

# Review of Seqwater and SunWater Warnings Communications

Report 1: 2015-16



## Document Details

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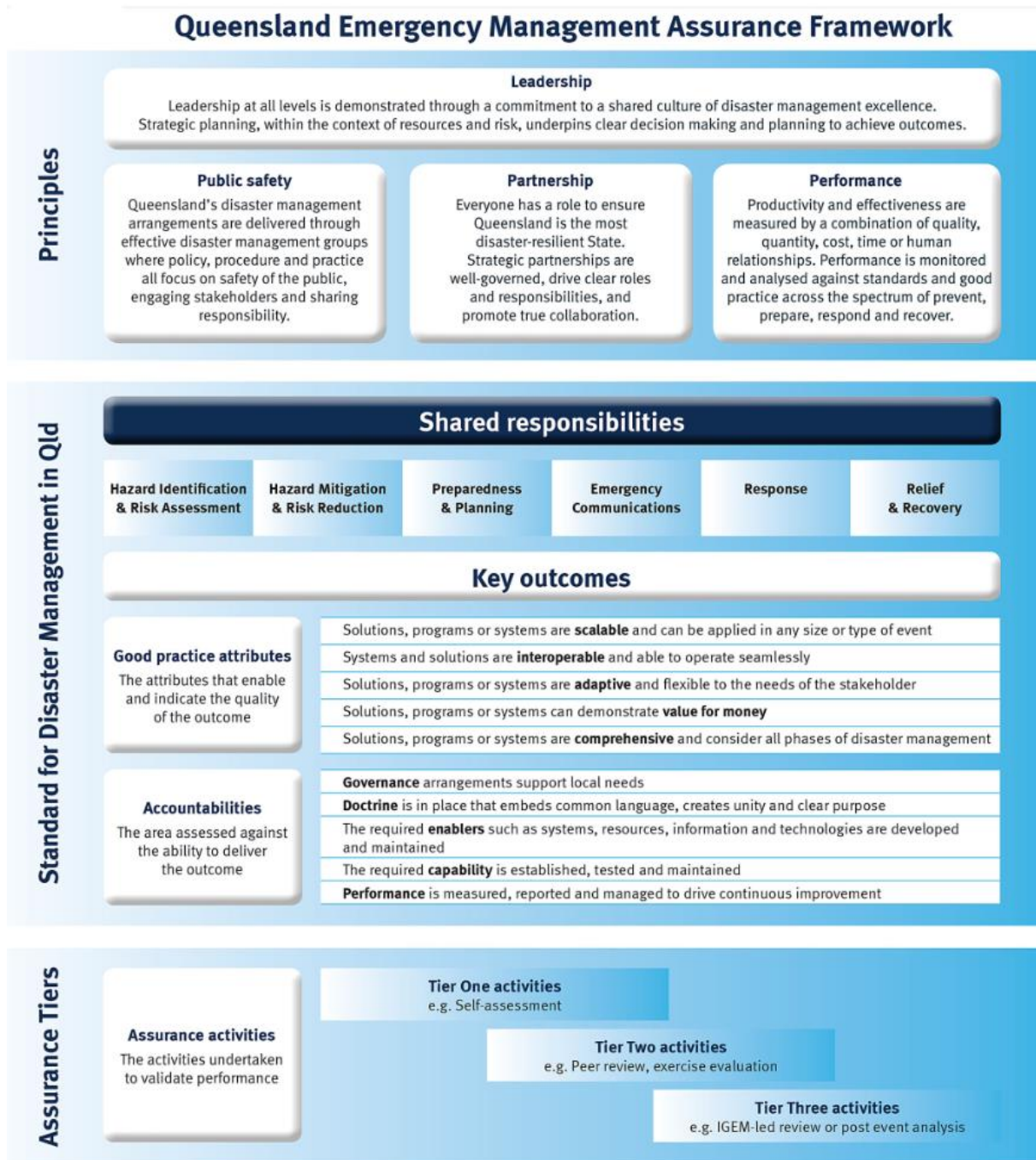
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# Letter of transmittal

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18 September 2015



**Queensland  
Government**

**Inspector-General  
Emergency Management**

The Honourable Jo-Ann Miller MP  
Minister for Police Fire and Emergency Services and  
Minister for Corrective Services  
GPO Box 15195  
CITY EAST QLD 4002

Dear Minister

In accordance with your letter of confirmation to The Honourable Mark Bailey MP, Minister for Main Roads, Road Safety and Ports and Minister for Energy and Water Supply of 4 June 2015, that I would undertake a Review of Seqwater and Sunwater Warnings Communications during Flood Events, I am pleased to submit the final report.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Iain S MacKenzie'.

Iain S MacKenzie AFSM  
Inspector-General Emergency Management

## Context

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Seqwater and SunWater own and operate large water supply dams throughout Queensland. Three of the Seqwater dams are also operated as statutorily prescribed flood mitigation dams. Seqwater and SunWater are legally obliged to notify people who live immediately downstream of their dams of flood water releases or spillway overflow that may cause property damage or endanger human life. In practise, both organisations currently have considerable discretion as to how they undertake these notifications. Both have also recently received criticism from some downstream residents and stakeholder groups about the timeliness and effectiveness of their communications. This is following Seqwater's release of floodwaters from Wivenhoe dam in May 2015 (the May 2015 event) and the release processes at SunWater's Callide Dam in February 2015.<sup>1</sup>

As a result, the Minister for Transport, Road Safety and Ports and Minister for Energy and Water Supply, through the Minister for Police, Fire and Emergency Services and Minister for Corrective Services, requested the Inspector-General Emergency Management (IGEM) conduct a review of Seqwater's and SunWater's flood release communications. The IGEM was also requested to develop principles to enable effective dam warnings communications.

This review considers clarification and appropriateness of roles and responsibilities for dam-related warnings and notifications, identification of impacted stakeholder groups, and the timings, content and means of messaging used. These matters need to be clarified and understood by all to increase the likelihood of communities and individuals at risk of impact from dam releases to make informed decisions about evacuation, the protection of their property or their personal safety.

It should be noted that the term dam 'release' implies control, which is not the case in most instances of dam outflows or spills. Only a limited number of gated dams that are owned by Seqwater have approved flood mitigation manuals which will have active or controlled releases through gated structures. Occasionally other gated dams may have manual operation of gates for specific circumstances, though this is typically not the case for SunWater.

### *Principles and legislation*

To successfully coordinate dam warnings communications and manage the expectations of all involved, a set of common principles should underlie the management strategy. Principles guide people's decisions and actions; the policies and procedures developed by organisations and systems; and the laws and doctrine of entities.<sup>2</sup> They can be defined as 'accepted rules of action or conduct'.<sup>3</sup> This definition is oriented towards performance and accomplishment, with *accepted* denoting agreement from multiple parties on the way something should be done.

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<sup>1</sup> See review terms of reference, Appendix A and Office of the IGEM 2015, *2015 Callide Creek Flood Review* report.

<sup>2</sup> Etkin & Davis 2007.

<sup>3</sup> Macquarie University 2000.



When scoping this review we found some conflicts between relevant pieces of legislation and principles that guide key stakeholder organisations with responsibilities for dam warnings:

- *Disaster Management Act 2003* – disaster management principles
- *Government Owned Corporations Act 1993* – corporatisation principles, including the relevant Statement of Corporate Intent under Part 8 of this Act
- *Local Government Act 2004* – local government principles
- *South East Queensland Water (Restructuring) Act 2007* – Operational Plan under s. 51, and Statement of Obligations under s. 51C
- *Water Supply (Safety and Reliability) Act 2008* – regulatory framework
- *Water Act 2000* – commercialisation principles.

The Emergency Management Assurance Framework and the Standard for Disaster Management are used as the benchmark when considering this issue. In particular, the principles that underpin effective disaster management in Queensland – Leadership, Public Safety, Partnership and Performance, and those components dealing with hazard identification and risk assessment, public engagement, communication systems and warnings.<sup>4</sup> The framework was developed in partnership with more than 70 disaster management practitioners representing state and local government, non-government, volunteer and government owned corporations from across Queensland.

The goal of this review is to identify the principles that can be applied, during all phases of events, by stakeholders to improve communication between dam owners and the community. The principles we identified to meet this goal are outlined at the 'Warnings principles' section of this report.

#### *Shared understanding*

A review of stakeholders' strategic planning documents demonstrates the intent for effective and timely warnings communications. However, at times organisations may address the management of warnings communications from diverse operational perspectives, often influenced by their interpretations of legislation, policies and guidelines. These perspectives may be culturally based, resourced based or based on the priority of the day. All three of these are relevant to this review.

Without shared understanding of key stakeholders' priorities and legislative principles, the policies and regulations they operate under, and their end-to-end operational processes, systems of communication may not consistently meet community expectations.

#### *Changing environment*

Considerable work has been undertaken to improve dam warnings communications following the Queensland Floods Commission of Inquiry. In recent years, a number of changes have occurred in the operational environment of the dam safety and disaster management sectors, including:

- machinery of government changes
- changes to legislative requirements and policy, particularly to the
  - *Water Supply (Safety and Reliability) Act 2008* and

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<sup>4</sup> Office of the IGEM 2014.

- *Disaster Management Act 2003*
- organisational restructure of the community safety portfolio
- organisational restructure to the Department of Energy and Water Supply
- organisational restructures to Seqwater and SunWater operations including the creation of the Queensland Bulk Water Authority.

These changes need to be effectively managed and evaluated to ensure successful implementation and a continued focus is on priorities affecting community safety.

#### *Relevant reviews*

Considerable work has also been undertaken in more recent times relating to the topic of dam warnings communications, including the:

- National review of warnings and information, Emergency Management Victoria, 2014
- 2015 Callide Creek Flood Review, Office of the IGEM, 2015
- Review of local governments' emergency warnings capability, Office of the IGEM, 2015.

These reports have been used as reference points to guide our analysis of issues.

## Executive summary

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### Background

Seqwater and SunWater have been criticised by some downstream residents and other stakeholders for their perceived ineffective and untimely warnings and notifications. As a result, the Minister for Transport, Road Safety and Ports and Minister for Energy and Water Supply requested this review through the Minister for Police, Fire and Emergency Services and Minister for Corrective Services.

The purpose of our review is to examine Seqwater's and SunWater's flood release communications with the community and other stakeholders. Its emphasis is on public safety and community expectation, exploring the responsibilities and expectations of the community, the roles and responsibilities of involved entities, and communication processes and systems. This includes the integration of dam warnings and notifications with the disaster management system at local, district and the state level. We look at the timeliness and effectiveness of existing communication approaches and recommend principles and strategies to improve them.

During our review we considered a wide range of information and advice provided by key dam safety and disaster management stakeholders. We conducted a strategic review of legislation and principles, the changing policy environment, the levels of understanding and sharing of responsibility between the parties, and related work conducted at state and national levels. We also engaged with affected community members, including sponsoring a number of community focus groups conducted around Queensland in communities living downstream of our chosen dam sites.

We found inconsistencies in some of the legislation and principles that guide key stakeholder organisations with responsibilities for dam warnings. However, the basic elements of a system that can offer assurance are present. The consistent and diligent application of these, together with a commitment to meeting community expectations, will deliver confidence and improved outcomes. It is important to recognise sole responsibility cannot be allocated to any one party.

Our analysis was framed by the Standard for Disaster Management in Queensland. In particular we used the components for hazard identification and risk assessment, warnings, communication systems and public engagement. The details of these components were the basis of our planning. Delivering a strategy that addresses the key indicators of these components will result in more timely, accurate and relevant messaging to the correct audience. In framing what we expected to find we also considered the *Water Supply (Safety and Reliability) Act 2008* (WSSR Act) along with other plans and guidelines from the dam safety and disaster management sectors.

### Community expectations

Our community focus group participants identified they have a responsibility to keep themselves informed and to take actions before, during and after an event. However, they also have a clear expectation they will be warned if they are at risk.

Key findings from the focus groups include their expectations that warnings and notifications will:

- be tailored to individual community needs and local conditions
- be received by everyone at risk, whether subscribed to opt-in systems or not
- be timely, up-to-date, relevant and detailed through multiple channels without having to pre-register
- be explained through community awareness campaigns
- consider the risks associated with the means, timings and frequency of distribution.

The current subscriber based systems used by Seqwater and SunWater are not widely known to the focus group participants. Most believe they have the right to be warned if they are at risk, whether they subscribe to these systems or not. There is a clear assumption that warnings will be automatically provided, will allow them time to act, will provide them the correct information, and will tell them what to do through a means they receive and understand.

### **The current dam safety environment**

As a result of the Queensland Floods Commission of Inquiry during 2011 and 2012, amendments to the WSSR Act introduced a number of provisions to improve response to dam incidents or outflows that pose a hazard to the community. These included emergency action planning provisions to improve dam owners' communications about dam releases and spills to stakeholders including councils, disaster management groups and potentially affected downstream communities. A multi-agency group was established to oversee the implementation of dam related recommendations, with ongoing monitoring by the Department of the Premier and Cabinet.

As the lead agency responsible for dam safety and its regulation, the Department of Energy and Water Supply (DEWS) subsequently developed and implemented a supporting policy program, including a provisional guideline for emergency action planning for dam owners. This was to be supported by disaster management stakeholders to ensure alignment and integration of dam warnings and notifications with disaster management plans at local, district and the state level. The DEWS develops and implements dam safety policy in consultation with relevant stakeholders, including Seqwater, SunWater, and the community.

The DEWS is also responsible for implementing a regulatory program for referable dams and flood mitigation. This program is to ensure the content of emergency actions plans meets the criteria of the legislation, including communications with members of the public about dam releases or spills if safety or property may be threatened. When approving a plan, the DEWS must also be satisfied it effectively deals with each emergency condition for the dam.

### **Dam communication systems**

Seqwater and SunWater provide notifications and warnings to the public using a variety of means. This includes warnings using the Emergency Alert operated by Queensland Fire and Emergency Services. Notification methods include subscriber based notification systems, traditional and social media, and recorded telephone messages.

In 2014 Seqwater and the DEWS jointly conducted an optimisation study presenting a range of options to manage Wivenhoe and Somerset dams during flood events. Following a consultation process, a decision was made in December 2014 to implement a strategy called *Alternative Urban 3* which changes how the flood mitigation compartment of Wivenhoe Dam is used. This strategy allocates more space in an attempt to protect houses and buildings from damage during major floods. The May 2015 event was the first time *Alternative Urban 3* was practised in real-time, and the expectations of some whose property was affected to receive timely, up-to-date and detailed communications were not met.

We found that Seqwater and SunWater apply the legislative requirements of the WSSR Act differently, partly because Seqwater operates flood mitigation dams. This results in different approaches to how they communicate with downstream residents, councils and local disaster management groups. The 'Dam communication systems' section of this report provides findings and refers to the May 2015 event as an example of these varying approaches.

### **Dam notifications and warnings**

Our review's community focus groups indicate the public expects notifications and warnings will be disseminated as soon as possible when known by dam owners. They also expect messages will include timings to guide their actions, will convey the urgency of the developing situation, that regular updates will be provided and when the next update can be expected.

We reviewed Seqwater's and SunWater's warning and notification systems with particular focus on the interaction with local councils and disaster management groups. The interpretation of legislation, policy and guidelines was also included as part of this review.

It is clear there is no 'one size fits all solution'. The mechanism utilised, the approach adopted and the messages delivered will need to be different dependent upon the community, the situation and the event. There is no shortcut to the hard work this entails and it requires leadership to be demonstrated by all those with a role to play.

One consistent message received from the community relates to the timing of messaging. Very clearly there is an expectation people will be informed of likely impacts as early as possible. It is reasonable to expect this be adopted as a priority approach for dam releases and that owners and operators adopt an approach of issuing notifications when they have a reasonable expectation a release may occur, rather than when it has already occurred.

### **Shared responsibilities**

Successful dam warnings communications based on the current legislative and policy environment require a multi-agency approach. Ongoing, location-specific collaboration and engagement between all involved stakeholders is required to meet policy objectives. Effective control and regulatory mechanisms will ensure a contemporary approach. Effective management is also needed to ensure the required collaboration and communication occurs and that all responsibilities are understood and accepted. Identification of roles and responsibilities of key stakeholders for dam warnings communications is provided in our report.

## Warnings principles

Principles are vital tools to keep everyone on the same page and maintain the drive of continuous improvement. We used the principles of the Emergency Management Assurance Framework to not only guide the review, but believe they are the most relevant for all parties to frame successful dam warnings communication outcomes. These principles are Leadership, Public Safety, Partnership and Performance. We consider these a starting point for what should be ongoing discussion between all stakeholders in building and maintaining professional working relationships.

## Conclusion

The findings of our review highlight that systemic issues are a root cause of operational communications not always meeting their objectives. These issues need to be proactively managed and supported by an ongoing collaborative approach in order to be successful.

Adequate control and regulatory mechanisms will ensure a contemporary approach to meeting policy objectives. Ongoing collaboration and engagement between all involved stakeholders will ensure policy objectives can adapt to an ever changing environment.

There is a range of information, guidance, and direction available including industry standards, statutory and non-statutory guidelines at both national and state levels, along with recommendations from a number of reviews and inquiries. Our review has tried to build on these and provide a way forward for the dam safety sector, the links between dam safety and disaster management, and the warnings responsibilities for both.

## Findings

#	Finding	Terms of Reference
1	Our community focus groups acknowledge they have a responsibility to be engaged with warnings providers and be prepared.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> </ul>
2	Our community focus groups believe they have the right to be warned if they are at risk. They expect that warnings and notifications about dam releases or spills will be: <ul style="list-style-type: none"> <li>• tailored to suit local needs and conditions</li> <li>• received by everyone at risk whether subscribed to opt-in systems or not</li> <li>• are timely, up-to-date, relevant and detailed through multiple channels without having to pre-register</li> <li>• explained through community awareness campaigns</li> <li>• consider the risks associated with the means, timings and frequency of distribution.</li> </ul>	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> </ul>
3	Integration of dam safety with disaster management arrangements is dependent at the state level upon strong engagement between the Department of Energy and Water Supply and Queensland Fire and Emergency Services.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>



4	The Department of Energy and Water Supply's Emergency Action Planning for Referable Dams guideline, developed to guide dam owners on planning to meet legislated requirements for referable dams, remains provisional. The Department advises this action had been delayed awaiting the completion of the 2015 Callide Creek Review and this review, but will now occur.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
5	The Emergency Action Planning for Referable Dams guideline is promoted as being a 'best practice' guide only.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
6	The Emergency Action Planning for Referable Dams guideline does not clearly explain to dam owners what makes an effective emergency action plan. It would benefit from inclusion of the assessment criteria/standards applied by the regulator when considering whether to approve the plan.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
7	Not all Seqwater's and SunWater's current approved emergency action plans identify each emergency condition as required by legislation and outlined in the Emergency Action Planning for Referable Dams guideline.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Developed principles</li> </ul>
8	Improving dam safety compliance, administration and quality control processes would increase the likelihood of the public receiving the most timely and relevant information.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Developed principles</li> </ul>
9	Changes to the <i>Water Supply (Safety and Reliability) Act 2008</i> appear to have created inconsistencies between various sections and how they are applied.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
10	Seqwater uses a communication protocol for releases from its flood mitigation dams, including Wivenhoe Dam, while SunWater uses emergency action plans to communicate with the public about dam releases and spills.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Developed principles</li> </ul>
11	Policy development and implementation would benefit from inclusion of end-to-end evaluation strategies supported by education programs and testing activities to ensure understanding and effectiveness.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Developed principles</li> </ul>

12	During the May 2015 event the persons living downstream of Wivenhoe Dam whose safety or property that may have been threatened did not receive timely notification about the opening of the gates.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
13	There appears to be different interpretations and applications by Seqwater and SunWater for the emergency conditions 'downstream release hazard' and 'a circumstance that potentially indicates an increase in the likelihood of a dam failure hazard or downstream release hazard happening'.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
14	There are different levels of urgency assigned by our community focus group members to the terms notify and warn. The use of these terms may impact their ability to understand and assess risks and take appropriate action during dam emergency events.	<ul style="list-style-type: none"> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
15	Many of Seqwater's and SunWater's emergency action plans do not currently include clear trigger points for the escalation of the plans through activation levels with appropriate public notification and warning activities linked to each level.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
16	The issue of responsibility for warnings and notifications of downstream persons that may be affected is one that must be addressed on a location specific basis through collaboration between dam owners/operators and local disaster management groups.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Developed principles</li> </ul>
17	Notification content provided by Seqwater and SunWater may not always support community understanding. Further evaluation and testing of notification content is required with key stakeholders and community members.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Content of messaging</li> <li>• Developed principles</li> </ul>

18	Arrangements for identifying and using flood classification levels to inform both dam safety and disaster management warnings and notifications may not reflect the current situation.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Content of messaging</li> <li>• Developed principles</li> </ul>
19	Warnings and notifications need to be distributed through multiple integrated channels and ensure the needs of target audiences are met.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
20	Dam owners' current reliance on subscriber based notification systems for communities at risk may not adequately consider the requirements of the legislation.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
21	Seqwater's and SunWater's opt-in systems would benefit from greater effort to capture people at risk and may need to be augmented through use of the Emergency Alert system. This would ensure all persons whose safety or property is potentially at risk are warned about potential downstream release hazards and the potential impact of emergency events.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
22	Not all of SunWater's referable dams have pre-formatted Emergency Alert messages and supporting polygons lodged with the State Disaster Coordination Centre.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> </ul>
23	Not all disaster management groups have dam owners as core or advisory members in areas where referable dams may pose a risk to the downstream community.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
24	Collaborative risk-based planning between dam owners, councils and disaster management groups would improve both disaster management and emergency action planning outcomes.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholder</li> <li>• Developed principles</li> </ul>

25	Disaster management guidelines do not provide adequate advice and information about council and disaster management groups' roles and responsibilities in supporting the management of communications for referable dams.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
26	Facilitation of all relevant disaster management groups and entities to review and provide feedback on emergency action plans at local, district and the state level would improve communication links and consistency of operations.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
27	Information and communication timeliness and consistency about dam related emergencies would be improved by Seqwater's and SunWater's direct involvement in the state disaster management arrangements.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Developed principles</li> </ul>
28	The disaster management warnings and alert systems training does not currently include information about dam notifications and warnings or the integration of dam related communications with the disaster management system.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
29	The Queensland Flood Warnings Consultative Committee includes members of all key stakeholder agencies except for the Queensland Police Service. This committee should inform future work conducted regarding dam warnings communications.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
30	Without shared understanding of key stakeholders' priorities and legislative principles, the policies and regulations they operate under, and their end-to-end operational processes, systems of communication may not consistently meet community expectations.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>

## Recommendations

#	Theme	Responsible entity	Recommendation	Terms of reference
1	Messaging	<p><b>Lead:</b> Seqwater and SunWater</p> <p><b>Support:</b> Local governments, local disaster management groups and Department of Energy and Water Supply</p>	<p>Seqwater and SunWater focus immediate attention and action on issues of collaboration with local disaster management groups, addressing information sharing, messaging responsibilities, terminology and timing. A Framework for such action plan is provided below.</p> <p>Actions should be implemented immediately with an update report to the Office of the Inspector-General Emergency Management and the Department of Energy and Water Supply by 1 December 2015 and quarterly thereafter, or until such time as the committee subject of Recommendation 2 is established.</p>	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>

### Framework for Action: Seqwater and SunWater

Based upon the reasonably foreseeable hazards identified for downstream releases from referable dams i.e. '... a reasonably foreseeable hazard to the safety of persons or property that could potentially be caused or aggravated by—

(a) a release of water from the dam's spillway; or

(b) a controlled release of the water from the dam' (*Water Supply (Safety and Reliability) Act*, s. 352C)

develop an order of priority for action and;

proactively engage with the relevant local disaster management groups and the Department of Energy and Water Supply with a view to:

- sharing information regarding possible release scenarios, specifically known or likely impacts of 'downstream release hazards'
- developing a joint understanding of the persons whose safety or property may be threatened for each of these scenarios
- agreeing on sequencing of notifications and allocating responsibility for coordination/release of information for:
  - situations where the downstream flooding can be directly related to dam outflow and
  - alternative sequencing and responsibility for notifications that may be needed for situations where downstream flooding may not be directly related to dam outflow
- identifying the means to be used (e.g. social media, mainstream media, Emergency Alert campaigns, opt-in services of councils and dam owners/operators) - ideally this would be based on known community preferences and penetration
- predefining mapping polygons for various scenarios in a format compatible with State Disaster Coordination Centre requirements
- pre-populating messaging templates
- having all messaging tested with the State Disaster Coordination Centre
- revisiting current opt-in lists and instigating means of encouraging further membership, including joint promotional campaigns with local disaster management group member organisations.

Whilst the object should be to demonstrate effectiveness against all indicators of the relevant components of the Standard for Disaster Management, specifically:

- Component 1: Hazard Identification and Risk Assessment
- Component 5: Public Engagement
- Component 6: Communication Systems
- Component 7: Warnings

particular attention should be paid in the first instance to ensure that:

- plain language community messages and education programs are action-oriented and inform the community of the risks
- there are multiple delivery channels that are adaptable to meet audience needs and circumstances
- content is established and tested while improvements are documented and managed
- information made available to the public:
  - is accurate, reliable, relevant, timely
  - includes the purpose, process for access and limitations of any potential support and systems
  - links to warning types, sources and content
  - is consistent across, and vertically through, entities and systems
- systems are in place to address public enquiries, dispel misinformation, and to source and disseminate education materials, tools and information
- roles and responsibilities for public information and public education are agreed to and documented prior to events
- the use of key terminology, including activation levels, is consistently applied across all levels
- warning systems and arrangements support the continuous flow of critical, up-to-date, and relevant information between key stakeholders
- warning messages use common language and are consistent with other public information and advice
- warnings are tested with the community to determine community understanding of content, message receipt, perception of authority and resultant action.

**Note: as discussed within the body of the report, in relation to timeliness:**

**‘...owners and operators adopt an approach of issuing notifications when they have a reasonable expectation a release may occur rather than when it has already occurred.’**



#	Theme	Responsible entity	Recommendation	Terms of reference
2	Implementation	<b>Lead:</b> Department of the Premier and Cabinet	<p>A committee be established, chaired by the Department of the Premier and Cabinet, reporting to the Queensland Disaster Management Committee. This committee will provide implementation of strategic dam safety and disaster management policy and coordinate the work program across the agencies and relevant entities.</p> <p>Further functions include:</p> <ul style="list-style-type: none"> <li>• determine appropriate and achievable timeframes for implementation</li> <li>• provide oversight for the implementation of this review's recommendations</li> <li>• promote shared responsibility and apply the principles recommended in this review</li> <li>• ensure relevant recommendations from other reviews conducted by the Office of the Inspector-General Emergency Management are considered</li> <li>• consider research outcomes at a National level and other validated research.</li> </ul>	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
3	Legislation, Policy and Plans	<b>Lead:</b> Department of Energy and Water Supply	<p>Review the <i>Water Supply (Safety and Reliability) Act 2008</i> and the Emergency Action Planning for Referable Dams guideline to enhance effective communication.</p> <p>This review needs to consider:</p> <ul style="list-style-type: none"> <li>• consistency between legislation, policy, guidelines and plans</li> <li>• the provision of definitions for key terms to eliminate inter-changeable use</li> <li>• that the guideline has the appropriate status</li> <li>• that the approval process the regulator applies to ensure emergency action plans comply with legislation and guideline requirements is strengthened and transparent. This includes the establishment of criteria for effectiveness and the requirement for testing of plans.</li> </ul>	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>

#	Theme	Responsible entity	Recommendation	Terms of reference
4	Legislation, Policy and Plans	<b>Lead:</b> Department of Energy and Water Supply and Queensland Fire and Emergency Services	In accord with the outcomes of Recommendation 3, the Emergency Action Planning for Referable Dams guideline and the Queensland Local Disaster Management Guidelines are aligned to require dam operators, councils and local disaster management groups to collaborate in planning, and their plans reflect: <ul style="list-style-type: none"> <li>• agreed warning and notification systems</li> <li>• the testing and exercising of agreed warning and notification systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
5	Legislation, Policy and Plans	<b>Lead:</b> Queensland Police Service and Queensland Fire and Emergency Services  <b>Support:</b> Department of Energy and Water Supply	Responsibilities of all referable dam owners under the <i>Water Supply (Safety and Reliability) Act 2008</i> are clearly articulated in the State Disaster Management Plan. The district and local disaster management guidelines are updated to include responsibilities for all referable dam owners and operators, councils and disaster management groups for notifying and warning the public; and require referable dam owners to be advisors to local disaster management groups where there are referable dams. We note the considerable variance in the capability of referable dam owners and this should be taken into consideration when developing plans.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Developed principles</li> </ul>
6	Legislation, Policy and Plans	<b>Lead:</b> Department of Energy and Water Supply	Any dam safety policy and strategies developed to improve warnings and notifications are regularly evaluated to assure effectiveness, in line with community expectations.	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>

#	Theme	Responsible entity	Recommendation	Terms of reference
7	Disaster Operations	<p><b>Lead:</b> Seqwater and SunWater</p> <p><b>Support:</b> Queensland Fire and Emergency Services</p>	<p>Emergency Alert messages for dam related events are:</p> <ul style="list-style-type: none"> <li>• pre-formatted, consistent and current polygons are identified</li> <li>• content aligned with the Queensland Emergency Alert Guidelines</li> <li>• stored and practised in consultation with the State Disaster Coordination Centre.</li> </ul>	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Timing of informing impacted stakeholders</li> <li>• Content of messaging</li> <li>• Means of messaging</li> <li>• Developed principles</li> </ul>
8	Training, Education and Public Information	<p><b>Lead:</b> Seqwater, and SunWater (and other referable dam owners where relevant)</p>	<p>Seqwater and SunWater (and other referable dam owners where relevant) proactively engage with relevant local governments to develop and implement a community education and information program for identified communities at risk of dam release scenarios where the downstream flooding can be directly related to dam outflow.</p>	<ul style="list-style-type: none"> <li>• Clarity and appropriateness of roles and responsibilities</li> <li>• Identification of impacted stakeholders</li> <li>• Developed principles</li> </ul>

## Other relevant review recommendations from Office of the Inspector-General Emergency Management

#	Review	Responsibility entity	Recommendation
3	Review of State Agency Integration at a Local and District Level	<p><b>Lead:</b> Queensland Fire and Emergency Services</p> <p><b>Support:</b> Department of the Premier and Cabinet; Queensland Police Service; Department of Infrastructure, Local Government and Planning; Public Safety Business Agency</p>	An integrated risk-based approach to disaster management planning for Queensland is developed that is consistent with the Standard for Disaster Management in Queensland and applicable at all levels of the arrangements.
7	Review of Local Governments' Emergency Warning Capability	<p><b>Lead:</b> Queensland Fire and Emergency Services</p>	<p>Warning and alert systems training (including the use of Emergency Alert and the requirements of the guidelines) is delivered to:</p> <ul style="list-style-type: none"> <li>• relevant local and district disaster management group members</li> <li>• authorising officers, and</li> <li>• other relevant stakeholders.</li> </ul>
9	Review of Local Governments' Emergency Warning Capability	<p><b>Lead:</b> Queensland Fire and Emergency Services</p> <p><b>Support:</b> Queensland Police Service, Public Safety Business Agency</p>	Formal research is commissioned or meta-analysis is undertaken to provide a better understanding of the effectiveness of warnings and other relevant message testing. The outcomes are disseminated to all disaster management entities and learnings used to inform practice.
13	2015 Callide Creek Flood Review	<p><b>Lead:</b> Queensland Fire and Emergency Services</p>	State Disaster Coordination Centre considers requesting a representative from the critical infrastructure owner be present as a liaison officer in the State Disaster Coordination Centre during activations for events that may impact on their assets.

## Purpose

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In accordance with its terms of reference, the purpose of this review is to examine Seqwater's and SunWater's flood release communications with the community and other stakeholders; assess the timeliness and effectiveness of existing communication approaches; and recommend strategies to improve them. The review also includes the development of principles to enable effective dam warnings communications. The Terms of Reference for the review is at Appendix A.

