EMERGENCY ACTION PLAN — WOONGARRA BALANCING STORAGE (DAM ID 2031)

ISSUE: 9.0 June 2024 **Expiry Date: м Juуe нлнф**

Prepared by **Sunwater Limited**

Controlled Copy No.

Gated: No	Staffed: No

Type: Central core-earth and rock-fill embankment dam

Project: Woongarra Balancing Storage EAP **File no.:** 08-000383/001

Address: 1284 Childers Road

Location: Lat. -24.920590° Lon. 152.263853°
24°55’14.08”S 152°15’49.87”E

Approved by the delegate of the Chief Executive, Department of Local Government, Water and Volunteers until 1 June 2029.

Emergency activation quick reference – Dam Hazards

The Emergency Action Plan (EAP) for Woongarra Balancing Storage covers 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

Dam Hazards and section numbers	Activation Levels			
	Alert	Lean Forward	Stand Up	Stand Down
	• Locally managed (DDO)	• Locally managed (DDO and IC)	• Locally managed (DDO and IC) with advice from Owner's Rep/DSTDM	• Locally managed (DDO and IC) with advice from Owner's Rep/DSTDM
	Activation triggers for dam hazards			
Flood operations **See section 5**	• EL 35.65 m and rising (0.1 m below spillway crest level)	• Storage above EL 35.86 m (Flood of Record)	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	• Storage level EL 35.75 m and falling with no forecast increase in EL for 48 hours
Piping: embankment, foundation, or abutments **See section 6**	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Risk assessment has determined that failure risk has reduced
Earthquake **See section 7**	• Earthquake confirmed (by DSTDM) or felt in the area, AND • Intensity less than 5 Modified Mercalli (MM)	• Earthquake confirmed (by DSTDM) 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 confirmed (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Risk assessment has determined that failure risk has reduced
Terrorist threat/ activity or high energy impact **See section 8**	• Not applicable	• Not applicable	• Possible terrorist activity noticed at 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

CONTINUED NEXT PAGE: EMERGENCY ACTIVATION QUICK REFERENCE

Emergency activation quick reference – Other Emergency Situations

The EAP for Woongarra Balancing Storage 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)

Other Emergency Situations and section numbers	Activation levels		
	Communications Failure – Dam Site (DDO)	Communications Failure – Local Area (LEC/ORR)	Communications Failure – Brisbane (IC/DSTDM)
	Site managed (DDO - becomes LEC)	Brisbane managed by Incident Coordinator (IC)	Locally managed by Local Event Coordinator (LEC)
Comms Failure See section 9	• Unable to communicate to or from Dam site	• Unable to communicate to or from Local Area	• Unable to communicate to or from Sunwater Brisbane

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Document control

Authorisation of document

Name	Position/role	Signature	Date
	EAP Program Lead — Prepared for submission		06/01/2025
	Principal Engineer – Dam Safety Compliance — Approved for submission		06/01/2025
	GM Asset Integrity — Approved for submission		20/01/2025
	EGM – Engineering and Water Resources (or delegate) — Dam Owner Authorising Officer		20/01/2025

Document revision history

Version	Date	Prepared by	Reason for change	Ref no.
2	Feb 2011		Created but not issued. Will be issued as Version 3, consistent with all EAPs to be issued in 2011 as Issue 3.	HB # 1060512
3	Oct 2011		Significant changes to all sections of Woongarra Balancing Storage Emergency Action Plan to reflect current Sunwater Management structure and other changes.	HB # 1044320
3C	Sep 2013		Amendments due to new legislative requirements	HB # 1135636
4	Aug 2016		New Emergency Action Plan developed at expiry of 3E approval. Issued for consultation with Relevant Disaster Management Groups.	HB # 1879840
5	October 2017		New Emergency Action Plan with minor amendments including contact list updates.	HB # 2086532
6	July 2018		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).	HB # 2086532
7	December 2018		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	HB # 2367517
7.1	September 2019		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holders list. Removed Downstream Notification map as no longer required. Minor error corrections and other non-substantive changes.	HB # 2473537
7.2	September 2020		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	HB # 2572872

Version	Date	Prepared by	Reason for change	Ref no.
7.3	September 2021		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes such as removing Comprehensive Risk Assessments description (2.9) and simplifying FODM role in Activation triggers (5.2.1) including removing para 5.2.2.	HB # 2653335
7.4	September 2022		Amended contacts and associated sections. Minor error corrections and other non-substantive changes. The Chemical Hazard section has been removed as it is not a Dam Safety Hazard and is dealt with in other more relevant documents.	HB # 2726206
8.0	November 2022		Minor error corrections and other non-substantive changes. Minor changes to Section 3 – Dam Details. Incorporated non-substantive EAP changes resulting from feedback from previous internal and external reviews. Substantive changes to maps in Appendix B. Updated Downstream Residents Notification List in Appendix A4.	eDOCS #2743825
8.1	September 2023		Chemical spill section and all references to it removed. Updated Emergency Alert Request form. Added Fatigue Management section. Non-substantive updates as part of Annual Safety Statement. Minor error corrections and readability improvements.	eDOCS #2811846
9.0	June 2024		Full review pending expiry.	eDOCS #2851142

Controlled document distribution list

Copy no.	Position	Location
1	Operations Supervisor	Sunwater, Bundaberg
2	General Manager	Sunwater, Bundaberg
3	Emergency Action Plan Lead	Sunwater, Brisbane
4	Local Disaster Coordinator—Local Disaster Management Group (LDMG)	Bundaberg Regional Council
Notes: Communication information for each 'Controlled Copy Holder' is attached in Appendix A		

Electronic document distribution list

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Position	Location
Executive Officer— Bundaberg District Disaster Management Group (DDMG)	Police, Bundaberg
Emergency Management Coordinator	Queensland Police Service, Maryborough
Senior Flood Forecaster	Bureau of Meteorology, Brisbane
Note: Communication information for each 'Electronic Copy Holder' is in Appendix A.	

1. References, abbreviations, and definitions

1.1 References/associated documents

Ref.	Document title	Reference/location
A	Sunwater (internal) Strategic Event Procedure	Sunwater internal document
B	Sunwater (internal) Woongarra Balancing Storage Dam Operation and Maintenance Manual	Woongarra Balancing Storage O&M Manual
C	Sunwater (internal) Woongarra Balancing Storage Dam Safety Condition Schedule	eDOCS# 2720257
D	Queensland Disaster Management Guidelines	https://www.disaster.qld.gov.au/__data/assets/pdf_file/0032/359465/QLD-Disaster-Management-Guideline.pdf
E	Queensland Rainfall and River Conditions (Flood Warning)	http://www.bom.gov.au/qld/flood/index.shtml?ref=hdr
F	Sunwater (internal) Emergency Alert Protocol	eDOCS# 2156253
G	Sunwater (internal) Referable Structures Standing Operating Procedure: SOP 12 Dam Logbooks	SOP 12 Dam Log Books (sharepoint.com)
H	Sunwater (internal) Woongarra Balancing Storage Comprehensive Risk Assessment (March 2022)	eDOCS # 2719943
I	Woongarra Balancing Storage Hazard Management Toolkit (HMT)	Sunwater internal document
J	Sunwater (internal) Fatigue Management Procedure	Fatigue Management Procedure

1.2 Abbreviations and acronyms

ABC	Australian Broadcasting Corporation
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AMTD	Adopted Mean Thread Distance
ANCOLD	Australian National Committee on Large Dams
AWS	Australian Warning System
BOM	Bureau of Meteorology
CEO	Chief Executive Officer
CRA	Comprehensive Risk Assessment
D/S	Downstream
DCF	Dam Crest Flood
DCL	Dam Crest Level
DDC	District Disaster Coordinator
DDMG	District Disaster Management Group
DDMP	District Disaster Management Plan
DDO	Dam Duty Officer
DDS	Director Dam Safety
DSR	Dam Safety Regulator
DSMP	Dam Safety Management Program Procedure
DSSC	Dam Safety Surveillance Coordinator
DSTDM	Dam Safety Technical Decision Maker
EAP	Emergency Action Plan
EA	Emergency Alert
EER	Emergency Event Report
EGMO	Executive General Manager Operations
EL	Elevation Level
FCL	Fixed Crest level
FODM	Flood Operations Decision Maker
FSL	Full Supply Level
GM	General Manager
GMSRC	General Manager Stakeholder Relations & Communication
EGM E&WR	Executive General Manager Engineering & Water Resources
IC	Incident Coordinator
IFHC	Incremental Flood Hazard Category
IGEM	Inspector-General Emergency Management
LB	Left Bank
LDC	Local Disaster Coordinator
LDMG	Local Disaster Management Group
LDMP	Local Disaster Management Plan
LEC	Local Event Coordinator
MAP	Manager Asset Planning
Max. OL	Maximum Operating Level
ME	Manager Environment
MM	Modified Mercalli
O&M	Operation & Maintenance
OB	Observation Bore
OC	Operations Centre
OCDO	Operations Centre Duty Operator
OM	Operator Maintainer
OMGR	Operations Manager
OS	Operations Supervisor
ORR	Owner's Regional Representative
PAR	Population at Risk
PFRM	Predictive Flood Routing Model
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PMPF	Probable Maximum Precipitation Flood
PWRE	Principal Water Resources Engineer
QDMC	Queensland Disaster Management Committee
QPS	Queensland Police Service
RB	Right Bank
RC	Regional Council
RCC	Roller Compacted Concrete
RDMW	Department of Regional Development, Manufacturing and Water
ROC	Regional Operations Centre
RPEQ	Registered Professional Engineer of Queensland
RSL	Reduced Supply Level
SCED	Senior Civil Engineer Dams
SDCC	State Disaster Coordination Centre
SDF	Sunny Day Failure
SDTE	Senior Dam Technical Engineer
SES	State Emergency Service
SHD	State Height Datum
SMS	Short Message Service
SMT	Sunwater Media Team
SO	Standby Operator
SOM	Senior Operator Maintainer
SOP	Standing Operating Procedure
SS	Storage Supervisor
SWL	Storage Water Level
SWRE	Senior Water Resources Engineer
U/S	Upstream
WHS	Workplace Health & Safety
WQ	Water Quality

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.

Term	Definition
Terms set out in section 352A of the *Water Supply (Safety and Reliability) Act 2008 (Qld) – Amended*	
Australian Warning System	A national approach to information and warnings during emergencies like bushfire, flood, storm, extreme heat, and severe weather.
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 2003*, 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*.

Term	Definition
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 farmland 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. • **Stand Up:** The operational state where resources are mobilised, personnel are activated, and operational activities commenced. 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, DDMGs or Disaster Coordination Centres.

Term	Definition
AWS Warning Levels	The three AWS warning levels are: • **Advice:** The first warning level of the Australian Warning System meaning an incident has started but there is no immediate danger. Stay up to date in case the situation changes. • **Watch and Act:** The second warning level of the Australian Warning System meaning there is a heightened level of threat. Conditions are changing you need to start taking action now to protect you and your family. • **Emergency:** The third and highest warning level of the Australian Warning System meaning lives may be in danger and action should be taken immediately. **Notes:** These AWS Warning levels do not change the Activation Levels of the EAP and are intended for external public facing information only. There is no Stand Down equivalent in AWS warning levels
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.
Concurrent Flooding	Flood flows downstream of a dam that are not a result of dam outflows, for instance those from adjacent catchments or from the sea, and which occur in the same period as downstream releases or flooding from the dam.
Dam crest flood	The flood event that causes reservoir levels to reach the lowest point of non-overflow section of a dam.
Dam failure	Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.
Downstream releases	Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam.
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, resulting in the generation of seismic waves that 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.
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.

Term	Definition
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 flood	Probable maximum precipitation flood is the flood resulting from probable maximum precipitation coupled with standard catchment conditions that can be expected.
'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, fail or contaminate 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 Emergency Action Plan for Referable Dam Guideline (RDMW 2023) and the Queensland State Disaster Management Plan 2023. 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 earthquake):

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 government whose area may be affected by a dam hazard for Woongarra Balancing Storage has been assessed as **Bundaberg Regional Council.** Sunwater has provided the council 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 Bundaberg Balancing Storage is **Bundaberg Police 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 Woongarra Balancing Storage 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 Woongarra Balancing Storage 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 Woongarra Balancing Storage 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 Bundaberg Local Disaster Management Plan (LDMP).

2.3 Scope

The Woongarra Balancing Storage EAP covers:

- dam hazards evaluated within Sunwater's Dam Safety Management Program
- details about the dam that are relevant to a dam hazard
- triggers for activation of a tiered response to dam hazards
- roles and responsibilities in responding to an emergency event
- notification and communication protocols
- inspection, monitoring, and reporting protocols during emergencies
- other relevant information that may assist with identifying the area affected by an emergency event, and the management of emergency events at Woongarra Balancing Storage.

2.4 Sunwater 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 period Sunwater staff complete 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 include walkthroughs of new changes, scenario (role play) and Q & A to check the knowledge and competency of all those who attended. The training is presented to relevant Sunwater staff (DDO's, LEC's and IC's) and disaster management stakeholders. DSTDM and FODM 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 Sunwater employees in these various roles also have a walkthrough of the EAP.

Note: All enquiries regarding EAP training should be directed to

Sunwater is also working towards carrying out a full test once annually involving each local authority and disaster management stakeholders. 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. The test results relating to numbers of alerts generated will be shared with local authority and disaster management stakeholders.

2.5 Principles used in developing this EAP

The LDMG has principal carriage of managing any disaster situation within the community, with the support of the district and state groups.

Sunwater will aim to inform and support the LDMG in the Bundaberg area.

The LDMG will be the principal voice on all communication to the community during a disaster situation in most circumstances except those where imminent dam failure is likely, and time is critical.

During a dam failure event that occurs with little or no warning, Sunwater will undertake the following actions to ensure the community is informed as soon as possible:

- maintain an up-to-date list of immediate D/S residents of Woongarra Balancing Storage. The downstream limit is shown in the plan in Appendix B2 by the zone labelled Limit of downstream notification area.
- provide timely advice to the LDMG.
- notify the immediately D/S residents via SMS.
- contact SDCC Watch desk to request an Emergency Alert campaign throughout the Woongarra Balancing Storage Emergency Polygon.

