [redacted]

Copies:

Subject: CALIBRATION OF THE HEC-RAS MODEL FOR BRISBANE RIVER

From: Scott Abbey

Job No: TO04157

Date: 30 June 1997

No of Pages: 3

Martin

Attached are plots of the comparison between MIKE 11 and HEC-RAS for the 100 year and 10 year ARI design storms.

We are looking for some feedback in relation to whether you want the calibration of the HEC-RAS model to use scaled MIKE 11 mannings n values. The attached plots are the MIKE 11 mannings n values that have been scaled by a factor of 0.85.

You will notice for both floods that generally the HEC-RAS water levels are reasonably consistent with the water levels estimated by the calibrated MIKE 11 model. To obtain a better calibration between the two models we will have to adjust HEC-RAS mannings n values at specific locations.

Generally the difference between the two models are within 150 mm however the maximum difference for the 10 year flood is 180 mm and 300 mm for the 100 year flood.

Could you please let me know if the scaled MIKE 11 values are preferable or if you want the HEC-RAS model calibrated further. Please contact me as soon as possible so we are able to continue with this phase of the work.

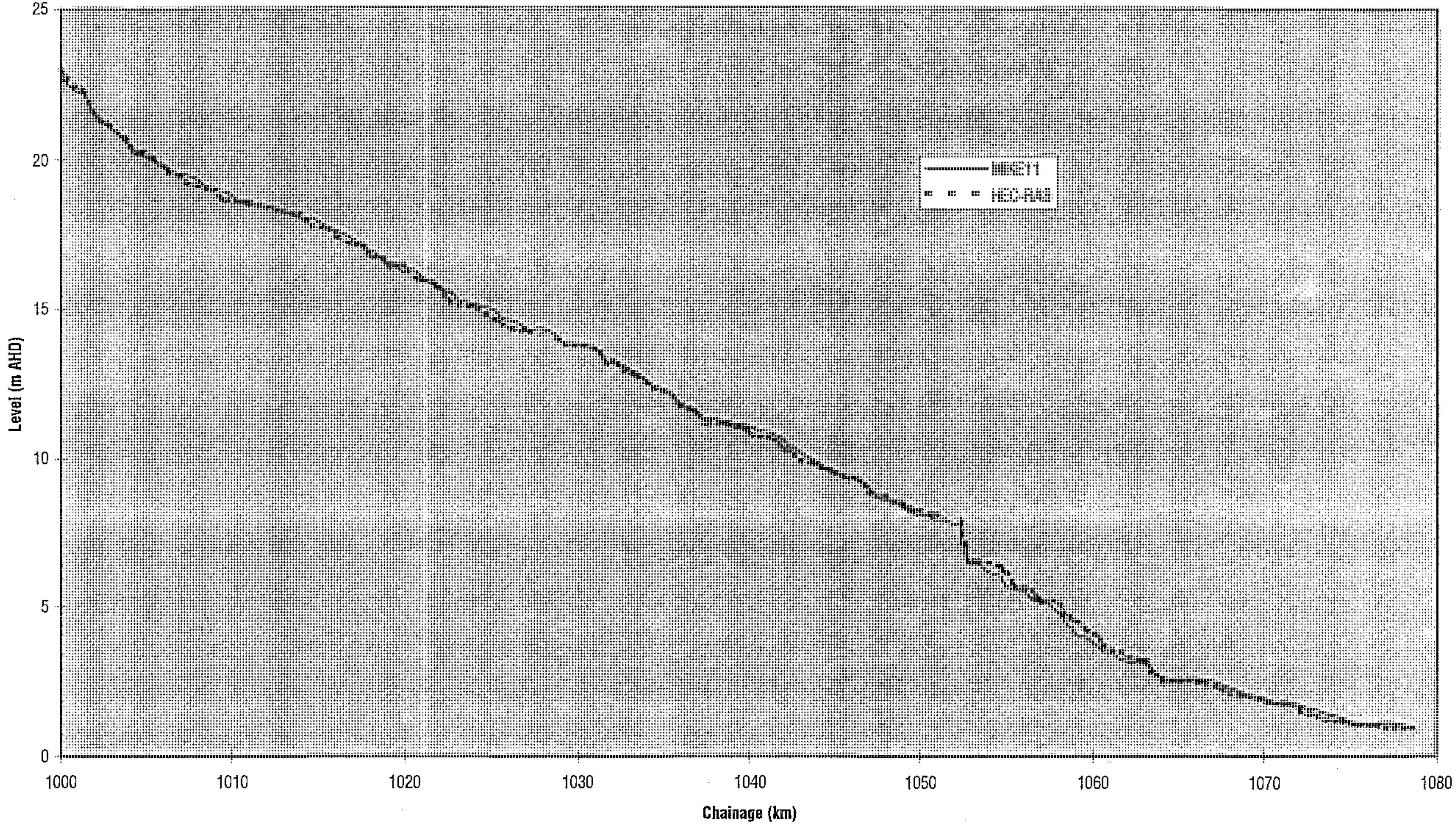
Regards

[redacted]

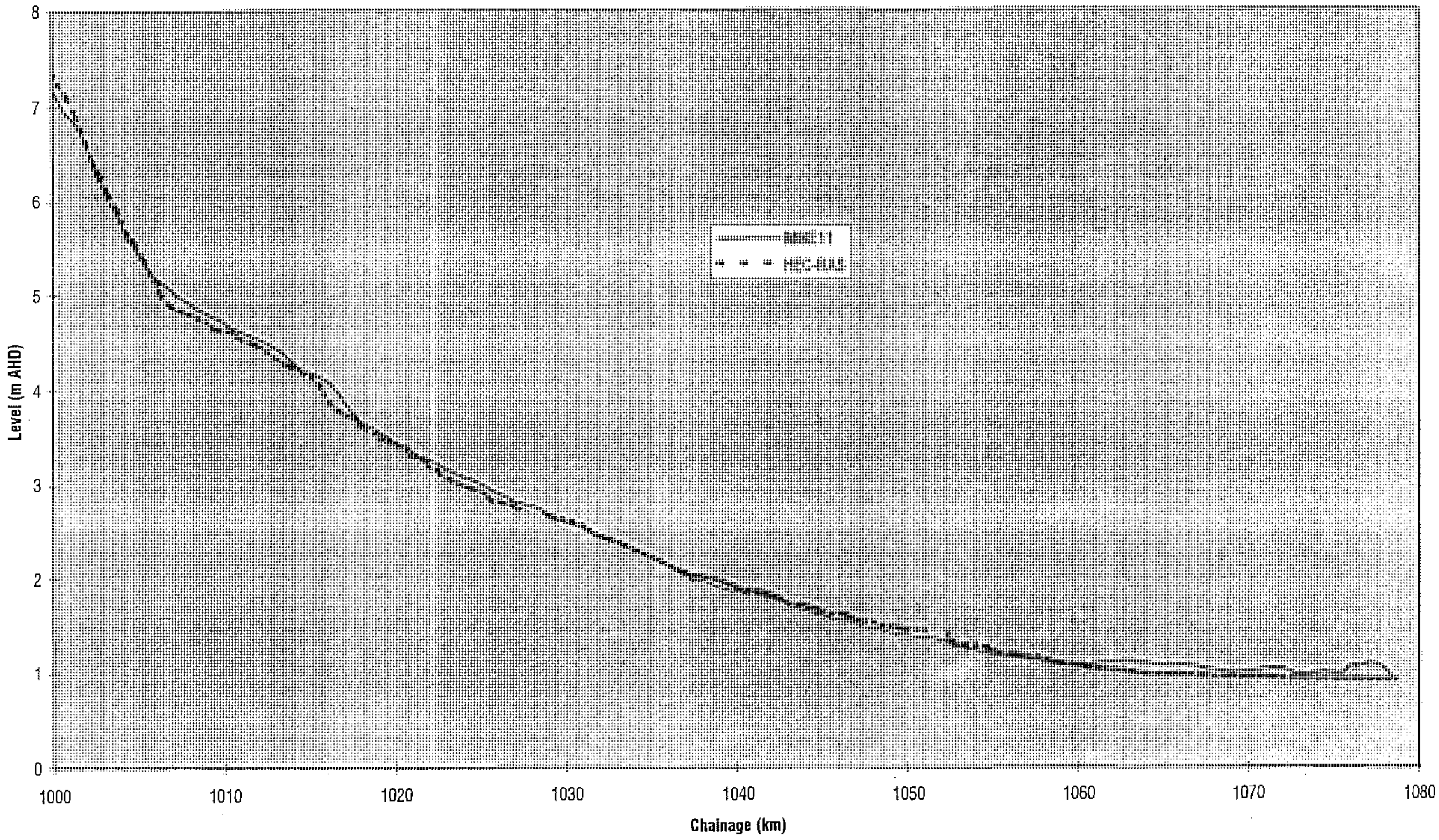
Scott Abbey
Project Manager

C:\MSOFFICE\WINWORD\MGCALHR.DOC

100 Year Comparison



10 Year Comparison



FAXED

DATE: / /

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	15 July 1997
Copies:	1	**No of Pages:**	4
Subject:	DAM OPERATING PROCEDURES		

Martin

As discussed we have done some additional RAFTS modelling for a number of dam starting water levels and operating procedures for the 100 year ARI design flood. The table below presents results and details of these runs.

Wivenhoe Starting Water Level (m)	Wivenhoe Release Procedure	Somerset Starting Water Level (m)	Somerset Release Procedure	Discharge Lowood (m^3/s)	Discharge Moggill (m^3/s)	Discharge Port Office (m^3/s)
67.0 - full	Emergency	100.5 - full	Emergency	9300	9550	9550
67.0 - full	Procedure 4	100.5 - full	Emergency	9500	9650	9650
59.0 - half full	Emergency	95.5 - half full	Emergency	6450	7550	7550
57.0 - quarter full	Emergency	90.5 - quarter full	Emergency	5950	7550	7550
-	No Release	-	No Release	5300	7500	7500

Somerset Dam

The operation procedure for Somerset Dam states that once a level in the dam reaches 100.5 m that the crest gates are to be raised to enable uncontrolled discharge. The regulator and sluices are to be kept closed until either:

- ☐ the inflow into Wivenhoe Dam begins to decrease, or
- ☐ the level in Somerset dam exceeds RL 102.25 m.

Since the RAFTS model cannot handle the first condition (ie dam level changes) the second condition was adopted as the emergency procedure.

Wivenhoe Dam

Emergency procedures are as set out in the Manual of Operational Procedures for Flood Mitigation for Wivenhoe Dam and Somerset Dam (Sep 1992).

Procedure four was chosen as the alternate operation procedure as the water levels at Gregor's Creek, Woodford and Lyon's Bridge for the 100 year flood met with the conditions specified on page 30 of the Manual of Operational Procedures for Flood Mitigation for Wivenhoe Dam and

Somerset Dam (Sep 1992). Procedure four states that the combined flow at Lowood is not to exceed 3 500 m^3/s until the water level in Wivenhoe reaches RL 74 m. Once the level in Wivenhoe reaches RL 74 m, releases are increased until the level behind Wivenhoe Dam decreases.

This procedure could not be modelled in RAFTS and hence the procedure was simplified to the following:

☐ no release occurred until the water level in Wivenhoe reached RL 74 m, and
☐ once a level of RL 74 m was reached emergency release rates were adopted.

These assumptions were considered to be reasonable as in the 100 year ARI 30 hour design flood the releases from Wivenhoe prior to Lowood exceeding the maximum flow of 3 500 m^3/s were small. Similarly, once a level of RL 74 m is exceeded the safety of the dam is compromised thus emergency procedures would be a likely option.

Discussion of Results

From the above table it can be seen that when peak flows at Lowood, Moggill and Port Office were compared for the dams full case, procedure 4 and the emergency release procedure resulted in similar peak discharges. This was due to the peak flows from Wivenhoe, Lowood and Moggill all coinciding at approximately 48 hours. These cases were considered to be the worst case flows for the 100 year ARI flood.

Since the change in procedures did not reduce the peak flows the starting water level in each of the dams was reduced to half full and quarter full (emergency release procedures were used for both dams). From the table it can be seen that this reduced the flow at Moggill and Port Office to approximately 7 500 m^3/s. Rating curves for Moggill and Port Office are attached to give you some indication of approximate changes in water levels at these sites for each scenario.

To determine the lower limit of expected flows at the Port Office and Moggill, the RAFTS model was rerun with the exclusion of Wivenhoe Dam, Somerset Dam and the above catchments. This case assumed that Somerset and Wivenhoe Dams were capable of storing the total flood volume upstream of Wivenhoe (100 year ARI). The results show that peak flows at Moggill and Port Office are similar (7 500 m^3/s) to the half and quarter full dam cases. This suggests the answer lies somewhere between 7 500 m^3/s and 9 650 m^3/s.

It is our view that it is not acceptable to assume starting water levels for either dams without some basis. Our advice from Rory Nathan suggests that a joint probability analysis should be conducted on likely historical dam levels and the design storms. This analysis will provide some basis for starting dam water levels. A final methodology for the joint probability was never completed as it was decided by council to assume the dams were full. Should you require us to carry out a joint probability analysis a suitable methodology can be provided.

If you have any queries regarding the above please contact me on (076) 398 417.

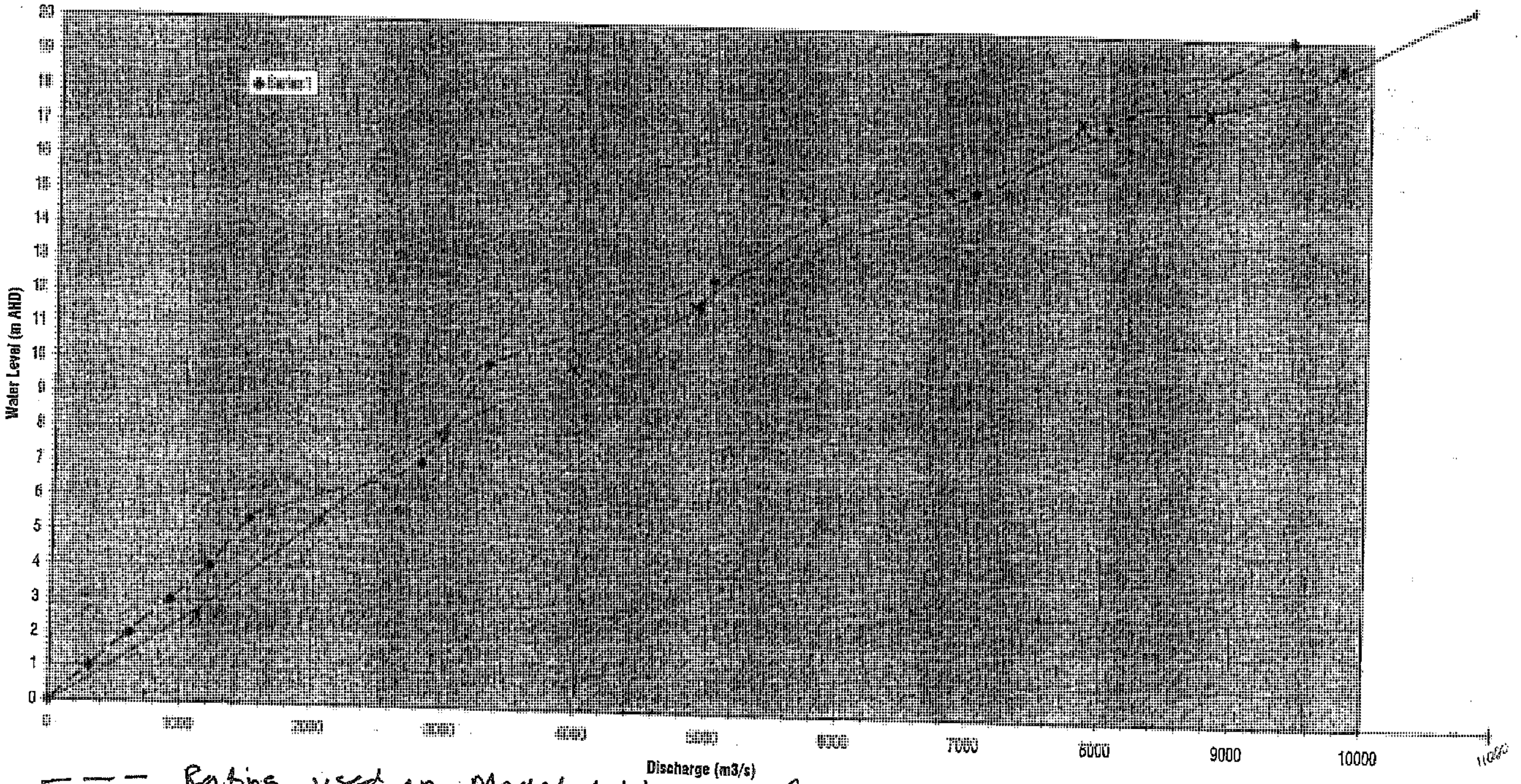
Regards

[redacted]

Scott Abbey
Project Manager

D:\DAMOPSMG.DOC

Rating Curve (BOM) 1006.3 km



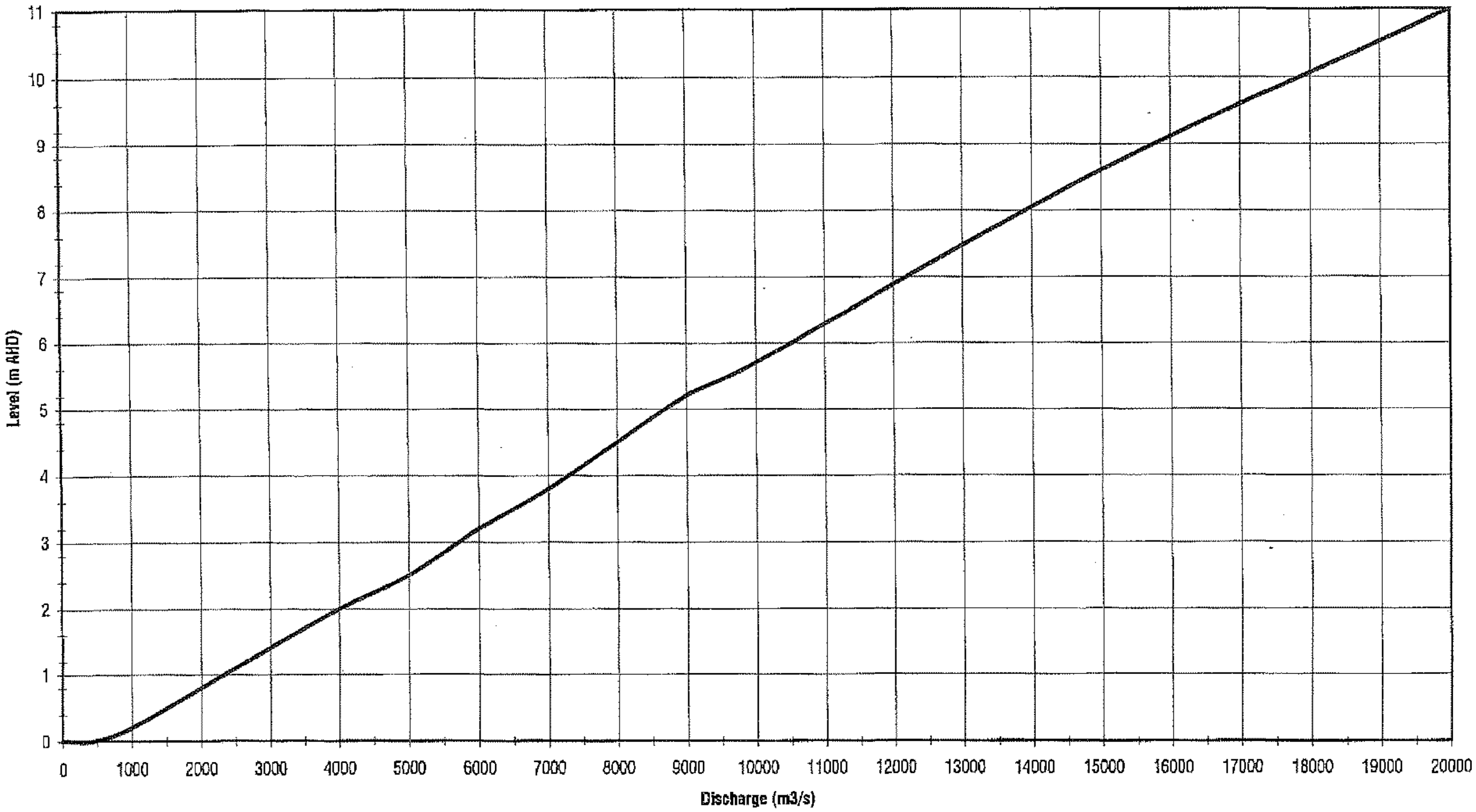
— — — Rating used in Model Calibration Report

—— Revised rating based on MIKE11

MOGGILL RATING CURVES

Figure 1

Rating Curve at Port Office (Assume -0.15mAHD at Bar)



SINCLAIR KNIGHT MERZ

Facsimile Transmission

To:	BRISBANE CITY COUNCIL	**From:**	Scott Abbey
Attention:	MARTIN GILES	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	24 July 1997
Copies:		**No of Pages:**	5
Subject:	REVEGETATION CONSULTATION BROCHURE		

Martin

TASK 10 of our proposal is Community Consultation. We (you) have liaised with the Bushland Rehabilitation unit of Council and was able to get an extensive list of potential contact groups from the document *Community Contacts by the Queensland Conservation Council.*

We have prepared a draft questionnaire to be sent to 10 groups most relevant to our study . A copy is attached for your review. The idea is to send a large plan to each group and 20 to 30 questionnaires and request feedback . Ten relevant groups have been identified. This information will be used to help with the development of the revegation strategy. We thought that we would ask if the feedback could occur with in 4 weeks of sending out the data.

Could you please review this information and provide some feedback . I would like to send the information out by the middle of next week.

I await your response.

Regards

[redacted]

Project Manager

Sinclair Knight Merz Pty Ltd A.C.N. 001 024 095
49 Annand Street, Toowoomba QLD, Australia 4350.

Telephone: +61 76 39 8400
Fax: +61 76 39 8490

BRISBANE RIVER FLOOD STUDY

REVEGETATION STRATEGY QUESTIONNAIRE

What is the Background to this Questionnaire?

In 1989, Brisbane City Council (BCC) established the Strategy Plan for the Management of Brisbane waterways with the view to protecting these valuable resources of your city.

The overall philosophy of the Waterways Strategy Plan is to gradually develop a plan by which Brisbane's remaining natural waterway corridors can be preserved, and modified urban floodways may be enhanced while minimising flood problems.

BCC have decided to augment the Strategy Plan for the Brisbane River from Moreton Bay to the city boundary at Moggill , by including the development of a revegetation strategy as part of a detailed flood study of the river. Consultants Sinclair Knight Merz are currently preparing this detailed flood study of the Brisbane River to be completed in November 1997. The primary outcomes from the study will be to provide design flood levels along the length of the river and to develop a flood forecasting model. Secondary outcomes of the study will be to set flood regulation lines along the river and to develop a revegetation strategy.

So Why This Questionnaire?

The purpose of this questionnaire is to obtain input from community environment groups and residents along the Brisbane River corridor, to document zones of ecological significance and identify areas which can be revegetated without significant hydraulic impacts.

Previous responses to a similar questionnaire for Cubberla Creek and community submissions to BCC in responses to newspaper advertisements, indicate that a significant body of ratepayers support the rehabilitation of creek environments and understand the need for planning measures to preserve this resource.

Brisbane City Council and Sinclair Knight Merz need your help to assist us in the compilation and implementation of a suitable revegetation strategy for the Brisbane River.

Revegetation - What is it?