## Scope

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This review aligns with the functions of the Office of the Inspector-General Emergency Management (IGEM) under section 16C of the *Disaster Management Act 2003* (the DM Act). It provides a level of assurance against the Emergency Management Assurance Framework and the Standard for Disaster Management in Queensland.

The emphasis of our review is on public safety and community expectation, exploring:

- the responsibilities and expectations of the community for warnings
- the processes and systems around dam warnings and notifications
- the roles and responsibilities of involved entities
- the interface between the dam safety and disaster management sectors.

This includes reviewing interactions and collaboration between:

- dam owners and operators
- the Department of Energy and Water Supply (DEWS) (as the regulator for dam safety under the *Water Supply (Safety and Reliability) Act 2008* (the WSSR Act) and primary policy agency)
- disaster management groups and entities
- other relevant stakeholder agencies (for example, the Bureau of Meteorology)
- Queensland communities that may be subject to the impact of dam releases or spills, and therefore dam related warnings communications.

To achieve the purpose of our review, we also looked at the implications of changes to legislation and policy introduced following the Queensland Floods Commission of Inquiry (QFCoI).

The review's focus is on Seqwater's and SunWater's gated dams, and refers to events involving Seqwater's Wivenhoe Dam (the May 2015 event) and SunWater's Callide Dam (in February 2015). Our analysis also includes a selection of ungated dams. The review therefore delivers findings and recommendations applicable more broadly across the full suite of Seqwater and SunWater dams, many other referable dams in Queensland, and to relevant entities within the disaster management sector.

During the review we did not consider flood gauge management or the resultant data, as this is subject to a parallel review led by the Department of Natural Resources and Mines.

## Methodology

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The review was conducted between 15 June 2015 and 18 September 2015. Its terms of reference request the development of principles to address its components. To guide this, we used the existing disaster management principles in the Emergency Management Assurance Framework – Leadership, Public Safety, Partnership, and Performance - to support our review methodology.<sup>5</sup> We also used the Standard for Disaster Management in Queensland, particularly the components of hazard identification and risk assessment, public engagement, communication systems and warnings to guide our analysis. The components and key outcomes of the Standard, in conjunction with applicable legislation, were used to align our expectations. To ensure all areas were assessed on their ability to deliver outcomes we used the accountabilities of governance, doctrine, enablers, capability and performance as outlined in the Emergency Management Assurance Framework.

While the review's terms of reference specifically relate to Seqwater's and SunWater's gated dams, we also included some non-gated dams for completeness. Dams were selected using the following factors:

- Seqwater or SunWater own or operate the dam
- the dams are gated
- if not gated, the dams have a high 'population at risk'<sup>6</sup>
- downstream communities have previously been impacted by substantial flooding.

Based on these factors, the subject dams chosen were:

Owned and operated by Seqwater

- Wivenhoe (gated)
- Somerset (gated)
- North Pine (gated)
- Leslie Harrison (recently converted from gated to un-gated)
- Hinze (un-gated)

Owned and operated by SunWater

- Coolmunda (gated)
- Leslie (gated)
- EJ Beardmore (gated)
- Fairbairn (un-gated)
- Callide (gated)

Owned by Townsville City Council operated by SunWater

- Ross River (gated).

We requested documents from, and held discussions with, representatives from Seqwater, SunWater, the DEWS as the regulator for dam safety and primary policy agency under the WSSR Act, other state and Commonwealth agency representatives and community members.

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<sup>5</sup> Office of the IGEM 2014.

<sup>6</sup> *WSSR Act 2008*, s. 346.



We also sourced information relating to local and district disaster management arrangements, visited the subject dams and in most cases met with local governments responsible for downstream communities. The local governments we engaged included:

- Somerset Regional Council
- Ipswich City Council
- Brisbane City Council
- Moreton Bay Regional Council
- Redland City Council
- Gold Coast City Council
- Goondiwindi Regional Council
- Southern Downs Regional Council
- Balonne Shire Council
- Central Highlands Regional Council
- Banana Shire Council<sup>7</sup>
- Townsville City Council.

We requested extensive information from all stakeholders about their plans and arrangements relating to dam safety and warnings. This included information about implementing the QFCoI recommendations and subsequent events; interactions between dam safety and disaster management entities; and plans and activities for informing, educating and communicating with the community. A full list of contributing entities and their involvement in the review is included at Appendix B.

To ensure a community perspective was included, we conducted community focus groups in localities downstream of a selection of the subject dams, namely Kirwan, Emerald, Nerang, Kallangur, St George and Lowood. Participants were drawn from surrounding suburbs. These localities are all in the vicinity of Seqwater and SunWater dams, with the exception of Kirwan, which is in Townsville Regional Council's local government area. An extract of the focus group report is located at Appendix E.

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<sup>7</sup> We noted the extensive engagement recently conducted with Banana Shire Council during our office's review into the flooding of Callide Creek, and therefore relied on the information provided during that review.

## What we expected to find

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The Standard for Disaster Management in Queensland provides key disaster management outcomes as follows:

for hazard identification and risk assessment, that:

- stakeholders have a shared understanding of, and ready access to, risk information for all types of events
- risk assessments are robust, replicable and authoritative
- risk assessments are integral to the mitigation, preparedness, continuity, response and recovery planning processes and documentation

for warnings, that communities at risk of impact from an event:

- are defined and can be targeted with contextualised warnings, and
- receive fit-for-purpose, consistent, accurate warnings through all phases of events

for communication systems, that:

- support the continuity of operations through all phases of an event, and
- provide access to reliable, accurate, timely, and integrated information

and for public engagement, that:

- empowers communities through timely information and education to prepare for, respond to and recover from events, and
- has a positive effect on the actions taken by communities across all phases of events.<sup>8</sup>

The National Review of Warnings and Information found that communities expect warnings to be ‘a clear call to action, rather than vague or generalist statements about safety’. The review also highlighted the ‘need to better tailor warnings, minimise vague information within templates, and to remove ‘slogans’ about community safety within warnings’.<sup>9</sup>

With specific reference to dam communications, the following points have been developed using the Standard for Disaster Management in Queensland, the provisions of the WSSR Act, other plans and guidelines from the dam safety and disaster management sectors, and recognised good practice advice.

We expected to find:

- At-risk communities are identified, engaged and understand their role.
- All other relevant stakeholders are known and agreed on, and they collaborate regularly with each other and with the community.
- Roles and responsibilities, including those for providing support, are identified, understood, accepted, and documented; and there is awareness and understanding of the roles and responsibilities of others.
- Accepted responsibilities are based on legislative and regulatory requirements, collaborative risk assessments, and build upon previous work or recommendations.

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<sup>8</sup> Office of the IGEM 2014, pp. 27-31.

<sup>9</sup> EMV 2014, p. 11.

- There are sound legislative frameworks and guidelines in place; and a rigorous policy process that includes decision making, implementation and evaluation processes to enable effective dam warnings communications and integration between the dam safety and disaster management sectors.<sup>10</sup>
- Dam safety regulation is based on good practice and includes providing advice and guidance, with robust processes in place for approvals, maintenance and compliance, and a capability for enforcement if required.<sup>11</sup>
- Dam communications systems support integrated warnings and notifications through consistent, up to date, reliable and accurate information that aligns with disaster management arrangements.
- Potentially affected stakeholder groups and communities, including individuals, are identified and documented in emergency action plans.
- Emergency action plans identify the range of emergency conditions that may affect the dam and downstream residents, and outline a combination of communication methods that are best suited to meet different stakeholder needs.
- Warnings and notifications planning and decision making considers different emergency conditions, stakeholders and stages of dam release, and is suited to the downstream conditions at the time.
- Warnings are pre-prepared and have been tested and improved where necessary.
- Processes are in place to ensure all potentially affected stakeholders receive warnings as soon as it is known that dam releases are likely, or to allow enough time for action.
- Responsible stakeholders, including the community, have worked together to develop clear, concise and understandable warning content that can be quickly understood and acted on.
- The structure, language, delivery and timing of warnings should complement concurrent messaging undertaken by stakeholders and agencies at local, state and national levels.<sup>12</sup>

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<sup>10</sup> Althaus, Bridgman & Davis 2007.

<sup>11</sup> ANAO 2007.

<sup>12</sup> Office of the IGEM 2015, Review of local governments' emergency warning capability, p. 25.

## Community expectations

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Research has found that only one in five Australians is prepared for disaster.<sup>13</sup> The National Strategy for Disaster Resilience promotes that individuals be responsible for preventing, preparing for, responding to and recovering from disasters within their own communities. 'Active planning and preparation for protecting life and property, based on an awareness of the threats relevant to their locality, can increase both individual and community resilience.'<sup>14</sup>

In terms of community responsibility, the QFCoI stated 'it is the responsibility of residents close to the dam to apprise themselves of how certain outflows will affect their property'.<sup>15</sup> However, this is dependent on a number of factors specific to dam events that we would expect to see based on legislation and policy:

- that accurate and meaningful information is available to residents to allow them to determine the potential impacts
- the conditions at the time of the outflow are taken into account, either normal conditions or during flooding
- that accurate notifications and warnings about the timings and volumes of expected outflows are provided with enough time to aid residents' decision making.

The more aware the community is of the risks that apply to them and the systems in place to support them, they may become more resilient and less reliant on emergency services.

### What we found

Our review's focus groups clearly identified an expectation from community members that the dam operator or council will protect them and that they will be warned.<sup>16</sup> The following key findings reflect their expectations in regard to receiving warnings or notifications about potential risks to their safety and property:

- Warnings need to be tailored to individual community needs and local conditions.<sup>17</sup>
- When using SMS or landline telephone to warn the community, messages should be received by everyone at risk, regardless whether or not people are pre-registered.<sup>18</sup>
- People at risk should receive timely, up-to-date, relevant and detailed communications via multiple channels without having to pre-register.<sup>19</sup>
- Community members are unlikely to register to receive warnings without significant awareness campaigns.<sup>20</sup>
- There are concerns about reliance on electronic means of warning distribution, particularly for elderly people, in cases of power outage, and potential for too many or irrelevant warnings causing complacency.<sup>21</sup>

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<sup>13</sup> Australian Red Cross website, <http://www.redcross.org.au/preparedness-week.aspx>.

<sup>14</sup> COAG 2009, p. v.

<sup>15</sup> QFCoI 2011, p. 138.

<sup>16</sup> MCR 2015, p. 13.

<sup>17</sup> Ibid, p. 10.

<sup>18</sup> Ibid, p. 11.

<sup>19</sup> Ibid, p. 13.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid.

The current requirement to subscribe to receive notifications from dam owners was not widely known by focus group participants.<sup>22</sup> Most believe they have the right to be warned if they are at risk, whether they are subscribed to opt-in systems or not.<sup>23</sup> There is a clear assumption that warnings will be automatically provided,<sup>24</sup> and that the warnings will allow people time to act, will provided them the correct information, will tell them what to do through a means that they receive and understand.

The following table summarises the expectations of focus group participants.<sup>25</sup>

	Minor event	Major event	Fast onset
<b>Timing of initial message<sup>26</sup></b>	As soon as issue is evident. Ideally, at least 24-48 hours prior to impact.	As soon as issue is evident. Ideally, up to one week or at least 24 hours prior to impact.	As soon as issue is evident.
<b>Follow up message intervals</b>	4-24 hourly or more frequently if the situation changes.	1-4 hourly or more frequently if the situation changes.	30-60 minutes, or more frequently if the situation changes.
Each message should contain details of when the next regular update will be issued so that residents know when to re-check.			
<b>Channel</b>	Regardless of the type of event (minor/major/fast onset), residents living downstream from dams suggest warnings or notifications be distributed via multiple channels to maximise the opportunity of people receiving the message. For any event the following channels are expected: <ul style="list-style-type: none"> <li>• Text message to mobile</li> <li>• Recorded message to landline</li> <li>• Media reports (radio and television).</li> </ul> Occasions when other specific channels are relevant are detailed below by event type:		
	Minor event	Major event	Fast onset
	<ul style="list-style-type: none"> <li>• Email</li> <li>• Roadside signage</li> <li>• Facebook Website</li> <li>• Letterbox drops</li> </ul>	<ul style="list-style-type: none"> <li>• Email</li> <li>• Roadside signage</li> <li>• Facebook</li> <li>• Siren in street/town</li> <li>• Emergency siren on broadcasted warnings (TV/radio)</li> <li>• Door knocking</li> <li>• Website</li> <li>• Letterbox drops</li> </ul>	<ul style="list-style-type: none"> <li>• Siren in street/town</li> <li>• Emergency siren on broadcasted warnings (TV/radio)</li> <li>• Door knocking (police/SES)</li> <li>• Facebook (time permitting)</li> </ul>
<b>Source</b>	The preferred source (author) of messaging varies depending on region, as discussed under section 4.1. For consistency and credibility, most respondents believe that a single source for all messaging would be better than receiving different messages from different sources. The exception to this is Facebook where a range of groups might be expected to have a Facebook page (e.g. council, LDMG, QPS, SES). Door knocking would be expected from police or SES workers. Pre-event advice such as flyers inserted with rates notices/electricity bills are considered a good way to educate people about the notification/warning systems that will be used in emergency events.		
<b>Audience</b>	Minor event	Major event	Fast onset
	Anyone likely to be affected.	Anyone likely to be affected, plus wider community (provided messaging details specific areas of impact). *	Anyone likely to be affected, plus wider community (provided messaging details specific areas of impact). *
<b>Final message</b>	Once waters have peaked.	Messages should continue after the peak to provide further information on available support, clean-up activities and highlight any ongoing risks.	Messages should continue after the peak to provide further information on available support, clean-up activities and highlight any ongoing risks.
	Whenever the final message is delivered, it should be stated that that is the final message and a link to further information or available assistance be provided.		
<b>Information needed</b>	Information needed is consistent across event type: <ul style="list-style-type: none"> <li>• Likely timing (start of event, peak of event predictions, likely end time)</li> <li>• Who will be impacted (suburb/part of town or specific streets)</li> <li>• How will people be impacted (river height, damage/risks likely/animals or farming equipment at risk)</li> <li>• What should people do (if evacuation is recommended – where to go, if sand-bagging is recommended – where to get sandbags from)</li> <li>• Phone number or other point of access for more information</li> <li>• Details on next update</li> </ul>		

<sup>22</sup> Ibid, p. 13.

<sup>23</sup> Ibid, p. 27.

<sup>24</sup> Ibid, p.14.

<sup>25</sup> Ibid, p. 30-31.

<sup>26</sup> We note the expectation of being able to provide up to one week, and a minimum of 24 hours notification, may not be achievable considering weather patterns and forecasting reliability.

This table may be considered in conjunction with the components of the Standard for Disaster Management in Queensland dealing with hazard identification and risk assessment, public engagement, communication systems and warnings, to be used as criteria when developing and clarifying site specific dam warnings communications.<sup>27</sup>

The concept of taking individual responsibility was understood and accepted by participants in our focus groups.<sup>28</sup> However, the participants believed their ability to take action was dependant on them receiving warnings and being advised what actions they should take through those warnings.<sup>29</sup> These beliefs are evidenced by the following statements from participants:

*"You just need to really follow directions ... I think generally with flooding and any disaster, people have really got to take a bit of their own responsibility for their own safety."*

*"I still think there must be more encouragement for the individual to look after themselves and be proactive themselves in getting the batteries, getting the radio, turning it on and listening."*

Participants identified the following as the responsibilities they believe apply to them before, during and after an emergency:<sup>30</sup>

Lead-up to event	During event	After event
<ul style="list-style-type: none"> <li>• Listen or look-out for warnings and notifications</li> <li>• Inform others about risks (especially elderly neighbours)</li> <li>• Move possessions out of harm's way</li> <li>• Consider actions that may need to be taken given the potential outcomes and when to take them</li> <li>• (For those on social media) Share information or updates with friends</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to monitor warnings and notifications</li> <li>• Take action (e.g. evacuate, move to higher ground)</li> <li>• Follow instructions from emergency services</li> <li>• Help others</li> <li>• Stay out of the way of authorities (i.e. no sight-seeing)</li> </ul>	<ul style="list-style-type: none"> <li>• Clean-up</li> <li>• Help others</li> </ul>

It was also identified that participants were not necessarily active in seeking out information about flooding.<sup>31</sup> This shows an opportunity exists to increase awareness of the possible risks faced by the community and the need for greater community education and engagement.

The National Review of Warnings and Information showed wide agreement that the success of warnings 'largely relies on efforts to build community resilience, awareness and preparedness prior to any emergency'.<sup>32</sup> Dam warnings stakeholders can engage the community in the planning process through:

- promoting the recently released Queensland Plan for involvement 'in community consultation for plans and projects in your local area'<sup>33</sup>
- actively implementing the Queensland Strategy for Disaster Resilience, which encourages 'individuals, families and communities to take responsibility for building

<sup>27</sup> See Recommendation 1.

<sup>28</sup> MCR, p. 13.

<sup>29</sup> Ibid, p. 25.

<sup>30</sup> Ibid.

<sup>31</sup> Ibid, p. 13

<sup>32</sup> EMV 2014, p. 10.

<sup>33</sup> Queensland Government website, <http://queenslandplan.qld.gov.au/delivering-the-plan/get-involved/infrastructure.aspx>.



their capacity and capability to withstand and recover from disasters'<sup>34</sup>

- providing the means to maintain a level of public awareness and preparedness about risks and local arrangements
- organising and supporting involvement in activities such as volunteering programs, community education and information, or local emergency coordination committees.

We are aware that communities have been engaged in the development of dam release policy and that some councils and dam owners are active in providing information about dam risks and activities. While further discussion on these initiatives is included within our report, more can be done. Based on our focus groups further work is required to increase the knowledge, understanding and resilience of communities at risk from dam related hazards, particularly during flooding events.

### **Finding 1**

Our community focus groups acknowledge they have a responsibility to be engaged with warnings providers and be prepared.

### **Finding 2**

Our community focus groups believe they have the right to be warned if they are at risk. They expect that warnings and notifications about dam releases or spills will be:

- tailored to suit local needs and conditions
- received by everyone at risk whether subscribed to opt-in systems or not
- are timely, up-to-date, relevant and detailed through multiple channels without having to pre-register
- explained through community awareness campaigns
- consider the risks associated with the means, timings and frequency of distribution.

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<sup>34</sup> DLGCR, p. 13.

# Current dam safety environment

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## Introduction to dam operations

Dams can be built to fulfil purposes including water storage and flood mitigation.<sup>35</sup> An owner of a dam is 'the owner of land on which the dam is constructed or is to be constructed',<sup>36</sup> and 'the person, organisation or legal entity responsible for the control, operation and maintenance of the dam'.<sup>37</sup> Dam owner responsibilities for warnings communications are regulated by the DEWS under the WSSR Act, particularly through flood mitigation, emergency action planning and reporting provisions. Emergency action plans (EAPs) developed by dam owners show the warnings communications processes and activities to notify the downstream communities relevant to each dam.

A water storage dam is used to ensure a safe and sustainable water supply.<sup>38</sup> The maximum amount allowed to be stored when the dam is not affected by flood is called the *full supply level*.<sup>39</sup> If the volume of water in the dam goes over the full supply level the dam will spill or the dam operators must release the extra water.<sup>40</sup> Water supply dams can be gated or un-gated. Un-gated dams do not provide any control over water spilling from the dam once full supply level is reached.<sup>41</sup> When this occurs, water flows over the spillway crest, down a spillway and out of the dam, effectively passing on the flow of any water above full supply level. Un-gated dams can, however, still help to attenuate a flood as some water is held back in the dam during this process.<sup>42</sup> However, typically a water storage dam will not have a flood storage compartment for storing flood inflows.<sup>43</sup>

A *flood mitigation* dam is 'designed to temporarily store or control flood runoff sometimes in addition to providing water supply'.<sup>44</sup> Dams with significant storage capacity, for example Wivenhoe Dam, are designed and operated to provide flood mitigation by storing water during peak flood flow. Flood mitigation dams have gates that allow the dam operators some control over how much water is released during a flood, however not all gated dams are flood mitigation dams. The level of control is usually determined by the size and the type of flood. In the case of SunWater, all of its 19 dams, including four gated dams, are water storage dams and none are designated as flood mitigation dams.<sup>45</sup>

It is important to understand that releases from a dam are only one potential source of floodwater contributing to the flows in rivers or watercourses downstream of dams. This means notifications from dam owners are generally not an indication of total flooding downstream of the dams. Rather, except in limited situations for gated dams, they are specifically about the outflow from the dam.<sup>46</sup>

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<sup>35</sup> ICLD 2012, p.19.

<sup>36</sup> *WSSR Act 2008*, Schedule 3, see definition of 'owner'.

<sup>37</sup> AGD 2009, p.3.

<sup>38</sup> Seqwater website, <http://www.seqwater.com.au/water-supply/dams-weirs>.

<sup>39</sup> *WSSR Act 2008*, Schedule 3, see definition of 'full supply level'.

<sup>40</sup> DEWS 2014, North Pine Dam Optimisation Study.

<sup>41</sup> Seqwater website, <http://www.seqwater.com.au/latest-updates/news/2015/05/02/how-do-gated-and-un-gated-dams-work>.

<sup>42</sup> *Ibid*.

<sup>43</sup> Information provided by SunWater on 28 August, 2015.

<sup>44</sup> ANCOLD 2003.

<sup>45</sup> Information provided by SunWater on 10 September, 2015.

<sup>46</sup> Information provided by Seqwater on 28 August, 2015.

*Referable dams* are defined at s. 341 of the WSSR Act. To determine if a dam is referable, several sections of this Act are applicable. The first element used is a *failure impact assessment*.<sup>47</sup> This assessment must be undertaken if the dam is more than 10 metres in height with a storage capacity of 1500 megalitres, or more than 10 metres in height with a storage capacity of 750 megalitres, and a dam catchment area more than three times the dam's maximum surface area at full supply.<sup>48</sup>

Once completed, a properly conducted failure impact assessment will identify whether there is a *population at risk* (PAR)<sup>49</sup> for a dam failure, and consequently whether the dam is referable, and its failure impact rating. Dams with a category 1 failure impact rating are those with between two and 100 PAR.<sup>50</sup> Dams with a category 2 failure impact rating have more than 100 PAR.<sup>51</sup> The determination of whether a dam is referable and its failure impact rating is only resolved once the DEWS has accepted a properly conducted failure impact assessment of a reasonable standard.<sup>52</sup> There are 104 referable dams across Queensland with an approximate total PAR of 550 000.<sup>53</sup> Hazardous waste dams and weirs are not referable dams.<sup>54</sup>

### The changing dam safety environment

The QFCoI was a catalyst for improvement, making multiple recommendations to bolster dam warnings communications. The DEWS has demonstrated a commitment to consulting with stakeholders in developing policy initiatives resulting from these recommendations. It has also provided guidance and advice to referable dam owners on developing EAPs, including on dam warnings communications.

As a result of the QFCoI recommendations, the DEWS developed a program for EAPs to be approved by the regulator under the WSSR Act. This process was intended to encourage dam owners and local disaster management groups to work together to determine good practice warnings planning for their communities. Supporting policy guidance was implemented through educational roadshows and some exercising, primarily to support the introduction of a provisional EAP guideline.

The information in the table on the following page was provided by the DEWS. It sets out the timelines of changes to legislation, the implementation activities and educational tools used, and the development of the provisional EAP guideline.

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<sup>47</sup> All SunWater category 2 dams (most of their dams) have a deemed category rating as determined by the regulator without a failure impact assessment. They are dams that predated the legislation.

<sup>48</sup> *WSSR Act 2008*, s. 343.

<sup>49</sup> *Ibid.*, s. 346, the number of persons whose safety will be at risk if the dam, or the proposed dam after its construction, fails.

<sup>50</sup> *Ibid.*

<sup>51</sup> *Ibid.*

<sup>52</sup> *Ibid.*, s. 349 and information provided by the DEWS on 3 September, 2015.

<sup>53</sup> DEWS 2015, *The regulation of dam safety in Queensland*, p. 2.

<sup>54</sup> *WSSR Act 2008*, s. 341, unless a weir has a variable flow control structure on the crest of the weir.

1 August 2011	QFCol publication of Interim Report containing a number of relevant recommendations for dam safety emergency action planning.
16 March 2012	QFCol publication of Final Report containing a number of relevant recommendations for dam safety emergency action planning.
8 November 2012	Passage of <i>Water Legislation (Dam Safety and Water Supply Enhancement) and Other Legislation Amendment Bill 2012</i> adding the EAP requirements to the WSSR Act. Prior to this, EAPs were required in response to a dam safety condition (typically referred to as DS13) which required the preparation and implementation of an EAP in accordance with the provisions of the <i>Queensland Dam Safety Management Guidelines</i> . There was no mechanism in this approach for the approval of these EAPs.
September 2012 to April 2013	Establishment of the 'Dams Implementation Group' (DIG) to implement the dam related recommendations of the QFCol. DIG Working Group responsible for putting together guidelines on EAPs for referable dams. This Referable Dam Working Group was a sub-committee of the overall DIG Committee and involved representation from: <ul style="list-style-type: none"> <li>• Dam Safety Regulator (DEWS)</li> <li>• Local Government Association of Queensland</li> <li>• Emergency Management Queensland</li> <li>• Seqwater</li> <li>• SunWater</li> <li>• Brisbane City Council</li> <li>• Queensland Police Service</li> </ul> The Referable Dam Working Group reported back to the wider DIG Committee.
April 2013	Letters sent to all dam owners advising of new legislative requirements EAPs.
24 May 2013	Review of Callide Dam Gate Operations in the January 2013 Flood Event by Water Solutions.
June 2013	Publication of provisional EAP guideline by DEWS.
July 2013	Awareness sessions (road shows) for dam owners and LDMGs.
1 October 2013	Referable dam owners required to submit EAPs to the Dam Safety Regulator for approval.
Since 1 October 2013	Ongoing review of EAPs and decisions on whether to approve them or not. Substantial detailed advice has been provided to dam owners to date. Often multiple and repeated negotiations by phone and in person occur.
20 February 2015	Ex-Tropical Cyclone Marcia passes over Callide Valley.
26 February 2015	Redacted versions of approved EAPs placed on DEWS website.
1 May 2015	Intense rainfall event in south-east Queensland.
4 June 2015	Publication of IGEM 2015 Callide Creek Flood Review Report.

Originally, support for implementation of dam emergency action planning in the disaster management sector was provided by Emergency Management Queensland. Queensland Fire and Emergency Services (QFES) is the agency now responsible for administering the *Disaster Management Act 2003* (the DM Act). The DEWS regularly engages with QFES at the state level as part of the State Disaster Coordination Group. This ongoing collaboration should also be encouraged in the development of dam safety policy and warnings to ensure alignment between the dam safety and disaster management sectors.

### **Finding 3**

Integration of dam safety with disaster management arrangements is dependent at the state level upon strong engagement between the Department of Energy and Water Supply and Queensland Fire and Emergency Services.

## Legislative requirements for dam warnings and notifications

### *Regulation of the Water Supply (Safety and Reliability) Act 2008*

The chief executive is the regulator under s. 10 of the WSSR Act. The Director-General of the DEWS, as the chief executive, is responsible for the regulation of referable dams under the WSSR Act. When performing regulatory functions, the purpose of the WSSR Act to 'provide for the safety and reliability of water supply'<sup>55</sup> must be considered. This is achieved by regulating referable dams and flood mitigation responsibilities, as well as regulatory frameworks for water supply and protecting the interests of customers.<sup>56</sup>

### *Flood mitigation manuals*

Flood mitigation responsibilities, including preparation of flood mitigation manuals, apply only to Seqwater's Wivenhoe, Somerset and North Pine Dams as prescribed by the WSSR Act.<sup>57</sup> A flood mitigation manual can only be approved if carrying out its operational strategies and procedures would minimise risk to human life and safety.<sup>58</sup> The manual must also achieve balance between preventing dam failure, maintaining the dam's full supply level and minimising risk to property, disruption to transport, and environmental impact.<sup>59</sup> However, the responsibility for dam warnings communications lies within emergency action planning and these dams are required to have both a flood mitigation manual and an EAP.

### *Emergency action plans*

The content of EAPs includes the activities to be conducted by dam owners in line with their responsibility for dam warnings communications. Pursuant to QFCoI recommendation 17.31,<sup>60</sup> the *Water Legislation (Dam Safety and Water Supply Enhancement) and Other Legislation Bill* was progressed in October 2012. The amended WSSR Act places additional requirements for referable dam owners when developing EAPs for each dam. The legislation mandates their content and includes provisions for ensuring appropriate notification is provided to potentially affected community members.<sup>61</sup>

Section 352H of the WSSR Act states that prior to developing an EAP, dam owners must identify the *emergency conditions* relevant to their dam. These emergency conditions include:

- '... (a) a dam failure hazard; or
- (b) a downstream release hazard; or
- (c) a circumstance that potentially indicates an increase in the likelihood of a dam failure hazard or downstream release hazard happening'.<sup>62</sup>

A *dam failure hazard* is 'a reasonably foreseeable hazard that has the potential to cause or contribute to the failure of the dam'.<sup>63</sup>

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<sup>55</sup> WSSR Act 2008, s. 11, s. 3.

<sup>56</sup> Ibid, s. 3, note the other provisions of s. 3 are outside the scope of this review.

<sup>57</sup> WSSR Regulation 2011, s. 3.

<sup>58</sup> Ibid, s. 371F.

<sup>59</sup> Ibid.

<sup>60</sup> QFCoI 2012, p. 601.

<sup>61</sup> WSSR Act 2008, s. 352H.

<sup>62</sup> Ibid, s. 352A, see definition of 'emergency condition'.

<sup>63</sup> Ibid, s. 352B.

A *downstream release hazard* is:

‘... a reasonably foreseeable hazard to the safety of persons or property that could potentially be caused or aggravated by—  
 (a) a release of water from the dam’s spillway; or  
 (b) a controlled release of the water from the dam’.<sup>64</sup>

Section 352H of the WSSR Act provides the mandatory content of the plans includes identifying for **each** emergency condition:

- the **area** likely to be affected by an emergency event
- **when, how**, and the **order of priority** they must notify
  - disaster management groups
  - the persons whose safety or property may be threatened
  - relevant local governments
  - the DEWS
  - any other relevant entity
- the **actions** they must take to respond.

In their deliberations dam owners now need to include *reasonably foreseeable* hazards to the safety of persons or property, potentially caused or aggravated by spillway or controlled releases from their dams.<sup>65</sup> The mandatory content of the plans includes identifying likely affected areas, arrangements for notifying relevant entities, and the actions dam owners must take to respond to each emergency condition.

SunWater advised us the primary concept in the WSSR Act was based on prevention to ensure good public safety outcomes. That is, public safety consideration is a primary requirement in owning, operating and maintaining dams.<sup>66</sup> The inclusion of emergency action planning requirements to the WSSR Act has enhanced the public safety component to all referable dams. The WSSR Act outlines the criteria for the chief executive to approve EAPs if they comply with content requirements and effectively deal with each emergency condition for the dam.<sup>67</sup>

#### *Emergency action planning guideline*

Section 572 of the WSSR Act provides that the chief executive may make guidelines about failure impact assessments of water dams, managing referable dams, flood capacity of dams and any other matter relating to the administration of the Act.

The DEWS consulted with key stakeholders to develop the Emergency Action Planning for Referable Dams guideline (the provisional EAP guideline). The guideline was released in June 2013 and awareness sessions were conducted for dam owners, councils and disaster management groups in various locations across Queensland in July 2013. The initial round of EAP approvals was completed in October 2014. The DEWS advises the intention was to finalise the guideline following feedback and the initial round of EAP approvals to include lessons and improvements on the process in early to mid-2015.

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<sup>64</sup> WSSR Act 2008, s. 352C.

<sup>65</sup> Ibid.

<sup>66</sup> Information provided by SunWater on 28 August, 2015.

<sup>67</sup> WSSR Act 2008, s. 352J, s. 352H.

The final guideline is still under development and the DEWS advises it has been further delayed due to the Callide Creek flooding of February 2015 and this review. The guideline is promoted by the DEWS as a 'best practice' guide for dam owners to develop EAPs to meet legislated requirements.<sup>68</sup>

#### **Finding 4**

The Department of Energy and Water Supply's Emergency Action Planning for Referable Dams guideline, developed to guide dam owners on planning to meet legislated requirements for referable dams, remains provisional. The Department advises this action had been delayed awaiting the completion of the 2015 Callide Creek Review and this review, but will now occur.

