Queensland Government

Department of Regional Development, Manufacturing and Water

Emergency Action Plan for Referable Dam Guideline

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This publication has been compiled by Dam Safety of Department of Regional Development, Manufacturing and Water, Water Resource Management Division.

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Contents

Figures

Tables

Appendices

A. EAP checklist
B. Example Quick reference guide
C. Example of escalation of Dam Hazards – Flooding
D. Example of escalation of Dam Hazards – Sunny Day Failure
E. Example of a communication protocol table
F. Examples of inundation maps
G. QFES Emergency Alert (EA) process
H. Emergency alert request form
I. Examples of AWS Messaging templates
J. Example of EAP Messaging Script
K. Emergency event report (EER) template
L. Annual Safety Statement template
M. Local government/DDMG notice template
N. Glossary

Summary

This guideline, which is an approved guideline under section 572 of the *Water Supply (Safety and Reliability) Act 2008* (the Act), is intended to assist referable dam owners and key stakeholders in developing, submitting and reviewing an emergency action plan (EAP). It also outlines the criteria that will be used by the chief executive to assess the EAP and issue an approval notice.

While this guideline is intended for referable dams in Queensland, the principles described are applicable to all dams and similar infrastructure.

This guideline has been developed by the Department of Regional Development, Manufacturing and Water with input and review from dam owners and industry stakeholders in Queensland. It reflects their knowledge and experience.

While the primary audience for the guideline is dam owners and operators the contents are intended to be informative guidance for all stakeholders.

Version history

Version	Update
1: 2017	Original version following IGEM recommendations and Act amendments, previous information relating to EAPs was provided in the Dam Safety Management Guidelines (2002).
2: 2020	Incorporating 2019 Act amendments; feedback from 2019 Dam Owners forum; IGEM 2019 Paradise Preparedness review recommendations; new section 6 Operating under an EAP; new Appendices EAP template, EAP Checklist, Maps, QFES Emergency Alert Request form, Emergency Event Report template, Annual review notice. References to DEWS (Department of Energy and Water Supply) changed to DNRME (Department of Natural Resources Mines and Energy).
3: 2021	References to DNRME (Department of Natural Resources Mines and Energy) changes to DRDMW (Department of Regional Development, Manufacturing and Water). Department website and email addresses updated. Additional clarification on Local Government Notices when the dam owner is the Local Government. Link to Qld Counter-Terrorism Strategy updated. Link provided to the Person-Centred Emergency Preparedness Framework and Toolkit. Addition of the MMI scale. Removal of Debriefing after an incident through After Action Review. New Appendix B – Quick Reference Guide. Updated from the EAP Annual Review notice to the Annual Safety Statement template.
4: 2023	Incorporated Australian Warning Systems message requirement. Updated the local government and DDMG notice template. Updated the Terrorism call priority list. New information on EAPs required to meet the web content accessibility guideline. Additional clarification on the mandatory requirement for local government notices. Moved example tables to Appendices. Clarification to the EAP annual requirements. Update to Appendix examples. New Appendix (J) example of message script to provide LDMG with EAP event information.

Disclaimer

Dam owners can be liable for loss or damage caused by the failure of or escape of water from a dam. Section 364 of the *Water Supply (Safety and Reliability) Act 2008* states:

'Nothing in this chapter affects the liability of a dam owner or operator for any loss or damage caused by the failure of a dam or the escape of water from the dam'.

The provisions of the Act will override this guideline in the event of there being any inconsistency between the Act and this guideline.

No responsibility is accepted for actions taken or any losses sustained based on reliance on an interpretation of this guideline to the exclusion of the relevant legislative provisions.

Dam owners and their agents are reminded that they must obtain their own legal and specialist technical and engineering advice about whether their actions will meet the requirements of the relevant legislation and are appropriate in their particular circumstances.

This guideline contains checklists and matters to consider. There is a risk that these checklists are incomplete as there may be other issues to consider that may be unique to a particular dam.

It is the responsibility of each dam owner to consider whether there are any matters beyond those contained in this guideline which may be of relevance to their dam.

The dam safety department is considered an informed source of knowledge in dam safety matters and is frequently asked to provide opinion or comment. This is provided within the constraints of the department's resource availability and time and is not intended to replace rigorous technical investigations to support or refute the opinion or comment.

No warranty is given to dam owners in relation to this guideline (including as to accuracy, reliability, completeness, currency or suitability) and no liability is accepted (including, without limitation, liability in negligence) for any loss, damage or costs (including consequential loss) relating to any use of this guideline.

1. Introduction

The chief executive of the Department of Regional Development, Manufacturing and Water (DRDMW) administers the *Water Supply (Safety and Reliability) Act 2008* (the Act). This guideline should be read in conjunction with the Act. A copy of the Act can be found at www.legislation.qld.gov.au.

1.1 Purpose of this guideline

The purpose of this guideline is to assist referable dam owners and key stakeholders in developing an emergency action plan (EAP). This guideline contains information on what must be included in an EAP, how to submit an EAP for approval and how to perform an annual review of an EAP. It describes the purpose and contents of an Emergency Event Report (EER). It also outlines the criteria that will be used by the chief executive to assess the EAP and issue an approval notice.

It is important to note these are guidelines only and are designed to assist referable dam owners in drafting their EAP. Notwithstanding anything in this guideline that may be interpreted as the contrary, the provisions of the Act hold force.

Emergency action planning should be viewed as a continual improvement process. This refers to a process that:

- incorporates detailed disaster risk management principles
- aligns with relevant disaster management plans
- demonstrates collaboration with all stakeholders regarding the roles and responsibilities under such a plan.

1.2 What is a referable dam?

A dam is referable if it meets the requirements of a referable dam under section 341 of the Act and threatens the personal safety of two or more persons if it were to fail. A referable dam is regulated for dam safety purposes in accordance with the Act.

A description of methodologies to identify a referable dam, including exclusions and legislative considerations, is provided in the Failure Impact Assessment guidelines (DNRME, 2018). This also describes situations when a dam is deemed as referable by the chief executive.

Only referable dams require an EAP.

1.3 What is an emergency action plan and what must it contain?

‘The emergency planning process is a sequence of steps by which an emergency plan is prepared, implemented and continuously reviewed. The planning process has a role in building the knowledge of people involved and strengthening the relationship and networks between them’.

Australian Disaster Resilience Handbook Collection Emergency Planning, second edition 2020

An EAP provides guidance for actions required as a result of any hazardous situations or emergency events occurring at a dam.

It is a hazard specific plan that informs the local government's local disaster management plan (LDMP), detailing the actions to be undertaken to minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam occurs (s. 352E(2)). The EAP is implemented by the dam owner, with support from the local government disaster management group(s) (LDMG(s)).

It is important the EAP is user-friendly as it may be used during highly stressful situations at short notice.

The EAP must:

- comply with the Act (s. 352(H))
- be accompanied by each notice given by a local government or district group and any notice responses by the owner
- state general dam information and specifications
- state the roles and responsibilities of all parties who play a role during an event
- identify dam hazards, dam hazard events and emergency events
- include inundation maps showing areas impacted by dam hazards and emergency events
- state the processes to be followed by dam personnel to manage the events
- state who, when and how the warning messages are to be delivered to downstream persons at risk including the order of priority
- align warning messages with the Australian Warning System (AWS) protocols
- include the Emergency Alert and associated polygon, both of which are to be uploaded onto the State Disaster Coordination Centre (SDCC) Event Management System powered by Noggin and tested prior to submission to the chief executive
- state who (numbered in priority order), when and how the individuals who have a role in the implementation of the EAP will be notified when a dam hazard event and/or a dam emergency event occurs
- state how the dam owner, in collaboration with the local government(s), will keep downstream residents advised of changes to the EAP and/or the dam risk profile
- be reviewed and updated prior to the wet season (1 October) each year and, along with an annual safety statement, notification provided to the chief executive advising an annual review of the EAP has been completed
- meet the requirements of the Australian Government Style Manual. For example, the EAP must be written in plain English unless there is a clear need for the use of technical language.

It is important to acknowledge the circumstances of each referable dam are not the same. While all referable dams are required to have an approved EAP, the complexity of the EAP is directly related to the impact the dam has on downstream communities.

For example, a dam owner of a farm dam with one house downstream would prepare and submit a simplified EAP that appropriately represents the level of risk for the dam.

In contrast, a large, gated dam situated upstream of a major urban area represented by multiple local government agencies would require more complexity in the EAP.

The Act (s. 352M(3)) requires the approved EAP to be publicly available with personal information being redacted. These are published by the department and accessed at https://www.business.qld.gov.au/industries/mining-energy-water/water/industry-infrastructure/dams/emergency-action-plans/map.

1.4 Suggested EAP content

There are mandatory contents of the EAP (section 1.3 and section 2). In addition, dam owners must demonstrate they have consulted with the local government (specifically the LDMG) on its content, format and warning messages to ensure it is most useful to, and consistent with, the Local Disaster Management Plan (LDMP).

Table 1 provides a non-exhaustive list of suggested content headings for an EAP. Appendix A provides a checklist of matters to consider that can also inform content.

Table 1: Suggested content headings for an EAP

Suggested content heading	Comments
Title page	Clearly identify the name of the dam, dam ID and the dam owner. Date and version of the plan. The approval period (expiry date) will be placed on the cover by the department on approval prior to publication.
Quick reference guide	The quick reference guide provides the reader with immediate access to important information (such as triggers for dam hazards) and easy navigation to relevant sections in the EAP (see Appendix B).
Preface, including: • distribution control sheet • version history • EAP authorisation table • table of contents	Noting the department does not require a controlled copy of the EAP.
Introduction and general information: • general dam description • total and incremental people at risk (PAR) • public awareness and communication • EAP training and exercise • fatigue management policy • schedule for updating EAP • control copy holders • dam monitoring (before and during events) • dam schedule of inspections (before and during events)	Information should be concise and relevant. General dam description should include a table with basic details of the dam, and relevant information relating to risks (see Appendix A).

Suggested content heading	Comments
Summary of EAP roles and responsibilities	Summary of every organisation and officer that has a role within the EAP.
Relevant dam personnel and key stakeholder notification charts	The notification table to identify priority order of contact, after hours contact details and an alternative contact.
EAP response process for each dam emergency event	Colour coded response triggers and actions for each identified dam hazard (see Section 3 and Appendix C for examples of escalation tables)
PAR notification and communication protocol (plan)	Identifying who, when and how PAR will be notified (in priority order if relevant). Note that multiple communications systems are required in case of communication failure.
Evacuation responsibilities	If appropriate and relevant to the specific dam and proximity of PAR.
Part 2: Appendices • notification contact list • event scenario maps • storage and discharge curves • drawings of dam structure • forms and log sheets • maps of dam location and catchment area • access to the site and alternative site access during adverse weather • local government and district disaster management group (DDMG) notices • references, abbreviations and definitions	When developing appendices: • dam owners, in coordination with emergency management authorities, should consider including supporting information that will help them respond rapidly and effectively to an incident • the main body of the EAP should be user-friendly, consider shifting supplementary / supporting content into appendices.

1.5 When is an EAP required for a new dam?

An EAP should be prepared and be in effect before a dam poses a life safety hazard. In this regard:

- An EAP should be considered during construction once the dam can impound water to an extent sufficient to generate PAR.
- If construction methodologies provide suitable diversion works such that impoundment cannot occur then an EAP should be in place upon completion of construction.
- The EAP may require adjustment between construction phase and completion of works.
- In the absence of any direction from the chief executive, the Act (s. 352F) requires an EAP to be submitted for approval within four months after dam construction is completed. Such a time lag between completion of construction and EAP preparation is not considered appropriate under most circumstances.

Dam owners who are considering constructing a new dam are encouraged to contact the department via email at damsafety@rdmw.qld.gov.au regarding dam safety requirements that may apply.

1.6 Is a new EAP required when a dam changes ownership?

A new EAP is required when the owner of the referable dam changes.

If the dam changes ownership, the Act (s. 366) requires the former owner to advise the chief executive within 10 business days after the change in ownership.

The advice must state all of the following:

- the name of the dam
- the date of the change in ownership
- the real property description of the land on which the dam is situated
- contact details for the new owner, including, for example, the new owner's name and address; and if the new owner is a corporation—
  - the new owner's Australian Business Number (ABN) or Australian Company Number (ACN)
  - the name of the new owner's chief executive officer (however described).

The owner is to (s. 366(2)), within 10 business days after a change in ownership of the dam, submit a revised EAP to the chief executive amending the approved EAP to:

- record the change in ownership of the dam
- make other changes to the plan required due to the change in ownership.

The former owner of the dam is to ensure all relevant dam safety documentation for the dam, including the EAP, is provided to the new owner within 10 business days after the change in ownership (s. 366 (4)).

1.7 What is the approval period of an EAP?

The maximum approval period for an EAP is five years, however the duration of approval is considered by the chief executive and can be for a shorter duration.

The approval period is to be stated within the approved plan (s. 352K(2)) prior to distribution of final approved copies to key stakeholders and publication.

1.8 EAPs are published on the department's website

All approved EAPs are published at Emergency Action plans for referable dams (s. 352M). EAPs are published for the following reasons:

- EAPs provide information on risks associated with referable dams; IGEM (2019) and Snorteland (2019) highlight the obligation to inform the community of their risks, especially if those risks change. It is recommended that dam owners be transparent with their knowledge of dam safety risks and seek to educate and inform the community when opportunities become available.

Prior to publishing, personal information is redacted or removed. Redacted information includes:

- name, address and contact details
- name of relevant dam personnel (job title, business phone numbers and business mobile after hours are not redacted)
- signatures (for example, on approval page)
- individual or property names that appear on inundation/flood maps (street names are not redacted from maps).

For any security or other concerns regarding the release of information contained in the approved EAP, make a submission in writing within 10 business days from the date of the approval letter. Concerns can be submitted via email to damsafety@rdmw.qld.gov.au. The approved EAP will be published in a form considered appropriate after taking into account any submission received within the specified time.

2. Dam owners' requirements under the Act

The EAP must be developed:

> *'…to minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam happens'* (s. 352E(2)).

As stated in s. 352H of the Act, the minimum requirements for the content of an EAP are:

(1) The emergency action plan must:

(a) identify each dam hazard for the dam; and

(b) for each dam hazard:

(i) identify the area likely to be affected by a dam hazard event or emergency event arising from the dam hazard, including, for example, by attaching to the plan maps showing areas vulnerable to flooding if the event were to happen; and

(ii) identify each circumstance that indicates a material increase in the likelihood of the dam hazard event or emergency event happening; and

Examples for subparagraph (ii):

- *an unusual amount of seepage from the dam*
- *rainfall in the catchment area of the dam*

(iii) state when and how the owner of the dam plans to warn persons who may be harmed, or whose property may be harmed, by the dam hazard event or emergency event, if a circumstance mentioned in subparagraph (ii) arises or the dam hazard event or emergency event happens, including the order of priority in which the persons or categories of persons are to be warned; and

(iv) state when and how the owner plans to notify the relevant entities for the dam if a circumstance mentioned in subparagraph (ii) arises or the dam hazard event or emergency event happens, including the order of priority in which the relevant entities are to be notified; and

(v) state the actions the owner plans to take in response to a dam hazard event or emergency event; and

(c) be accompanied by each notice given by a local government or district group under s. 352HB(3) or s. 352HC(2) for the plan, and any notice responses by the owner; and

(d) include any other relevant matter prescribed by regulation.

(2) For subsection (1)(b)(iii) the emergency action plan may provide for the dam owner to make arrangements with a relevant entity for warnings to be given by the relevant entity on behalf of the dam owner in appropriate circumstances.

