Emergency activation quick reference – Dam Hazards

The Emergency Action Plan (EAP) for Tinaroo Falls Dam covers five 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>Stand Up</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activation levels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locally managed (DDO)</td>
<td></td>
<td></td>
<td>Locally managed (DDO, LEC and IC) with advice from Owner’s Rep/DSTDM</td>
</tr>
<tr>
<td>Lean Forward</td>
<td></td>
<td></td>
<td>Locally managed (DDO, LEC and IC) with advice from Owner’s Rep/DSTDM</td>
</tr>
<tr>
<td>Stand Up</td>
<td></td>
<td></td>
<td>Locally managed (DDO, LEC and IC) with advice from Owner’s Rep/DSTDM</td>
</tr>
<tr>
<td>Stand Down</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dam hazards and section numbers</th>
<th>Activation triggers for dam hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flood operations</strong></td>
<td>See section 5</td>
</tr>
<tr>
<td>EL 670.32 m and rising</td>
<td>Storage between FSL 670.42 m and 671.42 m</td>
</tr>
<tr>
<td>Storage between EL 671.42 m and 672.74 m</td>
<td>Storage below EL 671.42 m and falling</td>
</tr>
<tr>
<td><strong>Chemical spill/toxic conditions</strong></td>
<td>See section 6</td>
</tr>
<tr>
<td>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</td>
<td>Not Applicable Confirmation of or highly likely probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment</td>
</tr>
<tr>
<td><strong>Piping: Embankment, foundation or abutments</strong></td>
<td>See section 7</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>Piping condition has been established</td>
<td>Risk Assessment has determined that piping risk has reduced</td>
</tr>
<tr>
<td><strong>Earthquake</strong></td>
<td>See section 8</td>
</tr>
<tr>
<td>Earthquake reported or felt in the area</td>
<td>Earthquake reported or felt in the area</td>
</tr>
<tr>
<td>Intensity less than 5 Modified Mercalli (MM)</td>
<td>Intensity greater than or equal to 5 MM, OR</td>
</tr>
<tr>
<td></td>
<td>Intensity less than 5 MM and change detected during surveillance inspection</td>
</tr>
<tr>
<td>Earthquake reported or felt in the area, AND</td>
<td>Risk Assessment has determined that failure risk has reduced</td>
</tr>
<tr>
<td></td>
<td>A possible failure path has been identified</td>
</tr>
<tr>
<td><strong>Terrorist threat/activity or high energy impact</strong></td>
<td>See section 9</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Possible terrorist activity/suspicious noticed at dam or Threat received</td>
<td>Risk Assessment has determined that failure risk has reduced</td>
</tr>
<tr>
<td><strong>Overturning or sliding of monoliths</strong></td>
<td>See section 10</td>
</tr>
<tr>
<td>Indications of movement of monoliths noted such as cracking, increased seepage, spilling</td>
<td>Storage level at flood of record level of EL 672.74 m</td>
</tr>
<tr>
<td>Obvious displacement of one or more monoliths, OR</td>
<td>Evidence of scouring at or near toe of dam</td>
</tr>
<tr>
<td>Risk Assessment has determined that sliding or over turning risk has reduced</td>
<td></td>
</tr>
</tbody>
</table>

NEXT PAGE: EMERGENCY ACTIVATION QUICK REFERENCE – OTHER EMERGENCY SITUATIONS
Emergency activation quick reference – Other Emergency Situations

The EAP for Tinaroo Falls 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: Emergency activation quick reference (continued)

<table>
<thead>
<tr>
<th>Other Emergency Situations and section numbers</th>
<th>Activation levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications Failure – Dam Site (DDO)</td>
<td>Site managed (DDO - becomes LEC)</td>
</tr>
<tr>
<td>Communications Failure – Local Area (LEC/ORR)</td>
<td>Brisbane managed by Incident Coordinator (IC)</td>
</tr>
<tr>
<td>Communications Failure – Brisbane (IC/DSTDM)</td>
<td>Locally managed by Local Event Coordinator (LEC)</td>
</tr>
</tbody>
</table>

Activation triggers for other emergency situations

- Comms Failure
  See section 11
  - Unable to communicate to or from Dam site
  - Unable to communicate to or from Dam Site
  - Unable to communicate to or from Local Area

13 15 89 Sunwater Customer 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
# Table of Contents

Emergency activation quick reference – Dam Hazards ........................................ i
Emergency activation quick reference – Other Emergency Situations ................. ii
Document control ................................................................................................ viii
Document revision history .................................................................................. ix

Controlled document distribution list ................................................................ x

1. References, abbreviations and definitions .................................................... 1
   1.1 References/associated documents .............................................................. 1
   1.2 Abbreviations and acronyms .................................................................. 2
   1.3 Business terms and definitions ................................................................. 3

2. Introduction .................................................................................................... 7
   2.1 Context ...................................................................................................... 7
   2.2 Purpose ..................................................................................................... 8
   2.3 Scope ......................................................................................................... 8
   2.4 Sunwater provides training ....................................................................... 8
   2.5 Principles used in developing this EAP ..................................................... 9
   2.6 Community information ......................................................................... 11
   2.7 Lessons learnt ......................................................................................... 11
   2.8 Downstream notifications lists ................................................................ 11
   2.9 Comprehensive Risk Assessments ......................................................... 11

3. Dam details .................................................................................................. 12
   3.1 General dam information ....................................................................... 12
   3.2 Population at risk .................................................................................... 13
   3.3 Spillway adequacy .................................................................................. 13
   3.4 General arrangement ............................................................................. 13
   3.5 Emergency inspections and monitoring .................................................. 15

4. Roles and responsibilities ........................................................................... 17

5. Dam hazard– flood operations .................................................................. 20
   5.1 Overview ................................................................................................. 20
   5.2 Emergency Actions ................................................................................ 22

6. Dam hazard--chemical spill/toxic conditions ........................................... 30
   6.1 Overview ................................................................................................. 30
   6.2 Emergency action roles ........................................................................... 30

7. Dam hazard–piping: embankment, foundation or abutments .................. 37
   7.1 Overview ................................................................................................. 37
   7.2 Emergency action roles ........................................................................... 37
8. Dam hazard—earthquake .................................................. 45
  8.1 Overview ........................................................................ 45
  8.2 Emergency Actions .......................................................... 45
9. Dam hazard—terrorist threat/activity or high energy impact .......... 53
  9.1 Overview ........................................................................ 53
  9.2 Emergency action roles .................................................... 53
10. Dam hazard—overturning or sliding of monoliths ...................... 61
  10.1 Overview ....................................................................... 61
  10.2 Emergency Actions .......................................................... 61
11. Other emergency situation—communications failure ............... 70
  11.1 Overview ....................................................................... 70
  11.2 Emergency actions .......................................................... 70

Appendix A : Notification and Communication Lists ............................ A1
Appendix B : Inundation Maps and Emergency Control Measures .......... B1
Appendix C : Equipment, Messaging Instructions and Technical Data .......... C1
Appendix D : Tinaroo Falls Emergency Action Plan Toolkit ....................... D1
Appendix E : Interaction with local government and district groups .......... E1
List of Tables

Table 1: Emergency activation quick reference ................................................................. i
Table 2: Tinaroo Falls Dam specifications ......................................................................... 12
Table 3: Estimated incremental PAR ................................................................................ 13
Table 4: Flood classification triggers .............................................................................. 21
Table 5: Historical Floods at Tinaroo Falls Dam ................................................................. 21
Table 6: Emergency activation trigger summary ............................................................... 22
Table 7: Flood operations – DDO emergency action ......................................................... 23
Table 8: Flood operations – LEC emergency action ........................................................... 24
Table 9: Flood operations – IC emergency action ............................................................... 25
Table 10: Flood operations – LEC and IC communication plan ......................................... 26
Table 11: Flood operations – DSTDM emergency action .................................................. 28
Table 12: Flood operations – FODM emergency action ..................................................... 29
Table 13: Chemical spill/toxic conditions–DDO emergency action ..................................... 32
Table 14: Chemical spill/toxic conditions–LEC emergency action ..................................... 33
Table 15: Chemical spill/toxic conditions–IC emergency action ......................................... 34
Table 16: Chemical spill/toxic conditions–LEC and IC communication plan .................... 35
Table 17: Chemical spill/toxic conditions–DSTDM emergency action ............................... 36
Table 18: Piping: embankment, foundation or abutments–DDO emergency action .............. 39
Table 19: Piping: embankment, foundation or abutments–LEC emergency action ............. 40
Table 20: Piping: embankment, foundation, or abutments—IC emergency action ............... 41
Table 21: Piping: embankment, foundation or abutments–LEC and IC communication plan ................................................................................................................................. 42
Table 22: Piping: embankment, foundation or abutments–DSTDM emergency action .......... 44
Table 23: Earthquake–DDO emergency action .................................................................. 47
Table 24: Earthquake–LEC emergency action .................................................................. 48
Table 25: Earthquake–IC emergency action ..................................................................... 49
Table 26: Earthquake–LEC and IC communication plan .................................................... 50
Table 27: Earthquake–DSTDM emergency action ............................................................... 52
Table 28: Terrorist threat/activity or high energy impact–DDO emergency action ............... 55
Table 29: Terrorist threat/activity or high energy impact–LEC emergency action ............... 56
Table 30: Terrorist threat/activity or high energy impact–IC emergency action .................... 57
Table 31: Terrorist threat/activity or high energy impact–LEC and IC communication plan ................................................................................................................................. 58
Table 32: Terrorist threat/activity or high energy impact – DSTDM emergency action .......... 60
Table 33: Overturning or sliding of monoliths–DDO emergency action .............................. 63
Table 34: Overturning or sliding of monoliths–LEC emergency action ............................... 64
Table 35: Overturning or sliding of monoliths–IC emergency action ................................... 65
Table 36: Overturning or sliding of monoliths–LEC and IC communication plan ................ 66
Table 37: Overturning or sliding of monoliths—DSTDM emergency action..............................................69
Table 38: Communications failure emergency activation trigger summary ..................................................70
Table 39: Communications failure—DDO emergency action ..................................................................71
Table 40: Communications failure—LEC emergency action .................................................................72
Table 41: Communications failure—IC emergency action ..................................................................73
Table 42: Communications failure—LEC AND IC communication plan ..................................................73
Table 43: Communications failure—DSTDM emergency action .................................................................74
Table 44: Communications failure—FODM emergency action .................................................................75
Table B1: Key Locations for the Tinaroo Falls Dam Break Analysis .........................................................B3
Table B2: Peak flood levels and maximum rise above initial conditions ..................................................B3
Table B3: Peak height above crossing level (m) ......................................................................................B4
Table B4: Flood level classifications (m AHD) ......................................................................................B4
Table B5: Flood timing for Sunny Day Failure (hr:min) ..........................................................................B5
Table B6: Flood timing for DCF – No dam failure (hr:min) ....................................................................B5
Table B7: Flood timing for PMP design flood – Dam failure (hr:min) .......................................................B6
Table B8: Peak velocities (m/s) ............................................................................................................B6
Table B9: Peak discharge (m³/s) ............................................................................................................B7
List of Figures

Figure 1: Sunwater emergency response organisation .................................................................10
Figure 2: Tinaroo Falls Dam general arrangement ........................................................................14
Figure 3: Instrumentation layout ..................................................................................................16
Figure 4: Chemical spill/toxic conditions flowchart .................................................................31
Figure 5: Piping: embankment, foundation, or abutments flowchart ........................................38
Figure 6: Earthquake flowchart ..................................................................................................46
Figure 7: Terrorist threat/activity or high energy impact flowchart .............................................54
Figure 8: Overturning or sliding of monoliths flowchart ...............................................................62
Figure B1: Flood Impact Mapping for Tinaroo Falls Dam ............................................................. B2
Figure B2: Tinaroo Falls Dam Catchment Area Map ................................................................. B44
Document control

Authorisation of document

This document has been reviewed and accepted by the following:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/role</th>
<th>Signature/date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SunWater Manager Operations Centre — Prepared for submission</td>
<td>27/9/18</td>
</tr>
<tr>
<td></td>
<td>SunWater Dam Safety Program Manager — Approved for submission</td>
<td>27/9/18</td>
</tr>
</tbody>
</table>
## Document revision history

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
<th>Prepared by</th>
<th>Reason for change</th>
<th>Hummingbird ref no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>May 2008</td>
<td></td>
<td>Significant changes of Tinaroo Falls Dam Emergency Action Plan to reflect Sunwater Management Structure and other minor changes (Refer HB #616872 Versions 2&amp; 2A for details)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>August 2010</td>
<td></td>
<td>Significant changes to all Sections of Tinaroo Falls Dam Emergency Action Plan to reflect current Sunwater Management Structure and other changes</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>August 2014</td>
<td></td>
<td>New Emergency Action Plan developed at expiry of 3E approval. Issued for consultation with relevant disaster management groups</td>
<td>#1619460</td>
</tr>
<tr>
<td>4A</td>
<td>June 2015</td>
<td></td>
<td>Improvements and clarifications made following reviews of new EAP by Sunwater staff</td>
<td>#1724339</td>
</tr>
<tr>
<td>5</td>
<td>Sep 2016</td>
<td></td>
<td>Updates to notification &amp; communication lists and Emergency Alert sections.</td>
<td>#2023125</td>
</tr>
<tr>
<td>6</td>
<td>August 2017</td>
<td></td>
<td>Revised and reviewed Emergency Action Plan developed at expiry of approval. Also includes; updates that reflect the Water Legislation (Dam Safety) Amendment Act 2017, implementation of changes to Sunwater management structure, new event management roles and addition of new Emergency Activation section (Other Emergency Situations).</td>
<td>#2130700</td>
</tr>
<tr>
<td></td>
<td>November 2017</td>
<td></td>
<td>Updated Emergency Alert messaging for Cairns area.</td>
<td>#2130700</td>
</tr>
<tr>
<td>7</td>
<td>December 2017</td>
<td></td>
<td>Issue 6 – not approved for use, but changes continue in this issue. Includes updates to notification &amp; communication lists and Emergency Alert sections. Also incorporates non-substantive updates to Sections 1, 2 &amp; 4 and error corrections.</td>
<td>#2230927</td>
</tr>
<tr>
<td>8</td>
<td>December 2018</td>
<td></td>
<td>Amended contacts and associated sections, e.g. Organisation chart &amp; Controlled Copy Holders list. Minor error corrections and other non-substantive changes.</td>
<td>#2367506</td>
</tr>
<tr>
<td>8.1</td>
<td>October 2019</td>
<td></td>
<td>Legislated yearly contact updates. Minor error corrections and other non-substantive changes. Updated Downstream Notification map.</td>
<td>#2450051</td>
</tr>
</tbody>
</table>
## Controlled document distribution list

<table>
<thead>
<tr>
<th>Copy no.</th>
<th>Position</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Storage Supervisor</td>
<td>Sunwater, Tinaroo Falls Dam</td>
</tr>
<tr>
<td>2</td>
<td>Operations Manager</td>
<td>Sunwater, Mareeba</td>
</tr>
<tr>
<td>3</td>
<td>Dam Safety Surveillance Coordinator</td>
<td>Sunwater, Brisbane</td>
</tr>
<tr>
<td>4</td>
<td>Chief Executive</td>
<td><em>(electronic copy only)</em> Sunwater, Tinaroo Falls Dam</td>
</tr>
<tr>
<td>5</td>
<td>Local Disaster Coordinator – Local Disaster Management Group</td>
<td>Mareeba Shire Council</td>
</tr>
<tr>
<td>6</td>
<td>Local Disaster Coordinator – Local Disaster Management Group</td>
<td>Tablelands Regional Council</td>
</tr>
<tr>
<td>7</td>
<td>Local Disaster Coordinator – Local Disaster Management Group</td>
<td>Cairns Regional Council</td>
</tr>
<tr>
<td>8</td>
<td>Executive Officer – Far North QLD Disaster Management Group</td>
<td><em>(electronic copy only)</em> Police, Cairns</td>
</tr>
<tr>
<td>9</td>
<td>Director Disaster Management Services</td>
<td><em>(electronic copy only)</em> State Disaster Coordination Centre - Queensland Fire and Emergency Services, Brisbane</td>
</tr>
<tr>
<td>10</td>
<td>Emergency Management Coordinator, Far North Region</td>
<td>Queensland Fire and Emergency Services, Cairns</td>
</tr>
</tbody>
</table>

