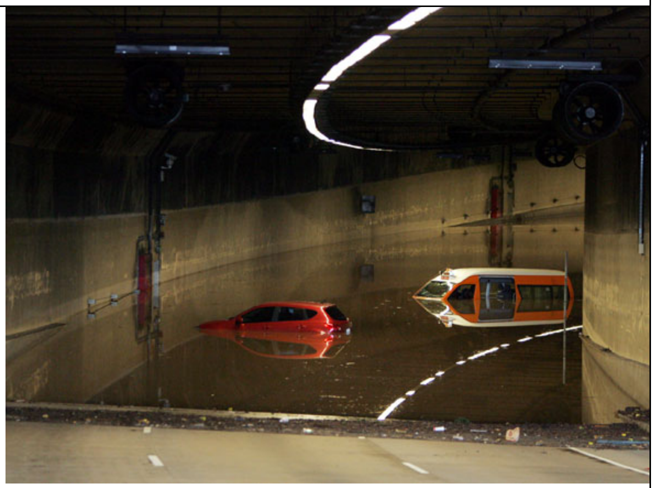
Australian Government

Bureau of Meteorology

Bremer River, Warrill, Lockyer and Laidley Creek Floods

November 2008



1	2
3	4
5	6

1. The Bremer River bursts over the Old Toowoomba Road Bridge at Leichhardt, Ipswich. Photo from Courier Mail website. User submitted Bruce Long.
2. Traffic crosses the Mount Crosby Weir as floodwater surges over the gates. Photo from Courier Mail website. User submitted Bruce Long.
3. A farmer's flooded in house at Rosewood. Photo from Courier Mail website. User submitted Bruce Long.
4. Abandoned vehicles in the Inner City Bypass, Bowen Hills. Photo from Courier Mail website. User submitted Steve Pohlner.
5. Vehicles negotiate floodwaters at the Laidley turnoff on the Warrego Highway. Photo from Courier Mail website. User submitted David Martinelli.
6. Floodwaters lap the foundations of the Riverlink shopping centre near Ipswich. Photo from Courier Mail website. User submitted Glenys Sanders.

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.

Table of Contents

Bremer River, Warrill, Lockyer and Laidley Creek Floods
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1. Introduction

Intense rainfall occurred overnight on Wednesday 19th November across South East Queensland, particularly in the Ipswich and Lockyer Valley area. This caused local flash flooding overnight with riverine flooding occurring in the Bremer River, the Lockyer, Laidley and Warrill Creeks on Thursday 20th November, 2008. Major flood levels were reached in the Bremer River and in the Lockyer, Ipswich and Northern Brisbane Creeks (see Figures 1.0.1 and 1.0.2).

A series of combined surface and upper level trough systems moved over South East Queensland in the previous three days leading up to Wednesday 19th November (see Figure 1.0.3). This produced significant rainfall over the catchments leading to reduced losses and saturated soils. The onset of this intense rainfall on to the saturated catchments caused very rapid runoff and fast river rises.

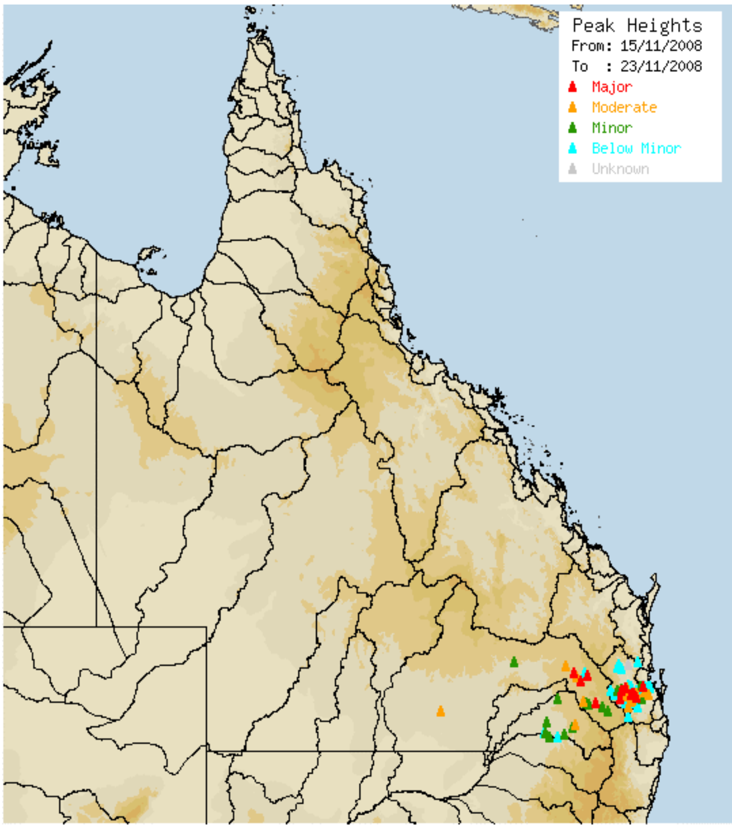
Homes were flooded around Ipswich, the Lockyer Valley, inner and western Brisbane and the Gold Coast. The small community of Forest Hill, with about 1000 residents, was completely cut off.

The Inner City Bypass in Brisbane and the Warrego Highway were closed due to flooding, while only one outbound lane on the Centenary Highway remained open. There was also localised flooding on the Ipswich Motorway. A bridge was washed away on Woolshed Creek at Tallagalla near Ipswich. Rail lines were closed between Bundamba and Ipswich stations, due to a mudslip at Ebbw Vale and Brisbane Road at Bundamba and Blackstone Road at Bundamba Creek were cut.

Swift water rescues were required for many people in cars trapped in floodwaters throughout the area. Tragically a woman died when the car she was travelling in was swept away by floodwaters at a crossing on Laidley Creek at Forest Hill near Gatton[1].

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

Figure 1.0.1 Peak Flood Height Map for Queensland 15-23 November 2008



[1] Flood effects taken from the Department of Emergency Services website and the Courier Mail website.

Figure 1.0.2 Peak flood Height Map for South East Queensland 15-23 November 2008

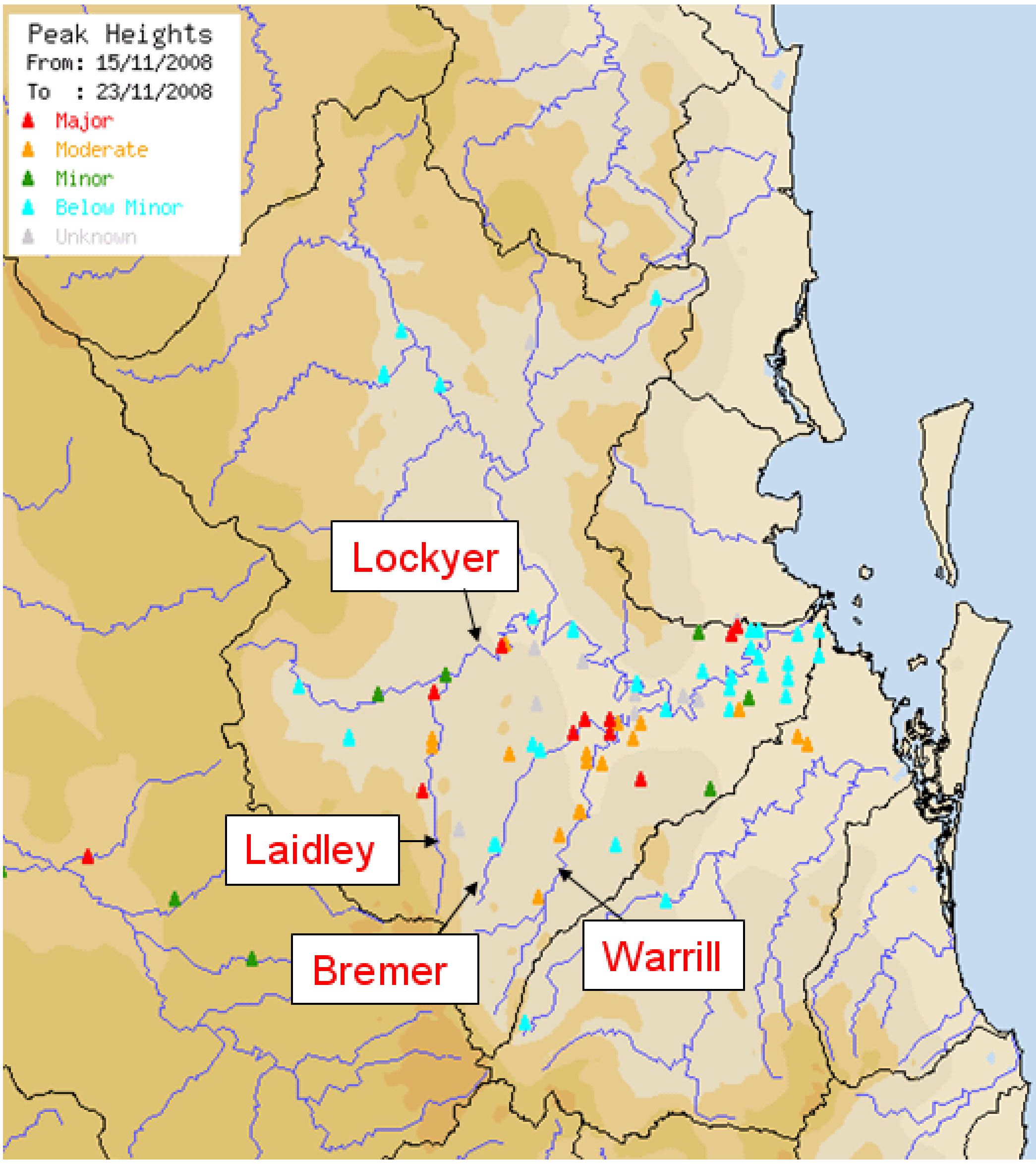
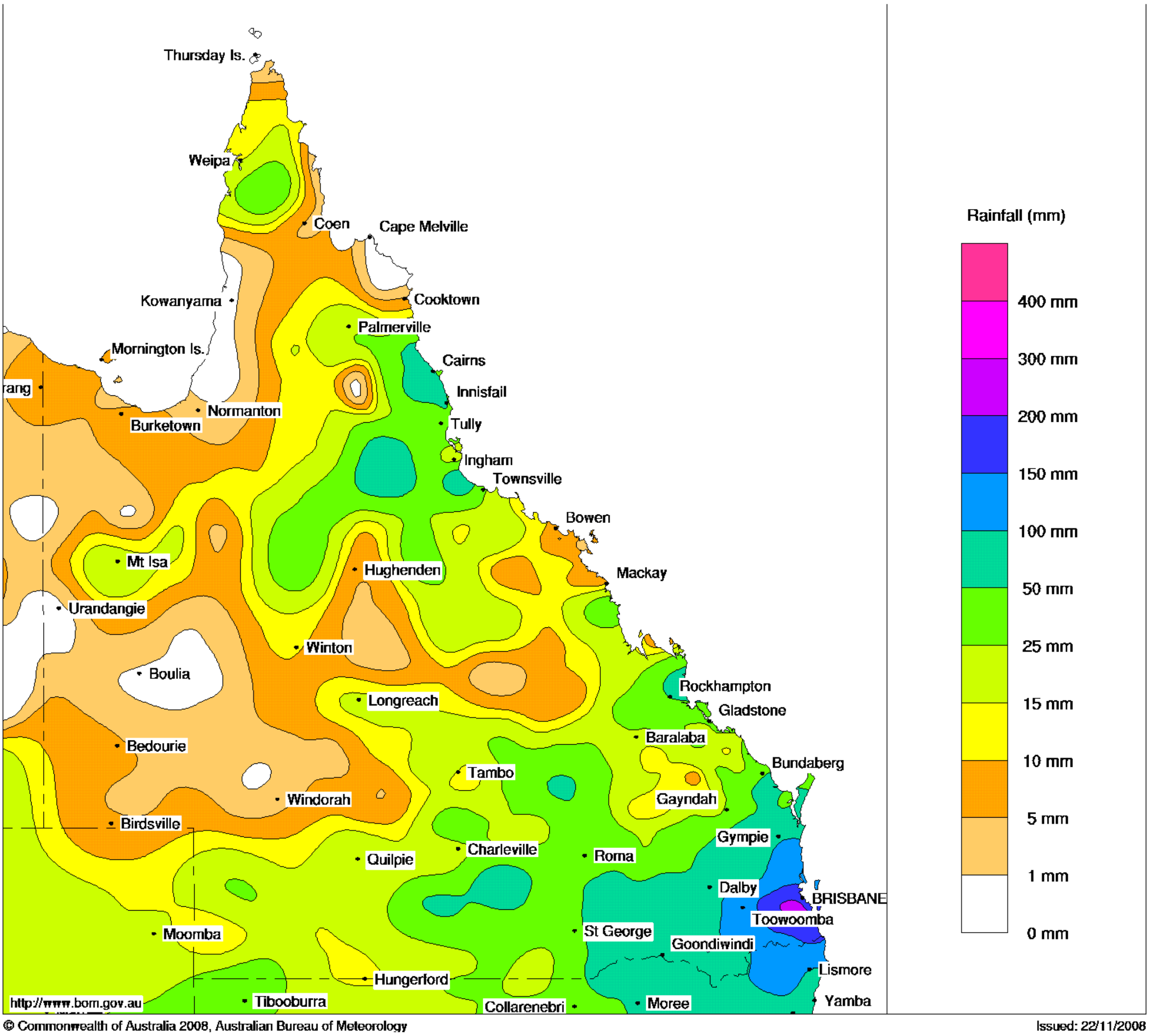


Figure 1.0.3 Rainfall Map of Queensland for the 7 Days to 22nd November 2008



2. Meteorological Summary

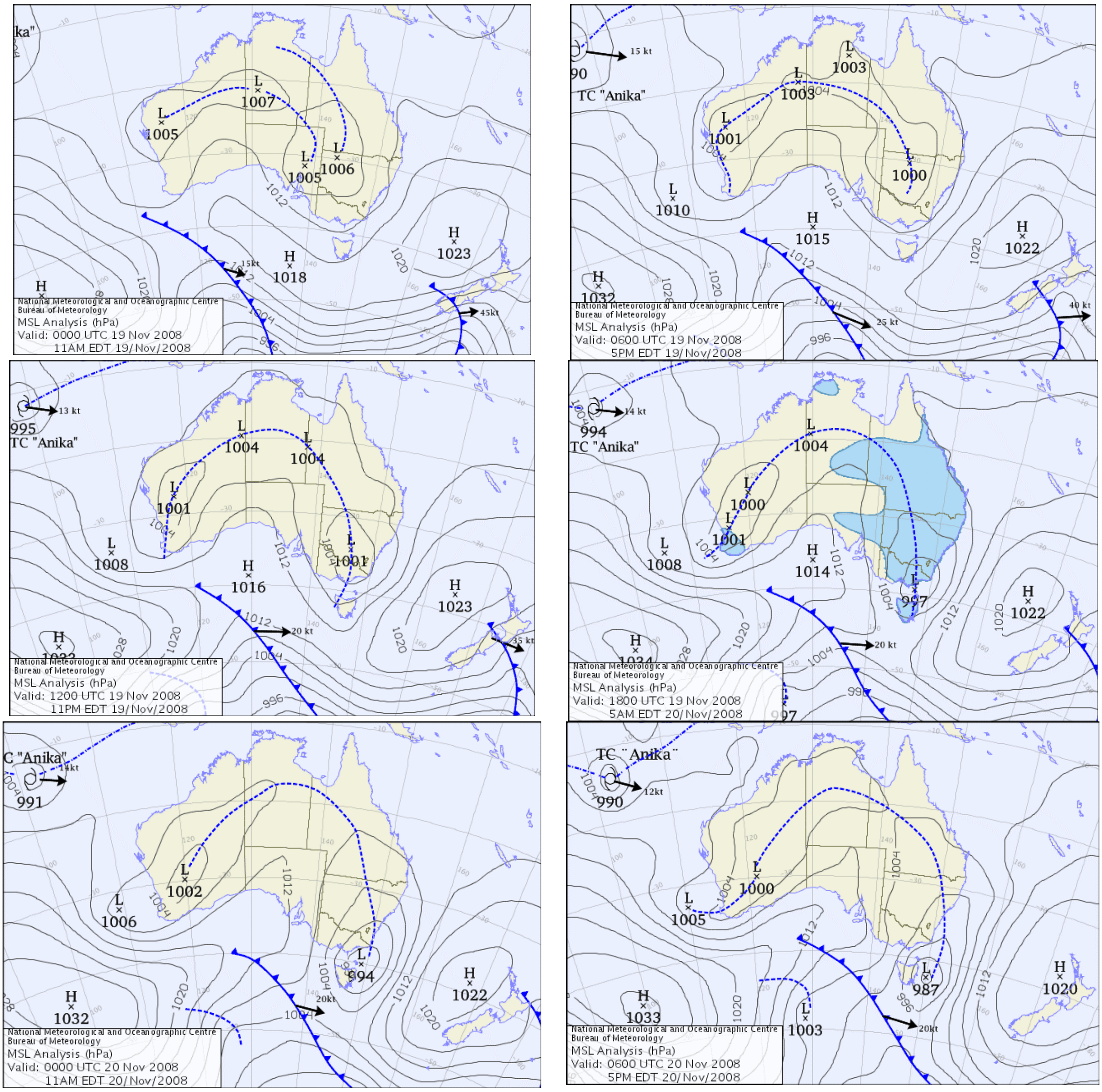
A surface trough that extended through inland Queensland combined with an upper level trough system to deliver severe thunderstorms and flood rainfall across parts of south east Queensland overnight on the 19th of November.

This chapter presents a discussion and analysis of the meteorological conditions that led to the intense rainfall.

2.1 Meteorological Analysis

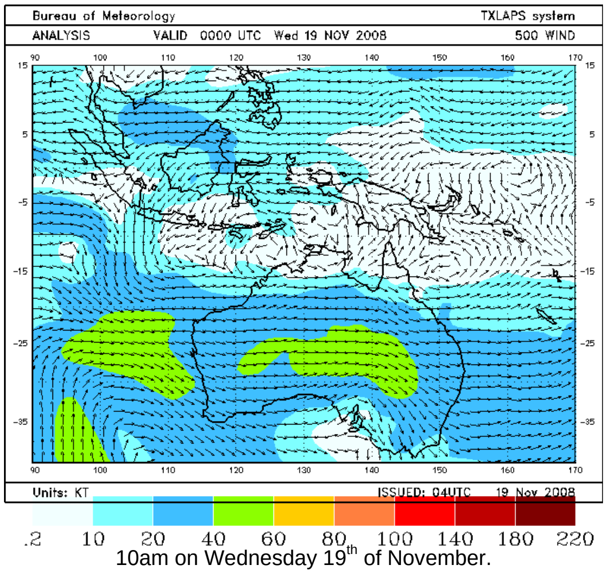
The flood rains that occurred across south east Queensland overnight on the 19th of November resulted from a surface low-pressure trough system interacting with a trough at 5500 metres above the surface. The Mean Sea Level Pressure analysis for 4pm EST on the 19th of November, see Figure 2.1.1, shows the trough system extending from central west Queensland to south west QLD. To the east of this trough north easterly winds provided low level moisture across SE Queensland on Wednesday afternoon.

