EMERGENCY ACTION PLAN — EUNGELLA DAM (ID 266)

ISSUE: 8.2 — September 2024 **Expiry:** 1 July 2026

Prepared by **Sunwater Limited**

Controlled Copy No.

Gated: No	Staffed: Yes

Type: Earth and rock-fill, sloping core

Project: Eungella Dam EAP **File no.:** 08-000365/001

Address: 3086 Eungella Dam Road

Location: Lat. -21.146720° Lon. 148.378054°
21°08’48.2”S 148°22’41.0”E

Approved by the delegate of the Chief Executive, Department of Regional Development, Manufacturing and Water until 1 July 2026.

Emergency activation quick reference

The Emergency Action Plan (EAP) for Eungella Dam covers four 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. **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
	Activation triggers for dam hazards			
Flood operations **See section 5**	• EL 562.61m and rising (0.1m below FSL)	• Storage above FSL 562.71m	• Storage above EL 566.04m (flood of record—April 1989)	• Storage level EL 563.00m and falling no more rain observed in prior 12 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 reported or felt in the area, AND • Intensity less than 5 Modified Mercalli (MM)	• Earthquake reported or felt in the area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection	• Earthquake reported or felt in the area, AND • A possible failure path has been identified	• 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 • 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 Eungella Dam covers one other emergency situation evaluated within Sunwater's Dam Safety Management Program. Use the following table to select the relevant section of the EAP that deals with the other emergency situation. **Note: The Incident Coordinator (IC) is responsible for the decision to activate the EAP. Should the IC be unavailable, the Local Event Coordinator (LEC) or Dam Duty Officer (DDO) is responsible for the decision.**

Table 1 (continued): Emergency activation quick reference

Other Emergency Situations and section numbers	Activation level		
	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)
	Activation triggers for other emergency situations		
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		24/09/2024

Document revision history

Version	Date	Prepared by	Reason for change	Ref no.
2	May 2008		Significant changes of Eungella Dam Emergency Action Plan to reflect Sunwater Management structure and other minor changes. Refer HB # 601935 for amendments issued.	
3	October 2011		Significant changes to all sections of Eungella Dam Emergency Action Plan to reflect current Sunwater Management structure and other changes.	
3C	September 2013		Amendments due to new legislative requirements	1064546
4	October 2016		New Emergency Action Plan developed at expiry of 3E approval. Issued for consultation with Relevant Disaster Management Groups.	1870460
5	February 2017		Section 5, Emergency condition—flood operations, reviewed and amended by Sunwater after consultation with the Dam Safety Regulator.	1870460
6	October 2017		New Emergency Action Plan with minor amendments including contact list updates.	2092457
7	October 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).	2274532
7.1	September 2019		Yearly contact update completed including relevant items such as Controlled Copy Holders and Organisational chart. Minor non-substantive error and formatting corrections.	2465147
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.	2571774
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.	2652782
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.	2725694
8.0	February 2023		References updated in section 1. Fatigue management added in section 2.5. Amendments to emergency action tables in sections 5 to 9, inclusive of trigger change to Stand Up 2 in Flood Operations in section 5. Updates to dam details in section 3, contacts in Appendix A4, and inundation maps in Appendix B. Updated threat direction polygon in Appendix A7. Minor error corrections and other non-substantive changes. Incorporated AWS messaging changes.	2743863

Version	Date	Prepared by	Reason for change	Ref no.
8.1	September 2023		Non-substantive updates as part of Annual Safety Statement. Minor error corrections and readability improvements.	2809657
8.2	September 2024		Wet season preparedness – contact updates	2865415

Controlled document distribution list

Copy no.	Position	Location
1.	Storage Supervisor	Sunwater, Eungella Dam
2.	General Manager, Central	Sunwater, Moranbah
3.	Emergency Action Plan Program Lead	Sunwater, Brisbane
Notes: Communication information for each 'Controlled Copy Holder' is attached in Appendix A.		

Electronic document distribution list

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Position	Location
Local Disaster Coordinator, Local Disaster Management Group (LDMG 1)	Mackay Regional Council, Mackay
Local Disaster Coordinator, Local Disaster Management Group (LDMG 2)	Whitsunday Regional Council, Proserpine
Executive Officer, Mackay DDMG	Police, Mackay
Officer in Charge, Mackay Police Communications Centre	Police, Mackay
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	Emergency action plan for referable dam guideline (DRDMW 2021)	https://www.resources.qld.gov.au/__data/assets/pdf_file/0018/84015/eap-guideline.pdf
B	Guidelines on Selection of Acceptable Flood Capacity for Dams (ANCOLD, 2000)	ANCOLD
C	Guidelines on Consequence Categories for Dams (ANCOLD, 2012)	ANCOLD ISBN: 978-0-9808192-5-0
D	Australian Rainfall and Runoff (ARR) 2016	http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com/
E	Guideline for Failure Impact Assessment of Water Dams (DNRME 2018)	Guideline for failure impact assessment of water dams (resources.qld.gov.au)
F	Water Act 2000	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2000-034
G	Water Supply (Safety and Reliability) Act 2008 (March 2022)	https://www.legislation.qld.gov.au/view/whole/pdf/inforce/current/act-2008-034
H	Queensland Dam Safety Management Guideline (DRDMW August 2024)	https://www.resources.qld.gov.au/__data/assets/pdf_file/0007/78838/dam-safety-management.pdf
I	Professional Engineers Act 2002 (RPEQ) (September 2013)	https://www.legislation.qld.gov.au/view/pdf/inforce/2013-09-23/act-2002-054
J	Queensland Disaster Management Act 2003 (April 2022)	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2003-091
K	Queensland Emergency Alert Manual – M.1.174 (February 2022)	M.1.174 Queensland Emergency Alert Manual (disaster.qld.gov.au)
L	Queensland Government Communications and systems for public information and warnings	https://www.disaster.qld.gov.au/dmg/Response/Pages/5-6.aspx
M	Guidelines for the Development of Communication Education, Awareness and Engagement Programs (2010)	https://knowledge.aidr.org.au/media/1970/manual-45-guidelines-for-the-development-of-communication-education-awareness-and-engagement-programs.pdf
N	Sunwater (internal) Strategic Event Procedure	Strategic Event Procedure
O	Queensland State Disaster Management Plan 2018 (Queensland's Disaster Management Committee)	Queensland-State-Disaster-Management-Plan
P	Queensland Disaster Management Guidelines	https://www.disaster.qld.gov.au/dmg/Pages/DM-Guideline.aspx

Ref.	Document title	Reference/location
Q	Queensland Rainfall and River Conditions (BOM-Flood Warning)	http://www.bom.gov.au/qld/flood/index.shtml?ref=hdr
R	Sunwater (internal) Emergency Alert Protocol	eDOCS# 2156253
S	Sunwater (internal) Eungella Dam Operation and Maintenance Manual	Eungella Dam O&M Manual
T	Sunwater (internal) Eungella Dam Safety Condition Schedule	eDOCS # 1740562
U	Sunwater (internal) Eungella Dam Failure Impact Assessment Review 2014	eDOCS # 1545128
V	Sunwater (internal) Eungella Dam Hydrological Modelling – WRM 2014	HB # 2711183
W	Sunwater (internal) Eungella Dam Two Dimension Hydraulic Modelling Report – Aurecon 2015	eDOCS # 1879301
X	Sunwater (internal) Eungella Dam Comprehensive Risk Assessment (April 2022)	eDOCS # 2720018
Y	Referable Structures Standing Operating Procedure SOP 12 Dam Logbooks	SOP 12 Dam Logbooks (sharepoint.com)
Z	Sunwater Operations (internal) Template Dam — Hazard Management Toolkit (HMT)	Only available with Sunwater internal versions of EAPs
AA	Sunwater (internal) Fatigue Management Procedure	Fatigue Management Procedure

1.2 Abbreviations and acronyms

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
CED	Chief Engineer Dams
CEO	Chief Executive Officer
CRA	Comprehensive Risk Assessment
CTG	Counter Terrorism Group
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
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
EGME&WR	Executive General Manager Engineering & Water Resources
EL	Elevation Level
FCL	Fixed Crest Level
FODM	Flood Operations Decision Maker
FSL	Full Supply Level
GM	General Manager
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 Officer
OCO	Operations Coordinator
OM	Operator Maintainer
OMGR	Operations Manager
OS	Operations Supervisor
ORR	Owner's Regional Representative
PAR	Population at Risk
PDSE	Principal Dam Safety Engineer
PFRM	Predictive Flood Routing Model
PLL	Probable Loss of Life
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PMPF	Probable Maximum Precipitation Flood
PWRE	Principal Water Resources Engineer
QDMC	Queensland Disaster Management Committee
QFD	Queensland Fire Department
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
SCTN	Security and Counter Terrorism Network
SDCC	State Disaster Coordination Centre
SDF	Sunny Day Failure
SDTE	Senior Dam Technical Engineer
SES	State Emergency Service
SMS	Short Message Service
SMT	Sunwater Media Team
SO	Standby Operator
SOP	Standing Operating Procedure
SRT	Strategic Response Team
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 defined with reference to the *Water Supply (Safety and Reliability) Act 2008* (ref G)	
Dam hazard	Means a reasonably foreseeable situation or condition that may: • cause or contribute to the failure of the dam, if the failure may cause harm to persons or property, OR • require an automatic or controlled release of water from the dam, if the release of the water may cause harm to persons or property.
Dam hazard event	Means an event arising from a *dam hazard* if: • persons or property may be harmed because of the event, AND • a coordinated response, involving 2 or more of the following relevant entities, is unlikely to be required; each local group and district group for the EAP, each local government whose area may be affected, the Chief Executive, another entity the owner of the dam considers appropriate, AND • the event is not an emergency event.
Disaster management plan	Of a district group or local government, means the group's or local government's disaster management plan under the Disaster Management Act.
District group (District Disaster Management Group)	For an emergency action plan (EAP), means a district group established under the Disaster Management Act, section 22 whose disaster district under that Act could, under the plan, be affected by a *dam hazard*.
Emergency event	Means an event arising from a *dam hazard* if: • persons or property may be harmed because of the event, AND • any of the following apply: • a coordinated response, involving 2 or more of the following *relevant entities*, is likely to be required; each *local group* and *district group* for the EAP, each local government whose area may be affected, the Chief Executive, another entity the owner of the dam considers appropriate, OR • the event may arise because of a disaster situation declared under the Disaster Management Act, OR • an entity performing functions under the State *disaster management plan* may, under that plan, require the owner of the dam to give the entity information about the event.
Local group (Local Disaster Management Group)	For an EAP, means a local group established under the Disaster Management Act, section 29 whose local government area could, under the plan, be affected by a *dam hazard*.
Notice response	A dam owner's written response to a notice following an assessment of an EAP by a local government or district group.

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 Guidelines* (ref O):	
Activation levels	The four levels of EAP activation are: • Alert: A heightened level of vigilance due to the possibility of an event occurring. No further action may be required; however, the situation should be monitored by someone capable of assessing the potential of the threat. Moving to an Alert level indicates the dam owner is getting ready to activate the Lean Forward level of the EAP if the situation deteriorates. • Lean Forward: An operational state characterised by a heightened level of situational awareness of an impending disaster event and a state of operational readiness. Disaster coordination centres are on standby and prepared but not activated. • Stand Up: The operational state where resources are mobilised, personnel are activated, and operational activities commenced. Disaster coordination centres are activated. The dam owner needs to provide an Emergency Event Report (EER) in accordance with the provision of the Act. • Stand Down: Transition from responding to an event back to normal core business and/or continuance of recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present. The movement through these levels of activation is not necessarily sequential. It should be applied with flexibility and adaptability and be tailored to the location and event. Triggering one of these levels of activation may not necessarily mean a similar activation of LDMGs or DDMGs.

Term	Definition
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	The lowest elevation of the non-overflow crest section of the dam excluding handrails, parapets or wave walls that have not been designed to store water.
Dam crest flood	The flood event which, when routed through the reservoir, results in a still water reservoir level equivalent to the lowest dam crest level.
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.
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	The flood resulting from the probable maximum precipitation coupled with the worst flood-producing catchment conditions that can be realistically expected in the prevailing meteorological conditions.
Probable maximum precipitation	The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin.
Probable maximum precipitation flood	The flood resulting from the probable maximum precipitation coupled with typical catchment conditions.

Term	Definition
Stability, main embankment	High foundation pore pressure peaks may reduce the Factor of Safety against slip circle failure to an unacceptable level.
'Sunny day' failure	'Sunny day' dam failure is where the failure occurs at the full supply level and there is no concurrent rain associated flooding.
Terrorist activity	A deliberate attempt to damage or fail a dam.

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

2. Introduction

2.1 Context

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

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

Summary of legal requirements – Section 352H

Section 352H (1) of the Act requires that the EAP must identify each dam hazard for the dam

and for each of these dam hazard types (e.g. flood operations):

- identify the area likely to be affected by a dam hazard event or emergency event arising from the dam hazard; and
- identify each circumstance that indicates a material increase in the likelihood of the dam hazard event or emergency event happening; and
- 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
- 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
- state the actions the owner of the dam plans to take in response to a dam hazard event or emergency event.

In accordance with section 352H (2) of the Act, the EAP may provide for the dam owner to make arrangements with a relevant entity for warnings to be given by the relevant entity on behalf of the dam owner in appropriate circumstances.

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

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

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

The local governments whose area may be affected by a dam hazard for Eungella Dam have been determined as **Mackay Regional Council (MRC) and Whitsunday Regional Council (WRC)**. Sunwater has provided the MRC and the WRC 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 Eungella Dam is **Mackay 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 Eungella Dam and the area likely to be affected for each hazard
- to prescribe emergency actions taken by the dam owners and operating personnel in identifying and responding to dam hazards and notifying relevant entities.

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

The focus of this EAP is the management of dam hazards at Eungella Dam by the owner of the dam (Sunwater) and the communication and notification of dam hazards to the LDMGs, DDMGs and broader community. However, the EAP sits within the broader emergency response framework. This EAP has been assessed and considered to be consistent with the Mackay and Whitsunday Local Disaster Management Plans.

2.3 Scope

The Eungella Dam EAP covers:

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

2.4 Sunwater provides training

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

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

The EAP training that is carried out on-site includes walkthroughs of new changes, scenario (role play) and Q & A to check the knowledge and competency of all those who attended. This on-site training is presented to relevant Sunwater staff (DDO's, LECs and ICs) and disaster management stakeholders. DSTDM information sessions are carried out once a year with the same walkthrough of new changes and Q&A but this is not specific to any one dam. New employees to these various roles would also have a walkthrough of the EAP to understand after they start at Sunwater.

