



Australian Government
Bureau of Meteorology

Central and Western Queensland Floods

January 2008



1	2
3	4
5	6
7	8

Clockwise from top left;

1. Flooded roads around Proserpine.
2. Burdekin Falls Dam
3. Giru flooding from the Air. (newsdotcom)
4. Cars washed off road near Giru.
5. Bradleys Gully floods Charleville.
6. Nogoa River at Fairbairn Dam
7. Dragline and coal mine flooded by the Nogoa River
8. Houses flooded in Emerald.

All photos are sourced from the Internet via www or email.

Note:

1. Data in this report has been operationally quality controlled but errors may still exist.
2. This product includes data made available to the Bureau by other agencies. Separate approval may be required to use the data for other purposes. See Appendix 1 for DNRW Usage Agreement.
3. This report is not a complete set of all data that is available. It is a representation of some of the key information.

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Central and Western Queensland Floods

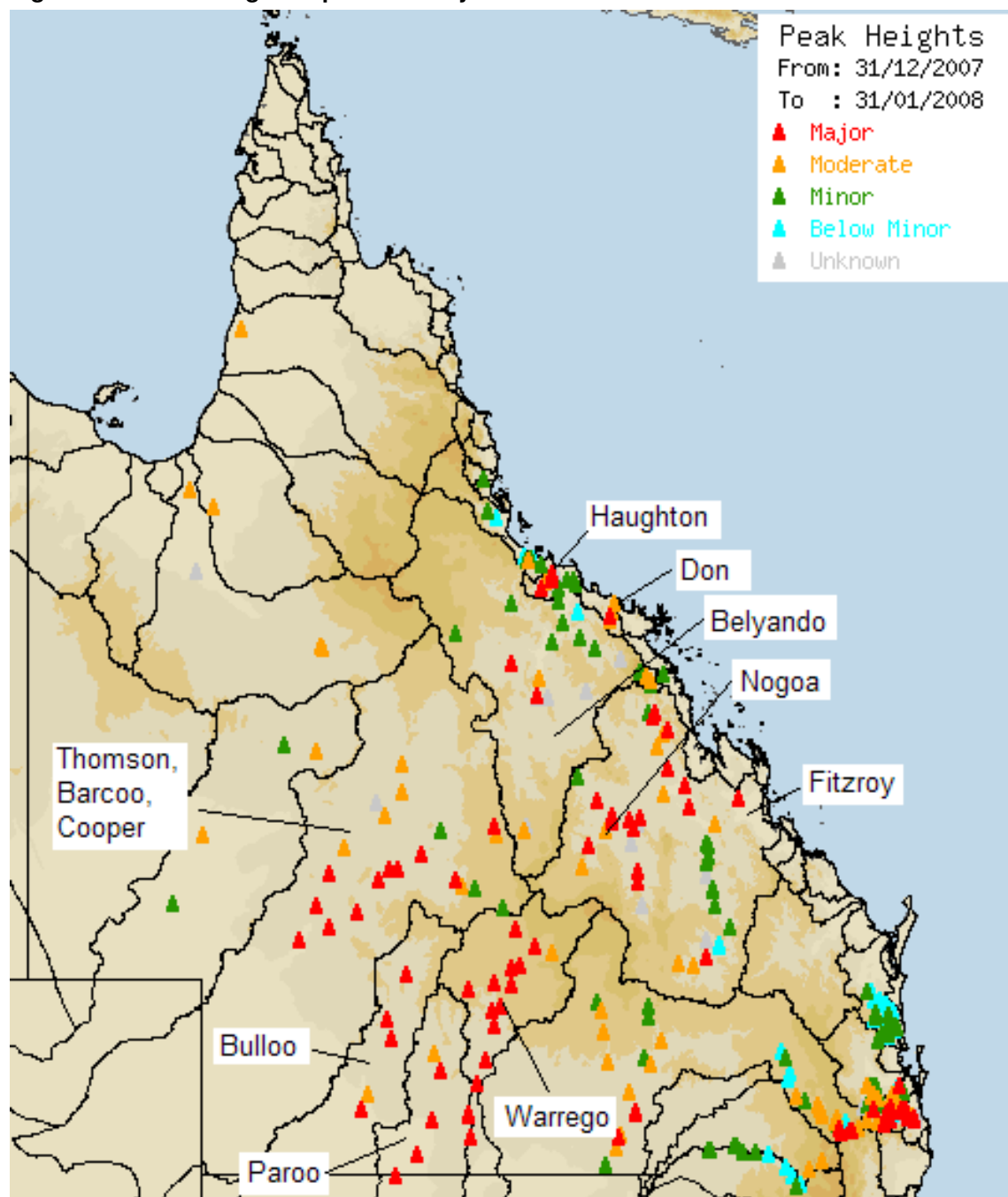
January 2008

1. Introduction

Very heavy rainfall occurred along the Queensland coast between Townsville and Mackay and inland over the Coalfields and Central Interior between the 10th and 20th of January and followed from a tropical low pressure centre tracking a path across the state. This rainfall caused widespread flooding along the central coast and central and western inland Queensland. The most significant flooding, in terms of damages and rarity, was in the Nogoa, Belyando and Warrego rivers.

This report provides a summary and analysis of the meteorology and hydrology of the event.

Figure 1.1 Peak Height Map for January 2008 - Queensland



2. Meteorological Summary

Flood producing rains along the Queensland coast between Townsville and Mackay and inland over the Coalfields and Central Interior occurred between the 10th and 20th of January and followed from a tropical low pressure centre tracking a path across the state. See Figure 2.1.1 for the track mapped out by the tropical low. Analysis of observations at Mean Sea Level and wind fields at 1500 metres provides enough evidence to suggest that this low remained as the remnants of Tropical Cyclone Helen which tracked across the Gulf of Carpentaria before moving inland as a tropical low near Burketown on the 7th January 2008.

This chapter presents a discussion and analysis of the meteorological conditions that led to major flooding across several parts of the state and traces the path undertaken by the tropical low.

2.1 Meteorological Analysis

Tropical Cyclone Helen developed over waters about 400 kilometres to the southwest of Darwin on the 4th January and strengthened to category 2 intensity later that day. The cyclone tracked eastward and crossed the Northern Territory coast about 100 kilometres to the south of Darwin on the 5th of January where it weakened to a tropical low. The system remained as a low and continued to track eastward across the northern Territory's Top End and back out over the water in the Gulf of Carpentaria. The low did not re-strengthen to tropical cyclone intensity as it tracked east then southeast to meander back across the coast near Burketown in the Gulf Country of Queensland on the 7th of January 2008.

The Mean Sea Level (MSL) low pressure system weakened and fluctuated in positions over the next 3 days, however a discreet low centre remained a feature at 1500 metres above the surface as shown in Figure 2.1.2.

The low tracked further eastward over the next 3 days to again position itself over waters to the east of Cardwell on the 14th of January 2008. At this time the surface low interacted with a trough at levels between 3000 metres and 5500 metres above the surface causing the low to intensify. Intensification continued as the system turned and tracked south-southwest to cross the coast near Townsville early on the 15th of January and to be positioned over Charters Towers by the afternoon of the 15th of January 2008. See Figure 2.1.3 for the MSL Pressure analysis of the intensification of the low. The system at this time had some of the characteristics of a tropical cyclone with a band of maximum strength winds surrounding the centre (as is evident from the 3pm observation from Charters Towers which was southwest at an estimated 96 kilometres per hour and a recorded pressure of 993 hectopascals) and deep bands of convection. See Figure 2.2.1, which shows a sequence of radar imagery as the low strengthens to maximum intensity.

The movement and intensification of this intense low was coincident with heavy rainfall recorded in the Ross and Burdekin river basins with maximum falls to 9am on the 14th of January in the Ross catchment and 9am on the 15th in the Burdekin catchment. Maximum rainfalls around Charter Towers occurred later in the day on the 15th coincident with the passage of the tropical low. During this time of intensification, an analysis of the wind profile up to 5500 metres and low level moisture indicate an intersection of very moist tropical air in the low levels and strong Warm Air Advection (WAA) and the uplift of air on the coast to the south of Townsville. This is coincident with the high 24-hour rainfall totals recorded in the Haughton, Don and Proserpine catchments at 9am on the 14th of January. This intersection extended further southward during the 14th of January and was coincident with the heavier falls in the 24-hour period ending 9am on the 15th of January moving southward of the previous 24-hour falls. See Figure 2.1.4 to view the intersection of moist tropical air and the widespread uplift of air resulting from Warm Air Advection.

The low tracked steadily southward overnight on the 15th of January to be positioned well northeast of Longreach by 9am on the 16th. This movement southward allowed the deep moist tropical air to penetrate well inland and in combination with strong WAA in the southeast quadrant of the low circulation, resulted in heavy rainfalls over the eastern part of the Thompson, Barcoo, Cooper catchments.

Movement of the system over the following 12 hours was somewhat slower, maintaining a moist and favourable environment for heavy precipitation. It was at this time that the heaviest rainfalls occurred over the Nogoa River and Theresa Creek in the Fitzroy basin and along the Warrego River through to Charleville. The wind analysis at 1500 metres above the surface for 10pm on the 17th of January 2008 reveals a broad area of stronger northeast winds with winds to 107 km/hr recorded at this level at Charleville Airport. This was coincident with the development of a deep trough at 5500 metres above the surface and assisted to produce further intense rainfalls over western parts of the Fitzroy river basin around Emerald and along the Warrego

River around Charleville in the 24-hour period to 9am on the 18th of January. Figure 2.1.5 shows the band of stronger NW winds and middle level troughing.

The low tracked steadily southward from 9am on the 18th of February to cross the Queensland/New South Wales border by the 19th of January. Consequently, rainfall eased over Queensland.

Figure 2.1.1 Track of Tropical Low Pressure System from the 9 – 18 January 2008

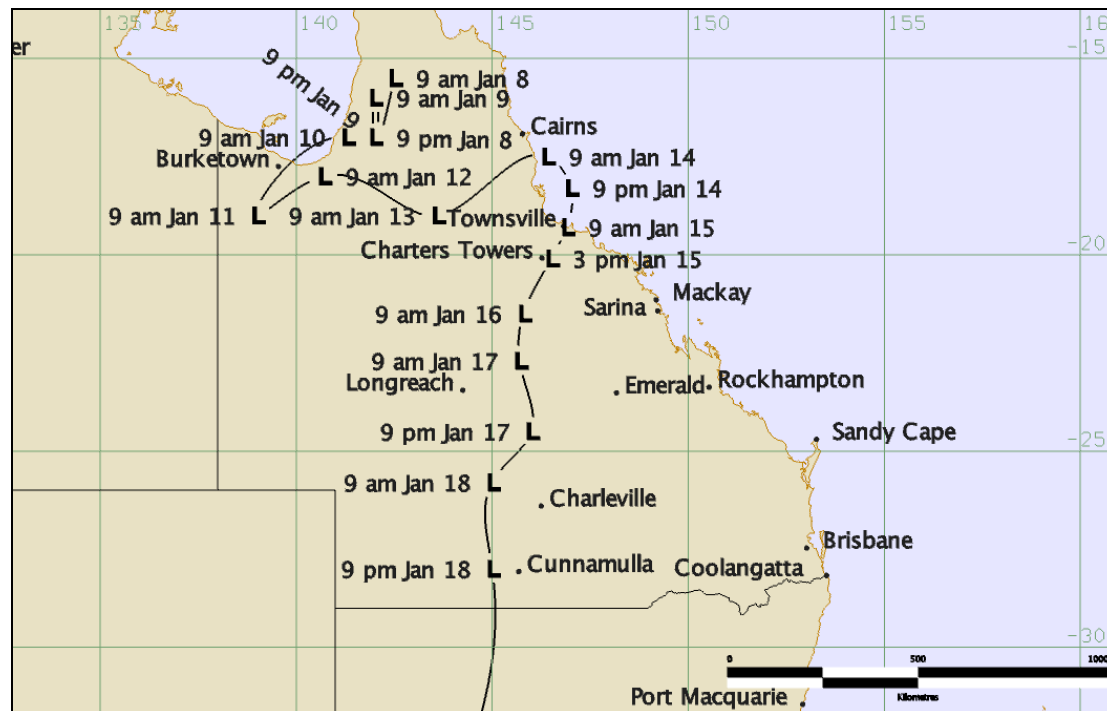


Figure 2.1.2 Analysis of the Wind Field at a height of 1500 metres above Mean Sea Level at 10pm on the 10 January 2008.

L marks the centre of the Low.

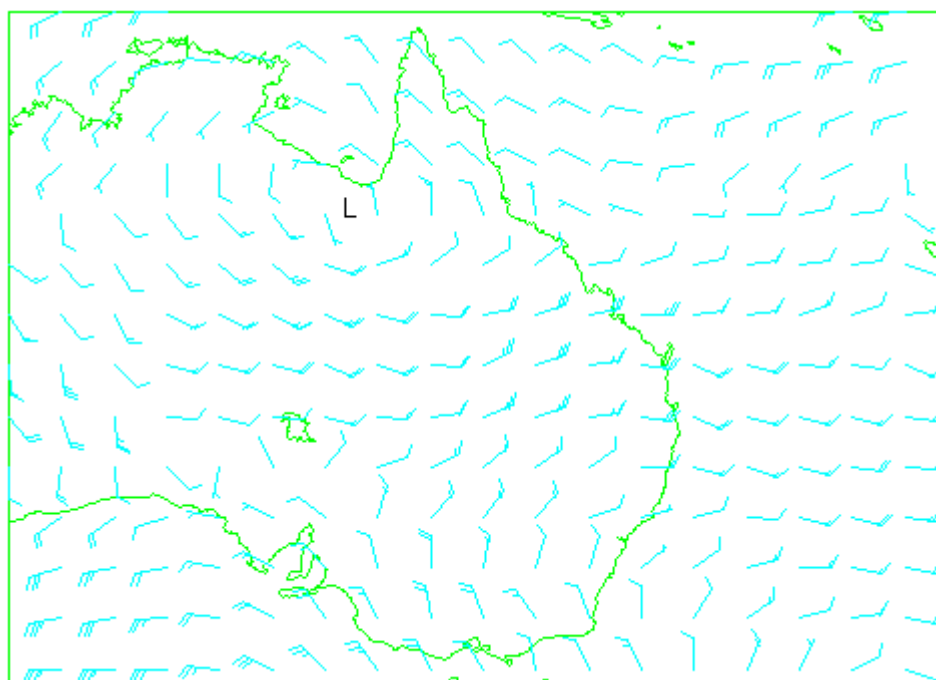


Figure 2.1.3 Weather Charts for Australia 14 January 2008 to 15 January 2008 during the intensification of the tropical low over north Queensland.

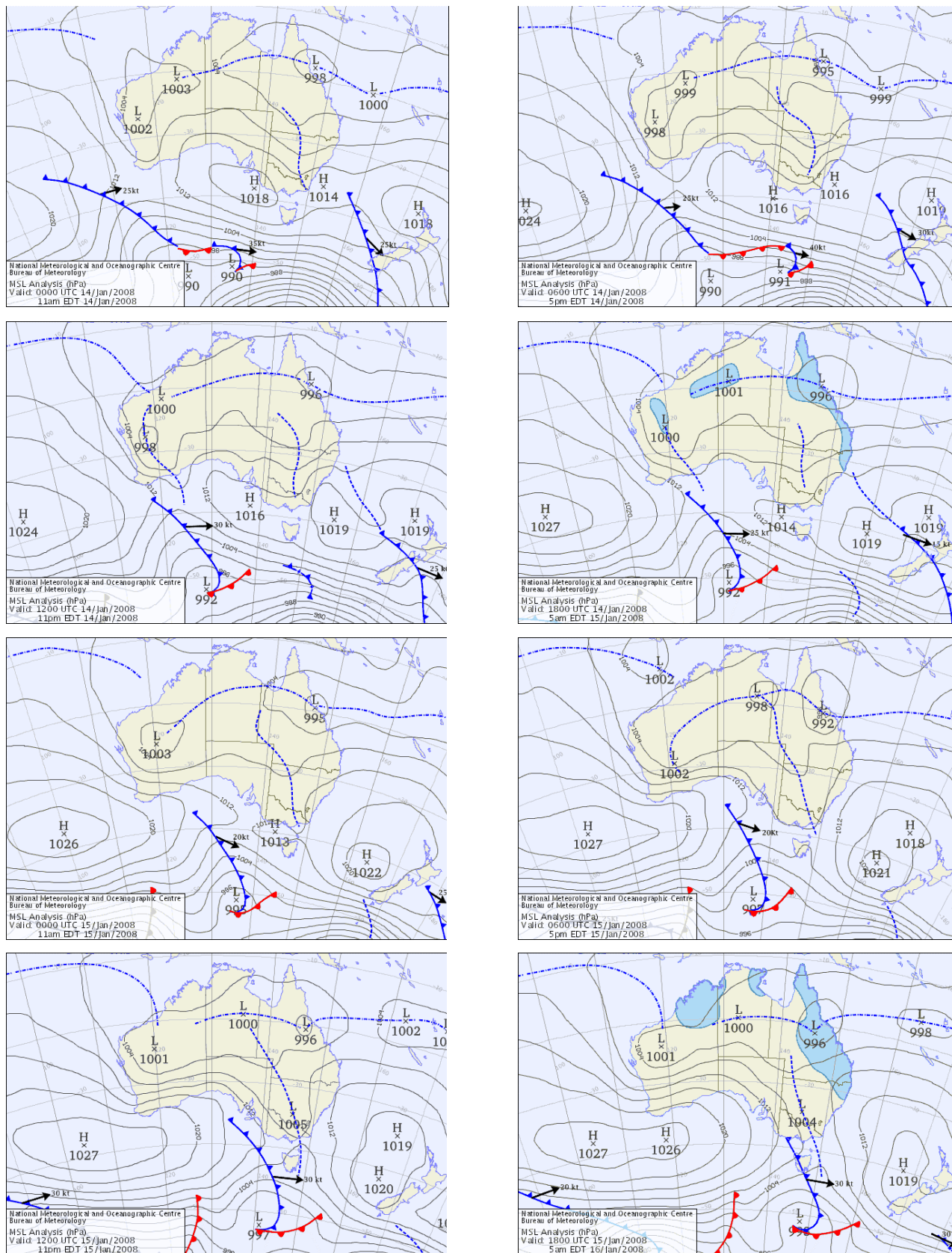


Figure 2.1.4 Areas of Warm Air Advection (WAA) and Moist Tropical Air near Townsville at 10pm on the 14th of January 2008.

The most intense rainfall occurred in the Pioneer, Proserpine, Don and Burdekin catchments. Winds barbs, displayed in knots, at 1500m, 3000m and 5500m are denoted by the colours light blue, dark blue and yellow respectively. Moisture is displayed in units of grams per kilogram.

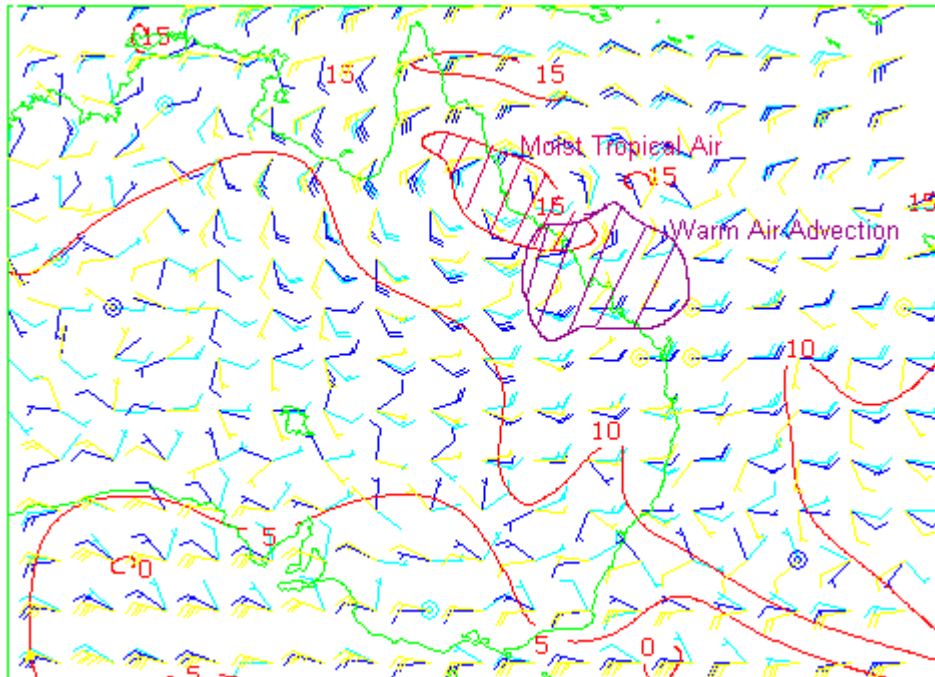
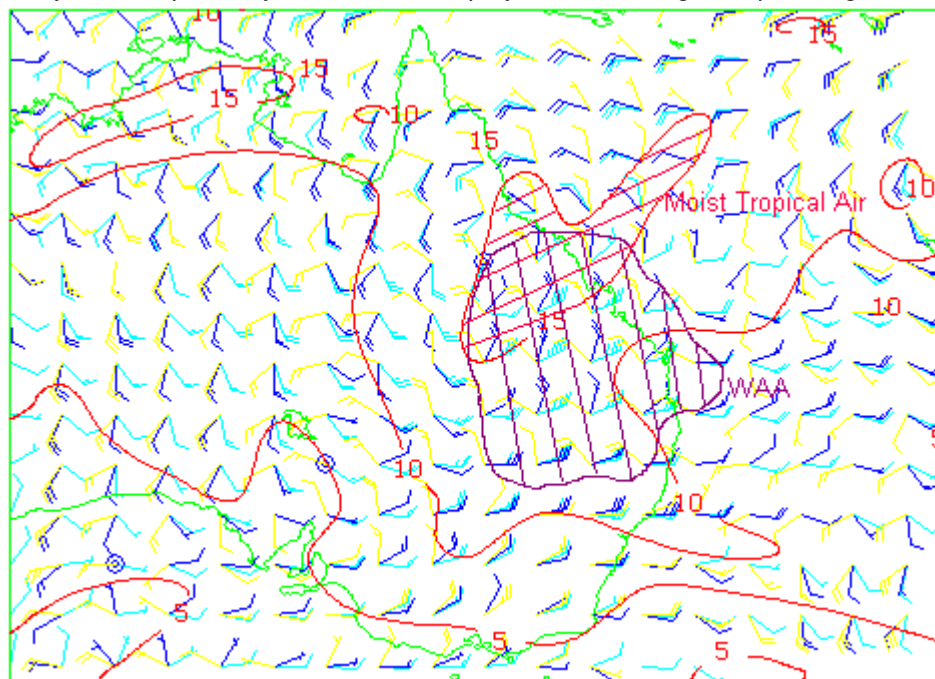


Figure 2.1.5 Areas of Warm Air Advection (WAA) and Moist Tropical Air at 10pm on the 17th of January 2008.

The most intense rain occurred in the western parts of the Fitzroy basin and southern half of the Warrego. Winds barbs, displayed in knots, at 1500m, 3000m and 5500m are denoted by the colours light blue, dark blue and yellow respectively. Moisture is displayed in units of grams per kilogram.



2.2 Radar Imagery Analysis

Volumetric radar imagery from various sites across Queensland was available to monitor this flood producing rainfall event. Townsville and Bowen radars provided sufficient imagery and coverage areas to monitor and analyse rainfalls over the Haughton, Don, Ross, Burdekin and Proserpine basins. Mackay radar imagery covered all areas of the Pioneer and merged imagery from Gladstone, Mackay and Warrego radars was used to monitor and analyse rainfall over the Nogoa River and Theresa Ck. Warrego radar imagery also provided useful data to monitor and analyse rainfall over the Warrego catchment. Rainfall over the Belyando River and the Thompson and Barcoo Rivers was monitored and analysed by imagery from the Longreach radar.

An analysis of radar imagery from Townsville and Bowen radars on the 15th of January clearly showed the intensification of the tropical low off the coast, as shown in Figure 2.2.1. The sequence of imagery showed evidence of a circulation centre with rainbands forming around the centre early on the 15th of January while the system was still located over water. The rainbands were directly affecting nearby coastal parts as a secondary band of showers and thunderstorms developed further southeast of the centre affecting Proserpine and the Pioneer basins. Rain bands continued to develop and extend from the system centre for the next 6 to 12 hours as the system crossed the coast and moved southwest over Charters Towers. The centre of the system became difficult to detect on radar from about 3:00 pm on the 15th January 2008. However, rain bands and thunderstorms persisted along the coast for the following 24 hours producing large 24-hour rainfall totals recorded at 9 am on the 16th of January.

Rainfall over the Nogoa River and Theresa Ck areas was a little more difficult to monitor and analyse from radar imagery, as the most intense rainfall was at least 300 kilometres from the Gladstone and Warrego radars. At this distance from the radar, the returned signal loses strength and therefore the intensity of rain and thunderstorms can appear less than what it truly is. The sequence of imagery from the Warrego radar from 9am on the 16th of January to 9 am on the 19th of January indicated precipitation over the region, but no clear representation of the intensity of this rainfall. As rain and thunderstorms approached the Warrego radar from the Emerald area, the precipitation rates appear to intensify when in actual fact the intensity has more likely remained the same and the signal has simply strengthened due to the closer proximity to the radar. Rain with extensive areas of thunderstorms was evident on the Warrego radars from early on the 16th of January through to the 19th of January. A significant decrease in rainfall early on the 18th of January was followed up with extensive afternoon and overnight thunderstorm activity before clearing south of the Queensland border during the 19th. A sequence of two-hourly images from the Warrego radar on the 17th of January during the period of most intense rainfall across the region is shown in Figure 2.2.2.

The widespread heaviest rainfalls over the Thompson, Barcoo and Cooper catchment were recorded at 9am on the 16th of January. Radar imagery shows the development of rain and thunderstorms over the region during the afternoon of the 15th of January. This activity persisted through the evening and overnight to produce rainfalls over 100 mm at Blackall. Further storm activity occurred on the 16th to produce large rainfalls over the Thompson, Barcoo and Belyando River catchments by 9am on the 17th of January.

Intense rainfalls over the Belyando River were difficult to analyse from radar and the observation network due to the sparsity of the data in this region. The Longreach radar identified rain and thunderstorms over the region but once again, at a distance of more than 300 kilometres from the radar, the intensity of this activity could not be determined.

Figure 2.2.1. Radar Imagery of the Intensification of the Tropical Low near Townsville on the 15th of January 2008.

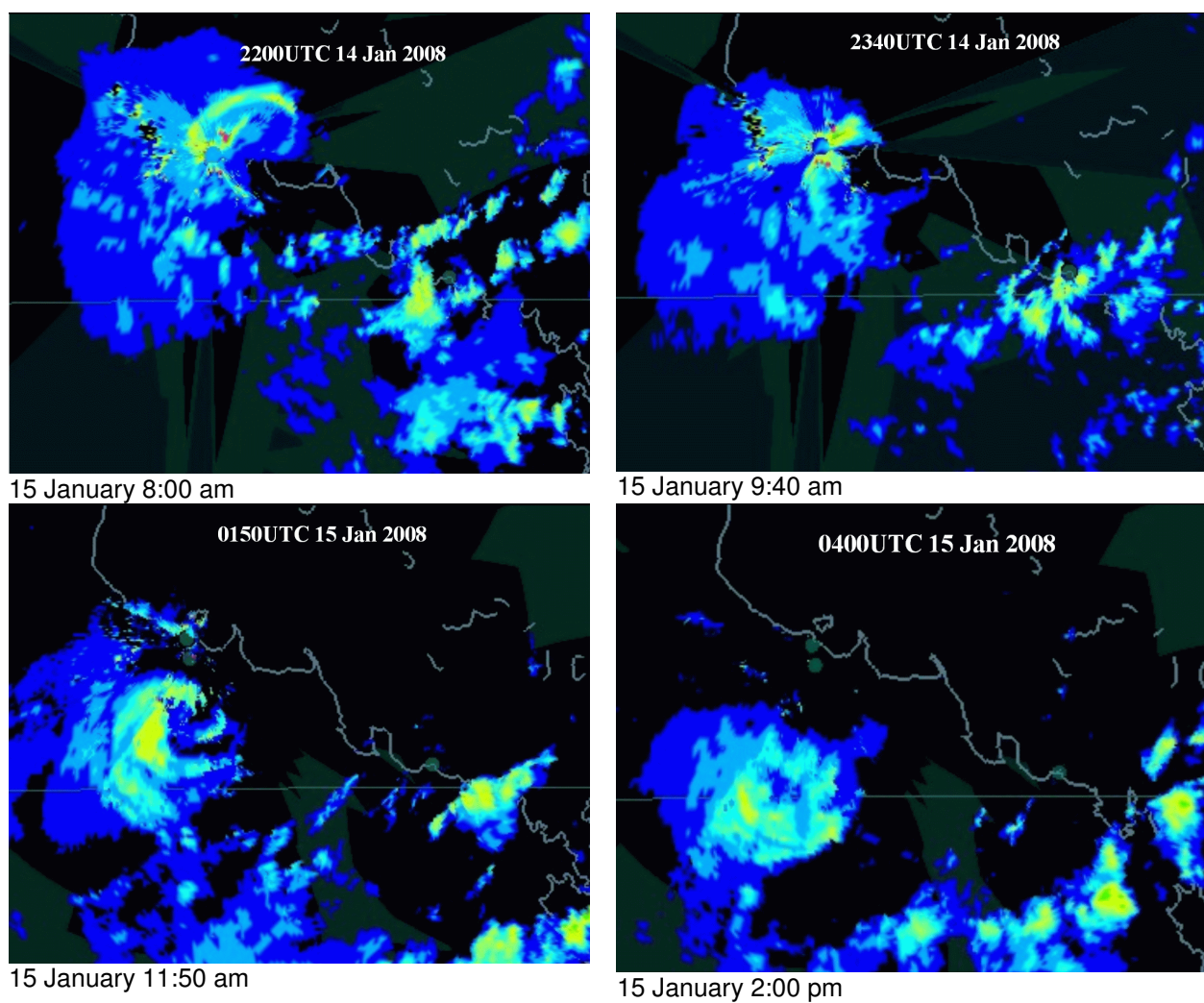
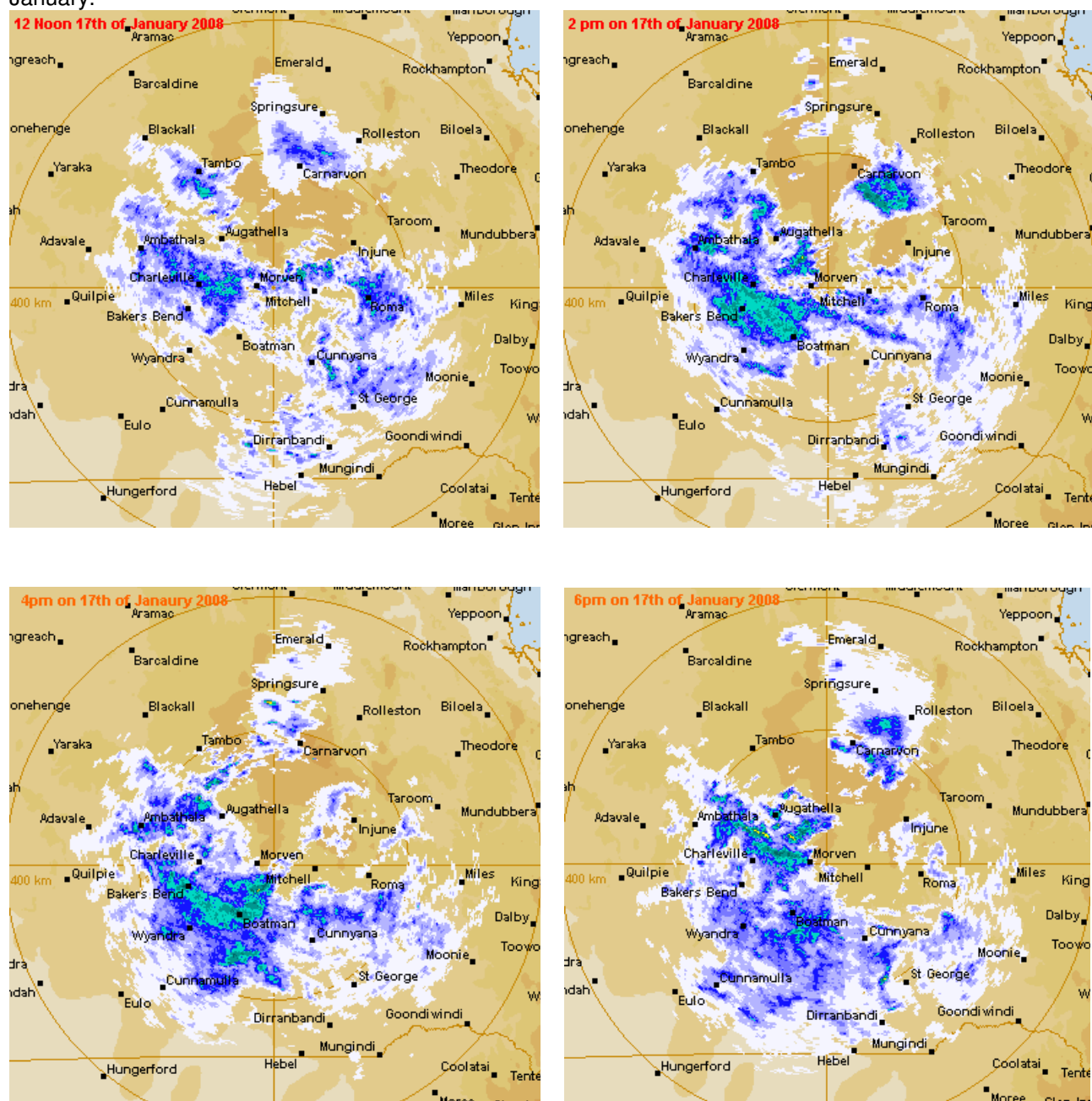
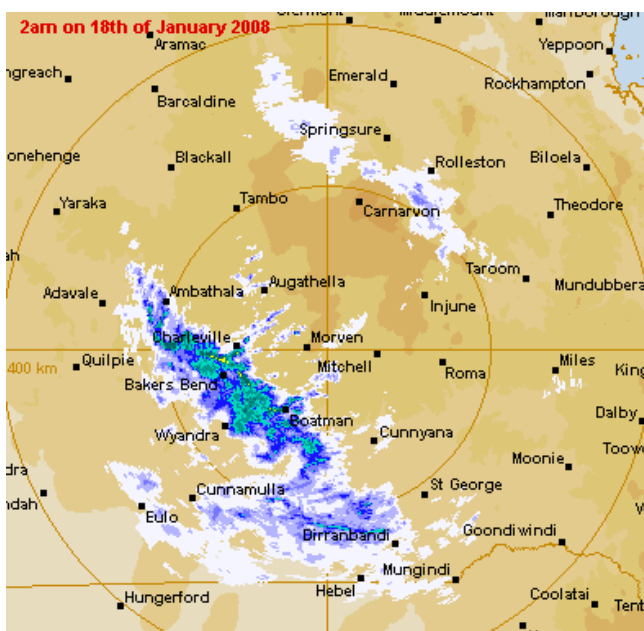
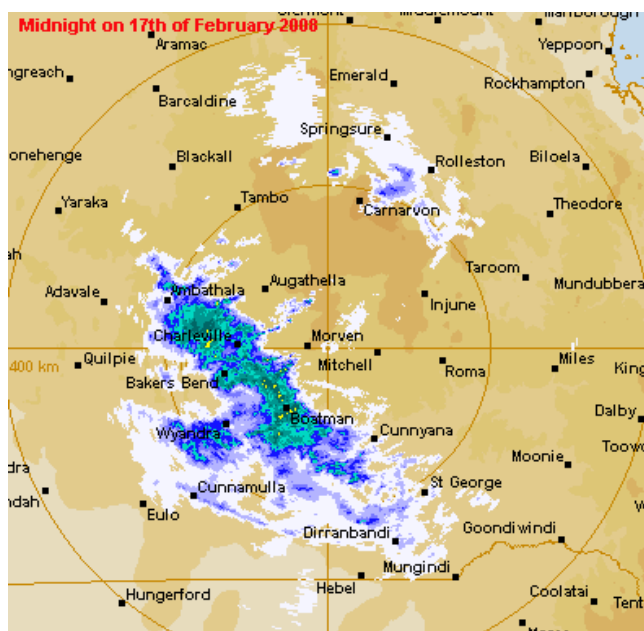
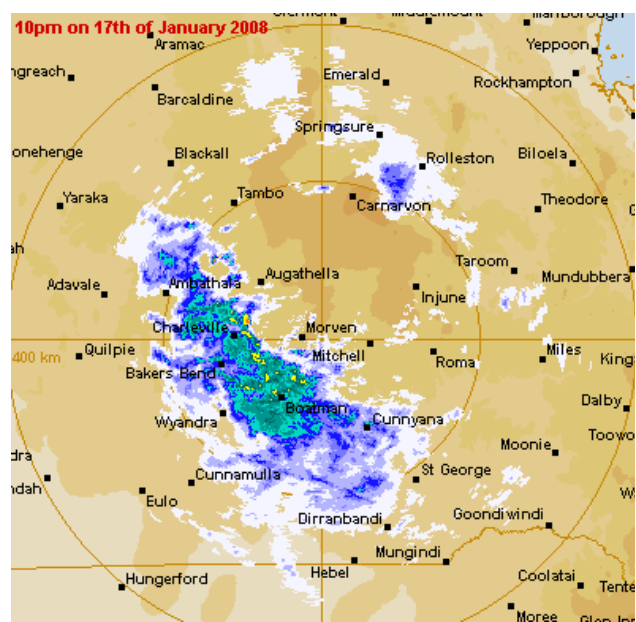
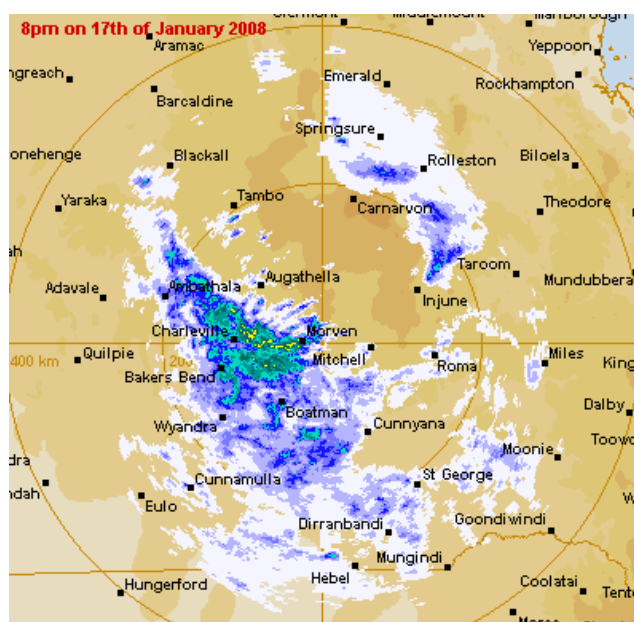


Figure 2.2.2. Sequence of Radar Imagery from the Warrego Radar.

Images at two hourly intervals are shown for the period from 12 noon on the 17th of January to 2am on 18th of January.





3. Central Coast Flooding

Heavy rainfall occurred on the Central Coast of Queensland between Townsville and Mackay starting Sunday 13th January and continuing until Saturday 19th January. This caused a record major flood in the Haughton River at Giru on Tuesday the 15th and minor to moderate flooding in the Don, Pioneer and lower Burdekin Rivers. It also caused widespread flash flooding in the Proserpine and Airlie Beach area. As the low moved inland from Townsville very heavy rainfall and flash flooding occurred in the Charters Towers area during the afternoon of the 15th January.

The heaviest rainfalls were in the Proserpine area where 24 hour to 9am totals were greater than 300mm at Proserpine Airport and Lower Gregory and weekly totals reaching over 600mm.