Figure 2.1.1 Weather Charts for Australia from the19th to 20th of November 2008.

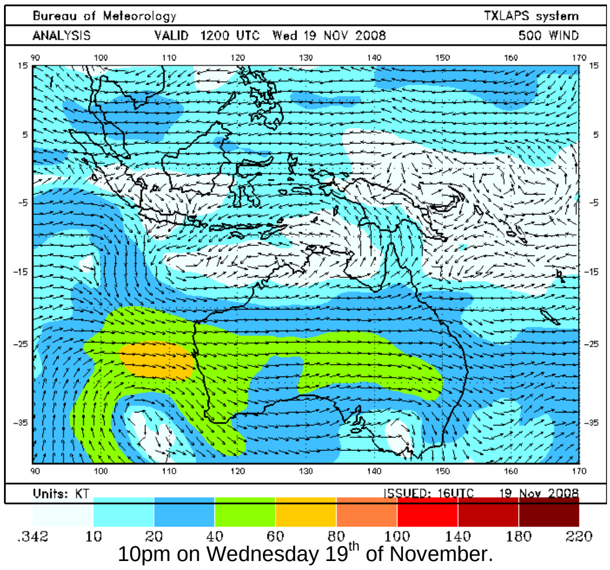


The development of an upper trough over land to the east of the Mean Sea Level low-pressure system was also occurring at a level 5,500 metres above the surface, as can be seen in the analysis at Figure 2.1.2. At 10pm EST on the 19th of November this trough was located over the heavy rainfall area.

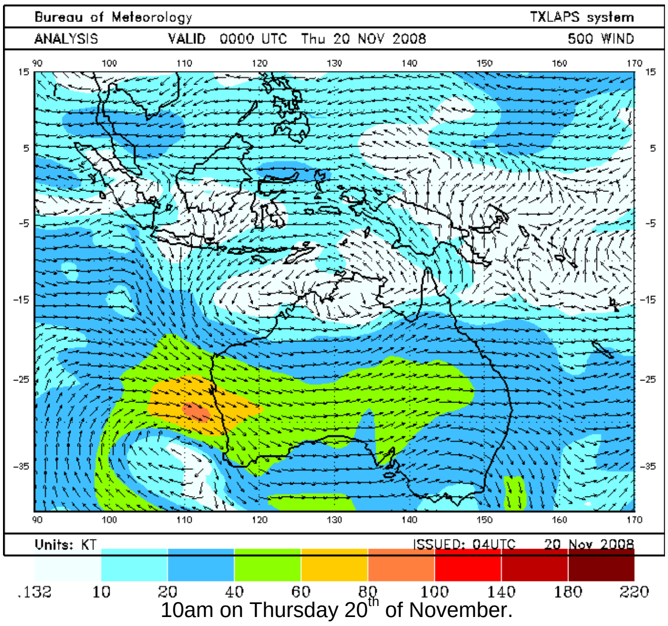
Figure 2.1.2 Upper wind charts (5500 metres) for Australia from the 19th to the 20th of November 2008.



10am on Wednesday 19th of November.



10pm on Wednesday 19th of November.



10am on Thursday 20th of November.

The inland surface trough remained over the southern interior. A weakening SE change near Fraser Island moved southwards as surface winds shifted NE resulting in an enhancement of the vertical wind profile that saw winds turning anti-clockwise with height. Such a profile depicts Warm Air Advection (WAA) characteristic of the ascent of air and the formation of rainbands[2].

2.2 Radar Imagery Analysis

Mt Stapylton 3-dimensional volumetric radar imagery was available throughout the 19th and 20th November 2008. An analysis of this data shows that severe thunderstorms developed around Toowoomba and the Lockyer Valley during the afternoon on the 19th of November. In the evening an eastward moving rain band covered south east Queensland. This slow moving rain band cleared Toowoomba and the Lockyer Valley around 3am on the 20th. From 9pm to 3am moderate to heavy rainfall persisted over the Ipswich to Toowoomba area.

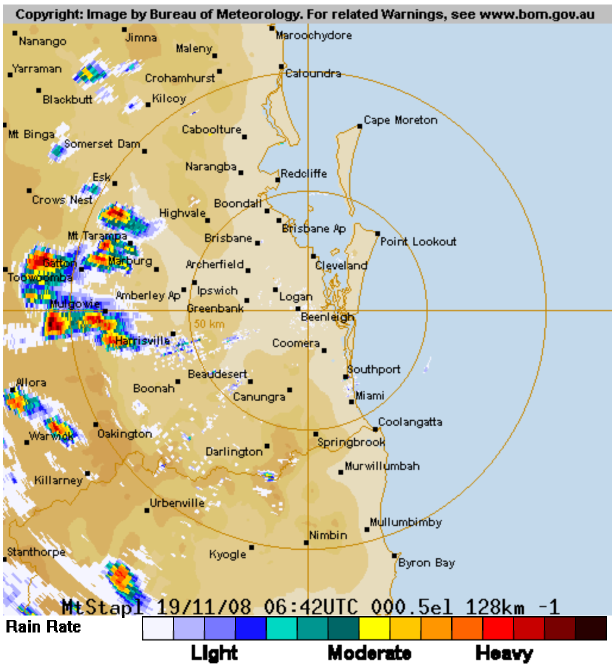
Figure 2.2.1 shows radar imagery from the Mt Stapylton radar for selected times between 4:30 pm and 11:30 pm on the 19th of November 2008.

Figure 2.2.2 shows radar imagery from the Mt Stapylton radar for selected times between 5:30pm and 8:00pm on the 20th of November 2008.

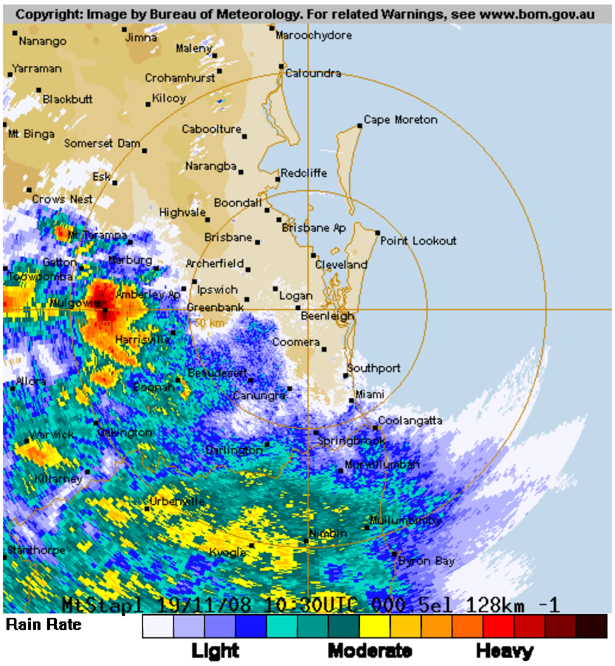
[2] Studies by Bonell, Callaghan and Connor (2005) have revealed that intense rainfall in southeast Queensland is typically associated with a vertical wind profile that sees winds turning anti-clockwise with height, namely WAA, with the highest rainfalls recorded from events where winds were mostly in the north-east quadrant.

Figure 2.2.1 Radar Pictures at 4:42pm, 8:30pm, 10:30pm and 11:30pm on the 19th of November 2008.

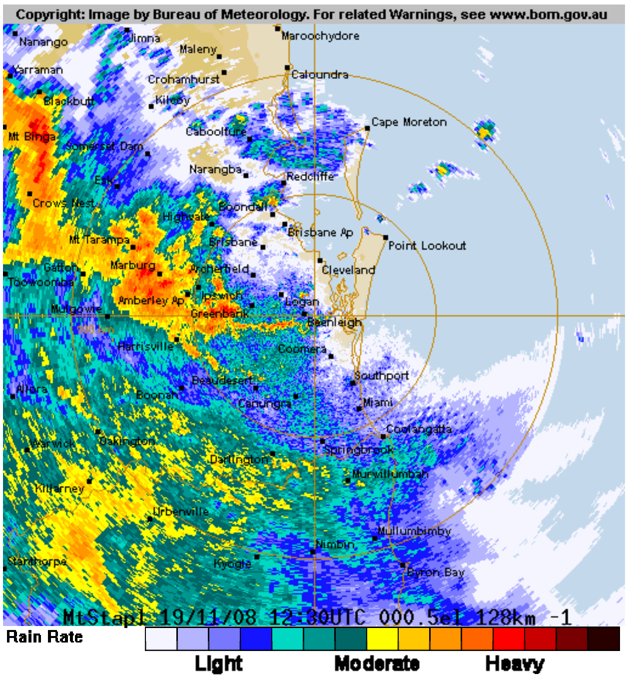
4:42pm EST on 19th of November 2008



8:30pm EST on 19th of November 2008



10:30pm EST on 19th of November 2008



11:30pm EST on 19th of November 2008

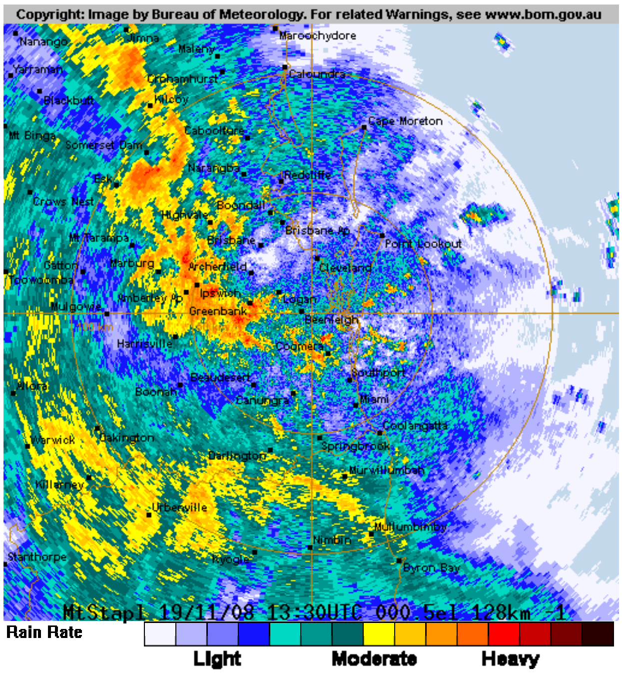
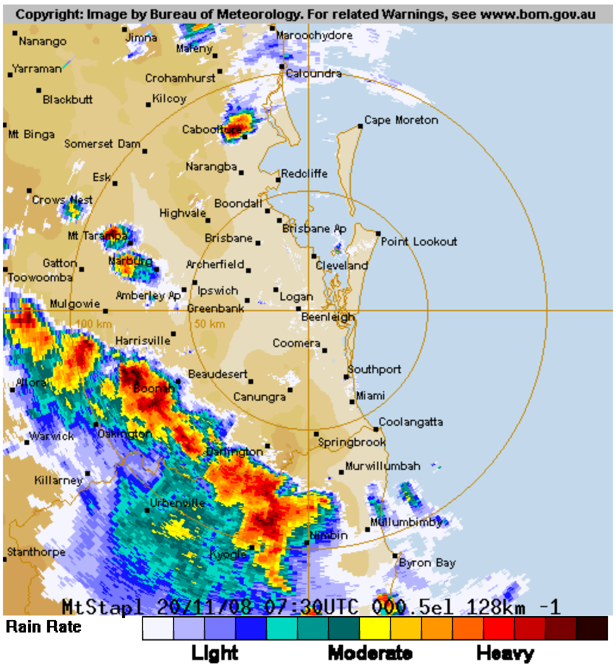
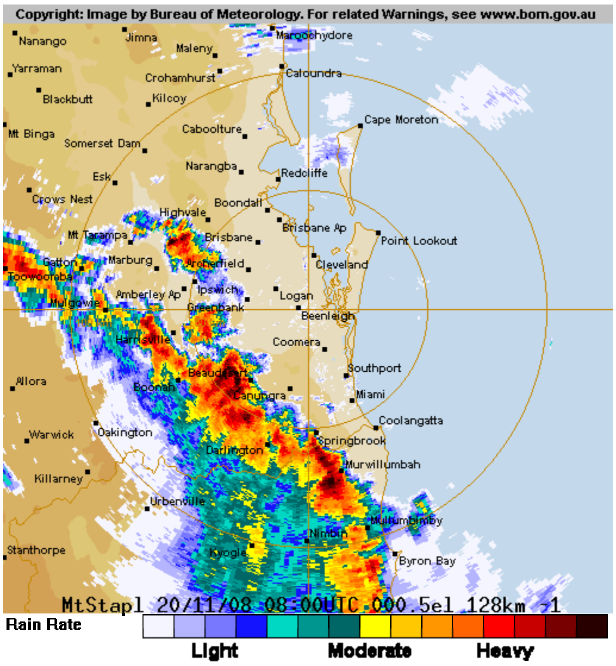


Figure 2.2.2 Radar Pictures at 5:30pm, 6:00pm, 7:00pm and 8:00pm on the 20th of November 2008.

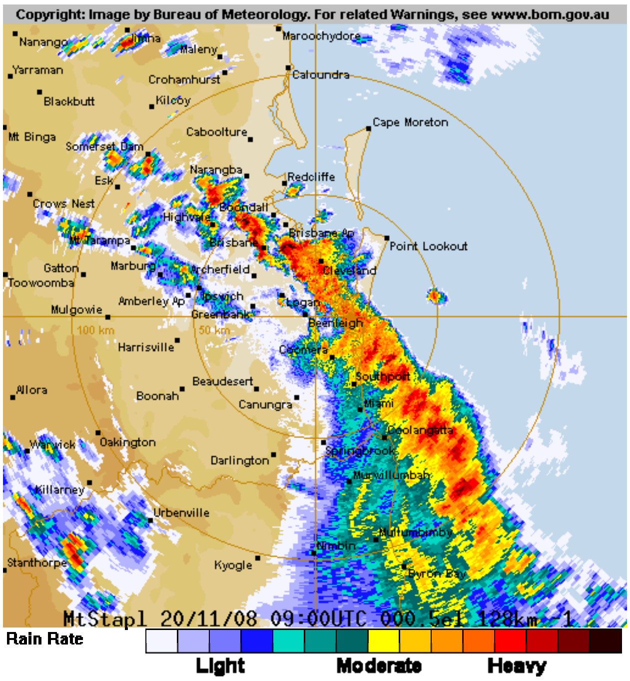
5:30pm EST on 20th of November 2008



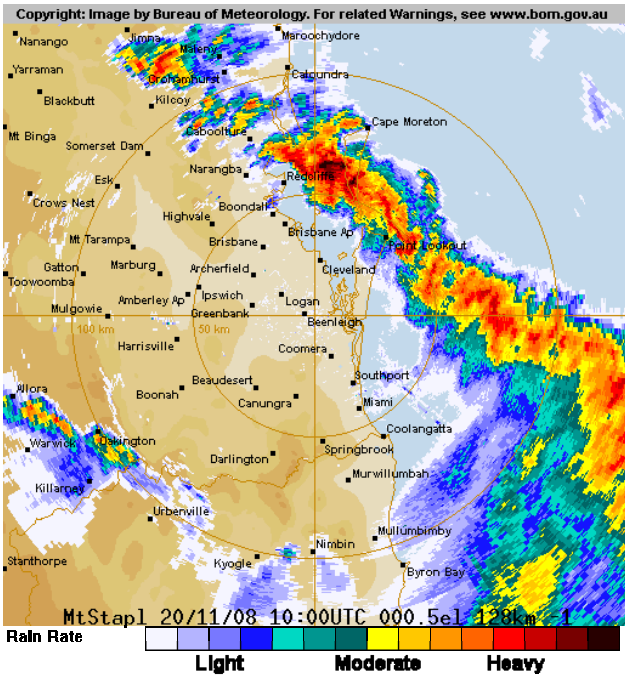
6:00pm EST on 20th of November 2008



7:00pm EST on 20th of November 2008



8:00pm EST on 20th of November 2008



3. Hydrology

The flooding in the Bremer River, the Lockyer, Laidley and Warrill Creeks on Thursday 20th November, 2008 caused considerable damage and was the most significant flooding in some parts of the region since 1974. As can be seen from Table 3.0.1, several locations had their second highest flood on record and others were the highest for many years.

In the Laidley Creek, major flooding was the highest since 2001at Mulgowie TM. At Laidley moderate flooding was the highest since 2004, but the records for this site only started in 1990. Further downstream at Warrego Highway TM major flooding was the highest since 1996, but the records for this site only go back to 1991.

Major flooding at Lyons Bridge on the Lockyer Creek was the highest on record since 2001, from a record starting in 1955.

Major flood levels reached in the Bremer River at Walloon were the highest since 1974 and the 2nd highest on record, with records going back to 1974. Downstream, major flood levels at Brassall (Hancocks Bridge) Alert were the highest since 1996 and the 3rd highest on record, with records going back 1974. Moderate flooding at Ipswich was the highest since 1996 but only the 27th highest on record, with a long record dating back to 1840.