A copy of the Act is available at www.legislation.qld.gov.au

Dam owners may have responsibilities under the Standard for Disaster Management in Queensland. The Standard for Disaster Management should be applied in conjunction with disaster management doctrine, good practice guidance and government policy, with particular reference to the *Disaster Management Act 2003* and the Queensland Prevention, Preparedness, Response and Recovery Disaster Management Guideline.

The *Work Health and Safety Act (2011)* does not specifically mention dams however, there is the obligation to 'ensure as far as is reasonability practical, the health and safety of workers……to protect workers and other persons from harm …… arising from specified substances and plant'. Noting substances includes any 'natural or artificial liquid'.

3. Developing an EAP

Section 1.4 of this guideline provides suggested headings and Appendix A provides a checklist of matters to consider when developing an EAP.

It is important to note that EAPs form a hazard specific plan for the LDMP which is developed by the local government to manage its response to local disasters (such as riverine flooding, storms and bushfires).

The primary purpose of an EAP is to enable the dam owner and the LDMG(s) to respond to dam hazard events or dam emergency events in a timely and effective manner.

Establishing and stating within the EAP the roles and responsibilities to manage and respond to the dam emergency hazard/event is essential. Key roles include:

- Dam owners are the owner of the EAP; they are responsible for dam operations and any related incidents and identify and escalate concerns to stakeholders.
- In most EAPs, the LDMG will lead the wider community emergency event response, requesting assistance from the DDMG as required.
- Ultimately the PAR in the community are the recipients; the response measures must reflect upon their capabilities and concerns.

The dam owner is encouraged to work with the local government to complete the following steps:

1. Identify dam hazards, dam hazard events and dam emergency events. Note that, depending upon consequences described in Sections 3.1 to 3.3, a dam hazard escalates to a dam hazard event and/or a dam emergency event.
2. Identify and prioritise the relevant entities that have a role in the implementation of the EAP.
3. Reach an agreement on the roles and responsibilities of all relevant entities who have a role in the implementation of the EAP.
4. Identify people who may be harmed and whose property may be harmed as a result of the dam hazard events or dam emergency events.
5. Ensure the warning messages align with the AWS protocol and reflect local government action words.
6. Identify how and when warning messages are to be disseminated to PAR.

The EAP is a record of the agreement made by the parties to distribute warning messages, provide resources and to work cooperatively in the implementation of the plan.

For more information on tools available to assist parties in understanding and reaching agreements on their roles and responsibilities, email damsafety@rdmw.qld.gov.au.

3.1 Dam hazard identification

The EAP is to identify each of the hazards that could become a dam hazard event and escalate to an emergency event.

A **dam hazard** is a reasonably foreseeable situation or condition that may:

- cause or contribute to the failure of the dam, if the failure may cause harm to persons or property, or
- require an automatic or controlled release of water from the dam if the release of the water may cause harm to persons or property.

The dam hazards included within the EAP will vary depending on the type of dam and the consequences of the escalation from a dam hazard event to an emergency event.

Dam hazards may include:

- **Flooding** within the dam catchment resulting in an increase in the dam storage level and spillway discharge.
- **Embankment stability** hazards which can result in distress or abnormalities in embankments such as cracking or deformation, sliding or any structural damage that has the potential to escalate to a dam failure (i.e. an emergency event). Embankment stability hazards can occur as a result of significant rainfall, earthquake, landslide, or in very rare occurrences, from an act of terror.
- **Earthquake** will cause an embankment stability hazard, but this risk should be separated as there are early warning triggers that can be utilised using the both the Richter Scale (measurement of magnitude) and/or Modified Mercalli Scale (measurement of intensity).
- **Seepage,** new seepage or an increase in the observed seepage detected during routine inspections has the potential to become a dam hazard event or escalate to a dam emergency event.
- **Acts of terrorism** on a referable dam generally pose a very low risk to the safety of a dam. The chief executive has a responsibility to implement the Queensland Government's - Queensland Counter-Terrorism Strategy and as such, the EAP is to acknowledge acts of terrorism are a dam hazard that could escalate to an emergency event. To assist in a police response, the following contacts and notification priority order is to be stated within the EAP:
  - Priority 1 Triple zero (if lives are at immediate risk call 000 immediately).
  - Priority 2 Police Link 131 444 or the Local Police Station or Crime Stoppers on 1800 333 000 (if no immediate life threat, but you are witnessing suspicious behaviour currently occurring at or around critical infrastructure).
  - Priority 3 National Security Hotline (1800 1234 00) (to report suspicious activity or behaviour).

When identifying, quantifying and assigning relevant response triggers to dam hazards, dam owners should consider any obligations under the *Professional Engineers Act 2000* and the potential requirement to engage a registered professional engineering of Queensland to undertake engineering services.

While it may not be possible to identify every type of emergency, the EAP should provide sufficient general guidance to assist flexible and adaptable response to unforeseen situations.

3.2 When does a dam hazard become a dam hazard event?

A dam hazard becomes a dam hazard event when persons or property are at risk of harm due to the event, but the actions undertaken by the dam owner are **unlikely** to require a coordinated response involving two or more relevant entities.

The 'relevant entities' (s. 352A) mentioned above are:

- the persons who may be affected, or whose property may be affected, if a dam hazard event or emergency event were to happen for the dam e.g. owners of parcels of farmland adjacent to the dam and residents of a township
- each LDMG and DDMG for the EAP
- each local government whose local government area may be affected if a dam hazard event or emergency event were to happen for the dam
- the chief executive
- another entity the owner of the dam considers appropriate.

For example:

- A dam hazard is the potential for significant catchment inflows to cause flooding downstream.
- A dam hazard event occurs when minor downstream flooding occurs, the EAP is activated to the 'alert' level, but a coordinated response by two or more relevant entities (as listed above) is not required.

For each dam hazard event identified (and the potential escalation to a dam emergency event, see next section) the EAP is to have an escalation table that provides clear and concise instructions to enable dam operation personnel to complete the associated level tasks (s. 352H(1)(b)(v)).

Outflows from dams are only one potential source of floodwater contributing to the increased flows and water levels downstream.

It may be beneficial for the EAP and/or associated community educational material to include information that puts the significance of dam outflows into context with localised riverine flooding (i.e. resulting from significant rainfall within the broader catchment area).

3.3 When does a dam hazard event become an emergency event?

An **emergency event** is an event arising from a dam hazard where persons or property may be harmed due to the event and any of the following apply:

- a coordinated response to the event involving **two or more relevant entities** specified above is likely to be required (a coordinated response is a request for entities to take action to respond to the dam emergency event under the EAP)

- the event is arising from a disaster situation declared under the *Disaster Management Act 2003* and/or
- an entity performing functions under the State Disaster Management Plan may, under that plan, require the owner of the dam to give the entity information about the event.

Continuing the example from Section 3.2:

- A dam hazard is the potential for significant catchment inflows to cause flooding downstream.
- A dam hazard event occurs when minor downstream flooding occurs, the EAP is activated to the 'alert' level, but a coordinated response by two or more relevant entities is not required.
- An emergency event occurs when major downstream flooding occurs and inflows result in reservoir level rise approaching the dam crest and raising structural concerns, cutting roads or leaving the banks of rivers. This would require the dam owner to coordinate a response with the local government(s), LDMG(s) and the Queensland Police Service to notify persons at risk, close roads and/or consider community evacuations.

Spillway releases occurring when the LDMG is at stand up (activated under the *Disaster Management Act 2003*) in response to a disaster are not automatically a dam emergency event. Such releases become an emergency event when the dam hazard escalates to a trigger level where the dam owner needs to respond under the EAP as part of a coordinated response involving two or more entities (as specified above).

3.4 Escalation levels of an EAP

There are four escalating levels of EAP activation (Figure 1).

Figure 1: Colour coding of escalations

It is appropriate that low risk events, such as a low magnitude earthquake or a spillway overflow where PAR are not placed at risk, are managed by the dam owner in consultation with the LDMG but the EAP is not activated[1].

In the event of an EAP activation for an emergency event, the dam owner will work with the LDMG, particularly in terms of providing information to the SDCC incident controller on the status of the event and the performance of the dam.

Triggers for escalation to an EAP level will require careful consideration of the timing of preparation for an appropriate response and the consequences of delayed notifications and actions. For example, if evacuation of PAR is an action at 'stand-up' escalation then the trigger to move to 'stand-up' must consider the time required to warn stakeholders, initiate evacuation and allow time to evacuate (Evacuation: Responsibilities, Arrangements and Management Manual).

Examples of escalation tables are provided in Appendix C. The appendix also provides comments on triggers for escalation.

[1] Such low risk events which do not impact PAR or property are categorised as "deficiencies, incidents or failures" and addressed as a component of a dam safety management program (DNRME, 2020).

There may be situations where an emergency event has a series of escalating trigger events that reflect the escalating level of risk.

For example, if a dam is approaching the flood of record and forecasting indicates a likely exceedance of flood of record the EAP could go straight to 'Stand up' in preparation. Alternatively, it may be appropriate for the EAP to have sequential 'Stand up' triggers (i.e. Stand up 1, Stand up 2, etc.) to enable the escalation table and associated notifications and warnings to be relevant to the emergency event and the level of risk posed.

3.5 Inundation maps

Inundation mapping is vital for the effectiveness of the EAP and is therefore a mandatory EAP requirement (s. 352H(1)(b)(i)).

Inundation maps show the extent of flood inundation resulting from a dam failure event. Table 2 lists the events to be mapped (mandatory and optional). Table 3 lists the components the maps need to clearly show. The purpose of the inundation map is to enable rapid identification of PAR, and evacuation routes where practicable, to assist in emergency response and potential evacuations.

The complexity of the maps should be appropriate for the dam, its failure consequences and the precision of the analysis but also be directed towards their purpose during an emergency event. In the interests of balancing simplicity with completeness, judgement is required in selecting which maps to include in the EAP.

EAPs must contain inundation maps. In addition, digital copies of inundation maps are to be provided to the chief executive in a Geographic Information System (GIS) format at the time of EAP submission (ArcGIS shape file format or similar). The digital maps should include appropriate metadata including projection system, map source, date created, reference to consequence assessment conducted to prepare, etc.

Dam owners are encouraged to share mapping data with the local government to assist in the preparation of evacuation maps.

IGEM (2019) and Snorteland (2019) highlight the obligation to inform the community of their risks, especially if those risks change.

Publication of mappable inundation maps, in addition to publication of the EAPs, provide a means to disclose dam safety risks.

It is recommended that dam owners be transparent with their knowledge of dam safety risks and seek to educate and inform the community when opportunities become available.

Examples of maps are provided in Appendix F.

Table 2: Events to be included as EAP inundation maps

Event	Requirement to include in EAP
Sunny Day Failure (SDF) • These are floods caused by unexpected failure of the dam in the absence of a wet weather event. They may happen at any time, caused by factors such as internal erosion or earthquake activity.	**Mandatory** SDF does not apply to dams that are normally empty, such as detention basins
Probable Maximum Flood (PMF) with dam failure • PMF is the theoretical maximum flood event. It is expected that inundation cannot be greater in extent than this and that locations outside of this inundation area are safe from flooding and represent a safe haven for evacuation.	**Mandatory** PMF may not apply to dams with minimal catchments, such as ring tanks / turkey nest dams
Probable Maximum Flood (PMF) without dam failure • PMF is the theoretical maximum flood event. Presentation of this map provides an understanding of worst-case inundation extent so long as the dam remains intact.	**Mandatory** PMF may not apply to dams with minimal catchments, such as ring tanks / turkey nest dams
Dam Crest Flood (DCF) with and without dam failure • DCF is the flood event that causes reservoir levels to reach the crest of a dam,	Optional
Design flood events with and without dam failure, including intermediate flood events, such as: • 1:100 AEP event • 1:500 AEP event • 1:2,000 AEP event • 1:10,000 AEP event.	Optional
Inundation mapping for the design and intermediate flood events.	Optional

Table 3: Components to include in EAP inundation maps

Event	Requirement to include in EAP
Maximum extent (zone limited to the area where the incremental effect of a dam break flood is 300 mm or higher).	**Mandatory**
Title of map, legend, scale, north arrow, labels, Australian Height Datum (AHD), date of imagery, year modelling was undertaken, software platform used, type and age of survey data.	**Mandatory**
Locations of identified PAR, local government boundaries.	**Mandatory**
Maximum depth.	Recommended
Travel time, time to inundation, or time to peak of inundation. Typically shown as contour lines showing hourly progression of flood progress downstream of a dam.	Recommended
Maximum hazard (velocity*depth) • Hazard, the combination of velocity*depth, provides a valuable measure of the stability of both people and vehicles in flood waters and to buildings affected by flooding.	Optional

3.6 EAP communication to internal and external parties

The EAP must include the communication protocol to be used if/when the EAP is activated (s. 352H(1)(b)(iv)). This includes business and after hours contact information of those who have a role and responsibility within the EAP and an alternative contact person.

The EAP communication protocol is required to state:

- **who** (numbered in order of priority of contact), the name, position title, organisation of the entity contact person (or a 24-hour disaster management hotline). Details to include a alternative contact person,
- **when** each person will be contacted (at which trigger level) and by who, for each stage of the hazard or emergency event (clearly numbered in order of priority), and
- **how** (email, SMS text to mobile and/or recorded message to landline telephone).

The notification information is to be tailored to the needs and priorities of each dam. The accuracy of the contact information is critical for the timely notification of those responsible for making decisions and issuing instructions within their organisations.

Personal information such as names and private phone numbers are redacted from the published EAP. Position titles and business phone numbers will normally be visible in the published EAP.

An example of a communication protocol table can be found in **Appendix E**.

3.7 Warning messages

The dam owner is responsible for ensuring warning messages are distributed to people who may be harmed and whose property may be harmed as a direct result of the dam hazard events or emergency events identified in the EAP (s. 352(H)(b)(iii)).

The Australian Warning System (AWS) is a national approach to information and warnings for hazards like bushfire, flood, storm, cyclone, extreme heat and severe weather. The AWS aims to provide consistent warnings to communities so that people know what to do when they see a warning level.

Incorporation of the AWS is mandatory for all EAPs. This requires the dam owner to ensure all external warning messages have a consistent approach.

There are three warning levels:

- **Advice:** An incident has started. There is no immediate danger. Stay up to date in case the situation changes.
- **Watch and Act:** There is a heightened level of threat. Conditions are changing and you need to start taking action now to protect you and your family.
- **Emergency Warning:** An Emergency Warning is the highest level of warning. You may be in danger and need to take action immediately. Any delay now puts your life at risk.

The AWS includes websites and apps. The icons are supported by calls to action that can be used flexibly across all three warning levels.

Figure 2: Icons and calls to action

Dam owners are encouraged to work with the local government (specifically the LDMG) on the messaging to ensure specific call to actions words for the community are consistent across the EAP and the LDMP. The messages need to be developed for local systems (EWN, Burst, Whispir) as well as EA messages, media releases and social media posts.

Dam owners are responsible for providing messages to those persons whose property may be affected as a direct result of the dam hazard event or dam emergency event.

It is recommended dam owners, in partnership with the local government develop and distribute 'Get Ready' information to PAR to assist residents in becoming self-reliant during disaster events. The aim is to assist the households to be proactive in self-monitoring weather events and taking reasonable action to be informed, prepared, stay safe and to recover from disaster events.

There can be significant differences in the time available between emergency event initiation and the need for people downstream to act. It may therefore be appropriate for dam owners to identify and prioritise within the EAP those 'near PAR' who are at most risk. Dam owners could consider illustrating the demarcation between highest and lesser priority groups via categories on an inundation map (s. 352H(1)(b)(iii) and (iv)).

In all cases it is recommended PAR be provided with opportunities to obtain consistent, up to date information to support notification and warning messages so long as all messages are consistent and derived from the same information sources.

Subscriber services that provide notifications and warnings, sharing of links to emergency dashboards (including the dam owners as well as the local government disaster dashboard) and media outlets all provide valuable information (see also Section 3.8).

