Emergency action plan for referable dam guideline
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<tr>
<td>1: 2017</td>
<td>Original version following IEGM recommendations and Act amendments, previous information relating to EAPs was provided in the Dam Safety Management Guidelines (2003).</td>
</tr>
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</table>
1. Introduction

The chief executive, Department of Natural Resources, Mines and Energy (DNRME), 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 the website 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 should be included in an EAP, how to submit an EAP for approval and how to perform an annual review of an EAP. 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 that these are guidelines only and are designed to assist referable dam owners in drafting their EAP. Notwithstanding anything in this guideline that might be interpreted to 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?

Not all dams are referable dams. A dam is referable if a failure impact assessment (FIA) demonstrates there would be two or more populations at risk (PAR) if the dam were to fail.

A dam becomes referable if:

- an FIA of the dam is carried out under the Act
- the FIA states the dam has or will have a category 1 or category 2 failure impact rating (FIR) of two or more PAR
- the chief executive has accepted the assessment.

Only referable dams are regulated for dam safety purposes and require EAPs. The process by which a dam is made referable is detailed in the Act (s341; 342A and 342B).

Further information on guidelines associated with referable dams is available on the website www.dnrme.qld.gov.au.
1.3. **What is an emergency action plan and what must it contain?**

“Emergency planning should be conducted for all dams which, because of releases as a result of failure or dam operation, might pose a risk to life or property. The planning process should establish roles and responsibilities clearly, identify the resources needed to manage emergency events involving dams, develop appropriate strategies to warn and evacuate those at risk and develop procedures for plan audits, testing and review”.

Australian Institute for Disaster Resilience: *Manual 23-emergency management planning for floods affected by dams*

The EAP is a standalone plan 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 that the EAP is user-friendly as it may be used during highly stressful situations at short notice.

The EAP must:

- comply with the Act (s352(H))
- be consistent with the local disaster management plan(s)
- 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 notifications and warning messages are to be delivered to downstream persons at risk
- 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
- state the dam owners training schedule for EAP officers and other relevant parties to effectively implement and test the effectiveness of the EAP
- be reviewed and updated prior to the wet season (1 October) each year and a notice provided to the chief executive advising that an annual review of the EAP has been completed (see Appendix 6).

It is important to acknowledge that 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 large farm dam with one house downstream would prepare and submit a simplified EAP that appropriately represents the level of risk for the dam.

The Act (s 352M(3)) requires the approved EAP to be publicly available with personal information being redacted. These are published by DNRME and accessed at [www.dnrme.qld.gov.au](http://www.dnrme.qld.gov.au).

### 1.4. Suggested EAP outline

When considering the content of the EAP in addition to the elements identified in Section 1.3 of this guideline and the regulatory requirements stated in Section 2, dam owners are encouraged to consult with the local government (specifically the local disaster management group) on its format to ensure it is most useful to, and consistent with the local disaster management plan. It may also be worthwhile consulting district disaster management groups (DDMGs) to consider a broader consistency.

The contents of the EAP should include but not be limited to the suggested headings in Table 1. **Appendix 1** provides a checklist of matters to consider when developing an EAP that can also inform contents.

**Table 1: Suggested content headings for an emergency action plan**

<table>
<thead>
<tr>
<th>Suggested content heading</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title page</td>
<td></td>
</tr>
<tr>
<td>Quick reference guide</td>
<td>The quick reference guide provides immediate access to important information (such as triggers for dam hazards) and easy navigation to relevant sections in the EAP.</td>
</tr>
<tr>
<td>Preface, including:</td>
<td></td>
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<tr>
<td>Distribution control sheet</td>
<td></td>
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<tr>
<td>Version history</td>
<td></td>
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<tr>
<td>EAP authorisation table</td>
<td></td>
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<tr>
<td>Table of contents</td>
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<tr>
<td>Introduction and general information</td>
<td>Information should be concise and relevant.</td>
</tr>
<tr>
<td>General dam description</td>
<td></td>
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<tr>
<td>Public awareness and communication</td>
<td></td>
</tr>
<tr>
<td>EAP training and exercise</td>
<td></td>
</tr>
<tr>
<td>Schedule for updating EAP and distributing to the key stakeholders and near PAR</td>
<td>General dam description should include a table with basic details of the dam, maps of dam location, access, catchment area and relevant information relating to risks (see <strong>Appendix 1</strong>).</td>
</tr>
<tr>
<td>Dam monitoring before and during events</td>
<td></td>
</tr>
<tr>
<td>Suggested content heading</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>• Dam schedule of inspections (before and during events)</td>
<td></td>
</tr>
<tr>
<td>Summary of EAP roles and responsibilities</td>
<td></td>
</tr>
<tr>
<td>Relevant dam personnel and key stakeholder notification flowcharts</td>
<td></td>
</tr>
<tr>
<td>EAP response process for each dam emergency event</td>
<td>Response triggers and actions for each identified dam hazard (see Section 3).</td>
</tr>
<tr>
<td>PAR notification and communication protocol</td>
<td>Note that multiple communications systems are required in case of failure</td>
</tr>
<tr>
<td>Evacuation responsibilities</td>
<td>If appropriate and relevant to the specific dam and proximity of PAR.</td>
</tr>
</tbody>
</table>

**Part 2: Appendices**

- event scenario maps
- notification contact list
- storage and discharge curves
- drawings of dam structure
- forms and log sheets
- access to the site and alternative site access during adverse weather
- local government and DDMG notices
- abbreviations
- 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?

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

The Act (s 352F) requires an EAP to be submitted to the chief executive for approval within four months after the dam construction is completed. However, if the chief executive gives the dam owner a notice requiring the EAP before the construction is completed, the EAP will be due within the period of at least 30 business days or as stated in the notice.
1.6. **Is a new EAP required when a dam changes ownership?**

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; and
- the date of the change in ownership; and
- the real property description of the land on which the dam is situated; and
- 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); and
  - 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; and
- make other changes to the plan required due to the change in ownership.

The former owner of the dam is to ensure all relevant documentation (i.e. dam safety conditions, data book, standing operating procedures, detailed operation and maintenance manual, EAP, and the FIA) for the dam 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 chief executive cannot approve an EAP for longer than five years. The approval period is to be stated within the approved plan (s 352K(2)) prior to distribution of final approved copies to key stakeholders.

1.8. **How is the EAP published on the department’s website?**

All approved EAPs are published on the department’s website (s 352M). Prior to publishing, the EAP is reviewed and privacy information is redacted or removed.

Redacted information includes:

- name, address and contact details of PAR
- name of relevant dam personnel (job position, 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. The approved EAP will be published in a form considered appropriate after taking into account any submission received within the specified time.
2. What are the 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 s352H 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 section 352HB(3) or 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 on the website at www.legislation.qld.gov.au
3. Developing an EAP

Appendix 1 provides a checklist of matters to consider when developing an EAP.

