

<i>Name of Witness</i>	Craig William EDMONSTON
<i>Date of Birth</i>	24 th May, 1946
<i>Address and contact details</i>	[Redacted] [Redacted] [Redacted] email - [Redacted]
<i>Occupation</i>	Consulting Surveyor
<i>Officer taking statement</i>	Detective Senior Sergeant Mark Reid
<i>Date taken</i>	02 September 2011

Craig William EDMONSTON states:

1. I am a Registered Surveyor currently living in Yeppoon and am [Redacted] years old. I was born and educated in Rockhampton. I commenced working as a cadet surveyor in Rockhampton in 1964. I set up my own practice in Emerald in 1973 and lived in Emerald until December 2009.
2. I served as Mayor of the Emerald Shire Council during the periods 1979-1982, 1985-1989. My original work in Emerald mainly related to surveying irrigation farms, roads, drains and channels after the construction of the Fairbairn Dam. Much of this work included working along the Nogoa River in the 1970's when flooding was a regular occurrence.
3. I have also carried out extensive survey work in the upper reaches of the Nogoa River and Theresa Creek. The coal mining industry came into being and I have been involved in the development of most of the coal mines in the Central Highlands including Ensham Mine which the Nogoa River passes through.
4. I first became involved in public life through the formation of the Comet River Bridge Committee. This group was formed to agitate for a high level bridge over the Comet River because of the extensive flooding in the 1970's which cut the Capricorn Highway for several weeks at a time. The group was successful and a new bridge was built which went under water before it was finished.
5. Because of the flooding events of the early years in Emerald I acquired an interest in floods and what caused them and built on that early experience over the years. Through this particular gathering of knowledge, my surveying experience and an extensive knowledge of the Central Highlands, I believe I have accumulated practical knowledge of the area equal to anybody.
6. This statement has been prepared because of serious concerns relating to the flooding events of January 2008 and December/January 2010/2011 in the Nogoa River seriously affecting the town of Emerald and properties along the Nogoa River including the Ensham Mine.
7. The community was not prepared for these events. The warnings were inappropriate, often incorrect and confusing. The severity of the events was overstated in terms of chance of

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 Exhibit Number: 679

recurrence. Complacency was evident due to lack of accurate and consistent advice. Significant property damage could have been avoided with correct advice.

- 8. The Disaster Management Team did not contain any genuine long term experience of flooding in the Nogoia River and in Emerald, and were reluctant to take any notice of experienced residents.

2008 FLOOD

- 9. Emerald suffered from a major flood in January 2008. Fortunately for the town the Fairbairn Dam had only been 35% full when the rainfall event commenced. There is no doubt that the spare capacity of the dam had a significant mitigating effect on that flood in Emerald. Even so, the flood height on the gauge at Emerald reached 15.36m which is classified as a major flood. Sunwater produced a report titled "Impact of Fairbairn Dam on the January 2008 Emerald Flood" which was released to the public. This report calculated the discharge over the dam starting at 35% full, if the dam had been 100% full, and if there was no dam at all. The conclusion was that "Empty or full, the Dam has a significant mitigating impact on floods in Emerald". This may be so, but what the report didn't say was exactly what height would have been reached in Emerald had the dam been full at the start of the rain event.

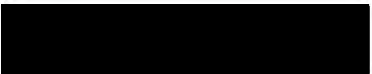
- 11. The "mitigating effect" previously described is achieved because when the Dam overflows the restriction of flow caused by the dams construction holds the water back and reduces the height downstream. It takes longer for the water to get away and therefore creates the situation that occurred in December 2010, when the dam was still discharging when a major rain event occurred. Thus the existence of the Dam has actually impacted adversely on flooding in Emerald in December 2010.

- 12. A study of rainfall records from 1883 to 1973 when the dam was completed reveals that this situation would have occurred several times since 1883. It appears that the periods around 1890, 1916-1918 and 1950-1956 could well have seen major flooding because of the dam, had it existed at the time. This scenario substantially complicates the calculation of return period intervals for a particular flood. This can no longer be calculated from a single rain event as has been done in the past.

ENSHAM MINE

- 13. There has been abundant media coverage of the flooding of Ensham Mine in January 2008, particularly showing the photo of the submerged Dragline. Ensham Resources General Manager claimed the flood had washed out a levee bank built to withstand a Q 100 flood and that this was a Q 200 event. See Courier Mail 22/01/2008, P.6 "The giant machine was flooded with company chief executive John Pegler saying the deluge far exceeded the one-in-100 year magnitude". The front page showed the large photo of the Dragline with the old "Duckponds" homestead and sheds in the foreground, well clear of the water.

- 14. The facts are that the maximum height recorded at Duckponds gauge in 2008 was 14.52m. In January 2011 the height was 15.03m. However the gauge was only established in 1994. The flood in 1978 was higher than in 2008. The record is probably in December 1916 which was at least 2.0m higher than 2010/2011. Higher floods than in 2008 also occurred in 1918, 1950, 1954 and 1956. The dragline was sitting right in the middle of the Nogoia River flood plain. When the levee washed away in darkness on Saturday 19th January 2008, there was no water flowing over the Fairbairn Dam crest so the Nogoia River had nothing to do with the failure of the levee. The levee was destroyed by the flooding from Theresa Creek which was nowhere near a record flood.