The warning level (Advice, Watch and Act, Emergency Warning) should be the most appropriate to a particular point in time and direct the community to take what protective actions it needs to take to be safe.

Table 4: Example of the notification and warning escalation table

Emergency trigger level	Developing flood in the dam catchment	Potential AWS warnings (as pre-determined with the relevant disaster group)
Alert	Significant rainfall in catchment with storage levels rising towards full supply level (FSL) and a spillway discharge expected.	**Warning level: Advice** **Stay Informed** Delivered to disaster management group(s) and persons at risk of harm alerting them to the situation. The intent of the message is to advise persons at risk of harm there is no immediate danger however, they should stay informed to keep themselves up to date with developments. For example: • Stay informed – find out what is happening and stay up to date. • Listen to your local radio station [inserting frequency is preferable]. • Click here for all warnings [insert website / channel where this warning will be published]. • Click here for weather information www.bom.gov.au/qld.

Emergency trigger level	Developing flood in the dam catchment	Potential AWS warnings (as pre-determined with the relevant disaster group)
Lean forward	Spillway flows increasing but as yet are unlikely to impact on downstream persons at risk of harm.	**Warning level: Advice** **Stay Informed**  An updated message to those who received the previous Advice message plus additional people who might be impacted by increasing spillway discharges. The message should convey the likelihood that persons at risk will be impacted by the emergency event. For example: • Decide what you will do if flooding starts. • Stay out of rivers and creeks. • If flooding starts, do not drive unless you have to. • Charge mobile phones.
Stand up	Spillway discharge increasing with flows that are likely to impact on downstream persons at risk of harm.	**Escalated Warning level:** **WATCH AND ACT**  Distribute to all relevant entities and persons at risk of harm. Message to instruct people to prepare now or move to higher ground For example: • Decide if you and the people you live with will leave if floodwaters get close to your house. • Warn friends, family and neighbours in the area. Help others if you can. • Lift important things onto benches, tables, high shelves or upstairs. • Charge mobile phones. **Warning level:** **EMERGENCY WARNING** Message to all relevant entities, persons at risk of harm and the wider community.  Message to instruct residents to take immediate action. For example: • People in the following places must leave immediately: add locations.

Emergency trigger level	Developing flood in the dam catchment	Potential AWS warnings (as pre-determined with the relevant disaster group)
		• Take your pets, pet food, pet lead or crate, mobile phone, charger, enough clothes for three days, important documents (like insurance papers and passports) and medicine with you. • Decide where you and the people you live with will go – a safe place in a higher part of town away from flooding. This could be with family or a friend. • If you do not have a safe place, [an evacuation centre has / evacuation centres have] been set up at: venue name and full address.
Stand down	Flood receding with storage levels dropping back towards FSL. Dam releases are unlikely to impact on others.	**Warning level: Advice**  Delivered to relevant entities and persons at risk of harm advising the end of the emergency event. Includes action words such as safe to return, return with caution or avoid the area if there has been significant impact. Dam floods are decreasing.

When drafting the warning message consider:

Assessment of AWS compliance

To be compliant the message must have the AWS three-tiered scaled warning system that states the warning level, hazard, location content, calls to action, icons (in full warnings only, not SMS or EAs) and colours to assure national warning consistency.

Assessment of sufficiency of warning content

To be effective, warnings must provide sufficient information for the receiver to understand the risk to themselves, their families and their property, to make an informed decision to take the protective action e.g. move your car, move household items from the floor, get sandbags now.

For the receiver to acknowledge the warning as real or legitimate, the source of the warning message, the nature of the hazard, its location, the time frame, and when to expect further updates must be included in the message.

Assessment of language or style of warning content

In addition to content, to be effective the wording of warnings are to be specific in the call to action, and consistent in messaging. This can be achieved by consulting with the Local Government to align the EAP messaging with the LDMP.

Assessment of channel factors

For some channels, such as EAs, the use of direct or terse language is appropriate for short-form warnings.

In Queensland there are over one million people living downstream from referable dams who are protected by EAPs.

Demographics can influence how effective notifications and warnings are received and actioned by the community.

Dam owners are encouraged to consider the messaging needs of the audience and undertake community education before any event occurs on what to do when warnings are received. This may assist in the management of community expectations on the content and frequency of EAP notification and warning messages.

For assistance on emergency planning for people with a disability see the Person-Centred Emergency Preparedness Framework and Toolkit to assist in meeting the specific needs of people with disabilities during an emergency.

3.8 Delivery of warning messages

The Act provides for the **dam owner** to enter into an agreement with a third party to deliver warning messages (s. 352H(2)) on its behalf. If an agreement is in place, the EAP is to provide details of the arrangement. The arrangement does not exempt the EAP from stating who, when and how the warnings will be delivered or the requirement for the inclusion of the pre-prepared message wording and emergency alert (EA) polygon within the EAP and the SDCC Event Management System powered by Noggin.

Generally, **local governments** provide warnings of flash flooding within its local government area via the Disaster Management Dashboard and local media or will share warnings from Bureau of Meteorology. Many local governments have stream gauging stations to monitor stream heights to inform flash flood warnings.
The **Bureau of Meteorology** (Bureau) is the lead agency for warning about riverine flooding and does not issue community action warnings. However, not all rivers have a flood warning service. For information on services provided by the Bureau, visit their website at www.bom.gov.au.

Warnings are only one element of the overall emergency messaging during an event. The EAP should provide:

- a website such as the local government disaster dashboard where the public can be referred to for updates on dam hazard / emergency events
- an agreed communication procedure to provide warnings, or advance hazard advice to the public
- alternative external communication system(s) if/when there is a communications failure.

For further information on public information and warnings during an emergency event, see the Australian Disaster Resilience Handbook Collection, Public Information and Warnings, Handbook 16 available at the Australian Disaster Resilience Knowledge Hub website www.knowledge.aidr.org.au.

EAP warning messages are required to be distributed through all phases of the event until the event is over (see Figure 3). However, the frequency may depend on outcomes of community consultation.

Warnings save lives and minimise harm by facilitating protective action
Warnings serve and support broader risk management actions, ranging from hazard reduction and response to ongoing community education and resilience building.

Warnings empower people and foster shared responsibility
Having access to clear public information and warnings about imminent or current emergencies means communities can better understand their risk, consider their personal situation and take protective action.

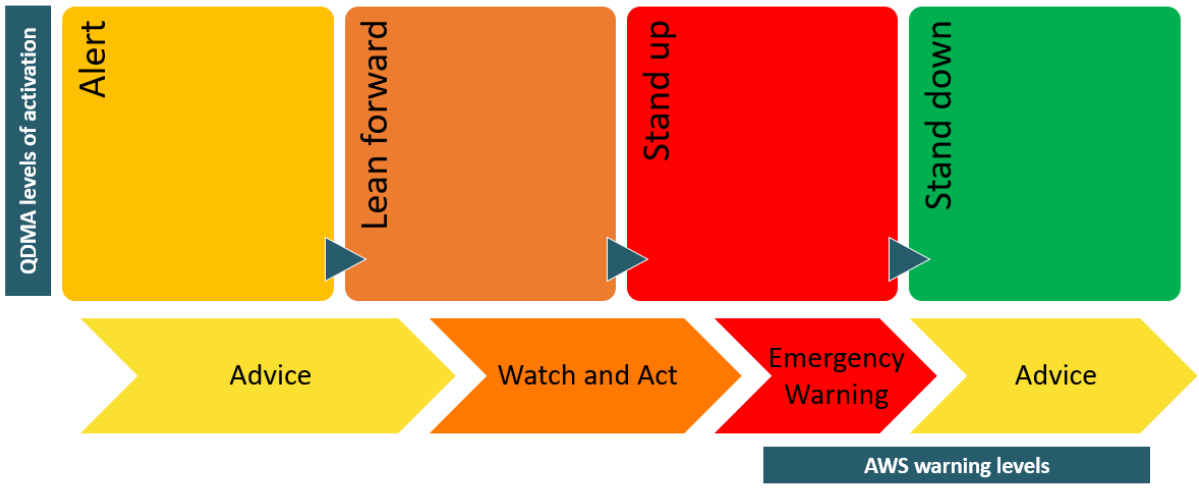
A mandate and responsibility to warn
Authorities have moral and various legal obligations to do everything they can to protect life and property from the impacts of hazards and emergencies, including through the provision of knowledge and information.

Public value
Effective warnings make a clear contribution to mitigating and minimising the lasting consequences disasters can have on households, businesses and communities.

Community expectation
Communities expect if important information is available, it will be shared promptly and effectively.

Australian Institute for Disaster Resilience: Warnings Republishes Handbook,

Figure 3: Queensland disaster management arrangements (QDMA) levels mapped to AWS warning levels



As shown in Figure 3, the AWS warning levels do not strictly align with each QDMA activation level. The appropriate AWS warning level is to be identified based on the message that needs to be communicated at each level of activation.

For timeliness of messages, the Australia Disaster Resilience Handbook Collection, Manual 21, Flood Warnings, indicates there is no convention in Australia for acceptable warning time. However, the guidelines provided in Manual 23 – Emergency Management Planning for Floods Affected by Dams suggest warning time for evacuation needs to be considered in time blocks of not less than one hour to ensure action plans can be realistically implemented. Each dam is to be considered on its individual circumstances.

Reminder it's just as important to distribute a message advising the community when the event is over and the dam has returned to business as usual procedures during the EAP stand down process

The EAP is to state how the messages will be delivered. This could include:

- personalised phone calls or door knocks to vulnerable persons and/or near PAR (if appropriate, practical and safe to conduct)
- mass notification and warning messages via voice message to landlines and SMS to mobile phones
- mainstream media news coverage i.e. radio and television
- social media i.e. websites (local government(s) and dam owner), Facebook, Twitter, Instagram
- sirens or other direct means of localised warnings.

Traditional media such as ABC radio and television interviews continue to be a mainstream source of information accessed by the community during an emergency event.

The EAP should consider multiple means of communications and redundancies in critical systems in order to maximise the chance of the notification and warning messages being received with sufficient time to react and take action. It is important that information provided is consistent across all communication channels.

3.9 Notification call register

If the dam owner (or other entity, by agreement) has a small number of PAR immediately downstream of the dam, it may be quicker to deliver the warning messages via personalised telephone calls. If this is the case, it may be effective to include the contact list within the EAP for ease of reference by the actioning officer. Note, this personal information is redacted from the EAP prior to it being published at https://www.business.qld.gov.au/industries/mining-energy-water/water/industry-infrastructure/dams/emergency-action-plans/map.

If the notification call register is extensive, or it is not appropriate for inclusion within the EAP, then the EAP is to state:

- priority order in which the calls will be made
- how the call register was generated
- process to ensure the list is up to date
- who holds the list
- who will make the calls.

3.10 Dam warning information (subscription) service

Subscription information services are a tool for dam owners to deliver information to those persons who have subscribed or opted in to receive dam event notifications and warnings. If dam owners are utilising this service, the EAP is to include registration details or alternatively, details on how to download the relevant mobile application.

A challenge with subscription services is that not all PAR may necessarily subscribe; this implies that, in order to contact all PAR, other methods are required. The dam owner must take this into account when developing the warning communications protocol.

The subscription service does not remove the dam owner's responsibility to issue warning messages.

3.11 National emergency alert system

The national emergency alert system (EA system) is administered in Queensland by QPS – Emergency Services and Safety and is available to dam owners, local governments and other relevant entities to distribute warnings for emergency events or a declared state disaster event. The EA system sends preformatted warning messages (via caller ID +61 444 444 444) to mobile phones and landlines within a specified geographic area, identified by a polygon shape file, refer Appendix G. The polygon is an electronic predefined geographic area for use in a geographic information system (GIS) to define the area in which the warning message will be distributed via voice message to landlines and SMS messages to mobile phones.

Dam owners are **required** to prepare and submit polygons and the associated pre-formatted warning wording for all EAPs to the SDCC Event Management System powered by Noggin **prior** to the EAP being submitted to the chief executive for approval. See Appendix H. for the EA form.

It can take up to 30 minutes (or more) from the time a request to issue an EA is received at the SDCC Watch Desk to when it is received by the PAR. Lodging preformatted approved polygons and messages within the SDCC Event Management System powered by Noggin can significantly reduce this time.

As the EA relies on telecommunications networks to send messages, due to a number of factors such as weather and the impact on telecommunication infrastructure message delivery cannot be guaranteed.

For more information visit https://www.emergencyalert.gov.au/

However, there are circumstances where the EA system is not appropriate for the dam or the PAR. For example, if the at-risk area has poor mobile phone reception or where it is more efficient for the dam owner to contact the people directly. If this is the case, the EAP is to clearly state the most efficient way the dam owner will deliver messages to the PAR (i.e. dam owner will telephone or send out an SMS).

Large dam owners who have developed multiple polygons to cover the relevant risk areas may include within the EAP only those polygons associated with the highest 'priority' persons and associated areas at risk. However, all polygons and prepared messages are to be lodged in the QFES Disaster Management Portal.

For more information about the creation and dissemination of emergency warnings are available at www.disaster.qld.gov.au.

4. Maintaining an EAP

After the EAP has been developed, approved and distributed, annual reviews and updates must be performed. Without periodic updates the EAP can become outdated and ineffective.

4.1 Undertaking the EAP annual review

The Act (s. 352P) requires the EAP to be reviewed **before 1 October** annually and a notice provided to the chief executive stating if an amendment of the EAP is required.

The Act (s. 352P) also provides the chief executive with the ability to nominate, by written notice an alternative review date (alternative to 1 October) for a dam owner to submit a review.

In undertaking the annual EAP review, the dam owner should consider if:

- there are actions within the Schedule of Matters that could be addressed in this version
- contact details and prioritisation of relevant entities, including the PAR are correct
- the currency of flood inundation studies and associated maps
- there are approved or proposed residential and/or commercial development/s downstream of the dam
- the wording and frequency of warning messages align with the AWS
- the action words within the warning messages align with the local government LDMP
- the warning messages are understood by downstream residents
- the pre-prepared EA System GIS polygons and messages are appropriate, tested and lodged in the QFES Disaster Management Portal
- the EAP is consistent with the local disaster management plan(s)
- there are learnings from Emergency Event Reports (EER) submitted for the dam in the previous 12 months
- there are learnings from EAP training scenarios
- the EAP reflects industry best practice
- there is scheduled dam improvement/maintenance works within the next 12 months
- Non-substantive items within the Schedule of Matters attached to the Notice of Approval.

A template for a manual Annual Review Notice is available at Appendix L. An Electronic Annual Review Notice form is available on the Dam Safety Department (DSR) Portal.

Dam owners are encouraged to keep their EAPs as “living documents” and proactively update their plans as changes occur and improvements are identified. Updated plans can be submitted at any time.

4.2 Annual reviews resulting in non-substantive changes

Once reviewed by the dam owner, a complete EAP (in PDF format) is to be submitted to the chief executive under the Act (s. 352Q) to amend the approved EAP to:

- Correct a minor error, or
- Make a change that is not a change of substance, for example – update contact phone numbers, minor changes to warning messages.

Other examples that would be considered not to be changes of substance include:

- Correcting grammatical errors
- Formatting changes
- Updating contact details
- Improving the maps
- Effectiveness that does not change the intent of the EAP
- Clarifying explanations
- Clarity of wording

The amendments must be minor in nature and must not change the intent of the EAP. Changes to the triggers for escalation of hazards to emergency events, increases in the number of PAR, incorporating the AWS warning message protocol, or new modelling associated with the production of inundation maps will be assessed as substantive in nature and will require the local government notice(s).