During a flood event, the LDMG in the Bundaberg 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 immediate D/S residents of Woongarra Balancing Storage. The downstream limit is shown in the plan in Appendix B2 by the zone labelled Limit of downstream notification area.
- provide the LDMG with a copy of the list of residents (immediately D/S) annually for inclusion in the LDMG's SMS alert system.
- provide timely advice to the LDMG.

Sunwater will independently inform and support the Bundaberg DDMG.

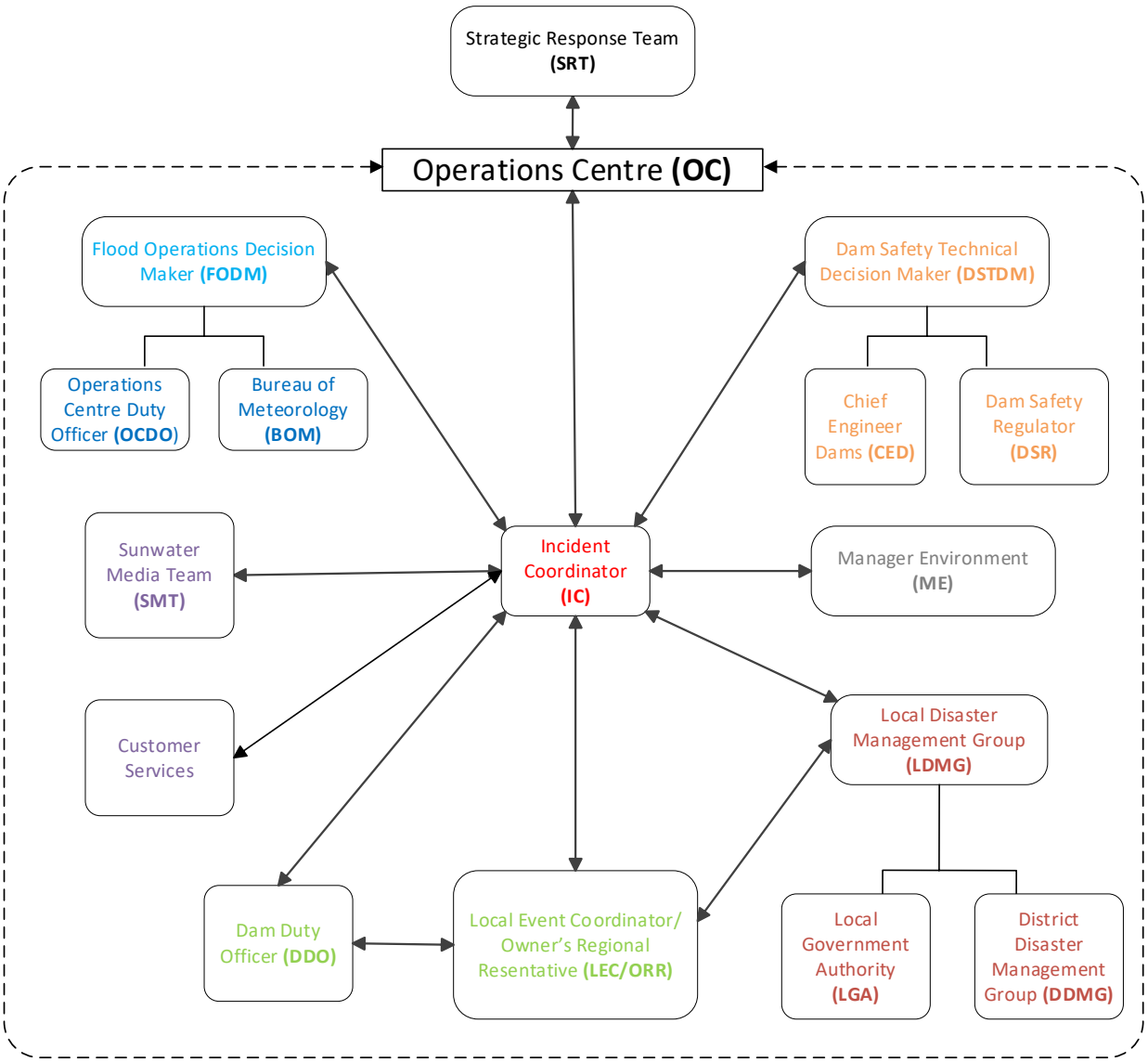
2.6 Fatigue Management Plan

Sunwater has a Fatigue Management Procedure (reference J). This document recognises fatigue as an important workplace hazard and has identified and outlined control processes to mitigate the risk of fatigue impaired HSE incidents. A copy of Sunwater's Fatigue Management Procedure can be provided upon request.

2.6.1 Dam emergency organisation within Sunwater

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

Figure 1: Sunwater emergency response organisation



Key aspects of the emergency management framework are:

- Central to the framework is the role of 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.
- The DSTDM is primarily responsible for analysing dam safety and providing expert technical advice in this regard. They will be expected to discuss dam hazards with peers and other technical experts and make sound decisions to mitigate risks and to determine a response to incidents and emerging issues. The DSTDM is the key communication contact with the Dam Safety Regulator.
- The FODM has responsibility for all matters involving flood modelling and forecasting and determining the associated impact to Sunwater storages/infrastructure and EAP actions. The FODM may pre-

emptively advise the IC to activate the EAP in accordance with available hydrology forecast information. For example, if an EAP trigger level is predicted to be exceeded based on forecast dam inflows derived from observed rainfall and streamflow conditions upstream of the dam, the EAP may be activated to the predicted level. Regarding the operation of the OC, the FODM must liaise with the IC as necessary to inform of decisions made.

- 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.

2.7 Community information

Sunwater with the assistance of Bundaberg Regional Council 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, the Sunwater web page, Sunwater App and at several regional show/field days across regional Queensland where Sunwater may have stalls and information available.

In the event of a dam failure or when required Sunwater also have the use of the National Emergency Alert System to send a voice message or SMS. This service is provided by the State Disaster Coordination Centre and the process Sunwater follows is documented in Appendix A.

A copy of all Sunwater approved EAPs are available to the public on the Sunwater website: https://www.sunwater.com.au/community/preparing-for-emergencies/emergency-management/

These copies are redacted to protect people's personal details.

2.8 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 RDMW as appropriate.

In addition, Sunwater requests any post event learnings be communicated regarding operational effectiveness and areas for improvement.

3. Dam details

3.1 General dam information

Location: Woongarra Balancing Storage is located on the right bank of Burnett River. The storage is 8 km south of Bundaberg.

Construction: Woongarra Balancing Storage was constructed in 1977, to provide irrigation water to farmers on the Woongarra channel system.

Specification: The table below lists general specifications of Woongarra Balancing Storage.

Table 2: Woongarra Balancing Storage specifications

Description	Specification
Dam type	**Central core-earth and rock-fill embankment dam**
Nominal crest elevation	EL 37 m
Embankment crest length	2,120 m
Embankment crest width	5 m
Built height (above lowest bed)	9 m
Maximum Operating Level (Max. OL)	EL 35.50 m
Full Supply Level (FSL)—nominal	EL 35.75 m
Historical recorded max storage	EL 35.86 m (23 March 2012)
Live storage (at FSL)	1,225 ML
Reservoir surface area (at FSL)	0.46 km^2
Catchment area	1.02 km^2
Minimum Operating Level (Min OL)	EL 34.0 m
Storage capacity at Min OL	635 ML
Probable Maximum Flood (PMF) Level	EL 36.6 m
PMF occurrence	1 in 100,000,000 AEP
Spillway depth at PMF	0.85 m
At Dam Crest Level	
Dam Crest Level (DCL)	EL 37.00 m (design) EL 36.95 m AHD (surveyed minimum 2016) refer drawing 244950
Storage capacity (at DCL)	2,000 ML
Emergency spillway	
Type	Un-gated broad crested weir control structure
Crest level	EL 35.75 m
Crest width	50 m
DCF spillway capacity	113 m^3/s (9,763 ML/d)

Description	Specification
Outlet Works	Outlet control structure at ch. 393 m discharging to Woongarra main channel and outlet to channel W1 at ch. 1300 m.
Woongarra main channel outlet	Outlet consists of 2 x 1800 mm RC delivery pipelines (one not in use) that are controlled by a penstock gate at the inlet and a float gate at the outlet.
Channel W1 outlet	Intake structure fitted with a 450 mm diameter Armco slide gate and 300 mm AC delivery pipe.

Note: All levels are to Australian Height Datum (AHD).
Conversion for Dam is AHD = ((State Datum in feet x 0.3048) + 0.303) m

3.2 Population at risk

Population at Risk (PAR) assessments were carried out for the 2022 Comprehensive Risk Assessment (CRA, ref H). For a sunny day failure, the PAR is 16. The total PAR for the 1 in 100-year AEP is 17 (incremental of 9). The total PAR for the probable maximum flood is 10 (incremental of 0).

Further information is available upon request from Sunwater.

3.3 General arrangement

The general arrangement drawings are in Appendix B.

3.4 Emergency inspections and monitoring

The Woongarra Balancing Storage has been designed to conform to modern design standards, so that its failure is highly unlikely. 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 Woongarra Balancing Storage.

3.4.1 Inspections

- Routine Visual Inspection: Conducted as per routine surveillance Work Order or as directed by the DSTDM
- Detailed Inspection: Conducted annually
- Comprehensive Inspection: Conducted 5-yearly

4. Roles and responsibilities

EAP roles and responsibilities	Position holder

Owner
• Liaise with the Board and Minister
• Activate Sunwater Strategic Response and Business Continuity Plans, if required
• Ensure necessary resources are available to manage any dam hazard and emergency events
• Record communications, notifications and observations as required
• At all times, aim to provide timely advice and support to the local disaster management groups (LDMGs) in the affected local government areas and the district disaster management groups (DDMGs) in the affected disaster districts
• During a dam hazard event that occurs with little or no warning, undertake the following actions to ensure the community is informed as soon as possible:
  ○ Notify the downstream residents listed in the EAP via SMS
  ○ Contact SDCC Watch Desk to request an Emergency Alert campaign as detailed in the emergency alert request and threat direction polygon
• Where a dam hazard event occurs with adequate time to warn downstream residents, notify the residents listed in the EAP via SMS (unless otherwise agreed with the LDMGs)
	CEO
	EGMO
	EGM E&WR

Owner's Head Office Representative • Authorise the issuing of EAPs, SOPs and O&M Manuals and Amendments • 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 • Ensure that risks identified in CRAs or other technical reports undertaken in relation to Dam Safety are Included in the EAP • Ensure visual inspections and instrumentation monitoring frequencies conform to ANCOLD Guidelines • Ensure all Dam Safety work orders, work instructions and lesson learned outcomes are fully implemented. • Ensure requirements of the Dam Condition Schedule are met • Ensure the work instructions are correct and the Logbooks, SOPs, Data Books, and EAPs are reviewed annually as per the Condition Schedule • 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 • 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 • 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 • Record communications, notifications and observations as required	GM Asset Integrity GM Asset Management

EAP roles and responsibilities	Position holder
Owner's Regional Representative (ORR) • Liaise with the Storage Supervisor/Operator Maintainer • Arrange dam specific training and accreditation for relevant staff • Ensure competent, trained and accredited personnel operate the storages • Undertake the role of LEC as required • Record communications, notifications and observations as required • Ensure all work orders, work instructions and lesson learned outcomes are fully implemented.	GM Burnett & Lower Mary OS
Technical Advisor • Analyse the situation and provide expert technical advice • Discuss issue with peers and other technical experts and make sound decisions to mitigate the risk • Determine response to incidents and emerging issues • Record communications, notifications and observations as required	GM Environment
Dam Safety Technical Decision Maker (DSTDM) • Analyse the situation and provide expert technical advice in relation to Dam Safety • Discuss Dam Hazard with peers and other technical experts and make sound decisions to mitigate the risk • Determine response to incidents and emerging issues • Issue warning on dam failure and advise on protective measures • Ensure the EAP is implemented appropriately and carry out the DSTDM role as required • Maintain current RPEQ accreditation • Liaise with Regulator as required • Record communications, notifications and observations as required	Various personnel as per DSTDM roster
Flood Operations Decision Maker (FODM) • Maintain current RPEQ accreditation. • Provide hydrological advice in relation to predicted and actual dam outflows including assessment of weather and flood warnings and other related matters as identified in the OC SOP (Sunwater internal). • Interpret and apply rainfall data in accordance with the OC SOP, including, as required under the OC SOP, liaising with BOM. • Ensure the EAP is implemented appropriately and carry out the FODM role as required. • Record communications, notifications and observations as required.	Various personnel as per FODM roster
Operations Centre Duty Officer (OCDO) • Decide if a flood is imminent and record modes of operation • Extract data relative to the event from available sources • Utilise this data in predictive flood models and determine results from these models for approval by FODM • Liaise with the FODM or IC to update current flood situation and routing data • Record communications, notifications and observations as required	Various personnel as per OC roster

EAP roles and responsibilities	Position holder
Sunwater Media Team (SMT) • Analyse sensitive issues, discuss with the Owner and issue media releases • Handle public and customer comments (including social media) and advise the Owner if necessary • Liaise with the IC and update State Disaster Management Group of flood events • Record communications, notifications and observations as required	Various personnel as per Media Team roster
Incident Coordinator (IC) • Notify LDMG/s, or council/s if LDMG not Stood Up, of intent to use the Emergency Alert (EA) • Activate the EAP • Ensure the EAP is implemented appropriately and carry out the IC role as required • Arrange Situation Reports and determine frequency, as required • Record communications, notifications and observations as required	Various personnel as per IC roster
Local Event Coordinator (LEC) • Liaise with the Local Disaster Coordinator or proxy • Activate the EAP, when necessary • Ensure the EAP is implemented appropriately and carry out the LEC role as required • Record communications, notifications and observations as required	Various personnel as per LEC roster
Dam Duty Officer (DDO) • Complete accreditation to operate and maintain relevant storage • Ensure the EAP is implemented appropriately and carry out the DDO role as required • Take direction from the DSTDM and IC as requested • Arrange immediate site inspection and make informed assessment of the situation • Escalate any issue not covered in the EAP or where actions are not clear • Record communications, notifications and observations as required	SS OM
Council **Bundaberg Regional Council** • Council has legislated local government functions, as per Section 80 of the Qld Disaster Management Act (2003). These include: • Ensure it has a disaster response capability • Approve its local disaster management plan • 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 • Perform other functions given to the local government under the Act • And as per Section 352HB of the Water Legislation (Dam Safety) Amendment Act (2017): • Must assess (in consultation with its LDMG) the EAP for consistency with the Local Disaster Management Plan	

