EMERGENCY ACTION PLAN—FAIRBAIRN DAM

ISSUE: 9.1

Date: September 2019

Project: Fairbairn Dam EAP

File no.: 08-000366/001

Rural no.: via Selma Road

Location: Lat. -23.650199°
           Lon. 148.065168°
           23°39′00.65″S
           148°03′64.46″E

Approved by the delegate of the Chief Executive,
Department of Natural Resources, Mines and
Energy until 3 May 2021

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Emergency activation quick reference—Dam Hazards

The Emergency Action Plan (EAP) for Fairbairn Dam covers six dam hazards evaluated within Sunwater’s Dam Safety Management Program. Use the following table to select the relevant section of the EAP that deals with the dam hazard. **NOTE:** The Incident Coordinator (IC) is responsible for the decision to activate the EAP. Should the IC be unavailable, the Local Event Coordinator (LEC) or Dam Duty Officer (DDO) is responsible for the decision.

### Table 1: Emergency activation quick reference

<table>
<thead>
<tr>
<th>Dam Hazards and section numbers</th>
<th>Activation levels</th>
<th>Activation triggers for dam hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alert</strong></td>
<td>Lean Forward</td>
<td>Stand Up</td>
</tr>
<tr>
<td>Locally managed (DDO)</td>
<td>Locally managed (DDO, LEC and IC)</td>
<td>Locally managed (DDO, LEC and IC) with advice from Owner’s Rep/DSTDM</td>
</tr>
</tbody>
</table>

### Activation triggers for dam hazards

**Flood operations**
- See section 5
- **EL 204.13 m and rising (0.1 m below FSL)**
- **Storage above FSL 204.23 m**
- **Storage above EL 207.03 m (2.8 m above FSL), OR**
- **Observed scour**
- **Storage level EL 207.03 m and falling**

**Chemical spill/ toxic conditions**
- See section 6
- **Reports of contamination or potential contamination in the catchment area of the storage (excludes normal operating and monitoring of BGA)**
- **Escalated BGA or toxic condition from the Sunwater Environmental group**
- **Not applicable**
- **Confirmation or high probability of a large amount of chemical spill/toxic conditions found in the storage/catchment**
- **Risk assessment that risk has reduced**
- **Confirmation that significant contamination has not occurred**
- **All clear WQ test result**

**Piping: embankment, foundation, or abutments**
- See section 7
- **Increasing leakage through an embankment, the foundations, or abutments**
- **Increasing leakage through an embankment, the foundations, or abutments with cloudy water**
- **Piping condition has been established**
- **Risk assessment has determined that failure risk has reduced**

**Earthquake**
- See section 8
- **Earthquake reported or felt in the area, AND**
  - **Intensity less than 5 Modified Mercalli (MM)**
  - **Intensity greater than or equal to 5 MM, OR**
  - **Intensity less than 5MM and change detected during surveillance inspection**
- **Earthquake reported or felt in the area, AND**
  - **A possible failure path has been identified**
- **Risk assessment has determined that failure risk has reduced**

**CONTINUED NEXT PAGE: EMERGENCY ACTIVATION QUICK REFERENCE**
## Emergency activation quick reference – Other Emergency Situations

The EAP for Fairbairn Dam covers one other emergency situation evaluated within Sunwater’s Dam Safety Management Program. Use the following table to select the relevant section of the EAP that deals with the other emergency situation. **Note: The Incident Coordinator (IC) is responsible for the decision to activate the EAP. Should the IC be unavailable, the Local Event Coordinator (LEC) or Dam Duty Officer (DDO) is responsible for the decision.**

### Table 1 (continued): Emergency activation quick reference

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<tr>
<td><strong>Alert</strong></td>
<td>Locally managed (DDO)</td>
<td>Site managed (DDO - becomes LEC)</td>
</tr>
<tr>
<td><strong>Lean Forward</strong></td>
<td>Locally managed (DDO, LEC and IC)</td>
<td>Brisbane managed by Incident Coordinator (IC)</td>
</tr>
<tr>
<td><strong>Stand Up</strong></td>
<td>Locally managed (DDO, LEC and IC) with advice from Owner’s Rep/DSTDM</td>
<td>Locally managed by Local Event Coordinator (LEC)</td>
</tr>
<tr>
<td><strong>Stand Down</strong></td>
<td>Locally managed (DDO, LEC and IC) with advice from Owner’s Rep/DSTDM</td>
<td></td>
</tr>
</tbody>
</table>

### Communications Failure

- Site managed (DDO - becomes LEC)
- Brisbane managed by Incident Coordinator (IC)
- Locally managed by Local Event Coordinator (LEC)

### Other Emergency Situations and section numbers

- **Comms Failure**
  - See section 11
  - Unable to communicate to or from Dam site
  - Unable to communicate to or from Local Area
  - Unable to communicate to or from Sunwater Brisbane

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**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**

- e.g., taking photographs/video, dam inspections, instrument readings
- **ALL PHOTOS MUST BE DATE STAMPED**

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13 15 89 Sunwater Customer Support 24-hour contact line
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## Document control

### Authorisation of document

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**Note:** Communication information for each ‘Controlled Copy Holder’ is attached in Appendix A.
1.  References, abbreviations and definitions

1.1  References/associated documents

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<td>F</td>
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<td>H</td>
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<td>HB # 15-001003/001</td>
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### 1.2 Abbreviations and acronyms

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<td>AEP</td>
<td>Annual Exceedance Probability</td>
<td>O&amp;M</td>
<td>Operation &amp; Maintenance</td>
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<td>AHD</td>
<td>Australian Height Datum</td>
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<td>Owner’s Regional Representative</td>
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<td>Comprehensive Risk Assessment</td>
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<td>Population at Risk</td>
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<td>D/S</td>
<td>Downstream</td>
<td>PFRM</td>
<td>Predictive Flood Routing Model</td>
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<td>Dam Crest Flood</td>
<td>PLL</td>
<td>Probable Loss of Life</td>
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<td>Maximum Operating Level</td>
<td>WHS</td>
<td>Workplace Health &amp; Safety</td>
</tr>
<tr>
<td>ME</td>
<td>Manager Environment</td>
<td>WQ</td>
<td>Water Quality</td>
</tr>
<tr>
<td>MM</td>
<td>Modified Mercalli</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Business terms and definitions

The meaning of terms used in this section are set out in accordance with relevant legislation or as defined by operator requirements.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terms set out in section 352A of the Water Supply (Safety and Reliability) Act 2008 (Qld) - Amended</td>
<td></td>
</tr>
<tr>
<td>Dam hazard</td>
<td>Means 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.</td>
</tr>
<tr>
<td>Dam hazard event</td>
<td>Means an event arising from a dam hazard if:                                                                                                                                      - persons or property may be harmed because of the event, AND                                                                                                                                  - a coordinated response, involving 2 or more of the following relevant entities, is unlikely to be required; each local group and district group for the EAP, each local government whose area may be affected, the chief executive, another entity the owner of the dam considers appropriate, AND - the event is not an emergency event.</td>
</tr>
<tr>
<td>Disaster management plan</td>
<td>Of a district group or local government, means the group’s or local government’s disaster management plan under the Disaster Management Act.</td>
</tr>
<tr>
<td>District group (District Disaster Management Group)</td>
<td>For an emergency action plan (EAP), means a district group established under the Disaster Management Act, section 22 whose disaster district under that Act could, under the plan, be affected by a dam hazard.</td>
</tr>
<tr>
<td>Emergency event</td>
<td>Means an event arising from a dam hazard if:                                                                                                                                      - persons or property may be harmed because of the event, AND                                                                                                                                  - any of the following apply:</td>
</tr>
<tr>
<td></td>
<td>- a coordinated response, involving 2 or more of the following relevant entities, is likely to be required; each local group and district group for the EAP, each local government whose area may be affected, the chief executive, another entity the owner of the dam considers appropriate, OR</td>
</tr>
<tr>
<td>Local group (Local Disaster Management Group)</td>
<td>For an EAP, means a local group established under the Disaster Management Act, section 29 whose local government area could, under the plan, be affected by a dam hazard.</td>
</tr>
<tr>
<td>Notice response</td>
<td>A dam owner’s written response to a notice following an assessment of an EAP by a local government or district group.</td>
</tr>
</tbody>
</table>
A dam, or a proposed dam after its construction, will be a referable dam if:

- a failure impact assessment of the dam, or the proposed dam, is carried out under the Act, AND
- the assessment states the dam has, or the proposed dam after its construction will have, a category 1 or category 2 failure impact rating, AND
- the chief executive has, under section 349 of the Act, accepted the assessment.

Also, a dam is a referable dam if:

- under section 342B of the Act, the owner of a dam is given a referable dam notice and, before the effective day for the notice, does not give the chief executive a failure impact assessment for the dam, AND
- the chief executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam.

Means each of the following under the EAP for the dam:

- 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. the owners of parcels of farm land adjacent to the dam or 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
- the chief executive
- another entity the owner of the dam considers appropriate e.g., the Queensland Police Service.

The four levels of EAP activation are:

- **Alert**: A heightened level of vigilance due to the possibility of an event occurring. No further action may be required; however, the situation should be monitored by someone capable of assessing the potential of the threat. Moving to an Alert level indicates the dam owner is getting ready to activate the Lean Forward level of the EAP if the situation deteriorates.

- **Lean Forward**: An operational state characterised by a heightened level of situational awareness of an impending disaster event and a state of operational readiness. Disaster coordination centres are on standby and prepared but not activated.

- **Stand Up**: The operational state where resources are mobilised, personnel are activated, and operational activities commenced. Disaster coordination centres are activated. The dam owner needs to provide an Emergency Event Report (EER) in accordance with the provision of the Act.

- **Stand Down**: Transition from responding to an event back to normal core business and/or continuance of recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present.

The movement through these levels of activation is not necessarily sequential. It should be applied with flexibility and adaptability and be tailored to the location and event.

Triggering one of these levels of activation may not necessarily mean a similar activation of LDMGs or DDMGs.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bureau of Meteorology flood level classifications</td>
<td>The three levels of flooding are:</td>
</tr>
<tr>
<td></td>
<td>• <strong>Minor flooding:</strong> This causes inconvenience such as closing of minor roads and the submergence of low-level bridges and makes the removal of pumps located adjacent to the river necessary.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Moderate flooding:</strong> This causes the inundation of low-lying areas requiring the removal of stock and/or the evacuation of some houses. Main traffic bridges may be closed by flood waters.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Major flooding:</strong> This causes inundation of large areas, isolating towns and cities. Major disruptions occur to road and rail links. Evacuation of many houses and business premises may be required. In rural areas widespread flooding of farmland is likely.</td>
</tr>
<tr>
<td>Chemical spill/toxic condition</td>
<td>The contamination of water in the storage of the dam that could create a dam hazard.</td>
</tr>
<tr>
<td>Concurrent Flooding</td>
<td>Flood flows downstream of a dam that are not a result of dam outflows, for instance those from adjacent catchments or from the sea, and which occur in the same period as downstream releases or flooding from the dam.</td>
</tr>
<tr>
<td>Dam crest failure</td>
<td>Dam crest flood is when failure occurs during a flood event with the water level at the crest of the non-overflow section of the dam embankment:</td>
</tr>
<tr>
<td></td>
<td>• for an embankment dam, is the lowest point of the embankment crest</td>
</tr>
<tr>
<td></td>
<td>• for a concrete dam, is the level of the non-overflow section of the dam, excluding handrails and parapets if they do not store water against them</td>
</tr>
<tr>
<td></td>
<td>• for a concrete faced rockfill dam, is the lowest point of the crest structure.</td>
</tr>
<tr>
<td>Dam failure</td>
<td>Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.</td>
</tr>
<tr>
<td>Downstream releases</td>
<td>Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam.</td>
</tr>
<tr>
<td>Earthquake</td>
<td>A sudden release of energy in the earth’s crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity, resulting in the generation of seismic waves that can be destructive. The potential consequences of an earthquake include:</td>
</tr>
<tr>
<td></td>
<td>• settlement, sliding, or overturning of monoliths in the dam wall</td>
</tr>
<tr>
<td></td>
<td>• initiation of seepage lines in the foundations or abutments that could lead to piping damage and potential inoperability of appurtenant works.</td>
</tr>
<tr>
<td>Flood release</td>
<td>A flood release from a dam occurs when catchment inflows raise the storage level above the Full Supply Level (FSL) resulting in a discharge from the spillway of the dam.</td>
</tr>
<tr>
<td>Piping</td>
<td>Internal scour caused by the water flow and seepage that occurs through earth dams, dam foundations, or dam abutments. The internal scour can lead to the formation of a pipe, which can to lead to a failure of the dam.</td>
</tr>
<tr>
<td>Plane strike or other impact</td>
<td>The impact of a plane, meteorite, or other high energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Probable maximum flood</td>
<td>Probable maximum flood is the flood resulting from probable maximum precipitation coupled with the worst catchment conditions that can be realistically expected.</td>
</tr>
<tr>
<td>Probable maximum precipitation</td>
<td>Probable maximum precipitation is the theoretical greatest depth of precipitation physically possible based on generalised methods.</td>
</tr>
<tr>
<td>Probable maximum precipitation design flood</td>
<td>Probable maximum precipitation design flood is the flood resulting from probable maximum precipitation coupled with standard catchment conditions that can be expected.</td>
</tr>
<tr>
<td>Stability, main embankment</td>
<td>High foundation pore pressure peaks may reduce the Factor of Safety against slip circle failure to an unacceptable level.</td>
</tr>
<tr>
<td>‘Sunny day’ failure</td>
<td>‘Sunny day’ dam failure is where the failure occurs at the full supply level and there is no concurrent rain associated flooding.</td>
</tr>
<tr>
<td>Terrorist activity Plane strike or other impact</td>
<td>A deliberate attempt to damage or fail a dam. The impact of a plane, meteorite, or other high-energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam.</td>
</tr>
</tbody>
</table>

*Note:* Sunwater has attempted to write the EAP to cope with all reasonably foreseeable emergency situations. However, there is considerable uncertainty about how any emergency situation might develop and progress. Factors such as the weather, the location, the mechanics, and the rate and size of any actual failure can considerably affect any resulting flood discharges. Therefore, a significant number of assumptions have had to be made in compiling sections of the EAP. Some variation in outcome should be expected where the event differs from the assumed behaviour.
2. Introduction

2.1 Context

Under the Water Supply (Safety and Reliability) Act (2008) (the Act), the owner of a referable dam must have an approved EAP for the dam. Referable dams, by definition, would put lives at risk if they were to fail.

This EAP has been prepared in accordance with Chapter 4 of the Act. The content requirements for EAPs are contained in section 352H of the Act.

Summary of legal requirements – Section 352H

Section 352H(1) of the Act requires that the EAP must identify each dam hazard for the dam; and for each of these dam hazard types (e.g., flood operations, or chemical spill/toxic conditions):

1. identify the area likely to be affected by a dam hazard event or emergency event arising from the dam hazard; and

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

3. state when and how the owner of the dam plans to warn persons who may be harmed, or whose property may be harmed by an event caused by the dam hazard, if one happens, and/or there is a material increase in the likelihood of an occurrence, including the order of priority in which the persons or categories of persons are to be warned; and

4. state when and how the owner plans to notify the relevant entities for the dam, if a dam hazard event or emergency event happens or, there is a material increase in the likelihood of such an occurrence, including the order of priority in which the relevant entities are to be notified; and

5. state the actions the owner of the dam plans to take in response to a dam hazard event or emergency event.

In accordance with section 352H(2) of the Act, the EAP 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.

Section 352HA of the Act states that before giving the chief executive an EAP, the owner of the dam must give a copy of the plan to each local government whose area may be affected by a dam hazard identified in the plan; and each district group for the plan.

Section 352HB of the Act states that the local government must assess the EAP for consistency with its disaster management plan. In its assessment, the local government must consult with the local district group for the plan.

Within 30 business days of receiving the EAP, the local government must give the owner of the dam a notice, which states whether it considers the plan is consistent with its disaster management plan; and if not, give reason why it considers the EAP is not consistent. The EAP must include any such notices, provided to the owner of the dam by a local government (or district group); and any responses which the owner gives to these notices. Section 352H(1) further stipulates that an EAP must include any other relevant matter prescribed by regulation.

The local governments whose areas may be affected by a dam hazard for Fairbairn Dam have been assessed as the Central Highlands Regional Council (CHRC) and Isaac Regional Council (IRC). Sunwater has provided the CHRC and IRC with a copy of the draft EAP for assessment.