 Witness Signature..... Signature of officer
 Page Number 2 of 11

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 GPO Box 1738 Brisbane
 Queensland 4001 Australia
 Telephone 1300 309 634
 Facsimile +61 7 3405 9750
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- 15. In an interview on ABC Radio on 14/02/2008 with Mitch Grayson, John Pegler stated – “when that water came towards the mine on Saturday night, it was enormous. It was unprecedented in anybody’s experience and it overtopped the levee banks”. Mitch Grayson went on to say – “Now, it’s fair enough to say that this is a one in a 100 year flood, or a freak flood, but the mine itself is right in the middle of a flood plain. Your company must have been aware something like this could have happened.” John Pegler responded with – “Lots of flood modelling has been done, but this exceeds the experiences and expectations considerably. This by anybody’s experiences was unprecedented.”
- 16. All of this is absolute rubbish. Either they didn’t do any flood modelling or the modelling was incompetent. They could have called myself as I had a lot of experience in working on the flood plain and providing information to Ensham in the very early days of development of the mine. They could have called [REDACTED] the former owner of the property called “Duckponds”. He would have told them about his experiences with floods including the 1956 flood that came up to the door handles of the homestead, and the 1978 flood that got into the house yard. The point I wish to make here is that high profile people who wouldn’t know anything about flooding in the Nogoa River have been making very firm quantitative statements that are simply not true, but have the effect of creating complacency in the community.
- 17. On 1/12/2010 the ABC News reported that “Ensham Resources says levee banks have been built around its Central Queensland mine near Emerald, west of Rockhampton, to prevent flooding this wet season”, it went on to say “Ensham says it has built new levee banks able to withstand a one-in-1000 year flood.” This must be some levee. But what is the effect on upstream property? We already know that the restrictive effect of the Fairbairn Dam holds the water back upstream, mitigating the flood below the restriction.

2010 FLOODING IN NOGOA RIVER

- 18. Wide spread rain throughout November and early December had caused minor flooding in the Nogoa River. The river had reached a height of 10.7m in Emerald on Sunday night 26/12/2010 and was steady.
- 19. Heavy rain started falling on the headwaters of the Nogoa River on Boxing Day 26/12/2010. I woke to the news early on Monday 27th which reported falls of up to 250mm in the Nogoa catchment. I went straight to the computer and on to the Bureau of Meteorology site (B.O.M.) to check on the rainfall data. It showed that while the whole Nogoa catchment had not received flood rains, the upper reaches of the Nogoa and Claude Rivers had received 200mm to 250mm. I noted that the Mantuan Downs gauge was not on the screen.
- 20. I then checked the flood gauge at Raymond, which had only recently come back into action, and it was rising rapidly, almost vertical. This was about 7.00am. I then said to my wife – “Emerald is in for a very big flood.”

MEDIA ADVICE:

- 21. The Courier Mail on or about 4/12/2010 reported the following. “It’s wet everywhere out here – the flood plain, the creeks, rivers and the dams.” Central Highlands Mayor Peter Maguire said. “It won’t take much to see those flood levels rise so we will continue to monitor conditions over the next few days.”



Witness Signature..... Signature of officer
Page Number 3 of 11

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Queensland 4001 Australia
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Facsimile +61 7 3405 9750
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22. After the Boxing Day rain the Courier Mail at 10.49am on 27/12/2010 posted an article about ten towns on flood alert. In that article it stated – “The Nogoa River catchment received 200mm of rain overnight and could cause minor flooding again in Emerald.
23. However by late Wednesday at 22.33pm, 29th Sky News reported – “At Emerald, inland from Rockhampton, residents have been told to expect the biggest flood in its history with the Nogoa River expected to peak at 15.6m on Friday. That’s above the 15.36m metre peak reached in January 2008, when 2700 people were evacuated and the community was left with a \$50 million damage bill”.
24. Once again this was incorrect information as it was common knowledge by anyone in authority that the 1950 flood had reached 15.7m on the Emerald gauge. The 15.7m commonly accepted as the record flood height for the 1950 flood, equates to the reading of 51ft 6ins on the gauge on 27th November. This reading was advised to [REDACTED] and [REDACTED] consulting engineers, by the Irrigation and Water Supply Commission, by letter dated 23rd April, 1976. Following extensive research, I have recently found that the highest reading on the gauge reported widely at the time of the flood was 53ft (16.15m). This height agrees with the level recorded on drawings of the Nogoa rail bridge by Queensland Rail and also is confirmed by eye witness reports on the event by several people I have spoken to. My recent research has shown confusion with previous flood heights and there is no reliable way of knowing how to compare different floods. Information provided to me by IWSC shows the 1916 flood as being the same height in Emerald as the 1950 flood, while newspaper reports indicate it could have been lower. However, there were many different gauges used between 1916 and now. In January 1918 a major flood was reported around the 12th and this was followed by another major flood about the 24th. When comparing floods on the town gauge at Emerald, the 1950 flood is still the record flood.
25. It was also incomplete information as residents were led to believe that the water in Emerald would be only 0.24m higher than in 2008. The fact is in some areas of Emerald the water would be up to 1.5m higher than in 2008 despite the flood gauge only recording 0.7m higher at the flood peak. Very few people would have been able to predict this, but the few who could, were not consulted.

MEDIA COVERAGE

26. During this period when the river was rising there was extensive media coverage often providing confusing advice. For example on Wednesday evening 29th WIN TV News showing film of water well below the Vince Lester bridge, reported that there would be about 100 homes flooded on Thursday and this would increase to about 200 homes on Friday.
27. At this very point in time the water would have been lapping the bridge and it had been predicted that the flood would be 0.3m higher than in 2008, which meant many more than 200 homes would be flooded, plus most industrial areas, and many businesses. In the end the number of houses flooded was over 1000, almost all industrial buildings, both shopping centres, Hospital, and most shops and business premises were flooded as well.
28. All through this flood event the B.O.M., the CHRC and the seemingly compliant media continually understated the likely impact of the flood. As a consequence many people were lulled into a false sense of security. Millions of dollars of damage to property and vehicles could have been avoided had the correct advice been provided in the first instance on Monday 27th December. There was plenty of time for people to respond appropriately with timely and

Witness Signature..... Signature of officer

Page Number 4 of 11

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GPO Box 1738 Brisbane
Queensland 4001 Australia
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correct advice. It is far better to make a call worse than actual than the other way around. In the case of Emerald the authorities had almost the entire population of the town TRAPPED in town with the only way out by helicopter. Had the river risen another metre such an evacuation could have been catastrophic. The community should have been advised of the worst case scenario right at the beginning of the flood event. This was the case with all other floods including Alpha, Rockhampton, Brisbane, Southern Queensland and so on.