EAP roles and responsibilities	Position holder
Queensland Police Service (QPS) Manage the initial situation based on local operational procedures; including but not limited to: • Conduct emergency operations • Coordinate and support Sunwater during a declared emergency at the dam • Liaise with relevant organisations • Evacuation of persons if required • Security of specific area	Local Police
Disaster Management Groups/Personnel (In addition to requirements outlined in the Qld. Disaster Mgmt. Act (2003) LDMG • Assist Sunwater and the Bundaberg Regional Council to ensure community education around messaging and impacts of EAP related events is undertaken and continually improves • Work with Bundaberg Regional Council and Sunwater to ensure the EAP is regularly exercised • Identify and coordinate the use of manpower and resources that may be required for an EAP event • Identify and provide advice to DDMG about support services required by the LDMG to manage an EAP event QPS • Work with dam owner and LDMG to ensure Emergency Alerts polygons are prepared, stored and tested DDMG • DDMG may review plan with consistency with the District Disaster Management Plan	LDMG DDMG QPS
Dam Safety Regulator (DSR) • Liaise with relevant Minister on necessary actions. • Approve this document as required under legislation • Liaise with Chief Executive as required in administering (regulating) the *Water Supply (Safety and Reliability) Act 2008*	DDS
Strategic Response Team (SRT) • Facilitate the assessment, escalation and notification and management of strategic response and recovery for a high or extreme risk, or impact, event. • Initial and ongoing assessment of event status and requirements • Development, and revision of, strategic objectives based on requirements • Identifying, managing, and monitoring strategic risks • Monitor media and stakeholder/customer impacts • Managing/overseeing event communications including media, stakeholder, customer and internal communications. • Record communications, notifications and observations as required.	Various ELT members as per SRT roster

5. Dam Hazard—flood operations

5.1 Overview

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

- Where natural catchment inflows fill Woongarra Balancing Storage to EL 35.75 m and the rate of inflow exceeds the capacity of the outlet works. 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.
- Hydrological modelling shows that the dam crest embankment is not overtopped in extreme events (CRA 2022, ref H). Overtopping risk at stand up has been included in this EAP in case of unprecedented circumstances.
- The spillway is located on the western side of the storage and discharges overland directly to the Burnett River. **There is no population at risk for spillway flows**.
- There is population at risk during piping failures, with the highest risk breach location in the North-East corner, towards Bonna Road. The area likely to be affected by this emergency event via piping failure is described as:
  - Residential dwellings to the northeast of Woongarra Balancing Storage, particularly adjacent to McCoys Creek and Branyan Creek.

5.2 Emergency actions

Regarding the emergency action tables in this section, 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 3: Flood emergency activation trigger summary

EAP Flood Activation Trigger	Trigger Summary	AWS Warning Level
Alert	• EL 35.65 m and rising (0.1 m below spillway crest level)	
Lean Forward	• Storage above EL 35.86 m (Flood of Record)	**Advice**
Stand Up	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	**Emergency**
Stand Down	• Storage level EL 35.75 m and falling with no forecast increase in EL for 48 hours	

While this EAP is not triggered until Woongarra Balancing Storage reaches a level of EL 35.65 m, Sunwater and the Bundaberg Regional Council LDMG will work cooperatively and will endeavour to share intelligence of any rainfall event as and when either organisation becomes aware of a situation that could result in the activation of the EAP.

In respect of forecast rainfall, as is identified in the roles and responsibilities of the FODM, regard must be had to the OC SOP (Sunwater internal).

The activation of Stand Up requires consideration of wave action. For example, if the gauge reading was forecast to reach 1 m below the dam crest level and the DDO reported 1 m high waves, Stand Up will be triggered. Furthermore, the DSTDM may also trigger this activation if there are any dam safety concerns as the storage approaches dam crest level.

5.2.2 Emergency actions

Table 4 to Table 9 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- LEC & IC external communication plan
- Dam Safety Technical Decision Maker (DSTDM)
- Flood Operations Decision Maker (FODM).

Table 4: Flood operations—DDO emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• EL 35.65 m and rising (0.1 m below spillway crest level)	• Storage above EL 35.86 m (Flood of Record)	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	• Storage level EL 35.75 m and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Aim to maintain storage level between Min. Operating Level (OL) (EL 34.00 m) and Max. OL (EL 35.50 m) • Storage level above Max OL (EL 35.5 m)—increase discharge through the main channel by adjusting the outlet regulator gate • Inspect the dam daily (or as instructed by the DSTDM) and photograph/video and record using the approved forms in ref I and send to DSTDM and IC • Undertake site preperations including but not limited to: – Check communication systems (including backup, radio, satellite, phones, and internet) – Monitor catchment conditions • Record the Storage Level daily (or as instructed by the ORR/DSTDM) using the gauge boards • Record rainfall daily • Update Dam Logbook as per SOP 12	• As per previous activation level, AND • Inspect and record level of the dam twice daily (or as instructed by the DSTDM) and photograph/video and record using the approved forms in ref I and send to DSTDM and IC. Attention will be given to: – visual inspection of flow patterns over spillway for evidence of scouring – inspect embankment for leaks, deformation, and erosion – obvious signs of seepage, in particular known inspection points • Report any unusual readings or observations to the DSTDM and IC as soon as practical • Photograph spillway discharge area, monitor signs of bank erosion	• As per previous activation level, AND • Record the storage level regularly (or as instructed by the DSTDM) • Photograph/video and record using the approved forms in ref I and send to DSTDM and IC • Photograph spillway and D/S face at regular intervals • Remotely inspect the dam three times daily (or as instructed by the DSTDM) and photograph/video and record using the approved forms in ref I and send to DSTDM and IC • Evacuate any plant and/or vehicles to higher ground	• Return to routine surveillance activities and frequencies—inspect the dam for any damage identified • Forward all EER material to IC email as required • Update Dam Logbook as per SOP 12
Notifications	• IC • SO • LEC	• As per previous activation level	• As per previous activation level	• As per previous activation level
AWS Warning Level		**Advice**	Emergency	

Table 5: Flood operations—LEC emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• EL 35.65 m and rising • (0.1 m below spillway crest level	• Storage above EL 35.86 m (Flood of Record)	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	• Storage level EL 35.75 m and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Develop/implement staff roster	• As per previous activation level	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• IC • DDO	• As per previous activation level, AND • LDMG • DDMG	• As per previous activation level	• As per previous activation level
AWS Warning Level		Advice	Emergency	

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

Table 6: Flood operations—IC emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• EL 35.65m and rising • (0.1m below spillway crest level	• Storage above EL 35.86m (Flood of Record)	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	• Storage level EL 35.75m and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Create Sunwater Incident Report • Update Sunwater Intranet with dam status • NOTE: IC to carry out LEC actions unless LDMG is *Stood Up*	• As per previous activation level	• As per previous activation level	• Deactivate EAP Event • Complete all Internal and External notifications • Compile EER and deliver to DSR if required • Close Sunwater Incident Report • Update Sunwater Intranet with dam status • Return to routine activities
Notifications	• DDO • LEC/ORR • DSTDM • SMT	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of stand down
AWS Warning Level		Advice	Emergency	

Table 6: Flood operations—IC emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• EL 35.65m and rising • (0.1m below spillway crest level	• Storage above EL 35.86m (Flood of Record)	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	• Storage level EL 35.75m and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Create Sunwater Incident Report • Update Sunwater Intranet with dam status • NOTE: IC to carry out LEC actions unless LDMG is *Stood Up*	• As per previous activation level	• As per previous activation level	• Deactivate EAP Event • Complete all Internal and External notifications • Compile EER and deliver to DSR if required • Close Sunwater Incident Report • Update Sunwater Intranet with dam status • Return to routine activities
Notifications	• DDO • LEC/ORR • DSTDM • SMT	• As per previous activation level, AND • D/S Residents	• As per previous activation level	• Inform all previously notified contacts of stand down
AWS Warning Level		Advice	Emergency	

Table 7: Flood operations—LEC & IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text	AWS Warning Level
Alert	• EL 35.65m and rising • (0.1m below spillway crest level)	N/A	N/A	No community message required	
Lean Forward	• Storage above EL 35.86m • (Flood of Record)	• D/S Residents • LDMG	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG, FODM and/or DSTM to send appropriate message.** **Refer to Annexe for sample message**	Advice
Stand Up	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG, FODM and/or DSTDM to send appropriate messaging via SMS.** **Refer to Annexe for sample message**	Emergency
		• LDMG • DDMG	• Phone	Describe current situation with dam—What is the event? What is the status? Advise of current storage level Advise of any forecasts you are aware of	
Stand Down	• Storage level EL 35.75m and falling with no forecast increase in EL for 48 hours			No community message required	

Table 8: Flood operations—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• EL 35.65m and rising • (0.1m below spillway crest level	• Storage above EL 35.86 (Flood of Record)	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	• Storage level EL 35.75m and falling with no forecast increase in EL for 48 hours
Action	• Record all communication • Provide technical advice to DDO and IC on a needs basis • Review surveillance reports and determine if any additional responses are required	• As per previous activation level	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level • CEO	• As per previous activation level
AWS Warning Level		Advice	Emergency	

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

Table 9: Flood operations—FODM emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• EL 35.65m and rising • (0.1m below spillway crest level	• Storage above EL 35.86m (Flood of Record)	• Storage above EL 36.95 m (allowing for wave action), OR • As advised by DSTDM	• Storage level EL 35.75m and falling with no forecast increase in EL for 48 hours
Action	• Record all communication • Provide technical advice to DDO, DSTDM and IC on a need basis. • Inform IC of any EAP decisions made. • Review SDCC reports and determine if any additional responses are required. • Undertake inflow assessment as per the OC SOP and update as necessary. • Update and issue Status Updates if required.	• As per previous activation level	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• IC • DDO • DSTDM • BOM	• As per previous activation level	• As per previous activation level	• As per previous activation level
AWS Warning Level		Advice	Emergency	

6. Dam Hazard—piping: embankment, foundation, or abutments

6.1 Overview

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

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

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

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

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

6.1.1 Assessment of circumstances that indicate 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.

6.2 Emergency action roles

Table 10 to Table 14 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM).

Figure 2: Piping: embankment, foundation, or abutments flowchart

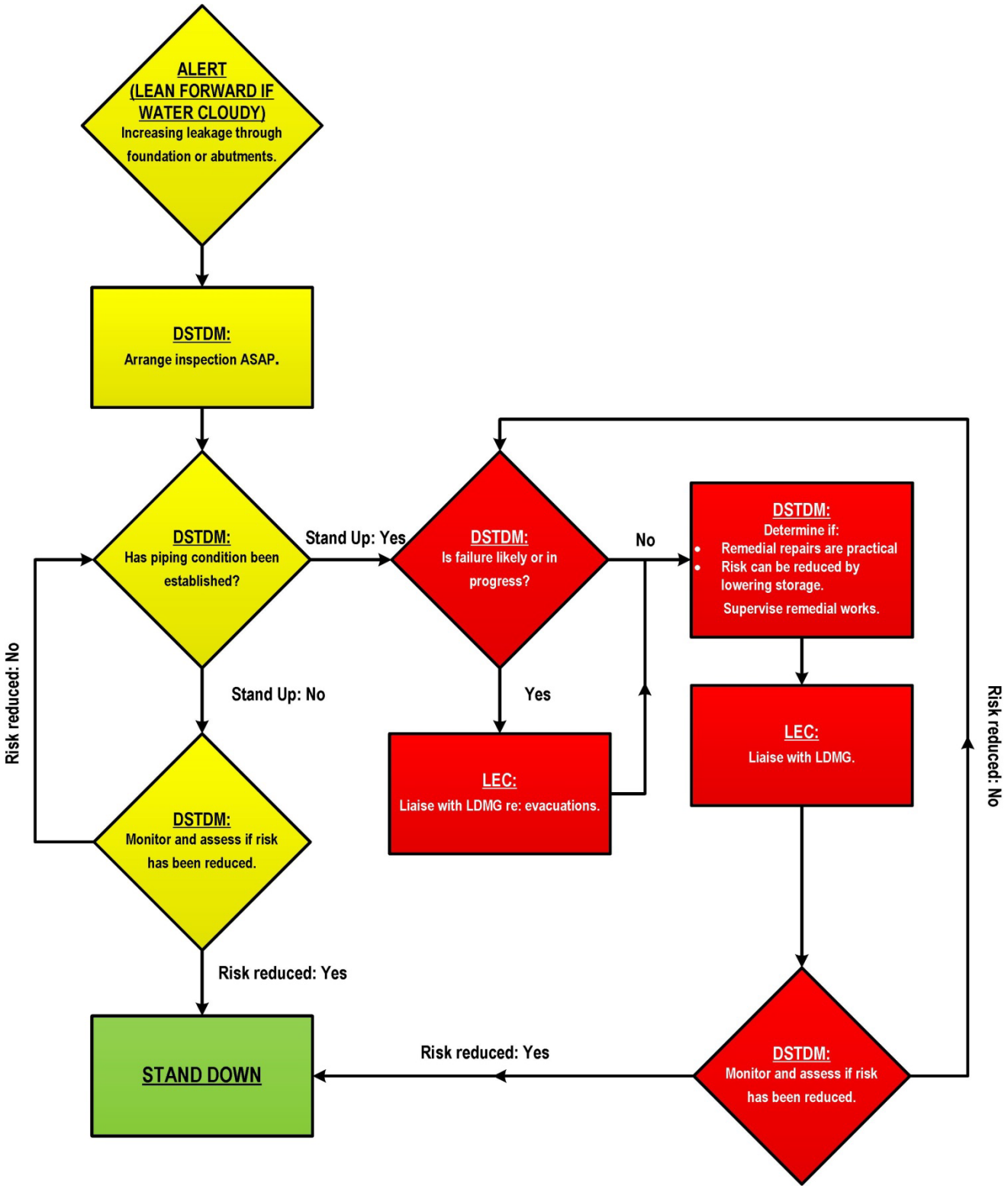


Table 10: Piping: embankment, foundation, or abutments—DDO emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Increasing leakage through the embankment, the foundations, or abutments	• Increasing leakage through the embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that piping risk has reduced
Actions	• Record all communication • Monitor flows every 6 hours until a decreasing trend is observable, or as directed by the DSTDM • Photograph/video the piping from a safe point and record using the approved forms and send to DSTDM • Update Dam Logbook as per SOP 12	• As per previous activation level	• As per previous activation level, AND • Support/supervise remedial works as required • Lower the storage if directed • Close any affected roads if not already closed by others • Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public	• As per previous activation level, AND • Vacate the immediate vicinity of the piping condition	• Forward all EER material to IC email as required • Update Dam Logbook as per SOP 12 • Return to routine activities
Notifications	• DSTDM • IC • SO • LEC	• As per previous activation level	• 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