A high priority of the Waterways Strategy Plan is to enhance the urban amenity of the waterways environments within Brisbane. It is considered that revegetation of river and creek corridors is an appropriate means of attaining this goal.

Revegetation, however, is limited by local ownership and flooding constraints. It may only occur where flood levels on private properties are not increased due to tree planting. It is anticipated that in the future, the Brisbane River may support a range of vegetation communities varying in type, form and density along the river banks forming an ecological corridor. Significant areas of overbank may also be available for revegetation.

How You Can Help Us With a Revegetation Strategy?

On the back page of this brochure is a questionnaire. Copies of the brochure and questionnaire will be distributed to environmental groups situated along the Brisbane River corridor. Due to the length of the Brisbane River corridor in question, an A1 plan of the study area has been provided to your Group Co-ordinator. We ask that on this map you mark any areas that you think should be revegetated.

We ask that you complete this questionnaire as a group and/or distribute it to any parties you feel may contribute to this study. Your input is considered a valuable component of this study, so we hope that you will rapidly complete the questionnaire and return it to the address below. Should you require further information on the questionnaire or the Brisbane River Flood Study, please direct all enquires to the Project Manager, Mr Scott Abbey at:

Sinclair Knight Merz
Reply Paid Post 198
P O Box 839
TOOWOOMBA QLD 4350
Telephone : (076) 398 400
Facsimile: (076) 398 490

QUESTIONNAIRE

1. Please mark on map provided to your group co-ordinator, locations where you or your group thinks that future revegetation may occur. Indicate the type and density of planting for each revegetation area specified on the map.

2. Please rate how strongly you agree with the following statements about the river near your home.

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
The river corridor should be revegetated	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
The river banks in the area are damaged after major storms	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
The river banks in the area require rehabilitation	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

3. Are you aware of any flora or fauna habitats that should be protected in your local area?

Yes ☐ 1 Go to Question 4

No ☐ 2 Go to Question 5

4. Please mark their general location on the map attached.

5. In terms of the future development of the river corridor, do you have any concerns or issues which you think should be addressed in this study?

____

____

6. Please detail any ideas you have for additional uses of the river corridor (eg Recreation).

____

____

7. Please provide any comments that you feel are relevant to this Study (provide extra pages if necessary).

____

____

____

____

Thank you for your assistance.

SINCLAIR KNIGHT MERZ

Calculation Record

Form ET2 August 96

Project No. T0[illegible]4157 File

SHEET No. [redacted] OF

PREPARED BY. DATE. 24-7-97

CHECKED BY. DATE.

PROJECT Brisbane River Flood Study **WORK PACKAGE** Environmental Groups

TASK Find which are appropriate **ELEMENT**

Brisbane City Council - Bushland Care Program

[redacted]

Brisbane River Management Group

FLOOR 11

[redacted]

Chelmer Bushcare Group

[redacted]

Corinda Bushcare Group

[redacted]

Norman Ck Flood Action Group

[redacted]

COMMENTS ON CALCULATION RECORD:

Comments by: Date:

SINCLAIR KNIGHT MERZ

Calculation Record
Form ET2 August 96

Project No. . . . . .File . . . .
SHEET No. . . . . 2 . . . . OF . . . .
PREPARED BY. . . . . DATE. . . . .
CHECKED BY. . . . . DATE. . . . .

PROJECT	**WORK PACKAGE**
TASK	**ELEMENT**

Oxley Creek Environment Group [redacted]

~~Peran~~ Perrin Creek Bushland Group.

[redacted]

Rivermouth Action Group

[redacted]

Teneriffe Bushland Park Group

[redacted]

Toowong Creek Working Group.

[redacted]

COMMENTS ON CALCULATION RECORD:

Comments by: Date:

SINCLAIR KNIGHT MERZ → SAO (TOBA). TO 04157. **Calculation Record** 12

Form ET2 August 96

Project No. .... File ....
SHEET No. 1 OF 3
PREPARED BY T.P. DATE 31/7/97
CHECKED BY .... DATE ....

PROJECT Brisbane River Flood Study **WORK PACKAGE** Mtg with CLIENT

TASK ——— **ELEMENT** 31/7/97 –

* 1955 Verification

Q: Consistent method for calculating initial & continuing loss — Ken Morris.

Q: Gauge with the 1955 flood.

Comment: Enquire statements are made about the afflux caused by the bridges.

Q: Are the "higher" levels for the 1955 floods in the same location as for previous calibration event? If so may need to reconsider the roughness in the reach. — checked Not really consistent. in 31 flood they are spot on.

* Dam Operating Procedures

Comment: Data still coming in from DNR.

Agreement: Run with Dam full scenario ✓

Comment: Dam operating rules are being revised for the Emergency Option.

(BBF) PMP → Various discussions & investigations — Don't let this hold up progress

Q: 1:100 flood intensity report – are we happy that it is pretty well settled. ⇒ YES

COMMENTS ON CALCULATION RECORD:

BCC has a need to get into the system!

Comments by: Date:

Form 8033

SINCLAIR KNIGHT MERZ

Calculation Record

Form ET2 August 96

Project No. .... File ....
SHEET No. 2 OF 3
PREPARED BY. TLF DATE 31/7/97
CHECKED BY. .... DATE. ....

PROJECT **WORK PACKAGE**

TASK **ELEMENT**

Comment : State govt independent work is also showing a rise in the 100 yr flood level?

: Assess whether 1974 flood mitigated with current operating rules is higher than currently published figures..

Community Consultation.

- 2 page brochure. ✓
- Washed out picture of Brisbane River ???
- — use 1974 flood photos.
- Address — Reply Paid SKM address. ✓

Program

28/8/97 → Next milestone → Draft 3

2 10/10/97 — 6 weeks

RAFTS Model → 3 weeks

— 19/6/97 → 4/7/97.
due arrived.

Task 6A ⇒. 3 weeks to get data + 3 weeks to do the analysis.

Plus. Pull back for 3 weeks @ the later stages.

⇒ 23/12/97 X4.

Also RAFTS Model didn't have enough nodes (another 10 days).

COMMENTS ON CALCULATION RECORD:

Comments by: Date:

SINCLAIR KNIGHT MERZ

Calculation Record

Form ET2 August 96

Project No. .... File ....
SHEET No. 3 .... OF 3 ....
PREPARED BY. .... DATE 2/5/97
CHECKED BY. .... DATE. ....

PROJECT	**WORK PACKAGE**	
TASK	**ELEMENT**	

SAA → to supply an updated points graph. Done.

Drafting:

- Scales – BCC to think about it – OK ✓
- WSP Routine. ← Done

BCC team

- Karen Fields → New Project Officer ✓

COMMENTS ON CALCULATION RECORD:	Comments by:	Date:

SINCLAIR KNIGHT MERZ

49 Annand Street
PO Box 839
Toowoomba QLD
Australia 4350
Telephone: (076) 39 8400
Facsimile: (076) 39 8490

1 August 1997
TO04157\SAA:L913S.DOC

Engineer in Charge Waterways
Brisbane City Council
GPO Box 1434
BRISBANE QLD 4001

Attention: Mr Ken Morris

Dear Ken

BRISBANE RIVER FLOOD STUDY
REVISED TARGET DATES

Following completion of the Design Report and review of approved work variations the following revised target dates for the completion of the Brisbane River Flood Study have been identified:

☐ Waterway Management Report	10 October 1997
☐ Flood Mapping Report	17 November 1997
☐ Community Consultation	3 December 1997
☐ Final Report/Handover	23 December 1997

Alterations to the original program are based on the following approved variations:

☐ Variation 1 - Additional work in developing the hydrological model
(3 weeks extension of time)
☐ Variation 2 - Additional verification events assessment
(3 weeks extension of time)

The project milestones have also been affected by problems with the upgrade of the 500 node Rafts model supplied by WP software (required because of the large size of the catchment model) and delays in the supply of data, from DNR for the additional verification events (3 weeks)

Quality System
Quality Endorsed Company
ISO 9001 Lic 0800
Standards Australia

Sinclair Knight Merz Pty. Limited. A.C.N. 001 024 095
Principals P Dougas (MD), E Aslaksen, D Barnes, L Black, T Boyle, R Brayshaw, P Cassell, A Condon, J Curran, B Dadd, A Davie, J Duffy, R Emslie, T Fiedler, A Gale, R Graham, R Halloran, A Harper, P Heath, M Holden, I Housley, D Howarth, P Huckerby, D Hunter, A Hurd, C Jelley, G Katari, W Kellermann, J Kelly, J Knight, W Lawson, K Levey, G Lewis, S Linforth, I Maitland, D Mathlin, N Mayo, A Milner, R Morrison, L Moseley, J Moss, P Oliver, C Poppie, R Pryor, I Purcell, M Read, G Rees, G Richardson, B Robertson, G Sharpley, O Stacy, J Stapleton, R Steele, M Thomas AM, I Thompson, W Toohey, J Tranter, R Turland, B Urwin, P Vaughan, T Whitington, J Winton, R Winton, T Winton, K Young **Associates** C Adam, T Addison, J Alban, G Alexander, P Alexander, L Appelgren, J Armstrong, R Barclay, P Baudish, C Beard, J Bell, L Benson, A Blackman, S Bond, C Bower, B Brown, K Brown, G Bullock, K Burgess, J Buttenshaw, J Campbell, J Carrabott, N Case, P Casey, D Cecil, L Chapple, B Chute, M Clarke, W Currey, I Cutler, P Dimmitt, K Dobrich, R Dunkley, B Dunn, R Dusting, T Ellis, P Erlanger, R Evans, B Fitts, T Fox, D Franklin, J French, S Gillespie, P Giltinan, D Glasson, J Green, M Greenway, P Griffin, T Hanson, M Hewitt, J Hinton, G Hoxley, F Kavanagh, R Kearton, R Keessen, C Kell, B Kettle, D Kilsby, D Kinder, N King, J Kirkland, P Kruger, G Layton, G Linke, M Mahon, A Maltby, J McEvoy, J Martin, P Minahan, S Misra, L Morris, J Mulkearns, G Mullen, R Nathan, C Needham, J Nichols, N Nielsen, D Pain, J Perks, A Petersen, J Porter, A Prout, C Pulbrook, A Prince, K Robinson, P Robson, J Russel, O Scott, M Simpson, G Sleeman, W Soong, R Taylor, Z Tonkovic, R Treacy, W Watson, M Waugh, W Wight, J Woodbury, M Young, P Zahnleiter, R Zauner. **Consultant** B Sinclair AM

Enclosed is the updated study program for the Brisbane River Flood Study.

You can be assured that every effort within our power will be made to comply with these revised target dates to ensure the timely completion of this significant project.

Yours faithfully

[redacted]

Scott Abbey
Project Manager

Facsimile transmission from

BRISBANE CITY COUNCIL

WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
04 August 1997

To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Mr Scott Abbey		No. of Pages 2 *(including this page)*
From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]
Re **BRISBANE RIVER FLOOD STUDY**		

Please find attached an excerpt from the DNR report on Wivenhoe Dam Failure Analysis which we just received from [redacted] All I can say is that I am confused and hope that a mind such as yours may be able to figure out what's going on.

Other DNR reports suggest that the 24 hour duration 100 year event produces the peak flow in the Brisbane River at the Port Office. The flow DNR reports is similar to that obtained by your model. OK so far.

The flood levels quoted in the excerpt are for 48 and 72 hour storms, and are labelled design events. For some reason the 24 hour event was not modelled and, even more strangely, the 72 hour event gives higher levels than the 24. I rang [redacted] and he seemed to indicate that the 24 hour event wasn't modelled hydraulically, which seems a bit strange. The other thing that bothers me is that whether, even though labelled design events, the flow hydrographs for the event incorporate some form of dam failure.

Since your post-Wivenhoe flow matches that quoted by DNR, I would tend to think that your flows are acceptable. Consequently, the levels quoted by DNR can be used to check the levels predicted by your model for similar flows.

Please see what you make of this information as it seems particularly strange to me.

Regards

[redacted]

Martin Giles
Engineer Waterways

Noted ~ response sent
[redacted] 18/8/97.
TO 04157

WIVENHOE DAM FAILURE ANALYSIS SUMMARY • Peak Water Surface Elevation (m AHD)

DESIGN FLOODS

Storm Centred over:		Wivenhoe	Wivenhoe	Wivenhoe	Wivenhoe	Wivenhoe	Wivenhoe
Storm Duration (Hours)		48	30 72	48	48	48	48
Storm ARI (Years)		100	100	1000	10000	IFF	PMF
BRISBANE RIVER	Wivenhoe Dam	47.6	48.0	50.8	54.0	54.4	59.8
	Lowood	43.5	43.9	47.4	51.2	51.6	57.3
	Savages Crossing	40.6	41.0	44.8	48.8	49.2	54.8
	Burtons Bridge	35.8	36.2	40.0	44.2	44.7	50.6
	Mt Crosby Weir	23.9	24.3	28.0	32.4	32.9	38.2
	Moggill	16.1	19.64 16.4	19.0	22.5	22.9	27.3
	Goodna Hospital	14.4	14.7	17.3	20.7	21.1	25.5
	Centenary Bridge	10.6	10.8	13.1	16.2	16.6	21.0
	Indooroopilly Bridge	8.6	11.37 8.8	10.5	13.1	13.4	17.0
	St Lucia Ferry	5.8	5.9	7.3	9.6	9.9	13.4
	Port Office Gauge	4.1	5.53 4.2	5.1	6.5	6.7	8.6
	Cairncross Dock	2.2	2.2	2.6	3.4	3.5	4.5
LOCKYER CREEK	Lyons Bridge	62.8	62.6	63.0	63.0	63.0	63.0
	Brisbane Valley Rail	53.8	53.7	54.	54.0	54.2	59.1
	OReilly's Weir	47.1	47.4	50.20	53.4	53.8	59.1
BREMER RIVER	Three Mile Bridge	22.9	22.6	23.1	23.1	23.1	27.3
	One Mile Bridge	20.6	21.1	20.9	22.5	22.9	27.3
	David Trumpy Bridge	18.0	17.51	19.0	22.5	22.9	27.3
	Warrego Highway	16.5	16.4	19.0	22.5	22.9	27.3

WIVENHOE DAM FAILURE ANALYSIS SUMMARY • Peak Discharge (m^3/s)

DESIGN FLOODS

Storm Centred over:		Wivenhoe	Wivenhoe	Wivenhoe	Wivenhoe	Wivenhoe	Wivenhoe
Storm Duration (Hours)		24 48	30 72	36 48	48	48	48
Storm ARI (Years)		100	100	1000	10000	IFF	PMF
BRISBANE RIVER	Wivenhoe Dam	6495	6810	9975	13495	14085	25040
	Lowood	7670 7110	9300 7395	7750 10535	14680	15240	23565
	Savages Crossing	6595	6890	9965	14330	14900	23045
	Burtons Bridge	6455	6735	9710	14045	14615	22630
	Mt Crosby Weir	6280	6550	9405	13745	14320	22200
	Moggill	8260 6665	9550 6850	8280 9170	12880	13375	19085
	Goodna Hospital	6665	6825	9080	12740	13220	18810
	Centenary Bridge	6610	6780	9005	12425	12890	18205
	Indooroopilly Bridge	6560	6740	8785	12260	12710	17850
	St Lucia Ferry	6460	6665	8570	11850	12280	17075
	Port Office Gauge	8260 6460	9560 6665	8280 8570	11845	12275	17065
	Cairncross Dock	6465	6675	8565	11835	12265	17050
LOCKYER CREEK	Lyons Bridge	2805	2590	3150	3155	3155	3155
	Brisbane Valley Rail	3340	3010	3670	3670	3670	3665
	OReilly's Weir	3240	2895	3695	2695	2800	3725
BREMER RIVER	Three Mile Bridge	885	870	870	870	870	870
	One Mile Bridge	2220	2115	2320	2325	2320	2315
	David Trumpy Bridge	2200	2090	2320	2315	2315	2290
	Warrego Highway	2040	1880	2135	1985	1955	-2320

Facsimile transmission from

BRISBANE CITY COUNCIL

WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
12 August 1997

To
Sinclare Knight Merz

Facsimile No.
[redacted]

Attention
Scott Abbey

No. of Pages 3
(including this page)

From
[redacted]

Phone No.
[redacted]

Facsimile No.
[redacted]

Re
Revegetation Strategy Questionnaire/Locality Plans

Scott,

The plans you provided for the questionnaire look good but could you also provide a cover sheet which shows all of the Brisbane River reaches in BCC boundaries. This may assist the groups in locating sites on the locality plans.

Please find attached a almost final draft of the questionnaire which was set out by JSA publishers, Milton.

Thank you,

[redacted]

Contents noted

Cover sheet prepared

[redacted] 14/8/97

T004157

Brisbane River Flood Study

We Need Your Help

Brisbane City

About the study

As part of Brisbane City Council's ongoing commitment to the enhancement of Brisbane's waterways, a flood study is currently being undertaken of the Brisbane River from Moreton Bay to the City boundary at Moggill.

The aims of the study are to :

- calculate design flood levels along the length of the river;
- develop a flood forecasting model;
- set flood regulation lines along the river; and
- develop a revegetation strategy.

What is revegetation?

Brisbane City Council wants to enhance the urban amenity and environmental value of the waterways within
Brisbane City Council wants to enhance the urban amenity and environmental value of the waterways within suitable for revegetation with endemic native
Brisbane by identifying areas along river and creek corridors which are suitable for revegetation with endemic native
trees and shrubs.

Revegetation however, is limited by local ownership and flooding constraints. It may only occur where flood levels
Revegetation however, is limited by local ownership and flooding constraints. It is anticipated that in the future, the Brisbane River may
on private properties are not increased due to tree planting. It is anticipated that in the future, the Brisbane River may support a range of vegetation communities varying in type, form and density along the river banks, forming an
support a range of vegetation communities varying in type, form and density along the river banks, forming an
ecological corridor. Significant areas of bank may also be available for revegetation.
at the top of the river

X

Why we need your help

Copies of this flyer will be distributed to environmental groups situated along the Brisbane River corridor. Due to
the length of the Brisbane River, an A1 size plan of the study area has been provided to your Group Coordinator.

Community groups such as yours possess valuable knowledge about the river's history and areas which are of
ecological significance. We want to collect any comments you may have about the Brisbane River so it can be
managed effectively and areas suitable for revegetation investigated in the flood study. You can help by taking a few
moments to complete the attached questionnaire and return it to:

Reply Paid Permit 11
Sinclair Knight Merz
PO Box 246
SPRING HILL QLD 4004

Please note that responses to the questionnaire will be confidential. You may distribute this questionnaire to any parties you feel may
contribute to this study. The closing date for submissions is Friday 29 August, 1997. If you have any enquiries relating
to the study or to information contained in this flyer, please contact Scott Abbey on phone (076) 398 400 or fax
(076) 398 490.

Your response to the questionnaire will help the Council plan for future projects along the study area.

1. **Please Mark on the map provided to your Group Coordinator, the locations where you or your group believe future revegetation should occur. Indicate the type and density of planting for each revegetation area specified on the map.**

2. **Please rate how strongly you agree with the following statements about the river in your area.**

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
The river corridor should be revegetated	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
The river banks in the area are damaged after major storms	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
The river banks in the area require rehabilitation	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

3. **Are you aware of any flora or fauna habitats that should be protected in your local area?**

Yes ☐ 1 Go to Question 4
No ☐ 2 Go to Question 5

X **Please mark the general location** of the habitats **on the map** provided to your Group Co-ordinator

5. **In terms of future development of the river corridor, do you have any concerns or issues that you think should be addressed in this study?**

6. **Please detail any ideas you have for additional uses of the river corridor (eg. Recreation).**

7. **Please provide any other comments that you feel are relevant to this Study (add extra pages if necessary).**

Thank you for your assistance.

Brisbane City Council Information
GPO Box 1434
Brisbane Qld 4001

Printed on recycled paper
JSA4238 8/97 • 500

For more information please telephone Brisbane City Council on 07 3403 8888

SINCLAIR KNIGHT MERZ

FAXED

DATE:........../........../..........

Facsimile Transmission

To:	BCC	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	07 34039902	**Date:**	18 August 1997
Copies:		**No of Pages:**	2
Subject:	BRISBANE RIVER FLOOD STUDY		

Martin

We have received you fax regarding the excerpt from the DNR report on Wivenhoe Dam Failure Analysis. I would like to be able so say that we have worked out what the DNR have done however we are just as confused as you are.

We have checked our 100 year ARI design flows and flood levels at various locations for the 24 hour, 30 hour and 36 hour duration events and found that the critical duration is 30 hours for both the dams effective and no dams effective cases. The table below presents 100 year ARI discharges at Lowood, Moggill and Port Office Gauge for the dams effective case.

Location	Discharge (m3/s) 24 hr Duration	Discharge (m3/s) 30 hr Duration	Discharge (m3/s) 36 hr Duration
Lowood	7670	9300	7750
Moggill	8260	9550	8280
Port Office	8260	9560	8280

The above discharges are greater than those reported by DNR for the 100 year ARI 48 and 72 hour duration's. The Final Draft Report on Downstream Flooding (DNR August 1993) states that the 100 year ARI critical duration storm is 24 hours with a discharge of 9120 m^3/s so why they never ran this event I can only speculate.

Regardless of whether the design events incorporate some form of dam failure flow, the peak discharges reported by DNR for the 48 hour and 72 hour are significantly less than that of the 24 hour storm hence peak flood levels should be greater for the 24 hour storm.

For dam failure analysis it is most commonly found that longer duration events are critical because of the large volumes of water associated with these storms. This may explain why the DNR never modelled the 24 hour storm as I believe their focus was to assess the integrity of Wivenhoe and Somerset Dams.

We were not required to consider dam break in our investigation however initial investigations indicate that if the dams are at full supply level failure may occur for larger events. If dam failure does occur it is likely that flood levels in the Brisbane river will increase significantly to those reported in the SKM design events report (30 hour storm duration). For our investigation we have assumed that dam failure does not occur and the critical duration was assumed to be when peak discharges were obtained within the Brisbane City Boundaries at the Port Office and Moggill.

Our 100 year ARI peak flood levels for Moggill, Indooroopilly Bridge and the Port Office were estimated to be 19.64 m AHD, 11.37 m AHD and 5.53 m AHD respectively. These levels are significantly greater than those reported by the DNR for the 48 hour and 72 hour events.

I hope this in some way may have helped but only John Ruffini can explain why they never ran the 24 hour event through their hydraulic model. If you would like to discuss this further please call me on [redacted]

Regards

[redacted]

Scott Abbey
Project Manager

SINCLAIR KNIGHT MERZ

Facsimile Transmission

FAXED
1/9/97

To: BCC [redacted]

Attention: Martin Giles

Fax No: [redacted]2

Copies:

Subject: BRISBANE RIVER FLOOD STUDY - PMP

From: Scott Abbey

Job No: TO04157

Date: 1 September 1997

No of Pages: 3

Martin

We have run the PMP events in RAFTS and found that the critical duration storm is 168 hours or above (see attached plot). The PMP events were run assuming no losses which was consistent with the loss parameters adopted for the 100 Year ARI design storm.

The predicted critical duration storm calculated by the DNR was 120 hours however a loss scenario of 0 mm initial loss and 2.5 mm/hr continuing loss were used in their analysis. To check that our model was working correctly the 120 hour storm was run using a continuing loss of 2.5 mm\hr. This resulted in a peak discharge at the Port Office of 29960 m^3/s compared to DNR estimate of 31950 m^3/s. These peak discharges were within 7% of each other hence it was considered that the RAFTS model was working correctly and our methodology was appropriate.

From the attached plot of peak discharge versus duration it can be seen that the critical duration storm is 168 hours or greater. Since information of longer duration storms is not available, if we are to adopt the no loss scenario we will have to assume the 168 hour storm is the critical duration.