It is important to note that EAPs form a sub-plan of the Local Disaster Management Plan (LDMP) which is developed by the local government to manage its response to local disasters (such as riverine flooding, storms and bushfires).

The aim is to develop an EAP that enables the dam owner and the LDMG(s) to respond to dam hazard events or dam emergency events in a timely and effective manner. Dam owners are legally responsible for dam operations and any related incidents. In most EAPs, the LDMG will lead the emergency event response, requesting assistance from the District Disaster Management Group (DDMG) as required. Establishing and stating within the EAP the roles and responsibilities is essential.

The dam owner is encouraged to work with the local government, the LDMG and the DDMG to complete the following steps:

- identify dam hazards, dam hazard events and dam emergency events
- identify and prioritise the relevant entities that have a role in the implementation of the EAP
- reach an agreement on the roles and responsibilities of all relevant entities who have a role in the implementation of the EAP
- identify people who may be harmed and whose property may be harmed as a result of the dam hazard events or dam emergency events
- identify how and when the content of the notification and warning messages are to be disseminated to the people who may be harmed and whose property may be harmed as a result of the dam hazard event or dam emergency event
- identify who will deliver the notifications and messages.

The EAP becomes a record of the agreement made by the parties to provide resources and 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@dnrme.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

- **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 2013-19, and as such, the EAP is to acknowledge that 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 National Security Hotline (1800 123 400)
  - Priority 2 Queensland Police Service counter-terrorism liaison officer (the LDMG can provide the dam owner with the appropriate contact number)
  - Priority 3 triple zero

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 farm land adjacent to the dam and residents of a township
- each local group and district group 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, significant rainfall resulting in increased dam inflows may be a dam hazard and could become a dam hazard event when the flows/discharge through the spillway cannot be contained within the downstream river banks. This results in the EAP being activated to the
‘alert’ or ‘stand up’ 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 the two or more relevant entities specified above is likely to be required (a coordinated response is a request for entities to taking 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.

For example, rainfall from a tropical cyclone may be a dam hazard and could become an emergency event if inflows place the integrity of the dam at risk. This would then require the dam owner to coordinate a response with the local government(s), LDMG(s) and the QPS to notify persons at risk, close roads and/or consider community evacuations.

Spillway releases occurring when the disaster management group 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 a part of a coordinated response involving two or more entities (as specified above).

3.4. Escalation levels of an EAP

The four levels of EAP activation, with descriptions of conditions defining each level, are described in Table 2. Colour coding the escalation table yellow, amber, red and green assist in the identification of the emergency level.
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 or 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.

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.

In the event of an EAP activation for emergency events, the dam owner will work with the LDMG, particularly in terms of providing information to the State Disaster Coordination Centre (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.

Examples of escalation tables are provided in Appendix 2. The appendix also provides comments on triggers for escalation.

### 3.5. Inundation maps

In addition to general maps such as the dam location, site access and catchment area, inundation maps showing the consequences of dam failure are required. 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 consequences of a dam failure (irrespective of the likelihood of the dam failure actually occurring). The intent of the inundation maps is to assist in the identification of PAR that may be harmed as a direct result of an event and to inform any evacuation that may be required.
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.

Table 2 lists flood events to be included, or can be included, as maps in an EAP. Table 3 lists components, or properties of a flood event, to be included in the inundation maps.

Examples of maps are provided in Appendix 3.

In addition to inundation maps being included in the EAP document itself, the inundation maps are to be provided to the chief executive in a Geographic Information System (GIS) digital format at the time of the EAP submission. The following details are requested:

- Polygons of inundation extent, GIS shape file (shp) format or ESRI geodatabase (gdb) format
- Coordinate system GDA94
- Metadata to ISO 19139 requirements
  - the abstract is to provide a generic statement explaining what the data is, e.g. This dataset displays the extent of flooding that would occur following the sunny day failure of a reportable dam
  - the contact details of the dam owner responsible for the data
  - a statement of how the data was constructed e.g. lineage
  - the accuracy of the data e.g. +/-10 metres

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

To enable all relevant parties to have a shared understanding of the risks associated with the flood scenarios all mapping is to be in a format that can be utilised by public mapping systems.

### Table 2: Events to be included as EAP inundation maps

<table>
<thead>
<tr>
<th>Event</th>
<th>Requirement to include in EAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunny Day Failure (SDF)(^1)</td>
<td>Mandatory</td>
</tr>
<tr>
<td>• 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.</td>
<td></td>
</tr>
<tr>
<td>Probable Maximum Flood (PMF) with dam failure(^2)</td>
<td>Mandatory</td>
</tr>
<tr>
<td>• PMF is the theoretical maximum flood event.</td>
<td></td>
</tr>
<tr>
<td>• It is expected that inundation cannot be greater in extent than this and that locations outside of this inundation area are safe from flooding.</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Note that SDF does not apply to dams that are normally empty, such as detention basins.

\(^2\) 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. It is expected that inundation cannot be greater in extent that this.
- Presentation of this map provides an understanding of worst case inundation extent so long as the dam remains intact.

Mandatory

Dam Crest Flood (DCF) with and without dam failure
- DCF is the flood event that causes reservoir levels to reach the crest of a dam³.

Optional

Critical flood event with and without dam failure
- This is the flood event which, when combined with dam failure, causes the highest consequence (usually the highest incremental PAR).

Optional

Historical Maximum Flood

Optional

Design Annual Exceedance Probability (AEP) flood events⁴ with and without dam failure, including:
- 1% AEP event
- 0.2% AEP event
- 0.05% AEP event
- 0.01% AEP event

Optional

Emergency communication polygons (refer Section 3.6.5)

Mandatory

Table 3: Components to include in EAP inundation maps

<table>
<thead>
<tr>
<th>Map component</th>
<th>Requirement to include in EAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum extent</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Maximum depth</td>
<td>Recommended</td>
</tr>
<tr>
<td>Travel time, time to inundation, or time to peak of inundation</td>
<td>Recommended</td>
</tr>
</tbody>
</table>

³ Specifically for the DCF:
- The flood event initial condition assumes the reservoir storage is full supply level.
- Wind and wave effects are excluded.
- For embankment dams the crest flood level is the lowest point of the embankment crest.
- For concrete dams the crest flood level is the non-overflow section of the dam, excluding handrails and parapets if they do not store water against them.
- For concrete faced rockfill dams the crest flood level is the lowest point of the crest structure or a point on a wave wall if it is designed to take the corresponding water load.