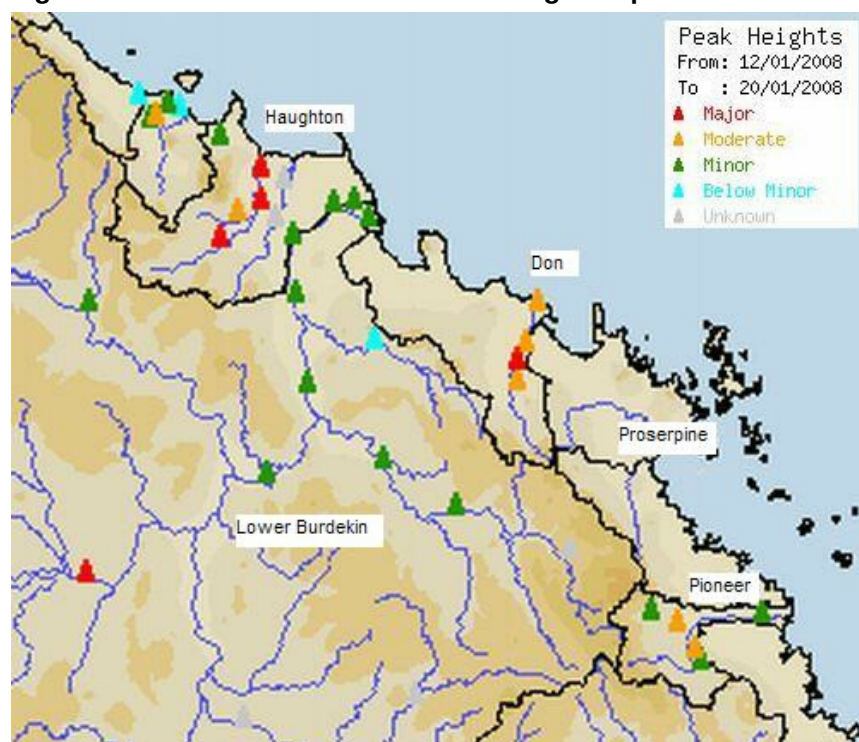
The Haughton River also received very heavy rainfall with the maximum 24 hour to 9am total of 289mm being recorded at Giru and totals for the week of greater than 500mm.

This chapter provides a technical summary and analysis of the hydrology of the event.

Table 3.1 Peak Height Comparison to Records

Gauging Station	Jan 2008 Peak (metres)	Start of Record	Ranking	Highest Since	Highest on Record
Haughton River at Mt Piccaninny	8.26	1971	3rd	Feb 2007 (1 year)	9.13m Feb 2007
Haughton River at Powerline	9.67	1971	7th	April 2000 (8 years)	11.50m Jan 1978
Haughton River at Giru	3.0	1978	1st	New Record (30 years)	New Record
Cape River at Taemas	9.39	1950	8th	Feb 1991 (17 years)	9.91m Mar 1954

Figure 3.2 Central Coast QLD – Peak Height Map



3.1 Rainfall Maps

Figure 3.1.1 Rainfall Map of Queensland for the 7 Days to 20th January 2008
 Queensland Rainfall (mm) Week Ending 20th January 2008
 Product of the National Climate Centre

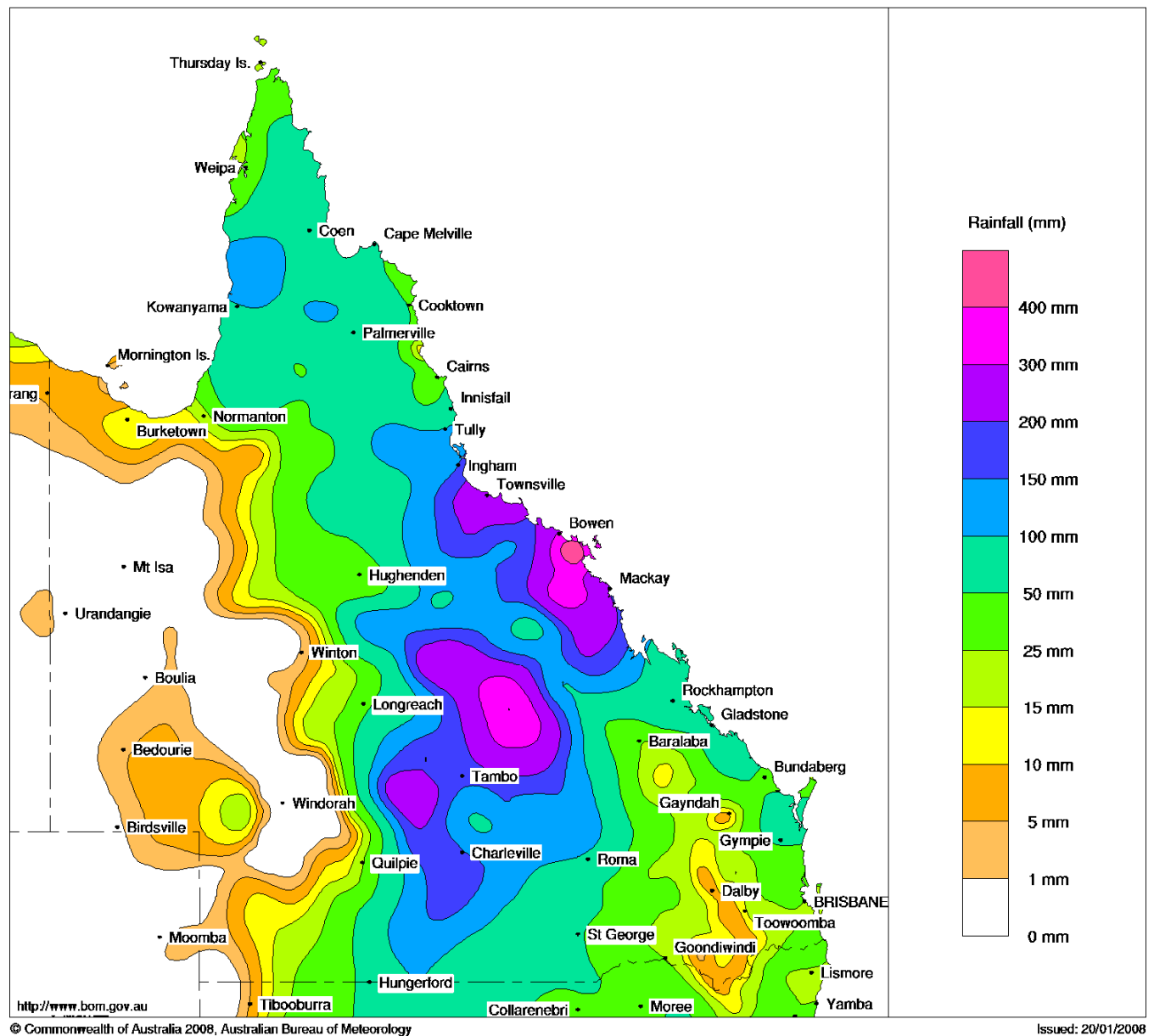


Figure 3.1.2 Rainfall Map for Townsville to Mackay for the 24 hours to 09:00 14 January 2008



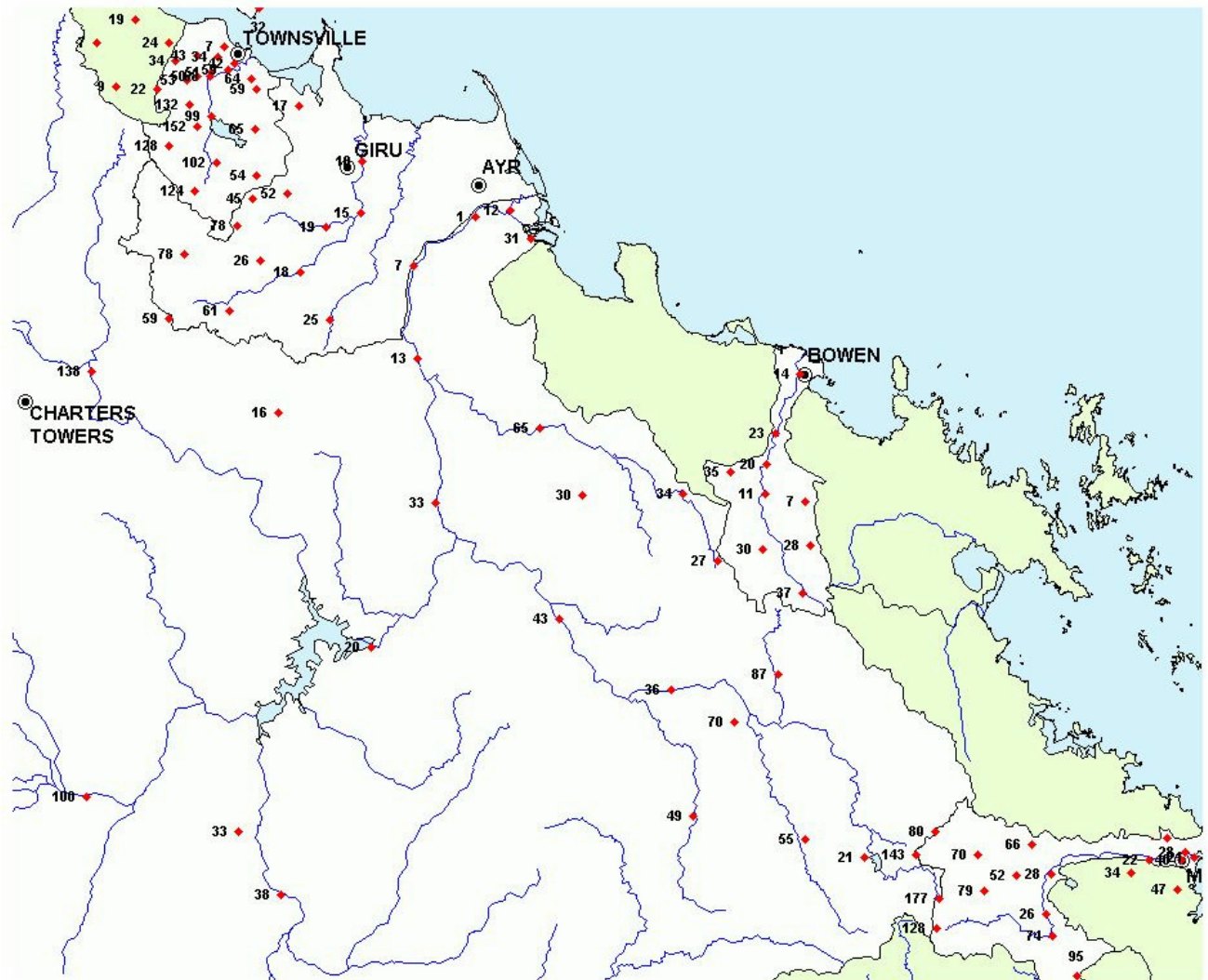
1. Very heavy rainfall in the Townsville area and around Giru caused rises in the Haughton river and flash flooding in smaller creeks during the 14th January.

Figure 3.1.3 Rainfall Map for Townsville to Mackay for the 24 hours to 09:00 15 January 2008



1. Rainfall overnight on the 14th and into the 15th in the Don River catchment caused a moderate flood at Bowen Pump Station with a peak of around 5.04 metres recorded at 3.25am 15/1/2008.
2. Not shown on this map is the heavy rainfall that was occurring around the Proserpine area which caused widespread flash flooding.

Figure 3.1.4. Rainfall Map for Townsville to Mackay for the 24 hours to 09:00 16 January 2008



1. The rainfall during the day on the 15th caused rises in the Haughton River and a record major flood at Giru which peaked at 3 metres at around 22.30pm 15/1/2008.
2. As the low moved inland it crossed over Charters Towers and caused flash flooding and significant wind damage.

Figure 3.1.5 Rainfall Map for Townsville to Mackay for the 24 hours to 09:00 18 January 2008



1. Heavy rainfall in the Pioneer River catchment causes fast rises and minor to moderate flooding in the Pioneer River during the morning 18/1/2008.

3.2 Rainfall Intensity

The most intense rainfall during January, along the Central Coast, occurred in the Haughton River Catchment and in the coastal area near Proserpine. Some key stations from these catchments have been chosen for Intensity Frequency Duration (IFD) analysis and the results can be found in Figures 3.2.2 and 3.2.4.

The most statistically significant short duration rainfall occurred at Giru in the Haughton River where for the 2 hour duration the observed total of 143mm is assessed as being between 5% AEP (20 year) and 2% AEP (50 year) intensity.

The rainfall in the Proserpine area was intense at short durations but more significant statistically at longer durations around 12 to 24 hours. The DNRW station at Lower Gregory recorded 303mm in 12 hours and 483 in 24 hours which have been assessed as being between 5% AEP (20 year) and 2% AEP (50 year) intensity.

Note: A flood frequency analysis would be required to assess the probability of flood levels reached at each location. The frequency analysis in this report is for rainfall only.

Figure 3.2.1 Hourly Hyetographs for Giru and Upper Reid

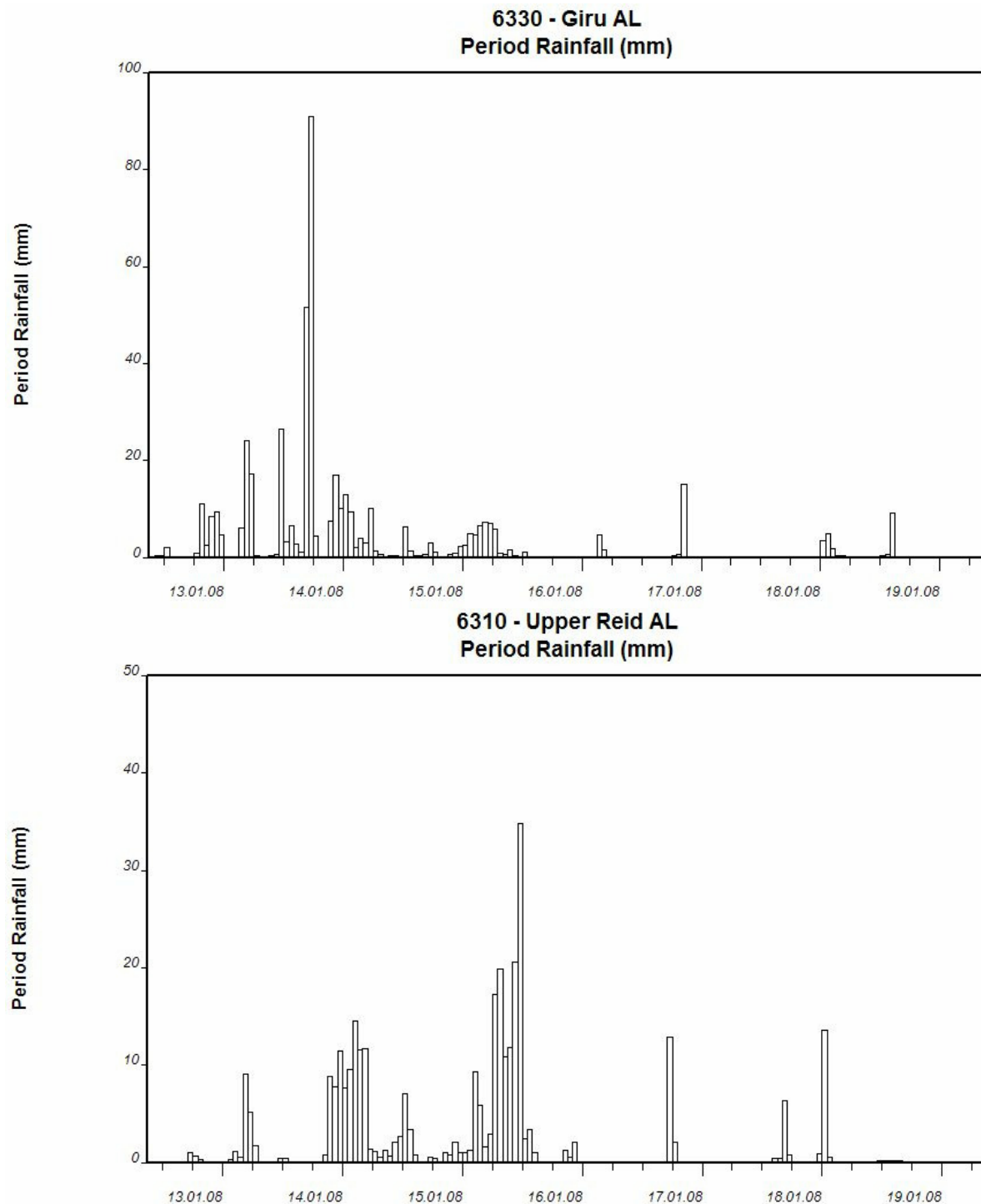
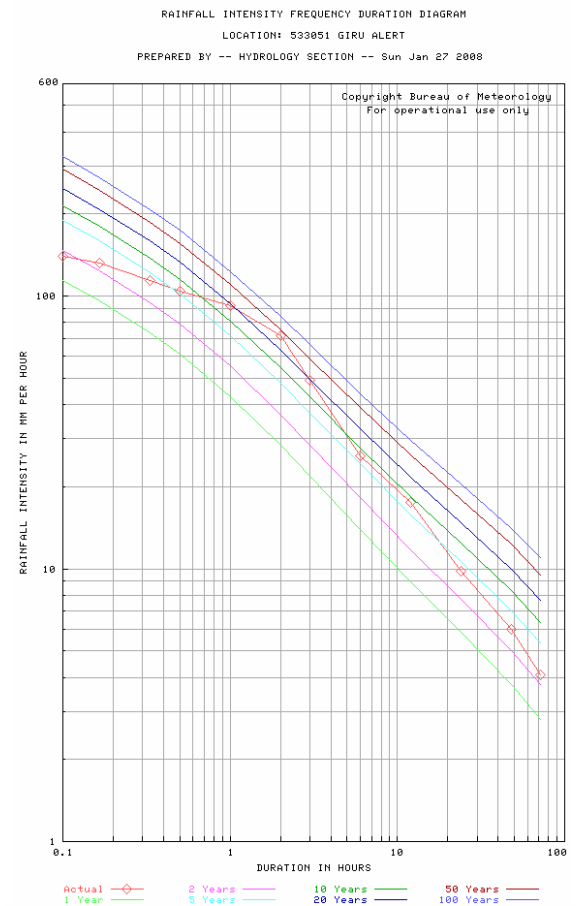


Figure 3.2.2 Intensity Frequency Duration Rainfall Analysis for Giru and Upper Reid

RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS		
LOCATION: 533051 GIRU ALERT		
Analysis of the rainfall for the 333 hours to Sun Jan 27 12:15:25 2008		
Rain (mm)	Period Ending	ARI (years)
12	5 mins ending at 17:06:27 13/01/2008	1-2
14	6 mins ending at 17:06:27 13/01/2008	2
22	10 mins ending at 17:09:42 13/01/2008	2-5
38	20 mins ending at 17:12:57 13/01/2008	2-5
52	30 mins ending at 17:20:57 13/01/2008	5-10
92	60 mins ending at 17:50:12 13/01/2008	10-20
143	2 hours ending at 18:07:27 13/01/2008	20-50
147	3 hours ending at 18:34:27 13/01/2008	10-20
155	6 hours ending at 22:14:27 13/01/2008	5-10
210	12 hours ending at 04:00:12 14/01/2008	5-10
235	24 hours ending at 14:41:42 14/01/2008	2-5
287	48 hours ending at 14:41:42 15/01/2008	2-5
293	72 hours ending at 14:41:42 16/01/2008	2-5



RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS		
LOCATION: 533053 UPPER REID ALERT		
Analysis of the rainfall for the 333 hours to Sun Jan 27 13:58:39 2008		
Rain (mm)	Period Ending	ARI (years)
6	5 mins ending at 11:17:01 15/01/2008	< 1
7	6 mins ending at 11:18:01 15/01/2008	< 1
11	10 mins ending at 11:22:01 15/01/2008	< 1
22	20 mins ending at 11:29:51 15/01/2008	< 1
29	30 mins ending at 11:31:24 15/01/2008	1
43	60 mins ending at 11:29:46 15/01/2008	1-2
59	2 hours ending at 11:41:53 15/01/2008	1-2
68	3 hours ending at 11:48:35 15/01/2008	1-2
115	6 hours ending at 11:48:45 15/01/2008	2-5
140	12 hours ending at 14:19:27 15/01/2008	2-5
155	24 hours ending at 11:48:40 15/01/2008	1-2
255	48 hours ending at 20:28:42 15/01/2008	2-5
274	72 hours ending at 18:21:05 16/01/2008	2-5

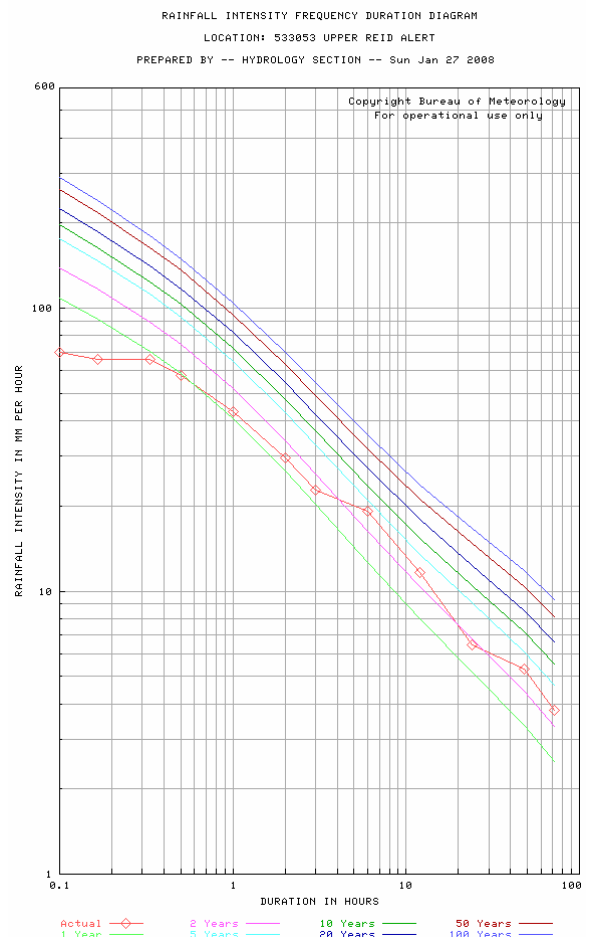


Figure 3.2.3 Hourly Hyetographs for Lower Gregory and Proserpine

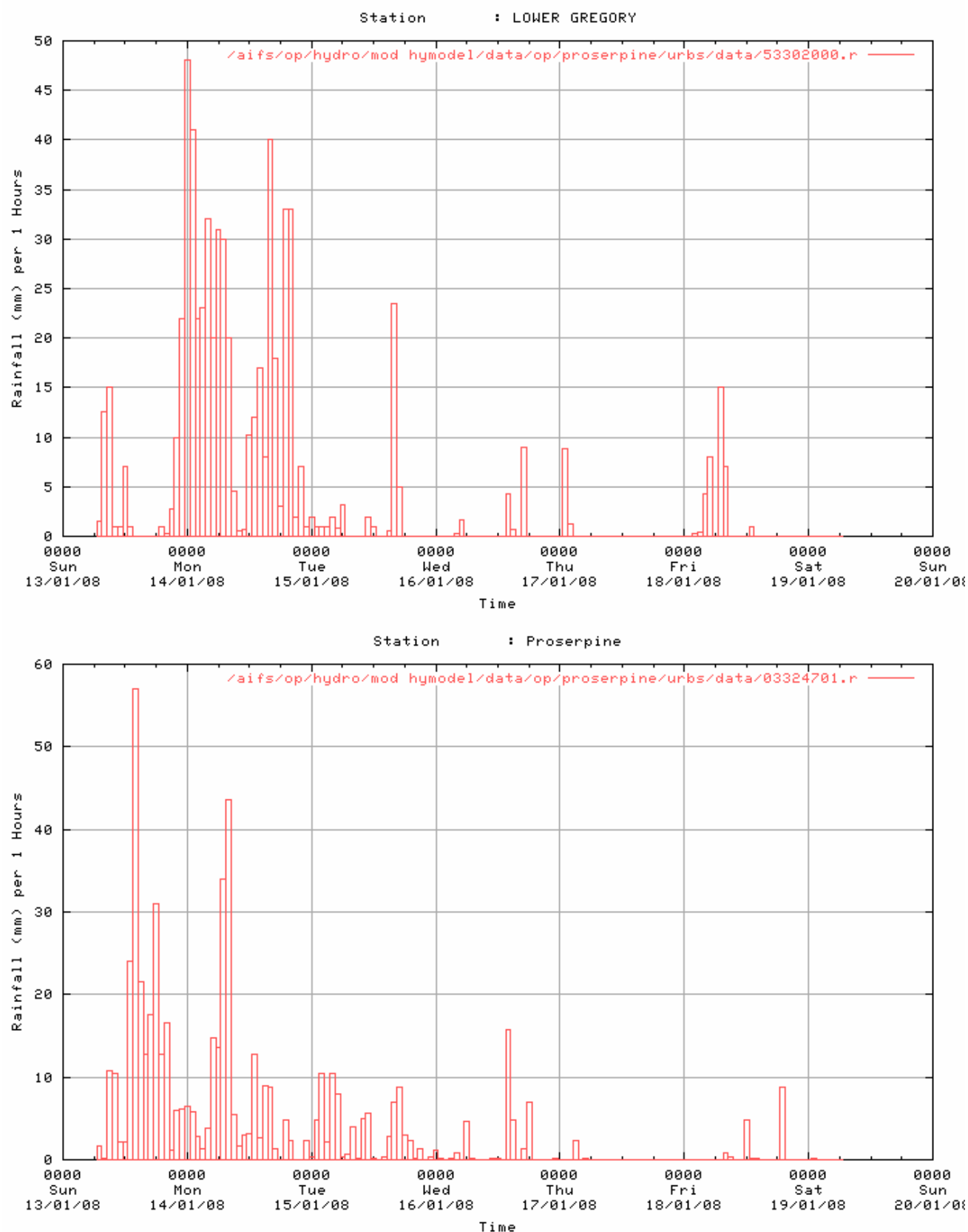
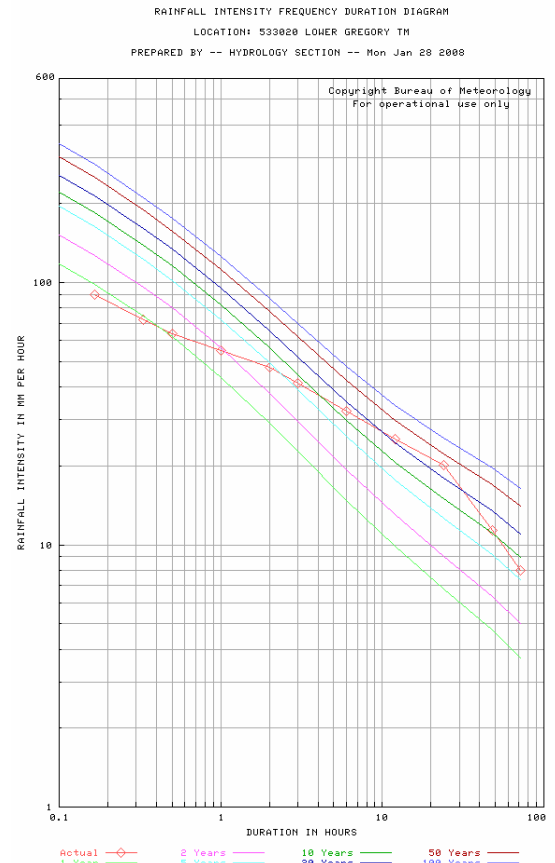


Figure 3.2.4 Intensity Frequency Duration Rainfall Analysis for Lower Gregory and Proserpine**RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS**

LOCATION: 533020 LOWER GREGORY TM

Analysis of the rainfall for the 379 hours to Mon Jan 28 09:00:00 2008

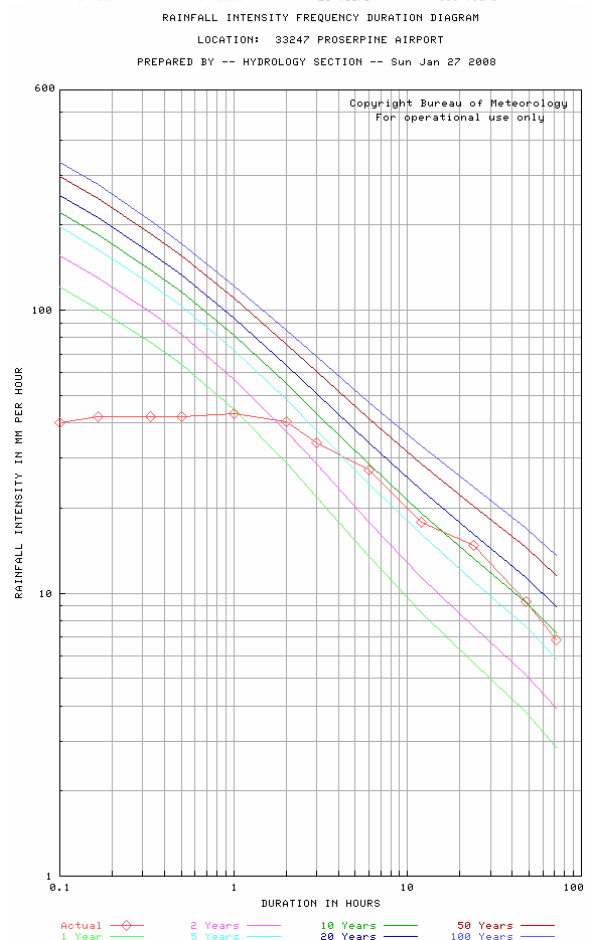
Rain (mm)	Period Ending	ARI (years)
15	10 mins ending at 19:20:00 14/01/2008	< 1
24	20 mins ending at 19:20:00 14/01/2008	1
32	30 mins ending at 00:10:00 14/01/2008	1-2
55	60 mins ending at 00:20:00 14/01/2008	1-2
95	2 hours ending at 01:10:00 14/01/2008	2-5
124	3 hours ending at 01:20:00 14/01/2008	5-10
194	6 hours ending at 04:30:00 14/01/2008	10-20
303	12 hours ending at 08:50:00 14/01/2008	20-50
483	24 hours ending at 20:30:00 14/01/2008	20-50
543	48 hours ending at 05:30:00 15/01/2008	10-20
577	72 hours ending at 04:50:00 16/01/2008	5-10

**RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS**

LOCATION: 33247 PROSERPINE AP

Analysis of the rainfall for the 341 hours to Sun Jan 27 14:00:00 2008

Rain (mm)	Period Ending	ARI (years)
3	5 mins ending at 07:05:00 14/01/2008	< 1
4	6 mins ending at 07:06:00 14/01/2008	< 1
7	10 mins ending at 07:10:00 14/01/2008	< 1
14	20 mins ending at 07:20:00 14/01/2008	< 1
21	30 mins ending at 07:30:00 14/01/2008	< 1
43	60 mins ending at 08:00:00 14/01/2008	< 1
81	2 hours ending at 14:00:00 13/01/2008	2-5
102	3 hours ending at 15:00:00 13/01/2008	2-5
164	6 hours ending at 18:00:00 13/01/2008	5-10
213	12 hours ending at 00:00:00 14/01/2008	5-10
353	24 hours ending at 09:00:00 14/01/2008	10-20
447	48 hours ending at 11:00:00 15/01/2008	10-20
491	72 hours ending at 09:00:00 16/01/2008	5-10



3.3 Rainfall Totals

The abbreviations used in the following tables include :

AL - ALERT Radio Telemetry
 TM - Telephone Telemetry
 AWS - Automatic Weather Station
 SYN - Bureau Synoptic Station

Note: * signifies automatic station.

Table 3.3.1 Rainfall Totals for the Proserpine Area

Station Name	24 hours to 9am							Total
	12	13	14	15	16	17	18	
Proserpine								
Hecate	24	11	113	149	44	23	35	399
Crystal Brook	2.6	18	220	245	26	25	23	560
Proserpine AWS *	45	27	353	93	44	32	1.2	595
Lower Gregory TM *	5	27	317	197	34	24	35	639
Jochaims TM *	0	5	217	139	23	31	50	465
Numerical Average	15	18	244	165	34	27	29	532
Maximum	45	27	353	245	44	32	50	639

Table 3.3.2 Rainfall Totals for the Haughton River

Station Name	24 hours to 9am							Total
	12	13	14	15	16	17	18	
Haughton								
Mingela			56	52	56	3.8	5.7	174
Mingela AL *	17	44	50	47	58	3	5	224
Upper Reid AL *	14	20	89	92	79	15	23	332
Cameron Hill AL *	17	39	65	82	25	1	51	280
Four Mile AL *	8	37	41	61	61	32	29	269
Mt Piccaninny TM *	47	16	42	70	21	9	24	229
Mt Piccaninny AL *	44	14	37	63	18	9	23	208
Donnington Airpark AL *	4	50	156	63	44	0	33	350
Upper Major Creek AL *	4	54	220	170	51	0	4	503
Major Creek AL *	21	59	95	52	19	3	3	252
Major Creek TM *	21	58	94	17	19	4	2	215
Powerline TM *	83	72	167	50	9	15	10	406
Powerline AL *	80	67	167	56	15	16	11	412
Giru	42	111	289	57	10	17	15	541
Giru AL *	43	88	266	58	9	16	11	491
Upper Barrattas AL *	82	32	35	68	24	11	30	282
Numerical Average	35	51	117	66	32	10	17	323
Maximum	83	111	289	170	79	32	51	541

Table 3.3.3 Rainfall Totals for the Don River

Station Name	24 hours to 9am							Total
	12	13	14	15	16	17	18	
Don								
Upper Don AL *	10	4	54	100	37	19	21	245
Boundary Creek AL *	47	1	56	134	30	42	8	318
Emu Creek AL *	9	5	83	123	28	23	30	301
Moss Vale AL *	18	15	87	101	34	27	98	380
Mt Dangar AL *	31	14	103	82	25	18	226	499
Warden Bend	3.2	15	94	98	16	25	116	367
Roma Peak	19	11	104	183	7.8	33	57	415
Roma Peak AL *	15	10	98	180	7	26	54	390
Reeves AL *	2	17	98	95	22	25	50	309
Bowen Pump Station AL *	6	24	69	79	13	4	32	227
Guthalungra TM *	5	20	51	81	24	15	23	219
Numerical Average	15	12	82	114	22	23	65	334
Maximum	47	24	104	183	37	42	226	499

Table 3.3.4 Rainfall Totals for the Pioneer River

Station Name	24 hours to 9am							Total
	12	13	14	15	16	17	18	
Pioneer								
Septimus TM *	10	6	3	13	33	9	40	114
Plevna AL *	6	48	20	40	127	19	151	411
Ridgeland AL *	7	39	54	56	180	41	136	513
Teemburra Dam Hw TM *	22	10	15	24	79	3	156	309
Teemburra Dam AL *	22	10	15	25	79	3	156	310
Whiteford's AL *	7	3	3	12	74	26	38	163
Hannaville AL *	3	5	1	9	95	34	126	273
Sarich's AL *	11	5	3	13	26	14	40	112
Clarke Range AL *	18	19	62	166	79	18	168	530
Dalrymple Heights	13	43	64	118	153	13	95	499
Eungella AL *	13	44	63	114	144	13	97	488
Finch Hatton AL *	3	16	22	64	71	21	202	399
Gargett AL *	1	9	5	27	51	5	112	210
Dow's Creek AL *	7	4	8	55	65	6	26	171
Mirani Weir TM *	44	4	4	19	25	12	17	125
Mirani Weir AL *	47	4	5	20	28	13	17	134
Mirani	72	2.5	6.5	21	21	19	26	168
Dumbleton Rocks AL *	5	2	3	15	22	2	3	52
Te Kowai SYN	1	5	5	12	35	7.1	19	84
Hospital Bridge AL *	2	10	2	12	40	8	14	88
Mackay AWS *	1.2	5.4	3.8	12	17	18	18	75
Mackay Airport AWS *	0.8	10	1	11	32	12	36	103
Mackay AL *	1	9	3	12	21	13	22	81
East Mackay	1.5	8	3	14	24	24	18	93
Gooseponds AL *	2	9	4	12	28	4	16	75
Bakers Creek AL *	1	2	1	10	46	14	62	136
Forbes Road TM *	1	2	67	59	58	40	93	320
Mt Roy TM *	42	3	7	26	32	13	11	134
Stafford Crossing TM *	0	1	117	84	60	25	32	319
Calen TM *	24	7	26	40	40	3	1	141
Numerical Average	13	11	20	37	60	15	65	221
Maximum	72	48	117	166	180	41	202	530

Table 3.3.5 Rainfall Totals for the Ross River

Station Name	24 hours to 9am							Total
	12	13	14	15	16	17	18	
Ross/Bohle								
Alligator Creek AL *	7	86	178	42	17	0	29	359
Stuart AL *	9	76	160	83	58	1	51	438
Stuart Creek AL *	11	73	150	84	64	5	22	409
Calcium AL *	4	91	107	74	80	9	51	416
Nettlefield AL *	20	14	138	82	123	3	4	384
Woodlands AL *	18	34	203	92	103	0	7	457
Brabons AL *	36	32	199	113	128	17	10	535
Mcdonalds AL *	7	32	168	100	56	1	35	399
Cormacks AL *	67	43	164	54	65	0	16	409
Gleesons Mill AL *	43	29	248	95	152	1	5	573
Ross River Dam AL *	50	40	182	40	98	0	2	412
The Pinnacles AL *	85	21	124	96	132	5	6	469
Black Weir (Riverway) AL *	25	52	122	88	68	36	8	399
Kirwan AL *	20	55	150	82	50	17	13	387
Aplin Weir AL *	10	66	117	74	58	19	12	356
Mysterton AL *	11	70	149	78	42	18	8	376
Louisa Creek AL *	10	63	146	93	34	6	27	379
Mt Margaret AL *	41	20	89	100	22	23	6	301
Deeragun AL *	10	27	96	109	34	5	3	284
Little Bohle River AL *	27	17	115	80	53	3	2	297
Bohle River AL *	32	24	128	81	50	5	5	325
Mt Bohle AL *	15	41	167	103	43	2	34	405
Yabulu	12	30	92	121	30	22	13	320
Townsville Airport AL *	11	81	93	16	7	2	0	210
Townsville AWS *	10	78	157	98	36	2	31	412
Nelly Bay AL *	3	102	70	121	32	1	39	368
Numerical Average	23	50	143	85	63	8	17	388
Maximum	85	102	248	121	152	36	51	573

Table 3.3.6 Rainfall Totals for the Black River

Station Name	24 hours to 9am							Total
	12	13	14	15	16	17	18	
Black R to Crystal Ck								
Upper Black River AL *	88	47	83	90	10	3	8	329
Black River AL *	15	38	34	102	23	3	14	229
Upper Bluewater AL *	17	124	60	75	7	28	4	315
Bluewater AL *	9	55	49	90	18	47	28	296
Bluewater TM *	9		48	89	19	46	29	240
Woolshed AWS *	25	61	126	117	28	4.4	10	371
Paradise Lagoon AL *	38	16	84	58	0	24	18	238
Rollingstone	70		182	72	4	13		341
Mutarnee	60	8.2	81	68	2	65	8.4	293
Numerical Average	37	50	83	85	12	26	15	295
Maximum	88	124	182	117	28	65	29	371

Table 3.3.7 Rainfall Totals for the Burdekin River

Station Name	24 hours to 9am							Total
	12	13	14	15	16	17	18	
Burdekin								
Glen Harding	3	2	64	90	14			173
Lucky Springs	12		46			1		59
Greenvale Township	17	1.1	46	26	40	1.6		132
Blue Range TM *	9	29		13	0	3	15	69
Gregory Springs	67	12	43	20	6	1.4		149
Wando Vale	15	12	84	13	1.4			125
Paluma AL *	22	34	84	83	3	6	5	237
Paluma	36/2	34	100	96	3.5	4	7.5	245
Paluma Dam AL *	40	30	47	62	3	4	1	187
Hillgrove	73	22	72	16	8.2	4.8	10	206
Toomba	23	43	51	22	7.8	6.6	23	176
Charters Towers SYN	48	30	37	20	147	10	3.6	296
Sellheim	7.6	9.4	51	23	158			249
Sellheim AL *	7	9	47	22	136	1	6	228
Ravenswood AL *	15	12	28	31	16	24	56	182
Ravenswood	19	11	33		20	22	55	160
Alpha	1.8/2	0.8		2.6	9.6	162	50	225
Violet Grove TM *	0	1	3	2	0	171	86	263
Albro		10	1.8	10	50	171	21	264
Ulcanbah	9.6		5	4.2	84	11		114
Bulliwallah	28	22	15	13	37	53		168
Winvic			4	8	22	24	36	94
Frankfield					12	30	88	130
Mt Douglas	12	2.8		25	47	36	52	175
Dooruna Downs	9.2	10	5.8	7.4	13	11		56
St Anns TM *				12	34	4	87	137
St Anns AL *	25	12	39	13	38	4	95	226
Scartwater AL *	30	36	38	15	33	2	29	183
Mount Mcconnell		17	25	25	26	18	95	206
Pentland TM *	32	151	65	1		3	0	252
Pentland		74	82	23	9		2	190
Broadleigh Downs	37	31	43	69			17	197
Homestead	24	69	102	23	23			241
Balfes Creek	33		34	19	111	2.3		199
Taemas AL *	9	39	33	9	104	7	30	231
Taemas	25			8.6	59			93
Burdekin Dam		20	20	30	24	16	93	203
Burdekin Dam AL *	2	12	11	21	20	11	95	172
Turrawalla	64	9.4		18				91
Blenheim AL *	62	9	47	29	55	6	9	217
Eungella Dam AL *	51	17	38	30	20	4	27	187
Urannah TM *	9	24	39	31	93	21	19	236
Sutherland AL *	13	24	57	194	86	13	6	393
The Stonewall AL *	6	9	40	126	69	6	3	259
Jacks Creek AL *	5	8	25	91	35	5	11	180
Weetalaba AL *	116	8	31	35	53	12	15	270
Collinsville SYN	3.6	23	49	78	26	23	3.6	206
Myuna AL *	3	24	36	48	42	0	2	155
Red Hill Creek TM *	14	27	35	56	30	5	7	174
Dalbeg AL *	11	55	26	46	33	4	31	206