#### **Finding 5**

The Emergency Action Planning for Referable Dams guideline is promoted as being a 'best practice' guide only.

#### *Approval of emergency action plans*

The chief executive (or responsible delegate) is the accountable officer for the approval of EAPS. Section 352J of the WSSR Act states the criteria for approving an EAP is that the content of the plan must meet all requirements of the legislation,<sup>69</sup> and the chief executive must be satisfied the plan *effectively* deals with *each* emergency condition for the dam. As part of its regulatory role, the DEWS should supply clear guidance to dam owners to enable them to determine what makes an effective plan. This would include how to ensure, as stated in the provisional EAP guideline, the plan is to be used as an 'ongoing continued improvement process that incorporates detailed disaster risk management principles and aligns with local government disaster management plans.'<sup>70</sup> The guideline could also be enhanced to inform dam owners how EAPs will be assessed by the chief executive to determine their effectiveness.

#### **Finding 6**

The Emergency Action Planning for Referable Dams guideline does not clearly explain to dam owners what makes an effective emergency action plan. It would benefit from inclusion of the assessment criteria/standards applied by the regulator when considering whether to approve the plan.

The requirement to identify each emergency condition for the dam,<sup>71</sup> and to consider and plan for the identified emergency conditions, is supported through clear and consistent definitions and examples in legislation and the provisional EAP guideline. Of the 11 approved plans we reviewed, all considered dam failure hazards, while only six considered downstream release hazards. While some consideration is given to the indicators that may contribute to dam failure, no plans outline how they consider the emergency condition for circumstances that may potentially increase the likelihood of these hazards occurring.<sup>72</sup>

<sup>68</sup> Information provided by the DEWS on 3 September, 2015.

<sup>69</sup> See *WSSR Act 2008*, s. 352H for content requirements of EAPs.

<sup>70</sup> DEWS 2013, p. 10.

<sup>71</sup> *WSSR Act 2008*, s 352H.

<sup>72</sup> *Ibid*, s. 352A, see definition of 'emergency condition'.

Although planning for each emergency condition may contain common elements, it is stated in the legislation the plan must include particular information for each.<sup>73</sup> It would be good practice to outline each separately for ease of identification in risk management and when enacting a plan. This is particularly relevant as the plan must state the actions the owner must take in response to each condition.

It is noted that references to similar inundation mapping may occur but it is information 'for each' emergency condition that must be clearly identified in the content of the EAP.<sup>74</sup> Not identifying all emergency conditions, and planning accordingly, increases the likelihood that persons whose safety or property may be threatened by a condition will not be notified or warned to allow the required actions. The DEWS' Dam Safety Business Plan 2015-16 shows it is currently developing a new Referable Dam Register. This project will improve its ability to ensure compliance with EAP statutory requirements.

### **Finding 7**

Not all Seqwater's and SunWater's current approved emergency action plans identify each emergency condition as required by legislation and outlined in the Emergency Action Planning for Referable Dams guideline.

#### *Annual reviews of emergency action plans*

Under the WSSR Act, dam owners are to conduct annual reviews of their EAPs<sup>75</sup> and must advise the chief executive of any amendments.<sup>76</sup> This provides a way to ensure dam owners are improving their plans based on the chief executive's assessment and feedback. Both the chief executive and the dam owner are responsible for ensuring EAPs are written to comply with legislation and meet any compliance standards. However, we have been advised by dam owners these processes can take an extended amount of time to complete. This may result in the public not receiving or having access to the most up to date and relevant information and plans.

During this review we found a number of plans contain errors and have not been updated following organisational and legislation changes. Some plans do not contain the information required by legislation, including all dam emergency conditions. Some also refer to other plans where the information is provided under different legislative requirements. In some cases it is evident that information is copied across plans.

Failure to ensure plans are quality controlled may impact warnings communications as the dam owner is required to communicate with individuals, disaster management groups and organisations about potential hazards. Section 352N of the WSSR Act states dam owners must ensure individuals named in the plan to be personally notified of an emergency condition have access to the approved plan. While the public can access EAPs as they are made available by the chief executive on the DEWS website,<sup>77</sup> extended approval times may affect this requirement. The quality of the EAP, and the assurance it provides may also have a direct impact on community and stakeholder confidence in the plan.

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<sup>73</sup> Ibid, s. 352H.

<sup>74</sup> Ibid, s. 352A, s.352H.

<sup>75</sup> Ibid, s. 352P.

<sup>76</sup> Ibid, s. 352Q, s. 352R.

<sup>77</sup> Ibid, s. 352M.



**Finding 8**

Improving dam safety compliance, administration and quality control processes would increase the likelihood of the public receiving the most timely and relevant information.

*Identified inconsistency in the Water Supply (Safety and Reliability) Act 2008*

In October 2012 the *Water Legislation (Dam Safety and Water Supply Enhancement) and Other Legislation Amendment Bill 2012* inserted a new division covering emergency action planning and emergency reporting for referable dams.

Prior to this, in November 2011 the *Disaster Readiness Amendment Bill 2011* was passed, adding a provision at s. 354 of the WSSR Act for the chief executive to apply a dam safety condition that:

‘... may include requirements about giving information to the local community situated immediately downstream of the dam about the likely or actual release of water from, or flow of water through, the dam as a result of flooding’.<sup>78</sup>

Notifications and warnings arrangements with the public were introduced in the October 2012 bill. However, s. 354 also provides that dam safety conditions can require information to the local community situated immediately downstream of the dam outside the EAP process. We considered this section may provide a way for the chief executive to ensure information is provided to those at risk if an EAP is not yet approved. The DEWS subsequently advised the section was to have been removed from the legislation following the introduction of EAP provisions to the WSSR Act, and applying this section is not its intent.<sup>79</sup> The DEWS also advised it is currently reviewing various sections of the legislation to ensure consistency in its regulatory approach for continuous improvement of EAPs.

**Finding 9**

Changes to the *Water Supply (Safety and Reliability) Act 2008* appear to have created inconsistencies between various sections and how they are applied.

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<sup>78</sup> Ibid, s. 354.

<sup>79</sup> Meeting with the DEWS, 29 July 2015.

## Dam communications systems

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### Current Seqwater and SunWater dam communication systems

This section of the review describes Seqwater's and SunWater's current communications systems for dam notifications and warnings. We outline an example of Seqwater's dam communication systems in practise. For a SunWater example, refer to the Office of the IGEM's 2015 Callide Creek Flood Review report.<sup>80</sup>

#### *Seqwater*

Seqwater conducts dam releases using its Communications Protocol for Releases from Seqwater's Gated Dams. This protocol is used to 'define the communication arrangements in the event of a dam release from one of Seqwater's gated dams, to assist in the effective, coherent and timely coordination of information to stakeholder agencies and the public'.<sup>81</sup> Seqwater advises for emergency warnings triggered by an emergency condition in a Seqwater EAP, its primary warning system is the Emergency Alert operated by QFES.<sup>82</sup> The communications protocol indicates this is to be used only for a potential dam failure.<sup>83</sup>

Seqwater also has a protocol titled 'Flood Operations Centre Stakeholder Communication Work Instructions'. The aim of this document is to:

'present the procedural framework that supports timely and accurate gate and flood water release information to the community and other key stakeholders... This procedure has been developed in response to a requirement by the Queensland Floods Commission of Inquiry. This requirement is to ensure Seqwater notifies people living immediately below the wall of a referable dam of any impending releases from a gated dam, or spills from an un-gated dam'.<sup>84</sup>

Seqwater uses an opt-in commercial early notification system launched in late December 2011. Seqwater has promoted its opt-in dam release notification service through a range of communication channels, including targeted regional newspaper, commercial radio, cinema, digital billboard and social media advertising. A webpage was created for the service to enable community members to easily subscribe online, primarily from a link on the home page 'Register for free dam alerts'.<sup>85</sup>

The figure on the following page shows the increase in registrations for Seqwater's dam release notification service from 28 December 2011 to 7 July 2015. This may indicate that more people are receiving advice about this service and are seeking out information provided by Seqwater.

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<sup>80</sup> Office of the IGEM 2015, 2015 Callide Creek flood review.

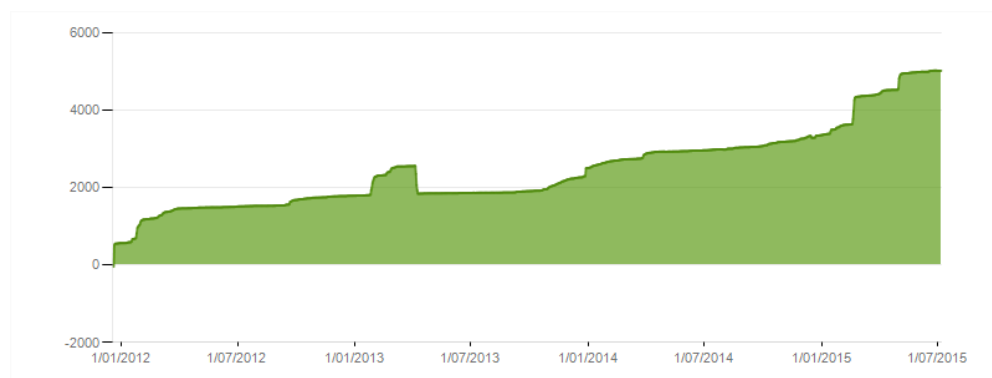
<sup>81</sup> Seqwater 2015, Communications protocol.

<sup>82</sup> Letter from Seqwater to the IGEM, 10 July 2015.

<sup>83</sup> Seqwater 2015, Communications protocol.

<sup>84</sup> Seqwater 2015, Flood Operations Centre Stakeholder Communication Work Instructions.

<sup>85</sup> Seqwater website, <http://www.seqwater.com.au/dam-release-information-service>.



Seqwater does not rely solely on this service to notify communities at risk. It has a multi-channel approach involving media (television, radio), social media (Twitter, Facebook), recorded phone messages and a 1800 number for information about current dam releases and spilling from its dams. This number has been consistent since 2011 and the Duty Communications Officer is required to update the message weekly.

In addition to the above procedures, Seqwater uses traditional and social media to inform the broader community about dam operations, gated dam releases and spilling from ungated dams. Storage levels on the Seqwater website are updated every two hours and an emergency panel on the home page provides the latest information and key contacts. Regular updates are also provided to a range of stakeholders including the State Disaster Coordination Group through the DEWS and during events situation reports directly to the State Disaster Coordination Centre.<sup>86</sup>

### *SunWater*

SunWater communicates with stakeholders guided by its EAPs. It has multiple approaches to providing information to those who may be impacted by its dams including:

- an opt-in notification list for those living up to 10 kilometres downstream<sup>87</sup>
- an RP data search every five years to ensure parcels of land are identified and owner's details are accurate<sup>88</sup>
- contacting by telephone downstream landholders or customers on their notification lists as required
- social media to provide updates to the community
- availability of storage level information on SunWater's website
- online access to the publication Dam Management During Floods<sup>89</sup>
- updates to local governments, police, emergency services and disaster management agencies and the State Disaster Coordination Group through the DEWS.

### **Finding 10**

Seqwater uses a communication protocol for releases from its flood mitigation dams, including Wivenhoe Dam, while SunWater uses emergency action plans to communicate with the public about dam releases and spills.

<sup>86</sup> Information provided by Seqwater on 9 September, 2015.

<sup>87</sup> SunWater website, <http://www.sunwater.com.au/home/contact-us/emergency-action-plan/sunwater-emergency-action-plan-notification-list-registration>.

<sup>88</sup> Information provided by SunWater on 28 August, 2015.

<sup>89</sup> SunWater 2015, Dam management during floods.

## An example of dam safety policy change on Seqwater's operations

In 2014 Seqwater and the DEWS jointly conducted an optimisation study presenting a range of options to manage Wivenhoe and Somerset dams during a flood event. In relation to flood warnings and notifications, the report concluded that generally Seqwater, the Bureau of Meteorology (BoM), Brisbane City Council, Ipswich City Council and Somerset Regional Council had 'robust warning and notification systems' in place for warnings during different levels of flood events.<sup>90</sup> Therefore, at the time the DEWS considered those entities had the systems in place to adequately warn and notify the community and stakeholder agencies.

Community feedback was sought on the options presented. In December 2014 the decision was made to implement a strategy called *Alternative Urban 3*, which changes how the flood mitigation compartment of Wivenhoe Dam is used. It allocates more space in an attempt to protect houses and buildings from damage during major floods. The strategy was incorporated into the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam in November 2014. Seqwater met with key stakeholders downstream of the Wivenhoe Dam (the mid-Brisbane irrigators) in December 2014 to explain the changes.<sup>91</sup>

The May 2015 event was an intense rainfall event in South East Queensland required the release of flood waters from Wivenhoe Dam, testing the policy for the first time. Seqwater advised us the event was a relatively small flood flow and the extent of property affected was within river banks. Further, there are significant limitations to information available to identify property at risk for such small flooding and that community expectations and reasonable expectations of timeliness, relevance and detail of communications may not align.<sup>92</sup>

Downstream residents did not receive notifications that dam gates had opened via Seqwater's opt-in system until releases had commenced.<sup>93</sup> Limited contextual advice and time for residents to assess risks and take appropriate action resulted in some damage to property. Therefore, the expectations of those whose property was affected to receive timely, up-to-date and detailed communications were not met. This is despite the policy being developed in consultation with stakeholders, in line with recognised good policy practices.<sup>94</sup> An evaluation strategy and opportunities to test or exercise during planning and development, supported by community education programs, would add to continued suitability and improvement of community outcomes.

A community member affected by the May 2015 event summarises the issues: 'there are assumptions about communications and it needs to move to securing understanding and not telling'. It was suggested education programs around communications would assist them to develop personal action plans, for example, an information session on terminology such as cubic meters.<sup>95</sup> Testing activities, including desktop exercises, would ensure actions are practised and understanding is embedded.

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<sup>90</sup> DEWS 2014, Wivenhoe and Somerset Dams optimisation study, p. 192.

<sup>91</sup> Information received from Seqwater on 9 September, 2015.

<sup>92</sup> Ibid.

<sup>93</sup> Information provided by Seqwater on 10 July, 2015.

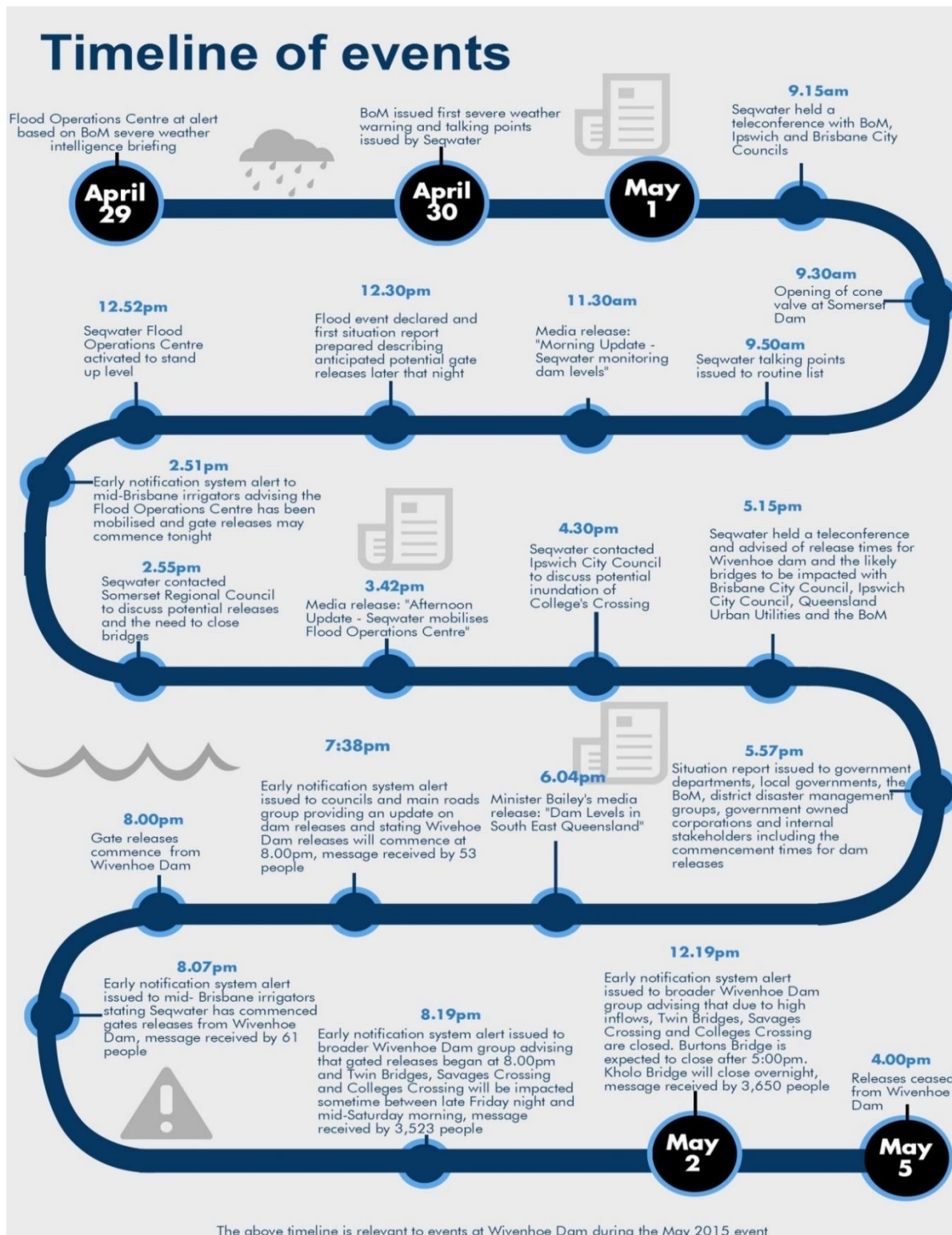
<sup>94</sup> Althaus, Bridgman & Davis 2007.

<sup>95</sup> Interview with community member on 9 July, 2015.

**Finding 11**

Policy development and implementation would benefit from inclusion of end-to-end evaluation strategies supported by education programs and testing activities to ensure understanding and effectiveness.

On 1 May 2015 Seqwater released flood waters from Wivenhoe Dam. Seqwater advised it received complaints from the community about its communications. According to Seqwater the timeline of the event is as follows:





Seqwater's Flood Event Report states the public was notified through a variety of means including emails, SMS, access to 1800 recorded message, website updates, social media, media releases and interviews. Seqwater's notification records indicate that at 2.51pm a group called the 'mid-Brisbane irrigators' were issued a message that the Seqwater Flood Operations Centre had been mobilised and that gate releases 'may commence tonight depending on the rainfall over the next six hours'. A further 53 people received text notifications at 7.38pm (councils and the Department of Transport and Main Roads), 61 people at 8.07pm (mid-Brisbane irrigators), and a further 3523 people at 8.19pm.<sup>96</sup> The relevant messages are outlined in Appendix C.

Some examples of public feedback to the event communications are:<sup>97</sup>

Friday 1 May, 2015

*"At about Noon to return home, I was listening to River 949 radio, a SEQ Water report stated that the Wivenhoe Dam had reached drinking maximum storage but not to worry that there was plenty flood storage reserve, and that the gates will not be opened.....At 8:30 pm I received a SMS that the SEQ WATER would begin releases at 8:00 pm, my neighbour on the right got his SMS just after 8:00 pm. My neighbour on the left said he had received a SMS at 9:00 pm. His pump was flooded"*

*"Why was there no official notice from SEQwater at 3.15pm at which time they know that releases were going to be made?"*

*"Why were we not given an appropriate warning that water releases (sic) were not made in an early and timely way necessitating this late activity in water flow, when the system is heavily loaded with natural run off volumes?"*

*"I want answers and a bloody good explanation of why you failed to do what was promised after the lessons learned from previous floods".*

*"The sad reality is Hundreds if not Thousands of people were inconvenienced for no good reason except maybe some good media from the government, we saved flooding"*

As noted, residents received text notifications at different times, with some not receiving advice until after the dam gates were opened. These night time notifications also did not allow sufficient time for action to be taken to safeguard property. This was also affected by residents advising they had heard some media channels advising that gate releases would not occur.

Seqwater advised the IGEM as part of this review that it considered its notification systems during the event were of a good standard. Seqwater advised that the rapid escalation of the event on the afternoon of 1 May 2015, and the requirements of its Flood Mitigation Manuals, resulted in the need for flood releases from the Seqwater gated dams to be initiated more quickly than for previous flood events. Seqwater further advised:

- 'The flood levels were well below emergency action trigger levels (which means not a dam emergency) at the Seqwater Dams
- The Seqwater Flood Operations Centre was mobilised due to the need to declare a flood event for gate operations at Wivenhoe and North Pine dams and provide communications and interactions with agencies as defined in the agreed protocol.
- The flood levels that occurred downstream of Wivenhoe Dam, Hinze Dam, and North Pine dam were below minor flood classification published by BoM and triggers defined for Brisbane River (downstream of Wivenhoe Dam) and Nerang River

<sup>96</sup> Information provided by Seqwater, notifications Wivenhoe 1-5 May 2015, see Appendix D.

<sup>97</sup> Information provided by Seqwater, July 2015.

(downstream of Hinze Dam) where the Bureau of Meteorology issue ‘flood warnings’ under current arrangements.

- The outflows from a significant number of Seqwater dams did trigger dam release notifications – which is a service Seqwater provides to advise of dam overflows or gate releases.
- Seqwater issued dam release notifications and supplemented this with other media channels’.<sup>98</sup>

We note the following:

- Seqwater provided that the timing, location, duration and intensity of the rainfall that fell across South East Queensland on Friday 1 May was unpredictable. Accordingly, Seqwater’s expectation of the likelihood and timing of dam releases necessarily changed as the day progressed and rain fell across dam catchments.<sup>99</sup>
- Seqwater advised that during rapidly evolving situations, it is not possible for Seqwater to predict in advance the quantum of floodwater release to be made from Wivenhoe Dam (and hence the exact impact on downstream communities).<sup>100</sup>
- Seqwater’s Flood Event Report shows its operations for this event were not conducted under its EAP for Wivenhoe Dam.
- Seqwater used its flood mitigation manual and communications protocol,<sup>101</sup> including its Flood Operations Centre Stakeholder Communication Work Instructions.
- At approximately 2.51pm on 1 May 2015 Seqwater advised the mid-Brisbane irrigators of potential releases ‘depending on rainfall over the next six hours’. However the broader community were not advised through Seqwater’s notification system of the releases until after the gates had opened. There were reports of residents being caught off-guard by a change in messaging. This moved from:
  - media channels advising weather predictions (the BoM providing rainfall forecasts) and reports that releases ‘were unlikely at this time but possible’
  - to media reports that dam releases were ‘now likely that evening’
  - to notification subscribers receiving a message from Seqwater to advise the gates had already opened.<sup>102</sup>
- Due to the notification timing, some residents were required to move their irrigation pumps at night.<sup>103</sup>
- The communications protocol used by Seqwater seems to provide for downstream communities to be informed of the actual gates opening, only when the release has, or is about to commence.
- Seqwater’s communications providing updates to all those affected for the duration of the May 2015 event could have been improved. Although traffic control was put in place at Seqwater’s request,<sup>104</sup> on 4 May 2015 school buses were not aware they were unable to cross a bridge due to weight restrictions and had to be turned around.<sup>105</sup>

<sup>98</sup> Letter from Seqwater to the IGEM dated 10 July 2015.

<sup>99</sup> Information provided by Seqwater on 10 July, 2015.

<sup>100</sup> Ibid.

<sup>101</sup> Seqwater 2015, Flood Event Report, p. I, p. v.

<sup>102</sup> Information provided by Seqwater on 9 September, 2015.

<sup>103</sup> Interview with community member on 9 July, 2015.

<sup>104</sup> Information provided by Seqwater, notifications Wivenhoe 1-5 May 2015, see Appendix D.

<sup>105</sup> Seqwater website, <http://www.seqwater.com.au/latest-updates/news/2015/05/04/seqwater-dam-releases-wivenhoe-dam>; Southern Cross Transit 2015, <http://www.southerncrosstransit.com.au/>.

- Seqwater advised that since the May 2015 event, it has revised its communication processes and overall procedure to ensure earlier and additional notifications to subscribers: refined its notification content to more closely align with EAP requirements; significantly upgraded its notification service, and provide further information and explanation about the gated and un-gated notifications on the Seqwater website when people sign up to the service. Although still to be tested and validated, we consider this pro-active approach commendable.

It is noted Seqwater did not activate its EAP for Wivenhoe Dam during the May 2015 event. If the approved Wivenhoe Dam EAP was activated, it refers to the Bulk Water Authority Emergency Response Plan to provide ‘details of how Seqwater provides notifications and engages with emergency management stakeholders during dam safety emergencies’.<sup>106</sup> The EAP goes on to say that the Bulk Water Authority Emergency Response Plan does not provide ‘detailed site specific actions for particular incidents or emergencies, but rather the framework within which those incidents and emergencies are managed.’<sup>107</sup> It provides a generic ‘all-hazards’ emergency management response, inside of which specific plans (such as the Wivenhoe Dam Emergency Action Plan) can be effectively utilised.

Using a different approach, SunWater notionally activates an EAP for its dams when:

‘... we believe that a downstream release hazard occurs. Due to the definition of downstream release hazard in the legislation, the hazard generally occurs for very small discharges. Downstream release hazard is defined in the legislation (s352C) as a reasonably foreseeable hazard to the safety of persons or property that could potentially be caused or aggravated by a release of water from a dam’s spillway eg flooding of property or transport infrastructure. Given irrigators have pumps installed in water courses d/s [downstream] of dams, those pumps are property and will generally be flooded from any spillway flow, by definition very small spillway flows constitute a downstream release hazard. Also a number of our dams have low level public road crossings in close proximity of the dam (Callide, Tinaroo, Burdekin, Coolmunda etc). Almost any spillway flow will impact on this transport infrastructure, hence again by definition a d/s release hazard’.<sup>108</sup>

The second reading speech by the Hon. Mark McArdle (30 October 2012), to introduce the *Water Legislation (Dam Safety and Water Supply Enhancement) and other Legislation Amendment Bill* stated:

‘Seqwater also raised the issue of potential duplication between emergency event reports and flood event reports and was also concerned an emergency event report could be triggered by controlled release or spills over ungated dams because of the definition of ‘downstream release hazard’. The Department of Energy and Water Supply advises it is not intended to capture every routine spillway release and that the definition limits the events that need to be reported on’.<sup>109</sup>

<sup>106</sup> Seqwater 2014, Wivenhoe Dam Emergency Action Plan, p. 10.

<sup>107</sup> Ibid.

<sup>108</sup> Information provided by SunWater on 8 July, 2015.

<sup>109</sup> McArdle 2012, p. 2229.



The two approaches, and the information from the DEWS, show there seems to be different interpretations and understandings when planning for downstream release hazards and emergency events that may occur as a result.

The DEWS advises that its EAP approval process is one of continuous improvement and that EAPs are evolving quickly. The DEWS also provides there is a 'need for recognition that EAPs and their associated communications may not work perfectly every time and it may take some time to develop'.<sup>110</sup> The DEWS Water Planning and Regulation Dam Safety Business Plan 2015-2016 shows there is a developing work program to 'monitor dam owner compliance with regulatory requirements and enforce when necessary'. This includes a new referable dam register to monitor compliance.<sup>111</sup>

**Finding 12**

During the May 2015 event the persons living downstream of Wivenhoe Dam whose safety or property that may have been threatened did not receive timely notification about the opening of the gates.

**Finding 13**

There appears to be different interpretations and applications by Seqwater and SunWater for the emergency conditions 'downstream release hazard' and 'a circumstance that potentially indicates an increase in the likelihood of a dam failure hazard or downstream release hazard happening'.

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<sup>110</sup> Information provided by the DEWS on 3 September, 2015.

<sup>111</sup> DEWS 2015, Water Planning and Regulation Dam Safety Business Plan, p. 2.

## Dam notifications and warnings

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### Timings of notifications and warnings

The timing of both notifications and warnings needs to allow sufficient time for recipients to act upon advice based on local conditions at the time.<sup>112</sup> It is appreciated that this represents an 'ideal' situation, however Seqwater advises this is not always possible. Dam owners cannot control the timing of the rainfall or the flood. The flood operations for gated dams are governed by operating rules that are critical for the safety of the dam, and hence the desired lead time will not always be possible.<sup>113</sup>

Our focus groups indicate the public expects notifications and warnings will be disseminated as soon as an issue is known by the dam owners. They also expect that messages will include timings to guide their decisions and actions, will convey the urgency of the developing situation, that regular updates will be provided and when the next update can be expected.

#### *Notification or warning?*

The use of terminology may affect the perception of urgency of messages to members of the public and other operational stakeholders. While the QFCoI intended that dam owners be responsible for 'warning' communities living immediately downstream of dams,<sup>114</sup> the WSSR Act uses the term 'notify'.<sup>115</sup> Both seem to be used interchangeably in parts of the provisional EAP guidelines.

While neither term is specifically defined in the WSSR Act or the *Disaster Management Act 2003* (the DM Act), there is a difference between the two. The Macquarie Dictionary defines notify to mean, 'to give notice to, or inform, of something'.<sup>116</sup> It also defines to *warn* as 'to give notice or intimation to (a person, etc.) of danger, impending evil, possible harm, or anything unfavourable' and *warning* as 'something serving to warn'.<sup>117</sup>

This is supported by our community research, where the majority of our focus groups recognise a difference in the meaning of the terms.<sup>118</sup> The participants mostly believe a *notification* is used to alert of a possible future event. A *warning* 'is considered to be more important, to have a more urgent tone and implied the recipient is potentially in danger and requires action immediately'.<sup>119</sup>

'Warnings are intended to achieve two distinct outcomes – to inform the community of an impending or current threat, and to promote appropriate actions.'<sup>120</sup> The QFCoI Interim Report discusses the importance of warnings, specifically recommendation 4.17 states 'dam operators should ensure each emergency action plan includes a clear statement as to the frequency of, and circumstances in which, warnings will be issued to people listed in the

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<sup>112</sup> EMV 2014, p.84.

<sup>113</sup> Information received from Seqwater on 28 August, 2015.

<sup>114</sup> QFCoI 2011, p. 138.

<sup>115</sup> WSSR Act 2008, s. 352H.

<sup>116</sup> Macquarie University 2000.

<sup>117</sup> Ibid.

<sup>118</sup> MCR 2015, p. 12.

<sup>119</sup> Ibid.

<sup>120</sup> EMQ 2012, Queensland Emergency Alert Guidelines, p. 13.

emergency action plan'.<sup>121</sup> Dam owners therefore need to ensure persons at the most risk are the highest priority. This is provided for in the legislation which says an EAP must include an order of priority for relevant entities.<sup>122</sup>

The current notification systems used by SunWater and Seqwater, which are subscriber based, may not always convey the urgency of the situation and the actions required. For example, during the Callide Creek flooding of February 2015, SunWater's texts used the term *flood alert notification*. In contrast, the Banana Local Disaster Management Group used the term *flood warning*. In comparing the messages, our focus groups found the disaster management message more clearly conveyed that there was an emergency occurring and they needed to take urgent action.

The disaster management system also differentiates between providing 'warnings' and 'information' to the community. When a local disaster management group moves to the lean forward stage of activation, it initiates the public information and warnings sub-plans for the local government area as needed.<sup>123</sup> Under these sub-plans, public information includes preparedness and planning advice, information about events and recommended actions that are not of an urgent nature. Warnings are separate and for more urgent advice. To align with the disaster management system across all plans and arrangements, non-urgent advice could be provided by dam owners using the term notification, while warnings could provide more urgent messaging about timings and actions to be taken.

The difference in perceptions of urgency between the terms warning and notification may result in decreased ability to make informed decisions and confuse the importance of actions required by the public and other agencies involved. To enable the public to adequately assess risks and take appropriate action, separating and clarifying the terms may create a clear distinction and better reflect what the community expects.