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

1.1 References/associated documents

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Document title</th>
<th>Reference/location</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Tinaroo Falls Dam Operation and Maintenance Manual</td>
<td>Tinaroo_Falls_Dam_OM_Manual</td>
</tr>
<tr>
<td>C</td>
<td>Tinaroo Falls Dam Safety Condition Schedule</td>
<td>HB # 05-009144/002</td>
</tr>
<tr>
<td>D</td>
<td>Queensland Disaster Management Guidelines</td>
<td><a href="http://www.disaster.qld.gov.au">http://www.disaster.qld.gov.au</a></td>
</tr>
<tr>
<td>H</td>
<td>Emergency Alert Protocol</td>
<td>HB # 15-001003/001</td>
</tr>
</tbody>
</table>
## 1.2 Abbreviations and acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEP</td>
<td>Annual Exceedance Probability</td>
</tr>
<tr>
<td>AHD</td>
<td>Australian Height Datum</td>
</tr>
<tr>
<td>AMTD</td>
<td>Adopted Mean Thread Distance</td>
</tr>
<tr>
<td>ANCOLD</td>
<td>Australian National Committee on Large Dams</td>
</tr>
<tr>
<td>BOM</td>
<td>Bureau of Meteorology</td>
</tr>
<tr>
<td>CED</td>
<td>Chief Engineer Dams</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CRA</td>
<td>Comprehensive Risk Assessment</td>
</tr>
<tr>
<td>D/S</td>
<td>Downstream</td>
</tr>
<tr>
<td>DCF</td>
<td>Dam Crest Flood</td>
</tr>
<tr>
<td>DCL</td>
<td>Dam Crest Level</td>
</tr>
<tr>
<td>DDC</td>
<td>District Disaster Coordinator</td>
</tr>
<tr>
<td>DDMG</td>
<td>District Disaster Management Group</td>
</tr>
<tr>
<td>DDO</td>
<td>Dam Duty Officer</td>
</tr>
<tr>
<td>DDS</td>
<td>Director Dam Safety</td>
</tr>
<tr>
<td>DNRME</td>
<td>Department of Natural Resources, Mines &amp; Energy</td>
</tr>
<tr>
<td>DSR</td>
<td>Dam Safety Regulator</td>
</tr>
<tr>
<td>DSSC</td>
<td>Dam Safety Surveillance Coordinator</td>
</tr>
<tr>
<td>DSTDMA</td>
<td>Dam Safety Technical Decision Maker</td>
</tr>
<tr>
<td>EAP</td>
<td>Emergency Action Plan</td>
</tr>
<tr>
<td>EA</td>
<td>Emergency Alert</td>
</tr>
<tr>
<td>EER</td>
<td>Emergency Event Report</td>
</tr>
<tr>
<td>EGMO</td>
<td>Executive General Manager Operations</td>
</tr>
<tr>
<td>EL</td>
<td>Elevation Level</td>
</tr>
<tr>
<td>FODM</td>
<td>Flood Operations Decision Maker</td>
</tr>
<tr>
<td>FSL</td>
<td>Full Supply Level</td>
</tr>
<tr>
<td>GM</td>
<td>General Manager</td>
</tr>
<tr>
<td>GMSRC</td>
<td>General Manager Stakeholder Relations &amp; Communication</td>
</tr>
<tr>
<td>GMWR &amp; DS</td>
<td>General Manager Water Resources &amp; Dam Safety</td>
</tr>
<tr>
<td>IC</td>
<td>Incident Coordinator</td>
</tr>
<tr>
<td>IFHC</td>
<td>Incremental Flood Hazard Category</td>
</tr>
<tr>
<td>IGEM</td>
<td>Inspector-General Emergency Management</td>
</tr>
<tr>
<td>LBC</td>
<td>Left Bank</td>
</tr>
<tr>
<td>LDC</td>
<td>Local Disaster Coordinator</td>
</tr>
<tr>
<td>LDMG</td>
<td>Local Disaster Management Group</td>
</tr>
<tr>
<td>LEC</td>
<td>Local Event Coordinator</td>
</tr>
<tr>
<td>MAP</td>
<td>Manager Asset Planning</td>
</tr>
<tr>
<td>Max. OL</td>
<td>Maximum Operating Level</td>
</tr>
<tr>
<td>ME</td>
<td>Manager Environment</td>
</tr>
<tr>
<td>MM</td>
<td>Modified Mercalli</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation &amp; Maintenance</td>
</tr>
<tr>
<td>OB</td>
<td>Observation Bore</td>
</tr>
<tr>
<td>OC</td>
<td>Operations Centre</td>
</tr>
<tr>
<td>OCDO</td>
<td>Operations Centre Duty Officer</td>
</tr>
<tr>
<td>OCO</td>
<td>Operations Coordinator</td>
</tr>
<tr>
<td>OM</td>
<td>Operator Maintainer</td>
</tr>
<tr>
<td>OMGR</td>
<td>Operations Manager</td>
</tr>
<tr>
<td>ORR</td>
<td>Owner’s Regional Representative</td>
</tr>
<tr>
<td>PFRM</td>
<td>Predictive Flood Routing Model</td>
</tr>
<tr>
<td>PMF</td>
<td>Probable Maximum Flood</td>
</tr>
<tr>
<td>PMP</td>
<td>Probable Maximum Precipitation</td>
</tr>
<tr>
<td>PMPDF</td>
<td>Probable Maximum Precipitation Design Flood</td>
</tr>
<tr>
<td>PWRE</td>
<td>Queensland Water Resources Engineer</td>
</tr>
<tr>
<td>QDMC</td>
<td>Queensland Disaster Management Committee</td>
</tr>
<tr>
<td>RB</td>
<td>Right Bank</td>
</tr>
<tr>
<td>RC</td>
<td>Regional Council</td>
</tr>
<tr>
<td>RCC</td>
<td>Roller Compacted Concrete</td>
</tr>
<tr>
<td>ROC</td>
<td>Regional Operations Centre</td>
</tr>
<tr>
<td>RPEQ</td>
<td>Registered Professional Engineer of Queensland</td>
</tr>
<tr>
<td>RSL</td>
<td>Reduced Supply Level</td>
</tr>
<tr>
<td>SCE</td>
<td>Senior Civil Engineer</td>
</tr>
<tr>
<td>SDCC</td>
<td>State Disaster Coordination Centre</td>
</tr>
<tr>
<td>SDF</td>
<td>Sunny Day Failure</td>
</tr>
<tr>
<td>SDTE</td>
<td>Senior Dam Technical Engineer</td>
</tr>
<tr>
<td>SES</td>
<td>State Emergency Service</td>
</tr>
<tr>
<td>SHD</td>
<td>State Height Datum</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>SMT</td>
<td>Sunwater Media Team</td>
</tr>
<tr>
<td>SO</td>
<td>Standby Operator</td>
</tr>
<tr>
<td>SOM</td>
<td>Senior Operator Maintainer</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard Operating Procedure</td>
</tr>
<tr>
<td>SRT</td>
<td>Strategic Response Team</td>
</tr>
<tr>
<td>SS</td>
<td>Storage Supervisor</td>
</tr>
<tr>
<td>SWL</td>
<td>Storage Water Level</td>
</tr>
<tr>
<td>SWRE</td>
<td>Senior Water Resources Engineer</td>
</tr>
<tr>
<td>U/S</td>
<td>Upstream</td>
</tr>
<tr>
<td>WHS</td>
<td>Workplace Health &amp; Safety</td>
</tr>
<tr>
<td>WQ</td>
<td>Water Quality</td>
</tr>
</tbody>
</table>
1.3 **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>
</table>
| Dam hazard | 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. |
| Dam hazard event | 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. |
| Disaster management plan | Of a *district group* or local government, means the group’s or local government’s disaster management plan under the Disaster Management Act. |
| District group (District Disaster Management Group) | 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*. |
| Emergency event | 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:  
  - 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  
  - the event may arise because of a disaster situation declared under the Disaster Management Act, OR  
  - an entity performing functions under the State *disaster management plan* may, under that plan, require the owner of the dam to give the entity information about the event. |
| Local group (Local Disaster Management Group) | 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*. |
| Notice response | A dam owner’s written response to a notice following an assessment of an EAP by a local government or *district group*. |
### Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Referable dam             | 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. |
| Relevant entity           | 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. |

### Terms consistent with Queensland disaster management arrangements

| Activation Levels | 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 stand-by 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>
</table>
| Bureau of Meteorology flood level classifications | The three levels of flooding are:  
  • **Minor flooding**: 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.  
  • **Moderate flooding**: 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.  
  • **Major flooding**: 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. |
| Chemical spill/toxic Condition            | The contamination of water in the storage of the dam that could create a dam hazard.                                                                                                                                                                                                                                                                                                                                                                                                          |
| Dam crest failure                         | 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  
  • for an embankment dam, is the lowest point of the embankment crest  
  • 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  
  • for a concrete faced rockfill dam, is the lowest point of the crest structure.                                                                                                                                                                                                                                                                                           |
| Dam failure                               | Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.                                                                                                                                                                                                                                                                                                                                                                          |
| Earthquake                                | 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 and resulting in the generation of seismic waves which can be destructive. The potential consequences of an earthquake include:  
  • settlement, sliding or overturning of monoliths in the dam wall  
  • initiation of seepage lines in the foundations or abutments that could lead to piping damage and potential inoperability of appurtenant works.                                                                                                                                                                                                                   |
| Environmental release                     | Tinaroo Dam outlet works include river and irrigation outlets. The outlets can release up to 2419 ML/d. Such releases can cause a low level dam hazard.                                                                                                                                                                                                                                                                               |
| Flood release                             | 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.                                                                                                                                                                                                                                                                                                                                         |
| Piping                                    | 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 lead to a failure of the dam.                                                                                                                                                                                                                                                                                     |
| Plane strike or other impact              | 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.                                                                                                                                                                                                                                                                                                                   |
| Probable maximum flood                    | Probable maximum flood is the flood resulting from probable maximum precipitation coupled with the worst catchment conditions that can be realistically expected.                                                                                                                                                                                                                                                                                                                                 |
| Probable maximum precipitation            | Probable maximum precipitation is the theoretical greatest depth of precipitation physically possible based on generalised methods.                                                                                                                                                                                                                                                                                                                                                     |
| Probable maximum precipitation design flood | Probable maximum precipitation design flood is the flood resulting from probable maximum precipitation coupled with standard catchment conditions that can be expected.                                                                                                                                                                                                                                                                                                                          |
Term | Definition
--- | ---
‘Sunny day’ failure | ‘Sunny day’ dam failure is where the failure occurs at the full supply level and there is no concurrent rain associated flooding.
Terrorist activity | A deliberate attempt to damage or fail a dam.

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 Tinaroo Falls Dam, have been assessed as Mareeba Shire Council (MSC), Tablelands Regional Council (TRC) and Cairns Regional Council (CRC). Sunwater has provided MSC, TRC and CRC each 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 group for Tinaroo Falls Dam is Far North District Disaster Management Group (DDMG). Sunwater has provided the DDMG 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 Tinaroo Falls 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 Tinaroo Falls 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 Tinaroo Falls 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 relevant Local Disaster Management Plans.

2.3  Scope

The Tinaroo Falls 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 has 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. DSTDM 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 authority. 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 LDMGs have principal carriage of managing any emergency situation within the community, with the support of the district and state groups.
- Sunwater will aim to inform and support the LDMGs in the Mareeba, Tablelands, and Cairns areas.
- The LDMGs will be the principle voice on all communication to the community during an emergency situation where practical.
- During a dam hazard 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 immediately D/S residents of Tinaroo Falls Dam. The downstream limit is shown in Figure B1 by the zone labelled Limit of downstream notification area
  - provide timely advice to the LDMGs
  - notify the Immediately D/S residents via SMS
  - contact SDCC Watch desk to send emergency notification to the Dam emergency polygons.
- During a dam hazard the LDMG in the Mareeba 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 immediately D/S residents of Tinaroo Falls Dam. The downstream limit is shown in Figure B1 by the zone labelled Limit of downstream notification area
  - notify the Immediately D/S residents via SMS unless otherwise agreed with LDMGs
  - provide timely advice to the LDMGs.
- Sunwater will aim to inform and support the Far North DDMG.
2.5.1 Dam emergency organisation within Sunwater

The Sunwater emergency management framework generally utilises the organisations 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 Incident Coordinator (IC) for any dam hazard at a dam. The IC will maintain overall responsibility for managing the dam hazard.

- The IC is responsible for the decision to activate the EAP. Should the IC be unavailable, the Local Event Coordinator (LEC) followed by the Dam Duty Officer (DDO) is responsible for the decision. 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 responsibility 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 and technical staff will provide technical advice to the IC, LEC and DDO on an as needs basis. The Flood Operations Decision Maker (FODM) and Dam Safety Technical Decision Maker (DSTDM) will provide flood and dam engineering advice respectively during a dam hazard. Such advice will be provided within an established framework of Standing Operating Procedures (SOPs), models, standards, and manuals. This is an advisory role only and does not diminish the decision responsibility of the IC, LEC or DDO.
• If circumstances develop during a dam hazard that exceeds the established framework, it will be necessary to escalate to either the FODM or DSTDM. These roles are filled by Registered Professional Engineers of Queensland (RPEQ) and are suitably qualified professionals who can make engineering decisions and provide engineering decisions as defined in the Professional Engineers Act of Queensland. In some circumstances these decision-making roles may need to direct those in the direct chain of command. These decision making roles are providing direct engineering supervision to the advisors through the established framework of SOPs, models, standards, and manuals or through direct supervision.

2.6 Community information

• Sunwater with the assistance of Mareeba, Tablelands and Cairns Councils 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.

• Downstream residents are also provided information in text message/phone calls in the event of an activation of this EAP.

• In the event of an emergency event or when otherwise 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 Appendixes A8 and A10.

• A copy of all Sunwater approved EAPs are available to the public on the Business Queensland website: https://www.business.qld.gov.au/industries/mining-energy-water/water/industry-infrastructure/dams/emergency-action-plans/map 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 5 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, individuals are able to register to receive notifications for this EAP and are able to register either through the Sunwater website or by calling the Sunwater call centre 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 Executive General Manager Operations and Services, 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: Tinaroo Falls Dam is situated 14 km in the north east of Atherton at AMTD 101.4 km on the Barron River.

Catchment: The dam serves the Barron River system with a total area of 2100 km². Tinaroo Falls Dam has a catchment of 550 km². The catchment is bounded by the Mulgrave to the east, Johnstone and Herbert catchments to the South and Mitchell to the West.

Tributaries: The major tributaries are Barron River and Mazlin creek.

Storage Capacity: The storage capacity at FSL is 438,920 ML.

Construction: Completed in 1958, Tinaroo Falls Dam is a mass concrete gravity dam. The purpose of the dam is to supply irrigation water to Mareeba-Dimbula Irrigation Area. The Dam was upgraded with the installation of post-tensioned anchors and overflow scour protection in 2009 and was completed in 2011.

Specification: The table below lists general specifications of Tinaroo Falls Dam.

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam type</td>
<td>Mass concrete gravity dam</td>
</tr>
<tr>
<td>FSL</td>
<td>EL 670.42 m</td>
</tr>
<tr>
<td>DCL</td>
<td>EL 674.11 m (Top of Kerb EL 674.31 m)</td>
</tr>
<tr>
<td>Dam height</td>
<td>41.48 m above downstream toe</td>
</tr>
<tr>
<td>Dam length</td>
<td>533.5 m</td>
</tr>
</tbody>
</table>
| Historical recorded storage (as at 19/09/2012) | Max EL 672.74 m – Feb ‘99  
Min EL 656.42 m – Dec ‘03  
Max EL 671.34 m – Jan ‘11 (Post Spillway Upgrade) |
| Spillway type                       | Central uncontrolled ogee crest with baffle wall type dissipator             |
| Spillway crest level                | EL 670.42 m                                                                 |
| Spillway capacity                  | 1188 m³/s (102,643 ML/d)                                                     |
| Outlet description                 | Irrigation outlet – one 1500 mm mild steel pipe with guard valve and radial gate regulator at downstream end.  
Hydropower – one 1500 mm mild steel pipe feeding the Hydropower generator.  
River outlet – one 1500 mm mild steel pipe with guard valve and fixed cone dispersion valve at the downstream end. |
| Outlet capacity                    | Irrigation outlet – 7 m³/s (605 ML/d) per gate  
River outlet – 21 m³/s (1814 ML/d) |
### 3.2 Population at risk

The incremental population at risk (PAR) for the SDF and DCF (1:200) are shown in the following table:

<table>
<thead>
<tr>
<th>Location</th>
<th>SDF</th>
<th>DCF (1:200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam to Mareeba</td>
<td>341</td>
<td>352</td>
</tr>
<tr>
<td>Mareeba</td>
<td>3,285</td>
<td>3,746</td>
</tr>
<tr>
<td>Mareeba to Kuranda</td>
<td>9,887</td>
<td>1,131</td>
</tr>
<tr>
<td>Kuranda to Ocean</td>
<td>10,346</td>
<td>11,037</td>
</tr>
<tr>
<td><strong>TOTAL PAR:</strong></td>
<td>14,595</td>
<td>16,266</td>
</tr>
</tbody>
</table>

### 3.3 Spillway adequacy

A comprehensive risk assessment (CRA) of Tinaroo Falls Dam was undertaken in 2008. That CRA had concluded that Tinaroo Falls Dam is capable of passing 27% of the PMF equating to inflows of 2269 m$^3$/s and a corresponding outflow of 1188 m$^3$/s.

A spillway capacity upgrade of Tinaroo Falls Dam was completed in 2010. That upgrade enabled the dam to safely pass the Acceptable Flood Capacity (AFC). The dam is currently capable of passing 100% of the Probable Maximum Flood equating to inflows of up to 8497 m$^3$/s and a corresponding maximum outflow of 6580 m$^3$/s.

A Spillway Rating Curve is included in Appendix C.

### 3.4 General arrangement

The general arrangement drawing is in Figure 2, in the following page.
NOTES:
1. LEVELS DATUM AHD (M999 ± EL 076.204)
2. COORDINATE SYSTEM PLAN DERIVED FROM TRUNCATED AMG
   PHYSIG: ESRI056101MB112056101AMG
   ± t 5266.561N 1272.946E PLANE

TINAROCO FALLS DAM
SPILLWAY CAPACITY UPGRADE 2009
GENERAL ARRANGEMENT

FOR AS BUILT SURVEYS
REFER ORG 239562

SUNWATER LIMITED
ACN 131 034 985

P & G FRASERSON
PROJECT DESIGN ENGINEERS

DATE: MAY 2009

SCALE: (A3 SIZE)
3.5 Emergency inspections and monitoring

Tinaroo Falls 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 hazards, as soon as it begins to develop, or becomes apparent, the following is applicable to Tinaroo Falls Dam.

3.5.1 Inspections

- **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 Tinaroo Falls Dam.

- **Settlement/movement measurement**
  Surface settlement points: 52 located along the crest of the embankment and five located along the crest of the spillway

- **Seepage measurement**
  V notch weir: Five located along the lower gallery, four located along the upper gallery

The location of instrumentation and monitoring equipment are detailed in Figure 3 of the following pages of this EAP.