Sunwater is also working towards carrying out a full test once annually involving each local authority 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.

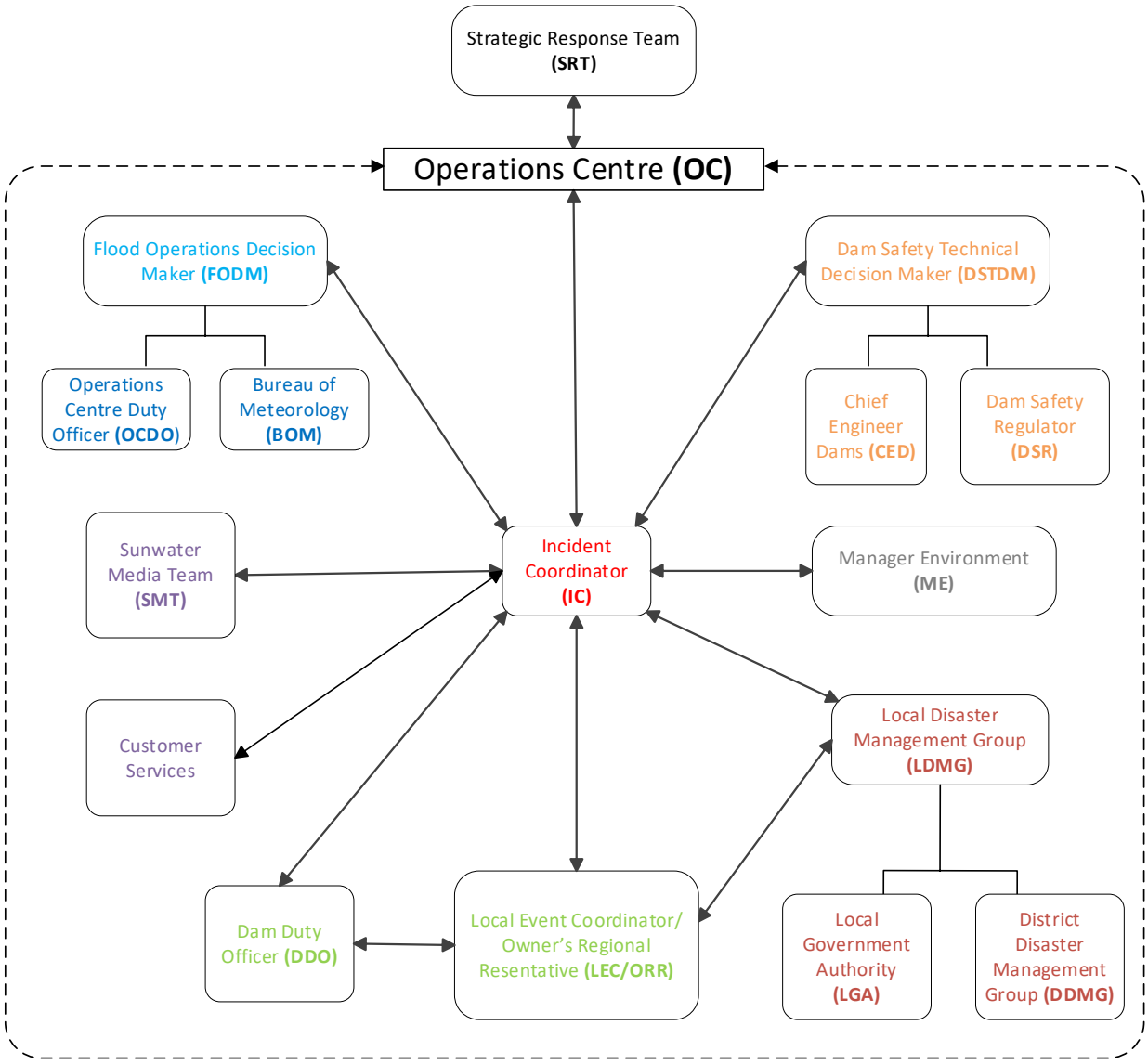
2.5 Fatigue Management Plan

Sunwater has a Fatigue Management Procedure (ref AA). 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 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 coordination of the EAP when activated.
- 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.

- The IC is responsible for the decision to activate the EAP. The IC is the lead coordinator in the implementation of any EAP in events for Sunwater. Should the IC be unavailable, the Local Event Coordinator (LEC) followed by the Dam Duty Officer (DDO) is responsible for the implementation of the EAP. 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 FODM and DSTDM roles are filled by Registered Professional Engineers of Queensland (RPEQ) and are suitably qualified professionals who are able to make engineering decisions and provide engineering decisions as defined in the Professional Engineers Act of Queensland.

2.7 Community information

Sunwater with the assistance of the local councils will ensure community education around messaging and impacts of the EAP and its related events is undertaken and continually improved by incorporating actions from Lessons Learnt (section 2.8).

Sunwater currently provides information externally to customers, downstream residents and the community in a range of ways or channels in relation to dam hazards and emergency situations. Individuals can access information through Facebook, Twitter, the Sunwater web page, Sunwater App and at several regional show/field days across regional Queensland where Sunwater may have stalls and information available.

Immediate D/S residents of Eungella Dam are also provided information in text message/phone calls in the event of an activation of this EAP.

In the event of a dam failure or when required, Sunwater also has the use of the National Emergency Alert System to send a voice message and SMS. This service is provided by Telstra and managed by the State Disaster Coordination Centre. The process Sunwater follows is documented in Appendix A8.

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

2.9 Downstream notifications lists

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

3. Dam details

3.1 General dam information

Location: Eungella Dam is an earth and rockfill dam situated on Broken River at AMTD 71.8 km within the Parish of Eungella, County of Hillalong, in the Shire of Mirani. The dam is located approximately 72 km west of the city of Eton.

Purpose: Eungella Dam is used to supply water for mining and irrigation to the surrounding areas. Eungella Dam was constructed as part of the Collinsville Power Station Water Supply project, but now also supplies the coalfields at Glendon and Moranbah and the townships of Collinsville, Scottsville, Glendon and Moranbah via pipeline and regular river releases to fill the Bowen River Weir.

Catchment: Eungella Dam catchment is bounded by the Clarke Mountain range to the east and Mount Bruce to the west. Vegetation varies from rainforest at the catchment headwater to cleared grasslands at lower elevations.

Construction: Eungella Dam was constructed to full height in 1968.

Specification: The table below lists general specifications of Eungella Dam.

Table 2: Eungella Dam specifications

Description	Specification
Dam type	**Earth and rock-fill, sloping core**
Full Supply Level (FSL)	EL 562.71 m
Historical recorded max storage—April 1989	EL 566.04 m
Storage capacity (FSL)	112,476 ML
Storage area (FSL)	848 ha
Dead storage	1,256 ML
Dam Crest Level (DCL)	EL 569.21 m (2015 Stage 1 – Design) EL 569.15 m (Spillway bridge - 2016 survey)
Length across dam crest	276 m
Maximum height of dam	44.5 m
Dam Crest Level Flood (DCF)	1 in 1,200 AEP (CRA 2022)
Catchment area	142 km^2
Spillway type	**Concrete ogee crest with fully lined side channel spillway and flip bucket dissipator**
Spillway crest level	EL 562.71 m
Spillway crest length	48.77 m at FSL (excluding bridge piers) 54.86 m at spillway bridge (including bridge piers)
Spillway bridge piers	2 × 0.91 m wide
Spillway capacity (DCL)	1,300 m^3/s
Maximum spillway depth at DCF	6.5 m
Outlet	**Two nominal 840 mm diameter fixed cone dispersion values for river releases** **BMA pump station connected to auxiliary outlet pipe work**
River outlet capacity (FSL)	11.3 m^3/s (975 ML/d) – one regulating valve at 100% stroke
Outlet capacity (DCL)	12.2 m^3/s (1050 ML/d) – one regulating valve at 100% stroke

3.2 Population at risk

The 2022 Comprehensive Risk Assessment (ref X) estimated the highest total failure PAR for Eungella Dam is 7 for the 1 in 1,200 AEP (DCF) scenario and 0 for the SDF scenario.

3.3 General Arrangement

The general arrangement drawings are in Appendix B.

3.4 Emergency inspections and monitoring

The Eungella Dam 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 Eungella Dam.

3.4.1 Inspections

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

3.4.2 Instrumentation and monitoring

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

- Settlement/movement measurement
  - 11 surface settlement points on the Main Dam—9 located along the crest of the dam, 1 on the upstream face, 1 on the downstream face
  - 5 survey control stations
- Rainfall gauge
- Storage level recorder
- Tailwater recorder

The Instrumentation Layout is in Appendix B.

4. Roles and responsibilities

Roles and responsibilities	Position holder

Owner (Sunwater)
• Liaise with the Board and Minister
• Activate Sunwater Strategic Response and Business Continuity Plans if required
• Ensure necessary resources are available to manage any event
• Maintain an up-to-date list of immediate D/S residents of Eungella Dam. The downstream limit is shown in Appendix B2 by the zone labelled Limit of downstream notification area
• At all times, aim to provide timely advice and support to the LDMGs in the affected local government areas and the 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 immediate D/S residents via SMS
  ○ contact SDCC Watch Desk to request an Emergency Alert campaign throughout the Eungella Dam Emergency polygon
• During a dam hazard event that occurs with adequate warning; notify the immediate D/S residents via SMS, **unless otherwise agreed with the LDMGs**
• Record communications, notifications and observations as required
	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 five 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

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	GM Central OCO 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) • Maintain current RPEQ accreditation • 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 • 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
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 SDMG of flood events • Record communications, notifications and observations as required	Various personnel as per Media Team roster

Roles and responsibilities	Position holder
Incident Coordinator (IC) • Notify council of intent to use the Emergency Alert • 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	SOM SS OM
Mackay Regional Council and Whitsunday Regional Council Councils have legislated local government functions, as per Section 80 of the *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	

Roles and responsibilities	Position holder
Disaster Management Groups/Personnel - (In addition to requirements outlined in the *Disaster Management Act (2003)*) LDMG • As per IGEM review recommendation: work together with Sunwater and the councils to ensure community education around messaging and impacts of EAP related events is undertaken and continually improves • Work with councils and Sunwater to ensure the EAP is regularly exercised • Identify and coordinate the use of resources and support services that may be required for an EAP event, noting that for safety events unique to the dam Sunwater will approach councils to initiate • During a dam hazard event, the LDMGs (**providing the LDMGs are activated and Stood Up**) in Mackay and Whitsunday areas will take the lead role in notifying the **broader community affected by the hazard** • Identify and provide advice to the relevant DDMGs about support services required by the LDMG to manage an EAP event • Provide reports and make recommendations to the relevant DDMGs about matters relating to EAP events QFD • Work with dam owner and LDMGs to ensure Emergency Alert polygons are prepared, stored and tested at the State Watch Desk • And as per Section 352HC of the *Water Legislation (Dam Safety) Amendment Act (2017)* DDMG • May review the EAP for consistency with the District Disaster Management Plan	LDMG QFD DDMG
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

5. Dam Hazard—flood operations

5.1 Overview

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

- A dam hazard where natural catchment inflows fill Eungella Dam to FSL 562.71m and the rate of inflow exceeds the capacity of the outlet works. Inflows will cause the storage to temporarily rise to above the FSL of the storage at which time the spillway will discharge water into the Broken River. Note:

- The greater the rate of inflow, the higher the storage will rise.
- The higher the storage level rises, the greater the loads on the dam structure.
- Although unlikely, the greater the loading, the higher the likelihood of a dam failure.

Typically, the level of surveillance is increased during flood operations (refer tables in this section).

- Spillway discharge from the dam. The spillway will then discharge water downstream into the Broken River.

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

- As the rate of discharge increases, there will be an impact on low-level road crossings of the Broken River and other infrastructure in the river such as pump sites.

The following table shows historical floods experienced at Eungella Dam.

Table 3: Historical floods experienced at Eungella Dam

Flood Rank	Date	Peak Height EL	Peak Height (m over crest)
1	Apr 1989	566.04m	3.33m
2	Mar 2017	565.26m	2.55m
3	Feb 1991	565.21m	2.50m
4	Apr 2000	564.64m	1.93m
5	Dec 2010	564.38m	1.67m

Detailed information on downstream flood impacts is presented in Appendix B.

The following table shows Elevation Level versus percentage of Full Supply Level at Eungella Dam.

Table 4: EL versus FSL at Eungella Dam

% of FSL	EL (m)
50	554.70
55	555.67
60	556.59
65	557.46
70	558.30
75	559.10
80	559.88
85	560.62
90	561.34
95	562.04
100 (FSL)	562.71
105	563.36
110	564.00
115	564.61
120	565.21

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 5: Flood emergency activation trigger summary

Alert	• EL 562.61m and rising (0.1m below FSL)
Lean Forward	• Storage above FSL 562.71m
Stand Up—greater than flood of record	• Storage above EL 566.04m (flood of record—April 1989)
Stand Up—2	• Storage above EL 569.21m (allowing wave action), OR • As advised by the DSTDM
Stand Down	• Storage level EL 563.00m and falling, with no forecast increase in EL

While this EAP is not triggered until Eungella Dam reaches EL 562.61m, Sunwater, Mackay and Whitsunday Regional Councils and their respective LDMGs 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.