Dalbeg	22	37	13	80	9.4		25	186
Upper Bogie AL *	24	8	48	149	27	38	21	315
Mt Pleasant AL *	2	17	63	95	34	33	94	338
Eton Vale AL *	8	31	40	58	30	3	26	196
Strathbogie AL *	9	13	24	71	64	17	8	206
Millaroo AL *	35	22	20	50	13	1	15	156
Clare	28	33	16	54		19	98	248
Clare AL *	31	23	22	58	7	6	46	193
Inkerman Bridge AL *	23	25	46	47	1	23	69	234
Rita Island AL *	23	17	27	60	12	12	30	181
Groper Creek AL *	19	29	25	41	31	18	26	189
Home Hill			72/3	43	3	14	58	118
Ayr AWS *	46	23	64	59	1.4	33	80	306
Alva Beach AWS *	18	42	65	63	0	2.6	16	207
Numerical Average	24	24	40	42	35	21	35	196
Maximum	116	151	102	194	158	171	98	393

3.4 Peak Heights

Table 3.4.1 Peak Flood Heights between 12/01/2008 and 22/01/2008

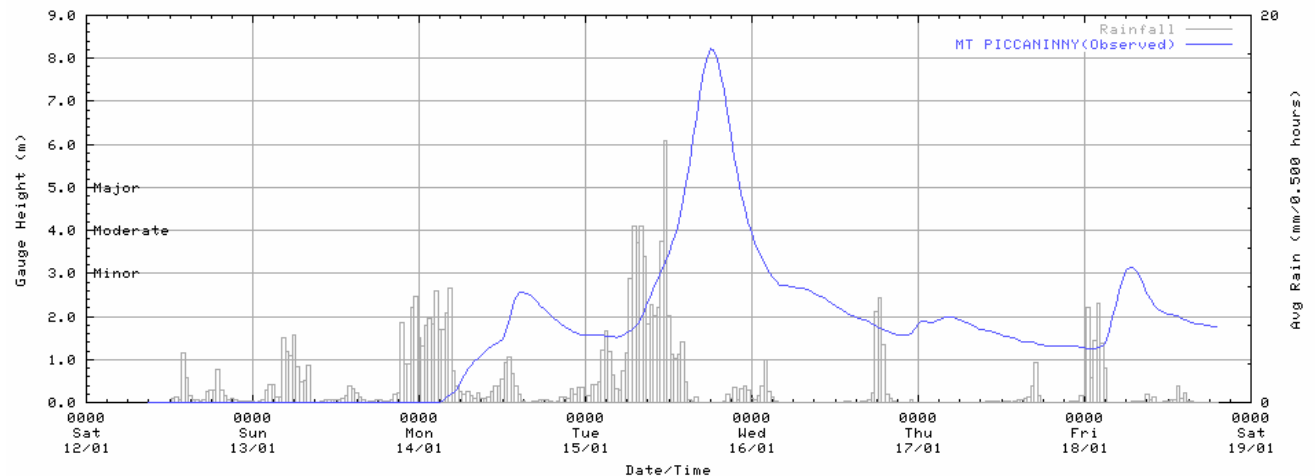
Station No.	Station Name	Date	Height (metres)	Flood Class
PIONEER				
Pioneer R				
533026	WHITEFORD'S TM	18/01/2008 04:20	6.1	Minor
533026	WHITEFORD'S TM	19/01/2008 05:50	5.55	Minor
33301	WHITEFORD'S ALERT	18/01/2008 04:14	6.07	Minor
33301	WHITEFORD'S ALERT	19/01/2008 05:51	5.52	Minor
33282	SARICH'S TM	16/01/2008 04:00	7.32	Minor
33282	SARICH'S TM	20/01/2008 10:20	8.14	Moderate
33299	SARICH'S ALERT	18/01/2008 05:25	8.85	Moderate
533092	FINCH HATTON TM	15/01/2008 15:20	3.61	Minor
533092	FINCH HATTON TM	20/01/2008 14:40	3.64	Minor
33281	GARGETT TM	18/01/2008 02:20	8.36	Moderate
33304	GARGETT ALERT	18/01/2008 01:56	8.6	Moderate
33300	DUMBLETON ROCKS ALERT	18/01/2008 06:54	17.98	Minor
33300	DUMBLETON ROCKS ALERT	20/01/2008 13:20	17.63	Minor
DON				
Don R				
33265	IDA CREEK ALERT	15/01/2008 23:45	4.35	Moderate
33267	MT DANGAR ALERT	14/01/2008 06:21	3.9	Minor
33267	MT DANGAR ALERT	15/01/2008 01:00	6.35	Major
33268	REEVES ALERT	14/01/2008 07:22	3.76	Minor
33268	REEVES ALERT	15/01/2008 01:25	5.46	Moderate
33264	BOWEN PUMP STATION ALERT	15/01/2008 02:35	5.04	Moderate
BURDEKIN				
Upper Burdekin R to BFD				
533075	SELLHEIM ALERT	15/01/2008 21:00	13.85	Minor
Belyando R to Mt Douglas				
35229	ALPHA	18/01/2008 22:00	7.3	Minor
35229	ALPHA	20/01/2008 04:00	7.7	Moderate
535053	VIOLET GROVE TM	19/01/2008 20:00	8.59	Unknown
Suttor R to BFD				
534016	EAGLEFIELD TM	15/01/2008 02:20	6.81	Unknown
534019	BOWEN DEVELOPMENT RD TM	19/01/2008 03:00	4.89	Unknown
Cape R to BFD				
530003	PENTLAND TM	14/01/2008 02:20	4.12	Minor
534010	TAEMAS ALERT	17/01/2008 09:01	9.39	Major
Lower Burdekin R d/s BFD				
34029	BURDEKIN DAM	17/01/2008 09:00	3.55	Minor
533015	JACKS CREEK ALERT	18/01/2008 16:00	11.6	Minor

33292	MYUNA ALERT	15/01/2008 22:40	6.01	Minor
33292	MYUNA ALERT	19/01/2008 01:00	6.01	Minor
33291	DALBEG ALERT	17/01/2008 01:00	14.1	Minor
33291	DALBEG ALERT	19/01/2008 11:25	14.2	Minor
33289	STRATHBOGIE ALERT	18/01/2008 11:25	7.16	Below Minor
33287	MILLAROO ALERT	17/01/2008 06:20	11.55	Minor
33287	MILLAROO ALERT	19/01/2008 12:30	11.65	Minor
33286	CLARE ALERT	17/01/2008 07:30	11.19	Minor
33286	CLARE ALERT	19/01/2008 16:30	11.24	Minor
33288	INKERMAN BRIDGE ALERT	17/01/2008 08:20	8.5	Minor
33288	INKERMAN BRIDGE ALERT	19/01/2008 19:30	8.6	Minor
533057	RITA ISLAND ALERT	17/01/2008 12:25	1.75	Minor
533057	RITA ISLAND ALERT	19/01/2008 20:15	1.8	Minor
533049	GROPER CREEK ALERT	17/01/2008 11:30	3.44	Minor
533049	GROPER CREEK ALERT	19/01/2008 20:25	3.49	Minor
HAUGHTON				
Haughton R				
533027	MT PICCANINNY TM	18/01/2008 06:15	3.15	Minor
533055	MT PICCANINNY ALERT	14/01/2008 15:00	2.73	Below Minor
533055	MT PICCANINNY ALERT	15/01/2008 18:00	8.26	Major
533055	MT PICCANINNY ALERT	18/01/2008 06:16	3.21	Minor
533072	MAJOR CREEK ALERT	14/01/2008 18:00	7.07	Minor
533072	MAJOR CREEK ALERT	15/01/2008 23:00	8.32	Moderate
533056	POWERLINE ALERT	14/01/2008 21:00	4.17	Below Minor
533056	POWERLINE ALERT	15/01/2008 21:30	9.67	Major
33253	GIRU	14/01/2008 11:45	1.42	Below Minor
33253	GIRU	15/01/2008 22:30	3.0	Major
ROSS				
Ross R				
532034	ALLIGATOR CREEK ALERT	13/01/2008 16:00	5.54	Minor
532037	MYSTERTON ALERT	13/01/2008 18:20	3.17	Below Minor
532032	LOUISA CREEK ALERT	13/01/2008 18:00	5.68	Minor
532032	LOUISA CREEK ALERT	14/01/2008 01:00	5.43	Minor
532044	LITTLE BOHLE RIVER ALERT	14/01/2008 03:20	3.11	Minor
532044	LITTLE BOHLE RIVER ALERT	15/01/2008 09:10	3.06	Minor
532043	BOHLE RIVER ALERT	14/01/2008 07:15	6.44	Moderate
532043	BOHLE RIVER ALERT	15/01/2008 15:50	6.59	Moderate
BLACK				
Black River				
532046	BLACK RIVER ALERT	15/01/2008 11:15	4.66	Below Minor

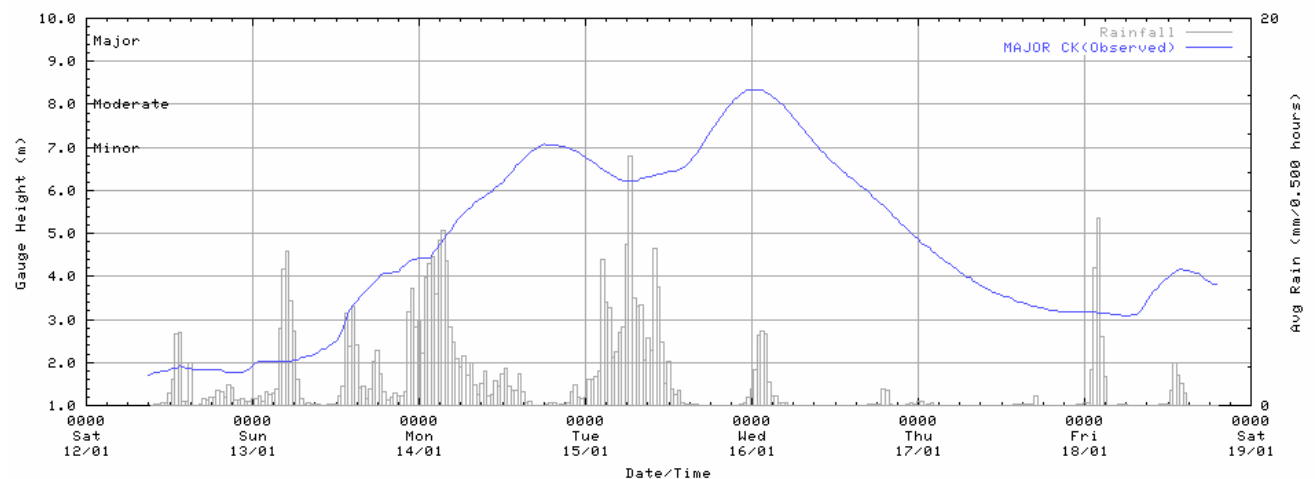
3.5 Flood Hydrographs

Figure 3.5.1 River Heights - Haughton River

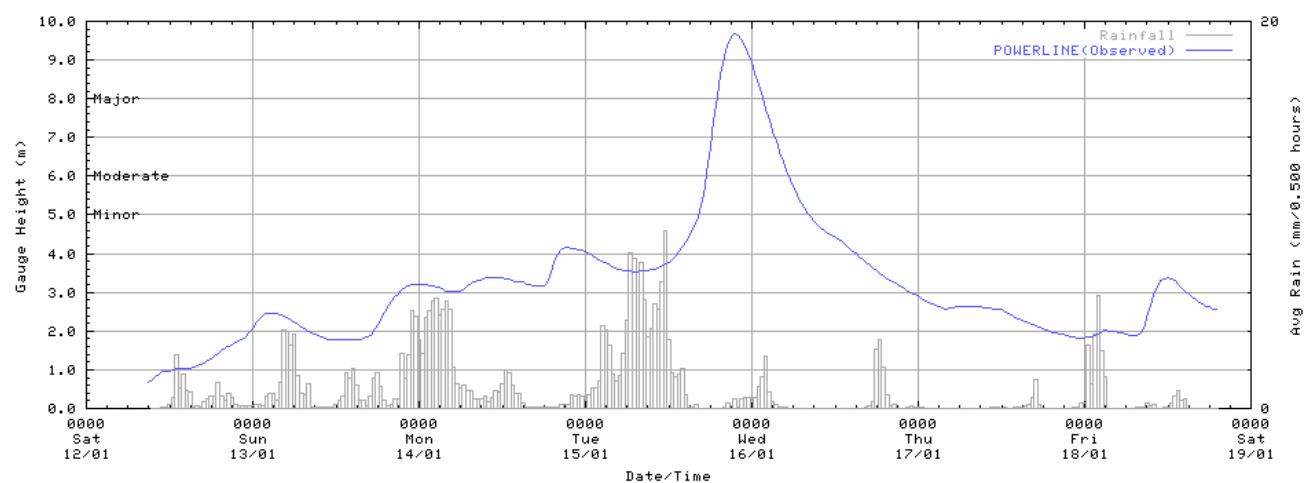
Haughton River – Mt Piccaninny



Major Creek – Major Creek AL



Haughton River – Powerline



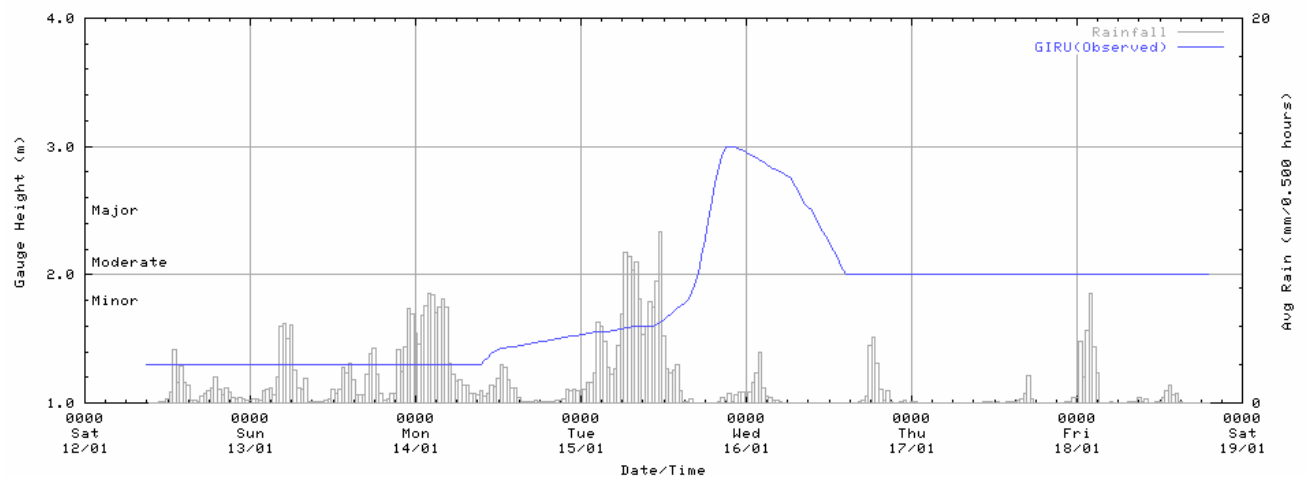
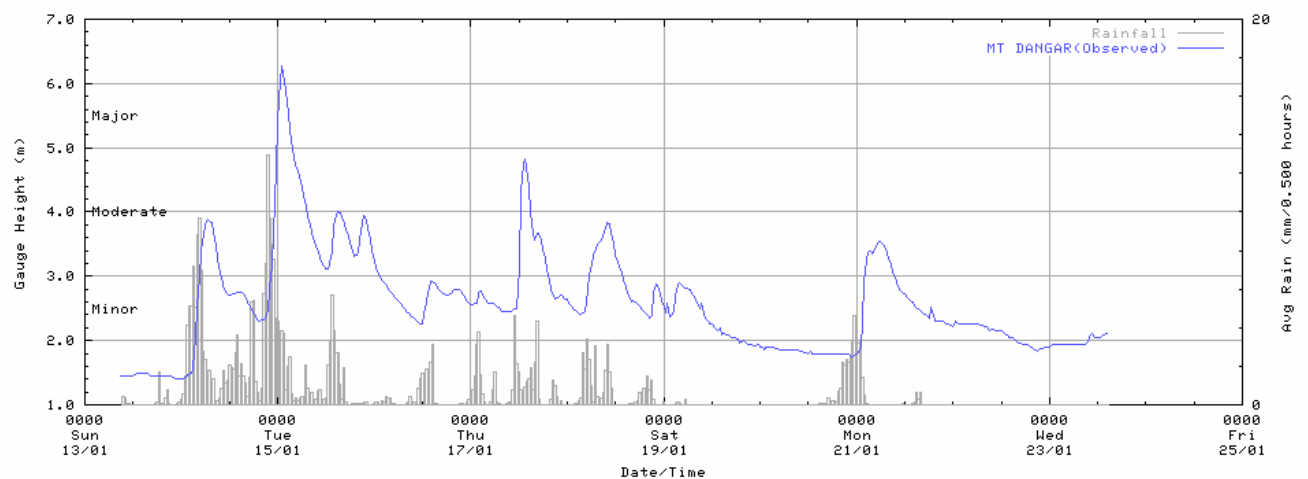
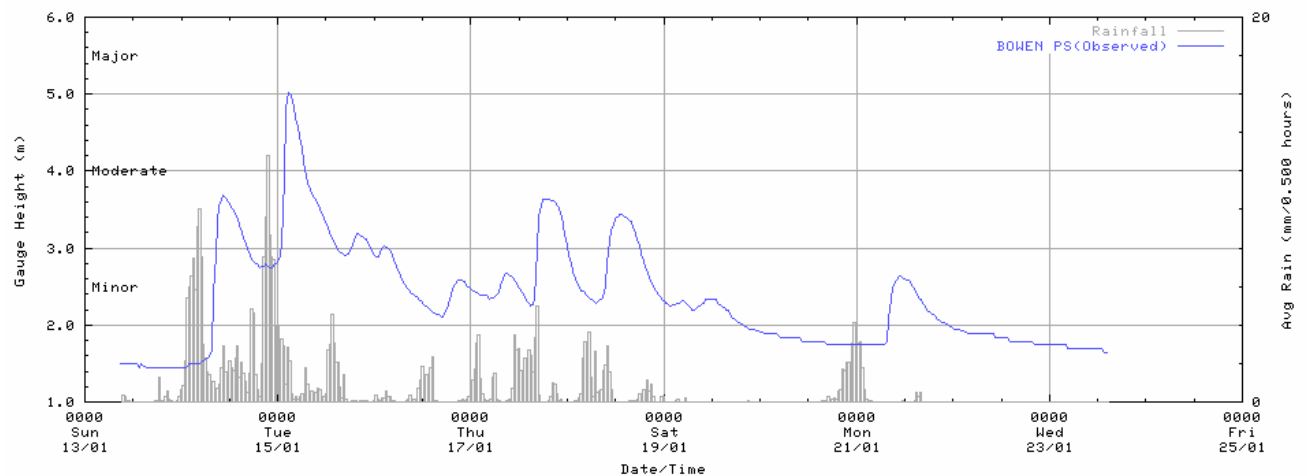
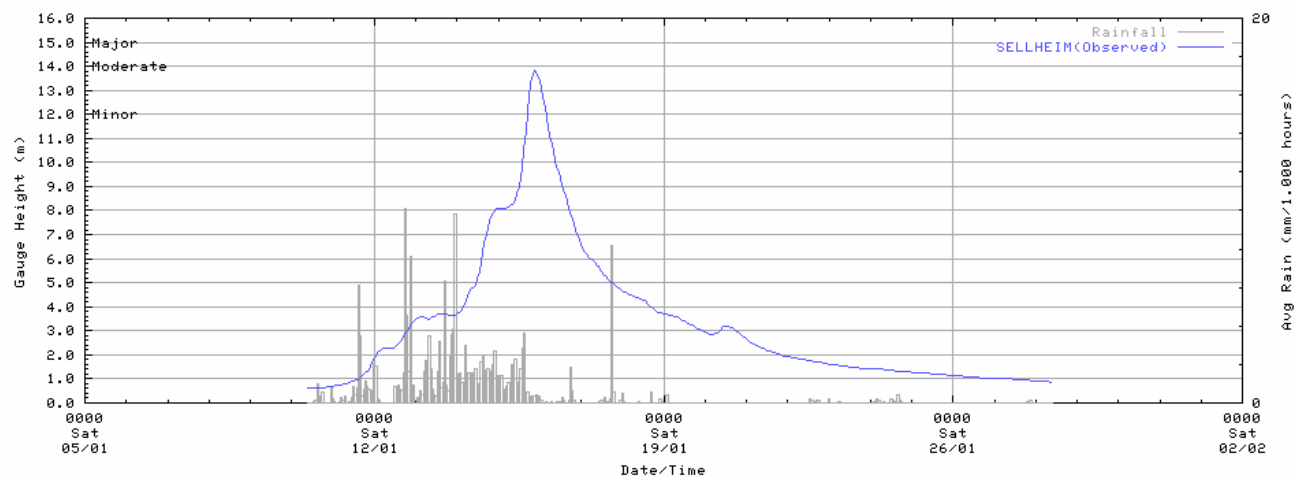
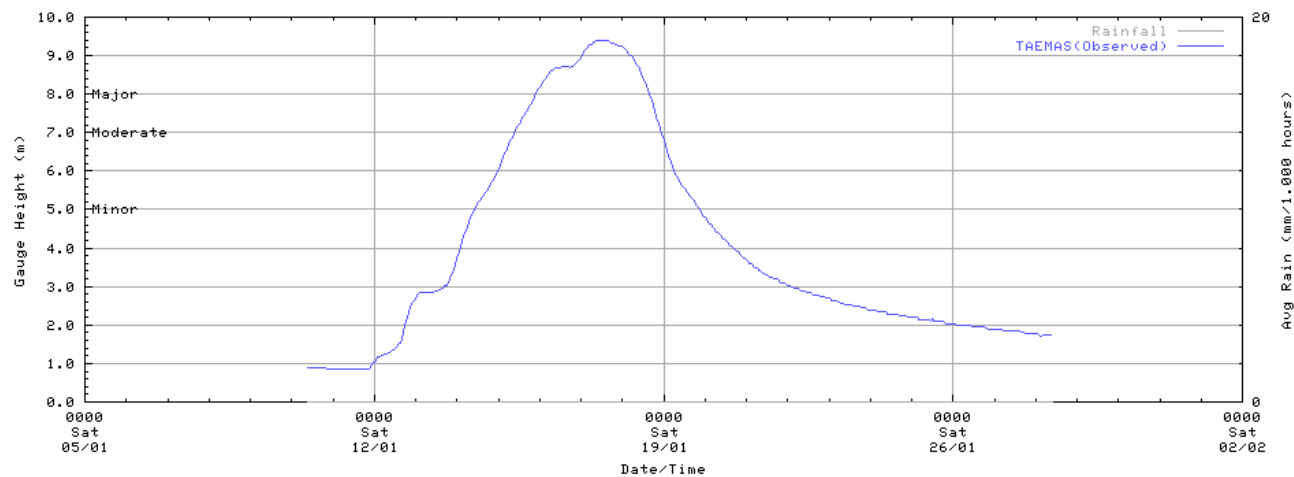
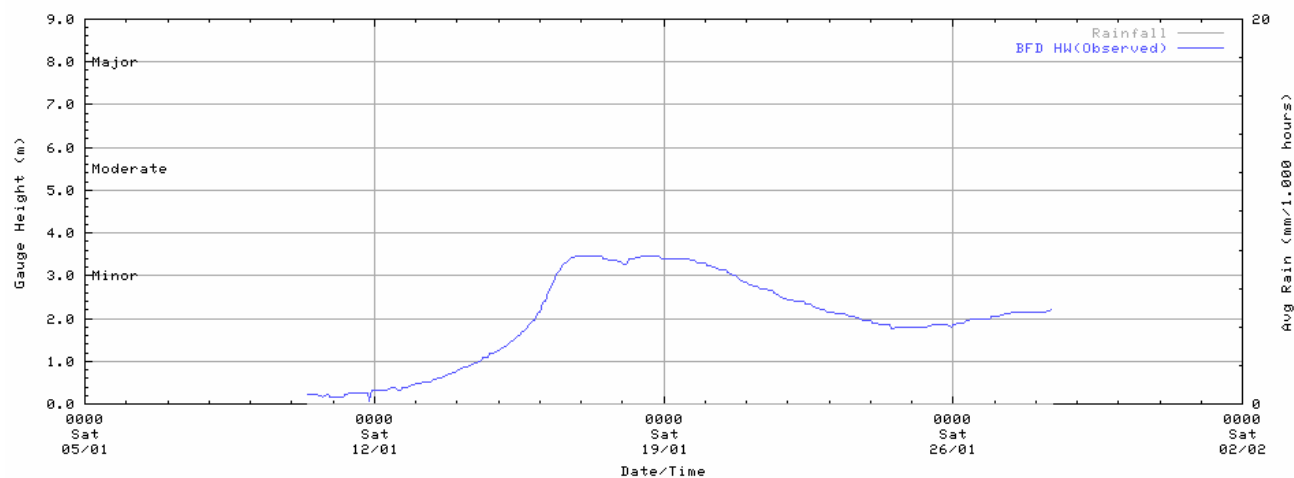
Haughton River – Giru**Figure 3.5.2 River Heights - Don River****Mt Dangar – Don River****Bowen Pump Station – Don River**

Figure 3.5.3 River Heights - Burdekin River and Tributaries**Sellheim – Upper Burdekin River****Taemas AI – Cape River****Burdekin Falls Dam – Burdekin River**

Inkerman Bridge – Burdekin River

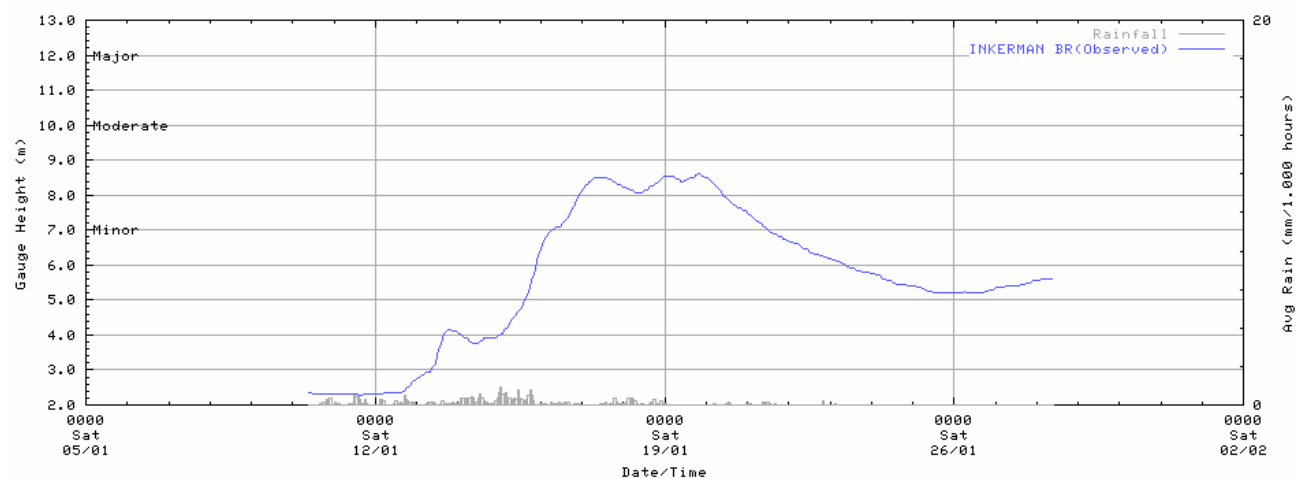
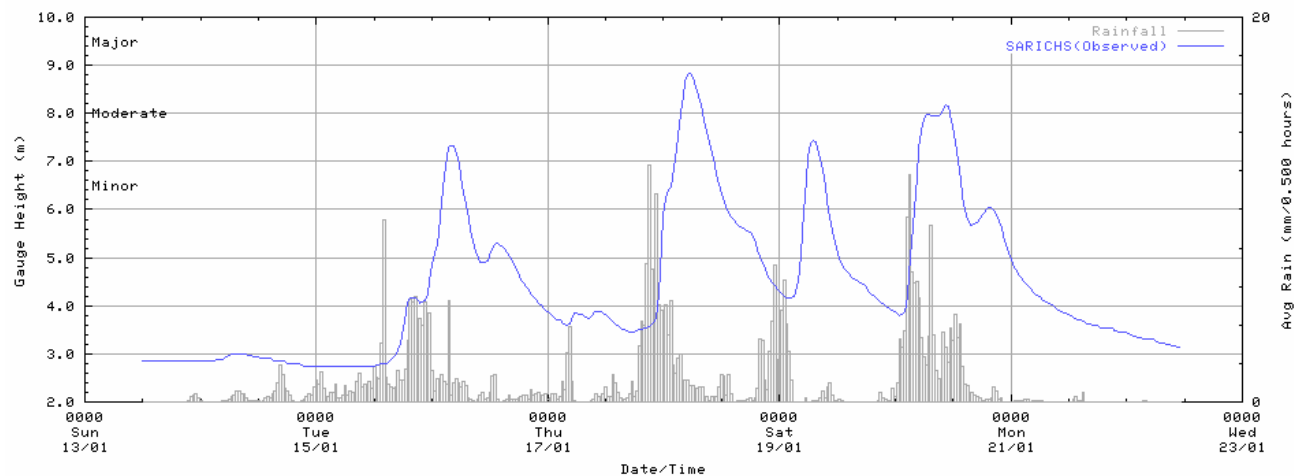
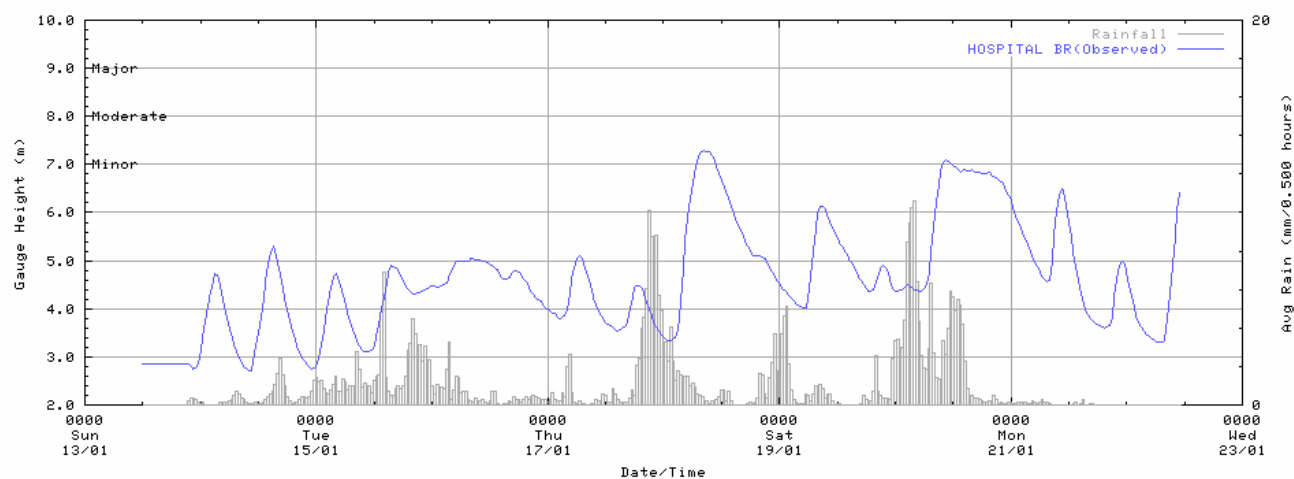
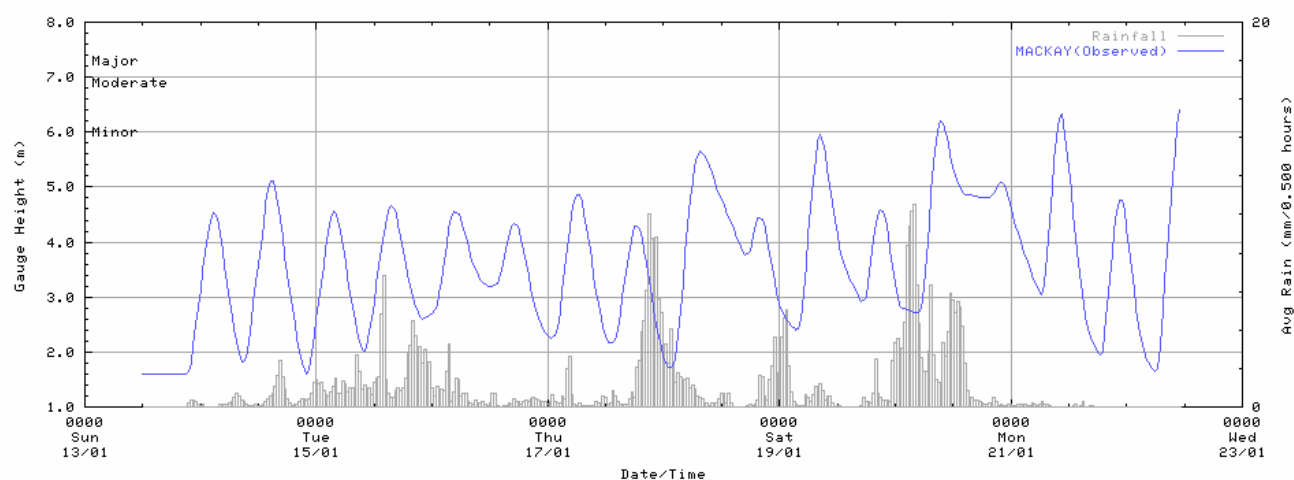


Figure 3.5.4 River Heights - Pioneer River**Sarich's – Pioneer River****Hospital bridge – Pioneer River****Mackay – Pioneer River**

4. Central and Western Queensland Flooding

As the low moved inland from Townsville it caused very heavy rainfall in the headwaters of the Belyando, Barcoo, Nogoa, Warrego, Paroo, Bulloo and Comet Rivers and Theresa Creek. The heavy rainfall lasted for several days and caused widespread major flooding throughout Central and Western Queensland.

This chapter will concentrate on flooding in the Fitzroy, Thomson/Cooper, Warrego, Paroo, Bulloo, Belyando, Suttor and Balonne Rivers that occurred in January 2008. It provides a technical summary and analysis of the hydrology of the event.

Table 4.1 Peak Height Comparison to Records

Gauging Station	Jan 2008 Peak (metres)	Start of Record	Ranking	Highest Since	Highest on Record
Nogoa River at Craigmore	16.25	1972	1st	New Record (36 years)	New Record
Nogoa River at Fairbairn Dam	4.44	1974	1st	New Record (34 years)	New Record
Nogoa River at Emerald	15.36	1950	2nd	Nov 1950 (58 years)	15.70m Nov 1950
Nogoa River at Duckponds	14.52	1994	1st	New Record (18 years)	New Record
Theresa Creek at Valaria	11.60	1954	2nd	Feb 1978 (30 years)	12.00m Feb 1978
Theresa Creek at Gregory Highway	10.82	1956	2nd	Feb 1978 (30 years)	11.02m Feb 1978
Comet River at Comet Weir	10.33	1973	6th	May 1983 (25 years)	11.96m Feb 1978
Mackenzie River at Yakcam	20.55	1978	2nd	Feb 1978 (30 Years)	23.15m Feb 1978
Connors River at Mt Bridget	16.77	1967	5th	Jan 1991 (17 years)	20.18m Mar 1988
Fitzroy River at Riverslea	21.93	1918	14th	Jan 1991 (17 years)	31.48m Jan 1918
Fitzroy River at Rockhampton	7.55	1918	32nd	Feb 1991 (17 years)	10.11m Jan 1918
Alpha Creek at Alpha	7.70	1950	3rd	Mar 1950 (58 years)	10.26m (Apr 1990)
Belyando River at Mt Douglas	9.90	1950	3rd	Feb 1974 (34 years)	11.61m (Apr 1958)
Suttor At St Anns	8.93	1974	3rd	Feb 1974 (34 years)	10.20m Feb 1974
Jordon River at Jericho	3.08	1950	3rd	Apr 1990 (18 years)	3.80m Apr 1990
Barcoo River at Blackall	5.15	1950	8th	Feb 1997 (11 years)	7.30m Apr 1990
Barcoo River at Isisford	8.68	1968	2nd	Apr 1990 (18 years)	9.20m Apr 1990
Thomson River at Longreach	3.95	1894	26th	Feb 2000 (8 years)	5.78m May 1955
Warrego River at Augathella	6.50	1910	2nd	Apr 1990 (18 years)	7.30m Apr 1990
Warrego River at Charleville	6.02	1910	16th	Feb 1997 (11 years)	8.54m Apr 1990
Warrego River at Cunnamulla	9.91	1890	6th	Apr 1990 (18 years)	11.07m 1890
Blackwater Creek at Adavale	5.20	1949	4th	Jan 2004 (4 years)	6.07m Mar 1963

Bulloo River at Quilpie	6.20	1950	9th	Jan 2004 (4 years)	7.85m Apr 1963
Bulloo River at Thargomindah	6.07	1949	7th	Jan 2004 (4 years)	6.78m Jan 1974
Paroo River at Eulo	4.95	1890	16th	Jan 2004 (4 years)	5.99m Mar 1890
Paroo River at Hungerford	2.30	1974	14th	Jan 2004 (4 years)	2.92m Apr 1990
Balonne River at St George	7.33	1968	24th	Jan 2004 (4 years)	12.24m Apr 1990