⁴ The Annual Exceedance Probability (AEP) of a flood event is the probability that the event will be exceeded in a given year. For example, a 1% AEP flood has a 1% probability of being exceeded in a given year. A 1% AEP flood is also described as a 100 year annual return period (ARI) event. Note that an ARI of 100 years does not imply that the event will occur only once in 100 years.
Map component

<table>
<thead>
<tr>
<th>Requirement to include in EAP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typically shown as contour lines showing hourly progression of flood progress downstream of a dam</strong></td>
</tr>
<tr>
<td><strong>Maximum hazard (velocity*depth)</strong></td>
</tr>
<tr>
<td>Optional</td>
</tr>
<tr>
<td><strong>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</strong></td>
</tr>
<tr>
<td>Mandatory</td>
</tr>
<tr>
<td><strong>Locations of identified PAR</strong></td>
</tr>
<tr>
<td>Mandatory</td>
</tr>
<tr>
<td><strong>Statement of map limitations (included with map or in separate section of EAP)</strong></td>
</tr>
<tr>
<td>Mandatory</td>
</tr>
</tbody>
</table>

- The accuracy and limitation of the information supplied on the maps and how best to use the map(s) should be specified and described within the EAP. This allows users to be aware of the limitations to the potential accuracy and make adjustments to suit the circumstances of the event.
- Potential limitations can include:
  - the accuracy of the available terrain data and calibration data to facilitate modelling of dam hazard events and dam emergency events and the calibration of these models
  - limitations on the assumptions used to numerically model the actual physical river systems and the magnitude and timing of any potential dam breaches
  - the availability of data on completed and/or proposed downstream development.

### 3.6. EAP communication to internal and external parties

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

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 24hour disaster management hotline) - details to include a backup 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).
An example of a communication protocol table is shown below.

### Table 4: Key stakeholder notification table

<table>
<thead>
<tr>
<th>Alert – Dam Safety Emergency Event</th>
<th>Priority</th>
<th>Who</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>1</td>
<td>Dam Operator Emergency Manager</td>
<td>(W) 1234 5678 (AH) 1234 6789 (Email) <a href="mailto:emergencymanager@damoperator.com">emergencymanager@damoperator.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternative Emergency Supervisor</td>
<td>(W) 1234 0000 (AH) 1234 9876 (Email) <a href="mailto:emergencysupervisor@damoperator.com">emergencysupervisor@damoperator.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director Dam Safety</td>
<td>(W) (07) 3199 4848 (AH) 0436 658 451 (Email) <a href="mailto:damsafety@dnrme.qld.gov.au">damsafety@dnrme.qld.gov.au</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternative</td>
<td>DNRME Incident Hotline 1300 596 709 (24 hours 7 day)</td>
</tr>
</tbody>
</table>

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.

#### 3.6.1. Notification and warning messages

The dam owner is responsible for ensuring notification and 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)).

A notification provides information and advice on a heightened risk to enable those potentially impacted to make informed decisions about preparedness and safety.

A warning is intended to inform the community of an imminent dam hazard event, or emergency event, and cause an appropriate response to take action to protect life and/or property.

The key element of a warning message is telling the reader if, when, and potentially how, they need to act to protect life or property for example, ‘seek further information’, ‘take shelter’, ‘evacuate’, ‘move to higher ground’ or ‘activate your personal emergency plan’.
Dam owners are responsible for providing notifications and 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 that 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 that 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 (see Table 5). 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 3.6.2).

Table 5: Example of the notification and warning escalation table

<table>
<thead>
<tr>
<th>Emergency trigger level</th>
<th>Developing flood in the dam catchment</th>
<th>Potential notifications (as pre-determined with the relevant disaster group)</th>
</tr>
</thead>
</table>
| Alert                   | Significant rainfall in catchment with lake levels rising towards full supply level (FSL) and a spillway discharge expected. | EAP notification  
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 keep themselves up-to-date with developments. |


### Emergency trigger level

<table>
<thead>
<tr>
<th>Emergency trigger level</th>
<th>Developing flood in the dam catchment</th>
<th>Potential notifications (as pre-determined with the relevant disaster group)</th>
</tr>
</thead>
</table>
| Lean forward            | Spillway flows increasing but as yet are unlikely to impact on downstream persons at risk of harm. | **EAP notification**  
An updated notification to those who received the alert notification 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. Message will instruct persons in danger to start taking action to protect life and property. |
| Stand up                | Spillway discharge increasing with flows that are likely to impact on downstream persons at risk of harm. | **EAP warning**  
Prepare to take action messages to all relevant entities and persons at risk of harm.  
**Escalated EAP warning**  
Take immediate action messages to all relevant entities, persons at risk of harm and the wider community. |
| Stand down              | Flood receding with lake levels dropping back towards FSL. Dam releases are unlikely to impact on others. | **EAP notification**  
Delivered to relevant entities and persons at risk of harm advising the end of the emergency event. |

---

In Queensland there are approximately 700,000 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 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.

### 3.6.2. Delivery of notification and 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, in order of priority, when and how the warnings will be delivered or the requirement for the inclusion of the pre-prepared message wording or EA polygon within the EAP. Noting, the dam owner retains the responsibility to distribute the notification messages. The EAP will need to state who and how these messages will be distributed.

Generally, local governments provide warnings of flash flooding within its local government area via the Disaster Management Dashboard and local media. Many local governments have stream gauging stations to monitor stream heights to inform flash flood warnings.

The Bureau of Meteorology (the Bureau) is the lead agency for issuing warnings for riverine flooding. 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

Notifications and 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, notifications, or advice to the public
- an alternative 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 notification and warning messages are required to be distributed through all phases of the event until the event is over (see Image 2). However, the frequency may depend on outcomes of community consultation.

For timeliness of notifications and 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 that action plans can be realistically implemented. Each dam is to be considered on its individual circumstances.

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.

3.6.3. Notification call register

If the dam owner (or other entity, by agreement) is delivering the notification and warning messages via personalised telephone calls then it may be effective to include the contact list within the EAP for ease of reference by the actioning officer. Note that this information is redacted from the EAP prior to it being published on the department’s website.

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

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

3.6.4. 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; the dam owner must take this into account when developing a notification and warning protocol.

3.6.5. National emergency alert system

The national emergency alert system (EA system) is administered in Queensland by QFES and is available to dam owners, local governments and other relevant entities to distribute warnings for emergency events or a declared state disaster events. The EA system sends preformatted warning messages to mobile phones and landlines within a specified geographic area, identified by a polygon shape file, refer Appendix 4. The polygon is an electronic predefined geographic area for use in a 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 QFES via the QFES EA Portal **prior** to the EAP being submitted to the chief executive for approval. See **Appendix 4** for the EA form.

It can take up to 30 minutes from the time a request to issue an EA Alert is received at the Watch Desk to when it is received by the PAR. Lodging preformatted approved polygons and messages with the SDCC Watch Desk can significantly reduce this time.