The activation of Stand Up – 2 requires consideration of wave action. For example, if the gauge reading was forecast to reach 1m below the dam crest level and the DDO reported 1m high waves, Stand Up – 2 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 action roles

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

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

Table 6: Flood operations—DDO emergency action

Activation level	Alert	Lean Forward	Stand Up—greater than flood of record	Stand Up—2	Stand Down
Activation trigger	• EL 562.61m and rising (0.1m below FSL)	• Storage above FSL 562.71m	• Storage above EL 566.04m (flood of record—April 1989)	• Storage above EL 569.21m (allowing wave action), OR • As advised by the DSTDM	• Storage level EL 563.00m and falling, with no forecast increase in EL
Actions	• Record all communication • Inspect the dam daily (or as instructed by the DSTDM) and photograph/video and record using the approved forms in the HMT and send to IC & DSTDM • Undertake site preparations including but not limited to: check communication systems – (including backup and radio, satellite, phones, fax, and internet) • Notify the SO (who will be available for duty for the duration of a flood or Emergency Event) • Record the Storage Level twice daily (or as instructed by the DSTDM) using the gauge boards and confirm accuracy of gauging station • Record rainfall—daily • Update Dam Logbook as per SOP12	• As per previous activation level, AND • Inspect the dam daily (or as instructed by the DSTDM), in photograph/video and record using the approved forms in the HMT and send to IC & DSTDM. Attention will be given to: – visual inspection of flow patterns over spillway and dissipator for evidence of scouring – inspect embankment for leaks, deformation, and erosion obvious signs of seepage • – Inspect the spillway for any blockages due to debris.	• As per previous activation level, AND • Inspect the Dam 6-hourly (or as instructed by the DSTDM) and photograph/video and record using the approved forms in the HMT and send to IC & DSTDM • Record lake height at the Headwater Gauge twice daily (or as requested) • Read instrumentation daily (or as instructed by the DSTDM) as shown in section 3.4.2 • Consider the need to isolate floating pontoon - HV switching (discuss with IC) • Close any affected roads as directed and move on any members of the public	• As per previous activation level, AND • Evacuate any plant and/or vehicles to higher ground • View the embankment (with binoculars) • Remotely inspect the dam 6-hourly (or as instructed by the DSTDM) photograph/video and record using the approved forms in the HMT and send to IC & DSTDM • Check signs of erosion on D/S face, especially near spillway, if possible	• Return to routine surveillance activities and frequencies—inspect the dam for any damage identified • Forward information for EER to IC email • Update Dam Logbook as per SOP12
Notifications	• IC • SO • LEC	• As per previous activation level	• As per previous activation level	• As per previous activation level	• DSTDM (at end of event) • Email IC

Table 7: Flood operations—LEC emergency action

Activation level	Alert	Lean Forward	Stand Up—greater than flood of record	Stand Up—2	Stand Down
Activation trigger	• EL 562.61m and rising (0.1m below FSL)	• Storage above FSL 562.71m	• Storage above EL 566.04m (flood of record—April 1989)	• Storage above EL 569.21m (allowing wave action), OR • As advised by the DSTDM	• Storage level EL 563.00m and falling, with no forecast increase in EL
Actions	• Record all communication • Develop/implement staff roster * **NOTE:** IC to contact LDMGs unless LDMG 1 is Stood Up	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Forward information for EER to IC email • Return to routine activities
Notifications	• IC • DDO • LDMG 1 * • LDMG 2 *	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level

Table 8: Flood operations—IC emergency action

Activation level	Alert	Lean Forward	Stand Up—greater than flood of record	Stand Up—2	Stand Down
Activation trigger	• EL 562.61m and rising (0.1m below FSL)	• Storage above FSL 562.71m	• Storage above EL 566.04m (flood of record—April 1989)	• Storage above EL 569.21m (allowing wave action), OR • As advised by the DSTDM	• Storage level EL 563.00m and falling, with no forecast increase in EL
Actions	• Record all communication • Liaise with Sunwater Customer Support to send SMS to D/S residents • Obtain catchment conditions from the DDO • Create Incident Report Record • Update Sunwater intranet with dam status * **NOTE:** IC to contact LDMGs unless LDMG 1 is Stood Up	• As per previous activation level, AND • Ensure all abnormal observations or damage has been reported to 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	• As per previous activation level, AND • Ensure staff are relocated to a safe location	• Deactivate EAP • Compile EER and deliver to DSR if required • Close Incident Report Record • Update Sunwater intranet with dam status • Return to routine activities
Notifications	• D/S Residents • DDMG • DDO • DSTDM • LEC/ORR • SMT • SRT	• As per previous activation level	• As per previous activation level	• As per previous activation level, AND • SDCC Watch Desk	• Inform previous notifications of deactivation as required

Table 9: Flood operations—LEC & IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• When EL 562.61m and rising (preparedness)	• **LDMG 1** • **LDMG 2**	• Phone	Describe current situation with dam—What is the event? What is the status? Advise of current storage level
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS.
Lean Forward	• Storage above FSL 562.71m	• **LDMG 1** • **LDMG 2** • DDMG	• Phone	Describe current situation with dam—What is the event? What is the status? Advise of current storage level and whether any flood releases are due to commence Discuss any potential road/bridge closures
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS.
Stand Up—greater than flood of record	• Storage above EL 566.04m	• **LDMG 1** • **LDMG 2** • DDMG	• Phone	Describe current situation with dam—What is the event? What is the status? (Storage is greater than flood of record) Advise of current storage level Advise of any forecasts you are aware of
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS

Table 9 (Continued): Flood Operations—LEC and IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up—2	• Storage above EL 569.21m (allowing wave action) OR • As advised by the DSTDM • Dam failure possible but not in progress	• **LDMG 1** • **LDMG 2** • DDMG	• Phone	Describe current situation with dam—What is the event? *(Overtopping of crest)* What is the status? (Dam failure possible but not in progress) Advise of current storage level Advise of any forecasts you are aware of
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (blank copy in ref Z) and email to SDCC Watch Desk to send. Develop message in consultation with DSTDM.
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
	• Dam failure in progress	• **LDMG 1** • **LDMG 2** • DDMG	• Phone	Describe current situation with dam—What is the event? (Overtopping of crest) What is the status? (Dam failure in progress) Advise of current storage level Advise of any forecasts you are aware of
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send.
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
Stand Down	• Storage level EL 563.00m and falling, no more rain observed in prior 12 hours	• **LDMG 1** • **LDMG 2** • DDMG	• Phone	Describe current situation with dam—What is the event? What is the status? Advise of current storage level Advise EAP has been deactivated
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS

Table 10: Flood operations—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up—greater than flood of record	Stand Up—2	Stand Down
Activation trigger	• EL 562.61m and rising (0.1m below FSL)	• Storage above FSL 562.71m	• Storage above EL 566.04m (flood of record—April 1989)	• Storage above EL 569.21m (allowing wave action) OR As advised by the DSTDM	• Storage level EL 563.00m and falling, with no forecast increase in EL
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	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations • Monitor situation and assess risks	• Forward information for EER to IC email • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level	• As per previous activation level, AND • CEO—if time permits	• As per previous activation level

Table 11: Flood operations—FODM emergency action

Activation level	Alert	Lean Forward	Stand Up—greater than flood of record	Stand Up—2	Stand Down
Activation trigger	• EL 562.61m and rising (0.1m below FSL)	• Storage above FSL 562.71m	• Storage above EL 566.04m (flood of record—April 1989)	• Storage above EL 569.21m (allowing wave action) OR As advised by the DSTDM	• Storage level EL 563.00m and falling, with no forecast increase in EL
Action	• 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. • Record all communication and decisions made	• As per previous activation level	• As per previous activation level	• As per previous activation level,	• Forward information for EER to IC email • Return to routine activities
Notifications	• IC • DDO • DSTDM • BOM	• As per previous activation level	• As per previous activation level	• As per previous activation level,	• As per previous activation level

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

6.1 Overview

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

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

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

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

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

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 increased likelihood of piping. This circumstance is the trigger for the Alert status for piping.

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

6.2 Emergency action roles

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

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

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

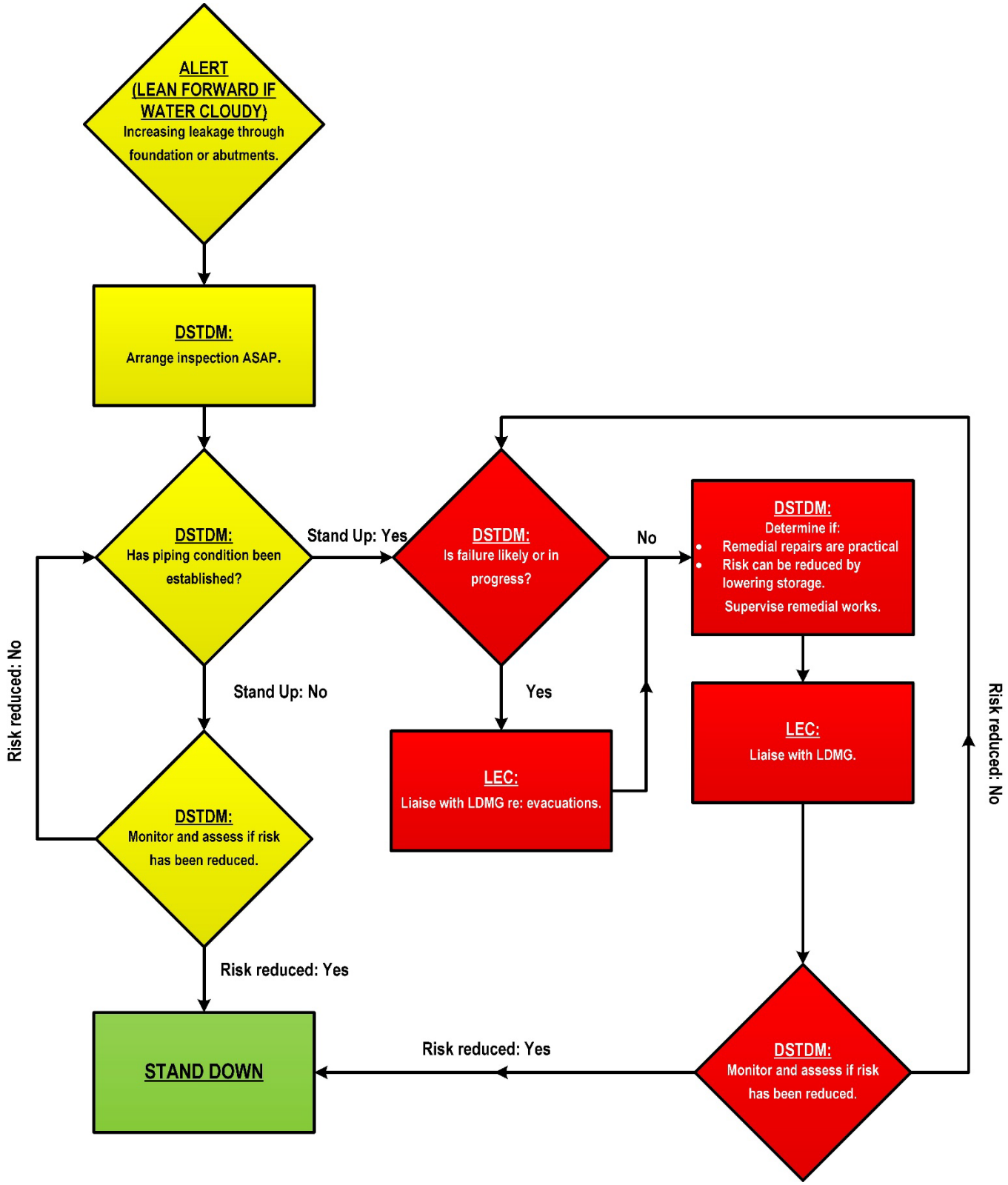


Table 12: Piping: embankment, foundation, or abutments—DDO emergency action

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 (or as otherwise instructed by the DSTDM) until a decreasing trend is observable, or as directed by the IC • Photograph/video the piping from a safe point and record using the approved forms in the HMT and send to IC & DSTDM • Update Dam Logbook as per SOP12	• 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 as directed and move on any members of the public • Maintain surveillance of area immediately downstream of dam (if safe to do so) move on any members of the public	• As per previous activation level, AND • Ensure remedial works cease and plant and personnel have been moved to a safe location • Vacate the immediate vicinity of the piping condition • Record/photograph the piping damage and/or dam failure from a safe point	• Inspect the dam for any damage and photograph any damage identified during the event • Forward information for EER to IC email • Update Dam Logbook as per SOP12 • 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

Table 13: 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	• As per previous activation level	• As per previous activation level, AND • Liaise with relevant council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward information for EER to IC email • Return to routine activities
Notifications	• IC • DDO • LDMG 1 • LDMG 2	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level

Table 14: 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 Incident Report Record • Update Sunwater intranet with EAP status * **NOTE:** IC to contact LDMGs unless LDMG 1 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 • Liaise with Sunwater Customer Support to send SMS to D/S residents and phone those without mobiles • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level, AND • 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 • Compile EER and deliver to DSR if required • Close Incident Report Record • Update Sunwater intranet with dam status • Return to routine activities
Notifications	• DDO • LEC/ORR • SMT • SRT	• As per previous activation level, AND • DDMG	• As per previous activation level, AND • D/S Residents • SDCC Watch Desk	• As per previous activation level	• Inform previous notifications of deactivation as required

Table 15: Piping: embankment, foundation, or abutments—LEC & IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• Increase in leakage through an embankment, the foundations, or abutments	• **LDMG 1** • **LDMG 2**	• 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
Lean Forward	• Increase in leakage through an embankment, the foundations, or abutments with cloudy water	• **LDMG 1** • **LDMG 2** • 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	• **LDMG 1** • **LDMG 2** • 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
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send. Develop messages in consultation with DSTDM
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS.