Regardless of whether we assume zero losses or apply a continuing loss, the critical duration for the events with less than 100 year recurrence interval is 30 hours compared to the PMP event which is likely to be greater than 96 hours. This makes it difficult to compute the intermediate events as these events are estimated by using PMP, 50 and 100 year rainfall depths, intensities or peak discharges. Since these events are of varying durations an appropriate method needs to be adopted. We have come up with the following two methodologies:

1. An extrapolation of the IFD curves for the 100 year and 50 year ARI storms so that the intensities for a 168 hours can be estimated. Methods set out in Australian Rainfall and Runoff will then be used to estimate the intermediate events. (ie. 1000, 2000, 10000, 100000 year ARI)

2. The second method uses peak discharges for the PMF, 100 year and 50 year ARI events whereby peak discharges for intermediate events are predicted using methods set out in AR&R. Once the peak discharges for intermediate floods have been calculated, the hydrograph used for the PMF will be scaled accordingly and used for the intermediate events.

This method eliminates the need to predict critical durations for the intermediate events. A duration of 168 hours will be adopted for these events.

Could you please advise us of whether you would like us to apply any losses to the PMP events so that we can finalise which event will be the critical duration storm.

Could you also indicate which method you consider to be the most appropriate for the calculation of the intermediate storms, given the context of this study.

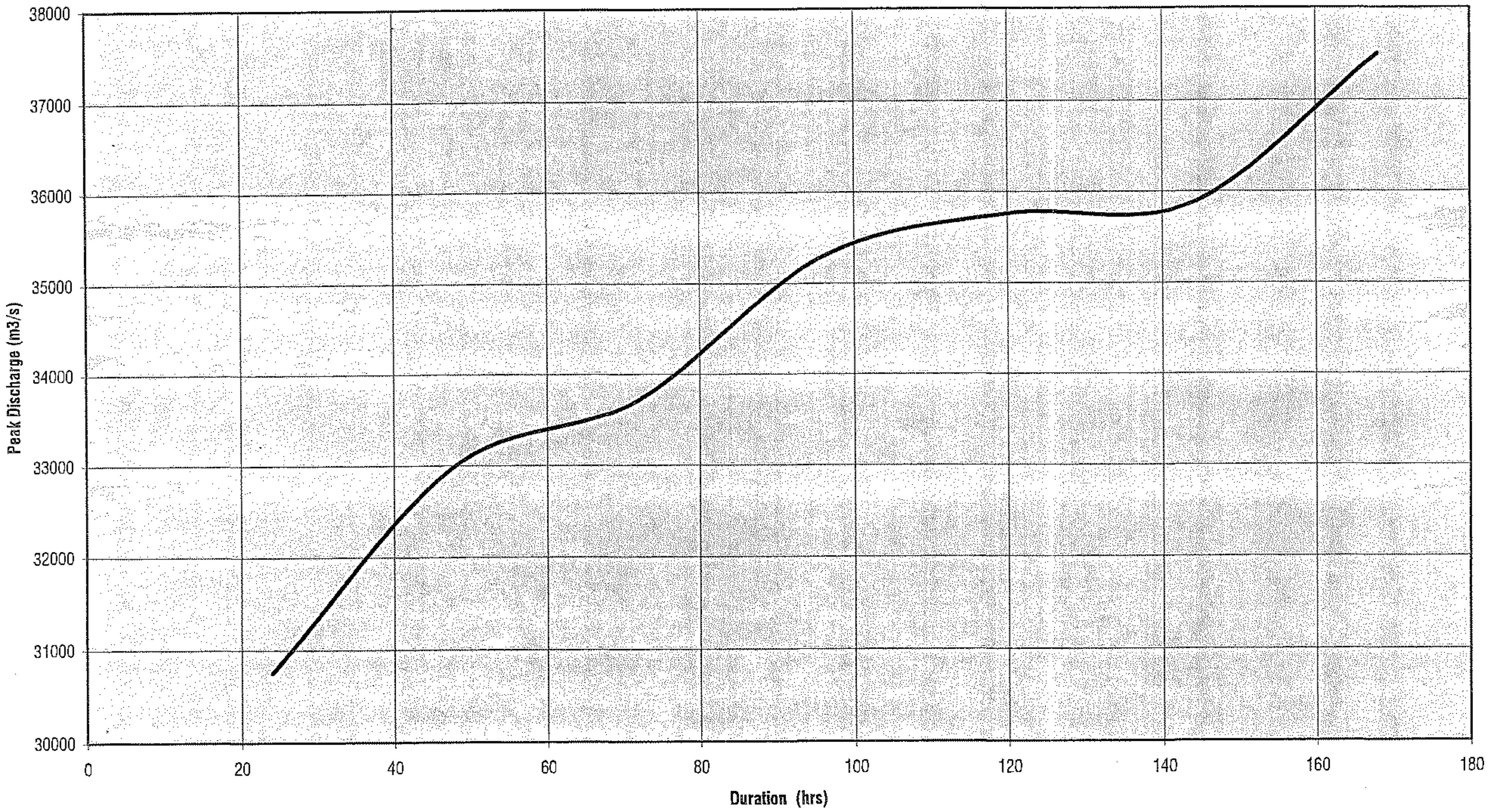
If you would like to discuss these issues further could you please contact me on [redacted]

Regards

[redacted]

Scott Abbey
Project Manager

PMP - Critical Duration



Facsimile transmission from
BRISBANE CITY COUNCIL
WATERWAYS SECTION
Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date 01 September 1997	

To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Scott Abbey/ Mark Salisbury		No. of Pages 1 *(including this page)*
From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]
Re **BRISBANE RIVER FLOOD STUDY**		

Hope the community consultation is going well. Thank you for sending down the report on the additional verification events. I have reviewed the report and everything looks fine. My only suggestion, which is fairly minor, is to replace the graphs showing daily rainfall totals for each station with tables similar to those prepared for the Moggill and Cubberla Creek flood studies to save paper. ✓

Now, I also need to beg a favour or two.

Firstly, a Councillor has requested a copy of the A1 size sheets distributed to local groups. Could you please prepare another copy and forward it to me (normal mail will be fine) so that I can comply with the Councillors request. ② JAA

Secondly, as you are no doubt aware, gauge data over the lower reaches of the Brisbane River is fairly scant. We would greatly appreciate it if you could forward the stage hydrographs calculated by the Brisbane River flood model at Ch 1022.575 (BN1500) for the following events:

- January 1974
- April 1989 (a and b)
- June 1983
- May 1996

① MAS

To simplify things, please just e-mail me the MIKE-11 text files at [redacted] and I can upload the files to provide the tailwater data I require at present.

Thanks for your help. If this request presents any problems, please do not hesitate to contact me to discuss alternate arrangements.

Regards

[redacted]

Engineer Waterways

H:\

SINCLAIR KNIGHT MERZ

Facsimile Transmission

To: BCC
Attention: [redacted]Martin Giles
Fax No: [redacted]
Copies:
Subject: BRISBANE RIVER FLOOD STUDY

From: Scott Abbey
Job No: TO04157
Date: 17 ~~March~~ Sept 1997
No of Pages: 1

[redacted]artin

The waterway management strategy phase of the report is moving along reasonably well and we expect to complete this work by the 10 October deadline. By early next week we should have the initial regulation lines and revegetation strategy completed and would like to hear any comments that you may have before we finalise them.

In previous studies we have used your copy of FastTABS 2 dimensional model for the flood mapping phase. Could you confirm whether we are able to borrow the latest FastTABS model, and if so could you organise the Bimap information into the correct format for use in this model. If we can organise this in the near future it is not likely to hold us up with the commencement of the Flood Mapping phase, due to start on 13 October.

In addition, could you please send us a copy of the latest format for your database so that we can start compiling the necessary information.

If would like to discuss this any further, please contact me at this office on (076) 398417.

Regards

[redacted]

Scott Abbey
Project Manager

Facsimile transmission from
BRISBANE CITY COUNCIL
WATERWAYS SECTION
Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

SINCL [illegible] MERZ
REC'D 03 SEP 1997 P MGR
WHO | ACTION | SIGN/DATE
[redacted] noted MOS advised
JOB No. FILE

Date
03 September 1997

To
Sinclair Knight Merz

Facsimile No.
[redacted]

Attention
Scott Abbey/ Mark Salisbury

No. of Pages 1
(including this page)

From
Martin Giles

Phone No.
[redacted]

Facsimile No.
[redacted]

Re
BRISBANE RIVER FLOOD STUDY

With reference to your facsimiles of 26 August 1997 and 2 September 1997, I would like to advise as follows:

HEC-RAS: Go with the HEC-RAS model which gives consistency between MIKE11 and HEC-RAS values (i.e. channel markers at tidal boundary)

Profiles: Your consideration of requirements is correct i.e. Take the higher of the 100 year storm surge level with no flow and the 100 year event with MHWS tailwater.

For lesser events, the use of storm surge becomes even more questionable (e.g. do you include a Greenhouse Effect?). Because of this uncertainty, please disregard storm surges for more frequent events.

I have discussed your PMP facsimile of 1 September 1997 with Ken and he is not convinced with regard to peak inflow increasing with increasing duration. Please contact me with regard to this and we will try and hammer something out.

I trust that the above is self explanatory. If you have any queries, please do not hesitate to contact me.

Regards

[redacted]

Martin Giles
Engineer Waterways

Facsimile transmission from
BRISBANE CITY COUNCIL
WATERWAYS SECTION
Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
05 September 1997

To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Scott Abbey / Mark Salisbury		No. of Pages 1 *(including this page)*
From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]

Re
BRISBANE RIVER FLOOD STUDY

Thank you for your facsimile of 4 September. Although you have conclusively demonstrated that your calculations are correct, it is still hard to accept that peak flow increases with increasing duration. Given your facsimile, it would appear that storm bursts within the long duration temporal patterns cause the anomalous results.

For a while we were thinking about toying around with a magistorm type approach to try and overcome this problem. However, since the variation in peak flow with duration is less than 5 percent, it is considered that further work is not justified.

We therefore recommend that the following be adopted for the PMP:

- Duration 168 hours
- No continuing loss

Further, for the intermediate events we recommend that the second methodology presented in your facsimile of 1 September be adopted, i.e. use the peak discharges for the PMF, 100 year and 50 year ARI events whereby peak discharges for intermediate events are predicted using methods set out in ARR. Once peak floods have been calculated, the PMF hydrograph is scaled for use in the intermediate events.

I trust that this approach is acceptable to you and thank you for the work you have completed in relation to the PMP. If you have any queries in relation to this matter, please do not hesitate to contact me.

T004157

Regards

SAA noted. Proceed as above
MDS as above

[redacted]

Martin Giles
Engineer Waterways

[redacted] 5/9/97

5030

TELEPHONE MESSAGE

JOB BRIS RIVER

FILE TO04157

PHONE CALL TO [✓ FROM] Martin Giles

TIME

OF

PHONE

DATE 22/9/97

DETAILS OF MESSAGE:

Flood forecasting Model.

① Suggested using Rafts model to get flows and HECRAS model to establish levels. (only if similar work load)

② only require Rating Curves (MAWS) @ crossings and operating Gauges in Rafts

③ Also require Ultimate disaster RAFTS model ie whole catchment using available telemetry data over entire catchment.

Meeting Thursday 25/9 @ 2pm. will supply Radio Telemetry data then.

BY [redacted]

CIRCULATION & ACTION

NAME	ACTION REQUIRED	INIT'	DATE
[redacted]	FYI (Back to me to file.)	✓	

Facsimile transmission from

BRISBANE CITY COUNCIL

WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

SINCLAIR KNIGHT MERZ
RECD 07 [illegible]

[redacted] Noted & used for WNM section of Study [redacted]

Date
07 October 1997

To
Sinclair Knight Merz

Facsimile No.
[redacted]

Attention
Scott Abbey/ Martin Giles

No. of Pages 5
(including this page)

From
Martin Giles

Phone No.
[redacted]

Facsimile No.
[redacted]

Re
BRISBANE RIVER REGULATION LINES

I have reviewed your fax and recommend that the top of bank be taken as the bank closest to the 2 year level. The concept of a 15 metre buffer for the Brisbane River is somewhat dodgy anyway, so the bank closest to the 2 year level will be fine. The attached sketches indicate my consideration of top of bank.

Given the above definition of top of bank, the regulation line is placed at either the encroachment line or the top of bank plus 15 metres, depending which extends further into the floodplain.

With regard to the potential development of wharfs and loading docks, we would like to see this included in the regulation line assessment. However, the analysis does not have to be overly detailed and could be of the 'likely impact on flood levels' of such developments upon flood levels.

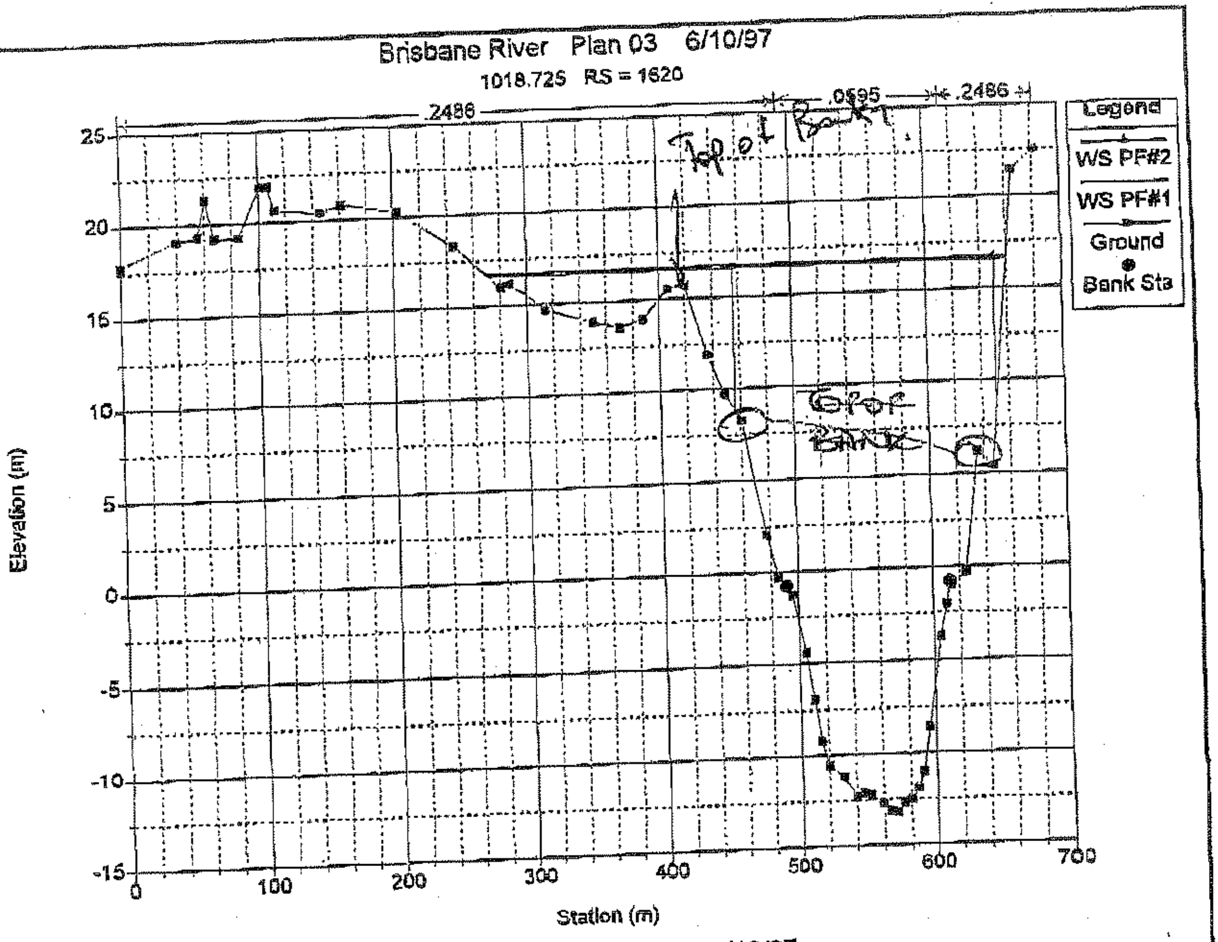
For those events greater than 100 years, I agree with you that the events do not have to be rerun due to the effect that regulation lines would have upon flood levels. Although properties would only be filled to the 100 year level plus 300 mm, with regulation lines in place the model would assume filling to an infinite level, removing storage and producing unrealistic increases in flood level for extreme events.

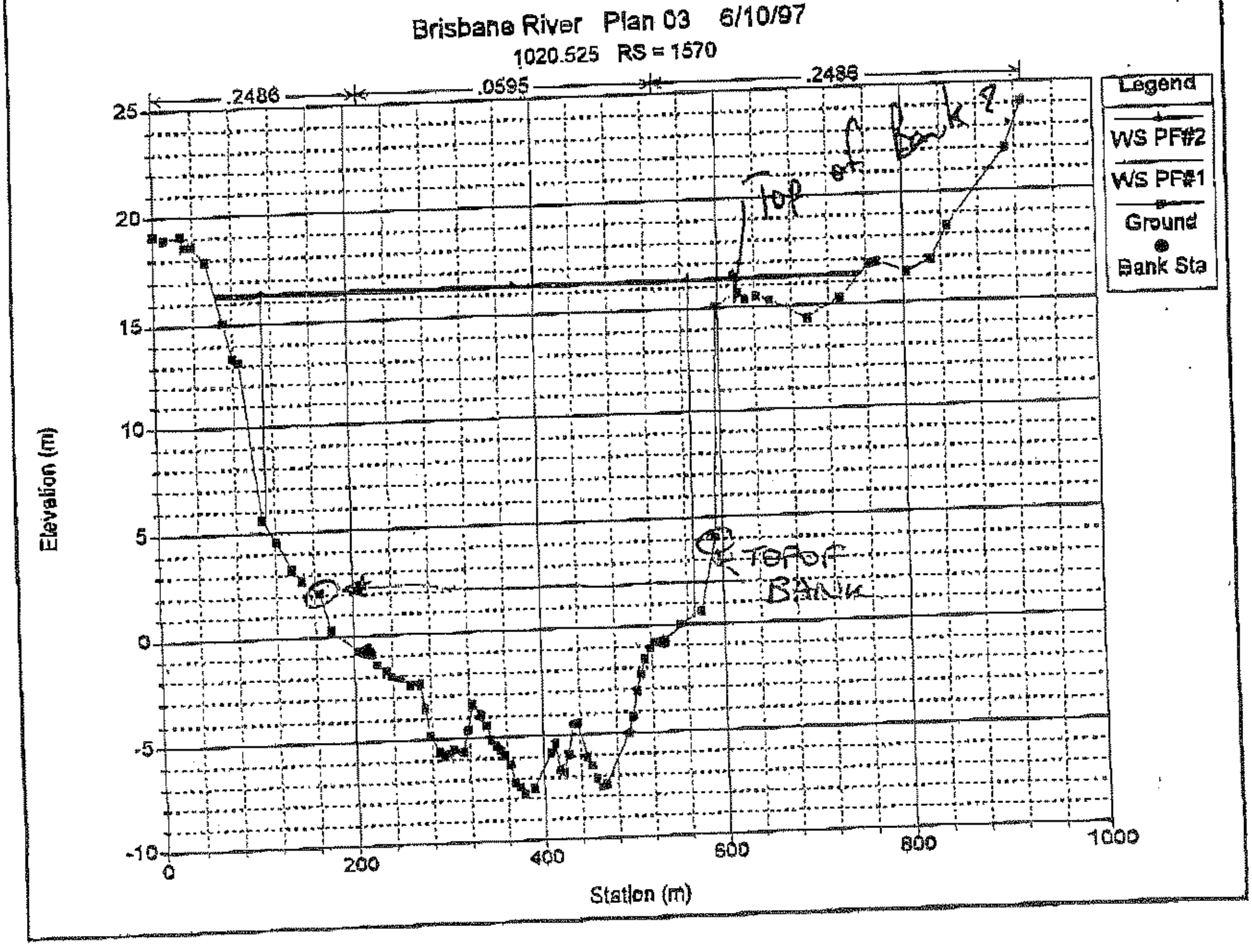
I trust that the above is of assistance. If you have any further queries, please do not hesitate to contact me.

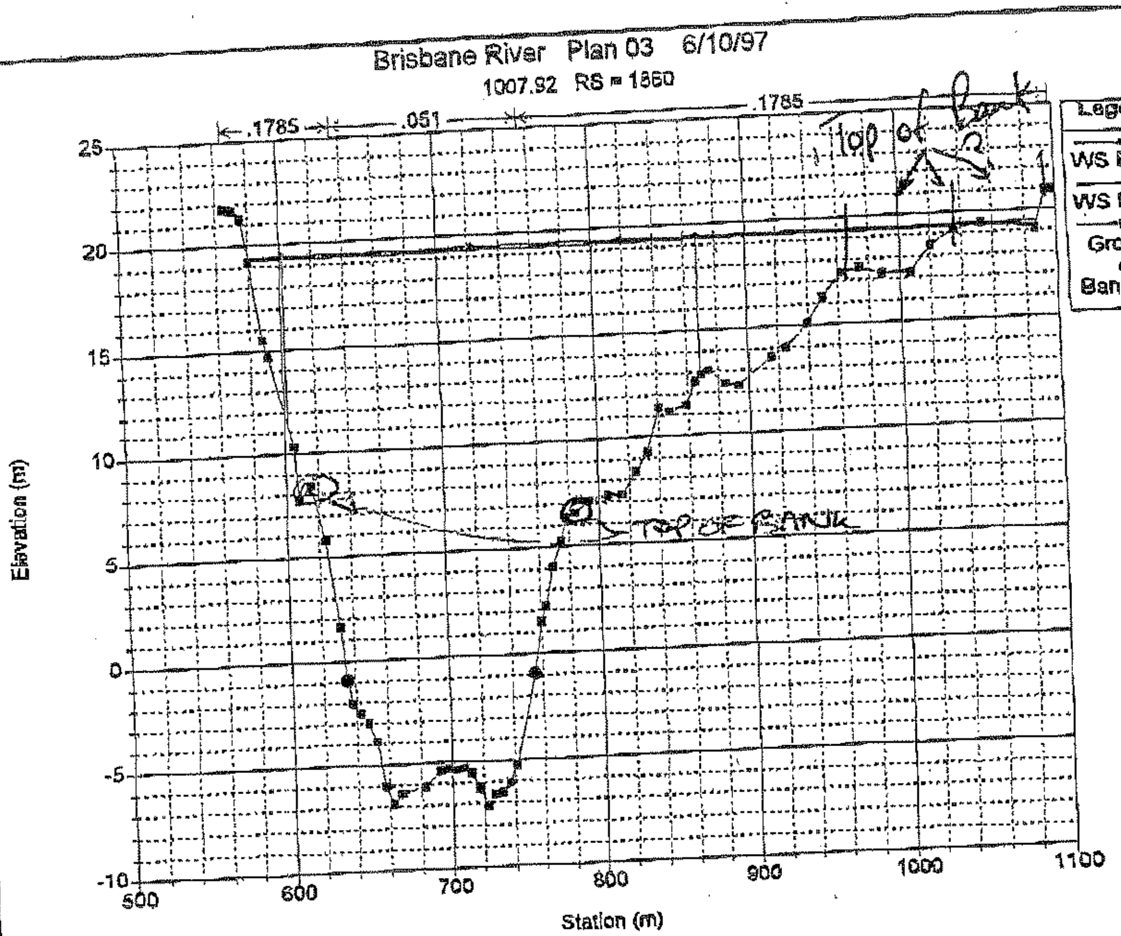
Regards

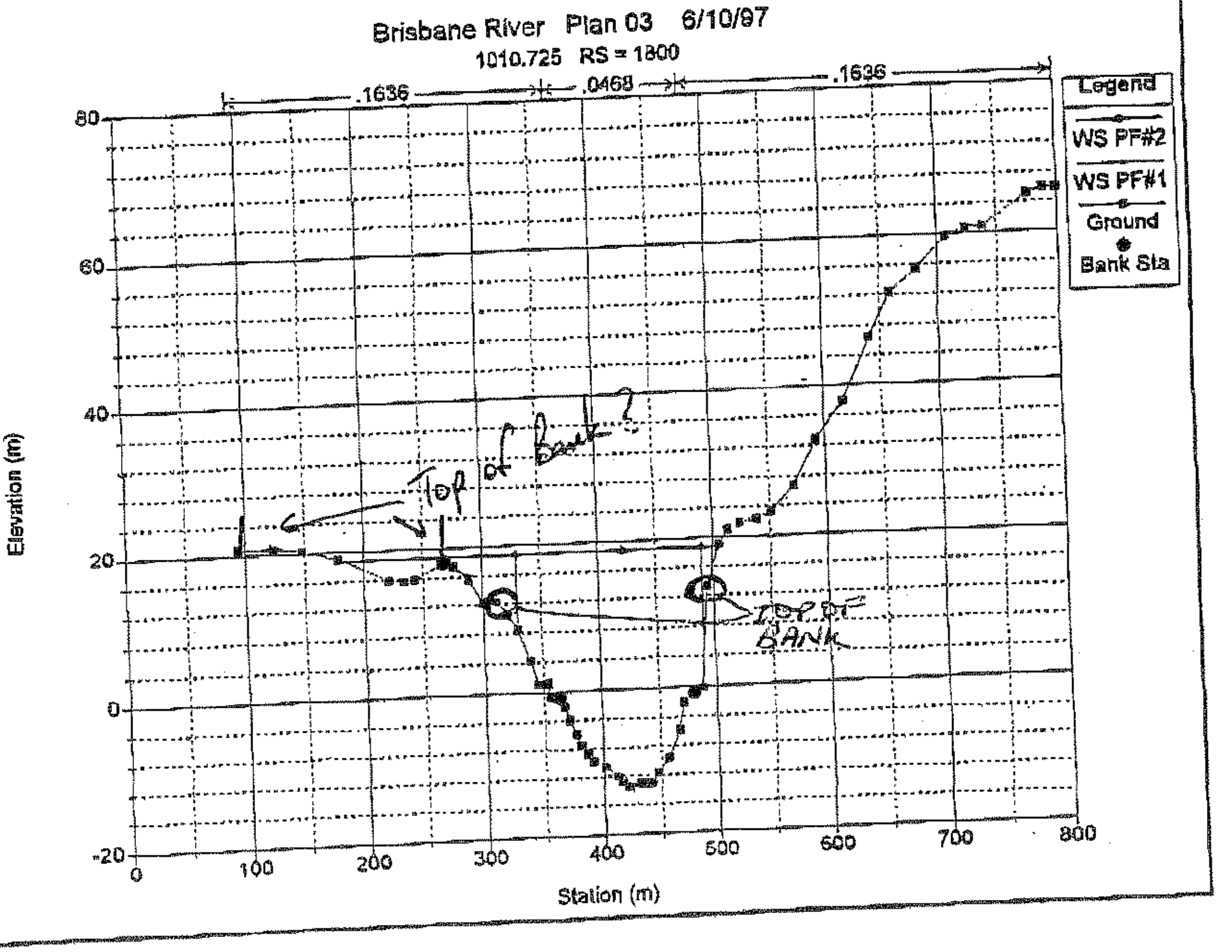
[redacted]