Section 352HC of the Act states that a district group may review the EAP for consistency with its disaster management plan. The district groups for Fairbairn Dam are Rockhampton & Mackay District Disaster Management Groups (DDMGs). Sunwater has provided the DDMGs with a copy of the draft EAP for review.
2.2 Purpose

The purpose of this EAP is:

• to minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam happens
• to identify dam hazards that could occur at Fairbairn Dam and the area likely to be affected for each hazard
• to prescribe emergency actions taken by the dam owners and operating personnel in identifying and responding to dam hazards and notifying relevant entities.

It is possible for more than one dam hazard to exist at Fairbairn Dam at the one time. In such a circumstance, it may be necessary to act on the procedures within separate sections simultaneously.

The focus of this EAP is the management of dam hazards at Fairbairn Dam by the owner of the dam (Sunwater) and the communication and notification of dam hazards to the LDMGs, DDMGs and broader community. However, the EAP sits within the broader emergency response framework. This EAP has been developed to be consistent with and support the objectives of the Central Highlands Regional Council Local Disaster Management Plan.

2.3 Scope

The Fairbairn Dam EAP covers:

• dam hazards evaluated within Sunwater’s Dam Safety Management Program
• details about the dam that are relevant to a dam hazard
• identification of circumstances that indicates a material increase in the likelihood of a dam hazard
• triggers for activation of a tiered response to dam hazards
• roles and responsibilities in responding to a dam hazard
• notification, warning, and communication protocols
• inspection, monitoring, and reporting protocols during emergencies
• other relevant information that may assist with identifying the area affected by a dam hazard, and the management of such hazards

2.4 Sunwater provides training

• Training of the use and implementation of this EAP document is carried out at various times throughout the year, but specific pre-wet season training is undertaken in the months leading up to the wet season at each dam site.

• During this time Sunwater staff have work instructions for site preparations, and during July to September carry out checks on stores, supplies of fuel, on the current EAP such as contact details for individuals and Dam information.

• The EAP training that is carried out on site (with DDO’s, LEC and IC present) include walkthroughs of new changes, scenario (role play) and Q & A to check the knowledge and competency of all those who attended. DSTDIM information sessions are carried out once a year with the same walkthrough of new changes and Q & A but this is not specific to any one Dam. New employees to these various roles would also have a walkthrough of the EAP to understand after they start at Sunwater.

• Sunwater is also working towards carrying out a full test once annually involving each local Council. Where there is more than one referable dam in a local area, the exercise could involve more than one dam or the location will be rotated. This full test would involve the SDCC and include the (non-live) testing of Emergency Alerts.
2.5 Principles used in developing this EAP

- The LDMG has principal carriage of managing any emergency situation within the community, with the support of the district and state groups.
- Sunwater will inform and support the LDMGs in the Central Highlands Regional Council (CHRC) and Isaac Regional Council (IRC) areas.
- The LDMG CHRC will be the principle voice on all communication to the community during an emergency situation in most circumstances except those where imminent dam failure is likely, and time is critical.
- During an emergency event that occurs with little or no warning, Sunwater will undertake the following actions to ensure the community is informed as soon as possible:
  - maintain an up to date list of residents and other affected parties downstream from Fairbairn Dam to a location approximately 1.5km downstream of the Denison and Selma road intersection (towards Emerald)—(immediately D/S residents)
  - provide timely advice to the LDMGs
  - notify the immediately D/S residents via SMS
  - contact SDCC watch desk to send emergency notification to Fairbairn emergency polygon.
- During an emergency event the LDMG in the CHRC area will take the lead role in notifying all relevant persons. Sunwater will support the LDMG by undertaking the following actions to ensure the community is informed as soon as possible:
  - maintain an up to date list of residents and other affected parties downstream from Fairbairn Dam to a location approximately 1.5km downstream of the Denison and Selma road intersection (towards Emerald)—(immediately D/S residents)
  - provide the LDMGs with a copy of the list of residents (immediately D/S) annually for inclusion in the LDMG’s SMS alert system
  - provide timely advice to the Local Disaster Coordinator.
- Sunwater will independently inform and support the Rockhampton and Mackay DDMGs.
2.5.1 Dam emergency organisation within Sunwater

The Sunwater emergency management framework generally utilises the organisation’s hierarchy and in-house experts as illustrated in Figure 1 below.

**Figure 1: Sunwater emergency response organisation**

Key aspects of the emergency management framework are:

- Central to the framework is the role of IC for any dam hazard at a dam. The IC will maintain overall responsibility for a coordinated response to the dam hazard incident.

- The IC is responsible for activating the EAP when the dam reaches an EAP activation level, unless instructed to activate by the FODM or the DSTDM who have determined that it is reasonable likely that the dam could reach an EAP activation level. Should the IC be unavailable, the LEC followed by the DDO is responsible for the activation. If the IC loses all communications during a dam hazard, then as a fail-safe position, the LEC followed by the DDO will assume the duties and responsibilities of the IC. However, loss of communications could result in some communication processes defined in this EAP not being carried out.

- Sunwater’s in-house engineering (includes FODM and DSTDM) and technical staff will provide technical advice to the IC, LEC and DDO on an as needs basis. The FODM and DSTDM will also make flood and dam engineering decisions respectively during a dam hazard. These roles are filled by RPEQs (or by experienced engineers under the direct supervision of an RPEQ) and are suitably qualified professionals as defined in reference E. Such advice will be provided within an established framework of SOPs, models, standards and manuals.
2.6 Community information

- Sunwater with the assistance of Central Highlands Regional Council (CHRC) will ensure community education around messaging and impacts of the EAP and its related events is undertaken and continually improved.
- Sunwater currently provides information externally to customers, downstream residents and the community in a range of ways or channels in relation to Dam hazards and Emergency Situations. Individuals can access information through Facebook, Twitter, the Sunwater web page, Sunwater App and at several regional show/field days across regional Queensland where Sunwater may have stalls and information available.
- Immediately D/S residents of Fairbairn Dam are also provided information in text message/phone calls in the event of an activation of this EAP.
- In the event of a Dam failure or when required Sunwater also have the use of the National Emergency Alert System to send a voice message or SMS. This service is provided by the State Disaster Coordination Centre and the process Sunwater follows is documented in Appendix A10.
- A copy of all SunWater approved EAPs are available to the public on the Business Queensland website (reference F). These copies are redacted to protect people’s personal details.

2.7 Lessons learnt

- Sunwater carries out Lessons Learnt workshops as part of its post event management. These Lessons learnt can result in changes to the EAP. These are captured and if applicable to this document are implemented at the earliest opportunity and are made available in the next EAP update to the regulator as part of Sunwater’s continual improvement of its EAPs. The lessons learnt actions if relevant are provided to stakeholders, such as the LDMGs, DDMGs, other dam owners and DNRME as appropriate.
- In addition, Sunwater requests any post event learnings be communicated regarding operational effectiveness and areas for improvement.

2.8 Downstream notifications lists

- Sunwater has compiled the notification lists through an iterative process. At least every 3 years Sunwater writes to all lot on plan landholders that are impacted in the downstream zones. In addition to individual letters, advertisements are placed yearly in local papers to capture any new residents in the areas. All year, applicable individuals can register to receive notifications for this EAP and are able to register either through the Sunwater website or by calling Sunwater Customer Enquiries on 13 15 89.

2.9 Comprehensive Risk Assessments

- Comprehensive Risk Assessments (CRA) are carried out on all Sunwater Dams. These are technical reports that are utilised to ascertain risks for each dam as the basis for emergency triggers. The CRA can be made available to Disaster Management Personnel whom require further assurance around the findings. To obtain a copy of a relevant CRA a request should be made in writing to Sunwater’s General Manager Water Resources and Dam Safety, it should detail the reason for the request and indicate who will be interpreting the data, i.e. engineering capability, for any unqualified personnel.
3. Dam details

3.1 General dam information

**Location:** Fairbairn Dam is situated approximately 16 km south-west of Emerald, on the Nogoa River at AMTD 685.6 km.

**Purpose:** Fairbairn Dam is the main source of supply for the Nogoa Mackenzie Water Supply Scheme. The dam is operated in conjunction with Selma, Bedford, Bingegang, and Tartrus Weirs to regulate supplies along the Mackenzie River and downstream to the Springfield Creek junction. The dam also releases into the Selma and Weemah channel systems to supply irrigators. The scheme is the source of supply for 6 industrial water supply pipelines serving the Central Queensland coalfields area.

**Catchment:** The Nogoa catchment is part of the larger Fitzroy basin. The catchment area of the basin at Rockhampton is over 140,000 km². The catchment area of the Nogoa River at Fairbairn dam is 16,320 km².

**Storage Capacity:** The storage capacity at FSL is 1,301,133 ML.

**Construction:** Completed in 1972, Fairbairn Dam is a zoned, rock-filled embankment dam with a central clay core.

**Specification:** The table below lists general specifications of Fairbairn Dam.

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dam type</strong></td>
<td>Zoned earth and rock-fill</td>
</tr>
<tr>
<td><strong>Full Supply Level (FSL)</strong></td>
<td>EL 204.23 m</td>
</tr>
<tr>
<td><strong>Storage capacity at FSL</strong></td>
<td>1,301,133 ML</td>
</tr>
<tr>
<td><strong>Storage area at FSL</strong></td>
<td>15,000 ha</td>
</tr>
<tr>
<td><strong>Embankment crest level</strong></td>
<td>EL 218.86 m</td>
</tr>
<tr>
<td><strong>Historical recorded max storage—Dec 2010 Flood (45 years of record)</strong></td>
<td>EL 209.80 m (5.57 m above FSL)</td>
</tr>
<tr>
<td><strong>Max height of dam above foundation</strong></td>
<td>46.33 m (approx.)</td>
</tr>
<tr>
<td><strong>Length across crest</strong></td>
<td>823 m</td>
</tr>
<tr>
<td><strong>Spillway type</strong></td>
<td>Chute with uncontrolled ogee crest</td>
</tr>
<tr>
<td><strong>Spillway crest level</strong></td>
<td>EL 204.23 m</td>
</tr>
<tr>
<td><strong>Spillway capacity at Dam Crest Level (DCL)</strong></td>
<td>1,881,620 ML/d (21,778 m³/s)—over the spillway only</td>
</tr>
<tr>
<td><strong>Crest length</strong></td>
<td>163.07 m (excluding width of bridge piers)</td>
</tr>
<tr>
<td><strong>Outlet works</strong></td>
<td>2 (on either side of abutment)</td>
</tr>
<tr>
<td><strong>Saddle Dam type</strong></td>
<td>Homogeneous earth-fill</td>
</tr>
<tr>
<td><strong>Number of Saddle Dams</strong></td>
<td>6 with a combined length of 8.4 km</td>
</tr>
<tr>
<td><strong>Saddle DCLs</strong></td>
<td>1, 5, 6—EL 217.94 m</td>
</tr>
<tr>
<td></td>
<td>2, 3, 4—EL 218.86 m</td>
</tr>
</tbody>
</table>
3.2 Population at risk

Fairbairn Dam is classified as an ‘Extreme’ hazard category dam. This classification is based on a Population at Risk (PAR) of 12,500 for the Sunny Day Failure (SDF) event, with the severity of damage and loss assessed as ‘Major’. The dam was assessed for flood events as having a ‘High A’ Incremental Flood Hazard Category (IFHC) rating. This rating was based on an incremental PAR of 869 and ‘Major’ damage and loss for the incremental flood impact zone between the Probable Maximum Flood (PMF) ‘Dam Failure’ and PMF ‘No Dam Failure’, in accordance with Guidelines on Assessment of the Consequences of Dam Failure (ANCOLD, 2000).

Accordingly, the Acceptable Flood Capacity (AFC) for this rating is the Probable Maximum Precipitation Design Flood (PMPDF), based on the Guidelines on Selection of Acceptable Flood Capacity for Dams (ANCOLD, 2000).

3.3 Spillway adequacy

A Comprehensive Risk Assessment (CRA) of Fairbairn Dam was undertaken in 2009. Since completion of this assessment Sunwater has identified that an improvement of the Fairbairn Dam concrete spillway is required. Once this improvement is completed the dam can safely pass a Dam Crest Flood (DCF). It should be noted that the town of Emerald will be fully inundated due to natural flooding (No Dam Failure) at such an event.

3.4 General arrangement

The general arrangement drawings, including slab plan, are in Appendix B1.

---

1 Fairbairn Dam Comprehensive Risk Assessment, November 2009 – HB# 881752
3.5 Emergency inspections and monitoring

The dam has been designed to conform to modern design standards, so that its failure is highly unlikely. In order to maintain the dam in a safe condition and detect any dam hazard, as soon as it begins to develop or becomes apparent, the following is applicable to Fairbairn Dam.

3.5.1 Inspections

The following inspections are to be carried out:

- **Routine Visual Inspection**: Conducted as per the ANCOLD guidelines or as directed by the DSTDM
- **Detailed Inspection**: Conducted annually
- **Comprehensive Inspection**: Conducted 5-yearly

3.5.2 Instrumentation and monitoring

To confirm the structural behaviour and safety of the embankment, the following instrumentation was installed, and is monitored, at Fairbairn Dam.

- **Pore pressure measurement**
  - Twin-tube hydraulic piezometers (46) are located in two cross-sections of the embankment.

- **Settlement/movement measurement**
  - Surface settlement points (33):
    - 13 are located upstream of the dam axis
    - 14 are located downstream of the dam axis.
  - Electric settlement points:
    - 2 are located on the crest
    - 2 are located on the upstream face
    - 2 are located on the downstream face.

- **Seepage measurement**
  - V-notch weir:
    - 1 located at the downstream end of the foundation drainage blanket
    - 1 located at the downstream end of the diversion.