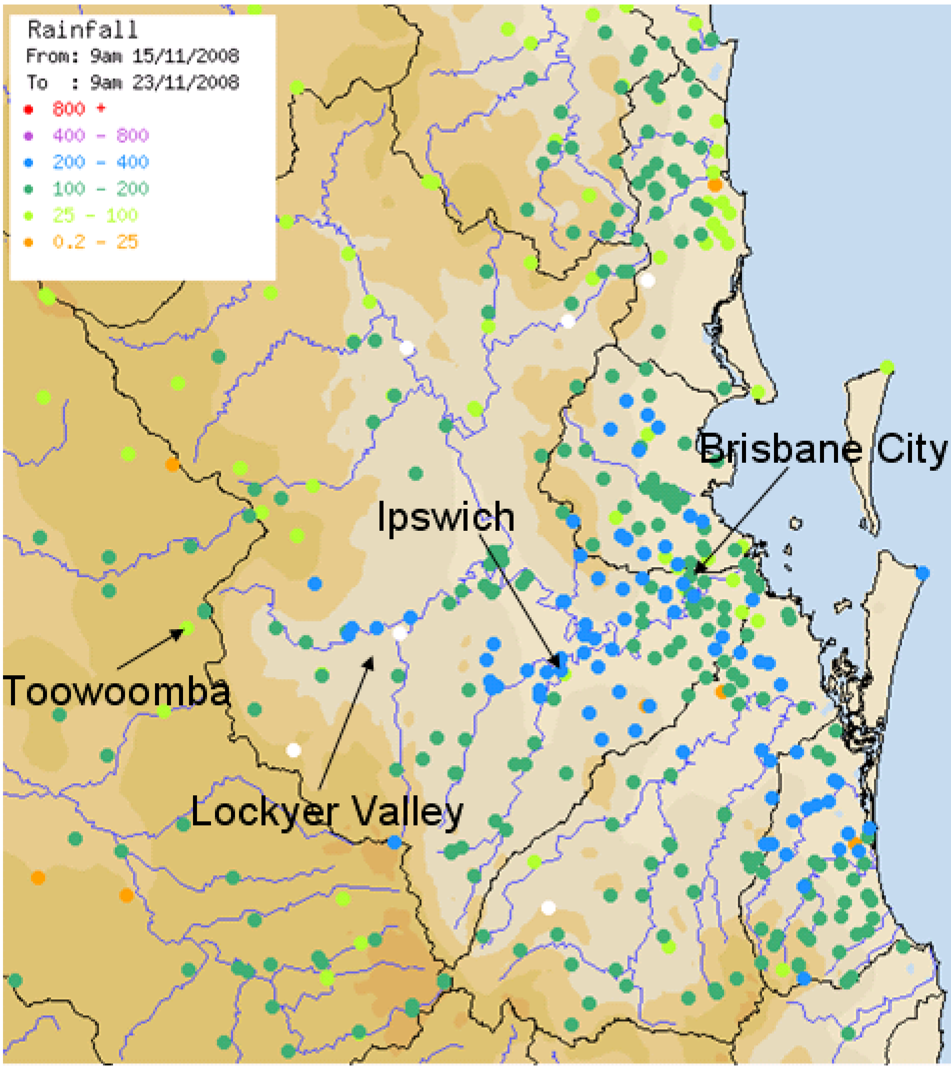
Major flood levels at Ripley Alert on Bundamba Creek and Ithaca Alert on Ithaca Creek were both the 2nd highest on record, with records going back to 1974.

Table 3.0.1 Peak Height Comparison to Records

Gauging Station	Nov 2008 Peak (metres)	Start of Record	Ranking	Highest Since	Highest on Record
Laidley Creek at Mulgowie TM	7.07m	1967	33rd	Feb 2001 (7 years)	9.14m Jan 1976
Laidley Creek at Laidley	6.10m	1990	6th	Mar 2004 (4 years)	8.50m May 1996
Laidley Creek at Warrego Highway TM	6.03m	1991	3rd	May 1996 (12 years)	6.77m May 1996
Lockyer Creek at Lyons Bridge	13.12m	1955	19th	Feb 2001 (7 years)	17.46m Mar 1955
Bremer River at Walloon	7.87m	1974	2nd	Jan 1974 (34 years)	8.70m Jan 1974
Bremer River at Walloon TM	9.28m	1961	3rd	Apr 1988 (20 years)	11.56m Jan 1974
Bremer River at One Mile Bridge Alert	16.13m	1974	6th	Apr 1988 (20 years)	25.10m Jan 1974
Bremer River at Brassall (Hancocks Bridge) Alert	13.73m	1974	3rd	May 1996 (12 years)	22.60m Jan 1974
Bremer River at Ipswich	10.00m	1840	27th	May 1996 (12 years)	24.50m Feb 1893
Bundamba Creek at Ripley Alert	54.30m	1974	2nd	Jan 1974 (34 years)	58.85m Jan 1974
Ithaca Creek at Ithaca Alert	15.06m	1974	2nd	Jan 1974 (34 years)	15.49m Jan 1974
Warrill Creek at Harrisville	4.65m	1893	35th	Jan 2008 (0 years)	8.33m Feb 1893
Purga Creek at Loamside	7.16m	1974	16th	May 1996 (12 years)	9.26m Jan 1974

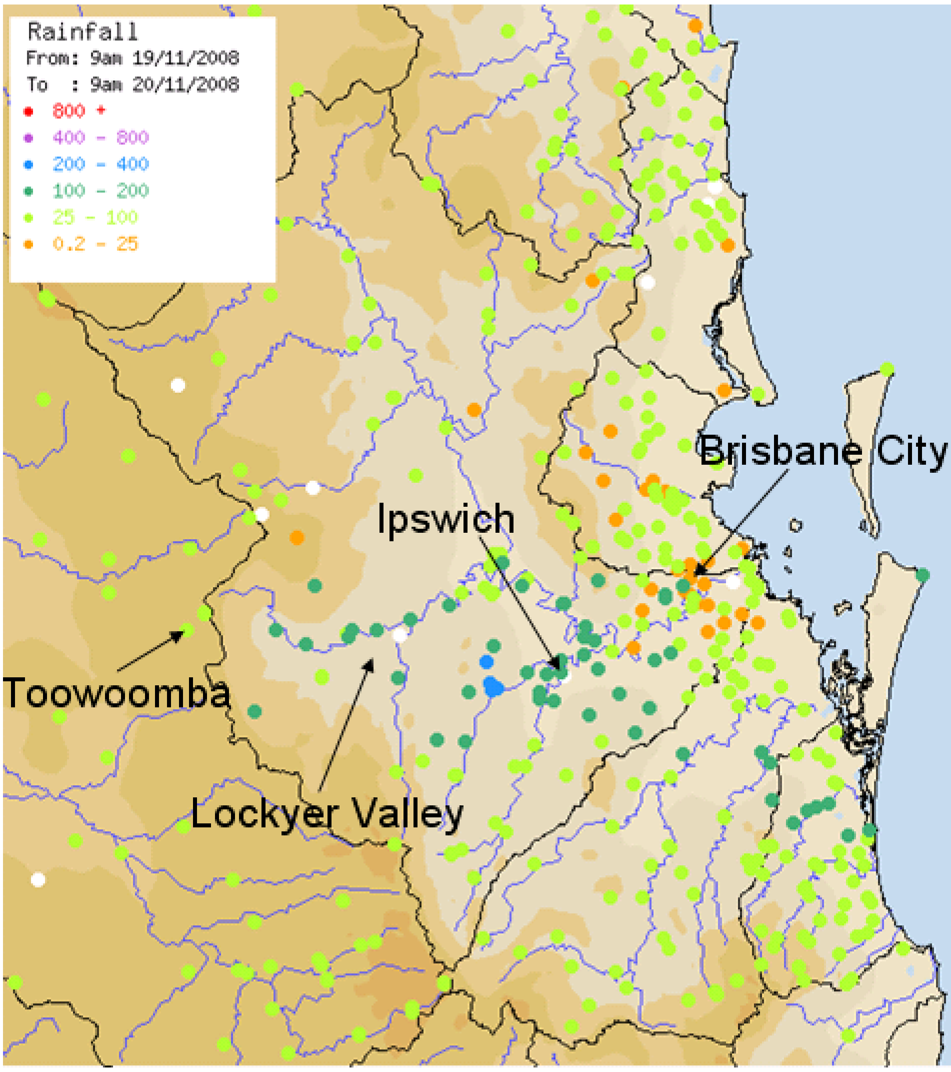
3.1 Rainfall Map

Figure 3.1.1 Rainfall Map of South East Queensland for the 7 Days to 23th November 2008



This maps shows the rainfall recorded during the 7 days to 23rd November along the South East Coast and especially Ipswich/Lockyer Valley area. Most catchments were saturated before the heavy rainfall that occurred on the night of the 19th November. Rainfall amounts are in millimetres.

Figure 3.1.2 Rainfall Map of South East Queensland for the 24 hours to 9am 20th November 2008

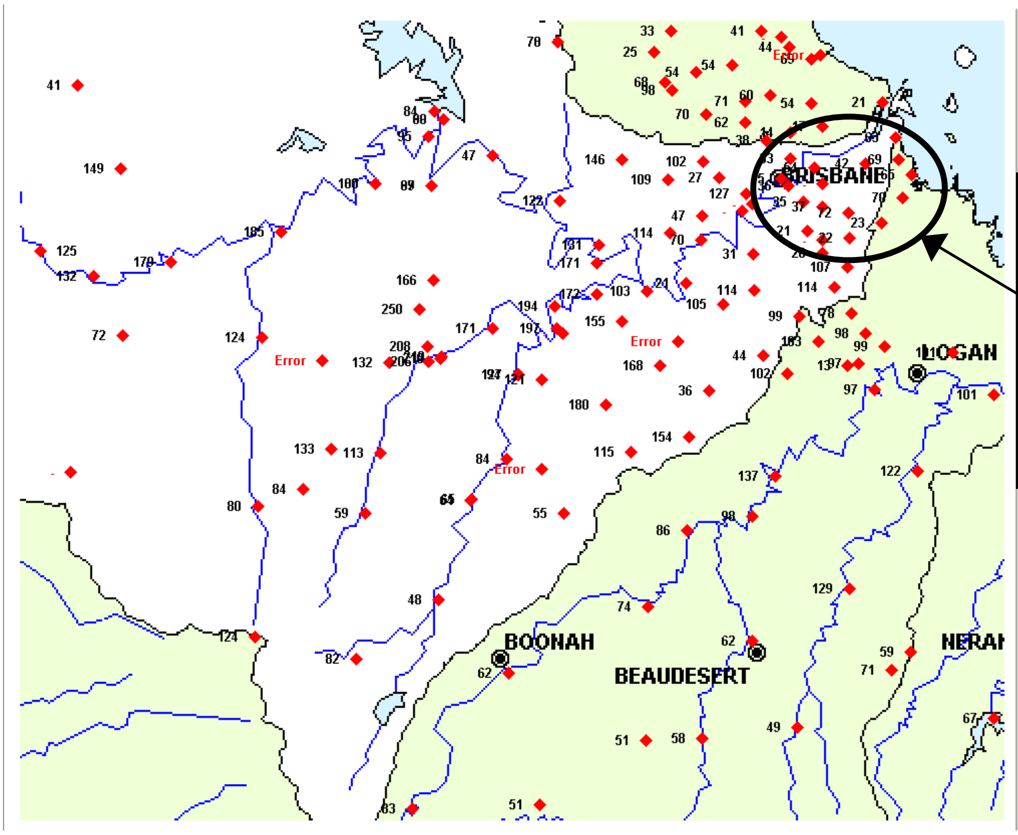


This map shows the large rainfall totals received overnight in the Ipswich/Lockyer Valley area. Rainfall amounts are in millimetres.

Rainfall Maps for the Bremer River, Warril and Lockyer Creeks

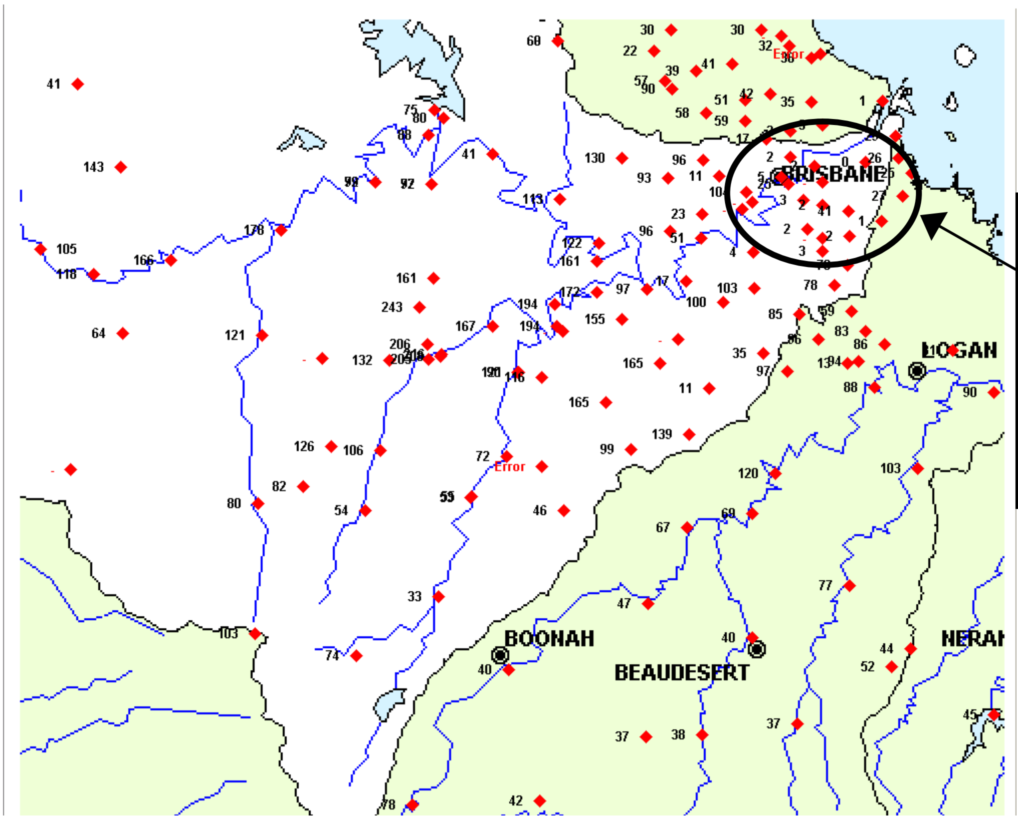
The rainfall amounts in Figures 3.1.3 to 3.1.8 are all given in millimetres.

Figure 3.1.3 Rainfall Maps for 48 hours to 09:00 21 November 2008



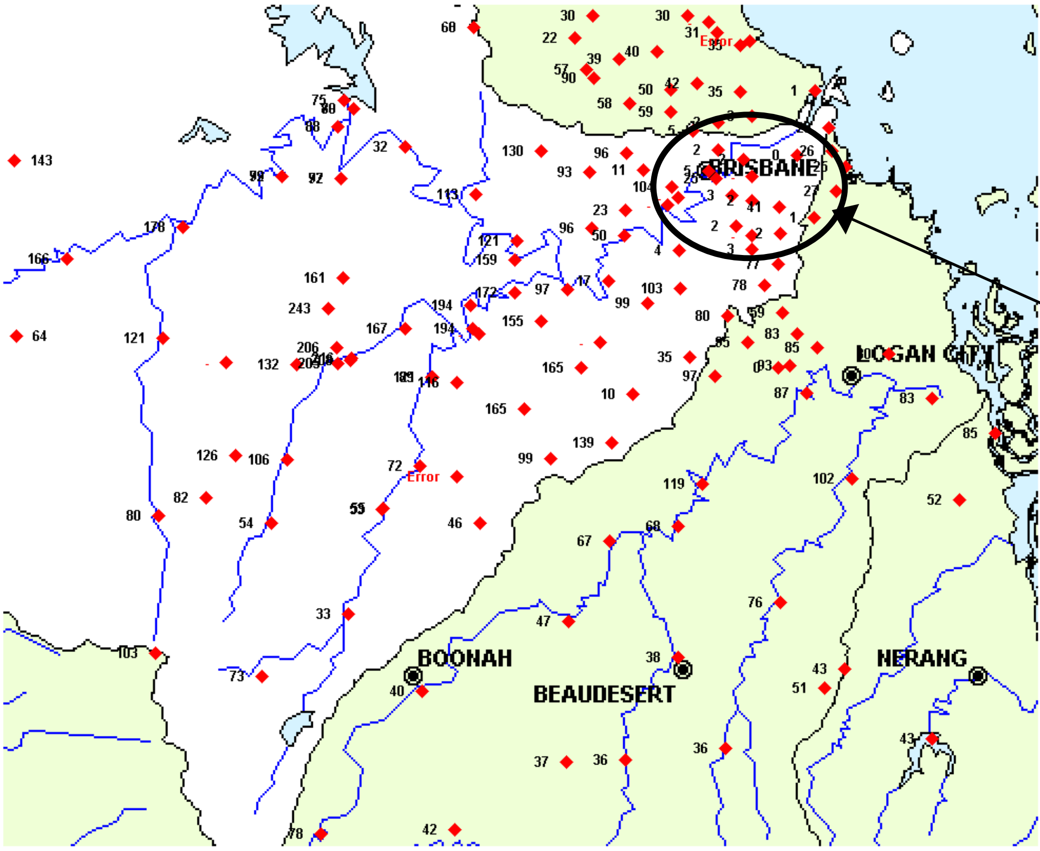
Note: In the Brisbane area a communications failure caused the loss of data. This resulted in lower than expected rainfall totals.

Figure 3.1.4 Rainfall Maps for 24 hours to 09:00 20 November 2008



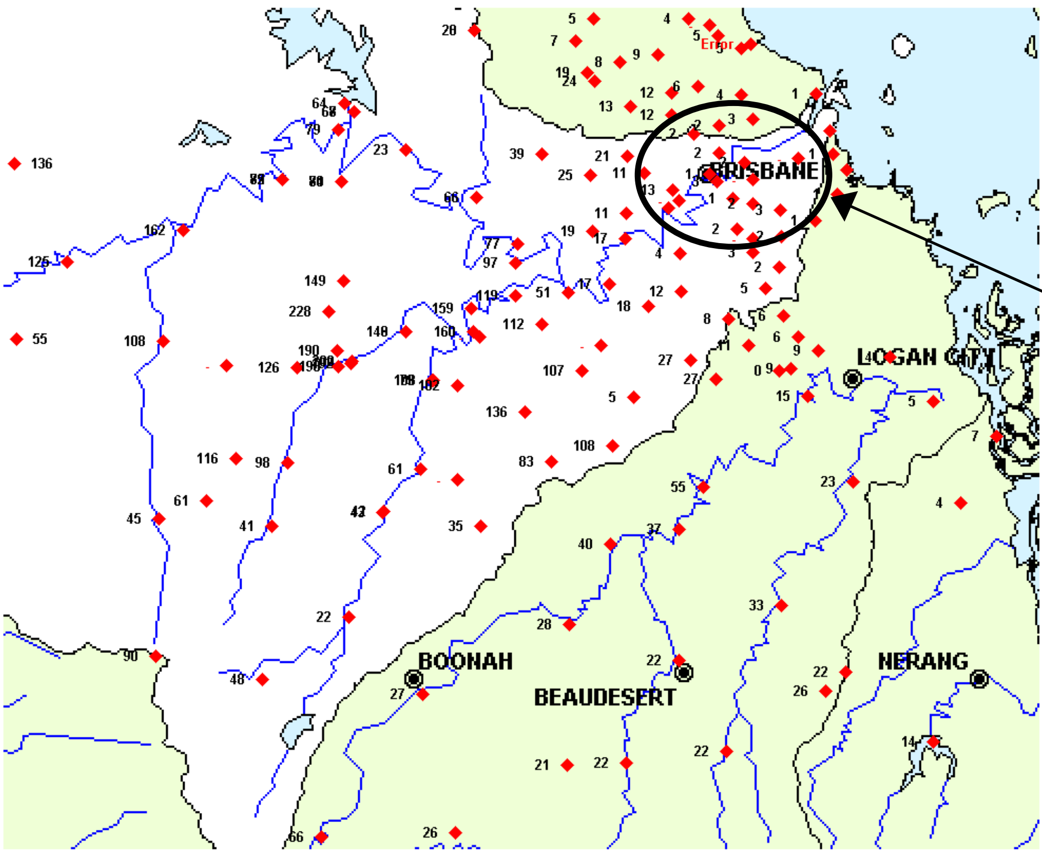
Note: In the Brisbane area a communications failure caused the loss of data. This resulted in lower than expected rainfall totals.