Table 11: Piping: embankment, foundation, or abutments—LEC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Increasing leakage through the embankment, the foundations, or abutments	• Increasing leakage through the embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that piping risk has reduced
Actions	• Record all communication • Complete Situation Report, unless otherwise directed	• As per previous activation level	• As per previous activation level, AND • Liaise with relevant Council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• IC • DDO	• As per previous activation level, AND • LDMG	• As per previous activation level	• As per previous activation level	• As per previous activation level

Table 12: Piping: embankment, foundation, or abutments—IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Increasing leakage through the embankment, the foundations, or abutments	• Increasing leakage through the embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that piping risk has reduced
Actions	• Record all communication • Create Sunwater Incident Report • Update Sunwater Intranet with dam status • Note: IC to carry out LEC actions unless LDMG is *Stood Up*	• 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. • Confirm EAs and other messages are prepared in advance –if required.	• As per previous activation level, AND • Liaise with Sunwater Media on-call, LDMG, FODM and/or DSTM to send appropriate message • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level	• Deactivate EAP Event • Complete all internal and external notifications • Compile EER and deliver to DSR if required • Close Sunwater Incident Report • Update Sunwater Intranet with dam status • Return to routine activities
Notifications	• DSTDM • DDO • LEC/ORR • SMT • SRT	• As per previous activation level, AND • DDMG	• As per previous activation level, AND • D/S Residents • SDCC • ABC	• As per previous activation level	• Inform all previously notified contacts of stand down

Table 13: Piping: embankment, foundation, or abutments—LEC & IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• Increase in leakage through an embankment, the foundations, or abutments			N/A – Internal communications only
Lean Forward	• Increase in leakage through an embankment, the foundations, or abutments with cloudy water	• LDMG • DDMG	• Phone	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
Stand Up 1	• Piping condition has been established	• SDCC	• Phone & Email	**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref l) and email to the SDCC to send.**
		• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG, FODM and/or DSTM to send appropriate message. Refer to Annexe for sample message**
		• LDMG • DDMG	• Phone	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. Discuss any potential road/bridge closures Prepare for possible evacuations
		• ABC	• Phone	Message to be determined

Table 13 (Continued): Piping: embankment, foundation, or abutments—LEC & IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up 2	• Failure likely due to piping, AND • Sufficient water in storage to create a dam failure hazard	• SDCC	• Phone & Email	**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref l) and email to the SDCC to send.**
		• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG, FODM and/or DSTM to send appropriate message. Refer to Annexe for sample message**
		• LDMG • DDMG	• Phone	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
		• ABC	• Phone	Message to be determined.
	• Dam failure in progress	• SDCC	• Phone & Email	**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref l) and email to the SDCC to send.**
		• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG, FODM and/or DSTM to send appropriate message. Refer to Annexe for sample message**
		• DDMG	• Phone	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
		• ABC	• Phone	Message to be determined.
Stand Down	• Risk assessment has determined that failure risk has reduced	• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG, FODM and/or DSTM to send appropriate message. Refer to Annexe for sample message**
		• LDMG • DDMG	• Phone	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

Table 14: Piping: embankment, foundation, or abutments—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Increasing leakage through the embankment, the foundations, or abutments	• Increasing leakage through the embankment, the foundations or abutments with cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that piping risk has reduced
Action	• Record all communication • Arrange an inspection of the dam to assess its condition as soon as possible, when safe to do so • Determine if piping condition has been established • Monitor situation and assess risks	• As per previous activation level	• Assess risk and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) • Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision • Monitor situation and assess risks	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level, AND • DSR	• As per previous activation level	• As per previous activation level, AND • CEO	• As per previous activation level

7. Dam Hazard—earthquake

7.1 Overview

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

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

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

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to earthquake damage and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) or the Probable Maximum Precipitation (PMP) outlines when a dam failure is in progress or likely due to earthquake damage and concurrent flooding or downstream releases are occurring or expected to occur.
- **Note:** Definitions for *Concurrent Flooding* and *Downstream Releases* are provided in Section 1.3

7.2 Emergency action roles

Table 15 to Table 19 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Local Event Coordinator (LEC)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM).

Figure 3: Earthquake flowchart

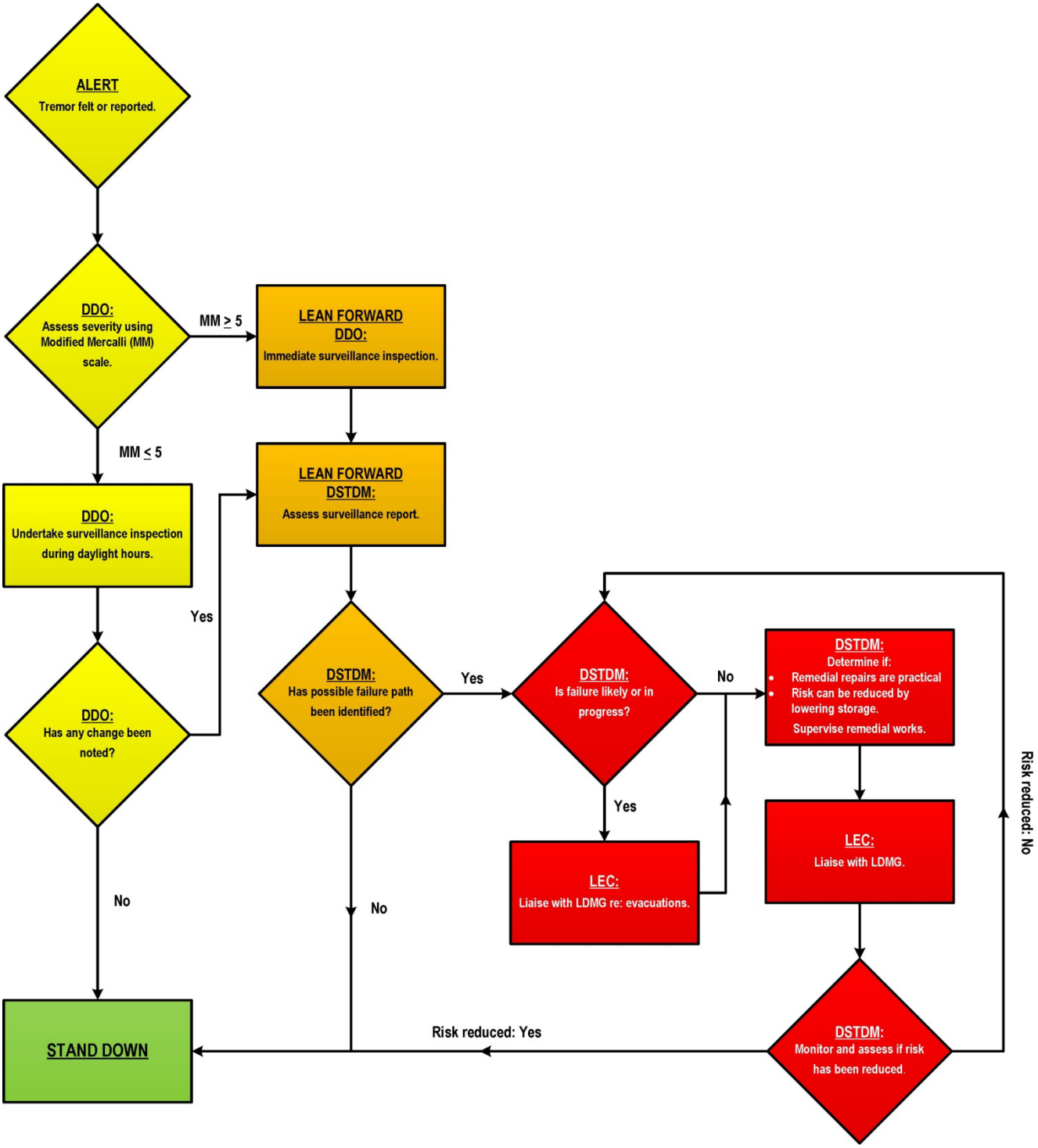


Table 15: Earthquake—DDO emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM	• Earthquake confirmed* (by DSTDM) 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 confirmed* (by DSTDM) 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	• DDO to assess magnitude (MM scale) at dam location • Record all communication • Inspect the embankment and spillway structure in daylight hours (if safe to do so) and report to the DSTDM and IC—photograph/video and record using the approved forms and send to DSTDM and IC • Check for leaks, deformation, erosion, and concrete damage • Update Dam Logbook as per SOP 12	• As per previous activation level, AND • Repeat the inspection as directed	• As per previous activation level, AND • Support/supervise remedial work as required • Lower the storage if directed • Liaise with IC regarding potential road closure • Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public • Vacate the immediate vicinity of the embankment	• As per previous activation level • Ensure remedial works cease and plant and personnel have been moved to a safe location. • Record/photograph the earthquake damage and/or dam failure from a safe point	• Inspect the dam for any damage and photograph any damage identified during the event • Forward all EER material to IC email as required • Update Dam Logbook as per SOP 12 • Return to routine activities
Notifications	• DSTDM • IC • SO • LEC	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level

*'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.

Table 16: Earthquake—LEC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM	• Earthquake confirmed* (by DSTDM) 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 confirmed* (by DSTDM) 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	• Record all communication	• As per previous activation level	• As per previous activation level, AND • Liaise with relevant Council(s) regarding potential road/bridge closures	• As per previous activation level	• forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC	• As per previous activation level, AND • LDMG	• As per previous activation level	• As per previous activation level	• As per previous activation level

*'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.

Table 17: Earthquake—IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM	• Earthquake confirmed* (by DSTDM) 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 confirmed* (by DSTDM) 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	• Record all communication • Create Sunwater Incident Report • Update Sunwater Intranet with dam status • Note: IC to carry out LEC actions unless LDMG is *Stood Up*	• 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 Sunwater Recovery Coordinator. The Sunwater Recovery Coordinator is responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance –if required.	• As per previous activation level, AND • Mobilise resources to undertake remedial works if directed by DSTDM • Liaise with Sunwater Media on-call, LDMG, FODM and/or DSTM to send appropriate message and email to D/S residents and phone those without mobiles	• As per previous activation level • Liaise with the DSTDM to confirm that dam failure is in progress • Confirm that remedial works have ceased if directed by the DSTDM and plant and personnel have been moved to a safe location • Liaise with DDO and DSTDM re: potential for evacuations	• Deactivate EAP Event • Complete all internal and external notifications • Compile EER and deliver to DSR if required • Close Sunwater Incident Report • Update Sunwater Intranet with dam status • Return to routine activities
Notifications	• DDO • DSTDM • LEC/ORR • SMT • SRT	• As per previous activation level, AND • DDMG	• As per previous activation level, AND • SDCC • D/S Residents • ABC	• As per previous activation level	• Inform all previously notified contacts of stand down

*'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.

Table 18: Earthquake—LEC & IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM	• n/a	• n/a	n/a—Internal communications only
Lean Forward	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection	• LDMG • DDMG	• Phone	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 Stand by for further information
Stand Up 1	• Earthquake confirmed* (by DSTDM) or felt in the area, OR • A possible failure path has been identified	• SDCC •	• Phone & Email	**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref I) and email to the SDCC to send.**
		• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG and DSTM to send appropriate message.** **Refer to Annexe for sample message.**
		• LDMG • DDMG	• Phone	Describe current situation with dam—What is the event? *(Dam Safety Risk—Earthquake felt or reported in area)* What is the status? (Possible earthquake damage to dam) Advise of current storage level. Discuss any potential road/bridge closures Activate emergency response
		• ABC	• Phone	Message to be determined

Table 18 (Continued): Earthquake—LEC & IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up 2	• Failure likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• SDCC	• Phone & Email	**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref I) and email to the SDCC to send.**
		• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG and DSTM to send appropriate message. Refer to Annexe for sample message.**
		• LDMG • DDMG	• Phone	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. Discuss any potential road/bridge closures (if not discussed at Stand Up—1) Prepare coordinated evacuation
		• ABC	• Phone	Message to be determined
	• Dam failure in progress	• SDCC	• Phone & Email	**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref I) and email to the SDCC to send.**
		• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG and DSTM to send appropriate message. Refer to Annexe for sample message.**
		• LDMG • DDMG	• Phone	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 Coordinate evacuation of Downstream Residents and move people to higher ground
		• ABC	• Phone	Message to be determined

Table 18 (Continued): Earthquake—LEC & IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Down	• Risk assessment has determined that failure risk has reduced	• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG and DSTM to send appropriate message.** **Refer to Annexe for sample message.**
		• LDMG • DDMG	• Phone	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

*'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.

Table 19: Earthquake—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM	• Earthquake confirmed* (by DSTDM) 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 confirmed* (by DSTDM) 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
Action	• Record all communication • Monitor situation and assess risks	• As per previous activation level, AND • Review surveillance inspection of the dam and assess its condition as soon as possible • Determine if there are any possible failure paths from reported damage	• As per previous activation level, AND • Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so • Assess risk and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) • Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision • Monitor situation and assess risks	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level, AND • CEO	• As per previous activation level	• As per previous activation level

*'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.