Layout

The instrumentation layout drawings are in Appendix B1.
<table>
<thead>
<tr>
<th>Roles and responsibilities</th>
<th>Position holder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Owner</strong></td>
<td></td>
</tr>
<tr>
<td>• Liaise with the Board and Minister</td>
<td>CEO</td>
</tr>
<tr>
<td>• Activate Sunwater Strategic Response and Business Continuity Plans, if required</td>
<td>EGMO</td>
</tr>
<tr>
<td>• Ensure necessary resources are available to manage any event</td>
<td>GMWR&amp;DS</td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td><strong>Owner’s Head Office Representative</strong></td>
<td></td>
</tr>
<tr>
<td>• Authorise the issuing of EAPs, SOPs and O&amp;M Manuals and Amendments</td>
<td>SCED</td>
</tr>
<tr>
<td>• Facilitate Dam Safety Training Courses for Service Managers, Operations Supervisor, Dam Operators and other staff as appropriate and ensure that all staff required to undertake Dam Safety work are trained and accredited</td>
<td>DSSC</td>
</tr>
<tr>
<td>• Ensure that risks identified in CRAs or other technical reports undertaken in relation to Dam Safety are included in the EAP</td>
<td>CED</td>
</tr>
<tr>
<td>• Ensure visual inspections and instrumentation monitoring frequencies conform to ANCOLD Guidelines</td>
<td>MAP</td>
</tr>
<tr>
<td>• Ensure all Dam Safety work orders, work instructions and lesson learned outcomes are fully implemented.</td>
<td></td>
</tr>
<tr>
<td>• Ensure requirements of the Dam Condition Schedule are met</td>
<td></td>
</tr>
<tr>
<td>• Ensure the work instructions are correct and the Log Books, SOPs, Data Books, and EAPs are reviewed annually as per the Condition Schedule</td>
<td></td>
</tr>
<tr>
<td>• Undertake and prepare the 5 yearly Comprehensive Inspection Reports with suitably qualified personnel within the time specified in the Condition Schedule and that work orders are created for recommendations and work is undertaken as required</td>
<td></td>
</tr>
<tr>
<td>• Undertake Annual Inspections and prepare reports within the time frames specified in the Condition Schedule and that work orders are created for recommendations and work is undertaken as required</td>
<td></td>
</tr>
<tr>
<td>• Review the Dam Safety Instrumentation Database and evaluate data to verify the structural integrity of the dams on a regular basis and maintain a spreadsheet for verification for audit and quality control</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td><strong>Owner’s Regional Representative (ORR)</strong></td>
<td></td>
</tr>
<tr>
<td>• Liaise with the Storage Supervisor/Operator Maintainer</td>
<td>OCO</td>
</tr>
<tr>
<td>• Arrange dam specific training and accreditation for relevant staff</td>
<td>OMGR</td>
</tr>
<tr>
<td>• Ensure competent, trained and accredited personnel operate the storages</td>
<td>OS</td>
</tr>
<tr>
<td>• Undertake the role of LEC as required</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td>• Ensure all work orders, work instructions and lesson learned outcomes are fully implemented.</td>
<td></td>
</tr>
<tr>
<td><strong>Technical Advisor</strong></td>
<td>ME</td>
</tr>
<tr>
<td>• Analyse the situation and provide expert technical advice</td>
<td></td>
</tr>
<tr>
<td>• Discuss issue with peers and other technical experts and make sound decisions to mitigate the risk</td>
<td></td>
</tr>
<tr>
<td>• Determine response to incidents and emerging issues</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td>Roles and responsibilities</td>
<td>Position holder</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>Dam Safety Technical Decision Maker (DSTDM)</strong></td>
<td>Various personnel as per DSTDM roster</td>
</tr>
<tr>
<td>• Analyse the situation and provide expert technical advice in relation to Dam Safety</td>
<td></td>
</tr>
<tr>
<td>• Discuss Dam Hazard with peers and other technical experts and make sound decisions to mitigate the risk</td>
<td></td>
</tr>
<tr>
<td>• Determine response to incidents and emerging issues</td>
<td></td>
</tr>
<tr>
<td>• Issue warning on dam failure and advise on protective measures</td>
<td></td>
</tr>
<tr>
<td>• Ensure the EAP is implemented appropriately and carry out the DSTDM role as required</td>
<td></td>
</tr>
<tr>
<td>• Maintain current RPEQ accreditation</td>
<td></td>
</tr>
<tr>
<td>• Liaise with Regulator as required</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td><strong>Flood Operations Decision Maker (FODM)</strong></td>
<td>Various personnel as per FODM roster</td>
</tr>
<tr>
<td>• Provide hydrological advice in relation to predicted and actual dam outflows</td>
<td></td>
</tr>
<tr>
<td>• Ensure model outputs are checked and approved</td>
<td></td>
</tr>
<tr>
<td>• Ensure the EAP is implemented appropriately and carry out the FODM role as required</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td><strong>Operations Centre Duty Officer (OCDO)</strong></td>
<td>Various personnel as per OC roster</td>
</tr>
<tr>
<td>• Decide if a flood is imminent and record modes of operation</td>
<td></td>
</tr>
<tr>
<td>• Extract data relative to the event from available sources</td>
<td></td>
</tr>
<tr>
<td>• Utilise this data in predictive flood models and determine results from these models for approval by FODM</td>
<td></td>
</tr>
<tr>
<td>• Liaise with the FODM or IC to update current flood situation and routing data</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td><strong>Sunwater Media Team (SMT)</strong></td>
<td>Various personnel as per Media Team roster</td>
</tr>
<tr>
<td>• Analyse sensitive issues, discuss with the Owner and issue media releases</td>
<td></td>
</tr>
<tr>
<td>• Handle public and customer comments (including social media) and advise the Owner if necessary</td>
<td></td>
</tr>
<tr>
<td>• Liaise with the IC and update SDMG of flood events</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td><strong>Incident Coordinator (IC)</strong></td>
<td>Various personnel as per IC roster</td>
</tr>
<tr>
<td>• Notify council of intent to use the Emergency Alert</td>
<td></td>
</tr>
<tr>
<td>• Activate the EAP</td>
<td></td>
</tr>
<tr>
<td>• Ensure the EAP is implemented appropriately and carry out the IC role as required</td>
<td></td>
</tr>
<tr>
<td>• Arrange Situation Reports and determine frequency, as required</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td><strong>Local Event Coordinator (LEC)</strong></td>
<td>Various personnel as per LEC roster</td>
</tr>
<tr>
<td>• Liaise with the Local Disaster Coordinator or proxy</td>
<td></td>
</tr>
<tr>
<td>• Activate the EAP, when necessary</td>
<td></td>
</tr>
<tr>
<td>• Ensure the EAP is implemented appropriately and carry out the LEC role as required</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td>Roles and responsibilities</td>
<td>Position holder</td>
</tr>
<tr>
<td>-----------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Dam Duty Officer (DDO)</strong></td>
<td></td>
</tr>
<tr>
<td>• Ensure the EAP is implemented appropriately and carry out the</td>
<td></td>
</tr>
<tr>
<td>DDO role as required</td>
<td></td>
</tr>
<tr>
<td>• Arrange immediate site inspection and make informed assessment</td>
<td></td>
</tr>
<tr>
<td>of the situation</td>
<td></td>
</tr>
<tr>
<td>• Escalate any issue not covered in the EAP or where actions</td>
<td></td>
</tr>
<tr>
<td>are not clear</td>
<td></td>
</tr>
<tr>
<td>Council has legislated local government functions, as per</td>
<td></td>
</tr>
<tr>
<td>Section 80 of the Qld Disaster Management Act (2003).</td>
<td></td>
</tr>
<tr>
<td>• Ensure information about an event or a disaster in its area</td>
<td></td>
</tr>
<tr>
<td>is promptly given to the district disaster</td>
<td></td>
</tr>
<tr>
<td>• Perform other functions given to the local government under</td>
<td></td>
</tr>
<tr>
<td>the Act</td>
<td></td>
</tr>
<tr>
<td>And as per Section 352HB of the Water Legislation (Dam Safety)</td>
<td></td>
</tr>
<tr>
<td>Amendment Act (2017):</td>
<td></td>
</tr>
<tr>
<td>• must assess (in consultation with its LDMG) the EAP for</td>
<td></td>
</tr>
<tr>
<td>consistency with the Local Disaster</td>
<td></td>
</tr>
<tr>
<td><strong>Disaster Management Groups/Personnel</strong> - (In addition to</td>
<td></td>
</tr>
<tr>
<td>requirements outlined in the Qld. Disaster Mgmt.</td>
<td></td>
</tr>
<tr>
<td>• Assist Sunwater and the Councils to ensure community education</td>
<td></td>
</tr>
<tr>
<td>around messaging and impacts</td>
<td></td>
</tr>
<tr>
<td>• Work with Central Highlands Regional Council and Sunwater</td>
<td></td>
</tr>
<tr>
<td>to ensure the EAP is regularly</td>
<td></td>
</tr>
<tr>
<td>• Identify and coordinate the use of manpower and resources</td>
<td></td>
</tr>
<tr>
<td>that may be required for an EAP event</td>
<td></td>
</tr>
<tr>
<td>• Identify and provide advice to DDMG about support services</td>
<td></td>
</tr>
<tr>
<td>required by the LDMG to manage an EAP event</td>
<td></td>
</tr>
<tr>
<td>• Provide reports and make recommendations to the relevant</td>
<td></td>
</tr>
<tr>
<td>DDMG about matters relating to EAP</td>
<td></td>
</tr>
<tr>
<td>• Work with dam owner and LDMGs to ensure Emergency Alerts</td>
<td></td>
</tr>
<tr>
<td>polygons are prepared, stored and</td>
<td></td>
</tr>
<tr>
<td>• DDMG may review plan with consistency with the District</td>
<td></td>
</tr>
<tr>
<td>Disaster Management Plan</td>
<td>DDS</td>
</tr>
</tbody>
</table>
5. Dam hazard—flood operations

5.1 Overview

The emergency action described in this section (dam hazard—flood operations) relates to:

- A dam hazard where natural catchment inflows fill Fairbairn Dam to FSL (204.23 m) and the rate of inflow exceeds the capacity of the outlet works. The spillway will then discharge water downstream into the Nogoa River. These flood flows can create an emergency event. Inflows will also cause the storage to temporarily rise to above the FSL of the storage. Note:
  - The greater the rate of inflow, the higher the storage will rise.
  - The higher the storage level rises, the greater the loads on the dam structure.
  - Although unlikely, the greater the loading, the higher the likelihood of a dam failure.
  Typically, the level of surveillance is increased during flood operations (refer tables in this section).

- Spillway discharge from the dam where there have been no indications that a dam failure may be initiating or in progress.

The area likely to be affected by this dam hazard is described as:

- For small flows, the water will be contained within the Nogoa and McKenzie rivers and will not create an emergency event.
- As the rate of discharge increases, there will be an impact on low-level road crossings of the Nogoa and McKenzie Rivers and other infrastructure in the river such as pump sites.
- When the storage height exceeds moderate flood level (3.5 m over the spillway), EL 207.73 m flows will begin to break out of the river banks and inundate low-lying areas. The 1 in 100-year flood event will reach a storage elevation of 206.78 m (2.55 m) over the spillway.
- When the storage height exceeds major flood level (4.0 m over the spillway), EL 208.03 m flows will impact on urban areas. The maximum area impacted will be less than that inundated in the 2010 flood.
- The Probable Maximum Precipitation Design Flood (PMPDF) will result in a storage level of 218.59 m and exceed the height of the Saddle Dams. The maximum area affected at this level is shown by the PMF No Dam Failure line on the maps in Appendix B.
### Table 3: Flood classification triggers

<table>
<thead>
<tr>
<th>Flood classification level</th>
<th>Depth over spillway (m)</th>
<th>Storage elevation (m AHD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>4.0</td>
<td>208.23</td>
</tr>
<tr>
<td>Moderate</td>
<td>3.5</td>
<td>207.73</td>
</tr>
<tr>
<td>Minor</td>
<td>2.8</td>
<td>207.03</td>
</tr>
</tbody>
</table>

*Source: Bureau of Meteorology*

### Table 4: Historical floods experienced at Fairbairn Dam

<table>
<thead>
<tr>
<th>Flood rank</th>
<th>Date</th>
<th>Peak height (EL)</th>
<th>Peak height (m over crest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dec 2010</td>
<td>209.80 m</td>
<td>5.57</td>
</tr>
<tr>
<td>2</td>
<td>Feb 2008</td>
<td>208.67 m</td>
<td>4.44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>207.05 m</td>
<td>2.82</td>
</tr>
<tr>
<td>4</td>
<td>Feb 1978</td>
<td>207.02 m</td>
<td>2.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>206.67 m</td>
<td>2.44</td>
</tr>
<tr>
<td>6</td>
<td>Feb 2012</td>
<td>206.65 m</td>
<td>2.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>206.64 m</td>
<td>2.41</td>
</tr>
<tr>
<td>8</td>
<td>Dec 1975</td>
<td>206.17 m</td>
<td>1.94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>205.92 m</td>
<td>1.69</td>
</tr>
</tbody>
</table>
5.2 Emergency actions

In the table below, each level of activation includes both its own actions and the actions of any lower level, unless those lower level actions are superseded.

5.2.1 Activation triggers

<table>
<thead>
<tr>
<th>Level</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td>EL 204.13m and rising (0.1m below FSL)</td>
</tr>
<tr>
<td>Lean Forward</td>
<td>Storage above FSL 204.23m</td>
</tr>
<tr>
<td>Stand Up greater than minor flood level</td>
<td>Storage above EL 207.03m (2.8m above FSL)</td>
</tr>
<tr>
<td>Stand Up greater than major flood level</td>
<td>Storage above EL 208.23m (4.0m above FSL)</td>
</tr>
<tr>
<td>Stand Up greater than flood of record</td>
<td>Storage above EL 209.80m (5.57m above FSL), OR Observed scour in the spillway</td>
</tr>
<tr>
<td>Stand Down</td>
<td>Storage level EL 207.03m and falling</td>
</tr>
</tbody>
</table>

While this EAP is not triggered until Fairbairn Dam reaches a level of EL 204.13m, Sunwater and Central Highlands Regional Council will work cooperatively and will endeavour to share intelligence of any rainfall event as and when either organisation becomes aware of a situation that could result in the activation of the EAP.

5.2.2 Assessment of circumstances that indicate an increase in the likelihood of flood operations

The Operations Centre Duty Officer (OCDO) will assess the weather and flood warnings daily in accordance with the Operations Centre (OC) SOP. The OCDO will escalate to the Incident Coordinator (IC) any warnings that have the potential to generate an inflow event in the catchment in the following 24 hours.

The on-call IC will escalate to the FODM any local intelligence on catchment conditions that could increase the probability of inflows to the dam.

If the river rises at upstream river gauges (i.e. Craigmore or higher in the catchment) indicating that the dam will reach EL 204.13 m, the FODM may instruct the IC to trigger the Alert status for flood operations before the trigger level is reached.

5.2.3 Emergency action roles

Table 6 to Table 11 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
- Flood Operations Decision Maker (FODM)
Table 6: Flood operations—DDO emergency action

<table>
<thead>
<tr>
<th>Action level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up greater than minor flood level</th>
<th>Stand Up greater than flood level</th>
<th>Stand Up greater than major flood level</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>• EL 204.13m and rising (0.1m below FSL)</td>
<td>• Storage above FSL 204.23m</td>
<td>• Storage above EL 207.03m (2.8m above FSL)</td>
<td>• Storage above EL 208.23m (4.0m above FSL)</td>
<td>• Storage above EL 209.80 m (5.57m above FSL)</td>
<td>• Storage level EL 207.03m and falling</td>
</tr>
<tr>
<td>Actions</td>
<td>• Inspect the dam daily (or as instructed by the DSTDM), and photograph/video and record using approved forms in Appendix D and send to IC and DSTDM</td>
<td></td>
<td>• As per previous activation level, AND</td>
<td>• As per previous activation level, AND</td>
<td>• As per previous activation level, AND</td>
<td>• Return to routine surveillance activities and frequencies—inspect the dam for any damage and photograph any damage identified</td>
</tr>
<tr>
<td></td>
<td>• Undertake site preparations</td>
<td></td>
<td>• Inspect the dam daily (or as instructed by DSTDM), and photograph/video and record using approved forms in Appendix D and send to IC and DSTDM</td>
<td>• Evacuate any plant and/or vehicles to higher ground</td>
<td>• Monitor and record the storage level at 4-hourly intervals (or as instructed by the DSTDM)</td>
<td>• View the embankment (with binoculars)</td>
</tr>
<tr>
<td></td>
<td>(if not already complete) including but not limited to: check fuel and operation of backup generator check operations of sump pump check seal of Selma outlet building check communication systems (including backup)</td>
<td></td>
<td>• Attention</td>
<td>• Photograph spillway discharge area daily and email to Owner’s Representative</td>
<td>• Inspect the dam 3 times daily (or as instructed by the DSTDM), and photograph/video and record using approved forms in Appendix D and send to IC &amp; DSTDM</td>
<td>• Photograph spillway</td>
</tr>
<tr>
<td></td>
<td>• Monitor catchment conditions</td>
<td></td>
<td>• Audible alarm</td>
<td>• Inspect the dam twice daily (or as instructed by the DSTDM), and photograph/video and record using approved forms in Appendix D and send to IC and DSTDM</td>
<td>• Inspect the dam 3 times daily (or as instructed by the DSTDM), and photograph/video and record using approved forms in Appendix D and send to IC &amp; DSTDM</td>
<td>• Photograph spillway</td>
</tr>
<tr>
<td></td>
<td>• Notify the SO (who will be available for duty and onsite for the duration of a Dam Hazard)</td>
<td></td>
<td>• Visual inspection of flow patterns over spillway and dissipator for evidence of scouring variations in readings</td>
<td>• Monitor and record the storage level at 4-hourly intervals (or as instructed by the DSTDM)</td>
<td>• Monitor and record the storage level at 4-hourly intervals (or as instructed by the DSTDM)</td>
<td>• Photograph spillway discharge area daily and email to Owner’s Representative</td>
</tr>
<tr>
<td></td>
<td>• Record the storage level twice daily (or as instructed by the DSTDM) using the gauge boards and confirm accuracy of gauging station</td>
<td></td>
<td>• Report any unusual readings or observations to the DSTDM and IC as soon as practical</td>
<td>• Monitor and record the storage level at 4-hourly intervals (or as instructed by the DSTDM)</td>
<td>• Monitor and record the storage level at 4-hourly intervals (or as instructed by the DSTDM)</td>
<td>• Photograph spillway discharge area daily and email to Owner’s Representative</td>
</tr>
<tr>
<td></td>
<td>• Record rainfall daily</td>
<td></td>
<td></td>
<td>• Report any unusual readings or observations to the DSTDM and IC as soon as practical</td>
<td>• Monitor and record the storage level at 4-hourly intervals (or as instructed by the DSTDM)</td>
<td>• Photograph spillway discharge area daily and email to Owner’s Representative</td>
</tr>
<tr>
<td></td>
<td>• Record all communication</td>
<td></td>
<td></td>
<td>• Report any unusual readings or observations to the DSTDM and IC as soon as practical</td>
<td>• Monitor and record the storage level at 4-hourly intervals (or as instructed by the DSTDM)</td>
<td>• Photograph spillway discharge area daily and email to Owner’s Representative</td>
</tr>
<tr>
<td></td>
<td>• Log Book entries as per SOP 12</td>
<td></td>
<td></td>
<td>• Report any unusual readings or observations to the DSTDM and IC as soon as practical</td>
<td>• Monitor and record the storage level at 4-hourly intervals (or as instructed by the DSTDM)</td>
<td>• Photograph spillway discharge area daily and email to Owner’s Representative</td>
</tr>
</tbody>
</table>

If scour observed at any level, **immediately** notify DSTDM. Discuss bridge closure with IC & DSTDM.