Table 15 (Continued): Piping: embankment, foundation, or abutments—LEC & IC 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 hazard	• **LDMG 1** • **LDMG 2** • 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
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send. Develop messages in consultation with DSTDM
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
	• Dam failure in progress	• **LDMG 1** • **LDMG 2** • 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
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send.
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
Stand Down	• Risk assessment has determined that piping risk has reduced	• **LDMG 1** • **LDMG 2** • DDMG (if from Stand Up)	• 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
		• D/S Residents (if from Stand Up)	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS

Table 16: 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 • Advise DSR of EAP activation	• As per previous activation level	• As per previous activation level, AND • 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) • Monitor situation and assess risks	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations	• Forward information for EER to IC email • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level	• As per previous activation level, AND • CEO—if time permits	• As per previous activation level

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

7. Dam Hazard—earthquake

7.1 Overview

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

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

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

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

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

7.2 Emergency action roles

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

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

Figure 3: Earthquake flowchart

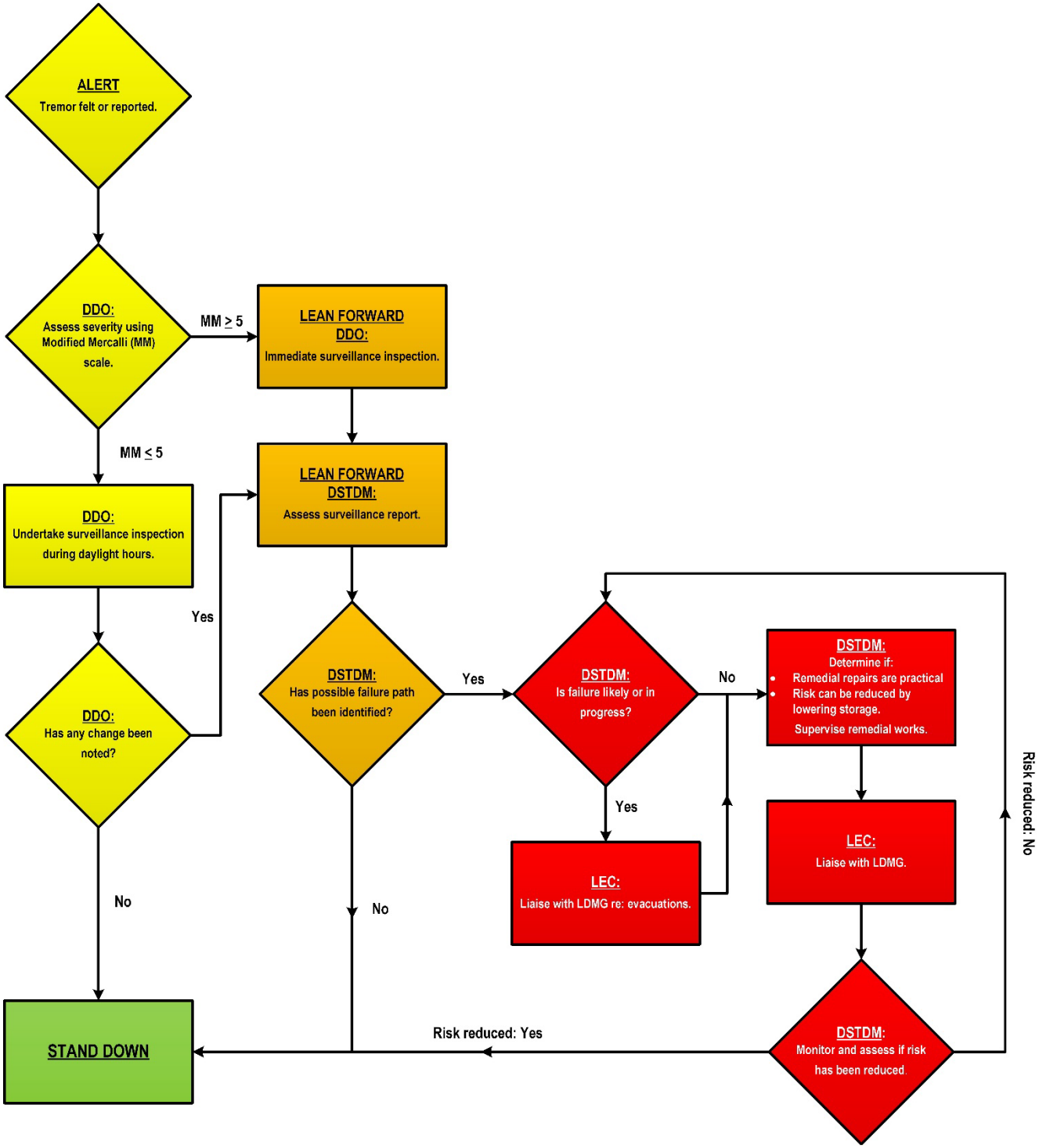


Table 17: Earthquake—DDO emergency action

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	• Record all communication • Inspect the dam wall, spillway structure, and abutments in daylight hours (if safe to do so) and report to the DSTDM and IC • Photograph/video and record using the approved forms in the HMT and send to IC & DSTDM • Check for leaks, deformation, erosion, and concrete damage • Update Dam Logbook as per SOP12	• As per previous activation level, AND • Immediately inspect the dam wall, spillway structure, and abutments (if safe to do so), and report to the IC & DSTDM (unless inspection completed in Alert Stage) Repeat the inspection as directed	• As per previous activation level, AND • Support/supervise remedial work as required • Lower the storage if directed • Close any affected roads, if not already closed by others • Maintain surveillance of area immediately downstream of dam (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, AND • 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 information for EER to IC email • Update Dam Logbook as per SOP12 • Return to routine activities
Notifications	• DSTDM • IC • LEC	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level

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

Table 18: 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 information for EER to IC email • Return to routine activities
Notifications	• IC • DDO • LDMG 1 • LDMG 2	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level

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

Table 19: Earthquake—IC emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	• Earthquake confirmed* or felt in the area, AND • Intensity less than 5MM~	• Earthquake confirmed* 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* 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 • Liaise with DDO, LEC and DSTDM • Create Incident Report Record • Update Sunwater intranet with dam status **NOTE:** IC to contact LDMGs unless LDMG 1 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 • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles • Mobilise resources to undertake remedial works if directed by DSTDM	• 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 • Compile EER and deliver to DSR if required • Close Incident Report Record • 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 • D/S Residents • SDCC Watch Desk	• As per previous activation level	• Inform previous notifications of deactivation as required

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

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

Table 20: Earthquake—LEC & IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• Earthquake confirmed or felt in the area, AND • Intensity less than 5MM	• **LDMG 1** • **LDMG 2**	• 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
Lean Forward	• Earthquake confirmed 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 1** • **LDMG 2** • 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 or felt in the area, AND • A possible failure path has been identified	• **LDMG 1** • **LDMG 2** • 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 LDMG to activate LDMP
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send. Develop messages in consultation with DSTDM
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS"

Table 20 (Continued): Earthquake—LEC & IC Communications 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	• **LDMG 1** • **LDMG 2** • 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) LDMG to activate LDMP
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send. *Develop* messages *in consultation with DSTDM*
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
	• Dam failure in progress	• **LDMG 1** • **LDMG 2** • 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 LDMG to activate LDMP
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send.
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
Stand Down	• Risk assessment has determined that failure risk has reduced	• **LDMG 1** • **LDMG 2** • 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
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS

Table 21: Earthquake—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	• Earthquake confirmed* or felt in the area, AND • Intensity less than 5MM~	• Earthquake confirmed* 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* 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 • Review surveillance inspection of the dam and assess its condition as soon as possible • Review instrumentation data and determine if any additional responses are required • Monitor situation and assess risks • Advise DSR of EAP activation	• As per previous activation level, AND • 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)	• As per previous activation level	• Forward information for EER to IC email • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level, AND • CEO—if time permits	• As per previous activation level, AND • CEO—if time permits (if not from Stand Up—1)	• As per previous activation level

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

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

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

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 failure 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 Eungella Dam 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) outline 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 22 to Table 26 specify emergency actions for the following roles:

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

Figure 4: Terrorist threat/activity or high energy impact flowchart

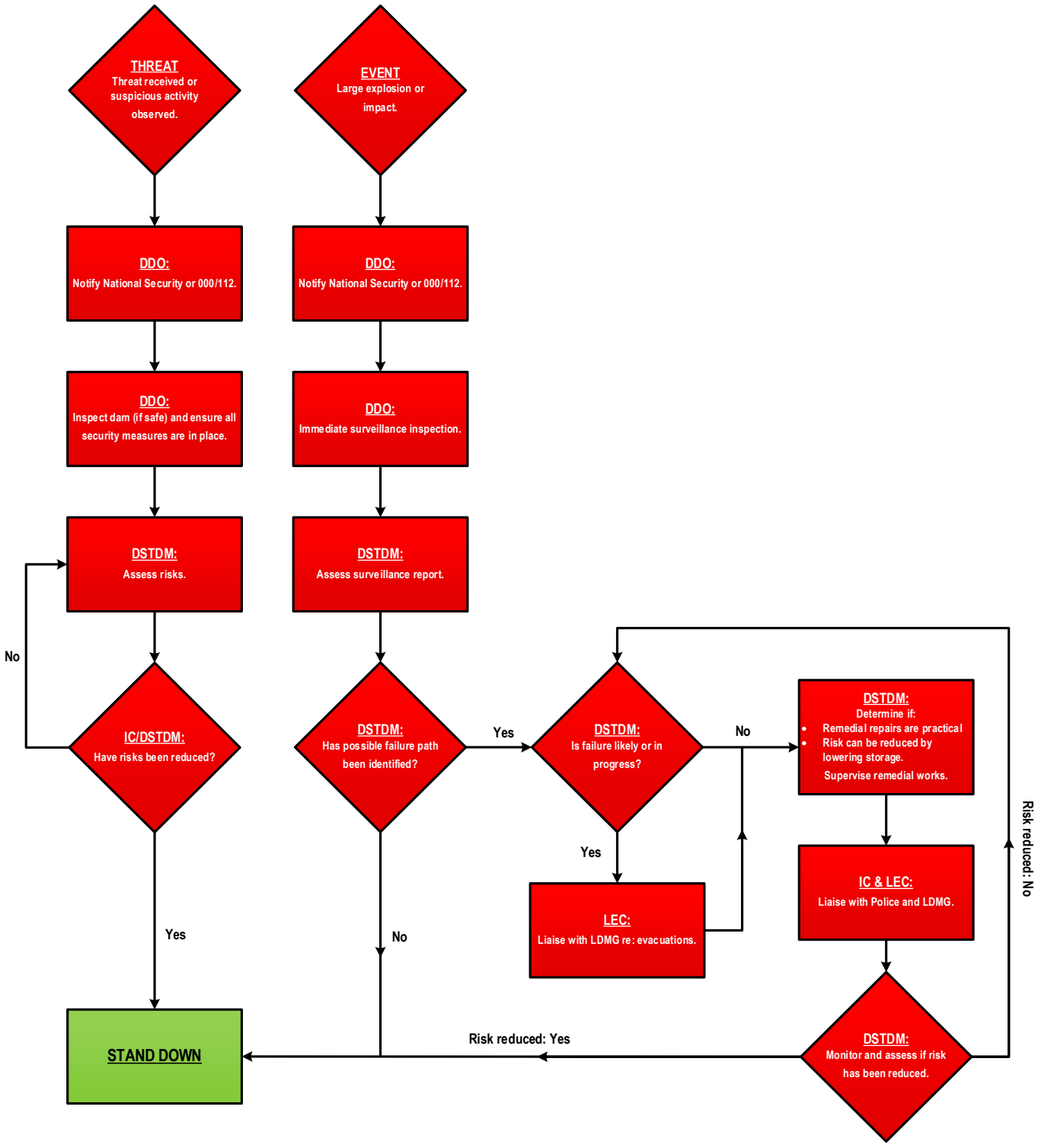


Table 22: Terrorist threat/activity or high energy impact—DDO emergency action

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 • 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 in the HMT and send to IC & DSTDM • If Police appoint Incident Manager support and follow instructions • Close any affected roads as directed and move on any members of the public • Update Dam Logbook as per SOP 12	• As per previous activation level, AND • Undertake surveillance inspection of dam (if safe)	• As per previous activation level, AND • Lower reservoir level, if directed • Record/photograph the damage from a safe point • Vacate the immediate vicinity of the affected area	• 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 23: 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 • 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 • If DDMG appoint Incident Manager support and follow instructions • Liaise with relevant council(s) regarding possible road/bridge closures	• As per previous activation level	• As per previous activation level, AND • Liaise with DDO, IC, and LDMG re: potential for evacuations	• Forward information for EER to IC email • Return to routine activities
Notifications	• Not applicable	• DDO • IC • LDMG 1 • LDMG 2	• As per previous activation level	• As per previous activation level	• As per previous activation level

Table 24: 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 • 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 contact LDMGs unless LDMG 1 is Stood Up	• As per previous activation level	• As per previous activation level, AND • Mobilise resources to undertake remedial works if directed by DSTDM	• Deactivate EAP event • Compile EER and deliver to DSR if required • Close 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 • D/S Residents • SDCC Watch Desk	• As per previous activation level	• Inform previous notifications of deactivation as required

Table 25: Terrorist threat/activity or high energy impact—LEC & IC 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 notice at the dam • Threat received	• **LDMG 1** • **LDMG 2** • DDMG • CTG (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 LDMG to activate LDMP
Stand Up—2	**EVENT** • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)	• **LDMG 1** • **LDMG 2** • DDMG • CTG (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) LDMG to activate LDMP
		• SDCC Watch desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send. *Develop messages* in *consultation with DSTDM*
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS

Table 25 (Continued): Terrorist threat/activity of high emergency impact—LEC & IC Communication Plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up—3	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• **LDMG 1** • **LDMG 2** • 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
		• SDCC Watch desk	• Phone & Email	Complete Emergency Alert Request Form as per instructions (copies in Appendix A8 and ref Z) and email to SDCC Watch Desk to send.
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
Stand Down	• Risk assessment has determined that failure risk has reduced	• **LDMG 1** • **LDMG 2** • 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
		• D/S Residents	• SMS (Phone for those without mobiles)	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS

Table 26: 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 • 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) • Monitor situation and assess risks	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations	• Forward information for EER to IC email • Return to routine activities
Notifications	• Not applicable	• DDO • IC • SRT • DSR	• As per previous activation level	• As per previous activation level	• As per previous activation level

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

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 27: 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 indicate 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 28 to Table 33 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 28: 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 (if available)	• LEC • SO (if available)

Table 29: 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 (if available) • LDMG 1 • LDMG 2	• DDO • DSTDM (if available) • SO • LDMG 1 • LDMG 2 • DDMG

Table 30: Communications failure—IC 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	• 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 • 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 carry out functions of the LEC as much as practicable • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Notifications	• LEC • DSTDM • SO (if available) • DDMG	• DDO (if available) • DSTDM • SO (if available) • LDMG 1 (if available) • LDMG 2 (if available) • DDMG (if available)

Table 31: 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 (if available) • **LDMG 1** • **LDMG 2** • DDMG	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		IC to send Sunwater Incident and Near Miss Alert		EAP Alert Notification—Eungella Dam—Site Communications Failure
Comms Failure – Local Area	• Unable to communicate to or from local area including LEC and ORR	• DDO (if available) • DSTDM • SO (if available) • **LDMG 1** (if available) • **LDMG 2** (if available) • DDMG (if available)	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		IC to send Sunwater Incident and Near Miss Alert		EAP Alert Notification—Eungella Dam—Local Area Communications Failure
Comms Failure – Brisbane	• Unable to communicate to or from Sunwater Brisbane	• DSTDM (if available) • **LDMG 1** • **LDMG 2** • DDMG	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		LEC to send Sunwater Incident and Near Miss Alert		EAP Alert Notification—Sunwater Brisbane Communications Failure

