

Foreword

The Callide Creek Flood Report presents the findings of a comprehensive review, conducted by my office, into the events associated with the impact of Tropical Cyclone Marcia in the Callide Valley area. Our terms of reference required particular attention to flooding that occurred downstream of the Callide Dam, and the operation of the Dam. The report also provides commentary on flooding events in other catchments at the time and the cumulative effect this had at various locations. The review included commissioning an independent hydrologist report, provided by BMT WBM, to capture, analyse and model relevant data to assist us to make a range of findings and recommendations.

The review was instigated as a commitment by the Premier and Minister for the Arts, the Honourable Annastacia Palaszczuk MP, to those affected by flooding; to discover what role, if any, the Callide Dam played in the event.

The review has considered the actions of those entities that share disaster management responsibilities in the context of this event; and, has made recommendations designed to enhance the safety and well-being of affected communities in the future. The review has highlighted the complexities of disaster management and the need for thorough and proper planning, preparation and practicing of those arrangements.

I acknowledge that officers who work in these entities often make difficult decisions with limited information during times of stress, and that these decisions have been subject to scrutiny by this review in hindsight, without these same pressures. The review team has been cognizant of this and consciously applied a test of reasonableness to their deliberations.

The review has revealed systemic difficulties, particularly in relation to warnings and education. Matters relating to improvements to flood monitoring and predicting capabilities are achievable, but will require coordinated effort and the support of a number of entities. Other longer term improvements to flood modelling, should have a direct impact on future town planning and building approval processes. These are matters of urgency that should be commenced as soon as practical. The approach needs to include open and frank discussion with, and disclosure to, current residents about risks faced.

I have been privileged through this review to be invited into people's homes, when they are suffering and desperately trying to recover, and have been privy to people's raw emotions. I have heard of remarkable bravery and willingness to help neighbours. I have been told heartbreaking stories such as that of a husband and wife separated in floodwaters while trying to save their children, not knowing if they would see each other again; and of the heartbreak of children losing favourite toys, not realising how close they may have been to losing a lot more. To those people I can only offer my genuine thanks and admiration.

This report has sought to answer as many questions as possible surrounding the flooding of Callide Creek. In doing so, we have been faithful to our commitment to determine and report on the facts. My hope and belief is that the recommendations will ease future risk through better access to information, understanding, improved disaster management response, and planning.

I must commend those entities from whom we sought information, in particular SunWater, the Banana Shire Council and the Department of Energy and Water Supply. They freely, willingly and enthusiastically assisted, realising the gravity of the matter and the opportunity for improvement. They showed what I believe to be a genuine commitment to deliver improved outcomes.

I thank and acknowledge all of the staff of my office, in particular those who worked directly on the review and those who willingly assisted. My thanks also to those seconded onto the team, who transitioned seamlessly and became much valued members.

I need also to highlight that, in our visits to those affected, not one issue was raised in relation to poor performance or lack of empathy shown by insurance companies. Given the often adverse media coverage after previous events, this was particularly pleasing to note.

The recommendations in this report cannot stop future flood events. However, if adopted, implemented, rehearsed and reviewed, situations should not be repeated where:

- people are trapped in their house looking at a one metre wall of water pressing against glass doors
- children are being evacuated within minutes of houses being inundated
- elderly couples find themselves driving through water over their headlights.

The clarification, documentation, and exercising of roles and responsibilities of all entities that contribute to effective disaster management, are critical to this success.

The challenge is for all entities to acknowledge accountability for matters identified; and to take the concept of 'shared responsibility', so often talked about in disaster management circles, from rhetoric to reality.

Iain S Mackenzie

Inspector-General Emergency Management

Executive Summary

Background

For the second time in two years, the Callide Valley in the Banana Shire has experienced major flooding. Several large floods in 2013 caused the Callide Dam gates to be opened. The association between flooding and the dam gates prompted community concern that the operation of the Callide Dam had exacerbated flooding.

On the evening of 20 February 2015, Tropical Cyclone Marcia impacted the Callide Valley bringing significant rainfall and Category 1 wind gusts. The rain was intense over a short period of time causing rapid stream rises. As the Callide Dam quickly filled, the gates opened automatically releasing water through the gates.

