

Flood summary for the Nogoa River at Emerald

- The town of Emerald is on the Nogoa River in the Fitzroy catchment
- The flood heights at Emerald are measured using a combination of an automatic gauge owned by the Central Highlands Regional Council and a manual gauge owned by the Bureau of Meteorology (Bureau station number: Automatic – 535076, Manual - 053260).
- Emerald recorded major flooding in December 2010 causing significant inundation to the town.
- A detailed map of the flood warning network is available on the Bureau website at http://www.bom.gov.au/hydro/flood/qld/brochures/river_maps.shtml

Location map

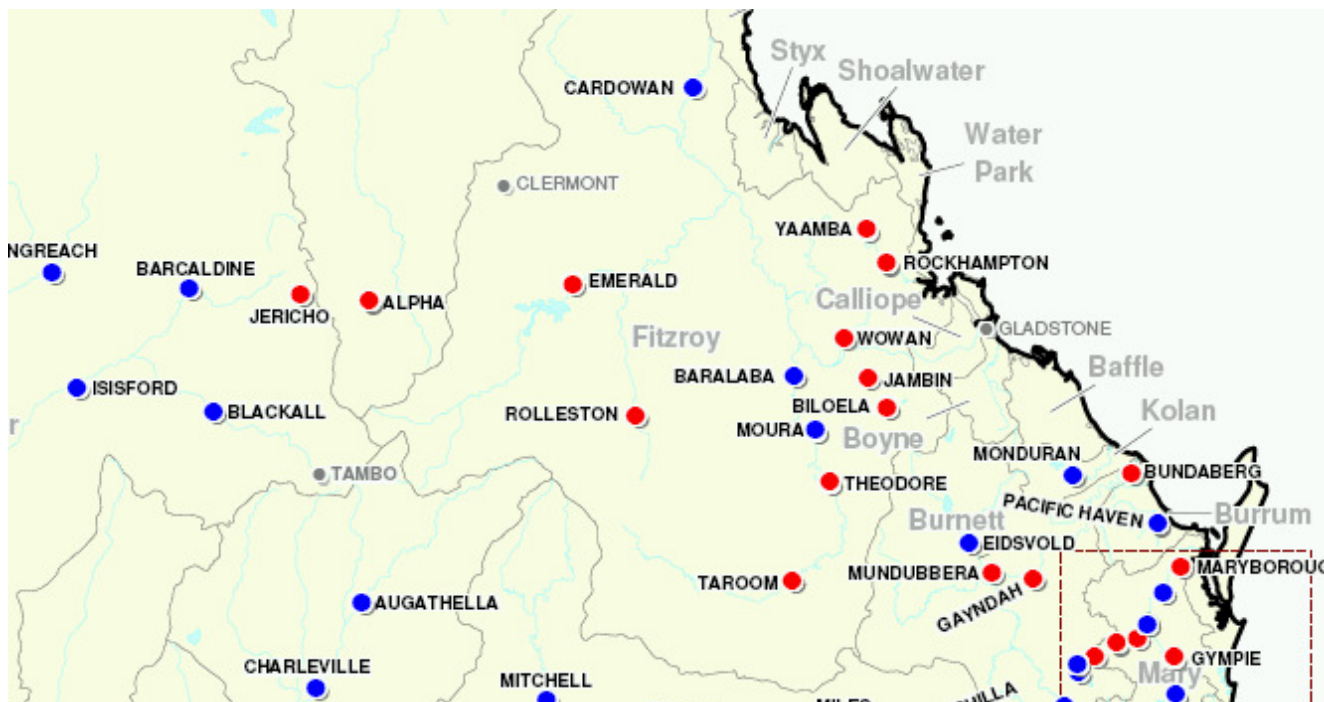


Figure 1. Map showing location of Emerald.

Note: Red dots are reported flood inundated towns or cities and blue dots are flood affected towns or cities.