Table 32: Communications failure—DSTDM emergency action

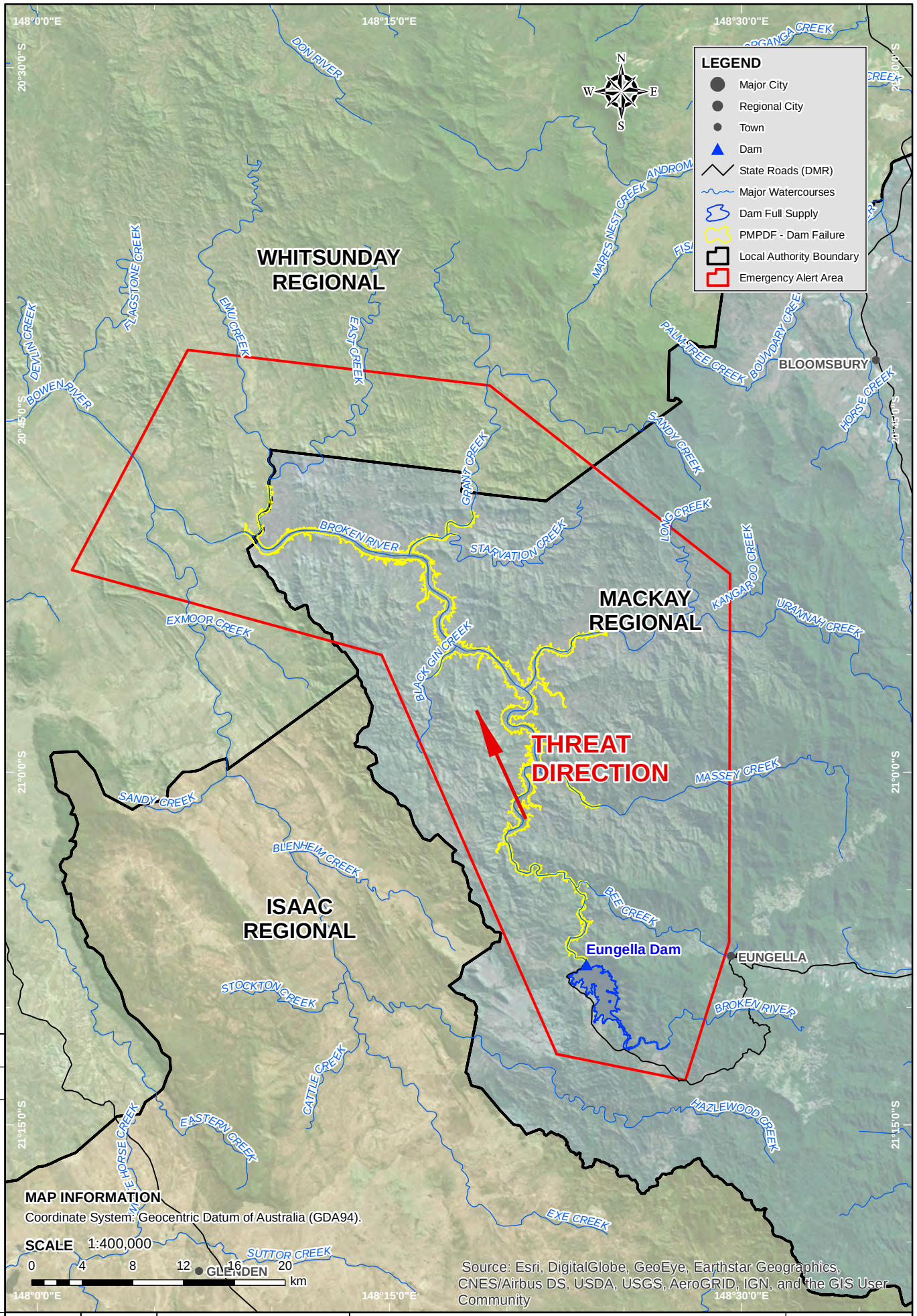
Activation level	Comms Failure – Site	Comms Failure – Local Area
Activation trigger	• Unable to communicate to dam site	• Unable to communicate to local area including LEC and ORR
Actions	• Provide technical advice to IC/LEC on a needs basis • Record all communication • As much as is practicable, continue 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 (if time permits) • DSR (if applicable)	• IC • DDO (if available) • CEO (if time permits) • DSR (if applicable)

Table 33: 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 (if available) • DSTDM

APPENDIX A Notification and communication lists

Appendix A1 to Appendix A7 has been redacted



Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-WSRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\Emergency Alerts\249574-B.mxd
Printed: Monday, 03/09/2018 03:15:18 PM

MAP PRODUCED BY:
WATER RESOTCES & DAM SAFETY
TEL. (07)3120 0000

REVISION	DATE	REMARKS	CKD	MH
A	03/09/18	ALERT BOUNDARY AMENDED	MB	MH
A	23/01/18	ISSUED FOR USE	MB	MH

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
MB	
APPROVED	
M. HUGHES	
23/1/2018	

EUNGELLA DAM
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA

CONTRACT NUMBER	
DRAWING NUMBER	REV.
249574	B
SHEET 1 OF 1	
DATE JANUARY 2018	

Appendix A8: Dam failure emergency alert request

Queensland emergency alert request guidelines

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

Instructions

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

Filename:	Voice Message:	SMS:
[redacted]	Flood Emergency Warning from Sun water. People downstream of Yuhn guh luh Dam must leave immediately. Yuhn guh luh Dam 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 Mackay Regional Council disaster dot mackay dot q l d dot gov dot ay you and Whitsunday Regional Council disaster dot Whitsunday r c dot q l d dot gov dot ay you.	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Eungella Dam must LEAVE IMMEDIATELY. Eungella Dam 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 Mackay Regional Council http://disaster.mackay.qld.gov.au/ and Whitsunday Regional Council http://disaster.whitsundayrc.qld.gov.au/

The following pages contain a per-filled copy of the Eungella Dam Emergency Alert Request form.

Queensland Government

PHONE THE SDCC WATCH DESK [redacted] – ADVISE EA IS BEING DEVELOPED

EMERGENCY ALERT REQUEST

Location of Alert: Eungella Dam
(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 ___ (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 Sun water. People downstream of Yuhn guh lah Dam must leave immediately. Yuhn guh luh Dam 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 Mackay Regional Council disaster dot mackay dot q l d dot gov dot ay you and Whitsunday Regional Council disaster dot Whitsunday r c dot q l d dot gov dot ay 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 Eungella Dam must LEAVE IMMEDIATELY. Eungella Dam 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 Mackay Regional Council http://disaster.mackay.qld.gov.au, and Whitsunday Regional Council http://disaster.whitsundayrc.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.

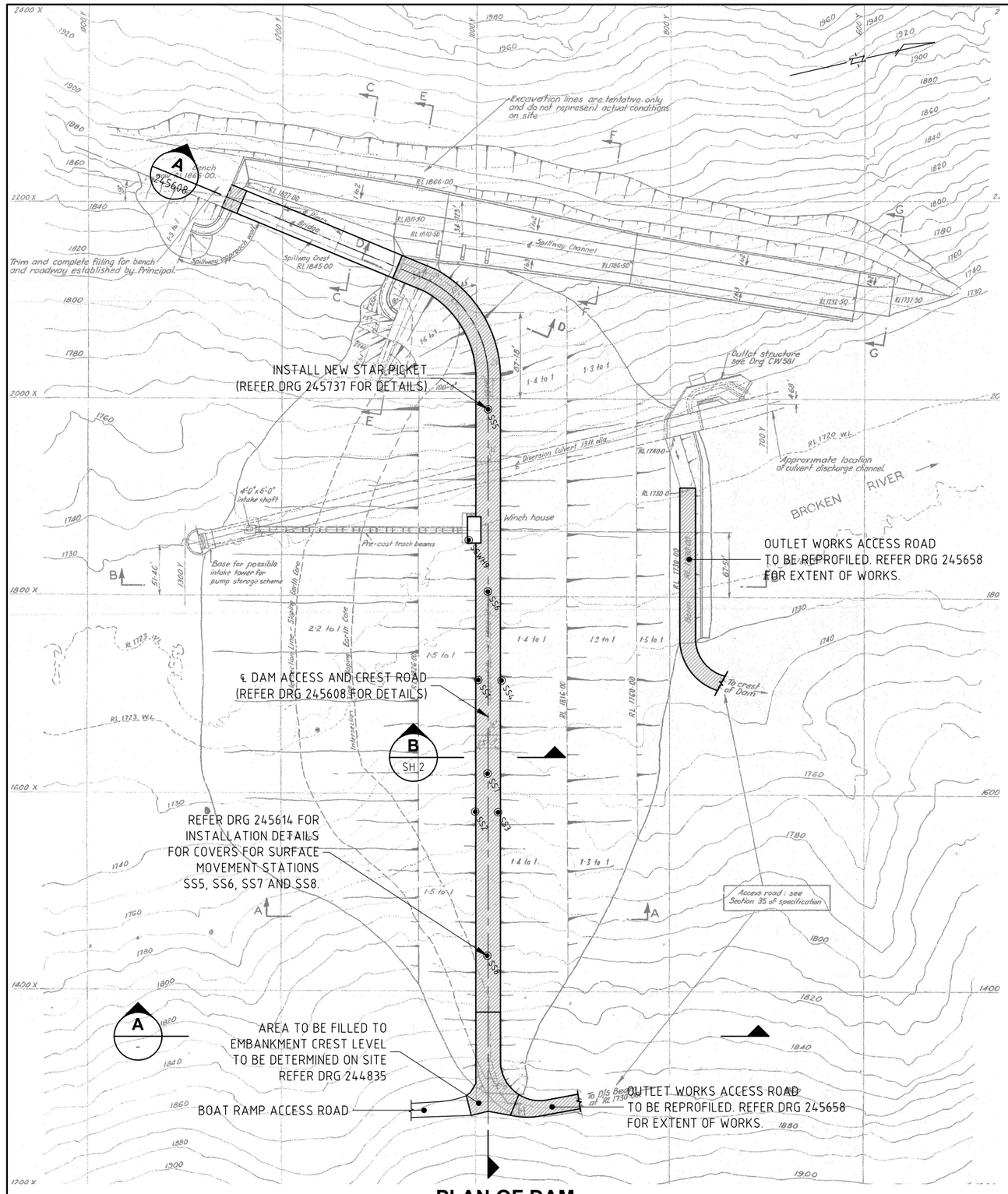
SMS example:

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.

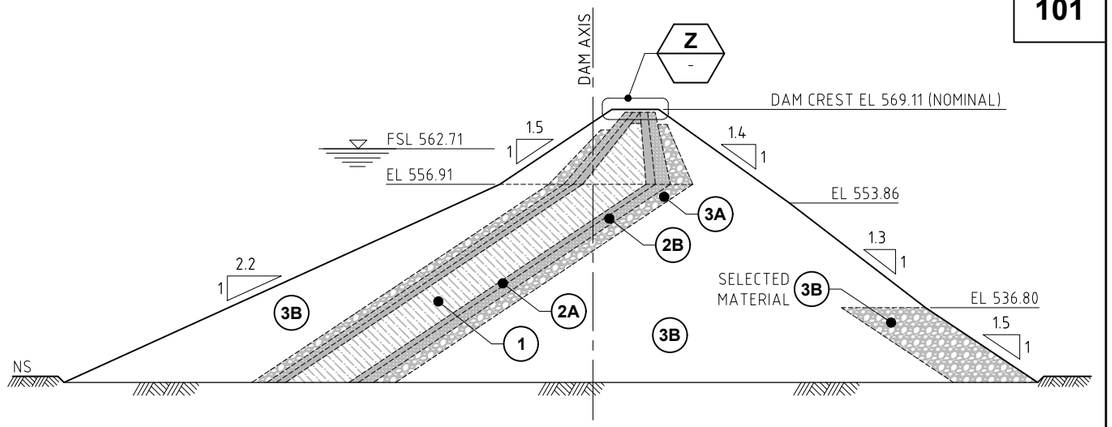
APPENDIX B Inundation maps and emergency control measures

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.



PLAN OF DAM

SCALE 1:1500

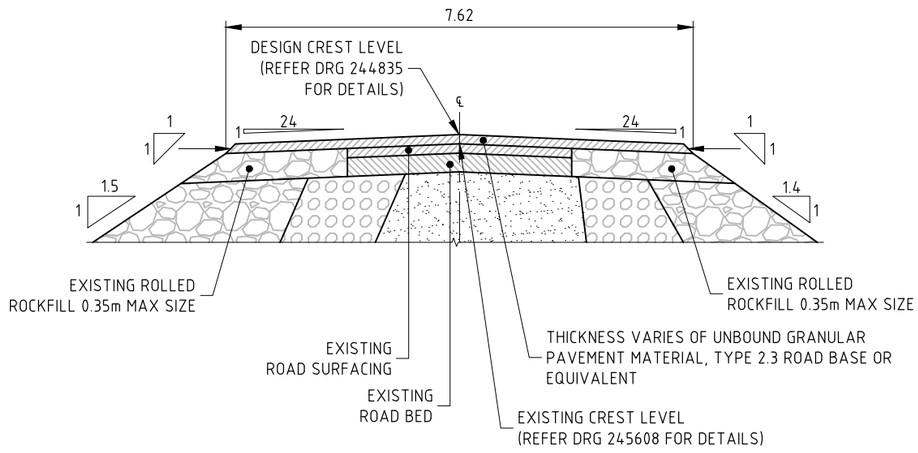


TYPICAL EMBANKMENT SECTION

SECTION A

SCALE 1:1000

Levels on this drawing are in metres
based on BM 961301 = EL 569.976m AHD (Derived)



DETAIL Z

SCALE 1:100

NOTES:

- DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
- LEVELS ARE IN METRES TO AUSTRALIAN HEIGHT DATUM.