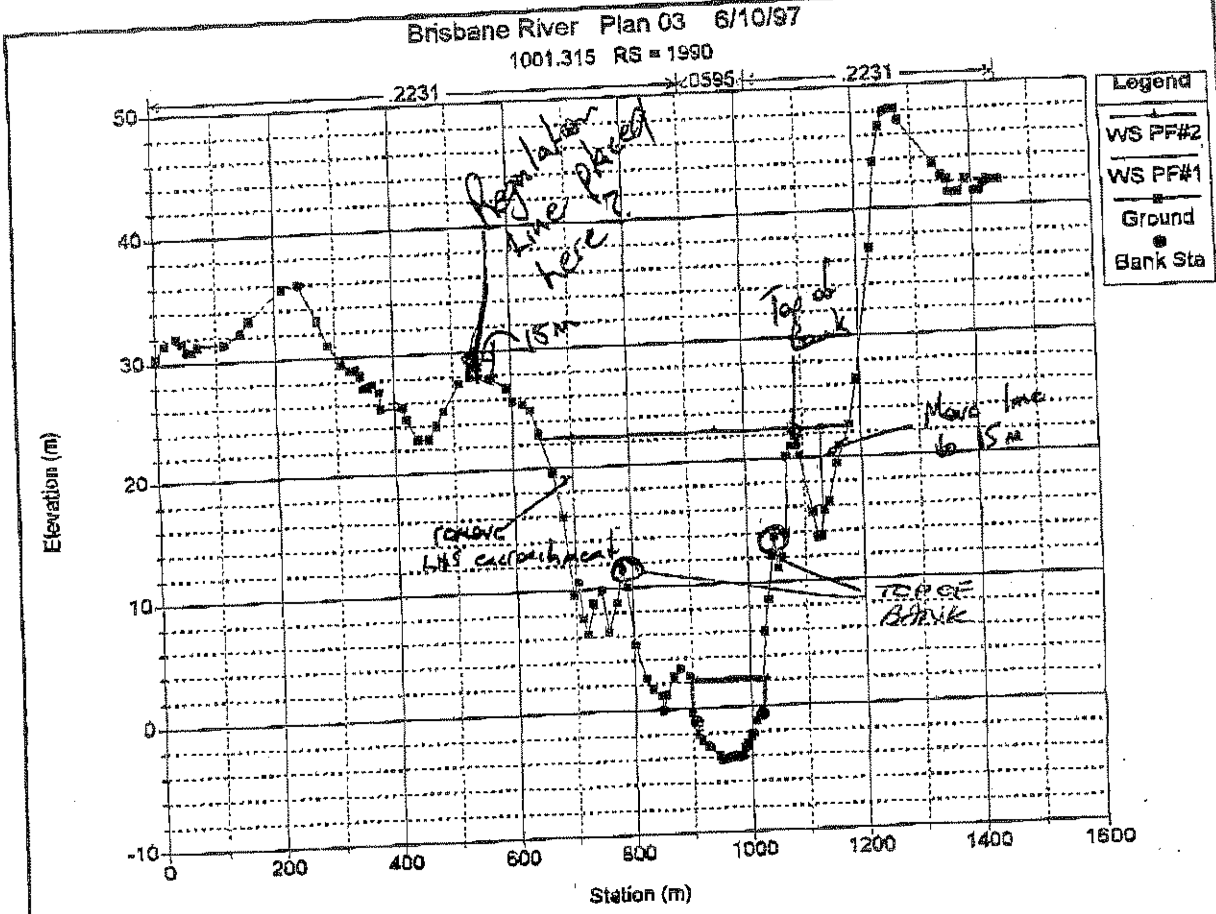
Martin Giles
Engineer Waterways

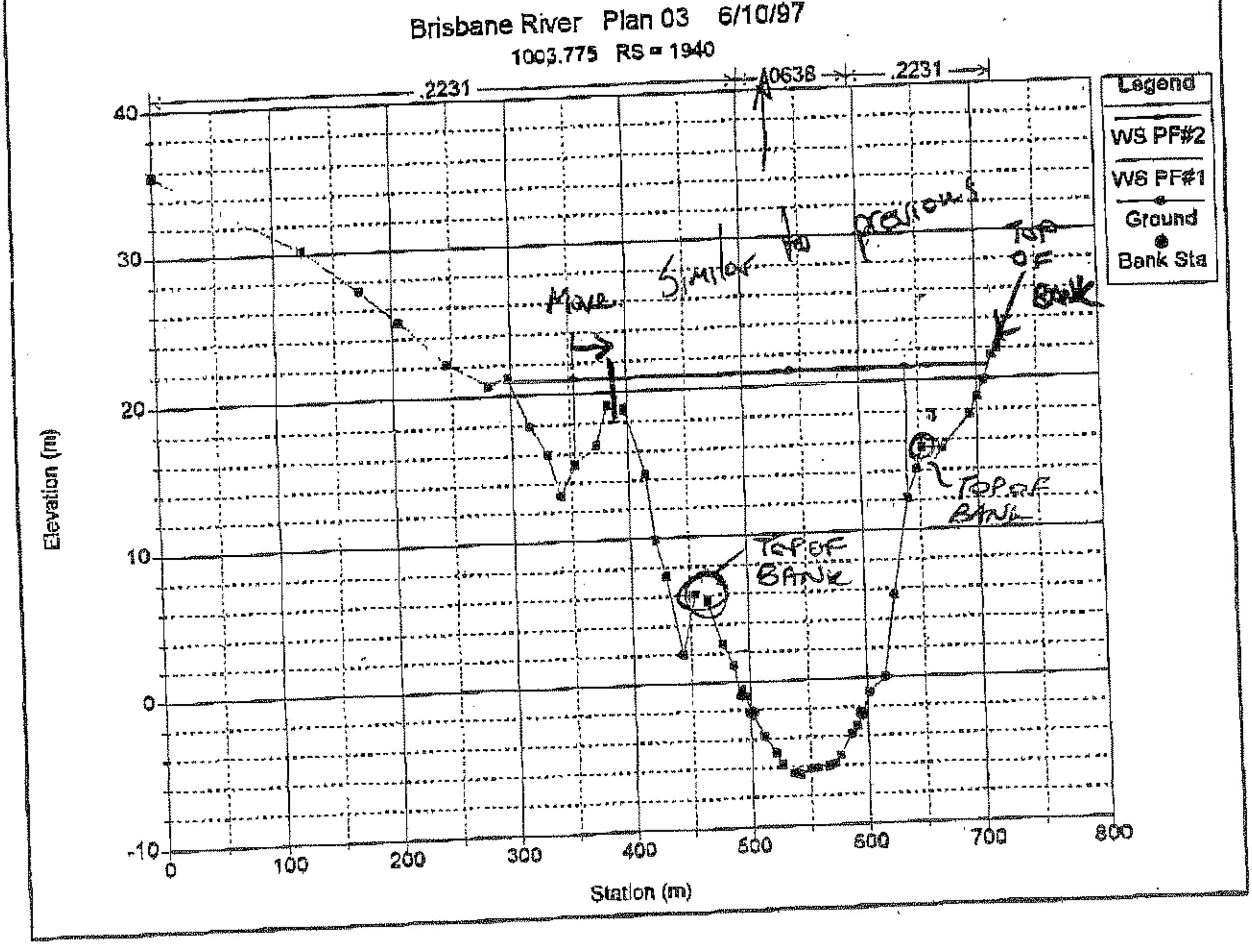

Brisbane River Plan 03 6/10/97
1018.725 RS = 1620
.2486
.0595
.2486
Top of Bank ?
Top of BANK
Legend
WS PF#2
WS PF#1
Ground
Bank Sta
Elevation (m)
25
20
15
10
5
0
-5
-10
-15
Station (m)
0
100
200
300
400
500
600
700

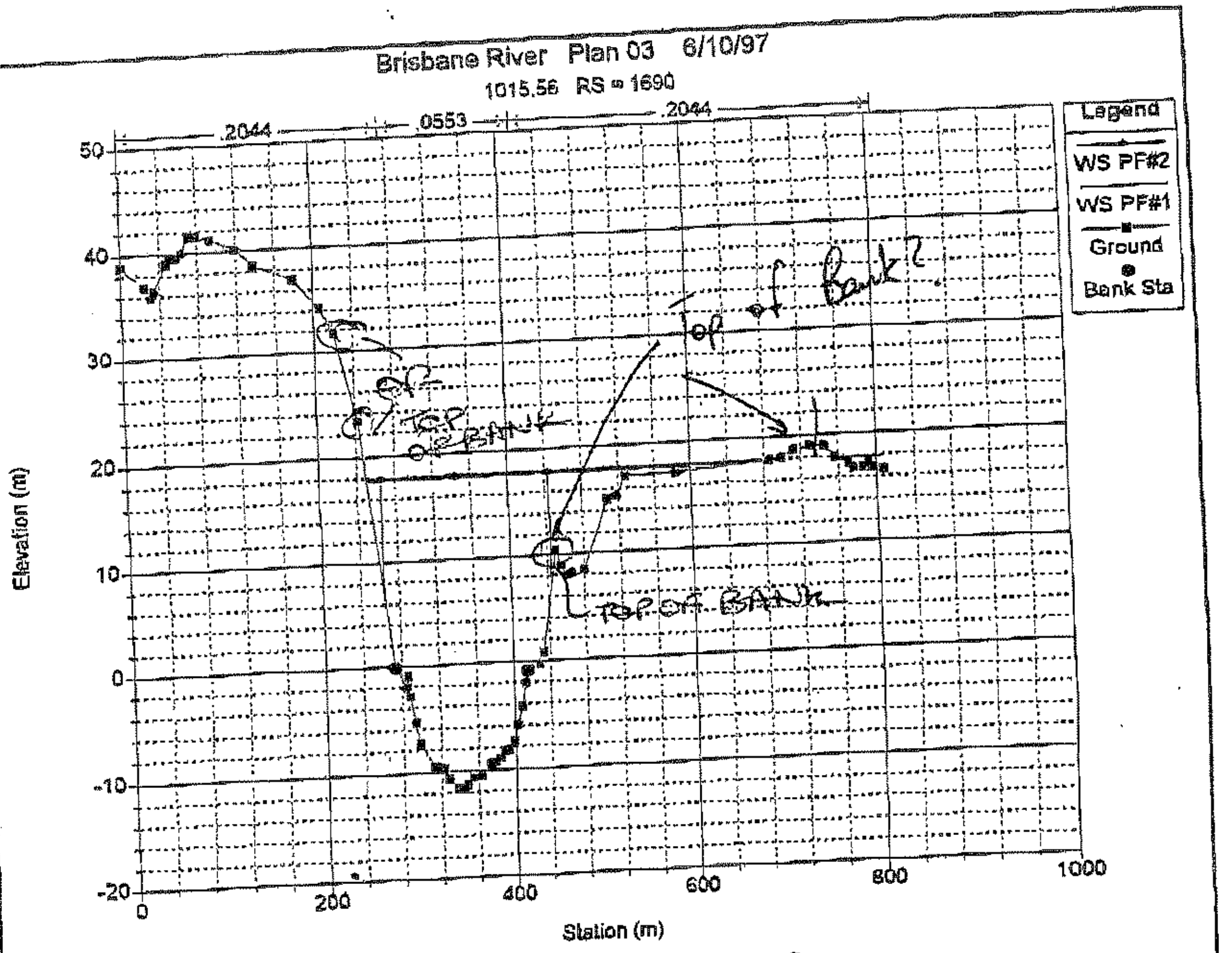

Brisbane River Plan 03 6/10/97
1020.525 RS = 1570
.2486
.0595
.2486
Top of Bank ?
Top of BANK
Legend
WS PF#2
WS PF#1
Ground
Bank Sta
Elevation (m)
25
20
15
10
5
0
-5
-10
Station (m)
0
200
400
600
800
1000

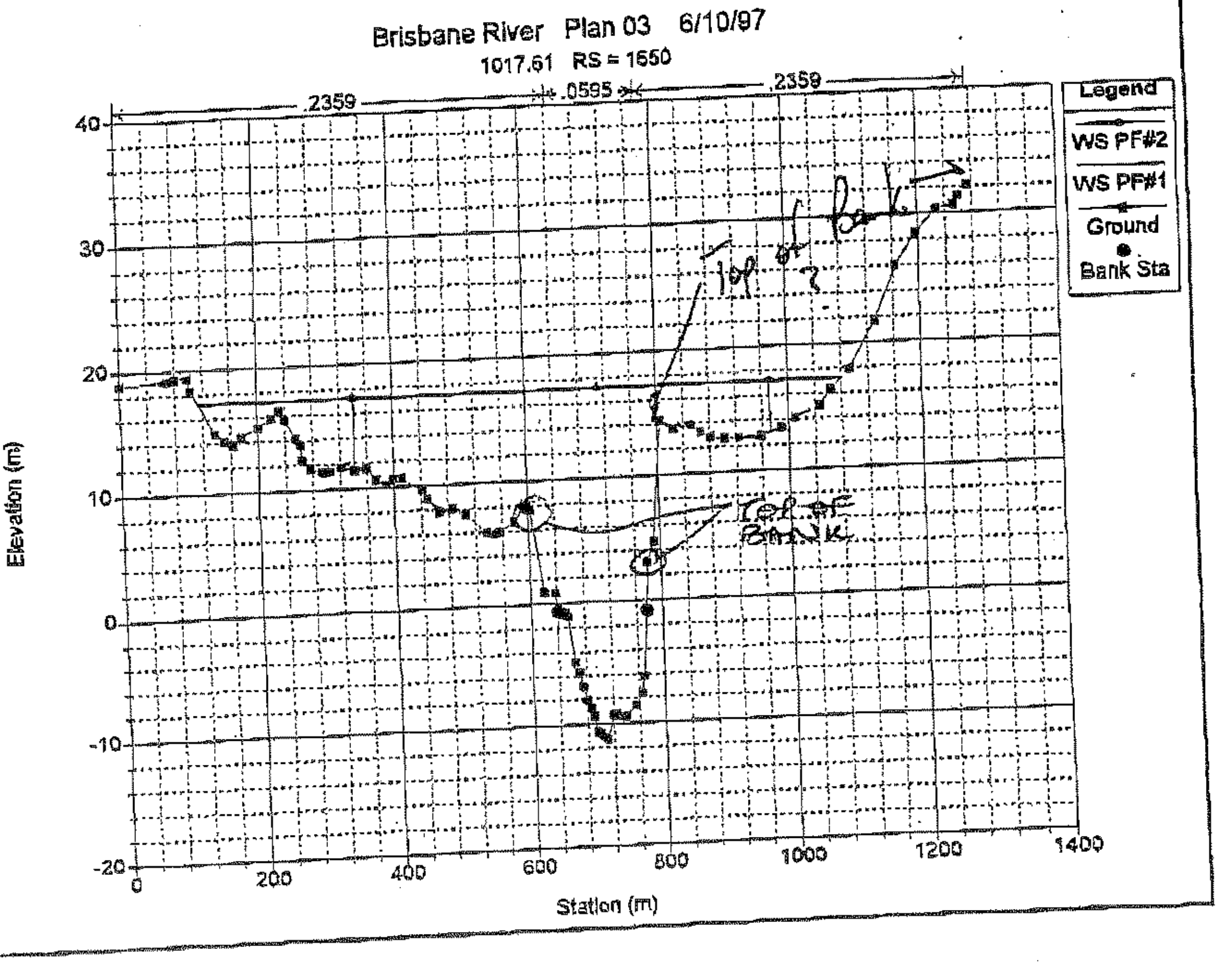

Brisbane River Plan 03 6/10/97
1007.92 RS = 1860
.1785
.051
.1785
Top of Bank ?
TOP OF BANK
Legend
WS PF#2
WS PF#1
Ground
Bank Sta
Elevation (m)
25
20
15
10
5
0
-5
-10
500
600
700
800
900
1000
1100
Station (m)


Brisbane River Plan 03 6/10/97
1010.725 RS = 1800
.1636
.0468
.1636
Top of Bank?
TOP OF BANK
Legend
WS PF#2
WS PF#1
Ground
Bank Sta
Elevation (m)
80
60
40
20
0
-20
0
100
200
300
400
500
600
700
800
Station (m)


Brisbane River Plan 03 6/10/97
1001.315 RS = 1990
.2231
.0595
.2231
Legend
WS PF#2
WS PF#1
Ground
Bank Sta
Elevation (m)
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
1600
Station (m)
Regulator Line placed here ?
15M
Top of bank
Move line to 15M
remove LHS encroachment
TOP OF BANK


Brisbane River Plan 03 6/10/97
1003.775 RS = 1940
.2231
.0638
.2231
Legend
WS PF#2
WS PF#1
Ground
Bank Sta
Elevation (m)
40
30
20
10
0
-10
0
100
200
300
400
500
600
700
800
Station (m)
Move similar to previous
TOP OF BANK
TOP OF BANK
TOP OF BANK


Brisbane River Plan 03 6/10/97
1015.56 RS = 1690
.2044
.0553
.2044
Legend
WS PF#2
WS PF#1
Ground
Bank Sta
Elevation (m)
50
40
30
20
10
0
-10
-20
0
200
400
600
800
1000
Station (m)
Top of Bank?
Top of Bank?
TOP OF BANK


Brisbane River Plan 03 6/10/97
1017.61 RS = 1650
.2359
.0595
.2359
Legend
WS PF#2
WS PF#1
Ground
Bank Sta
Elevation (m)
40
30
20
10
0
-10
-20
0
200
400
600
800
1000
1200
1400
Station (m)
Top of Bank?
TOP OF BANK

Facsimile transmission from

BRISBANE CITY COUNCIL

WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
08 October 1997

To Sinclair Knight Merz	Facsimile No. [redacted]
Attention Scott Abbey/ Martin Giles	No. of Pages 1 *(including this page)*

From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]

Re
BRISBANE RIVER ZONINGS

In response to your query, the abbreviations of the various zonings for Brisbane are as follows:

Non Urban	NU
Future Urban	FU
Residential A	RA
Residential B	RB
Inner Residential	IR
Rural Residential	RR
Future Industry	FI
Service Trades	ST
Light Industry	LI
Warehouse and Transport	WT
General Industry	GI
Noxious Industry	NI
Waterfront Activities	WA
Extractive Industry	EI
Central Business	CB
Commercial	CL
Business	BS
Unserviced Land	UL
Open Space	OS
Sport and Recreation	SR
Island Village	IV
Conservation	CN
Particular Development	PD

[illegible] [redacted]
Ok Advice on Zon [redacted]
changes

Hope the above list is of assistance. If you have any further queries, please do not hesitate to [redacted] Regards

Martin Giles
Engineer Waterways

SINCLAIR KNIGHT MERZ

FAXED
22/10/97

Facsimile Transmission

To: BRISBANE CITY COUNCIL
Attention: Martin Giles
Fax No: [redacted]
Copies:
Subject: BRISBANE RIVER FLOOD STUDY - REGULATION LINES

From: Scott Abbey
Job No: TO04157
Date: 22 October 1997
No of Pages: 2

Martin

After discussions with you yesterday we have given consideration to the suggestion of the removal of the 15 m buffer rule previously imposed on the Brisbane River regulation lines. This would require a significant amount of additional work (approximately 80 man hours) and it is questionable whether the removal of the buffer is either practical or worth the additional cost involved in assessing the adjustment of the regulation lines.

In many of the locations where the buffer rule has been applied the amount of fill required to raise the level of development above the 100 Year ARI flood level is probably within an acceptable range (1.0 to 1.5 m). Should the buffer zone be removed, the amount of fill that is required will be significantly increased (in many cases greater than 5 m of fill) due to the topography of the river banks and hence would most likely be an impractical exercise.

The regulation line analysis that was performed for the Brisbane River was conducted by determining the top of bank (ie first bank above the 2 Year ARI flood level) at each cross section. Bank markers were then placed on the left and right banks at the extent of the buffer zones working upstream with approximately 5 cross sections at a time. The model was then run and impacts due to the five modified cross sections were assessed. If the increase in flood level was above the allowed 150 mm (approx) then the bank markers were moved out and several iterations were conducted until the impacts were within the specified limits.

This assessment considered that regulation lines within areas of existing development had the highest priority and therefore the greatest emphasis was placed on working towards the most efficient placement of regulation lines within these areas. Areas where little or no development existed were also tested however in most cases this resulted in a level increase of greater than 150 mm.