Flood effects and severity

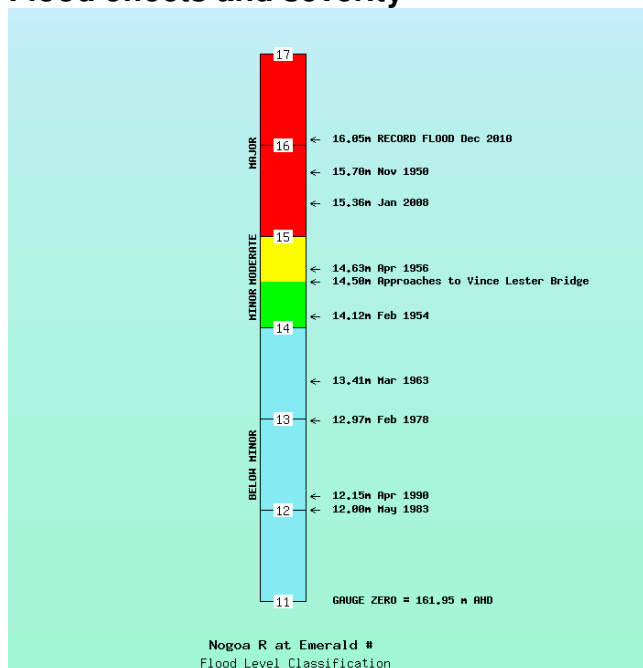


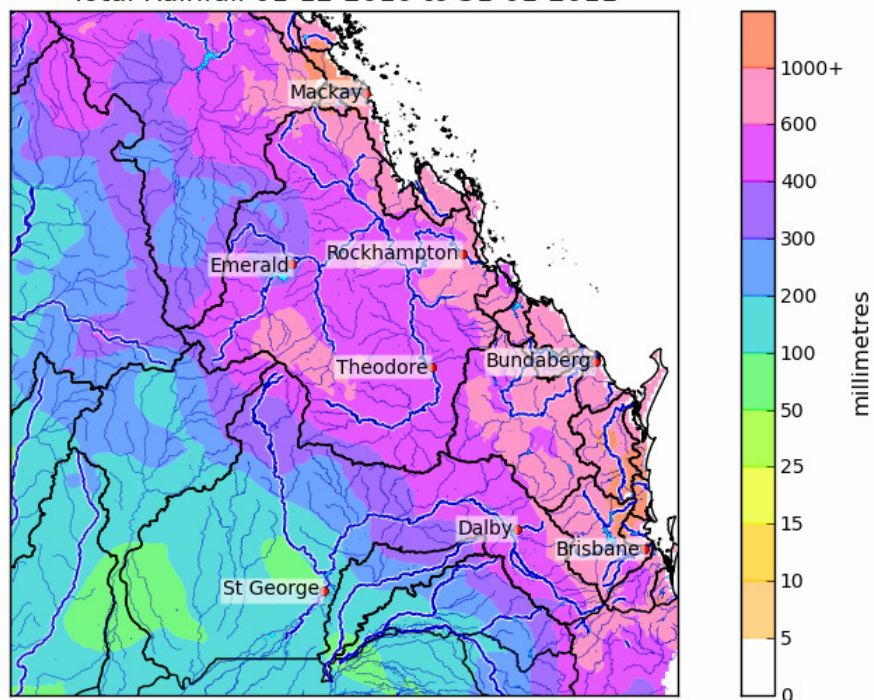
Figure 2. Flood level classifications and flood effects for Emerald.

- **Peaked at 16.05 metres on 31/12/2010.**
- Minor: 14 metres
Moderate: 14.5 metres
Major: 15 metres.
- Gauge zero is 161.95 metres AHD.
- Estimated 1000 houses and 95% of properties inundated (ABC News).
- The river peaked at 16.05 metres on 31/12/2010. This peak is a new record, higher than the previous record of 15.7 metres in 1950.
- Above major flood level (15 metres) from 30/12/2010 to 02/01/2011.
- Remained above minor flood level (14 metres) from 29/12/2010 to 03/01/2011.

Rainfall summary

- Over 600mm was recorded in parts of the Nogoa River catchment during December 2010 and January 2011.
- Very heavy rainfall of over 400mm in the Carnarvon ranges between 9am on 26/12/2010 and 9am on 28/12/2010.