Figure 3.1.5 Rainfall Maps for 12 hours to 03:00 20 November 2008



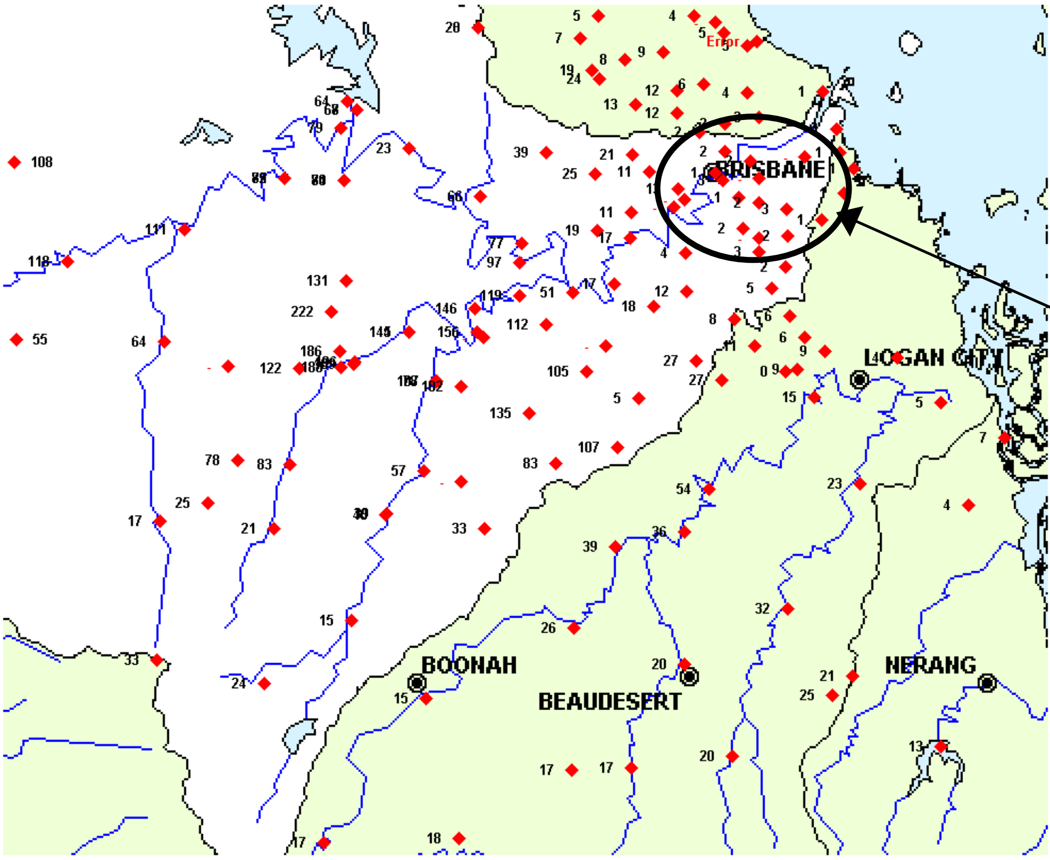
Note: In the Brisbane area a communications failure caused the loss of data. This resulted in lower than expected rainfall totals.

Figure 3.1.6 Rainfall Maps for 6 hours to 00:00 20 November 2008



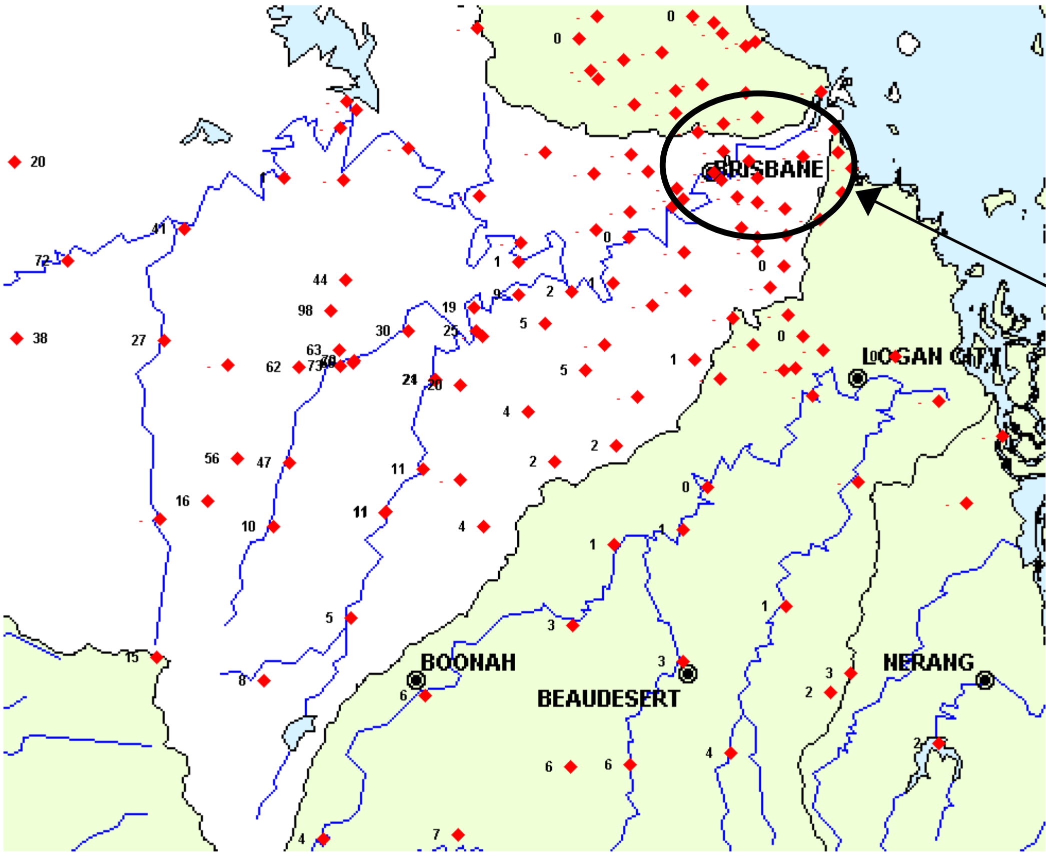
Note: In the Brisbane area a communications failure caused the loss of data. This resulted in lower than expected rainfall totals.

Figure 3.1.7 Rainfall Maps for 3 hours to 00:00 20 November 2008



Note: In the Brisbane area a communications failure caused the loss of data. This resulted in lower than expected rainfall totals.

Figure 3.1.8 Rainfall Maps for 1 hour to 22:00 19 November 2008



Note: In the Brisbane area a communications failure caused the loss of data. This resulted in lower than expected rainfall totals.

3.2 Rainfall Intensity

The most intense rainfall that occurred overnight on Wednesday 19th November was in the headwaters of the Bremer River, the Lockyer, Laidley and Warrill Creeks. For some of the key stations from these catchments Hourly Hyetographs (Figure 3.2.1) and Intensity Frequency Duration (IFD) analyses (Figures 3.2.2) have been produced.

The highest rainfall total was at Tallegalla Alert near the Bremer River where 243 millimetres was recorded in the 24 hours to 9am 20th November 2008. The observed rainfall intensities during the night of the 19th November have been assessed as exceeding 1% AEP (100 year Average Recurrence Interval (ARI)) intensities for durations between 1 and 24 hours. (Figure 3.2.2)

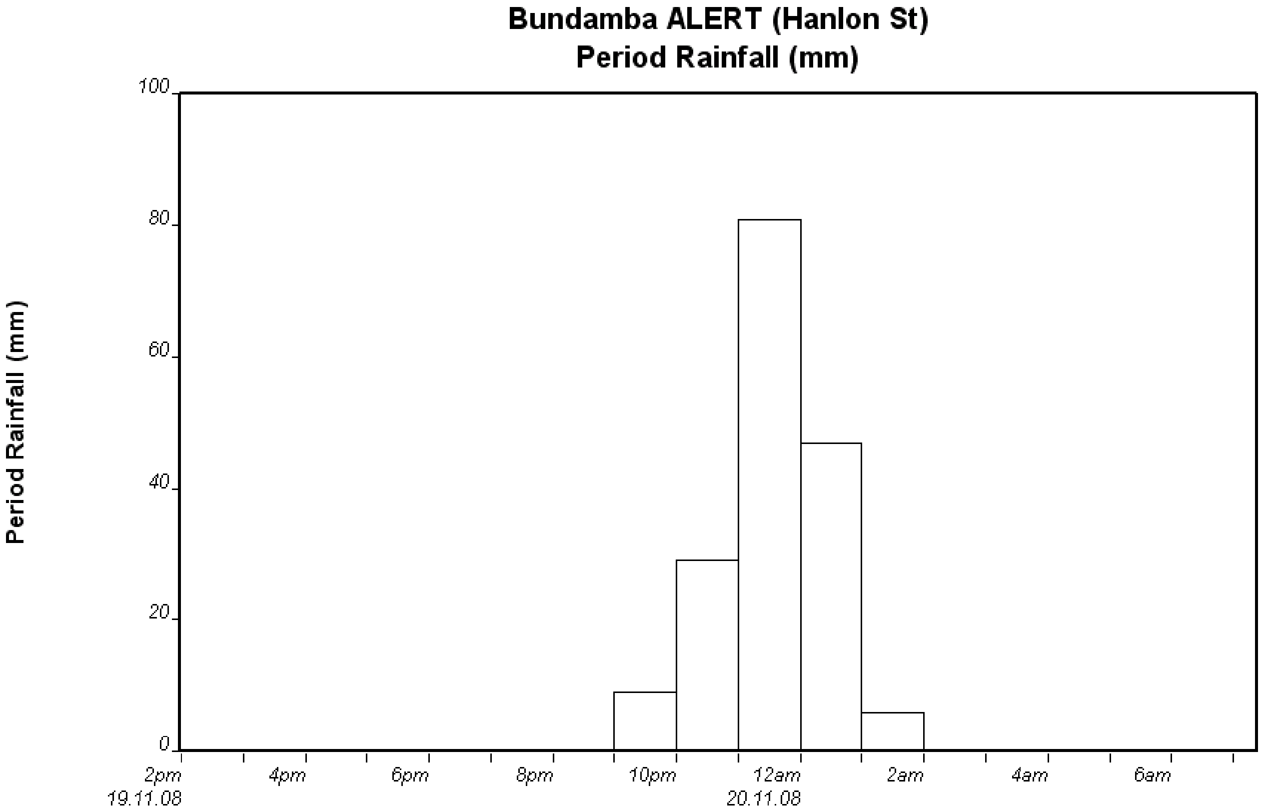
Rosewood and Brassall, also on the Bremer River, received 204mm and 194mm respectively in the 24 hours to 9am 20th November 2008. The observed rainfall intensities during the night of the 19th November have been assessed as exceeding 1% AEP (100 year Average Recurrence Interval (ARI)) intensities for durations between 2 and 12 hours for Rosewood and between 3 and 6 hours for Brassall. (Figure 3.2.2)

In the Ipswich/Brisbane Creek rainfalls was not as statistically significant. At Bundamba 172mm in the 24 hours to 9am 20th November 2008 was recorded. A comparison of observed intensities to IFD intensities for the rainfall at Bundamba can be found in Figure 3.2.2 and shows that only the maximum observed 3 hour intensity during the event exceeded the 1% AEP (100 year ARI) intensity.

The rainfall in the Upper Brisbane was also less significant statistically. The IFD analysis of observed data for Wivenhoe Dam, which received 77mm in the 24 hours to 9am 20th November 2008, indicates the rainfall intensities were at most 20-50% AEP (2-5 year ARI).

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 Bundamba Alert (Hanlon St) and Tallegalla Alert



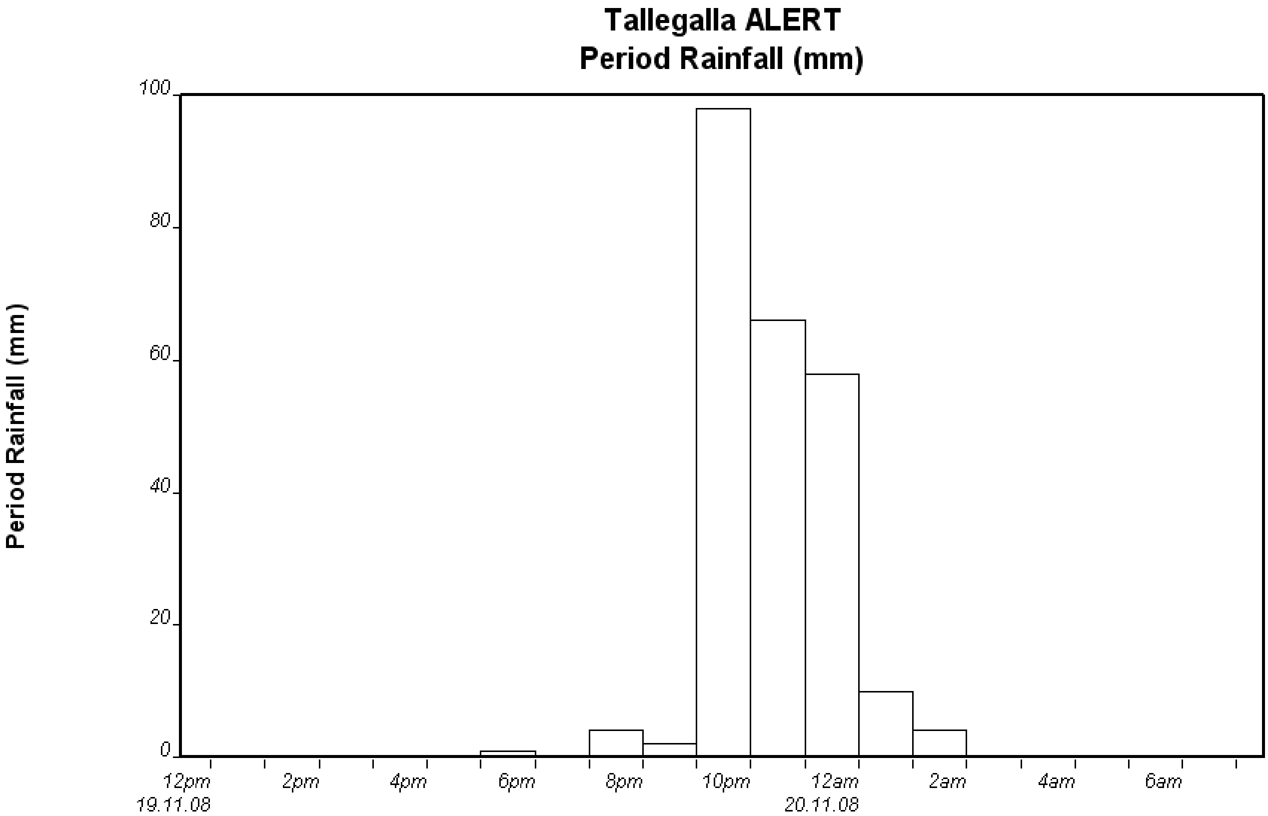
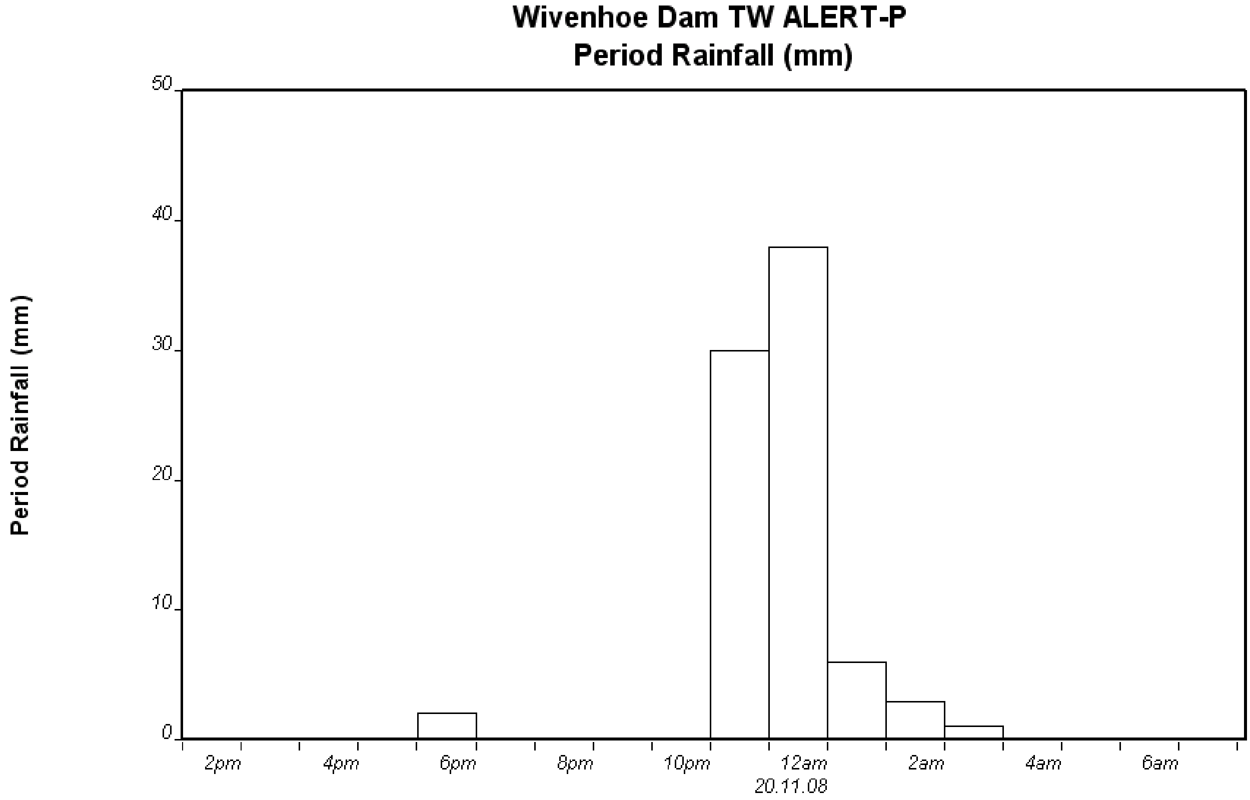


Figure 3.2.2 Hourly Hyetographs for Wivenhoe Dam TW Alert and Rosewood Alert.