It was found that the hydraulic model was sensitive to both cumulative flood level increases from downstream effects as well as increases in discharges due to a loss of storage in the upper reaches. This made the setting of regulation lines a complex and difficult task as changes in upstream river conditions had a significant effect on downstream levels.

The setting of regulation lines was to be based on the following three criteria as stated in the brief:

- Where private property is not effected, the total afflux may be increased to 150 mm.
- Where private property is affected, the Waterway Management Plan should aim for no increase in flood level.
- Regulation lines should be set to provide a minimum 15 m buffer to the top of the bank to manage future erosion and sedimentation problems.

During the preparation of the Brisbane River flood study scope of works we assumed that the setting of regulation lines would be based on the brief's guidelines. As it was considered that a significant amount of private properties would be affected by flood water, and based on the guidelines in the brief, many of the regulation lines would be set at the limit of inundation.

After discussions with yourself it was determined that regardless of whether private properties were affected, the 150 mm flood level increase would apply. This meant that the effort to complete this task was increased however at the time our budget allowed us to complete this work within the specified time frame and on budget.

If however you would like to remove the 15 m buffer rule a considerable amount of additional time and effort will have to be spent resetting the regulation lines.

We believe that the regulation lines we have prepared in the Draft Waterways Management Report are practical and provide a reasonable solution if existing development is considered to be the main priority. Furthermore the removal of the 15 m buffer will extend the time to complete the study and additional costs will be incurred which may require a variation to the contract. This further iteration of regulation line locations may not have any significant benefits with regard to the placement of lines given the 150 mm maximum afflux requirements.

If you have any queries regarding this fax please contact me on (076) 398417.

Regards

[redacted]

Project Manager

Facsimile transmission from

BRISBANE CITY COUNCIL
WATERWAYS SECTION

Floor 13, Brisbane Administration Centre

Brisbane City
Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
31 October 1997

SINCLAIR KNIGHT MERZ
[illegible]
WHO
ACTION
DATE
JOB No.
FILE

[redacted]
Noted
please calc how much money we need to SQuirrel away for this activity and advise - SA

To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Mr Scott Abbey		No. of Pages 1 *(including this page)*
From Martin Giles	Phone No [redacted]	Facsimile No. [redacted]

Re
BRISBANE RIVER PUBLIC DISPLAY

As discussed at our recent meeting, there is presently some debate going on within Council with regard to the flood levels calculated for the Brisbane River.

Consequently, it is requested that preparations for the public display portion of the study be placed on hold until further notice.

We trust that this will not inconvenience you too greatly. If the matter does cause problems, please do not hesitate to contact us.

Regards

[redacted]

Martin Giles
Engineer Waterways

[redacted]

find attached amount required for public display

[redacted]

Noted.

SINCLAIR KNIGHT MERZ

FAXED

DATE:........../........../..........

Facsimile Transmission

To:	BCC	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	3 November 1997
Copies:		**No of Pages:**	1
Subject:	BRISBANE RIVER FLOOD STUDY		

Martin

We have received you fax regarding the postponement of the public display and we are in agreement to conduct this task at a later date.

As you are aware the flood contour mapping phase of the study was due to commence on the 13 October 1997. To begin this task we require a contour grid over the Brisbane River which extends from the river mouth to the upstream city boundary. This information was requested approximately five weeks ago and as yet we have not received any data.

As this activity is on the critical path of this study, I wish to advise that the completion date has been influenced by this delay. We will advise you of our revised milestones once this data is received.

If you would like to discuss this further please contact me at this office

Regards

[redacted]

Scott Abbey
Project Manager

TELEPHONE MESSAGE

JOB BRISBANE RIVER FILE TOP4157

PHONE CALL TO/~~FROM~~ MARTIN GILES TIME 11.00 AM

OF BCC PHONE [redacted] DATE 7-11-97

DETAILS OF MESSAGE:

- Go with 1 in 10000 plots for flood contouring profiles
- will be back to work on Brisbane River. will provide contact phone numbers.
- provide x.y.z files either today or monday.
- Bathymetry will be provided in the form of invert levels of river.

BY: [redacted]

CIRCULATION & ACTION

NAME	ACTION REQUIRED	INIT'	DATE

SINCLAIR KNIGHT MERZ

FAXED 27/11/97

Facsimile Transmission

To:	BCC	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	27 November 1997
Copies:	Ken Morris	**No of Pages:**	2
Subject:	BRISBANE RIVER FLOOD STUDY		

Martin

We are currently trying to finalise the flood forecasting models required to be set up. These consist of the following:

1. RAFTS and HECRAS models using BCC radio pluvios and streamflow predictions from DNR
2. RAFTS model only with MHWS rating curves at operating gauges and bridges (same inputs as 1)
3. "if everything else fails" RAFTS and HECRAS models with inputs from BCC radio gauges and BOM (rainfall data)

A user interface between RAFTS and HEC-RAS has been completed where discharges calculated by RAFTS are input and up to 15 tailwater level cases can be analysed. The output from this model produces a flow data file (Forecast.f01) used by HEC-RAS.

The HEC-RAS model has been completed and rating curves at each of the 7 structures and 3 stream gauges have been determined and these have been included in the RAFTS model for the Mean High Water Springs tailwater condition ie model number two.

To complete the RAFTS models we need to clarify a number of issues.

For models one and two discussions to this point have assumed that the RAFTS model would use an estimated inflow hydrograph at Mt Crosby which will be supplied by the Department of Natural Resources. However as a precaution it has been determined that the model would also have to be able to use rainfall from the upper catchments to calculate the required hydrographs in the event that the DNR are unable to provide the necessary inflow information as is the case in model three.

The problem with this is that an inflow hydrograph above the Bremer and Brisbane River confluence would not account for flows from the Bremer River. As no telemetry gauges for the Bremer River Catchment have been provided in your listings supplied to date perhaps inflow hydrographs above and below the Bremer river should be obtained from the DNR flood forecasting model.

During calibration of the Sinclair Knight Merz RAFTS model discharges showed good correlation with the DNR predicted discharges between 20 years and 200 years ARI. For predicted ARI events greater than 200 years ARI the difference between SKM and DNR predicted discharges range from 11% to 17% and for ARI events of less than 20 years ARI are approximately 42%. Since most emphasis is placed on flood events from 20 years to 200 years ARI it was considered that the DNR estimates downstream of Bremer River would be acceptable for use in the flood forecasting model.

The telemetry rain gauges provided by BCC are located within the city boundaries and hence rainfall from the Bremer, Wivenhoe, Somerset and Lockyer catchments will have to be provided if a reasonably accurate flood forecasting model is to be produced. This will be required for the backup model number three that is in case hydrographs are not able to be supplied by DNR.

Could you please provide the names, station numbers, northings and eastings of any radio telemetry pluvios outside the Brisbane City boundary that you may have access to so that we can complete the RAFTS flood forecasting model. Should you not have access to any pluvios in the upper catchments could you indicate what parameters we would need to consider (if any) when gaining access to these telemetry rainfall stations governed by other authorities.

Could you also indicate whether you would like us to use the predicted DNR hydrographs above and below the Bremer and Brisbane River confluence for flood forecasting model number one or whether you would like us to use a combination of the DNR predicted hydrograph at Mt Crosby and use the RAFTS model to predict the discharges once we have gained access to radio telemetry gauges within the Bremer River catchment.

Please note that only one flood forecasting model was offered in our brief and should the formulation of the three proposed models prove to require a significant amount of additional effort, a variation on the scope of works may be sought. If you would like to discuss this matter further please contact me at this office.

Regards

[redacted]

Scott Abbey
Project Manager

C:\MSOFFICE\WINWORD\FFMODEL.DOC

SINCLAIR KNIGHT MERZ

DATE:........./........../..........

Facsimile Transmission

To: Brisbane City Council

Attention: Martin Giles\Ken Morris

Fax No: [redacted]

Copies:

Subject: BRISBANE RIVER FLOOD STUDY

From: Scott Abbey

Job No: TO04157

Date: 5 December 1997

No of Pages: 4

Martin

Attached is an example of flood contouring at a bend on the Brisbane River using the techniques that were discussed at last Tuesday's meeting with Damian, Mark and yourself.

The proposed methodology to construct the attached example of the flood contours was as follows.

1. The super-elevation at the bend was calculated using the formula;

$$\Delta h = V^2_{max}/g.[20r_c/3b - 16r_c3/b3 + (4r_c2/b2-1)^2.\ln((2r_c+b)/(2r_c-b)) \quad \text{(Chow 1959)}$$

   where V^2_{max} = max velocity at bend
   r_c = center radius of bend, and
   b = width at bend (note: width assumed to be the river proper)
   Δh = the change in the average water surface level predicted by MIKE 11 where the average water level predicted MIKE 11 was applied at the AMTD line.

2. Once the Δh at the bend was calculated this was added to the average water level (predicted by MIKE 11) on the outside of the bend and subtracted on the inside of the bend.

3. A linear interpolation was then performed between each of the cross-sections at the inside middle and outside of the river proper to determine the location where RL 13.4, 13.3, 13.2, 13.1 and 13.0 were located. These points were then joined across the river to form the flood contours.

For this example you will note that there is significant flood inundation outside the extents of the river proper and hence it has been assumed that these locations would not be subject to the effects of two dimensional flow. Therefore the superelevation calculations have been conducted for the main channel and the levels at the inside and outside of the main channel have been applied to the adjoining floodplains and storages.

This was considered to be a reasonable assumption as previous modelling has indicated the floodplain and storage areas exhibit little or no conveyance. The flood contours in these locations have therefore been extended at the same water level based on the closest contour value until they reach the natural surface level.

This process is reasonably time consuming and considering the number of bends along the reach it is expected to be a reasonably large task. Having said this, it is considered that this methodology will result in a better answer than that produced by the Fasttabs model due to the mixing effects of one dimensional and two dimensional modelling solutions.

In relation to the drafting of the flood contouring, discussions last Tuesday indicated that it was possible to interpolate the required 0.1 m increments if a planar surface was constructed. It is my understanding that before this interpolation process can be done a terrain model which covers the extent of inundation needs to be developed. The planar surface is then overlaid onto the terrain model, and the interpolation can be done. This brings us back to the problem that we had obtaining a terrain model for proposed Fasttabs modelling. To this point Bimap have not been able to provide the required information and a significant amount of time and money has been wasted trying to utilise what was supplied.

We propose that in this instance it would be quicker to produce the flood maps using manual methods due to the size of the terrain model required to complete this task.

We expect that if we use the above manual methods we will be able to complete the task within the specified time frame that was originally allowed for the Fasttabs modelling. This does not allow for the additional time that has been wasted manipulating and managing the data previously provided by Bimap.

The above methodology was developed because of the significant delays that have so far occurred due to late supply of the requested data and the inappropriate format in which this information was supplied. The original grid terrain data for the Fasttabs Model was requested on the 1 October 1997 and this phase of the study was to commence on the 13 October 1997.

We did not receive the initial data files until the 14 November 1997 and the final set of these files until the 22 November. The information that was received at this time consisted of large amounts of extraneous data in files that had to be manipulated into an appropriate format. This manipulation of data proved to be a time consuming and onerous task due to the size of the files and so far little progress has been made manipulating these files.

This task was made more difficult by the fact that no key map was provided to show the location of each data set. The provision of this keymap was requested however to this point we have not sighted this information. This formatting of terrain works were not originally included in our offer. We would therefore be seeking a variation to compensate for the lost time and expenses we have incurred in attempting to utilise this data.

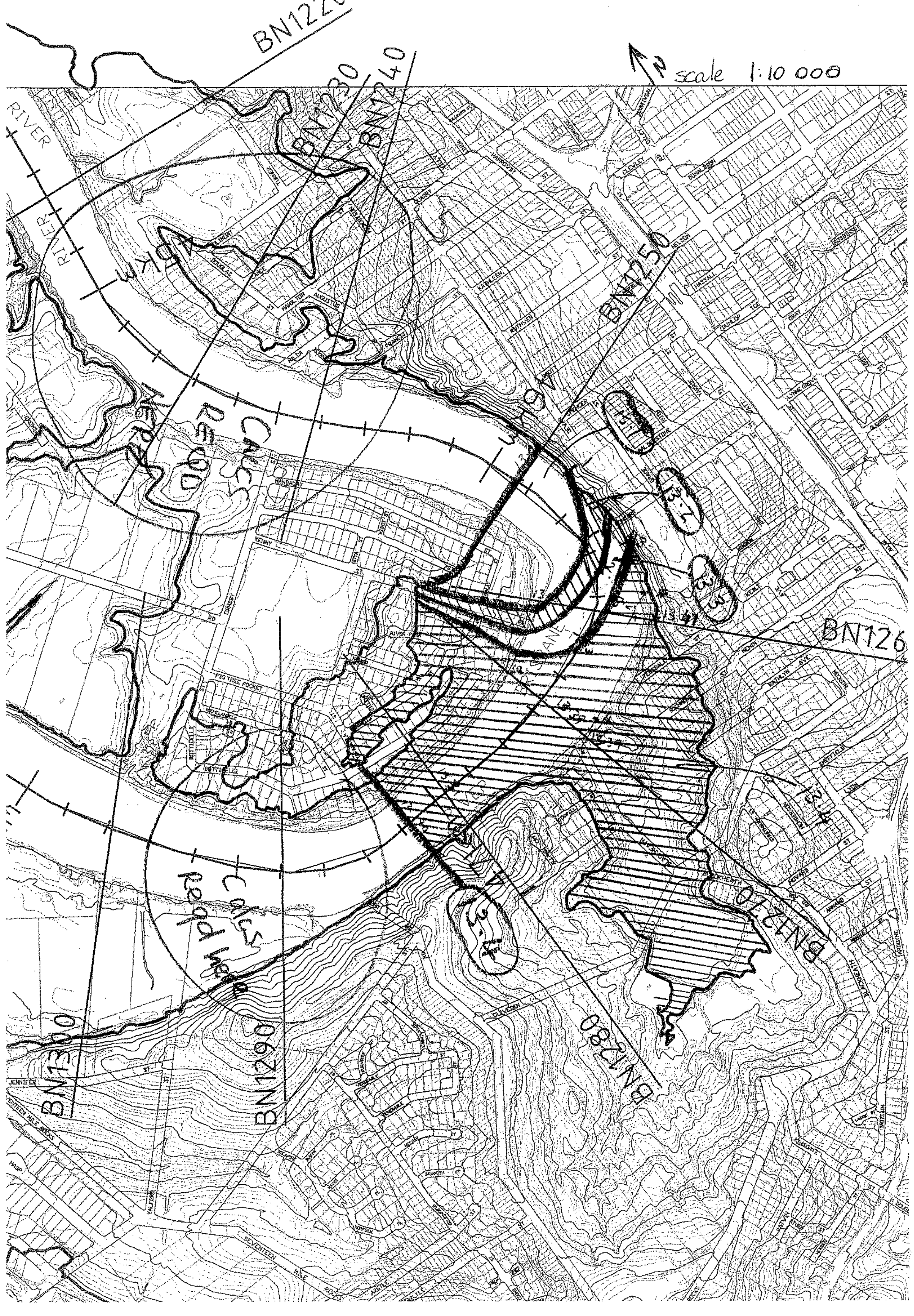
These delays have significantly effected the proposed completion date of the project and we would like to organise a meeting next week (possibly the morning of Wednesday 10/12/97) to discuss study progress, a new completion date and the previously mentioned contract variation.

C:\MSOFFICE\WINWORD\FMAP.DOC

Could you please contact me this afternoon after your meeting with Ken to advise on the suitability of the proposed flood mapping methodology, the flood forecasting issues discussed yesterday and to arrange an appropriate meeting time early next week.

[redacted]

Project Manager


N
scale 1:10 000
BN1220
BN1230
BN1240
BN1250
BN126
BN1270
BN1280
BN1290
BN1300
Calcs Reqd here
Calcs Reqd
13.4
13.3
13.2
13.1
13.4
RIVER
FIG TREE POCKET
KENNY
JENNIFER
SEVENTEEN MILE ROCKS
HAMILTON
AUGUSTUS
DOUGLAS
KATHLEEN
RUTHVEN
HASSALL
DONALDSON
CLEVELEY
NELSON

TELEPHONE MESSAGE

JOB Brisbane River Flood Study FILE T004157

PHONE CALL TO/[✓ FROM] Martin Giles TIME

OF PHONE DATE 8/12/97

DETAILS OF MESSAGE: Martin has advised:

Flood forecasting Model

One model only using Hydrograph at Moggil

Flood Mapping

Straights: AMTD line, 0.1 m increments across to inundation line as per our fax.

Bends: as per our fax to final points and eye in the contours based on points calced at the cross-sections

Actions finalise program to complete & milestones for submission to meeting BY: on Wednesday @ 2pm

[redacted]

CIRCULATION & ACTION

NAME	ACTION REQUIRED	INIT'	DATE
[redacted]	FYI.		

SINCLAIR KNIGHT MERZ

FAXED

DATE:........./........../..........

Facsimile Transmission

To:	BCC	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	16 December 1997
Copies:	Ken Morris	**No of Pages:**	8
Subject:	BRISBANE RIVER FLOOD STUDY		

Martin

We have analysed the effects of the reduction of storage for Oxley Creek, Breakfast Creek and Bulimba Creek based on available current regulation lines as extracted from BIMAP. A reduction in the Bremer River storage was not considered as regulation lines for this river were not available.

This analysis uncovered that the hydraulic model was not sensitive to the reduction of storage (due to the regulation lines on the respective creeks) on Breakfast and Bulimba Creeks. However increases in predicted flood levels of up to 210 mm in the Brisbane River were predicted if a reduction of storage due to the interim regulation lines was applied to Oxley Creek. This increase was calculated for the case of existing conditions in the Brisbane River and reduced floodplain storage (based on interim regulation lines) in Oxley Creek only. In many areas the predicted increase is above the allowable flood level increase of 150 mm before any regulation or revegetation was placed on the Brisbane River. If the Oxley Creek interim regulation lines are adopted, the regulation lines for the Brisbane River would most likely have to be placed at the extent of inundation in many locations. The Brisbane River regulation line model was also run with the reduced Oxley Creek storage (due to interim regulation lines) in order to determine the combined impacts of the two sets of regulation lines. This case predicted increases in flood levels, using the existing conditions model no regulation line on Oxley Creek as the base case, of up to 350 mm. Such an increase would be unacceptable based on the current standards being applied to the Brisbane River. The attached table shows the predicted flood level increases for a number of cases

These increases in water levels were due to the reduction in Oxley Creek storage causing an increase in discharge downstream of Oxley Creek and hence higher flood levels which in turn caused water to be backed raising flood levels upstream to the model boundary. The attached graph shows the predicted increase in discharge for the existing case - no loss of Oxley Creek storage and existing case - reduced Oxley Creek storage.

The current interim regulation lines in the lower reaches of Oxley Creek are set at approximately RL 5.0 m AHD which is well below the Brisbane River 100 year flood level (10.87 m AHD for the existing case no lost storage) at the Oxley Creek and Brisbane River confluence. Since the water level in Oxley Creek would therefore be approximately RL 11 m AHD it was considered that the interim regulation lines are impractical as in most locations six metres of fill would be required adjacent to Oxley Creek in order for developments to be above the 100 year ARI Brisbane River flood level. A plan showing the 100 year inundation for the Brisbane River flood has been provided with the current interim regulation lines for Oxley Creek superimposed.

The analysis undertaken illustrates that substantial flood level increases will result from inappropriate placement of the current interim regulation lines for Oxley Creek. Therefore we believe that the Oxley Creek interim regulation lines must be addressed in detail, considering possible Brisbane River level impacts, during the current study of Oxley Creek.

With respect to the setting of Brisbane River regulation lines, we have assumed that the Oxley Creek regulation lines would be located to produce minimum impacts on the Brisbane River. It is likely that the practical location of the Oxley Creek regulation lines will be at or around the RL 10.0 to 11.0 m AHD range allowing for approximately 1.0 m of fill and only minor losses of floodplain storage.

We are therefore continuing the flood mapping phase of the study using the flood levels obtained by the previously approved Brisbane River regulation lines.

Could you please consider these significant findings and provide some feedback on our proposed approach as soon as possible.

Regards

[redacted]

Scott Abbey
Project Manager

SENSITIVITY OF TRIBUTARY STORAGE DUE TO REGULATION LINES

WATER LEVEL Location	Chainage (km)	1 Existing 100 Year ARI	2 Existing + Oxley Creek Regs 100 Year ARI	Difference 2-1 (m)	3 Regs + Oxley Creek Regs 100 Year ARI	Difference 3-1 (m)
BRISBANE	1000.00	22.76	22.80	0.04	22.82	0.06
BRISBANE	1000.29	22.57	22.60	0.03	22.61	0.04
BRISBANE	1000.78	22.29	22.33	0.04	22.35	0.06
BRISBANE	1001.32	22.20	22.24	0.04	22.26	0.06
BRISBANE	1001.87	21.68	21.72	0.04	21.74	0.06
BRISBANE	1002.35	21.48	21.53	0.05	21.55	0.07
BRISBANE	1002.79	21.46	21.51	0.05	21.53	0.07
BRISBANE	1003.28	21.13	21.18	0.05	21.20	0.07
BRISBANE	1003.78	20.86	20.92	0.06	20.93	0.07
BRISBANE	1004.30	20.41	20.46	0.05	20.48	0.07
BRISBANE	1004.81	20.37	20.43	0.06	20.45	0.08
BRISBANE	1005.33	20.20	20.26	0.06	20.26	0.06
BRISBANE	1005.87	19.89	19.95	0.06	19.95	0.06
BRISBANE	1006.20	19.76	19.82	0.06	19.82	0.06
BRISBANE	1006.20	19.76	19.82	0.06	19.82	0.06
BRISBANE	1006.30	19.72	19.78	0.06	19.78	0.06
BRISBANE	1006.91	19.51	19.58	0.07	19.58	0.07
BRISBANE	1007.41	19.48	19.55	0.07	19.49	0.01
BRISBANE	1007.92	19.19	19.26	0.07	19.17	-0.02
BRISBANE	1008.45	19.02	19.09	0.07	19.04	0.02
BRISBANE	1008.93	18.96	19.03	0.07	18.97	0.01
BRISBANE	1009.40	18.86	18.94	0.08	18.88	0.02
BRISBANE	1009.72	18.85	18.93	0.08	18.82	-0.03
BRISBANE	1010.49	18.50	18.58	0.08	18.52	0.02
BRISBANE	1010.73	18.52	18.60	0.08	18.52	0.00
BRISBANE	1010.98	18.44	18.52	0.08	18.46	0.02
BRISBANE	1011.51	18.43	18.51	0.08	18.46	0.03
BRISBANE	1011.98	18.43	18.51	0.08	18.45	0.02
BRISBANE	1012.48	18.33	18.41	0.08	18.40	0.07
BRISBANE	1012.94	18.22	18.31	0.09	18.29	0.07
BRISBANE	1013.19	18.18	18.26	0.08	18.26	0.08
BRISBANE	1013.19	18.18	18.26	0.08	18.26	0.08
BRISBANE	1013.45	18.14	18.22	0.08	18.20	0.06
BRISBANE	1013.68	18.11	18.20	0.09	18.18	0.07
BRISBANE	1013.68	18.11	18.20	0.09	18.18	0.07
BRISBANE	1013.91	18.08	18.17	0.09	18.14	0.06
BRISBANE	1014.31	18.05	18.14	0.09	18.11	0.06
BRISBANE	1014.61	18.08	18.17	0.09	18.14	0.06
BRISBANE	1015.09	17.94	18.04	0.10	18.01	0.07
BRISBANE	1015.56	17.81	17.90	0.09	17.85	0.04
BRISBANE	1015.85	17.77	17.86	0.09	17.81	0.04
BRISBANE	1015.85	17.77	17.86	0.09	17.81	0.04
BRISBANE	1016.14	17.71	17.81	0.10	17.77	0.06
BRISBANE	1016.64	17.62	17.72	0.10	17.70	0.08
BRISBANE	1016.89	17.53	17.62	0.09	17.61	0.08
BRISBANE	1016.89	17.53	17.62	0.09	17.61	0.08
BRISBANE	1017.13	17.39	17.49	0.10	17.47	0.08
BRISBANE	1017.61	17.26	17.37	0.11	17.37	0.11
BRISBANE	1017.92	17.10	17.21	0.11	17.25	0.15
BRISBANE	1018.20	17.02	17.13	0.11	17.20	0.18
BRISBANE	1018.73	16.69	16.81	0.12	16.87	0.18
BRISBANE	1019.10	16.56	16.67	0.11	16.74	0.18
BRISBANE	1019.49	16.45	16.57	0.12	16.61	0.16
BRISBANE	1019.87	16.15	16.27	0.12	16.34	0.19
BRISBANE	1020.12	16.25	16.37	0.12	16.41	0.16
BRISBANE	1020.53	16.22	16.35	0.13	16.40	0.18
BRISBANE	1020.83	16.07	16.19	0.12	16.23	0.16
BRISBANE	1021.10	15.86	15.99	0.13	16.03	0.17
BRISBANE	1021.54	15.69	15.82	0.13	15.86	0.17
BRISBANE	1021.72	15.72	15.85	0.13	15.91	0.19