8. Dam Hazard—terrorist threat/activity or high energy impact

8.1 Overview

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

The vulnerability of Woongarra Balancing Storage to a terrorist attack is low.

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

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

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

8.1.1 Assessment of circumstances that indicate 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.

8.2 Emergency action roles

Table 20 to Table 24 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: Terrorist threat/activity or high energy impact flowchart

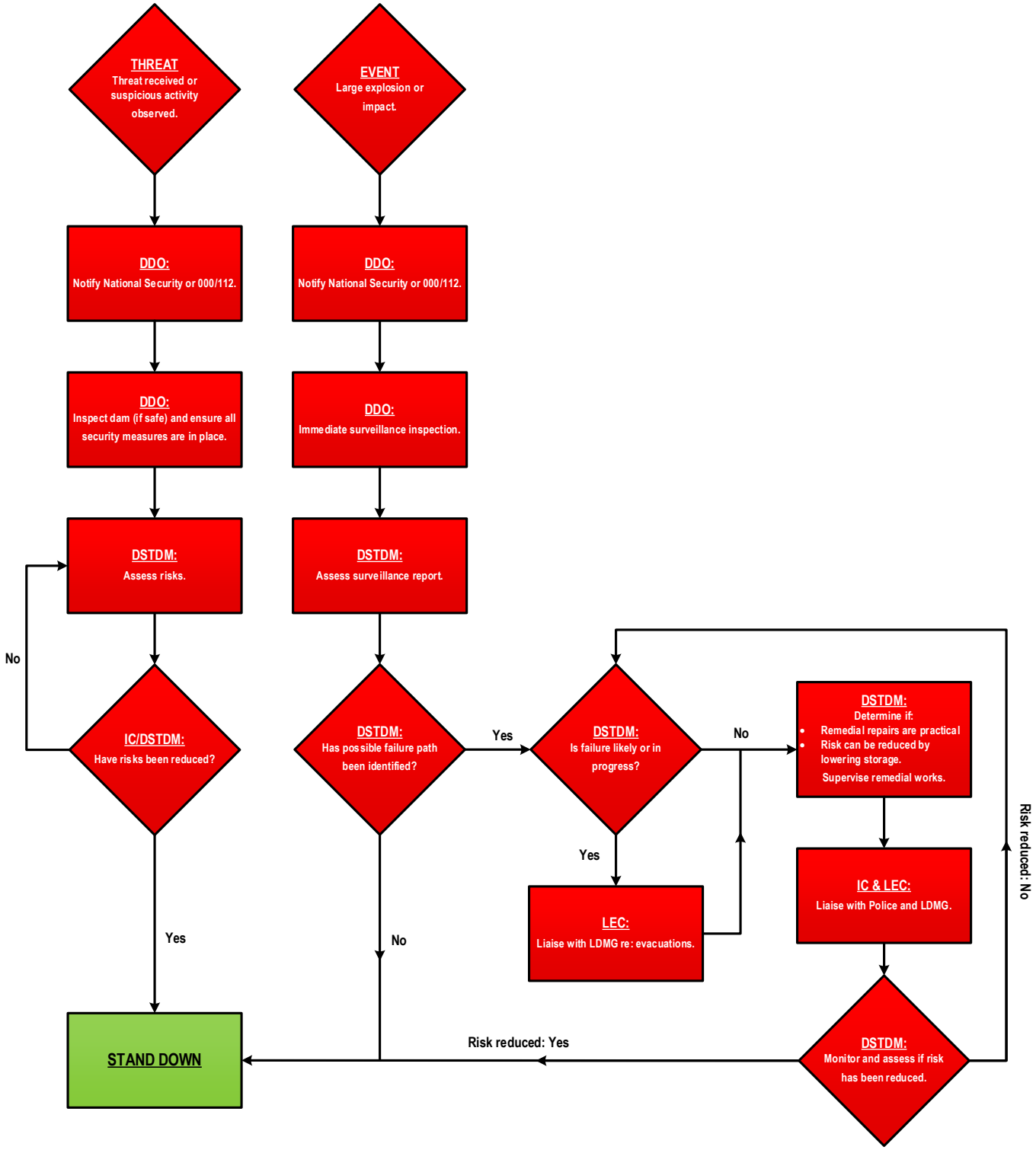


Table 20: Terrorist threat/activity or high energy impact—DDO emergency action

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	• Not applicable	THREAT • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	EVENT • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	RESPONSE • 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
Actions	• Not applicable	• In an emergency call 000. • Record all communication • If any suspicious behaviour noticed, contact DSTDM for advice. If instructed by DSTDM, of if threat received, complete the following: • Inspect dam (if safe) and ensure all security measures in place (locked gates, etc.) • Photograph/video suspicious items from a safe point and record using the approved forms and send to IC & DSTDM • If Police appoint Incident Manager support and follow instructions • Close any affected roads as directed • Update Dam Logbook as per SOP 12	• As per previous activation level, AND • Undertake surveillance inspect dam (if safe) • Vacate the immediate vicinity of the affected area	• As per previous activation level, AND • Lower reservoir level, if directed	• Forward information for EER to IC email • Update Dam Logbook as per SOP 12 • Return to routine activities
Notifications	• Not applicable	• #000 Emergency • DSTDM • IC • SO • LEC	• As per previous activation level	• As per previous activation level	• As per previous activation level

Table 21: Terrorist threat/activity or high energy impact—LEC emergency action

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	• Not applicable	THREAT • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	EVENT • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	RESPONSE • 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
Actions	• Not applicable	• Record all communication • Contact National Security • If Police appoint Incident Manager support and follow instructions • Note: IC to carry out LEC actions unless LDMG 1 is *Stood Up*	• As per previous activation level	• As per previous activation level, AND • Liaise with DDO, IC and LDMG re: potential for evacuations	• Deactivate EAP Event • Forward all EER material to IC email as required • Return to routine activities
Notifications	• Not applicable	• CTG • DDMG • DDO • DSTDM • LEC/ORR • SMT • SRT	• As per previous activation level	• As per previous activation level	• As per previous activation level

Table 22: Terrorist threat/activity or high energy impact—IC emergency action

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	• Not applicable	THREAT • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	EVENT • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	RESPONSE • 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
Actions	• Not applicable	• Record all communication • Contact National Security • If Police appoint Incident Manager support and follow instructions • Create Incident Report Record • Update Sunwater Intranet with dam status • Consider the need to appoint a Sunwater Recovery Coordinator. The Sunwater Recovery Coordinator is responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance –if required. • Note: IC to carry out LEC actions unless LDMG 1 is Stood Up	• As per previous activation level, AND • Arrange an inspection and assess the condition of the dam	• As per previous activation level, AND • Liaise with DDO, DSTDM, and LEC re: potential for evacuations • Mobilise resources to undertake remedial works if directed by DSTDM	• Deactivate EAP Event • Complete all internal and external notifications • Compile EER material and deliver to DSR if required • Close out Incident Report Record • Update Sunwater Intranet with dam status • Return to routine activities
Notifications	• Not applicable	• CTG • DDMG • DDO • DSTDM • LEC/ORR • SMT • SRT	• As per previous activation level, AND • SDCC • D/S Residents • ABC	• As per previous activation level	• Inform all previously notified contacts of stand down

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

Table 23: Terrorist threat/activity or high energy impact—LEC & IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	ALERT NOT APPLICABLE			
Lean Forward	LEAN FORWARD NOT APPLICABLE			
Stand Up 1	THREAT • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	• LDMG • DDMG • National Security Hotline (if not completed by DDO)	• 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) Discuss any potential road/bridge closures Activate emergency response
Stand Up 2	EVENT • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	• SDCC •	• Phone & Email	**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref l) and email to the SDCC to send.**
		• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG and DSTM to send appropriate message.** **Refer to Annexe for sample message.**
		• LDMG • DDMG • National Security Hotline (if not completed by DDO or at Stand Up—1)	• Phone	Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/ impact/explosion, etc.) What is the status? (Under Investigation) Discuss any potential road/bridge closures (if not discussed at Stand Up—1) Prepare coordinated evacuation
		• ABC	• Phone	Message to be determined

Table 23 (Continued): Terrorist threat/activity or high energy impact—IC communication plan

Activation level	Trigger for communications	Group to contact	Method	
Stand Up 3	RESPONSE • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• SDCC	• Phone & Email	**Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref l) and email to the SDCC to send.**
		• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG and DSTM to send appropriate message.** **Refer to Annexe for sample message.**
		• LDMG • DDMG	• 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) Initiate evacuations
		• ABC	• Phone	Message to be determined
Stand Down	• Risk assessment has determined that failure risk has reduced	• D/S Residents	• SMS • Phone (for those without mobiles)	**Liaise with Sunwater Media on-call, LDMG and DSTM to send appropriate message.** **Refer to Annexe for sample message.**
		• LDMG • DDMG	• Phone	Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/ impact/explosion, etc.) What is the status? (Dam Hazard Stood Down) Advise that failure risk has been reduced and EAP has been deactivated

Table 24: Terrorist threat/activity or high energy impact—DSTDM emergency action

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	• Not applicable	THREAT • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	EVENT • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	RESPONSE • 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
Action	• Not applicable	• Record all communication • Assess risks	• As per previous activation level, AND • Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so • Assess risk and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) • Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision • Monitor situation and assess risks	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• Not applicable	• IC • DDO • SRT • DSR	• As per previous activation level	• As per previous activation level	• As per previous activation level

9. Other emergency situation—communications failure

9.1 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.

9.2 Emergency actions

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

9.2.1 Activation triggers

Table 25: Communications failure emergency activation trigger summary

Comms Failure – Site	• Unable to communicate to or from dam site (usually affects DDO)
Comms Failure – Local area	• Unable to communicate to or from local Area (likely to affect LEC or ORR)
Comms Failure – Brisbane	• Unable to communicate to or from Sunwater Brisbane (could affect DSTDM or FODM & will affect IC)

9.2.2 Assessment of circumstances that indicates the likelihood of communications failure escalating the activation level of a current Dam Hazard

The Operations Centre Duty Officer (OCDO) will assess the weather and flood warnings daily in accordance with the Operations Centre (OC) SOP. The OCDO will escalate to the Flood Operations Decision Maker (FODM) any warnings that have the potential to cause a significant communications failure.

The on-call IC will escalate to the FODM any local intelligence on conditions that could increase the probability of a significant communications failure.

The FODM will determine whether it is reasonably likely that there will be a significant communications failure within the subsequent 24 hours and assess the likely effect on current dam hazards. If required, the FODM will instruct the IC to escalate the activation level of any current dam hazards.

9.2.3 Emergency action roles

Table 26 to Table 30 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 26: Communications failure—DDO emergency action

Activation level	Comms Failure – Local Area	Comms Failure – Brisbane
Activation trigger	• Unable to communicate to Local Area including LEC or ORR	• Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
Actions	• As much as practicable assume the role of LEC • Continue tasks in accordance with any other current Emergency Action • Every hour attempt communications by any and all means noting the following: – Mobile phone-try texting instead of voice, much higher probability of success – Satellite Phone-needs to access open sky unless external antenna fitted – Social media-e.g. Facebook (Internet may be available via landline) • Record all communication and attempts via Dam Logbook entries as per SOP 12 and communications log if EAP event is current	• Determine if LEC is in communication and if not, assume the LEC role as much as is practicable • Continue tasks in accordance with any other current Emergency Action • Every hour attempt communications by any and all means noting the following: – Mobile phone-try texting instead of voice, much higher probability of success – Satellite Phone-needs to access open sky unless external antenna fitted – Social media-e.g. Facebook (Internet may be available via landline) • Record all communication and attempts via Dam Logbook entries as per SOP 12 and communications log if EAP event is current
Notifications	• IC • SO	• LEC • SO

Table 27: Communications failure—LEC emergency action

Activation level	Comms Failure – Dam Site	Comms Failure – Brisbane
Activation trigger	• Unable to communicate to Dam site	• Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
Actions	• Every hour attempt communications by any and all means noting the following: – Mobile phone-try texting instead of voice, much higher probability of success – Satellite Phone-needs to access open sky unless external antenna fitted – Social media-e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Assume that the DDO is carrying out LEC role at site as much as practicable • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action	• Issue Sunwater Incident Alert • Every hour attempt communications by any and all means noting the following: – Mobile phone-try texting instead of voice, much higher probability of success – Satellite Phone-needs to access open sky unless external antenna fitted – Social media-e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Liaise with the DDO and assume IC role • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action
Notifications	• IC • DSTDM • SO • LDMG	• DDO • DSTDM • SO • LDMG • DDMG

Table 28: Communications failure—LEC and IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Comms Failure – Site	• Unable to communicate to or from Dam site, AND • DDO is at Dam site	• IC/LEC • DSTDM • SO • LDMG • DDMG	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
Comms Failure – Local Area	• Unable to communicate to or from Local Area including LEC and ORR	• DDO • DSTDM • SO • LDMG • DDMG	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
Comms Failure – Brisbane	• Unable to communicate to or from Sunwater Brisbane	• DSTDM • LDMG • DDMG	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?