#### **Finding 14**

There are different levels of urgency assigned by our community focus group members to the terms notify and warn. The use of these terms may impact their ability to understand and assess risks and take appropriate action during dam emergency events.

#### *Warning trigger points and activation levels*

The provisional EA guideline states:

'... resolution of this timeline will depend on careful consideration of...:

- the rate of development of the emergency condition,
- the time required to provide adequate notification to all stakeholders
- the time required for those notified to act effectively on the notification'.<sup>124</sup>

The QFCoI stressed the frequency of warnings should be dependent on the specific flood event and the rate of rise of flood waters. The suggestion was to link the frequency of warnings with the rate of rise of lake levels.<sup>125</sup> This is reflected in the provisional EAP

<sup>121</sup> QFCoI 2011, p. 139.

<sup>122</sup> *WSSR Act 2008*, s. 352H.

<sup>123</sup> EMQ 2011, p. 31.

<sup>124</sup> DEWS 2013, p.23.

<sup>125</sup> QFCoI 2011, p. 138.

guidelines, however no specific advice is provided on how this link between rising lake levels and frequency of warnings can be achieved by dam owners.

Warnings need to be updated regularly to reflect any emerging threat from changing conditions. All EAPs should include information about the frequency of warnings planned for different situations and emergency conditions. These should be identified and recorded in the EAP by the dam owner in consultation with the community, councils and other relevant entities in line with the WSSR Act.<sup>126</sup>

We found limited information about event-related trigger points for activation of EAPs through alert, lean forward and stand up levels and the communications activities with the public that should be linked to each of these levels. These trigger points can be linked to specific inflows or should align with other operational activities including activation of flood operations centres or other plans and protocols. Seqwater's communications protocol shows activation levels, however does not specify triggers, or if the levels are for the flood operations centre, the EAP or other plans.

We found that generally communication with the public about dam releases does not occur until the EAP is at stand up activation level. This may increase the likelihood of the community receiving notifications or warnings when releases are imminent or have already commenced. The inclusion of public communications activities across all levels of activation of the EAP, including commencing notifications at alert level once a potential issue has been identified, would better meet community expectations.

#### **Finding 15**

Many of Seqwater's and SunWater's emergency action plans do not currently include clear trigger points for the escalation of the plans through activation levels with appropriate public notification and warning activities linked to each level.

#### *Identifying areas of responsibility*

The Commonwealth Attorney General's Department manual 'Emergency Management Planning for Floods Affected by Dams' states, 'warning time for evacuation needs to be considered in time blocks of not less than one hour to ensure that action plans can be realistically implemented'.<sup>127</sup> The provisional EAP guideline says:

'... [it] may be reasonable for the dam owner and the relevant disaster management group to consider a distance of one hour's flood wave travel time for any resultant flood downstream from the dam as the 'cut-off' for notification by dam owners.'<sup>128</sup>

The Office of the IGEM's 2015 Callide Creek Flood Review was advised:

'... Given that flood water velocities are typically up to 3m<sup>3</sup>/s, a flood wave would travel up to approximately 10km. Therefore SunWater EAPs took the view that it would assume responsibility for notification of first 10km d/s of dam'.<sup>129</sup>

<sup>126</sup> WSSR 2008, s. 352H.

<sup>127</sup> Commonwealth of Australia 2009, p. 18.

<sup>128</sup> DEWS 2013, p.23.

<sup>129</sup> SunWater submission to 2015 Callide Creek flood review, p. 40.

This reasoning converts the timeframe of one hour to a distance of 10 kilometres and applies it to all of SunWater's dams. SunWater therefore considers all residents past 10km downstream of its dams are the responsibility of the council or disaster management group to warn or notify of the potential impact of dam releases. However, given that EAPs should take local context into account and allow for different event conditions this may not always be the case. While dam owners should consult with councils or disaster management groups to determine the level of existing flood waters and any downstream release hazards, only the dam owner can determine the volume of the release or spill.

The information required to determine who will be affected by outflows from a dam, and therefore who the dam owner should warn or notify, should be estimated to the best of the dam owner's ability when considering each emergency condition within the EAP. When undertaking this activity the dam owner should draw on information and advice from a range of stakeholders including the community, councils, the BoM, disaster management groups and any other relevant government agencies.

For un-gated dams, the lake level is published in real time on the BoM webpage and is available to all stakeholders. Agency stakeholders that have copies of Seqwater EAPs have access to information in the EAPs which can be used to assess dam outflow from the real time lake level.<sup>130</sup>

In this review we found only one of the 11 EAPs we examined prescribed their notification cut-off as one hour's travel time and equated this to 10 kilometres. Four of the 11 showed their geographical range of notification as *immediately affected* downstream residents, while the remainder refer only to *downstream residents* or *residents living downstream* with no timeframe allocated or localities referenced.

Using a one-size-fits-all measure is not the best approach to identifying the area likely to be affected, and subsequently the persons likely to be affected by a particular outflow under specific conditions. Lack of interaction and information sharing between dam owners and key stakeholders will result in an increased risk to people who should be warned or notified.

#### **Finding 16**

The issue of responsibility for warnings and notifications of downstream persons that may be affected is one that must be addressed on a location specific basis through collaboration between dam owners/operators and local disaster management groups.

#### *Identifying relevant persons*

The WSSR Act specifies that relevant entities for a referable dam include 'the persons whose safety or property may be threatened by an emergency condition'.<sup>131</sup> Identifying the *relevant entities* and documenting them in the EAP is important as they include the population at risk from dam failure hazards and the persons and communities that must be warned or notified of downstream release hazards.

<sup>130</sup> Information received from Seqwater on 9 September, 2015.

<sup>131</sup> WSSR Act 2008, s. 352H.

The WSSR Act states an EAP must:

‘...state when and how the owner of the dam must notify the relevant entities of the emergency condition, if it happens, including the order of priority in which the relevant entities are to be notified’.<sup>132</sup>

All relevant entities must be listed in the EAP, including individuals who may be affected by releases or spills from the dam. The dam owner must provide the plan to any individual ‘who, under the plan, is named and required to be personally notified of an emergency condition’.<sup>133</sup> We found during our review that a number of plans do not identify individuals or specific communities or localities to be notified or warned under different emergency conditions.

The intent of the QFCoI was for dam owners to be responsible for warning only those residents living immediately downstream of dams.<sup>134</sup> This made an ‘exception to the general rule that dam operators are not responsible for providing warnings directly to the community’.<sup>135</sup> However, the legislation provides for *all* persons whose safety or property may be threatened by a dam failure or downstream hazard, or any circumstance that may increase the likelihood of these happening.

During hearings on the bill to amend the WSSR Act, Seqwater told the State Development, Infrastructure and Industry Committee it believed the proposed definition of relevant entity went beyond the original intent of the QFCoI.<sup>136</sup> Specifically, Seqwater was concerned the number of people captured under the definition would be ‘considerably more people than a limited category of people and residents living immediately downstream of referable dams’.<sup>137</sup> In response to these concerns, the DEWS advised it was developing guidelines (the provisional EAP guideline) to provide greater clarity around the term relevant entity.<sup>138</sup> The provisional EAP guideline advises dam owners they may wish to use the one hour approach to planning.<sup>139</sup> We have, however, identified this is not necessarily the best way to identify those persons that will likely be affected under differing conditions.<sup>140</sup>

During this review we found not all Seqwater and SunWater EAPs (or other documents) had identified the individuals or communities to be notified or warned for different emergency conditions. Although the legislation is not specific about who is a resident ‘living immediately downstream’ it remains the responsibility of dam owners to only notify or warn those who will potentially be affected by a dam failure or downstream release or spill.

Determining each emergency condition for each dam and the areas likely to be affected will assist in this identification. Ongoing engagement, risk assessment and planning with councils and disaster management groups will further help to identify the points for each specific condition where control and responsibility transfers. The provisional EAP guidelines provides advice that dam owners and other stakeholders should work together to identify those at risk.

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<sup>132</sup> WSSR Act 2008, s. 352H.

<sup>133</sup> Ibid, s. 352N.

<sup>134</sup> QFCoI 2011, p. 138.

<sup>135</sup> QFCoI 2011, p. 138.

<sup>136</sup> SDIIC 2012.

<sup>137</sup> SDIIC 2012, p.7.

<sup>138</sup> SDIIC 2012.

<sup>139</sup> DEWS 2013, p. 23.

<sup>140</sup> See previous section on timing approaches to identifying areas of responsibility.

## Content of notification and warnings

Notifications and warnings need to be provided in a way they can be *understood* by those receiving them. Different stakeholders will want to receive messages in different ways, and this should mean messaging is reflective of local needs. Content needs to be tailored to the context of the community and the specific emergency condition or hazard the community is facing.<sup>141</sup> It is important for the dam owner and council to work together with the community to identify what the potential impact will be and how this should best be relayed.

Our focus groups indicated participants need consistent information including:

- likely timings including start of event, peak of event predictions, and likely end time
- who will be impacted, for example suburbs or specific streets if possible
- how people will be impacted, for example expected river heights, any likely damage or risks to property
- what people should do, for example if they should consider evacuating, where to go, if sandbagging is recommended and where to get sandbags
- a phone number or other point of access for more information
- details of when the next update will be issued.<sup>142</sup>

Criticism of message content generally centres on messages that are confusing, not directive enough, or unclear. The mispronunciation of place names also creates criticism of messages. This can create confusion and seed the idea that those issuing the alert lack the local knowledge required to provide accurate and reliable advice.<sup>143</sup> Our focus groups also suggested avoiding acronyms if not commonly used, and ensuring references to further information is specific.<sup>144</sup>

The groups further stated that to be successful, warnings will include a clear indication that an emergency is occurring.<sup>145</sup> The National Review of Warnings and Information found that successful messages are constructed with concise, unambiguous language that is free of jargon.<sup>146</sup> Our focus groups highlighted that appropriate content would also benefit from including 'an instruction on where to go, a phone number for further information and specific timeframes'.<sup>147</sup> Furthermore, if situations are changing, messages should be updated and it is important to provide new information clearly.<sup>148</sup>

The groups were asked to provide feedback on text messages sent by SunWater and the Banana Local Disaster Management Group during the Callide Creek flooding in February 2015. The disaster management group's text was as follows:

'Flood Warning from Banana LDMG. Water releasing Callide Dam. Threat to Life and Property. Jambin & Goovigen leave area now or seek higher ground. Listen to radio'.<sup>149</sup>

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<sup>141</sup> Office of the IGEM 2015, Review of local governments' emergency warning capability, p 20.

<sup>142</sup> MCR 2015, p. 30-31.

<sup>143</sup> EMV 2014, p.12.

<sup>144</sup> MCR 2015, p.34.

<sup>145</sup> Ibid.

<sup>146</sup> EMV 2014, p.12.

<sup>147</sup> MCR 2015, p.34.

<sup>148</sup> EMV 2014, p. 33.

<sup>149</sup> MCR 2015, p. 34.

The participants found this text was clear, they understood an emergency situation was at hand, that action needed to be taken and where to find further information. The SunWater notification alerts used during this event were not found to be as useful, particularly in terms of the sense of urgency conveyed and the technical language used.

Our review was advised by a number of stakeholders of the various language and technical information about dam releases and spills conveyed in messaging. For example, dam owners may use different terminology to explain how much water will be released and how it will potentially affect downstream communities. Examples of SunWater's notifications during the February 2015 Callide Valley flooding includes the terms 'Flood Stage 4 current flow = 298000ML/day' (megalitres per day). Our focus group advised abbreviations such as ML/day would not be understood by most community members.

In Seqwater examples we found it has contextualised messaging to suit the needs of particular groups, for example using the terminology cubic metres requested and understood by irrigators. During our interviews some community members identified there may be additional education required by Seqwater to ensure understanding based on situational awareness and release volumes.

In discussions with councils, we were told notifications and warnings to the public would be most useful if they identified the likely level of impact to a local landmark, for example a bridge, compared to a previous flood or release event. We were given some examples where councils used this approach during floods to create meaningful messages for the community. These messages clearly outlined the potential impacts on points of interest historically known to local community members and easy to understand for visitors. Seqwater advises it has updated its notifications following the May 2015 event in response to stakeholder feedback to reference inundation of local bridges as a guide.

The community would benefit from dam owners and disaster management groups having agreed terminology and content pre-formatted and tested for notifications and warnings suited to a variety of conditions and events. The Queensland Emergency Alert Guidelines has message templates that comply with the National Telephony Warning System Guidelines and the Common Alerting Protocol that can also be used by dam owners to ensure consistency in message context between stakeholders.<sup>150</sup>

#### **Finding 17**

Notification content provided by Seqwater and SunWater may not always support community understanding. Further evaluation and testing of notification content is required with key stakeholders and community members.

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<sup>150</sup> EMQ 2012, Dam release communications protocol, p. 13.



### *Flood classification levels*

The BoM provides its flood warnings based on identified flood classification levels that describe the severity and nature of flood impacts around river height stations.<sup>151</sup>

There are three levels:

- Minor – causes inconvenience, minor roads may be closed, low level bridges may be submerged, back yards and buildings below floor level may be inundated
- Moderate – the area of inundation is more substantial, main traffic routes may be affected, some buildings may be inundated above floor level, and evacuation of flood affected areas may be required
- Major – extensive rural and/or urban areas are inundated, many buildings may be affected above floor level, properties and towns may be isolated, major rail and traffic routes may be closed, evacuation of flood affected areas may be required and utility services may be affected.

The levels assist in the community understanding the potential impact of a flood and can also help to determine the added impact a dam release may have. Therefore, the BoM information is particularly important to assist in preparing appropriate messages.

It is important to note there are differences between flood classifications used by the BoM as the information in the warnings, and the trigger levels the BoM use to start producing warnings. While the BoM relies on these classification levels to produce its warnings, it advises the responsibility for determining the levels rests with local governments and should be reviewed annually.<sup>152</sup> The BoM is working with a range of stakeholders to develop guidelines that will assist councils to appropriately review flood classification levels and to evaluate their recommendations.<sup>153</sup>

During our review we identified that the BoM and councils can improve their engagement and processes to produce more reliable flood classification levels for communities. This reliability has the potential to impact the accuracy and effectiveness of warnings communications. Dam owners, councils, disaster management agencies and the community may also be less aware of the risks associated with the different flood levels.

#### **Finding 18**

Arrangements for identifying and using flood classification levels to inform both dam safety and disaster management warnings and notifications may not reflect the current situation.

### **Means of notifications and warnings**

There are a variety of ways in which notifications and warnings can be provided, however, all rely on strong processes of community engagement and education to ensure awareness and understanding. Mechanisms also need to be reflective of the community and cater to the individual community's diversity.<sup>154</sup>

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<sup>151</sup> Information provided by BoM, August 2015.

<sup>152</sup> BoM 2013.

<sup>153</sup> BoM 2013.

<sup>154</sup> Office of the IGEM 2015, Review of local governments' emergency warning capability.

Our focus groups suggested that notification and warning mechanisms should include:

- telecommunications programs, including text and landline
- multi-media reporting including television, radio and social media
- emails
- sirens
- display boards and road side signage
- door knocking and letterbox drops.<sup>155</sup>

The groups held a variety of concerns about the distribution of warnings including:

- ‘... that elderly people without access to technology will miss out on vital messages
- that a reliance on electronic communications for warnings will mean that messages cannot be distributed once channels lose power
- the potential for too many notifications/warnings to be delivered which may cause communities to become complacent
- the potential for notifications/warnings to be geographically irrelevant to the recipient’.<sup>156</sup>

The groups were concerned that people may not receive the warning. Consequently, they suggested that warnings be ‘distributed via multiple channels to maximise the opportunity of people receiving the message’.<sup>157</sup>

During our review we found that both Seqwater and SunWater do use multiple channels to distribute their notifications, as do disaster management groups and councils. Improvements are needed to ensure each channel reaches those it is meant to, and that the channels are integrated to allow for seamless notifications and warnings to all those who need them. This can only be achieved by increasing engagement and risk based planning between those responsible.

If information is to be distributed verbally through the media, most would prefer to hear from the chairperson of the local disaster management group in association with the mayor.<sup>158</sup> The community also expects that dam owners, councils and others with responsibilities will be working together during events so that whatever means of communication is used they will be getting the right information.<sup>159</sup> Dam owners should therefore ensure their plans include liaising with councils and disaster management groups prior to and during events, to link into existing disaster management communications arrangements.

#### **Finding 19**

Warnings and notifications need to be distributed through multiple integrated channels and ensure the needs of target audiences are met.

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<sup>155</sup> MCR 2015, p. 30-31.

<sup>156</sup> Ibid, p. 13.

<sup>157</sup> Ibid, p. 30.

<sup>158</sup> Ibid, p. 25.

<sup>159</sup> Ibid.

### *Opt-in notification systems*

In all cases, Seqwater and SunWater as dam owners are legally obliged to notify people who live immediately downstream of their dams of releases or spillway overflows that may cause property damage, or endanger human life.<sup>160</sup> Who is considered in this category can only be determined within the context of each potential downstream release hazard and impact of the resultant emergency event. In some cases these are high risk situations where a level of urgency may be required and warnings are indicated as opposed to notifications.

Dam owners' current reliance on subscriber based notification systems for communities at risk may not adequately consider the requirements of the legislation. All persons whose safety or property may be threatened by a dam release or spill, in particular during an existing flood, must be prioritised in communication arrangements. This includes those individuals who are named in the plan to be notified of an emergency condition.<sup>161</sup> Opt-in notification systems do not provide this guarantee.

In conducting regional focus groups in communities downstream of dams, we found the availability of opt-in systems was not well known. Most participants believed they would automatically be warned of any condition relating to the dam that may put themselves or their properties at risk.<sup>162</sup> This belief was unconditional and not dependent on membership of an opt-in warning system. Participants agreed it is the responsibility of the dam owners to issue warnings as they have greater knowledge of what is happening at the dam.<sup>163</sup> However, they had some concerns with the reliability and timeliness of messages and the potential to not capture everyone at risk.<sup>164</sup>

At the time of our review, community based evaluation of the opt-in notification systems used by dam owners had not been conducted.<sup>165</sup> To ensure warnings are meeting the needs of the community, robust real time evaluation should be considered. Evaluation components should also be built into exercises and tested with the community as a method of community engagement.

#### **Finding 20**

Dam owners' current reliance on subscriber based notification systems for communities at risk may not adequately consider the requirements of the legislation.

#### **Finding 21**

Seqwater's and SunWater's opt-in systems would benefit from greater effort to capture people at risk and may need to be augmented through use of the Emergency Alert system. This would ensure all persons whose safety or property is potentially at risk are warned about potential downstream release hazards and the potential impact of emergency events.

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<sup>160</sup> Terms of reference – see Appendix A.

<sup>161</sup> *WSSR Act 2008*, s. 352N.

<sup>162</sup> MCR 2015, p. 27.

<sup>163</sup> *Ibid*, pp. 24-25.

<sup>164</sup> *Ibid*, p. 23.

<sup>165</sup> Meeting with Seqwater on 9 July 2015.

### *Use of Emergency Alert*

In addition to notifications and information being released through multiple channels, Seqwater has advised its primary vehicle for warning immediate downstream communities for dam emergencies is through the Emergency Alert system managed by QFES. Both Seqwater and SunWater are able to initiate an Emergency Alert campaign by contacting QFES and providing the required information in the appropriate formats.

Currently, Emergency Alert is the only mechanism available that will send warnings to mobile phones and landlines within a specified geographic area. The Queensland Emergency Alert Guideline provides principles to ensure the system is the most appropriate and effective means of warning those communities in given situations.<sup>166</sup> For example, while Emergency Alert could definitely be used for dam failure hazards, it could also be used for downstream release hazards where there is potential risk to life and it is a timely means of providing the necessary warning. The use of Emergency Alert should be one part of a communications system that is:

- coordinated
- consistent and standard-based
- multi-modal
- targeted
- compliant with relevant legislation
- authoritative and accountable
- complete
- interoperable.<sup>167</sup>

The National Review of Warnings and Information found that 32 percent of people expect to rely upon Emergency Alert as their only source of warning. Of those who have already received warnings via Emergency Alert, 80 percent expect to receive one in the event of a future incident.<sup>168</sup> This shows that using Emergency Alert will increase community expectations that they will be warned.

One focus group commented that 'generally speaking the warnings are not considered timely, especially given the speed with which water arrives at the local area from the dams'.<sup>169</sup> It is important to note that Emergency Alert cannot be relied upon as the only way to warn immediate downstream communities. It can take more than 30 minutes to prepare and release an Emergency Alert campaign, and this is reliant upon a number of other contributing factors that may increase the timeframes for distribution.<sup>170</sup>

For these reasons the use of Emergency Alert should be considered one of a number of means of messaging. The community would benefit from dam owners and disaster management groups having pre-formatted and tested warnings, potentially suited to a variety of emergency conditions and events. The Queensland disaster management system has pre-planned message templates that comply with the National Telephony Warning System Guidelines and the Common Alerting Protocol.<sup>171</sup> These could be used as a basis for

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<sup>166</sup> EMQ 2012, Queensland Emergency Alert Guidelines.

<sup>167</sup> Ibid.

<sup>168</sup> EMV 2014, p. 13.

<sup>169</sup> MCR 2015, p.21.

<sup>170</sup> EMQ 2012, Queensland Emergency Alert Guidelines.

<sup>171</sup> Ibid, p. 13.

warnings to immediate downstream communities in the event of dam release or spill during floods.

The Office of the IGEM's review of the Callide Creek flooding in February 2015 recommended that SunWater and the Banana Shire Council should have Emergency Alert messages that are pre-formatted and consistent. These messages are to be supported by polygons<sup>172</sup> identified according to risk, and be tested and practiced with the State Disaster Coordination Centre.<sup>173</sup> Rollout of this requirement across all of Seqwater's and SunWater's dams would be beneficial and is a key recommendation in relation to those dams cited in our Terms of Reference. SunWater has advised it has a number of referable dams across the state that do not have current pre-formatted polygons to identify at-risk communities. QFES advises it has 12 polygons lodged at the State Disaster Coordination Centre. QFES also advises Seqwater has approximately 102 polygons lodged at the State Disaster Coordination Centre.<sup>174</sup>

Dam owners and councils should work together when developing polygons to ensure that areas of responsibility are clearly defined and agreed prior to use during events.

### **Finding 22**

Not all of SunWater's referable dams have pre-formatted Emergency Alert messages and supporting polygons lodged with the State Disaster Coordination Centre.

### **Consistency in developing notifications and warnings**

The National Review of Warnings and Information recommended a need to

'... pursue greater national consistency of warning frameworks across jurisdictions by leading a coordinated review of current frameworks, assessing the evidence base for change, and identifying opportunities for harmonisation'.<sup>175</sup>

In an attempt to consider the approach of harmonisation we asked our focus groups to consider the warning approach under the national PREPARE.ACT.SURVIVE strategy used for bushfire.<sup>176</sup> At the time we conducted our focus groups this warning approach incorporated three levels as follows:

**'Advice** – there is a fire in your area, there is currently no threat to property, but stay informed and consider taking a series of preparatory actions

**Watch and Act** – there is a fire in your area, you could be impacted and should prepare to enact your Bushfire Survival Plan and

**Emergency Warning** – there is a fire in your area, you need to enact your Bushfire Survival Plan immediately and prepare for impact.<sup>177</sup>

<sup>172</sup> EMQ 2012, Queensland Emergency Alert Guidelines, for the purpose of disaster management, a polygon is a 2-dimensional shape made up of closed straight lines that is defined as an emergency incident area on a map using a geographic information system, and that defines an area to receive an Emergency Alert.

<sup>173</sup> Office of the IGEM 2015, 2015 Callide Creek flood review, recommendation 9, p. 120.

<sup>174</sup> Information provided by QFES on 1 September, 2015.

<sup>175</sup> EMV 2014, p. 2.

<sup>176</sup> RFSQ 2015.

<sup>177</sup> Ibid.

We note that in Queensland the Rural Fire Service uses a fourth level, 'Notification' which can be issued when there is currently no threat to property and no action required.<sup>178</sup> The feedback from the focus groups indicated that if the fire warnings approach was adopted and utilised in any flooding scenario, the approach would potentially have merit.<sup>179</sup> They clarified its potential usability, advising that to be successful, there 'would need to be a significant education program aimed at residents to ensure universal understanding of the actions required under each stage'.<sup>180</sup> Given that there are existing education programs in place for this approach for bushfire, these could be used as a basis for broadening the system across other hazards.

At the national level, as a result of the National Review of Warnings and Information, the newly established National Public Information and Warnings Working Group will conduct research into the question of harmonisation. The Queensland Flood Warnings Consultative Committee, chaired by the BoM, and other groups involved in dam safety and disaster management, will benefit from Queensland's continued involvement in this work at the national level.

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<sup>178</sup> RFSQ website, [https://ruralfire.qld.gov.au/Fire\\_Safety\\_and\\_You/Bushfire\\_Warnings/index.asp](https://ruralfire.qld.gov.au/Fire_Safety_and_You/Bushfire_Warnings/index.asp).

<sup>179</sup> MCR 2015, p. 35.

<sup>180</sup> Ibid.

## Shared responsibilities

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A summary of the roles and responsibilities of key stakeholders for dam warnings communications is at Appendix D.

### Dam release communications protocol

During late 2012 a multi-agency group, coordinated by Emergency Management Queensland, reviewed the dam release communications protocol for the Brisbane River, North Pine River and Tingalpa catchments. The purpose of this document was to:

‘... define the communication arrangements by the Australian, State and Local government in the event of a release from a gated dam to ensure effective, coherent and timely coordination of flooding information to key stakeholders and the public.’<sup>181</sup>

The document outlined the Queensland Government’s role to coordinate the distribution of reliable and consistent information and its outcomes were to ensure public safety, keep stakeholders engaged and informed, and support disaster management activities in South East Queensland.<sup>182</sup> The protocol provided guidance and leadership for cross government dam release communications activities. It also assisted agencies to harmonise their key messages using a collaborative approach across all levels of government.

Primary responsibility for coordinating dam release communication activities was assigned to the Water Grid Manager. Its responsibilities included:

- developing key communications messages regarding the dam release
- liaising with impacted agencies’ communications staff to distribute the information
- briefing media advisors to the Premier, Minister for Energy and Water Supply, and the Minister for Police and Community Safety, and
- briefing the Directors-General of the Departments of Natural Resources and Mines, Premier and Cabinet, Energy and Water Supply, and Community Safety.

From 1 January 2013 the Water Grid Manager was incorporated into the Queensland Bulk Water Supply Authority under the banner of Seqwater. The Queensland Water Commission also ceased at the same time the Water Grid Manager ceased to function. The functions of the Water Grid Manager then passed to Seqwater. The Protocol ownership is currently led by Seqwater and is a document that manages communication exchanges across multiple agencies to define relationship roles and information exchange.

The protocol’s purpose has moved away from *ensuring* effective, coherent and timely coordination of flooding information to key stakeholders and the public towards *assisting*; away from providing *guidance and leadership* for cross government communications towards *supporting*; and away from providing *a mechanism to assist* agencies to coordinate and harmonise communication activities towards providing *information to assist*.

Reinvigorating a state level communications protocol for referable dams that applies state-wide would strengthen dam warnings communications at a number of levels. We would not intend this document replace Seqwater’s Dam Release Communications Protocol as this remains useful to Seqwater for managing communications with other agencies about

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<sup>181</sup> EMQ 2012, Dam release communications protocol.

<sup>182</sup> Ibid.

operations related to Seqwater's flood mitigation dams. However, a document that applies across all disaster management entities would help to ensure all communications with the public about dam related notifications and warnings during disaster events are coordinated. It would link across local, district and the state level, including the Crisis Communication Network when activated.

### **Collaboration between dam owners and disaster management groups**

Our focus groups expected that dam owners would be working together with local governments during times of potential disaster.<sup>183</sup> The dam owners will be responsible through EAPs for notifying or warning particular groups of people whose safety or property may be threatened by a dam release or spill. Councils and disaster management groups will be responsible for providing information and warnings to a wider group about the potential impact of disaster events. These groups may overlap to some extent and ongoing risk assessment and planning is required to determine responsibilities.

The DM Act provides that local and district disaster management groups must consult with essential service providers if the chair considers they can help the group perform its functions.<sup>184</sup> As dam owners and operators, SunWater and Seqwater constitute essential service providers and therefore should be consulted. The QFCoI also recommended each local disaster management group 'should include in its meetings a representative of the operator of any dam upstream of its region which contributes water to flooding'.<sup>185</sup>

Of 11 local governments we consulted during this review, eight have Seqwater or SunWater as core or advisory members of the local disaster management group. Of the ten district groups for those areas, four have them as advisory members. We note this may mean representatives of dam owners are members or advisors to multiple disaster management groups. This may create an issue if a widespread event occurs over an extended period, requiring liaison with all groups simultaneously. Seqwater advises us its disaster management group members and advisors are supported by technical experts and its Flood Operations Centre staff, however they may not be recognised as proxies by the different groups or have the required knowledge of local arrangements.

The Office of the IGEM has found that risk assessments, and particularly the identification and escalation of residual risk from local to district groups, can be improved.<sup>186</sup> Ten of the 11 local disaster management plans we reviewed included dam failure in risk assessments, while only three included dam release or spill. Only two of ten district groups assessed both, with most either not considering dam related incidents at all, or deferring to local plans.

Prior to submitting an EAP to the regulator for approval, the WSSR Act states that dam owners must provide opportunity for disaster management groups to give feedback to ensure consistency with disaster management plans.<sup>187</sup>

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<sup>183</sup> MCR 2015, p. 24.

<sup>184</sup> *DM Act 2003*, s. 48A. This may be done through invitation to meetings, seeking advice in providing reports or recommendations, or in preparing disaster management plans.

<sup>185</sup> QFCoI 2011, p. 13, recommendation 4.15.

<sup>186</sup> Office of the IGEM 2015, Report on the assessment of disaster management plans.

<sup>187</sup> *WSSR Act 2008*, s. 352G.



If the dam owner receives a response from the relevant disaster management group (within the required 10 day period)<sup>188</sup> it must be submitted to the regulator with the EAP.<sup>189</sup> However, the dam owner does not have to respond to the report.<sup>190</sup>

Disaster management groups should take the opportunity to review EAPs to ensure alignment with their arrangements and plans. Information from dam owners to the community about the dam's operation and the potential impact of various outflows should be complementary.<sup>191</sup> A good quality assurance check may be to include key content from the EAP with respect to notifications, warnings and triggers (as a minimum) into a relevant sub-plan of the local disaster management plan. This would add further protective measures for communicating with downstream residents and the population at most risk. We note that less than half of groups we spoke to have provided comment on EAPs. This is potentially due to a lack of guidance to disaster management groups about their responsibilities in this regard.

QFES is responsible to develop guidelines to support disaster management planning.<sup>192</sup> The guidelines specify what local governments and district disaster management groups should include in their plans regarding public information and warnings. The Office of the IGEM's reviews have recommended the local disaster management and Emergency Alert guidelines be reviewed by QFES. This should include providing information about planning and coordinating dam notifications and warnings in collaboration with dam owners. We have been advised by QFES that the Emergency Alert guideline is currently being reviewed.

Continual collaboration would also benefit dam owners when developing or reviewing their EAP, or at the completion of their lifespan which may be up to a maximum of five years.<sup>193</sup> As an example, during our review we found evidence of high levels of collaboration between SunWater and Central Highlands Regional Council. This is reflected in the quality of the EAP for Fairbairn Dam. This plan clearly states that it is developed to be consistent with, and support, the objectives of the local disaster management plan.<sup>194</sup> Continual collaboration is reflective of the principles of the Emergency Management Assurance Framework and should be encouraged across both sectors.

### **Finding 23**

Not all disaster management groups have dam owners as core or advisory members in areas where referable dams may pose a risk to the downstream community.

### **Finding 24**

Collaborative risk-based planning between dam owners, councils and disaster management groups would improve both disaster management and emergency action planning outcomes.

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<sup>188</sup> Ibid.

<sup>189</sup> Ibid, s. 352I.

<sup>190</sup> Ibid, s. 352G.

<sup>191</sup> Office of the IGEM 2015, Callide Creek flood review.

<sup>192</sup> *DM Act 2003*, s. 63.