---

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**

e.g., taking photographs/video, dam inspections, instrument readings

**ALL PHOTOS MUST BE DATE STAMPED**
## Table 7: Flood operations—LEC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert Level</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td>Lean Forward</td>
<td>Stand Up greater than minor flood level</td>
</tr>
<tr>
<td></td>
<td>Stand Up</td>
<td>Stand Up greater than major flood level</td>
</tr>
<tr>
<td></td>
<td>Stand Down</td>
<td>Stand Down greater than flood of record</td>
</tr>
</tbody>
</table>

### Internal notifications

- **EL 204.13m and rising (0.1m below FSL):**
  - Liaise with LDMG re: situation
  - Develop/implement staff roster
  - Record all communication

### External notifications

- **DDO:**
  - Storage above FSL 204.23m
  - As per previous activation level
  - As per previous activation level

- **CHRC:**
  - As per previous activation level
  - Liaise with DDO & CHRC to manage access to dam wall and spillway by members of the public
  - As per previous activation level
  - If scour observed, move to Stand Up—greater than flood of record

- **LDMG 1:**
  - As per previous activation level

- **LDMG 2:**
  - As per previous activation level

- **CHRC:**
  - As per previous activation level

- **As required:**
  - Inform LDMG of potential dam failure if scour observed

- **Storage level EL 207.03m and falling:**
  - Forward EER information to IC email
  - Return to routine activities

### Important Notes

- All action must be taken when it is safe to do so, e.g., taking photographs/video, dam inspections, instrument readings.
- All photos must be date stamped.
# Fairbairn—2019/20–i9.1

## Table 8: Flood operations—IC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Action 1</th>
<th>Action 2</th>
<th>Action 3</th>
<th>Action 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lean Forward</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand Up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage above FSL 204.13m and rising</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand Down</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE: IC to carry out LEC actions unless LDMG 1 is stood up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** IC to carry out LEC actions unless LDMG 1 is stood up.
Table 9: Flood operations—LEC and IC communication plan

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alert</strong></td>
<td>● When EL 204.13m and rising (Preparedness)</td>
<td>● LDMG 1, DDMGs</td>
<td>Phone and Email</td>
<td>Describe current situation with dam—What is the event? What is the status? Advise of current storage level</td>
</tr>
<tr>
<td><strong>Lean Forward</strong></td>
<td>● Storage above FSL 204.23m</td>
<td>● LDMG 1, LDMG 2, DDMGs</td>
<td>Phone</td>
<td>Describe current situation with dam—What is the event? What is the status? Advise of current storage level</td>
</tr>
<tr>
<td><strong>Stand Up</strong></td>
<td>● Storage above EL 207.03m</td>
<td>● LDMG 1, LDMG 2, DDMGs</td>
<td>Phone</td>
<td>Describe current situation with dam—What is the event? What is the status? (Storage is greater than minor flood level) Advise of current storage level</td>
</tr>
<tr>
<td><strong>Stand Up</strong></td>
<td>● Storage above EL 208.23m</td>
<td>● LDMG 1, LDMG 2, DDMGs</td>
<td>Phone</td>
<td>Describe current situation with dam—What is the event? What is the status? (Storage is greater than major flood level) Advise of current storage level</td>
</tr>
<tr>
<td><strong>Stand Up</strong></td>
<td>● Storage above EL 209.80m (5.57m above FSL)</td>
<td>● LDMG 1, LDMG 2, DDMGs, SDCC Watch Desk</td>
<td>Phone</td>
<td>Describe current situation with dam—What is the event? What is the status? (Storage is greater than flood of record and/or observed scour—dam failure possible) Advise of current storage level Advise of any forecasts you are aware of</td>
</tr>
<tr>
<td><strong>Stand Up</strong></td>
<td>● Observed scour in the spillway (dam failure likely)</td>
<td>● LDMG 1, LDMG 2, DDMGs, SDCC Watch Desk</td>
<td>Phone</td>
<td>Describe current situation with dam—What is the event? What is the status? (Storage is greater than flood of record and/or observed scour—dam failure likely) Advise of current storage level Advise of any forecasts you are aware of Check with LDMGs &amp; discuss need for Emergency Alert Message</td>
</tr>
<tr>
<td><strong>Stand Down</strong></td>
<td>● Storage level EL 207.03m and falling</td>
<td>● LDMG 1, LDMG 2, DDMGs</td>
<td>Phone</td>
<td>Complete emergency siren instructions in Appendix A11 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.</td>
</tr>
</tbody>
</table>

**NOTE:** All communications with D/S residents during flood events are handled by CHRC.
Table 10: Flood operations—DSTDM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td>Internal notifications • Provide technical advice to DDO and IC on a needs basis • Review surveillance reports and determine if any additional responses are required • Record all communication</td>
</tr>
<tr>
<td>Lean Forward</td>
<td>External notification • As required</td>
</tr>
<tr>
<td>Stand Up</td>
<td>• Storage above FSL 204.23m (0.3m below FSL) • Provide technical advice to DDO and IC on a needs basis • Review surveillance reports and determine if any additional responses are required • Record all communication</td>
</tr>
<tr>
<td>Stand Down</td>
<td>• As per previous activation level</td>
</tr>
<tr>
<td>greater than minor flood level</td>
<td>• Storage above EL 207.03m (2.8m above FSL) • As per previous activation level</td>
</tr>
<tr>
<td>greater than major flood level</td>
<td>• Storage above EL 208.3m (4.0m above FSL) • As per previous activation level, AND • CEO — if time permits • As per previous activation level</td>
</tr>
<tr>
<td>greater than flood of record</td>
<td>• Storage above EL 209.80m (5.57m above FSL) • Observed scour in the spillway • As per previous activation level, AND • If scour is observed, determine if dam failure is possible or likely • If failure is likely or in progress, decision required — advise IC of decision • Liaise with the IC and confirm need to sound emergency siren due to dam failure • As per previous activation level</td>
</tr>
<tr>
<td>Stand Down</td>
<td>• As per previous activation level</td>
</tr>
<tr>
<td>Stand Down</td>
<td>• As per previous activation level</td>
</tr>
<tr>
<td>Stand Down</td>
<td>• As per previous activation level</td>
</tr>
</tbody>
</table>

ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO e.g., taking photographs/video, dam inspections, instrument readings

ALL PHOTOS MUST BE DATE STAMPED

13 15 89 Sunwater Customer Support 24-hour contact line
<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL 204.13m and rising (0.1m below FSL)</td>
<td>• Internal notifications</td>
<td>• External notifications</td>
<td>• Not applicable</td>
<td>• Not applicable</td>
</tr>
<tr>
<td>• Extract data from available sources</td>
<td>• Update flood models as per SOP of OC</td>
<td>• Update and issue flood operations report</td>
<td>• Record all communication</td>
<td></td>
</tr>
<tr>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• Not applicable</td>
<td></td>
</tr>
<tr>
<td>• Storage above FSL 204.23m</td>
<td>• Storage above EL 207.03m (2.8m above FSL)</td>
<td>• Storage above EL 208.23m (4.0m above FSL)</td>
<td>• Storage level EL 207.03m and falling</td>
<td></td>
</tr>
<tr>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• Forward EER information to IC email</td>
<td></td>
</tr>
<tr>
<td>• Not applicable</td>
<td>• Not applicable</td>
<td>• Not applicable</td>
<td>• Return to routine activities</td>
<td></td>
</tr>
</tbody>
</table>

All action must be taken when it is safe to do so, e.g., taking photographs/video, dam inspections, instrument readings. All photos must be date stamped.
6. Dam hazard—chemical spill/toxic conditions

6.1 Overview

The dam hazard described in this section relates to:

- the presence of substantial volumes of chemicals or other potentially toxic contaminants can create a dam hazard
- the dam hazard can occur due to a traffic or industrial accident, a flood event transporting chemical drums into the storage, or an activity on or near the storage
- the dam hazard can impact urban, domestic, or stock users of water either within or downstream of the storage, or on recreational users
- the maximum area affected by any spill will depend on whether the river is in flood and/or the spillway is discharging. The maximum affected area of any spill would be the PMF map in Appendix B as an upper limit.

Note: This section does not apply for normal operating and monitoring of Blue Green Algae (BGA) within the storage under the Sunwater policy for BGA management (Refer: EM29 BGA Manual).

6.2 Emergency action roles

Table 12 to Table 16 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
Figure 2: Chemical spill/toxic conditions flowchart

ALERT
Reports of contamination or potential contamination in the catchment area of the storage.

DDO: Undertake investigations to check the accuracy and details of any reports.

Stand Up: Yes
Risk reduced: Yes

DSTDM: Assess the situation and determine need to move up activation level.

Stand Up: No

DSTDM: Monitor and assess if risk has been reduced.

Risk reduced: Yes

STAND DOWN
Risk reduced: Yes

DSTDM: Determine if:
- WQ testing is required
- Precautionary closure of outlets and treated water supply is required.

LEC: Liaise with LDMG re: clean up activities.

Risk reduced: No

IC: Monitor and assess if risk has been reduced.

Risk reduced: No
## Table 12: Chemical spill/toxic conditions—DDO emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Activation trigger

- Reports of contamination or potential contamination in the catchment area of the storage (excludes normal operating and monitoring of BGA)
- Escalated BGA or toxic condition from the Sunwater Environmental group
- Undertake investigations to ascertain the veracity and details of any reports
- Sketch, measure, photograph, and locate the spill's position in the reservoir/catchment and record using the approved forms in Appendix D and send to IC & DSTDM
- Update Dam Log Book as per SOP12
- Liaise with DSTDM
- Record all communication

**NOTE:**

For normal BGA management (which is excluded) refer to the Sunwater Policy EM29 BGA Manual

### Actions

1. **As required**
2. **Not applicable**
3. **Not applicable**
4. **Not applicable**

<table>
<thead>
<tr>
<th></th>
<th>1. DSTDM</th>
<th>2. IC</th>
<th>3. LEC</th>
<th>4. Call 000/112 if emergency services are required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

- Confirmation or high probability of a large amount of chemical spill/toxic conditions found
- Update BGA warning signage, if relevant
- Collect water samples, if directed
- Close all outlet works, if directed
- Shut off all treated water offtakes, if directed
- Update Dam Log Book as per SOP12
- Close storage to recreational usage
  1. **As required**
  2. **Not applicable**
  3. **Not applicable**
  4. **Not applicable**

- Risk assessment that risk has reduced
- Confirmation that significant contamination has not occurred
- All clear WQ test result
- Forward information for EER to IC email
- Update Dam Log Book as per SOP12
- Return to routine activities
  1. **As per previous activation level**
  2. **As required**

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**

e.g., taking photographs/video, dam inspections, instrument readings

**ALL PHOTOS MUST BE DATE STAMPED**

---

**13 15 89 Sunwater Customer Support 24-hour contact line**
**Table 13: Chemical spill/toxic conditions—LEC emergency action**

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Activation trigger</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Not applicable</td>
<td></td>
<td>• Confirmation or high probability of a large amount of chemical spill/toxic conditions found in the storage/catchment</td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td></td>
<td></td>
<td>• Liaise with LDMG, IC re: situation</td>
<td>• Forward information for EER to IC email</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not applicable</td>
<td>• Record all communication</td>
<td>• Confirmation that significant contamination has not occurred</td>
</tr>
</tbody>
</table>

**Internal notifications**
1. IC
2. DDO

**External notifications**
3. LDMG 1
4. LDMG 2

**Support 24-hour contact line**

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**
e.g., taking photographs/video, dam inspections, instrument readings
ALL PHOTOS MUST BE DATE STAMPED

13 15 89 Sunwater Customer Support 24-hour contact line
Table 14: Chemical spill/toxic conditions—IC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>• Not applicable</td>
<td>• Confirmation or high probability of a large amount of chemical spill/toxic conditions found in the storage/catchment</td>
<td></td>
</tr>
</tbody>
</table>
| Actions | • Not applicable | | • Deactivate EAP  
• Compile EER and deliver to DSR if required  
• Return to routine activities |
| Internal notifications | 1. DDO  
2. DSTDM  
3. LEC/ORR | • Not applicable | 3. DSTDM  
4. DDO  
5. LEC/ORR  
6. SMT | • Inform previous notifications of deactivation as required |
| External notifications | 4. DDMGs | • Not applicable | 1. D/S Residents & Treated Water Users  
2. DDMGs | • As required |

NOTE 1: IC to carry out LEC actions unless LDMG1 is Stood Up

NOTE 2: For normal BGA management (which is excluded) refer to the Sunwater Policy EM29 BGA Manual.

ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO  
e.g., taking photographs/video, dam inspections, instrument readings  
ALL PHOTOS MUST BE DATE STAMPED
Table 15: Chemical spill/toxic conditions—LEC and IC communication plan

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td>LDMG 1, LDMG 2, DDMGs</td>
<td>Phone</td>
<td></td>
</tr>
<tr>
<td>Lean Forward</td>
<td>LEAN FORWARD NOT APPLICABLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand Up</td>
<td>LDMG 1, LDMG 2, DDMGs</td>
<td>Phone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D/S Residents &amp; Treated Water Users</td>
<td>SMS (Phone for those without mobiles)</td>
<td></td>
</tr>
<tr>
<td>Stand Down</td>
<td>LDMG 1, LDMG 2, DDMGs</td>
<td>Phone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D/S Residents &amp; Treated Water Users</td>
<td>SMS (Phone for those without mobiles)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 16: Chemical spill/toxic conditions—DSTDM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activation trigger</strong></td>
<td>• Reports of contamination or potential contamination in the catchment area of the storage (excludes normal operating and monitoring of BGA)</td>
<td>• Not applicable</td>
<td>• Confirmation or high probability of a large amount of chemical spill/toxic conditions found in the storage/catchment</td>
<td>• Risk assessment that risk has reduced</td>
</tr>
<tr>
<td></td>
<td>• Escalated BGA or toxic condition from the Sunwater Environmental group</td>
<td></td>
<td></td>
<td>• Confirmation that significant contamination has not occurred</td>
</tr>
<tr>
<td></td>
<td>• Monitor situation and assess risks</td>
<td></td>
<td></td>
<td>• All clear WQ test result</td>
</tr>
<tr>
<td></td>
<td>• Record all communication</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** For normal BGA management (which is excluded) refer to the Sunwater Policy EM29 BGA Manual.

<table>
<thead>
<tr>
<th>Action</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Assess situation and determine need to move to Stand Up</td>
<td>• Not applicable</td>
<td></td>
<td>• Assess risk and determine actions including need for WQ testing, shut down of treated water supplies, and precautionary closure of outlet works</td>
<td>• Forward information for EER to IC email</td>
</tr>
<tr>
<td>• Monitor situation and assess risks</td>
<td></td>
<td></td>
<td>• Obtain technical advice from Manager Environment</td>
<td>• Return to routine activities</td>
</tr>
<tr>
<td>• Record all communication</td>
<td></td>
<td></td>
<td>• Liaise with the IC</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** For normal BGA management (which is excluded) refer to the Sunwater Policy EM29 BGA Manual.

<table>
<thead>
<tr>
<th>Internal notifications</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DDO</td>
<td>• Not applicable</td>
<td></td>
<td></td>
<td>• As required</td>
</tr>
<tr>
<td>2. IC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ME — if available</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. CEO — if time permits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External notifications</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>• As required</td>
<td>• Not applicable</td>
<td></td>
<td></td>
<td>• As required</td>
</tr>
</tbody>
</table>

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**

E.g., taking photographs/video, dam inspections, instrument readings.

**NOTICE:** ALL PHOTOS MUST BE DATE STAMPED

Support 24-hour contact line

13 15 89 Sunwater Customer Support 24-hour contact line
7. Dam hazard—piping: embankment, foundation, abutments or gates

7.1 Overview

The emergency action described in this section relates to a potential dam hazard due to a piping condition through the embankment (Main Dam or Saddle Dams), foundations, or dam abutment. An early indicator of a piping condition can be an increase in seepage or a new area of seepage. If the seepage water is cloudy or has become cloudy, this may indicate that material is being transported and a pipe is being established.

If a pipe is established and progresses, then a dam failure may result. If a potential pipe is detected early, remedial repairs maybe possible in the form of constructing a filter and weighting zone over the pipe exit if safe to do so.

The flood outlines in Appendix B are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by piping. The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to piping and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to piping and concurrent flooding or downstream releases are occurring or expected to occur.

Notes: Definitions for Concurrent Flooding and Downstream Releases are provided in Section 1.3

7.1.1 Assessment of circumstances that indicates an increase in the likelihood of piping

An increase in seepage or a new area of seepage is a circumstance that could indicate an increased likelihood of piping. This circumstance is the trigger for the alert status for piping.