Table 29: Communications failure—DSTDM emergency action

Activation level	Comms Failure – Dam Site	Comms Failure – Local Area
Activation trigger	• Unable to communicate to Dam site	• Unable to communicate to Local Area including LEC and ORR
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
Notifications	• IC • LEC • CEO • DSR (if applicable)	• IC • DDO • CEO • DSR (if applicable)

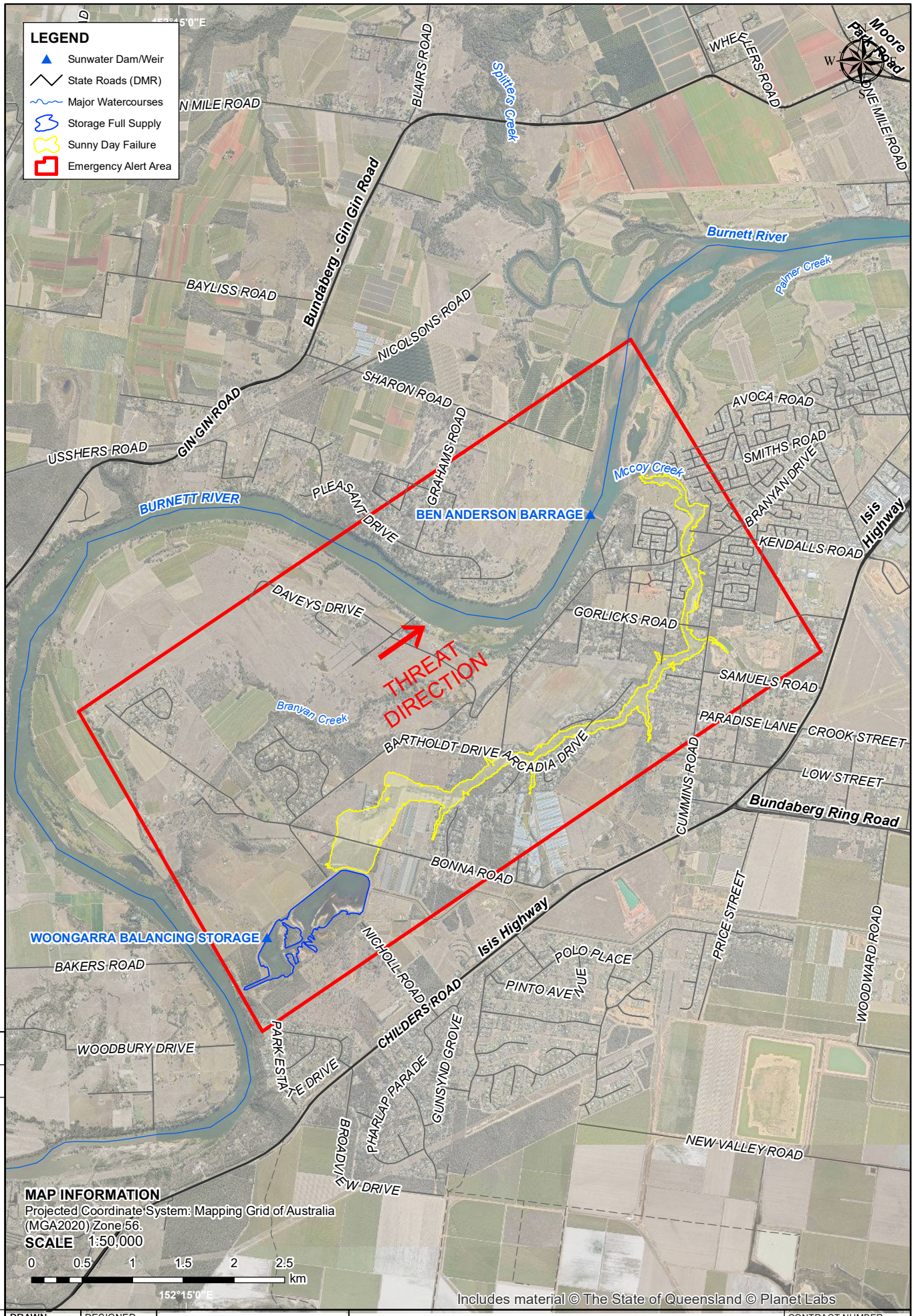
Table 30: Communications failure—FODM emergency action

Activation level	Comms Failure – Site	Comms Failure – Local Area
Activation trigger	• Unable to communicate to Dam site	• Unable to communicate to Local Area including LEC and ORR
Actions	• Record all communication • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action	• 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
Notifications	• IC • LEC • DSTDM	• IC • DDO • DSTDM

APPENDIX A Notification and communication lists

A1 Sunwater regional notification list
A2 Sunwater Brisbane notification list
A3 External notification list
A4 D/S residents' notification list
A5 Other D/S residents' notification list (outside area—requested messaging)
A6 Other reference contacts
A7 Emergency alert polygon
A8 Dam failure emergency alert request

Appendix A1 to Appendix A6 have been redacted



Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\WoongarraBS_CRA2022\Drawings\ArcMap\258635-A.mxd
Printed: 03/03/2023

MAP PRODUCED BY:
ASSET DELIVERY
TEL. (07)3120 0000

REVISION	DATE	REMARKS	CKD	PSD
A	03/03/23	ISSUED FOR USE	LH	MH

DRAWN ES | DESIGNED
CHECKED LH | CHECKED
APPROVED M. HUGHES 03/03/2023

sunwater

WOONGARRA BALANCING STORAGE
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA

CONTRACT NUMBER
DRAWING NUMBER 258635
REV. A
SHEET 1 OF 1
DATE MARCH 2023

Appendix A8: Dam failure emergency alert request

Queensland emergency alert request guidelines

An Emergency Alert (EA) Request form should be completed, if required (see Sections 5 to 8 for actions) and sent to the SDCC Watch Desk to activate the Woongarra Balancing Storage (BS) Emergency Polygon.

Instructions

1. EA Request forms are not to be used for Flood UNLESS a flood has triggered an Emergency Event.
2. Obtain appropriate MS Word format form from either the Sunwater SharePoint site or the SDCC Disaster Management Portal.
3. Telephone the [redacted] and tell them your intention to use the EA for an Emergency Event for Woongarra BS.
   a. A Polygon for this dam is stored on the Disaster Management Portal. Ask the SDCC operative to locate the polygon. It will be a KML file called [redacted]
   b. Give them your phone number, confirm their name, and end the call after advising the form/s will be sent shortly.
4. IC and DSTDM will work together to craft a message relevant to the hazard and discuss with the LDMG if there is time. If time does not permit use approved pre-filled form/s.
5. Send filled out EA form/s and the Woongarra BS Threat Direction polygon to SDCC watch desk email: [redacted] The form/s MUST be sent from a Sunwater email address and come from the IC, DSTDM, or member of the Sunwater Executive.
6. Phone back SDCC to check that the message has been sent and ask for email confirmation.
7. Create an Incident Report Record to advise of completion of EA campaign.

The following text is a copy of that contained in the prefilled EA request/s:

Filename:	Voice Message:	SMS:
[redacted]	FLOOD EMERGENCY WARNING from Sunwater. People downstream of Woon garra Balancing Storage including Bran yan and Mick Coys creek must LEAVE IMMEDIATELY. Woon garra Balancing Storage possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Bundaberg Regional Council disaster dot Bundaberg dot q el dee dot guv dot aye you	FLOOD EMERGENCY WARNING from Sunwater. People downstream of Woongarra Balancing Storage including Branyan and Mccoys creek must LEAVE IMMEDIATELY. Woongarra Balancing Storage possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Bundaberg Regional Council http://disaster.bundaberg.qld.gov.au

The next two pages contain a copy of the Woongarra BS Emergency Alert Request form and instructions.

Queensland Government

PHONE THE [redacted] – ADVISE EA IS BEING DEVELOPED

EMERGENCY ALERT REQUEST

Location of Alert: Woongara Balancing Storage (e.g. Suburb, Town) | **Date:**

LGA/Agency requesting: | **Time:**

Requesting Officer (e.g. Disaster Coordinator/Incident Controller)
Name:
Agency/Position:
Telephone:
(SDCC Watch Desk may telephone you)

Email:

Advised **LDC/LDMG**: ☐ YES **DDC/DDMG**: ☐ YES **Neighbouring LDMG/LGA**: ☐ YES ☐ N/A

Send Alert **Immediately**: ☐ YES **Scheduled**: ☐ YES Date & Time / / : hrs

Event Type
☐ Cyclone ☐ Storm Tide ☐ Flash Flood ☐ Flood
☐ Bushfire ☐ Fire Incident ☐ Smoke / Toxic Plume ☐ Chemical Spill
☐ Tsunami (Sent as Location Based Text Message ONLY)
☒ Other (please specify): Catastrophic Dam Failure

Distributed by: (Channel)
☒ Voice (Landline only) ☒ SMS – Location Based (Location of phone at time of distribution) ☐ SMS – Service Address Based (Registered billing address)

Message Severity
☒ Emergency Warning (Activates SEWS) ☐ Watch & Act ☐ Advice

Threat Direction Required? (e.g. Fire, Dam Spill) ☐ YES ☐ N/A

Threat location indicated on map? Only For Emergency Warning Voice & Service Address SMS ☒ YES ☐ N/A

EA Messaging Filename (Doc, Pdf):

Polygon Filename, (Kml, Kmz, Gml, GeoJSON):

Number of polygons 1 (if multiple, attach list in order of priority)

Supplied via: ☐ DM Portal ☐ Email ☐ Verbal ☐ Other
Other (please specify):

Supplied via: ☒ DM Portal ☐ Email ☐ Verbal ☐ Other
Other (please specify):

Voice: Type or handwrite, max 4000 characters incls spaces. (Ideally message should be < 450 characters)

FLOOD EMERGENCY WARNING from Sunwater. People downstream of Woon garra Balancing Storage including Bran yan and Mick Coys creek must LEAVE IMMEDIATELY. Woon garra Balancing Storage possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Bundaberg Regional Council disaster dot Bundaberg dot q el dee dot gov dot aye you.

SMS: Type or handwrite, use capitals for clarity, max 612 characters incls spaces. (Ideally should be < 160 characters incl. spaces)

FLOOD EMERGENCY WARNING from Sunwater: People downstream of Woongarra Balancing Storage including Branyan and Mccoys creek must LEAVE IMMEDIATELY. Woongarra Balancing Storage possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Bundaberg Regional Council http://disaster.bundaberg.qld.gov.au/

Remove EA from websites:
☐ 12 hrs ☐ 24 hrs ☐ 48 hrs ☐ Specify Date & Time: ☐ Check back in 12 hrs:
☐ Replace previous EA message / / : hrs Contact #:_____

Requesting Officer: **Signature:** **Date:** / /

Send to [redacted] to confirm receipt

FOR USE BY SDCC

EA Request Form completed by: SDCC Watch Desk ☐ Requesting Officer ☐

Notification of any delays provided to Requestor: ☐ YES ☐ NO

EA User Name:
Signature: Date: / /

Emergency Alert No:

Authorising Officer Name:
Signature: Date: / /

EMS EA Campaign Report ID:

Report provided to Requestor on EA outcomes: ☐ YES ☐ NO

The EA Manual, EA Quick Reference Guide, EA Request Form Template are available at: www.disaster.qld.gov.au

DO NOT SEND THIS PAGE

(Sunwater internal use only)

Emergency Alert (EA) Request instructions

Complete ALL initial fields, especially contact details, and check applicable boxes.

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. Check applicable box.
STEP 2.	Enter the Polygon file name/s.
STEP 3.	*Sunwater Polygons are all in *.kml format.* Check applicable box.
STEP 4.	*Sunwater Messaging/spatial data is always supplied via DMportal.* Check applicable box. Enter the file name.

Voice Message: Either type or handwrite the required message in CAPITALS. 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.
An Emergency Warning message must start with "EMERGENCY EMERGENCY" Do not use special characters.

SMS: Either type the message or handwrite the characters into the boxes.
Capitals only required as per normal grammar rules, but an Emergency Warning message must start with "EMERGENCY EMERGENCY" (in capitals). Do not use special characters.

Voice example:

EMERGENCY. EMERGENCY. SUN WATER ADVISE IMMINENT FAILURE OF CANIA DAM. 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: MOONFORD AND MONTO. DO NOT DELAY. LEAVE NOW. CENTRAL MONTO AND BILOELA ARE SAFE LOCATIONS.

SMS example:

EMERGENCY. EMERGENCY. Sunwater advise imminent failure of Cania Dam. Take action to protect life and leave now. Moonford and Monto are at risk. Info on ABC Radio. Central Monto & Biloela are safe.

If using template EA messages, please provide the appropriate variables that are in the template message guides. Refer to the Queensland EA Manual for copies of the template message guides.

APPENDIX B Drawings, inundation maps and emergency control measures

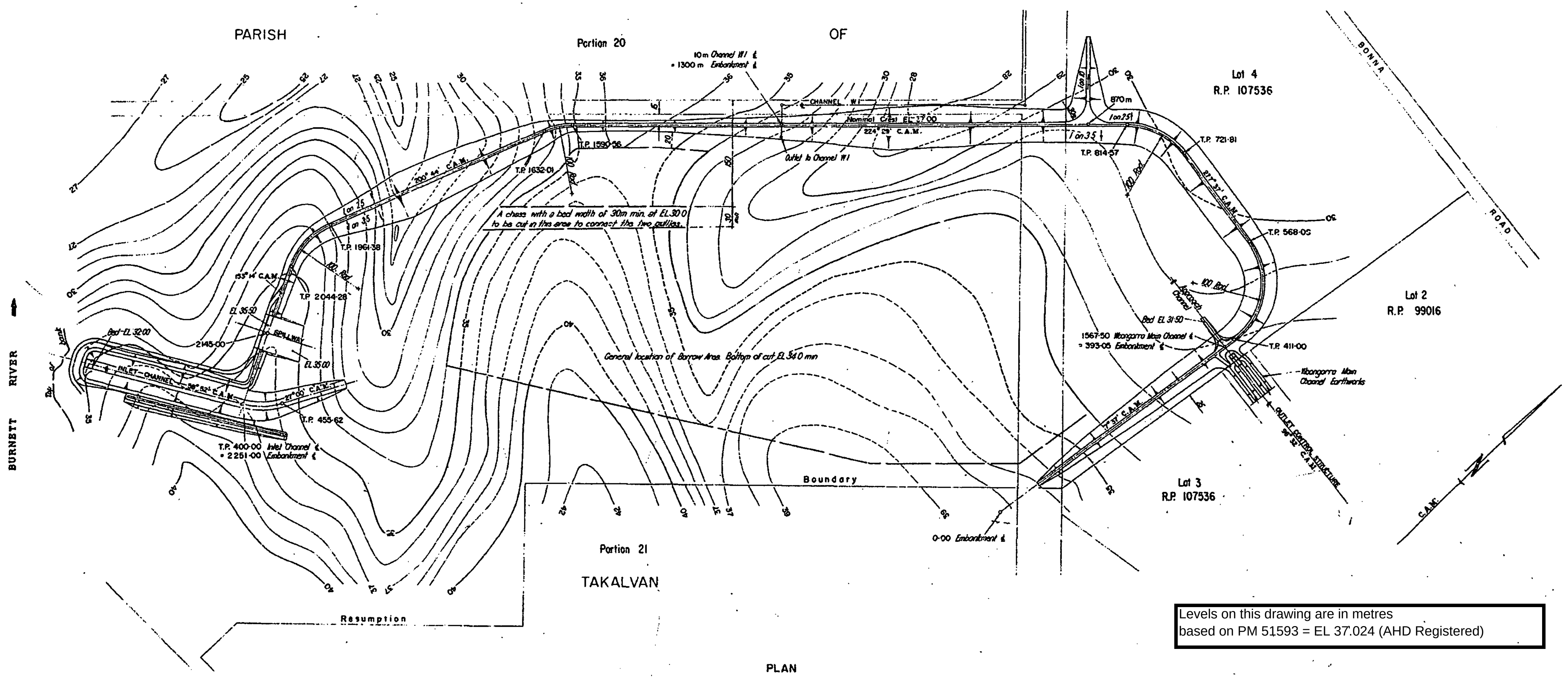
B1 Drawings

B2 Flooding impact – downstream (notification area)

B3 Inundation maps

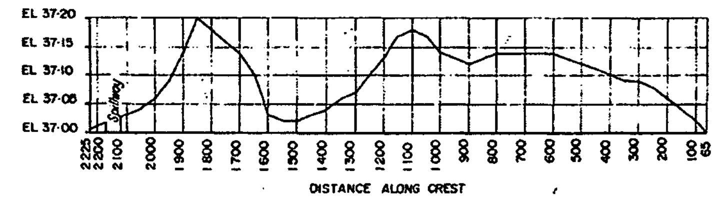
B4 Locality plan

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.