<sup>193</sup> *WSSR Act 2008*, s. 352A.

<sup>194</sup> SunWater 2014, p. 7.

**Finding 25**

Disaster management guidelines do not provide adequate advice and information about council and disaster management groups' roles and responsibilities in supporting the management of communications for referable dams.

Prior to submitting an EAP to the DEWS, a dam owner must provide a copy of the plan to the chairperson of *the* relevant disaster management group.<sup>195</sup> In determining which group is relevant, s. 352D of the WSSR Act could more clearly state that there may be multiple relevant groups.

It is in the best interests of the dam owner to consult *all* groups, both local and district, that cover areas containing population at risk. We are aware that EAPs are provided to multiple disaster management groups. However, the question may arise as to which group is to provide feedback on the plan. The DEWS advises that it considered that the district group would coordinate responses from local groups. To clarify, all relevant groups should be consulted to ensure those potentially affected by, or responsible for, supporting warnings communications are involved in the planning cycle. The DEWS should require confirmation from the dam owners that this has occurred.

The review of EAPs for consistency with disaster management arrangements is also important at the state level. In deciding whether to approve a plan, the DEWS may ask for advice from QFES.<sup>196</sup> This may be an appropriate action given QFES' lead agency status for warnings in the state.<sup>197</sup> This could support consistency between dam warnings communications procedures and QFES' processes at the state level, particularly for the use of the national Emergency Alert system.

A centralised, easily accessible data repository for current approved plans would be beneficial, supported by the administration processes to ensure everyone is working from the same plan. It would be beneficial if all relevant groups were identified in the register of approved EAPs kept by the regulator.<sup>198</sup>

**Finding 26**

Facilitation of all relevant disaster management groups and entities to review and provide feedback on emergency action plans at local, district and the state level would improve communication links and consistency of operations.

**Collaboration at the state level**

During an emergency event, Seqwater and SunWater issue situation reports directly to the State Disaster Coordination Centre at the same time as to the DEWS. They are currently represented on the State Disaster Coordination Group by the DEWS. During disaster events this group will meet regularly at the State Disaster Coordination Centre to coordinate disaster operations for the state. The DEWS is responsible in the Queensland State Disaster Management Plan for dam safety and ensuring dam owners have EAPs.<sup>199</sup>

<sup>195</sup> WSSR Act 2008, s. 352G.

<sup>196</sup> Ibid, s. 352I.

<sup>197</sup> QPS 2015, p. 49.

<sup>198</sup> WSSR Act 2008, s. 352M.

<sup>199</sup> QPS 2015, p. 46.

The Office of the IGEM's 2015 Callide Creek Flood Review recommended a representative of critical infrastructure owners be present as liaison officers at the State Disaster Coordination Centre during activations that may impact on their assets.<sup>200</sup> This must be in cases of potential downstream release hazards as well as impact on the dam.

This review agrees with the advantages of dam owners being included as invited advisors or members of state level groups, similar to the arrangements for energy and telecommunications providers. This arrangement would facilitate first-hand information and advice about potential or actual dam releases and spills during floods and support consistent communications during events where a dam is potentially involved. A state-wide, whole-of-government communications protocol would support this initiative.

#### **Finding 27**

Information and communication timeliness and consistency about dam related emergencies would be improved by Seqwater's and SunWater's direct involvement in the state disaster management arrangements.

#### *Queensland Fire and Emergency Services*

QFES is the agency responsible for the administration of the DM Act and the functional lead agency at the state level for warnings in the Queensland State Disaster Management Plan.<sup>201</sup> The State Disaster Coordination Centre will generally issue warnings and alerts to key stakeholders. Stakeholders are then responsible for disseminating those warnings through their own communication networks.

QFES is also responsible for ensuring persons with functions under the DM Act are appropriately trained.<sup>202</sup> The Public Safety Business Agency (PSBA) provides a service to QFES in managing the development and delivery mechanism for training developed under its disaster management training framework. QFES officers in regional areas deliver the training to disaster management stakeholders. This includes specific training prescribed to officers with certain functions.

The current warnings and alert systems training is not a requirement for all disaster management group members. The Office of the IGEM's review of local government warning capability recommended an overhaul of the training package and its wider delivery, and PSBA and QFES have committed to completing these improvements.<sup>203</sup> It would be beneficial for this training to include some information about dam warnings requirements and responsibilities. It would also assist integration if it was delivered to dam owners' staff to ensure they are aware of emergency warnings from the disaster management perspective, and understand how their responsibilities fit.

#### **Finding 28**

The disaster management warnings and alert systems training does not currently include information about dam notifications and warnings or the integration of dam related communications with the disaster management system.

<sup>200</sup> Office of the IGEM 2015, Callide Creek flood review, recommendation 13.

<sup>201</sup> *DM Act 2003*, s. 16A; QPS 2015, p. 14.

<sup>202</sup> *DM Act 2003*, s. 16A.

<sup>203</sup> Office of the IGEM 2015, Review of local governments' emergency warning capability, recommendations 6 & 7.

### *Bureau of Meteorology*

The BoM's responsibility under the Queensland State Disaster Management Plan is to provide 'forecasts, warnings and long term outlooks on environmental phenomena that affect the safety, prosperity and resilience of Australians'.<sup>204</sup> It also has responsibility for flood monitoring and prediction, and disseminating flood forecasts and warnings.<sup>205</sup>

The BoM chairs the Queensland Flood Warnings Consultative Committee, which meets biannually. The role of the committee is to 'enhance community safety, mitigation and prevention capability across all Queensland communities in relation to the impact of fresh water floods.'<sup>206</sup>

The membership of the committee includes:

- BoM (Chair and Secretariat)
- Department of Community Safety & EMQ [now represented by QFES]
- Department of Natural Resources and Mines (DNRM)
- DEWS
- Department of Local Government, Community Recovery and Resilience (DLGCRR)
- Department of State Development, Infrastructure and Planning (DSDIP)
- Local Government Association of Queensland (LGAQ)
- Brisbane City Council (BCC)
- Queensland Reconstruction Authority (QRA)
- Queensland Bulk Water Supply Authority (Seqwater)
- SunWater.<sup>207</sup>

We note that the membership of this committee includes representatives of all key stakeholders for dam warnings and notifications with the exception the Queensland Police Service representing disaster districts. As most of the work between dam owners seems to be at the local level we consider this group could provide valuable insight and advice to the issue of warnings and notifications for dam releases and spills during floods.

#### **Finding 29**

The Queensland Flood Warnings Consultative Committee includes members of all key stakeholder agencies except for the Queensland Police Service. This committee should inform future work conducted regarding dam warnings communications.

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<sup>204</sup> QPS 2015, p. 49.

<sup>205</sup> BoM 2013.

<sup>206</sup> Ibid.

<sup>207</sup> Ibid.

## Warnings principles

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'If there is not a clear understanding and statement of principles, then there cannot be a consistent, cohesive and embracing disaster management strategy, or effective communications between different organizations.'<sup>208</sup>

Principles are vital tools to keep everyone on the same page and motivated to reach an end goal. Principles can be developed and applied at different levels. At the highest level, ethical or core value principles reflect the fundamental values and ethics that motivate behaviours. Further types of principles include strategic principles relating to policy direction; tactical principles concerning the application of policies; and implementation principles considering the monitoring and evaluating of any actions taken.<sup>209</sup>

The following sets of principles have been identified as already relevant to stakeholder groups in current legislation and standards:

- Disaster management principles in the Emergency Management Assurance Framework (Leadership, Public Safety, Partnership, Performance). These can be seen as the core value principles for disaster management.<sup>210</sup> They have an altruistic and values focus.
- Disaster management planning principles in the *Disaster Management Act 2003* (comprehensive; management in accordance with strategic policy framework, state disaster management plan and guidelines; local government primacy; district and state support to local). These can be seen as strategic principles for disaster management that provide policy direction – how things should be done.
- Local government principles in the *Local Government Act 2004* (transparent effective processes, decision making in the public interest; sustainable management, effective services; democratic representation; good governance; ethical and legal behaviour). These can be seen as both core value and strategic principles for local governments, but still have community service at their core.
- Corporatisation principles in the *Government Owned Corporations Act 1993*, and the commercialisation principles for water authorities (Seqwater) in the *Water Act 2000* (clarity of objectives; management autonomy and authority; strict accountability for performance; competitive neutrality). These can be seen as strategic principles that provide policy direction to Seqwater and SunWater in their roles as dam owners and operators. There is a community service focus contained in the Statement of Corporate Intent, operational plans and Statement of Obligations.

### Finding 30

Without shared understanding of key stakeholders' priorities and legislative principles, the policies and regulations they operate under, and their end-to-end operational processes, systems of communication may not consistently meet community expectations.

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<sup>208</sup> Etkin & Davis 2007.

<sup>209</sup> Etkin & Davis 2007.

<sup>210</sup> Etkin & Davis 2007.

## Dam warnings communications principles

The current legislative and policy environment for dam warnings communications prescribes a multi-agency approach. The effective management of this is needed to ensure the required collaboration and communication occurs. As outlined in the methodology section of our report, we used the principles of the Emergency Management Assurance Framework to guide our review. These principles were developed in collaboration with a wide range of disaster management practitioners. During the review we found these principles to be the most relevant core value principles to guide effective and integrated dam warnings communications.

Leadership	Leadership is demonstrated through a commitment to a shared culture of excellence in dam warnings communications at all levels. Strategic planning, within the context of resources and risk, underpins clear decision-making, regulatory, policy and planning priorities to achieve outcomes for the community.
Public Safety	Public safety is a primary driver for the continuous improvement of dam safety regulation, policy, plans and communications. Dam owners and disaster management groups ensure policies, procedures and practice focus on the safety of their communities, engaging stakeholders and sharing responsibilities.
Partnership	Strategic partnerships that are well governed, drive clear roles and responsibilities, and promote true collaboration across all stakeholders in dam warnings communications will improve community outcomes.
Performance	A culture of performance drives dam safety outcomes where productivity and effectiveness is measured by a combination of quality, quantity, cost, time or quality of human relationships. Performance is monitored and analysed against clear regulatory guidance and standards and good practice is identified and embedded across all phases of planning and operations.

We consider these principles a starting point for what should be an ongoing discussion between all stakeholders in building and maintaining professional working relationships to ensure communities at risk are prioritised.

## The Standard for Disaster Management in Queensland

The application of the Standard for Disaster Management in Queensland, and in particular the shared responsibility of Emergency Communications and its components of hazard identification and risk assessment, public engagement, communications systems and warnings, will guide further policy development, application and improvements. It establishes the performance requirements for all entities and should be used to ensure shared programs better meet community needs.

## Shared Responsibility: Hazard Identification and Risk Assessment

### Component 1: Hazard Identification and Risk Assessment

Hazard identification and risk assessment is fundamental to effective disaster management and forms the basis for disaster management planning and programs. Hazard identification and risk assessments should be iterative and regularly reviewed to ensure planning is based on up-to-date accurate data.

No.	Key Outcomes	Good Practice Attributes	
1.1	Stakeholders have a shared understanding of, and ready access to, risk information for all types of events	Interoperable, Comprehensive, Scalable	
1.2	Risk assessments are robust, replicable and authoritative	Value for Money, Comprehensive	
1.3	Risk assessments are integral to the mitigation, preparedness, continuity, response and recovery planning processes and documentation	Interoperable, Comprehensive	
Indicators		Accountabilities (linked to Key Outcomes)	
a	Hazard identification and risk assessment processes follow an international standard or other industry recognised methodology that is agreed as valid by stakeholders and approved by the entity for which they are undertaken	Enablers, Governance	1.2
b	Hazards and risks are identified and assessed regularly for all types of events in collaboration with stakeholders and the assessment is used by the entity to develop plans for all phases of disaster management	Capability, Governance	1.1, 1.3
c	Risk assessments consider hazards caused by human acts and natural hazards, most likely, most dangerous and catastrophic events, as well as the exposure and vulnerability of people, property, the environment, economy and entity operations	Doctrine	1.2
d	Hazard identification and risk assessment is evidence-based, uses a broad range of sources, is informed by valid data and draws on lessons identified	Performance	1.2
e	Hazard identification and risk assessments are undertaken and reviewed at regular intervals by individuals or entities skilled in the process	Capability	1.2
f	Risk assessments use plain language explanations, are readily accessible and communicated to communities to which they relate	Enablers	1.1
g	Where agreed, residual risk is transferred formally and documented	Performance, Governance	1.1, 1.3

## Shared Responsibility 4: Emergency Communications

Emergency communications both within and across those agencies, groups and networks responding to and engaging with the wider community is paramount to effective operations.

### Component 5: Public Engagement

Public engagement (including public information and public education) is foundational to all disaster management activities and is a two-way process in which entities and the broader community work together to understand, prepare for, respond to and recover from disasters.

No.	Key Outcomes	Good Practice Attributes	
5.1	Communities are empowered through timely public information and through education initiatives to prepare for, respond to, and recover from disasters	Adaptable, Interoperable, Comprehensive, Scalable, Value for Money	
5.2	Public engagement outcomes have a positive effect on the action taken by the community across all phases of disaster management	Adaptable, Interoperable, Comprehensive, Scalable, Value for Money	
Indicators		Accountabilities (linked to Key Outcomes)	
a	A public engagement plan includes community profiling to define groups within the community and includes a range of strategies to meet community information and education needs	Doctrine Governance	5.1, 5.2
b	Plain language community messages and education programs are action-orientated and inform the community of the risks	Doctrine	5.2
c	There are multiple delivery channels which are adaptable to meet audience needs, and circumstances. Content is established and tested while improvements are documented and managed	Capability, Performance	5.1
d	Information made available to the community: <ul style="list-style-type: none"> <li>is accurate, reliable, relevant, timely</li> <li>includes the purpose, process for access and limitations of any potential support and systems</li> <li>links to warning types, sources and content</li> <li>is consistent across, and vertically through, entities and systems</li> </ul>	Governance	5.1, 5.2
e	Systems are in place to address public enquiries, dispel misinformation, and to source and disseminate education materials, tools and information	Enablers	5.1
f	Roles and responsibilities for public information and public education are agreed to and documented prior to events	Governance	5.1
g	Public information and education activities are regularly tested for community understanding of content, perception of authority and resultant action	Performance	5.2



*Component 6: Communication Systems*

Effective communication systems are necessary for disaster operations. Communication systems include any means or methods used by entities to share critical information.

No.	Key Outcomes	Good Practice Attributes	
6.1	Communication system/s support the continuity of entity operations and disaster operations through all phases of events	Comprehensive, Interoperable, Adaptable	
6.2	Communication system/s provides access to reliable, accurate, timely, and integrated information across all levels of Queensland's disaster management arrangements	Scalable, Interoperable, Value for Money	
Indicators		Accountabilities (linked to Key Outcomes)	
a	Roles, responsibilities, and protocols for use and access to communications systems are agreed, documented and shared between stakeholders	Capability, Doctrine, Governance	6.2
b	Communications system/s: <ul style="list-style-type: none"> <li>• capture/s performance data</li> <li>• are regularly tested and exercised (including redundancies)</li> <li>• results are documented and analysed</li> <li>• viable improvements are made</li> </ul>	Performance, Capability	6.1, 6.2
c	The use of key terminology, including activation levels, is consistently applied across all levels	Doctrine	6.1, 6.2
d	The communications system/s support the continuous flow of up-to-date critical information between key stakeholders	Enablers	6.2
e	There are redundancies in place for primary system/s	Enablers	6.1
f	The communications system/s are responsive to the range of reasonably foreseeable operating environments	Enablers, Capability	6.1, 6.2

*Component 7: Warnings*

The ability for the community to take appropriate action in the event of a disaster is vitally important to reducing the risk of loss of life and property. Warnings include any communication to the broader community which requires the community to take action to protect life or property.

No.	Key Outcomes	Good Practice Attributes	
7.1	Communities at risk of impact from an event are defined and can be targeted with contextualised warnings	Scalable, Adaptable, Value for Money	
7.2	Communities at risk of impact from an event, receive fit-for-purpose, consistent, accurate warnings through all phases of events	Comprehensive, Interoperable	
Indicators		Accountabilities (linked to Key Outcomes)	
a	Communities at risk of impact from an event are profiled to identify and define groups with an emphasis on determining barriers to effective communication	Enablers, Doctrine	7.1, 7.2
b	Warning systems and arrangements support the continuous flow of critical, up-to-date, and relevant information between key stakeholders	Doctrine, Enablers	7.2
c	Warning messages use common language and are consistent with other public information and advice	Doctrine, Enablers	7.2
d	Warning messages and systems are regularly reviewed, tested and exercised	Performance	7.2
e	Warning messages are delivered by entities with authority to do so, in line with agreed and documented roles and responsibilities	Capability, Doctrine, Governance	7.2
f	Warnings are tested with the community to determine community understanding of content, message receipt, perception of authority and resultant action	Performance, Capability	7.1
g	Entities value-add to warnings with appropriate local context and content and tailor dissemination approaches to local needs	Enablers, Doctrine	7.1, 7.2

## Conclusion

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This review set out to examine Seqwater's and SunWater's flood release communications and the associated operational activities. In addition, shared principles to be applied to improve communications by key stakeholders were requested. The findings of the review highlight that systemic issues are a root cause of operational communications not always meeting their objectives. These issues need to be proactively managed and supported by an ongoing collaborative approach in order to be successful.

Adequate control and regulatory mechanisms will ensure a contemporary approach to meeting policy objectives. Ongoing collaboration and engagement between all involved stakeholders will ensure policy objectives can adapt to an ever changing environment.

There is also a range of information, guidance and direction available to drive improvement across dam warnings and emergency warnings more broadly. These include industry standards, statutory and non-statutory guidelines at both national and state levels, and the recommendations from a number of reviews and inquiries.

Our review has tried to build on these and provide a way forward for the dam safety sector, the links between dam safety and disaster management, and the warnings responsibilities for both.

# Recommendations

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## Messaging

### Recommendation 1

#### Accountable agency

**Lead:** Seqwater and SunWater

**Support:** Local governments, local disaster management groups, and the Department of Energy and Water Supply

Seqwater and SunWater focus immediate attention and action on issues of collaboration with local disaster management groups, addressing information sharing, messaging responsibilities, terminology and timing. A Framework for such action plan is provided below.

Actions should be implemented immediately with an update report to the Office of the Inspector-General Emergency Management and the Department of Energy and Water Supply by 1 December 2015 and quarterly thereafter, or until such time as the committee subject of Recommendation 2 is established.

#### Framework for Action: Seqwater and SunWater

Based upon the reasonably foreseeable hazards identified for downstream releases from referable dams i.e. '... a reasonably foreseeable hazard to the safety of persons or property that could potentially be caused or aggravated by—

- (a) a release of water from the dam's spillway; or
- (b) a controlled release of the water from the dam' (*Water Supply (Safety and Reliability) Act*, s. 352C)

develop an order of priority for action and;

proactively engage with the relevant local disaster management groups and the Department of Energy and Water Supply with a view to:

- sharing information regarding possible release scenarios, specifically known or likely impacts of 'downstream release hazards'
- developing a joint understanding of the persons whose safety or property may be threatened for each of these scenarios
- agreeing on sequencing of notifications and allocating responsibility for coordination/release of information for:
  - situations where the downstream flooding can be directly related to dam outflow and
  - alternative sequencing and responsibility for notifications that may be needed for situations where downstream flooding may not be directly related to dam outflow
- identifying the means to be used (e.g. social media, mainstream media, Emergency Alert campaigns, opt-in services of councils and dam owners/operators) - ideally this would be based on known community preferences and penetration
- predefining mapping polygons for various scenarios in a format compatible with State Disaster Coordination Centre requirements
- pre-populating messaging templates
- having all messaging tested with the State Disaster Coordination Centre
- revisiting current opt-in lists and instigating means of encouraging further membership, including joint promotional campaigns with local disaster management group member organisations.

Whilst the object should be to demonstrate effectiveness against all indicators of the relevant components of the Standard for Disaster Management, specifically:

- Component 1: Hazard Identification and Risk Assessment
- Component 5: Public Engagement
- Component 6: Communication Systems
- Component 7: Warnings

particular attention should be paid in the first instance to ensure that:

- plain language community messages and education programs are action-oriented and inform the community of the risks
- there are multiple delivery channels that are adaptable to meet audience needs and circumstances
- content is established and tested while improvements are documented and managed
- information made available to the public:
  - is accurate, reliable, relevant, timely
  - includes the purpose, process for access and limitations of any potential support and systems
  - links to warning types, sources and content
  - is consistent across, and vertically through, entities and systems
- systems are in place to address public enquiries, dispel misinformation, and to source and disseminate education materials, tools and information
- roles and responsibilities for public information and public education are agreed to and documented prior to events
- the use of key terminology, including activation levels, is consistently applied across all levels
- warning systems and arrangements support the continuous flow of critical, up-to-date, and relevant information between key stakeholders
- warning messages use common language and are consistent with other public information and advice
- warnings are tested with the community to determine community understanding of content, message receipt, perception of authority and resultant action.

**Note: as discussed within the body of the report, in relation to timeliness:**

**‘...owners and operators adopt an approach of issuing notifications when they have a reasonable expectation a release may occur rather than when it has already occurred.’**

## Implementation

### Recommendation 2

#### Accountable agency

**Lead:** Department of the Premier and Cabinet

A committee be established, chaired by the Department of the Premier and Cabinet, reporting to the Queensland Disaster Management Committee. This committee will provide implementation of strategic dam safety and disaster management policy and coordinate the work program across the agencies and relevant entities. Further functions include:

- determine appropriate and achievable timeframes for implementation
- provide oversight for the implementation of this review's recommendations
- promote shared responsibility and apply the principles recommended in this review
- ensure relevant recommendations from other reviews conducted by the Office of the Inspector-General Emergency Management are considered
- consider research outcomes at a national level and other validated research.

## Legislation, policy and plans

### Recommendation 3

#### Accountable agency

**Lead:** Department of Energy and Water Supply

Review the *Water Supply (Safety and Reliability) Act 2008* and the Emergency Action Planning for Referable Dams guideline to enhance effective communication. This review needs to consider:

- consistency between legislation, policy, guidelines and plans
- the provision of definitions for key terms to eliminate inter-changeable use
- that the guideline has the appropriate status
- that the approval process the regulator applies to ensure emergency action plans comply with legislation and guideline requirements is strengthened and transparent. This includes the establishment of criteria for effectiveness and the requirement for testing of plans.

### Recommendation 4

#### Accountable agency

**Lead:** Department of Energy and Water Supply and Queensland Fire and Emergency Services

In accordance with the outcomes of Recommendation 3, the Emergency Action Planning for Referable Dams guideline and the Queensland Local Disaster Management Guidelines are aligned to require dam operators and local disaster management groups to collaborate in planning, and the plans reflect:

- agreed warning and notification systems
- testing and exercising of agreed notification and warnings systems.

## Recommendation 5

### Accountable agency

**Lead:** Queensland Police Service and Queensland Fire and Emergency Services

**Support:** Department of Energy and Water Supply

Responsibilities of referable dam owners under the *Water Supply (Safety and Reliability) Act 2008* are clearly articulated in the State Disaster Management Plan. The district and local disaster management guidelines are updated to include responsibilities for referable dam owners and operators, councils and disaster management groups for notifying and warning the public; and require referable dam owners to be advisors to local disaster management groups where there are referable dams. We note the considerable variance in the capability of referable dam owners and operators and this should be taken into consideration when developing plans.

## Recommendation 6

### Accountable agency

**Lead:** Department of Energy and Water Supply

Any dam safety policy and strategies developed to improve warnings and notifications are regularly evaluated to assure effectiveness, in line with community expectations.

## Disaster operations

### Recommendation 7

#### Accountable agency

**Lead:** Seqwater and SunWater

**Support:** Queensland Fire and Emergency Services

Emergency Alert messages for dam related events are:

- pre-formatted, consistent and current polygons are identified
- content aligned with the Queensland Emergency Alert Guidelines
- stored and practised in consultation with the State Disaster Coordination Centre.

## Training, education and public information

### Recommendation 8

#### Accountable agency

**Lead:** Seqwater and SunWater (and other referable dam owners where relevant)

Seqwater and SunWater (and other referable dam owners where relevant) proactively engage with relevant local governments to develop and implement a community education and information program for identified communities at risk of dam release scenarios where the downstream flooding can be directly related to dam outflow.

## **Other relevant review recommendations from the Office of the Inspector-General Emergency Management**

The Office of the Inspector-General Emergency Management has published a number of review reports which have particular relevance to this report. The relevant recommendations for this review contained within those reports are as follows:

### **Recommendation 3: Review of State Agency Integration at a Local and District Level**

An integrated risk-based approach to disaster management planning for Queensland is developed that is consistent with the Standard for Disaster Management in Queensland and applicable at all levels of the arrangements.

**Lead:** Queensland Fire and Emergency Services

### **Recommendation 7: Review of Local Governments' Emergency Warning Capability**

Warning and alert systems training (including the use of Emergency Alert and the requirements of the guidelines) is delivered to:

- relevant local and district disaster management group members
- authorising officers, and
- other relevant stakeholders.

**Lead:** Queensland Fire and Emergency Services

### **Recommendation 9: Review of Local Governments' Emergency Warning Capability**

Formal research is commissioned or meta-analysis is undertaken to provide a better understanding of the effectiveness of warnings and other relevant message testing. The outcomes are disseminated to all disaster management entities and learnings used to inform practice.

**Lead:** Queensland Fire and Emergency Services

**Support:** Queensland Police Service, Public Safety Business Agency

### **Recommendation 13: 2015 Callide Creek Flood Review**

State Disaster Coordination Centre considers requesting a representative from the critical infrastructure owner be present as a liaison officer in the State Disaster Coordination Centre during activations for events that may impact on their assets.

**Lead:** Queensland Fire and Emergency Services



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# Appendix A: Terms of reference

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## Review of Seqwater & Sunwater Warnings Communications During Flood Events

### Terms of Reference

#### **Purpose**

To undertake a review of Seqwater and Sunwater's flood release communications with the community, and other stakeholders e.g. Local Disaster Management Groups; which will assess the timeliness and effectiveness of existing communication approaches, and recommend strategies to improve them and for the Inspector-General of Emergency Management (IGEM) to provide the Minister of Energy and Water Supply through the Minister for Police, Fire and Emergency Services and Minister for Corrective Services with a report to be tabled in the Parliament.

#### **Background**

Sunwater and Seqwater own and operate large water supply dams throughout Queensland. Three of the Seqwater dams are also operated as statutorily prescribed flood mitigation dams. In all cases, Seqwater and Sunwater are legally obliged to notify people who live immediately downstream of these dams of flood water releases, or spillway overflows, that may cause property damage, or endanger human life. In practice, both organisations have considerable discretion as to how they undertake these notifications.

Both organisations have recently been criticised by some downstream residents, and stakeholder groups such as Local Disaster Management Groups, for the timeliness and effectiveness of their communications following Seqwater's release of floodwaters from Wivenhoe dam in May 2015 and the release processes at Sunwater's Callide Dam in February 2015.

Seqwater and Sunwater are Queensland Government owned entities that own and operate dams across the State. Delivery of clear, concise, timely and relevant dam release and related information to potentially impacted residents, businesses and communities downstream of these dams is critical. This can be through potentially multiple communications channels.

Whilst these dam operators have critical roles to play in the lead-up to, and during, flood events, it is important that role clarity exists between the dam operators and the respective disaster management groups, eg each relevant Local Disaster Management Group and the Bureau of Meteorology.

Considerable improvements have been made in recent years, including since the Queensland Floods Commission of Inquiry that followed the flooding consequences of the 2010/11 Queensland wet season. The recent flood event in the Callide Valley and the dam releases from Wivenhoe Dam provide the opportunity to review existing communications to identify further potential improvements.

#### **Scope of Review**

The review is to focus on Seqwater and SunWater's gated dams, which include Seqwater's Wivenhoe Dam and SunWater's Callide Dam. The review may deliver findings and recommendations that apply more broadly across Seqwater and Seqwater's full suite of dams across the State

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## Review of Seqwater & Sunwater Warnings Communications During Flood Events

### Issues to be Covered in the Review

The review will include the development of principles to address the following issues:

- Clarity and appropriateness of roles and responsibilities between the dam owners and local disaster management groups, including determining criteria by which it is decided whether it is the dam owner or the LDGM, or both, will inform downstream communities of flood releases. It will also be important to ensure the dam owners and LDMGs integrate with the Bureau of Meteorology, which has a number of existing roles in relation to flooding and other weather-related warnings.
- Identification of impacted stakeholder groups to be notified of impending dam releases and by whom – this requires dam owners and/or LDMGs to have procedures in place to ensure all residents, businesses and others have the opportunity of inclusion in dam release information systems.
- Timing of informing impacted stakeholder groups, given the criticality of impacted stakeholders being notified as soon as dam releases are likely.
- Content of messaging – it is also essential that the messaging is clear, concise and able to be quickly understood by all impacted stakeholders. It may be that messages need to be different for different target groups of stakeholders, and at different stages of the dam releases.
- Means of messaging – with increasing options for communications, it is important to get the right combination of communications methods (sms's, emails, internet, social media, etc) for the various target stakeholder groups.

### Consultation

The IGEM will consult as necessary with communities downstream of Wivenhoe Dam and, in relation to the Callide Valley communities, additional consultation with these communities (i.e. in addition to that undertaken for his current review) may be necessary.

Topics for consultation will be developed in consultation with the Department of Energy and Water Supply. Consultation may include targeted market research activities.

### Roles

The review is to be led by the Inspector-General of Emergency Management (IGEM) with support as required from key stakeholders. The IGEM is in the final stages of an independent review of the flooding in the Callide Valley in February 2015.

The IGEM will identify the necessary skills required and staffing requirements as part of the initial scoping phase and may seek support from relevant entities.

The Minister for Energy and Water Supply will table the report in Parliament upon its completion.

### Deliverables and Timing

The Review is to commence within two weeks after the release of the Callide Creek Flood Review. Draft report to the Minister for Energy and Water Supply within 12 weeks, with a final Report within a further two weeks (allowing for Cabinet consideration, if necessary).

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## Appendix B: Review contributors

Entity	Documents	In-person meeting	Telephone conversation	Written feedback
Brisbane City Council	X	X	X	
Balonne Shire Council	X	X	X	
Banana Shire Council	X		X	
Central Highlands Regional Council	X	X	X	X
Gold Coast City Council	X		X	
Goondiwindi Regional Council	X	X	X	
Ipswich City Council	X		X	
Moreton Bay Regional Council	X	X	X	
Redland City Council	X		X	
Somerset Regional Council	X		X	
Southern Downs Regional Council	X	X	X	
Townsville City Council	X	X	X	X
Local Government Association of Queensland		X	X	
Seqwater	X	X	X	X
SunWater Limited	X	X	X	X
SunWater Limited – regional staff		X	X	
Bureau of Meteorology		X	X	
Department of Energy and Water Supply	X	X	X	X
Queensland Fire and Emergency Services	X	X	X	X
Queensland Police Service	X			

## Appendix C: Notifications Wivenhoe Dam 1-5 May 2015

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**Sent: Tue 05 May 15 7:07:09 pm**

**Wivenhoe Dam gate releases have ceased**

**Group: Wivenhoe Dam**

**Total messages sent: 5762, total recipients: 3696**

Seqwater advises that gate releases from Wivenhoe Dam ceased at 4.00pm, Tuesday 5 May 2015 and the Flood Mobilisation Centre has de-mobilised. For the latest Dam Level information, please visit <http://bit.ly/R7Cilw>

**Sent: Tue 05 May 15 7:00:58 pm**

**Wivenhoe Dam gate releases ceased**

**Group: Council and Main Roads**

**Total messages sent: 56, total recipients: 54**

Seqwater advises that gate releases from Wivenhoe Dam ceased at 4.00pm, Tuesday 5 May 2015 and the Flood Mobilisation Centre has de-mobilised. For the latest Dam Level information, please visit <http://bit.ly/R7Cilw>

**Sent: Sat 02 May 15 12:19:31 pm**

**Crossing closures – Brisbane River**

**Group: Wivenhoe Dam**

**Total messages sent: 5,672, total recipients: 3,650**

Seqwater advises that due to high inflows, Twin Bridges, Savages Crossing and Colleges Crossing are closed. Burtons Bridge is expected to close after 5:00pm. Kholo Bridge will close overnight. At this stage, the Mt Crosby Weir Bridge and Fernvale Bridge are not expected to be impacted.