Information relating to monitoring and instruction can also be found in Appendix D.
### 4. Roles and responsibilities

<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 spread sheet 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</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></td>
</tr>
<tr>
<td>• Analyse the situation and provide expert technical advice</td>
<td>ME</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 (OC) – data collector</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 councils of intent to use the Emergency Alert (EA)</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>SOM</td>
</tr>
<tr>
<td>• Complete accreditation to operate and maintain relevant storage</td>
<td>SS</td>
</tr>
<tr>
<td>• Ensure the EAP is implemented appropriately and carry out the DDO role as required</td>
<td>OM</td>
</tr>
<tr>
<td>• Take direction from the DSTDM and IC as requested</td>
<td></td>
</tr>
<tr>
<td>• Arrange immediate site inspection and make informed assessment of the situation</td>
<td></td>
</tr>
<tr>
<td>• Escalate any issue not covered in the EAP or where actions are not clear</td>
<td></td>
</tr>
<tr>
<td>• Record communications, notifications and observations as required</td>
<td></td>
</tr>
<tr>
<td><strong>Councils (Mareeba, Tablelands and Cairns)</strong></td>
<td></td>
</tr>
<tr>
<td>Councils have legislated local government functions, as per Section 80 of the Qld Disaster Management Act (2003). These include:</td>
<td></td>
</tr>
<tr>
<td>• Ensure it has a disaster response capability</td>
<td></td>
</tr>
<tr>
<td>• Approve its local disaster management plan</td>
<td></td>
</tr>
<tr>
<td>• Ensure information about an event or a disaster in its area is promptly given to the district disaster coordinator for the disaster district in which area it is situated</td>
<td></td>
</tr>
<tr>
<td>• Perform other functions given to the local government under the Act</td>
<td></td>
</tr>
<tr>
<td>• must assess (in consultation with its LDMG) the EAP for consistency with the Local Disaster Management Plan</td>
<td></td>
</tr>
<tr>
<td><strong>Disaster Management Groups/Personnel</strong> - (In addition to requirements outlined in the Qld. Disaster Mgmt. Act 2003). The agreement of the below is sought through the review and approval of this document.</td>
<td>LDMG</td>
</tr>
<tr>
<td><strong>LDMG</strong></td>
<td>DDMG</td>
</tr>
<tr>
<td>• Assist Sunwater and the Council/s to ensure community education around messaging and impacts of EAP related events is undertaken and continually improves</td>
<td>QFES</td>
</tr>
<tr>
<td>• Work with Council/s and Sunwater to ensure the EAP is regularly exercised</td>
<td></td>
</tr>
<tr>
<td>• Identify and coordinate the use of manpower and resources that may be required for an EAP event</td>
<td></td>
</tr>
<tr>
<td>• Identify and provide advice to DDMG about support services required by the LDMG to manage an EAP event</td>
<td></td>
</tr>
<tr>
<td>• Provide reports and make recommendations to the relevant DDMG about matters relating to EAP events and any support required</td>
<td></td>
</tr>
<tr>
<td><strong>QFES</strong></td>
<td></td>
</tr>
<tr>
<td>• Work with dam owner and LDMG to ensure Emergency Alerts polygons are prepared, stored and tested</td>
<td></td>
</tr>
<tr>
<td><strong>DDMG</strong></td>
<td></td>
</tr>
<tr>
<td>• DDMG may review plan with consistency with the District Disaster Management Plan</td>
<td></td>
</tr>
<tr>
<td>• Ensure the communication provided under this EAP is consistent with the District Disaster Management Plan</td>
<td></td>
</tr>
<tr>
<td><strong>Dam Safety Regulator (DSR)</strong></td>
<td>DDS</td>
</tr>
<tr>
<td>• Liaise with relevant Minister on necessary actions.</td>
<td></td>
</tr>
<tr>
<td>• Approve this document as required under legislation</td>
<td></td>
</tr>
<tr>
<td>• Liaise with chief executive as require din administer (regulating) the Water Supply (Safety and Reliability) Act 2008</td>
<td></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 Tinaroo Falls Dam to full supply level (FSL) EL 670.42m and the rate of inflow exceeds the capacity of the outlet works. The primary spillway will then discharge water downstream into the Barron River. These flood flows can create a dam hazard. 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 river 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 Barron River and other infrastructure in the river such as pump sites
- when the storage height exceeds moderate flood level (1.5 m over the spillway) EL 671.92 m flows will begin to break out of the river banks and inundate low lying areas
- when the storage height exceeds major flood level (2.7 m over the spillway) EL 673.12 m flows will impact on urban areas
- detailed information on downstream flood impacts, including tables and maps, is presented in Appendix B.
Table 4: 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>2.7</td>
<td>673.12</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.5</td>
<td>671.92</td>
</tr>
<tr>
<td>Minor</td>
<td>1.0</td>
<td>671.42</td>
</tr>
</tbody>
</table>

Source: Commonwealth Bureau of Meteorology

Table 5: Historical Floods at Tinaroo Falls Dam

The following table shows historical floods experienced at Tinaroo Falls 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>Feb 1999</td>
<td>672.74</td>
<td>2.32</td>
</tr>
<tr>
<td>2*</td>
<td>Jan 2011</td>
<td>671.34</td>
<td>0.92</td>
</tr>
<tr>
<td>3*</td>
<td>Feb 2019</td>
<td>670.88</td>
<td>0.46</td>
</tr>
</tbody>
</table>

* post spillway upgrade
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>Table 6: Emergency activation trigger summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alert</strong></td>
</tr>
<tr>
<td>• EL 670.32 m and rising</td>
</tr>
<tr>
<td>(0.1 below FSL)</td>
</tr>
<tr>
<td><strong>Lean Forward</strong></td>
</tr>
<tr>
<td>• Storage above FSL 670.42 m and approaching</td>
</tr>
<tr>
<td>EL 671.42 m</td>
</tr>
<tr>
<td><strong>Stand Up – greater than minor flood level</strong></td>
</tr>
<tr>
<td>• Storage above EL 671.42 m and approaching</td>
</tr>
<tr>
<td>EL 672.74 m</td>
</tr>
<tr>
<td><strong>Stand Up – greater than flood of record</strong></td>
</tr>
<tr>
<td>• Storage above EL 672.74 m and approaching</td>
</tr>
<tr>
<td>673.12</td>
</tr>
<tr>
<td><strong>Stand Up – greater than major flood level</strong></td>
</tr>
<tr>
<td>• Storage above EL 673.12 m</td>
</tr>
<tr>
<td><strong>Stand Down</strong></td>
</tr>
<tr>
<td>• Storage level EL 671.42 m and falling</td>
</tr>
</tbody>
</table>

Whilst this EAP is not activated until Tinaroo Falls Dam reaches an EL of 670.32 m, Sunwater and the LDMGs will work cooperatively and will endeavour to share intelligence of any rainfall event as an when either organisation becomes aware of a situation that could result in the activation of the EAP.

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

The Operations Centre Duty Officer (OCDO) will assess the weather and flood warnings on a daily basis 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.

The FODM will determine whether it is reasonably likely that the dam could reach EL 670.32m within the subsequent 24 hours. If so assessed, the FODM will instruct the IC to trigger the Alert status for flood operations.

5.2.3 Emergency action roles

Table 7 to Table 12 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 7: Flood operations – DDO emergency action

<table>
<thead>
<tr>
<th>Activation trigger</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up – greater than minor flood level</th>
<th>Stand Up – greater than flood of record</th>
<th>Stand Up – greater than major flood level</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>EL 670.32 m and rising</strong></td>
<td><strong>Storage between FSL 670.42 m and 671.42 m</strong></td>
<td><strong>Storage between EL 671.42 m and 672.74 m</strong></td>
<td><strong>Storage between EL 672.74 m and 673.12 m</strong></td>
<td><strong>Storage above EL 673.12 m</strong></td>
<td><strong>Storage level below EL 671.42 m and falling</strong></td>
</tr>
</tbody>
</table>

### Actions

- Inspect the dam daily (or as instructed by the DSTDM) – photograph/video and record using approved forms in Appendix D and send to IC & DSTDM
- Undertake site preparations (if not already complete) including but not limited to: check fuel and operation of backup generator; check operations of sump pump; check seal of outlet building and hydro power station; check communication systems (including backup)
- Monitor catchment conditions
- Notify the SO (who shall be available for duty for the duration of a dam hazard)
- Record the Storage Level – twice daily (or as instructed by the DSTDM) using the gauge boards or dip and confirm accuracy of gauging station
- Record rainfall – daily
- Record all communication
- Update Dam Log Book as per SOP 12
- As per previous activation level
- Inspect the Dam daily (or as instructed by the DSTDM) – photograph/video and record using approved forms in Appendix D and send to IC & DSTDM. Particular attention shall be given to:
  - visual inspection of flow patterns over spillway and dissipator evidence of scouring
  - inspect embankment for leaks, deformation and erosion
  - obvious signs of seepage
- Report any unusual readings or observations to the DSTDM & IC as soon as practical
- As per previous activation level, plus
- Record the storage level – 4-hourly intervals (or as instructed by the DSTDM)
- Inspect the Dam twice daily (or as instructed by the DSTDM) – photograph/video and record using approved forms in Appendix D and send to IC & DSTDM
- Inspections to include saddle dams from the time water level reaches the u/s toe
- Read dam instrumentation daily (or as instructed by the DSTDM), as per section 3.5.2)
- As per previous activation level, plus
- Evacuate any plant and/or vehicles to higher ground
- Monitor and record the Storage Level – four-hourly intervals (or as instructed by the DSTDM)
- Inspect the Dam 6-hourly (or as instructed by the DSTDM) – photograph/video and record using approved forms in Appendix D and send to IC & DSTDM
- Inspection to include saddle dams from the time water level reaches the u/s toe
- As per previous activation level, plus
- View the embankment (with binoculars)
- Photograph spillway discharge area and email to Owner’s Representative
- Return to routine surveillance activities and frequencies – Inspect the dam for any damage and photograph any damage identified
- Compile data, recording sheets and photographs for the EER. Information collected during the event should not be altered
- Update Dam Log Book entries as per SOP 12

### Internal notifications

- **IC**
- **SO**

### External notifications

- As required

---

**Flood levels above EL 672.74 m is a Lean Forward trigger for overturning/sliding – see Chapter 10**

---

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 8: Flood operations – LEC emergency action**

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up – greater than minor flood level</th>
<th>Stand Up – greater than flood of record</th>
<th>Stand Up – greater than major flood level</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activation trigger</strong></td>
<td>EL 670.32 m and rising (0.1m below FSL)</td>
<td>Storage between FSL 670.42 m and 671.42 m</td>
<td>Storage between EL 671.42 m and 672.74 m</td>
<td>Storage between EL 672.74 m and 673.12 m</td>
<td>Storage above EL 673.12 m</td>
<td>Storage level below EL 671.42 m and falling</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>• Liaise with LDMGs re: situation&lt;br&gt;• Develop/implement staff roster&lt;br&gt;• Record all communication</td>
<td>• As per previous activation level, AND&lt;br&gt;• Ensure all abnormal observations or damage has been reported to DSTDM and IC</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• Forward information for EER to IC&lt;br&gt;• Return to routine activities</td>
</tr>
<tr>
<td><strong>Internal notifications</strong></td>
<td>• DDO&lt;br&gt;• IC</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
</tr>
<tr>
<td><strong>External notifications</strong></td>
<td>• LDMG1&lt;br&gt;• LDMG2</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
</tr>
</tbody>
</table>

Flood levels above EL 672.74 m is a Lean Forward trigger for overturning/sliding – see Chapter 10
**Table 9: Flood operations – IC emergency action**

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up – greater than minor flood level</th>
<th>Stand Up – greater than flood of record</th>
<th>Stand Up – greater than major flood level</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>EL 670.32 m and rising (0.1m below FSL)</td>
<td>Storage between FSL 670.42 m and 671.42 m</td>
<td>Storage between EL 671.42 m and 672.74 m</td>
<td>Storage above EL 673.12 m</td>
<td>Storage level below EL 671.42 m and falling</td>
<td>Storage level below EL 671.42 m and falling</td>
</tr>
<tr>
<td>Actions</td>
<td>Liaise with the DSTDM and the FODM</td>
<td>As per previous activation level, AND</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>Deactivate EAP</td>
</tr>
<tr>
<td></td>
<td>Obtain catchment conditions from the DDO and liaise with FODM</td>
<td>Prepare Daily Situation Report, unless otherwise directed</td>
<td></td>
<td></td>
<td></td>
<td>Compile EER and organise delivery to the Dam Safety Regulator by the due date</td>
</tr>
<tr>
<td></td>
<td>Issue Sunwater incident alert (once only on activation of EAP)</td>
<td>Ensure all abnormal observations or damage has been reported to DSTDM</td>
<td></td>
<td></td>
<td></td>
<td>Complete Situation Report (final)</td>
</tr>
<tr>
<td></td>
<td>Record all communication</td>
<td></td>
<td>As per previous activation level</td>
<td></td>
<td></td>
<td>Return to routine activities</td>
</tr>
</tbody>
</table>

**Internal notifications**
- DDO
- LEC
- DSTDM
- FODM
- Sunwater Media Team
- Owner’s Regional Representative

**External notifications**
- DDMG
- D/S Residents

---

Flood levels above EL 672.74 m is a Lean Forward trigger for overturning/sliding – see Chapter 10
### Table 10: 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>
</table>
| **Alert**        | • When EL 670.32 m and rising (Preparedness) | • LDMG1  
• LDMG2 | Phone | Describe current situation with Dam – what is the event  
What is the status  
Advise current storage level  
Advise of any forecasts you are aware of |
|                  | • D/S Residents | • SMS (Phone for those without mobiles) | | SUNWATER EMERGENCY NOTIFICATION  
DAM: TINAROO FALLS  
EVENT: FLOOD  
STATUS: NEAR FULL STORAGE, SPILLWAY DISCHARGE LIKELY  
Current Storage Level: EL XXXX.XX m (XX m below spillway) and rising/steady/falling  
ACTION: PREPARE FOR FLOOD EMERGENCY ACTIVATION |
|                  | | | | Send Sunwater Incident and Near Miss alert |
| **Lean Forward** | • Storage above FSL 670.42 m | • LDMG1  
• LDMG2  
• DDMG | Phone | Describe current situation with Dam – what is the event. What is the status  
Advise current storage level  
Advise of any forecasts you are aware of |
|                  | • D/S Residents | • SMS (Phone for those without mobiles) | | SUNWATER EMERGENCY NOTIFICATION  
DAM: TINAROO FALLS  
EVENT: FLOOD  
STATUS: STORAGE SPILLING  
ACTION: Stay alert for further advice |
| **Stand Up – greater than minor flood level** | • Storage above EL 671.42 m | • LDMG1  
• LDMG2  
• DDMG | Phone | 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  
Advise of any forecasts you are aware of |
|                  | • D/S Residents | • SMS (Phone for those without mobiles) | | SUNWATER EMERGENCY NOTIFICATION  
DAM: TINAROO FALLS  
EVENT: FLOOD  
STATUS: MINOR FLOODING  
ACTION: Monitor weather and local conditions |
Table 10 (continued): 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>Stand Up – greater than flood of record</strong></td>
<td>• Storage above EL 672.74 m</td>
<td>• LDMG1</td>
<td>• LDMG2</td>
<td>• LDMG3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stand Up – greater than major flood level</strong></td>
<td>• Storage above EL 673.12 m</td>
<td>• LDMG1</td>
<td>• LDMG2</td>
<td>• LDMG3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stand Down</strong></td>
<td>• Storage level EL 671.42 m and falling</td>
<td>• LDMG1</td>
<td>• LDMG2</td>
<td>• LDMG3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<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>
### Table 11: Flood operations – DSTDM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up – greater than minor flood level</th>
<th>Stand Up – greater than flood of record</th>
<th>Stand Up – greater than major flood level</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>EL 670.32 m and rising (0.1m below FSL)</td>
<td>Storage between FSL 670.42 m and 671.42 m</td>
<td>Storage between EL 671.42 m and 672.74 m</td>
<td>Storage between EL 672.74 m and 673.12 m</td>
<td>Storage above EL 673.12 m</td>
<td>Storage level below EL 671.42 m and falling</td>
</tr>
</tbody>
</table>
| Action | • 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 | • As per previous activation level | • As per previous activation level | • As per previous activation level | • As per previous activation level | • Forward information for EER to IC  
• Return to routine activities |

**Flood levels above EL 672.74 m is a Lean Forward trigger for overturning/sliding – see Chapter 10**
## Table 12: Flood operations – FODM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up – greater than minor flood level</th>
<th>Stand Up – greater than major flood level</th>
<th>Stand Up – greater than flood of record</th>
<th>Stand Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation trigger</td>
<td>EL 670.32 m and rising (0.1m below FSL)</td>
<td>Storage between FSL 670.42 m and 671.42 m</td>
<td>Storage between EL 671.42 m and 672.74 m</td>
<td>Storage between EL 672.74 m and 673.12 m</td>
<td>Storage above EL 673.12 m</td>
<td>Storage level below EL 671.42 m and falling</td>
</tr>
</tbody>
</table>
| Actions | • Extract data from available sources  
• Update Flood Models as per SOP of OC  
• Update and issue flood operations report  
• Liaise with BOM  
• Update Owner’s Representative, DSTDM and IC re: current flood situation and PFRM results  
• Record all communication | • As per previous activation level | • As per previous activation level | • As per previous activation level | • As per previous activation level | • Forward information for EER to IC  
• Return to routine activities |
| Internal notifications | • IC  
• DDO | • As per previous activation level | • As per previous activation level, AND DSTDM | • As per previous activation level | • As per previous activation level | • As per previous activation level |
| External notifications | • Not applicable | • Not applicable | • Not applicable | • Not applicable | • Not applicable | • Not applicable |

Flood levels above EL 672.74 m is a Lean Forward trigger for overturning/sliding – see Chapter 10

---

**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
6. Dam hazard–chemical spill/toxic conditions

6.1 Overview

The emergency action 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 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 13 to Table 17 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: 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.