Total Rainfall 01-12-2010 to 31-01-2011



Total Rainfall 26-12-2010 to 28-12-2010

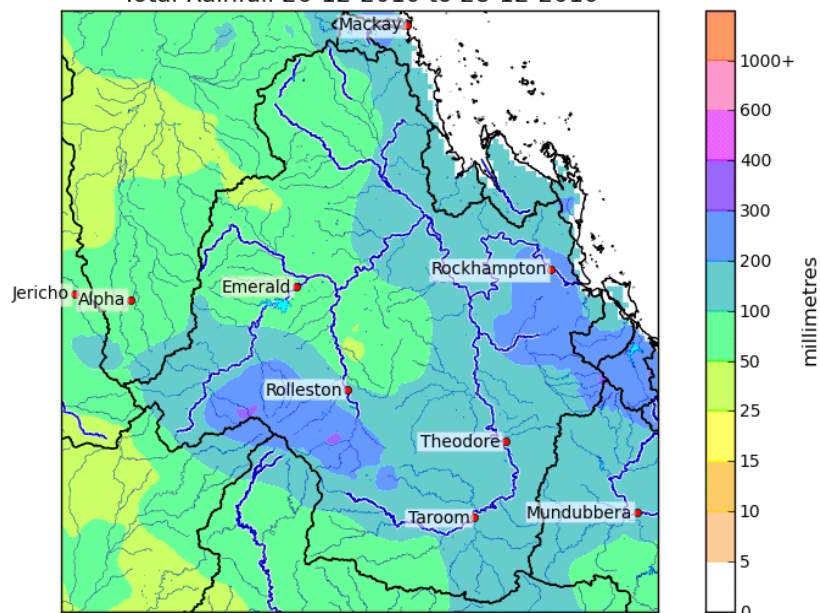


Figure 3. Rainfall map from 01/12/2010 to 31/01/2011 (top) and for the 48 hours to 9am on 28/12/2010 (bottom).

Rainfall Intensity

- Maximum rainfall intensities for four selected stations at Penjobe TM on Cona Creek, Upper Van Dyke AL near Vandyke Creek, Upper Claude AL near Clyde River and Glen Rock AL are shown in Tables 1 and 2.
- The most significant rainfall intensities for December 2010 and January 2011 occurred in the 12 to 72 hours prior to the 27/12/2010, with mainly a 1-2% Annual Exceedence Probability (50-100 year Average Recurrence Interval).

Table 1. Recorded maximum rainfall intensities for Penjobe TM on Cona Creek and Upper Van Dyke AL near Vandyke Creek for December 2010 and January 2011.

Rainfall Duration	Penjobe TM			Upper Van Dyke AL		
	Rainfall (mm)	Period ending	ARI (years)	Rainfall (mm)	Period ending	ARI (years)
12hr	158	11:55 AM 27/12/2010	50-100	189	5:55 AM 27/12/2010	> 100
24hr	239	12:35 PM 27/12/2010	> 100	248	1:05 PM 27/12/2010	> 100
48hr	261	12:35 PM 27/12/2010	50-100	268	2:55 PM 27/12/2010	> 100
72hr	264	1:30 PM 27/12/2010	50-100	272	3:30 PM 27/12/2010	50-100

Table 2. Recorded maximum rainfall intensities for Upper Claude AL near Clyde River and Glen Rock AL for December 2010 and January 2011.

Rainfall Duration	Upper Claude AL			Glen Rock AL		
	Rainfall (mm)	Period ending	ARI (years)	Rainfall (mm)	Period ending	ARI (years)
12hr	180	1:10 AM 27/12/2010	> 100	210	5:40 AM 27/12/2010	> 100
24hr	198	12:35 PM 27/12/2010	50-100	271	12:25 PM 27/12/2010	> 100
48hr	221	2:30 PM 27/12/2010	20-50	290	2:25 PM 27/12/2010	> 100
72hr	222	2:30 PM 27/12/2010	20-50	292	2:25 PM 27/12/2010	> 100

Flood event timeline

Table 3. Flood timeline for Emerald

Time/Date	Event Description	Gauge Height (metres)	Comment
6:51 AM 27/12/2010	First warning issued	10.65	First warning issued with reference to Emerald flooding.
29/12/2010	First time it exceeded minor flood level	14.0	Remained above minor flood level for ~6 days
29/12/2010	First time it exceeded moderate flood level	14.5	Total time above moderate flood was ~ 5 days
30/12/2010	First time it exceeded major flood level	15.00	Total time above major flood was ~4 days
4:00AM 31/12/2010	Major flood peak	16.05	New record
02/01/2011	Final fall below major	15.00	
02/01/2011	Final fall below moderate	14.5	
03/01/2011	Final fall below minor	14.0	
6:01 PM 03/01/2011	Final warning issued		