Cloudy seepage water is a circumstance that could indicate an increased likelihood of piping. This circumstance is the trigger for the lean forward status for piping.

7.2 Emergency action roles

Table 17 to Table 21 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
Figure 3: Piping: embankment, foundation, abutments or gates flowchart

- **ALERT** (LEAN FORWARD IF WATER CLOUDY): Increasing leakage through foundation or abutments.
- **DSTDM:** Arrange inspection ASAP.
- **DSTDM:** Has piping condition been established?
  - **Stand Up:** Yes
  - **Stand Up:** No
- **DSTDM:** Monitor and assess if risk has been reduced.
  - **Risk reduced:** Yes
  - **Risk reduced:** No
- **DSTDM:** Determine if:
  - Remedial repairs are practical
  - Risk can be reduced by lowering storage
  - Supervise remedial works.
- **LEC:** Liaise with LDMG.
  - **Risk reduced:** Yes
  - **Risk reduced:** No

**STAND DOWN**

**LEC:** Liaise with LDMG re: evacuations.
## Table 17: Piping: embankment, foundation, abutments or gates—DDO emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Action</th>
<th>Action</th>
<th>Action</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Internal notifications</td>
<td>External notifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increasing leakage through an embankment, the foundations, or abutments</td>
<td>As required</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitor flows every 6 hours or until a decreasing trend is observable, or as directed by the DSTDM</td>
<td>As per previous activation level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Photograph/video the piping from a safe point and record using the approved forms in Appendix D and send to IC &amp; DSTDM</td>
<td>As required</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notify SO</td>
<td>As per previous activation level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Update Dam Log Book as per SOP 12</td>
<td>As per previous activation level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Record all communication</td>
<td>As per previous activation level</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**
e.g., taking photographs/video, dam inspections, instrument readings

**ALL PHOTOS MUST BE DATE STAMPED**
### Table 18: Piping: embankment, foundation, abutments or gates—LEC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Up 2</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activation trigger</strong></td>
<td>• Increasing leakage through an embankment, the foundations, or abutments</td>
<td>• Increasing leakage through an embankment, the foundations, or abutments with cloudy water</td>
<td>• Piping condition has been established</td>
<td>• Failure in progress or likely due to piping, AND</td>
<td>• Risk assessment has determined that failure risk has reduced</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>• Liaise with DDO and IC re: situation</td>
<td>• As per previous activation level, AND</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• Forward information for EER to IC email</td>
</tr>
<tr>
<td></td>
<td>• Record all communication</td>
<td>• Liaise with relevant Council(s) regarding potential road/bridge closures</td>
<td>• Liaise with relevant Council(s) regarding potential road/bridge closures</td>
<td>• Liaise with relevant Council(s) regarding potential road/bridge closures</td>
<td>• Return to routine activities</td>
</tr>
<tr>
<td><strong>Internal notifications</strong></td>
<td>1. DDO</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As required</td>
</tr>
<tr>
<td></td>
<td>2. IC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>External notifications</strong></td>
<td>• As required</td>
<td>1. LDMG 1</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. LDMG 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO e.g., taking photographs/video, dam inspections, instrument readings
ALL PHOTOS MUST BE DATE STAMPED
### Table 19: Piping: embankment, foundation, abutments or gates—IC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Internal notifications</th>
<th>External notifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>• Increasing leakage through an embankment, the foundations, or abutments</td>
<td>• Liaise with DDO, LEC and DSTDM regarding situation</td>
</tr>
<tr>
<td>Orange</td>
<td>• Complete Situation Report, unless otherwise directed</td>
<td>• Record all communication</td>
</tr>
<tr>
<td>Red</td>
<td>• SW Incident and Near Miss Alert</td>
<td>• Note: IC to carry out LEC actions unless LDMG1 is Stood Up</td>
</tr>
</tbody>
</table>

**NOTE:** IC to carry out LEC actions unless LDMG1 is Stood Up.

- **Stood Up:**
  - **1. DSTDM**
  - **2. DDO**
  - **3. LEC/ORR**
  - **4. SMT**

- **Stand Up:**
  - **1. D/S Residents & Treated Water**
  - **2. SDCC Watch Desk**

- **Stand Down:**
  - **1. D/S Residents & Treated Water**
  - **2. SDCC Watch Desk**

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**

**e.g., taking photographs/video, dam inspections, instrument readings**

**ALL PHOTOS MUST BE DATE STAMPED**

13 15 89 Sunwater Customer Support 24-hour contact line
### Table 20: Piping: embankment, foundation, abutments or gates—LEC and IC communication plan

<table>
<thead>
<tr>
<th>Alert Level</th>
<th>Action</th>
<th>Message Text</th>
<th>Contact Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Lean Forward</td>
<td></td>
<td>Describe current situation with dam</td>
<td>Phone</td>
</tr>
<tr>
<td>Stand Up</td>
<td></td>
<td>What is the event?</td>
<td>Phone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What is the status?</td>
<td>Phone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Advise of current storage level</td>
<td>Phone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Advise any issues you are aware of</td>
<td>Phone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prepare for possible evacuations</td>
<td>Phone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liaise with Sunwater Customer Support to send</td>
<td>Phone</td>
</tr>
</tbody>
</table>

**DAM: Fairbairn**

**EVENT: Dam safety risk**

**STATUS: Confirmed**

**ACTION: Possible issue at dam list for further advice**

**PRODUCTION#2455713-v1-Fairbairn_Dam_EAP_I9_1.docx**
### Table 20 (Continued): Piping: embankment, foundation, abutments or gates—LEC and IC communication plan

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand Up 2</td>
<td>• Failure likely due to piping, AND • Sufficient water in storage to create a dam hazard</td>
<td>• LDMG 1 • LDMG 2 • DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with dam—What is the event? (Confirmed piping risk) What is the status? (Possible Dam Failure) Advise current storage level Prepare coordinated evacuations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SDCC Watch Desk</td>
<td>• Phone &amp; Email</td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A9 and Appendix D) and email to SDCC Watch Desk to send. Develop messages in consultation with DSTDM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DiS Residents &amp; Treated Water Users</td>
<td>• SMS (Phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification—urgent DAM: Fairbairn EVENT: Dam safety risk—piping STATUS: Dam failure likely ACTION: Possible evacuation follow instructions of emergency services</td>
</tr>
<tr>
<td></td>
<td>Dam failure in progress</td>
<td>• LDMG 1 • LDMG 2 • DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with dam—What is the event? (Confirmed piping risk) What is the status? (Dam Failure In Progress) Advise current storage level Coordinate evacuations of affected Downstream Residents and move people to higher ground</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SDCC Watch Desk</td>
<td>• Phone &amp; Email</td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A9 and Appendix D) and email to SDCC Watch Desk to send. SMS text as follows: IMMINENT FAILURE OF FAIRBAIRN DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. EMERALD IS AT RISK. INFO ON ABC RADIO. CAPELLA AND SPRINGSURE ARE SAFE.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DiS Residents &amp; Treated Water Users</td>
<td>• SMS (Phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send SMS: IMMINENT FAILURE OF FAIRBAIRN DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. EMERALD IS AT RISK. INFO ON ABC RADIO. CAPELLA &amp; SPRINGSURE ARE SAFE.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Emergency siren</td>
<td>• Phone &amp; Email</td>
<td>Complete emergency siren instructions in Appendix A11 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.</td>
</tr>
<tr>
<td>Stand Down</td>
<td>• Risk assessment has determined that failure risk has reduced</td>
<td>• LDMG 1 • LDMG 2 • DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with Dam—What is the event? (Dam Safety Risk—piping) What is the status? (Dam Hazard Stood Down) Advise risk assessment has determined that piping risk has reduced and EAP has been deactivated.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DiS Residents &amp; Treated Water Users</td>
<td>• SMS (Phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification DAM: Fairbairn EVENT: Dam safety risk—piping STATUS: Dam hazard stood down ACTION: None</td>
</tr>
</tbody>
</table>
## Table 21: Piping: embankment, foundation, abutments or gates—DSTDM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.
8. Dam hazard—earthquake

8.1 Overview

The emergency action described in this section relates to a potential dam hazard due to an earthquake causing damage to the dam embankment (Main Dam or Saddle Dams), foundations, or dam abutment. Damage could take the form of cracking or slumping of the embankment, deformation or land slip, or increased seepage.

If damage does occur then a dam failure may result. If damage is detected early, remedial repairs may be possible depending on the nature of the damage.

The flood outlines in Appendix B are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by earthquake damage. The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to earthquake damage and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to earthquake damage and concurrent flooding or downstream releases are occurring or expected to occur.

Notes: Definitions for Concurrent Flooding and Downstream Releases are provided in Section 1.3

8.2 Emergency action roles

Table 22 to Table 26 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
Figure 4: Earthquake flowchart

**ALERT**
Tremor felt or reported.

**DDO:**
Assess severity using Modified Mercalli (MM) scale.

- **MM ≥ 5**
  - **LEAN FORWARD**
  - **DDO:** Immediate surveillance inspection.

- **MM ≤ 5**
  - **DDO:** Undertake surveillance inspection during daylight hours.

  - **DDO:** Has any change been noted?
    - Yes
      - **DSTDM:** Has possible failure path been identified?
        - Yes
          - **DSTDM:** Is failure likely or in progress?
            - Yes
              - **DDO:** Determine if:
                - Remedial repairs are practical
                - Risk can be reduced by lowering storage.
              - Supervise remedial works.
            - No
              - **DSTDM:** Monitor and assess if risk has been reduced.
        - No
          - **LEON FORWARD**
          - **DSTDM:** Asess surveillance report.
    - No
      - **STAND DOWN**

**DSTDM:**
Has piping condition been established?

**LEAN FORWARD**
Assess surveillance report.

**DSTDM:**
Has possible failure path been identified?

**DDO:**
Assess severity using Modified Mercalli (MM) scale.

- **MM ≥ 5**
  - **LEON FORWARD**
  - **DDO:** Immediate surveillance inspection.

- **MM ≤ 5**
  - **DDO:** Undertake surveillance inspection during daylight hours.

  - **DDO:** Has any change been noted?
    - Yes
      - **DSTDM:** Has possible failure path been identified?
        - Yes
          - **DSTDM:** Is failure likely or in progress?
            - Yes
              - **DDO:** Determine if:
                - Remedial repairs are practical
                - Risk can be reduced by lowering storage.
              - Supervise remedial works.
            - No
              - **DSTDM:** Monitor and assess if risk has been reduced.
        - No
          - **LEON FORWARD**
          - **DSTDM:** Asess surveillance report.
    - No
      - **STAND DOWN**

**DSTDM:**
Is failure likely or in progress?

**DSTDM:**
Determine if:
- Remedial repairs are practical
- Risk can be reduced by lowering storage.
  Supervise remedial works.

**DDO:**
Undertake surveillance inspection during daylight hours.

**ALERT**
Tremor felt or reported.

**DDO:**
Assess severity using Modified Mercalli (MM) scale.

- **MM ≥ 5**
  - **LEAN FORWARD**
  - **DDO:** Immediate surveillance inspection.

- **MM ≤ 5**
  - **DDO:** Undertake surveillance inspection during daylight hours.

  - **DDO:** Has any change been noted?
    - Yes
      - **DSTDM:** Has possible failure path been identified?
        - Yes
          - **DSTDM:** Is failure likely or in progress?
            - Yes
              - **DDO:** Determine if:
                - Remedial repairs are practical
                - Risk can be reduced by lowering storage.
              - Supervise remedial works.
            - No
              - **DSTDM:** Monitor and assess if risk has been reduced.
        - No
          - **LEON FORWARD**
          - **DSTDM:** Asess surveillance report.
    - No
      - **STAND DOWN**

**DSTDM:**
Has piping condition been established?

**LEAN FORWARD**
Assess surveillance report.

**DSTDM:**
Has possible failure path been identified?

**DSTDM:**
Is failure likely or in progress?

**DDO:**
Undertake surveillance inspection during daylight hours.

**ALERT**
Tremor felt or reported.

**DDO:**
Assess severity using Modified Mercalli (MM) scale.

- **MM ≥ 5**
  - **LEAN FORWARD**
  - **DDO:** Immediate surveillance inspection.

- **MM ≤ 5**
  - **DDO:** Undertake surveillance inspection during daylight hours.

  - **DDO:** Has any change been noted?
    - Yes
      - **DSTDM:** Has possible failure path been identified?
        - Yes
          - **DSTDM:** Is failure likely or in progress?
            - Yes
              - **DDO:** Determine if:
                - Remedial repairs are practical
                - Risk can be reduced by lowering storage.
              - Supervise remedial works.
            - No
              - **DSTDM:** Monitor and assess if risk has been reduced.
        - No
          - **LEON FORWARD**
          - **DSTDM:** Asess surveillance report.
    - No
      - **STAND DOWN**

**DSTDM:**
Has piping condition been established?

**LEAN FORWARD**
Assess surveillance report.

**DSTDM:**
Has possible failure path been identified?

**DSTDM:**
Is failure likely or in progress?

**DDO:**
Undertake surveillance inspection during daylight hours.

**ALERT**
Tremor felt or reported.

**DDO:**
Assess severity using Modified Mercalli (MM) scale.

- **MM ≥ 5**
  - **LEAN FORWARD**
  - **DDO:** Immediate surveillance inspection.

- **MM ≤ 5**
  - **DDO:** Undertake surveillance inspection during daylight hours.

  - **DDO:** Has any change been noted?
    - Yes
      - **DSTDM:** Has possible failure path been identified?
        - Yes
          - **DSTDM:** Is failure likely or in progress?
            - Yes
              - **DDO:** Determine if:
                - Remedial repairs are practical
                - Risk can be reduced by lowering storage.
              - Supervise remedial works.
            - No
              - **DSTDM:** Monitor and assess if risk has been reduced.
        - No
          - **LEON FORWARD**
          - **DSTDM:** Asess surveillance report.
    - No
      - **STAND DOWN**

**DSTDM:**
Has piping condition been established?

**LEAN FORWARD**
Assess surveillance report.

**DSTDM:**
Has possible failure path been identified?

**DSTDM:**
Is failure likely or in progress?
Table 22: Earthquake—DDO emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* DDO to assess magnitude (MM scale) at dam location.
The Modified Mercalli (MM) Scale can be located in Appendix D.

**Table 23: Earthquake—LEC emergency action**

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Yellow</th>
<th>Orange</th>
<th>Red</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lean Forward</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand Up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand Down</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Activation trigger**

- Earthquake reported or felt in the area, AND
- Intensity less than 5 MM

**Actions**

- Internal notifications
- External notifications

**1.**

- Liaise with DDO & IC re: situation
- Record all communication

**2.**

- As per previous activation level
- Liaise with LDMG s re: situation

**1.**

- As per previous activation level

**2.**

- As per previous activation level
  - As per previous activation level
  - Liaise with DDO & relevant Council(s) regarding potential road/bridge closures

**1.**

- Failure in progress or likely due to earthquake, AND
- Sufficient water in storage to create a dam hazard

**Actions**

- As per previous activation level
- As per previous activation level
- As per previous activation level

**1.**

- Risk assessment has been determined that failure risk has reduced

**Actions**

- Forward information for EER to IC email
- Return to routine activities

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**

e.g., taking photographs/video, dam inspections, instrument readings

ALL PHOTOS MUST BE DATE STAMPED
Table 24: Earthquake—IC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** IC to carry out LEC actions unless LDMG1 is Stood Up.
### Table 25: Earthquake—LEC and IC communication plan

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alert</strong></td>
<td>• Earthquake reported or felt in the area, AND &lt;br&gt;• Intensity less than 5 MM</td>
<td></td>
<td></td>
<td>N/A—Internal communications only</td>
</tr>
<tr>
<td><strong>Lean Forward</strong></td>
<td>• Earthquake reported or felt in the area, &lt;br&gt;• Intensity greater than or equal to 5 MM, OR &lt;br&gt;• Intensity less than 5 MM and change detected during surveillance inspection</td>
<td>• LDMG 1 &lt;br&gt;• LDMG 2 &lt;br&gt;• DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with dam—What is the event? <em>(Dam Safety Risk—Earthquake damage)</em> &lt;br&gt;What is the status? <em>(Under investigation)</em> &lt;br&gt;Advise current storage level &lt;br&gt;Stand by for further information</td>
</tr>
<tr>
<td><strong>Stand Up 1</strong></td>
<td>• Earthquake reported or felt in the area, AND &lt;br&gt;• A possible failure path has been identified</td>
<td>• LDMG 1 &lt;br&gt;• LDMG 2 &lt;br&gt;• DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with dam—What is the event? <em>(Dam Safety Risk—Earthquake felt or reported in area)</em> &lt;br&gt;What is the status? <em>(Possible earthquake damage to dam)</em> &lt;br&gt;Advise current storage level. Discuss any potential road/bridge closures &lt;br&gt;Activate emergency response</td>
</tr>
<tr>
<td></td>
<td>• SDCC Watch Desk</td>
<td>• Phone &amp; Email</td>
<td></td>
<td>Complete Emergency Alert Request Form as per instructions <em>(blank copy in Appendix D)</em> and email to SDCC Watch Desk to send. &lt;br&gt;<em>Develop messages in consultation with DSTDIM</em></td>
</tr>
<tr>
<td></td>
<td>• D/S Residents &amp; Treated Water Users</td>
<td>• SMS (Phone for those without mobiles)</td>
<td></td>
<td>Liaise with Sunwater Customer Support to send SMS: &lt;br&gt;Communicate with Sunwater Emergency notification &lt;br&gt;DAM: Fairbairn &lt;br(EVENT: Dam safety risk—earthquake damage) &lt;br&gt;STATUS: Confirmed—earthquake damage &lt;br&gt;ACTION: Possible issue at dam listen for further advice</td>
</tr>
</tbody>
</table>

The Modified Mercalli (MM) Scale can be located in Appendix D.
The Modified Mercalli (MM) Scale can be located in Appendix D.