Risk reduced: No

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

Risk reduced: Yes

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

Risk reduced: No

**STAND DOWN**

**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.

**IC:**
Monitor and assess if risk has been reduced.
## Table 13: Chemical spill/toxic conditions—DDO emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Down</th>
</tr>
</thead>
</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 | • 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 |
| **Actions** | • Undertake investigations to ascertain the veracity and details of any reports  
• Sketch, measure, photograph and locate its position in the storage/catchment and record using the approved forms in and send to IC & DSTDM  
• Update Dam Log Book as per SOP 12  
• Liaise with DSTDM  
• Record all communication | • Not Applicable | • 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 SOP 12  
• Close storage to recreational use | • Forward information for EER to IC  
• Update Dam Log Book as per SOP 12  
• Return to routine activities |

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

| Internal notifications | IC  
DSTDM | IC  
DSTDM | As per previous activation level |
|------------------------|------|------|-------------------------------|
| **External notifications** | Not applicable | Not applicable | Call 000/112 if emergency services are required  
• Caravan Park Operator | As per previous activation level |

**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 14: Chemical spill/toxic conditions–LEC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Down</th>
</tr>
</thead>
</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 | • Not applicable | • Confirmation of or highly likely 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 |

| Actions | • Liaise with LDMGs re: situation  
• Record all communication | • Not applicable | • Liaise with LDMGs re: situation  
• Check support required to assist DDO in closure of storage to recreational use  
• Record all communication | • Forward information for EER to IC  
• Return to routine activities |

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

| Internal notifications | DDO  
IC | Not applicable | DDO  
IC | As required |
|------------------------|--------|--------------|--------|-----------|
| External notifications | LDMG1  
LDMG2 | Not applicable | LDMG1  
LDMG2  
LDMG3 | 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 15: Chemical spill/toxic conditions–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>
</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 | • 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 |
| **Actions** | • Liaise with DDO, LEC and DSTDM re situation  
• Record all communication  
**NOTE:** For normal BGA management (which is excluded) refer to the Sunwater Policy EM29 BGA Manual. | • Not applicable | • Monitor situation and assess risks  
• Coordinate with the DSTDM and the Senior Environmental Health Officer of the relevant Council to determine need for WQ testing, shut down of treated water supplies and precautionary closure of outlet works  
• Complete situation report SW Incident and Near Miss Alert  
• Consider if any customers in water supply scheme should be notified of the condition. If so, contact customer support on 13 15 89 and have notification messages sent | • Deactivate EAP Event  
• Compile EER and organise delivery to the Regulator within 30 days of the completion of the event  
• Return to routine activities  
• Check WQ Plan for any close out processes  
• Complete situation report |
| **Internal notifications** | • DDO  
• LEC  
• DSTDM | • Not applicable | • DSTDM  
• Owner’s Regional Representative  
• Sunwater Media Team | • Notification of deactivation of the EAP event to be provided to the DDO, LEC and DSTDM |
| **External notifications** | • Not applicable | • Not applicable | • DDMG  
• D/S Residents  
• Treated water supply users | • As per previous activation level |

---

**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 16: Chemical spill/toxic conditions–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>
| **Alert**        | • 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 | LDMG1  
LDMG2 | Phone | Describe current situation with Dam – What is the event (Water Quality).  
What is the status (Investigation underway)  
Advise of any issues you are aware of |
| **Lean Forward** | LEAN FORWARD NOT APPLICABLE | | | |
| **Stand Up**     | • Confirmation or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment | LDMG1  
LDMG2  
LDMG3  
DDMG  
District Disaster Coordinator, if it is a very large spill/toxic condition | Phone | Describe current situation with Dam – What is the event (Water Quality).  
What is the status (AVOID USE OR CONTACT WITH WATER)  
Advise of any issues you are aware of  
Advise EAP has been activated |
|                  | | D/S Residents  
Treated water supply users | SMS | Liaise with Sunwater Customer Support to send SMS: |
|                  | | | | Send SW Incident and Near Miss Alert  
EAP Activation – Tinaroo Falls Dam – Water Quality Incident |
| **Stand Down**   | • Risk Assessment that risk has reduced  
• Confirmation that significant contamination has not occurred  
• All clear WQ test result | LDMG1  
LDMG2  
LDMG3  
DDMG (if stand down from Stand Up) | Phone | Advise EAP has been deactivated  
Describe current situation with Dam – What is the event (Water Quality).  
What is the status (Dam Hazard Stood Down)  
Advise that significant contamination has not occurred and/or the WQ test results are all clear.  
Water is safe to use |
|                  | | D/S Residents (if stand down from Stand Up)  
Treated water supply users (if stand down from Stand Up) | SMS | Liaise with Sunwater Customer Support to send SMS: |
|                  | | | | |
Table 17: Chemical spill/toxic conditions–DSTDM emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Alert</th>
<th>Lean Forward</th>
<th>Stand Up 1</th>
<th>Stand Down</th>
</tr>
</thead>
</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 | • 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 |
| **Action** | • Assess situation and determine need to move to Stand Up  
• Monitor situation and assess risks  
• Record all communication | • Not applicable | • Assess risk and determine actions including need for WQ testing, shut down of treated water supplies and precautionary closure of outlet works  
• Liaise with the IC | • Forward information for EER to IC  
• Return to routine activities |
| **Internal notifications** | • DDO  
• IC | • Not applicable | • DDO  
• IC  
• CEO – if time permits | • As per previous activation level |
| **External notifications** | • Not applicable | • Not applicable | • Not applicable | • Not applicable |

**NOTE:** 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

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

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 may be possible in the form of constructing a filter and weighting zone over the pipe exit if safe to do so.

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

- if dam failure does not occur then there will not be any area affected
- if dam failure does occur then the maximum area affected area is the level shown by the SDF line on the maps in Appendix B

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 increase likelihood of piping. This circumstance is the trigger for the alert status for piping.

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

7.2 Emergency action roles

Table 18 to Table 22 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: Piping: embankment, foundation, or abutments flowchart
### Table 18: Piping: embankment, foundation or abutments—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><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 piping risk has reduced</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>• Monitor flows every 6 hours (or as otherwise instructed by the DSTDM) until a decreasing trend is observable or as directed by the IC</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level, AND</td>
<td>• As per previous activation level, AND</td>
<td>• Forward information for EER to IC</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></td>
<td>• Support/supervise remedial works as required</td>
<td>• Lower reservoir level</td>
<td>• Update Dam Log Book as per SOP 12</td>
</tr>
<tr>
<td></td>
<td>• Notify SO</td>
<td></td>
<td>• Lower the storage if directed</td>
<td>• Vacate the immediate vicinity of the piping condition</td>
<td>• Return to routine activities</td>
</tr>
<tr>
<td></td>
<td>• Update Dam Log Book as per SOP 12</td>
<td></td>
<td>• Close any affected roads if not already closed by others</td>
<td>• Photograph the seepage and piping from a safe point</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Record all communication</td>
<td></td>
<td>• Maintain surveillance of area immediately downstream of dam or saddle dam and ‘move on’ any members of the public</td>
<td>• As per previous activation level, AND</td>
<td></td>
</tr>
<tr>
<td><strong>Internal notifications</strong></td>
<td>• IC</td>
<td>• As per previous activation level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• DSTDM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• SO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>External notifications</strong></td>
<td>• As required</td>
<td>• As required</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></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**

**13 15 89 Sunwater Customer Support 24-hour contact line**
# Tinaroo–2019/20–i8.1

## Table 19: Piping: embankment, foundation or abutments–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 piping risk has reduced</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>• Liaise with DDO, IC and DSTDM re situation</td>
<td>• As per previous activation level</td>
<td>• Liaise with DDO and LDMGs re situation</td>
<td>• As per previous activation level, plus</td>
<td>• Forward information for EER to IC</td>
</tr>
<tr>
<td></td>
<td>• Record all communication</td>
<td></td>
<td>• Liaise with relevant Council(s) regarding potential road/bridge closures</td>
<td></td>
<td>• Return to routine activities</td>
</tr>
<tr>
<td><strong>Internal notifications</strong></td>
<td>• 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 per previous activation level</td>
</tr>
<tr>
<td></td>
<td>• IC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>External notifications</strong></td>
<td>• As required</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level, AND</td>
<td>• LDMG1</td>
</tr>
<tr>
<td></td>
<td>• LDMG1</td>
<td></td>
<td></td>
<td>• LDMG2</td>
<td>• LDMG3</td>
</tr>
<tr>
<td></td>
<td>• LDMG2</td>
<td></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**
# Piping: embankment, foundation, or abutments—IC emergency action

<table>
<thead>
<tr>
<th>Activation trigger</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>Increasing leakage through the embankment, the foundations, or abutments</td>
<td>Increasing leakage through the 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 Sufficient water in storage to create a dam hazard</td>
<td>Risk assessment has determined that piping risk has reduced</td>
<td></td>
</tr>
</tbody>
</table>

### Actions

- Liaise with DDO, LEC and DSTDM re: situation
- Complete Situation Report, unless otherwise directed
- Record all communication
- SW Incident and Near Miss Alert
- As per previous activation level, AND
- Investigate availability of machinery and materials (if insufficient stockpiles available)
- Place machinery operators on standby if directed by DSTDM
- Consider the need to appoint a recovery coordinator. The recovery coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over.
- As per previous activation level, AND
- Mobilise resources to undertake remedial works if directed by DSTDM
- As per previous activation level
- Deactivate EAP
- Compile EER and organise delivery to the Dam Safety Regulator by the due date
- Complete Situation Report (final)
- Return to routine activities
- As per previous activation level
- Mobilise resources to undertake remedial works if directed by DSTDM
- As per previous activation level
- Notification of deactivation of the EAP event to be provided to the DDO, LEC, DSTDM and Owner’s regional representative

### Internal notifications

- DDO
- LEC
- DSTDM
- Sunwater Media Team
- Owner’s Regional Representative
- As per previous activation level
- As per previous activation level
- As per previous activation level
- Notification of deactivation of the EAP event to be provided to the DDO, LEC, DSTDM and Owner’s regional representative

### External notifications

- As required
- DDMG
- SDCC Watch Desk
- D/S Residents
- As per previous activation level
- As per previous activation level
- 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
## Tinaroo–2019/20–i8.1

### Table 21: Piping: embankment, foundation or abutments–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>Increasing leakage through an embankment, the Foundations or abutments</td>
<td>Send SW Incident and Near Miss Alert</td>
<td>Phone</td>
<td>Tinaroo Falls Dam possible piping issue not confirmed</td>
</tr>
<tr>
<td><strong>Lean Forward</strong></td>
<td>Increasing leakage through an embankment, the Foundations or abutments with cloudy water</td>
<td>LDMG1, LDMG2</td>
<td>Phone</td>
<td>Describe current situation with Dam – What is the event (Unconfirmed piping risk). What is the status (Unconfirmed leakage – investigation continues). Advise of current storage level. Advise any issues you are aware of. Standby for further advice.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tinaroo Falls Dam Possible piping issue not confirmed</td>
</tr>
<tr>
<td><strong>Stand Up 1</strong></td>
<td>Piping condition has been established</td>
<td>LDMG1, LDMG2, DDMG</td>
<td>Phone</td>
<td>Describe current situation with Dam – What is the event (Confirmed piping risk). What is the status (Confirmed piping/leakage). Advise of current storage level. Advise any issues you are aware of. Prepare for possible evacuations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tinaroo Falls Dam piping established. Failure possible but not in progress.</td>
</tr>
</tbody>
</table>

Liaise with Sunwater Customer Support to send SMS:
- Sunwater Emergency notification
- DAM: Tinaroo Falls
- EVENT: Dam safety risk—piping
- STATUS: Confirmed—piping/leakage
- ACTION: Possible issue at dam listen for further advice

13 15 89 Sunwater Customer Support 24-hour contact line
## Table 21: Piping: embankment, foundation or abutments—LEC and IC communication plan (continued)

<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>Stand Up 2</strong></td>
<td>• Failure likely due to piping; AND • Sufficient water in storage to create a dam hazard</td>
<td><strong>LDMG1</strong> • <strong>LDMG2</strong> • <strong>LDMG3</strong> • <strong>DDMG</strong></td>
<td><strong>Phone</strong></td>
<td>Describe current situation with Dam – What is the event (Confirmed piping risk). What is the status (Possible Dam Failure) Advise of current storage level Prepare coordinated evacuations</td>
</tr>
<tr>
<td></td>
<td>• SDCC Watch desk</td>
<td><strong>Email &amp; Phone</strong></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td><strong>D/S Residents</strong></td>
<td><strong>SMS (phone for those without mobiles)</strong></td>
<td></td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification—urgent DAM: Tinaroo Falls EVENT: Dam safety risk—piping STATUS: Dam failure likely ACTION: Possible evacuation follow instructions of emergency services</td>
</tr>
<tr>
<td><strong>Send SW Incident and Near Miss Alert</strong></td>
<td></td>
<td></td>
<td></td>
<td>Tinaroo Falls Dam – Piping Failure likely</td>
</tr>
<tr>
<td></td>
<td>• Dam failure in progress</td>
<td><strong>LDMG1</strong> • <strong>LDMG2</strong> • <strong>LDMG3</strong> • <strong>DDMG</strong></td>
<td><strong>Phone</strong></td>
<td>Describe current situation with Dam – What is the event (Confirmed piping 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>• SDCC Watch Desk</td>
<td><strong>Email &amp; Phone</strong></td>
<td></td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and Appendix A10 with blank form in Appendix D) and email to SDCC Watch Desk to send.</td>
</tr>
<tr>
<td></td>
<td><strong>D/S Residents</strong></td>
<td><strong>SMS (phone for those without mobiles)</strong></td>
<td></td>
<td>Liaise with Sunwater Customer Support to send appropriate SMS in accordance with instructions in Appendix A8 and Appendix A10.</td>
</tr>
<tr>
<td><strong>Stand Down</strong></td>
<td>• Risk assessment determined that piping risk has reduced</td>
<td><strong>LDMG1</strong> • <strong>LDMG2</strong> • <strong>LDMG3</strong> • <strong>DDMG (if from Stand Up)</strong></td>
<td><strong>Phone</strong></td>
<td>Advise deactivation of EAP 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>
</tbody>
</table>
## Table 22: Piping: embankment, foundation or abutments–DSTDM 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 piping risk has reduced</td>
</tr>
<tr>
<td><strong>Action</strong></td>
<td>● Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so.</td>
<td>● As per previous activation level</td>
<td>● Assess risk and determine if failure likely or in progress</td>
<td>● Liaise with the LEC and IC</td>
<td>● Forward information for EER to IC</td>
</tr>
<tr>
<td></td>
<td>● Determine if piping condition has been established</td>
<td></td>
<td>● Determine if remedial repairs are practical</td>
<td></td>
<td>● Return to routine activities</td>
</tr>
<tr>
<td></td>
<td>● Monitor situation and assess risks</td>
<td></td>
<td>● Determine if risks can be reduced by lowering storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Record all communication</td>
<td></td>
<td>● Supervise* remedial repairs (if applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Monitor situation and assess risks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Internal notifications
- DDO
- LEC
- IC

<table>
<thead>
<tr>
<th><strong>External notifications</strong></th>
<th>As required</th>
<th>Dam Safety Regulator</th>
<th>As per previous activation level</th>
<th>As per previous activation level</th>
<th>As per previous activation level</th>
</tr>
</thead>
</table>

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.

---

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

- If dam failure does not occur then there will not be any area affected
- If dam failure does occur then the maximum area affected area is the level shown by the SDF line on the maps in Appendix B.

8.2 Emergency Actions

Table 23 to Table 27 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: 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:** Assess surveillance report.

**STAND DOWN**

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

**LEAN FORWARD**

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

- **Yes:**
  - **DSTDM:** Is failure likely or in progress?
    - **Yes:**
      - **DSTDM:** Determine if:
        - Remedy repairs are practical
        - Risk can be reduced by lowering storage
        - Supervise remedial works
    - **No:**
      - **DDO:** Undertake surveillance inspection during daylight hours
      - **DDO:** Assess severity using Modified Mercalli (MM) scale
      - **DDO:** Has any change been noted?
        - **Yes:**
          - **DSTDM:** Monitor and assess if risk has been reduced
        - **No:**
          - **DDO:** Undertake surveillance inspection during daylight hours
          - **DDO:** Assess severity using Modified Mercalli (MM) scale
          - **DDO:** Has any change been noted?
            - **Yes:**
              - **DSTDM:** Monitor and assess if risk has been reduced
            - **No:**
              - **DDO:** Undertake surveillance inspection during daylight hours
              - **DDO:** Assess severity using Modified Mercalli (MM) scale
              - **DDO:** Has any change been noted?

- **No:**
  - **DSTDM:** Has any change been noted?
    - **Yes:**
      - **DSTDM:** Immediate surveillance inspection
    - **No:**
      - **DSTDM:** Immediate surveillance inspection
Table 23: Earthquake–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>
</table>
| **Activation trigger** | • Earthquake reported or felt in the area, AND  
• Intensity less than 5 MM*  
• Earthquake reported or felt in the area, AND  
• 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  | • Failure in progress or likely due to earthquake, AND  
• Sufficient water in storage to create a dam hazard  | • Risk Assessment has determined that failure risk has reduced  |
| **Actions** | • Inspect the Dam Wall, Spillway Structure and Abutments in daylight hours (if safe to do so) and report to the DSTDM and IC - photograph/video and record using forms in Appendix D and send to IC & DSTDM  
• Check for leaks, deformation, erosion, and concrete damage  
• Notify SO  
• Update Dam Log Book as per SOP 12  
• Record all communication  | • Immediately inspect the Dam Wall, Spillway Structure and Abutments (if safe to do so) and report to the DSTDM and IC (unless inspection completed in Alert Stage) - photograph/video and record using forms in Appendix D and send to IC & DSTDM  
• Repeat the inspection as directed  
• Provide inspection report to DSTDM  
• Update dam Log Book as per SOP 12  | • As per previous activation level, AND  
• Support/supervise remedial work as required  
• Lower the storage if directed  
• Close any affected roads, if not already closed by others  
• Maintain surveillance of area immediately downstream of dam or saddle dam (if safe to do so) and 'move on' any members of the public  
• Sound Siren  
• Photograph the damage from a safe point  
• Vacate the immediate vicinity of the Embankment  | • As per previous activation level  
• Forward information for event report to IC  
• Update Dam Log Book as per SOP 12  
• Return to routine activities  |
| **Internal notifications** | • IC  
• DSTDM  
• SO  | • As per previous activation level  | • As per previous activation level  | • As per previous activation level  | • As per previous activation level  |
| **External notifications** | • As required  | • As required  | • As required  | • As required  | • As per previous activation level  |

* DDO to assess magnitude (MM scale) at dam location.

---

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

---

13 15 89 Sunwater Customer Support 24-hour contact line
The Modified Mercalli (MM) Scale is in Appendix D.

### Table 24: Earthquake–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>Activation trigger</td>
<td>- Earthquake reported or felt in the area, AND intensity less than 5 MM</td>
<td>- Earthquake reported or felt in the area, AND intensity greater than or equal to 5 MM; OR intensity less than 5 MM and change detected during surveillance inspection</td>
<td>- Earthquake reported or felt in the area, AND a possible failure path has been identified</td>
<td>- Failure in progress or likely due to earthquake, 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>

**Actions**

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

**Internal notifications**

- DDO
- IC
- As per previous activation level
- As per previous activation level
- As per previous activation level
- As per previous activation level

**External notifications**

- As required
- LDMG1
- LDMG2
- As per previous activation level
- As per previous activation level, and LDMG3
- As per previous activation level

---

**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 25: Earthquake—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>
</table>
| **Activation trigger** | • Earthquake reported or felt in the area, AND  
• Intensity less than 5MM | • Earthquake reported or felt in the area, AND  
• Intensity greater than or equal to 5MM, 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 | • Failure in progress or likely due to earthquake, AND  
• Sufficient water in storage to create a dam hazard | • Risk assessment has been determined that failure risk has reduced |
| **Actions** | • Liaise with DDO, LEC and DSTDM re: situation  
• Record all communication | • Liaise with DDO, DSTDM, and LEC re: situation  
• Investigate availability of machinery and materials (if insufficient stockpiles available)  
• Place machinery operators on standby if directed by DSTDM  
• Complete Situation Report, unless otherwise directed  
• SW Incident and Near Miss Alert | • As per previous activation level, AND  
• Mobilise resources to undertake remedial works if directed by DSTDM | • As per previous activation level | • Deactivate EAP  
• Compile EER and organise delivery to the Dam Safety Regulator by the due date  
• Complete Situation Report (final)  
• Return to routine activities |
| **Internal notifications** | • DDO  
• LEC  
• DSTDM  
• Sunwater Media Team  
• Owner’s Regional Representative | • As per previous activation level | • As per previous activation level | • As per previous activation level | • Notification of deactivation of the EAP event to be provided to the DDO, LEC, DSTDM and Owner’s Regional Representative |
| **External notifications** | • As required | • As required | • DDMG  
• SDCC Watch Desk  
• D/S Residents | • As per previous activation level | • As required |

---

The Modified Mercalli (MM) Scale is in Appendix D.