Flood Heights at Emerald

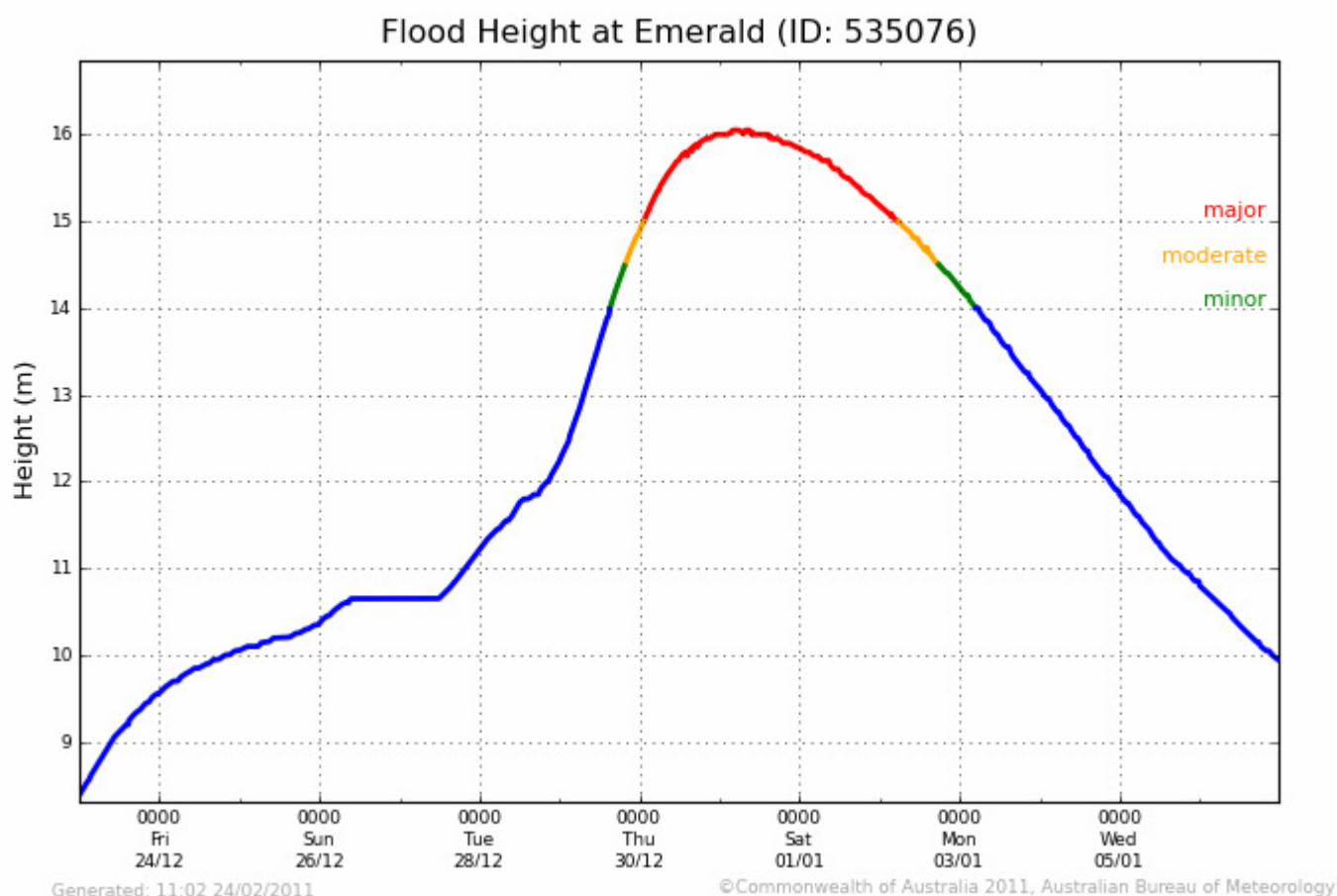


Figure 4. Flood Heights for the Emerald Alert.

Comparison with previous floods

- Start of record 1950 with 3 major flood peaks in the record
- Last major flood was 15.36 metres January 2008 but previous to that was 15.7 metres in 1950.