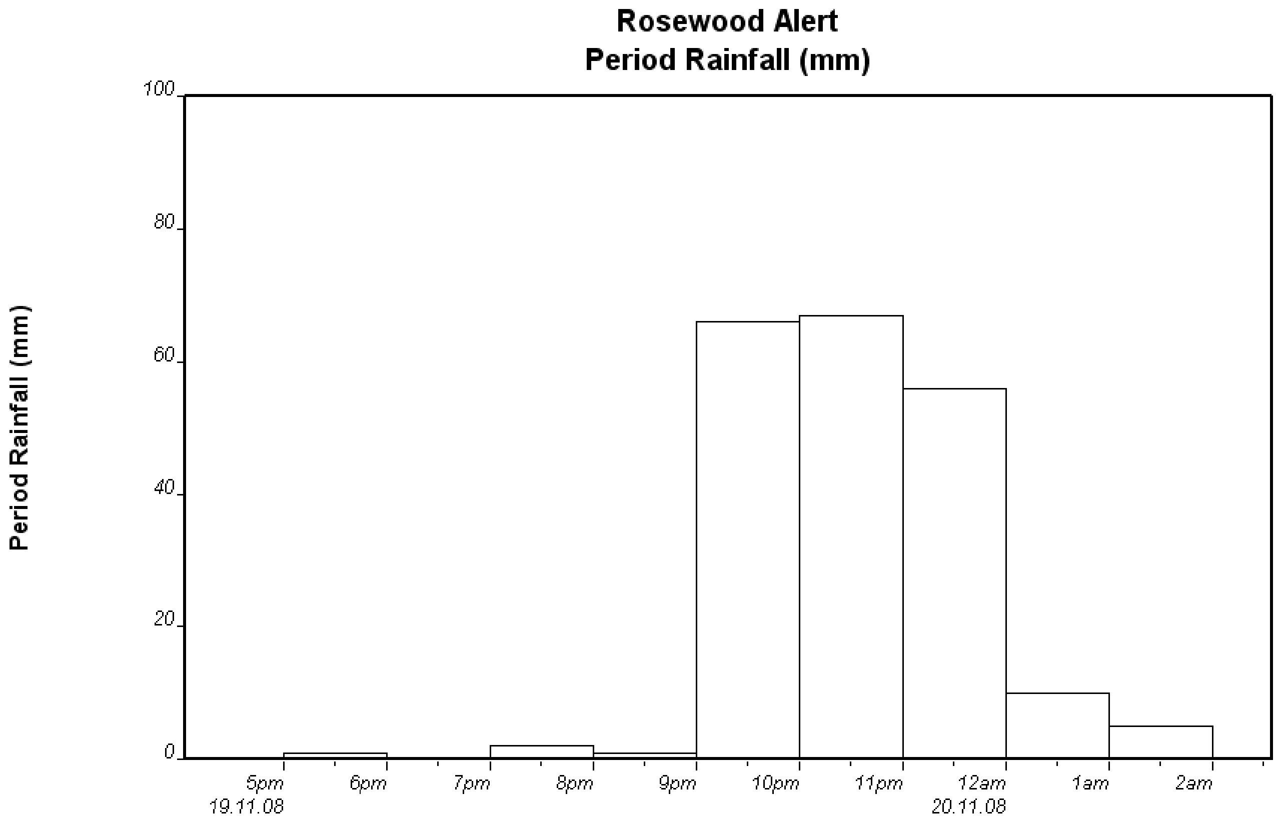


Figure 3.2.3 Hourly Hyetograph for Brassall Alert (Hancocks Bridge).

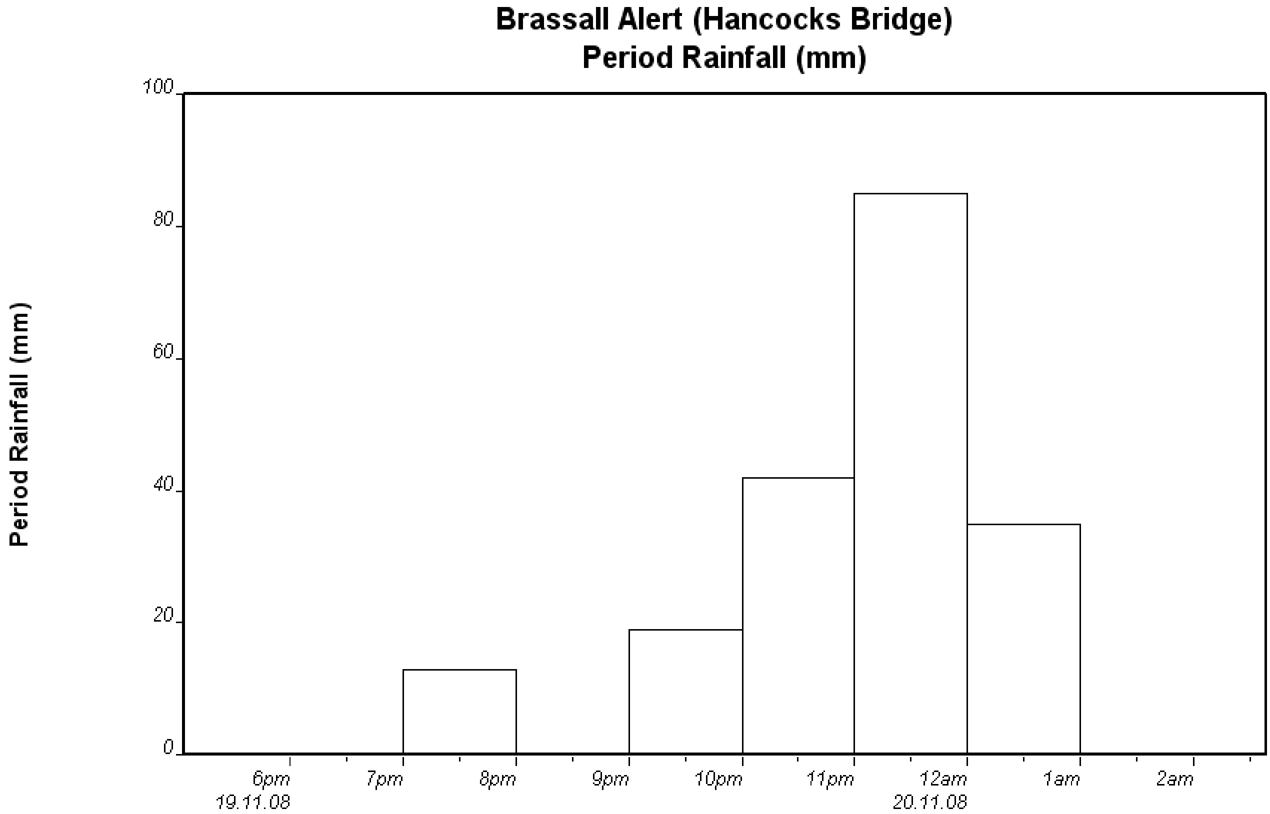


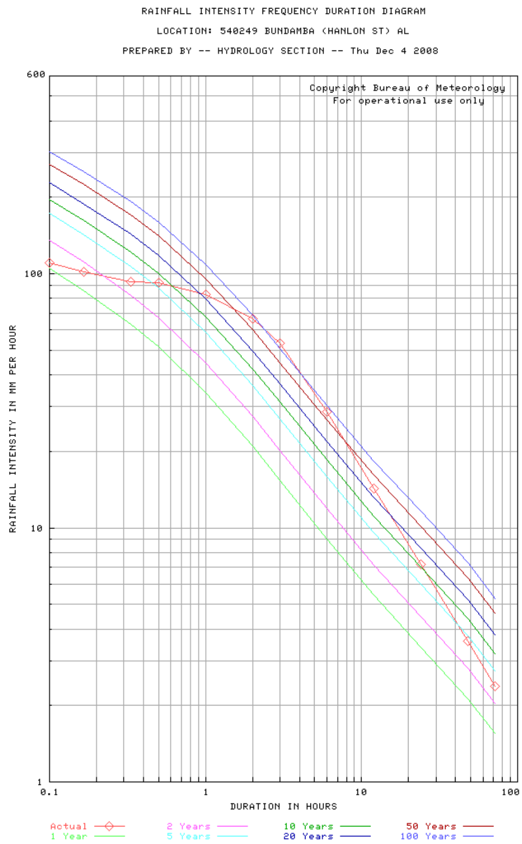
Figure 3.2.4 IFD Rainfall Analysis for Bundamba Alert (Hanlon St) and Tallegalla Alert.

RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS

LOCATION: 540249 BUNDAMBA (HANLON ST) AL

Analysis of the rainfall for the 72 hours to Sat Nov 22 10:59:51 2008

Rainfall (mm)	Period Ending	ARI (years)
10	5 mins ending at 23:49:35 19/11/2008	1-2
11	6 mins ending at 23:49:47 19/11/2008	1-2
17	10 mins ending at 23:51:23 19/11/2008	1-2
31	20 mins ending at 23:50:59 19/11/2008	2-5
46	30 mins ending at 00:10:11 20/11/2008	5-10
83	60 mins ending at 00:03:47 20/11/2008	20-50
133	2 hours ending at 00:46:59 20/11/2008	50-100
160	3 hours ending at 00:46:11 20/11/2008	> 100
172	6 hours ending at 01:46:11 20/11/2008	50-100
172	12 hours ending at 01:46:11 20/11/2008	20-50
172	24 hours ending at 10:59:47 20/11/2008	10-20
172	48 hours ending at 10:59:47 21/11/2008	2-5
172	72 hours ending at 10:59:47 22/11/2008	2-5



RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS

LOCATION: 40503 TALLEGALLA ALERT

Analysis of the rainfall for the 75 hours to Sat Nov 22 14:45:16 2008

Rainfall (mm)	Period Ending	ARI (years)
14	5 mins ending at 23:07:12 19/11/2008	2-5
16	6 mins ending at 23:07:27 19/11/2008	5
24	10 mins ending at 23:07:33 19/11/2008	5-10
42	20 mins ending at 23:12:54 19/11/2008	10-20
63	30 mins ending at 22:01:18 19/11/2008	20-50
109	60 mins ending at 22:09:06 19/11/2008	> 100
188	2 hours ending at 23:13:00 19/11/2008	> 100
222	3 hours ending at 00:08:57 20/11/2008	> 100
238	6 hours ending at 01:10:09 20/11/2008	> 100
243	12 hours ending at 01:53:21 20/11/2008	> 100
247	24 hours ending at 18:46:36 20/11/2008	> 100
250	48 hours ending at 11:44:12 21/11/2008	20-50
250	72 hours ending at 11:44:12 22/11/2008	20-50

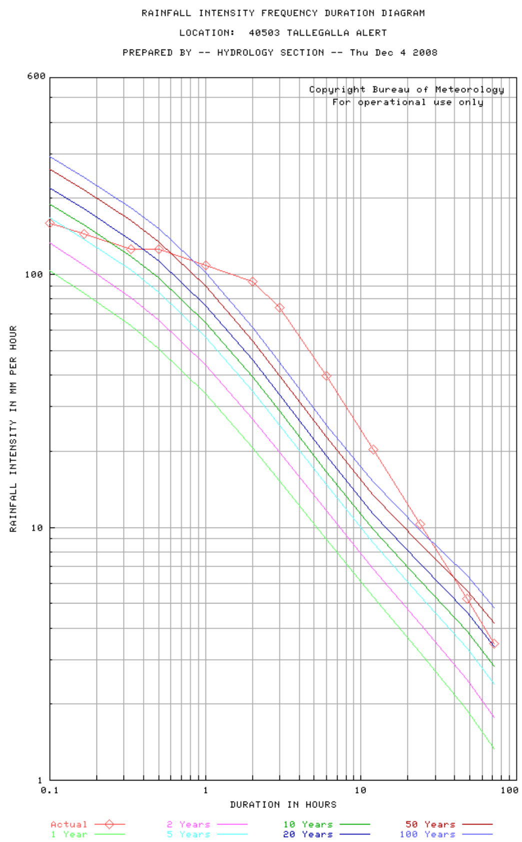
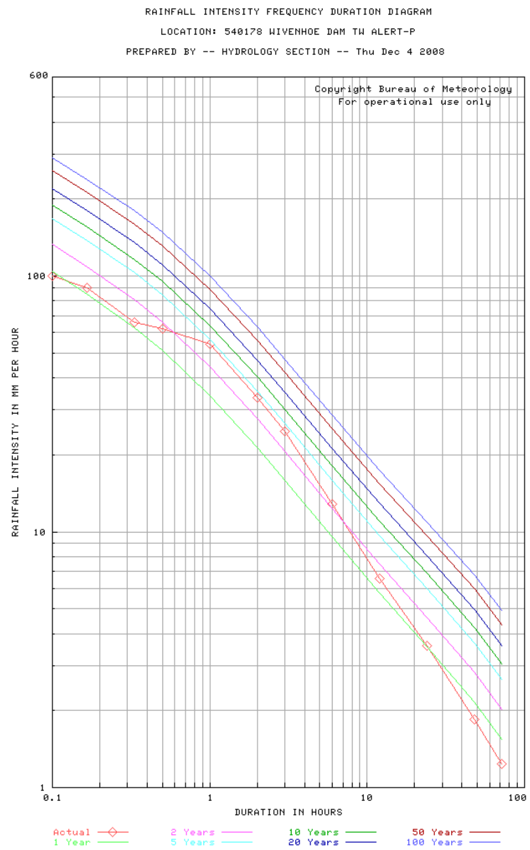


Figure 3.2.5 IFD Rainfall Analysis for Wivenhoe Dam TW Alert and Rosewood Alert.

RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS LOCATION: 540178 WIVENHOE DAM TW ALERT-P Analysis of the rainfall for the 72 hours to Sat Nov 22 12:36:17 2008		
Rainfall (mm)	**Period Ending**	**ARI (years)**
8	5 mins ending at 22:48:36 19/11/2008	< 1
10	6 mins ending at 22:49:36 19/11/2008	1
15	10 mins ending at 22:50:00 19/11/2008	1-2
22	20 mins ending at 23:23:24 19/11/2008	1-2
31	30 mins ending at 23:12:42 19/11/2008	1-2
54	60 mins ending at 23:38:39 19/11/2008	2-5
67	2 hours ending at 00:06:15 20/11/2008	2-5
74	3 hours ending at 01:06:15 20/11/2008	2-5
77	6 hours ending at 02:38:03 20/11/2008	2-5
79	12 hours ending at 02:38:13 20/11/2008	1-2
86	24 hours ending at 21:32:13 20/11/2008	1-2
89	48 hours ending at 12:36:16 21/11/2008	< 1
89	72 hours ending at 12:36:16 22/11/2008	< 1



RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS LOCATION: 540193 ROSEWOOD ALERT Analysis of the rainfall for the 72 hours to Sat Nov 22 15:13:48 2008		
Rainfall (mm)	**Period Ending**	**ARI (years)**
10	5 mins ending at 21:36:26 19/11/2008	1-2
11	6 mins ending at 21:36:36 19/11/2008	1-2
19	10 mins ending at 21:36:51 19/11/2008	2-5
34	20 mins ending at 21:38:06 19/11/2008	5
46	30 mins ending at 21:44:46 19/11/2008	5-10
78	60 mins ending at 22:14:21 19/11/2008	20-50
149	2 hours ending at 23:15:36 19/11/2008	> 100
190	3 hours ending at 00:12:16 20/11/2008	> 100
204	6 hours ending at 01:58:56 20/11/2008	> 100
208	12 hours ending at 02:30:35 20/11/2008	> 100
208	24 hours ending at 18:34:20 20/11/2008	50-100
210	48 hours ending at 14:30:35 21/11/2008	10-20
210	72 hours ending at 14:30:35 22/11/2008	10-20

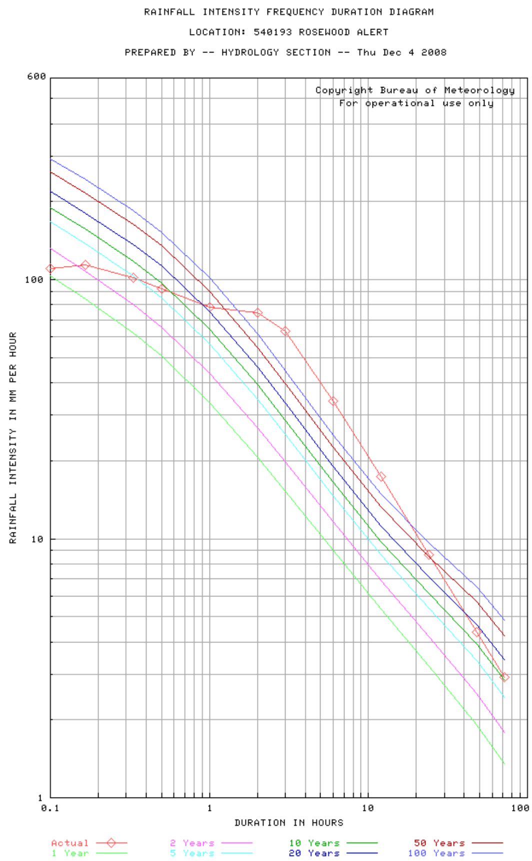


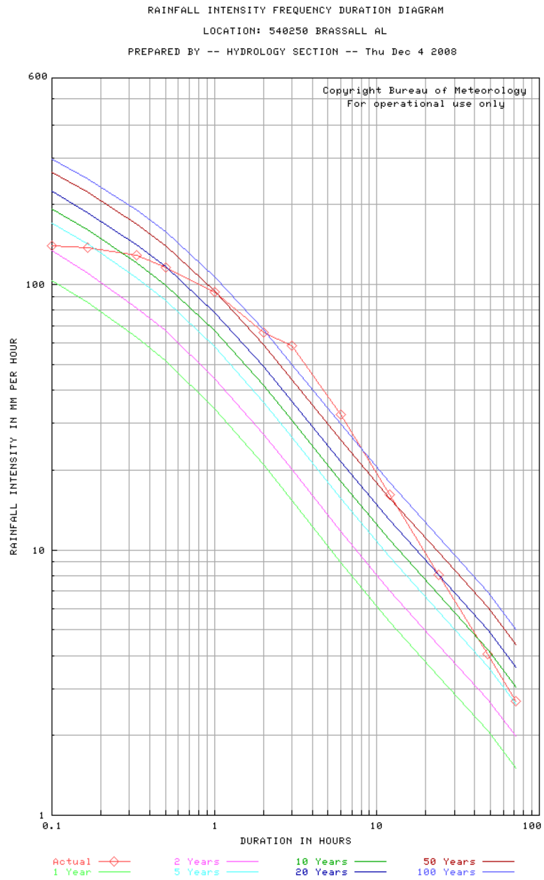
Figure 3.2.6 IFD Rainfall Analysis for Brassall Alert (Hancocks Bridge).