To ensure all contact details are correct and the non-substantive amendments do not conflict with the disaster management plan(s), the proposed changes should be shared with the local government(s) and the DDMG(s). **For non-substantive changes, the local government(s) and DDMG(s) are not required to provide the dam owner with a notice.**

Once the changes have been finalised the amended EAP in full including all attachments (in PDF format) can be lodged via the DSR Upload Portal to the chief executive for approval. The chief executive will, within 10 business days, decide to approve or refuse the amendment. If the chief executive has not made a decision in this time frame, the EAP as amended is to be taken as (deemed) approved for the remaining approval period.

However, in the event the chief executive subsequently determines the proposed EAP amendment is a change of substance, the dam owner will be advised and requested to undertake the required 30 business day consultation with the local government(s) and the DDMG(s) with the required notices to be provided.

On approval of the amended EAP, DRDMW will upload the approved EAP into the SDCC Event Management System powered by Noggin and publish a redacted version at Emergency action plans for referable dams.

Partial EAPs, EAPs marked as draft, EAPs unsigned and submissions without the required notices are incomplete submissions and will result in an Information Notice refusing approval of emergency action plan. Failure to submit the EAP on time can result in the issue of a Compliance Notice under section 465 of the Act and penalties applied if remedy of the contravention is not undertaken within the specific timeframe.

For further information on the department's compliance approach visit www.rdmw.qld.gov.au/water/regulatory-role.

4.3 Annual reviews resulting in substantive amendments

The following amendments are considered a substantive change to the EAP and require a new EAP assessment and approval by the chief executive:

- The dam structure
- The triggers for escalation of a dam hazard event and/or dam emergency event
- Additional dam emergency events added to the EAP
- An increase in PAR
- Incorporating the AWS warning message protocol
- Changes to inundation maps and/or associated information

If the dam owner is uncertain as to whether the changes in the EAP are substantive in nature, they are encouraged to contact the department via email at damsafety@rdmw.qld.gov.au.

To submit a substantially amended EAP refer to Section 3.

> To enable a shared understanding of the dam risk profile, the dam owner is to inform the chief executive of any changes to the dam risk profile and a communication strategy developed to ensure all relevant entities and PAR are informed.
>
> The communication strategy should be implemented as soon as possible after the change is identified, messages are tailored to the audience and must clearly state the scale of the change and how the risk is going to be managed.
>
> IGEM Report: Paradise Dam Preparedness Review Report 1:2019-20 Recommendation 3

4.4 EAP reviews triggered by the chief executive

The Act (s. 352O) provides the chief executive authority to direct a dam owner to review the EAP at any time if it is considered the EAP is no longer effective.

This might occur, for instance, if an Emergency Event Report (EER) recommends a change to the EAP or the local government advises the chief executive the EAP needs amendment to make it consistent with the LDMP.

4.5 Comprehensive review and renewal of the EAP

The dam owner is required to undertake a comprehensive review of the EAP before the approval period expires.

The comprehensive review is to consider:

- Items within the Schedule of Matters
- The identification of a dam safety concern
- New floodplain development resulting in a PAR increase
- Lessons learnt from training exercises that identified shortcomings in the EAP
- Lessons learnt and documented in Emergency Event Report/s (EER) from real life activations that identified shortcomings in the EAP

- Incorporation of the AWS warning protocol, or amendments to the content of the AWS warning messages
- Recommendations from IGEM Flood Review reports
- Changes to Standards for Disaster Management
- New dam safety and disaster management industry best practices

In undertaking the comprehensive review it is recommended the dam owner undertakes the process as outlined within Section 3.

All renewed EAPs are required to be provided to the local government(s) and the chair of the DDMG(s) for a period of 30 business days to review and relevant notices provided, refer to Section 2.

The renewed EAP is to be submitted to the chief executive at least two months prior to the approval period expiry date as stated on the approval notice.

5. Operating under an EAP

Having an EAP in place does not restrict the dam owners to rigidly adhere to the EAP if circumstances arise during emergency events which mean different actions may be necessary to respond to emergent circumstances or to improve the effectiveness of the EAP.

5.1 EAP training – desktop and scenario exercises

It is best practice to undertake an annual EAP desktop training in preparation for the wet season to ensure all dam personnel are familiar with EAP activation triggers, roles and responsibilities. This training is vital for the assessment of developing situations at all levels of responsibility. Technically qualified personnel should be trained in the incident management process, including detection, evaluation, notification, and appropriate response actions during all emergency level determinations. Several staff should be trained to ensure sufficient coverage of the EAP at any time.

Extending an invitation to key stakeholders such as the LDMG to participate in EAP activation scenario exercises can assist in identifying plan deficiencies and ensuring all participants are familiar with the prescribed procedures and their roles. It will also assist the LDMG to consider developing evacuation and emergency shelter plans for people who would be affected by an emergency event.

When an EAP scenario training exercise is conducted with one or more stakeholders a standing offer is to be extended to the department to attend as an observer.

Training also provides an opportunity to identify areas of improvement. Consider training, and subsequent application of lessons learnt as part of the annual EAP review and renewal.

To assist dam owners in planning and developing a dam safety exercise, the department's DSR can facilitate a range of EAP capability workshops for your team including:

- exercise management
- exercise evaluation
- evaluation of emergency management programs.

If the department's DSR officers have not observed an exercise in the previous three years, we will work with you to ensure all personnel are familiar with your EAP and requirements have been undertaken.

Email damsafety@rdmw.qld.gov.au for a training exercise, or alternatively refer to the Australian Disaster Resilience Handbook, Managing Exercises Handbook 3.

5.2 Fatigue management

Fatigue can have serious consequences for the management of an emergency event. On-the-job fatigue reduces emergency event readiness, affecting staff endurance, efficiency and effectiveness. This can lead to impaired judgement, poor decisions and slow response times during a high stress emergency event.

Managing fatigue is a joint responsibility between the worker and the dam owner. Dam owners should have in place a fatigue management plan to ensure dam personnel recognise the signs of fatigue and there are adequate available staff to manage a prolonged event through to stand down.

For practical guidance on managing fatigue in the workplace visit www.worksafe.qld.gov.au.

5.3 Community engagement and education

Dam owners should work with the local government to engage and educate the community especially the PAR downstream of the dam. Building on community knowledge about dams and educating about dam safety, how dams operate during flood events, and their roles during flood events.

These activities will strengthen relationships with the community and build resilience during dam safety events.

Engagement and education plans should be based on best practice set by the National Strategy for Disaster Resilience: Community Engagement Framework Handbook 6.

Best practices will be to engage with community members or test out warnings with community working groups. This is to demonstrate the engagement undertaken with the community to inform, educate and empower the PAR and community to act. This can be built on yearly with community meetings, open days, community events.

6. Emergency Event Report (EER)

The Act (s. 352T) requires dam owners to submit an EER to the chief executive within 30 business days after the end of the emergency event or, at a period agreed to in writing by the chief executive and the dam owner.

An EER is required if:

- a person or property has been or may be harmed because of the event.

  AND any of the following applies

- a coordinated response involving 2 or more of the relevant entities mentioned in paragraphs (b) to (d) of the definition relevant entity was required to respond to the event.
- the event arose because of a disaster situation declared under the *Disaster Management Act 2003*.
- an entity performing functions under the State Disaster Management Plan has, under that plan, required the owner of the dam to give the entity information about the event.

The content of the EER is specified by the Act (s. 352V) and must include:

- A description of the emergency event to which the report relates.
- Details of how the EAP was implemented.
- List the communications made and actions taken in response to the emergency event.
- Actions to monitor the dam and the area affected or potentially affected by the emergency event.
- Description of any damage to the dam, including by reference to photographs of the damage.
- State whether and to what extent any damage to the dam has been caused or contributed to by the emergency event.
- An assessment of whether and to what extent the approved EAP effectively dealt with the emergency event.
- Recommendation for any changes to the approved EAP that would allow the plan to deal with a similar emergency event more effectively.
- Details of any other matter that is relevant to the emergency event or how it was dealt with under the emergency action plan.
- Any other relevant matter prescribed under a regulation.

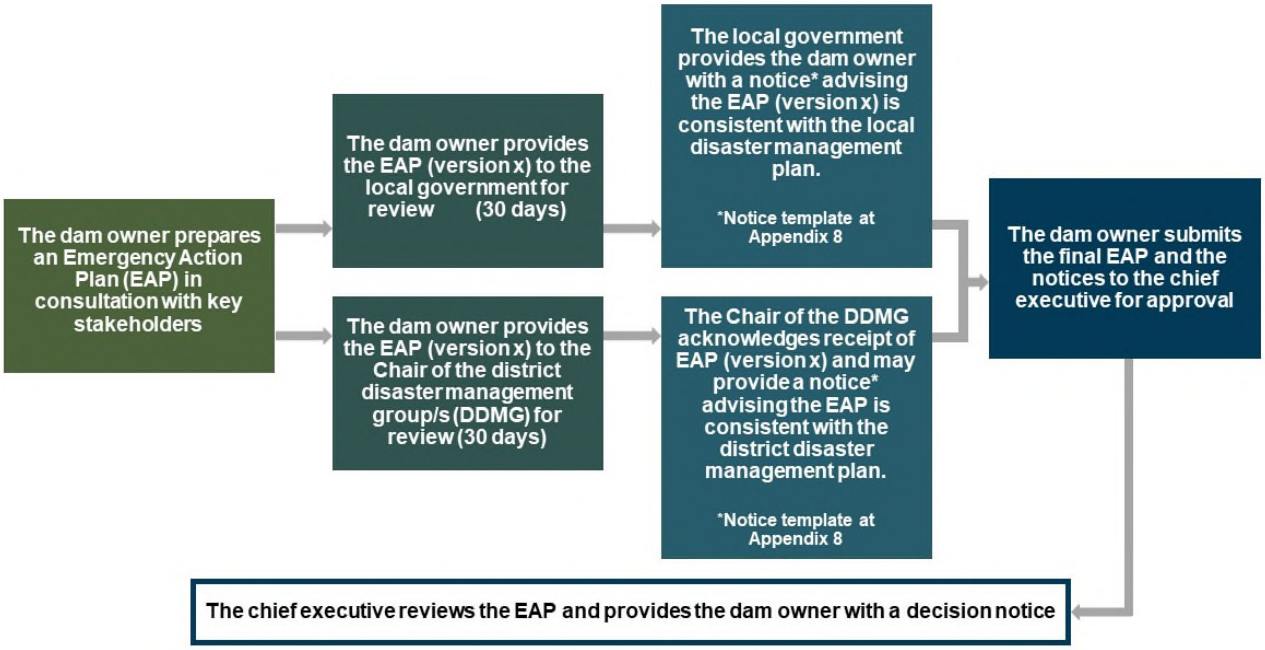
A template is provided in Appendix K.

It is recommended that a statement be included as part of an EAP's Stand Down notification to the department that states if an EER is required or not.

7. Submitting the EAP to the chief executive

There are a number of steps to be completed before an EAP can be submitted to the chief executive for approval (see Figure 4). These steps **must** be completed within legislated timeframes and should be factored into the dam owner's schedule for the development and submission of the EAP.

Figure 4: Preparing the EAP submission to the chief executive



The DSR officers are available to assist all stakeholders throughout the EAP development and submission process. To request assistance email damsafety@rdmw.qld.gov.au

7.1 Assessment by local and district groups

The Act (s. 352HA) requires dam owners to provide a copy of the EAP to each local government (usually facilitated by the LDMG) and DDMG whose local government area or district area may be affected by a dam hazard identified in the plan. These stakeholders have 30 business days to review the plan for consistency with the disaster management plan.

7.1.1 Local government notices

The Act (s. 352HB) requires the dam owner to receive a notice from each local government impacted by a dam hazard identified in the plan.

The local government chief executive officer or a delegate should sign the local government notice. If the dam is owned by the local government, the notice to the chief executive is to be signed by a delegate of the local government CEO who does not have a role or responsibility within the EAP (the notice does not come from the LDMG).

If the EAP is not consistent, the local government is to state the reasons why the EAP is not consistent within the notice.

If the dam owner has not received a notice from the local government within the 30 business day period and liaison has been made with the department prior to the submission, then the dam owner can request the department to accept the incomplete submission.

This requires the dam owner to provide evidence to demonstrate that they have:

- engaged with the local government during the drafting, reviewing and/or testing of the EAP.
- engaged with the local government to resolve any issues raised during consultation
- provided a final copy of the EAP to the local government for assessment. This version must be the version submitted to the chief executive for approval.
- raised concerns of challenges to receive the local government notice to the department prior to submission to the chief executive.
- escalated the absence of the notice with the local government Chief Executive Officer in an attempt to receive the notice prior to submitting the EAP to the chief executive
- demonstrated all reasonable efforts to engage with and seek alignment of content and expectations of the EAP, with the local government. Evidence to be provided to the department as part of the EAP submission to the chief executive for approval.

In the event the dam owner has not received the local government notice and all possible attempts to resolve the issue have been undertaken, the department will contact the local government Chief Executive Officer to enquire as to why a notice has not been provided and if required, facilitate a discussion with the local government and the dam owner to resolve issues that may be preventing the notice from being issued.

7.1.2 DDMG notices

The Act (s. 352HC) requires the dam owner to receive a notice or an acknowledgement from each district group impacted by a dam hazard identified in the plan.

The chair of the DDMG(s) may **(not compulsory)** provide a notice to the dam owner. If the decision of the chair is not to provide a notice to the dam owner, the DDMG is to acknowledge receipt of the EAP version x and advise the dam owner a notice will not be provided. This enables the dam owner to submit the EAP to the chief executive for approval.

The dam owner cannot submit the EAP to the chief executive prior to the 30 business days having elapsed since provision of the EAP to both entities **unless** a notice from the local government(s), and a notice or acknowledgement of receipt from the chair of the DDMG(s) has been received.

Any notices received by the dam owner **must be provided** to the chief executive when submitting the EAP for approval. The notice is to state the version of the EAP consulted on and accepted.

An EAP submission can only be submitted to the chief executive for approval if it has a local government notice and the DDMG notice/acknowledgement.

If the dam owner has not received the local government notice after 30 business days and can demonstrate all reasonable efforts to escalate the notice request to the local government Chief Executive Officer have been made, the dam owner can request the chief executive accept the incomplete submission. Evidence of engagement and escalation to resolve the issue is to be provided at the time of submitting the EAP for approval.

Otherwise, the submission will be considered incomplete and will result in a notice refusing the EAP. Failure to submit the EAP on time can result in the issue of a Compliance Notice under s 465 of the Act and penalties applied if remedy of the contravention is not

undertaken within the specific timeframe. For further information on the department's compliance approach, visit www.rdmw.qld.gov.au/water/regulatory-role.