EMBANKMENT ZONES

ZONE 1 - SANDY CLAYS AND CLAYS
ZONE 2A - SILTY SAND
ZONE 2B - FILTER ZONE
ZONE 3A - SELECTED SMALL SIZE ROCK FILL
ZONE 3B - ROCK FILL FROM SPILLWAY EXCAVATION

AS BUILT

REVISION					REFERENCE DRAWINGS
11/02/16	1	AS BUILT	IDH	P. G. RICHARDSON	
11/05/15	0	ISSUED FOR CONSTRUCTION	IDH	P. G. RICHARDSON	
DATE		REMARKS	CKD	PASSED	

SCALES (A3 SIZE)

0 5 10 15 20 25 METRES 1:500
0 10 20 30 40 50 METRES 1:1000
0 25 50 75 METRES 1:1500

DRAWN	DESIGNED
CSS	PGR
CHECKED	CHECKED
APPROVED	
P. G. RICHARDSON	
11/05/15	RPEQ 3641

SunWater

EUNGELLA DAM
DAM SAFETY UPGRADE STAGE 1
EMBANKMENT CREST ROAD
GENERAL ARRANGEMENT

CONTRACT NUMBER

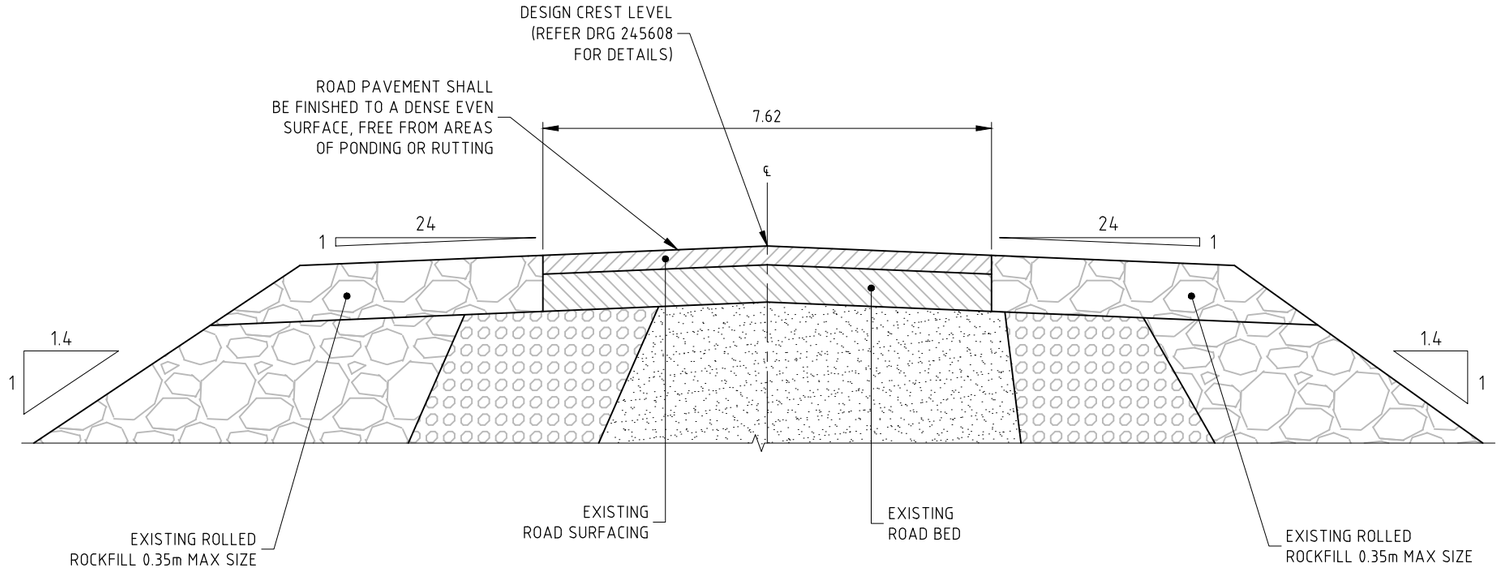
DRAWING NUMBER
245656
SHEET 1 OF 2

DATE MARCH 2015

0 1

DRAWING PRODUCED BY:
SUNWATER LIMITED
179 TURBOT ST,
BRISBANE QLD 4000
TEL: (07) 3120 0000

S:\BW Asset Delivery\SW-Bowen Broken WSS\N-WKBB-04-06-01-AA - Eungella Dam Safety Upgrade Stage 1\Drawings\AutoCAD\245656-1.dwg
11 Feb 2016 10:60 AM



SECTION B
SCALE 1:50 — SH 1

AS BUILT

NOTE:
- REFER SHEET 1 FOR DETAILED NOTES.

S:\BW Asset Delivery\SW-Bowen Broken WSS\N-WKBB-04-06-01-AA - Eungella Dam Safety Upgrade Stage 1\Drawings\AutoCAD\245656-B.dwg
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DRAWING PRODUCED BY:
SUNWATER LIMITED
179 TURBOT ST,
BRISBANE QLD 4000
TEL: (07) 3120 0000

REVISION					REFERENCE DRAWINGS
11/02/16	1	AS BUILT	IDH	P. G. RICHARDSON	
11/05/14	0	ISSUED CONSTRUCTION	IDH	P. G. RICHARDSON	
DATE		REMARKS	CKD	PASSED	

SCALES (A3 SIZE)
0 0.5 1.0 1.5 2.0 2.5 METRES
1:50

DRAWN	DESIGNED
CSS	PGR
CHECKED IDH	CHECKED
APPROVED	
P. G. RICHARDSON	
11/05/15	RPEQ 3641

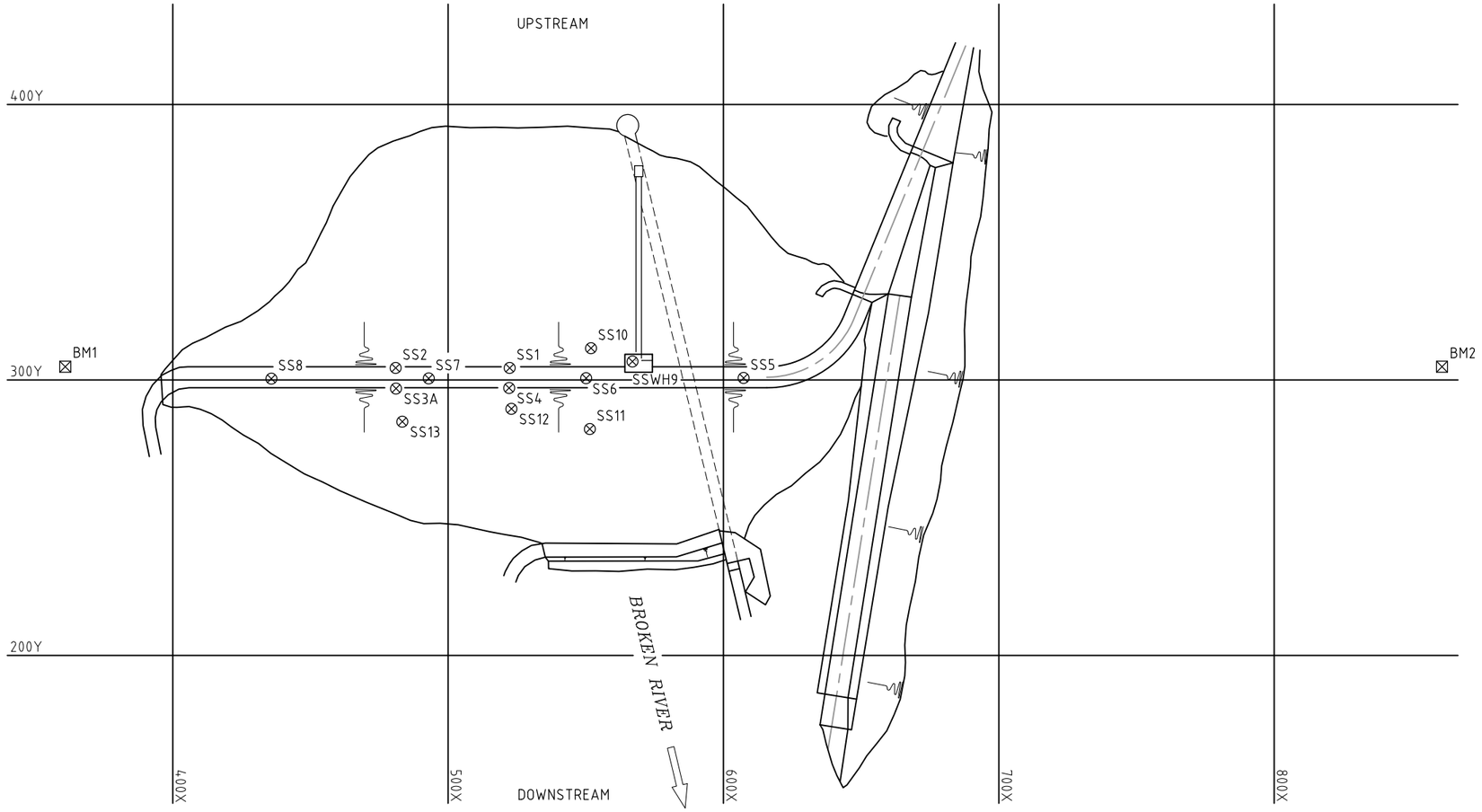
EUNGELLA DAM
DAM SAFETY UPGRADE STAGE 1
EMBANKMENT CREST ROAD
GENERAL ARRANGEMENT

CONTRACT NUMBER

DRAWING NUMBER
245656
SHEET 2 OF 2

DATE MARCH 2015

0 | 1



SURFACE MOVEMENT STATIONS

No	X	Y	ELEVATION	REMARKS
1	522.363	304.352	570.313	ORIGINAL MARK
2	480.962	304.358	569.923	ORIGINAL MARK
3A	481.084	296.885	569.685	REPLACES ORIGINAL MARK 3
4	522.171	297.076	570.148	ORIGINAL MARK
5	607.313	300.705	570.167	
6	550.123	300.620	570.255	
7	492.961	300.535	569.998	
8	435.806	300.446	569.493	
WH9	566.268	306.686	570.182	ORIGINAL MARK
10	551.913	311.533	565.384	MINI PRISMS ATTACHED TO ROCK
11	551.462	282.194	559.982	MINI PRISMS ATTACHED TO ROCK
12	522.997	289.517	565.361	LEICA PRISMS ATTACHED TO ROCK
13	483.376	284.864	562.266	LECIA PRISMS ATTACHED TO ROCK

SURVEY CONTROL STATIONS

BM1	360.956	304.800	586.729	BRASS PIN IN CONCRETE
BM2	860.956	304.800	N/A	STEEL ROD IN CONCRETE

LEGEND

⊠ SURVEY CONTROL STATION

⊗ SURFACE SETTLEMENT STATION

NOTES:

1. AZIMUTH DATUM: ARBITRARY GRID.
2. LEVELS DATUM: SUBTRACT 0.013m TO AHD 96
3. COORDINATES AND LEVELS FROM INITIAL SURVEYS IN AUGUST 1969 AND SEPTEMBER 1985.
4. AGD 84 ZONE 55 COORDINATES FOR
   BM1 E 644352.00 N 7661937.880
   SS7 (BM 961301) E 644224.371 N 7661971.782

S:\BW Asset Delivery\SW-Bowen Broken WSS\Eungella Dam Instrumentation\Drawings\AutoCAD\206433-C.dwg
04 Dec 2020 10:60 AM

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

REVISION					
DATE		REMARKS	CKD	PASSED	
04/12/20	C	STATIONS 12 & 13 ADDED & 3 REPLACED BY 3A	SES	B. TREBILCO	
25/05/11	B	NOTES ADDED, REMARKS ADDED	AN	AN	
16/11/10	A	POINTS 10 & 11 ADDED	--	--	

REFERENCE DRAWINGS	
27579	EUNGELLA DAM - GENERAL ARRANGEMENT

SCALES (A3 SIZE)

0 50 100 METRES
1:2000

DRAWN	DESIGNED
LMD	
CHECKED	CHECKED
APPROVED	

sunwater

DAM SAFETY INVESTIGATION
EUNGELLA DAM

INSTRUMENTATION LAYOUT

CONTRACT NUMBER

DRAWING NUMBER **206433** REV. **C**

SHEET 1 OF 1

DATE APRIL 1997

Appendix B2: Flooding Impacts—Downstream

Downstream flood impacts were revised in the 2022 CRA. The critical dam failure scenario is F04 DCF Piping, with a dam break PAR (incremental PAR) of less than 1. Sunny day failure does not generate any PAR. Flood wave travel times and population at risk are summarised in the tables below.

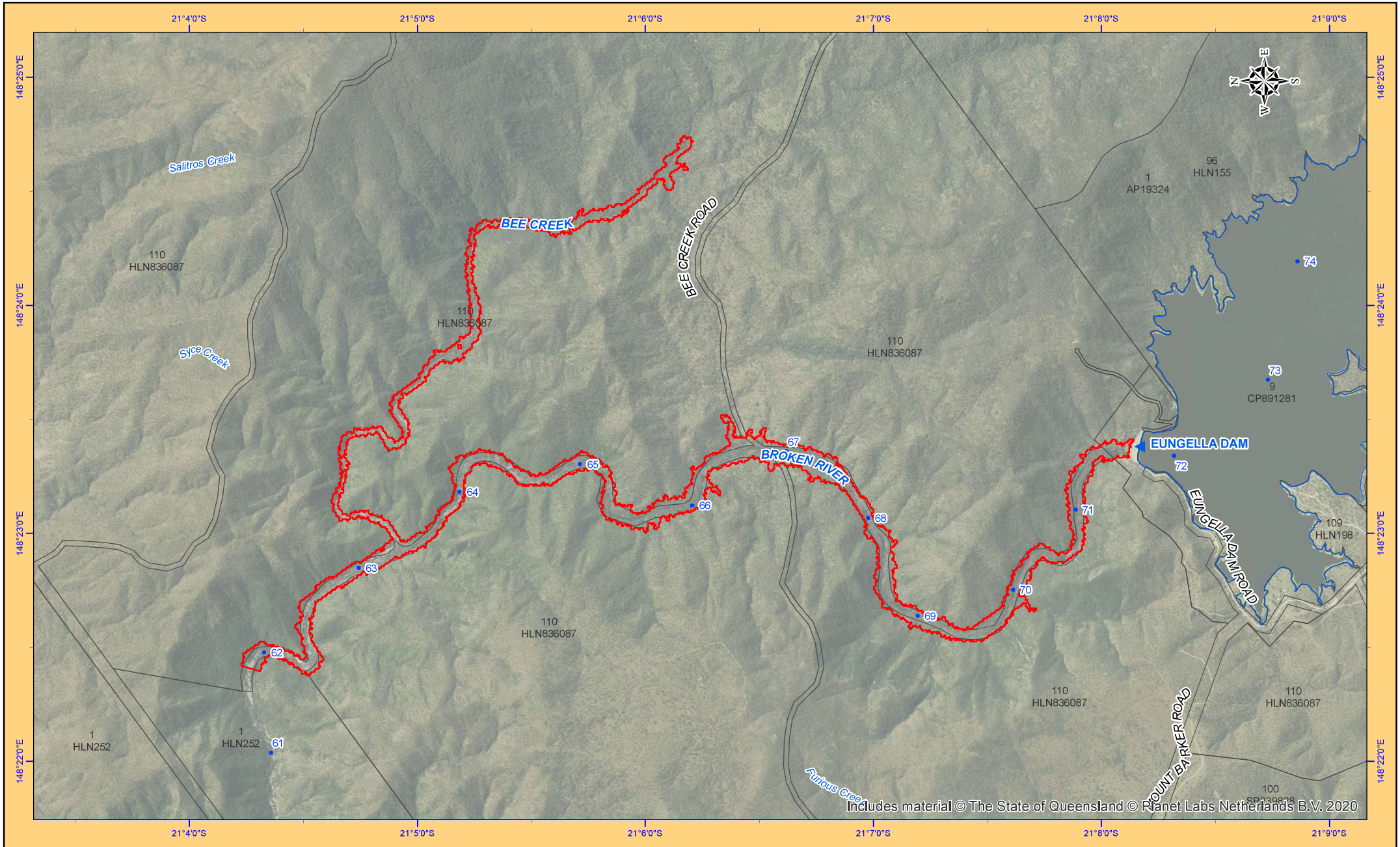
There are no public road crossings of the Broken River in the assessed reach downstream of Eungella Dam. A small number of access tracks traverse the river and are likely to be private accesses for landholders to travel within their property and are assumed to have negligible traffic.