Figure 4.1 Central and Western QLD – Peak Height Map

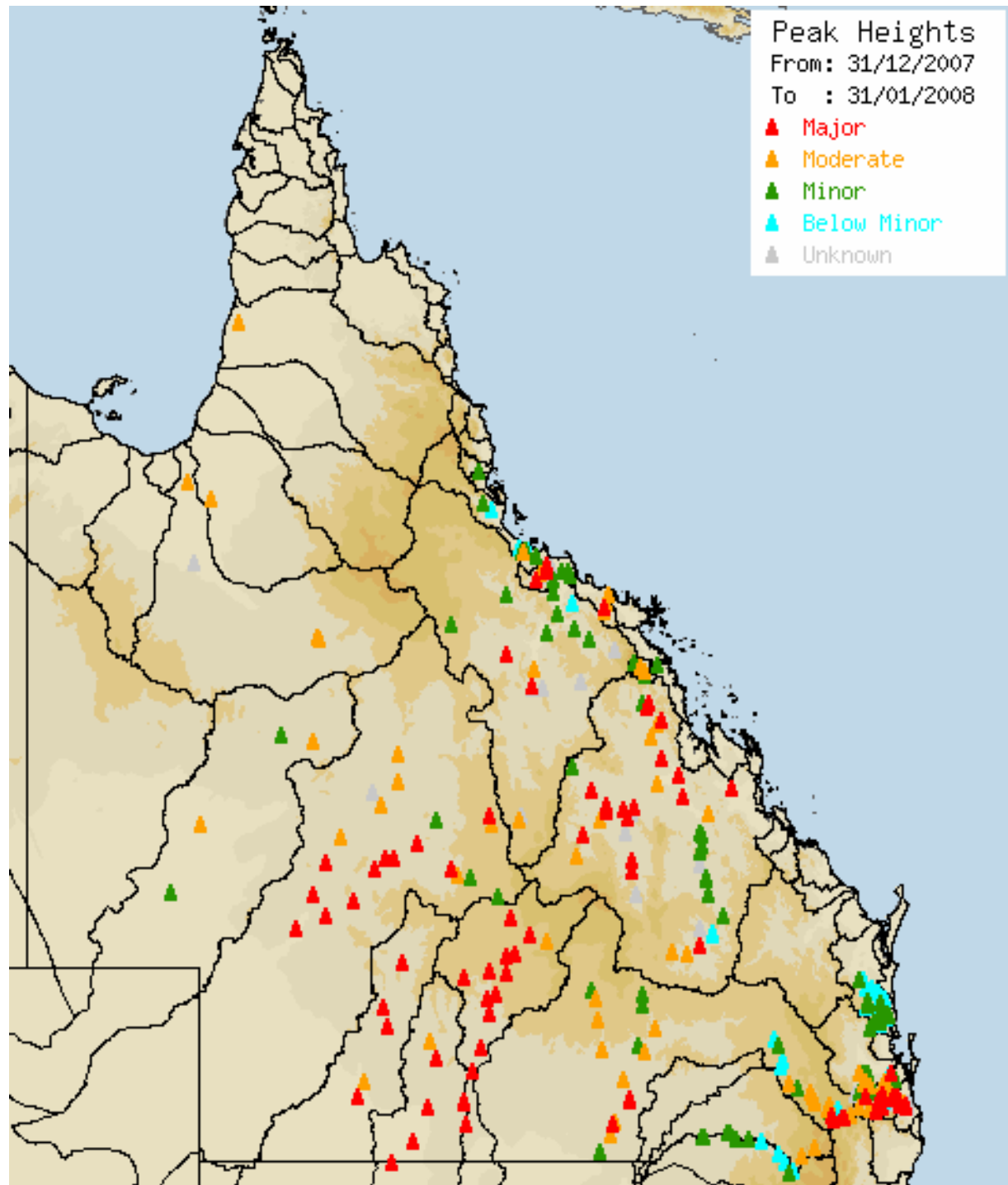
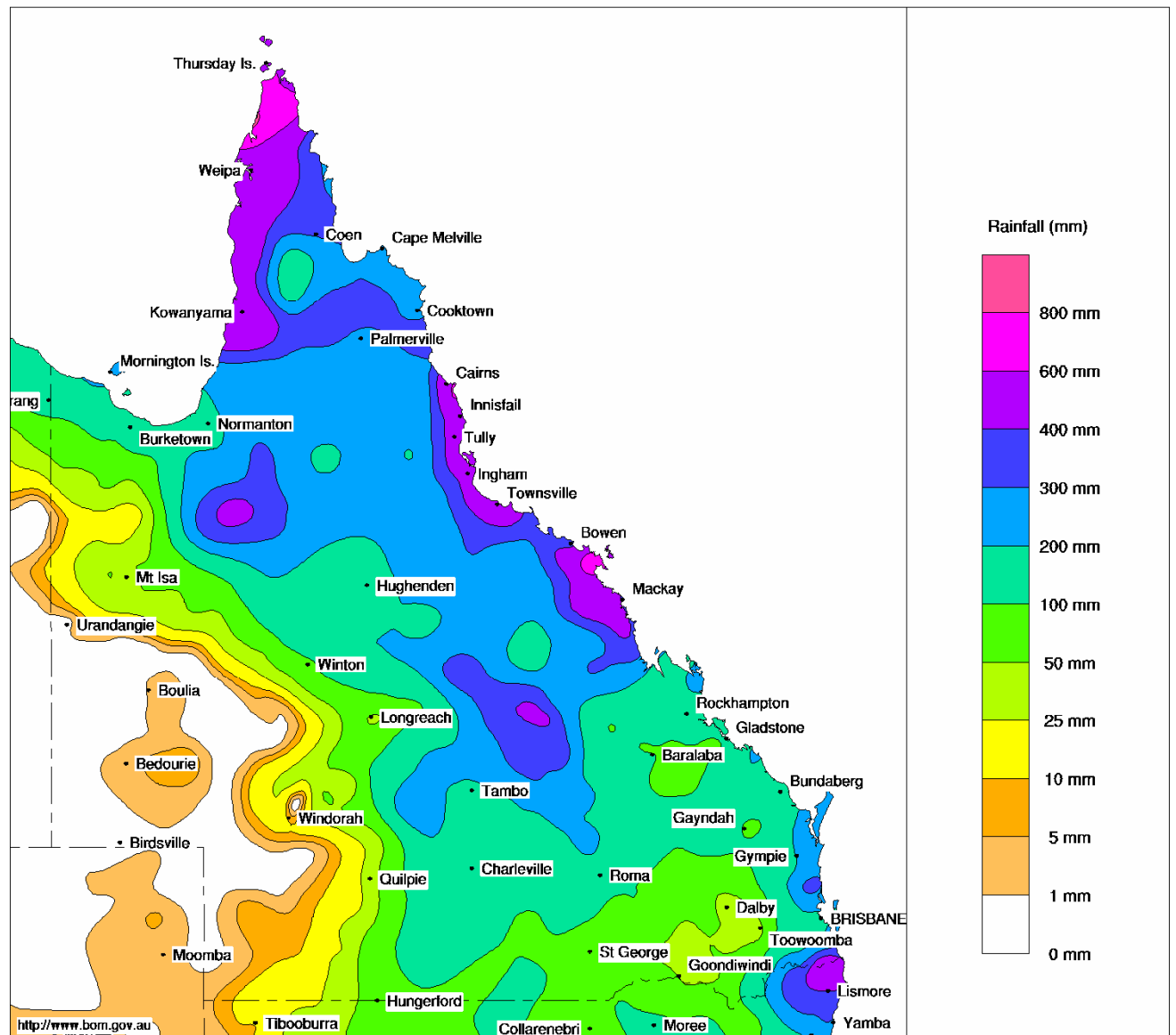


Figure 4.2 Queensland Rainfall Map for January 2008

Queensland Rainfall (mm)

January 2008

Product of the National Climate Centre



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Issued: 25/02/2008

4.1 Rainfall Maps

Figure 4.1.1 Rainfall Map of Queensland for the 7 Days to 20th January 2008
 Queensland Rainfall (mm) Week Ending 20th January 2008
 Product of the National Climate Centre

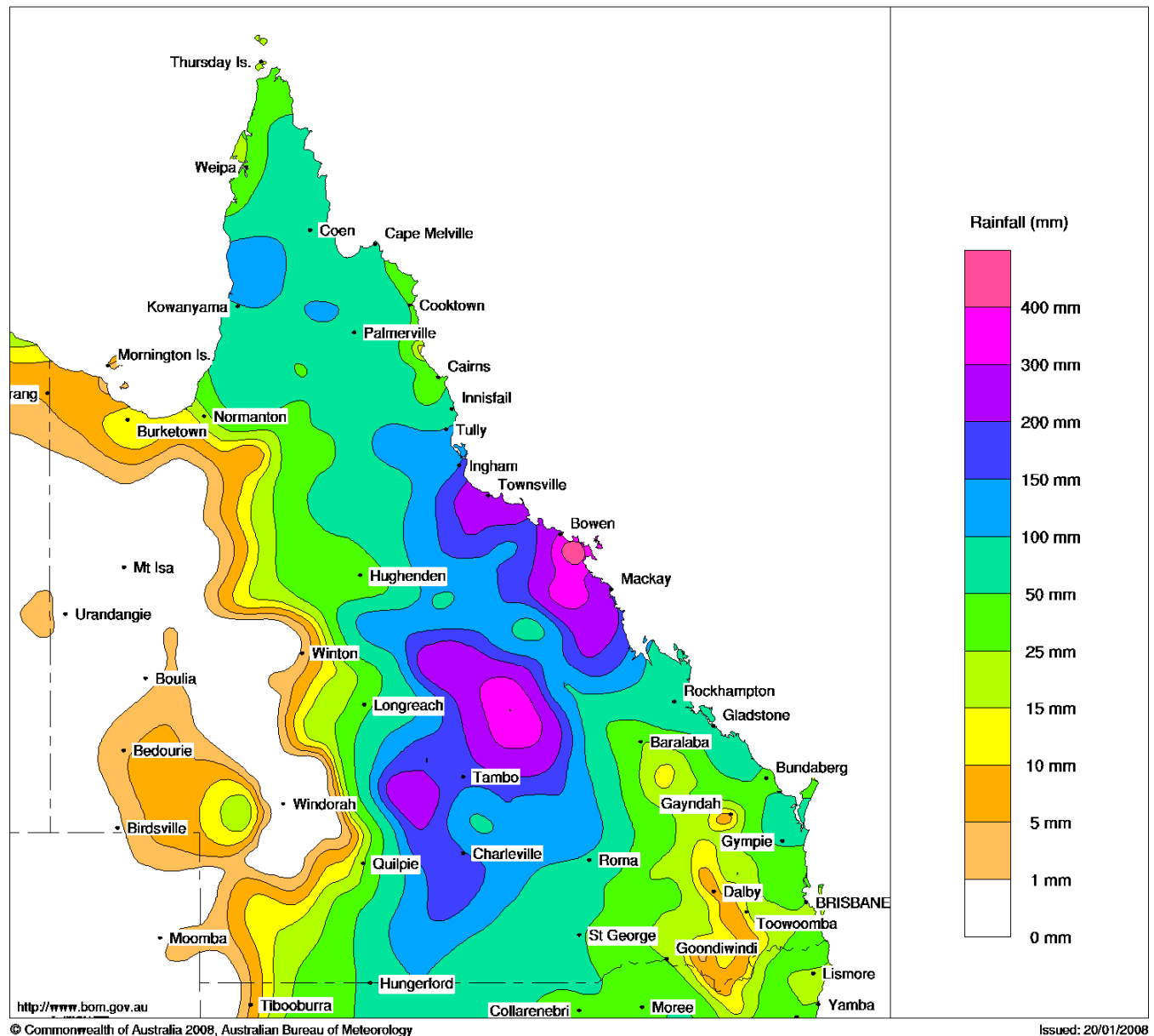
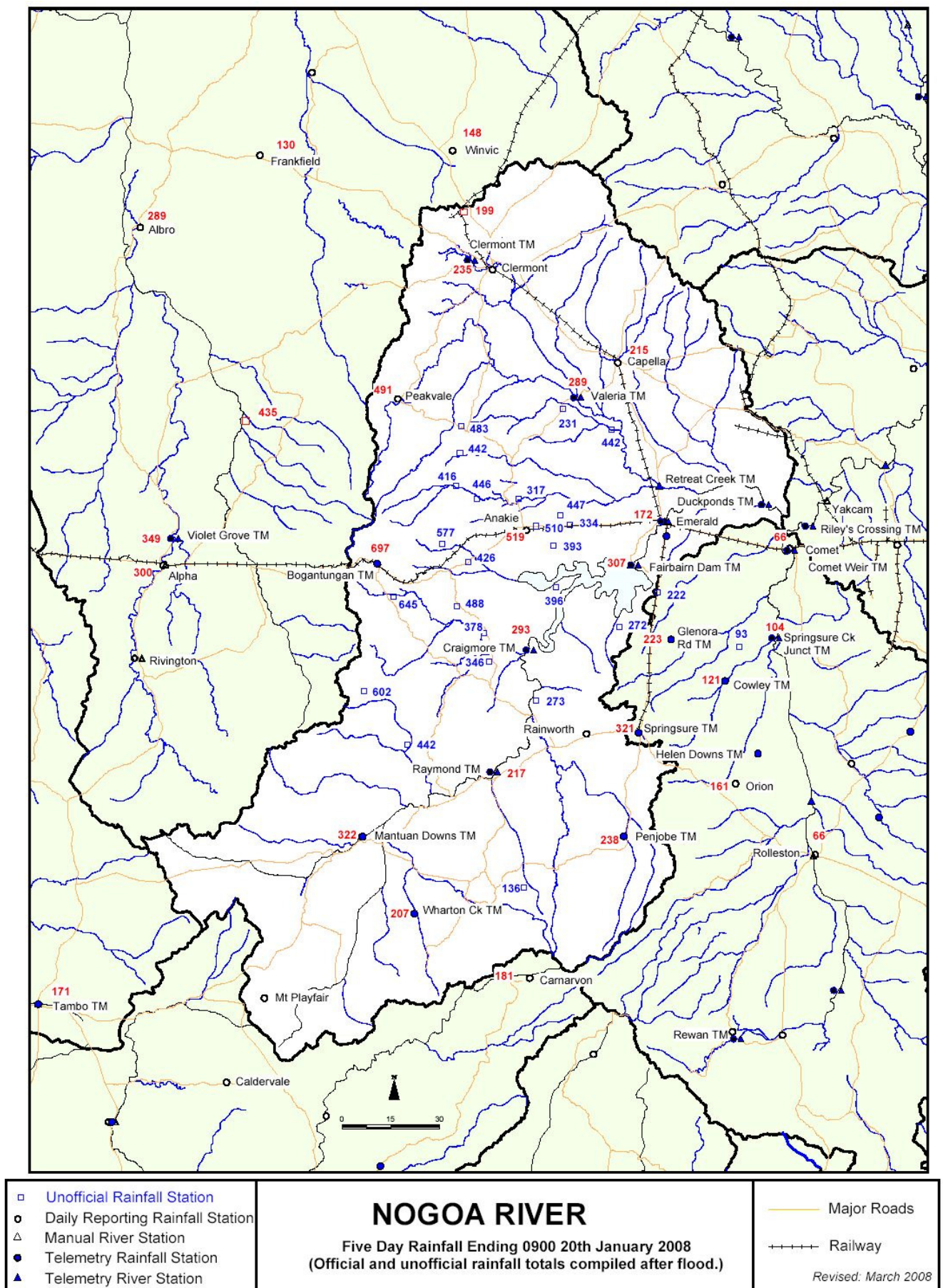


Figure 4.1.3 Rainfall Map of Nogoa River for the 5 Days to 20th January 2008 (all Stations)



4.2 Rainfall Intensity

The most statistically significant rainfalls occurred in the Nogoa River catchment. The point rainfalls in the Nogoa catchment have been compared to design rainfalls from ARR-IFD (Australian Rainfall and Runoff 1987 Intensity Frequency Duration) analysis and CRC-FORGE analysis. The ARR-IFD Analysis is useful for durations up to 72 hours and ARI's up to 100 years and is included in Figures 4.2.2, 4.2.3 and 4.2.4. The CRC-FORGE analysis is useful for durations greater than 24 hours and ARI's from 50 to 2000 years and results are available in Table 4.2.1, 4.2.2 and 4.2.3. Both techniques indicate that the very heavy point rainfalls at Bogantungan, Peakvale and Anakie were quite rare. For the 24 hour duration, observed intensities are well in excess of 1% AEP (100 year ARI) intensities and up to 0.2% AEP (500 year) for individual point locations.

This CRC-Forge analysis can also be applied to Average Catchment Rainfall and SunWater have done this in Figure 4.2.1 for the Average Catchment Rainfall to Fairbairn Dam. From this it is estimated the observed rainfall is between 1% AEP (100 year) and 0.5% AEP (200 year) for durations between 72 and 120 hours.

SunWater also compared the total inflow volume into Fairbairn Dam to design events and estimated the AEP of the dam inflow volume to be between 0.5% AEP (200 year) and 0.2% AEP (500 year).

The different techniques give different results but do indicate the rainfall event is quite rare for longer durations and is at least significantly greater than 1% AEP (100 year). A flood frequency analysis would be required to assess the probability of flood levels reached at each location.

Table 4.2.1 CRC-FORGE Point Rainfall Analysis for Bogantungan

Bogantungan		Duration	CRC FORGE Design Rainfall Estimates for Bogantungan (for various ARI's)					
Observed Rainfall	Estimated ARI		50	100	200	500	1000	2000
329	~500 year	24 hours	231	260	289	330	361	392
453	500-1000 year	48 hours	314	351	387	434	469	503
604	>2000 year	72 hours	346	386	426	477	514	551

NOTE. These estimates were derived using the software 'Rainfall IFD – version 1.0: Application of CRCFORGE/ARF for Queensland', August 2005. This software was produced by Queensland Department of Natural Resources and Water.

Table 4.2.2 CRC-FORGE Point Rainfall Analysis for Peakvale

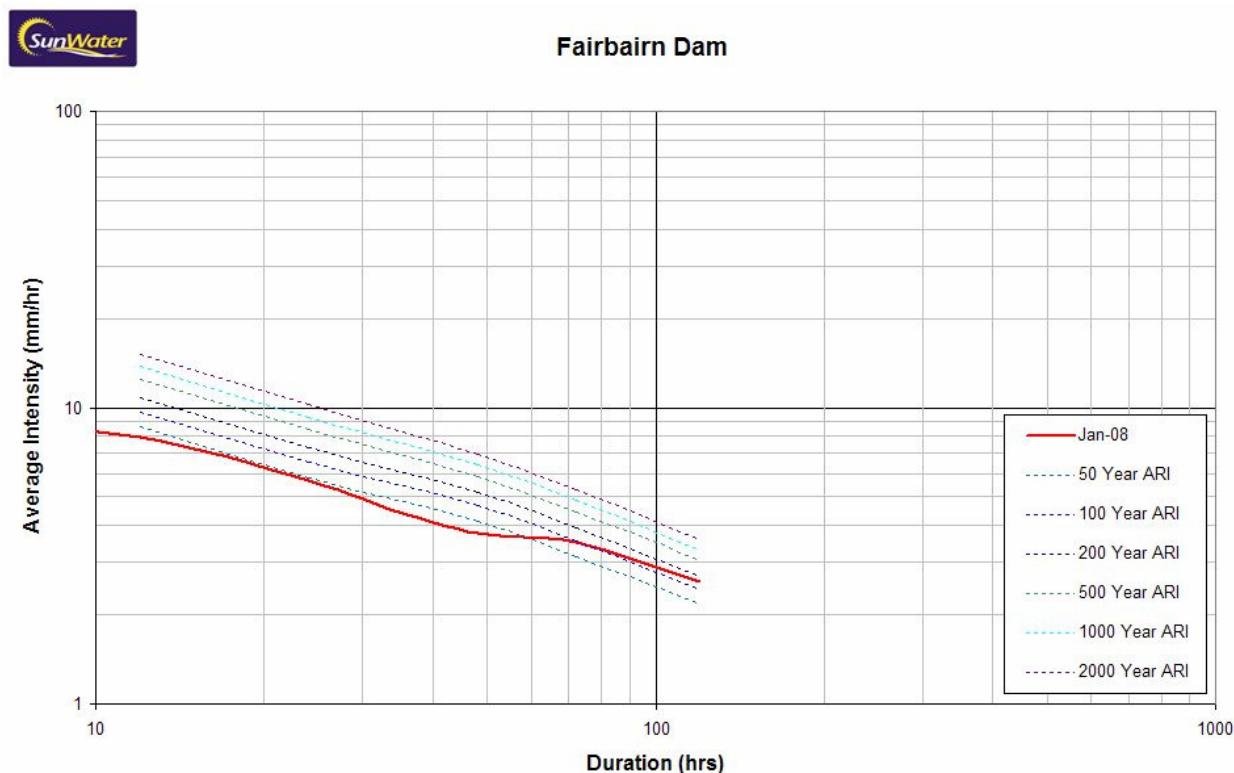
Peakvale		Duration	CRC FORGE Design Rainfall Estimates for Peakvale (for various ARI's)					
Observed Rainfall	Estimated ARI		50	100	200	500	1000	2000
205.4	~50 year	24 hours	205	231	260	299	330	362
368	~500 year	48 hours	255	287	319	362	396	430
470.4	~2000 year	72 hours	279	314	349	396	433	472

NOTE. These estimates were derived using the software 'Rainfall IFD – version 1.0: Application of CRCFORGE/ARF for Queensland', August 2005. This software was produced by Queensland Department of Natural Resources and Water.

Table 4.2.3 CRC-FORGE Point Rainfall Analysis for Anakie

Anakie		Duration	CRC FORGE Design Rainfall Estimates for Anakie (for various ARI's)					
Observed Rainfall	Estimated ARI		50	100	200	500	1000	2000
313.5	200-500 year	24 hours	226	255	285	326	358	391
386.1	200-500 year	48 hours	289	323	357	401	433	465
462.9	500-1000 year	72 hours	315	353	389	439	475	512

NOTE. These estimates were derived using the software 'Rainfall IFD – version 1.0: Application of CRCFORGE/ARF for Queensland', August 2005. This software was produced by Queensland Department of Natural Resources and Water.

Figure 4.2.1 CRC-FORGE Average Catchment Rainfall to Fairbairn Dam Analysis

Provided by SunWater.

The comparison to ARR-IFD analysis for Blackall, in the Barcoo River catchment, is available in Figure 4.3.5. This analysis indicates the observed rainfall intensity for 72 hours duration was greater than the 5% AEP (20 year) but less than 2% AEP (50 year). For other durations the intensities were less significant.

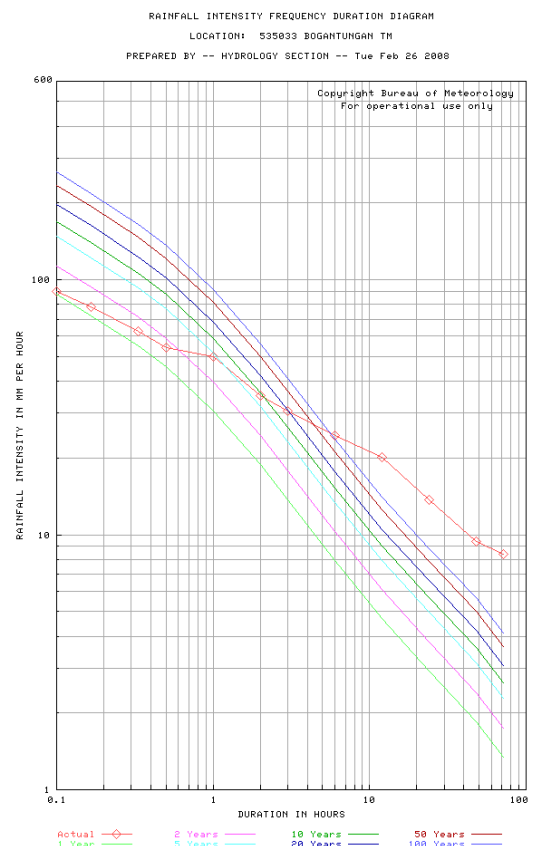
For Charleville in the Warrego River observed intensities for the 72 hour duration were between 2% AEP (50 year) and 1% AEP (100 year). Once again for shorter durations the rainfall intensities were less significant.

In most locations where Intensity-Frequency-Duration analysis was completed the observed rainfall intensities were the most significant statistically for 24 to 72 hour duration. While there was some short duration intense rainfall recorded, this event is most notable for the long duration of the rainfall, which produced significant runoff and large scale river flooding.

Note: A flood frequency analysis would be required to assess the probability of flood levels reached at each location. The frequency analysis in this report is for rainfall only.

Figure 4.2.2 Intensity Frequency Duration Rainfall Analysis for Bogantungan and Valeria

RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS		
LOCATION: 535033 BOGANTUNGAN TM		
Analysis of the rainfall for the 161 hours to Tue Jan 22 03:10:20 2008		
Rain (mm)	Period Ending	ARI (years)
8	5 mins ending at 15:18:25 15/01/2008	1-2
9	6 mins ending at 15:18:55 15/01/2008	1-2
13	10 mins ending at 14:46:01 15/01/2008	1-2
21	20 mins ending at 14:55:10 15/01/2008	1-2
27	30 mins ending at 21:48:22 18/01/2008	1-2
50	60 mins ending at 21:53:14 18/01/2008	2-5
70	2 hours ending at 03:32:49 17/01/2008	5-10
92	3 hours ending at 05:13:35 17/01/2008	20
147	6 hours ending at 06:37:32 17/01/2008	> 100
242	12 hours ending at 05:14:46 17/01/2008	> 100
329	24 hours ending at 10:51:38 17/01/2008	> 100
453	48 hours ending at 21:05:31 17/01/2008	> 100
604	72 hours ending at 02:25:58 19/01/2008	> 100



RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS		
LOCATION: 535018 VALERIA TM		
Analysis of the rainfall for the 216 hours to Tue Jan 22 00:00:00 2008		
Rainfall (mm)	Period Ending	ARI (years)
6	5 mins ending at 18:05:00 17/01/2008	< 1
7	6 mins ending at 18:06:00 17/01/2008	< 1
11	10 mins ending at 18:10:00 17/01/2008	< 1
16	20 mins ending at 14:15:00 18/01/2008	< 1
24	30 mins ending at 18:10:00 17/01/2008	< 1
37	60 mins ending at 18:10:00 17/01/2008	1-2
58	2 hours ending at 18:10:00 17/01/2008	2-5
71	3 hours ending at 18:10:00 17/01/2008	2-5
119	6 hours ending at 20:40:00 17/01/2008	20-50
124	12 hours ending at 20:45:00 17/01/2008	10-20
149	24 hours ending at 15:00:00 18/01/2008	10-20
207	48 hours ending at 15:10:00 18/01/2008	10-20
249	72 hours ending at 15:35:00 19/01/2008	20-50

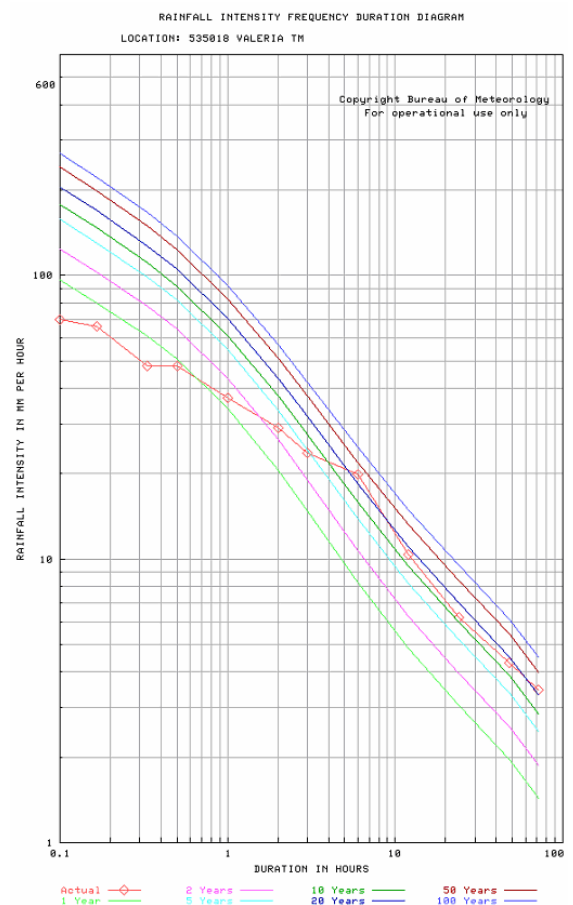


Figure 4.2.3 Intensity Frequency Duration Rainfall Analysis for Anakie

RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS		
LOCATION: ANAKIE		
Rainfall (mm)	Period Ending	ARI (years)
313.5	24 hours ending at 09:00:00 17/01/2008	>100
386.1	48 hours ending at 09:00:00 18/01/2008	>100
462.9	72 hours ending at 09:00:00 19/01/2008	>100

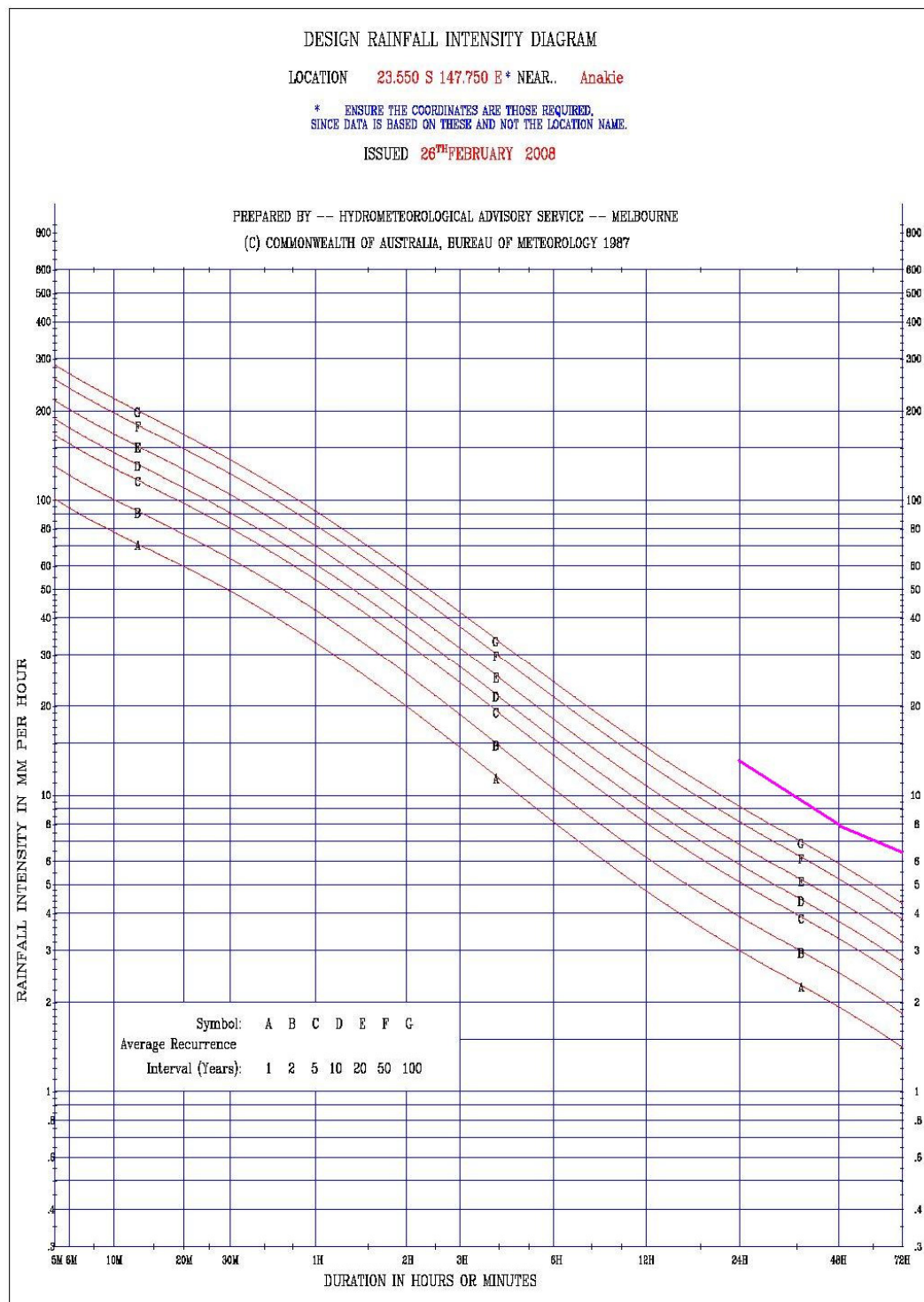


Figure 4.2.4 Intensity Frequency Duration Rainfall Analysis for Peakvale

RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS		
LOCATION: PEAKVALE		
Rainfall (mm)	Period Ending	ARI (years)
205.4	24 hours ending at 09:00:00 17/01/2008	50-100
368.0	48 hours ending at 09:00:00 18/01/2008	>100
470.4	72 hours ending at 09:00:00 19/01/2008	>100

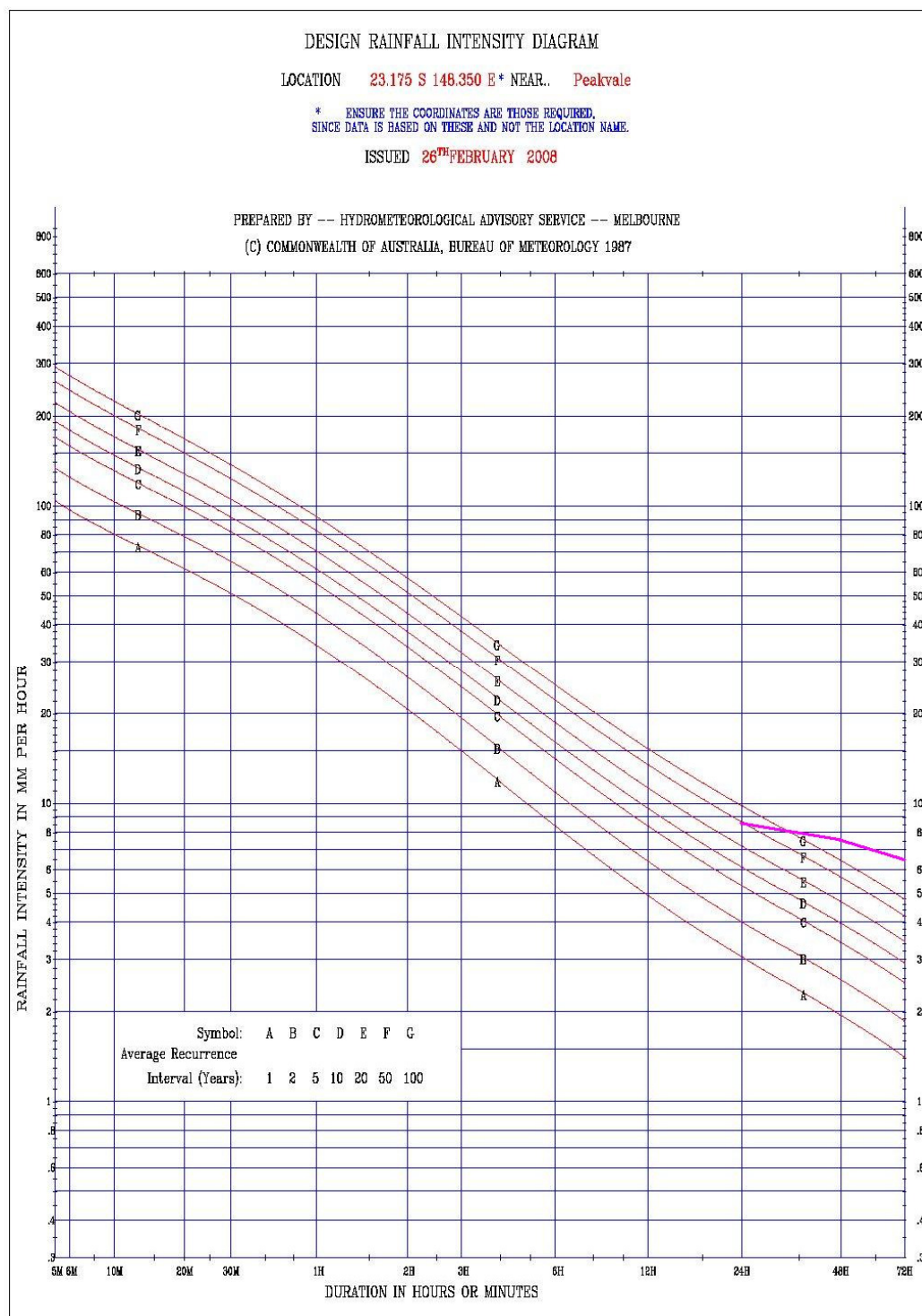
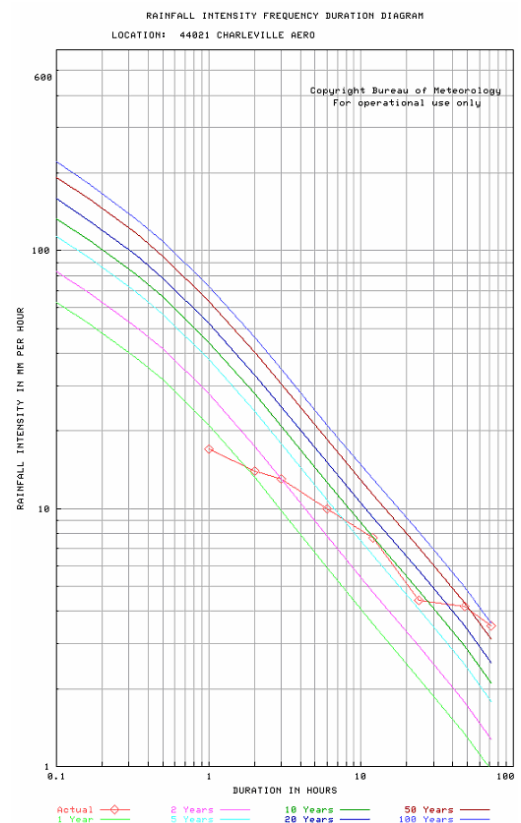


Figure 4.2.5 Intensity Frequency Duration Rainfall Analysis for Charleville and Blackall

RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS		
LOCATION: 044021 CHARLEVILLE		
Analysis of the rainfall for the 216 hours to Tue Jan 22 00:00:00 2008		
Rainfall (mm)	Period Ending	ARI (years)
17	60 mins ending at 21:00:00 17/01/2008	< 1
28	2 hours ending at 22:00:00 17/01/2008	1-2
39	3 hours ending at 23:00:00 17/01/2008	2
60	6 hours ending at 01:00:00 18/01/2008	2-5
92	12 hours ending at 00:00:00 18/01/2008	10
106	24 hours ending at 00:00:00 18/01/2008	5-10
201	48 hours ending at 03:00:00 18/01/2008	20-50
252	72 hours ending at 21:00:00 18/01/2008	50-100



RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS		
LOCATION: 036034 BLACKALL AP		
Analysis of the rainfall for the 216 hours to Tue Jan 22 00:00:00 2008		
Rainfall (mm)	Period Ending	ARI (years)
18	60 mins ending at 02:00:00 16/01/2008	< 1
29	2 hours ending at 02:00:00 16/01/2008	< 1
36	3 hours ending at 03:00:00 16/01/2008	< 1
64	6 hours ending at 06:00:00 16/01/2008	2-5
97	12 hours ending at 07:00:00 16/01/2008	5-10
119	24 hours ending at 19:00:00 16/01/2008	5-10
185	48 hours ending at 22:00:00 17/01/2008	10-20
213	72 hours ending at 08:00:00 18/01/2008	20-50