However, there are circumstances where the EA system is not appropriate for the dam or the particular 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 messages will be delivered.

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.

For more information about the creation and dissemination of emergency warnings, see the Queensland Emergency Alert Manual (m1.174) available at the website **www.disaster.qld.gov.au**.
4. 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 Image 3). 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.

Image 3: Preparing the EAP for submission to the chief executive.

The department is available to assist all stakeholders throughout the EAP development and submission process.

4.1. Local government and district disaster management group notices

The local government and chair of the district disaster management group (DDMG) must be provided the EAP for consideration for 30 business days prior to the dam owner submitting it to the chief executive for approval.

The local government must provide a written response.

The DDMG can provide a written response if preferred but must acknowledge receipt of receiving the EAP.

The Act (s352HA) requires dam owners to provide a copy of the EAP to each local government (usually facilitated by the local disaster management group, 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. If the EAP is not consistent, the local government is to provide a notice to the dam owner stating the reasons why the EAP is not consistent. The local government chief executive officer or a delegate should sign the local government notice.
The chair of the DDMG(s) is also to be provided 30 business days to review the EAP for consistency with the group’s disaster management plan. The chair may (not compulsory) provide a notice to the dam owner. If it is the decision of the chair is not to provide a notice to the dam owner, the chair is encouraged to acknowledge receipt of the EAP and advise the dam owner a notice will not be provided to enable 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 should state the version of the EAP consulted on and accepted. The chief executive may refuse to approve an EAP that is not accompanied by a notice that states the EAP version submitted for approval.

An EAP can only be submitted to the chief executive for approval if it has a local government notice and/or evidence the EAP has been provided to the local government(s) and the chair of the DDMG(s) (s 352H(1)(c)). Otherwise, the submission will be considered incomplete and the EAP will be refused and a compliance notice may be issued to the dam owner.

If the dam owner has not received a notice from the local government within the 30 business day period, the dam owner can submit the EAP to chief executive providing the dam owner can demonstrate:

- engagement with the local government during the drafting, reviewing and/or testing of the EAP
- a final copy of the EAP has been provided to the local government for assessment
- engagement with the local government to resolve any issues raised during consultation
- the absence of the notice has been escalated within the local government in an attempt to receive the notice prior to submitting the EAP to the chief executive.

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 the local and district disaster management plans.

The notice also demonstrates the dam owner has collaborated with the local government(s) and the DDMG(s) in the development of the EAP.

It is recommended that the dam owner allows at least 90 business days to complete the required consultation on the final draft of the EAP and submission of the final EAP prior to the EAP expiry date (see Image 4).
4.2. How to submit the EAP to the chief executive for approval

The EAP can 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.

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.

4.3. 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 the website www.dnrme.qld.gov.au 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.
5. 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.

5.1. 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.

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

- contact details and prioritisation of relevant entities, including the PAR are correct
- currency of flood inundation models and associated maps
- approved or proposed residential and/or commercial development downstream of the dam
- wording and frequency of notification and warning messages are relevant
- wording of notifications and warning messages are understood by downstream residents
- if the pre-prepared EA System GIS polygons are appropriate, tested and lodged with the QFES
- if the EAP is consistent with the disaster management plan(s)
- content from any Emergency Event Reports (EER) that were submitted for the dam in the previous 12 months
- learnings from EAP training scenarios
- if the EAP reflects industry best practice
- scheduled dam improvement/maintenance works within the next 12 months.

A template for the annual review notice is available at Appendix 6.

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 of the year.

5.2. 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 section 352Q of the Act 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, or new modelling associated with the production of inundation maps will be assessed as substantive in nature.

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).

On approval of the amended EAP, DNRME will forward a copy of the approved EAP to the QFES and publish a redacted version on the department website.

Partial EAPs and draft EAP submissions are likely to be considered an incomplete submission resulting in the EAP submission being refused. A compliance notice may also be issued to the dam owner.

5.3. 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
• 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@dnrme.qld.gov.au.
To submit a substantially amended EAP refer to Section 4.2.

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.

5.4. EAP reviews triggered by the chief executive

The Act (s 352O) provides the chief executive with the authority to direct a dam owner to review the EAP at any time if it is considered that 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 chairperson of the DDMG advises the chief executive that the EAP needs amendment to make it consistent with the local and disaster management plans.

5.5. 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.

Prior to expiry, if the dam owner is of the opinion that changes have occurred that require a substantive amendment (for example, the identification of a dam safety concern at a dam, a floodplain development creating a significant PAR increase, or lessons learnt from training exercises identify shortcomings in the EAP) then review and renewal should be considered.

It is recommended that 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, as per the requirements stated in the local government and DDMG notices, Section 4.1.

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.
6. 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.

If such a variation to the EAP proves necessary, dam owners should document the variation and the reasons for it in the Emergency Event Report submitted following the event.

6.1. 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 that dam personnel recognise the signs of fatigue and that 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.

6.2. EAP desktop and scenario exercises

Annual EAP desktop training in preparation for the wet season should be conducted to ensure all dam personnel are familiar with EAP activation triggers and 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 dam safety regulator 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 EAP review and renewal.

To assist dam owners in planning and developing a dam safety exercise, the DNRME Emergency Management Unit can run a range of capability programs for your team in relation to emergency management, including:

- exercise management
- exercise evaluation
- evaluation of emergency management programs
6.3. 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. A template is provided in Appendix 5.

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.

6.4. Debriefing after an incident though an After Action Review (AAR)

After every dam safety incident, an AAR should be undertaken to capture opportunities for improvement in the EAP and to highlight changes that could be made to improve its effectiveness. If necessary, changes to the EAP should be made as soon as possible following the debriefing.

The purpose of the AAR is to:
- guide and improve the EAP
- the AAR does not grade success or failure of team members.

When undertaking an AAR it is important to focus on the following four questions:
- what was expected to happen?
- what actually occurred?
- what went well and why?
- what can be improved and how?

For best results consider:
- conducting the team meeting in person, rather than by phone or teleconference
- ensure participation by all officers and relevant entities who had a role and responsibility within the EAP
- if an outside facilitator is being used, they should meet with the team leader to become familiar with the EAP before conducting the session
- there are always weaknesses to improve and strengths to sustain
• participants should share honest observations about what actually happened (objective data) without assigning blame or praise
• no one has all of the information or answers. Everybody has something important to contribute.
7. The role of the regulator

The dam safety regulator is the chief executive of the Department of Natural Resources Mines and Energy.

7.1. Ownership and responsibilities for the emergency action plan

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.

7.2. Issuance of guidelines

The chief executive issues guidelines which are intended to reflect industry best 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.

7.3. Compliance activities

The chief executive approves EPs as and when they require renewal or development. The chief executive can request a revision of an EAP at any time.