Failure Scenario	Time for Failure Peak to Travel to Confluence (min)					
	Dam	Bee Creek	Massey Creek	Urannah Creek	Black Gin Creek	Grant Creek
F01 SDF Piping	-	30	100	155	195	245
F02 1pct Piping	-	30	105	180	205	240
F03 1pct MF	-	30	170	265	320	390
F04 DCF Piping	-	30	95	165	190	220
F05 DCF MF	-	30	150	235	285	345

Flood Event	Failure Mode	Total PAR			Dambreak PAR		
		Day	Night	Weighted #	Day	Night	Weighted #
Sunny Day *	Piping	0	0	0	0	0	0
1 in 100 AEP	No failure	4	4	4			
	Piping	5	4	4	0.5	0.0	0.2
	Spillway Failure	4	4	4	0.1	0.0	0.0
1 in 1,200 (DCF)	No failure	8	7	8			
	Piping	8	7	8	0.2	0.0	0.1
	Spillway Failure	8	7	8	0.0	0.0	0.0

Downstream notification area

The map on the next page indicates the downstream notification area for outflows from Eungella dam.



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

- AMTD (Markers)
- Eungella Dam FSL
- Limit of Downstream Notification Area

EUNGELLA DAM 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).

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DRAWING No. 250711 B

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Appendix B3: Inundation maps

Drawings:

- Key map
- 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. Please refer to the Local Disaster Management Plan for the most current information.

Document: S:\BW_Water\Resources\GIS_Data\SW_Bowen Broken WSS\EungellaDam_CRA2022\Drawings\ArcMap\256780-A.mxd
Printed: Monday, 05/12/2022 07:44:54 AM

600000 620000 640000 660000 680000

7700000 7680000 7660000

BOWEN RIVER
Bowen River Weir
HAVILAH
EMU PLAINS
EMU CREEK
BROKEN RIVER
ROSELLA CREEK
BOWEN DEVELOPMENTAL ROAD
KANGAROO CREEK
WHITSUNDAY REGIONAL COUNCIL
EXMOOR
SHEET 4 OF 11
SHEET 3 OF 11
SHEET 2 OF 11
SHEET 1 OF 11
URANNAH
WEETALABA
BYERWEN
REDCLIFFE VALE
BLENHEIM
LITTLE BOWEN RIVER
ISAAC REGIONAL COUNCIL
EASTERN CREEK
TURRAWALLA
NEWLANDS
EXEVALE
REE CREEK
EUNGELLA DAM
EUNGELLA
EUNGELLA DAM ROAD
MACKAY REGIONAL COUNCIL
BLOOMSBURY
O'CONNELL RIVER
YALBOROO
BRUCE HIGHWAY
CALEN
MOUNT OSSA
KUTTABUL
MIRANI - MT. OSSA ROAD
MACKAY - EUNGELLA ROAD
PINNACLE
PIONEER RIVER
MIRANI
Mirani Weir
KINCHANT DAM
TEEMBURRA DAM
GARGETT - MIA MIA ROAD
MIRANI - ETON ROAD
BLACKS CREEK
CERITO CREEK
COLLINSVILLE - ELPHINSTONE ROAD
WOLLOMBI
SUTTOR CREEK
GLENDEN

N W E S

LEGEND
- State Road (DTMR)
- Qld Rail Network
- Major Watercourse
- Minor Watercourse
- Built Up Area
- Qld Local Government Area
- Maximum Flood Event

Sunwater Storages
- Dam
- Weir
- Dam Reservoir

REVISION					
05/12/22	A	ISSUED FOR USE	LH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020), Zone 55.

DRAWING REFERENCE
256781 - Sunny Day Failure
256782 - Probable Maximum Flood

SCALES (A3 SIZE)
0 3 6 9 12 15 km 1:300,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	LH
APPROVED	
M.G. HUGHES 5/12/2022	RPEQ: 18351

sunwater

EUNGELLA DAM
DAM BREAK ANALYSIS 2022
INUNDATION PLANS
KEYMAP

CONTRACT NUMBER	
DRAWING NUMBER 256780	REV. A
SHEET 1 OF 1	
DATE DECEMBER 2022	

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

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Printed: Monday, 05/12/2022 07:46:36 AM

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

635,000 640,000 645,000 650,000

7,665,000

7,660,000

URANNAH ROAD
BARKER ROAD
ROAD
BEE CREEK ROAD
BEE CREEK
Bullock Creek
Furious Creek
Spider Creek
MOUNT BARKER ROAD
Blenheim Creek
EUNGELLA DAM
Dry Creek
DIGGINGS ROAD
Mt Barker Creek
LIZZIE CREEK ROAD
BROKEN RIVER
EUNGELLA DAM ROAD

65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 84 85 86 87 88 89 90 91

LEGEND

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

Flood Modelling

- Model Limits
- Sunny Day Failure

Sunwater Storages

- Dam
- Saddle Dam
- Weir
- Eungella Dam FSL

REVISION					
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DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.

REFERENCE DRAWINGS
256780 - Keymap

SCALES (A3 SIZE)
0 500 1,000 1,500 2,000 2,500 m
1:50,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	LH
APPROVED	
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EUNGELLA DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE (EMBANKMENT FAILURE) INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
256781	A
SHEET 1 OF 4	
DATE DECEMBER 2022	

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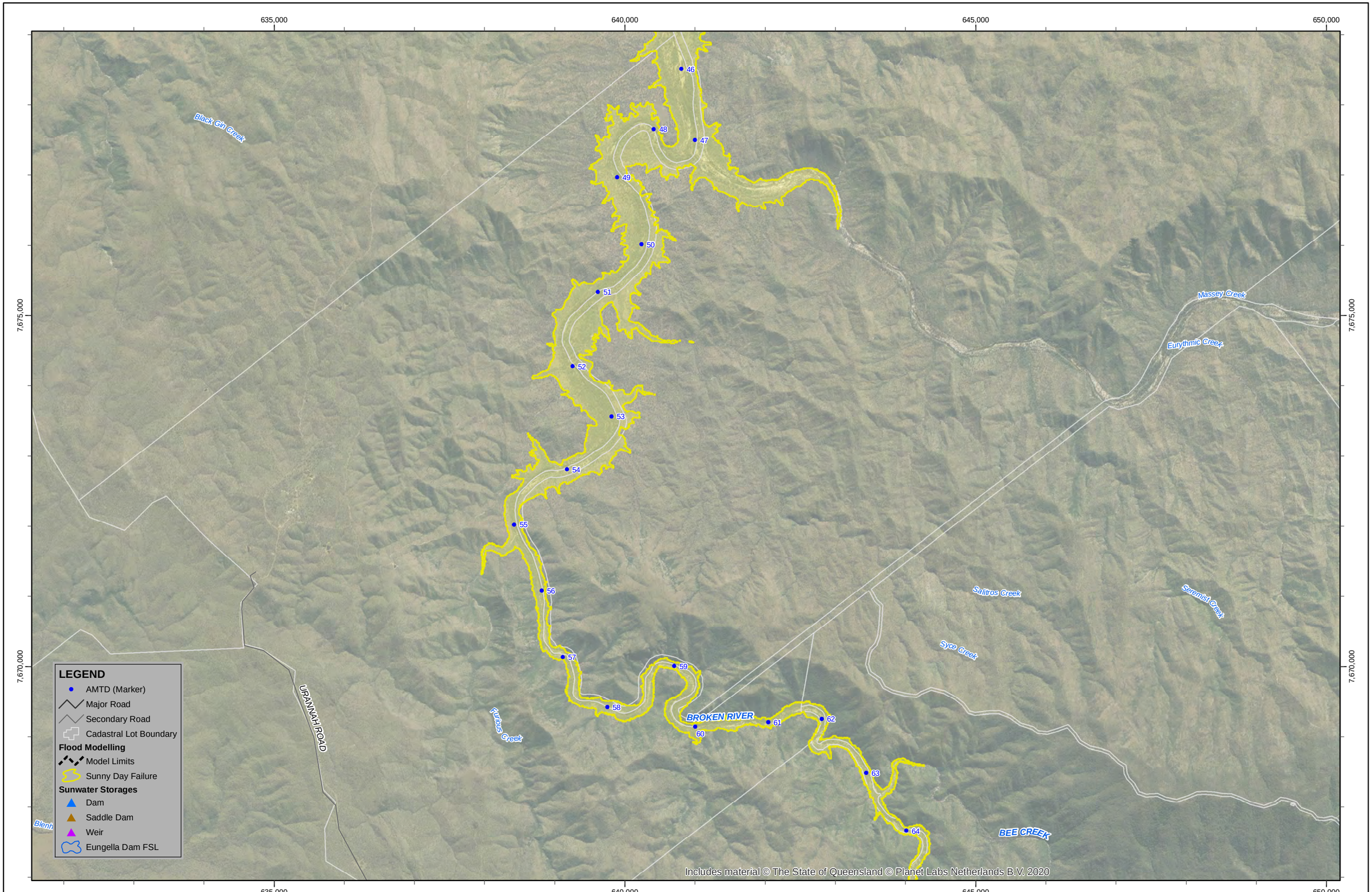

REVISION					
05/12/22	A	ISSUED FOR USE	LH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.

REFERENCE DRAWINGS
256780 - Keymap

SCALES (A3 SIZE)
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1:50,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	LH
APPROVED	
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ACN 131 034 985

EUNGELLA DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE (EMBANKMENT FAILURE) INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
256781	A

SHEET 2 OF 4
DATE DECEMBER 2022

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MAP PRODUCED BY:
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630,000 635,000 640,000 645,000

7,690,000 7,685,000 7,680,000

28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

BROKEN RIVER

Turn Back Creek

Black Gin Creek

Ernest Creek

Urannah Creek

Dicks Creek

Urannah

LEGEND

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

Flood Modelling

- Model Limits
- Sunny Day Failure

Sunwater Storages

- Dam
- Saddle Dam
- Weir
- Eungella Dam FSL

REVISION					
05/12/22	A	ISSUED FOR USE	LH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.

REFERENCE DRAWINGS
256780 - Keymap

SCALES (A3 SIZE)
0 500 1,000 1,500 2,000 2,500 m
1:50,000

DRAWN	DESIGNED
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CHECKED	CHECKED
	LH

APPROVED
M.G. HUGHES
5/12/2022
RPEQ: 18351

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EUNGELLA DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE (EMBANKMENT FAILURE) INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
256781	A

SHEET 3 OF 4

DATE DECEMBER 2022

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Map Produced By:
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Tel: (07) 3120 0000

620,000 625,000 630,000 635,000

7,700,000 7,695,000 7,690,000

EMU CREEK
BROKEN RIVER
Alice Creek
Grant Creek
Starvation Creek
Turn Back Creek
Trapp

9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

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

Flood Modelling
- Model Limits
- Sunny Day Failure

Sunwater Storages
- Dam
- Saddle Dam
- Weir
- Eungella Dam FSL

REVISION					
DATE		REMARKS	CKD	PSD	
05/12/22	A	ISSUED FOR USE	LH	MGH	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.

REFERENCE DRAWINGS
256780 - Keymap

SCALES (A3 SIZE)
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CHECKED	CHECKED
	LH
APPROVED	
M.G. HUGHES 5/12/2022	RPEQ: 18351

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EUNGELLA DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE (EMBANKMENT FAILURE) INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER 256781 | REV. A

SHEET 4 OF 4

DATE DECEMBER 2022

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

635,000 640,000 645,000 650,000

7,665,000

7,660,000

URANNAH ROAD
BARKER ROAD
ROAD
BEE CREEK ROAD
BEE CREEK
Bullock Creek
Furious Creek
Spider Creek
MOUNT BARKER ROAD
Blenheim Creek
EUNGELLA DAM
Dry Creek
DIGGINGS ROAD
Mt Barker Creek
LIZZIE CREEK ROAD
BROKEN RIVER
EUNGELLA DAM ROAD

65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 84 85 86 87 88 89 90 91

LEGEND

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

Flood Modeling

- PAR - No Dam Failure
- Additional PAR - Dam Failure
- Model Limits
- PMF - No Dam Failure
- PMF - Dam Failure

Sunwater Storages

- Dam
- Eungella Dam FSL

REVISION					
05/12/22	A	ISSUED FOR USE	LH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.

REFERENCE DRAWINGS
256780 - Keymap

SCALES (A3 SIZE)
0 500 1,000 1,500 2,000 2,500 m
1:50,000

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IDH	
CHECKED	CHECKED
	LH
APPROVED	
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EUNGELLA DAM
DAM BREAK ANALYSIS 2022
PROBALE MAXIMUM FLOOD (EMBANKMENT FAILURE) INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
256782	A
SHEET 1 OF 4	
DATE DECEMBER 2022	

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7,670,000

Black Gin Creek

URANNAH ROAD

Furious Creek

BROKEN RIVER

Massey Creek

Eurythmic Creek

Salitros Creek

Seremist Creek

Syce Creek

BEE CREEK

46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64

LEGEND

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

Flood Modeling

- PAR - No Dam Failure
- Additional PAR - Dam Failure
- Model Limits
- PMF - No Dam Failure
- PMF - Dam Failure

Sunwater Storages

- Dam
- Eungella Dam FSL

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

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DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.