SENSITIVITY OF TRIBUTARY STORAGE DUE TO REGULATION LINES

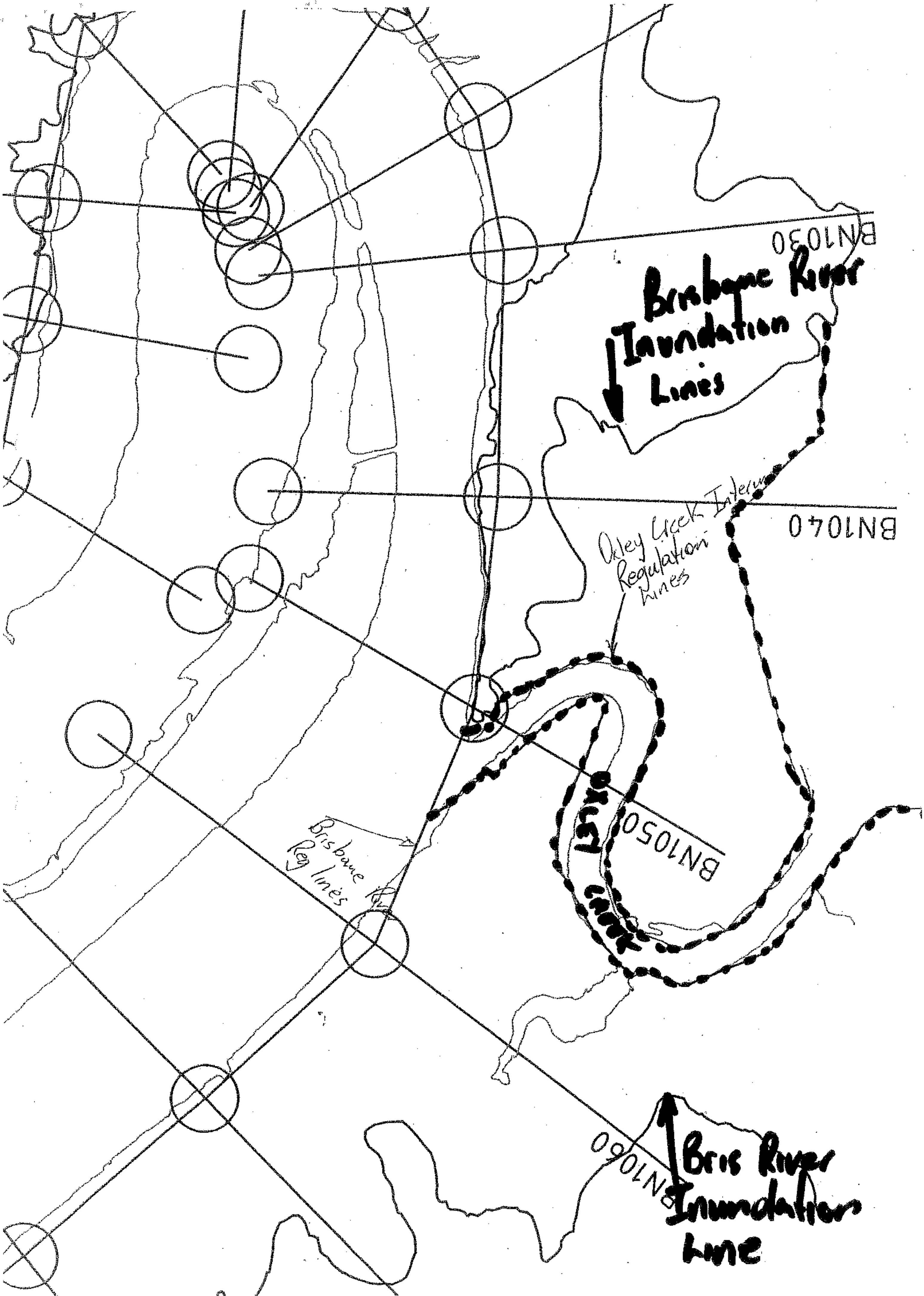
WATER LEVEL Location	Chainage (km)	1 Existing 100 Year ARI	2 Existing + Oxley Creek Regs 100 Year ARI	Difference 2-1 (m)	3 Regs + Oxley Creek Regs 100 Year ARI	Difference 3-1 (m)
BRISBANE	1021.90	15.65	15.78	0.13	15.82	0.17
BRISBANE	1022.11	15.53	15.66	0.13	15.61	0.08
BRISBANE	1022.58	15.45	15.59	0.14	15.65	0.20
BRISBANE	1023.04	15.21	15.35	0.14	15.36	0.15
BRISBANE	1023.57	15.12	15.26	0.14	15.30	0.18
BRISBANE	1024.08	15.07	15.21	0.14	15.25	0.18
BRISBANE	1024.56	15.01	15.15	0.14	15.19	0.18
BRISBANE	1025.07	14.91	15.06	0.15	15.09	0.18
BRISBANE	1025.36	14.77	14.92	0.15	14.95	0.18
BRISBANE	1025.59	14.61	14.76	0.15	14.76	0.15
BRISBANE	1026.17	14.48	14.64	0.16	14.66	0.18
BRISBANE	1026.68	14.38	14.53	0.15	14.55	0.17
BRISBANE	1026.90	14.25	14.41	0.16	14.38	0.13
BRISBANE	1027.16	14.11	14.27	0.16	14.29	0.18
BRISBANE	1027.68	14.17	14.33	0.16	14.36	0.19
BRISBANE	1028.18	14.19	14.35	0.16	14.36	0.17
BRISBANE	1028.68	14.06	14.22	0.16	14.27	0.21
BRISBANE	1028.68	14.06	14.22	0.16	14.27	0.21
BRISBANE	1028.76	13.91	14.08	0.17	14.14	0.23
BRISBANE	1028.76	13.91	14.08	0.17	14.14	0.23
BRISBANE	1029.20	13.80	13.96	0.16	13.97	0.17
BRISBANE	1029.68	13.82	13.99	0.17	13.97	0.15
BRISBANE	1030.22	13.82	13.98	0.16	14.02	0.20
BRISBANE	1030.87	13.75	13.92	0.17	13.98	0.23
BRISBANE	1031.26	13.59	13.76	0.17	13.86	0.27
BRISBANE	1031.70	13.21	13.38	0.17	13.50	0.29
BRISBANE	1032.00	13.31	13.49	0.18	13.58	0.27
BRISBANE	1032.23	13.18	13.36	0.18	13.46	0.28
BRISBANE	1032.59	12.94	13.12	0.18	13.21	0.27
BRISBANE	1033.08	12.79	12.97	0.18	13.08	0.29
BRISBANE	1033.37	12.68	12.86	0.18	13.01	0.33
BRISBANE	1033.90	12.45	12.63	0.18	12.75	0.30
BRISBANE	1034.37	12.29	12.48	0.19	12.60	0.31
BRISBANE	1034.89	12.19	12.38	0.19	12.51	0.32
BRISBANE	1035.41	11.94	12.13	0.19	12.27	0.33
BRISBANE	1035.90	11.65	11.85	0.20	11.96	0.31
BRISBANE	1036.46	11.35	11.55	0.20	11.66	0.31
BRISBANE	1036.77	11.28	11.47	0.19	11.59	0.31
BRISBANE	1036.92	11.12	11.31	0.19	11.43	0.31
BRISBANE	1037.09	11.07	11.26	0.19	11.39	0.32
BRISBANE	1037.09	11.07	11.26	0.19	11.39	0.32
BRISBANE	1037.18	10.98	11.17	0.19	11.29	0.31
BRISBANE	1037.18	10.98	11.17	0.19	11.29	0.31
BRISBANE	1037.29	10.93	11.12	0.19	11.23	0.30
BRISBANE	1037.63	10.91	11.10	0.19	11.21	0.30
BRISBANE	1038.09	10.93	11.13	0.20	11.18	0.25
BRISBANE	1038.60	10.91	11.10	0.19	11.17	0.26
BRISBANE	1039.10	10.90	11.10	0.20	11.25	0.35
BRISBANE	1039.20	10.91	11.11	0.20	11.24	0.33
BRISBANE	1039.20	10.91	11.11	0.20	11.24	0.33
BRISBANE	1039.57	10.92	11.12	0.20	11.20	0.28
BRISBANE	1039.67	10.90	11.10	0.20	11.18	0.28
BRISBANE	1039.67	10.90	11.10	0.20	11.18	0.28
BRISBANE	1039.83	10.87	11.07	0.20	11.16	0.29
BRISBANE	1039.83	10.87	11.07	0.20	11.16	0.29
BRISBANE	1040.09	10.84	11.04	0.20	11.13	0.29
BRISBANE	1040.25	10.79	10.98	0.19	11.08	0.29
BRISBANE	1040.25	10.79	10.98	0.19	11.08	0.29
BRISBANE	1040.49	10.71	10.90	0.19	10.99	0.28
BRISBANE	1041.01	10.74	10.94	0.20	11.06	0.32

SENSITIVITY OF TRIBUTARY STORAGE DUE TO REGULATION LINES

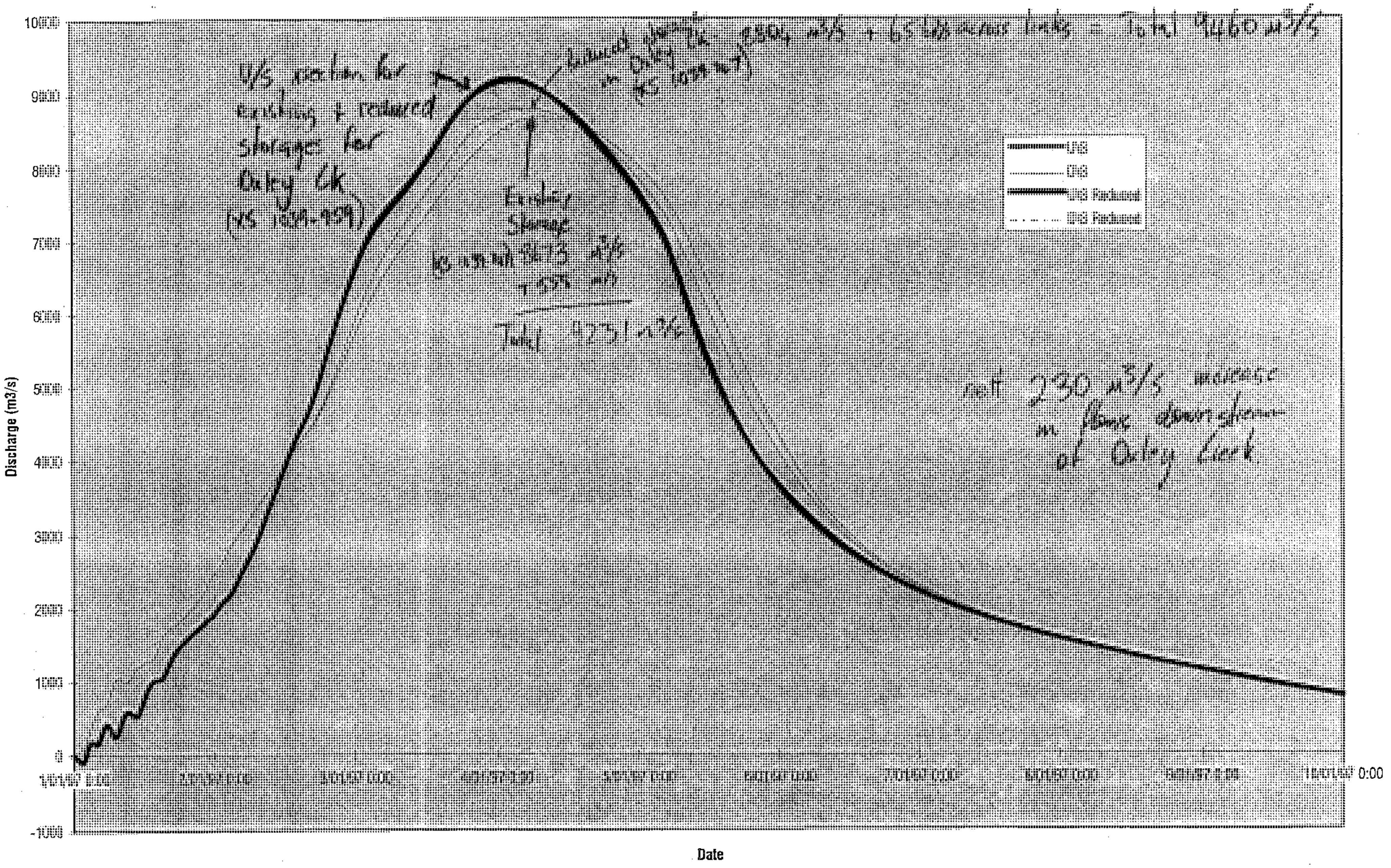
WATER LEVEL Location	Chainage (km)	1 Existing 100 Year ARI	2 Existing + Oxley Creek Regs 100 Year ARI	Difference 2-1 (m)	3 Regs + Oxley Creek Regs 100 Year ARI	Difference 3-1 (m)
BRISBANE	1041.23	10.71	10.91	0.20	11.00	0.29
BRISBANE	1041.46	10.62	10.82	0.20	10.92	0.30
BRISBANE	1041.70	10.59	10.79	0.20	10.89	0.30
BRISBANE	1041.96	10.45	10.65	0.20	10.79	0.34
BRISBANE	1042.24	10.30	10.50	0.20	10.61	0.31
BRISBANE	1042.50	10.29	10.49	0.20	10.60	0.31
BRISBANE	1042.50	10.29	10.49	0.20	10.60	0.31
BRISBANE	1042.52	10.29	10.49	0.20	10.60	0.31
BRISBANE	1042.91	10.22	10.43	0.21	10.44	0.22
BRISBANE	1043.01	10.18	10.39	0.21	10.45	0.27
BRISBANE	1043.01	10.18	10.39	0.21	10.45	0.27
BRISBANE	1043.08	10.15	10.36	0.21	10.44	0.29
BRISBANE	1043.11	10.15	10.35	0.20	10.43	0.28
BRISBANE	1043.11	10.15	10.35	0.20	10.43	0.28
BRISBANE	1043.73	9.91	10.11	0.20	10.18	0.27
BRISBANE	1044.06	9.75	9.95	0.20	10.06	0.31
BRISBANE	1044.34	9.58	9.78	0.20	9.89	0.31
BRISBANE	1044.61	9.53	9.73	0.20	9.85	0.32
BRISBANE	1044.86	9.49	9.69	0.20	9.79	0.30
BRISBANE	1045.40	9.31	9.50	0.19	9.60	0.29
BRISBANE	1045.89	9.17	9.37	0.20	9.44	0.27
BRISBANE	1046.18	9.09	9.29	0.20	9.38	0.29
BRISBANE	1046.34	9.02	9.21	0.19	9.32	0.30
BRISBANE	1046.58	8.97	9.17	0.20	9.29	0.32
BRISBANE	1046.90	8.78	8.98	0.20	9.07	0.29
BRISBANE	1047.35	8.41	8.60	0.19	8.67	0.26
BRISBANE	1047.92	8.17	8.36	0.19	8.45	0.28
BRISBANE	1048.38	8.23	8.43	0.20	8.49	0.26
BRISBANE	1048.89	8.00	8.19	0.19	8.28	0.28
BRISBANE	1049.12	7.94	8.13	0.19	8.23	0.29
BRISBANE	1049.37	7.75	7.95	0.20	8.06	0.31
BRISBANE	1049.59	7.74	7.94	0.20	8.04	0.30
BRISBANE	1049.87	7.63	7.82	0.19	7.92	0.29
BRISBANE	1050.43	7.61	7.81	0.20	7.89	0.28
BRISBANE	1050.86	7.46	7.67	0.21	7.75	0.29
BRISBANE	1051.36	7.46	7.67	0.21	7.76	0.30
BRISBANE	1051.90	7.30	7.50	0.20	7.58	0.28
BRISBANE	1052.31	7.40	7.60	0.20	7.71	0.31
BRISBANE	1052.31	7.40	7.60	0.20	7.71	0.31
BRISBANE	1052.39	7.23	7.42	0.19	7.51	0.28
BRISBANE	1052.39	7.23	7.42	0.19	7.51	0.28
BRISBANE	1052.60	7.14	7.32	0.18	7.40	0.26
BRISBANE	1052.60	7.14	7.32	0.18	7.40	0.26
BRISBANE	1052.64	6.63	6.77	0.14	6.83	0.20
BRISBANE	1052.64	6.63	6.77	0.14	6.83	0.20
BRISBANE	1052.87	6.49	6.63	0.14	6.68	0.19
BRISBANE	1053.32	6.42	6.57	0.15	6.63	0.21
BRISBANE	1053.32	6.42	6.57	0.15	6.63	0.21
BRISBANE	1053.39	6.24	6.39	0.15	6.55	0.31
BRISBANE	1053.39	6.24	6.39	0.15	6.55	0.31
BRISBANE	1053.90	5.85	5.98	0.13	6.12	0.27
BRISBANE	1054.64	5.78	5.90	0.12	5.98	0.20
BRISBANE	1054.64	5.78	5.90	0.12	5.98	0.20
BRISBANE	1054.68	5.70	5.82	0.12	5.87	0.17
BRISBANE	1054.68	5.70	5.82	0.12	5.87	0.17
BRISBANE	1054.97	5.45	5.57	0.12	5.63	0.18
BRISBANE	1055.28	5.40	5.52	0.12	5.55	0.15
BRISBANE	1055.42	5.40	5.53	0.13	5.54	0.14
BRISBANE	1055.96	5.34	5.47	0.13	5.50	0.16
BRISBANE	1056.40	5.09	5.22	0.13	5.25	0.16

SENSITIVITY OF TRIBUTARY STORAGE DUE TO REGULATION LINES

WATER LEVEL Location	Chainage (km)	1 Existing 100 Year ARI	2 Existing + Oxley Creek Regs 100 Year ARI	Difference 2-1 (m)	3 Regs + Oxley Creek Regs 100 Year ARI	Difference 3-1 (m)
BRISBANE	1056.70	5.03	5.16	0.13	5.18	0.15
BRISBANE	1056.87	5.22	5.37	0.15	5.40	0.18
BRISBANE	1056.87	5.22	5.37	0.15	5.40	0.18
BRISBANE	1056.95	5.12	5.26	0.14	5.29	0.17
BRISBANE	1056.95	5.12	5.26	0.14	5.29	0.17
BRISBANE	1057.09	4.97	5.10	0.13	5.13	0.16
BRISBANE	1057.53	4.83	4.96	0.13	4.99	0.16
BRISBANE	1058.04	4.58	4.70	0.12	4.73	0.15
BRISBANE	1058.23	4.50	4.62	0.12	4.64	0.14
BRISBANE	1058.53	4.37	4.48	0.11	4.50	0.13
BRISBANE	1058.74	4.41	4.52	0.11	4.53	0.12
BRISBANE	1059.04	4.13	4.23	0.10	4.26	0.13
BRISBANE	1059.54	4.09	4.19	0.10	4.21	0.12
BRISBANE	1059.99	3.88	3.99	0.11	4.00	0.12
BRISBANE	1060.35	3.65	3.74	0.09	3.73	0.08
BRISBANE	1060.54	3.50	3.58	0.08	3.59	0.09
BRISBANE	1061.02	3.45	3.54	0.09	3.54	0.09
BRISBANE	1061.53	3.24	3.32	0.08	3.32	0.08
BRISBANE	1062.02	3.16	3.24	0.08	3.24	0.08
BRISBANE	1062.54	3.12	3.20	0.08	3.20	0.08
BRISBANE	1062.94	3.11	3.19	0.08	3.19	0.08
BRISBANE	1063.13	3.08	3.16	0.08	3.14	0.06
BRISBANE	1063.13	3.08	3.16	0.08	3.14	0.06
BRISBANE	1063.31	2.99	3.07	0.08	3.06	0.07
BRISBANE	1063.65	2.72	2.78	0.06	2.76	0.04
BRISBANE	1064.00	2.68	2.74	0.06	2.72	0.04
BRISBANE	1064.49	2.55	2.61	0.06	2.58	0.03
BRISBANE	1065.01	2.57	2.64	0.07	2.60	0.03
BRISBANE	1065.50	2.53	2.59	0.06	2.56	0.03
BRISBANE	1065.99	2.54	2.60	0.06	2.60	0.06
BRISBANE	1066.51	2.46	2.52	0.06	2.52	0.06
BRISBANE	1067.02	2.43	2.49	0.06	2.46	0.03
BRISBANE	1067.49	2.32	2.38	0.06	2.34	0.02
BRISBANE	1067.97	2.20	2.25	0.05	2.23	0.03
BRISBANE	1068.66	2.02	2.06	0.04	2.05	0.03
BRISBANE	1069.05	1.95	1.99	0.04	1.97	0.02
BRISBANE	1069.54	1.89	1.93	0.04	1.91	0.02
BRISBANE	1070.03	1.82	1.86	0.04	1.84	0.02
BRISBANE	1070.53	1.72	1.76	0.04	1.73	0.01
BRISBANE	1071.04	1.64	1.67	0.03	1.64	0.00
BRISBANE	1071.52	1.67	1.71	0.04	1.69	0.02
BRISBANE	1072.02	1.56	1.59	0.03	1.65	0.09
BRISBANE	1072.02	1.56	1.59	0.03	1.65	0.09
BRISBANE	1072.02	1.56	1.59	0.03	1.65	0.09
BRISBANE	1072.52	1.50	1.53	0.03	1.52	0.02
BRISBANE	1073.00	1.46	1.49	0.03	1.48	0.02
BRISBANE	1073.49	1.36	1.38	0.02	1.38	0.02
BRISBANE	1074.00	1.29	1.31	0.02	1.30	0.01
BRISBANE	1074.46	1.22	1.24	0.02	1.24	0.02
BRISBANE	1074.99	1.09	1.10	0.01	1.10	0.01
BRISBANE	1075.48	1.06	1.07	0.01	1.06	0.00
BRISBANE	1076.00	1.07	1.08	0.01	1.08	0.01
BRISBANE	1076.50	0.96	0.96	0.00	0.96	0.00
BRISBANE	1077.01	0.96	0.97	0.01	0.97	0.01
BRISBANE	1077.51	0.97	0.97	0.00	0.97	0.00
BRISBANE	1078.04	0.95	0.95	0.00	0.95	0.00
BRISBANE	1078.53	0.92	0.92	0.00	0.92	0.00
BRISBANE	1078.66	0.92	0.92	0.00	0.92	0.00


BN1030
Brisbane River Inundation Lines
BN1040
Oxley Creek Interim Regulation Lines
BN1050
Oxley Creek
Brisbane R Reg lines
BN1060
Bris River Inundation Line

MHW100 Chart 2



SINCLAIR KNIGHT MERZ

FAXED
DATE ..../......../........