7.4. Responsibilities during an emergency

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

The chief executive delegate is the Dam Safety Regulation team that operates under Divisional Support, Natural Resources of DNRME. The delegation of the chief executive for dam safety emergencies is Director-General DNRME, Deputy Director-General Natural Resources, Executive Director Divisional Support and Dam Safety Director.

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

- To receive notifications from dam owners of escalating response levels, if defined as an action in the EAP (noting that 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 that 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 State Disaster Coordination Centre (SDCC).
The Regulator 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 regulator was successful.

### 7.5. 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 contract.

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

The Regulator has a backup protocol to contract and engage a dam safety advisor at short notice. For more information contact damsafety@dnrme.qld.gov.au.
Appendix 1: EAP checklist

General Document Items

- Is the name of the dam and other relevant identifies, such as dam ID, dam owner, version number clearly labelled on the cover?
- 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)?
- Is there a table of contents?
- Has the document been approved and signed by the dam owner authorising officer?
- Have the headers and footers been updated to reflect changes in page number, date and version number?

General Dam information

- 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.
- 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)?

Decision making items

- Are the escalation tables clearly described and labelled?
- Does each emergency event have an escalation table?
- Is the decision criteria clear to help dam personnel assess and determine the appropriate level for potential dam hazards and emergency conditions?
- Are the roles and responsibilities of dam personnel and key stakeholders during emergency events clearly stated?
- Is it clear who activates and stands down the EAP?

Notification and communication protocol

- Are the notification flowcharts complete and logical?
- Are the phone numbers, after hour’s phone numbers and back up personnel listed?
- Do you have a contact for engineering support?
- Do the notification flowcharts minimize the number of calls that dam operators are required to make, so that they can focus on implementing preventative actions? (optimally, 1 or 2 calls per entity is best with no more than 4 calls)
- Have the EA polygon and preformatted warning messages been submitted to QFES?
□ Is the primary and back up communications system described within the plan?
□ Is it clear who will issue the notifications and warnings?

Mapping

□ Does the inundation map include a north arrow and bar scale?
□ Are the inundation areas clearly delineated and labelled? This is especially important if there are “Sunny day” failure and “PMF plus failure” inundation limits shown on the maps.
□ Do the maps include a qualification stating that the inundation limits for an actual dam failure may vary in some ways from what is shown on the inundation map?
□ Are local roads, drainages, and other landmarks clearly labelled on the base map?
□ Are PAR visible?

Other

□ Is the frequency of testing and updating the document clearly described?
□ Are the Local Government and District Disaster Management Group notices attached to the submission?
□ Is the approval period stated on the final approved copy prior to distribution?
□ Has fatigue management during an emergency event been considered?
Appendix 2: Examples of escalation of dam hazards

A dam hazard escalates to a dam hazard event, which escalates further to an emergency event.

The following tables provide examples of triggers for escalating EAP activation levels for several dam hazards, including flooding, scouring, stability and seepage. The characteristics of each activation level for these hazards are described. General comments and tips are provided as footnotes.

It is important that the triggers are identified with the aim of maximising preparedness and minimising the consequences of dam failure. The dam owner's response to a dam hazard at their dam will need to be tailored to suit the circumstances at the dam and the characteristics and the consequences of dam failure.

The activation of these levels by the dam owner may not necessarily be sequential and should be applied with flexibility and adaptability. Further, there may not be a corresponding level of activation by the relevant disaster management groups to which the dam owner notifies. However, disaster management groups do need to be kept informed of the levels of activation and understand the associated risks.

Tools are available to explore effectiveness of emergency response (HEC-LifeSim and others). These tools simulate emergency events and produce detailed analyses and outputs that include probable loss of life. By analysing results and trialling a range of response measures (for example, time lag between trigger level occurrence and completion of evacuation), insights into emergency response may be derived.

The examples are not complete or exhaustive and are intended as a guide.

**Flooding**

<table>
<thead>
<tr>
<th>Potential problem</th>
<th>Activation level</th>
<th>General characteristics</th>
<th>When and what to check&lt;sup&gt;6&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooding issues:</td>
<td>Alert</td>
<td>Storage full and water</td>
<td>During periods of excessive</td>
</tr>
<tr>
<td>Incoming floods</td>
<td></td>
<td>level rising</td>
<td>rainfall, undertake visual</td>
</tr>
<tr>
<td></td>
<td>Lean forward</td>
<td>Spillway discharging</td>
<td>inspection and monitoring of any</td>
</tr>
<tr>
<td></td>
<td>Stand up</td>
<td>Downstream release</td>
<td>instrumentation and check water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hazard flows</td>
<td>levels and rates of rise of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>anticipated</td>
<td>water level.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Continue monitoring and inspections.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Continue monitoring and inspections at increased frequency.</td>
</tr>
</tbody>
</table>

<sup>5</sup> Activation levels need to consider the time required to take corresponding actions. For example, if a “stand-up” activation will result in an action to evacuate PAR, how much time will be required to evacuate those PAR? What is the reliability and accuracy of the trigger associated with this action and does it depend upon forecasts which contain an associated uncertainty?

<sup>6</sup> Consider the accuracy of forecasting future conditions. In order of advanced warning time and corresponding decrease in reliability, forecasting based on reservoir water levels, upstream water level gauges, rain on ground measurements and quantitative rainfall forecasts are all available tools to cause an EAP activation level.
<table>
<thead>
<tr>
<th>Potential problem</th>
<th>Activation level</th>
<th>General characteristics</th>
<th>When and what to check⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Greater than flood of record⁷</td>
<td>Undertake remedial works if safe to do so.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overtopping imminent or high risk of failure initiated⁸</td>
<td>Issue notifications as required.</td>
</tr>
<tr>
<td>Stand down</td>
<td>Lake levels dropping to FSL</td>
<td>Prepare EER (if required). Check for damage and undertake special inspection and remedial work as necessary.</td>
<td></td>
</tr>
</tbody>
</table>

### Damage to spillway⁹

<table>
<thead>
<tr>
<th>Potential problem</th>
<th>Activation level</th>
<th>General characteristics¹⁰</th>
<th>When and what to check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scouring or severe damage to spillway</td>
<td>Alert</td>
<td>Scouring/damage identified not yet endangering the dam.</td>
<td>Monitor extent of scour or damage and take steps to remediate problem if practical.</td>
</tr>
<tr>
<td>Lean forward</td>
<td>Significant erosion/damage identified which could progress to failure of the dam.</td>
<td>Monitor extent of scour or damage and take steps to remediate problem if practical.</td>
<td></td>
</tr>
<tr>
<td>Stand up</td>
<td>Scouring progressing to state where the safety of the dam is significantly impaired.</td>
<td>Continuous monitoring of extent of scour or damage and upgrade efforts to remediate if practical. Issue notifications as required.</td>
<td></td>
</tr>
<tr>
<td>Stand down</td>
<td>Risk of dam failure diminished to tolerable levels.</td>
<td>Prepare EER (if required). Continue routine dam safety inspections.</td>
<td></td>
</tr>
</tbody>
</table>

---

⁷ Flood of record should always be included as a “stand-up” activation level. Events above flood of record have not been encountered and operators and stakeholders have no direct background experience of potential hazards and consequences.