COUNCIL PLANNING POLICY

29. In light of the recent floods it should be apparent to Council that future flooding will be more a consequence of a combination of events rather than a single rainfall event. The old Q100 or Q50 rules do not apply in Emerald any more. Therefore any new flood line for building purposes should attempt to cater for the worst case event and certainly above the 2010 floodline. The old 1 in 30yr flood line adopted in the 1980's is certainly inappropriate, although it served the community well at the time. Following the 2008 flood, Council would have been expected to put in place an updated flood line for building purposes. However this appeared beyond their capacity. When approving an extension to the Emerald Market Shopping Centre near the Nogoia River on 20th September 2010 Council advised the following.

“Councils design flood standard, to determine Finished Floor Level (FFL) is the 100 year Average Recurrence Interval (ARI) flood level. Council does not possess specific flood data for Emerald and in the absence of such data, Council uses its Emerald Interim Flood Level Map to Determine Floor Levels (EIFLMDFL) to set minimum floor levels. Based on the EIFLMDFL, the designated 100 year ARI for the subject site is 176.8m AHD. As per Council's requirements, allowing for a 300mm freeboard, the minimum floor level required for the proposed development is 177.1m AHD.

30. The height of the water on this site in the 2008 flood was 177.3m. The height of water in 2010 was 178.0m yet the Council is using a 100 year ARI of 176.8m. The floor level is still below the level the water reached in 2008, which was exceeded by another 0.7m in 2010.
31. When this shopping centre was built in the first place all the old timers in Emerald thought the Council was mad in allowing it as it was always going to flood. Now it has – twice.
32. Another aspect of planning approvals over the years is that as the development moved North the land was generally filled to fit the flood lines of the times. This has resulted in substantial filling in some areas. Much of the filling occurred in the old flood channels going from south to north through and around the town. This filling has undoubtedly caused changes to the natural flow in flooding events and effected unfilled land on the upstream side of filling.
33. For quite a time Council itself was dumping material in the Nogoia River on the east side, even after the 2008 flood. I had specifically requested the Mayor to stop this activity but it continued for quite some time after the 2008 flood.

BOTANIC GARDENS

Witness Signature..... Signature of officer

Page Number 5 of 11

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34. The establishment of the botanic gardens within the Nogoa River will have some impact on the flow of water through town. Since the establishment of the gardens the vegetation has become much thicker than before the gardens. Old photos of the 1950 flood indicate the vegetation was sparse compared to now.

MAPPING

35. The Emerald Shire Council and now the CHRC has failed to update contour mapping of the Town and its environs. Orthophoto mapping was carried out in about 1984. The town started growing rapidly during the 1990's and naturally, outgrew the mapped area. The 2008 flood highlighted the critical need to have accurate contour mapping but nothing has been done. As there is a lack of accurate detailed mapping, it is not possible to build a model of the Nogoa floodplain that could be used to calculate flood height predictions accurately.
36. I believe that a telling statement was made by the Mayor of the C.H.R.C. at pages 2599 and 2600 of the enquiry transcript when he said "Ideally from this event, if we can get the hydrology, so to speak, that information right, I would be hopeful that we could get, for example, three days notice, at least, in Emerald for residents."
37. Bill Wilkinson, in his statement to the enquiry at page 2613 states "Yes, we had information coming from guys saying that it was the biggest flood they had seen in their lifetime in that part of the world. There was a mass of water." The facts are that this advice was not reflected in the first official flood warnings. The hydrology used was obviously wrong, the models, if actually used for predicting the flood were wrong, and the local landowner advice was obviously correct.

THE MAXIMUM PREDICTED FLOOD HEIGHT:

38. The maximum predicted height for the Town gauge was 16.2m made at about 7.00am on 30th December 2010. At this point in time, the river was 15.45m on the gauge and still rising at 0.05m/hr and already 0.1m higher than the 2008 flood. There was no advice provided through any media as to what the consequence of a 16.2m flood would be. There was some references to an updated map being available on the Council website, but when I clicked on this new map I still got the original map, loaded the day before.
39. At 16.35m on the Town gauge, only 300mm above the peak height actually recorded and 150mm above the prediction, the following consequences would have arisen.
- The rail bridge would be closed even to pedestrian movement and washed out on the western approach.
 - The approaches were already starting to wash out. The only way out of Emerald would be by helicopter.
 - The electricity substation would be under water and the power cut to Emerald, Gemfields, Springsure and all the way to Carnarvon Gorge.
 - The Mayor confirmed this at the public meeting on 28th March.
 - The hospital would have been flooded and surrounded by floodwaters.
 - The Blue Care facility in Borilla Street would be flooded and surrounded by water.
 - Water would have washed through the railway line on the western side of the railway station and a rush of water would have flooded many more businesses.
 - The evacuation centre in Gladstone Street would be flooded and closed. About 80%-90% of the Town area West of the Nogoa River would have been inundated.
 - Flood water would be threatening the Town Hall.
 - Almost every low set home on the west side of the Nogoa River would be flooded.


Witness Signature..... Signature of officer

Page Number 6 of 11

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- There were no evacuation plans in place for this situation.
- With the failure of electricity and all basic services such as water, sewerage and transport, and food supply, it would be necessary to evacuate the whole area west of the river, by helicopter with limited space available for helicopters to operate safely.
- All road access to Emerald would be closed, limiting emergency supplies of accommodation, food etc to air transport.
- Houses on the East side of the river would have been without power and food but may have had water.
- At the March 28 public meeting, I asked the Mayor to tell the meeting what they would have done, had the flood been 300mm higher. His response was simply “we would have been stuffed”.