Facsimile Transmission

To: BCC
Attention: Martin Giles
Fax No: [redacted]
Copies:
Subject: BRISBANE RIVER FLOOD STUDY

From: Scott Abbey
Job No: TO04157
Date: 22 December 1997
No of Pages: 1

Martin

We have completed the draft plans for the dimensioning of the regulation lines and I will send you down a copy of these plans by courier tonight.

The dimensioning has been done from real property boundaries however due to the scale required by the brief (1:10000) it is difficult to place dimensions from the closest property boundary to the regulation lines in most cases because of the readability of the dimensions.

Please note that the regulation lines for the adjoining tributaries (ie. Oxley Creek etc) have not as yet been superimposed onto the plans however this task will be completed once we have received your comments regarding the dimensioning that we have already completed.

If you need to discuss this matter further please contact me.

Regards

[redacted]

Scott Abbey
Project Manager

Sinclair Knight Merz Pty Ltd A.C.N. 001 024 095
49 Annand Street, Toowoomba QLD, Australia 4350.
Telephone: +61 76 39 8400
Fax: +61 76 39 8490

TELEPHONE MESSAGE

JOB BRISBANE RIVER FILE T004157

PHONE CALL [✓ TO]/FROM MARTIN GILES TIME

OF PHONE [redacted] DATE 22/12/97

DETAILS OF MESSAGE:

1) Reg lines on Bris River.

Stay with the ones currently generated.
Oxley Creek to be sorted out by others

2) Variation KM has taken to Barry Ball
for discussion. will hear early in
new year.

3) Reg line Dimensioning. Fax to be
sent to MG & Really Plans to MG today/
feedback in the new year.

BY: [redacted]

CIRCULATION & ACTION

NAME	ACTION REQUIRED	INIT'	DATE

SINCLAIR KNIGHT MERZ

FAXED
DATE: 23/12/97

Facsimile Transmission

To:	BCC	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	23 December 1997
Copies:		**No of Pages:**	2
Subject:	BRISBANE RIVER FLOOD STUDY		

Martin

We have completed the analysis for the flood contouring and these have been marked up in pencil on a number of draft plans. These plans will be sent either tonight or tomorrow night via courier. Prior to us finalising the drafting for the flood contours could you please review what we have marked up as the draft flood contours and notify us of any changes that you may have.

Please note that below cross-section BN 260 the flood contours will be a constant RL 2.5 m AHD due to storm surge levels. It was considered that super elevation below section BN 260 would be negligible due to the low velocities associated with storm surges hence these effects have not been plotted.

In addition, for calibration of the flood forecasting model, we require recorded rainfall data for the 1996 flood event at radio telemetry gauges given on the attached table. Could you please provide this information in **hydsys** format to enable us to bring it directly into the RAFTS model. Please send this information directly to Mark via e-ma [redacted]

This will most likely be the final correspondence prior to the Christmas break so on behalf of Mark and myself I would like to wish you a great Christmas and New Year and we will speak to upon our return on the 5 January 1998.

Regards

[redacted]

Scott Abbey
Project Manager

Location	Suburb	Number	Northing	Easting
Bracken Ridge Rd.	Bracken Ridge	P:BDR712 ✓	6979	502 ✓
Braun St.	Deagon	P:C_R560 ✓	6976	506 ✓
Sandgate STP	Bondall	P:C_R733 ✓	6977	507 ✓
Pinapple St	Carseldine	P:C_R715 ✓	6974	503 ✓
Aspley Res.	Aspley	P:LCR566 ✓	6972	501 ✓
Old Nth. Rd.	Everton Hills	P:C_R572 ✓	6971	498 ✓
Hamilton Rd.	Chermside	P:D_R509 ✓	6971	504 ✓
Brickyard Rd.	Geebung	P:D_R563 ✓	6971	506 ✓
Australian Woolshed	Ferny Hills	P:K_R545 ✓	6970	493 ✓
Osborne Rd.	Everton Park ✓	P:K_R539 ✓	6969	498 ✓
Hatward St.	Stafford	P:K_R542	6967	501
Nudgee Rd.	Toombul ✓	P:K_R557 ✓	6968 ✓	507 ✓
Sedgley Park	Alderley	P:B_R578	6966	500
Opposite Mann Park	Bowen Hills	P:B_R524	6965	503
Jason Street	Ithaca	P:I_R536	6963	499
Enoggera Dam	The Gap	P:E_R533	6964	493
Gold Ck Res	Brookfield	P:G_R718	6963	488
ABQ2	Mt Coot-tha	P:I_R512	6962	495
BAC		P:BCR015	6961	502
Alpha St. Wk Depot	Taringa	P:TWR027	6959	499
Indooroopilly Bowls Club	Indooroopilly	P:SIR505	6958	498
Anglican Church Moggill Rd.	Kenmore	P:GBR017	6957	494
Chadston Close	Kenmore Hills	P:M_R515	6958	493
Pullenvale Hall	Pullenvale	P:PLR742	6955	489
Wynnun STP	Lytton	P:BNR739	6967	516
Doughboy Pde	Hemmant	P:BMR527	6964	512
Pine St. Wk. Depot	Wynnum	P:W_R521	6963	517
Redfern St. Wks. Depot	Morningside	P:P_R029	6960	507
Caswell St.	East Bris	P:NMR554	6959	505
Old Cleveland Rd.	Carindale	P:BMR706	6958	510
SE Freeway	Greenslopes	P:NMR511	6957	504
Cnr Cavendish & Boundary	Cooparoo	P:NMR833	6956	507
Joachim St.	Holland Park West	P:NMR548	6956	505
Merion Pl	Carindale	P:BMR830	6955	510
Griffith Uni	Mt Gravatt	P:BMR138	6953	507
Greenwood St.	Wishart	P:BMR803	6951	510
School Rd.	Rochedale	P:BMR709	6948	511
Corinda High School	Corinda	P:OXR020	6953	499
Musgrave Rd.	Coopers Plains	P:SSR130	6951	502
Beatty Rd.	Acacia Ridge	P:OXR126	6948	501
Calamvale Telecom	Calamvale	P:OXR114	6946	605
Gowan Rd	Calamvale	P:S_R205	6943	506
Johnson Rd.	Forestdale	P:OXR108	6941	500
Thompson Rd.	Greenbank	P:OXR104	6936	495
Inala STP	Inala	P:BLR736	6948	499
Richlands Res	Richlands	P:BLR116	6947	496
Wacol STP	Wacol	P:WSR518	6949	491
Woogaroo Ck at Opossum Ck	Camira	P:WGR150	6942	489

SINCLAIR KNIGHT MERZ

DATE:

Facsimile Transmission

To: CARDNO &DAVIES
Attention: MARTIN GILES
Fax No: [redacted]
Copies:
Subject: BRISBANE RIVER FLOOD STUDY

From: Scott Abbey
Job No: TO04157
Date: 6 January 1998
No of Pages: 2

Martin
We have a few questions regarding the Brisbane River Flood Study.

Next Wednesday

1. To prepare rezoning recommendations we require the rezoning plan in digital format (DWG preferred). It would be desirable if each of the zonings are in separate layers. This plan would be similar to the one provided previously in hard copy.

Look

2. Two copies of the final plans are required by Council. It is proposed to supply 1 x film copy (flood mapping and reg line overlays on acetate and all others on film) and 1 x paper copy. Is this acceptable?

exaggerate vertical scale ID BRIDGE LOCATIONS + reach names,

Only up to 100yr

3. The brief calls for the profile of all floods to be plotted on one sheet. To do this would require an A0 sheet and around a 1:100000 scale. This plan will be hard to read and of little value to users due to the magnitude of the river system. Do you require this plan to be prepared?

4. We would like to start preparing flood contour final plans on Thursday. Can you provide any feedback of your review of the draft plans sent through before Christmas?

5. We are also seeking feedback on the regulation line dimensioning sent through earlier.

6. How is the progress on the extraction of rainfall data for the flood forecasting model requested prior to Christmas?

Your earliest response to these points would be appreciated?
I will call this afternoon to discuss.

Regards

[redacted]

Scott Abbey

Facsimile transmission from
BRISBANE CITY COUNCIL
WATERWAYS SECTION
Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date
08 January 1998

To
Sinclair Knight Merz

Facsimile No.
[redacted]

Attention
Mr Scott Abbey

No. of Pages 4
(including this page)

From
Martin Giles

Phone No.
[redacted]

Facsi[redacted]

Re
BRISBANE RIVER FLOOD STUDY- REPLY TO 6 JAN FAX

I have reviewed your facsimile of 6 January 1998 and wish to advise the following:

1. The requested zoning drawings will be prepared. To minimise the amount of data involved, we will only provide the zoning information for the area approximately within the proposed regulation lines. BIMAP has indicated that the earliest it can start work on this task is Monday.

2. Your proposal to submit 1xfilm copy and 1xpaper copy of plans is acceptable. ✓

3. Although messy, we do require the flood profiles to be plotted on a single sheet. ✓

4. With regard to flood contours, we have been through the submitted contours and found them to be generally acceptable. Of concern has been high superelevation calculated at certain bends. At one bend, a superelevation of 0.71 m is indicated which would give a total difference in water level of 1.4 metres across the bend. Despite the high velocity involved (4 m/s), the extent of the superelevation seems excessive and the equation suspect.

Upon consideration, it was thought that the superelevation would taper off with reducing velocity near the bank area. We therefore recommend that contours only be provided for say 70 percent of the calculated superelevation, with the remainder of the area between the contour nearest the 70 percent contour and the bank considered part of the one cell. Although this is hard to explain in words, what this means in reality is that the contours you have sent us do not move, just some of the higher areas are treated as part of a single, lower contour. I will courier you drawings showing the contours proposed to be deleted. However, to give you a better idea what we are proposing, I have attached the contours for one bend.

Also shown on the drawing is the proposed removal of contours on the inside of the bend to provide a smooth increase in level going around the inside of the bend. For the tight bend discussed above, the superelevation causes levels lower than those downstream. Although conservative, we propose the removal of the lower contours to avoid the potential for a low level to be quoted in the bend area.

The above methodology is rather arbitrary. However, given the work you have completed to date and the approximate nature of the contours anyway, it is considered that this method provides a reasonable compromise on contouring. We would welcome your comments in relation to this matter.

Finally, a couple of very minor discrepancies were noted at the boundary of some of the sheets, with the contours on the following sheet slightly contradicting those of the first sheet. The worst mismatch occurred in the vicinity of BN1590, with very small discrepancies at BN410, BN950, and BN1220.

5. The regulation line dimensioning sent through previously seems fine. I will present the plans to BIMAP for final comment to see if they have any problems with the dimensioning. I will get back to you on this tomorrow.

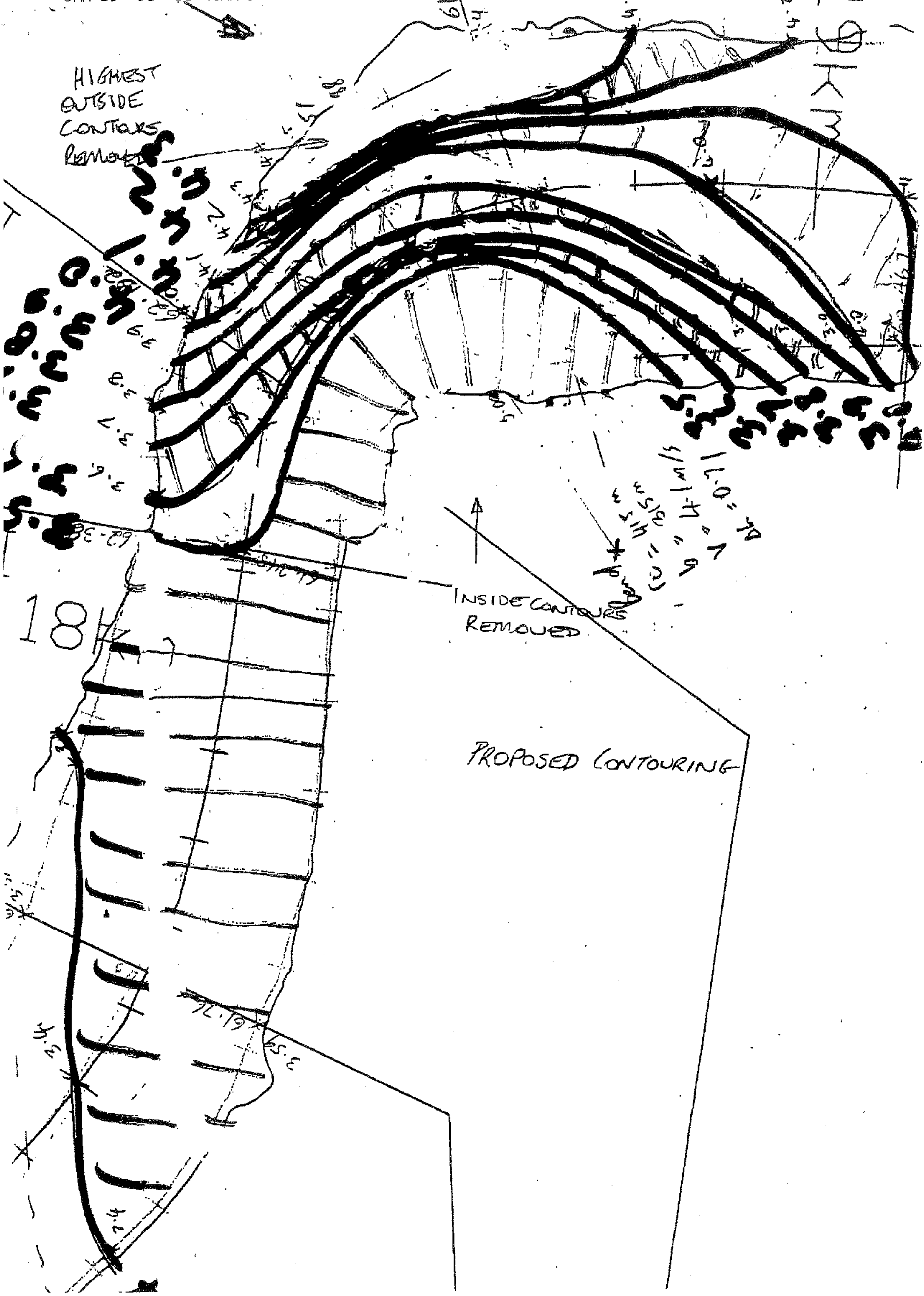
6. The requested rainfall data is being prepared now and will be e-mailed to you shortly after lunch.

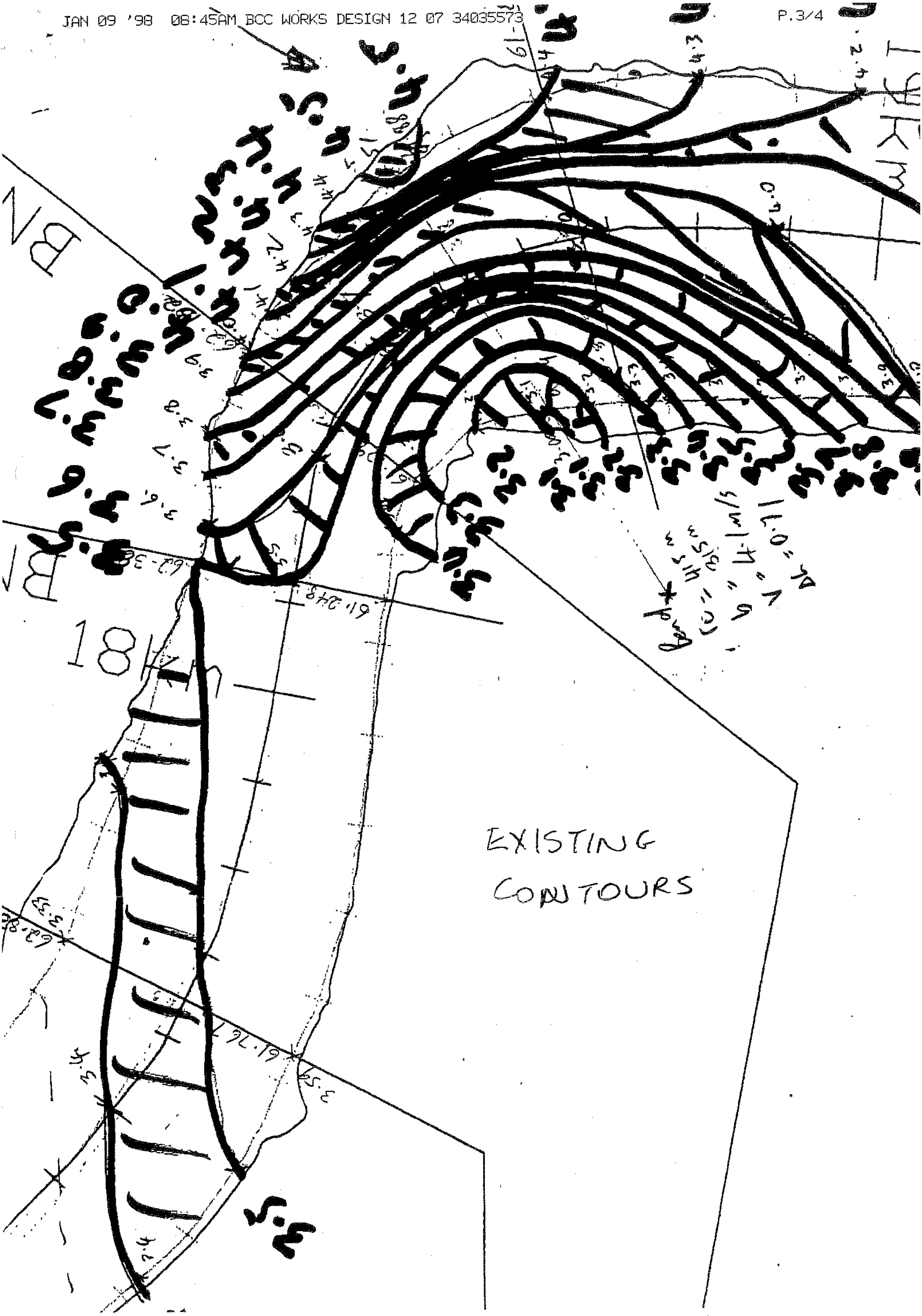
I trust that the above satisfactorily addresses your concerns in relation to the flood study. If you have any further queries, please do not hesitate to contact me.

Regards

[redacted]

Martin Giles
Contract Engineer Waterways


HIGHEST OUTSIDE CONTOURS REMOVED
INSIDE CONTOURS REMOVED
PROPOSED CONTOURING
18
3.4
2.4


EXISTING CONTOURS
18
BN
61.248
61.267
62.38
3.5
3.4
3.6
3.7
3.8
3.9
4.0
4.1
4.2
4.3

SINCLAIR KNIGHT MERZ

FAXED
3 / 1 / 98

Facsimile Transmission

To:	Brisbane City Council	**From:**	Scott Abbey
Attention:	Martin Giles	**Job No:**	TO04157
Fax No:	[redacted]	**Date:**	13 January 1998
Copies:		**No of Pages:**	2
Subject:	BRISBANE RIVER FLOOD STUDY		

Martin

We have been through the Brisbane River Brief and we are unable to locate where it states that the inundation lines are to be plotted 1 metre above the predicted flood levels.

As we have already completed plotting the inundation lines (without the additional 1 metre), a significant amount of additional work will have to be conducted to produce inundation plus 1 m plots with the flood contours extended to the additional inundation lines.

The plotting of the inundation lines is an arduous task due to the size of the files involved. In addition, the replotting of inundation lines by using offset methods from the inundation lines that have already been produced would not be effective as the Brisbane River consists of many low lying areas with adjoining creeks and differences between contours in these areas is not constant. It is therefore considered that the new inundation lines will have to be produced from first principles in most locations.

One problem associated with raising the inundation lines to 1 m above the predicted levels is that the lower end of the Brisbane River (from the mouth to Breakfast Creek downstream) has already been set to RL 2.5 m AHD (100 Year ARI) because of storm surge levels in Moreton Bay. If 1 metre was to be added to this level (3.5 m AHD), the amount of area enclosed within the inundation lines would be significant and additional contour information may be required. If this is the case some time delay may be experienced if BIMAP has to generate additional contours.

If you require us to carry out this additional task we would be seeking a variation in fees of $4800 to cover the costs of this additional task. Could you please contact us within the next few days to indicate which course of action you would like us to take. Once you notify us we will determine whether the proposed completion date of the 23 February 1998 will be effected.

If you have any further queries could you please contact me at this office.

Regards

[redacted]

Scott Abbey
Project Manager

Small Job Costing

Multiplier: 1.00

TASK	SAA		MDS		JAH		Expenses
	Rate:	$135	***Rate:***	$68	***Rate:***	$75	
	Hours	**$**	**Hours**	**$**	**Hours**	**$**	**$**
Inundation Lines Plot					56	4200	
Check of Plot	1	135	4	272			
	Sub Total	$135	Sub Total	$272	Sub Total	$4,200	$0
					Project Cost		$4,607
					Technology Charge		$207
					Total Project Cost		$4,814

Small Job Costing

Multiplier: 0.75

TASK	SAA		MDS		JAH		Expenses
	Rate:	$101	***Rate:***	$51	***Rate:***	$56	
	Hours	**$**	**Hours**	**$**	**Hours**	**$**	**$**
Inundation Lines Plot					56	3150	
Check of Plot	1	101.25	4	204			
	Sub Total	$101	Sub Total	$204	Sub Total	$3,150	$0
					Project Cost		$3,455
					Technology Charge		$155
					Total Project Cost		$3,611

TELEPHONE MESSAGE

JOB BRISBANE RIVER.

FILE T004157

PHONE CALL [✓ TO/FROM] Martin Giles

TIME

OF

PHONE

DATE 14/1/98

DETAILS OF MESSAGE:

Re fax of 13/1/98 for mapping of
Extra inundation line

Advised NOT TO proceed with
this option

BY: [redacted]

CIRCULATION & ACTION

NAME	ACTION REQUIRED	INIT'	DATE

Facsimile transmission from
BRISBANE CITY COUNCIL
WATERWAYS SECTION
Floor 13, Brisbane Administration Centre

Brisbane City

Brisbane City Council
69 Ann Street
Brisbane
Queensland

GPO Box 1434
Brisbane
Australia 4001

File:

Date 11 February 1998	

To Sinclair Knight Merz		Facsimile No. [redacted]
Attention Mr Mark Salisbury/ Mr Scott Abbey		No. of Pages 2 *(including this page)*
From Martin Giles	Phone No. [redacted]	Facsimile No. [redacted]
Re **COMMENTS ON FLOODING MAPPING REPORT**		

The only comments I would like to make in relation to the report are as follows:

- **Closure of Centenary Bridge**

The report notes that it was assumed that a road was closed if flow more than 300 mm deep was occurring across the road. As the analysis assumes full blockage of handrails, could you please check your results to ensure that time of road closure calculations are based on the actual minimum roadway level rather than the minimum level including debris.

- **Time of Peak**

The report presents a comparison between levels obtained by the flood forecasting model and those obtained by the MIKE-11 model. To provide an idea of the reliability of the accuracy of the model, a comparison to recorded values is required for the May 1996 event. Further, a comparison between the recorded and calculated time of peak needs to be made. This can be in the form of a summary table (especially as there are only two recorded values for the 1996 event) rather than the detailed results presented in the Appendix of the report.