⁸ Also consider levels above which access is restricted, services become damaged or when communications are likely to fail.

⁹ Dam hazards that can coincide with each other (for example spillway damage occurring during a flood event) may require cross-referencing in the EAP.

¹⁰ Structural issues at dams can escalate rapidly and are more likely to occur during a flood event. It may be appropriate to escalate activation to “stand-up” quickly, especially if spillway damage is detected during a major flood event.
## Embankment damage

<table>
<thead>
<tr>
<th>Potential problem</th>
<th>Activation level</th>
<th>General characteristics(^{11})</th>
<th>When and what to check</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Embankment scouring issues</strong></td>
<td>Alert</td>
<td>Identification of scouring or gullying of embankment notching of the upstream face of embankments by waves.</td>
<td>Inspect affected area of embankment to watch for signs of scoring progressing. Undertake remedial action if practical.</td>
</tr>
<tr>
<td></td>
<td>Lean forward</td>
<td>Cause of scour continuing and erosion becoming significant.</td>
<td>Continue monitoring. Upgrade efforts at remedial works if practical.</td>
</tr>
<tr>
<td></td>
<td>Stand up</td>
<td>Scouring progressing to state where the safety of the dam is significantly impaired.</td>
<td>Upgrade efforts at remedial works if practical. Continue monitoring of dam at increased frequency. Issue notifications as required.</td>
</tr>
<tr>
<td></td>
<td>Stand down</td>
<td>Cause of erosion abates and risk of failure drops significantly.</td>
<td>Prepare EER (if required). Remedial works are undertaken to significantly mitigate risk.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential problems</th>
<th>Activation level</th>
<th>General characteristics</th>
<th>When and what to check</th>
</tr>
</thead>
</table>
| Embankment stability issues:  
- signs of distress in embankment such as cracking or deformation/ sliding  
- abnormal instrumentation readings  
- earthquake  
- differential movements of walls etc. | Alert | Identification during routine inspection of initial signs of embankment distress such as cracks or scarps near the crest and bulges at the toe. | Inspect affected area of embankment to watch for signs of cracking progressing or deformation increasing. Undertake remedial action if practical. |
| | Lean forward | Cause of scour continuing and erosion becoming significant to the point where stability may be starting to be impaired. | Continue monitoring. Upgrade efforts at remedial works or load reduction if practical. |

\(^{11}\) Structural issues at dams can escalate rapidly and are more likely to occur during a flood event. It may be appropriate to escalate activation to "stand-up" quickly.
<table>
<thead>
<tr>
<th>Potential problem</th>
<th>Activation level</th>
<th>General characteristics&lt;sup&gt;11&lt;/sup&gt;</th>
<th>When and what to check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loads on embankment increasing or cracking/deformation increasing to state where the safety of the dam is significantly impaired.</td>
<td>Stand up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remediaworks completed or cause of seepage removed.</td>
<td>Stand down</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Seepage**

<table>
<thead>
<tr>
<th>Potential problem</th>
<th>Activation level</th>
<th>General characteristics</th>
<th>When and what to check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of new areas of seepage growth in existing areas of seepage.</td>
<td>Alert</td>
<td>Look for source of seepage, environmental changes such as vegetation damage, salt scalds, etc.</td>
<td></td>
</tr>
<tr>
<td>Detection of signs of cloudy water in seepage. Look for the source of cloudy water.</td>
<td>Lean forward</td>
<td>Continue monitoring. Undertake remedial works if practical. Reduce lake level if possible.</td>
<td></td>
</tr>
<tr>
<td>Seepage developing further. Discharge is clouding and increasing (piping failure has started).</td>
<td>Stand up</td>
<td>Continue monitoring of dam. Issue notifications as required.</td>
<td></td>
</tr>
<tr>
<td>Remedial works completed or cause of seepage removed.</td>
<td>Stand down</td>
<td>Prepare EER (if required). Continue routine monitoring.</td>
<td></td>
</tr>
</tbody>
</table>
Earthquake

<table>
<thead>
<tr>
<th>Potential problem</th>
<th>Activation level</th>
<th>General characteristics</th>
<th>When and what to check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake issues:</td>
<td>Alert</td>
<td>Earthquake felt</td>
<td>Continue monitoring.</td>
</tr>
<tr>
<td>• seismic activity</td>
<td>Lean forward</td>
<td>Earthquake felt, intensity &gt; 5 MM</td>
<td>Continue monitoring. Undertake remedial works if practical.</td>
</tr>
<tr>
<td>causing structural</td>
<td>Stand up</td>
<td>Failure in progress, likely due to earthquake and sufficient water in storage to create a dam hazard</td>
<td>Continue monitoring of dam. Issue notifications as required.</td>
</tr>
<tr>
<td>damage to dam</td>
<td>Stand down</td>
<td>Failure risk reduced</td>
<td>Prepare EER (if required). Continue routine monitoring.</td>
</tr>
</tbody>
</table>

Terrorist activity

<table>
<thead>
<tr>
<th>Potential problem</th>
<th>Activation level</th>
<th>General characteristics</th>
<th>When and what to check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrorism threat</td>
<td>Alert</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lean forward</td>
<td>Threat received</td>
<td>Continue monitoring.</td>
</tr>
<tr>
<td></td>
<td>Stand up</td>
<td>Large explosion heard Failure in progress, likely due to terrorist act and sufficient water in storage to create a dam hazard</td>
<td>Continue monitoring of dam. Undertake remedial works if practical. Reduce lake level if possible. Issue notifications as required.</td>
</tr>
<tr>
<td></td>
<td>Stand down</td>
<td>Failure risk reduced</td>
<td>Prepare EER (if required). Continue routine monitoring.</td>
</tr>
</tbody>
</table>

---

12 Dam hazards that can coincide with each other (for example embankment damage occurring during an earthquake) may require cross-referencing in the EAP.
Appendix 3 Examples of inundation maps
## Appendix 4: QFES Emergency Alert (EA) Checklist

The Emergency Alert: Request Checklist and Request Form is available at [https://www.disaster.qld.gov.au](https://www.disaster.qld.gov.au)