40. It is therefore extremely important that the control room get the maximum predicted height as accurate as possible at the earliest possible time. It is far better to predict a higher than actual peak height and have the community prepared for the worst, than procrastinate over the height and have residents caught out as was the case in Emerald.
41. I think that Emerald could have a higher flood. As the water first spilled over the Fairbairn Dam the flood in Theresa Creek had started to fall. Had the rain event moved in a different direction (from South to North), and Theresa Creek peaked just 2-3 days later, the peak height of the flood in Emerald would have certainly been higher and possibly more than 300mm higher. Had any further significant rain occurred after Boxing Day 2010 the peak height in Emerald could also have been higher. Had the Boxing Day rain fallen over a larger area within the catchment or the rain cell been positioned further to the North or West a much larger flood would have hit Emerald.
42. The rain cell that caused the flooding was shared with the Comet River catchment and the rivers flowing to the South and South-west of the Great Dividing Range. Following the peak of the 2008 flood on 23rd January, a major rain event occurred on 4th February where 100mm of rain fell in one hour causing substantial local flooding. Rockhampton experienced a flash flooding event like this recently where severe local flooding was caused by a torrential downpour occurring when the river was in minor flood, with the drains backed up by the floodwater.
43. Emerald was severely flooded in January 1918. There were very few streets then but the flood is reported to have “submerged Emerald streets”. Newspaper reports described workers seen to go to work without boots and trousers rolled up high and a huge body of water, some miles wide, on the west side of town. This early flood was followed by another major flood about 12 days later, when a very large cyclone crossed the coast at Mackay and flooded the whole of Central Queensland. The subsequent flooding led to the highest ever recorded flood in Rockhampton.
44. The Capricorn Highway bridge over the Comet River at Comet was flooded extensively during the 2010-11 floods. This was certainly a high flood.
45. However this latest record was exceeded by approximately 2.0m by the 1916 flood in Theresa Creek and Nogoia River which backed the water up the Comet River to a height of 154.5m AHD. The bridge deck height is 151.04m. Therefore, it is very possible, and in fact most likely, that at some time in the future Emerald will have a higher flood than in 2010-2011. Recent events throughout Queensland indicate that it would be quite possible to experience an


 Witness Signature..... Signature of officer
 Page Number 7 of 11

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event much worse than previously known. Planning for such an event should be the most urgent activity being undertaken by the C.H.R.C.

ACCURACY AND LOCATION OF FLOOD & RAIN GAUGES:

46. C.H.R.C. through Bill Wilkinson has made much about the work he has undertaken in installing 38 new "rain and river gauging systems" since the 2008 flood. The fact is that only one new rain gauge station has been established and this is at Sapphire. 16 stations were existing flood and rain gauges and 22 stations were existing rain recording stations.
47. New radio telemetry equipment was installed that would produce real time information. However this information has always been available by dialling up the station. Unfortunately the new system didn't work as expected. Raymond gauge was overtopped during the flood and the rain gauges were faulty and now, a review of their design is being undertaken. An important issue here is that it is unlikely that anyone from the C.H.R.C. is qualified or competent to understand this equipment, calibrate the equipment or properly service it. There is also a question about the durability of the telemetry system in severe weather. The old system seemed to work quite well in the past.

PROPOSED VAN DYKE CREEK GAUGE:

48. If there is only funding available for one additional gauge, it is my view that it would be better located near Mantuan Downs. The media release from Council appears to state that a new gauge on Van Dyke Creek will give up to 24hrs extra notice to Emerald. This is highly unlikely given the distances involved, and this gauge would only measure a small, though important, catchment. In the case where little rain fell on that catchment it would offer no benefit at all. The larger catchments of the Claude River and the Nogoia above the Claude junction would appear to present much greater warning on how much water was coming down the River. If Raymond is upgraded to become reliable, this will provide back up assurance and give Emerald at least 4 days notice of water coming from this area. However such decisions should be made by fully qualified, experienced and competent professionals.

COUNCIL PLANNING POLICY:

49. It seems that Council has been negligent in this area since the early 1990's. Although, there seems to be confusion. In an interview with Michael McKenna of "The Weekend Australian" on January 8-9, 2011, CHRC Councillor Paul Bell is quoted as follows in relation to buildings being flooded. "Bell, who was also mayor during much of the 1990's, admitted that many homes and businesses had been built on flood plains after Council relied on outdated flood mapping from the 1950's. He said after years of drought it was only during the 2008 floods, which inundated the town, that the full threat of the Nogoia River system was exposed. Until then we had 1950's data, which in some instances involved a notch on a tree or the memory of a local, to work from, Bell said."
50. On the other hand if we turn to the CHRC 'Local Disaster Management Plan' under the section 3.05 RISK STUDIES, we find that the section states. "The following risk studies have been undertaken in the former local government areas:
- Numerous flood studies of the Nogoia River Floodplain system.

I now turn to a letter received by myself from the CHRC dated 4 April, 2011. This letter is in response to an inquiry about Flood Level Building Line – Emerald. *A copy of this letter is attached. (CWE:06)*

Witness Signature..... Signature of officer

Page Number 8 of 11

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Queensland 4001 Australia
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Facsimile +61 7 3405 9750
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of the document. There is no plan, rather a description of the bureaucracy involved in organising disaster management, which is of little assistance to the residents facing a disaster.

FLOOD WARNING BY CIVILLIANS:

59. During the flood event of 2010-2011 many householders and some businesses were better prepared for the flood because of prior warning from people who knew that a massive flood was about to happen. *See C.Q.News 10/06/11 article (CWE:09)*. There are many stories like this. Many people were warned by property owners, helicopter pilots, Mr [REDACTED] and myself that this flood was definitely going to be bigger than the 2008 flood.
60. My wife and I were heavily involved in recovery work through Rotary as my wife [REDACTED] was the District Governor for the 2010-2011 year, for D9570, which covers the whole of Central Queensland from Maryborough to Mackay. We organised assistance to flood victims such as fencing repairs, fodder, food vouchers, cash contributions to community groups and individuals, linen supplies, water purification kits and so on. This brought us into contact with the helicopter pilots who all advised that they had tried to warn the C.H.R.C. and the Mayor about the size and destructive force of the impending flood, but this advice was ignored.
61. I was personally advised by graziers up the Nogoia above Raymond that they had never seen water like it before and the noise of the rushing water was unbelievable. This advice was consistent in all reports coming from up River on the morning of 27 December 2010. Yet at 11.00am the Mayor put out the official report that only a minor flood of 14.0m was expected in Emerald. It was obvious to anyone with an ounce of common sense that given:
- The amount and intensity of the rainfall upstream
 - The steep slopes that the bulk of the rain fell on
 - The river was already in minor flood and 2.0m over the Fairbairn Dam Spillway and 10.7m in Town.
 - There would be 100% runoff.
62. There had to be a much bigger flood in Emerald than in 2008. When the Raymond gauge went off the air I rang a property owner in the area and was advised that the gauge had been completely submerged and the water was about 1.4m higher than in 2008. The river would have been 8k or more wide. I tried to get the message through to the A.B.C. and was told they would ring me back, but they never did. It seems to be a common theme during the Queensland floods that the practical knowledge of experienced people was largely ignored by the bureaucrats in charge of predicting the outcomes and advising the communities. Where practical experience was used in places such as Alpha, the residents were adequately warned and damage was minimised.