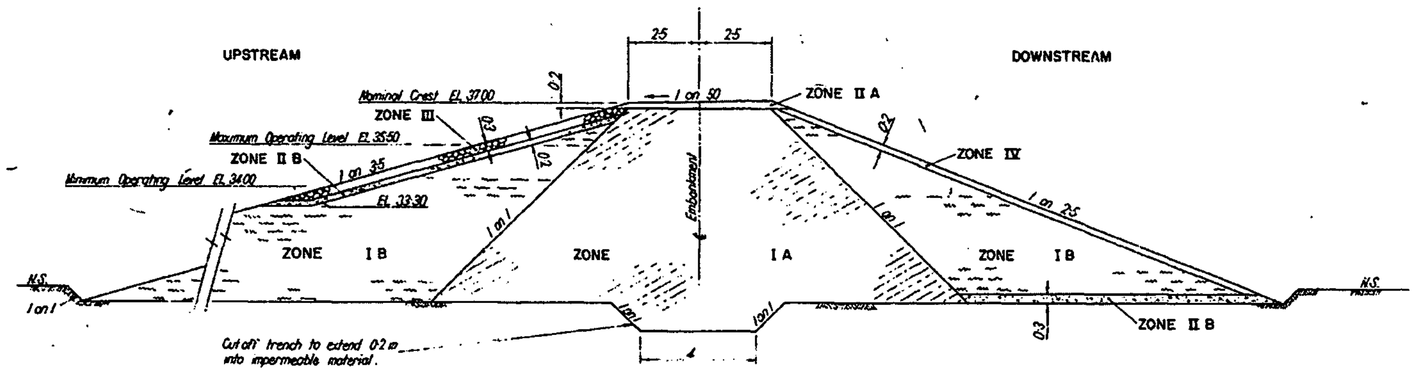


Levels on this drawing are in metres
based on PM 51593 = EL 37.024 (AHD Registered)

PLAN



LONGITUDINAL CAMBER OF CREST
Scale - Diagrammatic



TYPICAL CROSS SECTION OF EMBANKMENT
Not to Scale

MATERIAL CODE :

- Zone IA - Select Clay soil (SC, CL, CH) (25 < LL < 50)
- Zone IB - Random Fill approved by the Engineer.
- Zone IIA - Road Gravel
- Zone IIB - Filter Gravel
- Zone III - Rip Rap
- Zone IV - Top Soil
  Top Soil to be removed beneath Zones IA and IB and stockpiled for use on D/S slope.

NOTES :

1. Unless stated otherwise, all dimensions are in metres.
2. All levels are on Australian Height Datum (A.H.D.) and are expressed in metres.
3. Where Crest is less than 1.6 m above Stripping Level, Zone IA material is to be used in place of Zone IB and IIB materials.
4. Balancing Storage is to be constructed in accordance with specification.

AS-BUILT

JUNE 2005

Date	Revision	Remarks	Chd.	Rsd.
250705	B	AS BUILT INFORMATION		
1·4·77	A	10m Chan. W1 = 1300m Embkt ℄		

Drawing Schedule

		Channel W1 - Longitudinal Section
L45937	BL2013	Outlet to Channel W1
L45934-6	BL2010-2	Logs of Bore Holes - Sheets 1 to 3
M45933	BM2009	Woongarra Balancing Storage - Location of Bore Holes
L45923	BL1996	Inlet Channel & Spillway Area - General Arrangement
L45926	BL1999	Outlet Control Structure - General Arrangement
L36390	BL1231	Woongarra Main Channel Long. Section 0 m - 3000 m

Azimuth Datum : C.A.M. M1/79 to M1/84 reads 224°31'55"

Level Datum : A.H.D. based on P.S.M. M1/79 = EL 30.045

SCALE 25 0 50 100 150 200 250 metres

Design	Drafting
Prep. PG	Dr. K.R.H.
Chd. AU	Chd.
Supv. AU	Supv.

Recommended
Engineer I

Approved
District Engineer

IRRIGATION AND WATER SUPPLY COMMISSION

BUNDABERG IRRIGATION AREA
WOONGARRA BALANCING STORAGE
GENERAL ARRANGEMENT

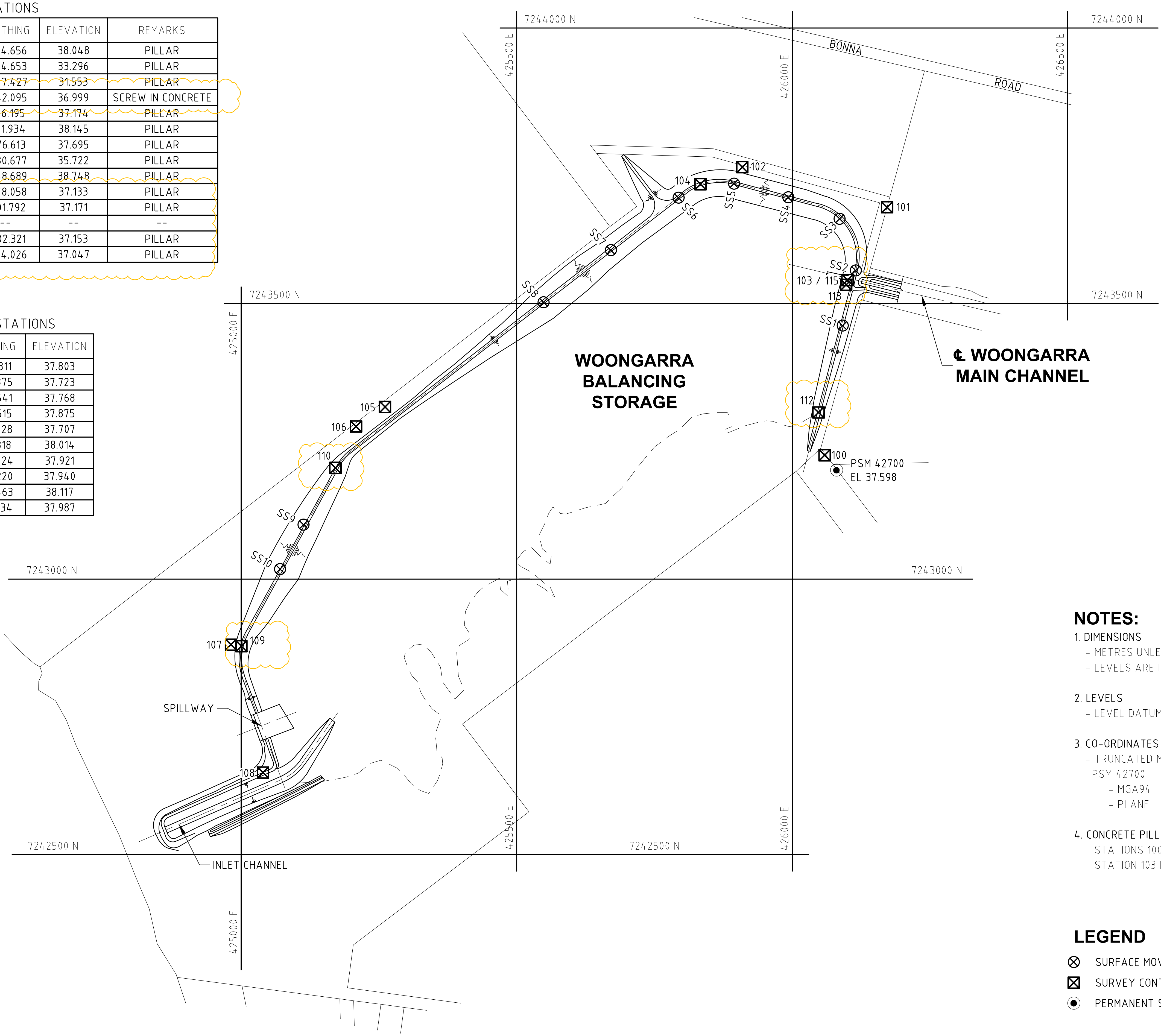
20·5·76 A3-45922 B A

SURVEY CONTROL STATIONS

No.	EASTING	NORTHING	ELEVATION	REMARKS
100	6058.885	3224.656	38.048	PILLAR
101	6172.223	3674.653	33.296	PILLAR
102	5909.443	3747.427	31.553	PILLAR
103/115	6100.246	3542.095	36.999	SCREW IN CONCRETE
104	5833.347	3716.195	37.174	PILLAR
105	5260.828	3311.934	38.145	PILLAR
106	5208.434	3276.613	37.695	PILLAR
107	4981.200	2880.677	35.722	PILLAR
108	5039.296	2648.689	38.748	PILLAR
109	5000.608	2878.058	37.133	PILLAR
110	5171.713	3201.792	37.171	PILLAR
111	--	--	--	--
112	6047.791	3302.321	37.153	PILLAR
113	6098.144	3534.026	37.047	PILLAR

SURFACE MOVEMENT STATIONS

No.	EASTING	NORTHING	ELEVATION
SS1	6091.474	3459.811	37.803
SS2	6115.310	3559.875	37.723
SS3	6085.840	3653.541	37.768
SS4	5992.766	3692.515	37.875
SS5	5894.417	3717.428	37.707
SS6	5793.668	3691.818	38.014
SS7	5670.836	3596.724	37.921
SS8	5548.813	3502.220	37.940
SS9	5113.167	3098.463	38.117
SS10	5070.571	3018.034	37.987



NOTES:

1. DIMENSIONS
   - METRES UNLESS OTHERWISE NOTED.
   - LEVELS ARE IN METRES AND TO AUSTRALIA HEIGHT DATUM (AHD).

2. LEVELS
   - LEVEL DATUM: PM 42700 = EL 37.598.

3. CO-ORDINATES
   - TRUNCATED MGA94. ZONE 56.
     PSM 42700
     - MGA94 - E 426080.330 N 7243197.576
     - PLANE - E 6080.330 N 3197.576

4. CONCRETE PILLARS
   - STATIONS 100-102 AND 104-108 ARE CONCRETE PILLARS.
   - STATION 103 IS SCREW IN CONCRETE.

LEGEND

- ⊗ SURFACE MOVEMENT STATION
- ⊠ SURVEY CONTROL STATION
- ◉ PERMANENT SURVEY MARK

S:\BW Asset Delivery\SW-Bundaberg WSS\N-WBIG-04-01-13-LF - Woongarra BS Install Survey Pts\Drawings\AutoCAD\234304-B.dwg
04 Nov 2021 2:32 PM

REVISION		REMARKS	CKD	PASSED
03/11/21	B	SURVEY CONTROL STATIONS ADDED	BC	D.SCRIVEN
23/05/14	A	SURVEY CONTROL & MOVEMENT STNS ADDED	MR	K. EHM
DATE		REMARKS	CKD	PASSED

REFERENCE DRAWINGS

SCALES (A3 SIZE)
0 100 200 300 375 METRES 1:7500

DRAWN JMR
DESIGNED
CHECKED IDH
CHECKED
APPROVED K. EHM 17/12/09

DRAWING PRODUCED BY: SUNWATER LTD TEL: (07) 3120 0000

BUNDABERG WATER SUPPLY SCHEME
WOONGARRA BALANCING STORAGE
INSTRUMENTATION ARRANGEMENT

CONTRACT NUMBER
DRAWING NUMBER 234304
DATE JUNE 2009
A B

MAP INFORMATION

Coordinate System: Geocentric Datum of Australia (GDA2020).

SCALE (A4 SIZE)

0 400 800 1,200 1,600 2,000 m 1:40,000

Legend

- PAR – PMF No Failure
- Sunwater Dams / Weirs
- AMTD (Markers)
- Spillway
- Balancing Storage Full Supply Level
- Limit of Downstream Notification Area (PMFFandNF 0.3m+)

WOONGARRA BALANCING STORAGE DOWNSTREAM NOTIFICATION AREA

NOTES

Areas further downstream will become progressively more impacted by other rainfall and inflows that occur downstream of the dam (not shown here).

sunwater

DRAWING No. 258636 A

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\WoongarraBS_CRA2022\Drawings\ArcMap\258636-A.mxd
Printed: 03/03/2023

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\WoongarraBS_CRA2022\Drawings\ArcMap\256615-B.mxd
Printed: Friday, 28/10/2022 07:06:00 AM

MAP PRODUCED BY:
SUNWATER LTD
TEL: (07) 3120 0000

420000 430000 440000 450000

7250000 7240000

KOLAN RIVER
BUNDABERG - MIRIAM VALE ROAD
Sandy Creek
MOORE PARK ROAD
Paddy Creek
Rubyanna Creek
BUNDABERG - PORT ROAD
BARGARA
BUNDABERG - BARGARA ROAD
Stony Creek
Splitters Creek
BURNETT RIVER
Oconnell Creek
BUNDABERG
ELLIOTT HEADS ROAD
Palmer Creek
SHEET 2 OF 3
SHEET 3 OF 3
Ben Anderson Barrage
BUNDABERG REGIONAL COUNCIL
BUNDABERG - GIN GIN ROAD
Branyan Creek
Mccoy Creek
BUNDABERG RING ROAD
WOONGARRA BALANCING STORAGE
ELLIOTT HEADS
Yellow Waterholes Creek
SHEET 1 OF 3
Swenson Creek
THE CEDARS ROAD
ISIS HIGHWAY
GOODWOOD ROAD
Gillens Creek
Elliott River
Cherry Creek
Coonarr Cree

LEGEND
- State Road (DTMR)
- Built Up Area
- Woongarra Balancing Storage

REVISION				
28/10/22	B	LOCAL GOVERNMENT AREA BOUNDARY	LH	MGH
25/10/22	A	ISSUED FOR USE	LH	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020), Zone 56.