RAINFALL INTENSITY FREQUENCY DURATION ANALYSIS

LOCATION: 540250 BRASSALL(HANCOCKS BR) AL

Analysis of the rainfall for the 15 hours to Thu Nov 20 07:17:45 2008

Rainfall (mm)	Period Ending	ARI (years)
11	5 mins ending at 23:35:20 19/11/2008	1-2
14	6 mins ending at 23:32:26 19/11/2008	2-5
23	10 mins ending at 23:35:32 19/11/2008	5
43	20 mins ending at 23:38:02 19/11/2008	10-20
58	30 mins ending at 23:42:02 19/11/2008	20
94	60 mins ending at 00:15:38 20/11/2008	50
132	2 hours ending at 00:16:50 20/11/2008	50-100
176	3 hours ending at 00:36:38 20/11/2008	> 100
194	6 hours ending at 00:54:38 20/11/2008	> 100
194	12 hours ending at 04:17:44 20/11/2008	50-100
194	24 hours ending at 10:17:43 20/11/2008	20-50
194	48 hours ending at 10:17:43 21/11/2008	5-10
194	72 hours ending at 10:17:43 22/11/2008	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 Stanley/Upper Brisbane River 17/11/2008 to 23/11/2008

	24 hours to 9am							Total
Station Name	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**mm**
Stanley/Upper Brisbane								
Peachester	19	32	46	33	5			**135**
Peachester AL *	10	28	33	27	5	0	0	**103**
Woodford	31	22	24	32	2			**111**
Lindfield	71	15	18	38	7			**149**
Mt Kilcoy Weir TM *	44	18	19	33	0	0	0	**114**
Kilcoy AL *	26	16	16	28	1	0	0	**87**
Somerset Dam Hw AL-P *	24	23	13	23	3	0	0	**86**
Somerset Dam Hw AL-B *	24	23	13	23	3	0	0	**86**
Top Of Brisbane AL *	1	3	14	37	3	0	0	**58**
Blackbutt	5	21	14	42				**82**
Yarraman AL *	3	11	11	30	3	0	0	**58**
Cooyar Creek TM *	2	13	17	46	0	0	0	**78**
Cooyar Creek AL *	2	11	14	36	0	0	0	**63**
Linville TM *	8	16	18	37	0	0	0	**79**
Devon Hills AL *	15	6	13	37		0		**71**
Mt Binga	8	34	13	65		1		**121**
Boat Mountain TM *	43	14	12	35	0	0	0	**104**
Boat Mountain AL *	24	23	14	25	0	0	0	**86**
Glendale TM *	32	27	18	35	0	0		**112**
Crows Nest	20	28	19	55	0			**122**
Crows Nest AL *	4	23	14	52	1	4	0	**98**
Perseverance AL *	3	24	17	59	0	0	0	**103**
Rosentreters Bridge TM *	4	28	17	51	0	0	0	**100**
Rosentreters Bridge AL *	3	25	15	40	0	0	0	**83**
Toogoolawah	7	28	22	47	3			**107**
Toogoolawah AL *	6	26	18	40	3	0	0	**93**
Caboonbah AL *	12	25	18	44	7	0	0	**106**
Esk	9	31	19	49	4			**112**
Wivenhoe Dam	8	18	19	62	9			**117**
Wivenhoe Dam Hw AL-B *	8	19	20	75	9	0	0	**131**
Wivenhoe Dam Tw AL-P *	8	19	22	80	9	0	0	**138**
Wivenhoe Dam Tw AL-B *	8	20	21	80	10	0	0	**139**
Numerical Average	**15**	**21**	**18**	**44**	**3**	**0**	**0**	**101**
Maximum	**71**	**34**	**46**	**80**	**10**	**4**	**0**	**149**

Table 3.3.2 Rainfall Totals for the Lower Brisbane River 17/11/2008 to 23/11/2008

Station Name	24 hours to 9am							Total mm
	17	18	19	20	21	22	23	
Lower Brisbane								
Toowoomba AL *	7	33	26	42	28	2	0	**138**
Helidon AL *	1	26	30	105	17	0	0	**179**
Upper Sandy Creek AL *	5	35	33	143	6	0	0	**222**
Sandy Creek Road AL *	0	17	36	118	14	1	0	**186**
Little Egypt AL *	1	11	33	114	4	1	0	**164**
Tenthill TM *	1	19	39	79	9	0	0	**147**
Gatton	5	27	32	186				**250**
Gatton AL *	2	27	34	166	13	0	0	**242**
Gatton AWS *	4	26	33	171	10	0	0	**244**
Mt Castle AL *	11	24	54	94	21	1	0	**205**
Thornton AL *	7	15	45	67	0	1	0	**135**
Showground Weir AL *	5	14	33	121	3	0	0	**176**
Glenore Grove AL *	4	18	29	177	7	1	0	**236**
Mt Tarampa	7	19	36	130	6			**197**
Lyons Bridge AL-P *	5	21	25	79	6	1	0	**137**
Lyons Bridge AL-B *	5	23	27	92	8	0	0	**155**
O'Reilly's Weir AL *	6	18	25	88	6	0	0	**143**
Lowood Pump Stn AL-B *	4	13	22	77	10	0	0	**126**
Lowood	7	18	28	97	13	0		**163**
Lowood AL-P *	4	16	23	92	7	0	0	**142**
Fernvale	8	19	28	118	12			**185**
Savages Crossing AL *	9	20	31	41	6	0	1	**108**
Marburg AL *	12	14	29	161	5	0	0	**221**
Lake Manchester	30	17	40	124	11			**222**
Lake Manchester AL *	27	15	37	113	9	0	0	**201**
Mt Crosby AL *	20	16	43	136	9	0	0	**224**
Colleges Crossing AL *	23	19	45	161	10	0	0	**258**
Karalee	25	15	49	164	12			**265**
Adams Bridge TM *	16	12	47	61	5	0	0	**141**
Adams Bridge AL *	14	10	42	46	5	0	0	**117**
Stokes Crossing AL *	11	9	49	106	7	1	0	**183**
Spressers Bridge AL *	9	17	42	205	1	1	0	**275**
Grey's Plains Road AL *	9	12	45	82	2	1	0	**151**
Franklyn Vale AL *	8	10	45	126	7	0	0	**196**
Kuss Road AL *	8	2	18	132	0	0	0	**160**
Tallegalla AL *	13	23	35	243	7	0	0	**321**
Rosewood Wwtp AL *	8	22	44	206	2	0	0	**282**
Rosewood AL-B *	10	19	43	216	3	0	0	**291**
Rosewood AL *	9	16	38	208	2	0	0	**273**
Walloon AL-P *	12	16	37	166	4	0	0	**235**
Walloon AL-B *	12	16	37	167	4	0	0	**236**
Tarome	10	21	53	84	10			**177**
Tarome AL-P *	9	19	47	74	7	0	0	**156**
Moogerah Dam	21	15	51	92	13			**192**
Toohills Crossing TM *	9	15	53	62	18	0	0	**157**
Kalbar TM *	18	18	53	32	16	1	0	**138**
Kalbar Weir AL *	11	15	46	33	15	1	0	**121**

Station Name	24 hours to 9am 17	18	19	20	21	22	23	Total mm
Lower Brisbane (continued)								
Harrisville	37	7	44	59	13			**160**
Harrisville AL *	33	6	43	53	10	0	6	**151**
Harrisville AL-B *	33	7	44	55	10	0	0	**149**
Churchbank Weir AL *	29	8	43	72	12	1	0	**165**
Amberley AL-P *	21	16	35	121	6	1	0	**200**
Amberley AL-B *	18	14	29	89	4	1	0	**155**
Amberley (Dnr) TM *	19	17	39	147	4	1	0	**227**
Amberley AWS *	17	17	42	157	3	0	0	**236**
Washpool AL *	27	6	34	46	9	1	0	**123**
Loamside AL *	24	13	38	116	5	0	0	**196**
One Mile Bridge AL *	26	16	48	194	3	0	0	**287**
Brassall(Hancocks Br) AL *	14	10	38	194	0	0	0	**256**
Moggill AL-P *	48	13	38	97	6	0	0	**202**
Jindalee AL *	39	14	38	74	19	0	0	**184**
Numerical Average	**14**	**16**	**38**	**116**	**8**	**0**	**0**	**193**
Maximum	**48**	**35**	**54**	**243**	**28**	**2**	**6**	**321**

Table 3.3.3 Rainfall Totals for the Ipswich/Brisbane Creeks 17/11/2008 to 23/11/2008

Station Name	24 hours to 9am 17	18	19	20	21	22	23	Total mm
Ipswich/Brisbane Creeks								
Lyons AL *	66	8	32	99	16	0	0	**221**
Ripley AL *	36	11	37	165	15	0	0	**264**
Bundamba (Barclay St) AL *	36	10	32	155	0	0	0	**233**
Bundamba (Hanlon St) AL *	26	4	22	172	0	0	0	**224**
Bellbird Park AL *	57	14	37	165	3	0	0	**276**
Carole Park AL *	36	12	39	100	5	0	0	**192**
Jingle Downs AL *	62	10	38	139	15	0	0	**264**
Greenbank	53	16	40	124	10	1		**244**
Calamvale AL *	34	11	41	80	14	0	0	**180**
Archerfield AWS *	33	12	37	78	29	0	0	**189**
Inala AL *	32	12	41	103	11	0	0	**199**
Brisbane Rpa Hospital				96	30			**126**
Brisbane AWS *	32	15	77	79	29	0	7	**239**
Eight Mile Plains AL *	32	12	53	78	36	0	0	**211**
Wishart(Greenwood St) AL *	34	11	53	78	29	0	0	**205**
Carindale AL *	37	11	72	41	31	0	0	**192**
Lytton AL *	27	11	67	29	34	1	0	**169**
Caltex Lytton	25	13	68	29	26	1		**162**
Ormiston	17	9	70	32	40			**168**
Ransome AL *	56	13	66	27	43	0	0	**205**
Manly	36	15	60	26	44			**181**
Manly AL *	46	12	62	26	39	0	0	**185**
Wynnum Bowls Club AL *	27	13	59	26	43	1	0	**169**
Pullenvale AL *	61	19	45	96	18	0	0	**239**
Gold Ck Reservoir AL *	54	22	56	93	16	1	0	**242**
Long Pocket	41	15	65	90	20			**231**
Toowong AL *	47	17	65	104	23	0	0	**256**
Three Ways AL *	41	25	50	130	16	0	0	**210**
Enoggera Dam AL *	77	17	56	96	6	10	0	**276**

Station Name	24 hours to 9am							Total mm
	17	18	19	20	21	22	23	
Ipswich/Brisbane Creeks (continued)								
Kelvin Grove	50	23	88	109	39	0		**309**
Numerical Average	**42**	**14**	**53**	**89**	**23**	**1**	**0**	**215**
Maximum	**77**	**25**	**88**	**172**	**44**	**10**	**7**	**309**

Table 3.3.4 Rainfall Totals for the Pine/Caboolture Rivers 17/11/2008 to 23/11/2008

Station Name	24 hours to 9am							Total mm
	17	18	19	20	21	22	23	
Pine/Caboolture								
Ferny Hills AL *	82	16	57	58	12	0	0	**225**
Alderley	60	17	81	53		0		**211**
Toombul	29	16	66	31	18			**160**
Brisbane Airport AWS *	26	12	50	29	17	0	0	**134**
Geebung AL *	35	15	65	35	19	0	0	**169**
Boondall	40	19	67	36	30			**192**
Everton Hills AL *	66	18	73	51	20	0	0	**209**
Deagon AL *	51	22	73	36	33	0	0	**309**
Bracken Ridge Res AL *	63	23	75	32	12	0	0	**205**
Mt Glorious	32	40	51	83	5			**211**
Mt Glorious AL-P *	28	41	40	69	7	0	0	**185**
Mt Nebo	51	28	52	88	10	1		**230**
Highvale	58	22	22	74	2	1		**179**
Cedar Ck Rd AL *	30	13	15	22	3	1	0	**84**
Samford AL *	40	18	55	81	11	0	0	**205**
Samford Village AL *	26	22	62	90	8	0	0	**208**
Clear Mountain AL *	41	27	48	30	3	0	0	**149**
Drapers Crossing AL *	59	20	55	39	15	0	0	**188**
Cash's Crossing AL *	67	0	67	41	13	0	0	**188**
Normanby Way AL *	47	25	68	30	11	0	0	**181**
Kluvers Lookout AL *	39	35	35	28	5	0	0	**210**
Laceys Creek AL *	40	39	44	27	4	0	0	**309**
Baxters Creek AL *	5	44	49	22	4	0	0	**124**
North Pine Dam AL-B *	32	25	54	18	3	0	0	**132**
Narangba	28	28	29	26	6			**117**
Browns Creek AL *	87	37	61	27	8	0	0	**220**
Lake Kurwongbah AL *	38	34	66	23	5	0	0	**166**
Youngs Crossing AL *	0	27	70	28	6	0	0	**131**
Strathpine			75	30	4			**109**
Petrie AL *	28	32	65	23	6	0	0	**154**
Lawnton AL *	38	34	75	26	7	0	0	**180**
John Bray Park AL *	48	29	72	32	8	0	0	**189**
Murrumba Downs AL *	55	34	75	26	7	0	0	**197**
Redcliffe AWS *	56	22	46	31	23	0	0	**178**
Mt Mee AL-P *	65	36	42	28	0	0	0	**171**
Mt Mee AL-B *	65	36	42	28	0	0	0	**171**
Moorina AL *	102	38	54	24	2	0	0	**220**
Burpengary(Rowley Rd) AL*		0	57	25	11	0	0	**93**
Burpengary (Dale St) AL *	79	37	58	33	15	0	0	**222**
Deception Bay AL *	46	38	53	33	20	0	0	**190**
Round Mt Reservoir AL *	77	24	29	30	8	0	0	**168**
Wamuran AL *	82	28	38	25	3	0	0	**176**

Station Name	24 hours to 9am							Total mm
	17	18	19	20	21	22	23	
Pine/Caboolture (continued)								
Upper Caboolture TM *	87	28	51	25	2	0	0	**193**
Upper Caboolture AL *	92	33	53	28	2	0	0	**208**
Caboolture Wtp AL *	64	35	44	41	7	0	0	**191**
Morayfield AL *	107	35	61	29	12	0	0	**244**
Bribie Island AL *	28	14	18	29	4	0	0	**93**
Beerburrum AWS *	38	21	33	27	3	0	0	**122**
Numerical Average	**51**	**26**	**54**	**37**	**9**	**0**	**0**	**181**
Maximum	**107**	**44**	**81**	**90**	**33**	**1**	**0**	**309**

3.4 Peak Flood Heights

Figure 3.4.1 Peak Flood Height Map for South East QLD

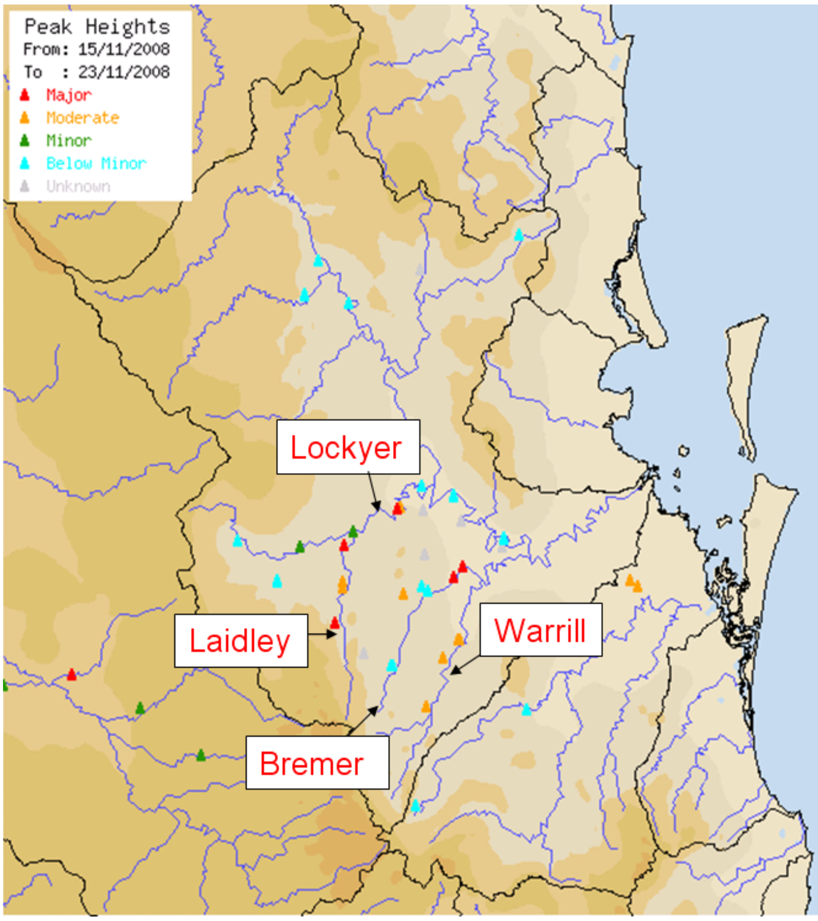


Table 3.4.1 Peak Flood Heights for the Brisbane River between 15/11/2008 and 23/11/2008.