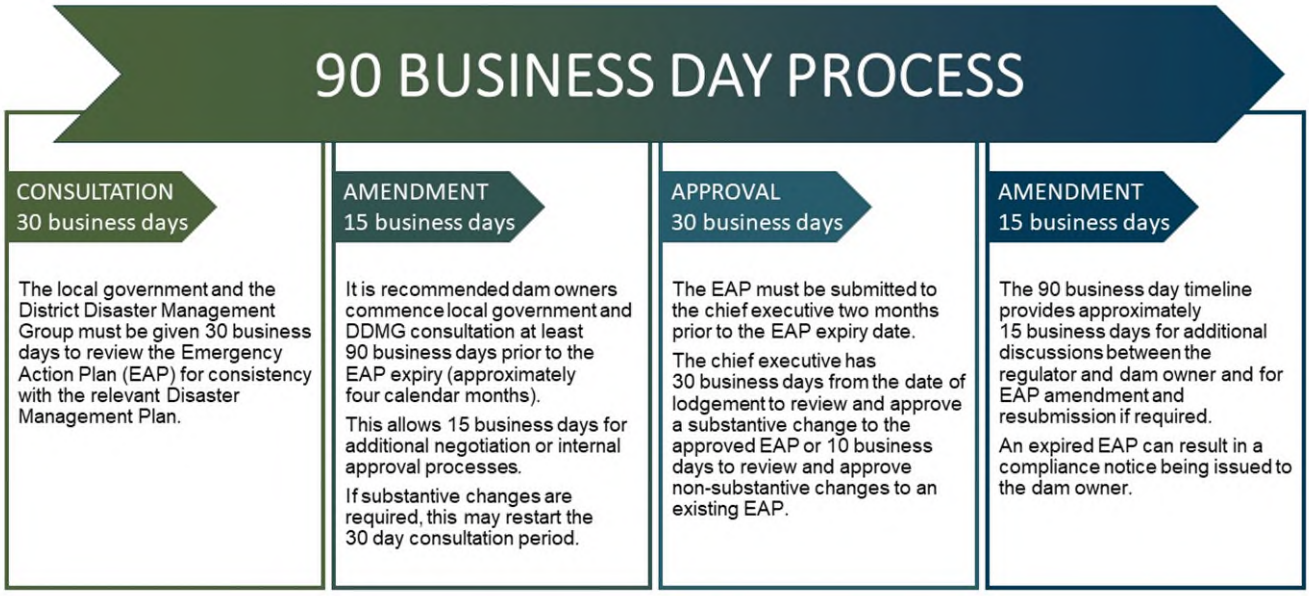
The notice(s) provided by local government(s) and the chair of DDMG(s) are a mechanism used by the chief executive to ensure the EAP is effective and is consistent with an LDMP and District Disaster Management Plan (DDMP). The notice also demonstrates the dam owner has collaborated with the local government(s) and the DDMG(s) in the development of the EAP.

Tip: add a received/read receipt to the email when sending the email request for an EAP review to the local government(s) and DDMG(s) for evidence when submitting to the chief executive.

It is recommended the dam owner allows at least 90 business days to complete the required consultation to draft the EAP and receive the notices to enable a complete submission to the chief executive. **The revised EAP must be approved by the chief executive prior to the current EAP expiry date** (see Figure 5).

Failure to have a (current) approved EAP can result in the issue of a Compliance Notice under s. 352E(1) of the Act and penalties applied if remedy of the contravention is not undertaken within the specific timeframe

Figure 5: Example timeline for an EAP submission



7.2 How to submit the EAP to the chief executive for approval

The EAP should be submitted via the DSR Upload Portal. The portal has been developed to provide an administrative triage for submissions and to allow for large size documents to be uploaded. PDF format is required for the EAP and supporting documents.

It is requested that digital versions of inundation maps also be provided upon submission of the EAP. See Section 3.5 for further details.

Note, the 30 business day approval timeframe will commence from the business day following the day of the complete lodgement of the submission.

7.3 EAP approval period

The Act (s. 352K(2)) states the chief executive can approve an EAP for a period of no more than five years.

When assessing an EAP, the chief executive makes a decision on the approval period. This decision is subjectively made based on effectiveness, maturity (of EAP, organisation and stakeholders), currency of information (of consequence analyses and changes in land use) and planned changes to the dam.

If the chief executive approves the EAP, the chief executive will:

- provide a notice of approval to the dam owner stating the approval period and any conditions of approval.
- forward a copy of the approved plan to the emergency management chief executive (QFES).
- publish the approved plan on Emergency Action plans for referable dams with redacted name, address and contact details of individuals.

If the chief executive decides to refuse to approve the EAP (s. 352L), the chief executive will:

- provide an information notice about the decision.
- provide a notice directing the dam owners to prepare a new EAP and resubmit to the chief executive within a stated period of at least 30 business days. The dam owner must comply with the notice or provide a reasonable excuse.

If the chief executive has not made a decision within the 30 business day period, the EAP is deemed to be approved for a period of two years. If the EAP is deemed to be approved, the dam owner will receive advice confirming the deemed approval.

7.4 EAP Refusal

The EAP submission will be assessed once it received. If it does not meet the requirements of section 352H(1)(c) of the Act, the decision will be made to refuse to approve the EAP.

The reasons for this decision can include but are not limited to the following:

- The EAP submission to the chief executive is incomplete, including EAP is not signed, EAP is marked as draft, mandatory items as specified within section 1.3 have not been included within the EAP.
- EAP triggers and escalation of the associated actions, including notifications, do not align with the current dam break/consequence assessment for the dam.
- Recommendations provided in a Schedule of Matters from a previous revision's approval notice have not been addressed or actioned and, as a result, the EAP is not considered to be effective (see also Section 7.5).
- The EAP submission is incomplete as it is not accompanied by each notice given by a local government or district group, and any notice responses by the owner.
- The EAP version submitted to the chief executive is not consistent with the EAP version stated on the local government and DDMG notice(s).
- The local government and/or DDMG notice is not signed.

- The local government and/or DDMG notice is not dated.
- The EA polygons and preformatted messages have not been uploaded into the QFES Disaster Management Portal.

7.5 Previous Schedule of Matters

The previous substantive amendment or renewal notice for the EAP may include a Schedule of Matters to be considered during the update of the EAP. This is a list of opportunities for improvement both substantive and non-substantive that were identified in the assessment of the EAP.

It is recommended to provide a written response to these matters in the current submission to the chief executive, justifying why each matter has or has not been addressed in the updated EAP version.

8. The role of the department

The dam safety department is the chief executive of the Department of Regional Development, Manufacturing and Water.

8.1 Ownership and responsibilities for the EAP

Referable dams are required to have an approved EAP. The dam owner is the owner of the approved EAP and is responsible for its implementation.

8.2 Issuance of guidelines

The chief executive issues guidelines which are intended to reflect industry good practice. However, other sources may be considered during the development of EAPs.

The provisions of the Act override this guideline to the extent of any inconsistency between the Act and the guideline. No responsibility is accepted for actions taken or any losses sustained based on reliance on an interpretation of this guideline to the exclusion of the relevant legislative provisions. In particular, dam owners and their agents must take their own legal advice as to whether their actions meet the requirements of the legislation.

8.3 Compliance activities

An audit is a verification activity aimed at monitoring the level of compliance against requirements contained within relevant standards, guidelines and/or legislation. To analyse and determine the compliance status of a dam owner, the chief executive conducts audits on the processes surrounding the implementation of the EAP, whether it be in a real-life or exercise scenario. An audit process could include the review of:

- An exercise scenario utilised by the dam owner to test the effectiveness of the EAP.
- Evidence of the training provided to personnel on their roles and responsibilities during the activation of the EAP.
- How and when the dam owner communicates with PAR on the EAP.
- Warning messages issued during previous activations of the EAP.
- Confirmation of processes contained within the EAP have been followed during previous activations.

8.4 Responsibilities during an emergency

The dam owner has primary responsibility for dam safety during an emergency situation.

The chief executive roles and responsibilities as the department during an emergency are:

- to receive notifications from dam owners of escalating response levels, if defined as an action in the EAP (noting this is a notification and not a requirement for endorsement or response by the chief executive).
- to provide supporting information to disaster management stakeholders during an emergency event (noting the dam owner is the primary provider of this information).
- to provide advice and guidance during an emergency event to disaster management stakeholders and dam owners.

- if the dam owner is unavailable or otherwise incapable, exercise emergency powers to give direction or take action about the failure of a dam (s. 359 and s. 359A)
- if requested by the dam owner, authorise an alternative operational procedure for a flood mitigation dam (s. 380) for Wivenhoe, Somerset and North Pine dams (which are owned by Seqwater).

These responsibilities are not limited by a disaster declaration or activation of the SDCC.

The department does not have a frontline response capability and cannot be relied upon to be available and contactable at all times. EAP actions must continue whether or not a notification to the department was successful.

8.5 Contracting dam safety advisors

During a dam safety emergency, it may be appropriate for the dam owner to seek advice from dam safety advisors external to their organisations. There is a risk that, when contacted, dam safety advisors will be reluctant to provide advice due to concerns associated with liabilities, especially when advice is provided without a contract.

It is recommended that dam owners consider this risk as part of their emergency preparedness.

The department has an untested backup protocol to contract and engage a dam safety advisor at short notice. For more information contact damsafety@rdmw.qld.gov.au or if it is a dam emergency contact the Director, Dam Safety.

9. References

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Water Supply (Safety and Reliability) Act 2008 viewed 5 April 2023,
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Best Practice Guide for Warning Originators 2013, viewed 5 April 2023,
https://knowledge.aidr.org.au/media/5656/warning-originators-best-practice.pdf

Attorney-General's Department.
Emergency Warnings – Choosing Your Words 2008, viewed 5 April 2023,
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https://knowledge.aidr.org.au/media/1975/manual-5-applications-guide.pdf

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https://knowledge.aidr.org.au/media/3547/handbook-3-managing-exercises.pdf

Attorney-General's Department
Community Engagement for Disaster Resilience Handbook (aidr.org.au) viewed 5 April 2023,
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https://www.igem.qld.gov.au/assurance-framework/Pages/default.aspx

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Queensland Fire and Emergency Services, Evacuation: Responsibilities, Arrangements and Management Manual

Evacuation: Responsibilities, Arrangements and Management Manual (disaster.qld.gov.au) viewed 8 June 2023,

Australian Warnings system
Australian Warning System (aidr.org.au) viewed 4 April 2023,
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Web Content Accessibility Guidelines (WCAG) 2.1 (w3.org) viewed 31 March 2023,
https://www.w3.org/TR/WCAG21/

Dr Rob Gordon 2020,
The Principles of effective warnings for emergency agencies, health and education authorities, Local Government, media and business

DNRME, 2020. Dam Safety Management Guideline, Department of Natural Resources Mines and Energy, Queensland, October 2020.
https://www.resources.qld.gov.au/__data/assets/pdf_file/0007/78838/dam-safety-management.pdf.

Appendices

A. EAP checklist

EAP Name:		Issue #	
General Document Items			
1.	Is the name of the dam and other relevant identifiers, such as dam ID, dam owner and version number clearly labelled on the cover?		
2.	Is the document a controlled document (i.e. each distributed plan is individually numbered and contains a statement that the plan is not to be copied or distributed by anyone other than the name owner)?		
3.	Is there a table of contents?		
4.	Has the document been approved and signed by the dam owner authorising officer?		
5.	Have the headers and footers been updated to reflect changes in page number, date and version number?		
6.	Sanity check of complete EAP document: - confirm page numbering and headers/footers are correct - look for incorrect; fonts, styles and sizing - remove or correct highlights and review notes - look for abnormal page positioning and 'Orphans' (text and table rows) - check table column spacing - check shading and borders consistency - Has draft been removed from the document?		
General Dam information			
7.	Information should be sufficiently detailed so that readers (which may include stakeholders and decision makers) gain a reasonable appreciation of the dam and the risks associated with it.		
8.	Is a table provided that includes, where practical: - storage characteristics (including links to storage capacity curve / table in appendices) - discharge characteristics (including links to spillway rating curve / table in appendices) - embankment and spillway dimensions (including any saddle dams, with drawings and maps in appendices) - design flood capacity (including flood event discharge, spillway depth and the probability associated with the flood event) - dam crest flood, or similar flood event above which the dam could be considered to be at elevated risk (including flood event discharge, spillway depth and the probability associated with the flood event) - flood of record and notable events - PAR (total, incremental and sunny day failure) and PLL (if available)?		

EAP Name:		Issue #	
Decision making items			
9.	Are the dam hazard and emergency trigger escalation tables clearly described and labelled?		
10.	Are the dam hazard and emergency triggers based on the current dam break study or consequence assessment?		
11.	Does each emergency event have an escalation table?		
12.	Is the decision criteria clear to help dam personnel assess and determine the appropriate level for potential dam hazards and emergency conditions?		
13.	Are the roles and responsibilities of dam personnel and key stakeholders during emergency events clearly stated?		
14.	Is it clear who activates and stands down the EAP?		
Notification and communication protocol			
15.	Are the notification flowcharts complete and logical?		
16.	Have the appropriate PAR been included on the notification list? (based on the current dam break. consequence assessment studies)		
17.	Have the contact details been checked and updated?		
18.	Are the phone numbers, after hours phone numbers and back up personnel listed?		
19.	Do you have a contact for engineering support?		
20.	Do the notification protocols minimise the number of calls that dam operators are required to make, so they can focus on implementing preventative actions? Optimally, one or two calls per entity is best with no more than four calls.		
21.	Have the EA polygon and preformatted warning messages been submitted, tested and approved in the QFES Disaster Management Portal?		
22.	Is the primary and back up communications system described within the plan?		
23.	Do the warnings meet the AWS warning protocol?		
24.	Is it clear who will issue the warnings?		
Mapping			
25.	Does the inundation map include a north arrow and bar scale?		
26.	Are the inundation areas clearly delineated and labelled? This is especially important if the EAP contains a range of maps such as ‘Sunny day’ failure and ‘PMF with and without dam failure’ and/or a specific AEP flood event with and without the concurrent flows in downstream catchment’.		

EAP Name:		Issue #	
27.	Do the maps include a qualification stating the inundation limits for an actual dam failure may vary in some ways from what is shown on the inundation map? (please indicate the magnitude of concurrent flood event)		
28.	Are local roads, drainages, and other landmarks clearly labelled on the base map?		
29.	Are PAR visible? Are PAR clearly distinguished from non-PAR?		
30.	Are the local government boundaries visible?		
Other			
31.	Have the items on the schedule of matters been addressed?		
32.	Is the frequency of testing and updating the document clearly described?		
33.	Have you included reference to the organisations fatigue management policy?		
34.	Have you included a section on community engagement and education?		
Notices			
35.	Are the local government and district disaster management group notices included in the submission?		
36.	Do the notices state the EAP version number and date?		
37.	Is the EAP version submitted to the local government and DDMG the same version that is stated on the notices and is the same version submitted for approval?		
Sender's Name			
Senders Signature			
Senders Position			

B. Example Quick reference guide

QUICK REFERENCE GUIDE Emergency Condition Level				
Dam Hazard	**Alert**	**Lean Forward**	**Stand Up**	**Stand Down**
Flood Event	Reservoir level equal to XXX metres above FSL	Reservoir above FSL, but as yet spill is unlikely to impact on downstream PAR	Extreme Flood Level: Reservoir approaching record flood level; AND likely to impact PAR	Reservoir levels stabilised to FSL and no further rain is forecasted
Sunny Day Failure	Earthquake of Magnitude 3 or higher detected in the vicinity or the Dam; OR Significant new or increased seepage areas identified at the Dam; OR Seepage flow containing sediment (cloudy appearance) observed at the Dam; OR New structural damage or movement areas identified at the Dam.	Seepage is increasing or earth material evident in the seepage is increasing; AND The increase cannot be controlled; OR New structural damage or movement areas have not stabilised and are demonstrating indication of continued worsening.	Dam failure is considered possible via an identified failure mechanism; OR New structural damage or movement areas indicate some potential for structural failure of the Dam.	Seepage through the Dam is controlled; AND No indicators of potential dam failure are present; AND Dam embankment is stable; AND No potential indicators of potential dam failure are present.