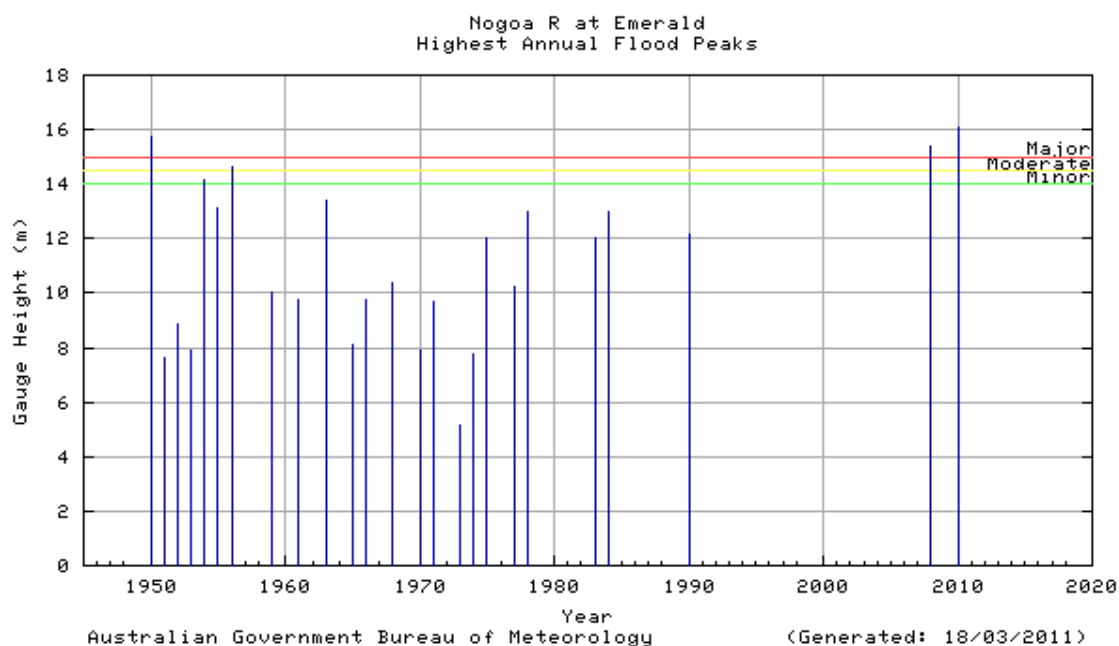


Figure 5. Highest annual flood peaks for the Nogoa River at Emerald.

Warning and Forecast Service

- Significant runoff commenced during early December with flood warnings for the Nogoa River issued between 03/12/2010 and 06/12/2010.
- Heavy rainfall occurred in late December with warnings commencing 27/12/2010 and continuing through to 03/01/2011.
- A total of 79 warnings were issued for the Fitzroy River system including the Nogoa River during December 2010 and January 2011.

Table 4. Table of peak height predictions for Emerald.

Time of Height Forecast	Forecast	Peak
27/12/2010 First warning issued. Height at the time was 10.65m (below minor)		
7:06 AM on Tuesday the 28th of December 2010	Exceed 14.5 metres (moderate) early Thursday	Rising limb forecasts – reach a level and expected to continue rising 14.55 metres at 8:10 PM Wed 29/12/2010 15.0 metres at 1:15 AM Thurs 30/12/2010 15.3 metres at 4:36 AM Thurs 30/12/2010
1:09 PM on Tuesday the 28th of December 2010	Exceed 14.5 metres (moderate) late Wednesday. Reach near 15.3 metres (major) during Friday.	
6:51 PM on Tuesday the 28th of December 2010	Exceed 15 metres (major) overnight Wednesday. Reach near 15.3 metres (major) during Friday.	
8:59 AM on Wednesday the 29th of December 2010	Reach about 15.7 metres during Friday.	15.7 metres at 11:18 AM Thurs 30/12/2010
9:59 PM on Wednesday the 29th of December 2010	Reach up to 15.9 metres during Friday.	15.9 metres at 5:16 PM Thurs 30/12/2010
7:12 AM on Thursday the 30th of December 2010	Reach up to 16.2 metres during Friday.	16.05 metres at 4:00 AM Fri 31/12/2010
7:34 AM on Friday the 31st of December 2010	Currently peaking at Emerald with latest reading of 16.05 metres at 6am Friday.	

Note: This table does not include all forecasts issued during these flood events.