Many in the community saw the Callide Dam gates as the cause of the disaster. The Inspector-General Emergency Management (IGEM) was commissioned to report on the circumstances of the Callide Creek flood event during Tropical Cyclone Marcia to determine whether disaster management arrangements and Callide Dam planning and operations were effective, and to identify opportunities to improve disaster management outcomes.

The impact to the community

While no lives were lost in the floodwaters, many were significantly and irrevocably affected. Homes and livelihoods were destroyed, businesses suffered losses, livestock perished, and crops and fences were washed away. Many people's safety was placed at risk by self-evacuating at night, with little warning.

Tropical Cyclone Marcia had immeasurable impact on the community of the Callide Valley in February 2015. Many people had not fully recovered from several flood events in January and February 2013. A community survey told us that 92% (n=374) of respondents had been personally affected in some way by flooding in the Callide Valley as a result of Tropical Cyclone Marcia.¹ Many entities had a positive influence on the outcomes for the Banana Shire, not least the community. The people of the Banana Shire shared information, helped to prepare, checked on, and came to the aid of others evacuating, returning home and cleaning up after the flood.

The operation of the Callide Dam

This review commissioned an independent hydrologist to undertake a technical assessment. The hydrologist report addressed the impact of discharges from the Callide Dam, aspects of the dam operation, and whether different operating rules could provide greater flood mitigation.

The report concluded that *'regardless of how Callide Dam was operated during the February 2015 event, the communities along the Callide Valley would still have experienced a major flood.'* A variety of scenarios modelled by the hydrologists concluded that the effect on flood levels in Jambin and Goovigen would have been minimal had the gates been manually operated, had the dam been full, or even had the dam been reduced to 50% of the full supply level.

The hydrology report confirmed that SunWater's Emergency Action Plan (EAP) was followed, but that the tools SunWater uses to carry out flood forecasting are inadequate. As a result, the likelihood of the dam gates opening could have been predicted earlier had the storage estimates been accurate, or based on more robust modelling tools.

Disaster Management arrangements

In the lead up to Tropical Cyclone Marcia passing Biloela, the Banana Shire Council (the Council) shared weather intelligence and basic preparedness information with the community. The review did not find evidence of adequate information being passed on to residents regarding what predicted rainfall in the area, or the forecast possibility of flash flooding, could mean for them. The Council appears to have access to limited flood studies and there are too few river gauges to adequately inform their disaster management planning, preparations and response. We consider that given the information available, along with the knowledge and experience of the Council staff and Local Disaster Management Group (LDMG) as a collective, there was opportunity for more information to be made available to the community.

As the cyclone intensified most of the focus was on the possible opening of the dam gates. This may have distracted attention from the range of other hazards and risk treatment strategies that some Local Disaster Coordination Centre (LDCC) staff had identified.

The absence of rain during the day of the cyclone appears to have influenced planning activities for the forecast event. Consequently, this affected the efficacy of the response when flooding rain began impacting creeks and rivers across the Banana Shire. The Council knew there were many houses in the Banana Shire built before cyclone ratings, and advised the community to shelter in place or with friends and families. Places of refuge were opened after the cyclone passed but significant flooding had already been experienced in many northern parts of the Banana Shire. Many evacuations at that time were dangerous or impossible.

While it was reasonable to be surprised by the magnitude of the flood event and speed of stream rises, we consider that both the LDMG and SunWater had sufficient information to better prepare the community. We believe better use could have been made of recent experience, risk assessments or flood mapping (albeit limited and dated). Those who were likely to be at risk could have been identified and told more about what was known. Noting the view of SunWater, that it has no choice under legislation than to rigidly adhere to the EAP, we do not consider that a plan that first notifies people at the time releases are expected to commence, is reasonable. In the context of warnings, SunWater's understanding of EAP compliance requirements is divergent to those of the dam safety regulator that supports the notion of flexibility to deal with emergent conditions. We note that the Department of Energy and Water Supply and SunWater have commenced work to clarify the legal status of EAPs.