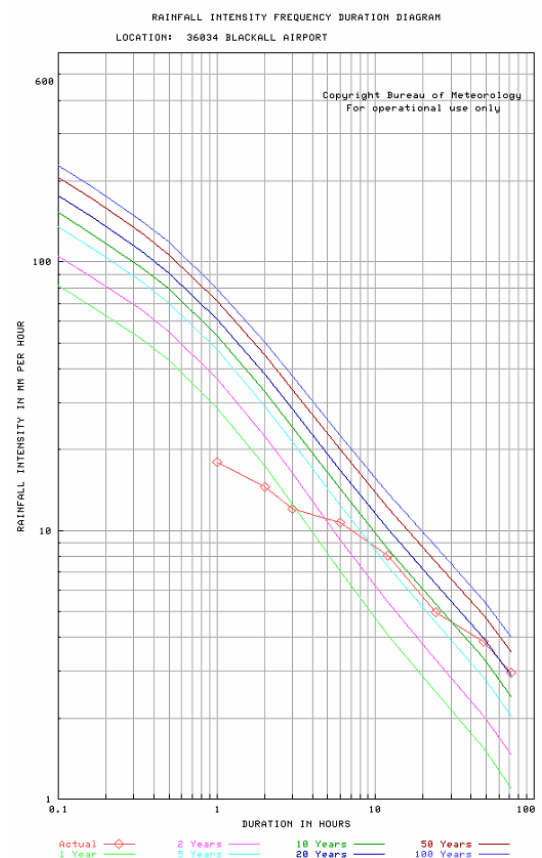


Figure 4.2.6 Hourly Hyetographs for Springsure and Mantuan Downs

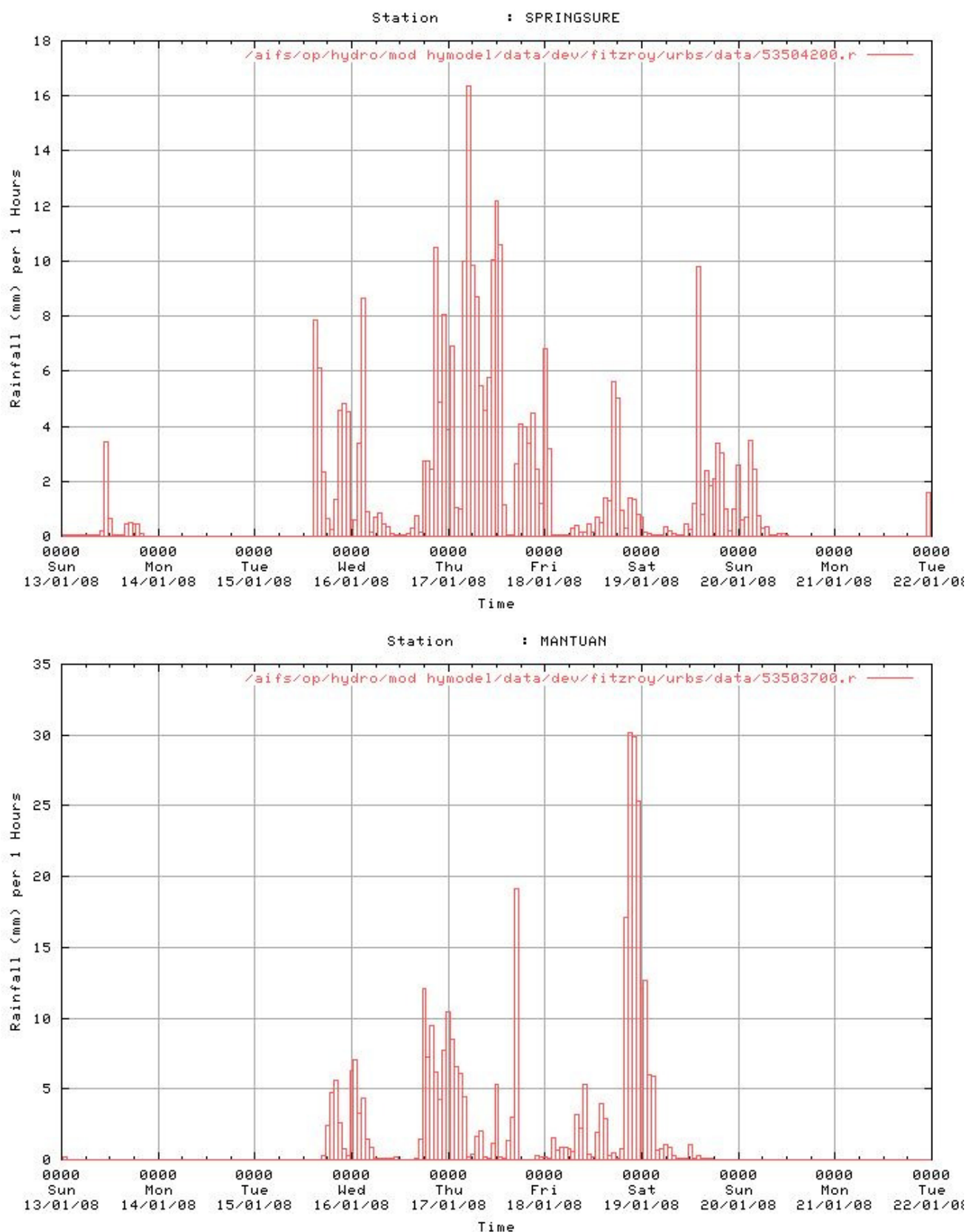


Figure 4.2.7 Hourly Hyetographs for Wharton Ck and Raymond

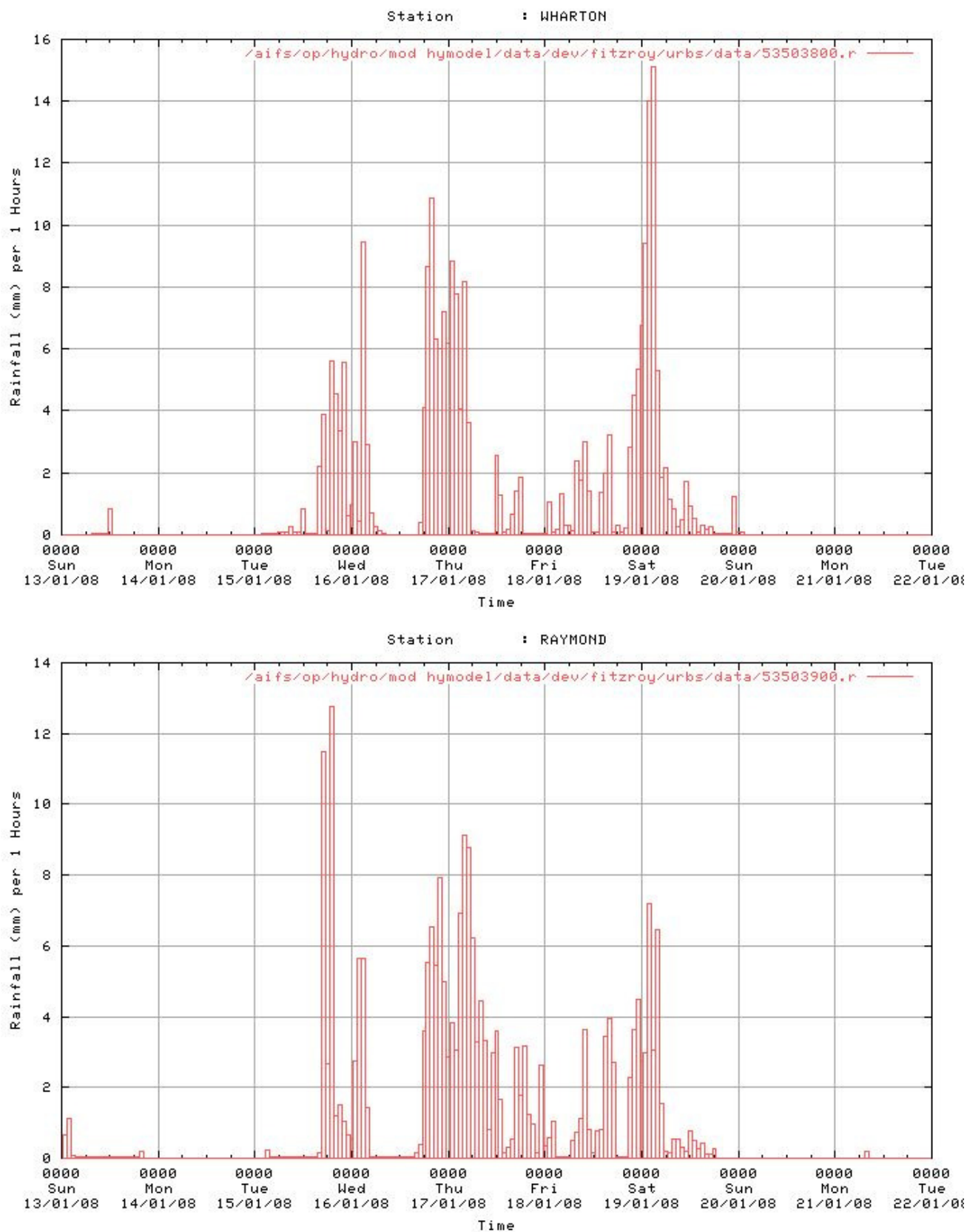


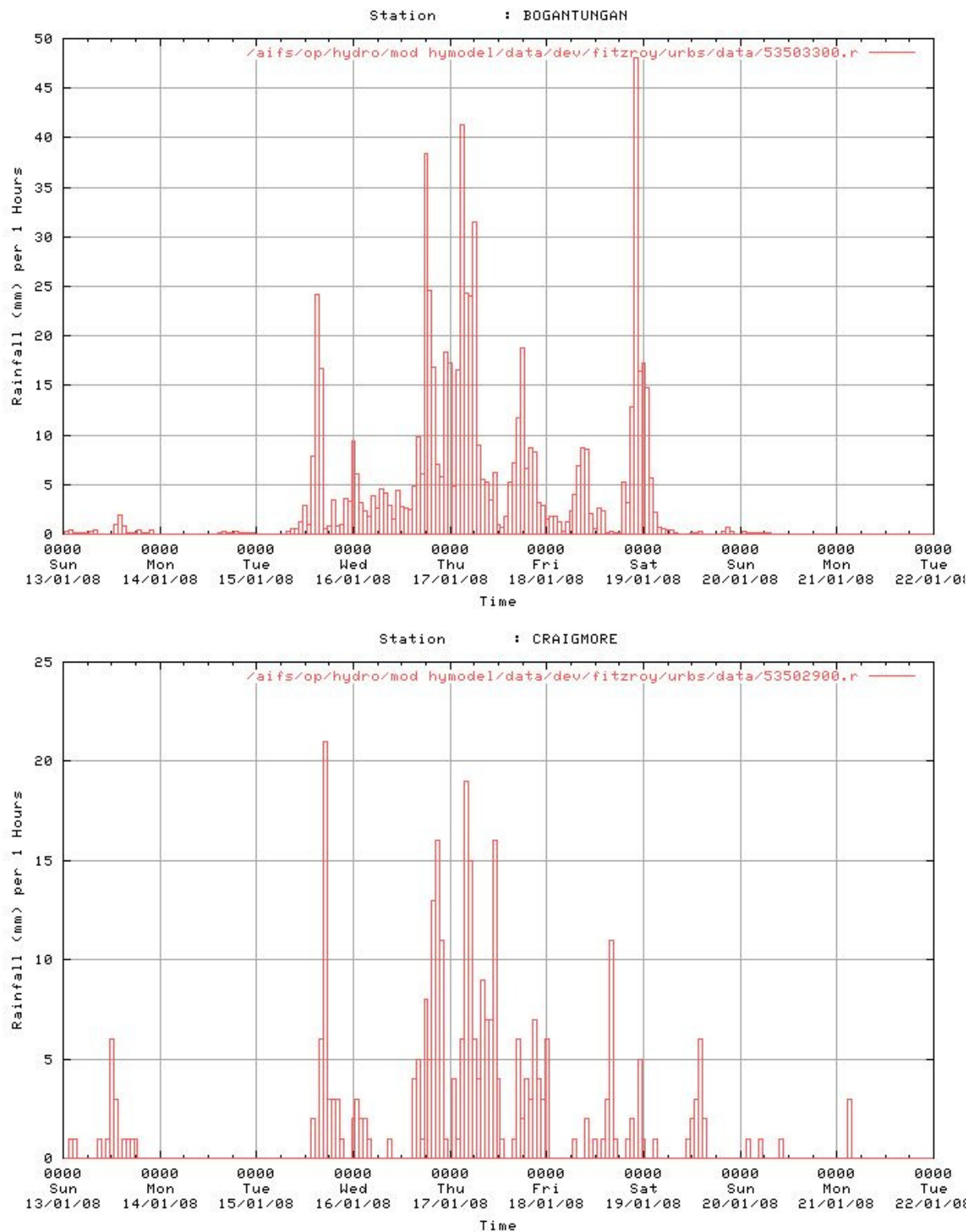
Figure 4.2.8 Hourly Hyetographs for Bogantungan and Craigmore

Figure 4.2.9 Hourly Hyetographs for Fairbairn Dam and Emerald

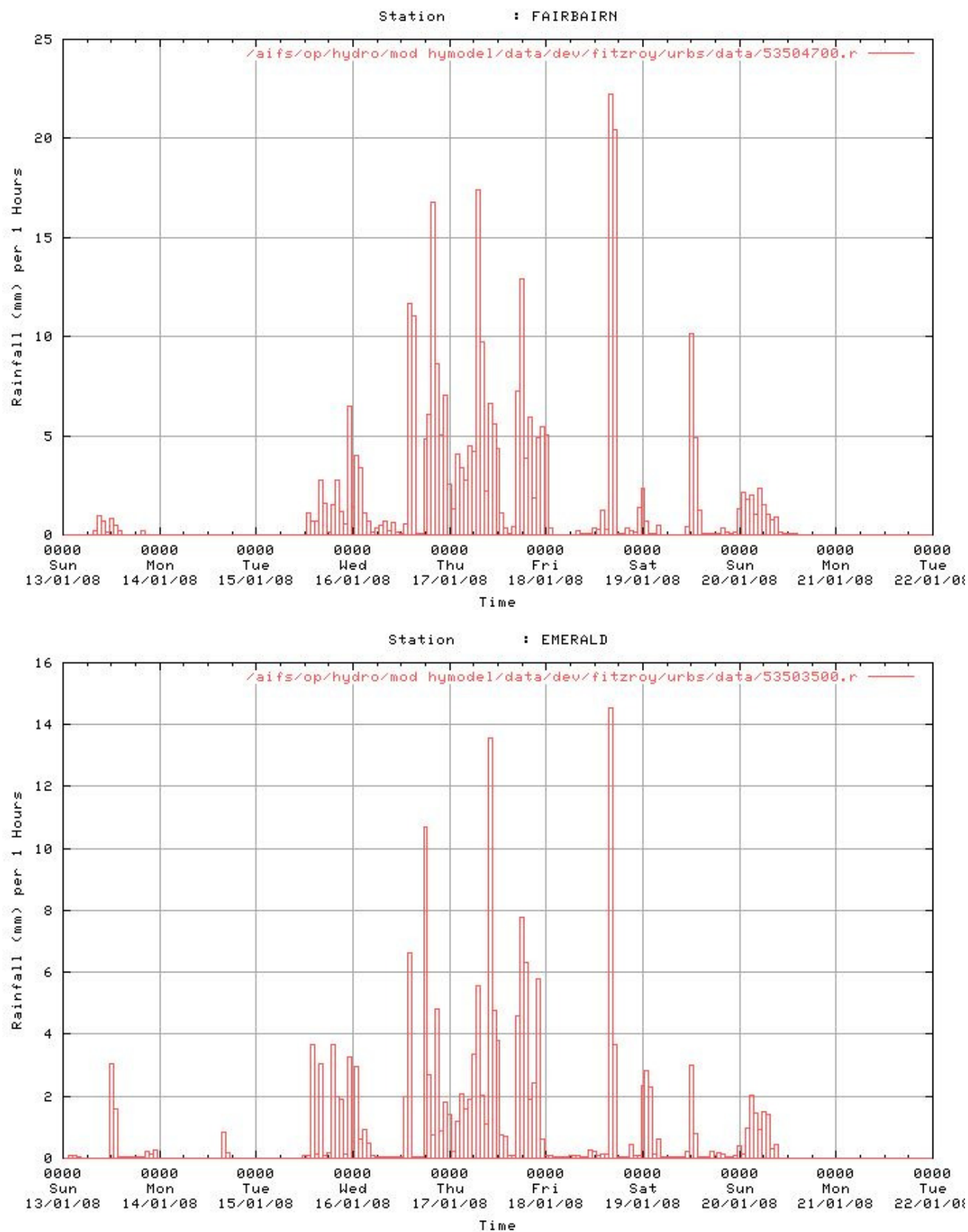


Figure 4.2.10 Hourly Hyetographs for Valeria and Rewan

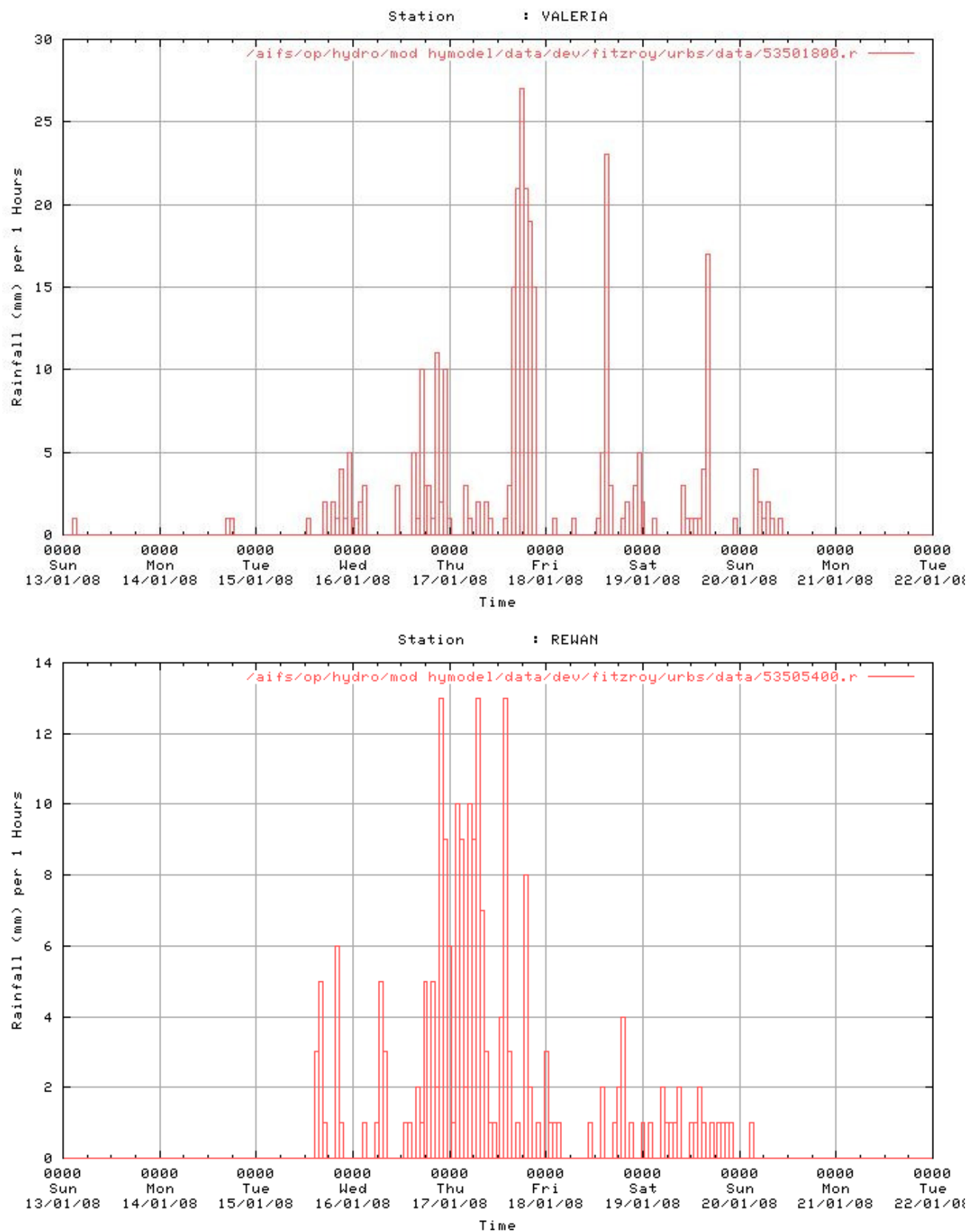


Figure 4.2.11 Hourly Hyetographs for Tambo and Blackall

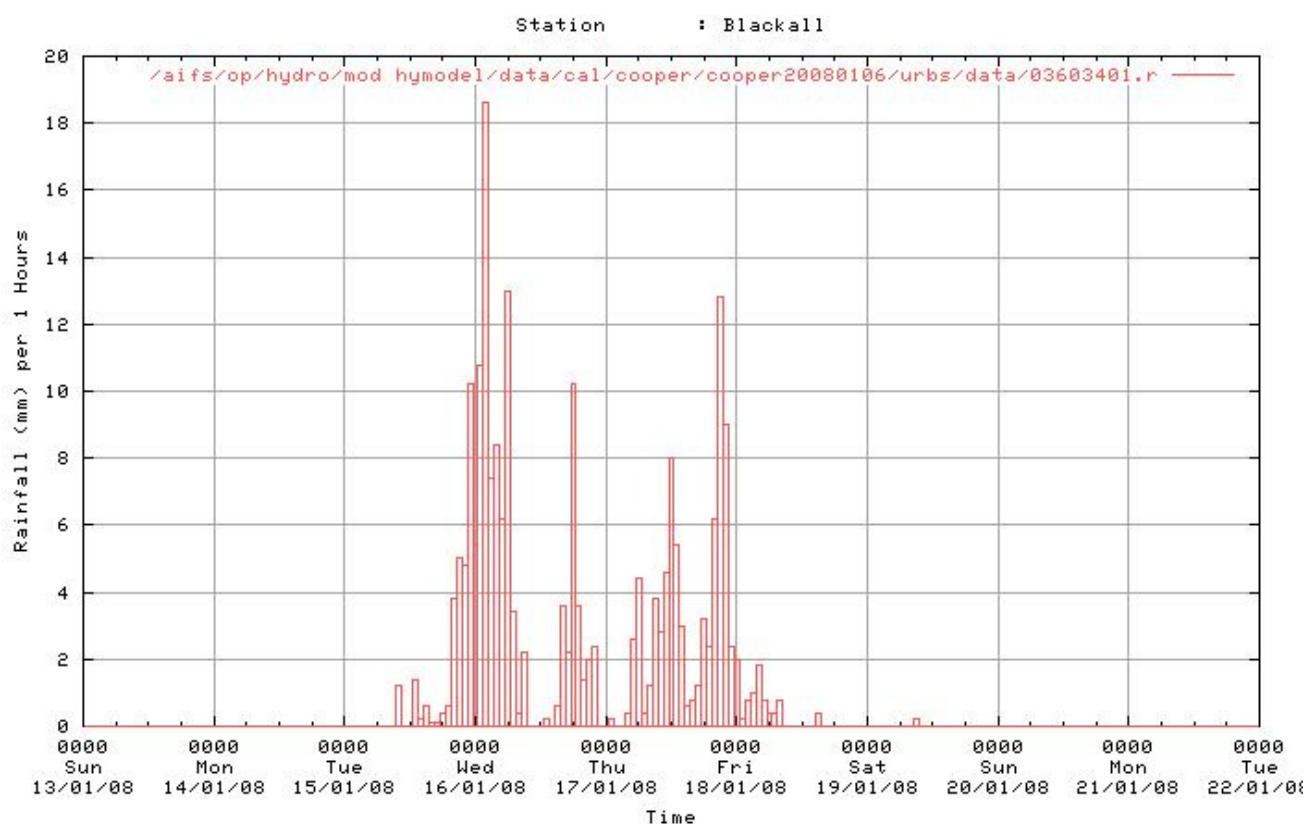
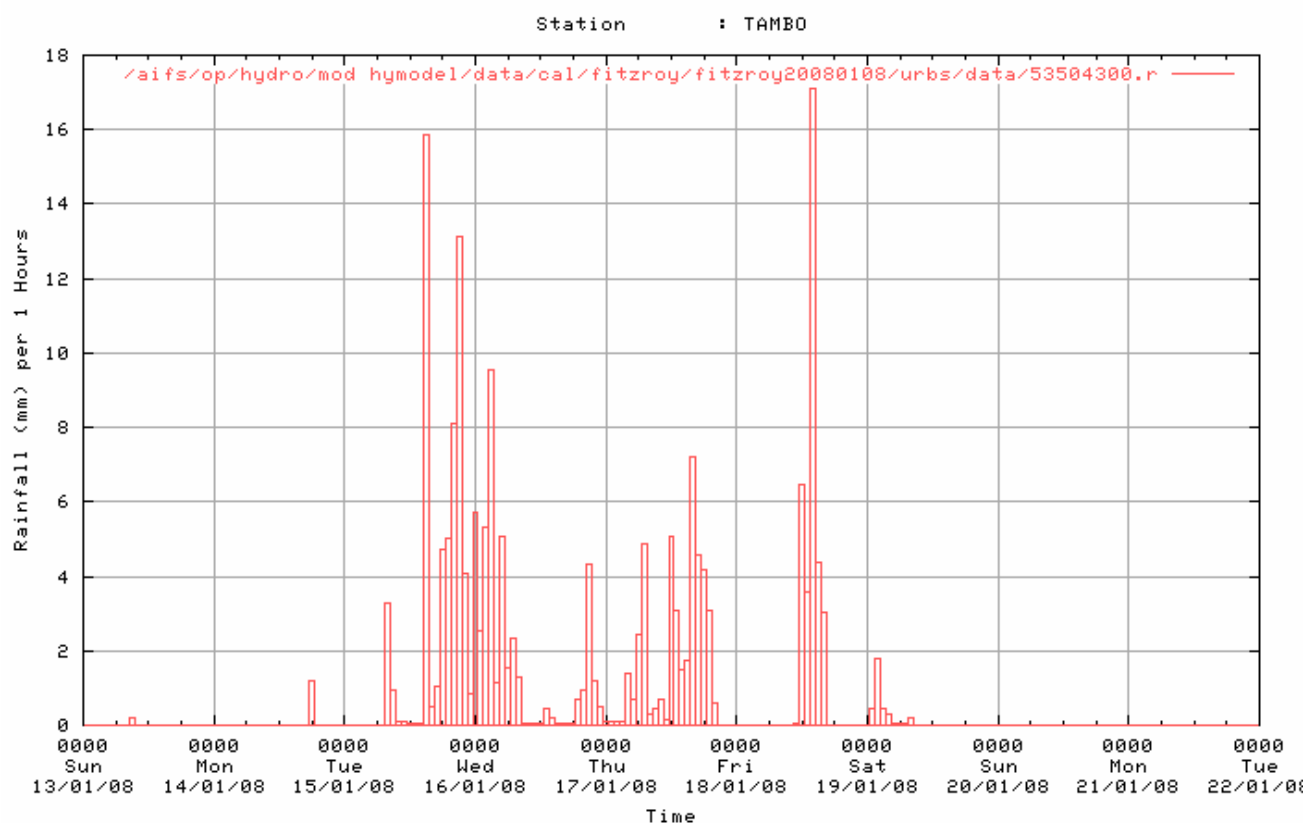


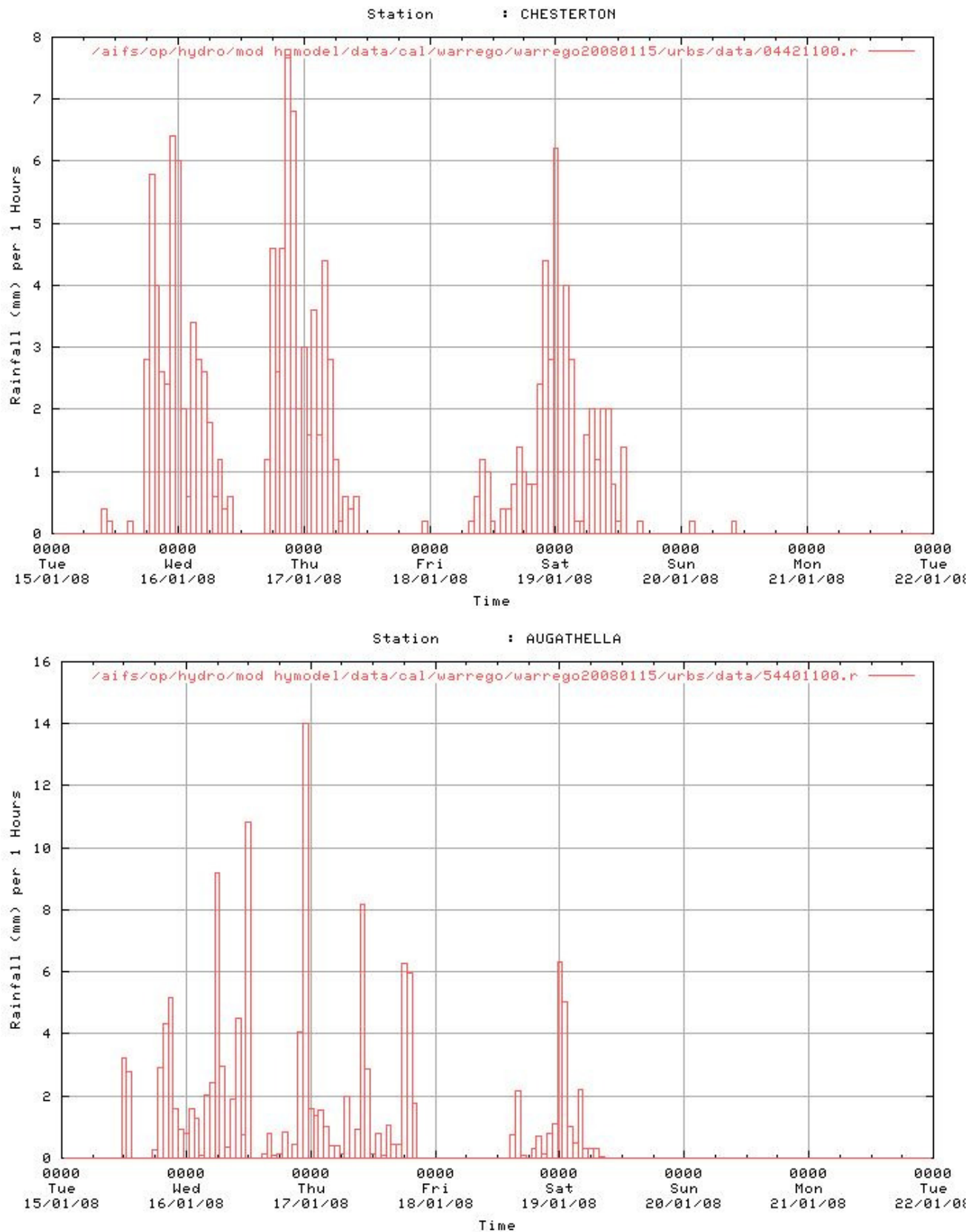
Figure 4.2.12 Hourly Hyetographs for Chesterton and Augathella

Figure 4.2.13 Hourly Hyetographs for 27 Mile Gardens and Raceview

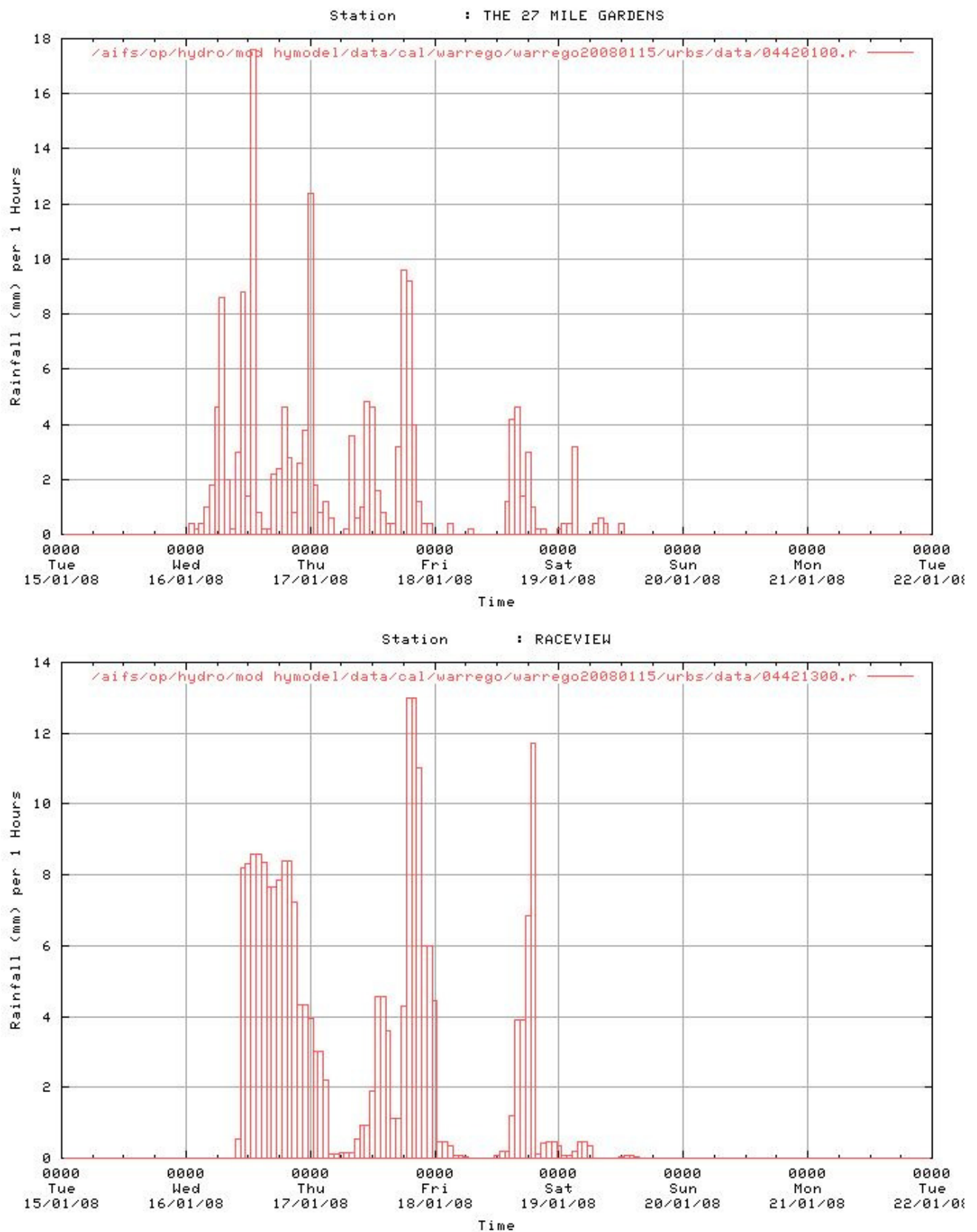
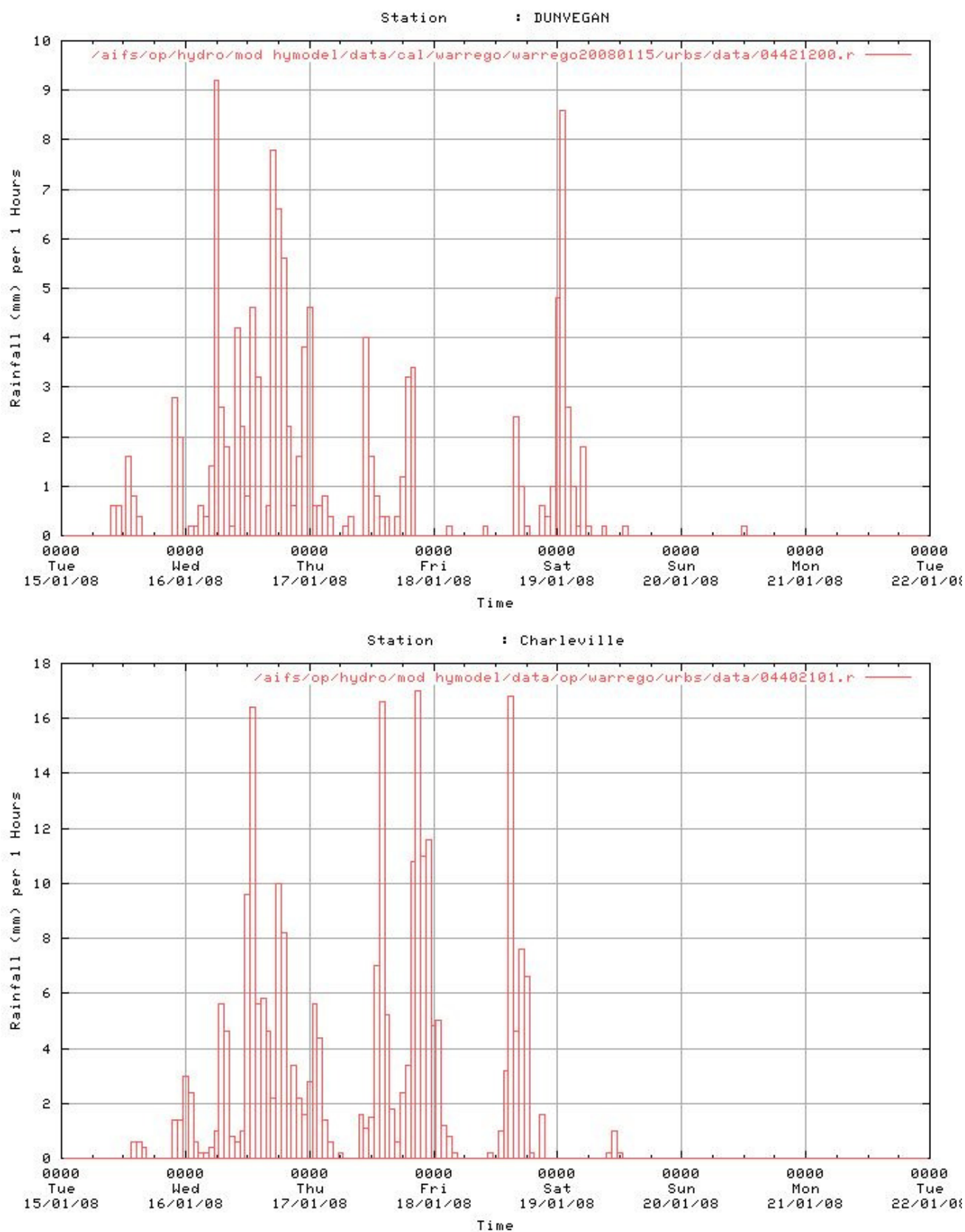


Figure 4.2.14 Hourly Hyetographs for Dunvegan and Charleville



4.3 Rainfall Totals

Table 4.3.1 Bureau and other Agency Rainfall Stations - Five Day Rainfall Ending 0900 20th January 2008

Number	Station Name	Latitude	Longitude	16	17	18	19	20	Total
30051	Torrens Ck	-20.7694	155.0211	20	10				30
34038	Moranbah	-21.9947	148.0308	20.2	18.4	26.6		0.4	65.6
35000	Alpha Post Office	-23.6497	146.6411	9.6	162.4	49.6	78		299.6
35001	Anakie Richardson St	-23.5522	147.7461	28	313.5	72.6	76.8	28.4	519.3
35010	Blair Athol	-22.6528	147.5583	10.2	54	19.8	110	5.2	199.2
35016	Capella Post Office	-23.0856	148.0236	20.4	52.4	67	32	43	214.8
35018	Carnarvon Station	-24.8089	147.7525	48.4	73	25.4	29.8	4.4	181
35019	Clermont Sirius St	-22.8239	147.6425	53.2	51.6	89.6	40.2	0.8	235.4
35021	Comet Post Office	-23.6042	148.5456	9.4	12.6	18	17	8.6	65.6
35040	Westgrove TM	-25.5811	148.4811	19.8	59.8	21.2	6.6	30.6	138
35042	Mantuan Downs	-24.4125	147.2464	38	83	39	162		322
35049	Gillespie	-24.5608	145.7869	88	20	40	11		159
35051	Orion	-24.2644	148.3825	28.2		95.8	16	21.2	161.2
35053	Peakvale Station	-23.1864	147.3539	20.6	205.4	162.6	102.4		491
35059	Rolleston Warrijo St	-24.4619	148.6261	2.8	12.4	31.8	14.2	5.2	66.4
35063	Somerby	-24.2111	148.7403	17.6	8.8	5.6	7.5	14	53.5
35065	Springsure Dame St	-24.1222	148.0867	55.4	111.2	87.4	25	42.6	321.6
35069	Tambo Post Office	-24.8819	146.2564	85	18	30.2	37.8	0	171
35073	Toliness Station	-25.3167	146.0194	60	50	46	29		185
35079	Wharton Creek Station	-24.6217	147.4064	40	75	15	70	7	207
35090	Rewan Station	-24.9606	148.3761	28	110	61.4	23	15.4	237.8
35094	Winvic	-22.4831	147.5172	22	24	36	66		148
35170	Wilpeena	-23.1014	148.9231		28	20	28	27	103
35190	Minnie Downs	-25.0311	145.8664	55	99	72	17		243
35194	Wyseby	-24.9606	148.5311	21.8	89.6	31.6	3.4	13.8	160.2
35259	Duneira	-24.5408	145.5692	86	51	59			196
35264	Emerald Airport	-23.5694	148.1756		53	51.6	25.6	15	145.2
35275	Islay Plains	-23.2103	146.8781	24	251	160			435
35283	Drensmaine	-25.2117	146.4817	11	41.8	13.8	26		92.6
35286	Glencoe	-23.7122	146.1675	26.4	78	22.4	24.2	2	153
35239	Wealwandangie	-24.4114	148.0417	95	83	14	46		238
35291	Drensmaine TM	-25.2117	146.4817	59.2	36	12.4	24.2	0.2	132
36003	Birricannia	-21.9089	144.6694	24.4	11.2	4.2			39.8
36004	Aramac Post Office	-22.9717	145.245	51.4	13	5.4	0.2		70
36007	Barcaldine Post Office	-23.5544	145.2883	37.8	16	8.8	0	0	62.6
36010	Bulliwallah	-21.6144	146.6344	37	53	33	29	40	192
36031	Longreach AWS	-23.4372	144.2769	11.8	15	1.8			28.6
36034	Blackall Airport	-24.4303	145.4306	104.2	39.2	70.6	0.6	0	214.6
36036	Lochnagar	-23.6239	145.6892	52	54.4	19.8			126.2
36037	Muttaburra	-22.5950	144.5469	13	21.4	0.4			34.8
36050	Ulcabnah	-22.0231	145.9831	83.8	11.2				95
36074	Jochmus	-22.3022	145.9900	154	80				234
36076	Eastmere	-22.5017	145.9183	96.8	223				319.8
36083	Albro Station	-22.7044	146.5694	50	171.4	20.8	47.2		289.4
36137	Listowel Downs	-25.2011	145.2269	25.8	63.2	219.2	3.8	12.4	324.4
36143	Blackall Township	-24.4214	145.4672	120	28.4	69.6	1		219
36160	Frankfield Station	-22.2717	147.0903	12	30	88			130