DRAWING REFERENCE
256616 - Sunny Day Failure
256617 - Probable Maximum Flood

SCALES (A3 SIZE)
0 0.95 1.9 2.85 3.8 4.75 km
1:100,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	LH
APPROVED	
M.G. HUGHES 25/10/2022	
RPEQ: 18351	

sunwater

WOONGARRA BALANCING STORAGE
DAM BREAK ANALYSIS 2022
INUNDATION PLANS
KEYMAP

CONTRACT NUMBER
DRAWING NUMBER 256615
REV. A
SHEET 1 OF 1
DATE OCTOBER 2022

Appendix B3: Inundation maps

Drawings:

- SDF
- PMF

Disclaimer: Every effort has been made to ensure the currency of the flood inundation maps reproduced in this EAP. However, as the maps have been extracted from external sources, their accuracy cannot be guaranteed.

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\WoongarraBS_CRA2022\Drawings\ArcMap\258632-A.mxd
Printed: Friday, 03/03/2023 11:16:35 AM

Map Produced By:
Water Resources and Dam Safety
Tel: (07) 3120 0000

424,000 426,000 428,000 430,000 432,000

7,248,000 7,246,000 7,244,000

USSHERS ROAD
DAVIS ROAD
GHOST GUM ROAD
SHARON ROAD
GIN GIN ROAD
WILLIS STREET
GRAHAMS ROAD
BURNETT RIVER
PLEASANT DRIVE
RUSTIC ROAD
DAVEYS DRIVE
Ben Anderson Barrage
NEVILLE DRIVE
HILLTOP PARADE
AVOCA ROAD
SMITHS ROAD
ROBINA DRIVE
DITTMANN ROAD
TWYFORD STREET
JOHNSTON STREET
Palmer Creek
TAKALVAN STREET
DR MAYS ROAD
KENDALL'S ROAD
GLENVIEW CRESCENT
MOTT STREET
JOHANNA BOULEVARD
PHOEBE CRESCENT
AIRPORT DRIVE
MARIA STREET
BRANYAN DRIVE
GORLICKS ROAD
PENNY LANE
SUTHERLAND ROAD
UNIVERSITY DRIVE
CUMMINS ROAD
SAMUELS ROAD
HUTCHINS STREET
PARADISE LANE
CROOK STREET
NORGROVE ROAD
CROW STREET
LOW STREET
FERMANN STREET
ROAD
Branyan Creek
LOUISE COURT
BARTHOLDT DRIVE
NAROOMA DRIVE
EVERGREEN DRIVE
Mccoy Creek
ARCADIA DRIVE
BUSH ROAD
BONNA ROAD
CHILDERS ROAD
BUNDABERG RING ROAD
VON DEEST STREET
WOONGARRA BALANCING STORAGE
BAKERS ROAD
NICHOLL ROAD
GUNSYNG GROVE
APPALOOSA DRIVE
POLO PLACE
PINTO AVENUE
CLYDESDALE AVENUE
DIAMANTINA DRIVE
BLACK BEAUTY COURT
PRICE STREET
ERINDALE AVENUE

25 26 27 28 29 30 31 32 35 36 37

LEGEND
- AMTD (Marker)
- Major Road
- Secondary Road
- Cadastral Lot Boundary

Flood Modeling
- PAR - Balancing Storage Failure
- Sunny Day Failure

Sunwater Storages
- Woongarra Balancing Storage

REVISION					
03/03/23	A	ISSUED FOR USE	LH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 56.

N W E S

SCALES (A3 SIZE)
0 250 500 750 1,000 1,250 m
1:25,000

DRAWN	DESIGNED
FMT	
CHECKED	CHECKED
	LH
APPROVED	
M.G. HUGHES 03/03/2023	RPEQ: 18351

sunwater

WOONGARRA BALANCING STORAGE
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
EMBANKMENT (PIPING)
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER: 258632
REV.: A

SHEET 1 OF 1

DATE MARCH 2023

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\WoongarraBS_CRA2022\Drawings\ArcMap\258631-A.mxd
Printed: Friday, 03/03/2023 10:54:33 AM

Map Produced By:
Water Resources and Dam Safety
Tel: (07) 3120 0000

424,000 426,000 428,000 430,000 432,000

7,246,000 7,244,000 7,242,000

GIN GIN ROAD
DAVIS ROAD
WILLIS STREET
GRAHAMS ROAD
PLEASANT DRIVE
RUSTIC ROAD
DAVEYS DRIVE
BURNETT RIVER
30
31
29
32
28
27
26
Ben Anderson Barrage
BRANYAN DRIVE
NEVILLE DRIVE
ROBINA DRIVE
AVOCA ROAD
DITTMANN ROAD
TWYFORD STREET
Palmer Creek
TAKALVAN STREET
DR MAYS ROAD
KENDALLS ROAD
GLENVIEW CRESCENT
MOTT STREET
JOHANNA BOULEVARD
PHOEBE CRESCENT
AIRPORT DRIVE
MARIA STREET
GORLICKS ROAD
PENNY LANE
SUTHERLAND ROAD
UNIVERSITY DRIVE
CUMMINS ROAD
SAMUELS ROAD
HUTCHINS STREET
PARADISE LANE
CROOK STREET
NORGROVE ROAD
CROW STREET
LOW STREET
FERMANN STREET
ROAD
BUNDABERG RING ROAD
VON DEEST STREET
CHILDERS ROAD
LOUISE COURT
BARTHOLDT DRIVE
Branyan Creek
NAROOMA DRIVE
EVERGREEN DRIVE
Mccoy Creek
ARCADIA DRIVE
BUSH ROAD
BONNA ROAD
WOONGARRA BALANCING STORAGE
35
36
37
BAKERS ROAD
WOODBURY DRIVE
PARK ROYAL DRIVE
NICHOLL ROAD
PHARLAP PARADE
GUNSYND GROVE
APPALOOSA DRIVE
ROKEBY COURT
CLYDESDALE AVENUE
PINTO AVENUE
POLO PLACE
DIAMANTINA DRIVE
BLACK BEAUTY COURT
PRICE STREET
ERINDALE AVENUE
WOODYARD ROAD

LEGEND
- AMTD (Marker)
- Major Road
- Secondary Road
- Cadastral Lot Boundary
- Spillway

Flood Modeling
- PAR - Dam Failure/No Failure
- PMF - No Dam Failure
- PMF - Dam Failure

Sunwater Storages
- Woongarra Balancing Storage

REVISION					
03/03/23	A	ISSUED FOR USE	LH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 56.

DEPTHS BELOW 300MM EXCLUDED

SCALES (A3 SIZE)
0 250 500 750 1,000 1,250 m
1:25,000

DRAWN	DESIGNED
FMT	
CHECKED	CHECKED
	LH
APPROVED	
M.G. HUGHES 03/03/2023	
RPEQ: 18351	

sunwater

WOONGARRA BALANCING STORAGE
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD
EMBANKMENT (PIPING)
INUNDATION PLAN

CONTRACT NUMBER

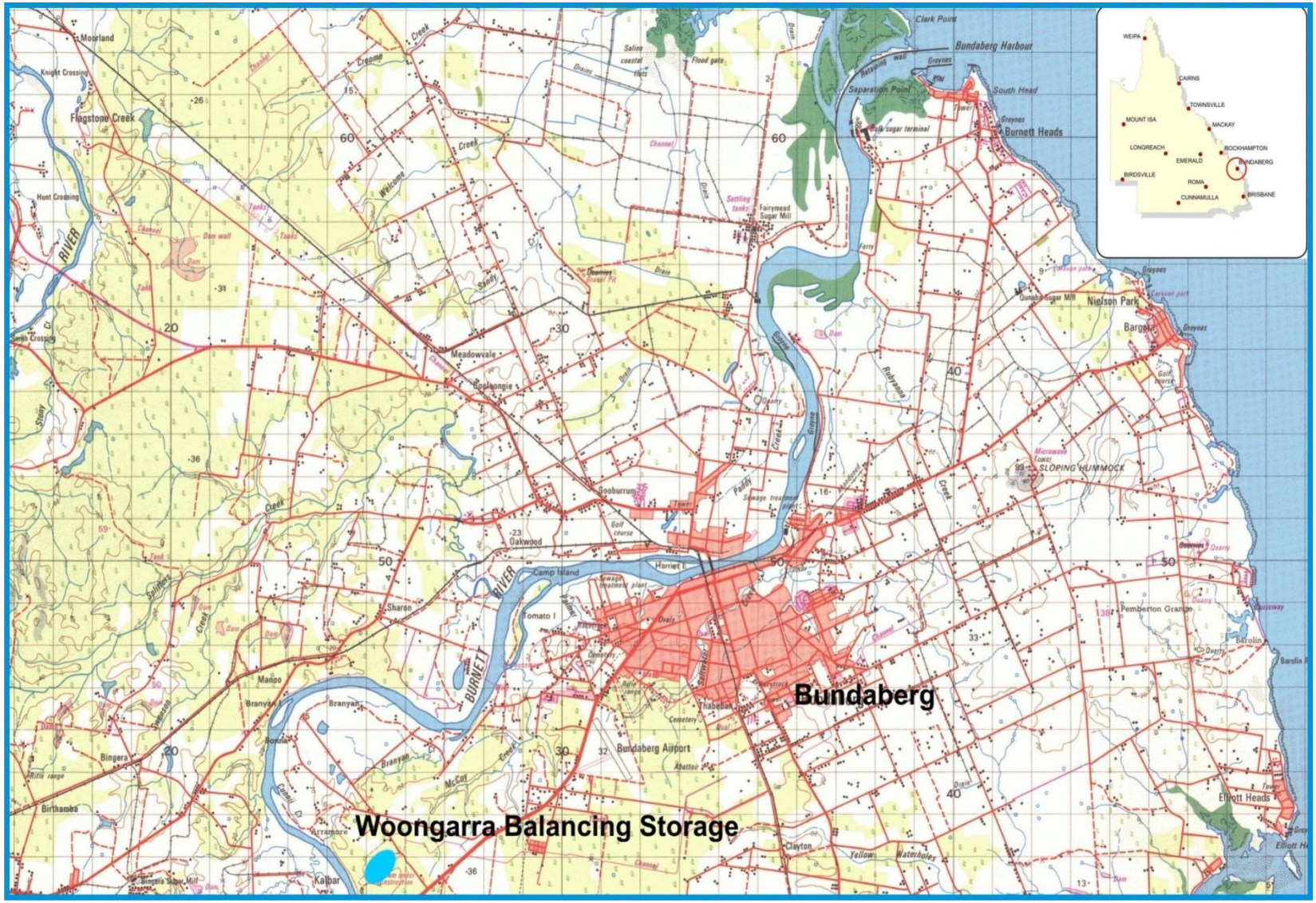
DRAWING NUMBER	REV.
258631	A

SHEET 1 OF 1

DATE MARCH 2023

Appendix B4: Locality plan

Figure B3: Woongarra Balancing Storage locality plan



APPENDIX C Equipment and technical information

C1 List of equipment available during an emergency

C2 Woongarra Balancing Storage—storage curve

Appendix C1 has been redacted

7

CAPACITY - megalitres

0 200 400 600 800 1000 1200 1400 1600 1750

0 10 20 30 40 50 SUBMERGED AREA - hectares

ELEVATION - metres

36 35 34 33 32 31 30 29 28 27

Spillway Crest EL 35·75

Max. Operating Level EL 35·50
1225 megalitres
46 hectares

Submerged Area

Capacity

Min. Operating Level EL 34·00
635 megalitres
32 hectares

Woongarra Main Channel F.S.L. EL 33·7

Outlet Pipe Obvert EL 33·5

Regulator Sill
EL 32·2

Outlet Pipe
Invert
EL 31·7

Bed EL 27·00

Levels on this drawing are in metres
based on PM 51593 = EL 37.024 (AHD Registered)

Compiled from drawing AI - 56647.

Level Datum A.H.D.

THIS PLAN SUPERSEDES DRAWING A3-49339

Revision					
Date		Remarks	Ckd.	Psd.	
17·10·80	A	Additional EL's	P.E.		

Drafting	
Dr. K.R.H.	
Ckd.	
Supv. P.E.	

QUEENSLAND WATER RESOURCES COMMISSION

BUNDABERG IRRIGATION AREA

WOONGARRA BALANCING STORAGE

STORAGE CURVES

4 - 9 - 79 | A3 - 56649 | A

BA3-2929

Appendix D Interaction with Local Government and District Groups

Appendix D has been redacted

Annexe — Woongarra BS SMS Messages for flooding

	Advice Stay informed	**Watch and Act** Prepare to leave	**Emergency** Leave immediately To be issued in consultation with council
SMS	ADVICE from Sunwater. Woongarra Balancing Storage is spilling excess water into the Burnett River. People in Branyan should STAY INFORMED and MONITOR CONDITIONS. There is no immediate danger. More information here: bit.ly/RecandSafety		FLOOD EMERGENCY WARNING from Sunwater: People downstream of Woongarra Balancing Storage including Branyan and Mccoys creek must LEAVE IMMEDIATELY. Woongarra Balancing Storage possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Bundaberg Regional Council http://disaster.bundaberg.qld.gov.au/