The availability of information to the public could have made a difference to community preparedness. SunWater believed for days prior to the cyclone that Callide and Kroombit Dams were likely to spill, and shared this belief with the LDMG. By Friday morning SunWater's computer modelling predicted the Callide Dam could release water within 24 hours. Again, SunWater told the LDMG, but we could not identify where the public were subsequently informed.

The hydrologist's assessment considers SunWater's computer modelling was incorrect, yet even this imperfect information could have promoted more accurate community perceptions of risk. Though considered by SunWater staff, early advice of the potential for the dam to spill was not progressed to the public, because SunWater waited for the EAP activation.

Warnings were discussed during meetings of the LDMG, but the LDMG resolved only to 'monitor' the dam until an alert was attempted in the late afternoon of Friday 20 February 2015.

The exact time the gates opened is a matter of theory, modelling and conjecture, as no one witnessed the event and there is no telemetry or recording means to capture this information. The hydrologist has calculated an opening time of approximately 8.30pm, though a SunWater operator thought they heard the gates opening between 8.37pm and 8.42pm. The reality is that this is not the critical issue. The first warning for the Callide Dam issued by SunWater was at 8.39pm. Shortly thereafter (at 8.48pm), the LDCC requested an Emergency Alert by contacting the State Disaster Coordination Centre (SDCC). Staff within the LDCC have advised us that they verbally requested a warning message earlier, but there was trouble with the maps used. In any event, the alert was not sent until around an hour later at 9.40pm. We consider that the timing of these alerts in relation to the opening of the dam gates and the magnitude of the event could have been considerably reduced.

Warning messages had not been adequately prepared to enable efficient use of the Emergency Alert system, and aspects of the warnings issued by both SunWater and the LDCC could have been improved to provide greater clarity for residents. Some residents told us that messages were too late, while others did not receive them at all.

We were told that the LDMG was not aware SunWater's warning service was by subscription only, and that not all residents in the area were subscribed. Some warnings issued by the LDCC were inconsistent with others they provided via Facebook and media releases. The warnings did not consider residents on many other creeks and rivers that were flooding or at risk of flooding. For example, the LDMG received warnings from SunWater about spilling from Kroombit Dam, but no further information was provided to the public by the LDCC.

The scarcity and delays in information exchange, with the community and between disaster management entities, on the evening of 20 February 2015 meant that the public did not have the best chance to anticipate or respond to the flood.

Telecommunications infrastructure

Telstra has several redundancies built into the fibre optic network. Damage to the Telstra fibre optic cable occurred approximately one hour before water started to be released from Callide Dam. The community survey that accompanies this report indicated that during the event, 50% (n=198) of residents experienced issues with landlines and 44% (n=165) with mobiles.² The Council itself did not have adequate telecommunications redundancies in place for Tropical Cyclone Marcia.

The future

While the flooding in Callide Creek was larger than many had previously experienced, it was not unprecedented. The few records available for the history of flooding in the area suggest flash flooding and events of a similar size to February 2015 have come before. Although the plans and flood risk studies owned by the Council require considerable updating, these past floods are documented in them. We are pleased to be told that the Council has commissioned the required flood study, and that a draft planning scheme has been submitted to Government.

There is every indication that floods of a devastating magnitude will occur again in the numerous watercourses in the Banana Shire. Improving the accuracy of predicting the extent of flooding depends on regular flood modelling to account for changes to topography from land clearing, levy banks and other man-made or natural changes to the landscape. It also requires reliable data sources from ground surveys, river and rain gauges. The data sources to inform accurate models are scarce. This also leaves town planning without a solid evidence base for decision-making. Ineffective land use planning is a persistent challenge for floodplain management in Queensland. The Council's approach to flood risk management, including town planning, cannot progress without these fit for purpose flood studies.

Floodplain management must be multi-faceted, multi-agency, and deal with competing interests for water. In Queensland, floodplain management is dispersed across various state-level agencies. This review proposes improved policy coordination across these agencies.