**Table 25 (Continued): Earthquake—LEC and IC communication plan**

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand Up 2</td>
<td>• Failure likely due to earthquake, AND • Sufficient water in storage to create a dam hazard</td>
<td>• LDMG 1 • LDMG 2 • DDMG s</td>
<td>• Phone</td>
<td>Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Dam Failure Likely) Advise current storage level. Discuss any potential road/bridge closures (if not discussed at Stand Up — 1) Prepare coordinated evacuation • SDCC Watch Desk • Phone &amp; Email Complete Emergency Alert Request Form as per instructions (blank copy in Appendix D) and email to SDCC Watch Desk to send. Develop messages in consultation with DSTDM • D/S Residents &amp; Treated Water Users • SMS (Phone for those without mobiles) Liaise with Sunwater Customer Support to send: Sunwater Emergency notification — urgent DAM: Fairbairn EVENT: Dam safety risk — earthquake damage STATUS: Dam failure likely ACTION: Possible evacuation follow instructions of emergency services</td>
</tr>
<tr>
<td>Stand Down</td>
<td>• Risk assessment has been determined that failure risk has reduced</td>
<td>• LDMG 1 • LDMG 2 • DDMG s</td>
<td>• Phone</td>
<td>Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Dam Hazard Stood Down) Advise risk assessment has been determined that failure risk has reduced and that EAP has been deactivated. • D/S Residents &amp; Treated Water Users • SMS (Phone for those without mobiles) Liaise with Sunwater Customer Support to send: Sunwater Emergency notification DAM: Fairbairn EVENT: Dam safety risk — earthquake damage STATUS: Dam hazard stood down ACTION: None</td>
</tr>
</tbody>
</table>
The Modified Mercalli (MM) Scale can be located in Appendix D.

The Modified Mercalli (MM) Scale can be located in Appendix D.

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.*
9. Dam hazard—terrorist threat/activity or high energy impact

9.1 Overview

The emergency action described in this section relates to a potential dam hazard due to a terrorist threat or activity or a high energy impact on the dam such as a plane crash or meteorite.

The vulnerability of Fairbairn Dam to a terrorist threat or activity or a high energy impact is low.

The flood outlines in Appendix B are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by a terrorist threat or activity or a high energy impact. The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to a terrorist threat or activity or a high energy impact and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to a terrorist threat or activity or a high energy impact and concurrent flooding or downstream releases are occurring or expected to occur.

Notes: Definitions for Concurrent Flooding and Downstream Releases are provided in Section 1.3

9.1.1 Assessment of circumstances that indicates an increase in the likelihood of terrorist activity or high energy impact

Advice from authorities of a specific risk to water infrastructure is a circumstance that could indicate increased likelihood of a terrorist threat. If this were specific enough to name a dam, this circumstance would trigger Stand Up—1 activation level.

9.2 Emergency action roles

Table 27 to Table 31 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
Figure 5: Terrorist threat/activity or high energy impact flowchart

**THREAT**
Threat received or suspicious activity observed.

**DDO:** Notify National Security or 000/112.

**DDO:** Inspect dam (if safe) and ensure all security measures are in place.

**IC:** Assess risks.

**IC:** Have risks been reduced?

**STAND DOWN**

**EVENT**
Large explosion or impact.

**DDO:** Notify National Security or 000/112.

**DDO:** Immediate surveillance inspection.

**DDO:** Inspect dam (if safe) and ensure all security measures are in place.

**IC:** Assess risks.

**DICM:** Assess surveillance report.

**DSTDM:** Has possible failure path been identified?

**DSTDM:** Is failure likely or in progress?

**DSTDM:** Determine if:
- Remedial repairs are practical
- Risk can be reduced by lowering storage

**Supervise remedial works.**

**DSTDM:** Monitor and assess if risk has been reduced.

**DDO:** Notify National Security or 000/112.

**IC & LEC:** Liaise with Police and LDWG.

**LEC:** Liaise with LDWG re: evacuations.

**Risk reduced: No**

**Risk reduced: Yes**
### Table 27: Terrorist threat/activity or high energy impact—DDO emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert/Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Up 2</th>
<th>Stand Up 3</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### THREAT
- Possible terrorist activity/suspicious behaviour noticed at the dam,
- Threat received

**NOTE:** If any suspicious behaviour noticed, contact DSTDM for advice.
If instructed by DSTDM, or if threat received, complete the following:
- Notify National Security or 000/112
- Inspect dam (if safe) and ensure all security measures in place (locked gates, etc.)
- Photograph/video the damage from a safe point and record using the approved forms in Appendix D and send to IC & DSTDM
- Close any affected roads, if not already closed by others
- Notify SO
- Update Dam Log Book as per SOP
- If Police appoint incident manager support and follow instructions
- Record all communication

#### EVENT
- Large Explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)

**RESPONSE**
- Failure in progress or likely due to impact or explosion, AND
- Sufficient water in storage to create a dam hazard

**NOTE:** As per previous activation level,
- Lower reservoir level if directed by DSTDM
- As per previous activation level

**Risk assessment has determined that failure risk has reduced**
- Forward information for EER to IC email
- Update Dam Log Book as per SOP
- Return to routine activities

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**
- e.g., taking photographs/video, dam inspections, instrument readings
- **ALL PHOTOS MUST BE DATE STAMPED**
**Table 28: Terrorist threat/activity or high energy impact—LEC emergency action**

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert/Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Up 2</th>
<th>Stand Up 3</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>• Not applicable</td>
<td>• Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received</td>
<td>• Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)</td>
<td>• Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard</td>
<td>• Risk assessment has determined that failure risk has reduced</td>
</tr>
<tr>
<td>Actions</td>
<td>• Not applicable</td>
<td>• Liaise with DDO, IC and LDMGs re: situation • If Police appoint incident manager support and follow instructions • Monitor situation and assess risks • Liaise with relevant Council(s) regarding possible road/bridge closures • Record all communication</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level, AND • Liaise with DDO and LDMG re: potential for evacuations</td>
<td>• Forward information for EER to IC email • Return to routine activities</td>
</tr>
<tr>
<td>Internal notifications</td>
<td>• Not applicable</td>
<td>1. DDO 2. IC</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As required</td>
</tr>
<tr>
<td>External notifications</td>
<td>• Not applicable</td>
<td>3. LDMG 1 4. LDMG 2</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As required</td>
</tr>
</tbody>
</table>

ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO e.g., taking photographs/video, dam inspections, instrument readings ALL PHOTOS MUST BE DATE STAMPED
<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert/Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Up 2</th>
<th>Stand Up 3</th>
<th>Stand Down</th>
</tr>
</thead>
</table>

**Table 29: Terrorist threat/activity or high energy impact—IC emergency action**

**Internal notifications**
- Not applicable

**External notifications**
- Not applicable

**THREAT**
- Possible terrorist activity/suspicious behaviour noticed at the dam, OR
- Threat received

**EVENT**
- Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)

**NOTE:** IC to carry out LEC actions unless LDMG1 is Stood Up.

**RESPONSE**
- Failure in progress or likely due to impact or explosion, AND
- Sufficient water in storage to create an emergency event

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO** e.g., taking photographs/video, dam inspections, instrument readings
**ALL PHOTOS MUST BE DATE STAMPED**

**NOTE:**
- National Security Hotline (if not completed by DDO)
- DDMG

**1. D/S Residents & Treated Water Users**

**2. SDCC Watch Desk**

**3. DDO**

**4. DSTDM**

**5. LEC/ORR**

**6. SMT**

**13 15 89 Sunwater Customer Support 24-hour contact line**
<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td></td>
<td></td>
<td></td>
<td>ALERT NOT APPLICABLE</td>
</tr>
<tr>
<td>Lean Forward</td>
<td></td>
<td></td>
<td></td>
<td>LEAN FORWARD NOT APPLICABLE</td>
</tr>
<tr>
<td>Stand Up 1</td>
<td>THREAT</td>
<td>LDMG 1</td>
<td>Phone</td>
<td>Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/impact/explosion, etc.)</td>
</tr>
<tr>
<td></td>
<td>• Possible terrorist activity/suspicious behaviour notice at the dam, OR</td>
<td>LDMG 2</td>
<td></td>
<td>What is the status? (Received/noted terrorist threat)</td>
</tr>
<tr>
<td></td>
<td>• Threat received</td>
<td>DDMGs</td>
<td></td>
<td>Activate emergency response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>National Security Hotline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand Up 2</td>
<td>EVENT</td>
<td>LDMG 1</td>
<td>Phone</td>
<td>Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/impact/explosion, etc.)</td>
</tr>
<tr>
<td></td>
<td>• Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)</td>
<td>LDMG 2</td>
<td></td>
<td>What is the status? (Under Investigation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DDMGs</td>
<td></td>
<td>Prepare coordinated evacuation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SDCC Watch Desk</td>
<td>Phone &amp; Email</td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A9 and Appendix D) and email to SDCC Watch Desk to send.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Develop messages in consultation with DSTDM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Liaise with Sunwater Customer Support to send SMS:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sunwater Emergency notification—urgent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DAM: Fairbairn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EVENT: Dam safety risk—security threat/impact/explosion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>STATUS: Under investigation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ACTION: Possible evacuation follow instructions of emergency services</td>
</tr>
</tbody>
</table>
## Table 30 (Continued): Terrorist threat/activity or high energy impact — LEC and IC communication plan

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
</table>
| Stand Up         | RESPONSE • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create an emergency event | • LDMG 1 • LDMG 2 • DDMGs                           | • Phone           | Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/impact/explosion, etc.)  
Initiate evacuations |
|                  |                                                                                              | • SDCC Watch Desk                                    | • Phone & Email   | Complete Emergency Alert Request Form as per instructions (copies in Appendix A9 and Appendix D) and email to SDCC Watch Desk to send.  
**SMS text as follows:**  
IMMINENT FAILURE OF FAIRBAIRN DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. EMERALD IS AT RISK. INFO ON ABC RADIO. CAPELLA AND SPRINGSURE ARE SAFE. |
|                  |                                                                                              | • D/S Residents & Treated Water Users                | • SMS (Phone for those without mobiles)               | Liaise with Sunwater Customer Support to send SMS:  
IMMINENT FAILURE OF FAIRBAIRN DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. EMERALD IS AT RISK. INFO ON ABC RADIO. CAPELLA & SPRINGSURE ARE SAFE. |
|                  |                                                                                              | • Emergency siren                                    | • Phone & Email   | Complete emergency siren instructions in Appendix A11 and notify SRT.      
Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out. |
| Stand Down       | • Risk assessment has determined that failure risk has reduced                               | • LDMG 1 • LDMG 2 • DDMGs                           | • Phone           | Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/impact/explosion, etc.)  
What is the status? (Dam Hazard Stood Down)  
Advise that failure risk has been reduced and EAP has been deactivated |
|                  |                                                                                              | • D/S Residents & Treated Water Users                | • SMS (Phone for those without mobiles)               | Liaise with Sunwater Customer Support to send SMS:  
Sunwater Emergency notification  
DAM: Fairbairn  
EVENT: Dam safety risk—security threat/impact/explosion  
STATUS: Dam hazard stood down  
ACTION: None |
## Table 31: Terrorist threat/activity or high energy impact—DSTDM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert/Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Up 2</th>
<th>Stand Up 3</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>• Not applicable</td>
<td>• Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received</td>
<td>• Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)</td>
<td>• Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard</td>
<td>• Risk assessment has determined that failure risk has reduced</td>
</tr>
</tbody>
</table>

| Action | • Not applicable | • Liaise with IC and DDO • Liaise with Sunwater Executive Leadership Team • Record all communication | • As per previous activation level, AND • Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so • Assess risk and determine if failure likely or in progress • Liaise with LEC • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) • Supervise* remedial repairs (if applicable) • Monitor situation and assess risks | • As per previous activation level, AND • Liaise with the IC and confirm need to sound emergency siren due to dam failure • Liaise with the IC and LEC and advise on need to recommend evacuations | • Forward information for EER to IC email • Return to routine activities |

| Internal notifications | • Not applicable | 1. IC 2. DDO | • As per previous activation level, AND 1. LEC/ORR | • As per previous activation level, AND • CEO—if time permits | • As required |

| External notifications | • Not applicable | • As required 2. DSR | • As per previous activation level | • As required | |

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.
10. Dam hazard—stability: main embankment

10.1 Overview

The emergency action described in this section relates to a potential dam hazard due to a slip circle failure of the main embankment.

If a slip circle failure initiates, a dam failure may result. If the early signs of slip circle failure are detected, remedial actions may be possible depending on the nature of the circumstances.

An investigation of the main dam’s embankment piezometer data identified a potential embankment stability dam safety issue, refer to HB #1967296. A slip circle failure may be possible as a result of high foundation pore pressures.

Piezometers 3, 7, 28 and 32 in the downstream alluvium, Piezometer 9 in the downstream side of the Zone 1 cut-off adjacent to the downstream alluvium, Piezometer 40 in the downstream Zone 1A and Piezometer 41 in the downstream Zone 5A above the Zone 2B filter drainage layer, are all recording increasing pressures over several years followed by rapid decrease in pressure over several months.

Piezometers 3, 7, 28 and 32 have recorded maximum pore pressures up to EL 190.0 and minimum pressures down to EL 180.0. The maximum pressures are up to 10 m above the level of the downstream horizontal Zone 2B filter. Therefore, it could be assumed that there is no seepage flow path between the alluvial zone and the Zone 2B filter or the Zone 2B filter is blocked. Hydraulic fracturing of the unstable or collapsing foundation soils may allow the slow build up in pore pressure to dissipate.

For the original stability analysis in the Design Report (QIWSC, 1974), the Steady State Seepage Analysis assumed there was zero pore pressure at the Zone 2B filter. Below the Zone 2B filter the pore pressure increases with the increasing depth of the pervious foundation material.

These high foundation pore pressure peaks may reduce the Factor of Safety against slip circle failure to an unacceptable level. Foundation piezometers downstream of the cut-off should be recording the maximum head of water below the Zone 2B filter relative to their location. Pore pressures readings higher than this maximum head should be a trigger alarm for the Operators.

The flood outlines in Appendix B are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by main dam embankment stability. The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to a slip circle failure and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to a slip circle failure and concurrent flooding or downstream releases are occurring or expected to occur.

Notes: Definitions for Concurrent Flooding and Downstream Releases are provided in Section 1.3

10.2 Emergency action roles

Table 32 to Table 36 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
Figure 6: Stability: main embankment flowchart

- ALERT (LEAN FORWARD IF FOUNDATION PORE PRESSURES >194.78m)
  i.e. Piezometers 3, 7, 28 & 32

- DSTDM:
  Arrange inspection ASAP.

- DSTDM:
  Has slip circle failure condition been established?

- DSTDM:
  Is failure likely or in progress?

- LEC:
  Liaise with LDMG re: evacuations.

- DSTDM:
  Determine if:
  • Remedial repairs are practical
  • Risk can be reduced by lowering storage.
  Supervise remedial works.

- DSTDM:
  Monitor and assess if risk has been reduced.

- Risk reduced: Yes
- Stand Up: Yes
- STAND DOWN

- Risk reduced: Yes
- Stand Up: No
- DSTDM:
  Monitor and assess if risk has been reduced.

- Risk reduced: No
- Stand Up: No
- DSTDM:
  Arrange inspection ASAP.