If you are concerned about road closures or other flood impacts, you should contact your local council. River level information can be obtained from the Bureau of Meteorology website, [www.bom.gov.au](http://www.bom.gov.au)

**Sent: Fri 01 May 15 8:19:20 pm**

**Gated releases commence from Wivenhoe Dam**

**Group: Wivenhoe Dam**

**Total messages sent: 5480, total recipients: 3523**

Controlled gate releases began from Wivenhoe Dam at approximately 8:00pm and will gradually increase depending on flows in the river.

Twin Bridges, Savages Crossing and Colleges Crossing will be impacted sometime between late Friday night and mid-Saturday morning.

It is not expected that Kholo, Burtons, Mount Crosby or Fernvale bridges will be affected at this time.

**Sent: Fri 01 May 15 8:07:49 pm**

**Gated releases from Wivenhoe Dam**

**Group: Mid Brisbane Irrigators**

**Total messages sent: 101, total recipients: 61**

Seqwater has commenced gate releases from Wivenhoe Dam from 8pm, with volume to slowly increase to about 400 m<sup>3</sup>/sec. More info <http://bit.ly/R7Cilw>

**Sent: Fri 01 May 15 7:38:06 pm**

**Gated releases from Wivenhoe Dam**

**Group: Council and Main Roads group**

**Total messages sent: 55, total recipients: 53**

As at 7:30pm Friday 1 May 2015, the following dam release update applies:

**GATED DAMS:**

**WIVENHOE DAM:**

Controlled gate releases will begin at approximately 8:00pm and increased depending on flows in the river.

Twin Bridges, Savages Crossing and Colleges Crossing will be impacted sometime between late Friday night and mid-Saturday morning.

It is not expected that Kholo, Burtons, Mount Crosby or Fernvale bridges will be affected at this time.

**SOMERSET DAM:**

Controlled releases from Somerset Dam into Wivenhoe Dam will continue until next week.

**NORTH PINE DAM:**

Controlled gate releases began at approximately 6pm and are expected to continue for several days.

Youngs Crossing is closed.

**UN-GATED DAMS:**

Seqwater advises that due to rainfall in the catchments, the following un-gated dams are currently spilling:

Borumba Dam

Ewen Maddock Dam

Lake Manchester

Wyaralong Dam

Baroon Pocket Dam

Gold Creek Dam

Leslie Harrison Dam

Cedar Pocket Dam

Hinze Dam

Sideling Creek Dam

Enoggera Dam

Lake Macdonald

Wappa Dam

Little Nerang Dam



**Seqwater's Flood Operations Centre has been mobilised**

**Sent: Fri 01 May 15 2:51:53 pm**

**Group: Irrigators**

**Total messages sent: 101, total recipients: 61**

Seqwater advises the Flood Operations Centre has been mobilised due to continuing rainfall in the catchment areas above the gated dams. Depending on rainfall over the next six hours, gate releases may commence tonight 1/5/15 from Wivenhoe Dam. You will be advised of any changes.

## Appendix D: Roles and responsibilities

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### Dam safety regulation

**Organisation:** Department of Energy and Water Supply

**Responsibility:** Regulating the dam safety provisions of the *Water Supply (Safety and Reliability) Act 2008*

**Accountability:** Director-General, Department of Energy and Water Supply

- Identifying referable dams<sup>211</sup>
- establishing dam safety management programs for referable dams through applying dam safety conditions, and the upgrade of those dams as required<sup>212</sup>
- approval of emergency action plans for referable dams<sup>213</sup>
- reviewing reports following emergency events at referable dams<sup>214</sup>
- reviewing flood event reports for flood mitigation manual dams<sup>215</sup>
- implementing the regulator's emergency powers if required
- compliance monitoring, regulation and enforcement of the provisions of the *Water Supply (Safety and Reliability) Act 2008* as required.<sup>216</sup>

### Dam safety policy

**Organisation:** Department of Energy and Water Supply

**Responsibility:** Effective administration of the *Water Supply (Safety and Reliability) Act 2008*, development of dam safety and dam emergency policy including planning guidelines

**Accountability:** Director-General, Department of Energy and Water Supply

- Providing policy guidance and approving emergency action plans
- developing guidelines as appropriate and as provided for under the *Water Supply (Safety and Reliability) Act 2008*<sup>217</sup>
- providing education and guidance to dam owners and others as required.

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<sup>211</sup> *WSSR Act 2008*, s. 341.

<sup>212</sup> *Ibid*, s. 353 -357A.

<sup>213</sup> Dam warnings communications falls under this responsibility.

<sup>214</sup> *WSSR Act 2008*, s. 352T-352V.

<sup>215</sup> *Ibid*, s. 383-385.

<sup>216</sup> DEWS email to Office of IGEM dated 15 July 2015.

<sup>217</sup> This includes guidelines for emergency action planning.

## Dam owners and operators

**Organisation:** Seqwater

**Responsibility:** To operate dams in accordance with the requirements of the *Water Supply (Safety and Reliability) Act 2008* and to meet the objectives of its Statement of Obligations and Operational Plan

**Type of organisation:** Statutory authority established under the *South East Queensland Water (Restructuring) Act 2007*

**Accountability:** Chief Executive Officer

**Organisation:** SunWater

**Responsibility:** To operate dams in accordance with the requirements of the *Water Supply (Safety and Reliability) Act 2008* and to meet the objectives of its Statement of Corporate Intent

**Type of organisation:** Government owned corporation established under the *Government Owned Corporations Act 1993*

**Accountability:** Chief Executive Officer

- Monitoring inflows to dams owned by them
- passing water inflows through the dam's spillway or outlet works in accordance with the operational procedures for the dam with due regard for public safety
- developing emergency action plans with the following content:
  - a. the **area** likely to be affected by an emergency event because of a dam failure or a downstream release
  - b. **when, how**, and the **order of priority** they must notify
    - disaster management groups
    - the persons whose safety or property may be threatened
    - relevant local governments
    - the DEWS
    - any other relevant entity
  - c. the **actions** they must take to respond<sup>218</sup>
- providing notifications to relevant entities of an emergency condition<sup>219</sup>
- fulfilling flood mitigation responsibilities, including preparation of flood mitigation manuals, for applicable dams.<sup>220</sup>

<sup>218</sup> *WSSR Act 2008*, s. 352H.

<sup>219</sup> *Ibid*, s. 352H.

<sup>220</sup> *WSSR Regulation 2011*, s. 3.

## Disaster management entities

**Role:** Queensland Disaster Management Committee

**Responsibility:** Fulfil its functions under section 18 of the *Disaster Management Act 2003*

**Accountability:** Chairperson (the Premier of Queensland)

- Developing a strategic policy framework for disaster management for the state
- ensuring effective disaster management is developed and implemented for the state
- ensuring arrangements between the state and the Commonwealth about matters relating to effective disaster management are established and maintained
- identifying resources, in and outside the state, that may be used for disaster operations
- providing reports and make recommendations that the state group considers appropriate about matters relating to disaster management and disaster operations
- preparing the state disaster management plan
- coordinating state and Commonwealth assistance for disaster management and disaster operations.<sup>221</sup>

**Role:** State Disaster Coordination Centre

**Responsibility:** The SDCC supports the State Disaster Coordination Group through the coordination of a State level operational response capability during disaster operations.

**Accountability:** Established under the Queensland State Disaster Management Plan - chaired by Queensland Police Service.

- Generally issuing warnings and alerts to key stakeholders
- managing the use of the Standard Emergency Warning Signal in conjunction with the Bureau of Meteorology
- managing and administering the Emergency Alert system
- keeping pre-prepared information provided by stakeholders to assist timely warnings to be distributed to geographical areas most at risk.<sup>222</sup>

**Organisation:** Queensland Fire and Emergency Services

**Responsibility:** Fulfil the functions of the chief executive under section 16A of the *Disaster Management Act 2003*, and developing guidelines under section 63.

**Accountability:** Commissioner, Queensland Fire and Emergency Services

- Establishing and maintaining arrangements between Queensland and Commonwealth agencies, including the Bureau of Meteorology, about matters relating to effective disaster management<sup>223</sup>
- responsible for the administration of the *Disaster Management Act 2003*<sup>224</sup>
- functional lead agency at the state level for warnings in the Queensland State Disaster Management Plan<sup>225</sup>

<sup>221</sup> *DM Act 2003*, s. 18.

<sup>222</sup> QPS 2015.

<sup>223</sup> *DM Act 2003*, s. 16A.

<sup>224</sup> *Ibid*, s.16A.

<sup>225</sup> QPS 2015.

- developing and maintaining guidelines to support disaster management planning<sup>226</sup> including for the use of the Standard Emergency Warning Signal and the Emergency Alert system
- responsible for ensuring persons with functions under the *Disaster Management Act 2003* are appropriately trained.<sup>227</sup>

**Organisation:** Bureau of Meteorology

**Responsibility:** Provide forecasts, warnings and long term outlooks on environmental phenomena.

**Accountability:** Director of Meteorology and Chief Executive Officer

- Providing 'forecasts, warnings and long term outlooks on environmental phenomena that affect the safety, prosperity and resilience of Australians'<sup>228</sup>
- responsible for flood monitoring and prediction, and disseminating flood forecasts and warnings<sup>229</sup>
- chairs the Queensland Flood Warnings Consultative Committee, which meets biannually.

**Role:** Local government

**Responsibility:** To fulfil the functions of a local government under the *Local Government Act 2009* and the *Disaster Management Act 2003*

**Accountability:** Mayor of the local government<sup>230</sup>

- Responsible for preparing a local disaster management plan for their area, with the assistance of their local disaster management group<sup>231</sup> including arrangements for public information and warnings<sup>232</sup>
- coordinating community education activities, including information on warnings<sup>233</sup>
- having a disaster response capability
- performing other functions given to local government under the *Disaster Management Act 2003*.<sup>234</sup>

**Role:** Local Disaster Management Groups

**Responsibility:** Fulfil the functions of a local disaster management group under s. 30 of the *Disaster Management Act 2003*

**Accountability:** Chairperson (Mayor or Councillor of the local government)

- Ensuring disaster management and disaster operations in the area are consistent with the state group's strategic policy framework for disaster management for the state
- developing effective disaster management, and regularly reviewing and assessing the disaster management
- helping the local government for its area to prepare a local disaster management plan

<sup>226</sup> *DM Act 2003*, s. 63.

<sup>227</sup> *Ibid*, s. 16.

<sup>228</sup> QPS 2015, p. 49.

<sup>229</sup> BoM 2013.

<sup>230</sup> *Local Government Act 2009*, s. 12.

<sup>231</sup> *DM Act 2003*, s. 58, s. 30.

<sup>232</sup> EMQ 2011, p.44.

<sup>233</sup> EMQ 2011, p. 25.

<sup>234</sup> QPS 2015, p.8.

- identifying and providing advice to the relevant district group about support services required by the local group to facilitate disaster management and disaster operations in the area
- ensuring the community is aware of ways of mitigating the adverse effects of an event, and preparing for, responding to and recovering from a disaster
- managing disaster operations in the area under policies and procedures decided by the state group
- providing reports and making recommendations to the relevant district group about matters relating to disaster operations
- identifying and coordinating the use of resources that may be used for disaster operations in the area
- establishing and reviewing communications systems in the group, and with the relevant district group and other local groups in the disaster district of the relevant district group, for use when a disaster happens
- ensuring information about a disaster in the area is promptly given to the relevant district group<sup>235</sup>
- disaster management groups should take the opportunity to review emergency action plans to ensure alignment with their arrangements and plans.

**Role:** District Disaster Management Group

**Responsibility:** Fulfil the functions of a district disaster management group under s. 23 of the *Disaster Management Act 2003*

**Accountability:** Commissioner, Queensland Police Service who appoints the Chairperson

- Ensuring that disaster management and disaster operations in the district are consistent with the state group's strategic policy framework for disaster management for the state
- developing effective disaster management for the district, including a district disaster management plan, and regularly reviewing and assessing that disaster management
- providing reports and making recommendations to the state group about matters relating to disaster management and disaster operations in the district
- regularly reviewing and assessing —
  - i. the disaster management of local groups in the district
  - ii. local disaster management plans prepared by local governments whose areas are in the district
- ensuring that any relevant decisions and policies made by the state group are incorporated in its disaster management, and the disaster management of local groups in the district
- ensuring the community is aware of ways of mitigating the adverse effects of an event, and preparing for, responding to and recovering from a disaster
- coordinating the provision of state resources and services provided to support local groups in the district
- identifying resources that may be used for disaster operations in the district
- making plans for the allocation, and coordination of the use, of resources
- establishing and reviewing communications systems in the group, and with and between local groups in the district, for use when a disaster happens

<sup>235</sup> *DM Act 2003*, s. 30.

- ensuring information about an event or a disaster in the district is promptly given to the state group and each local group in the district
- preparing a district disaster management plan
- disaster management groups should take the opportunity to review emergency action plans to ensure alignment with their arrangements and plans.<sup>236</sup>

### The community

- Actively undertaking activities to protect their lives and property
- building resilience
- developing social networks<sup>237</sup>
- using available information to apprise themselves of how certain dam outflows will affect their property.<sup>238</sup>

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<sup>236</sup> *DM Act 2003*, s. 23.

<sup>237</sup> DLGCR, Queensland Strategy for Disaster Resilience.

<sup>238</sup> QFCoI 2011, p. 138.



## **Appendix E: Community engagement**

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QLD 4004 AUSTRALIA  
PHONE 07 3254 0700  
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## Review of Seqwater and SunWater Warnings Communications

Qualitative research with  
community members

### Final Report

PREPARED FOR • Inspector-General Emergency Management

Date • July 2015    JOB # • 151480



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# Background & Method

## Project background

The Office of the Inspector-General of Emergency Management (IGEM) is undertaking a review of Seqwater and SunWater's flood release communications with the community and other stakeholders. The review will assess the timeliness and effectiveness of existing communication approaches and make recommendations for improvement.

As part of this review, Market & Communications Research (MCR) was commissioned by IGEM in July 2015 to undertake qualitative research with people living downstream from six dams: Ross River, Fairbairn, North Pine, Hinze, EJ Beardmore and Wivenhoe.

## Objectives

The objectives of the research were to:

- determine community members' understanding of current dam warnings communications
  - understand current concerns around dam warnings communications
  - determine the level of understanding of risk/s associated with dams in their community (site specific information related to dam safety)
  - determine if community members differentiate between notifications and warnings
- determine any variation in community expectations living downstream of a gated dam, as opposed to an ungated dam
- understand the community's expectation of the roles and responsibilities of:
  - a community member living downstream of a dam
  - a dam owner/operator
  - a local council - in particular the mayor/CEO
  - the local disaster management group
- understand what the expected message would be if there was danger of dam break or dam-related flooding
  - when the message would be received
  - who the message would come from
  - who would receive the message, and whether messages should be compulsory for all potentially impacted persons at risk
  - how the message should be received – for example via SMS, email, landline
  - understand the community's expectation in regards to whether the message would be different during times when there is already a flood risk, as opposed to times of normal river heights
- understand what action would be taken by community members (or be expected to taken) – prior, during and post event
- determine if community members have ever communicated with the dam owner, local council, or member of their LDMG about dam warnings communications
- understand resilience among community – are they building on past experience or increasing knowledge and skills
- uncover any other issues with the warnings and options for improvement.

## Method

Qualitative research, in the form of six face-to-face focus groups was undertaken to meet the research objectives.

Group #	Dam Name	Location of group	Respondents drawn from:	Date	Number of attendees
1	Ross River	Kirwan	Kelso, Rasmussen, Condon, Kirwan, Douglas	Wednesday 15 July, 12noon	10
2	Fairbairn	Emerald	Residents from Emerald	Sunday 19 July, 3pm	9
3	Hinze	Nerang	See map in appendix C	Monday 20 July, 12 noon	9
4	North Pine	Kallangur	See map in appendix C	Tuesday 21 July, 6pm	9
5	EJ Beardmore	St George	Residents from St George	Wednesday 22 July, 11.30am	9
6	Wivenhoe	Lowood	See map in appendix C	Thursday 23 July, 6pm	7

Each group contained a mix of gender and age groups. At least one primary producer was included in Emerald (Fairbairn Dam), St George (EJ Beardmore Dam) and Lowood (Wivenhoe Dam) groups.

Given the focus of this research was on community members, wherever possible, people with professional experience in the areas of emergency management, local government or dam management were not included in these focus group discussions.

### Group process

Q&A Market Research, MCR's qualitative recruitment partner recruited respondents for the study using a screening questionnaire developed by MCR. Potential respondents were sourced from either Q&A Market Research's database or via White Pages telephone listings. Respondents were paid \$80 as compensation for expenses; this is standard market research procedure.

The groups were held at a function centre (e.g. a hotel or club) and lasted for approximately 1.5 hours each.

The groups were recorded in audio format. IGEM representatives were not present at the focus groups.

### Interviewers and discussion guide

Jane McLean (Managing Director) and Therese Coufts (Senior Project Director) moderated the focus groups. At the completion of the fieldwork a thematic analysis of the data was undertaken and this report was prepared.

MCR designed a discussion guide after consulting with the Office of the Inspector-General Emergency Management. Feedback from the Office of the Inspector-General Emergency Management was incorporated into the final version of the guide used in focus groups (see Appendix A).

### Limitations

Findings should be read keeping in mind that the sample is qualitative and therefore is representative of the community members interviewed rather than all Queenslanders.



Publication of  
Information

MCR is a member of AMSRO and abides by the AMSRS Code of Professional Behaviour. The Code of Professional Behaviour can be downloaded at [www.amsrs.com.au](http://www.amsrs.com.au). Under the Code of Professional Behaviour – information about Client’s businesses, their commissioned market research data and findings remain confidential to the clients unless both clients and researchers agree the details of any publications.

MCR and Q&A Market Research both have ISO 20252 quality assurance accreditation.



Disclaimer

Focus groups are a valuable means of identifying a range of attitudes and behaviours in the market. However they do not measure the extent to which these attitudes or behaviours are found throughout the market. As is our normal practice, we emphasise that any recommendations in this report can be influenced by a number of unforeseen events or by management decisions. Therefore no warranty can be given that the information included will be predictive of a desired outcome.

# Summary

### **Level of engagement / interaction with local dam**

While most respondents are well aware of the name of their local dam, knowledge about who operates the dam varies by community. Awareness of the dam operator is most widespread among residents living close to Wivenhoe Dam, Fairbairn Dam, EJ Beardmore Dam and North Pine Dam and less apparent among those living in the vicinity of Ross River Dam or the Hinze Dam.

Most respondents are aware if their local dam is gated or ungated and most believe that gates provide the operator with control in terms of when and how water is released. The exception to this is found among those living downstream from the Hinze Dam or among some respondents living near the North Pine Dam, where knowledge about whether the dam is gated or not is less widespread.

### **Perceived risks associated with local dam**

Perceptions about risks associated with flooding from water being released by the local dam vary by community. Perceived risks are greatest in the Wivenhoe Dam area or in relation to the EJ Beardmore Dam. In all other locations most respondents perceive there to be very limited or no potential flooding risk associated with water being released from the local dam. See section 2.0 for more details.

### **Past experience of flooding**

Respondents in the vicinity of Wivenhoe Dam are the most likely to have personally experienced property damage from flooding associated with the Dam. Other past experiences include isolation due to road closures, damage to agricultural land and machinery and danger to lives.

Many Emerald and St George based respondents have also had personal experiences with flooding such as being evacuated, becoming isolated or having property damaged.

For most respondents who live downstream from the North Pine Dam past experience with flooding is restricted to being isolated (for short periods of time) due to road closures.

Those living near the Hinze Dam or the Ross River Dam are the least likely to have experienced any impacts from flooding associated with the dam.

### **Conclusions:**

*A high degree of variability in knowledge, perception of risk and past experience is evident between communities. It is therefore recommended that the approach to warnings communications be tailored to each community's needs and the local conditions.*

*There is an opportunity to increase community awareness about the risks of flooding and engagement with the dam and how it works (for dams such as Ross River, Hinze and North Pine). A familiarisation event such as a "Family Fun Day" at the dam where families can visit and enjoy facilities with a chance talk with emergency services personnel and the dam operator may therefore be worth considering. Presence at the local agricultural show might also be useful.*

### Recall of warnings received during past events

During times of flood, publicly available warnings such as television and radio reports and weather information from the Bureau of Meteorology website are said to be widely available and accessed. Word of mouth is also commonly relied upon. Some mention is also made of Facebook pages being used (e.g. council, local disaster group, personal pages).

Being evacuated is usually preceded by a household visit from police or SES workers.

The notifications or warnings provided directly to local residents (via SMS or landline telephone) have either come from the council, dam operator or (to a minor extent) the SES. This method of delivering warnings communications is found to be criticised when messages are not being received by everyone at risk (regardless of whether or not people pre-registered) or when messages are not being delivered in a timely manner. These issues are most commonly reported by respondents living in the vicinity of the Wivenhoe Dam and in relation to messages sent by Seqwater. In regions where the council is said to send such messages there appears to be less dissatisfaction.

### Impact of past experiences on preparations for future events

Residents living in the vicinity of Wivenhoe Dam are the community most likely to have altered their planning behaviour for future events as a result of past flooding events. However, apart from monitoring conditions, evidence of the development of formal emergency plans is low. Some say this is because their only option is to evacuate (and quickly), while others say an emergency plan is not able to be formulated until they know which roads will be cut by flooding.

Formal plans are also rare among those interviewed in Emerald or St George. A reliance on community word of mouth or following their 'instincts' about when to evacuate is the extent of the informal plans held by most. Because floods in these areas are considered to be slow moving and allow adequate time to plan, such emergency plans are not considered essential - this is especially the case if property damage has not been experienced in past events.

Townsville respondents also consider the risk of flooding associated with a water release from the Ross River Dam to be very low. While basic emergency kits (battery, radio, candles) are held by many across all regions, respondents in Townsville are more likely than others to have a well-stocked emergency kit and to have important personal documents securely stored. This behaviour is due to the high risk of cyclone, rather than flooding in this area.

### Conclusions:

*Having experienced flooding in the past increases the perceived future risk and heightens attention to warnings communications. As new residents may not have this experience it would be important to ensure they receive information about local risks when they move to the area. This is especially important given that newer residents are unlikely to be connected to the word of mouth network. Consider developing an information pack that can be distributed by real estate agents, made available at local retailers or provided by council with the rates notice.*

*Evidence of planning for flooding events is limited; consider providing region specific checklists to help and encourage people to prepare.*

*The types of warnings communications accessed varies within each community meaning different people may be getting different messages (including unofficial messages from private Facebook pages). Promotion of the official warnings communications channels (that people should consult) will increase the consistency of messages received.*

## Perceptions about roles and responsibilities for issuing notifications or warnings

### *Organisation/s perceived to be responsible*

Perceptions about who is responsible for issuing notifications or warnings about potential flooding associated with water releases from a dam varies by region. The council and dam operators are the organisations most likely to be nominated by respondents as having responsibility in this regard.

Where council is identified as being responsible for issuing notifications or warnings, it is either because the dam operator is not well known by locals and or because council is considered most likely to have the communications infrastructure in place and the contact details of relevant residents. Where the dam operator is nominated this is most commonly due to a belief that the dam operator has the most up-to-date information about the current situation and plans for releases.

Ultimately however, the source of notifications or warnings is less important than their content, timing and overall relevance. Community members have a strong perception that council and the dam operator would be working closely together during times of potential disaster.

### *Awareness of Local Disaster Management Group*

Awareness of the Local Disaster Management Group (LDMG) is strongest, though not universal, in the Emerald region and evident to a minor extent in the St George, North Pine or Townsville areas. In other regions there is no awareness of the LDMG among our respondents. This type of disaster management group (which respondents imagine would consist of council, the dam operator, emergency services and experts in flooding and disaster management) is however considered the most logical party to be responsible for issuing notifications or warnings. The potential downfall with this system noted by respondents is that messages could be delayed if input from multiple agencies is required each time a message is sent.

### *Role of the mayor*

Where the council is indicated as the organisation responsible for issuing notifications or warnings, the role of the mayor is considered to be as a spokesperson or co-spokesperson for a group of relevant emergency planning experts. Most would prefer to hear direct from the committee leader in association with the mayor, rather than solely from the mayor.

## Perceived difference between a notification and a warning

Most respondents see a clear difference between the terms: 'notification' and 'warning', namely that:

- a notification is considered to be providing information or advice about something that is going to happen in the future, it does not require an urgent response
- a warning is considered to be more important, to have a more urgent tone and implies the recipient is potentially in danger and requires action immediately.

The exception to this is among some of those living close to the Hinze Dam or the EJ Beardmore Dam who are likely to either see no difference in the meanings of the two terms or to think the reverse of that stated above.

### **Conclusions:**

*The research finds that the source (e.g. council/LDMG) or title (e.g. notification/warning) of warnings bear secondary importance to the content, distribution and timing of warnings.*

*There is an expectation that relevant organisations will work together closely during times of emergency and the dam operator is considered an integral part of this group. If it is not already the case, include the dam operator in the LDMG.*

*While awareness of the LDMG is low in some regions, community members are happy to be updated by expert members of such a group. It is however recommended that the mayor (or Premier during larger events) co-present or maintain visibility during such briefings.*

### Perceptions about whether registration is required in order to receive notifications or warnings

The majority of respondents in our groups are unaware they may be able to register for notifications or warnings from the dam operator or their local council and there is limited evidence of local area residents seeking any information about flooding from a dam operator, the council or the LDMG. Where this is done it has been conducted via a telephone conversation direct with the dam (e.g. SunWater in Townsville or Seqwater in Wivenhoe) or the council (e.g. Townsville). Informal conversations with other local residents (especially those who have lived in the area for some time) is the most common way respondents seek information and find out about flooding risks.

### Messaging expectations

People at risk expect to receive timely, up-to-date, relevant and detailed communications via multiple channels without having to pre-register. Residents assume current technologies, council databases and council communications infrastructure provide the ability for warnings or notifications to be automatically broadcast to people at risk. They believe Local and State Government have the ability to identify and target people via rates notices, electricity bills, registration/licensing or mobile phone towers. As such they are unlikely to register to receive such warnings without a significant awareness and motivational campaign.

Section 4.7 details the needs of community members in terms of message timing, channel, source, audience and information needed. A review of warnings communications examples from the 2015 Callide Valley event are also provided in section 5.0 of this report.

The concept of a multi-staged warning protocol (similar to the Rural Fire Service warning system “advice, watch and act, emergency warning) is considered potentially useful by many respondents. Critical though to its success would be a significant education program aimed at local residents to ensure universal understanding of the actions required under each stage.

### Concerns about dam notifications or warnings communications

Apart from those living downstream from the Wivenhoe Dam, most respondents have few concerns currently about dam notifications or warnings. This view is typically due to trusting the dam operator and or council to protect them (i.e. operate the dam safely and/or monitor and minimise risks appropriately) or because they do not consider flooding associated with dam releases a likely risk.

Concerns that are mentioned are:

- that elderly people without access to technology will miss out on vital messages
- that a reliance on electronic communications for warnings will mean that messages cannot be distributed once channels lose power
- the potential for too many notifications/warnings to be delivered which may cause communities to become complacent
- the potential for notifications/warnings to be geographically irrelevant to the recipient.

In preparing to conduct this research it was noted that there was no publically available listing of dwellings/properties at risk of flooding as a result from water releases from the local dam. While colour coded maps are available in PDF format via the Emergency Action Plans for each dam, as a community member it would be difficult to assess one’s personal level of risk using these documents.

*Continued over page.*

**Conclusions:**

*Community expectations in regards to receiving notifications or warnings are very high. There is a clear assumption that warnings communications would be automatically provided to people at risk. Further investigation into ways of routinely distributing messages (in a timely manner) to everyone at risk is therefore recommended.*

*Being able to quickly and accurately identify who is at risk is also essential, both for authorities distributing warnings communications as well as community members wanting to assess their own level of risk. Publication of a detailed list of streets or, if possible, an interactive map (with detail to street level) showing risk profiles would be useful.*

*Detailed information on the needs of community members in terms of message timing, channel, source, audience and information needed is provided in section 4.7; it is recommended that the development of warnings communications guidelines reflect these needs wherever possible.*

*One consistent source for warnings communication is recommended rather than multiple sources. Consideration of ways of increasing the speed of communication between the dam operator and council and ultimately the person at risk is however needed to ensure timely communications are provided.*

*Other feedback in section 4.8 of this report may also provide further input for warnings communication guidelines.*

*Development of a multi-staged warning protocol would be recommended, provided that it could be supported by a community education program. Ongoing reminders about the protocol would also be needed.*

# Findings



## 1.0 Level of engagement / interaction with local dam

### 1.1 Knowledge of local dam and operator

While most are well aware of the name of their local dam, knowledge about who operates the dam varies by community. The following table illustrates these differences.

	Knowledge of local dam and operator
<b>Ross River Dam</b>	<ul style="list-style-type: none"> <li>• Dam name well known</li> <li>• Operator assumed to be council</li> <li>• Limited awareness of SunWater or their role in operating the dam</li> <li>• Limited use for recreational activities, unless a member of the ski club or rowing club</li> </ul>
<b>Fairbairn Dam</b>	<ul style="list-style-type: none"> <li>• Dam well known – it is an integral part of the town, being heavily used for recreational activities (picnics, camping, swimming, fishing, skiing, boating) and an important attraction for 'grey-nomad' caravan tourists to the town</li> <li>• SunWater well known as operator</li> </ul>
<b>EJ Beardmore Dam</b>	<ul style="list-style-type: none"> <li>• Dam well known</li> <li>• SunWater well known as operator</li> </ul>
<b>Wivenhoe Dam</b>	<ul style="list-style-type: none"> <li>• Dam well known</li> <li>• Limited to no use for recreational activities</li> <li>• Seqwater well known as operator</li> </ul>
<b>Hinze Dam</b>	<ul style="list-style-type: none"> <li>• Dam well known</li> <li>• Operator assumed to be state government</li> <li>• Seqwater not well known as operator</li> <li>• Limited use for recreational activities</li> </ul>
<b>North Pine Dam</b>	<ul style="list-style-type: none"> <li>• Dam well known</li> <li>• Most understand Seqwater is operator</li> <li>• Limited use for recreational activities</li> </ul>

### 1.2 Perceptions as to whether dam is gated or ungated

Most community members believe that gates provide the operator with control in terms of when and how water is released. Awareness of whether their local dam is gated or not varies, as described in the table below.

	Perceptions as to whether dam is gated or ungated
<b>Ross River Dam</b>	<ul style="list-style-type: none"> <li>• Gated status well known</li> </ul>
<b>Fairbairn Dam</b>	<ul style="list-style-type: none"> <li>• Ungated status well known</li> </ul>
<b>EJ Beardmore Dam</b>	<ul style="list-style-type: none"> <li>• Gated status well known</li> </ul>
<b>Wivenhoe Dam</b>	<ul style="list-style-type: none"> <li>• Gated status well known</li> </ul>
<b>Hinze Dam</b>	<ul style="list-style-type: none"> <li>• Most unaware if the dam is gated or ungated</li> </ul>
<b>North Pine Dam</b>	<ul style="list-style-type: none"> <li>• Mixed - approximately one half aware that the dam is gated, one half unaware</li> </ul>

#### Verbatim comments

*"They can't release any more water from the dam than what those valves will let through; there are no gates that can be let down like Brisbane."*

Fairbairn Dam

*"I thought most dams would have gates on it for the simple reason if it gets too much water they have to let some go anyway."*

North Pine Dam

*"It's all gated so that they can mitigate any flooding, but we don't get the rain. We don't get the rain, so there is no flooding going on at the moment."*

Ross River Dam

## 2.0 Perceived risks associated with local dam

Perceptions about risks associated with flooding from water being released by the local dam vary by community, as described in the following table.