Station No.	Station Name	Date	Height	Flood Class
BRISBANE				
Lockyer Ck to Lyons Br				
040829	HELIDON TM	20/11/2008 23:00	2.07	Below Minor
540143	HELIDON ALERT	20/11/2008 22:36	2.08	Below Minor
540067	TENTHILL TM	20/11/2008 00:00	3.55	Below Minor
540152	TENTHILL ALERT	19/11/2008 23:50	3.33	Below Minor
540156	GATTON ALERT	20/11/2008 10:01	7.60	Minor
040835	MULGOWIE TM	20/11/2008 00:00	7.07	Major
040716	LAIDLEY	20/11/2008 06:30	6.10	Moderate
540047	SHOWGROUND WEIR HW TM	20/11/2008 04:30	7.71	Moderate
540158	SHOWGROUND WEIR ALERT	20/11/2008 04:29	7.47	Moderate
540050	WARREGO HIGHWAY TM	20/11/2008 06:00	6.03	Major
540149	GLENORE GROVE ALERT	20/11/2008 12:56	9.82	Minor

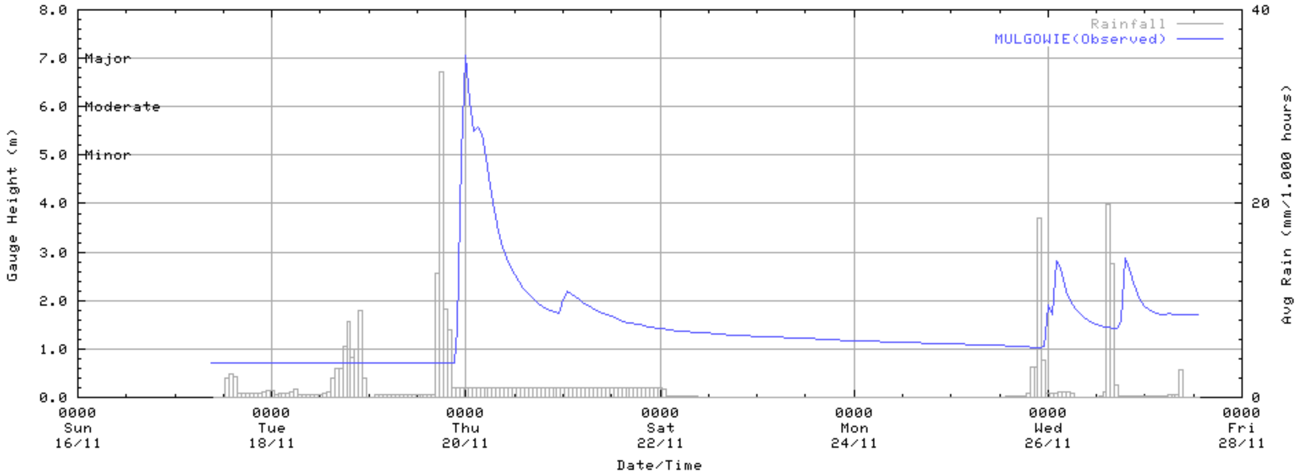
Station No.	Station Name	Date	Height	Flood Class
Lockyer Ck to Lyons Br (continued)				
540174	LYONS BRIDGE ALERT-P	20/11/2008 15:59	13.12	Major
040817	RIFLE RANGE ROAD TM	20/11/2008 18:50	12.76	Moderate
540153	O'REILLY'S WEIR ALERT	20/11/2008 20:23	10.37	Below Minor
Brisbane R.. Wivenhoe-Moggill				
540183	LOWOOD PUMP STN ALERT-B	21/11/2008 02:05	12.20	Unknown
540066	SAVAGES CROSSING TM	21/11/2008 07:20	5.64	Below Minor
540150	SAVAGES CROSSING ALERT	21/11/2008 07:38	5.78	Below Minor
540312	MARBURG ALERT	20/11/2008 00:28	8.00	Unknown
540257	BURTONS BRIDGE ALERT	21/11/2008 08:38	4.39	Unknown
540199	MT CROSBY ALERT	20/11/2008 09:12	8.29	Below Minor
540258	MT CROSBY ALERT-B	20/11/2008 10:17	8.35	Below Minor
540063	COLLEGES CROSSING ALERT	20/11/2008 11:53	4.51	Unknown
Bremer R to Ipswich				
540068	ADAMS BRIDGE TM	20/11/2008 01:00	3.80	Below Minor
540157	ADAMS BRIDGE ALERT	20/11/2008 00:24	3.75	Below Minor
540317	GREY'S PLAINS ROAD ALERT	19/11/2008 22:43	2.80	Unknown
540194	KUSS ROAD ALERT	20/11/2008 00:15	7.25	Moderate
540313	ROSEWOOD WWTP ALERT	19/11/2008 23:53	2.15	Below Minor
540193	ROSEWOOD ALERT	20/11/2008 02:55	3.57	Below Minor
540147	WALLOON ALERT-P	20/11/2008 05:31	7.87	Major
540081	WALLOON TM	20/11/2008 08:00	9.28	Major
540151	KALBAR WEIR ALERT	20/11/2008 02:41	3.31	Moderate
540058	KALBAR WEIR HW TM	20/11/2008 03:00	3.35	Moderate
540057	KALBAR WEIR TW TM	20/11/2008 03:10	7.60	Moderate
540154	HARRISVILLE ALERT	20/11/2008 11:23	4.65	Moderate
540217	CHURCHBANK WEIR TM	20/11/2008 16:30	2.34	Moderate
540316	CHURCHBANK WEIR ALERT	20/11/2008 12:15	2.35	Moderate
540180	AMBERLEY ALERT-P	20/11/2008 07:32	5.60	Moderate
540181	AMBERLEY ALERT-B	20/11/2008 06:59	5.60	Moderate
040816	AMBERLEY (DNR) TM	20/11/2008 04:00	6.67	Moderate
540195	WASHPOOL ALERT	20/11/2008 02:49	2.20	Below Minor
540062	LOAMSIDE ALERT	20/11/2008 04:06	7.16	Moderate
040836	ONE MILE BRIDGE ALERT	20/11/2008 10:36	16.13	Major
540250	BRASSALL(HANCOCKS BR) AL	20/11/2008 11:31	13.73	Major
040831	IPSWICH ALERT	20/11/2008 13:10	10.00	Moderate
040812	MOGGILL ALERT	20/11/2008 17:48	4.32	Below Minor
540200	MOGGILL ALERT-P	20/11/2008 17:09	4.37	Below Minor
040690	BRISBANE CITY TM	20/11/2008 15:40	1.38	Below Minor
540198	BRISBANE CITY ALERT	20/11/2008 15:12	1.45	Below Minor

Station No.	Station Name	Date	Height	Flood Class
Ipswich Cks				
040792	RIPLEY ALERT	20/11/2008 00:37	54.30	Major
040873	HARDING STREET ALERT	20/11/2008 02:57	25.03	Moderate
040875	BUNDAMBA SCHOOL ALERT	20/11/2008 04:35	17.23	Moderate
540249	BUNDAMBA (HANLON ST) AL	20/11/2008 05:47	8.75	Unknown
Southern Brisbane Cks				
540378	WOLSTON CREEK ALERT	20/11/2008 04:24	6.26	Unknown
040719	NEW BEITH TM	20/11/2008 03:20	4.96	Minor
040796	BEATTY ROAD ALERT	20/11/2008 17:03	5.37	Moderate
040789	DURACK KING AVE ALERT	20/11/2008 08:55	7.67	Below Minor
040791	COOPERS PLAINS ALERT	20/11/2008 01:44	7.11	Minor
540071	CORINDA HIGH ALERT	20/11/2008 03:41	2.98	Below Minor
540274	OXLEY CREEK MOUTH ALERT	20/11/2008 15:50	1.61	Below Minor
540134	HOLLAND PARK WEST ALERT	19/11/2008 00:06	16.90	Below Minor
540132	EAST BRISBANE ALERT	20/11/2008 02:48	1.44	Below Minor
540127	WISHART(GREENWOOD ST) AL	20/11/2008 03:02	21.71	Below Minor
540126	MANSFIELD ALERT	21/11/2008 02:32	8.62	Below Minor
540128	CARINDALE ALERT	20/11/2008 06:49	4.94	Below Minor
540129	HEMMANT ALERT	20/11/2008 15:20	1.25	Below Minor
540279	RANSOME ALERT	19/11/2008 05:35	2.24	Below Minor
540278	WYNNUM(BYRNESIDE TCE) AL	20/11/2008 19:36	3.81	Below Minor
Northern Brisbane Cks				
540296	PULLEN PULLEN CREEK AL	20/11/2008 10:10	2.96	Unknown
540061	MISTY MORN ALERT	20/11/2008 03:30	9.38	Below Minor
540119	ENOGGERA DAM ALERT	20/11/2008 04:53	77.49	Minor
540239	ALDERLEY ALERT	20/11/2008 19:06	16.04	Unknown
540116	ITHACA ALERT	19/11/2008 00:36	13.36	Below Minor
540116	ITHACA ALERT	20/11/2008 09:00	15.06	Major
540130	BOWEN HILLS ALERT	20/11/2008 15:42	1.38	Below Minor
540286	BREAKFAST CREEK MOUTH AL	20/11/2008 15:17	1.08	Below Minor

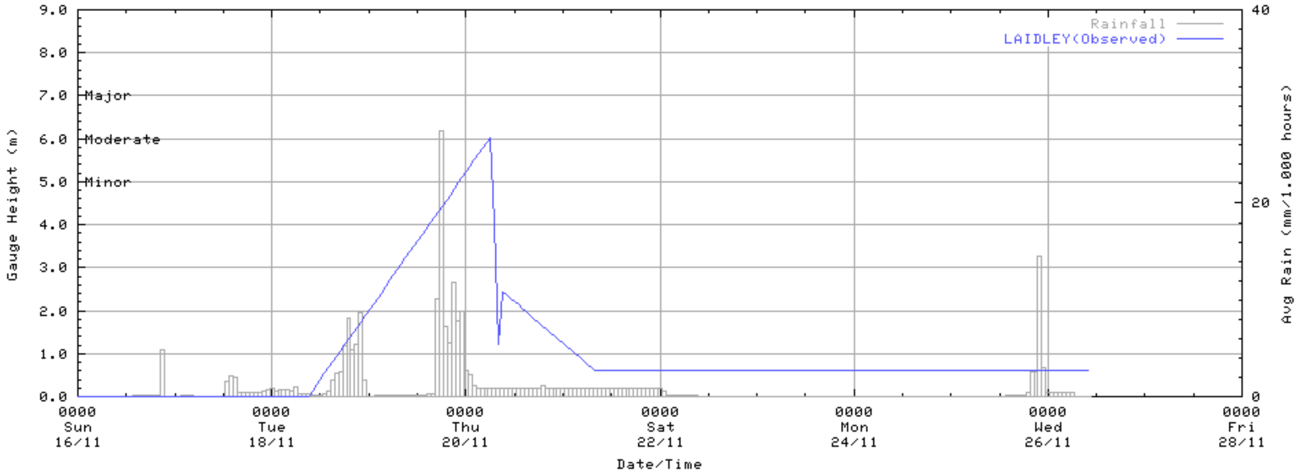
3.5 Flood Hydrographs

Figure 3.5.1 River Heights – Laidley Creek

Laidley Creek at Mulgowie TM



Laidley Creek at Laidley



Laidley Creek at Warrego Highway TM

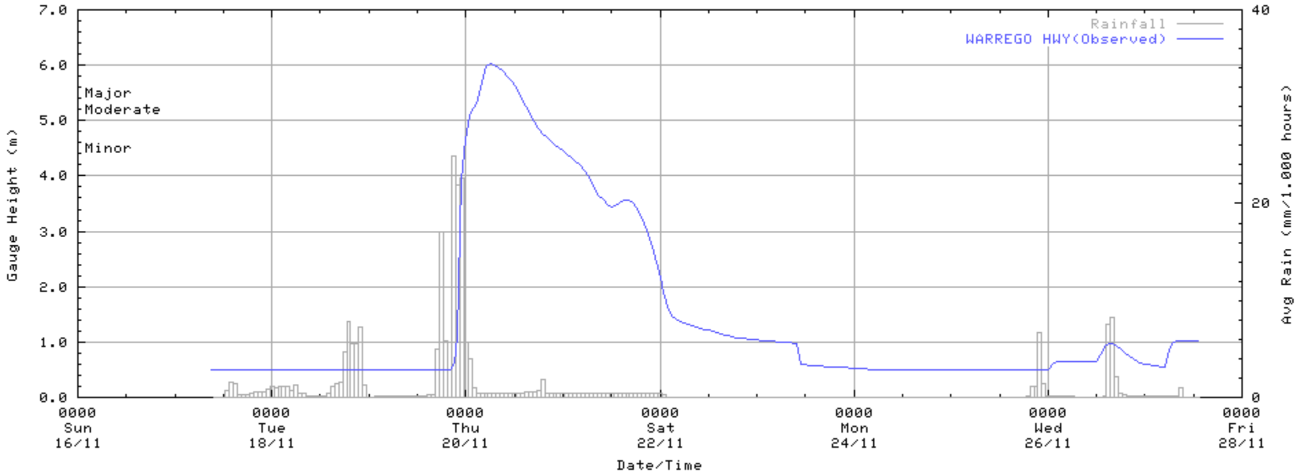


Figure 3.5.2 River Heights – Lockyer Creek

Lockyer Creek at Lyons Bridge

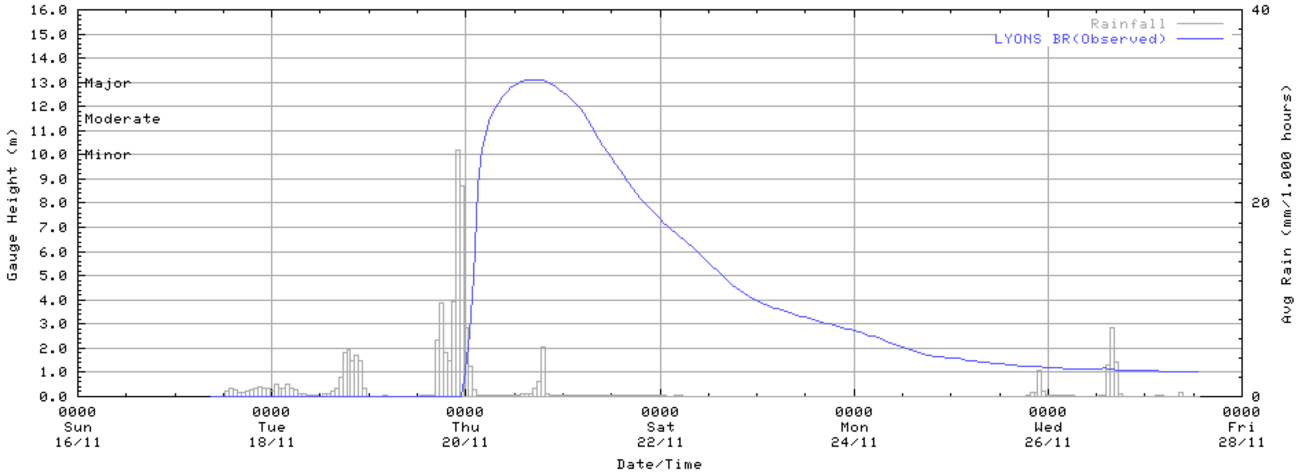
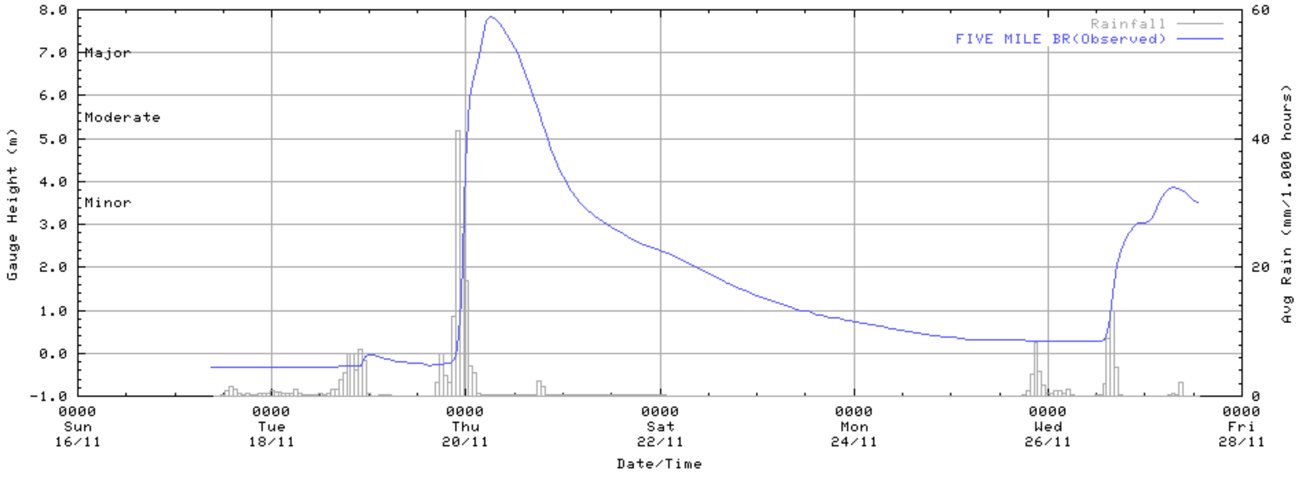
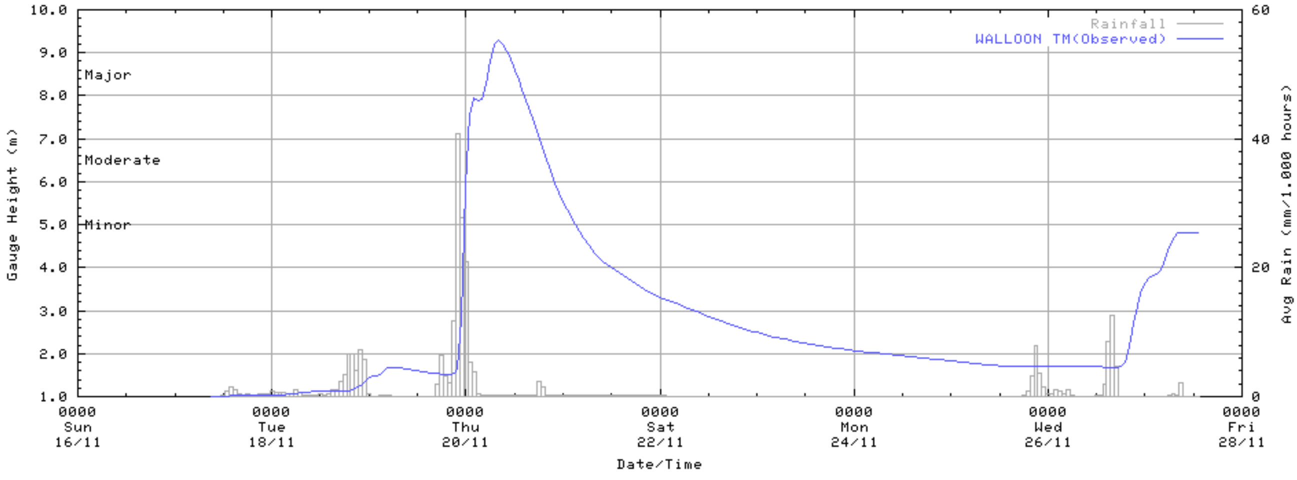