- Risk reduced: No
- Stand Up: No
- DSTDM:
  Monitor and assess if risk has been reduced.
Table 32: Stability: main embankment—DDO emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Up 2</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>● Foundation pore pressures readings higher than 177.10 m</td>
<td>● Foundation pore pressures readings higher than 194.78 m</td>
<td>● Slip circle failure condition has been established</td>
<td>● Failure in progress or likely due to Slip circle failure, AND Sufficient water in storage to create a dam hazard</td>
<td>● Risk assessment has determined that Slip circle failure risk has reduced</td>
</tr>
<tr>
<td>Actions</td>
<td>● The whole area of the Upstream/Downstream embankment areas, Crest, Weighted berm and Toe for the main embankment are visually inspected daily for any signs of a potential slide, i.e. Scarps, Cracks, Wet and Soft areas, Toe bulge etc. (refer to HB #1606070), II. Inspecting for Deficiencies: Instability) (or as otherwise instructed by the DSTDM) until foundation pore pressures fall below 177.10 m, or as directed by the IC</td>
<td>● As per previous activation level, AND Maintain photographic record</td>
<td>● As per previous activation level, AND Support/supervise remedial works as required Close any affected roads, if not already closed by others Maintain surveillance of Upstream/Downstream embankment areas, Crest, Weighted berm and Toe (if safe to do so) and move on any members of the public or other parties</td>
<td>● As per previous activation level, AND Vacate the immediate vicinity of the slip circle failure condition Ensure remedial works cease and plant and personnel have been moved to a safe location Record/photograph the slip circle failure from a safe point</td>
<td>● Forward information for EER to IC email Update Dam Log Book as per SOP 12 Return to routine activities</td>
</tr>
<tr>
<td>Internal notifications</td>
<td>1. DSTDM</td>
<td>● As per previous activation level</td>
<td>● As per previous activation level</td>
<td>● As per previous activation level</td>
<td>● As required</td>
</tr>
<tr>
<td></td>
<td>2. IC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. SO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External notifications</td>
<td>● As required</td>
<td>● As required</td>
<td>● As required</td>
<td>● As required</td>
<td>● As required</td>
</tr>
</tbody>
</table>

ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO e.g., taking photographs/video, dam inspections, instrument readings ALL PHOTOS MUST BE DATE STAMPED
### Table 33: Stability: main embankment—LEC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Up 2</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activation trigger</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundation pore pressures readings higher than 177.10 m</td>
<td>Foundation pore pressures readings higher than 194.78 m</td>
<td>Slip circle failure condition has been established</td>
<td>Failure in progress or likely due to Slip circle failure, AND Sufficient water in storage to create a dam hazard</td>
<td>Risk assessment has determined that Slip circle failure risk has reduced</td>
<td></td>
</tr>
</tbody>
</table>

| **Actions** | | | | | |
| Liaise with DDO and IC re: situation | As per previous activation level | As per previous activation level, AND Liaise with relevant Council(s) regarding potential road/bridge closures | As per previous activation level | Forward information for EER to IC email |
| Record all communication | | | As per previous activation level | Return to routine activities |

<table>
<thead>
<tr>
<th><strong>Internal notifications</strong></th>
<th>1. IC</th>
<th>2. DDO</th>
<th>1. LDMG 1</th>
<th>2. LDMG 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>External notifications</strong></th>
<th>1. As required</th>
<th>1. LDMG 1</th>
<th>2. LDMG 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As required</td>
</tr>
</tbody>
</table>

---

**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO**

*e.g., taking photographs/video, dam inspections, instrument readings*

**ALL PHOTOS MUST BE DATE STAMPED**

---

**Support 24-hour contact line**

13 15 89 Sunwater Customer Support
Table 34: Stability: main embankment—IC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Up 2</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>Foundation pore pressures readings higher than 177.10 m</td>
<td>Foundation pore pressures readings higher than 194.78 m</td>
<td>Slip circle failure condition has been established</td>
<td>Failure in progress or likely due to slip circle failure, AND</td>
<td>Risk assessment has determined that slip circle failure risk has reduced</td>
</tr>
<tr>
<td>Actions</td>
<td>Liaise with DDO, LEC and DSTDM re: situation</td>
<td>Complete Situation Report, unless otherwise directed</td>
<td>Investigate availability of machinery and materials (if insufficient stockpiles available)</td>
<td>Place machinery operators on standby if directed by DSTDM</td>
<td>Deactivate EAP</td>
</tr>
<tr>
<td></td>
<td>As per previous activation level, AND</td>
<td>As per previous activation level, AND</td>
<td>Mobilise resources to undertake remedial works if directed by DSTDM</td>
<td>Direct remedial works to cease if directed by the DSTDM and plant and personnel to be moved to a safe location</td>
<td>Compile EER and organise delivery to the DSR if required</td>
</tr>
<tr>
<td></td>
<td>SW Incident and Near Miss Alert</td>
<td>Record all communication</td>
<td>As per previous activation level</td>
<td>Liaise with the DSTDM to confirm that dam failure is in progress</td>
<td>Return to routine activities</td>
</tr>
<tr>
<td>Internal notifications</td>
<td>1. DDO</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>Inform previous notifications of deactivation as required</td>
</tr>
<tr>
<td></td>
<td>2. DSTDM</td>
<td>3. LEC/ORR</td>
<td>4. SMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External notifications</td>
<td>As required</td>
<td>As per previous activation level, AND</td>
<td>As per previous activation level, AND</td>
<td>As per previous activation level, AND</td>
<td>As required</td>
</tr>
<tr>
<td></td>
<td>DDMGs</td>
<td>D/S Residents &amp; Treated Water Users</td>
<td>Emergency siren</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. SDCC Watch Desk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: IC to carry out LEC actions unless LDMG1 is Stood Up

ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO e.g., taking photographs/video, dam inspections, instrument readings

ALL PHOTOS MUST BE DATE STAMPED
## Table 35: Stability: main embankment—LEC and IC communication plan

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alert</strong></td>
<td>• Foundation pore pressures readings higher than 177.10 m</td>
<td></td>
<td></td>
<td>N/A—Internal communications only</td>
</tr>
<tr>
<td><strong>Lean Forward</strong></td>
<td>• Foundation pore pressures readings higher than 194.78 m • Scars, cracks, wet and soft areas, toe bulge have been identified</td>
<td>• LDMG 1 • LDMG 2 • DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with dam—What is the event? (Unconfirmed main dam embankment stability risk) What is the status? (Unconfirmed main dam embankment stability risk—Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice</td>
</tr>
<tr>
<td><strong>Stand Up 1</strong></td>
<td>• Slip circle failure condition has been established</td>
<td>• LDMG 1 • LDMG 2 • DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with dam—What is the event? (Confirmed main dam embankment stability risk) What is the status? (Confirmed main dam embankment stability risk) Advise of current storage level Advise any issues you are aware of Discuss any potential road/bridge closures Prepare for possible evacuations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SDCC Watch Desk</td>
<td>• Phone &amp; Email</td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A9 and Appendix D) and email to SDCC Watch Desk to send. Develop messages in consultation with DSTDM</td>
</tr>
<tr>
<td></td>
<td>• D/S Residents &amp; Treated Water Users</td>
<td>• SMS (Phone for those without mobiles)</td>
<td></td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification DAM: Fairbairn EVENT: Dam safety risk—main dam embankment stability STATUS: Confirmed—main dam embankment stability ACTION: Possible issue at dam listen for further advice</td>
</tr>
</tbody>
</table>
### Table 35 (Continued): Stability: main embankment—LEC and IC communication plan

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand Up 2</td>
<td>• Failure in progress or likely due to Slip circle failure, AND Sufficient water in storage to create a dam hazard</td>
<td>• LDMG 1, LDMG 2, DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with dam—What is the event? (Confirmed main dam embankment stability risk) What is the status? (Possible Dam Failure) Advise of current storage level Prepare coordinated evacuations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SDCC Watch Desk</td>
<td>• Phone &amp; Email</td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A9 and Appendix D) and email to SDCC Watch Desk to send. Develop messages in consultation with DSTDM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• D/S Residents &amp; Treated Water Users</td>
<td>• SMS (Phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification—urgent DAM: Fairbairn EVENT: Dam safety risk—main dam embankment stability STATUS: Dam failure likely ACTION: Possible evacuation follow instructions of emergency services</td>
</tr>
<tr>
<td>Stand Down 2</td>
<td>• Dam failure in progress</td>
<td>• LDMG 1, LDMG 2, DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with dam—What is the event? (Confirmed main dam embankment stability risk) What is the status? (Dam Failure in Progress) Advise of current storage level Coordinate evacuations of affected Downstream Residents and move people to higher ground</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SDCC Watch Desk</td>
<td>• Phone &amp; Email</td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A9 and Appendix D) and email to SDCC Watch Desk to send. SMS text as follows: IMMINENT FAILURE OF FAIRBAIRN DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. EMERALD IS AT RISK. INFO ON ABC RADIO. CAPELLA AND SPRINGSURE ARE SAFE.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• D/S Residents &amp; Treated Water Users</td>
<td>• SMS (Phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send SMS: IMMINENT FAILURE OF FAIRBAIRN DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. EMERALD IS AT RISK. INFO ON ABC RADIO. CAPELLA &amp; SPRINGSURE ARE SAFE.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Emergency siren</td>
<td>• Phone &amp; Email</td>
<td>Complete emergency siren instructions in Appendix A11 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.</td>
</tr>
<tr>
<td>Stand Down 2</td>
<td>• Risk assessment has determined that slip circle failure risk has reduced</td>
<td>• LDMG 1, LDMG 2, DDMGs</td>
<td>• Phone</td>
<td>Describe current situation with Dam—What is the event? (Dam Safety Risk—main dam embankment stability) What is the status? (Dam Hazard Stood Down) Advise risk assessment has determined that main dam embankment stability risk has reduced and EAP has been</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• D/S Residents &amp; Treated Water Users</td>
<td>• SMS (Phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification DAM: Fairbairn EVENT: Dam safety risk—main dam embankment stability STATUS: Dam hazard stood down ACTION: None</td>
</tr>
</tbody>
</table>
### Table 36: Stability: main embankment—DSTDM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.
11. Other emergency situation—communications failure

11.1 Overview
The emergency action described in this section (other emergency situation—communications failure) relates to either:
- An emergency situation where all means of communication at the Dam site have been lost.
- An emergency situation where all means of communication with the Local area have been lost.
- An emergency situation where all means of communication with Brisbane site have been lost.
This section specifies actions and provides guidance for the three situations.

11.2 Emergency actions
Due to the large number of different possible scenarios, the table below only covers the most common or likely conditions.

11.2.1 Activation triggers

<table>
<thead>
<tr>
<th>Comms Failure</th>
<th>Site</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Comms Failure</td>
<td>Unable to communicate to or from Dam site (usually affects DDO)</td>
</tr>
<tr>
<td>Local area</td>
<td>Comms Failure</td>
<td>Unable to communicate to or from Local Area (likely to affect LEC or ORR)</td>
</tr>
<tr>
<td>Brisbane</td>
<td>Comms Failure</td>
<td>Unable to communicate to or from Sunwater Brisbane (could affect DSTDM or FODM &amp; will affect IC)</td>
</tr>
</tbody>
</table>

11.2.2 Assessment of circumstances that indicates the likelihood of communications failure escalating the activation level of a current Dam Hazard
The Operations Centre Duty Officer (OCDO) will assess the weather and flood warnings daily in accordance with the Operations Centre (OC) SOP. The OCDO will escalate to the Flood Operations Decision Maker (FODM) any warnings that have the potential to cause a significant communications failure.
The on-call IC will escalate to the FODM any local intelligence on conditions that could increase the probability of a significant communications failure.
The FODM will determine whether it is reasonably likely that there will be a significant communications failure within the subsequent 24 hours and assess the likely effect on current Dam Hazards. If required, the FODM will instruct the IC to escalate the activation level of any current Dam Hazards.

11.2.3 Emergency action roles
Table 38 to Table 43 specify emergency actions for the following roles:
- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
- Flood Operations Decision Maker (FODM)
Table 38: Communications failure—DDO emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Comms Failure Local Area</th>
<th>Comms Failure Brisbane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal notifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External notifications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Actions**

- Unable to communicate to Local Area including LEC or ORR
- Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
- As much as practicable assume the role of LEC
- Continue tasks in accordance with any other current Emergency Action
- Every hour attempt communications by all means noting the following:
  - Mobile phone - try texting instead of voice, much higher probability of success
  - Satellite Phone - needs to access open sky unless external antenna fitted
  - Fax - generally uses fixed landline and is therefore less likely to have failed
  - Social Media - e.g. Facebook (Internet may be available via landline)

**Internal notifications**

- As required

**External notifications**

- As required

- Record all communication and attempts via Dam Log Book entries as per SOP 12 and communications log if EAP event is current
## Table 39: Communications failure—LEC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Comms Failure Dam Site</th>
<th>Comms Failure Brisbane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### External Notifications

- **IC**
- **DDO**
- **DSTDM** (if available)
- **SO** (if available)
- **LDMG**
- **DDMG**

**PRODUCTION-#2455713-v1-Fairbairn_Dam_EAP_I9_1.docx**
### Table 40: Communications failure—IC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Comms Failure</th>
<th>Dam Site</th>
<th>Comms Failure</th>
<th>Local Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal notifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External notifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 41: Communications failure—LEC and IC communication plan

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Trigger for communications</th>
<th>Group to contact</th>
<th>Method</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comms Failure Site</td>
<td>• Unable to communicate to or from Dam site, AND • DDO is at Dam site</td>
<td>IC/LEC, DSTDM, SO (if available), LDMGs, DDMG</td>
<td>Phone</td>
<td>Describe current situation with dam communications. What is the status – estimated time to restore communications?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IC to send Sunwater Incident and Near Miss Alert</td>
<td>EAP Alert Notification—Fairbairn Dam—Site Communications Failure</td>
<td></td>
</tr>
<tr>
<td>Comms Failure Local Area</td>
<td>• Unable to communicate to or from Local Area including LEC and ORR</td>
<td>DDO (if available), DSTDM, SO (if available), LDMGs (if available), DDMG (if available)</td>
<td>Phone</td>
<td>Describe current situation with dam communications. What is the status – estimated time to restore communications?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IC to send Sunwater Incident and Near Miss alert</td>
<td>EAP Alert Notification—Fairbairn Dam—Local Area Communications Failure</td>
<td></td>
</tr>
<tr>
<td>Comms Failure Brisbane</td>
<td>• Unable to communicate to or from Sunwater Brisbane</td>
<td>DSTDM (if available), LDMGs, DDMG</td>
<td>Phone</td>
<td>Describe current situation with dam communications. What is the status – estimated time to restore communications?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LEC to send Sunwater Incident and Near Miss Alert</td>
<td>EAP Alert Notification—Sunwater Brisbane Communications Failure</td>
<td></td>
</tr>
<tr>
<td>Activation level</td>
<td>Comms Failure Site</td>
<td>Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal</td>
<td>Unable to communicate to Dam site</td>
<td>• Provide technical advice to IC/LEC on a needs basis • Record all communication • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External</td>
<td></td>
<td>1. IC 2. LEC 3. CEO (if time permits) 4. Dam Safety Regulator (if applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal</td>
<td>Unable to communicate to Local Area including LEC and ORR</td>
<td>• Provide technical advice to IC on a needs basis • Record all communication • Assume that the DDO is assisting IC with LEC role • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External</td>
<td></td>
<td>1. IC 2. DDO (if available) 3. CEO (if time permits) 4. Dam Safety Regulator (if applicable)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 43: Communications failure—FODM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Comms Failure Site</th>
<th>Comms Failure Local Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Activation trigger**

- Unable to communicate to Dam site
- Liaise with IC
- Record all communication
- As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action

**1. IC**

**2. LEC**

**3. DSTDM**

- Not applicable

**Activation trigger**

- Unable to communicate to Local Area including LEC and ORR
- Liaise with IC
- Record all communication
- Assume that the DDO is assisting IC with LEC role
- As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action

**1. IC**

**2. DDO (if available)**

**3. DSTDM**

- Not applicable
APPENDIX A NOTIFICATION AND COMMUNICATION LISTS

A1  Sunwater regional notification list
A2  Sunwater Brisbane notification list
A3  External notification list
A4  D/S residents notification list
A5  Other D/S residents notification list (outside area—requested messaging)
A6  Fairbairn treated water customers
A7  Other reference contacts
A8  Emergency alert polygon
A9  Dam failure emergency alert request
A10 Dam failure emergency siren activation

Appendix A1 to A7 have been redacted
While every care is taken to ensure the accuracy of this product, SunWater makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.