FLOOD PREVENTION FOR EMERALD:

63. During the public meeting held in Emerald on 28 March, several residents raised the possibility of discharging water from Fairbairn Dam to the East during large floods. This discharge would bypass Emerald and enter the Nogoia River further down stream. The Sunwater representatives simply dismissed this proposition. However such a proposal is not a stupid idea and should be thoroughly investigated.
64. It has just been proven in New Orleans that such an idea can be made to work. The Mississippi River flood management system failed for various reasons during hurricane Katrina but it was not the levee concept that failed. The work that has been done since 2005 ensured the safety during the recent extreme flooding event in the Mississippi.

Witness Signature..... Signature of officer

Page Number 10 of 11

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- 65. It would seem possible to protect Emerald from flooding by constructing levees and a bypass channel around the western side of the town. Only minor work would need to be done if the Dam was allowed to discharge to the East in order to minimise the flood height in Emerald. Such projects will obviously cost money and this should be identified in an appropriate study. However I personally know of several businesses who have recorded losses of \$1million and more. Houses have cost up to \$200,000 to repair. Every kitchen is about \$40,000. The cost of lost business is many millions and this loss is never recovered.
- 66. There will certainly be more floods of equivalent size or bigger. It is only a matter of time. It could be later this year or next year. Meanwhile building is still being carried out in areas that flooded or almost flooded. If New Orleans can be protected from one of the biggest floods in history, in one of the largest River systems in the World, surely Emerald can be protected from flooding in the Nogoia River.
- 67. I further recommend that a thorough study be undertaken to investigate all ways of flood proofing Emerald including the discharge from the Fairbairn Dam to the East, construction of levees and channels around the town of Emerald or a combination of both concepts and including raising the level of the spillway.

COMMUNITY COMPLACENCY:

- 68. [REDACTED] a research scientist at the University of Oklahoma, said many people who hear warnings will look outside to see whether they can see the tornado – “they want some kind of confirmation, they want to see it”. Weather experts aren’t sure why, but worry that people think that if a twister hasn’t appeared in a certain amount of time, it must have been a false alarm.
- 69. I think this also applies to floods. If they can’t see the water coming up they don’t think it will. I firmly believe that the recent history of dreadful flood height predictions has induced a lot of community complacency. Many residents in North Emerald have been incorrectly told they will get flooded and should evacuate in 2008 and 2010 when their houses did not get flooded. While the streets flooded the houses didn’t. This is partly due to the application of the building heights applied from the 1982 flood lines. It is also partly due to good luck with the particular flood. Different circumstances in a future flood could well inundate these houses when the owners will least expect it, and the control room will not predict it.

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C W EDMONSTON

Witness Signature..... Signature of officer

Page Number 11 of 11

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 Queensland 4001 Australia
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New gauge to fill warning gap

Simon Green | 16th March 2011

One of the 38 new river gauging systems the CHRC has installed since the 2008 floods.

PLANS are under way to install an important new gauging station along Van Dyke Creek that will give Emerald residents upstream an extra day of warning before future flood events.

Currently there is a large unmeasured gap between Raymond and Craigmore stations before the Nogoa River flows into the Fairbairn Dam, with about 40kms of free-flowing water between the gauges.

"A further gauging station down the bottom end of the Van Dyke will give everybody a better understanding of what's heading towards the Nogoa and the dam and also what's coming down Van Dyke itself," CHRC manager for corporate governance Bill Wilkinson said.

"Raymond is upstream of where Van Dyke comes in, and Craigmore is the last gauge which is in a very good position and very accurate.

"That gives everyone the final readings on what is coming into the dam.

"If we put one in at Van Dyke it should improve the ability of forecasters and might give us an extra day's understanding of what is coming into the dam.

"A gauge on Van Dyke will enable the community and disaster management groups to more quickly assess volumes before they get to Craigmore."

Along with the new Van Dyke gauge, CHRC will be installing an two extra river gauges and a rainfall gauge in the Rolleston township and upstream as a result of a successful funding submission approved late last year.

Since the 2008 floods, CHRC has installed 38 stations containing rain and river-level gauges, with funding secured from the Natural Disaster Management Program.

Mr Wilkinson said the new additions complemented the state-of-the-art weather radar installed post 2008.

"Some people would say we should have gauges on every section of every creek, but it is impracticable to have that density of network. But we are constantly looking at ways to improve the rain and flood warning system for the community across the entire shire," he said.

CHRC Mayor Peter Maguire said in the wake of recent flooding a need for further gauging systems along the Comet River was clearly identified.



Lex Iker owns three properties along Van Dyke Creek and welcomed the addition to the gauging network.

"Recent floods definitely accentuated the need for it, and it's often hard for us to get through to people downstream to let them know that there is a lot of water coming," he said.

"Van Dyke is certainly one of the quicker running creeks in the Fairbairn catchment."

Mr Iker said he lost 16 dams, 50kms of fencing and 60kms of roads, with the majority of damage being caused by Van Dyke Creek.

Installation of the gauges will get underway during the upcoming winter.

New gauge to fill flood warning gap

By SIMON GREEN

PLANS are under way to install an important new gauging station along Van Dyke Creek that will give Emerald residents upstream an extra day of warning before future flood events.