The water stored in the Callide Dam must be considered in the context of water security for the people and environment of Queensland. The operation of the Callide Dam cannot overlook the safety and wellbeing of the community living and working downstream. Balancing the competing interests for water in the Callide Dam is a complex process.

Minimising the flood impact to the residents of the Callide Valley is not as simple as reducing the storage level of the Callide Dam. Flood risk management, primarily the responsibility of the Council, must be prioritised to develop a broad suite of mitigation options. Community consultation on the mitigation options will promote a shared understanding of risk and enable mutual agreement on how to prioritise and share responsibility for the management of risk.

Providing comprehensive information about hazard identification and risk management is important in empowering the community to prepare for and respond to future events. Also vital is providing the community with better information about the operation of the dam, and the impacts that may result from various scenarios.

It will be crucial that SunWater, the Council and the LDMG more broadly, work closely together to improve risk-based disaster management planning, preparedness and response, including more coordinated and timely warnings.

Findings

#	Finding	Theme	Chapter	Page
1	There is currently insufficient information available to allow a fully informed decision on the use of Callide Dam to provide more active flood mitigation than its original design.	Operation of the Callide Dam	04	
2	Improved policy coordination of flood risk management would support councils to develop better flood risk management and town planning.	Managing Floods	05	
3	Improvements to Banana Shire Council's approach to flood risk management, including town planning, are dependent upon the Council having access to fit-for-purpose flood studies.	Disaster Management Planning & Preparation	06	
4	Of those surveyed, 55% indicated they had limited or no knowledge of disaster management arrangements.	Disaster Management Planning & Preparation	06	
5	It is difficult for residents to easily understand the implications of an Emergency Action Plan activation.	Disaster Management Planning & Preparation	06	
6	Believing there to be no legal option, SunWater followed the Emergency Action Plan, despite having information regarding emerging risks to downstream residents.	Disaster Management Planning & Preparation	06	
7	In relation to warnings, SunWater's understanding of Emergency Action Plan compliance requirements is divergent to that of the Department of Energy and Water Supply, which supports the notion of flexibility to deal with emergent conditions.	Disaster Management Planning & Preparation	06	
8	For flood events, there are significant gaps in the availability of operational information sources (such as real-time river and rainfall gauges) for the Banana Shire Local Disaster Management Group to utilise. This limits its ability to produce actionable intelligence and plan effectively for these events.	Disaster Management Response	07	
9	SunWater's reliance on rudimentary gauges and manual monitoring systems did not enable effective situational awareness and delayed warnings to downstream residents in this event.	Disaster Management Response	07	
10	The Bureau of Meteorology's ability to accurately forecast flood events in the Callide Valley is significantly limited by the quality and quantity of data sources.	Disaster Management Response	07	
11	Although the Banana Shire Council and SunWater communicated regularly during the event, this collaboration did not result in consistent and timely warnings being delivered to the community.	Disaster Management Response	07	

#	Finding	Theme	Chapter	Page
12	The prepared warning messages within the Local Disaster Coordination Centre were not adequate to enable rapid and efficient processing through the State Disaster Coordination Centre and into the Emergency Alert system.	Disaster Management Response	07	
13	The community was not provided with all the available risk information relevant to this event.	Disaster Management Response	07	
14	There is opportunity for improvement in the operation of the Local Disaster Coordination Centre across the full range of incident management functions that will particularly enhance planning, decision making, and warning processes in the future.	Disaster Management Response	07	
15	Issues related to telecommunications difficulties within the Local Disaster Coordination Centre may have been identified prior to the event if a business continuity plan had been completed and tested.	Disaster Management Response	07	
16	The event has highlighted opportunities for improvement in activation of the evacuation sub-plan and associated activities.	Disaster Management Response	07	
17	State Disaster Coordination Centre situational awareness would be improved through direct access to representatives of critical infrastructure owners.	Disaster Management Response	07	