	<b>Perceived risks associated with local dam</b>
<b>Ross River Dam</b>	<p>Most perceive there to be no or only very limited potential for risks associated with flooding from water being released from the Ross River Dam.</p> <p>One respondent notes when water is released quickly (not slowly or gradually) that it is destructive to the river bank and any equipment such as jetty's, boats or BBQs located on the river. This respondent does not however consider there to be any major risks to houses or people's lives.</p> <p>The current low level of the dam and drought conditions further reduce the perceived risks for Townsville residents. Some say with the right conditions (wet ground, cyclone, constant rain) that some areas could be flooded (i.e. Kelso).</p> <p>Localised flooding due to rain (not the dam) is considered commonplace given the lack of storm water drainage in some areas (roof water going directly into the yard).</p> <p>Past experience is the main reason for holding these views.</p>
<b>Fairbairn Dam</b>	<p>The possibility of flooding associated with water releases from the Fairbairn Dam is deemed to be low. When flooding does occur the most likely perceived impacts are that roads can be cut off, the town isolated, businesses impacted and damage done to property and agricultural land. The town is said to usually have between 3 and 7 days' notice before being inundated so threat to life is considered to be low.</p> <p>The existence of the dam is considered to 'save' the town from most flooding events. While some say the dam operators can increase the flows into the irrigation channels others say this ability is limited given this water is pumped into the channels only relatively slowly (and pumps can break down).</p> <p>Some say because the dam is ungated, water releases are slower than those at gated dams such as Wivenhoe Dam which is perceived to be able to release large volumes of water very quickly.</p> <p>Views are typically formed from past experience and or via talking to long-term local residents.</p> <p>The proposed building of levees to protect the town in the future is mentioned, although scepticism is expressed by some who feel some people in town will be at greater risk from floods as a result of the levees.</p>

## 2.0 Perceived risks associated with local dam (cont'd)

	<b>Perceived risks associated with local dam (cont'd)</b>
<b>EJ Beardmore Dam</b>	<p>Perceptions are that St George and its residents face a high risk of flooding associated with water releases from the EJ Beardmore Dam. Past experience, especially between 2010 and 2013 is the reason for this view. Damage to property, farming equipment, roads and threat to life are all considered relevant risks to the area. Many have direct experience in being evacuated.</p> <p>The relatively recent building of a levee is noted; however respondents also note that this does not protect everyone in town.</p> <p>Minor mention is also made in St George of rumours of a weakness (i.e. a crack) in the dam wall.</p>
<b>Wivenhoe Dam</b>	<p>Perceived risks from flooding associated with water releases from Wivenhoe Dam are very high according to those living in the Lowood, Fernvale or Wivenhoe Pocket areas. Threat to property, agricultural land, roads and loss life are potential outcomes of water releases.</p> <p>Direct experience has led most to form these views.</p> <p>There is a view that the gates are opened quickly, not slowly, and that the speed and volume of releases increases the risks to the local community.</p>
<b>Hinze Dam</b>	<p>Risks from flooding associated with releases from the Hinze Dam are considered minimal. Road closures, water pooling in low lying areas and degradation of the river bank are the most common threats mentioned. Smaller water courses are said to allow the water to escape quickly and prevent flooding.</p>
<b>North Pine Dam</b>	<p>Overall most respondents living close to the North Pine Dam consider the risks from flooding associated with a water release from the dam to be low. They assume the operators have time to make a decision and let the water out in a controlled manner in order to reduce potential issues.</p> <p>Road closures and damage to infrastructure on the river are the most common perceived risks associated with flooding from water releases from the North Pine Dam.</p> <p>Some say new developments are being built in areas that have traditionally flooded or that infrastructure projects such as the railway line under construction have changed the way water escapes and have increased the risks of flooding.</p> <p>Past experience is the main reason for holding these views.</p>

**Verbatim comments**

<i>"If that dam wasn't there (we'd be flooded more often), in some ways it's controlling the water that is coming through whereas my father in law was here in 54 and 52, and there was no dam then, he has got pictures of the water lapping that railway bridge."</i>	Fairbairn Dam
<i>"I wouldn't think loss of life is a drama (a risk), it's productivity for business and obviously the damage to property (that are the risks)."</i>	Fairbairn Dam
<i>"There are road closures, that's probably about it, and also they close the road going into Robina Shopping Centre, that happened a few months ago."</i>	Hinze Dam
<i>"If you look at the people at Young's Crossing, straightaway, you have the disabled horse riding right there, you have roadways there, that gets damaged, straight away."</i>	North Pine Dam
<i>"I would assume there wouldn't be any risk. I would assume that they would have that taken into account so it would be okay."</i>	North Pine Dam
<i>"In the 2011, that flood water came up over the retaining embankment and within 100 metres of my front gate and all the roads around were ripped up so I was basically stuck, isolated on a little patch, I could hear and see it coming up from behind."</i>	Wivenhoe Dam
<i>"But I think of course far more important, is the people who could have been killed by it, I do know of two old people over near Fernvale who lived alone, very elderly, who woke up lying in water and who got up onto the table in the kitchen and put their chairs on the kitchen table and sat on the chairs on the table in the dark waiting to see what happened."</i>	Wivenhoe Dam
<i>"I don't think we would ever get to the stage where it affected us."</i>	Ross River Dam
<i>"Yes there are risks, there are structural risks (to the river bank). If the water is let out gradually, then it finds its own flow, but when it comes out in a big rush, it eddies and undermines the banks along and actually since they made changes to the dam, it has become more destructive (to the river bank)."</i>	Ross River Dam
<i>"The problem there is, there is no storm water drainage here, everything off the roof just runs into your back yard, your front yard and then just fills the streets up."</i>	Ross River Dam

## 3.0 Past experience with flooding

### 3.1 Past events

Respondents in the vicinity of Wivenhoe Dam are the most likely to have personally experienced property damage from flooding associated with the Dam. Other past experiences include isolation due to road closures, damage to agricultural land and machinery and danger to lives.

Many Emerald and St George based respondents have also had personal experiences with flooding such as being evacuated, becoming isolated or having property damaged.

For most respondents who live downstream from the North Pine Dam past experience with flooding is restricted to being isolated (for short periods of time) due to road closures.

Those living near the Hinze Dam or the Ross River Dam are the least likely to have experienced any impacts from flooding associated with the dam.

### 3.2 Recall of warnings received during past events

	<b>Recall of warnings received during past events</b>
<b>Ross River Dam</b>	<ul style="list-style-type: none"> <li>• No flood warnings received in past</li> <li>• Some report getting text messages from council about weather issues (not dam related)</li> <li>• Radio/television news and Bureau of Meteorology website noted</li> <li>• One respondent contacted council to find out about water releases as fast water releases from the dam were damaging the river bank on her property; council advised her to go to SunWater <ul style="list-style-type: none"> <li>○ SunWater contact advised they do not notify residents, it is against policy. The only groups they notify are the rowing and ski clubs.</li> </ul> </li> </ul>
<b>Fairbairn Dam</b>	<ul style="list-style-type: none"> <li>• Radio broadcasts</li> <li>• Automatic text message warnings from council (no need for registration)</li> <li>• Phone calls to landline from council (no need for registration)</li> <li>• Bureau of Meteorology website</li> <li>• Council website (river height information)</li> <li>• Council flood indicator maps (although during the 2008 event these had to be reissued a number of times as the conditions changed)</li> <li>• Unofficial word of mouth warnings (usually from long term local residents) are often considered more reliable than official warnings <ul style="list-style-type: none"> <li>○ Especially during events such as in 2008 when river height gauging stations were washed away upstream</li> </ul> </li> </ul>
<b>EJ Beardmore Dam</b>	<ul style="list-style-type: none"> <li>• Police and SES door knocking – ordering of evacuation in last flood event <ul style="list-style-type: none"> <li>○ Resistance to evacuation order mentioned by some respondents as they did not consider the risk serious, although all reportedly complied (after threat of fine)</li> </ul> </li> <li>• Text message via SES/EMQ (pre-registered)</li> <li>• Word of mouth among local community members</li> <li>• Checking Bureau of Meteorology website and river height information</li> </ul>

### 3.2 Recall of warnings received during past events (cont'd)

<b>Wivenhoe Dam</b>	<p>Messaging received by those living near the Wivenhoe Dam was highly variable in the 2011 event and other events since then:</p> <ul style="list-style-type: none"> <li>• Bureau of Meteorology website, television and radio news</li> <li>• Some received landline recorded messages from Seqwater</li> <li>• Some received text messages from Seqwater</li> <li>• Watching the river themselves</li> <li>• Some have heard a siren in the past (although most say they cannot hear the siren from their house)</li> <li>• Minor mention is made in relation to receiving email warnings/advice from Seqwater</li> <li>• Some access Facebook for information from Bureau of Meteorology website</li> </ul> <p>Variation in the quality of the distribution system and timing of messaging is also noted:</p> <ul style="list-style-type: none"> <li>• Some respondents say they <i>had</i> registered but did not receive any or all of the messages</li> <li>• Some respondents say they had <i>not</i> registered but received warnings in the past</li> <li>• Generally speaking the warnings are not considered timely, especially given the speed with which water arrives in the local area from the dam</li> <li>• There is also a general comment that the warnings are not received with sufficient time to act and or that they are received at night time, making it difficult to take action (i.e. to evacuate or move possessions to higher ground)</li> </ul>
<b>Hinze Dam</b>	<ul style="list-style-type: none"> <li>• No flooding impacts noted</li> </ul>
<b>North Pine Dam</b>	<ul style="list-style-type: none"> <li>• Some are registered for and have received emergency text messages from Moreton Bay Regional Council</li> <li>• Some report receiving text messages from Seqwater (after registering due to a recommendation from neighbours – messages deemed useful for pre-advice about planned road closures)</li> <li>• Social media is used by some (e.g. Facebook pages such as Queensland Police Service, general community members)</li> <li>• Radio/television news and Bureau of Meteorology website noted</li> </ul>

#### 3.2.1 Problems with river height gauging stations

There is general comment in Townsville, St George and Emerald about the river height gauging stations being inaccurate due to sediment build up in the river and/or lack of dredging or of them being washed away during large events. While many are checking and rely heavily on this information, these issues reduce confidence in this information source.

#### 3.2.2 Weather forecasting

One respondent living downstream from Wivenhoe believes that Seqwater rely on a forecast (a modified Bureau of Meteorology (BOM) forecast) that is different to the forecast available to the general public on the BOM website. This can cause confusion; for example if the regular BOM website forecasts fine weather, locals may assume a dam release is unlikely, however because the dam operator uses a different forecast which predicts rain, a dam release may in fact be likely.

#### 3.2.3 Past experiences can lead to false sense of security

Mixed views are expressed among those living near Wivenhoe Dam. Some believe the dam would never release more water than it did in 2011 and (if their house did not flood in 2011) would therefore feel safe in the event of future water releases. Others do not agree, saying that future releases could in fact exceed 2011 releases.

### 3.2.3 Potential for complacency about warnings communications

Some respondents in the vicinity of North Pine Dam make mention of the potential for warnings communications to become too frequent, causing the community to become complacent.

#### Verbatim Comments

*"In the 2011 floods, my sister was living in Fernvale, and she was swept into the flood water, she was trying to save her grandson..., she went down and hurt all her leg, but her husband was quick enough to grab her and she kept a hold of her grandson. She suffered some damage."*

Wivenhoe Dam

*"The old people who had been here for many years and the old station people as well, were saying, you are going to have a big one, but in town (we weren't getting the warnings)."*

Fairbairn Dam

*"I was listening to the older people in town. My mother-in-law rang me and she said, Manchon Downs is over its roof, you are going to go, that town is in big trouble. Now she has been here virtually all her life."*

Fairbairn Dam

*"They were sending out text messages as well for people who had mobile phones and stuff."*

Fairbairn Dam

*"I registered to receive messages so I get one from Seqwater, so I know when Young's Crossing is going to go under."*

North Pine Dam

*"When the floods actually happened and just before we lost all our phones, we got a message on the landline that they were releasing."*

Wivenhoe Dam

*"In the 2011 flood, I got a warning to my mobile phone on the Monday night, saying if you are in a low lying area, you should evacuate which was absolutely crazy..., it was a warning really meant for the Lockyer area, not for us and yet there was no warning at all immediately prior to when we were flooded, there was nothing."*

Wivenhoe Dam

*"I did see a message come over Facebook because I follow the BOM site which was quite alarming, because before we lost power and everything, we were going to be hit with an 8 metre high wall of water. I have the BOM site and it updates... but then we lost power."*

Wivenhoe Dam

*"I didn't get any of that mobile (messages), we only heard the siren. We heard it not really loud, but we could see the water coming up because we are sort of highish and the water is down low. It's sort of a safe part, but we could hear the siren but we had no messages."*

Wivenhoe Dam

*"They gave us a warning at 19 minutes past 8 and told us the release from the dam would be a 8 o'clock, 20 minutes before, they did tell some of us in the afternoon, that they were opening the flood centre and there might be releases, but the first notice that said there will be releases was at 19 minutes past 8, and that is for people who are registered with Seqwater to get that message."*

Wivenhoe Dam

*"We were registered, my husband and I both registered, but I haven't had any messages through on my phone even in the May event we didn't get any."*

Wivenhoe Dam

*"I think the council has also done some work with sirens, but you can't hear them."*

Wivenhoe Dam

*"I have contacted the council about it and they just said it wasn't their problem really, so I actually went up to the dam and contacted the man at SunWater and we had a long conversation because the council thought that we would get a notification when the gates were going to be open and they (SunWater) said no, they don't, because they don't have anybody's number, they don't know who lives along the river and they said, no, it is not their policy. But they do contact our Rowing Club, and the Ski club."*

Ross River Dam

*"I got a text through SES. Also police were doing their job, getting around house to house and just general chatter within the community, pretty hard to avoid what the community is concerned about."*

EJ Beardmore Dam

### 3.3 Impact on preparations for future events

Residents living in the vicinity of Wivenhoe Dam are the community most likely to have altered their planning behaviour for future events as a result of past flooding events. Most are on alert for changes in the weather, changes to river heights and any warnings or notifications. While some have received notifications from the dam operator in the past there is a general view that these are not reliable, due to a perception that they are not timely or distributed to everyone at risk.

While most in the Wivenhoe Dam area believe that the risk of flooding associated with water release from the dam is high, apart from monitoring conditions, evidence of the development of formal emergency plans is low. Some say this is because their only option is to evacuate (and quickly). Others say they cannot formulate an emergency plan until they know which roads will be cut by flooding.

Formal plans are also rare among those interviewed in Emerald or St George. A reliance on community word of mouth or 'gut instinct' about when to evacuate is the extent of the informal plans held by most. Basic emergency kits (battery radio, candles) are held by some. Because floods in these areas are considered to be slow moving, allowing adequate time to plan, such emergency plans are not considered essential - this is especially the case if property damage has not been experienced in past events.

Townsville respondents consider the risk of flooding associated with a water release from the Ross River Dam to be very low. They are however more likely than respondents in other regions to have a well-stocked emergency kit and to have important personal documents securely stored. This behaviour is due to the high risk of cyclone, rather than a perceived high flood risk.

#### **Verbatim comments**

*"Both events we had lots and lots of time to get out, we took our cars over to a friend's place, we took our furniture out to a friend's cotton farm."*

Fairbairn Dam

*"Yes (I have a plan), it's called get in the car and get out of there. If you have had 5 metres of water through your house, you have no faith in bureaucracy, I have none. I sat through nearly a month before Royal Commission Hearings in Brisbane, I have no faith left in the government any more, and I hope they pick that up and run with it."*

Wivenhoe Dam

*"We have a two level track that goes down to the river, my husband and I monitor the river constantly, we also put markers along the track so that we are not mistaken if they go under, how fast they go under."*

Wivenhoe Dam

*"(I don't really have an emergency plan) Not really for flooding, but normally if a cyclone is coming, we used to leave town only because when we lived in Tully, that is what my family did, get to higher ground, so we have all our camping gear, that is all set up and ready to go and basically we head up Harvey's Range or we head Stuart way, then just stay there till it's safe."*

Ross River Dam



## 4.0 Warnings communications

### 4.1 Perceptions about roles and responsibilities for issuing notifications or warnings

Perceptions about who is responsible for issuing notifications or warnings about potential flooding associated with water releases from a dam varies by region. The council or the dam operator are the organisations most likely to be nominated by respondents as having responsibility in this regard.

Where council is identified as being responsible for issuing notifications or warnings, it is either because the dam operator is not well known by locals and or because council is considered the most likely to have the communication channels in place and the contact details of relevant residents. Where the dam operator is nominated, this is most commonly due to a belief that the dam operator has the most up to date information about the current situation and plans for releases.

Ultimately however, the source of notifications or warnings is less important than their content, timing and overall relevance. Community members have a strong perception that council and the dam operator would be working closely together during times of potential disaster.

Expectations about the roles and responsibilities of council/dam operator are consistent in both normal conditions and during times of flood.

	<b>Perceptions about roles and responsibilities for issuing notifications or warnings</b>
<b>Ross River Dam</b>	<p>Council (some say in conjunction with the LDMG) is considered best placed to deliver warnings given they are assumed to have the systems and communication channels in place to allow them to effectively target relevant residents (i.e. access to contact details and mapping and communications/distribution systems).</p> <p>Due to the low level of awareness of the dam operator there are limited to no expectations of receiving warnings from the dam operator.</p>
<b>Fairbairn Dam</b>	<p>During times of flood or emergency there is a clear view that the council would be responsible for issuing notifications or warnings, but that SunWater would be working closely with council about these matters.</p> <p>For pre-planned releases that may cause minor flooding and where advance notice is available, some say SunWater could be responsible for informing the community well in advance via notices in newspapers, radio or television.</p> <p>Some say the LDMG could be responsible (about one half of respondents were previously aware of the LDMG).</p>
<b>EJ Beardmore Dam</b>	<p>Mixed reactions are expressed in St George, with both council and SunWater being mentioned as potentially responsible. There appears to be a lack of confidence in SunWater's ability to provide timely warnings to locals as the content of these communications is perceived to be controlled from Brisbane.</p>
<b>Wivenhoe Dam</b>	<p>Seqwater is considered to be responsible for delivering notifications/warnings.</p> <p>Council is not considered to have enough knowledge of dam operations to be responsible for issuing warnings or notifications about water releases in a timely manner.</p>

#### 4.1 Perceptions about roles and responsibilities for issuing notifications or warnings (cont'd)

Perceptions about roles and responsibilities for issuing notifications or warnings	
<b>Hinze Dam</b>	<p>Because most are unaware that Seqwater is the dam operator, council is most commonly identified as the likely source of notifications or warnings.</p> <p>Others however have a view that responsibility should rest with the dam operator given they will be most aware of the situation at hand and will be able to provide the most timely and accurate information to residents. State Government or the SES are mentioned by a minority.</p>
<b>North Pine Dam</b>	<p>Seqwater is considered to be responsible for delivering notifications/warnings.</p> <p>Some say the State Government or a state based emergency services group could issue warnings. The local council is less likely to be thought of in this location (close to Brisbane), mainly because of experiences in the past where the State Government has publicly held this responsibility (e.g. during the 2011 event).</p>

##### 4.1.1 The role of the mayor

Where the council is indicated as the organisation responsible for issuing notifications or warnings, the role of the mayor is considered to be that of spokesperson or co-spokesperson for a group of relevant emergency planning experts. Most would prefer to hear direct from the committee leader in association with the mayor, rather than solely from the mayor.

#### 4.2 Perceptions around roles and responsibilities of individuals

Most respondents understand and accept the concept of individual responsibility in the event of flooding associated with water releases from the dam. Perceptions are consistent across locations. Any personal action is however highly dependent upon receiving warnings and or notifications both in the lead-up to and during the event.

Lead-up to event	During event	After event
<ul style="list-style-type: none"> <li>• Listen or look-out for warnings and notifications</li> <li>• Inform others about risks (especially elderly neighbours)</li> <li>• Move possessions out of harm's way</li> <li>• Consider actions that may need to be taken given the potential outcomes and when to take them</li> <li>• (For those on social media) Share information or updates with friends</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to monitor warnings and notifications</li> <li>• Take action (e.g. evacuate, move to higher ground)</li> <li>• Follow instructions from emergency services</li> <li>• Help others</li> <li>• Stay out of the way of authorities (i.e. no sight-seeing)</li> </ul>	<ul style="list-style-type: none"> <li>• Clean-up</li> <li>• Help others</li> </ul>

**Verbatim comments**

<i>"Most people would go to the city council if you wanted to find out what was happening, not the dam operator."</i>	Hinze Dam
<i>"The dam operator, they are up there, they should let out a warning. They have advance notice so they can connect with the people there. By the time you go to the council and then come back, something could happen."</i>	Hinze Dam
<i>"Council has the best infrastructure in place to be able to facilitate something like that."</i>	Fairbairn Dam
<i>"I think council would have the main resources, but would act on information from other areas, they set up a task force or group to coordinate that within the council, also the town planners, engineers, possibly engineers."</i>	Fairbairn Dam
<i>"SunWater should be involved they would be part of that whole group and anyone else who would have any decent input into an event like that, even farmers."</i>	Fairbairn Dam
<i>"If SunWater are releasing whether it is through irrigation channels or through the dam, if they are releasing more than their standard level of water, I think they should give some sort of notification, whether that is in the newspaper or something like that, if they are planning to release, my kids have grown up and I would trust that they would not go anyway, but if they are going walking up the weir fishing or something like that, well if there is going to be in 2 weeks' time an extra lot of water being released from the dam that might be a bit dangerous."</i>	Fairbairn Dam
<i>"We would assume SunWater would advise the Council and the council would have then been responsible for passing it on."</i>	Ross River Dam
<i>"Well the council have the facilities and technology and infrastructure rather than SunWater for notifying all the people, they have access to all the people, they know where we live."</i>	Ross River Dam
<i>"In general, in our situation here, the person at the dam goes and reads the level, he communicates that to the person in Goondiwindi, they then decide whether it is relevant, and then they communicate that to Brisbane and then Brisbane have a bit of a yarn about, then they communicate the message back to the person in Goondiwindi, who then goes and tells the guy in St George what he can or can't do and that might take 2 or 3 hours. By the time you get to that 3<sup>rd</sup> hour, the circumstances may be completely different and warrant a completely different decision. Back when it was operated locally, the guy locally made a decision and he communicated his decision to the council, the SES, everyone, police, immediately."</i>	BJ Beardmore Dam
<i>"Probably (an individual's responsibility is to) get your family set up straight away, have an idea of if you have to evacuate, where to, and maybe inform the neighbours as well. Just anyone you can contact."</i>	Hinze Dam
<i>"I think if it is safe enough, help your neighbours to dig trenches for example, to get the water away from your property."</i>	Hinze Dam
<i>"You just need to really follow directions. If you are helping, generally you have other people who you know that you might be helping. You can find people to assist but I think generally with flooding and any disaster, people have really got to take a bit of their own responsibility for their own safety. The last thing you want is people just driving around town to see what the flood levels are. Because if there is only the one bridge, it just adds to all of the traffic."</i>	Fairbairn Dam
<i>"I still think there must be more encouragement for the individual to look after themselves and be proactive themselves in getting the batteries, getting the radio, turning it on and listening."</i>	Wivenhoe Dam

### 4.3 Perceptions about whether registration is required in order to receive notifications or warnings

The majority of respondents in our groups were unaware they may be able to register for notifications or warnings from the dam operator or their local council and there is limited evidence of residents seeking information about flooding risks from a dam operator, the council or the LDMG. Where this has been done, it has been conducted via a telephone conversation direct with the dam (e.g. SunWater in Townsville or Seqwater in Wivenhoe) or the council (e.g. Townsville).

Informal information seeking via conversations with other local residents (especially those who have lived in the area for some time) is the most common way respondents seek and find out information about flooding risks.

	<b>Perceptions about whether registration is required in order to receive notifications or warnings</b>
<b>Ross River Dam</b>	<ul style="list-style-type: none"> <li>• People are unaware they can register for warnings from council (or any other body)</li> <li>• Perceptions are that any warnings would arrive automatically (either via text, landline phone call, mobile phone call, email, letterbox drops or media reports) <ul style="list-style-type: none"> <li>○ Reinforcing this view is the arrival of automatic messages in the past in association with cyclone notifications/warnings</li> </ul> </li> </ul>
<b>Fairbairn Dam</b>	<ul style="list-style-type: none"> <li>• Those who use water for irrigation are more likely than others to be on SunWater's distribution list – due to having to pay for their water and wanting to know when they can harvest water</li> <li>• Perceptions among the general community are that any warnings would arrive automatically (either via text, landline phone call, mobile phone call, email, letterbox drop, door knocking or media reports) <ul style="list-style-type: none"> <li>○ Reinforcing this view is the arrival of automatic messages during past flood events</li> </ul> </li> </ul>
<b>EJ Beardmore Dam</b>	<ul style="list-style-type: none"> <li>• Some say text messages are automatically received (respondents are uncertain if the messages were received from SunWater or from the SES)</li> <li>• Those who use water for irrigation are more likely than others to be on SunWater's distribution list – to know when to move farming equipment (i.e. pumps) before water is released</li> </ul>
<b>Wivenhoe Dam</b>	<ul style="list-style-type: none"> <li>• Based on variable past experiences (i.e. some messages not being received by those who were pre-registered for notifications/warnings) views are mixed, although ultimately respondents feel all local community members have a right to be warned or notified of such events</li> </ul>
<b>Hinze Dam</b>	<ul style="list-style-type: none"> <li>• Registering for notifications or warnings has not previously been considered by respondents as they do not feel in danger of a flood – most assume they would automatically be notified if they or their property were at risk</li> </ul>
<b>North Pine Dam</b>	<ul style="list-style-type: none"> <li>• Perceptions are that any warnings would arrive automatically (either via text, landline phone call, mobile phone call, email, letterbox drops or media reports)</li> </ul>

**Verbatim comments**

*"There is also the technology where they can actually use our mobile phones to contact us without registration, that is common in Tasmania in fire areas, they all get SMS's."*

Hinze Dam

*"I know we got messages. Wife got a text message on her mobile which I thought was pretty good. I don't know how they got the number."*

Fairbairn Dam

*"Technology, I am too old, I am sure with all the phone towers around the place, if you are within a certain distance of a phone tower, it would automatically be sent out to every phone in that area."*

North Pine Dam

*"I believe everybody should be warned, people along the river line first and then blanket everyone else."*

Wivenhoe Dam

#### 4.4 Perceived difference between a notification and a warning

Most respondents see a clear difference between the terms: 'notification' and 'warning', namely that:

- a notification is considered to be providing information or advice about something that is going to happen in the future, but does not require an urgent response
- a warning is considered to be more important, to have a more urgent tone and implies the recipient is potentially in danger and requires action immediately.

The exception to this is among some of those living close to the Hinze Dam or the EJ Beardmore Dam who are likely to either see no difference in the meanings of the two terms or to think the reverse of that stated above.

**Verbatim comments**

*"A notification is just to be aware of what could happen, and the warning is, get ready, it's about to (hit)."*

Hinze Dam

*"(There's) A lot more urgency with a warning, if they had sent us a lot of information out early for both flood events, that would have just been notification, like there is going to be a lot of rain, but when the actual warnings came out, particularly from the SES, that was more urgent."*

Fairbairn Dam

*"A notification would be online to say this will happen. A warning is you need to look at taking action because this is going to happen. Notification is yep, we are going to let a little bit of water out of the dam, we are going to drop the gates for a little bit, whereas a warning would be, we need to release a substantial amount of water from the dam, you are going to need to take action."*

Ross River Dam

#### 4.5 Awareness of Local Disaster Management Group

Awareness of the Local Disaster Management Group (LDMG) is strongest, though not universal, in the Emerald region and evident to a minor extent in the St George, North Pine or Townsville areas. In other regions there is no awareness of the LDMG among our respondents.

This type of disaster management group (which respondents imagine would consist of council, the dam operator, emergency services and experts in flooding and disaster management) is however considered the most logical party to be responsible for issuing notifications or warnings.

The potential downfall with this system noted by respondents is that messages could be delayed if input from multiple agencies is required each time a message is sent.

## 4.6 Concerns about dam notifications or warnings communications

Apart from those living downstream from the Wivenhoe Dam, most respondents have few concerns currently about dam notifications or warnings. This view is typically due to trusting that the dam operator and or council will act to protect them (i.e. operate the dam safely and/or monitor and minimise risks appropriately) or because they do not consider flooding associated with dam releases a likely risk.

Concerns that are mentioned are:

- that elderly people without access to technology will miss out on vital messages
- that a reliance on electronic communications for warnings will mean that messages cannot be distributed once power is lost
- the potential for too many notifications/warnings to be delivered and therefore there being a risk that the community will become complacent (this includes the media over-stating a risk, which may result in future warnings being less impactful)
- the potential for notifications/warnings to be geographically irrelevant to the recipient.

### **Verbatim comments**

*"You become a bit complacent, you get blasé all the time because there is cyclones from here to kingdom come and all of them are coming for you and none of them ever do."*

Fairbairn Dam

*"The media sensationalise it all and it ends up having the opposite effect because people just go, whatever."*

Fairbairn Dam

*"But will it get to the point we become immune to it like you think when all the (warnings come during) cyclone season, whatever, do we then become immune? And like with those ads, we don't pay attention, how many SES ads do we see. Getting bombarded with that sort of information is just too much, you become complacent about it and you will just think, oh it's not so bad, she'll be right."*

North Pine Dam

*"Power is a problem too, for us who live up this way, Kelso cuts out very easily and to rely on being notified when we may not have power and radio and TV, they say keep your TV on and you try and conserve your battery so you don't have them on all the time."*

Ross River Dam

## 4.7 Messaging expectations

People at risk expect to receive timely, up-to-date, relevant and detailed communications via multiple channels without having to pre-register. Residents assume current technologies, council databases and council communications infrastructure provide the ability for warnings or notifications to be automatically broadcast to relevant people at risk. They believe Local and State Governments have the ability to identify and target people via rates notices, registration/licensing, electricity bills or mobile phone towers.

	Minor event	Major event	Fast onset						
<b>Timing of initial message</b>	As soon as issue is evident. Ideally, at least 24-48 hours prior to impact.	As soon as issue is evident. Ideally, up to one week or at least 24 hours prior to impact.	As soon as issue is evident.						
<b>Follow up message intervals</b>	4-24 hourly or more frequently if the situation changes.	1-4 hourly or more frequently if the situation changes.	30-60 minutes, or more frequently if the situation changes.						
	Each message should contain details of when the next regular update will be issued so that residents know when to re-check.								
<b>Channel</b>	<p>Regardless of the type of event (minor/major/fast onset), residents living downstream from dams suggest warnings or notifications be distributed via multiple channels to maximise the opportunity of people receiving the message.</p> <p>For any event the following channels are expected:</p> <ul style="list-style-type: none"> <li>• Text message to mobile</li> <li>• Recorded message to landline</li> <li>• Media reports (radio and television).</li> </ul> <p>Occasions when other specific channels are relevant are detailed below by event type:</p> <table border="1"> <thead> <tr> <th>Minor event</th> <th>Major event</th> <th>Fast onset</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>• Email</li> <li>• Roadside signage</li> <li>• Facebook Website</li> <li>• Letterbox drops</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>• Email</li> <li>• Roadside signage</li> <li>• Facebook</li> <li>• Siren in street/town</li> <li>• Emergency siren on broadcasted warnings (TV/radio)</li> <li>• Door knocking</li> <li>• Website</li> <li>• Letterbox drops</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>• Siren in street/town</li> <li>• Emergency siren on broadcasted warnings (TV/radio)</li> <li>• Door knocking (police/SES)</li> <li>• Facebook (time permitting)</li> </ul> </td> </tr> </tbody> </table>			Minor event	Major event	Fast onset	<ul style="list-style-type: none"> <li>• Email</li> <li>• Roadside signage</li> <li>• Facebook Website</li> <li>• Letterbox drops</li> </ul>	<ul style="list-style-type: none"> <li>• Email</li> <li>• Roadside signage</li> <li>• Facebook</li> <li>• Siren in street/town</li> <li>• Emergency siren on broadcasted warnings (TV/radio)</li> <li>• Door knocking</li> <li>• Website</li> <li>• Letterbox drops</li> </ul>	<ul style="list-style-type: none"> <li>• Siren in street/town</li> <li>• Emergency siren on broadcasted warnings (TV/radio)</li> <li>• Door knocking (police/SES)</li> <li>• Facebook (time permitting)</li> </ul>
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	<b>Minor event</b>	<b>Major event</b>	<b>Fast onset</b>
<b>Source</b>	<p>The preferred source (author) of messaging varies depending on region, as discussed under section 4.1.</p> <p>For consistency and credibility, most respondents believe that a single source for all messaging would be better than receiving different messages from different sources.</p> <p>The exception to this is Facebook where a range of groups might be expected to have a Facebook page (e.g. council, LDMG, QPS, SES). Door knocking would be expected from police or SES workers.</p> <p>Pre-event advice such as flyers inserted with rates notices/electricity bills are considered a good way to educate people about the notification/warning systems that will be used in emergency events.</p>		
<b>Audience</b>	Anyone likely to be affected.	Anyone likely to be affected, plus wider community (provided messaging details specific areas of impact). *	Anyone likely to be affected, plus wider community (provided messaging details specific areas of impact). *
<b>Final message</b>	Once waters have peaked.	Messages should continue after the peak to provide further information on available support, clean-up activities and highlight any ongoing risks.	Messages should continue after the peak to provide further information on available support, clean-up activities and highlight any ongoing risks.
	Whenever the final message is delivered, it should be stated that that is the final message and a link to further information or available assistance be provided.		
<b>Information needed</b>	<p>Information needed is consistent across event type:</p> <ul style="list-style-type: none"> <li>• Likely timing (start of event, peak of event predictions, likely end time)</li> <li>• Who will be impacted (suburb/part of town or specific streets)</li> <li>• How will people be impacted (river height, damage/risks likely/animals or farming equipment at risk)</li> <li>• What should people do (if evacuation is recommended – where to go, if sand-bagging is recommended – where to get sandbags from)</li> <li>• Phone number or other point of access for more information</li> <li>• Details on next update</li> </ul>		

\* It is considered important to inform the broader community so that people not directly affected can help those who are affected by offering physical assistance or places to stay.