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Note: Flood Debris

VITAL EQUIPMENT: One of the 38 new river gauging systems the CHRC has installed since the 2008 floods. CHRC

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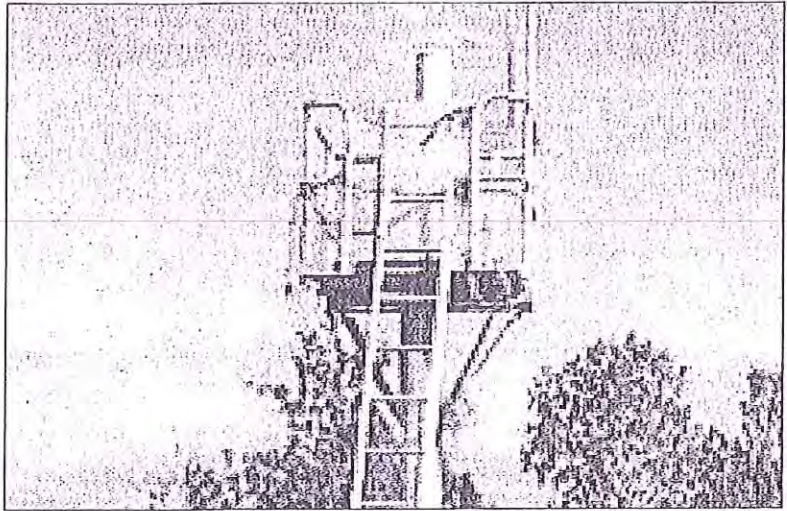
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C.Q.N WED 16.03.2011

CWE:02

CH rain gauge design review in pipeline: BOM



■ FAULTY GAUGES: The Central Highlands council is hoping a design flaw in its river gauging network will be fixed. Photo: Contributed

A BUREAU of Meteorology review of a design fault in rain gauges installed across the Central Highlands is "in the pipeline".

The flawed 0.2ml high resolution rain gauges are susceptible to failure when a small orifice at the outlet of the rain collection funnel becomes blocked with dust and leaf matter.

One on Arcturus Downs in the Orion district was found to have its funnel and filter blocked by another contaminant - cow hair.

Council workers carried out maintenance on four rain gauges in March at Rubyvale, Sunny Park, Blackdown Tableland and Arcturus Downs, all of which were found to be defective.

"The BOM and the suppliers of this (funnel orifice) component have been informed of the issue, and a review of the design and possible modification is in the pipeline," a report to council said.

"Arcturus Downs (rain gauge) is located near a private landing strip

within a paddock with cattle... can only guess that the cow hair is being blown up due to landing strip activity."

Rubyvale's rain gauge was diagnosed with a faulty reed switch on the tipping bucket. A replacement was ordered.

The funnels and filters on the remaining three gauges were cleaned. They will be monitored closely.

Plans are under way to install an important new gauging station along Van Dyke Creek that will give Emerald residents upstream an extra day of warning before future flood events.

Currently there is about 40km of free-flowing unmetred water between the Raymond and Craigmore stations before the Nogoia River flows into the Fairbairn Dam.

"A further gauging station down the bottom end of the Van Dyke will give everybody a better understanding of what's heading towards the Nogoia," council's Bill Wilkinson said.

Live cattle suspension costly

THE Federal Government's move to suspend live animal exports to a number of killing facilities in Indonesia could bankrupt northern Australian cattle producers, said the Australian Beef Association.

Agriculture Minister Joe Ludwig said the decision was based on footage collected by Animals Australia that showed cattle being mistreated before slaughter.

The minister said he had asked Australian officials to prepare orders that would enforce the complete suspension of live animal exports to the facilities identified by Animals Australia.

"These orders will strengthen the

decision I took to conduct a full investigation into the footage provided," Senator Ludwig said.

ABA chairman Brad Bellinger expressed his personal disgust at the footage shown on 4 Corners, but said banning live exports was not the answer.

Central Highlands graziers fear a ban could flood the local market and greatly decrease prices.

The ABA has called for stun-guns and proper knocking boxes to be given to any major Indonesian abattoir killing cattle from Australia.

The industry body also advocated for an abattoir to be built in Darwin.



employee to ring up a sale at the reopening of the... were excited to be the first customers. Photos: Lindsey Jackson EME270511colesreopen038

registers 1 locals



An employee Scates on behalf of his support. EME270511colesreopen015

gular flowers and... as they walked... ors.

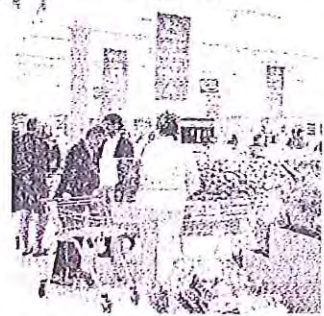
mers were busy... isles Evelyn Well... a Roughan were... mers through the

l she had been... d to the day and... nto her old groc... outline.

xcited about it re... been waiting for... with a smile.

an exciting yet... for Sonia Marsh... ashier to ring up

used a checkout



■ FRESH AND NEW: Customers took their time to peruse the aisles. EME270511colesreopen036

since I was 16 so this is all pretty new to me as well," Sonia said.

There were plenty of other eager customers who arrived at the store bright and early, and well before opening time, bringing with them comments of excitement.

CWE:03

2nd June 2011

Craig Edmonston

[REDACTED]
Yeppoon Qld 4703

Ph: [REDACTED]

Fax: [REDACTED]

Dear Craig,

Reference: Your letters - dated 4 April 2011 regarding river gauging stations; and 27 April 2011 regarding LIDAR aquisition

Sorry for the delay in replying to you.

The article in the CQ News on the 16/3/11 is a positive report to the community about the rain and river gauge ALERT network implemented by Council and the Bureau of Meteorology for flood warning, forecasters and the general public.