C. Example of escalation of Dam Hazards – Flooding

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• Storage rising due to rain in catchment	• Storage above FSL, unlikely to impact PAR	• Storage above FSL, likely to impact PAR	• Storage level falling or stabilised to FSL (if no structural damage occurred)
Actions	• Record all communication • Monitor dam and undertake visual inspection	• As per previous activation level; AND • Undertake inspection every 4 hours	• As per previous activation level; AND • Continuously monitor water levels in the dam (if safe to do so) • Support/supervise emergency works as required, such as storage lowering or controlled breaching • Discuss with LDMG, closure of affected roads if not already closed by others • Maintain surveillance of area immediately downstream of dam (if safe to do so)	• Prepare Emergency Event Report (EER) if required • Inspect dam and contact RPEQ if new damage observed, or the dam was overtopped • Return to routine activities
Internal notifications	• Advise onsite personnel if required	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of stand down
External notifications		1. PAR 2. LDMG	1. PAR 2. LDMG 3. DDMG/Local police 4. DSR	• Inform all previously notified contacts of stand down
External message		• EAP has been activated to Lean Forward • Describe current situation with dam: What is the event? (Flood event) What is the status of the dam? (overtopping has started?)	• EAP has been activated to Stand Up • Describe current situation with dam: What is the event? (Flood event) What is the status of the dam? (any structural damage to dam?) What is the current storage? (dam overtopping flows increasing) • Is more rain coming? (continuing rain forecast) • Confirm evacuations are required/underway/complete	• EAP has been deactivated • Describe current situation with dam: What is the status of the dam? Advise of current storage level (dam at FSL, overtopping flows decreasing) Advise weather conditions (no further rain forecasted)

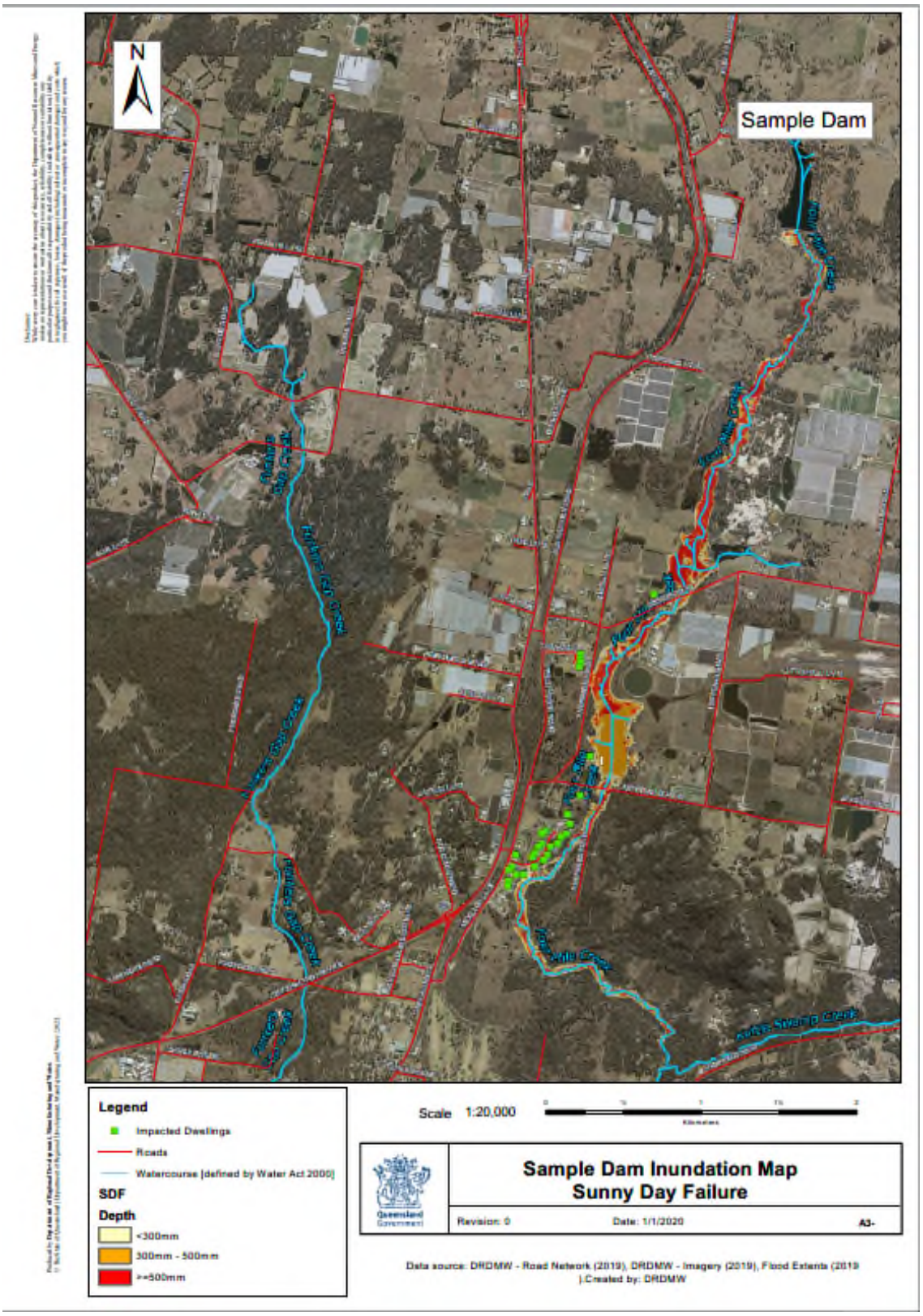
D. Example of escalation of Dam Hazards – Sunny Day Failure

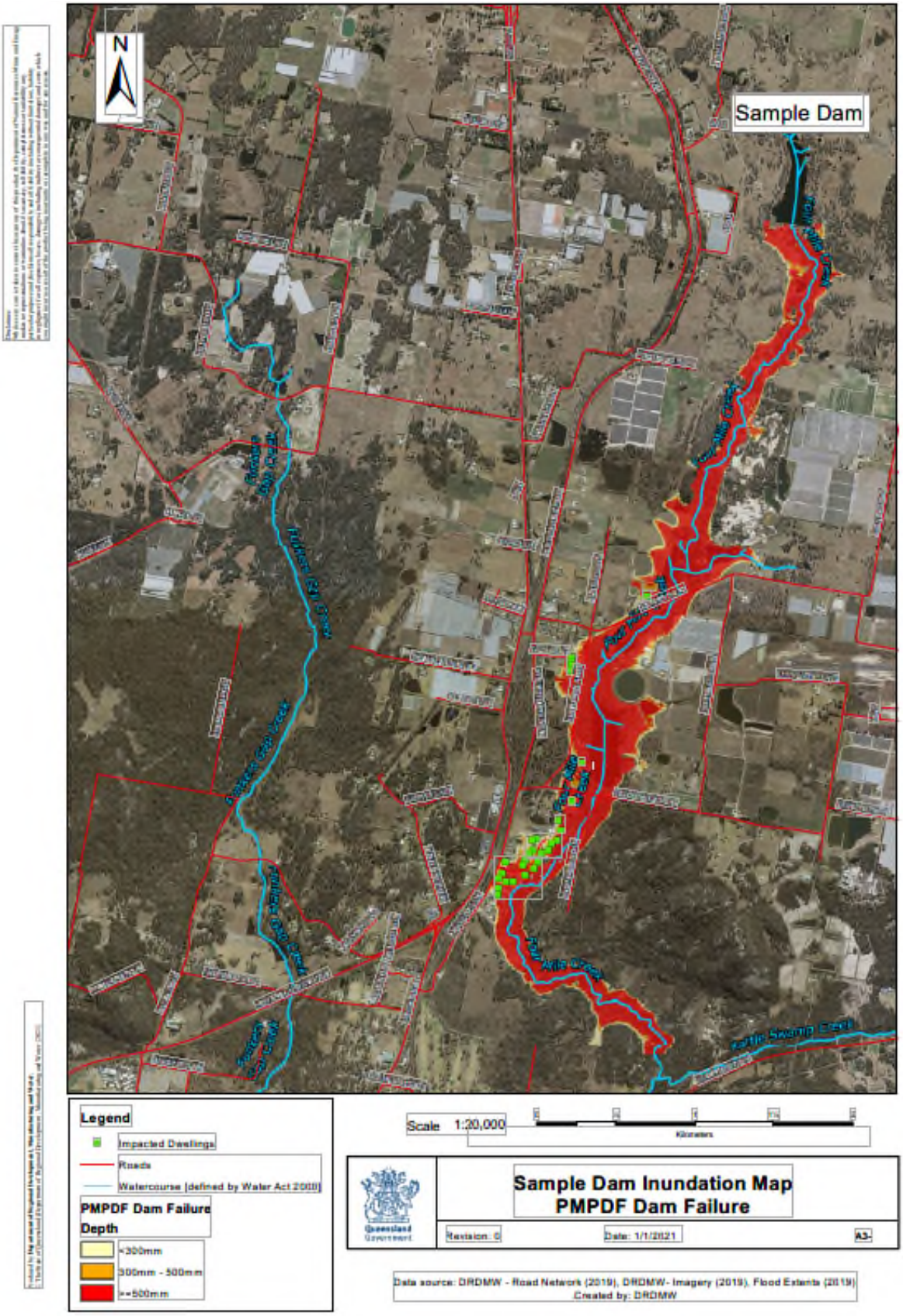
Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• New embankment cracking or settlement observed, visual movement/slippage of the embankment	• Embankment abnormalities, dam wall movement, new or increased seepage with cloudy discharge, sinkholes observed on dam embankment or reservoir and/or cracks in the embankment/spillway with seepage	• Embankment abnormalities, dam wall movement, seepage/piping developing, and dam failure is likely, rapidly expanding sinkhole(s) and/or sudden or rapidly proceeding slides of the embankment slopes	• Seepage/piping is manageable and/or water levels reduced to a 'safe' level
Actions	• Record all communication • Monitor dam (if safe to do so) • Monitor and record any leakage and/or cracks • Liaise with RPEQ if required	• As per previous activation level; AND • Undertake inspection every hour (if safe to do so) • Consider lowering storage (if safe to do so)	• As per previous activation level; AND • Continuously monitor the dam (if safe to do so) • Support/supervise remedial works as required • Lower the storage if directed • Close any affected roads if not already closed by others • Maintain surveillance of area immediately downstream of dam	• Prepare Emergency Event Report (EER) if required • Inspect dam and contact RPEQ if new damage observed • Return to routine activities
Internal notifications	• Advise onsite personnel if required	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of stand down
External notifications	1. LDMG 2. DDMG/local police 3. DSR	• As per previous activation level; AND • PAR	• As per previous activation level	• Inform all previously notified contacts of stand down
External Message	• Advise EAP has been activated • Describe current situation with dam: What is the event? (Dam Safety risk) What is the status? (identified embankment movement/cracks/leakage) • Advise of current storage level (dam at FSL)	• Advise EAP is at Lean Forward • Describe current situation with dam: What is the event? (Dam Safety risk) What is the status? (observations of identified embankment movement/cracks/leakage) • Advise of current storage level (dam at FSL)	• Advise EAP is at Stand Up • Describe current situation with dam: What is the event? (Dam Safety risk) What is the status? (observations of identified embankment movement/cracks/leakage) • Advise of current storage level (dam at FSL) • Confirm evacuations are required/underway/complete	• Advise EAP has been deactivated • Describe current situation with dam: What is the event? (Dam Safety risk) What is the status? (dam embankment is stable) Advise of current storage level (dam at FSL)

E. Example of a communication protocol table

When Alert – Dam Safety Emergency Event	Priority	Who	How: Phone, followed by email confirming conversation and action taken
A new event has impacted the Dam. The event is associated with water seepage, physical damage or the occurrence of an earthquake. The impacts of the event on the structural integrity of the dam are not fully understood, but the dam is not expected to be at any risk of failure Note: a template script of the message for external notifications can be found in Appendix J	1	Dam Operator Emergency Manager	(W) (AH) (Email) emergencymanager@damoperator.com
		Alternative Emergency Supervisor	(W) (AH) (Email) emergencysupervisor@damoperator.com
	2	Local Disaster Management Coordinator	(W) (AH) (Email) LDMC@LG.qld.gov.au
		Alternative Assistant Local Disaster Management Coordinator	(W) (AH) (Email) ALDMC@LG.qld.gov.au
	3	Director Dam Safety	(W) (AH) (Email)
		Alternative	DRDMW Incident Hotline (Email)

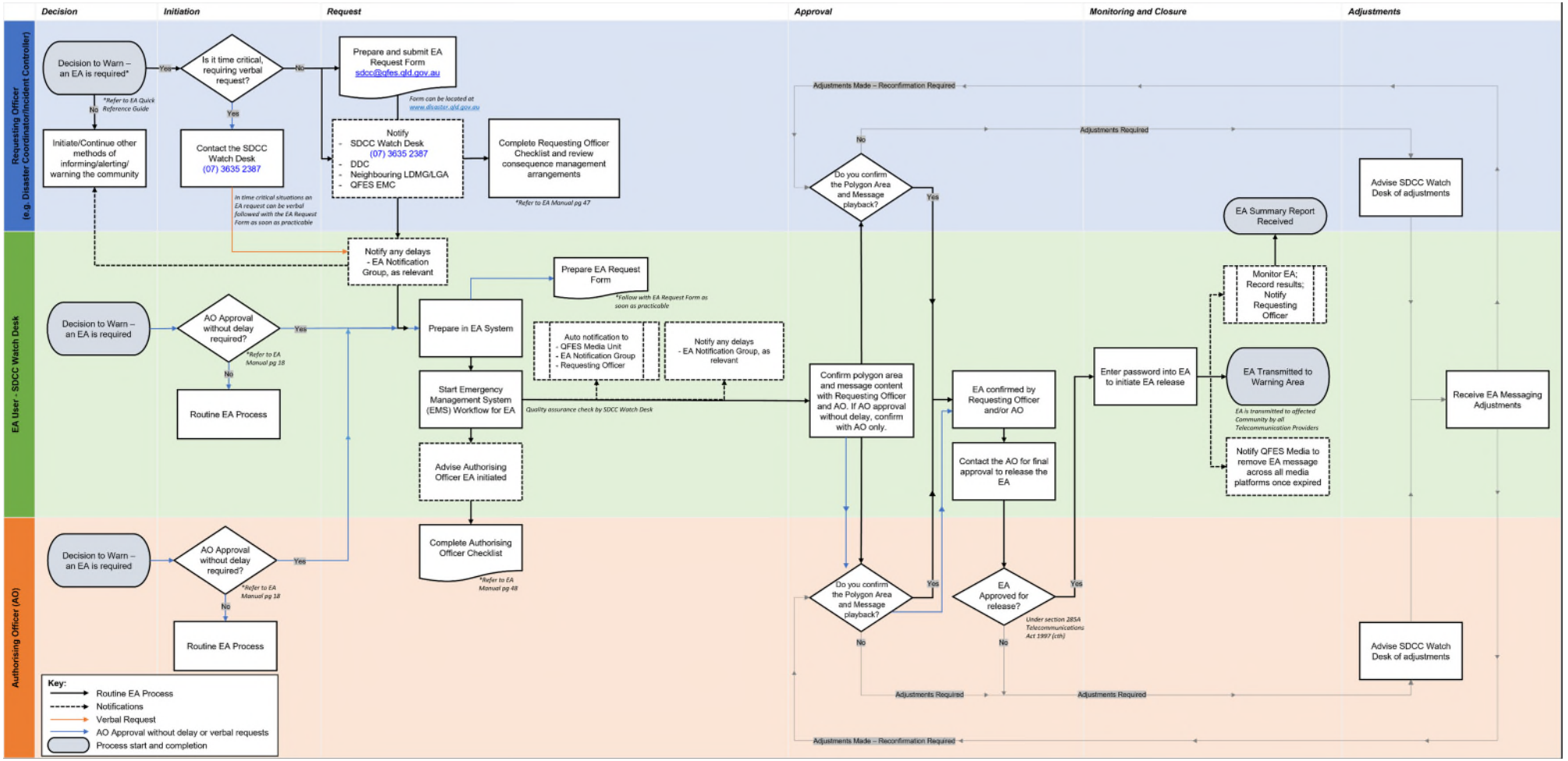
F. Examples of inundation maps




N
Sample Dam
Legend
Impacted Dwellings
Roads
Watercourse (defined by Water Act 2000)
PMPDF Dam Failure Depth
<300mm
300mm - 500mm
>=500mm
Scale 1:20,000
Kilometers
Sample Dam Inundation Map
PMPDF Dam Failure
Revision: 0
Date: 1/1/2021
A3-
Data source: DRDMW - Road Network (2019), DRDMW - Imagery (2019), Flood Extents (2019)
Created by: DRDMW

G. QFES Emergency Alert (EA) process

Checklist: The Emergency Alert: Request Check list and Request Form is available at www.disaster.qld.gov.au



H. Emergency alert request form

This form to be pre-filled out and submitted to the SDCC together with the polygons prior to the EAP being submitted to the chief executive for approval.