---

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
The Modified Mercalli (MM) Scale is in Appendix D.

Table 26: 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>Alert</td>
<td>• Earthquake reported or felt in the area, AND • Intensity less than 5 MM</td>
<td>N/A</td>
<td>Phone</td>
<td>N/A – Internal Communications Only</td>
</tr>
<tr>
<td>Lean Forward</td>
<td>• Earthquake reported or felt in the area • Intensity greater than or equal to 5 MM, OR • Intensity less than 5 MM and change detected during surveillance inspection</td>
<td>LDMG1, LDMG2</td>
<td>Phone</td>
<td>Describe current situation with Dam – What is the event (Dam Safety Risk – Earthquake damage). What is the status (Under investigation) Advise of current storage level Advise EAP has been activated Stand by for further information</td>
</tr>
<tr>
<td></td>
<td>Send Sunwater Incident and Near Miss report</td>
<td></td>
<td></td>
<td>EAP Activation – Tinaroo Falls Dam – Earthquake reported in area</td>
</tr>
<tr>
<td>Stand Up 1</td>
<td>• Earthquake reported or felt in the area, AND • A possible failure path has been identified</td>
<td>SDCC Watch desk</td>
<td>Email &amp; Phone</td>
<td>Complete Emergency Alert Request Form as per instructions (blank copy in Appendix D) and email to SDCC Watch Desk to send.</td>
</tr>
<tr>
<td></td>
<td>• SDCC Watch desk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• D/S Residents</td>
<td>SMS</td>
<td></td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification DAM: Tinaroo Falls EVENT: Dam safety risk—earthquake damage STATUS: Confirmed—earthquake damage ACTION: Possible issue at dam listen for further advice</td>
</tr>
<tr>
<td></td>
<td>• D/S Residents</td>
<td>SMS (phone for those without mobiles)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 26 (Continued): Earthquake–LEC & 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>Stand Up 2</strong></td>
<td>• Failure likely due to earthquake, and • Sufficient water in storage to create a dam hazard</td>
<td>• LDMG1, LDMG2, LDMG3, DDMG</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 of current storage level Prepare coordinated evacuation</td>
</tr>
<tr>
<td></td>
<td>• SDCC Watch desk</td>
<td>• Email &amp; Phone</td>
<td>Complete Emergency Alert Request Form as per instructions (blank copy in Appendix D) and email to SDCC Watch Desk to send.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• D/S Residents</td>
<td>• SMS (phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification—urgent DAM: Tinaroo Falls EVENT: Dam safety risk—earthquake damage STATUS: Dam failure likely ACTION: Possible evacuation follow instructions of emergency services</td>
<td></td>
</tr>
<tr>
<td><strong>Send SW Incident and Near Miss Alert</strong></td>
<td>Tinaroo Falls Dam – Earthquake Failure likely</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dam failure in progress</td>
<td>• LDMG1, LDMG2, LDMG3, DDMG</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 In Progress)? Advise of current storage level LDMGs to coordinate evacuation of Downstream Residents and move people to higher ground</td>
</tr>
<tr>
<td></td>
<td>• SDCC Watch desk</td>
<td>• Email &amp; Phone</td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and Appendix A10 with blank form in Appendix D) and email to SDCC Watch Desk to send.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• D/S Residents</td>
<td>• SMS (phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send appropriate SMS in accordance with instructions in Appendix A8 and Appendix A10.</td>
<td></td>
</tr>
<tr>
<td><strong>Send SW Incident and Near Miss Alert</strong></td>
<td>Tinaroo Falls Dam – Earthquake Failure in progress</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stand Down</strong></td>
<td>• Risk assessment has determined that failure risk has reduced</td>
<td>• LDMG1, LDMG2, LDMG3, DDMG</td>
<td>• Phone</td>
<td>Advise deactivation of EAP 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</td>
</tr>
<tr>
<td></td>
<td>• D/S Residents</td>
<td>• SMS (phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification DAM: Tinaroo Falls EVENT: Dam safety risk—earthquake damage STATUS: Dam hazard stood down ACTION: None</td>
<td></td>
</tr>
</tbody>
</table>
The Modified Mercalli (MM) Scale is in Appendix D.

Table 27: Earthquake–DSTDM 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>• Earthquake reported or felt in the area, AND • Intensity less than 5 MM</td>
<td>• Earthquake reported or felt in the area, AND • Intensity greater than or equal to 5 MM, OR • Intensity less than 5 MM and change detected during surveillance inspection</td>
<td>• Earthquake reported or felt in the area, AND • A possible failure path has been identified</td>
<td>• Failure in progress or likely due to earthquake, 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><strong>Action</strong></td>
<td>• Monitor situation and assess risks • Liaise with DDO and IC • Record all communication</td>
<td>• Review surveillance inspection of the dam and assess its condition as soon as possible • Determine if there are possible failure paths from reported damage</td>
<td>• Arrange a DSTDM 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 the IC • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage • Supervise* remedial repairs (if applicable) • Monitor situation and assess risks</td>
<td>• As per previous activation level</td>
<td>• Forward information for EER to IC • Return to routine activities</td>
</tr>
<tr>
<td><strong>Internal notifications</strong></td>
<td>• DDO • IC</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level, AND • CEO – if time permits</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
</tr>
<tr>
<td><strong>External notifications</strong></td>
<td>• As required</td>
<td>• Dam Safety Regulator</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
</tr>
</tbody>
</table>

* Supervision means provide technical oversight to the work. It does not necessarily mean onsite supervision.

NOTE: ‘Reported’ is defined as an alert received from Geoscience Australia or other source that advises an Earthquake >4.8ML (Richter Scale) has occurred within a 200km radius of the Dam.

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
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 meteor.

The vulnerability of Tinaroo Falls Dam to a terrorist attack is low.

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

- if dam failure does not occur then there will not be any area affected
- if dam failure does occur then the maximum area affected area is the level shown by the SDF line on the maps in Appendix B.

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 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 28 to Table 32 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 7: Terrorist threat/activity or high energy impact flowchart**

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

**EVENT**
Large explosion or impact.

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

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

**DDO:**
Immediate surveillance inspection.

**IC:**
Assess risks.

**DSTDM:**
Assess surveillance report.

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

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

**IC:**
Assess risks.

**DSTDM:**
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.

**STAND DOWN**

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

**IC and LEC:**
Liaise with Police and LDMS.

Risk reduced: Yes

No

Yes

No

Yes

No

限期 2019/20 – i8.1

PRODUCTION-#2450051-v1-Tinaroo_Dam_EAP__--_I8_1.docx8

Page 54
# Tinaroo–2019/20–i8.1

## Table 28: 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><strong>Activation trigger</strong></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><strong>Actions</strong></td>
<td>● Not applicable</td>
<td>● If any suspicious behaviour noticed, contact DSTDM for advice. If instructed by DSTDM, or if treat 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 &amp; DSTDM Close any affected roads, if not already closed by others Notify SO Update Dam Log Book as per SOP 12 If Police appoint incident manager support and follow instructions</td>
<td>● Notify National Security or 000/112 Undertake surveillance inspect dam (if safe) Photograph/video the damage from a safe point and record using the approved forms in Appendix D and send to IC &amp; DSTDM Close any affected roads, if not already closed by others Notify SO Update Dam Log Book as per SOP 12 If Police appoint incident manager support and follow instructions</td>
<td>● As per previous activation level, AND Lower reservoir level, if directed Update Dam Log Book as per SOP 12</td>
<td>● Forward information for EER to IC Update Dam Log Book as per SOP 12 Return to routine activities</td>
</tr>
<tr>
<td><strong>Internal notifications</strong></td>
<td>● Not applicable</td>
<td>● DSTDM ● IC ● SO</td>
<td>● As per previous activation level</td>
<td>● As per previous activation level</td>
<td>● As per previous activation level</td>
</tr>
<tr>
<td><strong>External notifications</strong></td>
<td>● Not Applicable</td>
<td>● Notify immediately the National Security Line or 000/112</td>
<td>● As per previous activation level</td>
<td>● As per previous activation level</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 29: 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>• Threat received</td>
<td>• Large explosion/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>

### Actions

- • Not applicable
- • Liaise with DDO, IC and LDMGs re situation
- • Complete Situation Report, as directed by DSTDM
- • If police appoint incident manager, support and follow instructions
- • Monitor situation and assess risks
- • Liaise with relevant Council(s) regarding possible road/bridge closures
- • As per previous activation level
- • As per previous activation level, plus Liaise with DDO and LDMGs re potential for evacuations
- • Forward information for EER to IC
- • Return to routine activities

### Internal notifications

- • Not applicable
- • DDO
- • IC
- • As per previous activation level
- • As per previous activation level
- • As per previous activation level

### External notifications

- • Not applicable
- • LDMG1
- • LDMG2
- • As per previous activation level
- • As per previous activation level, plus LDMG3
- • As per previous activation level

---

**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 30: Terrorist threat/activity or high energy impact—IC 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>
</table>
| **Activation trigger** | • Not applicable | • Possible terrorist activity/suspicious behaviour noticed at the dam, OR  
• Threat received | • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) | • Failure in progress or likely due to impact or explosion, AND  
• Sufficient water in storage to create a dam hazard | • Risk assessment has determined that failure risk has reduced |
| **TREATMENT** | • Liaise with DDO, DSTDM, and LEC re: situation  
• Complete Situation Report, unless otherwise directed  
• If Police appoint incident manager support and follow instructions  
• Monitor situation and assess risks  
• Record all communication  
• SW Incident and Near Miss Alert | • Liaise with DDO, DSTDM, and LEC re: situation  
• Complete Situation Report unless otherwise directed  
• If Police appoint incident manager support and follow instructions  
• Monitor situation and assess risks  
• SW Incident and Near Miss Alert | • Liaise with DDO, DSTDM, and LEC re: potential for evacuations  
• Mobilise resources to undertake remedial works if directed by DSTDM  
• Complete Situation Report unless otherwise directed  
• If Police appoint incident manager support and follow instructions  
• Monitor situation and assess risks  
• SW Incident and Near Miss Alert | • Deactivate EAP event  
• Compile EER and organise delivery to the Dam Safety Regulator by the due date  
• Complete Situation Report (final)  
• Return to routine activities |
| **RESPONSE** | • Not applicable | • Liaise with DDO, DSTDM, and LEC re: potential for evacuations  
• Mobilise resources to undertake remedial works if directed by DSTDM  
• Complete Situation Report unless otherwise directed  
• If Police appoint incident manager support and follow instructions  
• Monitor situation and assess risks  
• SW Incident and Near Miss Alert | • Not applicable | • As per previous activation level | • As per previous activation level | • Notification of deactivation of the EAP event to be provided to the DDO, LEC and DSTDM |
| **Internal notifications** | • Not applicable | • DDO  
• LEC  
• DSTDM  
• Owner’s Regional Representative  
• Sunwater Media Team | • As per previous activation level | • As per previous activation level | • As per previous activation level |
| **External notifications** | • Not applicable | • DDMG  
• National Security Hotline (if not completed by DDO) | • As per previous activation level AND  
• SDCC Watch Desk  
• D/S Residents | • As per previous activation level | • As per previous activation level | • As per previous activation level |

---

**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 31: 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>
<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>
</tbody>
</table>

### Stand Up 1

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

- National Security Hotline
- DDMG
- LDMG1
- LDMG2

- Phone

*Describe current situation with Dam – What is the event (Dam Safety Risk – Security threat/ impact/ explosion etc.). What is the status (Received/ noted terrorist threat)*

*Activate emergency response*

**Send SW Incident and Near Miss Alert**

**Tinaroo Falls Dam Possible Terrorist Activity**

### Stand Up 2

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

- LDMG1
- LDMG2
- DDMG

- Phone

*Describe current situation with Dam – What is the event (Dam Safety Risk – Security threat/ impact/ explosion etc.). What is the status (Under Investigation)*

*LDMGs to prepare coordinated evacuation*

**SDCC Watch desk**

**Email & Phone**

**Complete Emergency Alert Request Form as per instructions (blank copy in Appendix D) and email to SDCC Watch Desk to send.**

**D/S Residents**

**SMS (phone for those without mobiles)**

*Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification—urgent DAM: Tinaroo Falls EVENT: Dam safety risk—security threat/impact/explosion STATUS: Under investigation ACTION: Possible evacuation follow instructions of emergency services*

### Stand Up 3

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

- DDMG
- LDMG1
- LDMG2
- LDMG3

- Phone

*Describe current situation with Dam – What is the event (Dam Safety Risk – Security threat/ impact/ explosion etc.). What is the status (Dam Failure Likely In Progress)*

*LDMGs to initiate evacuations*

**SDCC Watch desk**

**Email & Phone**

**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and Appendix A10 with blank form in Appendix D) and email to SDCC Watch Desk to send.**

**D/S Residents**

**SMS (phone for those without mobiles)**

*Liaise with Sunwater Customer Support to send SMS: IMMINENT FAILURE OF TINAROO FALLS DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. MAREEBA IS AT RISK. INFO ON ABC RADIO. ATHERTON & CAIRNS ARE SAFE.*

13 15 89 Sunwater Customer Support 24-hour contact line
### Table 31: Terrorist threat/activity or high energy impact–LEC and IC communication plan (continued)

<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 Down</td>
<td>• Risk assessment has determined that failure risk has reduced</td>
<td>• LDMG1 • LDMG2 (if from Stand Up 3) • LDMG3 (if from Stand Up 3) • DDMG</td>
<td>• Phone</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>• D/S Residents</td>
<td>• SMS (phone for those without mobiles)</td>
<td>• Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification DAM: Tinaroo Falls EVENT: Dam safety risk—security threat/impact/explosion STATUS: Dam hazard stood down ACTION: None</td>
<td></td>
</tr>
</tbody>
</table>

13 15 89 Sunwater Customer Support 24-hour contact line
### Table 32: 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</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</td>
<td>• Risk assessment has determined that failure risk has reduced</td>
</tr>
<tr>
<td>Action</td>
<td>• Not applicable</td>
<td>• Liaise with IC and DDO</td>
<td>• Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so</td>
<td>• Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so</td>
<td>• Forward information for EER to IC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Liaise with Sunwater Executive</td>
<td>• Assess risk and determine if failure likely or in progress</td>
<td>• Liaise with the IC</td>
<td>• Return to routine activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Record all communication</td>
<td>• Determine if remedial repairs are practical</td>
<td>• Liaise with the IC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Determine if risks can be reduced by lowering storage.</td>
<td>• Determine if remedial repairs are practical</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Supervise* remedial repairs (if applicable)</td>
<td>• Determine if risks can be reduced by lowering storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Monitor situation and assess risks</td>
<td>• Supervise* remedial repairs (if applicable)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Monitor situation and assess risks</td>
<td></td>
</tr>
<tr>
<td>Internal Notifications</td>
<td>• Not applicable</td>
<td>• IC</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level, AND</td>
<td>• As per previous activation level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DDO</td>
<td></td>
<td>• CEO – if time permits</td>
<td></td>
</tr>
<tr>
<td>External Notification</td>
<td>• Not applicable</td>
<td>• As required</td>
<td>• Dam Safety Regulator</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
</tr>
</tbody>
</table>

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.
10. Dam hazard–overturning or sliding of monoliths

10.1 Overview

The emergency action described in this section relates to a potential dam hazard due to overturning or sliding of one or more of the concrete monoliths.

If one or more monoliths become unstable, a dam failure may result. If movement is detected early, remedial actions may be possible depending on the nature of the damage.

The stability of the dam in its current configuration has been fully evaluated. Overturning or sliding of a monolith should not occur for any loading. However if a change were to be introduced it is possible that an unstable situation could be created that would lead to a dam failure. The most likely cause of a change that could lead to an unstable situation would be scouring at or near the toe of a monolith during a large flood event.

The area likely to be affected by this dam hazard is described as:
- if dam failure does not occur then there will not be any area affected
- if dam failure occurs with concurrent flooding, then the maximum affected area is the level shown by the PMPDF line on the maps in Appendix B
- if dam failure occurs with no concurrent flooding, then the maximum affected area is the level shown by the SDF line on the maps in Appendix B.

If the DSTDM forms the view that significant scouring is occurring then the need for evacuations should be considered by disaster management authorities.

10.1.1 Assessment of circumstances that indicates an increase in the likelihood of overturning

An earthquake is a circumstance that could indicate an increased likelihood of overturning. Inspections following an earthquake would identify if any movement had taken place which is the alert status for overturning.

An increase in lake level beyond 672.74 m is a circumstance that could indicate an increase likelihood of overturning. This circumstance is the trigger for the lean forward status for overturning.

An increase in seepage is a circumstance that could indicate an increased likelihood of overturning. This circumstance is the alert status for overturning.