There are thirty eight ALERT sites in the network:

- 22 rain gauges only, and all completely new equipment.
- 16 combination rain / river gauges.
- The gauge at Sapphire on Retreat Creek is a completely new installation – tower, pipe work into the stream, sensors, canister and telemetry.
- All other rain / river gauges involved "piggy-backing" ALERT equipment to existing TM gauging stations, owned and managed by either DERM or Sunwater.
- In the instance of Raymond gauge, DERM made the decision that it no longer required the gauge for its business purposes, and transferred ownership of the gauge to Council. Thus, there was a tower on-site, and pipe-work into the stream. However, Council and BOM put in a completely new data canister, rain gauge, and VHF telemetry equipment onto the tower. DERM had removed all their equipment.
- The process of piggy backing the ALERT system to the same river gauges negated the need to replicate pipe-work and height sensor. It was cost effective in delivering real-time data to the BOM site, to the general public and to Council chambers for disaster management purposes.
- We did not have real-time data in 2008 or prior to 2008. All data from the existing stations was acquired by dialing up each station.

- DERM is only now currently upgrading some of their key river stations across the state to be real-time over satellite, so that BOM and the general public will be able to see the real-time rises and falls immediately on the BOM site for the DERM gauges.
- I do not believe Council or I needed to correct the newspaper story (I have attached a copy of the article). The work that went into developing and planning a completely new telemetry network, locating repeaters, checking signal strengths, checking connectivity from one to the next and ensuring the data would transmit to the radar and Council and then to BOM was considerable. The new gear – canisters, VHF telemetry repeaters, rain gauges all in my mind make for a 'new ALERT gauging system'.
- There was no ALERT system (real time) in existence before this system went in.
- It is a 'new' ALERT system.
- I was asked by the press to provide a photo of a river gauge after they had drafted the story. The picture I had on hand happened to be the Raymond gauge – as it is representative of what the ALERT river / rain gauge looks like.

The depth of water over the spillway on the night of the 26th December 2010, when the heavy rainfall event began to unfold in the upper catchment was 1.87m.

Your questions regarding the statistical measurements of the Fairbairn Dam and spillway infrastructure are best directed to Sunwater. They are the infrastructure owners, managers and responsible for the information they provide about their asset.

In relation to discrepancies in the gauging information between an ALERT gauge and a TM gauge. No gauge or electronic instrument is infallible. At times calibrations are needed, and readings can be affected by a number of various issues ranging from things affecting the sensor in the river, to things affecting the electronics in the canister, to things affecting the telemetry of the data. Sometimes when there appears to be an error - it is nigh on impossible to access the gauge immediately to undertake an investigation as to the possible cause. We can log remotely using our software and we work closely with BOM to do this. Some errors can be dealt with remotely – others require a field visit. In the instance of Craigmore – the approach BOM and Council will always take is to use the highest depth reading for flood prediction. Later, when the site can be accessed, the equipment is checked, the peak flood height is verified using a registered surveyor to check the gauge readings and discharges.

We have simplified an ALERT warning system and service to forecasters, the general public, disaster response managers etc. The system is working and it is maintained - Council has positioned itself well compared to some other local authorities within the state. We have an excellent working relationship with BOM, Sunwater and DERM and we aim to keep it that way so that collectively we can find cost efficiencies and effectiveness in service delivery of rain and river gauge data. Council has also received a lot of positive feedback about the weather and flood alert network, and the ability to look at things in the catchment real-time on the web site particularly in the lead up to and during this event.

With regard to your LIDAR data questions - I may have inadvertently used the word 'satellite' at the workshop – I have been pushing some fairly long hours – I did mean airborne.

Council is working with the lead State agencies (DERM and Dept of Communities) in obtaining this data. The State requested LGA's to identify priority areas. This then went through a validation check with other State agencies as to the real need. The State will be managing the tenders, acquisition and accuracy standards for numerous local government authorities across Queensland. DERM manages the geodetic network and is heavily involved in defining accuracy needs and

standards. Council simply worked hard to identify the priority areas, gain agreement from other State agencies so that the important areas we needed would be captured.

Council will always look to engaging local consultants and contractors where possible. In this instance, Council is not driving the tender process or the investment by the State, nor paying much of the cost. I am unsure how the State will invite tenders or fill the contract. TR Baillee as you indicate does come very well recommended by a number of mining businesses in our area.

Thank you for your continued interest in how Council and other stakeholders are improving their preparedness and warning mechanisms for disaster management.

Yours Faithfully

Bill Wilkinson
Manager Corporate Governance
Central Highlands Regional Council
Emerald Qld 4720

	16.73
28/12/2010 14:30	16.77
28/12/2010 14:50	16.82
28/12/2010 15:00	16.84
28/12/2010 15:20	16.89
28/12/2010 15:30	16.91
28/12/2010 15:40	16.95
28/12/2010 16:00	16.99
28/12/2010 16:30	17.05
28/12/2010 16:50	17.09
28/12/2010 17:00	17.12
28/12/2010 17:10	17.15
28/12/2010 17:40	17.20
28/12/2010 17:50	17.22
28/12/2010 18:00	17.25
28/12/2010 18:10	17.27
28/12/2010 18:20	17.30
28/12/2010 18:40	17.33
28/12/2010 18:50	17.35
28/12/2010 19:00	17.37
28/12/2010 19:20	17.41
28/12/2010 19:30	17.43
28/12/2010 20:00	17.49
28/12/2010 20:40	17.56
28/12/2010 21:00	17.60
28/12/2010 21:40	17.66
28/12/2010 21:50	17.68
28/12/2010 22:00	17.70
28/12/2010 23:00	17.77
28/12/2010 23:10	17.79
28/12/2010 23:20	17.82
29/12/2010 00:00	17.86
29/12/2010 00:20	17.89
29/12/2010 01:00	17.93
29/12/2010 01:30	17.97
29/12/2010 02:00	17.99
29/12/2010 03:00	18.02
29/12/2010 04:00	18.06
29/12/2010 05:00	18.10
29/12/2010 06:00	18.11
29/12/2010 07:00	18.14
29/12/2010 08:00	18.14
29/12/2010 09:00	18.16
29/12/2010 10:00	18.15
29/12/2010 11:00	18.13
29/12/2010 12:00	18.12
29/12/2010 12:40	18.10

PEAK

18.16
 17.76
 0.40 difference

[Data as Plot](#) | [Back to Bulletin](#)