Queensland Government	**PHONE THE SDCC WATCH DESK (07) 3635 2387 – ADVISE EA IS BEING DEVELOPED**	
	EMERGENCY ALERT REQUEST	
	Location of Alert: (e.g. Suburb, Town)	**Date:**
	LGA/Agency requesting:	**Time:**

Requesting Officer (e.g. Disaster Coordinator/Incident Controller) **Name:** **Agency/Position:**	**Telephone:** (SDCC Watch Desk may telephone you)
Email:	
Advised LDC/LDMG: ☐ YES **DDC/DDMG**: ☐ YES **Neighbouring LDMG/LGA**: ☐ YES ☐ N/A	
Send Alert	**Immediately**: ☐ YES **Scheduled**: ☐ YES Date & Time / / : hrs
Event Type	☐ Cyclone ☐ Storm Tide ☐ Flash Flood ☐ Flood ☐ Bushfire ☐ Fire Incident ☐ Smoke / Toxic Plume ☐ Chemical Spill ☐ Tsunami (Sent as Location Based Text Message ONLY) ☐ Other (please specify):
Distributed by: (Channel)	☐ Voice (Landline only) ☐ SMS – Location Based (Location of phone at time of distribution) ☐ SMS – Service Address Based (Registered billing address)
Message Severity	☐ Emergency Warning (Activates SEWS) ☐ Watch & Act ☐ Advice

Threat Direction Required? (e.g. Fire, Chemical Spill, Dam Spill) ☐ YES ☐ N/A	**Threat location indicated on map?** Only For Emergency Warning Voice & Service Address SMS ☐ YES ☐ N/A
EA Messaging Filename (Doc, Pdf):	**Polygon Filename, (Kml, Kmz, Gml, GeoJSON):** **Number of polygons** _____ (if multiple, attach list in order of priority)
Supplied via: ☐ DM Portal ☐ Email ☐ Verbal ☐ Other Other (please specify):	**Supplied via:** ☐ DM Portal ☐ Email ☐ Verbal ☐ Other Other (please specify):
Voice: Type or handwrite, max 4000 characters incls spaces. (Ideally message should be < 450 characters)	
SMS: Type or handwrite, use capitals for clarity, max 612 characters incls spaces. (Ideally should be < 160 characters incl. spaces)	

Remove EA from websites:	☐ 12 hrs ☐ 24 hrs ☐ 48 hrs ☐ Replace previous EA message	☐ Specify Date & Time: / / : hrs	☐ Check back in 12 hrs: Contact #:- _____
Requesting Officer: **Date: / /**		**Signature:**	
Send to sdcc@qfes.qld.gov.au and telephone (07) 3635 2387 to confirm receipt			
FOR USE BY SDCC			
EA Request Form completed by: SDCC Watch Desk ☐ Requesting Officer ☐			
Notification of any delays provided to Requestor: ☐ YES ☐ NO			
EA User Name: Signature: Date: / /			Emergency Alert No:
Authorising Officer Name: Signature: Date: / /			EMS EA Campaign Report ID:
Report provided to Requestor on EA outcomes: ☐ YES ☐ NO			
The EA Manual, EA Quick Reference Guide, EA Request Form Template are available at: www.disaster.qld.gov.au			

EA Request Form – F.1.177 Last Updated: 31 October 2022 Version: 3.0

I. Examples of AWS Messaging templates

The following templates can be used to develop a messages.

It is NOT intended that an Emergency Alert would be issued for every full AWS warning. Publishing channels should always be selected depending on the context of the incident.

Full AWS warnings should be published to channels that allow for long-form information. A complementary Emergency Alert could be issued in some situations to ALERT people to the situation and direct them to where the full warning is published.

The LOCATION, HAZARD and CALL TO ACTION should be reviewed and selected as appropriate for the current situation.

The list of places identified in the following templates are locations that fall within the PMF-Failure polygons for [Dam Name]. Refinement of the impacted areas should occur in real-time if the situation permits.

The following templates can be used to create messages to warn people likely to be flooded to get ready to leave for their own safety. This could be due to danger from flooding, or likelihood of extended isolation.

[Red brackets] – nuanced information unique to that event and location. Decided by council, based on intelligence.

Blue text – optional information for inclusion if appropriate.

EA General Advice

[Dam Name] has started spilling excess water due to heavy rain.

If you are downstream of the dam, Act now to stay safe, avoid fast flowing or deep water near waterways and floodplains. These hazards potentially threaten the safety of you and your property.

For more information:

Dam release information [website]

Council [local government dashboard link]

Weather warnings, river heights www.bom.gov.au

Road closures and transport www.qldtraffic.qld.gov.au

EA AWS ADVICE – Prepare now

[Dam Name] spill flow has increased due to heavy rain. {More rain is forecasted}

People in [insert warning area from inundation map] may experience or are flooding and should PREPARE NOW. Flooding could get worse [insert timeframe – quickly, later today, overnight, tomorrow]. Tell neighbours, friends and family. Call Triple Zero (000) if your life is in danger. Call the SES on 132 500 for flood help. Get full warnings and what you should do at [insert website where the full warning will be published].

Full AWS warnings

Possible dam failure > Watch and Act > Prepare to leave

PREPARE TO LEAVE – Local government Area – possible failure of [Dam name] as at [time, day, date, year]

Warning Level: Watch and Act

Warning area: Local government area downstream of [Dam name] and in proximity to the [name of river] and connected creeks (including lower regions of the [name of creek/watercourse]

People in the following places must prepare to leave:

 List areas identified in the inundation map.

Water levels in the [name of river] may rise rapidly. Prepare to move to higher ground and for isolation.

Do not expect emergency services to come to your door.

If your life is in danger, call Triple Zero (000) immediately.

What you should do:

- Prepare to leave so you can go quickly if the water levels in the [name of river] start to rise. Get ready now.
- Decide where you and the people you live with will go. Find a safe and high place away from flooding.
- If you do not have a safe place, [an evacuation centre has / evacuation centres have] been set up at:
    - Venue name and full address
    - Venue name and full address
- Warn friends, family and neighbours in the area of the possibility of dam failure.

More information:

- Dam Safety – Emergency Action Plan [Dam name]
- For Local government updates and a map of areas that may flood, go to local government dashboard website

The next update will be sent at [time, day, date] or when the situation changes.

This warning is from [issuing agency name].

Possible dam failure > Watch and Act > Prepare to leave

PREPARE TO LEAVE – Local government Area – possible failure of [Dam name] as at [time, day, date, year]

Warning Level: Watch and Act

Warning area: Local government area downstream of [Dam name] and in proximity to the [name of city/town]

River and connecting streams (including lower regions of the [name of river])

People in the following places must prepare to leave:

List areas identified in the inundation map.

Water levels in the [name of river] may rise rapidly. Prepare to move to higher ground and for isolation.

Do not expect emergency services to come to your door.

If your life is in danger, call Triple Zero (000) immediately.

What you should do:

- Prepare to leave so you can go quickly if the water levels in the [name of river] start to rise. Get ready now.
- Decide where you and the people you live with will go. Find a safe and high place away from flooding.
- If you do not have a safe place, [an evacuation centre has / evacuation centres have] been set up at:
    - Venue name and full address
    - Venue name and full address
- Warn friends, family and neighbours in the area of the possibility of dam failure.

More information:

- For Local government updates and a map of areas that may flood, go to Web address

The next update will be sent at [time, day, date] or when the situation changes.

This warning is from [issuing agency name].

Possible dam failure > Watch and Act > Prepare to leave

PREPARE TO LEAVE – [Local government area] – possible failure of [Dam name] as at [time, day, date, year]

Warning Level: Watch and Act

Warning area: [Local government] area downstream of [Dam name] and in proximity to the [name of river] and connected creeks ([name creeks/waterways])

People in the following places must prepare to leave:

[List places as per the inundation map]

Water levels in the [name of river] may rise rapidly. Prepare to move to higher ground and for isolation.

Do not expect emergency services to come to your door.

If your life is in danger, call Triple Zero (000) immediately.

What you should do:

- Prepare to leave so you can go quickly if the water levels in the [name of river] start to rise. Get ready now.
- Decide where you and the people you live with will go. Find a safe and high place away from flooding.
- If you do not have a safe place, [an evacuation centre has / evacuation centres have] been set up at:
    - Venue name and full address
    - Venue name and full address
- Warn friends, family and neighbours in the area of the possibility of dam failure.
- More information:

For [Local government] updates and a map of areas that may flood, go to Web address link - and the emergencies/emergency-dashboard

The next update will be sent at [time, day, date] or when the situation changes.

This warning is from [issuing agency name].

Dam Failure > Emergency Warning > Too dangerous to leave/Move to higher ground

TOO DANGEROUS TO LEAVE/MOVE TO HIGHER GROUND – Local Government Area – potential failure of Wivenhoe Dam as at [time, day, date, year]

Warning Level: EMERGENCY WARNING

Warning area: *[insert names of area/s likely to be impacted as per Watch and Act Template]*

People in the following places must immediately move to higher ground:

[List places as per the inundation map]

Get up as high as you can where you are. There is likely to be dangerous, fast-moving flooding and debris along the Brisbane River.

You are in serious danger. You must get up as high as you can to survive.

If your life is in danger, call Triple Zero (000) immediately.

What you should do:

- Stay where you are and get up as high as you safely can. This could be upstairs or on the roof.
- Help other people who are with you if you can.
- Tell someone where you are.
- Stay in place until you are rescued, or the water goes down enough to safely leave.

More information:

For [local government area] updates and a map of areas that may flood, go to [website/disaster dashboard].

The next update will be sent at [time, day, date] or when the situation changes.

This warning is from [issuing agency name].

J. Example of EAP Messaging Script

The following summaries and scripts are provided as a guide to assist dam owners to be consistent when providing information to external agencies during Flood Events. It is suggested to follow up these telephone conversations with the same text in an email to the agency contacted and record in communications log.

Before you make the relevant notification, ensure you have the following information to hand if applicable to the dam.

Information	Response
Dam Name	
Trigger Level exceeded	
Current Lake Level and Trend (rising / falling / steady)	
Contact Name and number for Local Government Agency (are multiple impacted?)	
Contact Name and number for DRDMW	
Is this notification based on predicted lake level or actual lake levels?	
Is there an operator on site or is surveillance available?	
What is the next trigger level (m AHD) for the Dam?	

Script:

Hello, this is <your name> from the <Dam Owner>. I'm calling regarding a notification required under the <Dam name> Dam Emergency Action Plan.

The <Dam name> EAP is now at <activation level> for <activation type>. Your organisation should enact any plans related to this trigger.

The lake level is currently XXX and rising / steady. This is subject to any further rainfall within the catchment.

We will not contact you again unless the lake level reaches the next trigger level listed in the EAP, which is XXX m AHD/ or <insert next trigger level>. However, please don't hesitate to contact <your name> on <phone number> if you require any further information.

Further notes:

If asked specific questions that are not outlined in the information above, it is suggested to reply with the following response:

There is currently no-one available to assist with answering that question, however if you send an email with your request to <email address> outlining the criticality of the requested information and your preferred response time, we will endeavour to action this request.

K. Emergency event report (EER) template

The Act (s. 352T) requires dam owners to submit an EER to the chief executive within 30 business days after the end of the emergency event or, at a period agreed to in writing by the chief executive and the dam owner. The EER report should be comprehensive but appropriate in details to reflect the severity of the event.

Emergency Event Report for <INSERT NAME OF DAM> <Insert date of report> <Insert Dam Owner/Operator>	
Table of Contents 1. Description of the event 2. General comments and/or recommended changes to the EAP 3. Management of the event • Instrument readings *alternately* actual rain gauge readings • Inspection sheets *or for smaller dams observations from monitoring* • Relevant photos of the event • Details of communication during the event with key stakeholders i.e. PAR, LDMG, Police, Media • Analysis of the communication i.e. was the communication effective • Reports issued during the event • Internal situation reports	
1.	Description of the event *Provide a description of the event.* *Was it part of a larger rain/flood event or cyclone?*
2.	General comments and/or recommended changes to the EAP *Provide comments on how effective the event was managed, learnings from the event, and are there any changes that could be made to the EAP to make it more effective*.
3.	Management of the event *Provide details of how the EAP was implemented.* *What actions were undertaken to monitor the dam and the affected area.* *What EAP activation triggers were reached?* *Provide the actual instrument and/or rain gauge readings* *Description of any damage to the dam, include photos of overflows, erosion, scouring etc.* *Details of communication undertaken with internal stakeholders and external parties i.e. PAR, Department, LDMG, Police, social media etc.* *Provide comment on if the communication strategy was effective. Did the PAR receive the SMS/phone messages, did they act on the direction?* *Was power lost? Did this impact on communications?* *Include any other relevant information.*

L. Annual Safety Statement template

Dam owners have the option of completing this statement and submitting via damsafety@rdmw.qld.gov.au or completing the electronic form (Annual Review Statement) on the Dam Safety Portal.

In accordance with s. 356A and s. 352P of the *Water Supply (Safety and Reliability) Act 2008* an annual statement of compliance and emergency action plan (EAP) review for <insert dam ID and Dam Name> has been completed.

The review has identified that (indicate with a tick) the dam safety management program (DSMP):

- ☐ Complies with relevant legislation and guidelines, including acceptable flood capacity and failure impact assessment
- ☐ Complies with all dam safety conditions applied to the dam
- ☐ Data book and relevant documentation is up to date, available and appropriately managed
- ☐ Operation and maintenance manual is current
- ☐ Equipment is in good working order
- ☐ Instrumentation, surveillance and monitoring equipment is in good working order
- ☐ Interpretation of instrumentation data is performed
- ☐ Engineering inspections have been performed and documented (details provided below)
- ☐ Deficiencies, incidents and/or failures have been noted and addressed
- ☐ Scheduled actions to address recommendations from external audits and inspections are being addressed (details provided below)

The review of the EAP has identified that:

- ☐ Hazards, triggers and corresponding response actions remain appropriate.
- ☐ Inundation information suitably shows population at risk (PAR).
- ☐ Notification and warning arrangements, including frequency, prioritisation and content, are appropriate.
- ☐ Contact details are complete and up to date.

The annual review has found that (indicate with a single tick):

- ☐ Amendment of the EAP is not required
- ☐ Amendment of the EAP is required, and an updated EAP will be submitted for assessment and approval.

For your records we can provide the following additional information (indicate with a tick):

- ☐ Emergency Alert polygons have been prepared and lodged with the SDCC Watch Desk.
- ☐ An event or training exercise involving use of the EAP occurred within the last year.

Additional relevant information pertaining to the DSMP, the EAP and our wet season preparedness is as follows:

EAP Training Exercise held on <Insert Date>. Provide information on who attended and the purpose of the exercise.

<insert points additional here as preferred>
Yours sincerely, <signed by Delegate of the Dam Owner>

M. Local government/DDMG notice template

If the local government CEO is the dam owner, the notice is to be signed by a delegate of the CEO who does not have a role within the EAP.

This notice does not come from the Local Disaster Management Group.

<date>

<Dam Owner>
<Address>

Attention:

<Insert name of local government or district disaster management group> notice to <Insert name of dam owner>.