10.2 Emergency Actions

Table 33 to Table 37 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 8: Overturning or sliding of monoliths flowchart**

**ALERT**
Indications of movement noted.

**LEAN FORWARD**
Storage level of flood of record or increase in movement or seepage.

**DSTDM:**
Assess surveillance report.

**DSTDM:**
Assess information and risk.

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

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

**DSTDM:**
Assess surveillance report.

**DSTDM:**
Arrange inspection as soon as possible.

**DSTDM:**
Assess information and risk.

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

**STAND DOWN**
Risk reduced: Yes

**STAND UP**
Obvious displacement of monolith or scouring at toe.

**DSTDM:**
Assess surveillance report.

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

**DSTDM:**
Supervise remedial works.

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

**LEC:**
Liaise with LDMG.

**LEC:**
Liaise with LDMG: evacuations.

**Risk reduced:**
Yes

**Risk reduced:**
No

**Risk reduced:**
No
### Table 33: Overturning or sliding of monoliths—DDO emergency action

<table>
<thead>
<tr>
<th>Activation trigger</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>Indications of movement of monoliths noted such as cracking, increased seepage, spilling</td>
<td></td>
<td>Storage level at flood of record level of EL 672.74 m</td>
<td>Obvious displacement of one or more monoliths, OR</td>
<td>Failure in progress or likely due to sliding or over turning</td>
<td>Risk Assessment has determined that sliding or over turning risk has reduced</td>
</tr>
<tr>
<td>Monitor dam every 6 hours (or as otherwise instructed by the DSTDM) until a decreasing trend is observable or as directed by the IC</td>
<td></td>
<td>As per previous activation level</td>
<td>As per previous activation level, AND</td>
<td>As per previous activation level, AND</td>
<td>Forward information for EER to IC</td>
</tr>
<tr>
<td>Maintain photographic record</td>
<td></td>
<td>Lower the storage if directed</td>
<td>Maintain surveillance of area immediately downstream of dam or saddle dam and ‘move on’ any members of the public</td>
<td>Vacate the immediate vicinity of the Embankment</td>
<td>Update Dam Log Book as per SOP 12</td>
</tr>
<tr>
<td>Notify SO</td>
<td></td>
<td>Update Dam Log Book as per SOP 12</td>
<td>Update Dam Log Book as per SOP 12</td>
<td>Update Dam Log Book as per SOP 12</td>
<td>Return to routine activities</td>
</tr>
<tr>
<td>Update Dam Log Book as per SOP 12</td>
<td></td>
<td>Record all communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record all communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Internal notifications

<table>
<thead>
<tr>
<th>DSTDM</th>
<th>SO</th>
<th>IC</th>
<th>DSTDM</th>
<th>SO</th>
<th>IC</th>
<th>DSTDM</th>
<th>SO</th>
<th>IC</th>
</tr>
</thead>
<tbody>
<tr>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### External notifications

<table>
<thead>
<tr>
<th>As required</th>
<th>As required</th>
<th>As required</th>
<th>As required</th>
<th>As required</th>
</tr>
</thead>
</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 34: Overturning or sliding of monoliths—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>• Indications of movement of monoliths noted such as cracking, increased seepage, spilling</td>
<td>• Storage level at flood of record level of EL 672.74 m</td>
<td>• Obvious displacement of one or more monoliths, OR Evidence of scouring at or near toe of dam</td>
<td>• Failure in progress or likely due to sliding or over turning</td>
<td>• Risk Assessment has determined that sliding or over turning risk has reduced</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>• Liaise with LDMGs re situation • Record all communication</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level, AND Liaise with LDMGs re potential for evacuations</td>
<td>• Forward information for EER to IC Return to routine activities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internal notifications</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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 per previous activation level</td>
</tr>
<tr>
<td></td>
<td>IC</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External notifications</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not applicable</td>
<td>LDMG1</td>
<td>LDMG1</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LDMG2</td>
<td>LDMG2</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LDMG3</td>
<td>LDMG3</td>
<td>As per previous activation level</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 35: Overturning or sliding of monoliths–IC emergency action

<table>
<thead>
<tr>
<th>Activation trigger</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>Indications of movement of monoliths noted such as cracking, increased seepage, spilling</td>
<td>Storage level at flood of record level of EL 672.74 m</td>
<td>Obvious displacement of one or more monoliths, OR Evidence of scouring at or near toe of dam</td>
<td>Failure in progress or likely due to sliding or over turning</td>
<td>Risk Assessment has determined that sliding or over turning risk has reduced</td>
<td></td>
</tr>
<tr>
<td>Activation trigger</td>
<td>Alert</td>
<td>Lean Forward</td>
<td>Stand Up 1</td>
<td>Stand Up 2</td>
<td>Stand Down</td>
</tr>
<tr>
<td>Liaise with DDO, LEC and DSTDM re situation</td>
<td>Complete Situation Report or as directed by DSTDM</td>
<td>SW Incident and Near Miss Alert</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>
</tr>
<tr>
<td>Actions</td>
<td>Internal notifications</td>
<td>External notifications</td>
<td>As per previous activation level</td>
<td>As per previous activation level, AND</td>
<td>As per previous activation level</td>
</tr>
<tr>
<td>DDO</td>
<td>DSTDM</td>
<td>LEC</td>
<td>As per previous activation level</td>
<td>As per previous activation level, AND</td>
<td>Owner’s Regional Representative</td>
</tr>
<tr>
<td>Internal notifications</td>
<td>External notifications</td>
<td>Notification of deactivation of the EAP event to be provided to the DDO, LEC and DSTDM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td>Not applicable</td>
<td>SDCC</td>
<td>D/S Residents</td>
<td>As per previous activation level</td>
<td>As per previous activation level</td>
</tr>
<tr>
<td>External notifications</td>
<td>Internal notifications</td>
<td>As per previous activation level</td>
<td>As per previous activation level, AND</td>
<td>Owner’s Regional Representative</td>
<td>Sunwater Media Team</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 36: Overturning or sliding of monoliths—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>• Indications of movement of monoliths noted such as cracking, increased seepage, spilling</td>
<td>• Nil</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lean Forward</strong></td>
<td>• Storage level at flood of record level of EL 672.74 m</td>
<td>• LDMG1 • LDMG2 • LDMG3</td>
<td>Phone</td>
<td>Describe current situation with Dam – What is the event (UNCONFIRMED INSTABILITY OF DAM). What is the status (UNDER INVESTIGATION) Advise current storage level Advise of any forecasts you are aware of Confirm EAP has been activated</td>
</tr>
<tr>
<td></td>
<td>Send SW Incident and Near Miss Alert</td>
<td>Tinaroo Falls Dam Possible instability issue not confirmed</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stand Up 1</strong></td>
<td>• Obvious displacement of one or more monoliths, OR Evidence of scouring at or near toe of dam</td>
<td>• LDMG1 • LDMG2 • LDMG3 • DDMG</td>
<td>Phone</td>
<td>Describe current situation with Dam – What is the event (CONFIRMED INSTABILITY OF DAM). What is the status (PREPARE FOR POSSIBLE EVACUATIONS) Advise current storage level Advise of any forecasts you are aware of</td>
</tr>
<tr>
<td></td>
<td>Send SW Incident and Near Miss Alert</td>
<td>Tinaroo Falls Dam Piping established. Failure possible but not in progress</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **SDCC Watch Desk** • Email & Phone
  - Complete Emergency Alert Request Form as per instructions (blank copy in Appendix D) and email to SDCC Watch Desk to send.

- **D/S Residents** • SMS (phone for those without mobiles)
  - Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification DAM: Tinaroo Falls EVENT: Dam safety risk—overturning/sliding STATUS: Confirmed—instability of dam ACTION: Possible issue at dam listen for further advice

13 15 89 Sunwater Customer Support 24-hour contact line
Table 36 (continued): Overturning or sliding of monoliths–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>Stand Up 2</strong></td>
<td>• Failure in progress or likely due to sliding or overturning</td>
<td>• LDMG1, LDMG2, LDMG3, DDMG</td>
<td>Phone</td>
<td>Describe current situation with Dam – What is the event (POSSIBLE DAM FAILURE). What is the status (PREPARE COORDINATED EVACUATION). Advise current storage level. Advise of any forecasts you are aware of.</td>
</tr>
<tr>
<td></td>
<td>• SDCC Watch Desk</td>
<td>• Email &amp; Phone</td>
<td>Complete Emergency Alert Request Form as per instructions (blank copy in Appendix D) and email to SDCC Watch Desk to send.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dam failure in progress</td>
<td>• LDMG1, LDMG2, LDMG3</td>
<td>Phone</td>
<td>Describe current situation with Dam – What is the event (DAM FAILURE). What is the status (DAM FAILURE IN PROGRESS, MOVE TO HIGHER GROUND - LDMGs coordinate evacuation of affected downstream residents). Advise current storage level. Advise of any forecasts you are aware of.</td>
</tr>
<tr>
<td></td>
<td>• SDCC Watch Desk</td>
<td>• Email &amp; Phone</td>
<td>Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and Appendix A10 with blank form in Appendix D) and email to SDCC Watch Desk to send.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dam failure in progress</td>
<td>• D/S Residents</td>
<td>SMS (phone for those without mobiles)</td>
<td>Liaise with Sunwater Customer Support to send appropriate SMS in accordance with instructions in Appendix A8 and Appendix A10.</td>
</tr>
</tbody>
</table>

Send SW Incident and Near Miss Alert

Tinaroo Falls Dam – Overturning/sliding Failure likely

Sunwater Customer Support 24-hour contact line

13 15 89 Sunwater Customer Support 24-hour contact line
Table 36 (continued): Overturning or sliding of monoliths—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 Down</td>
<td>• Risk Assessment has determined that risk has reduced</td>
<td>• LDMG1, LDMG2, LDMG3, DDMG</td>
<td>Phone</td>
<td>Advise EAP has been deactivated. Describe current situation with Dam – What is the event? What is the status? (Dam hazard stood down) Advise current storage level. Advise EAP has been deactivated.</td>
</tr>
<tr>
<td></td>
<td>• D/S Residents</td>
<td>• SMS (phone for those without mobiles)</td>
<td></td>
<td>Liaise with Sunwater Customer Support to send SMS: Sunwater Emergency notification. DAM: Tinaroo Falls. EVENT: Dam safety risk—overturning/sliding. STATUS: Dam hazard stood down. ACTION: None.</td>
</tr>
</tbody>
</table>
Table 37: Overturning or sliding of monoliths–DSTDM 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>• Indications of movement of monoliths noted such as cracking, increased seepage, spilling</td>
<td>• Storage level at flood of record level of EL 672.74 m</td>
<td>• Obvious displacement of one or more monoliths, OR</td>
<td>• Failure in progress or likely due to sliding or over turning</td>
<td>• Risk Assessment has determined that sliding or over turning risk has reduced</td>
</tr>
<tr>
<td><strong>Action</strong></td>
<td>• Review surveillance inspection of the dam and assess its condition as soon as possible</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level, AND</td>
<td>• As per previous activation level, AND</td>
<td>• Forward information for EER to IC</td>
</tr>
<tr>
<td></td>
<td>• Determine if there are possible failure paths from reported damage</td>
<td></td>
<td>• Assess risk and determine if failure likely or in progress</td>
<td>• Liaise with the IC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so</td>
<td></td>
<td>• Determine if remedial repairs are practical</td>
<td>• Determine if risks can be reduced by lowering storage.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Monitor situation and assess risks</td>
<td></td>
<td>• Supervise remedial repairs (if applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal notifications</strong></td>
<td>• 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 per previous activation level</td>
</tr>
<tr>
<td></td>
<td>• IC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>External notifications</strong></td>
<td>• As required</td>
<td>• Dam Safety Regulator</td>
<td>• As per previous activation level</td>
<td>• As per previous activation level</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
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 – Site</th>
<th>• Unable to communicate to or from Dam site (usually affects DDO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comms Failure – Local area</td>
<td>• Unable to communicate to or from Local Area (likely to affect LEC or ORR)</td>
</tr>
<tr>
<td>Comms Failure – Brisbane</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 on a daily basis 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 39 to Table 44 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 39: 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>Activation trigger</td>
<td>● Unable to communicate to Local Area including LEC or ORR</td>
<td>● Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM</td>
</tr>
<tr>
<td>Actions</td>
<td>● As much as practicable assume the role of LEC</td>
<td>● Determine if LEC is in communication and if not, assume the LEC role as much as is practicable</td>
</tr>
<tr>
<td></td>
<td>● Continue tasks in accordance with any other current Emergency Action</td>
<td>● Continue tasks in accordance with any other current Emergency Action</td>
</tr>
<tr>
<td></td>
<td>● Every hour attempt communications by any and all means noting the following:</td>
<td>● Every hour attempt communications by any and all means noting the following:</td>
</tr>
<tr>
<td></td>
<td>‒ Mobile phone-try texting instead of voice, much higher probability of success</td>
<td>‒ Mobile phone-texting instead of voice, much higher probability of success</td>
</tr>
<tr>
<td></td>
<td>‒ Satellite Phone-needs to access open sky unless external antenna fitted</td>
<td>‒ Satellite Phone-needs to access open sky unless external antenna fitted</td>
</tr>
<tr>
<td></td>
<td>‒ Fax-generally uses fixed landline and is therefore less likely to have failed</td>
<td>‒ Fax-generally uses fixed landline and is therefore less likely to have failed</td>
</tr>
<tr>
<td></td>
<td>‒ Social Media-e.g. Facebook (Internet may be available via landline)</td>
<td>‒ Social Media-e.g. Facebook (Internet may be available via landline)</td>
</tr>
<tr>
<td></td>
<td>● Record all communication and attempts via Dam Log Book entries as per SOP 12 and communications log if EAP event is current</td>
<td>● Record all communication and attempts via Dam Log Book entries as per SOP 12 and communications log if EAP event is current</td>
</tr>
<tr>
<td>Internal Notifications</td>
<td>● IC</td>
<td>● LEC</td>
</tr>
<tr>
<td></td>
<td>● SO (if available)</td>
<td>● SO (if available)</td>
</tr>
<tr>
<td>External Notifications</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 40: 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><strong>Activation trigger</strong></td>
<td>● Unable to communicate to Dam site</td>
<td>● Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>● Every hour attempt communications by any and all means noting the following:</td>
<td>● Issue Sunwater incident Alert</td>
</tr>
<tr>
<td></td>
<td>– Mobile phone-try texting instead of voice, much higher probability of success</td>
<td>● Every hour attempt communications by any and all means noting the following:</td>
</tr>
<tr>
<td></td>
<td>– Satellite Phone-needs to access open sky unless external antenna fitted</td>
<td>– Mobile phone-texting instead of voice, much higher probability of success</td>
</tr>
<tr>
<td></td>
<td>– Fax-generally uses fixed landline and is therefore less likely to have failed</td>
<td>– Satellite Phone-needs to access open sky unless external antenna fitted</td>
</tr>
<tr>
<td></td>
<td>– Social Media-e.g. Facebook (Internet may be available via landline)</td>
<td>– Fax-generally uses fixed landline and is therefore less likely to have failed</td>
</tr>
<tr>
<td></td>
<td>● Record all communication and attempts</td>
<td>● Social Media-e.g. Facebook (Internet may be available via landline)</td>
</tr>
<tr>
<td></td>
<td>● Assume that the DDO is carrying out LEC role at site as much as practicable</td>
<td>● Record all communication and attempts</td>
</tr>
<tr>
<td></td>
<td>● Liaise with IC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Liaise with DSTDM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action</td>
<td></td>
</tr>
</tbody>
</table>

**Internal Notifications**
- ● IC
- ● DSTDM
- ● SO (if available)

**External Notifications**
- ● LDMG1, LDMG2, LDMG3
- ● LDMG1, LDMG2, LDMG3
- ● DDMG

---

**Internal Notifications**
- ● DDO
- ● DSTDM (if available)
- ● SO

**External Notifications**
- ● LDMG1, LDMG2, LDMG3
- ● LDMG

---

**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 41: Communications failure—IC emergency action

<table>
<thead>
<tr>
<th>Activation level</th>
<th>Comms Failure – Dam Site</th>
<th>Comms Failure – Local Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activation trigger</strong></td>
<td>• Unable to communicate to Dam site</td>
<td>• Unable to communicate to Local Area including LEC and ORR</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>• Issue Sunwater incident Alert</td>
<td>• Issue Sunwater incident Alert</td>
</tr>
<tr>
<td></td>
<td>• Every hour attempt communications by any and all means noting the following:</td>
<td>• Every hour attempt communications by any and all means noting the following:</td>
</tr>
<tr>
<td></td>
<td>– Mobile phone-try texting instead of voice, much higher probability of success</td>
<td>– Mobile phone-texting instead of voice, much higher probability of success</td>
</tr>
<tr>
<td></td>
<td>– Satellite Phone-needs to access open sky unless external antenna fitted</td>
<td>– Satellite Phone-needs to access open sky unless external antenna fitted</td>
</tr>
<tr>
<td></td>
<td>– Fax-generally uses fixed landline and is therefore less likely to have failed</td>
<td>– Fax-generally uses fixed landline and is therefore less likely to have failed</td>
</tr>
<tr>
<td></td>
<td>– Social Media-e.g. Facebook (Internet may be available via landline)</td>
<td>– Social Media-e.g. Facebook (Internet may be available via landline)</td>
</tr>
<tr>
<td></td>
<td>• Record all communication and attempts</td>
<td>• Record all communication and attempts</td>
</tr>
<tr>
<td></td>
<td>• Liaise with LEC</td>
<td>• Liaise with the DDO and carry out functions of the LEC as much as practicable</td>
</tr>
<tr>
<td></td>
<td>• Liaise with DSTDM</td>
<td>• As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action</td>
</tr>
<tr>
<td></td>
<td>• As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action</td>
<td></td>
</tr>
</tbody>
</table>

**Internal Notifications**
- LEC
- DSTDM
- SO (if available)

**External Notifications**
- DDMG
- LDMG1, LDMG2 & LDMG3 (if available)
- DDMG (if available)

---

*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 42: 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 code</th>
<th>Message text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comms Failure - Site</td>
<td>• Unable to communicate to or from Dam site, AND</td>
<td>IC/LEC, DSTDM, SO (if available)</td>
<td>Phone</td>
<td></td>
<td>Describe current situation with dam communications. What is the status – estimated time to restore communications?</td>
</tr>
<tr>
<td></td>
<td>• DDO is at Dam site</td>
<td>LDMG1, LDMG2, LDMG3, DDMG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IC to send Sunwater Incident and Near Miss alert</td>
<td></td>
<td></td>
<td></td>
<td>EAP Alert Notification—Tinaroo Falls Dam—Site Communications Failure</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), LDMG1 (if available), LDMG2 (if available), LDMG3 (if available), DDMG (if available)</td>
<td>Phone</td>
<td></td>
<td>Describe current situation with dam communications. What is the status – estimated time to restore communications?</td>
</tr>
<tr>
<td></td>
<td>IC to send Sunwater Incident and Near Miss alert</td>
<td></td>
<td></td>
<td></td>
<td>EAP Alert Notification—Tinaroo Falls Dam—Local Area Communications Failure</td>
</tr>
<tr>
<td>Comms Failure - Brisbane</td>
<td>• Unable to communicate to or from Sunwater Brisbane</td>
<td>DSTDM (if available), LDMG1, LDMG2, LDMG3, DDMG</td>
<td>Phone</td>
<td></td>
<td>Describe current situation with dam communications. What is the status – estimated time to restore communications?</td>
</tr>
<tr>
<td></td>
<td>LEC to send Sunwater Incident and Near Miss alert</td>
<td></td>
<td></td>
<td></td>
<td>EAP Alert Notification—Sunwater Brisbane Communications Failure</td>
</tr>
</tbody>
</table>
## Table 43: Communications failure—DSTDM 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><strong>Activation trigger</strong></td>
<td>• Unable to communicate to Dam site</td>
<td>• Unable to communicate to Local Area including LEC and ORR</td>
</tr>
</tbody>
</table>
| **Actions** | • 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 | • 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 |
| **Internal Notifications** | • IC  
• LEC  
• CEO (if time permits) | • IC  
• DDO (if available)  
• CEO (if time permits) |
| **External Notifications** | • Dam Safety Regulator (if applicable) | • Dam Safety Regulator (if applicable) |

*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>Comms Failure – Site</th>
<th>Comms Failure – Local Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activation trigger</strong></td>
<td>• Unable to communicate to Dam site</td>
<td>• Unable to communicate to Local Area including LEC and ORR</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>• Liaise with IC</td>
<td>• Liaise with IC</td>
</tr>
<tr>
<td></td>
<td>• Record all communication</td>
<td>• Record all communication</td>
</tr>
<tr>
<td></td>
<td>• As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action</td>
<td>• Assume that the DDO is assisting IC with LEC role</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action</td>
</tr>
<tr>
<td><strong>Internal Notifications</strong></td>
<td>• IC</td>
<td>• IC</td>
</tr>
<tr>
<td></td>
<td>• LEC</td>
<td>• DDO (if available)</td>
</tr>
<tr>
<td></td>
<td>• DSTDM</td>
<td>• DSTDM</td>
</tr>
<tr>
<td><strong>External Notifications</strong></td>
<td>• Not applicable</td>
<td>• Not applicable</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
APPENDIX A: NOTIFICATION AND COMMUNICATION LISTS

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Sunwater regional notification list</td>
</tr>
<tr>
<td>A2</td>
<td>Sunwater Brisbane notification list</td>
</tr>
<tr>
<td>A3</td>
<td>External notification list</td>
</tr>
<tr>
<td>A4</td>
<td>D/S Residents notification list</td>
</tr>
<tr>
<td>A5</td>
<td>Other D/S Residents notification list (outside area—requested messaging)</td>
</tr>
<tr>
<td>A6</td>
<td>Other reference contacts</td>
</tr>
<tr>
<td>A7</td>
<td>Emergency alert polygon–Mareeba</td>
</tr>
<tr>
<td>A8</td>
<td>Dam failure alert request–Mareeba</td>
</tr>
<tr>
<td>A9</td>
<td>Emergency alert polygon–Cairns City</td>
</tr>
<tr>
<td>A10</td>
<td>Dam failure alert request–Cairns City</td>
</tr>
</tbody>
</table>

Appendix A1 to A6 have been redacted
Appendix A7: Emergency alert polygon–Mareeba

Tinaroo Falls Dam-Mareeba
## Appendix A8: Dam failure alert request–Mareeba

### Queensland emergency alert request guidelines

**Two** Emergency Alert Request forms should be completed, if required (see Sections 5 to 10 for actions) and sent to the SDCC Watch Desk to activate the *Tinaroo Falls Dam-Mareeba* Emergency Polygon.