#### 4.7.1 Tourists or visitors to the area

Respondents suggest that warnings be automatically distributed to anyone (via SMS) in the area during an event to ensure that tourists or visitors to the area also receive the warning.

#### 4.7.2 Pre-registering to receive notifications / warnings

A small number of respondents consider that pre-registration would be necessary in order to receive notifications or warnings from authorities. They recognise however that efforts would be needed to ensure the community was fully aware of the register and to encourage people to sign up (and then to keep the register updated when their phone or email address changes).



**Verbatim comments**

<i>"When you involve the word 'flood', if they have the capacity to send them a text message, they must, might as well."</i>	Fairbairn Dam
<i>"SMS can be an immediate way of getting the message out, (especially if) you don't expect the people to turn the radio on."</i>	Fairbairn Dam
<i>"Updates (should come) as the situation changes. If the situation is staying the same, then maybe once every 24 hours, but if it is changing every couple of hours (send them more often)."</i>	Fairbairn Dam
<i>"You could have travellers coming through, and they are not getting any warning, sit down underneath bridge, and may not know we have a dam. So people should not have to register for warnings."</i>	Fairbairn Dam
<i>"Council have the data, I rang up the other day to change my bin over, they had my details, so I could say exactly who I was. Most people would now have a mobile phone number..., the council have SMS."</i>	North Pine Dam
<i>"At the end of the day, you are never going to satisfy everyone. If it's about getting it out there, for example, I find that the SMS, if you find more people out there, somebody knows someone, and as you say your mum gives you a call, the message gets along (to others)."</i>	North Pine Dam
<i>"I still think one of the best is radio. If TV is down, internet is down, everything else is down, you will find the radio will work."</i>	North Pine Dam
<i>"Notifications before an event happens so if they are going to open the gates or whatever, they should let people know beforehand, (a) prior indicator as opposed to imminent danger."</i>	Wivenhoe Dam
<i>"If they know there is going to be minor flooding, say releases from the dam, why can't they give a minimum of 24 hours' notice."</i>	Wivenhoe Dam
<i>"They must make a decision at some point when they are going to do it, they must all get together, their engineers and everybody, and decide, at that point they should notify us."</i>	Ross River Dam
<i>"(What should they tell you?) What the time frame is, what the expected water rise is to be, what the duration would be."</i>	Ross River Dam

## 4.8 Other feedback

### 4.8.1 Identifying people or areas at risk

In preparing to conduct this research it was noted that there was no publically available listing of dwellings/properties at risk of flooding as a result from water releases from the local dam. While colour coded maps are available in PDF format via the Emergency Action Plans for each dam, as a community member it would be difficult to assess one's personal level of risk using these documents.

### 4.8.2 Using sign language during press conferences

One respondent notes that his son, who is deaf, complains that during emergency televised press conferences the vision finishes or cuts away as soon as the speaker finishes but before the sign language interpreter has finished. This means his son often misses important details.

### 4.8.3 Minimising flooding impacts

There is a view expressed in St George, Townsville and Wivenhoe that many problems (especially degradation of the riverbank but also flooding) could be avoided or reduced if the dam operator released water slowly in anticipation of incoming flows, rather than waiting until what appears to be the 'last minute' to release large volumes of water quickly. The same is also suggested in relation to the closure of dam gates.

### 4.8.4 Mobile phone jamming and radio reception in Wivenhoe Dam area

A number of Wivenhoe residents note that their mobile phone services were unavailable (i.e. jammed with too much activity) during the 2011 event.

While battery powered radios are nominated as a useful notification/warning channel, especially after landlines go down once the power is lost, many report not having good radio reception at home.

While these issues were only specifically mentioned in Wivenhoe they are potentially likely to occur in other regions.

### 4.8.5 Dam safety awareness days

In regions such as Townsville, where interaction with and knowledge about the dam is low, a dam familiarisation event is suggested by respondents. For example, a "Family Fun Day" where families can visit and enjoy facilities with a chance talk with emergency services personnel and the dam operator.

### 4.8.6 Road access and time of day

When notifying people by SMS to evacuate, some consideration should be given in regards to:

- ensuring the access roads out of the area are safe (i.e. not flooded)
- ensuring roads provide adequate capacity - in the case of many people leaving an area at the one time (this is especially the case in areas where there may be only one access road)
- the time of day the message is delivered (it is very difficult to take action during the night given there is no light).

## 5.0 Reactions to warnings communications examples

### 5.1 Text messages sent during Callide Valley 2015 event

Three examples of text messages were presented to respondents in order to gauge reactions:

1. Flood Warning from Banana LDMG. Water releasing Callide Dam. Threat to Life and Property. Jambin & Goovigen leave area now or seek higher ground. Listen to radio
2. SunWater Callide Dam Flood ALERT NOTIFICATION: D/S flooding expected – rapid rises REFER [www.bom.gov.au](http://www.bom.gov.au) and Local Emergency Mgt Groups for more info
3. SunWater Callide Dam Flood ALERT NOTIFICATION: Flood Stage 4 currentflow = 298000ML/day. REFER [www.bom.gov.au](http://www.bom.gov.au) and Local Emergency Mgt Groups for more info

**Message #1 - Flood Warning from Banana LDMG. Water releasing Callide Dam. Threat to Life and Property. Jambin & Goovigen leave area now or seek higher ground. Listen to radio**

This message is deemed the most useful of the three tested. The message clearly indicates to people that an emergency situation is at hand, that action needs to be taken and that recipients can find out further information if needed (listen to radio).

The message is considered easy to understand because it uses everyday language.

Information perceived to be missing from this message includes information on where to go, a phone number to call for more information and a more specific timeframe.

Some respondents say if areas in between Jambin and Goovigen were also likely to be impacted, this should also have been stated in the message. Without this there is a risk that people outside the two stated areas would have considered the message irrelevant.

**Message #2 – SunWater Callide Dam Flood ALERT NOTIFICATION: D/S flooding expected – rapid rises REFER [www.bom.gov.au](http://www.bom.gov.au) and Local Emergency Mgt Groups for more info**

**Message #3 - SunWater Callide Dam Flood ALERT NOTIFICATION: Flood Stage 4 currentflow = 298000ML/day . REFER [www.bom.gov.au](http://www.bom.gov.au) and Local Emergency Mgt Groups for more info**

Messages #2 and #3 are considered unhelpful, especially during times of emergency. The technical nature of these messages means they have little meaning for the lay person. More specifically:

- Abbreviations such as D/S or ML are not understood
- While farmers have an understanding of the volume of water represented by 298,000ML, most others do not
- The reference to the Bureau of Meteorology website homepage is considered unhelpful; respondents anticipate it would be too hard to find specific information of interest
- Most do not know about their Local Emergency Management Group or how to contact them.

## 5.2 Rural Fire Service warnings







The concept of a multi-staged warning protocol (similar to the Rural Fire Service warning system pictured below) is considered potentially useful by many respondents. Critical to its success however would be a significant education program aimed at residents to ensure universal understanding of the actions required under each stage.

Additionally, others suggest a numbered system to communicate the severity of the flood. Similar to that used in cyclones (categories) which, after education, would provide an easy way of communicating the type of event or damage that could be expected.




Queensland Fire and Emergency Services  
Rural Fire Service Queensland

# Information & Warnings

## What do warnings mean?

 <p><b>ADVICE</b></p> <p>There is a fire in your local area, access information and monitor conditions.</p>	
 <p><b>WATCH &amp; ACT</b></p> <p>Fire is heading toward you, conditions are changing and you need to take action now to protect yourself and your family.</p>	
 <p><b>EMERGENCY WARNING</b></p> <p>You are in imminent danger and need to take action immediately. You will be impacted by fire.</p>	

PREPARE.ACT.SURVIVE [ruralfire.qld.gov.au](http://ruralfire.qld.gov.au)



# Appendices

## Appendix A – Discussion guide

### *Commence recording – moderator introduction:*

Thank-you for coming to our research discussion today, my name is Therese/Jane from MCR, the independent market research company. The Inspector-General Emergency Management is conducting a review of Seqwater and SunWater (the dam operators) warnings communications. As one part of the wider review process MCR has been commissioned by the Inspector-General Emergency Management to conduct research with members of the community to help understand how the community is notified or warned of water releases from dams, both during normal conditions and during flood events, and the community needs and expectations in relation to these communications.

Today's discussion will be guided by a list of questions we are using in a number of these sessions across Queensland. I like to conduct the sessions like a round-table discussion and encourage you to let me know your thoughts. I'm audio taping the session today, this will help me when preparing the report. Your identity will remain anonymous at all times. A transcript of the session may be prepared and provided to the Inspector-General Emergency Management's review team however no names will be included in that transcript and in the report the findings will be presented in aggregate form so that individuals cannot be identified.

### **Warm up**

- I'd like to firstly start by going around the table and asking you all to introduce yourself, tell me how long you have lived in the area, who's in your household and what sort of work/study you are involved in or if you are retired or at home at the moment.

### **Interactions with dam operator**

- Are you aware of the name of your local dam?
- Who operates the dam?

*Moderator note: inform respondents of dam name and operator if they do not know.*

- Do you know if the dam in your local area has gates or not?
- What is your understanding of why some dams have gates and some do not?
- To the best of your knowledge, are there any risks to people or property associated with flooding from water being released by the dam? *If yes:*
  - What are the risks? (*Moderator note potential risks are: loss of life, property damage, road/bridge closures or damage, infrastructure/essential services damage (i.e. water, power, sewerage), economic loss (i.e. loss of agriculture or businesses) and/or long term disruption to community (rebuilding and recovering)*)
  - How do you know about these? (*Moderator note: for example, personal experience, know someone with this type of experience, heard or saw in media during past events*)
  - How likely is it that this or these situations would ever eventuate in your area? Why is that? Or why not?

<i>Notes for moderator</i>			
<b>Dam name</b>	<b>Location</b>	<b>Gated</b>	<b>Owner/Operator</b>
Ross River Dam	Townsville	Yes	Owned by Townsville Council, operated by Sunwater
Fairbairn Dam	Emerald	No	Sunwater
Hinze Dam	Nerang	No	Seqwater
North Pine Dam	Kallangur	Yes	Seqwater
EJ Beardmore Dam	St George	Yes	Sunwater
Wivenhoe Dam	Lowood	Yes	Seqwater

**Moderator notes****Information from Seqwater website re gated/ungated dams for information**Gated dams

A gated dam is a dam that has been built to enable the operator of the dam to have some control over the release of floodwater. Once a gated dam reaches its Full Supply Level, the operator of the dam can control the release of water over the spillway of the gated dam using the gates on the spillway. Gated dams can potentially mitigate the impacts of a flood through the controlled release of water, although care must be taken to not hold back too much water and cause the dam to fail. The dam operator must also take care that released water does not combine with downstream floodwaters to worsen flooding. This can be difficult as water released from gated dams can take more than 24 hours to reach populated areas which can receive flood water from a variety of sources (not just the gated dam). Gated dam water releases aim to mitigate the impacts of flooding – a controlled release of water from a gated dam will not necessarily result in downstream flooding.

Un-gated dams

An un-gated dam is a dam that has been built in a way that means the operator of the dam has no control over water spilling from the dam once the dam water level surpasses the Full Supply Level. When inflows to an un-gated dam increase the water level beyond the dam's Full Supply Level, water begins to flow over the dam wall, down a spillway. The spillway of each dam is at a lower height than the dam embankment so that water can flow over the spillway and safely out of the dam. All un-gated dams help mitigate flooding to some extent. This is because the peak flow from an un-gated dam during a flood event is always less than the peak flow that would have occurred had the dam not been built, because some water is held back in the dam while it is spilling.

**Resilience**

- Have you been affected by a flooding event in the past?
- How were you affected? (*Moderator note: may refer back to the risks identified in previous section*).
- Did you receive any notification or warnings prior or during this event? If yes, who was it from and how did you receive it?
- Did this experience change the way you prepare for future events?
  - If so, how?
  - If not, why not?
- Do you have an emergency plan for flooding? Did you develop this as a result of your experience? If not, what prompted you to develop it?

*Moderator read out:*

As you may know, sometimes a dam will release water by opening its gates or via water overflowing the spillway. The opening of gate may be to release pressure on the dam structure (as part of its safety operations) or to manage potential backup of water upstream of the dam. This release of water can sometimes result in areas downstream from the dam being inundated with water. The release of water could occur during normal conditions, or on top of already occurring flooding events.



### Warnings communications

- Before today, who would you have thought was responsible for issuing notifications or warnings to local residents about potential flooding associated with water releases from the dam?
- How do you think local community members currently receive notifications or warnings?
- Do you have to register or do you automatically receive them if you live in the area? *(Moderator note: The public may register for notifications (sent by sms or email) from the dam operator (Seqwater or SunWater) and also in some cases from the local council. In some high risk cases, an Emergency Alert may be sent through the State Disaster Coordination Centre and this would reach all mobiles located within in a specific area at potential risk)*
- Have you ever sought information or tried to find out about for notification or warnings communications from:
  - The dam owner/operator {Sunwater/Seqwater}?
  - Local council?
  - The Local Disaster Management Group (LDMG)? *(moderator see notes over page)*
    - Have you heard of this group before?

For each organisation contacted ask:

- How did you seek this information (phone, in person, website, email, other)?
- What information were you after?
- Did the information provided adequately answer your query? If not, why not?

### Moderator notes on LDMG

- *Moderator note: The Local Disaster Management Group (LDMG) is made up of key stakeholder agencies and organisations that collaborate to prepare for and manage disaster events in a local government area. The group is chaired by the local council, and includes representatives from emergency service agencies (police, fire, ambulance etc.) and other organisations the council believes may be needed to help the community (e.g. this may include Department of Communities, Queensland Health, essential service or critical infrastructure representatives, Red Cross, or other community groups and others). The group is responsible for helping the council to write their disaster management plan, and will activate when an event may need to be managed collaboratively to help the community prepare for, respond to or recover from an event such as major flooding. When activated the group will be situated in a Local Disaster Coordination Centre (LDCC), which is usually located at the council chambers.*
- *The council will be the entity that owns the opt-in warning system. The LDMG is a group of stakeholders that conduct planning, response and recovery activities, but the council is primarily responsible for managing disaster events under the legislation. The council is the chair and lead agency within the LDMG. When an event occurs, the group will activate its LDCC and will run its operations out of that centre. Members of the public may, however, have contacted the LDCC directly for information during an event, if the council has provided a contact number... General warnings i.e. over media, may go out under the name of the LDMG but it would be the Chair of the LDMG (usually the Mayor) who provides such information.*
- *Note: Keep in mind that LDMG will not have the opt-in text based systems, the council will... LDMG may issue warnings, alerts etc. via social media, other forms of media, or may issue an emergency alert through the State Disaster Coordination Centre (located at the Emergency Services complex at Kedron in Brisbane).*

#### *Residents registering for warnings*

- Have you ever registered to receive a notification or warning from {Sunwater/Seqwater}/local council/LDMG?
  - What prompted you to do this?
  - How hard or easy was this to do?
  - If not, why not? Did you know you could register to receive notifications or warnings? *Moderator note: They may be different in different areas and this is what we want to determine. People choose to register for the notifications from the dam operators or the councils. Also see above – Seqwater and Sunwater have opt-in systems. Some councils will also have similar opt-in systems, but not all of them.*

#### *Residents receiving warnings*

- Have you ever received a notification or warning about dam releases or flooding from {Sunwater/Seqwater}/local council/LDMG?
  - What was this in response to?
  - How useful was this? Why?
  - If not, why not?

#### **Notification versus warning**

- What do you think, if anything, is the difference between a “notification” and a “warning”?
  - What does this term notification mean to you?
  - What does the term warning mean to you?
- Would your thoughts be different if the communication about the water release was made during normal conditions, or if it was made during a rain event where there may already be some potential for flooding?

#### **Concerns about warnings**

- Do you have any concerns about dam notifications or warnings communications? What are these? How do you think they can be addressed?

### Roles and responsibilities

- If the dam had to release water by opening its gates or via the spillway and flooding was likely, what, if anything, would you expect in terms of being warned about this event by the **dam owner/operator**? What would you expect them to do?
  - *Probe with: issue warnings to local residents via text/phone call/household visit, issue warnings via the media, issue warnings via their website or social media, clean up and recovery*
- If the dam had to release water by opening its gates or via the spillway and flooding was likely, what, if anything, would you expect in terms of being warned about this event by the **local council**?
  - What would you expect of the Mayor of your local council?
  - *Probe with: issue warnings to local residents via text/phone call/household visit, issue warnings via the media, issue warnings via their website or social media, clean up and recovery*
- If the dam had to release water by opening its gates or via the spillway and flooding was likely, what, if anything, would you expect in terms of being warned about this event by the **LDMG**?
  - *Probe with: issue warnings to local residents via text/phone call/household visit, issue warnings via the media, issue warnings via their website or social media of member agencies (e.g. police, fire, ambulance, Qld Health, SES, recovery groups like Red Cross/Communities), clean up and recovery*
- If the dam had to release water by opening its gates or via the spillway and flooding was likely, what, if anything, would you expect **YOUR** roles and responsibilities to be:
  - In the lead up to the event?
  - During the event?
  - And after the event?

*Probe with: enact an emergency plan, warn neighbours/family, listen/check for warnings, evacuate, clean up*

#### Notes for moderator:

- *Re Local councils: Keep in mind that smaller or regional councils may not have opt-in systems available, so the expectations may be different from the community in urban areas versus rural...*
- *Remember LDMG is a group of stakeholder agencies that will all have individual information etc. available to the public on their respective websites etc., but the council will be the point of truth for what goes out from the LDMG.*

### Expected messaging

If a flood event was likely to occur that would potentially affect you and your property, and the dam operator decided to release water from the dam, let's talk about the communication that you would expect to receive.

#### Three scenarios:

- If the event was projected to cause minor flooding, when should the initial message be received – how far before the event? OR In an ideal world, how much time would you need to prepare for this? - then go to questions below
- If the event was projected to cause major flooding, when should the initial message be received, how far before the event? OR In an ideal world, how much time would you need to prepare for this? - then go to questions below
- If the event was fast onset, for example a supercell storm, when should the initial message be received, how far before the event? OR In an ideal world, how much time would you need to prepare for this? - then go to questions below

#### For each scenario ask:

- How should it come? (*probe on: SMS, phone call to landline, phone call to mobile, email, posted on a website, media such as TV or radio, social media*)
- Who should the message come from? (*probe on: dam operator, local council, LDMG*)
- Who should get the message? (*probe on: only those who had registered, only those who live in the area immediately downstream of the dam (e.g. within 10km of the dam), only those who live in the areas expected to be affected, or anyone physically present in the geographic area expected to be affected at the time*)
- What information do you need in this message?
- Would you consider this message should be a notification or a warning?

And after that initial message, what other messages would you expect in the lead-up to and during the event:

- How often would messages be received and when would they be received?
- How should they come? (*probe on: SMS, phone call to landline, phone call to mobile, email, posted on a website, media such as TV or radio, social media*)
- Who would the messages come from? (*probe on: dam operator, local council, LDMG*)
- Who would get the messages? (*probe on: only those who had registered, only those who live in the area immediately downstream of the dam (e.g. within 10km of the dam), only those who live in the areas expected to be affected, or anyone physically present in the geographic area expected to be affected at the time*)
- What information would you need in these messages?
- Would you consider these messages should be a notification or a warning?
- At what stage would you expect the messages to cease?

REPEAT FOR NEXT SCENARIO

#### Opt-in to messages

- Should people have to register to receive these notifications or warnings?
  - If yes, how can they be made aware of this?
  - If no, what should happen in this case?

### Past warnings

Here are some example SMS warnings: **(HANDOUT 1)**

1. Flood Warning from Banana LDMG. Water releasing Callide Dam. Threat to Life and Property. Jambin & Goovigen leave area now or seek higher ground. Listen to radio
2. SunWater Callide Dam Flood ALERT NOTIFICATION: D/S flooding expected – rapid rises REFER [www.bom.gov.au](http://www.bom.gov.au) and Local Emergency Mgt Groups for more info
3. SunWater Callide Dam Flood ALERT NOTIFICATION: Flood Stage 4 currentflow = 298000ML/day . REFER [www.bom.gov.au](http://www.bom.gov.au) and Local Emergency Mgt Groups for more info

For each warning separately ask:

- o How hard or easy is this message to understand?
- o What action would you take if you received this message?
- o At what stage of an event do you think this message would be distributed?
- o How could they be improved?
- o What information is missing? What do you need to know? Keeping in mind that text messages are limited to 140 characters or less

*Once all discussed, ask:*

- o Of the three messages, which do you consider a warning and which a notification?

### Other examples

For bush fire, Queensland Fire and Emergency Services Rural Fire Service use three different warning stages, similar to a traffic light system, for example **(HANDOUT COLOUR PAGE)**

### Advice

There is a fire in your local area, access information and monitor conditions.

### Watch and Act

Fire is heading toward you, conditions are changing and you need to take action now to protect yourself and your family.

### Emergency Warning

You are in imminent danger and need to take action immediately. You will be impacted by fire.

- What do you think of this approach?
- What information could they deliver that would be relevant in a flood situation at each of these stages (e.g. advice, watch and act, emergency)
- How do you think each stage of message should be delivered, and in what circumstances?

Any other comments or concerns?

### Moderator read out:

Thank-you for your feedback today. I just wanted to remind you that this research is about understanding community information needs generally. If you are concerned or want to know more about the risks in your local area you can contact your local council or the general inquiry number at Seqwater or SunWater.

If you wish to provide any further information to the Inspector-General Emergency Management about this review, you can provide a written submission to [info@igem.qld.gov.au](mailto:info@igem.qld.gov.au) by close of business Friday 14<sup>th</sup> August, 2015.

Thank-you again for your time today.

## Appendix B – Handouts

### Handout 1

1. Flood Warning from Banana LDMG. Water releasing Callide Dam. Threat to Life and Property. Jambin & Goovigen leave area now or seek higher ground. Listen to radio
2. SunWater Callide Dam Flood ALERT NOTIFICATION: D/S flooding expected – rapid rises REFER [www.bom.gov.au](http://www.bom.gov.au) and Local Emergency Mgt Groups for more info
3. SunWater Callide Dam Flood ALERT NOTIFICATION: Flood Stage 4 currentflow = 298000ML/day . REFER [www.bom.gov.au](http://www.bom.gov.au) and Local Emergency Mgt Groups for more info

# Information & Warnings

## What do warnings mean ?



### ADVICE

There is a fire in your local area, access information and monitor conditions.



### WATCH & ACT

Fire is heading toward you, conditions are changing and you need to take action now to protect yourself and your family.



### EMERGENCY WARNING

You are in imminent danger and need to take action immediately. You will be impacted by fire.



PREPARE.ACT.SURVIVE

[ruralfire.qld.gov.au](http://ruralfire.qld.gov.au)

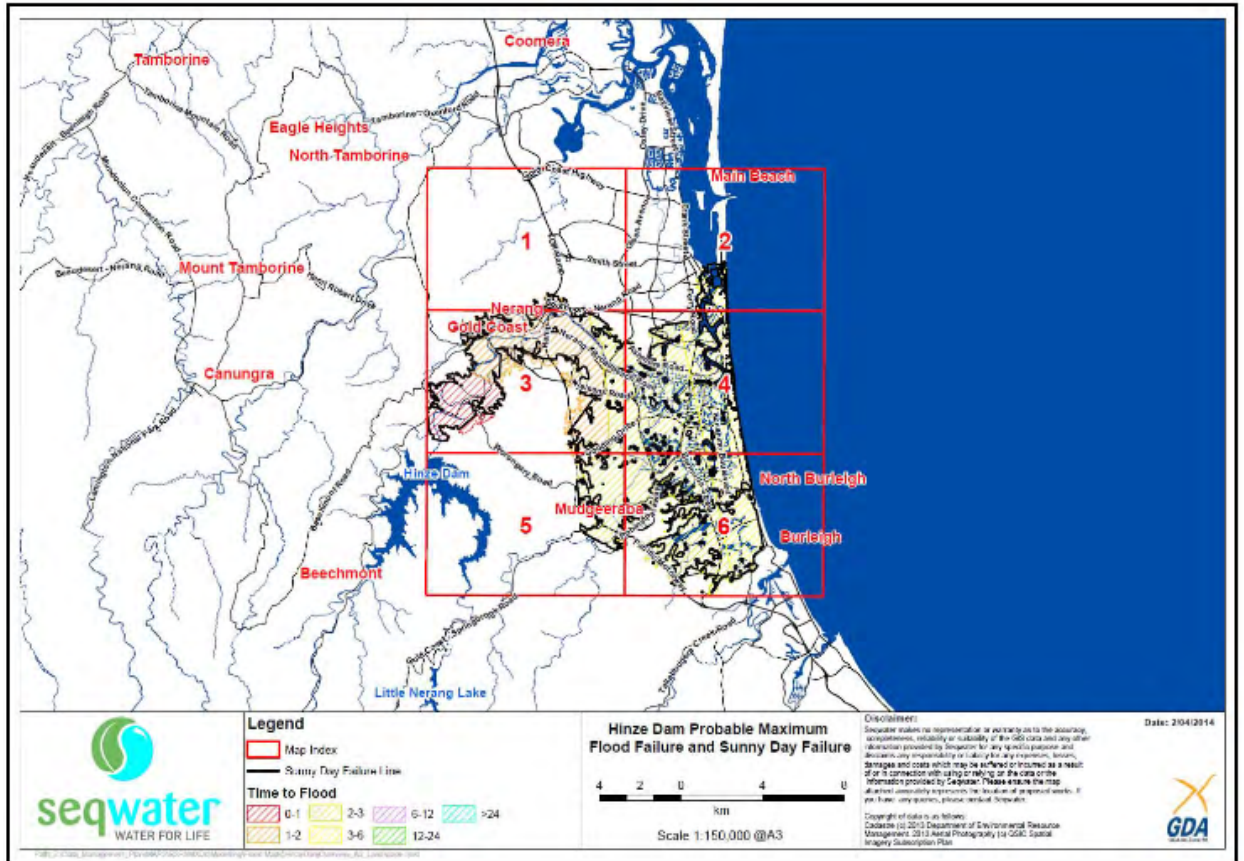




# Appendix C – Maps used in recruitment of respondents

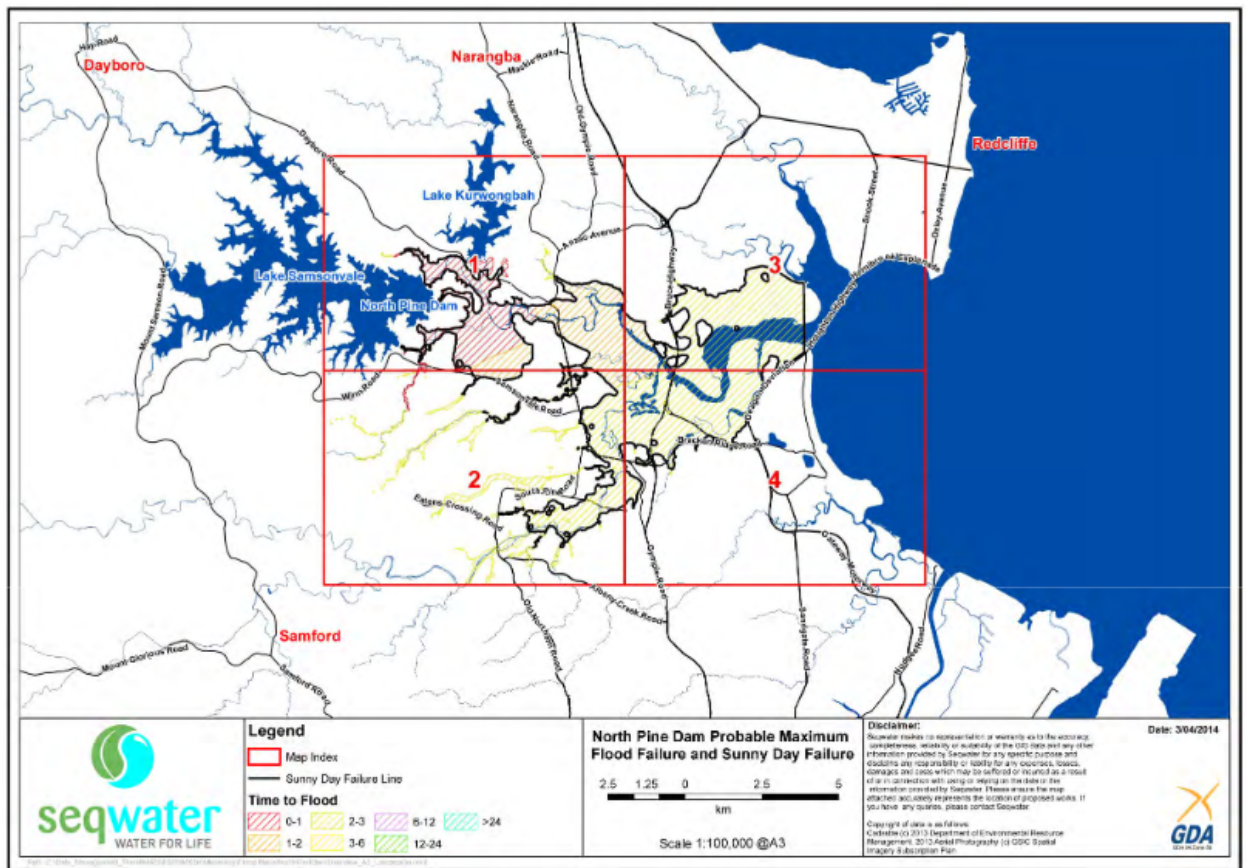
Further details on where respondents were drawn from. (See method)

**Hinze Dam – respondents were drawn from highlighted areas on Map 3 (Map Source: Hinze Dam Emergency Action Plan)**





North Pine Dam – respondents drawn from highlighted areas on Maps 1, 2 or 3 (Map Source: North Pine Dam Emergency Action Plan)



**Wivenhoe Dam – respondents drawn from highlighted areas on Maps 2, 4, 5, 6, 10 or 11 (Map Source: Wivenhoe Dam Emergency Action Plan)**