Recommendations

#	Responsible entity	Recommendation	Chapter	Page
1	Department of Energy and Water Supply, SunWater	<p>The Department of Energy and Water Supply and SunWater, undertake the necessary studies to determine whether or not it is feasible to operate Callide Dam as a flood mitigation dam. Such studies should include matters in relation to, but not limited to:</p> <ul style="list-style-type: none"> • The effect on the Callide Valley water supply • Dam safety issues • Actual mitigation outcomes • Cost-benefit analysis of alternative strategies • Alternative means of effecting improved community outcomes. <p>The results of this work should be made public to enhance public knowledge and provide confidence regarding dam operations.</p>	04	
2	Banana Shire Council	<p>Banana Shire Council investigate means to prioritise the commissioning of a fit-for-purpose flood study for high-risk areas across the Banana Shire to better inform flood risk management, including improved town planning. The outcomes of such a study should be available to the public and inform flood awareness campaigns, flood warnings, and building approvals.</p>	05	
3	Banana Shire Council	<p>Banana Shire Council coordinates the development of a strategy to significantly enhance public education regarding local disaster management arrangements within the Banana Shire, focusing on key identified risks.</p>	06	
4	SunWater	<p>SunWater provide downstream residents with easily understood information regarding operation of the dam, and the impacts that various outflows may have for them, in accordance with mapping prepared for the Emergency Action Plan. This information should be complementary to any information from the Banana Shire Council.</p>	06	
5	Department of Energy and Water Supply, SunWater	<p>The Department of Energy and Water Supply, in conjunction with SunWater, seek clarification of the dam owners' legal obligation to comply with Emergency Action Plans and, if required, investigate how a more flexible approach may be adopted.</p>	06	
6	Banana Shire Council, SunWater, the Bureau of Meteorology	<p>In accordance with recommendations of the BMT WBM report, the Banana Shire Council, SunWater, and the Bureau of Meteorology, under the stewardship of the Department of Natural Resources and Mines, jointly identify the requirements for a suitable gauge network for the Callide Valley to allow meaningful and timely flood warnings. The review should identify key stakeholders, examine potential funding sources and include a cost benefit analysis.</p>	07	

#	Responsible entity	Recommendation	Chapter	Page
7	Banana Shire Council	Prior to September 2015, the Banana Shire Council develops a multi-channel warning strategy and associated public information campaign, including common language and consistent messaging, for the Banana Shire.	07	
8	SunWater and Banana Shire Council	Prior to September 2015, SunWater and the Banana Shire Council jointly develop a multi-channel, common warning strategy, including common language and consistent messaging, for residents downstream of SunWater assets within the Banana Shire Council, and clearly articulate procedures for dissemination.	07	
9	Banana Shire Council and SunWater	As part of the above, both the Banana Shire Council and SunWater ensure Emergency Alert messages are pre-formatted, consistent, polygons are identified according to risk, and that they are tested and practiced with the State Disaster Coordination Centre.	07	
10	Banana Shire Local Disaster Management Group	Local Disaster Coordination Centre capability and capacity should be reviewed to ensure adequate staffing arrangements are in place to fill key positions, and that operational protocols are known and practiced across all functions to provide redundancy. Assistance for review and necessary training should be sought from key Local Disaster Management Group member agencies.	07	
11	Banana Shire Council	Banana Shire Council completes business continuity planning as a matter of priority, including documentation and testing of the plan.	07	
12	Banana Shire Council	The evacuation sub-plan component of the Local Disaster Management Plan should be reviewed, including any identified triggers for activation. Ideally, the plan should be tested in a live, multi-agency exercise prior to next summer.	07	
13	State Disaster Coordination Centre	State Disaster Coordination Centre considers requesting a representative from critical infrastructure owners be present as a liaison officer in the State Disaster Coordination Centre during activations for events that may impact on their assets.	07	

We note the recommendations provided within the independent hydrologist report. We have considered these within the context of our review process. Where necessary, appropriate and substantiated through our own findings, we have drawn upon them in the formulation of this report's recommendations and findings, which are presented for consideration and action by the relevant entities.

Endnotes Chapter 01

1. Market & Communication Research (MCR), Callide Creek Catchment Area Survey Report, MCR, Fortitude Valley, May 2015, p. 11.
2. *ibid.* p. 90.

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