CWE:05(A)

	16.86
28/12/2010 18:52	16.96
28/12/2010 19:43	17.06
28/12/2010 20:08	17.11
28/12/2010 21:10	17.21
28/12/2010 21:58	17.31
28/12/2010 22:42	17.36
28/12/2010 23:57	17.46
29/12/2010 00:32	17.51
29/12/2010 01:19	17.56
29/12/2010 02:13	17.61
29/12/2010 03:33	17.66
29/12/2010 04:46	17.71
29/12/2010 05:48	17.71
29/12/2010 08:30	17.76
29/12/2010 10:49	17.71
29/12/2010 11:48	17.71
29/12/2010 12:44	17.66
29/12/2010 14:23	17.61
29/12/2010 14:48	17.61
29/12/2010 16:33	17.51

Peak 18.16

[Data as Plot](#) | [Back to Bulletin](#)

About this table

1. The river height data is the latest available operational data provided for flood warning purposes and has not been quality controlled.
2. Stations marked with * or # indicate that the data is provided from automatic equipment.
3. Stations marked with * are Telephone Telemetry Devices and are nominally polled once a day and more often during floods.
4. Stations marked with # are ALERT Radio Telemetry and report every 3 hours and more often when the water level changes.
5. All river height reports are in metres and are shown in local time.
6. Heights or depths above/below roads, bridges, dam spillways and weirs are given as a guide only. For road open/closed information, see the [RACQ](#) website.
7. This product includes data made available to the Bureau by other agencies. Separate approval may be required to use the data for other purposes. Refer to [Listing of Operating Agencies](#) for Station Ownership.
8. Where data is supplied from a Department of Environment and Resource Management (DERM) Monitoring Site, please follow this [link](#) to get advice on data use and copyright.
9. For other Station details: [Flood Classifications](#), [Road Crossings](#), [Survey/AHD Details](#), [Maps](#)

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CWE:05(B)



CONTACT NAME: Luke Lankowski
TELEPHONE: (07) 4982 8359
FAX: 1300 242 687
EMAIL: llankowski@chrc.qld.gov.au

4 April 2011

CW Edmonston Consulting Surveyor

██████████
YEPPOON QLD 4703

Dear Sir

FLOOD LEVEL BUILDING LINE - EMERALD

I refer to your recent correspondence dated 13 March 2011 with regard to the flood level building line and advise as follows.

Council determines applications based on the best available information at the time of decision for applications for Material Change of Use, Reconfiguration of Lot and Operational Works. With respect to flooding impacts in Emerald, this information is currently sourced from documents prepared following the 1990 and 2008 flood events of the Nogoa River, and is subsequently reviewed by Council's engineers.

With regard to the areas of your specific concern it is noted that both decisions considered the impact of flood and overland flows. The conditions imposed on land at Newman Drive, Emerald sought to ensure the development was protected from overland flows as per Council's current practice by ensuring a minimum floor level at least 300mm above the finished ground level. For the proposed extension of the Target Country at the Emerald Market Plaza Shopping Centre however, it is noted that the applicant identified in their planning report that the land was subject to inundation and argued that the extension should be permitted at the level of the existing centre to improve centre functionality.

Under the *Emerald Shire Planning Scheme (Amendment 1 – 2009)* no specific flood heights are identified for all affected lands as insufficient information was available at the time of the creation of this document to address the requirements of State Planning Policy 1/03 "Mitigating the Adverse Impacts of Flood, Bushfire and Landslide". As such, flood heights and minimum floor levels such as those imposed on the two decisions you refer to are provided on an advisory basis only and cannot currently be enforced.

To address this issue Council has engaged Kellogg Brown & Root Pty Ltd (KBR) to undertake an audit of hydrological data from both the 2008 and 2010/11 flood events to assist in the development of a Flood Plain Management Study and has also engaged C&R Consulting to undertake an assessment of the upper Nogoa and Fairbairn Dam catchment and a Urban Flood Plain Analysis from the Fairbairn Dam spillway to downstream of Emerald township at Theresa Creek. These reviews will capture data to assist the creation of a flood plain model, a Flood Plain Management Plan and inform future planning schemes and influence proposed land zoning to minimise the impacts of flooding into the future.

.../2

Response to CW Edmonston-Flood Level Building Line Emerald

CWE:06

KBR and C&R Consulting will also consider issues such as the affect of urban development and structures on the flood plain and will review the impact of levees and structures such as bridges and rail infrastructure.

Unfortunately, these reviews are yet to be completed as information in relation to the 2010/11 flood event is still being compiled and assessed. However, once these studies are completed the resultant Flood Plain Management Plan will be released for public comment and Council would welcome your input given your interest in this issue.

The current timeframe for the completion of this study is outlined below:

- Collation of base data on 2008 and 2010/11 flood events – mid May 2011;
- Gap Analysis to inform Flood Plain Management Study – July 2011; and
- Completion of Hydraulic model for Emerald and upstream catchment area – December 2011.

Further information in relation to these projects can be obtained from Council's Manager Strategic Planning, Ms [REDACTED] on telephone number [REDACTED] or via email at [REDACTED]

Should you require further information, please contact Council's Development Services Section on telephone number 4982 8359.

Yours faithfully

[REDACTED]

Bryan Ottone
Chief Executive Officer

S/W/D North Emerald

**GORDONSTONE COAL MANAGEMENT
PTY LTD Box # 61**

REPORT ON
INVESTIGATION OF
FLOOD PROBLEMS IN EMERALD
FEBRUARY 1991



BLAIN JOHNSON PTY LTD

1371-08:1

CWE: 07

EMERALD TOWN FLOOD STUDY

Hydraulic modelling Nogoa River sensitivity report

Prepared for:

EMERALD SHIRE COUNCIL
65 Egerton Street
Emerald Qld 4720

Prepared by:

Kinhill Pty Ltd
ACN 007 660 317
299 Coronation Drive, Milton Qld 4064
Teléphone (07) 3368 9228, Facsimile (07) 3368 9229

16 May 2000

BWJ001-W-DO-001 Rev A

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CWE:08