43006	Mooga Hills TM	-26.2544	148.9453	21.8	32.4	8.6	0.2	29.4	92.4
43008	Springdale TM	-26.1683	148.6644	45	62.4	8.2	2.8	22.8	141.2
43015	Injune Post Office	-25.8428	148.5669	47	75.2	19	4	16.6	161.8
43020	Mitchell Post Office	-26.4888	147.9777	14.6	90.3	9.8	7.4	6.4	128.5
43033	Tindarra TM	-26.4689	148.8047	43.4	54.8	5.8	1.2	32.8	138
43051	Pine Hills TM	-26.2625	149.2389	4.4	15.4	0.8	0	6	26.6
43054	Injune TM	-25.8428	148.5669	46.4	82	17	4	17.4	166.8
43060	Havelock	-26.0756	147.9044	63.2	77.8	7	9.2	4.6	161.8
43105	Tabers TM	-26.4083	148.7833	49	62	5	1	31	148
44002	Augathella Post Office	-25.7956	146.5858	42.6	44.7	26.3	24.4		138
44021	Charleville Aero	-26.4139	146.2558	23.2	88.2	103.6	41.8	1.4	258.2
44050	Morven Post Office	-26.4156	147.1131	23	58.2	11.2	29.6	2	124
44056	Mungallala	-26.4458	147.5453	14.4	47.2	7.8	27.6	19	116
44057	Nive Downs	-25.4992	146.5442		38.2	14.2	19.2		71.6
44111	Wansey Downs	-25.8517	146.1894	33.4	47.4	54.4	35.6		170.8
44129	Pingine	-26.4214	144.9992	5	7	69			81
44133	Bogarella	-25.375	147.1072	43	42		91	3	179
44190	Lochinvar	-25.4697	146.8431	46	38	4	54		142
44199	Wetlands	-25.5981	147.1289		64	4	61	2.5	131.5
44201	The 27 Mile Garden TM	-26.0808	146.4172	0	72.4	42.2	21	0.4	136
44207	Bayswater	-25.4903	145.6144	34.4	60.6	123.6	11		229.6
44208	Warilda	-26.1394	145.6639	13.2	104.8	112.8	9.4	0	240.2
44209	Oakpark	-26.0581	146.1308		151	41			192
44211	Chesterton TM	-25.3353	147.3000	46.2	49.6	1.6	38.8	4.8	141
44212	Dunvegan TM	-26.1236	146.6228	25.4	51.4	15.6	25.2	0.2	117.8
44213	Raceview TM	-26.4083	146.4042	15	112	79	0	0	206
44223	Derbyshire Downs	-25.4536	147.3031	41	52	2.2	42	11	148.2
535018	Valeria TM	-23.1833	147.9000	21	58	125	46	39	289
535023	Bingegang H/W TM	-23.0769	149.0314	25	10	6	36	18	95
535025	Comet Weir TM	-23.6111	148.5506	8	15	18	18	8	67
535029	Craigmore TM	-23.8903	147.7553	50	135	65	29	14	293
535032	Utopia Downs TM	-25.7333	149.3167	0	25	8	0	19	52
535033	Bogantungan TM	-23.6481	147.2900	108	325.2	115.8	144.6	3	696.6
535035	Emerald TM	-23.5297	148.1658	24.2	51	54	28.2	14.8	172.2
535039	Raymond TM	-24.2317	147.645	47.8	86.6	27.6	52.4	3	217.4
535042	Springsure TM	-24.1219	148.0867	49.2	100.6	73.2	22	38.6	283.6
535047	Fairbairn Dam TM-B	-23.6525	148.0744	32	124.8	66.4	50.8	32.6	306.6
535048	Boxvale TM	-25.4158	148.6214	8	44	12	4	8	76
535052	Lake Brown TM	-24.8436	148.6925	25	55	11	1	13	105
535053	Violet Grove TM	-23.5778	146.6722	0	171	86	80	12	349
535054	Rewan TM	-24.9792	148.3869	26	109	40	20	11	206
535056	Springsure Creek Junction TM	-23.8564	148.5036		57	27	10	10	104
535057	Cowley TM	-23.9767	148.3506	11	42	32	24	12	121
535058	Glenora Road TM	-23.8603	148.1858	37	74	61	29	22	223
535060	Katrina Downs TM	-24.3586	148.8194	11	19	3	3	21	57
535061	Red Rock TM	-24.1189	148.9153	7	1	2	7	5	22
536002	Barcaldine Weir TM	-23.6500	145.2000	40	14	16	0	0	70
536003	Blackall TM	-24.4500	145.4667	112	37	68	0	0	217
544011	Augathella TM	-25.7944	146.5847	45	46	28	4		123
544021	Binnowie TM	-26.4842	146.0861	15	57	117	24	0	213

Table 4.3.2 Non-Bureau Rainfall Stations - 5 Day Rainfall ending 0900 20th January 2008

Station Name	Latitude	Longitude	16	17	18	19	20	Total
Medway	-23.749	147.332	68	266	144	162	5	645
Rutland	-23.911	147.642	64	174	66	32	10	346
Serpentine	NA	NA	66	182	117	42	10	417
Carinya	-23.769	147.53	65	301	76	46	0	488
Serento	-23.648	147.568	208	168	41	5	4	426
Green Valley	-23.679	147.322			559			559
Connemarra	-24.04	147.774	61	132	37	38	5	273
Mowbray	-23.866	147.621	55	183	102	38	0	378
Valerosa	-23.214	147.857	55	117	37	22	0	231
Borilla Park	-23.714	147.836	51	149	100	36	60	396
Glendarriwell	-23.597	147.825	30	196	93	41	33	393
Mt Mica	-23.264	147.548	29	140	267	47	0	483
Ramboda	-23.545	147.764	28	314	72	76	20	510
Yandaburra	-23.511	147.846	73	14	75	4	0	166
Central Creek	-23.591	147.49	54	243	233	41	6	577
Tanderra	-24.551	147.738	76	14	12	34	0	136
Berrigurra	-23.546	148.73	16	33	23	4	0	76
Sapphire	-23.466	147.721	120	125	50	22	0	317
Kielembete	-23.445	147.594	37	261	120	21	7	446
Nardoo	-23.511	147.846	32	240	106	37	32	447
Whitdale	-23.432	147.529	150	220	38	8	0	416
Kolane	-23.872	148.397	38	32	0	0	23	93
Juanita	-23.847	148.397	53	104	27	44	0	228
Caroa	-23.271	148.004	18	182	167	48	27	442
Willows Gemfields	NA	NA	58	277	134	41	3	513
Plainfield	-23.728	148.144	40	70	72	20	20	222
Stonybrook	-23.827	148.031	44	74	65	26	63	272
Dunloe	-23.537	147.875	22	166	80	41	25	334
Reklaw	-23.338	147.541	36	147	229	30	0	442
Jo Jo	-24.008	147.252	67	172	79	240	44	602
Echo Hills	-24.155	147.381	51	171	46	146	28	442

4.4 Peak Heights

Table 4.4.1 Peak Heights for the Fitzroy River

Station No.	Station Name	Date	Height (metres)	Flood Class
FITZROY				
<i>Dawson R</i>				
535032	UTOPIA DOWNS TM	19/01/2008 15:10	11.54	Moderate
35271	TARANA CROSSING	12/01/2008 08:00	6.25	Minor
35271	TARANA CROSSING	20/01/2008 16:00	10.3	Moderate
35115	TAROOM	12/01/2008 21:00	5.95	Moderate
35115	TAROOM	22/01/2008 09:00	6.07	Major
35282	TAROOM TM	12/01/2008 21:10	5.92	Moderate
35282	TAROOM TM	22/01/2008 04:40	5.99	Moderate
35096	THE GLEBE	23/01/2008 15:00	1.72	Below Minor
535044	GLEBE WEIR HW TM	23/01/2008 18:00	1.42	Below Minor
535045	GLEBE WEIR TW TM	23/01/2008 21:10	7.93	Below Minor
539065	ISLA-DELUSION XING TM	15/01/2008 12:50	7.38	Minor
539065	ISLA-DELUSION XING TM	24/01/2008 23:50	8.34	Minor
539043	WOODLEIGH TM	16/01/2008 23:20	8.01	Minor
539043	WOODLEIGH TM	26/01/2008 19:50	9.4	Minor
539081	MOURA WEIR TM	17/01/2008 08:30	1.1	Minor
539081	MOURA WEIR TM	27/01/2008 01:15	1.41	Minor
39296	MOURA	17/01/2008 11:30	6.8	Minor
539080	BARALABA HW TM	18/01/2008 10:15	1.24	Minor
539080	BARALABA HW TM	28/01/2008 12:00	1.49	Minor
539079	BARALABA TW TM	18/01/2008 16:35	6.26	Minor
539079	BARALABA TW TM	28/01/2008 12:25	7.64	Minor
535015	BECKERS TM	19/01/2008 04:00	6.79	Minor
535015	BECKERS TM	28/01/2008 20:30	8.32	Minor
35270	NEWLANDS	19/01/2008 09:00	6.95	Minor
35270	NEWLANDS	28/01/2008 08:53	9.05	Minor
539090	KNEBWORTH TM	28/01/2008 18:00	9.33	Minor
<i>Comet R</i>				
535052	LAKE BROWN TM	19/01/2008 06:00	6.89	Unknown
35145	ROLLESTON	20/01/2008 18:00	5.15	Major
535010	THE LAKE TM	19/01/2008 18:00	13.74	Major
535056	SPRINGSURE CREEK JUNCTION TM	22/01/2008 18:00	10.47	Unknown
535025	COMET WEIR TM	20/01/2008 11:00	9.3	Major
535025	COMET WEIR TM	24/01/2008 04:50	10.33	Major
<i>Nogoa R</i>				
535039	RAYMOND TM	19/01/2008 21:00	10.85	Moderate
535029	CRAIGMORE TM	18/01/2008 05:40	15.62	Major
535029	CRAIGMORE TM	20/01/2008 00:01	16.16	Major
535029	CRAIGMORE TM	20/01/2008 20:50	16.25	Major
35241	FAIRBAIRN DAM	22/01/2008 14:00	4.44	Moderate
35260	EMERALD	22/01/2008 21:00	15.36	Major
535028	CLERMONT TM	18/01/2008 03:10	4.53	Minor
35232	VALERIA	18/01/2008 15:00	11.6	Major
35232	VALERIA	20/01/2008 06:00	10.9	Major
535018	VALERIA TM	18/01/2008 11:10	11.41	Major

535018	VALERIA TM	20/01/2008 06:20	10.62	Major
535017	GREGORY HIGHWAY TM	19/01/2008 00:01	10.82	Major
535020	DUCKPONDS TM	19/01/2008 23:00	14.52	Major
535020	DUCKPONDS TM	24/01/2008 04:00	14.04	Major
Mackenzie R				
535046	RILEY'S CROSSING TM	24/01/2008 01:00	20.44	Unknown
35269	YAKCAM	24/01/2008 06:00	20.55	Major
35266	BINGEGANG	26/01/2008 12:00	15.8	Moderate
Connors R				
533091	MT BRIDGET TM	19/01/2008 12:50	15.52	Major
33083	CARDOWAN	19/01/2008 18:00	14.8	Moderate
33083	CARDOWAN	20/01/2008 12:00	12.9	Moderate
34083	WAITARA	20/01/2008 22:30	11.1	Major
534005	FUNNEL CREEK TM	18/01/2008 20:20	8.27	Moderate
534005	FUNNEL CREEK TM	20/01/2008 20:00	11.08	Major
533030	BRAESIDE TM	20/01/2008 22:10	7.56	Minor
534004	PINK LAGOON TM	20/01/2008 13:00	14.36	Moderate
534014	YATTON TM	21/01/2008 08:00	17.07	Major
Fitzroy R d/s Riverslea				
34096	TARTRUS TM	22/01/2008 21:30	16.2	Major
535024	COOLMARINGA TM	24/01/2008 17:00	20.31	Major
39044	RIVERSLEA TM	27/01/2008 22:40	21.93	Moderate
33076	YAAMBA	30/01/2008 18:00	14.25	Major
39264	ROCKHAMPTON	1/02/2008 09:00	7.55	Major

Table 4.4.2 Peak Heights for the Belyando, Cape and Suttor Rivers

Station No.	Station Name	Date	Height (metres)	Flood Class
BURDEKIN				
Upper Burdekin R to BFD				
533075	SELLHEIM ALERT	15/01/2008 21:00	13.85	Minor
Belyando R to Mt Douglas				
35229	ALPHA	18/01/2008 22:00	7.3	Minor
35229	ALPHA	20/01/2008 04:00	7.7	Moderate
535053	VIOLET GROVE TM	19/01/2008 20:00	8.59	Unknown
536007	BELYANDO CROSSING TM	23/01/2008 16:00	9.1	Unknown
34022	MT DOUGLAS	23/01/2008 07:30	9.9	Major
Suttor R to BFD				
534016	EAGLEFIELD TM	15/01/2008 02:20	6.81	Unknown
534019	BOWEN DEVELOPMENT RD TM	19/01/2008 03:00	4.89	Unknown
534008	ST ANNS TM	21/01/2008 00:00	7.14	Moderate
534012	ST ANNS ALERT	20/01/2008 16:25	7.18	Moderate
534012	ST ANNS ALERT	25/01/2008 12:00	8.93	Moderate
Cape R to BFD				
530003	PENTLAND TM	14/01/2008 02:20	4.12	Minor
534010	TAEMAS ALERT	17/01/2008 09:01	9.39	Major
Lower Burdekin R d/s BFD				
34029	BURDEKIN DAM	17/01/2008 09:00	3.55	Minor

Table 4.4.3 Peak Heights for the Balonne and Maranoa Rivers

Station No.	Station Name	Date	Height (metres)	Flood Class
CONDAMINE-BALONNE				
<i>Balonne R..Cotswold-Beardmore</i>				
43105	TABERS TM	18/01/2008 15:00	5.17	Minor
43074	ROMA	19/01/2008 06:40	6.4	Minor
43077	GARRABARRA	19/01/2008 17:00	6.4	Moderate
43077	GARRABARRA	21/01/2008 09:30	6.45	Moderate
43080	KARoola PARK	18/01/2008 09:00	6	Minor
43080	KARoola PARK	22/01/2008 09:00	5.7	Minor
43080	KARoola PARK	27/01/2008 09:00	4.9	Below Minor
43101	WERIBONE TM	19/01/2008 04:00	7.32	Minor
43101	WERIBONE TM	22/01/2008 22:10	8.85	Moderate
43101	WERIBONE TM	27/01/2008 12:00	6.12	Minor
<i>Maranoa R</i>				
43111	CURRAWONG	20/01/2008 22:00	4	Minor
43064	MITCHELL	18/01/2008 04:00	2.5	Minor
43064	MITCHELL	21/01/2008 04:00	3.75	Moderate
43102	MITCHELL TM	20/01/2008 22:30	4.26	Moderate
43099	SPRINGFIELD	18/01/2008 15:00	7	Moderate
43099	SPRINGFIELD	21/01/2008 09:00	7.6	Moderate
44075	WOODLANDS	22/01/2008 06:00	6.6	Moderate
43100	OLD CASHMERE TM	24/01/2008 17:50	5.94	Moderate
<i>Balonne R d/s Beardmore Dam</i>				
43053	ST GEORGE	23/01/2008 09:00	6.7	Major
43053	ST GEORGE	25/01/2008 09:00	7.33	Major
43104	ST GEORGE TM	23/01/2008 09:40	6.56	Major
43104	ST GEORGE TM	25/01/2008 10:00	7.16	Major
44154	WHYENBAH	26/01/2008 09:00	6.85	Moderate
544018	WHYENBAH TM	26/01/2008 12:00	5.82	Major
44117	DIRRANBANDI	27/01/2008 09:15	4.3	Moderate
544012	NARRAN RIVER TM	30/01/2008 01:00	4.32	Minor

Table 4.4.4 Peak Heights for the Warrego River

Station No.	Station Name	Date	Height (metres)	Flood Class
WARREGO				
<i>Warrego R u/s Charleville</i>				
44190	LOCHINVAR	18/01/2008 09:00	3.8	Minor
44190	LOCHINVAR	19/01/2008 07:00	8.5	Major
44199	WETLANDS	20/01/2008 09:00	3.2	Moderate
44118	AUGATHELLA	20/01/2008 03:00	6.5	Major
35283	DRENSMAINE	19/01/2008 21:30	6.3	Major
44006	BIDDENHAM	20/01/2008 23:59	6	Major
44201	THE 27 MILE GARDEN TM	21/01/2008 15:00	5.06	Major
44156	CHARLEVILLE RIVER	22/01/2008 08:00	6.02	Major
544020	BRADLEYS GLY CHARLEVILLE	18/01/2008 09:15	3.1	Unknown
<i>Warrego R d/s Charleville</i>				
44208	WARILDA	19/01/2008 09:00	6.45	Major

44209	OAKPARK	19/01/2008 17:00	6.5	Major
544021	BINNOWEE TM	2/01/2008 01:00	3.3	Below Minor
544021	BINNOWEE TM	20/01/2008 21:20	8.43	Major
44206	BAKERS BEND TM	21/01/2008 11:20	10.15	Major
544014	WYANDRA TM	22/01/2008 18:00	9.41	Major
44174	WALLEN	24/01/2008 18:00	9.88	Major
44116	CUNNAMULLA BRIDGE	25/01/2008 17:00	9.91	Major
544019	CUNNAMULLA WEIR TM	25/01/2008 22:00	8.65	Major
44210	ROCKY	7/01/2008 09:30	3.2	Minor
44210	ROCKY	27/01/2008 09:00	5.41	Major

Table 4.4.5 Peak Heights for the Paroo and Bulloo Rivers

Station No.	Station Name	Date	Height (metres)	Flood Class
PAROO				
<i>Paroo R</i>				
44222	QUILPETA	19/01/2008 09:45	3.35	Moderate
44085	HUMEBURN	20/01/2008 09:00	6.3	Major
44153	EULO	22/01/2008 18:30	4.95	Major
544015	CAIWARRO TM	25/01/2008 07:20	4.3	Major
44181	HUNGERFORD	27/01/2008 06:30	2.3	Major
BULLOO				
<i>Bulloo R</i>				
45043	ADAVALE	19/01/2008 10:00	5.2	Major
45044	QUILPIE	21/01/2008 15:00	6.2	Major
545007	QUILPIE TM	31/12/2007 20:00	4.55	Moderate
545007	QUILPIE TM	21/01/2008 10:00	6.17	Major
45003	SOUTH COMONGIN	2/01/2008 15:00	3.2	Minor
45003	SOUTH COMONGIN	22/01/2008 15:00	5.1	Major
545001	AUTUMNVALE TM	31/12/2007 20:00	5.81	Moderate
545001	AUTUMNVALE TM	28/01/2008 04:00	6.45	Moderate
45045	THARGOMINDAH	2/01/2008 06:00	4.77	Moderate
45045	THARGOMINDAH	29/01/2008 21:00	5.15	Moderate

Table 4.4.6 Peak Heights for the Thomson and Barcoo Rivers and Cooper Creek

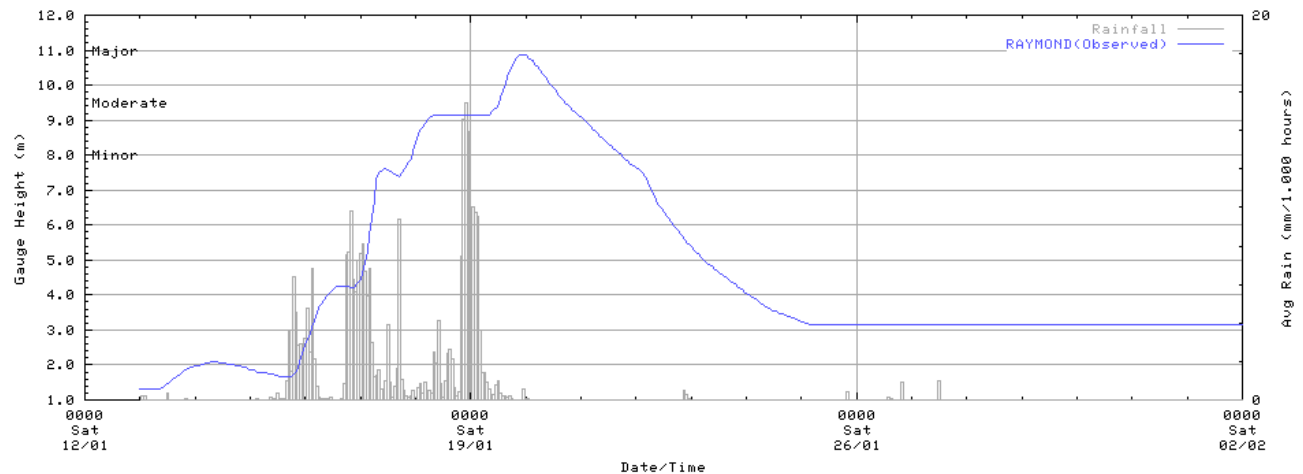
Station No.	Station Name	Date	Height	Flood Class
COOPER CREEK				
<i>Thomson R</i>				
36037	MUTTABURRA	16/01/2008 09:00	5.78	Moderate
36013	CAMoola PARK	17/01/2008 12:00	4.65	Moderate
36107	LONGREACH	3/01/2008 06:00	2.65	Minor
36107	LONGREACH	19/01/2008 07:30	3.95	Moderate
536005	DARR TM	14/01/2008 12:00	3.74	Unknown
536005	DARR TM	17/01/2008 20:00	3.54	Unknown
36116	BOGEWONG	7/01/2008 16:00	4	Moderate
36116	BOGEWONG	23/01/2008 18:00	5.6	Moderate
537004	STONEHENGE TM	11/01/2008 17:50	3.54	Minor
537004	STONEHENGE TM	25/01/2008 19:40	50.3	Major

38037	JUNDAH	14/01/2008 18:00	2.8	Minor
38037	JUNDAH	27/01/2008 15:00	5.2	Major
Barcoo R				
35284	TAMBO	16/01/2008 14:00	4.2	Minor
35284	TAMBO	19/01/2008 04:00	4.45	Minor
35049	GILLESPIE	18/01/2008 06:00	6.4	Minor
35049	GILLESPIE	20/01/2008 06:00	6.55	Minor
35259	DUNEIRA	18/01/2008 12:00	3	Moderate
36155	BLACKALL	18/01/2008 18:10	5.15	Major
36155	BLACKALL	18/01/2008 18:10	5.15	Major
536003	BLACKALL TM	18/01/2008 18:10	5.85	Moderate
36169	COOLAGH	20/01/2008 06:00	8.5	Major
35286	GLENCOE	19/01/2008 12:00	2.5	Moderate
35285	JERICHO	20/01/2008 06:00	3.08	Major
536002	BARCOLDINE WEIR TM	18/01/2008 14:00	1.54	Minor
36026	ISISFORD	21/01/2008 07:30	8.68	Major
36104	OMA	21/01/2008 15:00	7.68	Major
36094	WAHROONGHA	22/01/2008 06:00	6.45	Major
38034	GLENLOCK	3/01/2008 11:30	3.95	Below Minor
38034	GLENLOCK	24/01/2008 05:30	7.15	Major
538001	RETREAT TM	25/01/2008 18:00	11.05	Major
38018	RETREAT (BARCOO RIVER)	25/01/2008 17:30	10	Major
Cooper Ck				
38038	WINDORAH	6/01/2008 15:00	4.15	Moderate
38038	WINDORAH	29/01/2008 15:00	5.98	Major

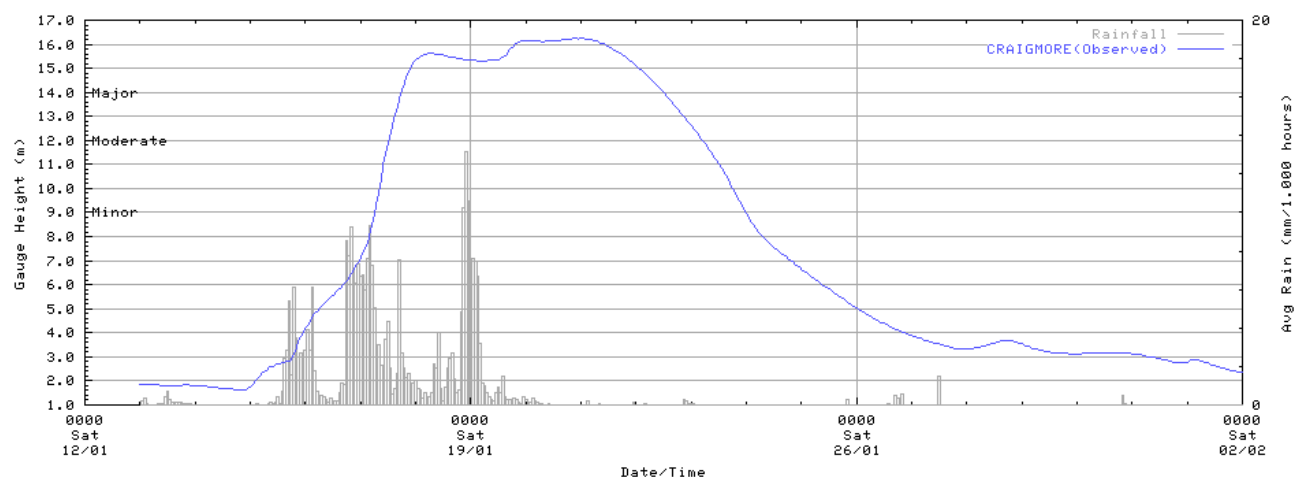
4.5 Flood Hydrographs

Figure 4.5.1 River Heights - Nogoa River

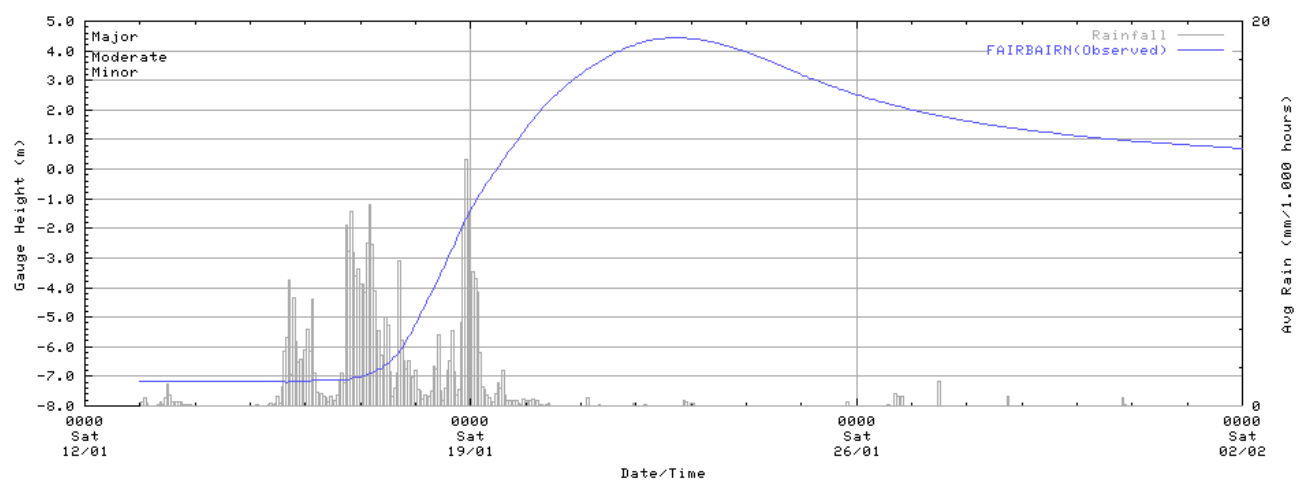
Raymond – Nogoa River

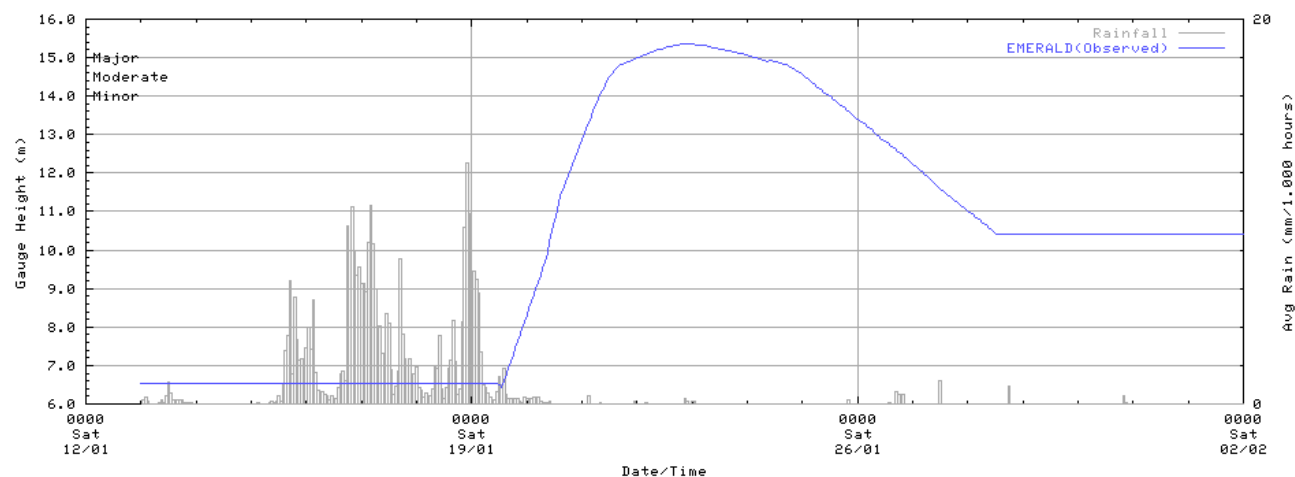
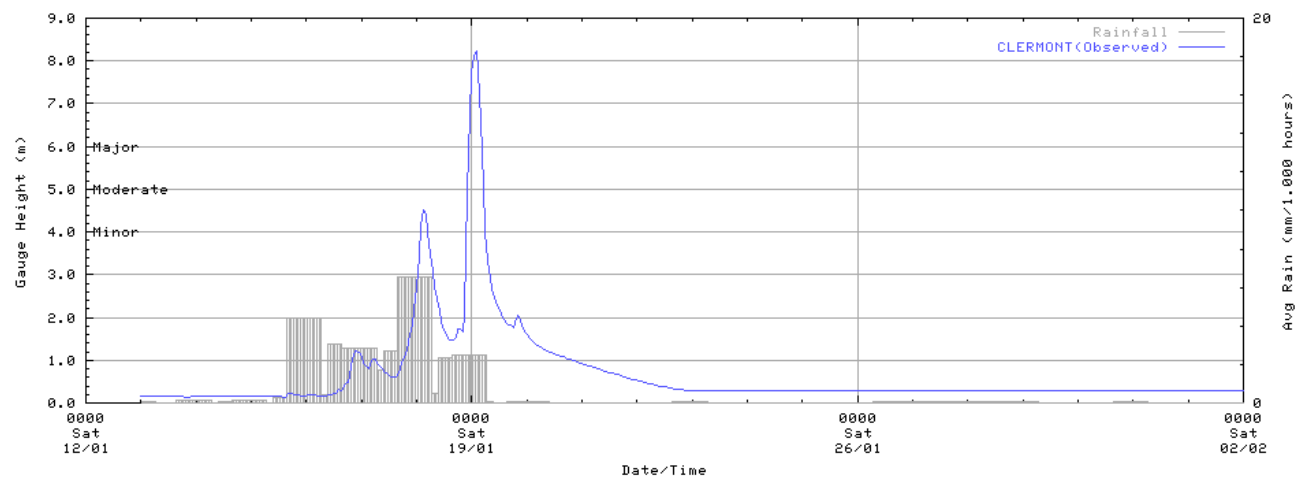
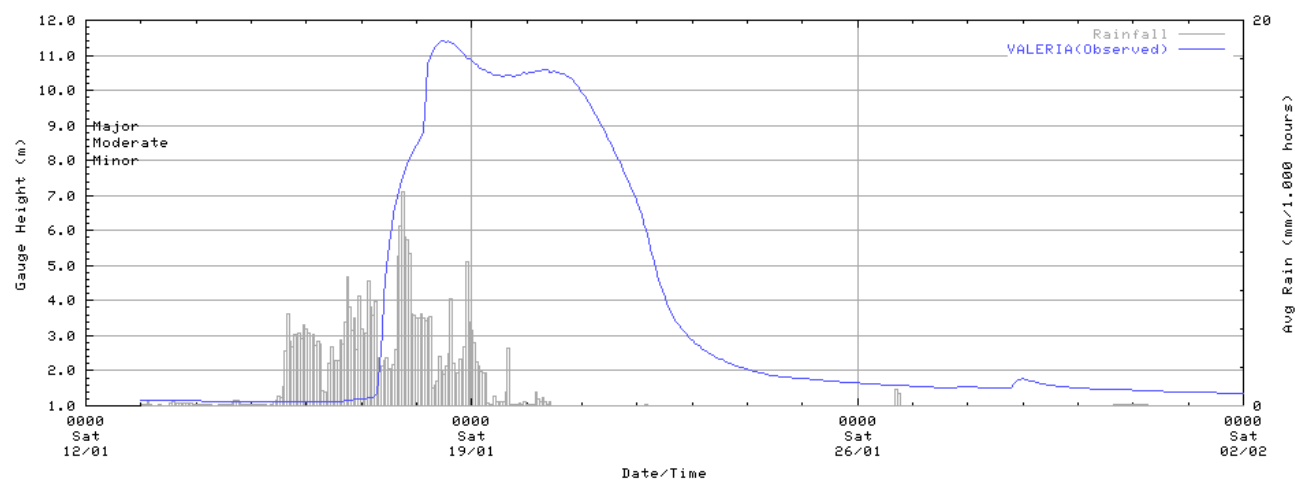