MAP INFORMATION
Coordinate System: Geocentric Datum of Australia (GDA94).
Scale 1:500,000

EMERGENCY ALERT AREA
FAIRBAIRN DAM
EMERGENCY ACTION PLAN

SunWater Limited
ACN 131 034 985

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Document: S:BW Asset Delivery\SW-BW Service Delivery\R-WSRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\249575-A.mxd
Printed: Tuesday, 23/01/2018 11:03:21 AM
Appendix A10: Dam failure emergency alert request

Queensland emergency alert request guidelines

An Emergency Alert Request form should be completed, if required (see Sections 5 to 10 for actions), and sent to the SDCC Watch Desk to activate the Fairbairn Dam Emergency Polygon.

Instructions

- This form is not to be used for Flood UNLESS a flood has triggered an emergency event.
- Print off the following Queensland Emergency Alert Request form.
- Telephone the SDCC Watch Desk on 07 3635 2387 or 0408 190 872 and tell them your intention to use the Emergency Alert for an emergency event for Fairbairn Dam.
- A KML Polygon for this dam is stored in the Sunwater area of the Disaster Management Portal in the Emergency Alert area. Ask the SDCC operative to locate the polygon. It will be a KML file called Fairbairn_Dam_Emergency_Polygon.
- Give them your phone number, confirm their name, and end the call after advising the form will be sent shortly.
- IC and DSTDM will work together to craft a message relevant to the hazard and discuss with the LDMGs, if there is time.
- Fill in the form and send to SDCC watch desk email: sdcc@qfes.qld.gov.au. This form must come from the IC, DSTDM, or member of the Executive.
- Phone back to check the message has been sent and ask for an email to confirm.
- Send an internal Incident Alert to advise of completion.
- This form MUST be sent from a Sunwater email address. If Sunwater email is not functional, they can confirm identification through the DNRME (Regulator), if required.
- Use the following text to complete the emergency alert request:

<table>
<thead>
<tr>
<th>Filename:</th>
<th>Message:</th>
<th>SMS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairbairn_Dam_Emergency_Polygon</td>
<td>EMERGENCY EMERGENCY. FAIRBAIRN DAM IS FAILING/EXPECTED TO FAIL. RESIDENTS DOWNSTREAM OF THE DAM NEED TO act TO PROTECT LIFE AND LEAVE IMMEDIATELY. FAILURE OF THE DAM WILL RESULT IN EXTREMELY DANGEROUS FLOODING DOWNSTREAM INCLUDING: EMERALD. DO NOT DELAY. LEAVE NOW. CAPELLA AND SPRINGSURE ARE SAFE LOCATIONS.</td>
<td>IMMINENT FAILURE OF FAIRBAIRN DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. EMERALD IS AT RISK. INFO ON ABC RADIO. CAPELLA &amp; SPRINGSURE ARE SAFE.</td>
</tr>
</tbody>
</table>

The next two pages contain a pre-filled copy of the Fairbairn Dam Emergency Alert Request form.
**Emergency Alert Request**

**Location:** Fairbairn Dam  
**Date:** / /  
**Time:** : hrs

**Requesting Officer:**  
**Telephone:**  
**Agency/Position:**  
**Email:**

**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): Catastrophic Dam Failure

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

**Campaign Mode**  
- [X] 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:**  
- [X] Map attached

**STEP 3. Spatial format:** (Indicate the format used)  
- [X] 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 *. MIDI Sequence, *.mif  
- [ ] OTHER (please specify)

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

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

**Emergency. Emergency. Sunwater Advise Fairbairn Dam is failing or expected to fail. Residents downstream of the dam need to act to protect life and leave immediately. Failure of the dam will result in extremely dangerous flooding downstream including: Emerald. Do not delay. Leave now. Capella and Springsure are safe locations.**

**Type or handwrite SMS below** (maximum of 160 characters including spaces)

**Imminent failure of Fairbairn Dam take action to protect life and leave now. Emerald is at risk. Info on ABC radio. Capella & Springsure are safe.**

SEND TO sdcc@qfes.qld.gov.au and call 07 36352387 TO CONFIRM

---

**FOR USE BY SDCC**

<table>
<thead>
<tr>
<th>Requesting Officer:</th>
<th>Signature</th>
<th>/ /20</th>
<th>[ ] Manual Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA User Name:</td>
<td>Signature</td>
<td>/ /20</td>
<td>[ ] EMS Transmission</td>
</tr>
<tr>
<td>Authorising Officer Name:</td>
<td>Signature</td>
<td>/ /20</td>
<td>EA Campaign No. _________</td>
</tr>
</tbody>
</table>

EMS Report ID: _________

---

*EA Manual and the Emergency Alert Request Form Template are available at: www.disaster.qld.gov.au*
### 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 handwritten 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.

```
//RELEVANTAUTHORITY//
//DIRECTIONANDAREA//
//NAME//
//NUMBER//
//TIME//
//TIMEandDAY//
//DIRECTIONandPLACE//
//HOURSMINUTES//
//PLACE//
//PLACEPLACE//
//EXTERNAL/INTERNAL//
//SUBURBS//
//FireIncident//
```
Emergency siren activation

Notes: The emergency siren is not to be activated UNLESS; a confirmed dam failure is in progress, the appropriate EAP trigger has been exceeded and the Emergency Alert is being sent out via SDCC and/or an Emergency broadcast by ABC radio.

IC will take the lead to initiate the activation of the emergency siren but may delegate to on-call DSTDM or FODM depending on the situation; noting that EA and Emergency broadcast are priority. The CEO or Executive Leadership Team member should be made aware if time permits.

Instructions
1. Telephone the SRT on 0418 102 328 and tell them your intention to use the dam failure emergency siren for an emergency event for Callide Dam.
2. Email previously sent Emergency Alert Request form to: SRT@sunwater.com.au.
3. Advise the LDMGs, Media and CEO if time permits.
4. Sound emergency siren following Technical Instructions below.
5. Create Sunwater Incident report to advise of the completion of the sounding of the siren.

Technical Instructions

The emergency siren alarm sequence is activated remotely via the SiRcom SMART Alert (SiSA) software. The SiSA software is accessed either via the client software installed on the local PC located in the Sunwater Operations Centre or via the SiSA web portal which can be accessed via the Sunwater ‘Jump Box’ infrastructure. Jump Box can be accessed by following this procedure:

1) navigate to the Citrix Remote Access https://gateway.sunwater.com.au
2) log in using your Sunwater user credentials (you will also be prompted for a security code via Office 365)
3) go to the APPS section
4) select the Remote Desktop Connection application and Open
5) type the IP address 10.240.90.6 into the ‘Computer’ field and click Connect
6) once prompted, enter your Sunwater user credentials into the fields in the dialogue box (if you are prompted with a security prompt, click the ‘Yes’ button)
7) once you are logged into the Jump-Box click the Start Menu button and type ‘RDP’ again to open a new Remote Desktop Connection session
8) type the address SCASIR01 into the ‘Computer’ field and click Connect (you may be prompted, enter your Sunwater user credentials into the fields in the dialogue box again).

Once the User has access to the SiSA software, the alarm is activated by following this procedure:

1) Log on to (SiSA) software.
2) Select the Siren/s that require activation using the SELECT UNITS button.
3) Once the Siren/s are selected press the EVACUATE button.
4) Confirm activation request by selecting the ACTIVATE button. Once the alarm is activated the SiRcom icon will flash red.

Allow the Alarm sequence to run to end. If the Alarm needs to be cancelled before the sequence is completed press the STOP ACTIVE SCRIPT button.
APPENDIX B DRAWINGS, PLANS, MAPS AND EMERGENCY CONTROL MEASURES

B1 Drawings
B2 Inundation plans & maps
B3 Emergency access routes
B4 Catchment area

NOTE: Actual levels may differ from those shown in flood inundation plans due to variations in assumptions made in the models to actual flood events.
Figure B5: Fairbairn Dam slab plan excerpt
Appendix B2: Inundation plans & maps

Drawings:
- 249250 – Keymap
- 249251 – Sunny Day Failure (15 sheets)
- 249252 – Probable Maximum Flood (15 sheets)
- Inundation maps from 2010 flood of record event

Disclaimer: Every effort has been made to ensure the currency of the flood inundation maps reproduced in this EAP. However, as the maps have been extracted from external sources, their accuracy cannot be guaranteed. Please refer to the Local Disaster Management Plan for the most current information.
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: Geocentric Datum of Australia (GDA94).

FAIRBAIRN DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2006
SUNNY DAY FAILURE
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Coordinate System: Geocentric Datum of Australia (GDA94).

MAP INFORMATION
Coordinate System: Geocentric Datum of Australia (GDA94).

REFERENCE DRAWINGS
249250 - Keymap
249251 - A

MAP INFORMATION
Scales (A3 Size)
0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000 5,500 6,000

FAIRBAIRN DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2006
SUNNY DAY FAILURE

CONTRACT NUMBER
249251 A

DATE: SEPTEMBER 2017

REMARKS

DATE: 12/10/2017

APPROVED

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DRAWN

ISSUED FOR USE

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J. STUART
11/10/2017

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FAIRBAIRN DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2006
SUNNY DAY FAILURE

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-- SunWater Limited

FAIRBAIRN DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2006
PROBABLE MAXIMUM FLOOD

M O D E L I N G  L I M I T
SunWater Storages

P M F - N o  D a m  F a i l u r e
P M F - D a m  F a i l u r e

A H T D ( M a r k e r s )
W a v e
A r a b r a n c h  W a v e
D a m  F u l l  S u p p l y  L e v e l

L o c a l  R o a d s
M a j o r  R o a d s
Q l d  R a i l  N e t w o r k

1 4 8 ° 0 ' 0 "  E
1 4 8 ° 2 ' 0 "  E
1 4 8 ° 4 ' 0 "  E
1 4 8 ° 6 ' 0 "  E
1 4 8 ° 8 ' 0 "  E

2 3 ° 3 6 ' 0 "  S
2 3 ° 3 8 ' 0 "  S
2 3 ° 4 0 ' 0 "  S
2 3 ° 4 2 ' 0 "  S

Lake Maraboon


IDH: 059250 - Keymap

Contract Number: 249252

Date: 12/10/2017

Dimensions: 1190.2x842.3

Legend:
- Modelling Limits
- SunWater Storages
  - Dam
  - Offstream Storage
  - Wave
  - Ararabunch Water
  - Dam Full Supply Level

MAP INFORMATION
- Coordinate System: Geocentric Datum of Australia (GDA94)
- The Dam Failure flood extent also includes the 'No Dam Failure' flood extent.

REFERENCE DRAWINGS
- 249250 - Keymap

SENCES (A3 Size):
- 0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000

Contact:
J. STUART
SunWater Limited
ACN 151 034 985
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Printed: Thursday, 12/10/2017 07:51:26 AM

Fairbairn Dam

**Legend**
- **SunWater Storages**
- **PMF - No Dam Failure**
- **PMF - Dam Failure**
- **AFRD (Markers)**
- **Major Roads**
- **Old Rail Network**
- **Headworks**
- **Avalanche Wax**
- **Dam Full Supply Level**
- **Local Roads**
- **Modeling Limits**

**Reference Drawings**
- 2D250 - Keymap

**Scale**
- (A3 Size)
- 0 500 1,000 1,500 2,000 2,500 1:50,000

**Source:** Esri, Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AERGRID, IGN, and the GIS User Community
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Coordinate System: Geocentric Datum of Australia (GDA94)
The Dam Failure flood extent also includes the 'No Dam Failure' flood extent.

Reference Drawings: 249250 - Keymap

Legend:
- Modeling Limits
- PMF - No Dam Failure
- PMF - Dam Failure
- AMTD (Markers)
- Local Roads
- Major Roads
- Old Rail Network
- SunWater Storage
- Dam
- Offstream Storage
- Weir
- Anabranch Weir
- Dam Full Supply Level
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Coordinate System: Geocentric Datum of Australia (GDA94). The 'Dam Failure' flood extent also includes the 'No Dam Failure' flood extent.

FAIRBAIRN DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2006
PROBABLE MAXIMUM FLOOD

SUNWATER LIMITED
ACN 151 034 985

J. STUART
21/03/17
EPSG: 9403

Map Information

Legend

Modeling Limits

SunWater Storages

- Dam

Offstream Storage

- Well

Anabranch Well

- Dam Full Supply Level

SunWater Storages

- Dam

Offstream Storage

- Well

Anabranch Well

- Dam Full Supply Level

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Offstream Storage

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Anabranch Well

- Dam Full Supply Level

- Dam
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INUNDATION PLAN - 2006
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The 'Dam Failure' flood extent also includes the 'No Dam Failure' flood extent.
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Source: ESRI, Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, the GIS User Community

Coordinate System: Geocentric Datum of Australia (GDA94).

The Dam Failure flood extent also includes the 'No Dam Failure' flood extent.
Figure B8: Inundation map (1 of 2) from 2010 flood of record event
Figure B9: Inundation map (2 of 2) from 2010 flood of record event
Appendix B3: Emergency access routes

Figure B10: Access route and locality plan

[Map showing Fairbairn Dam]
Figure B11: Alternative access routes (roads)
Figure B12: Access routes during fair and adverse weather conditions

Fairbairn Dam
Selma/Fairbairn Dam Rd

Fairbairn Dam
Emergency access route information

Access to Fairbairn Dam from Emerald is via Selma Rd and Springsure Rd. Selma Rd is paved and open to all traffic except road trains. During flood events, Selma Rd is cut when flow reaches 1.27 m above spillway.

Access to Fairbairn Dam via Springsure Rd is a sealed road and is open always. When flow reaches 3.5 m above spillway, the Vince Lester Bridge is closed and there is no access out of Emerald. During flood events Department of Main Roads place load restrictions on all roads (permits required).

- **Distance**: Approx. 20 km south of Emerald.
- **Travel Time**: Approx. 20 minutes via Selma Rd/Approx. 30 minutes via Springsure Rd.
- **Road Type**: Bitumen.

**Note:** When the downstream flood waters have inundated access route(s), then access to the dam will be by helicopter.
Appendix B4: Catchment area

Figure B13: Fairbairn Dam declared catchment boundary plan
APPENDIX C  Equipment and technical information

C1 List of equipment available during an emergency
C2 Right bank outlet works—curves for rapid drawdown
C3 Left bank outlet works—curves for rapid drawdown
C4 Spillway discharge rating curves at various heights
C5 Storage curve
C6 Fairbairn Dam storage capacity and submerged area curve
C7 Fairbairn Dam storage data
## Appendix C1: List of equipment available during an emergency

<table>
<thead>
<tr>
<th>Name of equipment</th>
<th>No.</th>
<th>Owner</th>
<th>Contact name</th>
<th>Contact number</th>
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<tr>
<td>Boat—Stacer 474 with 60 hp Outboard</td>
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<td>Generators, pumps, firefighting, and other ancillary equipment</td>
<td>Varies</td>
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<td>Service Manager</td>
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<td>Tip truck with HIAB</td>
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**Note:** In addition to the above list, further resources can be accessed through Local, District, and State Disaster Management framework, when each Local Disaster Management Group is activated. See relevant pages in communication lists for contact details.
Appendix C2: Right bank outlet works—curves for rapid drawdown

Figure C1: Fairbairn Dam right bank outlet works—curves for rapid drawdown
Appendix C3: Left bank outlet works—curves for rapid drawdown

Figure C2: Fairbairn Dam left bank outlet works—curves for rapid drawdown

NOTE: The discharges plotted are those obtained with gate actions shown. Full open/filled gates (reduced efficiency) can be obtained by reducing the pre-valves' setting for working position.
Figure C3: Fairbairn Dam spillway discharge rating curves at various height ranges

Fairbairn Dam Rating - 0m to 7m (Bureau of Meteorology, 2010)

Discharge (ML/Day)

Depth (m)

Height (AHDm)

Discharge (m³/sec)

2010 Flood 5.57m
2008 Flood 4.44m

Major - 4.0m
Moderate - 3.5m
Minor - 2.8m

2010/20 – i9.1

Appendix C4: Spillway discharge rating curves at various height ranges
Appendix C5: Storage curve

Figure C4: Fairbairn Dam storage curve
Appendix C6: Fairbairn Dam storage capacity and submerged area curve

Figure C5: Fairbairn Dam storage capacity and submerged area curve
Appendix C7: Fairbairn Dam storage data

Figure C6: Fairbairn Dam storage data

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CRST ELEVATIONS

Spillway
Saddle Dam Envelopes
Saddle Dam No 1
Saddle Dam No 2
Saddle Dam No 3
Saddle Dam No 4
Saddle Dam No 5
Saddle Dam No 6

NOTE: The storage information in the present table emerages from storage AS-2086.2
* This data was determined by extrapolation from available storage information.
APPENDIX D  Fairbairn Dam Emergency Action Plan toolkit
APPENDIX E  Interaction with local government and district groups