### Instructions

- These forms are not to be used for Flood UNLESS a flood has triggered an emergency event.
- Print off the following Queensland Emergency Alert Request forms.
- 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 Tinaroo Falls Dam–Mareeba.
- 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 *Tinaroo Falls_Dam_Mareeba_Emergency_Polygon*.
- Give them your phone number, confirm their name, and end the call after advising the forms 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 forms and send to SDCC watch desk email: sdcc@qfes.qld.gov.au. The forms must come from the IC, DSTDM, or member of the Executive.
- Phone back to check the messages have been sent and ask for an email to confirm.
- Send an internal Incident Alert to advise of completion.
- These forms 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 two emergency alert requests:

<table>
<thead>
<tr>
<th>Filename:</th>
<th>Message:</th>
<th>SMS1-Mareeba Townside:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tinaroo_Falls_Dam_Mareeba_Emergency_Polygon</strong></td>
<td><strong>EMERGENCY. EMERGENCY. TINAROO DAM IS FAILING. RESIDENTS DOWNSTREAM OF THE DAM NEED TO ACT TO PROTECT LIFE AND LEAVE IMMEDIATELY IF SAFE TO DO SO. FAILURE OF THE DAM WILL RESULT IN EXTREMELY DANGEROUS FLOODING AND FLASH FLOODS ALONG THE BARRON RIVER INCLUDING MAREEBA. DON’T DELAY LEAVE NOW. INFORMATION ON ABC RADIO. PEOPLE TOWN SIDE OF BARRON SHOULD GO TO THE MAREEBA RACECOURSE &amp; THOSE CAIRNS SIDE SHOULD HEAD TOWARDS SPEEWAH AS SAFE LOCATIONS</strong></td>
<td><strong>IMMINENT FAILURE TINAROO DAM. TAKE ACTION TO PROTECT LIFE &amp; LEAVE NOW. MAREEBA IS AT RISK. INFO ON ABC RADIO. PEOPLE TOWNSIDE OF BARRON MOVE TO THE RACECOURSE.</strong></td>
</tr>
<tr>
<td><strong>SMS2-Cairns Side:</strong></td>
<td><strong>IMMINENT FAILURE TINAROO DAM. TAKE ACTION TO PROTECT LIFE &amp; LEAVE NOW. MAREEBA AT RISK. INFO ON ABC RADIO. PEOPLE CAIRNS SIDE OF BARRON SHOULD HEAD TO SPEEWAH.</strong></td>
<td><strong>IMMINENT FAILURE TINAROO DAM. TAKE ACTION TO PROTECT LIFE &amp; LEAVE NOW. MAREEBA AT RISK. INFO ON ABC RADIO. PEOPLE CAIRNS SIDE OF BARRON SHOULD HEAD TO SPEEWAH.</strong></td>
</tr>
</tbody>
</table>

The next two pages contain pre-filled copies of the Tinaroo Falls dam (Mareeba) Emergency Alert requests.
EMERGENCY ALERT REQUEST

Location: Tinaroo Falls Dam – Mareeba Town side

Date: / / 
Time: : hrs

Requesting Officer: 
Agency/Position: 

Telephone: 
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
- □ Emergency Warning (NOTE activates the SEWS)
- □ Watch & Act
- □ Advice

Campaign Mode
- □ Voice
- □ SMS – Location Based
- □ SMS – Service Address Based

LDMG Advised
- □ YES
- □ NO

DDMG Advised
- □ YES
- □ NO

Threat Direction Required?
- □ YES
- □ NO

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

STEP 1. EA Polygon Area: □ Map attached

STEP 2. Filename:

STEP 3. Spatial format: (Indicate the format used)
- □ 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 *. mdi Sequence, *.mif
- □ OTHER (insert)

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

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

EMERGENCY. EMERGENCY. TINAROO DAM IS FAILING. RESIDENTS DOWNSTREAM OF THE DAM NEED TO act TO PROTECT LIFE AND LEAVE IMMEDIATELY IF SAFE TO DO SO. FAILURE OF THE DAM WILL RESULT IN EXTREMELY DANGEROUS FLOODING AND FLASH FLOODS ALONG THE BARRON RIVER INCLUDING MAREEBA. DON’T DELAY LEAVE NOW. INFORMATION ON ABC RADIO. PEOPLE TOWN SIDE OF BARRON SHOULD GO TO THE MAREEBA RACERCOURSE & THOSE CAIRNS SIDE SHOULD HEAD TOWARDS SPEEWAH AS SAFE LOCATIONS

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

IMMINENT FAILURE TINAROO DAM. TAKE ACTION TO PROTECT LIFE & LEAVE NOW. MAREEBA IS AT RISK. INFO ON ABC RADIO. PEOPLE TOWNSIDE OF BARRON MOVE TO THE RACERCOURSE.

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

FOR USE BY SDCC

Requesting Officer: 
EA User Name: 
Authorising Officer Name: 

Signature / /20

Signature / /20

Signature / /20

Manual Transmission
EMS Transmission
EA Campaign No. __________
EMS Report ID: __________

EA Manual and the Emergency Alert Request Form Template are available at: www.disaster.qld.gov.au
EMERGENCY ALERT REQUEST

Location: Tinaroo Falls Dam – Cairns side

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
☐ Emergency Warning (NOTE activates the SEWS) ☐ Watch & Act ☐ Advice

Campaign Mode
☐ Voice ☐ SMS – Location Based ☐ SMS – Service Address Based

LDMG Advised ☐ YES ☐ NO DDMG Advised ☐ YES ☐ NO

Threat Direction Required? ☐ YES ☐ NO Note: Can only be used for Emergency Warnings. Indicate direction on map

STEP 1. EA Polygon Area: ☐ YES ☐ NO Note: Can only be used for Emergency Warnings. Indicate direction on map

STEP 2. Filename:

STEP 3. Spatial format: (Indicate the format used)
☐ 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 *.mif, *.MIDI Sequence, *.mif
☐ OTHER (insert)

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

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

EMERGENCY. EMERGENCY. TINAROO DAM IS FAILING. RESIDENTS DOWNSTREAM OF THE DAM NEED TO act TO PROTECT LIFE AND LEAVE IMMEDIATELY IF SAFE TO DO SO. FAILURE OF THE DAM WILL RESULT IN EXTREMELY DANGEROUS FLOODING AND FLASH FLOODS ALONG THE BARRON RIVER INCLUDING MAREEBA. DON'T DELAY LEAVE NOW. INFORMATION ON ABC RADIO. PEOPLE TOWN SIDE OF BARRON SHOULD GO TO THE MAREEBA RACECOURSE & THOSE CAIRNS SIDE SHOULD HEAD TOWARDS SPEEWAH AS SAFE LOCATIONS

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

IMMINENT FAILURE TINAROO DAM. TAKE ACTION TO PROTECT LIFE & LEAVE NOW. MAREEBA AT RISK. INFO ON ABC RADIO. PEOPLE CAIRNS SIDE OF BARRON SHOULD HEAD TO SPEEWAH.

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

FOR USE BY SDCC

Requesting Officer: Signature / /20 ☐ Manual Transmission
EA User Name: Signature / /20 ☐ EMS Transmission
Authorising Officer Name: Signature / /20 EA Campaign No. ____________
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 handwriting 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//
```
Appendix A9: Emergency alert polygon-Cairns City
Appendix A10:  Dam failure alert request – Cairns City

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 in order to activate the *Tinaroo Falls Dam-Cairns* 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 Tinaroo Falls Dam–Cairns City.
- 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 *Tinaroo Falls_Dam_Cairns_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. The 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-Cairns City:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Tinaroo_Falls_Dam_Cairns_Emergency_Polygon</em></td>
<td>EMERGENCY. EMERGENCY. TINAROO FALLS 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: MARREEBA &amp; CAIRNS DO NOT DELAY. LEAVE NOW. PALM COVE AND GORDONVALE ARE SAFE LOCATIONS.</td>
<td>IMMINENT FAILURE OF TINAROO FALLS DAM TAKE ACTION TO PROTECT LIFE &amp; LEAVE NOW. CAIRNS NORTH IS AT RISK. INFO ON ABC RADIO. PALM COVE AND GORDONVALE ARE SAFE.</td>
</tr>
</tbody>
</table>

The next two pages contain a pre-filled copy of the Tinaroo Falls dam (Cairns-city) Emergency Alert request.
# EMERGENCY ALERT REQUEST

**Location:** Tinaroo Falls Dam – Cairns

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Cyclone</th>
<th>Storm Surge</th>
<th>Flash Flood</th>
<th>Flood</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>

**Date:** / / 

**Time:** : hrs

**Requesting Officer:**

**Agency/Position:**

**Telephone:**

**Email:**

**Event:**

- [ ] 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:**

- [ ] Emergency Warning (NOTE activates the SEWS)
- [ ] Watch & Act
- [ ] Advice

**Campaign Mode:**

- [ ] Voice
- [ ] SMS – Location Based
- [ ] SMS – Service Address Based

**LDMG Advised:**

[ ] YES  [ ] NO

**DDMG Advised:**

[ ] YES  [ ] NO

**Threat Direction Required?**

[ ] YES  [ ] NO

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

---

**STEP 1.** EA Polygon Area:

[ ] YES  [ ] NO

Map attached

**STEP 2.** Filename:

**STEP 3.** Spatial format: (Indicate the format used)

- [ ] 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 (insert)

**STEP 4.** Messaging/spatial data, is it supplied via

- [ ] DMportal - specify filenames below
- [ ] FTP - specify filenames below
- [ ] Email
- [ ] Other (please specify)

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

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

**EMERGENCY. EMERGENCY. TINAROO FALLS 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: MAREEBA & CAIRNS DO NOT DELAY. LEAVE NOW. PALM COVE AND GORDONVALE ARE SAFE LOCATIONS.**

**IMMINENT FAILURE OF TINAROO FALLS DAM TAKE ACTION TO PROTECT LIFE & LEAVE NOW. CAIRNS NORTH IS AT RISK. INFO ON ABC RADIO. PALM COVE AND GORDONVALE ARE SAFE.**

SEND TO sdcc@qkes.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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EA User Name:</th>
<th>Signature</th>
<th>/ /20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authorising Officer Name:</th>
<th>Signature</th>
<th>/ /20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EA Manual and the Emergency Alert Request Form Template are available at:** www.disaster.qld.gov.au
DO NOT SEND THIS PAGE

GUIDE TO COMPLETE STEPS 1 – 4

<table>
<thead>
<tr>
<th>STEP 1.</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP 2.</td>
<td>Tick applicable box and note the file name.</td>
</tr>
<tr>
<td>STEP 3.</td>
<td>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 “ql 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”</td>
</tr>
<tr>
<td>STEP 4.</td>
<td>SMS Is restricted to a maximum of 160 characters including spaces and punctuation. Either type the message or handwrite the characters into the boxes.</td>
</tr>
</tbody>
</table>

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//
```
APPENDIX B: INUNDATION MAPS AND EMERGENCY CONTROL MEASURES

B1  Flood Impact Downstream
B2  Inundation maps
B3  Access routes during fair and adverse weather conditions
B4  Tinaroo Falls Dam locality plan

Note: Actual levels may differ from those shown in flood inundation maps due to variations in assumptions made in the models to actual flood events.
**Table B1: Key Locations for the Tinaroo Falls Dam Break Analysis**

<table>
<thead>
<tr>
<th>Description</th>
<th>Barron R AMTD (km)</th>
<th>Model chainage (m)</th>
<th>Stream bed elevation (m AHD)</th>
<th>Crossing level (m AHD)</th>
<th>Crossing spans × L × W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinaroo Falls Dam</td>
<td>101.4</td>
<td>200</td>
<td>628.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kennedy Hwy Barron R, Mareeba</td>
<td>71.6</td>
<td>30,000</td>
<td>380.1</td>
<td>399.0</td>
<td>4 × 25 × 10</td>
</tr>
<tr>
<td>Anzac Ave Barron R, Mareeba</td>
<td>69.0</td>
<td>32,600</td>
<td>380.3</td>
<td>385.8</td>
<td>4 × 47 × 11</td>
</tr>
<tr>
<td>Cairns Railway Crossing, Biboohra</td>
<td>59.4</td>
<td>42,200</td>
<td>368.8</td>
<td>384.0</td>
<td></td>
</tr>
<tr>
<td>Bilwon Rd Barron R, Biboohra</td>
<td></td>
<td></td>
<td></td>
<td>378.0</td>
<td>5 × 110 × 4.5</td>
</tr>
<tr>
<td>Cairns Railway Crossing, Koah</td>
<td>40.2</td>
<td>61,400</td>
<td>349.2</td>
<td>362.3</td>
<td></td>
</tr>
<tr>
<td>Barron St Clohesy R, Koah</td>
<td></td>
<td></td>
<td></td>
<td>351.4</td>
<td></td>
</tr>
<tr>
<td>Little Rd Barron R, Myola</td>
<td>26.8</td>
<td>74,800</td>
<td>320.9</td>
<td>324.7</td>
<td>1 × 21 × 4.5</td>
</tr>
<tr>
<td>Kennedy Hwy Barron R, Kuranda</td>
<td>23.0</td>
<td>78,600</td>
<td>314.1</td>
<td>336.1</td>
<td></td>
</tr>
<tr>
<td>Hydro Weir at Barron Falls</td>
<td>21.4</td>
<td>80,200</td>
<td>318.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captain Cook Hwy Thomatis Ck, Cairns</td>
<td>8.0</td>
<td>93,600</td>
<td>-4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captain Cook Hwy Barron R, Cairns</td>
<td>6.0</td>
<td>95,600</td>
<td>-4.0</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

**Peak flood levels**

The peak flood levels at key locations are summarised in Table B2 and Table B3 for the PMF and Sunny Day Failure conditions respectively.

**Table B2: Peak flood levels and maximum rise above initial conditions**

<table>
<thead>
<tr>
<th>AMTD (km)</th>
<th>Description</th>
<th>Sunny Day Failure</th>
<th>DCF – No Dam Failure</th>
<th>PMP Design Flood – Dam Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak (m AHD)</td>
<td>Max rise (m)</td>
<td>Peak (m AHD)</td>
<td>Max rise (m)</td>
</tr>
<tr>
<td>101.4 Tinaroo Falls Dam</td>
<td>670.4</td>
<td>0.0</td>
<td>674.1</td>
<td>3.6</td>
</tr>
<tr>
<td>71.6 Kennedy Hwy, Mareeba</td>
<td>411.1</td>
<td>29.7</td>
<td>395.2</td>
<td>11.9</td>
</tr>
<tr>
<td>59.4 Road &amp; Rail Xings, Biboohra</td>
<td>387.1</td>
<td>14.9</td>
<td>382.8</td>
<td>8.6</td>
</tr>
<tr>
<td>40.2 Road &amp; Rail Xings, Koah</td>
<td>365.6</td>
<td>13.6</td>
<td>360.7</td>
<td>6.8</td>
</tr>
<tr>
<td>23.0 Kennedy Hwy, Kuranda</td>
<td>333.9</td>
<td>14.8</td>
<td>328.4</td>
<td>7.8</td>
</tr>
<tr>
<td>6.0 Captain Cook Hwy, Cairns</td>
<td>5.0</td>
<td>2.4</td>
<td>4.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>
**Flood level classification**

The BOM flood level classifications for sites downstream of Tinaroo Falls Dam in the Barron River catchment are shown in the table below.

<table>
<thead>
<tr>
<th>AMTD (km)</th>
<th>Station name</th>
<th>Crossing name</th>
<th>Minor flood height</th>
<th>Moderate flood height</th>
<th>Major flood height</th>
</tr>
</thead>
<tbody>
<tr>
<td>101.4</td>
<td>Tinaroo Falls Dam</td>
<td>Spillway</td>
<td>671.4</td>
<td>671.9</td>
<td>672.4</td>
</tr>
<tr>
<td>71.6</td>
<td>Mareeba Alert</td>
<td>Barron River Bridge</td>
<td>386.2</td>
<td>389.2</td>
<td>390.2</td>
</tr>
<tr>
<td>49.3</td>
<td>Bilwon Alert</td>
<td></td>
<td>364.8</td>
<td>367.8</td>
<td>368.8</td>
</tr>
<tr>
<td>26.8</td>
<td>Myola Alert</td>
<td>Russett Park Br</td>
<td>330.2</td>
<td>331.7</td>
<td>333.2</td>
</tr>
<tr>
<td>21.4</td>
<td>Barron Falls</td>
<td></td>
<td>324.9</td>
<td>325.9</td>
<td>326.9</td>
</tr>
<tr>
<td>13.5</td>
<td>Kamerunga Br Alert</td>
<td>Kamerunga Bridge</td>
<td>-4.0</td>
<td>-2.5</td>
<td>-1.0</td>
</tr>
<tr>
<td>13.0</td>
<td>Flaggy Creek Alert</td>
<td></td>
<td>381.2</td>
<td>382.7</td>
<td>383.7</td>
</tr>
</tbody>
</table>

**Note:** The flood heights shown for Bilwon and Kamerunga are based on assumed gauge zero at stream bed elevations of 358.75 and 9.00 m AHD, respectively.
Time to peak flood levels

Table B5 to Table B7 summarise the estimated time until the water level starts to rise (TFR) and the estimated time when the peak flood levels (TPL) are attained. The summarised data provides an indication of the available response time for each of the indicated sites.