<table>
<thead>
<tr>
<th>Stage of EA</th>
<th>National Warnings Principles</th>
<th>Prompts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision to Warn</td>
<td>Coordinated</td>
<td>□ Is there a potential for the loss of life or a major threat to a number of properties or the environment?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Does the community need to act in some way such as relocate to a safer area, prepare property or be aware of information?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Is the community required to take action or is urgent action required due to the time of the situation i.e. in the night?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Have you considered the delivery of messages for operations that cross jurisdictional borders?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Have checks been done with other warning agencies to avoid duplication?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Have call centres been briefed?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Have other consequence management issues been addressed?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Have other affected agencies local government, LDMGs, DDMGs, QPS, Ministers Office etc. been informed?</td>
</tr>
<tr>
<td>Warning and Alert Message construction and dissemination</td>
<td>Consistent and Standard-based</td>
<td>□ Are the messages consistent across different sources available to the general public?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Is the message simple, clear and brief?</td>
</tr>
<tr>
<td></td>
<td>Multi-modal</td>
<td>□ Are messages disseminated using a variety of delivery mechanisms, and do they complement each other to produce a complete picture?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Do the messages contain all relevant pertinent details?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Are the messages presented in a way that is easily and quickly understood?</td>
</tr>
<tr>
<td></td>
<td>Targeted</td>
<td>□ Are messages ONLY targeted to those communities at risk? (Avoid public complacency and over-warning)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Is the message relevant to the community receiving the EA?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Is the message worded in accordance with advice from the relevant agencies?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Is a threat direction required? (Can only be used for EA Warnings)</td>
</tr>
<tr>
<td></td>
<td>Compliant with Relevant Legislation</td>
<td>□ Are messages compliant with relevant commonwealth and jurisdictional legislation and policy?</td>
</tr>
<tr>
<td></td>
<td>Accountable</td>
<td>□ Has an authorised person approved the message for dissemination?</td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>□ Are there any subsequent community messaging requirements needed?</td>
</tr>
</tbody>
</table>
**Emergency alert request form**

This form should 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.

<table>
<thead>
<tr>
<th>Location:</th>
<th>Date: / /</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time: hrs</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requesting Officer:</th>
<th>Telephone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency/Position:</td>
<td>Email:</td>
</tr>
</tbody>
</table>

### Event Type
- [ ] Cyclone
- [ ] Storm Surge
- [ ] Flash Flood
- [ ] Flood
- [ ] Bushfire
- [ ] Fire Incident
- [ ] Smoke or Toxic Plume
- [ ] Chemical Spill
- [ ] Tsunami **(NOTE Tsunami EA campaigns will be sent as Location Based Text Message ONLY)**
- [ ] Other (please specify):

### Message Severity
- [ ] Emergency Warning **(NOTE activates the SEWS)**
- [ ] Watch & Act
- [ ] Advice

### Campaign Mode
- [ ] Voice
- [ ] SMS – Location Based
- [ ] SMS – Service Address Based

### LDMG Advised
- [ ] YES
- [ ] NO

### DDMG Advised
- [ ] YES
- [ ] NO

### Threat Direction Required?
- [ ] YES
- [ ] NO

**Note:** Can only be used for Emergency Warnings. Indicate direction on map.

#### STEP 1. EA Polygon Area:
- [ ] Map attached

#### STEP 2. Filename:

#### STEP 3. Spatial format:
- [ ] KML *.kml (preferred format as per Spatial guidelines)
- [ ] ESRI *.dbf, *.prj, *.shp, *.shx
- [ ] GML *.gml, *.xsd
- [ ] MapInfo TAB *.dat, *.id, *.map, *.tab
- [ ] MapInfo Mid/Mif* *.MID/Sequence, *.mif
- [ ] OTHER*(insert)

#### STEP 4. Messaging(s) spatial data, is it supplied via
- [ ] DMportal - specify filenames below
- [ ] FTP - specify filenames below
- [ ] Email
- [ ] Other (please specify)

Type (please use capitals for clarity) or handwrite Voice message **(ideally message should be less than 450 characters).**

Type or handwrite SMS below **(maximum of 160 characters including spaces)**
DO NOT SEND THIS PAGE

GUIDE TO COMPLETE STEPS 1 – 4

STEP 1. EA Polygon Area (e.g. detailed description and location reference to allow positive identification of message area, including street names with cross street, areas of interest such as parks, rivers, dams, coastal areas) it is preferable to attach a map identifying the message area. If a Threat Direction has been requested, please clearly indicate it on the map.

STEP 2. Tick applicable box and note the file name.

STEP 3. Voice Message: type or handwritten the required message. As the message will be translated by a text-to-speech process it is important that words are not unintelligible when translated e.g. “qld” used in a web site address must be entered as “q l d”, similarly the word “dot” must be entered into a web address instead of a full stop.

Voice Message ideally should have no more than 450 characters including spaces. Do not use special characters – refer to EA Manual for details. Warning message must start with “Emergency Emergency”

STEP 4. SMS Is restricted to a maximum of 160 characters including spaces and punctuation. Either type the message or handwrite the characters into the boxes.

Example: SMS Flash Flood Warning from SES for Opal Valley-immediate threat to life/property-Warn others-Leave area/prepare NOW or seek higher ground-Listen to local radio

If using template EA messages, please provide the appropriate variables that are in the template message guides. Refer to the Queensland Emergency Alert Manual for copies of the template message guides.
Appendix 5: Emergency event report (EER)

The Act \textit{(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.

### 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 \textit{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

\textit{Provide a description of the event.}

\textit{Was it part of a larger rain/flood event or cyclone?}

#### 2. General Comments and/or Recommended changes to the EAP

\textit{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

\textit{Provide details of how the EAP was implemented.}

\textit{What actions were undertaken to monitor the dam and the affected area.}

\textit{What EAP activation triggers were reached?}

\textit{Provide the actual instrument and/or rain gauge readings}

\textit{Description of any damage to the dam, include photos of overflows, erosion, scouring etc.}

\textit{Details of communication undertaken with internal stakeholders and external parties i.e. PAR, Regulator, LDMG, Police, Social Media etc.}

\textit{Provide comment on if the communication strategy was effective. Did the PAR receive the SMS/Phone messages, did they act on the direction.}

\textit{Was power lost? Did this impact on communications?}

\textit{Include any other relevant information}
Appendix 6: Annual review notice

Dam owners have the option of completing this notice and submitting via damsafety@dnrme.qld.gov.au or completed the questions on the Dam Safety Portal.

Dear Sir

In accordance with s352P of the Water Supply (Safety and Reliability) Act 2008 an annual review of the emergency action plan (EAP) has been completed.

This review of the EAP has identified that:

☐ Hazards, triggers and corresponding response actions remain appropriate.
☐ Inundation information suitably shows 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 required, (an updated EAP – in Pdf format must be submitted for assessment and approval)
☐ Amendment of the EAP is NOT required.