As per the *Water Supply (Safety and Reliability) Act 2008*, Section 352, the <insert name of local government or district disaster management group> was provided a copy of the emergency action plan (EAP) version <insert version number>, dated <insert date> for <insert name of dam> on <insert date copy was provided>.

The <Insert name of local government or district disaster management group> has reviewed the EAP and:

i. consider the EAP to be consistent with the <insert name of local government> Local Disaster Management Plan <insert version number>, dated <insert date>
ii. have been consulted on the format and content of the EAP warning messages; and
iii. agree to the roles and responsibilities for distributing the warning messages.

<Signature>
<insert title i.e. Chief Executive Officer / or delegate>
<Insert name of local government or district disaster management group>

N. Glossary

The following are common abbreviations and definitions, which have been utilised within this guideline and are common in EAPs and disaster management documents.

Abbreviations

The Act	*The Water Supply (Safety and Reliability) Act 2008*
AHD	Australian height datum
ANCOLD	Australian National Committee on Large Dams
AWS	Australian Warning System
Bureau	Bureau of Meteorology
DCF	Dam crest flood
DMG	Disaster management group
DDMG	District disaster management group
DM	Disaster management
DM Act	*Disaster Management Act 2003*
DRDMW	Department of Regional Development, Manufacturing and Water
DSR	Dam Safety Regulator
EA	Emergency alert
EAP	Dam owner’s emergency action plan
EER	Emergency event report
FIR	Failure impact rating
FSL	Full supply level
GS	Gauging station
GIS	Geographic information system
IGEM	Inspector-General Emergency Management
Km	Kilometre
LDMG	Local disaster management group
LDMP	Local disaster management plan
LG	Local government
MMI	Modified Mercalli Intensity scale
PAR	Population at risk

PLL	Potential for Loss of Life
PMF	Probable maximum flood
PMP	Probable maximum precipitation
PMPDF	Probable maximum precipitation design flood
PPRR	Prevention, preparedness, response and recovery
QDMA	Queensland disaster management arrangements
QDSMG	Queensland dam safety management guideline
QFES	Queensland Fire and Emergency Services
QPS	Queensland Police Service
SDCC	State disaster coordination centre
SDMG	State disaster management group

Definitions

(EAP) Activation	Is defined as actions undertaken by the dam owner as per the EAP in response to a dam event.
Alert	The first stage of emergency response whereby a heightened level of vigilance is maintained due to the possibility of an emergency event occurring. Action is required to ensure the situation is monitored by someone capable of assessing the potential of the threat.
Approved emergency action plan	An emergency action plan that is approved under section 352I (1) (a) or taken to be an approved emergency action plan under section 352Q (2). Refer to s. 352A of the Act
Approval period (for an EAP)	The period of approval for the EAP can be for a period of no more than five years and must be stated in the approved EAP. Refer to s. 352K(2) of the Act
Australian Warning System (AWS)	The AWS is a national approach to information and warnings for hazards like bushfire, flood, storm, cyclone, extreme heat and severe weather.
Chief executive	The chief executive of the department responsible for administering the provisions of the Act relating to referable dams. Sometimes referred to as the 'dam safety regulator' of Queensland. Reference to the chief executive includes reference to delegates under the Act.
Controlled document	Having an EAP issued as a 'controlled document' means specified copies of a document are kept up to date in a controlled manner using a system that distributes updated versions/pages of the document as they are issued and retrieves superseded versions/pages of the document as they become redundant. In this way, only the current version of the document is used during any event. A controlled document requires the following metadata to be recorded in the document and securely archived: • contents, versions and dates of versions • name and role of the person approving each version and details of any prior consultation undertaken • names and roles of persons issued with copies.
Dam	A dam means: • works that include a barrier, whether permanent or temporary, that does or could impound water; and • the storage area created by the works. The term includes an embankment or other structure that controls the flow of water and is incidental to works mentioned above. The term does not include the following: • a rainwater tank • a water tank constructed of steel or concrete or a combination of steel and concrete • a water tank constructed of fibreglass, plastic or similar material See the definition of 'referable dam'.

Dam crest flood (DCF)	Flood event which, when routed through the storage with the storage initially at full supply level, results in a still water in the storage, excluding wind and wave effects, that reaches: • the lowest point of the embankment crest (for embankment dams) • the level of the non-overflow section of the dam, excluding handrails and parapets if they do not store water against them (for concrete dams) • the lowest point of the crest structure or a point on a wave wall if it is designed to take the corresponding water load (for concrete faced rockfill dams).
Dam hazard	Dam hazard, for a dam, means a reasonably foreseeable situation or condition that may: (a) cause or contribute to the failure of the dam, if the failure may cause harm to persons or property or (b) require an automatic or controlled release of water from the dam if the release of the water may cause harm to persons or property. Refer to s. 352A of the Act
Dam hazard event	An event arising from a dam hazard if persons or property may be harmed because of the event; and (a) a coordinated response involving two or more of the relevant entities mentioned in paragraphs (b) to (d) of the definition relevant entity is unlikely to be required to respond to the event. (b) the event is not an emergency event. Refer to 352A of the Act
Dam operator	The person(s) or organisation responsible for the operation of a dam and works associated with the dam.
Dam owner	The person(s) or organisation that owns a dam. For the purposes of dam safety regulation an owner is any of the following: • the registered proprietor of the land (relevant for freehold land) • the lessee or licensee under the *Land Act 1994* of the land (relevant for non-freehold land that is, State land) • the holder of a mineral development license or mining lease under the *Mineral Resources Act 1989* • the person or body of persons who for the time being, has lawful control of the land, on trust or otherwise • the person who is entitled to receive rents and profits of the land • the person in actual occupation of the land or if there is no person in actual occupation, the person entitled to possession of the land
Department	Department of Regional Development Manufacturing and Water. Previously responsible departments are: • Department of Natural Resources Mines and Energy (DNRME) • Department of Energy and Water Supply (DEWS) • Department of Environment and Resource Management (DERM) • Department of Natural Resources and Water (NRW) • Department of Natural Resources and Mines (NRM)

	• Department of Natural Resources, Mines and Water (NRMW) Refer also to 'chief executive' above
Disaster management group (DMG)	A district group established under the *Disaster Management Act*, s. 22 whose disaster district under the Act could, under the plan, be affected by a dam hazard.
Disaster management plan (DMP)	A local or district disaster management group's disaster management plan under the *Disaster Management Act 2003* s. 53.
Disaster risk assessment	The process used to determine risk management priorities by evaluating and comparing the level of risk against predetermined standards, target risk levels or other criteria (Council of Australian Governments (COAG), Natural Disasters in Australia: Reforming mitigation, relief and recovery arrangements: 2002). Incorporates the processes of risk identification, risk analysis and risk evaluation (refer to ISO Guide 73:2009 Risk management - Vocabulary).
District disaster management group	District disaster management group(s) established under the *Disaster Management Act* s. 24, comprise representatives from regionally based Queensland Government agencies, which provide and coordinate whole-of-government support and resource gap assistance to disaster-stricken communities. The district group(s) perform a 'middle management' function within the disaster management arrangements by coordinating the provision of functional agency resources when requested by local group(s) on behalf of local government(s).
District group	The district group or an emergency action plan, means a district group established under the *Disaster Management Act* s. 22, whose disaster district under that Act could, under the plan, be affected by a dam hazard.
Early warning notification system	Non-government, commercial subscription-based warning/alert system that provides SMS, landline, email, and social media alert messages. The community is required to register to receive the notification service.
Emergency action plan (EAP)	An EAP provides guidance for actions required as a result of any hazardous situations or emergency events occurring at a dam. There is a legislative requirement for all referable dams to have an approved EAP.
Emergency alert (EA)	The emergency alert (EA) system is a national telephone warning system administered in Queensland by the Queensland Fire and Emergency Service. The EA system provides emergency authorities with a rapid mass notification service to deliver preformatted messages via landline and mobile telephones within a defined geographic area.
Emergency event	An event arising from a dam hazard if persons or property may be harmed because of the event, and any of the following apply: i. A coordinated response where two or more of the relevant entities, mentioned in paragraphs (b) to (d) of the definition *relevant entity,* are likely to be required to respond to the event. ii. The event may arise because of a disaster situation declared under the *Disaster Management Act 2003* s. 64*.* iii. An entity performing functions under the State disaster management plan may, under that plan, require the owner of the dam to give the entity information about the event.

	Refer to s. 352A of the Act
Emergency event interim report	An interim report on the performance of the dam and the functioning of the EAP during an emergency event, which is presented to the chief executive prior to the end of the event at the request of the chief executive. Refer to s. 352U of the Act
Emergency event report (EER)	A report on the performance of the dam and the functioning of the EAP during an emergency event which is presented to the chief executive following the *end* of the event. *(*'End' of an emergency event means when the dam hazard giving rise to the event is no longer a risk to persons or property.) Refer to s. 352T(2) of the Act
Failure	The physical collapse of all or part of a dam, or the uncontrolled release of any of its contents.
Failure impact assessment	An assessment undertaken to determine the potential consequences of failure for a dam, for the purposes of deciding whether to categorise a dam as a referable dam under the Act. Refer to s. 342 of the Act
Failure impact rating	A category 1 or 2 failure impact rating is allocated depending on the maximum population at risk assessed based on assumption of failure of a dam. • Category 1: 2 to 100 people at risk if the dam were to fail. • Category 2: more than 100 people at risk if the dam were to fail. Dams with category 1 or 2 failure impact ratings are referable dams under the Act.
Failure impact zone (or extent)	The zone surrounding a dam where impacts of a feasible dam failure event will cause consequence (i.e. that exceed failure impact criteria).
Hazard	A source of potential harm, or a situation with a potential to cause loss *(Emergency Management Australia, 2004).*
Incident	An event that could deteriorate to a very serious situation or endanger the safety of a dam. Examples of incidents include: • rapid change in seepage • overtopping of earth embankment • excessive beaching • excessive embankment erosion • spillway or by wash erosion or blockage • excessive cracking or displacement in concrete dams and spillways • sliding, rotation or settlement of the dam • malfunction of gates or crest bags • vandalism.
Inspector-General Emergency	The Inspector-General of Emergency Management is responsible for providing the Premier, Government and people of Queensland an assurance of public safety, through the establishment and

Management (IGEM)	implementation of an assurance framework to direct, guide and focus work of all agencies, across all tiers of Government to the desired outcomes of the disaster and emergency management arrangements for Queensland.
Lean forward	An operational state prior to 'stand up' characterised by a heightened level of situation awareness of a disaster (either current or impending) and a state of operational readiness. Disaster coordination centres are on standby, prepared but not activated.
Local disaster coordinator	An officer appointed under the *Disaster Management Act 2003* s 35 who is responsible for the coordination of disaster operations for the local disaster management group.
Local disaster management group (LDMG)	Local disaster management groups are established under the *Disaster Management Act 2003* s. 29 to support local government disaster management activities. The local group is supported by the relevant district group if and when disaster management activities exceed the capacity of a local group. The functions of the local group include (but are not limited to): • developing, regularly reviewing and assessing effective disaster management • assisting local government for its area to prepare a local disaster management plan • ensuring the community is aware of ways of mitigating the adverse effects of an event, and preparing for, responding to and recovery from a disaster • identifying and coordinating the use of resources that may be used for disaster operations • managing disaster operations in the area under policies and procedures decided by the State group • ensuring disaster management and disaster operations in the area are consistent with the State group's SPF for disaster management for the State.
Modified Mercalli Intensity (MMI) scale	Earthquake effects based on human observation are rated using the Modified Mercalli (MM) intensity scale, which ranges from I (not felt) up to X (total destruction).
Notice	A written statement provided to the dam owner from the local government and/or the disaster management group on the outcomes of the assessment of the EAP.
Notice response	A statement of reply from the dam owner to the local government and/or district disaster management group on the information provided within the notice of assessment. Refer to s. 352HB and s. 352HC of the Act
Population at risk (PAR)	The number of persons calculated using methodologies described in a failure impact assessment (DNRME, 2018), whose safety will be at risk if the dam or the proposed dam after its construction fails. PAR are persons who are not at risk by a flood event but are at risk when the same flood event is accompanied by a dam failure event. It can be considered as Total PAR minus the PAR affected by a no-failure flood event immediately prior to dam failure (subject to water depth and flood hazard thresholds).

Probable maximum precipitation (PMP)	The theoretical greatest depth of precipitation for a given duration that is, based on meteorological methods of maximisation, physically possible over a particular catchment area.
Probable maximum flood (PMF)	The flood resulting from probable maximum precipitation coupled with catchment conditions that are optimal for generating maximum runoff. It is a hypothetical flood estimate relevant to a specific catchment whose magnitude is such that there is negligible chance of it being exceeded.
Queensland Disaster Management Arrangements	Queensland's whole-of-government disaster management arrangements are based upon partnerships between government, government-owned corporations, non-government organisations (NGOs), commerce and industry sectors and the local community. These arrangements recognise each level of the disaster management arrangements working collaboratively to ensure the effective coordination of planning, services, information and resources necessary for comprehensive disaster management. The Australian Disaster Management Arrangements are formed around three levels of government, local, state and the Australian Government. The Queensland Disaster Management Arrangements acknowledge these three levels of government, however, are based on a four-tiered system to include an additional state government tier, between local and state governments and known as disaster districts. This enables a more efficient and effective operational service delivery to support local communities. Further details of the Queensland Disaster Management Arrangements are available at www.disaster.qld.gov.au/About_Disaster_Management/DM_arrangements.html
Referable dam	A referable dam is one that would, in the event of failure, put a population of two or more people at risk. Referable dams are regulated under the Act for dam safety purposes. The Act defines a referable dam as a dam or proposed dam after its construction, for which: • a failure impact assessment is carried out under the Act and • the assessment states the dam has or the proposed dam after its construction will have a category 1 or 2 failure impact rating and • the chief executive has under the Act, accepted the assessment. A dam also becomes referable when: • the chief executive reasonably believes the dam has a category 1 or 2 failure impact rating and gives a referable dam notice (RDN) under the Act to the owner and • the owner does not submit a failure impact assessment disputing the RDN within the time specified in that RDN.
Relevant entities	Means each of the following under the emergency action plan for the dam: (a) the persons who may be affected, or whose property may be affected, if a dam hazard event or emergency event were to happen for the dam e.g., owners of parcels of farmland adjacent to the dam, residents of a township (b) each local group and district group for the emergency action plan and each local government whose local government area may be affected

	if a dam hazard event or emergency event were to happen for the dam (c) the chief executive (d) another entity the owner of the dam considers appropriate e.g. the Queensland Police Service. Refer to s. 352A of the Act
Richter scale	The Richter magnitude scale (often shortened to Richter scale) is the most common standard of measurement for earthquakes. Scale 1 Small movement no damage to 10 Super Extreme damage
Risk identification and management process	The systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analysing, evaluating, treating, monitoring and reviewing risk. (refer to ISO Guide 73:2009 Risk management – Vocabulary and the ANCOLD Guidelines on Risk Assessment).
SitRep	A situational report that provides an update of the incident when requested by the department.
Stand down	The final stage of emergency response when there is no longer a requirement to respond to the event and the threat is no longer present. At 'stand down' there is a transition from responding to an event back to normal core business and/or recovery operations.
Stand up	The operational state following 'lean forward' whereby resources are mobilised, personnel are activated, and operational activities commenced. Disaster coordination centres are activated.
State disaster coordinator	The officer appointed under the *Disaster Management Act* 2003 s. 21B who is responsible for the coordination of disaster response operations for the State Disaster Management Group.
Sunny day failure	A dam failure event that occurs without a wet weather event.
The Act	The *Water Supply (Safety and Reliability) Act 2008*

Department of Regional Development,
Manufacturing and Water
GPO Box 2247, Brisbane, Queensland 4001
13 QGOV (13 74 68)
info@rdmw.qld.gov.au
rdmw.qld.gov.au

Queensland Government