- **Figure 2.2b**

The words on the left hand side of the figure ('Subject to Approaches in South Brisbane') probably need to be revised.

[redacted] ...mded + Fixed [redacted] 22

JOB No. T094157

- **Isolated Areas**

Given the flood levels in the Brisbane River, it is likely that some major roads in the Brisbane area will be inundated during major events (e.g. Cunningham Arterial crossing of Oxley Creek). As we have not provided definitive level information for such roads, it is not really possible for you to nominate which roads in backwater areas are affected by flooding. However, it would be good if some mention of the possibility of such flooding in backwater areas could be made in the report.

7

- Drawings

A review of the drawings has shown that you are using the Department of Works Title Block. As the Department no longer exists, it would be preferable if the City Design block could be applied.

I will send the new title blocks by e-mail shortly. Please advise if this causes major difficulties.

Otherwise, the report (apart from a few grammatical mistakes which I am sure you have picked up already) and accompanying drawings are fine.

If you have any queries in relation to the above, please do not hesitate to contact me.

Regards

[redacted]

Martin Giles

FACSIMILE

Brisbane City Council

City Design
Floor 3 T.C.Beirne Building
315 Brunswick Street Mall
Fortitude Valley 4006

PO Box 1434
Brisbane Qld 4001

Telephone 07 3403 0476
Facsimile 07 3403 0447

To SKM Fax [redacted]
Attention Scott Abbey, Mark Salisbury
From Martin Giles Fax [redacted]
Date 25 February 1998 No of Pages 6
Subject BRISBANE RIVER FLOOD STUDY
DRAFT FINAL REPORT COMMENTS

The review of the Brisbane River Flood Study Draft Final Report is progressing. As usual, the report is of a very high standard. Nev Gibson will be reviewing the regulation line location next week.

Rather than give you all the comments at once, please find attached comments relating to the first sections of the report. Most of the comments are very minor typographical nature.

Section 1- Introduction

- **Typos**

p5, para 2 Suggest replace "comprises of the four" with "comprises the four".

Section 2- Catchment Description

- **Typos**

p6, para 5 flows should be singular

Section 3- Available Data

- **Figures 3-1, 3-2, and 3-3**

In the vicinity of Brisbane, a line is drawn connecting Enoggera Dam with Moggill Creek. It is preferable that this line be removed.

- **Figure 3-2**

Between Wolston Park Hospital and Ipswich Composite, there is a rainfall station which is not named.

- **Figure 3-3**

Below Enoggera Reserve, there is a pluviograph which is not identified.

- **Typos**

p10, para 1 includes should be singular
p10, para 7 measure should be plural
p10, para 8 suggest change "by incidence of flooding" to "by the incidence of flooding"
p10, para 9 Dept of Natural Resource should be Dept of Natural Resources.

Section 5- Hydrologic Modelling

- **RAFTS Model Schematisation**

In my fax of 21 April 1997, I queried the location of nodes in the centre of subcatchments when RAFTS requires them to be sited at the downstream end of subcatchments. You cleared this up well with your reply of 8 May 1997. To prevent future readers of the report becoming potentially confused, particularly if RAFTS falls from grace, it would be nice if an appropriate note could be added to the text underneath the reference to the figures.

MB

- **Source of synthetic hydrographs**

On Page 22, it is noted that synthetic hydrographs of discharge from Wivenhoe and Somerset Dams were produced by Brisbane City Council. I vaguely remember some discussion by DNR that the spillway discharge relation for Wivenhoe Dam used by Council was overly optimistic (as you state in the report) and that the DNR had corrected the hydrographs. Could you please confirm whether the outflow hydrographs have been corrected.

- **Storm Duration**

Figures 5.4, 5.9 etc (rainfall distribution) have the duration of the storm to assist in the interpretation of the severity of the storm. It would be good if this information could be added to Figures 5-15 and 5-17 (1931 and 1955 floods) to provide consistency between plots.

- **Channel Routing for 1931 Event (p36)**

No indication is given of the storage curve (Curve A) used at Lowood for the event.

- **Table 5-13 (1931 event) (p36) and Table 5-15 (1955 event) (p38)**

Primary streamgauges need to be highlighted for consistency with other result tables.

done

- **Typos**

p38, para 1 "Of" should be lowercase.

Check

- **Post-Wivenhoe analysis of 1973 and 1974 events (pp42-44 and Table 5-21)**

As a sensitivity analysis, you have considered the change in peak flow associated with applying post-Wivenhoe PERN values to the 1973 and 1974 events. The potential exists for people reading the text to misinterpret the results presented in Table 5-21 and Appendix B, Figures B-10a and B-10b as including the Wivenhoe Dam itself. I suggest changing the title of Table 5-21 to something like "July 1973 and January 1974 Flood Sensitivity Analysis - Post Wivenhoe PERN values", with a note at the bottom to state that the storage was not modelled in the analysis. A similar modification could be made to Figures B-10a and B-10b.

Section 6- Hydraulic Model

- **Indooroopilly Bridges (p49)**

As noted previously by Nev Gibson, There are 3 bridges at Indooroopilly, 2 rail and 1 road.

- **Duplicate sentence (p59)**

On the 2nd paragraph of Section 6.8, the sentence beginning "Each of these HEC-RAS models…" is duplicated.

- **Figures 6-3 to 6-10**

These figures relate to RAFTS and MIKE-11 consistency. In the draft report, the gauges are identified by the name of the gauge (eg MOGGILL GAUGE). For the draft final report, names such as 74RFMGIN are used. As these figures are in the main report, it would be preferred if longer gauge names could be applied in the figures.

1983JIN.4

Further, it is recommended that the duration of each event be plotted so as to maximise the main part of the event. This is particularly the case for Figure 6-7 (1931), where a number of days could be removed at the beginning and end of the hydrograph and Figures 6-8 and 6-9, where a number of days could be removed from the end of the hydrographs.

Also, in Figure 6-4 the RAFTS hydrograph at the Moggill gauge is plotted against the MIKE-11 hydrograph at Jindalee.

- **Appendix C, Figures C3-C9**

Similar comments are applicable to the gauge naming used in Figures C3-C9 in Appendix C. However, as the figures are in an Appendix, they can be left as is if you wish.

- **Appendix C, Figure C-3a**

The figure is missing the results for the Crescent Road Gauge (Ch 1063.645) Crntld74.wmf

- **Typos**

p52, para 2	Figures C-2a to C-2l should be Figures C-2a to C-2i
p57, para 1	As above
p57, last para	suggest delete "predicted" as it is superfluous
p52, para 6	Suggest change "system had a lower bed level" to "system previously had a lower bed level" provided this is correct.

- **Bend Losses (p54, last para)**

Suggest replace "Since MIKE-11 cannot account for bend losses" with "Since MIKE 11 cannot directly account for bend losses" to clarify matters.

- **Previous Correspondence**

Our fax of 21 April 1997 notes the following regarding superelevation at bends:

> "On page 44 [now p53] of the draft report, it is noted that superelevation could be the cause of some of the discrepancies between recorded and predicted levels. Although we agree with this finding, it would probably help if you could provide an indicative estimate of the magnitude of the superelevation (for say the 1974 event) to help quantify the likely difference in level which could be expected at bends."

Your reply of 8 May replies:

> "Estimates of superelevation shall be provided at 3 locations where gauge levels differ from spot height levels on the opposite side of the river."

The quality of the report would be improved by inclusion of superelevation calculations.

Also, some of the typos identified on 21 April 1997 still have to be corrected:

p18, para 5	The first line does not make sense
p15, last para	Hydrograph should be plural
p19, para 5	'Imputed' should be 'input'
p23, para 4	'A' should be 'an'
p24, para 4	The second hydrographs should be singular
p24, para 5	'Is' should be 'are'
p26, table 5-5	Peak discharge difference in last line should be negative
p41, last para	'Plots or' should read 'Plots of'
p54, table 6-2	The units for velocity should be m/s

Section 7- Design Events Hydrology

- **Catchment Urbanisation (7.2, p63)**

Although the last paragraph is correct, it is requested that it be rewritten. The potential effect of urbanisation in the middle and upper reaches of the creek even in the long term is likely to be negligible. However, there is a potential for significant urbanisation in the lower reaches of the river. Future urbanisation in Brisbane and surrounding areas would cause the peak runoff from these areas to occur earlier than at present. As the time of concentration of the Brisbane River as a whole is large compared to that of the urban areas of Brisbane, it is slightly conservative to retain the present level of urbanisation rather than the potential ultimate level.

- **Table 7-2**

The table uses the subscripts a and c against the 120, 144 and 168 hour duration events. No note is made with regard to the meaning of the subscripts.

- **Section 7.9, p77, para 3**

It is suggested that the words "generally yield discharges within 1% of the flood frequency analysis (Table 7-10)" be replaced with "generally yield discharges within 1% of the flood frequency analysis at the Port Office gauge (Table 7-10)".

- **Figure 7-11**

In the vicinity of Brisbane, a line is drawn connecting Enoggera Dam with Moggill Creek. It is preferable that this line be removed.

- **Appendix E**

In Section 7.5, reference is made to Appendix E (p71). It would be good if each table in the Appendix was referenced.

- **Appendix E, Table E-1**

This table starts at 9/3/72 rather than 31/1/44 as in the Design Events Draft report.

- **Appendix G**

The inflow hydrographs in the draft Final Report are not as clear as those presented in the Design Events Report. For example, ENO200 is used instead of ENOGGERA CREEK INFLOW.

Section 8- Design Event Hydraulics

- **100 year profile (p79, para 5)**

Suggest replace "Following review of the cases assessed Council advised that the 100 year ARI flood profile be generated as follows:" with "Following review of the cases assessed, due to the uncertainty of a storm surge occurring coincidentally with the peak flow in the river, Council advised that the 100 year ARI flood profile be generated as follows:"

- **Section 8.3 (p80)**

The first paragraph makes a reference to the Section 6.8 March 1997 SKM calibration report. As Section 6.8 is reproduced in the final report, the reference to the previous report can be removed. Also, the final sentence of the paragraph could probably be deleted from the final report.

- **Typos**

p81, last para	Suggest change "locations in HEC-RAS" to "locations in the HEC-RAS"
p82, para 1	Missing - after Table I-4.

Section 9- Waterway Management

- **Section 9.2 (p83, para 5)**

The word "targeted" is fairly brutal. I suggest identified.

- **Section 9.4**

The second paragraph of this section says that interim lines were not supplied by Council for the study. While this is correct, the reason they were not supplied is that no interim lines were placed on the river. It is recommended that this paragraph be reworded to the effect that no interim lines had been set for the river.

- **Reach 18 (Milton)**

Under potential flooding, inundation is noted at BN730. Please check to see whether this should be BN740 rather than BN730.

- **Typos**

p92, last para	"Private" should be "Particular"
p93, para 4	Suggest replace "unknown" with "unnamed"
p94,	future urban should be in capitals
p95,	open space should be in capitals
p95,	rural residential should be in capitals
p96, para 6	Suggest replace "unknown" with "unnamed"
p97, para 1	Suggest add "the" before "regulation line"
p97,	rural residential should be in capitals
p98, last para	future urban should be in capitals
p99, para 1	residential A and non urban should be in capitals
p99,	general industry should be in capitals
p99,	"Private" should be "Particular" (2 locations)
p99,	open space should be in capitals (2 locations)
p100,	non urban should be in capitals
p101,	future urban should be in capitals
p101, para 1	"Private" should be "Particular"

✓ p103,	"Private" should be "Particular"
✓ p107,	as above
✓ p110,	residential B should be in capitals
✓ p112,	"Private" should be "Particular"
✓ p113,	special development should be in capitals
✓ p113,	Special development should be Special Development
✓ p114,	"Private" should be "Particular"
✓ p115,	as above
✓ p116,	open space should be in capitals
✓ p118,	residential A should be in capitals
✓ p118,	open space should be in capitals (2 locations)
✓ p119,	open space should be in capitals
✓ p119,	"Private" should be "Particular"
✓ p120,	waterfront activities should be in capitals
✓ p121,	industrial and waterfront industry should be in capitals
✓ p122,	as above
✓ p123,	as above
✓ p124,	as above

- **Appendix J, Table J-4**

Brilliant. Don't change a thing.

REQUIREMENTS OF BRIEF

In accordance with the brief for the project, the following items need to be added to the final report:

Brief page 27, item (j):

> "The original rating curve(s) (if any) and the one adopted in the model at each gauging station location, extrapolated to cover all design flows."

Brief page 27, item (n):

> ✓ "...The pluviograph data must be overlayed onto the IFD curves for each event."
>
> Due to the number of pluviograph stations in the Brisbane River catchment, this need only be completed at a number of representative pluviographs for each event.

Well, those are the comments for now. I will finish reviewing the remaining sections and advise of any comments early next week.

If you have any queries in relation to the above, please do not hesitate to contact me.

M. Giles

Martin Giles

FACSIMILE

Brisbane City Council

City Design

Floor 3 T.C.Beirne Building
315 Brunswick Street Mall
Fortitude Valley 4006

PO Box 1434
Brisbane Qld 4001

Telephone 07 3403 0476
Facsimile 07 3403 0447

To SKM Fax 07 4639 8490
Attention Scott Abbey, Mark Salisbury
From Martin Giles Fax 07 3403 0438
Date 10 March 1998 No of Pages 3
Subject BRISBANE RIVER FLOOD STUDY
DRAFT FINAL REPORT COMMENTS

Here goes with the second set of comments. As advised previously, Nev Gibson is presently looking at the regulation lines, so don't start printing off final copies of things just yet. Also don't forget the technical presentation which we will schedule for a little bit later on.

Section 10- Hydraulic Assessment of Structures

- **Handrails and guardrails**

In the second last paragraph of page 125, you state that handrails and guardrails were assumed to be blocked. As this is repeated in the next paragraph, the first reference to the guardrails can probably be deleted.

- **Appendix K**

It is requested that additional information be added to the hydraulic structure reference sheets to make them more complete:

Date of survey	The survey was completed in March 1996
Upstream and downstream obvert level	I know this is hard to fill in but information such as that contained on the profiles would be good. It could even be added as an additional comment
Construction Date of Current Structure	From drawings- Although the date of the drawing may not reflect the actual date built, at least it gives us an idea.

- **Typos**

p125, para 1	Suggest replace were with was
p126, para 2	Replace "which is to be completed during the Flood Mapping phase of the study" with "which is discussed in Section 11".
p127, last para	Bridges should be singular and "have" should be "has"
p128, para 1	The paragraph discusses the William Jolly Bridge then refers to "the two structures". To clarify matters, it is suggested that reference be made to the William Jolly Bridge and the Merivale bridge instead of "two structures".

SINCLAIR KNIGHT MERZ
REC'D 10 MAR 1998 MGR
WHO ACTION INIT/DATE
JOB No. FILE

Section 11- Flood Forecasting Model

- **Table 11-3**

In your summary of recorded and predicted results, a slightly different peak level and time of peak is quoted for the Western Inner Bar for the 1974 event. As this level is your downstream tailwater level, the two results should be identical.

- **Typos**

p129, Paras 1 & 2	Council should be in capitals (3 locations)
p130, para 1	"Were" should be "are"
p130, para 3	"Have" should be "has"
p132, para 1	"Have" should be "has"
p134, para 3	Suggest replace "been in Table 11-2" with "been included in Table 11-2"

Not Available.

- **The brief**

Item (c) on Page 34 of the brief requires that at all continuous stream gauges a plot overlaying the hydrograph produced by the forecast model and the measured hydrograph be prepared. On the plot, the forecast model parameters including loss rate need to be noted.

Section 12- Flood Mapping

- **Reasons for ditching FastTABS**

Although the statements made in the first and second paragraphs of Section 12.4 were entirely acceptable for a progress report, it is recommended that they be refined for the final report which will be read by engineers not particularly interested in the difficulties involved in data manipulation.

While I agree a statement needs to be included as to why it was not feasible to use FastTABS, I suggest something along the following lines:

> Initially the flood contouring phase of the study was to be conducted using the two dimensional hydrodynamic model FastTABS. This model uses digital terrain data in the form of a mesh to calculate a two dimensional water surface. The water surface is output as a digital DXF file which is translated into a flood contour map.
>
> The contour information held in BIMAP was provided in the form of a rectangular mesh over the Brisbane River. As the contours were based on aerial photogrammetry, no information was available from BIMAP with regard to river bathymetry. To allow reliable water surface estimation, the BIMAP data was augmented by bathymetric data obtained from the survey of the river.
>
> Although FastTABS is capable of handling large numbers of data points (up to 1,000,000), the size of river was such that the number of data points was up to 20 times greater than the maximum allowable in the program. This amount of data precluded the efficient use of FastTABS to generate a two dimensional water surface.
>
> Given this, alternate methodologies were investigated for the contouring of the river. As the river is fairly uniform, it was decided that an appropriate methodology was to use levels predicted by the MIKE 11 hydraulic model and apply super-elevations at bends to account for the two dimensional flow effects.

The above is a rough idea only.

Section 13- Community Consultation

- **typos**

p143, para 2 Suggest replace "targeting" with something like "focussing on"
p143, para 5 Suggest replace "targeted" with something like "approached"

- **Appendix N**

A copy of the questionnaire needs to be included in the final report.

I will provide further advice with regard to finalisation of the report and submission of data as soon as possible. If you have any queries in relation to any of the above, please do not hesitate to contact me.

Regards

Martin Giles

T002157

FACSIMILE

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To Sinclair Knight Merz Fax [redacted]
Attention Scott Abbey, Mark Salisbury
From Martin Giles Fax [redacted]
Date 31 March 1998 No of Pages 3
Subject BRISBANE RIVER FLOOD STUDY
DRAWINGS

A review of the drawings submitted with the Draft Final Report has been completed. Nev Gibson is about to go through the regulation line drawings, so please do not print out final versions of any plots involving reg lines as yet (or design plots for case with reg lines in place).

In general, the quality of the drawings is high, with only minor modifications being suggested in most cases.

Suggestions for revisions to the drawings are as follows:

handrail 17.48
deck level 16.4
adjust soffit level
accordingly.

General

MERZ
REC'D 31 MAR '98
MGR
SIGN/DATE
FILE
JOB NO
[redacted]
31/3/98

In Sheet 8 of 9 on all drawings with a plan of the river, for some reason there are three lines highlighted at the left of the plan.

The upper deck levels shown for the Centenary Bridge seem high. Could you please review the levels to make sure that the steeply graded section of road leading to the bridge and not really part of the effective flow path has not been included.

People reviewing the profiles have been a little confused regarding the levels shown for each bridge. As Brisbane River features bridges which have arches and significant vertical curves, it is not possible to use the easy bridge representation used on small creek system. We would suggest either the addition of a small key figure denoting the location of each of the various levels (e.g. lowest soffit level, deck level etc) or altering the terminology in the description of levels. At present, the words *deck level* and *lowest weir level* are used to describe the highest point on the deck and the level at which flow across the deck first commences. As a suggestion, the words *lowest weir level* could be replaced by *lowest deck level*.

We would appreciate it if you could add the text shown on the attached page to any drawing with inundation lines. This is due to people mistakenly interpreting drawings in the past.

Drawings 1-9, and 10-18 (Calibration and Verification event flood profiles)

These plots would be improved if the plan of the section of river under consideration, as presented for the design profiles, was included on each drawing.

The location of gauges need to be added to the plots.

Drawing 12 needs to have its title block filled out.

Drawings 37-45

Drawing 43 says Drawing sheet 6 of 9 but should be 7 of 9.

Drawing 55

½ hr.

At present, lines are drawn for every 5 metre increase in level. Lines for every metre increase would improve the readability of the plot (although the present axis labelling of every 5 metres is fine).

Drawings 56-73 and 74-82

To avoid any potential for confusion with existing condition profiles, it would be good if the proposed regulation lines could be added to the plans in the top half of these drawings.

(4hrs)

Drawings 84-90

Drawing 87 is noted as being Drawing Sheet 3 of 7 when it should be 4 of 7,

Drawings 91-97

The shading used for the definition of high hazard areas does not stand out enough. We would prefer that high hazard areas receive a darker shading than the low hazard areas.

Drawings 105-111

We would not complain if the 100 year and 20 year inundation lines were added to the regulation line plots to reduce the number of drawings for the job. Further, the regulation lines and inundation lines could be added to the profiles to eliminate the need for drawings 98-111 altogether. This change is entirely up to you- if you feel it will reduce the cost of the project for you please go ahead. Otherwise, keep things the way they are. The cost of manipulating the dwgs would outweigh the cost of plotting.

overage of plan
iews on profiles
, ~~fro~~ not extensive
nough to show
two lines

Drawings 113-121

Drawing 113 is missing title (Flood Contour Plan) and Drawing sheet no (Drawing Sheet 1 of 9).

his could also be the
ase for the reg.
lines.

Until Nev Gibson has finished his review of the regulation lines, it would be unwise to proceed with plotting any drawings which relate to the regulation lines. Consequently, please feel free to plot out at your leisure Drawings 1 to 55.

We trust that the above is self explanatory. If you have any queries, please do not hesitate to contact us.

Regards

[redacted]

Martin Giles

WARNING

THIS INFORMATION SHOULD ONLY BE USED AS A GENERAL GUIDE TO FLOODING

The anticipated flood inundation areas shown on this plan are representative only and hence should not be used to extract anticipated flood levels.

The anticipated flood inundation areas have been derived from the results of a computer based hydraulic model of the creek system. Some discrepencies may exist between the surveyed cross sections and the 1980 orthophoto ground contours. In these instances the anticipated flood inundation levels and locations of flood regulation lines will be referenced to the details associated with the surveyed cross sections.

SINCLAIR KNIGHT MERZ

FAXED
DATE 29/4/98

Facsimile Transmission

To: Cardno & Davies
Attention: Martin Giles
Fax No: [redacted]
Copies:
Subject: BRISBANE RIVER FLOOD STUDY

From: Mark Salisbury
Job No: TO04157
Date: 29 April 1998
No of Pages: 2

Martin

We have reviewed the marked up regulation lines that you have provided and agree that no additional modelling be carried out due to the fact that any spurs that encroach onto the river between cross sections was accounted for in the calibration of the model.

From your telephone discussion with Mark, you indicated that if the buffer rule was the limiting factor, then the regulation line was to remain where it was originally placed. We have found that in most cases where the regulation line has been moved in (on the cross sections) by Council, the buffer rule is the limiting factor and hence prevents the regulation line from being moved (see Table J-4 Final Draft Report Vol 2).

The use of the buffer rule also introduces another problem when setting the regulation lines between cross sections. Although the buffer rule has been applied at each of the relevant cross sections, it does not necessarily mean that the buffer rule can be automatically applied between cross sections where the inundation line has been specified as the regulation line.

We believe that this problem can be handled in a number of ways, these being:

- We make the changes that have been requested (except for where the buffer rule applies at relevant cross sections), however we will make a statement in the report regarding the buffer rule between the cross sections. This statement will be along the lines of: "although a buffer zone of 15 m has been applied at the surveyed cross sections to allow for bank collapse, between cross sections where the inundation line has been adopted as the regulation line, no buffer zone has been applied. It is therefore recommended that prior to development, the bank stability in these locations should be assessed on an individual basis and a judgement made to the suitability of the development".
- Remove the buffer rule and adopt the line of inundation were applicable with the proviso that should development be required on the river bank in these locations, Council would require that a bank stability test be undertaken.
- Brisbane City Council can mark up the buffer zone between cross sections and resubmit the proposed regulation lines to SKM and we can then adopt these changes as the regulation lines.

Could you please advise us of which action you would like us to take so that we can finalise the report.

If you have any queries regarding this mater please contact me at this office.

Regards

[redacted]

Scott Abbey
Project Engineer