Table B5: Flood timing for Sunny Day Failure (hr:min)

<table>
<thead>
<tr>
<th>AMTD (km)</th>
<th>Location</th>
<th>Time to start of rise</th>
<th>Time flooding starts</th>
<th>Time to peak flood level</th>
<th>Time flooding stops</th>
</tr>
</thead>
<tbody>
<tr>
<td>71.6</td>
<td>Kennedy Hwy Crossing, Mareeba</td>
<td>1:20</td>
<td>1:35</td>
<td>2:30</td>
<td>7:45</td>
</tr>
<tr>
<td>59.4</td>
<td>Cairns Railway Crossing, Biboohra</td>
<td>0:20</td>
<td>3:40</td>
<td>5:50</td>
<td>10:50</td>
</tr>
<tr>
<td>59.4</td>
<td>Bilwon Rd Crossing, Biboohra</td>
<td></td>
<td>2:50</td>
<td></td>
<td>16:55</td>
</tr>
<tr>
<td>40.2</td>
<td>Cairns Railway Crossing, Koah</td>
<td>3:00</td>
<td>8:15</td>
<td>11:20</td>
<td>16:30</td>
</tr>
<tr>
<td>40.2</td>
<td>Barron St Clohesy R, Koah</td>
<td></td>
<td>always flooded*</td>
<td></td>
<td>always flooded*</td>
</tr>
<tr>
<td>23.0</td>
<td>Kennedy Hwy Crossing, Kuranda</td>
<td>7:40</td>
<td>never flooded</td>
<td>14:40</td>
<td>never flooded</td>
</tr>
<tr>
<td>6.0</td>
<td>Captain Cook Hwy Crossing, Cairns</td>
<td>9:50</td>
<td>17:05</td>
<td>18:00</td>
<td>19:10</td>
</tr>
</tbody>
</table>

* The Clohesy River crossing at Koah is always flooded in the model, due to the initial flow conditions.

Table B6: Flood timing for DCF – No dam failure (hr:min)

<table>
<thead>
<tr>
<th>AMTD (km)</th>
<th>Location</th>
<th>Time to start of rise</th>
<th>Time flooding starts</th>
<th>Time to peak flood level</th>
<th>Time flooding stops</th>
</tr>
</thead>
<tbody>
<tr>
<td>71.6</td>
<td>Kennedy Hwy Crossing, Mareeba</td>
<td>5:40</td>
<td>never flooded</td>
<td>44:30</td>
<td>never flooded</td>
</tr>
<tr>
<td>59.4</td>
<td>Cairns Railway Crossing, Biboohra</td>
<td>6:20</td>
<td>never flooded</td>
<td>45:10</td>
<td>never flooded</td>
</tr>
<tr>
<td></td>
<td>Bilwon Rd Crossing, Biboohra</td>
<td>20:50</td>
<td></td>
<td></td>
<td>86:35</td>
</tr>
<tr>
<td>40.2</td>
<td>Cairns Railway Crossing, Koah</td>
<td>4:00</td>
<td>never flooded</td>
<td>43:00</td>
<td>never flooded</td>
</tr>
<tr>
<td></td>
<td>Barron St Clohesy R, Koah</td>
<td></td>
<td>always flooded*</td>
<td></td>
<td>always flooded*</td>
</tr>
<tr>
<td>23.0</td>
<td>Kennedy Hwy Crossing, Kuranda</td>
<td>6:40</td>
<td>never flooded</td>
<td>43:00</td>
<td>never flooded</td>
</tr>
<tr>
<td>6.0</td>
<td>Captain Cook Hwy Crossing, Cairns</td>
<td>13:40</td>
<td>never flooded</td>
<td>45:30</td>
<td>never flooded</td>
</tr>
</tbody>
</table>

* The Clohesy River crossing at Koah is always flooded in the model, due to the initial flow conditions.
Table B7: Flood timing for PMP design flood – Dam failure (hr:min)

<table>
<thead>
<tr>
<th>AMTD (km)</th>
<th>Location</th>
<th>Time to start of rise</th>
<th>Time flooding starts&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Time to peak flood level&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Time flooding stops&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>71.6</td>
<td>Kennedy Hwy Crossing, Mareeba</td>
<td>5:30</td>
<td>27:25</td>
<td>39:50 (2:20)</td>
<td>54:15 (16:45)</td>
</tr>
<tr>
<td>59.4</td>
<td>Cairns Railway Crossing, Biboohra</td>
<td>0:20</td>
<td>30:40</td>
<td>42:50 (5:20)</td>
<td>55:50 (18:20)</td>
</tr>
<tr>
<td></td>
<td>Bilwon Rd Crossing, Biboohra</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.2</td>
<td>Cairns Railway Crossing, Koah</td>
<td>2:50</td>
<td>37:05</td>
<td>47:10 (9:40)</td>
<td>60:00 (22:30)</td>
</tr>
<tr>
<td></td>
<td>Barron St Clohesy R, Koah</td>
<td>always flooded&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.0</td>
<td>Kennedy Hwy Crossing, Kuranda</td>
<td>6:40</td>
<td>46:30 (9:00)</td>
<td>49:20 (11:50)</td>
<td>54:35 (17:05)</td>
</tr>
<tr>
<td>6.0</td>
<td>Captain Cook Hwy Crossing, Cairns</td>
<td>11:10</td>
<td>45:30 (8:00)</td>
<td>51:50 (14:20)</td>
<td>63:50 (26:20)</td>
</tr>
</tbody>
</table>

<sup>a</sup> Times shown are from onset of rain. The second time shown (in italics) is from the start of breach development.

<sup>b</sup> The Clohesy River crossing at Koah is always flooded in the model, due to the initial flow conditions.

**Peak mean velocities**

The peak mean velocity, together with the depth of flooding, provides an indication of the likely consequences of the flooding because it can affect the stability of pedestrians wading through flood waters and motor vehicles traversing flooded roads.

Table B8: Peak velocities (m/s)

<table>
<thead>
<tr>
<th>AMTD (km)</th>
<th>Location</th>
<th>Sunny Day Failure</th>
<th>DCF – No Dam Failure</th>
<th>PMP Design Flood – Dam Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>99.2</td>
<td>d/s Tinaroo Falls Dam*</td>
<td>5.9</td>
<td>2.4</td>
<td>5.7</td>
</tr>
<tr>
<td>71.6</td>
<td>Kennedy Hwy, Mareeba</td>
<td>4.8</td>
<td>1.7</td>
<td>5.2</td>
</tr>
<tr>
<td>59.4</td>
<td>Road &amp; Rail Xings, Biboohra</td>
<td>4.5</td>
<td>1.7</td>
<td>5.1</td>
</tr>
<tr>
<td>40.2</td>
<td>Road &amp; Rail Xings, Koah</td>
<td>5.4</td>
<td>1.9</td>
<td>6.0</td>
</tr>
<tr>
<td>23.0</td>
<td>Kennedy Hwy, Kuranda</td>
<td>6.6</td>
<td>2.2</td>
<td>7.3</td>
</tr>
<tr>
<td>6.0</td>
<td>Captain Cook Hwy, Cairns</td>
<td>7.8</td>
<td>2.9</td>
<td>8.4</td>
</tr>
</tbody>
</table>

* The peak velocity shown for Tinaroo Falls Dam is in the river downstream of the saddle dam discharge.
Peak discharge

The peak flood levels at key locations are summarised in Table B9.

<table>
<thead>
<tr>
<th>AMTD (km)</th>
<th>Location</th>
<th>Sunny Day Failure</th>
<th>DCF – No Dam Failure</th>
<th>PMP Design Flood – Dam Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>99.2</td>
<td>d/s Tinaroo Falls Dam*</td>
<td>48,240</td>
<td>1,170</td>
<td>65,490</td>
</tr>
<tr>
<td>71.6</td>
<td>Kennedy Hwy, Mareeba</td>
<td>39,350</td>
<td>1,520</td>
<td>57,330</td>
</tr>
<tr>
<td>59.4</td>
<td>Road &amp; Rail Xings, Biboohra</td>
<td>8,920</td>
<td>2,180</td>
<td>14,480</td>
</tr>
<tr>
<td>40.2</td>
<td>Road &amp; Rail Xings, Koah</td>
<td>9,090</td>
<td>3,130</td>
<td>18,190</td>
</tr>
<tr>
<td>23.0</td>
<td>Kennedy Hwy, Kuranda</td>
<td>8,090</td>
<td>3,690</td>
<td>18,140</td>
</tr>
<tr>
<td>6.0</td>
<td>Captain Cook Hwy, Cairns</td>
<td>7,400</td>
<td>3,960</td>
<td>17,350</td>
</tr>
</tbody>
</table>

* The peak discharge shown for Tinaroo Falls Dam is the combined main dam, spillway & saddle dam discharge.

Three scenarios were examined: a Sunny Day Failure, DCF – No Dam Failure, and PMP Design Flood – Dam Failure. The main conclusions drawn from the analysis are:

- Under BOM flood classifications, all three scenarios would cause a major flood at Mareeba, Bilwon, Myola, and Kamerunga. All scenarios except for the Sunny Day Failure would also cause a major flood in the Flaggy Creek area.
- All road crossings are significantly overtopped by all three events.
- A Sunny Day Failure would result in the water level starting to rise after about one hour 20 minutes at Mareeba, three hours for Koah, seven and a half hours for Kuranda, and 10 hours at Cairns, with peaks occurring about two and a half, 11½, 14½, and 18½ hours, respectively, after the start of breach development.
- A DCF – No Dam Failure scenario would result in the water level starting to rise after about five and a half hours at Mareeba, four hours for Koah, six and a half hours for Kuranda, and 15½ hours at Cairns, with peaks occurring about 44-46 hours after the onset of rain.
- A PMP Design Flood – Dam Failure scenario would result in the water level starting to rise after about five and a half hours at Mareeba, three hours for Koah, six and a half hours for Kuranda, and 14½ hours at Cairns, with peaks occurring about 40, 47, 49½, and 52 hours, respectively, after the onset of rain.
- Failure of the Saddle Dam due to a PMP Design Flood has much less impact than failure of the main dam. Compared to failure of the main dam, peak flood levels are 20 m lower near Tinaroo Falls Dam, 8 m lower at Mareeba, 6 m lower in Kuranda, and 1 m lower in Cairns.
Appendix B2: Inundation maps

Drawings:

- 249281–Keymap
- 249282–SDF–01
- 249282–SDF–02
- 249282–SDF–03
- 249282–SDF–04
- 249282–SDF–05
- 249282–SDF–06
- 249282–SDF–07
- 249282–SDF–08
- 249282–SDF–09
- 249282–SDF–10
- 249283–DCF–01
- 249283–DCF–02
- 249283–DCF–03
- 249283–DCF–04
- 249283–DCF–05
- 249283–DCF–06
- 249283–DCF–07
- 249283–DCF–08
- 249283–DCF–09
- 249283–DCF–10
- 249284–PMPDF–01
- 249284–PMPDF–02
- 249284–PMPDF–03
- 249284–PMPDF–04
- 249284–PMPDF–05
- 249284–PMPDF–06
- 249284–PMPDF–07
- 249284–PMPDF–08
- 249284–PMPDF–09
- 249284–PMPDF–10
Inundation Plan - 2004
Sunny Day Failure

Coordinate System: Geocentric Datum of Australia (GDA94).

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.

SunWater Limited
ACN 131 034 985

Tinaroo Falls Dam
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
SUNNY DAY FAILURE
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.
TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
DAM CRESCENT FLOOD

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).

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.

SunWater Limited
ACN 131 034 985

M. HUGHES
19/12/17

AN
MH

REFERENCE DRAWINGS

DOCUMENT: S:\BW Asset Delivery\SW-BW Service Delivery\R-Wxxx-01-07-01 EAP Flood Inundation Mapping\Drawings\ArcMap\Tinaroo Falls\249283-A.mxd
Printed: Tuesday, 19/12/2017 12:05:15 PM
Dulbil Weir
Granite Creek Weir

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004

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.

Coordinate System: Geocentric Datum of Australia (GDA94).

MAP INFORMATION
Coordinate System: Geocentric Datum of Australia (GDA94).
REFERENCE DRAWINGS
SML21 - Keymap

SCALES (A3 SIZE)

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
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.
TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
DAM CREST FLOOD

Coordinate System: Geocentric Datum of Australia (GDA94).

Map information
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.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

SunWater Limited
ACN 131 034 985
LEGEND

Modeling Limits
PMPDF - Dam Failure
AHFD (Mooring)
Local Roads
Major Roads
Old Rail Network

SunWater Storages
Dam
Overflow Storage
Wier
Anabranch Wier
Dam Full Supply Level

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

REFERENCE DRAWINGS
249281 - Keymap

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

REFERENCE DRAWINGS
249281 - Keymap

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.

TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Scales (A3 Size)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000

AN     MH

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.
TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

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.

Coordinate System: Geocentric Datum of Australia (GDA94).

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
TINAROO FALLS DAM
DAM BREAK ANALYSIS
INUNDATION PLAN - 2004
PROBABLE MAXIMUM PRECIPITATION
DESIGN FLOOD

Coordinate System: Geocentric Datum of Australia (GDA94).

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.

M. HUGHES
ACN 131 034 985

SunWater Limited
19/12/17


249284 - Keymap

Printed: Tuesday, 19/12/2017 12:07:32 PM
Appendix B3: Access Routes during fair and adverse weather conditions

Note: When the downstream flood waters have inundated access routes, then access to the dam shall be by helicopter.

Helipad coordinates:
UTM: 55K 345086 E, 8100819 S
Dec degrees: Lat -17.172339 degrees, Long 145.544238 degrees
**Helipad location description:**

Behind the Rural Fire Station, to the north-east of saddle dam beside Tinaroo Falls Dam Rd.

<table>
<thead>
<tr>
<th>Details</th>
<th>Tinaroo Falls Dam access route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>Approximately 45 km from Mareeba Depot / Approx 85 km from Cairns</td>
</tr>
<tr>
<td>Travel Time</td>
<td>Approximately 40 minutes (Mareeba) / Approximately 90 minutes (Cairns)</td>
</tr>
<tr>
<td>Road type</td>
<td>Bitumen</td>
</tr>
<tr>
<td>Speed limit</td>
<td>80–100 km/h</td>
</tr>
</tbody>
</table>
Appendix B4: Tinaroo Falls Dam Locality Plan
Lake Tinaroo Boating Hazard Chart

Warning: This chart is an old only and is not to be used for navigational purposes. Hazard dangers increase with lowering dam water levels.
Figure B2: Tinaroo Falls Dam Catchment Area Map
APPENDIX C: EQUIPMENT, MESSAGING INSTRUCTIONS AND TECHNICAL DATA

C1  List of equipment available during an emergency
C2  Spillway and tailwater data
C3  Spillway Capacity Upgrade
C4  Discharge Curves
C5  Storage Curve
## Appendix C1: List of Equipment Available During an Emergency

<table>
<thead>
<tr>
<th>Name of equipment</th>
<th>No's</th>
<th>Owner</th>
<th>Contact name</th>
<th>Contact number</th>
<th>Depot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat – Quintrex 385 Explorer with 15HP outboard</td>
<td>1</td>
<td>Sunwater</td>
<td>Civil Supervisor</td>
<td>0407 156 701</td>
<td>Tinaroo Falls Dam</td>
</tr>
<tr>
<td>Boat – Clark 5.3M with 75HP outboard</td>
<td>1</td>
<td>Sunwater</td>
<td>Civil Supervisor</td>
<td>0407 156 701</td>
<td>Tinaroo Falls Dam</td>
</tr>
<tr>
<td>Generators, pumps and other ancillary equipment</td>
<td>Varies</td>
<td>Sunwater</td>
<td>Civil Supervisor</td>
<td>0407 156 701</td>
<td>Mareeba</td>
</tr>
<tr>
<td>Backhoe</td>
<td>1</td>
<td>D&amp;D Backhoe</td>
<td>Civil Supervisor</td>
<td>0419 715 285</td>
<td>Mareeba</td>
</tr>
<tr>
<td>Truck, Grader, Excavator, Dozer</td>
<td>Varies</td>
<td>Mareeba Civil Supervisor</td>
<td>0407 156 701</td>
<td>Mareeba</td>
<td></td>
</tr>
<tr>
<td>Crane</td>
<td>Varies</td>
<td>Atherton Crane Hire</td>
<td>Civil Supervisor</td>
<td>0407 156 701</td>
<td>Quilter Crescent Tolga Mareeba</td>
</tr>
<tr>
<td>Front-End Loader Tractor</td>
<td>1</td>
<td>Sunwater</td>
<td>Civil Supervisor</td>
<td>0407 156 701</td>
<td>Mareeba</td>
</tr>
<tr>
<td>10 Tonne Tipper truck</td>
<td>1</td>
<td>Sunwater</td>
<td>Civil Supervisor</td>
<td>0407 156 701</td>
<td>Mareeba</td>
</tr>
<tr>
<td>3 Tonne Tipper Truck</td>
<td>1</td>
<td>Sunwater</td>
<td>Civil Supervisor</td>
<td>0407 156 701</td>
<td>Mareeba</td>
</tr>
</tbody>
</table>

In addition to the above list, further resources can be accessed through Local, District and State Disaster Management framework, if and when the Local Disaster Management Group is activated. See relevant pages in this section for contact details.
Appendix C2: Spillway Capacity Upgrade

Tinaroo Falls Dam Spillway Capacity Upgrade

Storage Elevation (m)

Discharge (m³/sec)

Dam Kerb EL 674.31
Spillway Crest EL 670.42
Appendix C3: Discharge curves
Appendix C4: Storage Curve
APPENDIX D: Tinaroo Falls Emergency Action Plan Toolkit
APPENDIX E: Interaction with local government and district groups