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
  ☐ Date
  ☐ Type i.e. Desktop scenario
  ☐ Attendance: LDMG (Y/N) DDMG (Y/N)

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

Yours sincerely,
Appendix 7: Notice Template

<date>

<Dam Owner>
<Address>

Attention:

<Insert name of Local Council 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 consider the EAP to be consistent with the local disaster management plan, version <insert version number>, dated <insert date>.

<Signature>
<insert title i.e. Chief Executive Officer / or delegate>
<Insert name of Local Government or District Disaster Management Group>
Appendix 8: Common abbreviations and definitions

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

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Act</td>
<td>The Water Supply (Safety and Reliability) Act 2008</td>
</tr>
<tr>
<td>AHD</td>
<td>Australian height datum</td>
</tr>
<tr>
<td>ANCOLD</td>
<td>Australian National Committee on Large Dams</td>
</tr>
<tr>
<td>BoM</td>
<td>Bureau of Meteorology</td>
</tr>
<tr>
<td>DCF</td>
<td>Dam crest flood</td>
</tr>
<tr>
<td>DMG</td>
<td>Disaster management group</td>
</tr>
<tr>
<td>DDMG</td>
<td>District disaster management group</td>
</tr>
<tr>
<td>DM</td>
<td>Disaster management</td>
</tr>
<tr>
<td>DM Act</td>
<td>Disaster Management Act 2003</td>
</tr>
<tr>
<td>DNRME</td>
<td>Department of Natural Resources, Mines and Energy</td>
</tr>
<tr>
<td>EA</td>
<td>Emergency alert</td>
</tr>
<tr>
<td>EAP</td>
<td>Dam owner’s emergency action plan</td>
</tr>
<tr>
<td>EER</td>
<td>Emergency event report</td>
</tr>
<tr>
<td>FIR</td>
<td>Failure impact rating</td>
</tr>
<tr>
<td>FSL</td>
<td>Full supply level</td>
</tr>
<tr>
<td>GS</td>
<td>Gauging station</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic information system</td>
</tr>
<tr>
<td>Km</td>
<td>Kilometre</td>
</tr>
<tr>
<td>LDMG</td>
<td>Local disaster management group</td>
</tr>
<tr>
<td>LDMP</td>
<td>Local disaster management plan</td>
</tr>
<tr>
<td>LG</td>
<td>Local government</td>
</tr>
<tr>
<td>PAR</td>
<td>Population at risk</td>
</tr>
<tr>
<td>PMF</td>
<td>Probable maximum flood</td>
</tr>
<tr>
<td>PMP</td>
<td>Probable maximum precipitation</td>
</tr>
<tr>
<td>PMPDF</td>
<td>Probable maximum precipitation design flood</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>PPRR</td>
<td>Prevention, preparedness, response and recovery</td>
</tr>
<tr>
<td>QDSMG</td>
<td>Queensland dam safety management guideline</td>
</tr>
<tr>
<td>QFES</td>
<td>Queensland Fire and Emergency Services</td>
</tr>
<tr>
<td>QPS</td>
<td>Queensland Police Service</td>
</tr>
<tr>
<td>SDCC</td>
<td>State disaster coordination centre</td>
</tr>
<tr>
<td>SDMG</td>
<td>State disaster management group</td>
</tr>
<tr>
<td>SES</td>
<td>State Emergency Service</td>
</tr>
</tbody>
</table>
### Definitions

| (EAP) Activation | Is defined as actions undertaken by the dam owner as per the EAP in response to a dam event if:  
|                  | 1. persons or property may be harmed, because of the event  
|                  | 2. a coordinated response involving two or more of the following relevant entities is likely to be required to respond to the event:  
|                  | • each local group and district group for the emergency action plan  
|                  | • 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 DNRME chief executive (the Regulator)  
|                  | • another entity the dam owner considers appropriate i.e. QPS, QFES. |
| 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 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 |
| Chief executive | The Director-General, Department of Natural Resources Mines and Energy (also known as the ‘regulator for dam safety’ of Queensland). |
| Controlled document | Having an EAP issued as a ‘controlled document’ means that 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 352A of the Act |
| Dam hazard event | An event arising an event arising from a dam hazard if persons or property may be harmed because of the event and
(a) a coordinated response involving 2 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

<table>
<thead>
<tr>
<th>Dam Safety Regulator</th>
<th>Refer to the ‘chief executive’ above.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disaster management group (DMG)</td>
<td>A district group established under the <em>Disaster Management Act, s 22</em> whose disaster district under the Act could, under the plan, be affected by a dam hazard.</td>
</tr>
<tr>
<td>Disaster management plan (DMP)</td>
<td>A local or District Disaster Management Group’s disaster management plan under the <em>Disaster Management Act 2003 s 53</em>.</td>
</tr>
<tr>
<td>Disaster risk assessment</td>
<td>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).</td>
</tr>
<tr>
<td>District disaster management group</td>
<td>District disaster management group(s) established under the <em>Disaster Management Act s 24</em>, 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).</td>
</tr>
<tr>
<td>District group</td>
<td>The district group or an emergency action plan, means a district group established under the <em>Disaster Management Act s 22</em>, whose disaster district under that Act could, under the plan, be affected by a dam hazard.</td>
</tr>
<tr>
<td>Early warning notification system</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Emergency action plan (EAP)</strong></td>
<td>An EAP provides guidance for actions required as a result of any hazardous situations or emergency events occurring at a dam.</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Emergency alert (EA)</strong></td>
<td>The emergency alert (EA) system is a national telephone warning system administered in Queensland by the Queensland Fire and Emergency Service. The EA systems provides emergency authorities with a rapid mass notification service to deliver preformatted messages via landline and mobile telephones within a defined geographic area.</td>
</tr>
</tbody>
</table>
| **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.  
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. |
| **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 bywash 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 |
| **Lean forward** | The stage of emergency response prior to 'stand-up' whereby a heightened level of situational awareness of a disaster event (either current or impending) is maintained and a state of operational readiness is developed. Personnel at dam are on standby, ready to activate the EAP. |
| **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. |
### 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 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)
Persons at dwellings or other places where people congregate for extended periods that, as a result of a dam failure event, are impacted by flooding or increased flooding.

### 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.

### 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 dam or proposed dam after its construction, for which:
- a failure impact assessment is required to be 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

The following cannot be considered to be referable dam:
### 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

### 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.


### 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. Moving into this operational state triggers the requirement for an emergency event report.

### 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.
<table>
<thead>
<tr>
<th>Sunny day failure</th>
<th>The failure of a dam without any other general flooding or spillway discharges.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Act</td>
<td>The <em>Water Supply (Safety and Reliability) Act 2008</em>.</td>
</tr>
</tbody>
</table>
Bibliography