Craigmore – Nogoa River

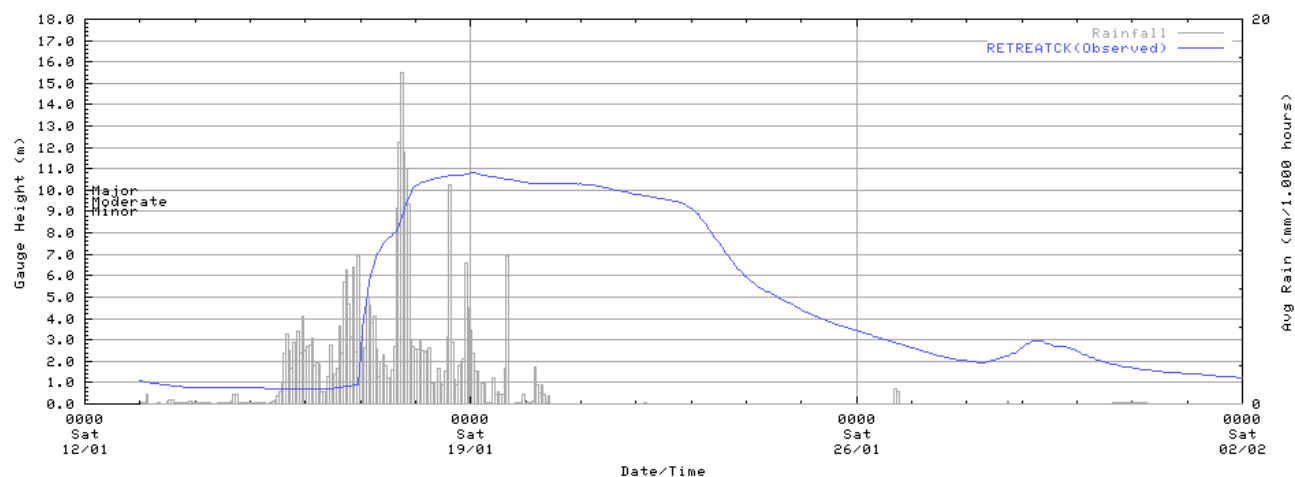


Fairbairn Dam – Nogoa River



Emerald – Nogoa River**Clermont – Theresa Creek****Valaria – Theresa Creek**

Retreat Creek/Gregory Highway – Theresa Creek



Duckponds – Nogo River

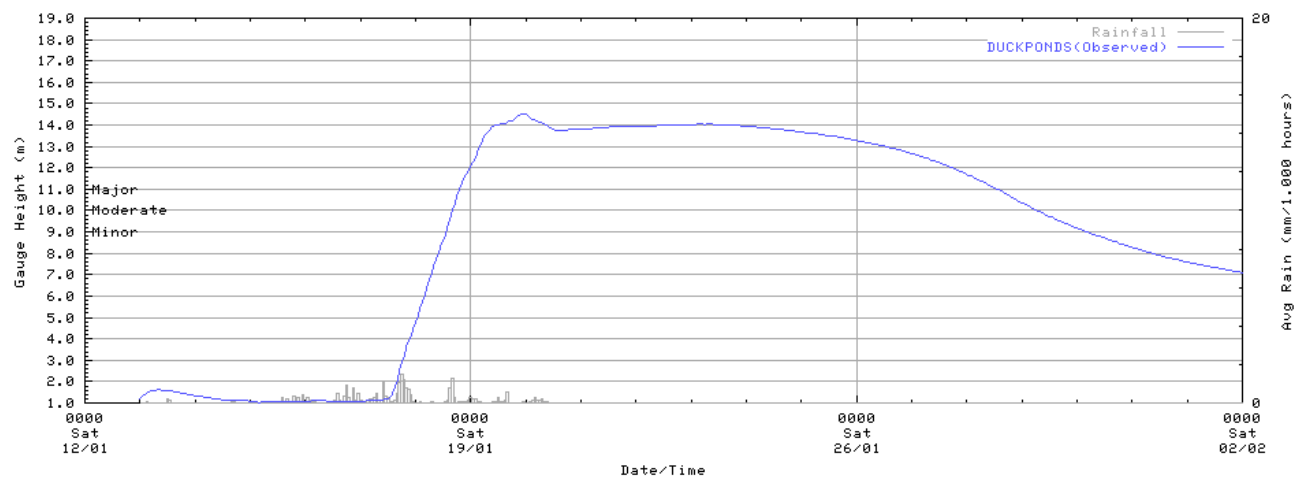
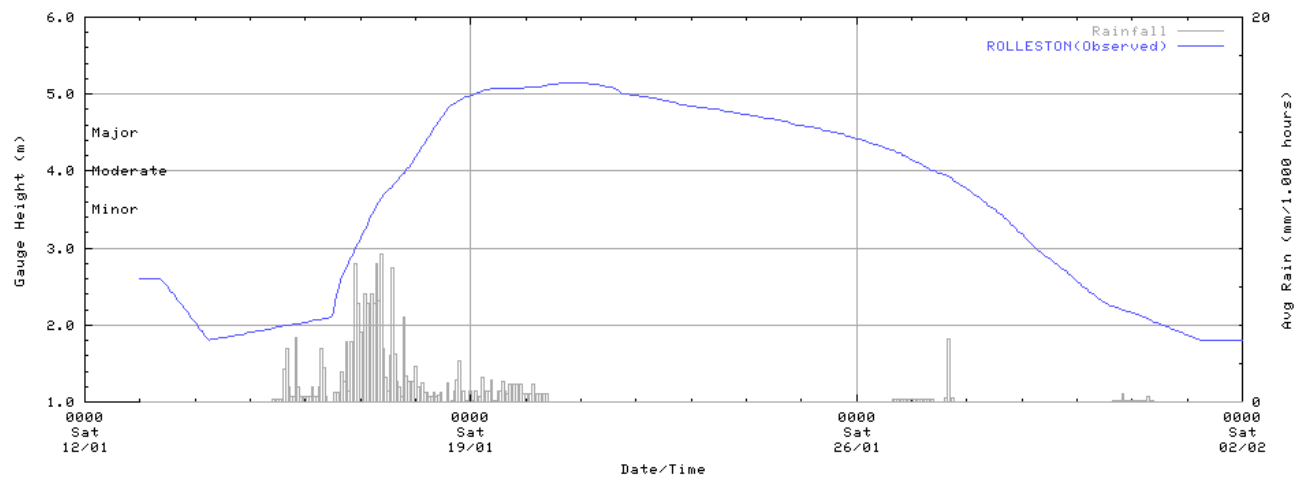
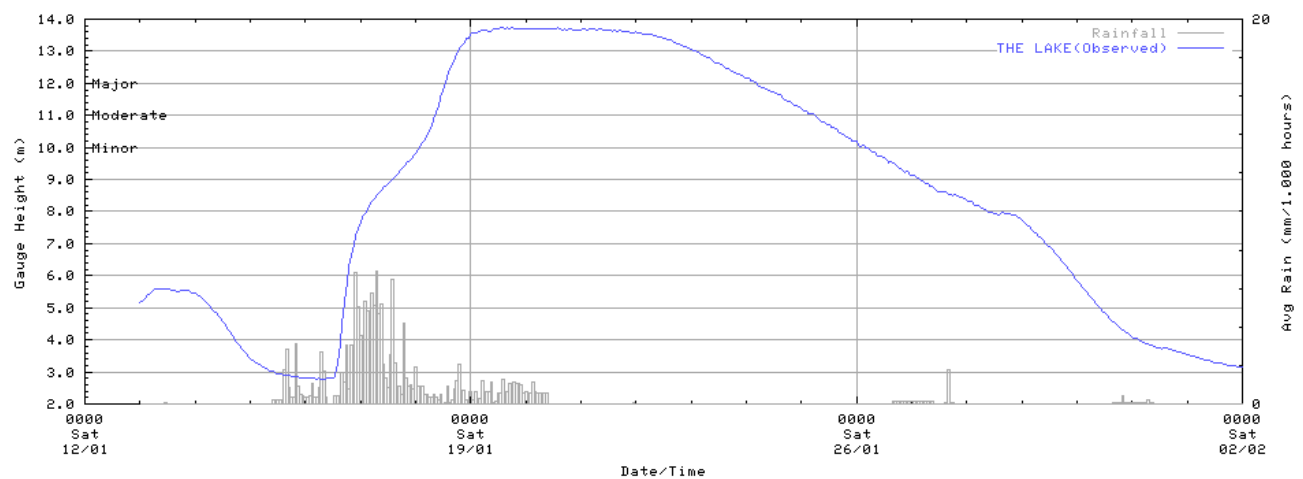
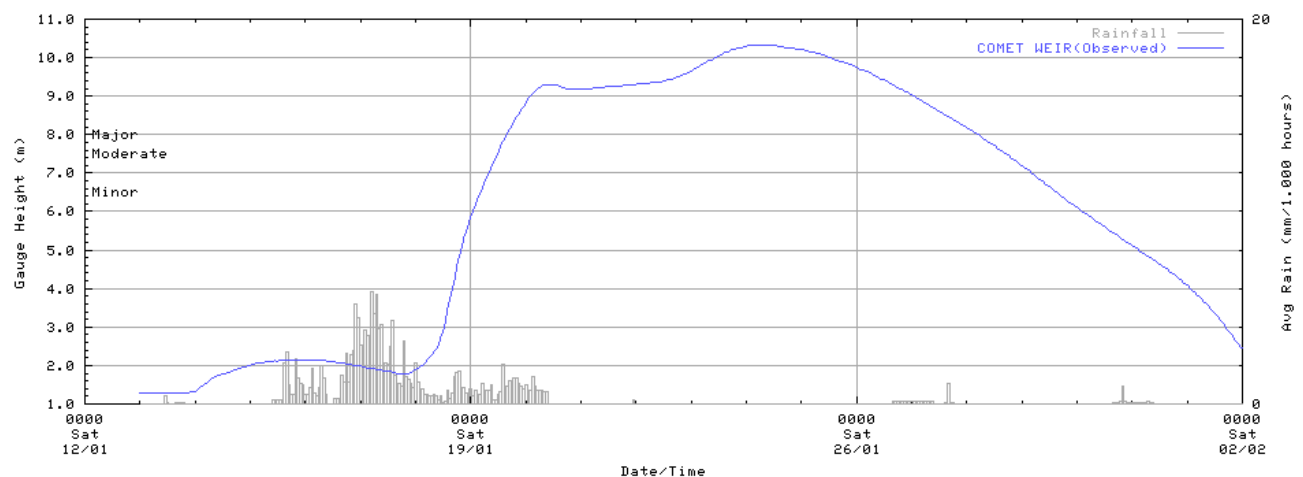
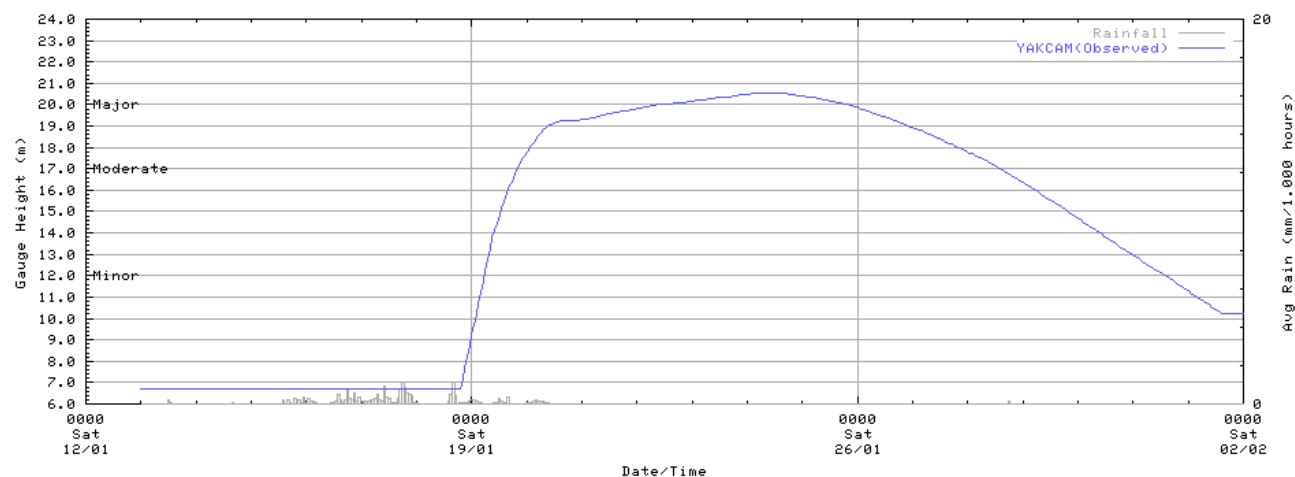
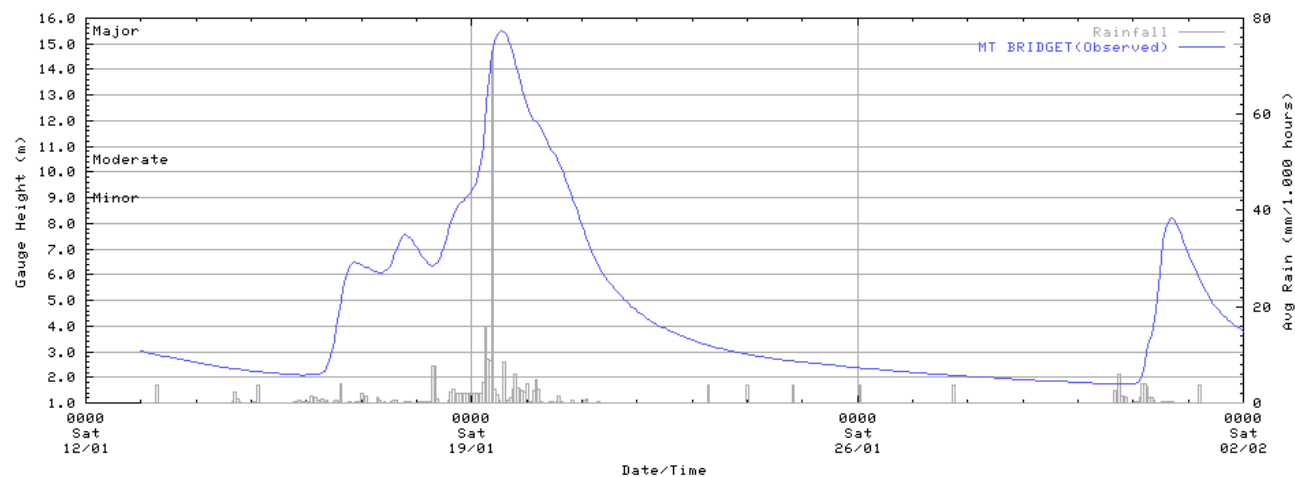
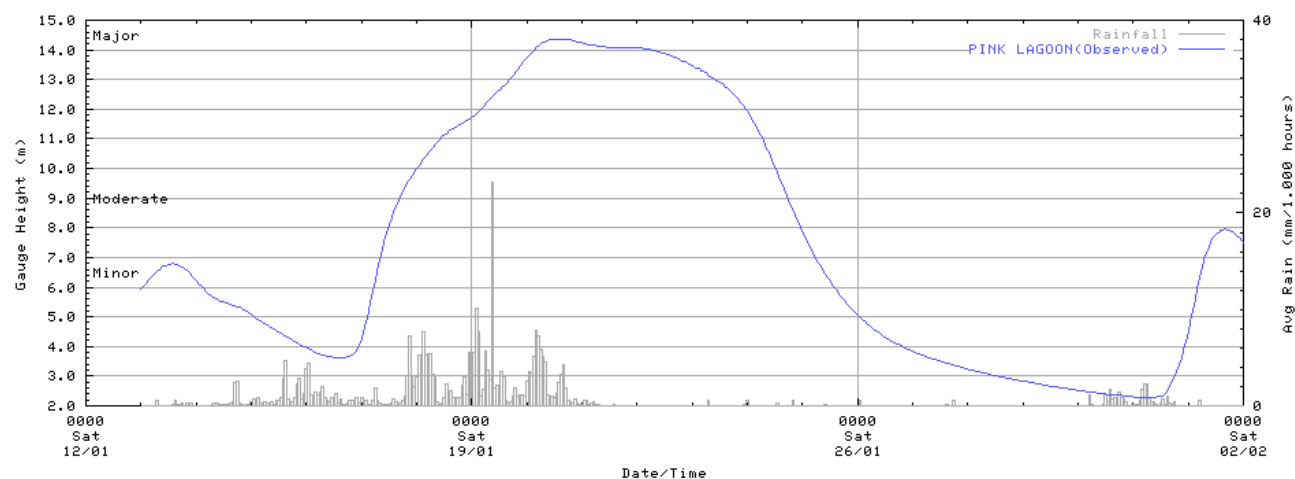
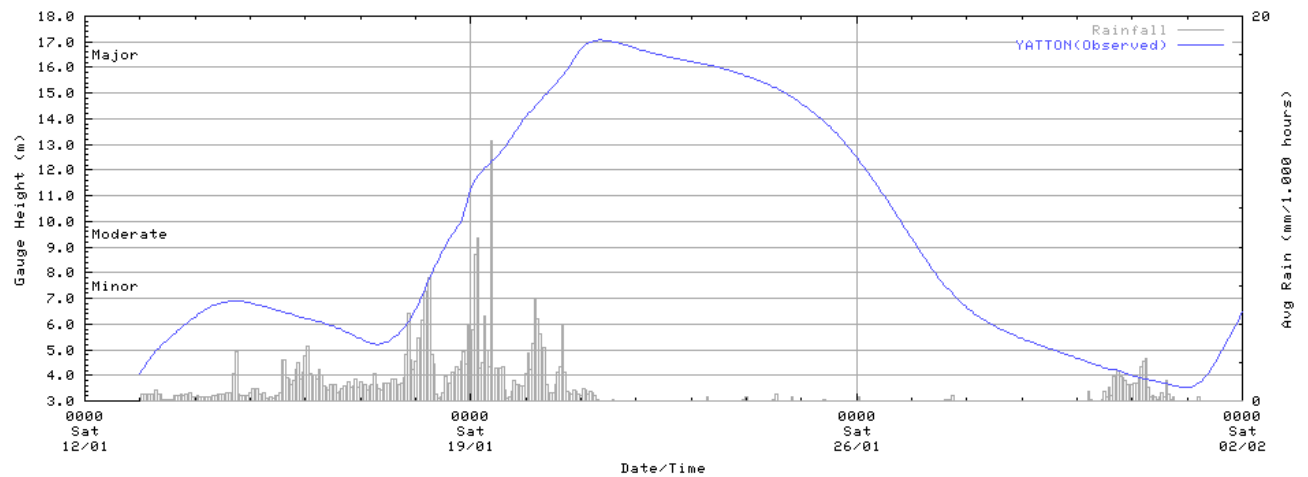


Figure 4.5.2 River Heights - Comet and Upper Mackenzie River**Rolleston – Comet River****The Lake – Comet River****Comet Weir– Comet River**

Yakcam – Mackenzie River**Mt Bridget – Connors River****Pink Lagoon – Connors River**

Yatton – Isaac River



Tartrus – Mackenzie River

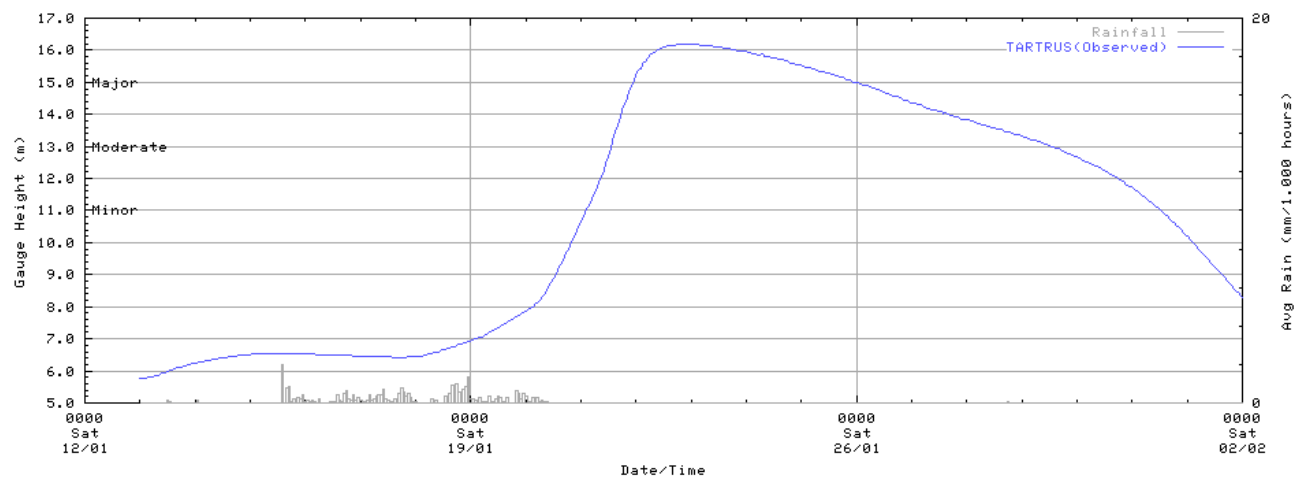


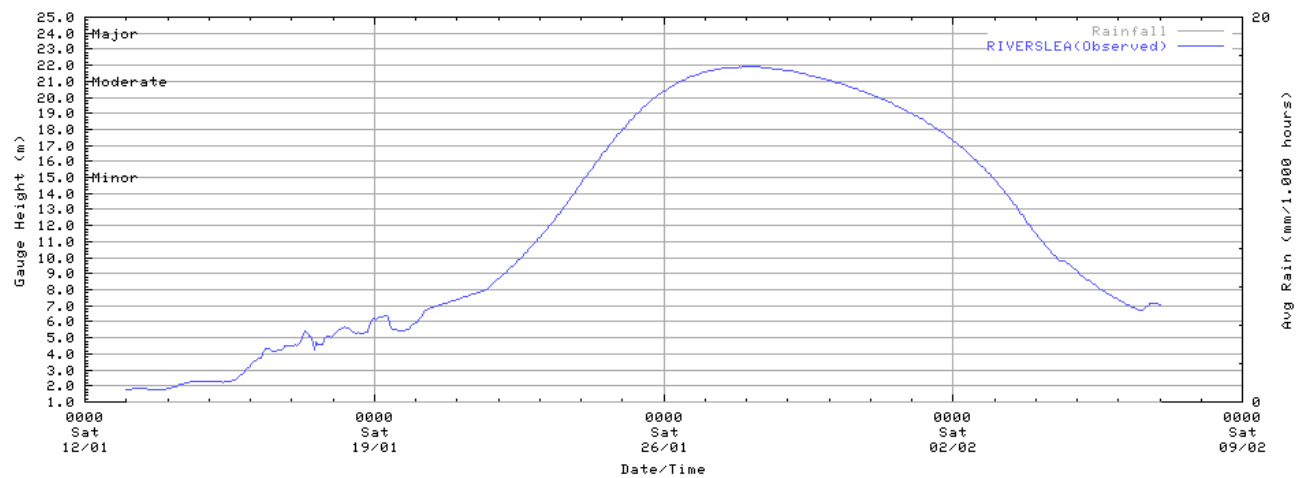
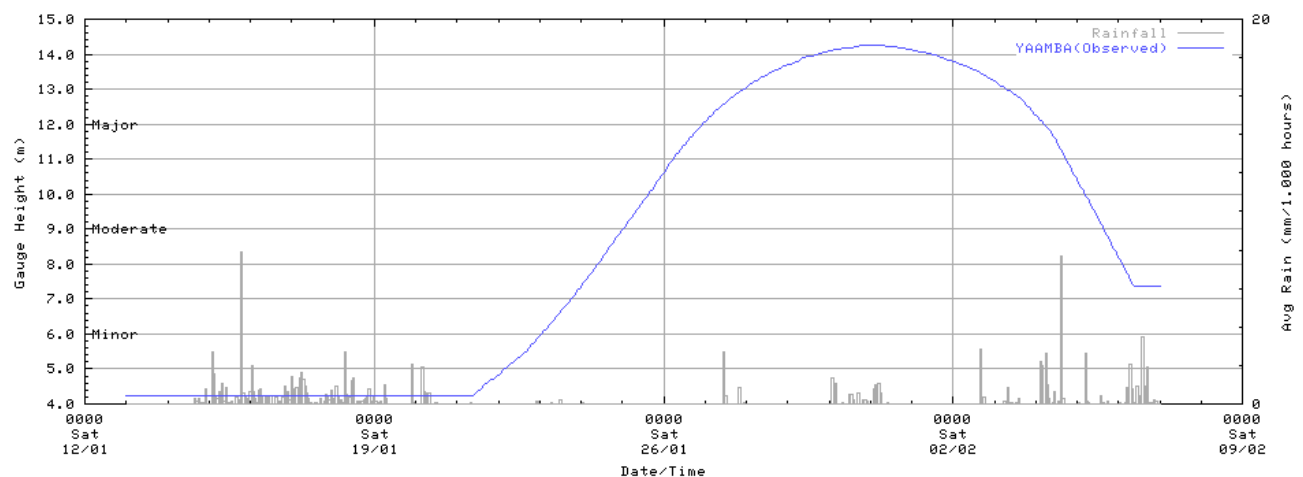
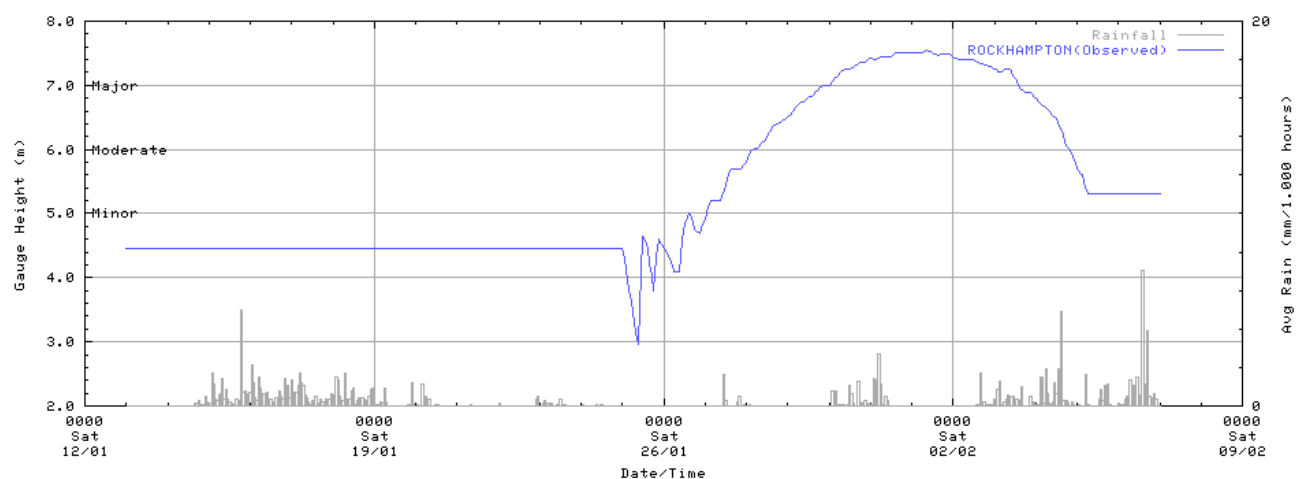
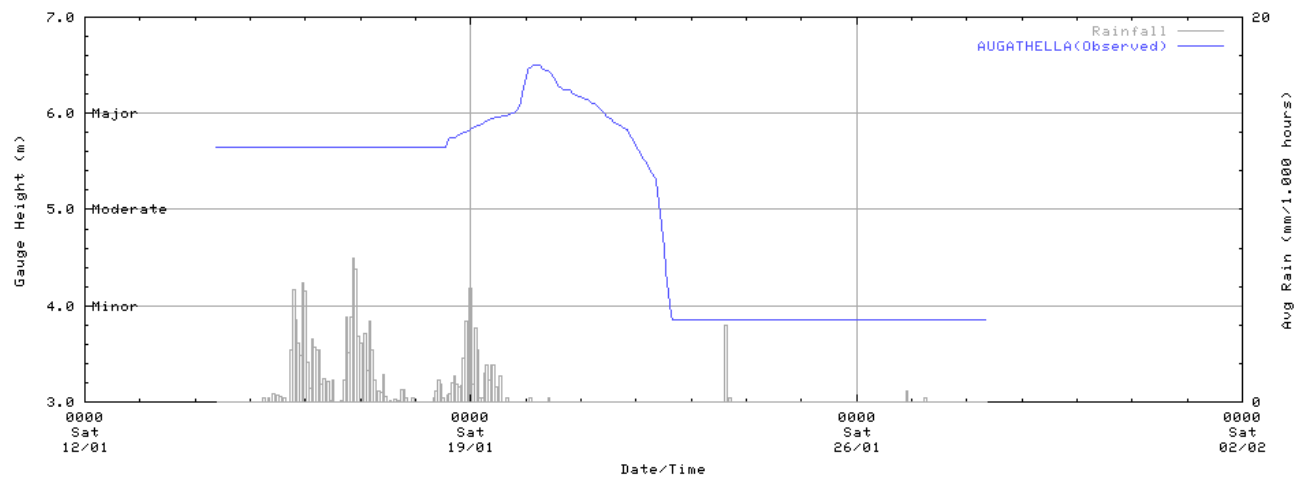
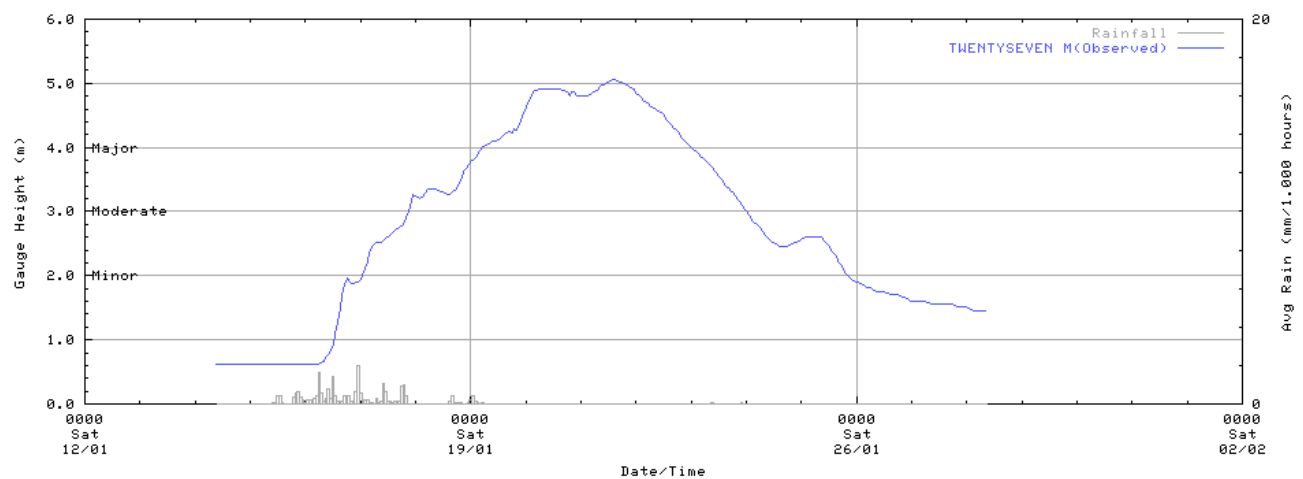
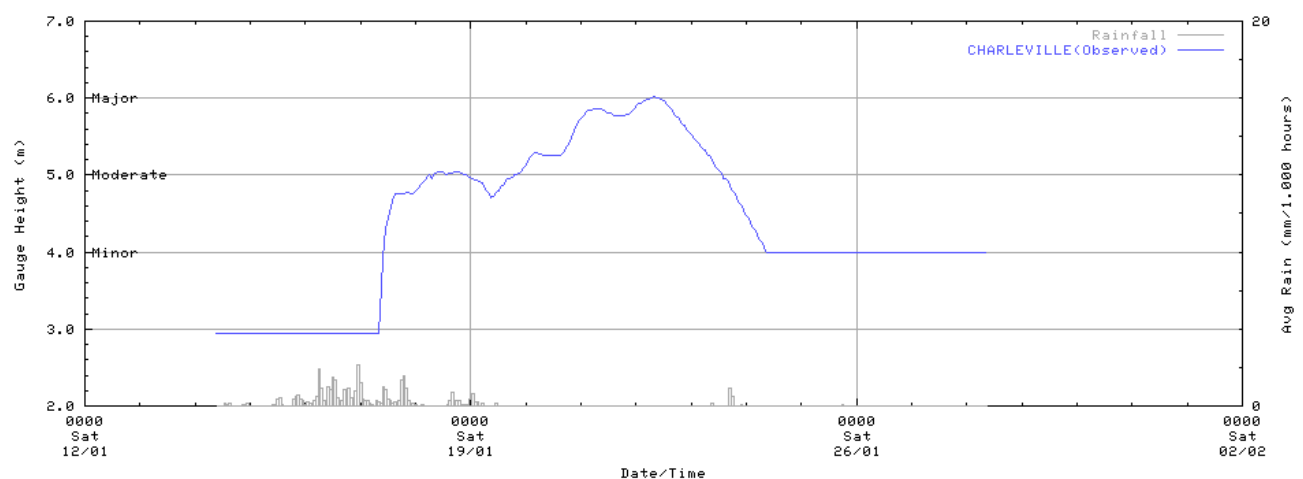
Figure 4.5.3 River Heights - Fitzroy River**Riverslea – Fitzroy River****Yaamba – Fitzroy River****Rockhampton – Fitzroy River**

Figure 4.5.4 River Heights - Warrego River**Augathella – Warrego River****The 27 Mile Gardens – Warrego River****Charleville – Warrego River**

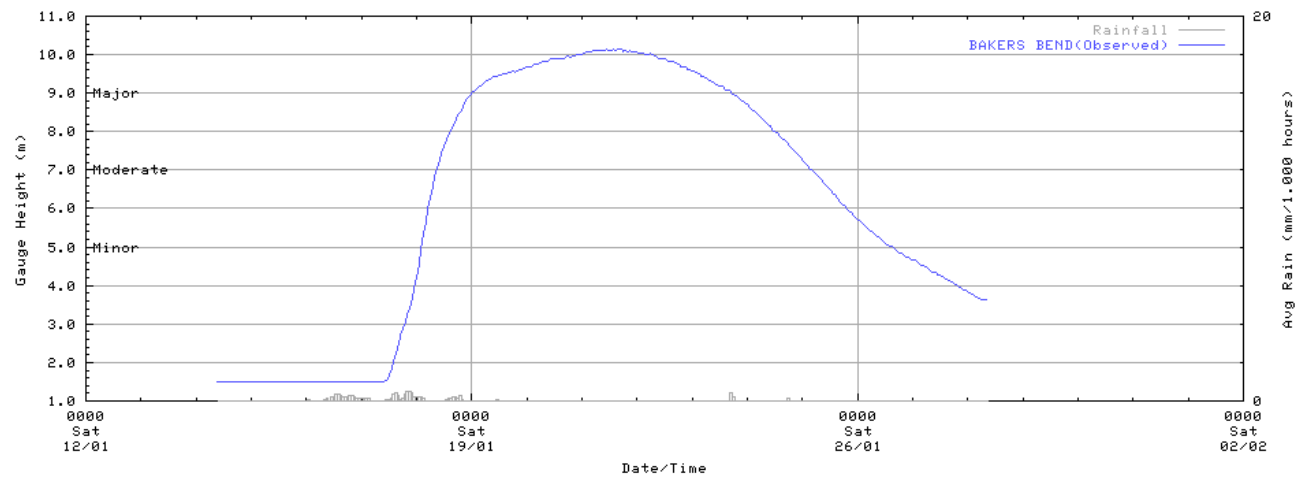
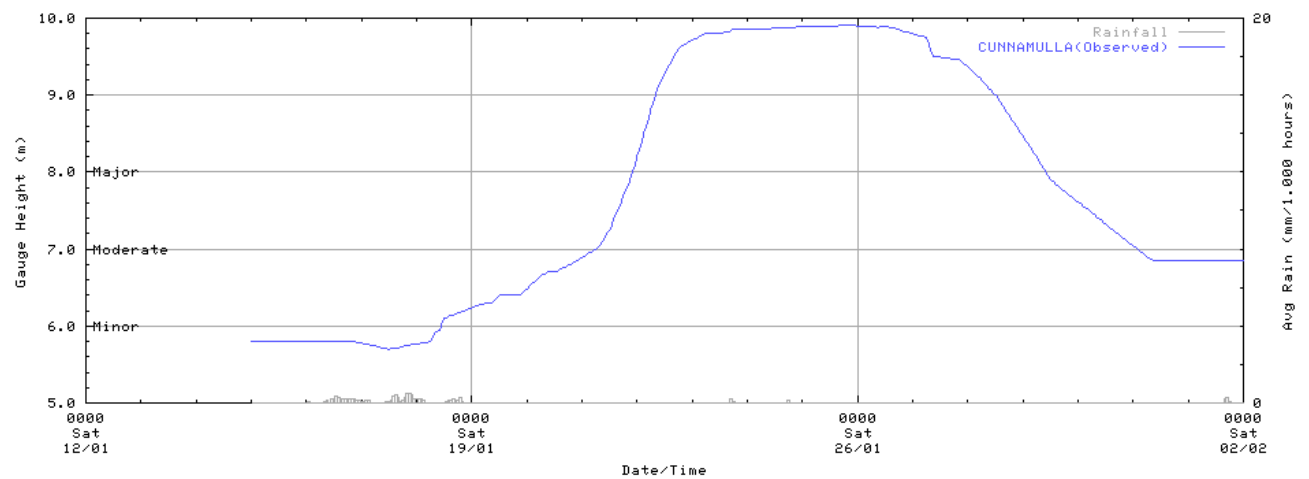
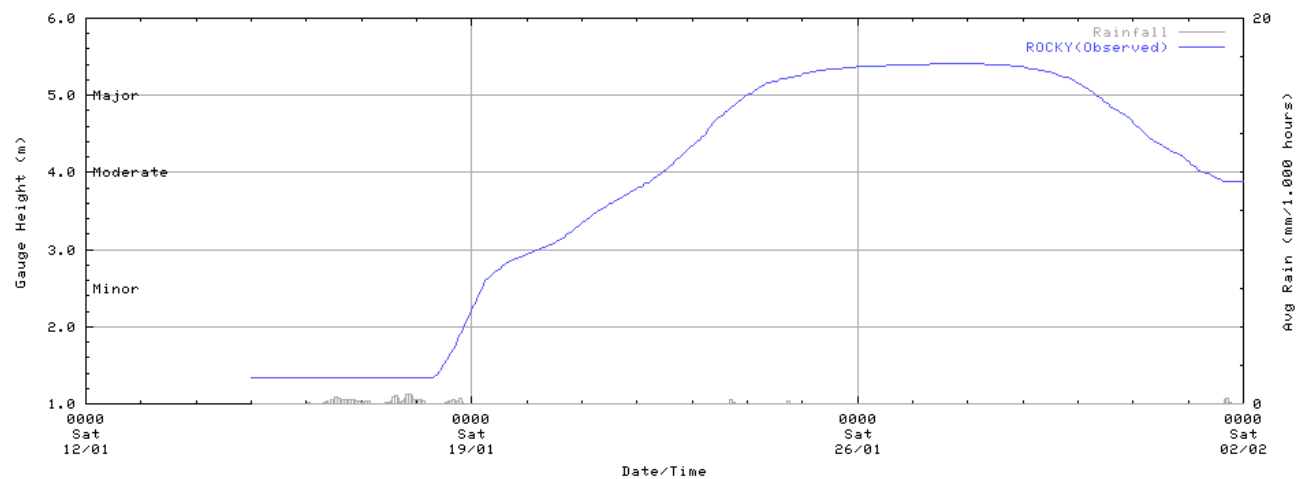
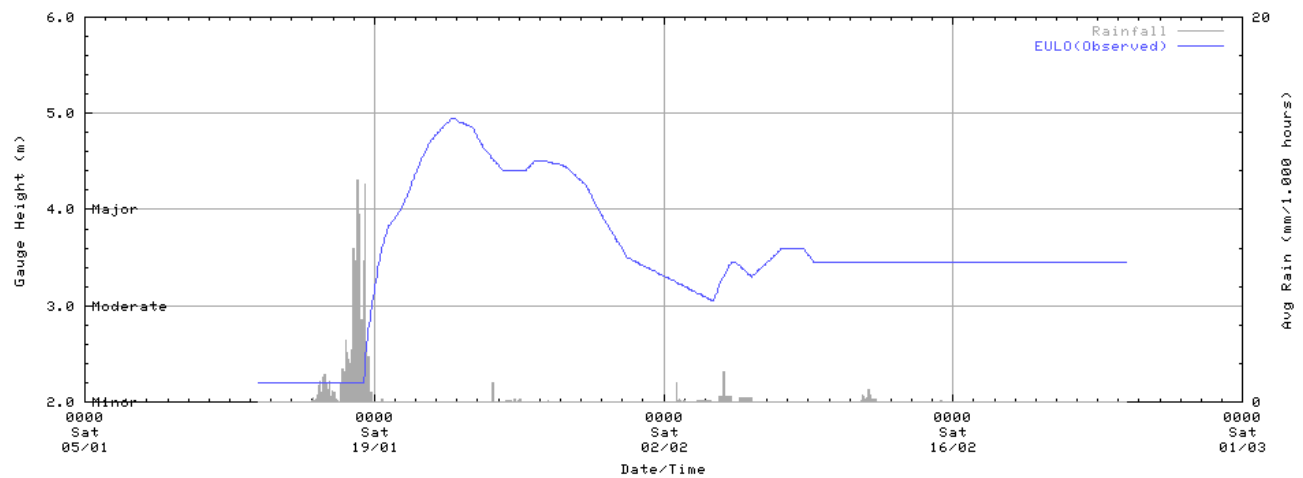
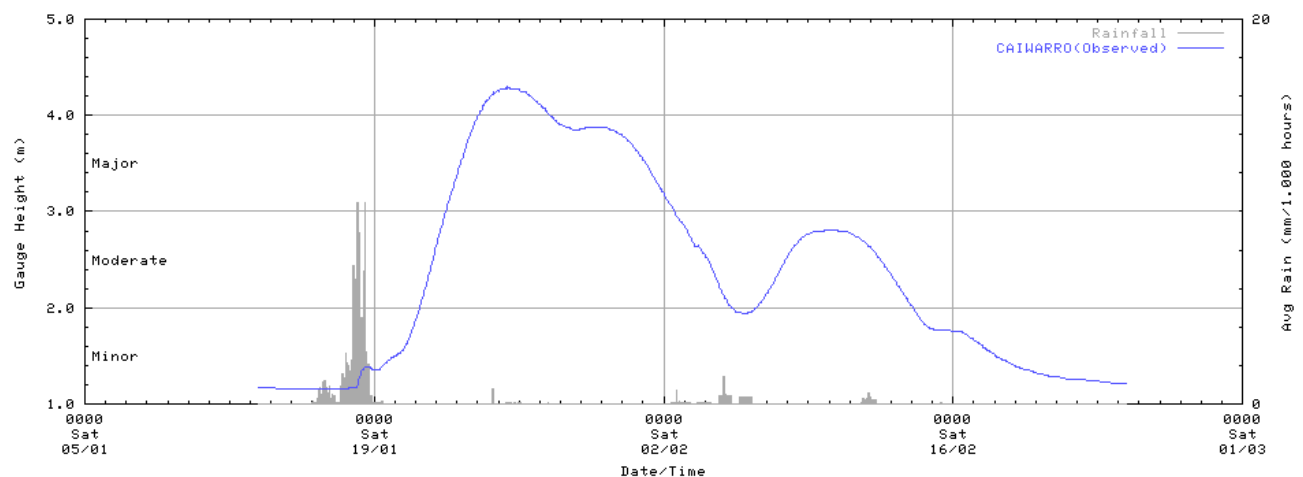
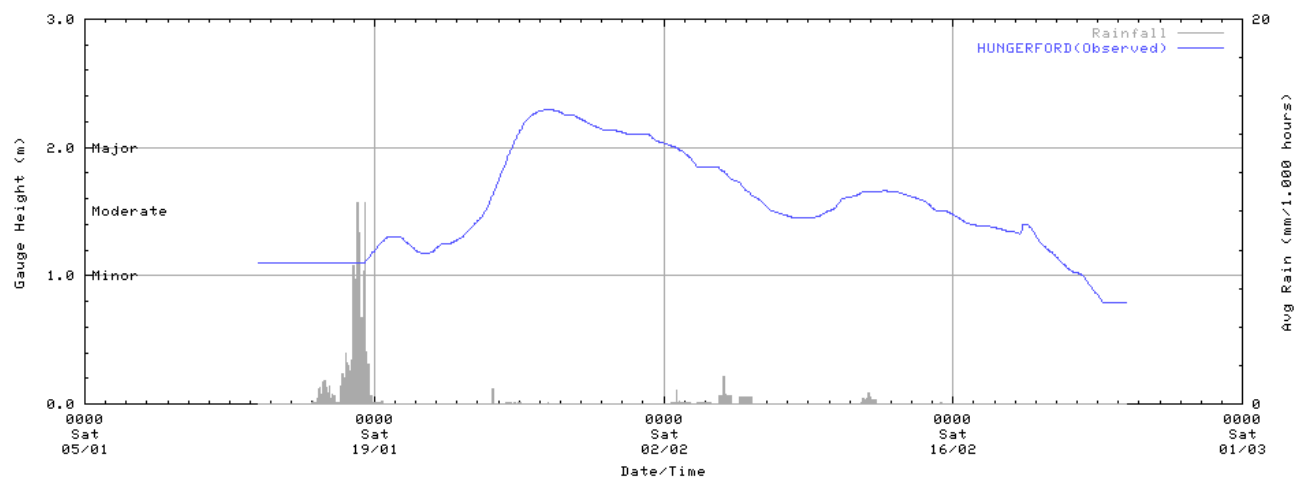
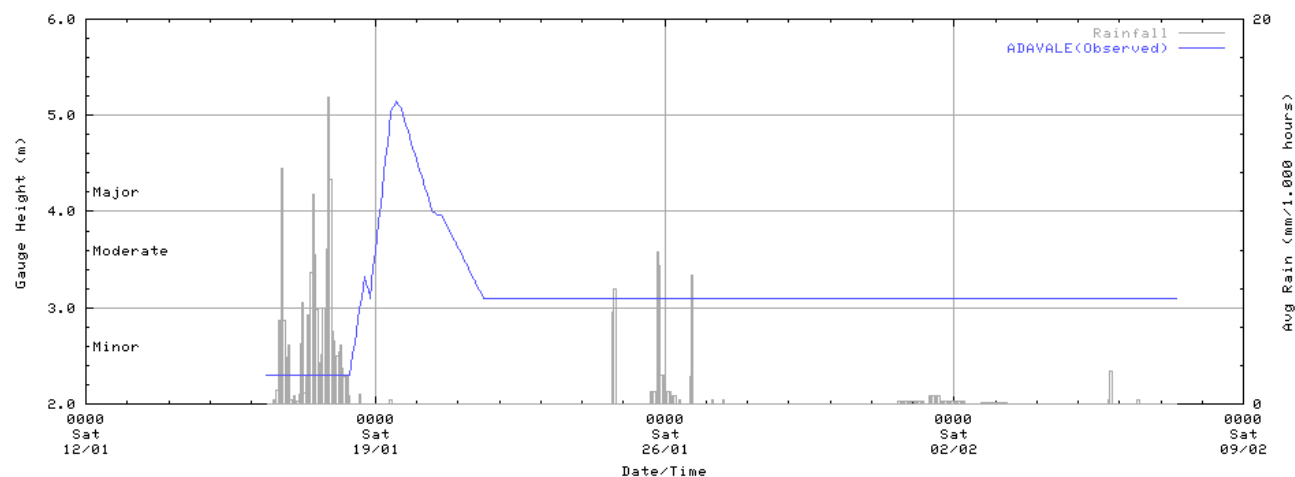
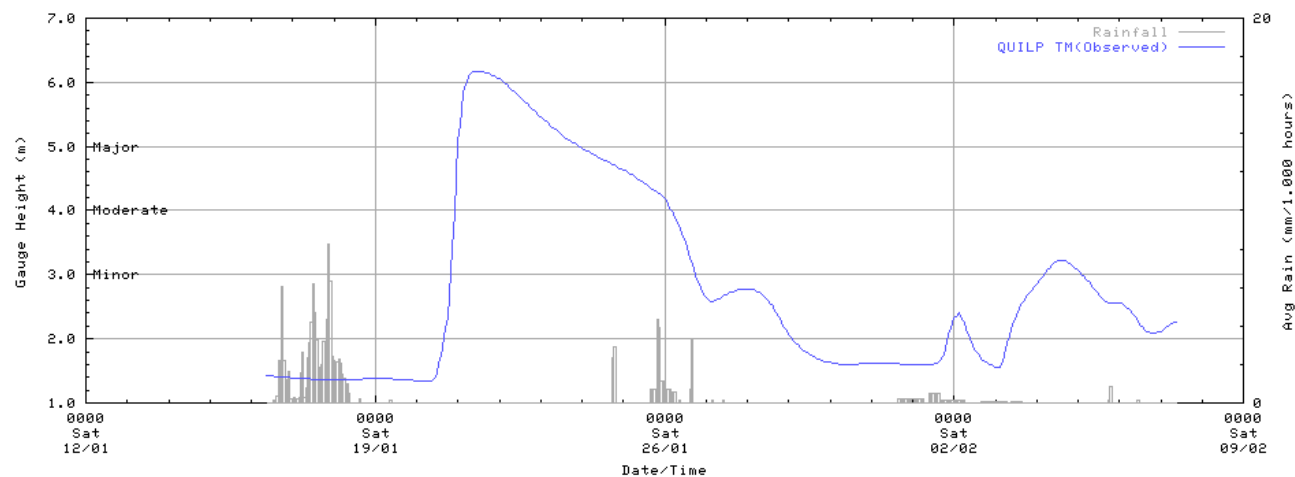
Bakers Bend – Warrego River**Cunnamulla – Warrego River****Rocky – Warrego River**

Figure 4.5.5 River Heights - Paroo and Bulloo Rivers**Eulo – Paroo River****Caiwarro – Paroo River****Hungerford – Paroo River**