Figure 3.5.3 River Heights - Bremer River

Bremer River at Five Mile Bridge



Bremer River at Walloon TM



Bremer River at One Mile Bridge Alert

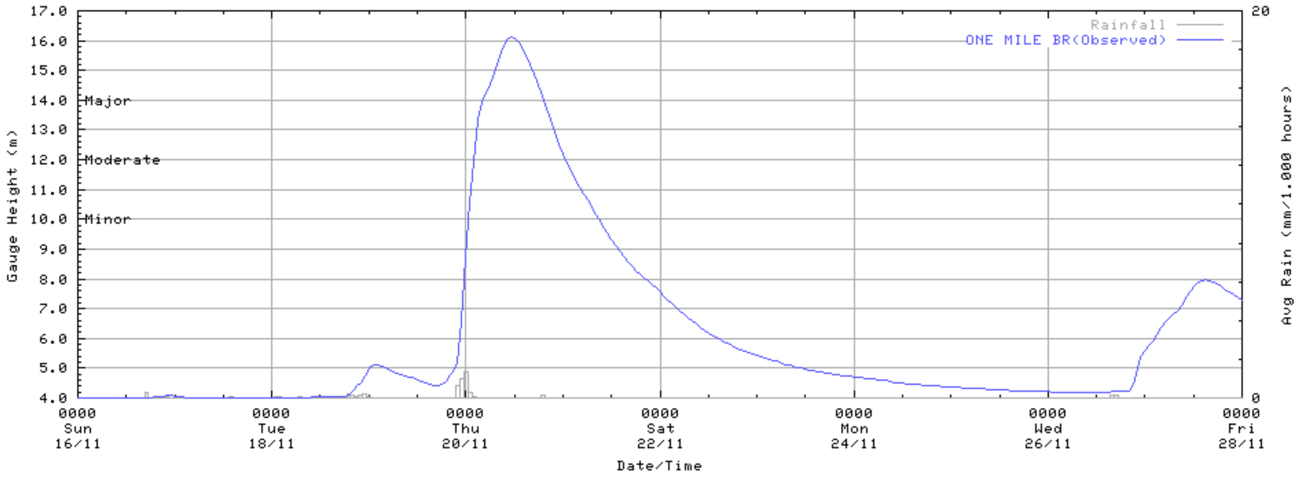
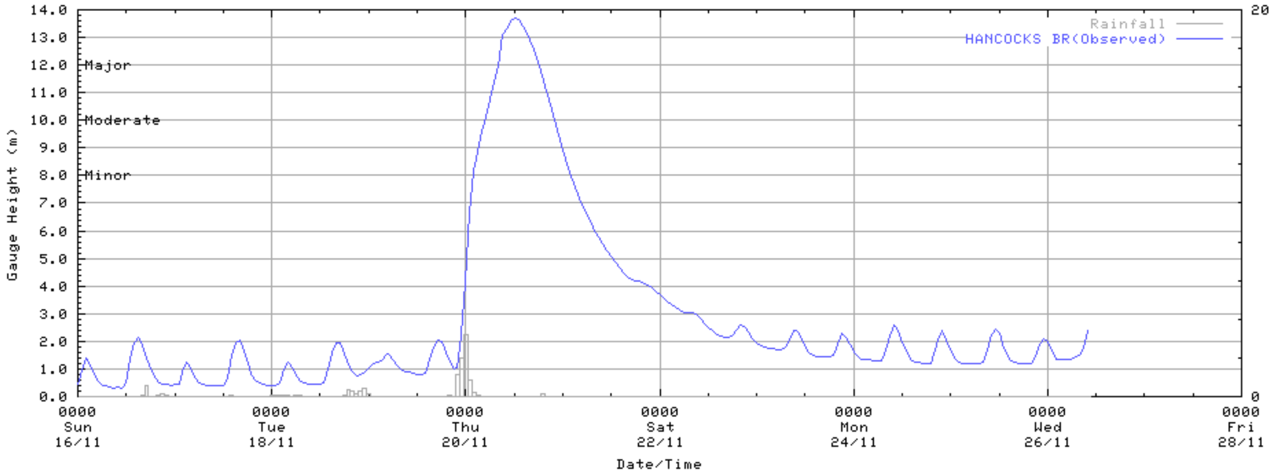


Figure 3.5.3 River Heights - Bremer River (continued)

Bremer River at Brassall (Hancocks Bridge) Alert



Bremer River at Ipswich

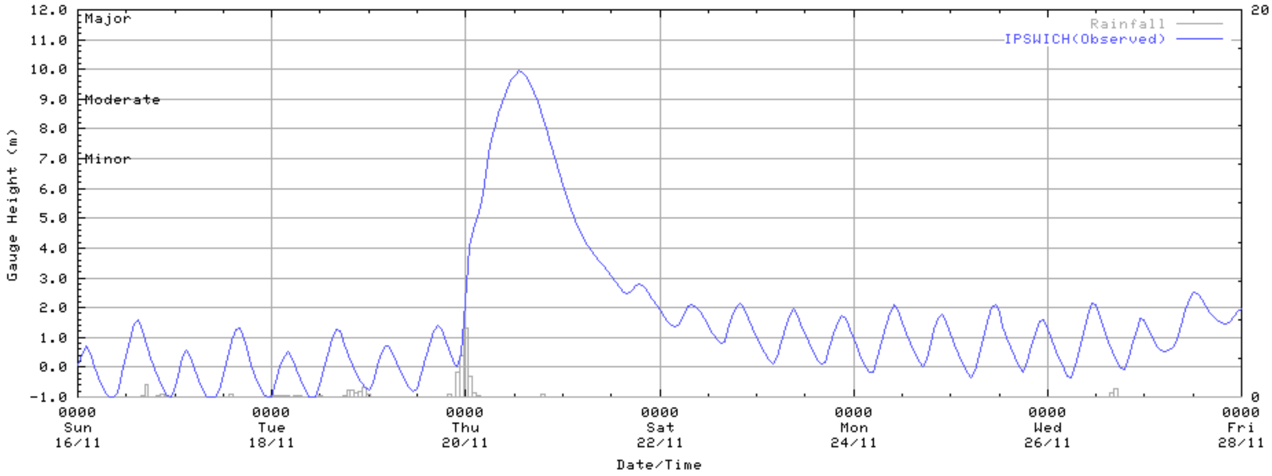


Figure 3.5.4 River Heights – Bundamba Creek

Bundamba Creek at Ripley Alert

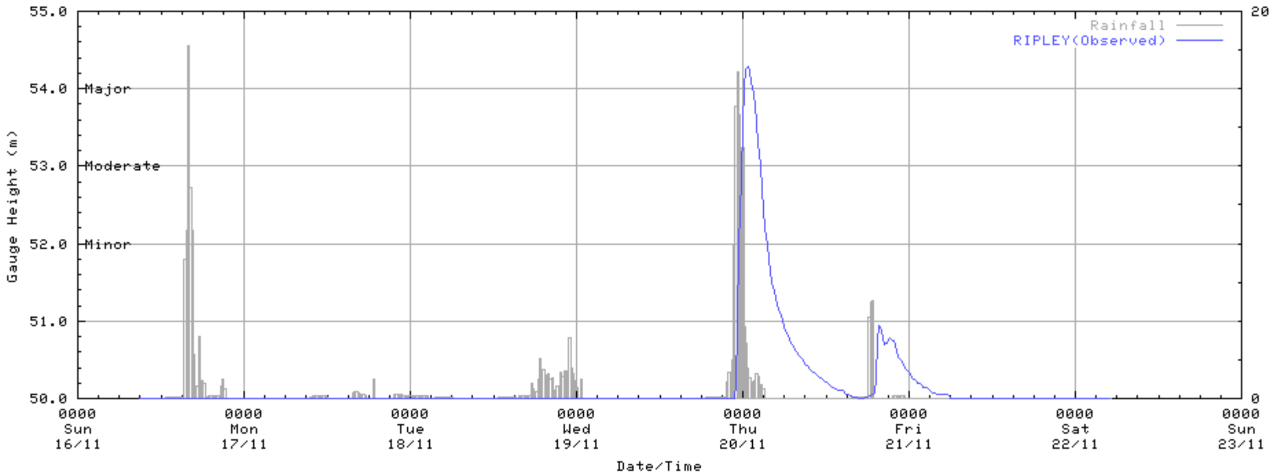
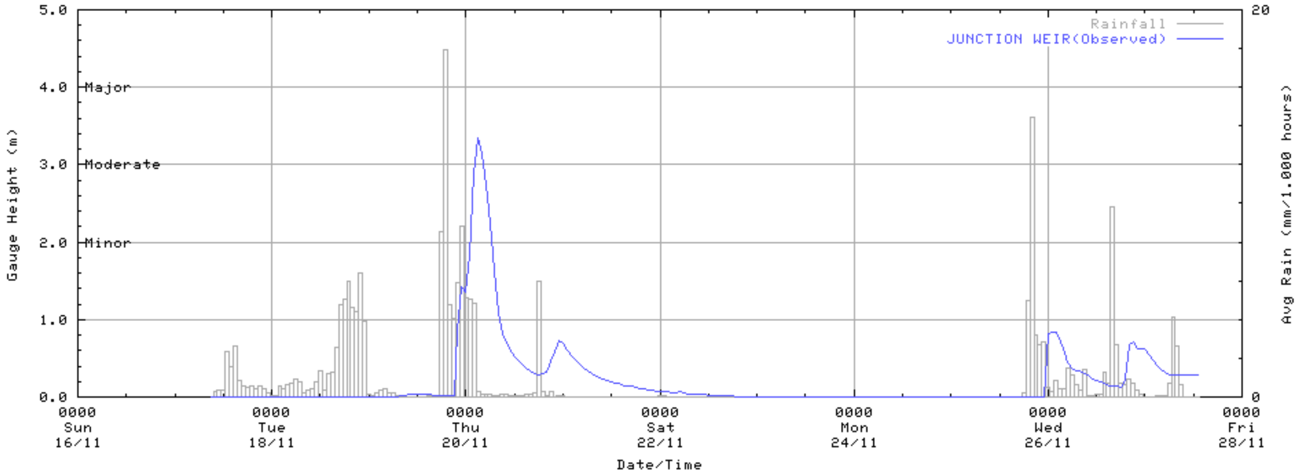
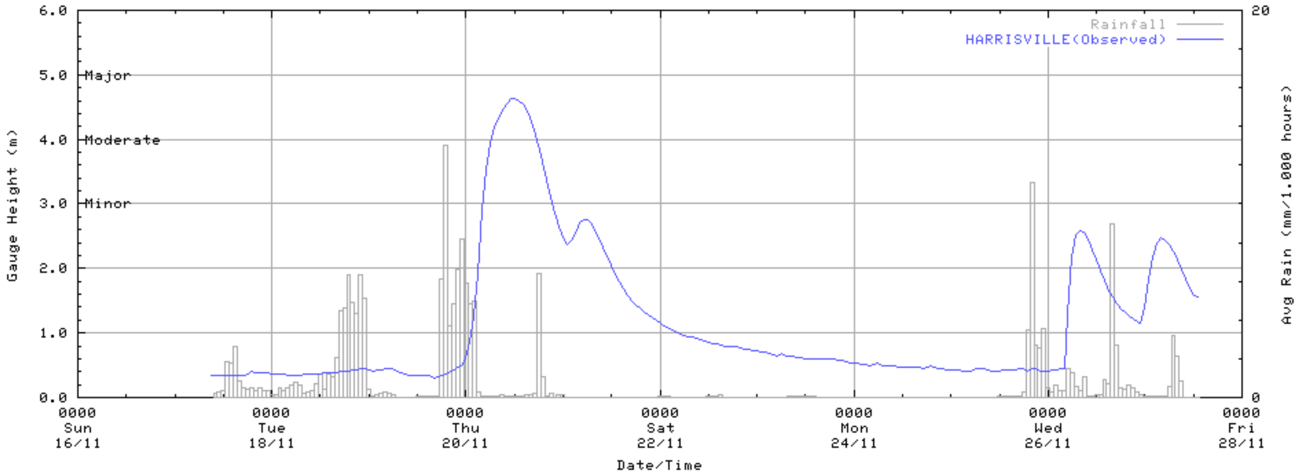


Figure 3.5.5 River Heights – Warrill Creek

Warrill Creek at Junction Weir



Warrill Creek at Harrisville



Warrill Creek at Amberley

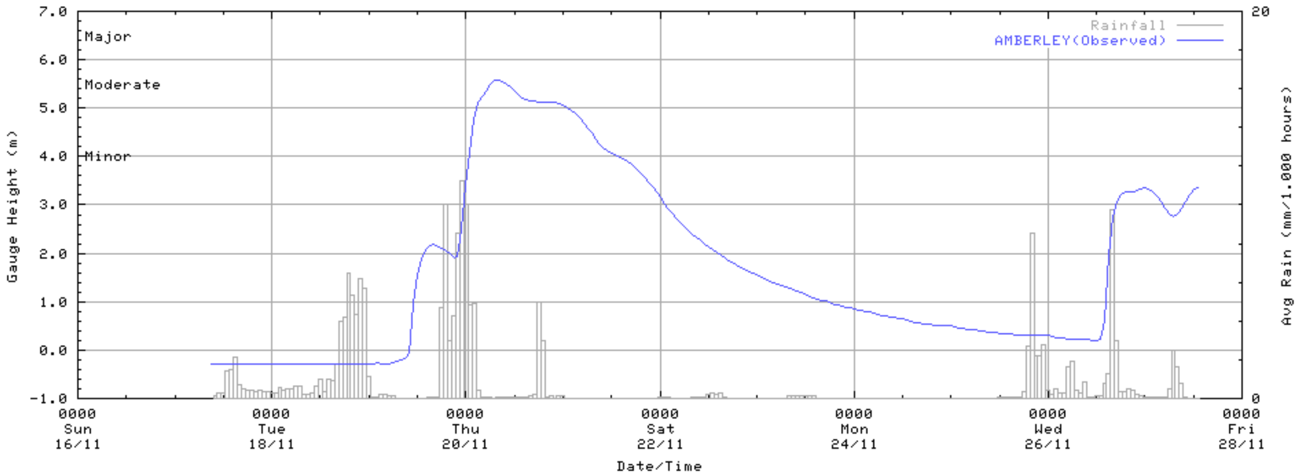
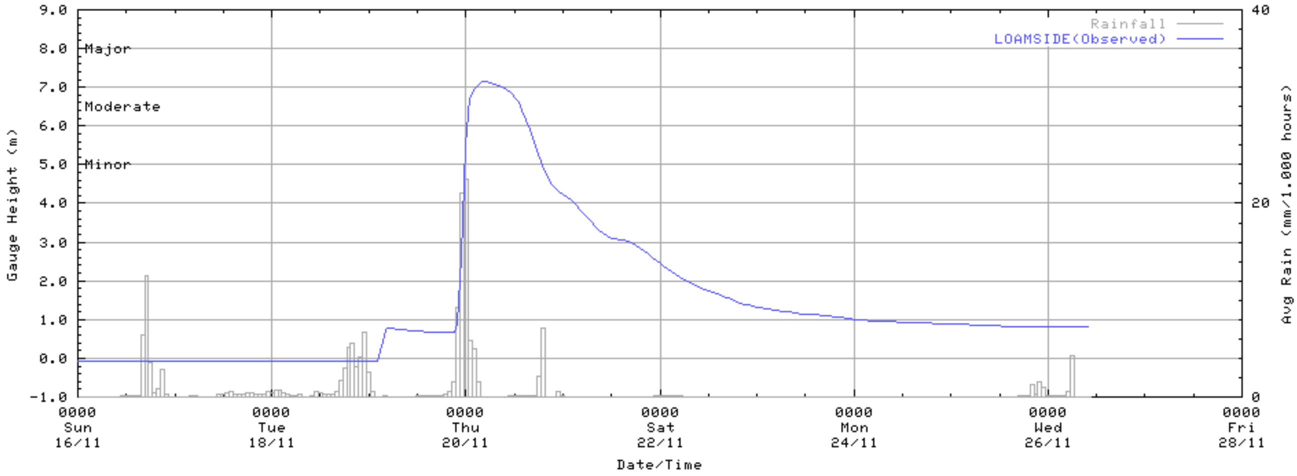


Figure 3.5.6 River Heights – Purga Creek

Purga Creek at Loamside



4. Warning Services

Severe Thunderstorm Warnings

- A Severe Thunderstorm Warning was first issued at 4:55 pm Wednesday 19 November 2008 for damaging wind and large hailstones for the Lockyer Valley, Ipswich City, Southern Downs, Scenic Rim and Toowoomba Council areas. Brisbane City was included in the warnings from 5:33 pm.
- This warning was updated every 30-45 minutes until it was cancelled at 7:29 pm.

- A Severe Thunderstorm Warning was then issued at 8:36 pm Wednesday 19 November 2008 for damaging wind, flash flooding and large hailstones for the Lockyer Valley, Logan City, Ipswich City, Scenic Rim and parts of the Gold Coast City, Southern Downs and Toowoomba Council areas.
- This warning was updated at least every 60 minutes until it was cancelled at 3:15 am Thursday, 20 November 2008.
- At 9:12 pm the warning for large hailstones was removed and the Brisbane City, Moreton Bay, Somerset, South Burnett, Toowoomba, Cherbourg Shire and parts of the Gympie, Dalby and Sunshine Coast Council areas were then included in the warning.

Flood Warnings

- At 10:47pm, a Flood Warning was issued for the Bremer River, the Lockyer, Laidley and Warril Creeks and adjacent streams.
- Flood Warnings continued to be updated until Friday morning.
- The first flood warning for the key forecast location of Ipswich on the Bremer River was issued at 10.47pm Wednesday 19 November 2008. At this time there was below minor flooding occurring at Ipswich. A moderate flood peak height of 10.00m was recorded at Ipswich at 1pm Thursday 20 November 2008, which was 14 hours after the first warning was issued.

The tables below document the issue of flood warnings for the South East Queensland Rivers during the period 19th November to 21st November 2008. A total of 14 warnings were issued for the event.

Table 4.0.1 Summary of Flood Warnings Issued

Warning No	Rivers	First Warning	Last Warning	Total
IDQ20805	Lockyer and Laidley Creeks, Bremer River and Warril Creek	10.47pm Wed 19/11/2008	11.05am Fri 21/11/2008	8
IDQ20885	Flood Summary	10.55pm Wed 19/11/2008	11.17am Fri 21/11/2008	6

Table 4.0.2 Quantitative Predictions

Forecast Location	Time of first Height Forecast	Forecast Peak / Time	Actual Peak	Lead Time
Ipswich	8:11am Thurs 20/11/2008	10.5m Midday Thurs 20/11/2008	10.0 m	4 Hrs

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