Adavale – Blackwater Creek



Quilpie TM – Warrego River



Thargomindah – Warrego River

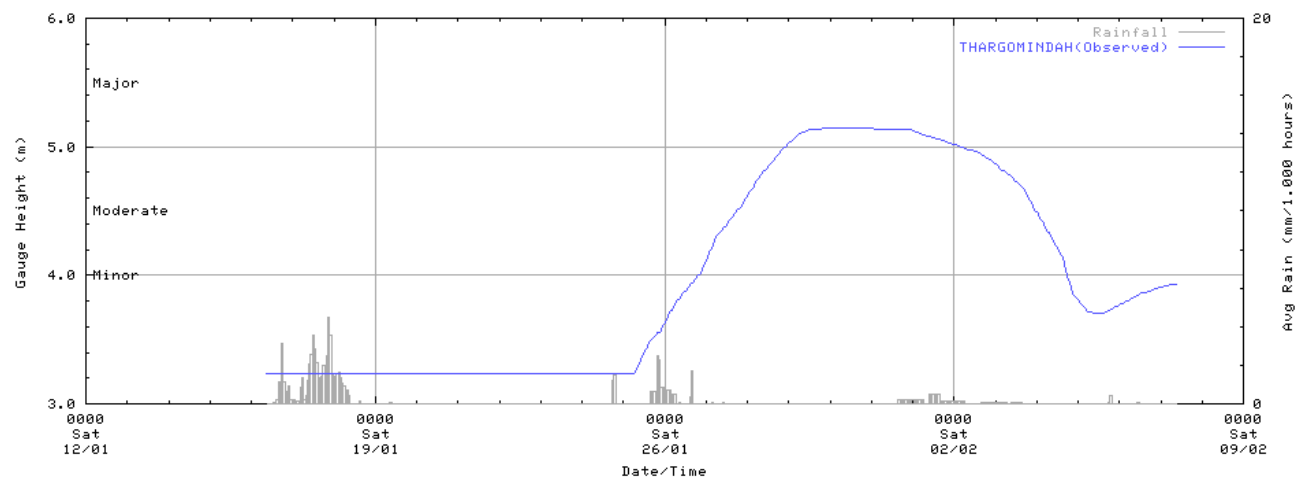
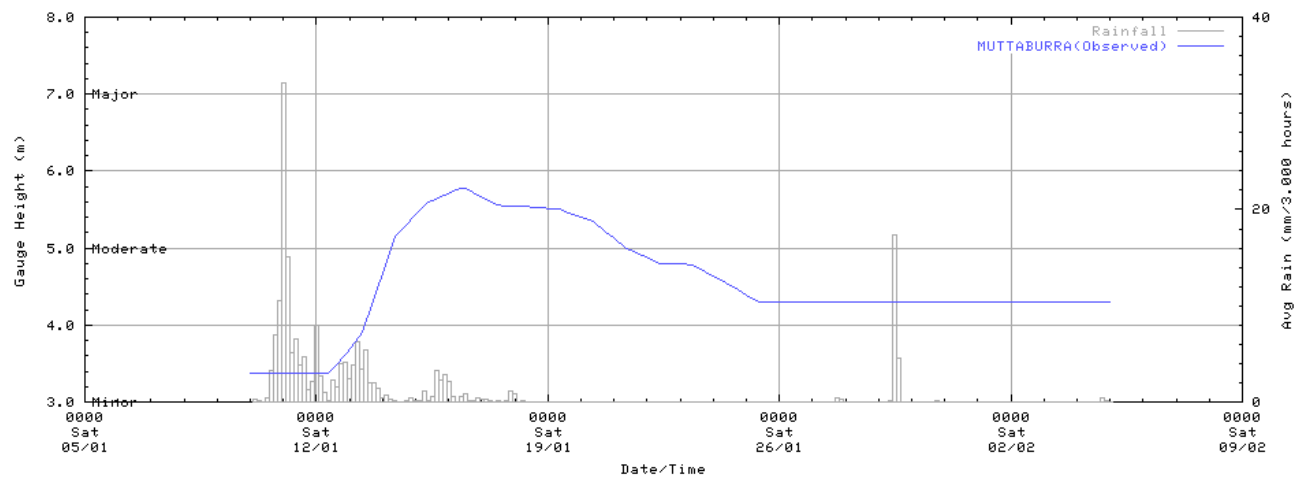
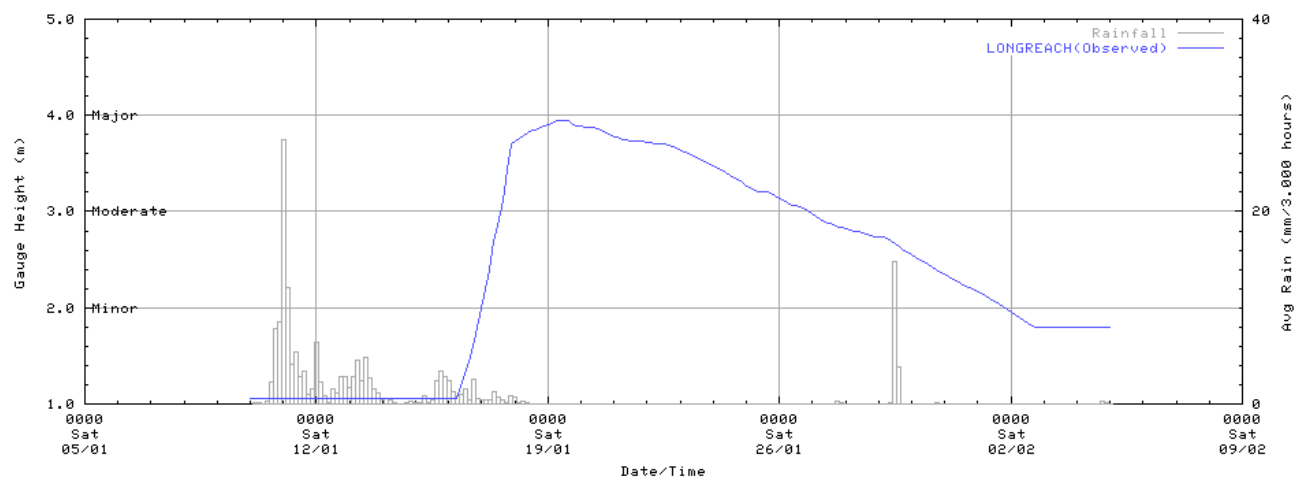
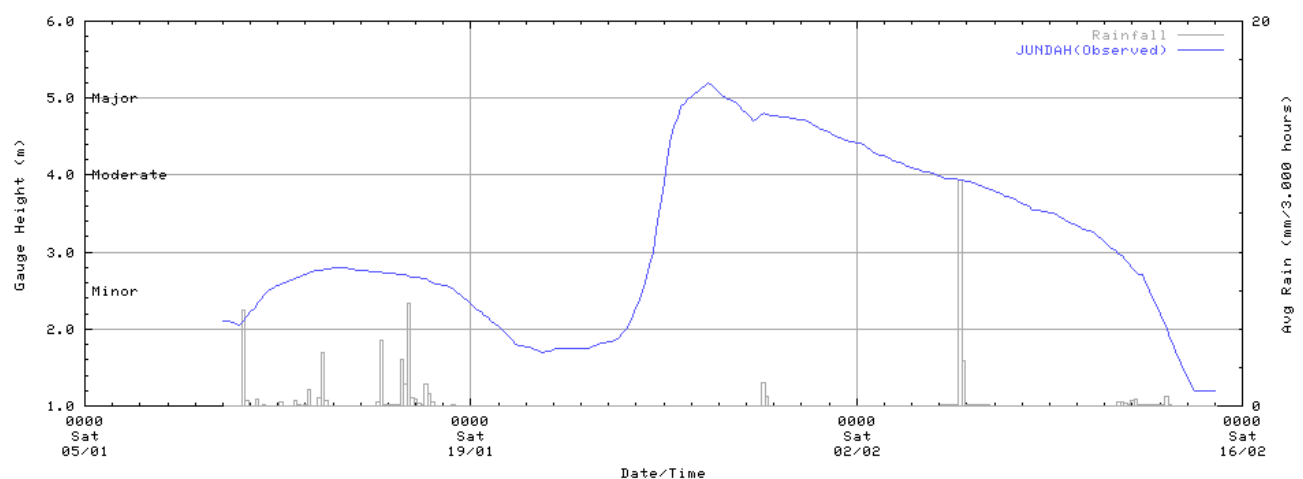
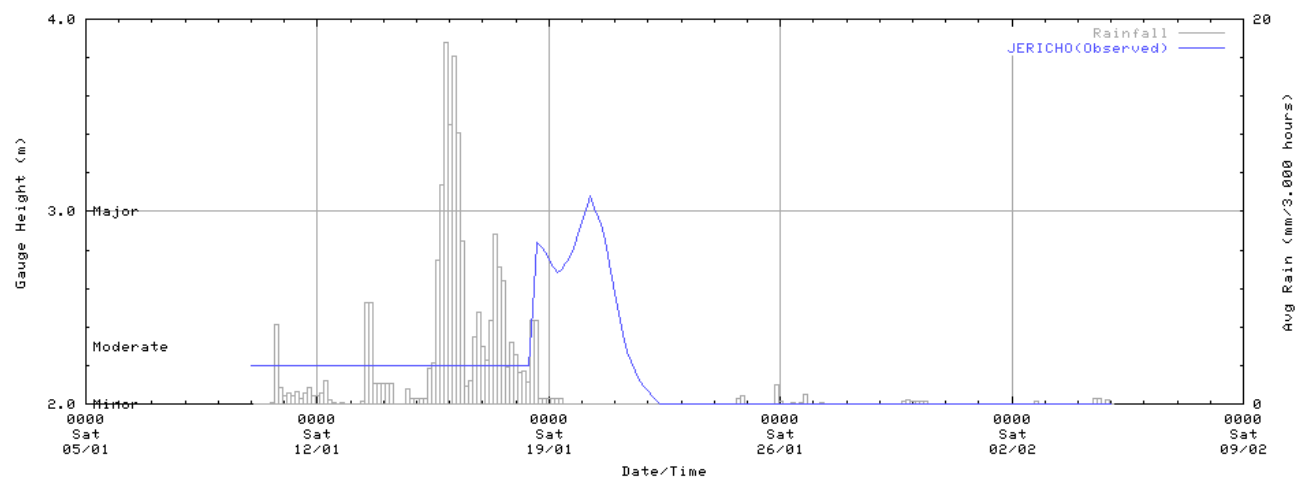
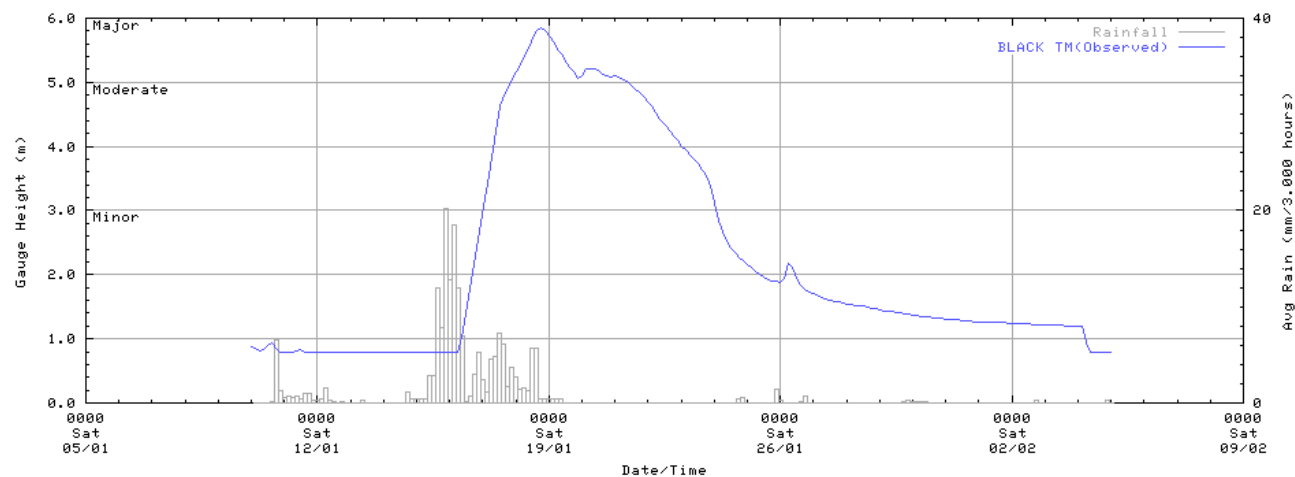
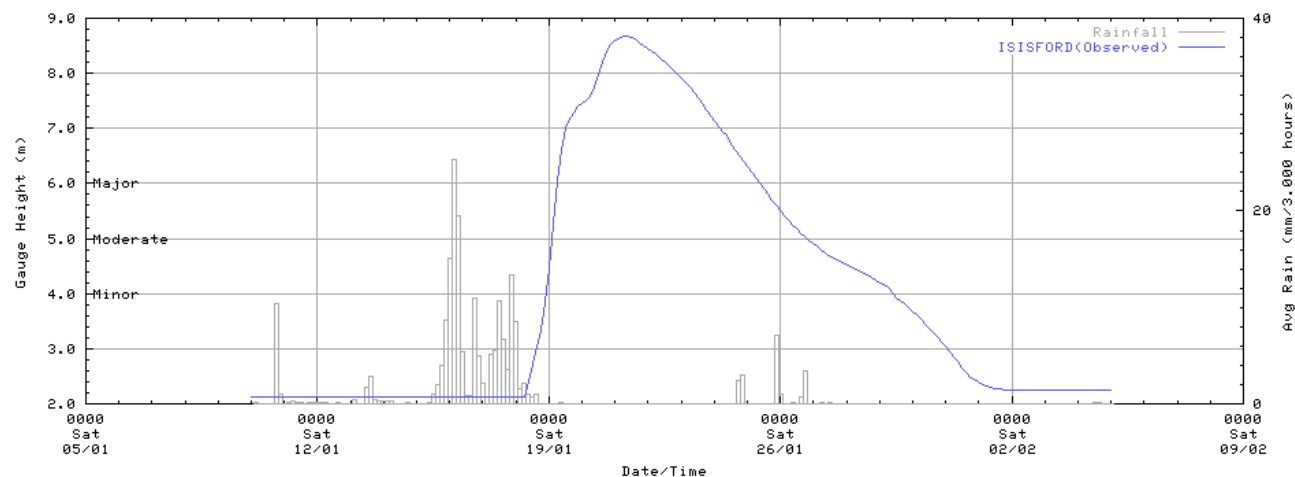
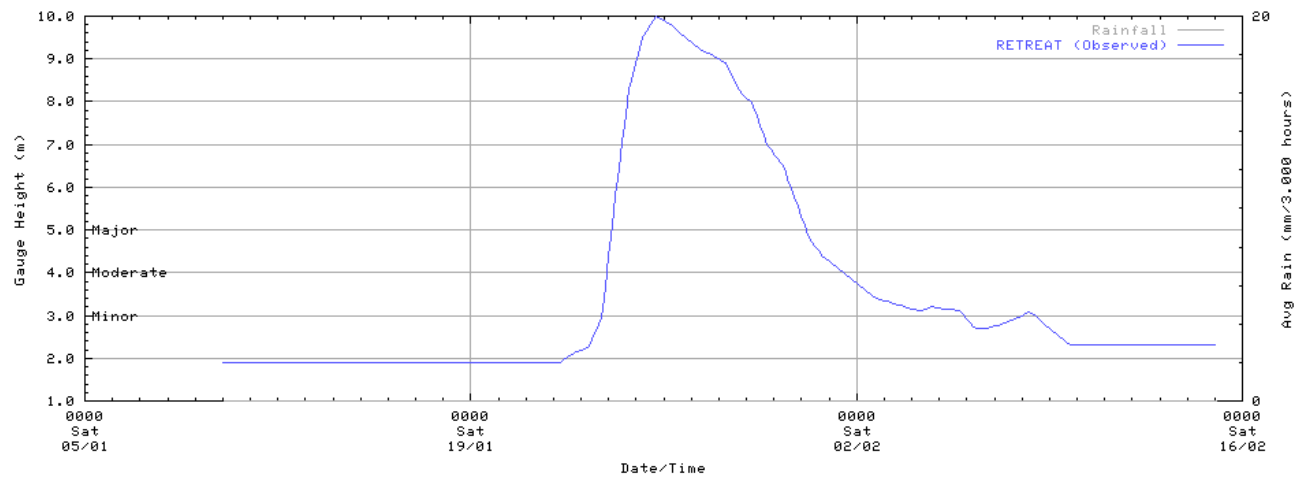


Figure 4.5.6 River Heights - Thomson and Barcoo Rivers and Cooper Creek**Muttaborra – Landsborough River****Longreach – Thomson River****Jundah – Thomson River**

Jericho – Jordan River**Blackall – Barcoo River****Isisford – Barcoo River**

Retreat – Barcoo River



Windorah – Cooper Creek

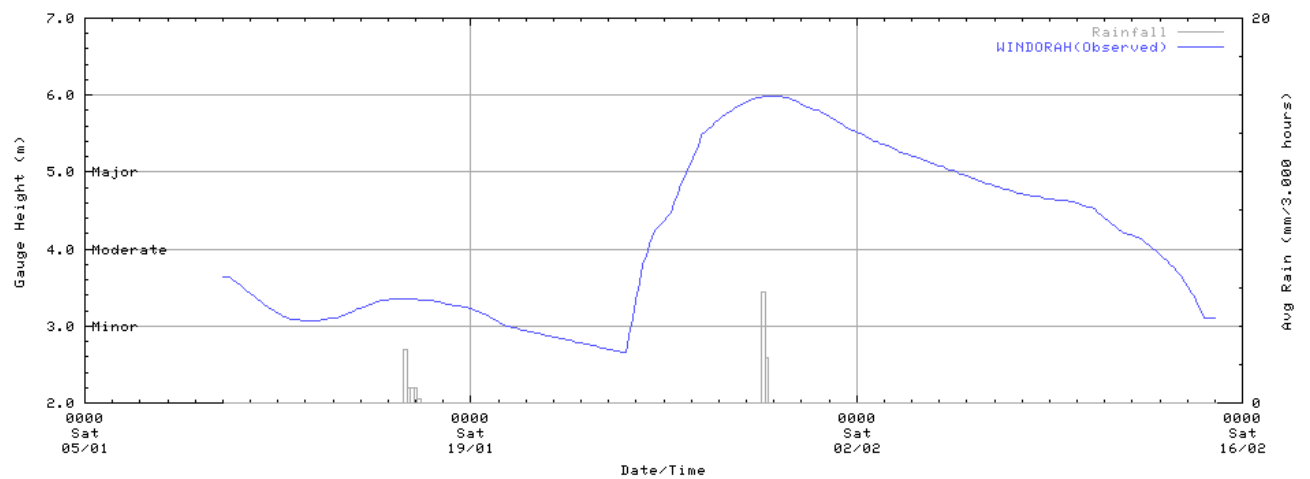


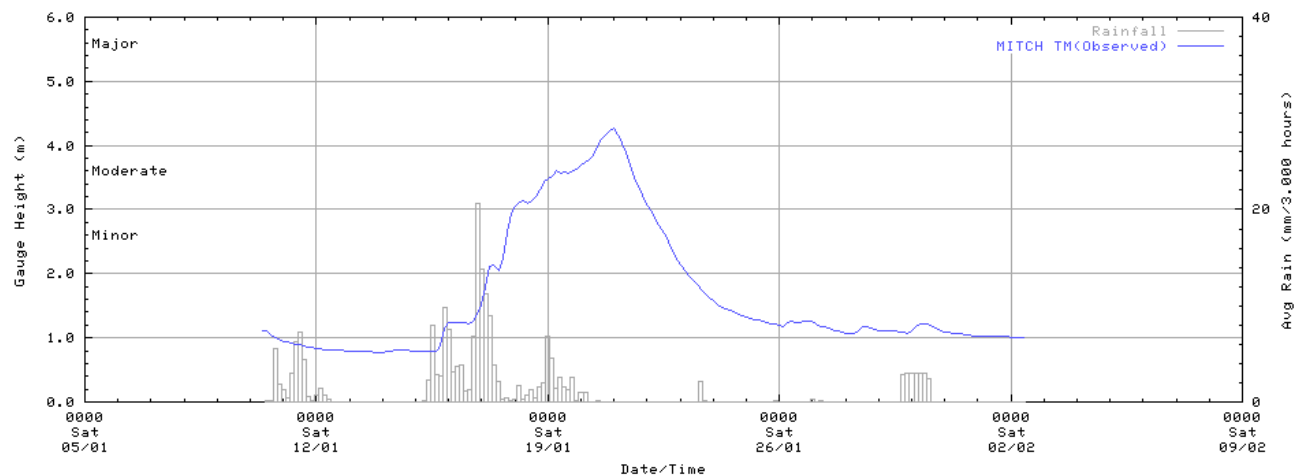
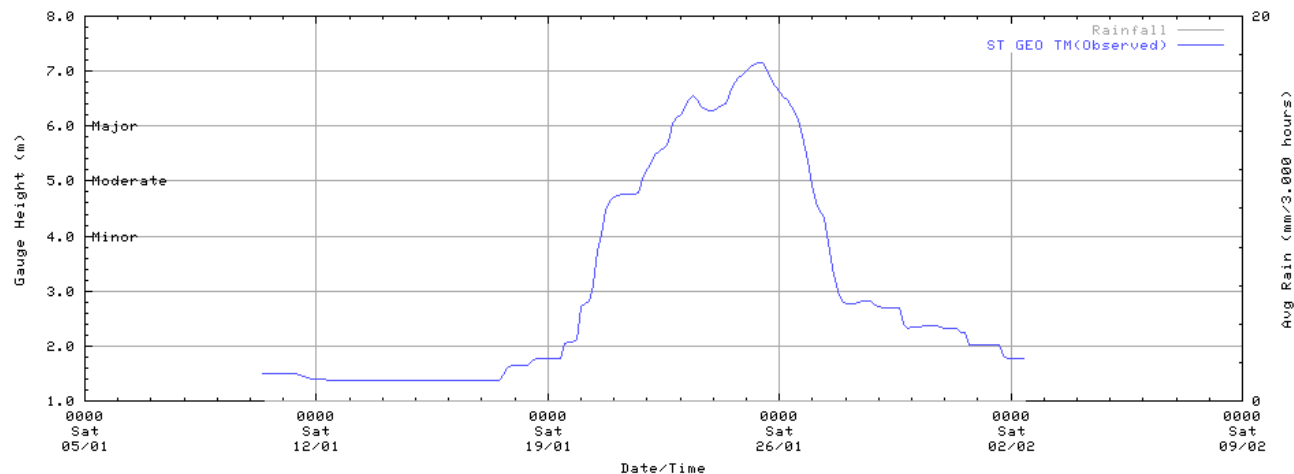
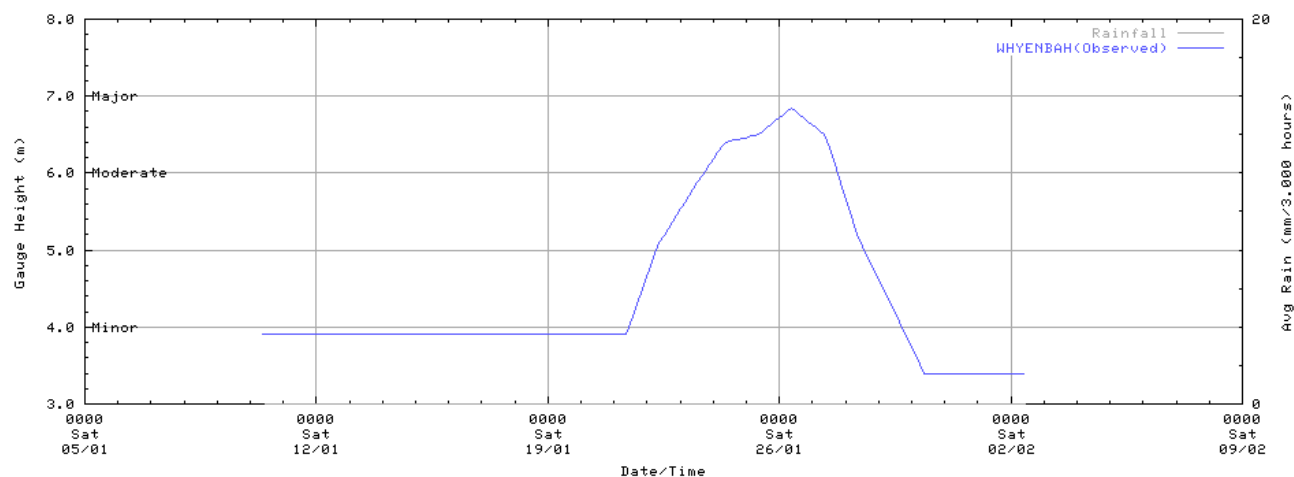
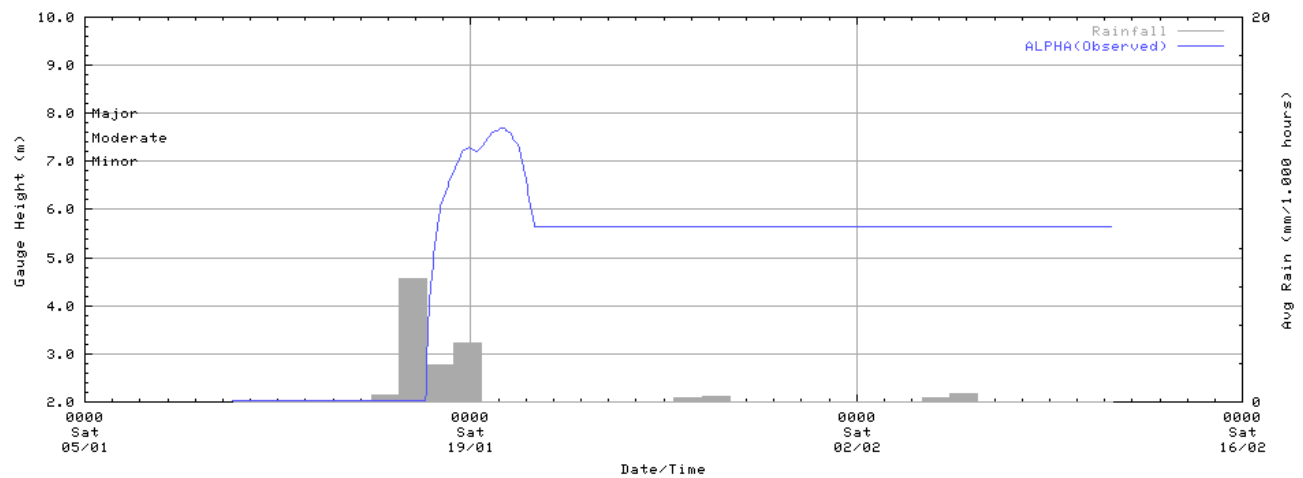
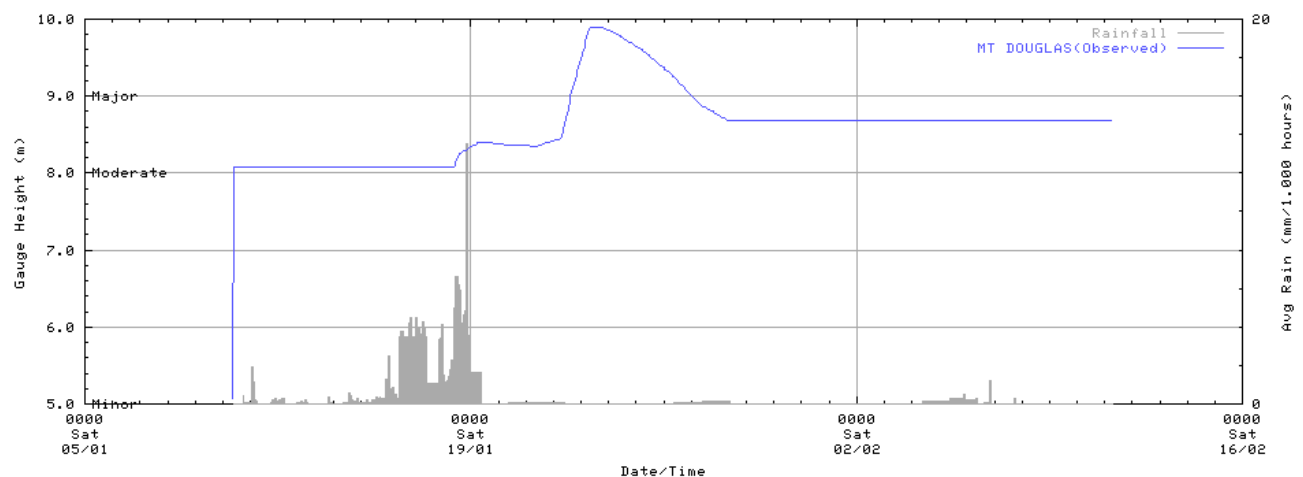
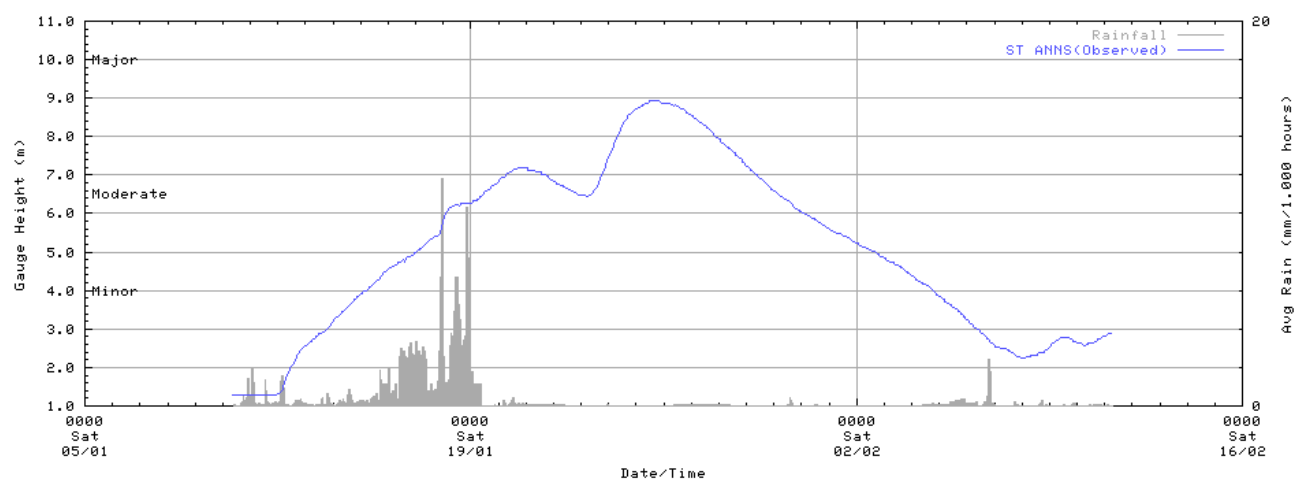
Figure 4.5.7 River Heights - Balonne and Maranoa Rivers**Mitchell – Maranoa River****St George – Balonne River****Whyenbah – Balonne River**

Figure 4.5.8 River Heights - Belyando and Suttor Rivers**Alpha - Alpha Creek****Mt Douglas – Belyando River****St Anns – Suttor River**

5 Warning Services

Table 5.1 Flood Warnings and Predictions issued between 10/1/2008 and 2/2/2008

River Basin	Number of Warnings	Number of Major Warnings	Number of Predictions	Number of Locations	First Warning	Last Warning
QLD Flood Summary	48				Continuous thru January and February	
FITZROY	43	43	60	4	6.22am Fri 18/1/2008	9.07am Sat 2/2/2008
PIONEER	2	0	0	0	2.55pm Sun 20/1/2008	7.17am Mon 21/1/2008
DON	20	1	4	1	5.19am Mon 14/1/2008	8.32am Sat 19/1/2008
BURDEKIN	20	10	13	4	8.33am Tue 15/1/2008	9.26am Mon 28/1/2008
HAUGHTON	12	6	3	1	7.30am Mon 14/1/2008	7.24am Thu 17/1/2008
CONDAMINE-BALONNE	7	5	3	2	9.47pm Tue 22/1/2008	9.39am Mon 28/1/2008
WARREGO	33	31	41	7	10.18am Thu 17/1/2008	9.26am Fri 1/2/2008
PAROO/BULLOO	33	26	17	5	5.43pm Fri 18/1/2008 4.58pm Fri 18/1/2008	Continued into February
COOPER CREEK	23	20	14	4	9.57am Mon 14/1/2008	Continued into February
TOTALS	244	142	155	28		

Table 5.2 Severe Weather Warnings for Flash Flooding issued between 10/1/2008 and 19/1/2008

Severe Weather Warnings for Flash Flooding – Total 18 (Headers Only)
<p>SEVERE WEATHER WARNING for Flash Flooding For people in the Herbert and Lower Burdekin District. Issued at 5:35 pm on Sunday 13 January 2008</p> <p>SEVERE WEATHER WARNING for Flash Flooding For people in the Herbert and Lower Burdekin District. Issued at 11:10 pm on Sunday 13 January 2008</p> <p>SEVERE WEATHER WARNING for Flash Flooding For people in the Herbert and Lower Burdekin District. Issued at 3:55 am on Monday 14 January 2008</p> <p>SEVERE WEATHER WARNING For people in the Herbert and Lower Burdekin District. Issued at 8:20 am on Monday 14 January 2008 Severe Weather Warning is CANCELLED.</p> <p>SEVERE WEATHER WARNING for Flash Flooding For people in Herbert Burdekin District south from Townsville Issued at 10:50 am on Tuesday 15 January 2008</p> <p>SEVERE WEATHER WARNING for Hazardous Winds and Flash Flooding. For people in Herbert Burdekin District south from Townsville Issued at 11:55 am on Tuesday 15 January 2008</p> <p>SEVERE WEATHER WARNING for Hazardous Winds and Flash Flooding. For people in Herbert and Lower Burdekin District, the Northern Goldfields and Upper Flinders. Issued at 12:10 pm on Tuesday 15 January 2008</p> <p>SEVERE WEATHER WARNING for Flash Flooding and Damaging Winds. For people in the southern Herbert and Lower Burdekin district, the Northern Goldfields and Upper Flinders district east of Pentland, and the Central Highlands and Coalfields district north of Moranbah. Issued at 2:50 pm on Tuesday 15 January 2008</p> <p>SEVERE WEATHER WARNING for Destructive Winds and Flash Flooding. For people in the southern Herbert and Lower Burdekin district, the Northern Goldfields and Upper Flinders district east of Pentland, and the Central Highlands and Coalfields district north of Moranbah. Issued at 3:55 pm on Tuesday 15 January 2008</p> <p>Reference to Flash Flooding Removed but warnings continued for strong wind.</p> <p>SEVERE WEATHER WARNING for Flash Flooding and local damaging wind gusts. For people in the Maranoa and Warrego, the southern Central Highlands and Coalfields, and the southeast Central West district. Issued at 10:25 am on Thursday 17 January 2008</p>

SEVERE WEATHER WARNING

for Flash Flooding and local damaging wind gusts.

For people in the Maranoa and Warrego, the southern Central Highlands and Coalfields, and the southeast Central West district.

Issued at 4:00 pm on Thursday 17 January 2008

SEVERE WEATHER WARNING

for Flash Flooding and local damaging wind gusts.

For people in the Maranoa, Warrego, Central Highlands, Coalfields, Central Coast

and the southeast Central West district.

Issued at 5:05 pm on Thursday 17 January 2008

SEVERE WEATHER WARNING

for Flash Flooding and local damaging wind gusts.

For people in the Maranoa and Warrego, Central Highlands and Coalfields, Central Coast

and southeast parts of the Central West district.

Issued at 11:15 pm on Thursday 17 January 2008

SEVERE WEATHER WARNING

for Flash Flooding and local damaging wind gusts.

For people in the Maranoa and Warrego, Central Highlands and Coalfields, Central Coast

and southeast parts of the Central West district.

Issued at 4:55 am on Friday 18 January 2008

SEVERE WEATHER WARNING

for Flash Flooding and local damaging wind gusts.

For people in the Maranoa and Warrego, Central Highlands and Coalfields, Central Coast

and southeast parts of the Central West district.

Issued at 11:05 am on Friday 18 January 2008

SEVERE WEATHER WARNING

for Flash Flooding and local damaging wind gusts.

For people in the Maranoa and Warrego, southern parts of the Central Highlands and Coalfields and southeast parts of the Central West district.

Issued at 4:35 pm on Friday 18 January 2008

SEVERE WEATHER WARNING

for Flash Flooding

For people in the Maranoa, Central Highlands and Coalfields.

Issued at 9:50 pm on Friday 18 January 2008

Severe Weather Warning is CANCELLED.

Table 5.3 Severe Storm Warnings for Flash Flooding issued between 10/1/2008 and 19/1/2008

Severe Weather Warnings for Flash Flooding – Total 9 (Headers and partial body)
<p>SEVERE THUNDERSTORM WARNING For FLASH FLOODING For people in parts of the Central Highlands & Coalfields and Central West Forecast Districts. Issued at 3:36 PM Wednesday, 16 January 2008.</p> <p>Severe thunderstorms are likely to produce very heavy rainfall and flash flooding in the warning area over the next several hours. Locations which may be affected include Clermont, Moranbah, Capella, Dysart, Alpha and Bogantungan.</p>
<p>SEVERE THUNDERSTORM WARNING For FLASH FLOODING For people in parts of the Central Highlands & Coalfields and Central West Forecast Districts. Issued at 5:42 PM Wednesday, 16 January 2008.</p> <p>Severe thunderstorms are likely to produce very heavy rainfall and flash flooding in the warning area over the next several hours. Locations which may be affected include Emerald, Clermont, Barcaldine, Moranbah, Tambo, Springsure, Capella, Dysart, Bogantungan, Jericho, Mantuan Downs and Aramac.</p> <p>Aramac has received 191mm of rainfall since 9am.</p>
<p>SEVERE THUNDERSTORM WARNING for FLASH FLOODING For people in parts of the Central Highlands & Coalfields, Central West and Maranoa & Warrego Forecast Districts. Issued at 8:16 PM Wednesday, 16 January 2008.</p> <p>Severe thunderstorms are likely to produce very heavy rainfall and flash flooding in the warning area over the next several hours. Locations which may be affected include Barcaldine, Tambo, Rolleston, Blackall, Springsure, Bogantungan, Jericho, Augathella and Mantuan Downs. The warning area also includes the Carnarvon Ranges and National Park.</p>
<p>SEVERE THUNDERSTORM WARNING for FLASH FLOODING For people in parts of the Central Highlands & Coalfields, Central West and Maranoa & Warrego Forecast Districts. Issued at 11:34 PM Wednesday, 16 January 2008.</p> <p>Severe thunderstorms are likely to produce very heavy rainfall and flash flooding in the warning area over the next several hours. Locations which may be affected include Tambo, Rolleston, Springsure, Alpha, Bogantungan, Jericho, Augathella and Mantuan Downs. This also includes the Carnarvon Ranges and National Park.</p>
<p>SEVERE THUNDERSTORM WARNING for FLASH FLOODING For people in parts of the Central Highlands & Coalfields, Central West and</p>

Maranoa & Warrego Forecast Districts.
Issued at 2:36 AM Thursday, 17 January 2008.

Severe thunderstorms are likely to produce very heavy rainfall and flash flooding in the warning area over the next several hours. Locations which may be affected include Tambo, Rolleston, Springsure, Alpha, Bogantungan, Jericho, Augathella and Mantuan Downs. This also includes the Carnarvon Ranges and National Park.

**SEVERE THUNDERSTORM WARNING
for FLASH FLOODING**

For people in parts of the
Central Highlands & Coalfields,
Central West and
Maranoa & Warrego Forecast Districts.
Issued at 5:26 AM Thursday, 17 January 2008.

Severe thunderstorms are likely to produce very heavy rainfall and flash flooding in the warning area over the next several hours. Locations which may be affected include Tambo, Rolleston, Springsure, Alpha, Bogantungan, Jericho, Augathella and Mantuan Downs. This also includes the Carnarvon Ranges and National Park.

**SEVERE THUNDERSTORM WARNING
for FLASH FLOODING**

For people in parts of the
Central Highlands & Coalfields and
Maranoa & Warrego Forecast Districts.
Issued at 8:00 AM Thursday, 17 January 2008.

Severe thunderstorms are likely to produce very heavy rainfall and flash flooding in the warning area over the next several hours. Locations which may be affected include Rolleston, Springsure, Alpha, Bogantungan and Mantuan Downs.

Rainfall reports in this area in the 100 to 200mm range since 9am yesterday.

**SEVERE THUNDERSTORM WARNING
for FLASH FLOODING**

For people in parts of the
Central Coast & Whitsundays Forecast District.
Issued at 12:43 PM Thursday, 17 January 2008.

Severe thunderstorms are likely to produce very heavy rainfall and flash flooding in the warning area over the next several hours. Locations which may be affected include Bowen and Collinsville.

Appendix 1. DNRW Usage Agreement



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