REFERENCE DRAWINGS
256780 - Keymap

SCALES (A3 SIZE)
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1:50,000

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CHECKED	CHECKED
	LH
APPROVED	
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RPEQ: 18351	

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EUNGELLA DAM
DAM BREAK ANALYSIS 2022
PROBALE MAXIMUM FLOOD (EMBANKMENT FAILURE) INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
256782	A

SHEET 2 OF 4

DATE DECEMBER 2022

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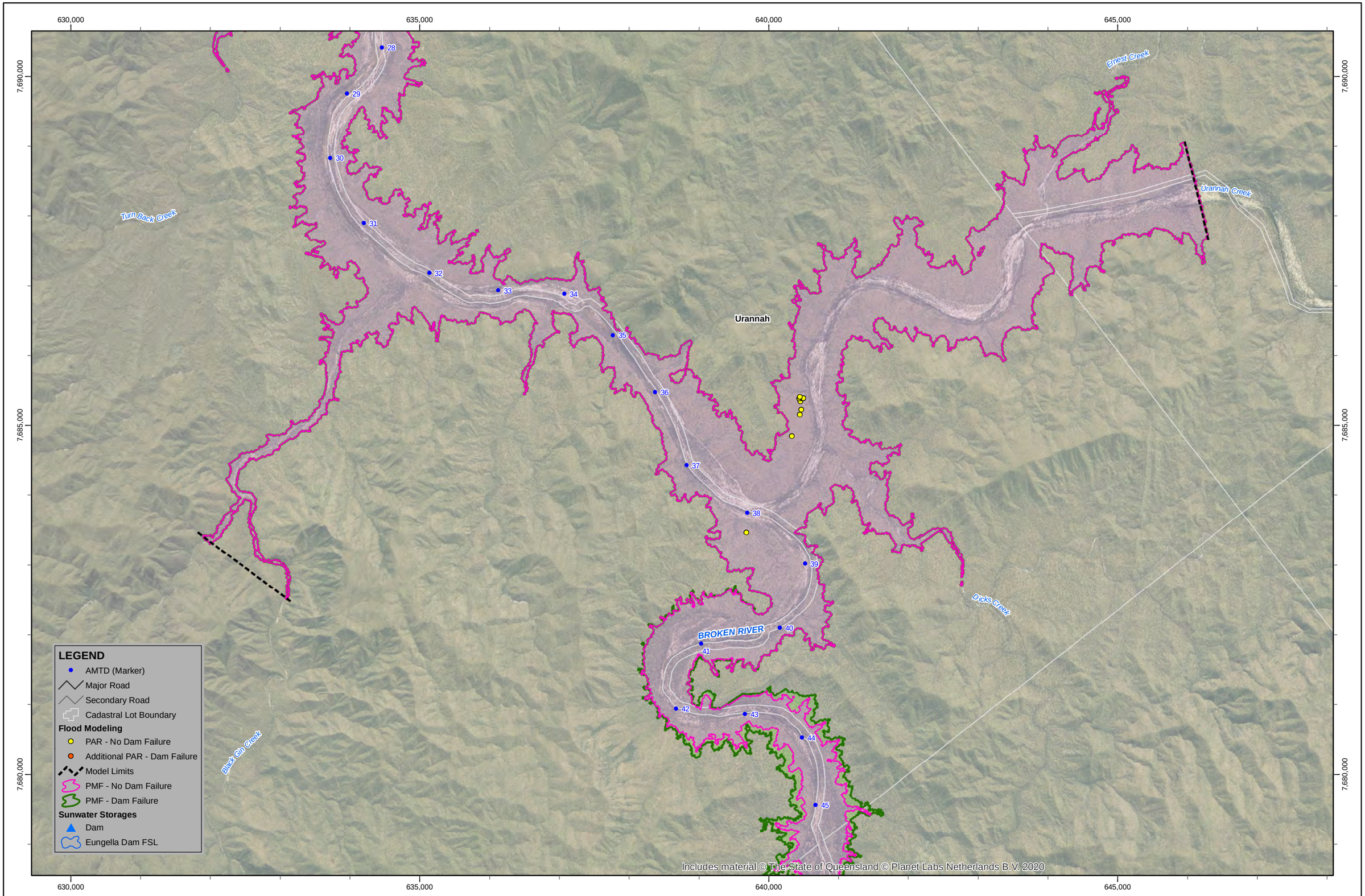

REVISION					
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DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.

REFERENCE DRAWINGS
256780 - Keymap

SCALES (A3 SIZE)
0 500 1,000 1,500 2,000 2,500 m
1:50,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	LH

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RPEQ: 18351

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EUNGELLA DAM
DAM BREAK ANALYSIS 2022
PROBALE MAXIMUM FLOOD (EMBANKMENT FAILURE) INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
256782	A
SHEET 3 OF 4	
DATE DECEMBER 2022	

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Map Produced By:
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Tel: (07) 3120 0000

620,000 625,000 630,000 635,000

7,700,000 7,695,000 7,690,000

EMU CREEK
BROKEN RIVER
Alice Creek
Grant Creek
Starvation Creek
Turn Back Creek
Trapi

9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

LEGEND

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

Flood Modeling

- PAR - No Dam Failure
- Additional PAR - Dam Failure
- Model Limits
- PMF - No Dam Failure
- PMF - Dam Failure

Sunwater Storages

- Dam
- Eungella Dam FSL

REVISION					
05/12/22	A	ISSUED FOR USE	LH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.

REFERENCE DRAWINGS
256780 - Keymap

N W E S

SCALES (A3 SIZE)
0 500 1,000 1,500 2,000 2,500 m
1:50,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	LH

APPROVED
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5/12/2022
RPEQ: 18351

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EUNGELLA DAM
DAM BREAK ANALYSIS 2022
PROBALE MAXIMUM FLOOD (EMBANKMENT FAILURE) INUNDATION PLAN

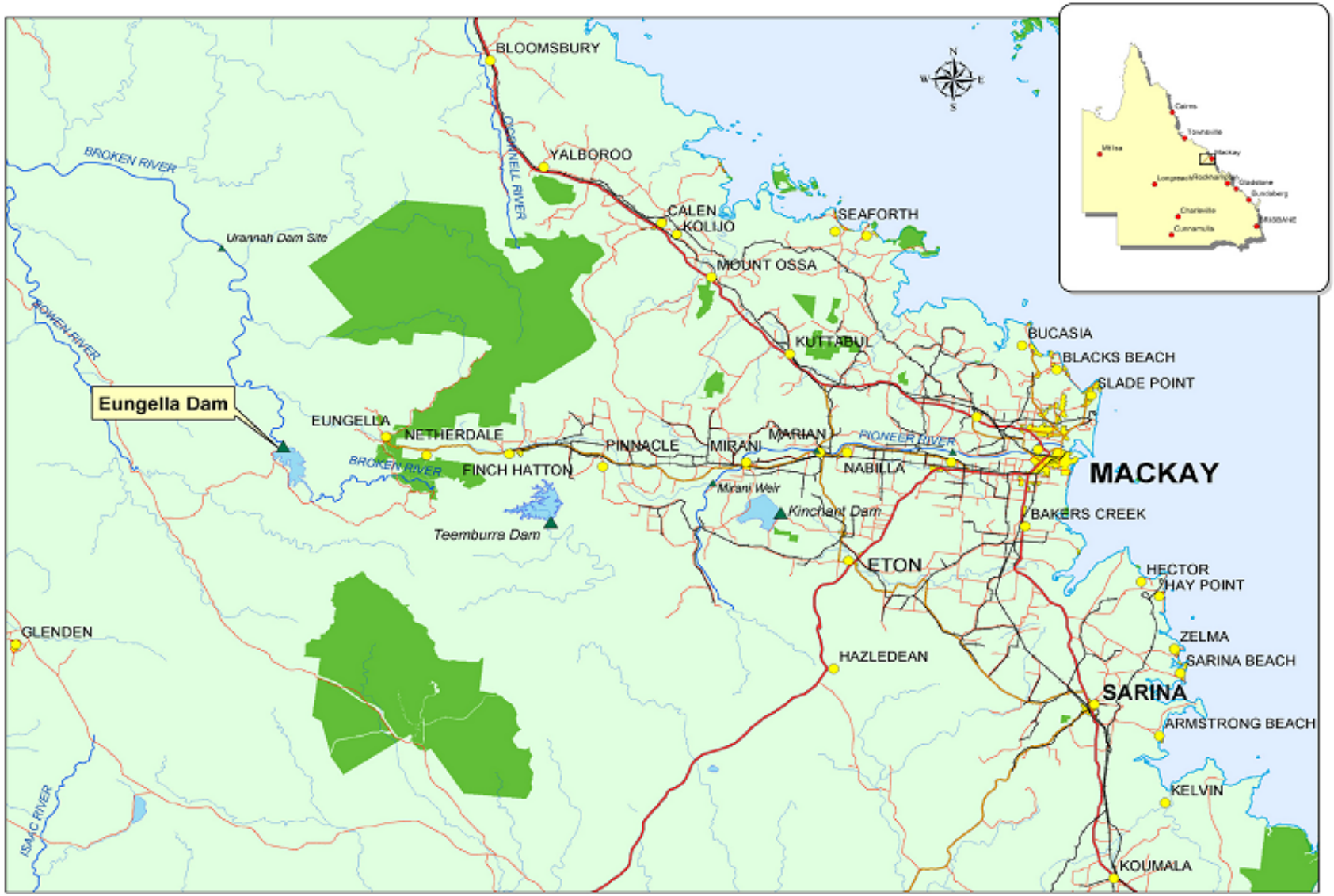
CONTRACT NUMBER

DRAWING NUMBER	REV.
256782	A

SHEET 4 OF 4
DATE DECEMBER 2022

Appendix B4: Locality plan

Figure B4: Eungella Dam locality plan



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Printed: Thursday, 22/10/2020 07:07:17 AM

MAP PRODUCED BY:
SUNWATER LTD
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148°22'0"E 148°24'0"E 148°26'0"E 148°28'0"E 148°30'0"E 148°32'0"E 148°34'0"E

21°8'0"S 21°10'0"S 21°12'0"S 21°14'0"S

120215A - BROKEN R AT EUNGELLA DAM TW

EUNGELLA DAM

120211A - BROKEN R AT EUNGELLA DAM HW

EUNGELLA DAM AL

EUNGELLA

EUNGELLA AL

NETHERDALE AL

MACKAY - EUNGELLA ROAD

DRY CREEK

BROKEN RIVER

100009A - CREDITON TBR

OLD RACECOURSE TM

SPRING CREEK

EUNGELLA DAM ROAD

RIDGELANDS AL

N W E S

LOCALITY PLAN

CAIRNS
TOWNSVILLE
MOUNT ISA
MACKAY
Map Extent
ROCKHAMPTON
BUNDABERG
BRISBANE

LEGEND

- Rainfall Station
- Rainfall & River Station
- River Station
- Town
- State Road (DTMR)

Sunwater Storage Infrastructure

- Sunwater Dam

sunwater

EUNGELLA DAM BROKEN RIVER CATCHMENT MAP

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

SCALES (A3 SIZE)
0 1 2 3 km 1:60,000

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

DRAWING No. 253508 A

APPENDIX C Equipment and technical information

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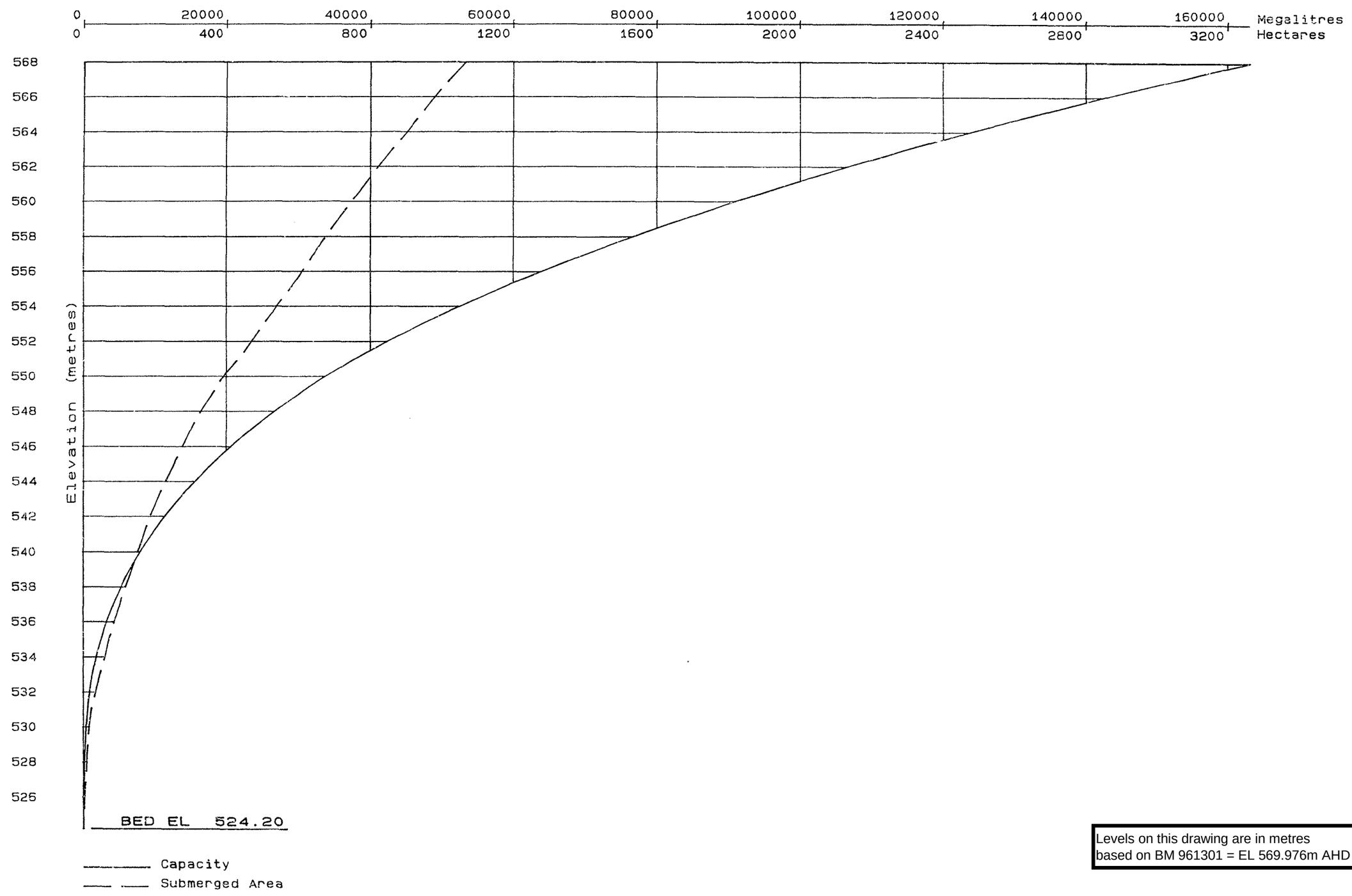


Levels on this drawing are in metres
based on BM 961301 = EL 569.976m AHD (Derived)

Level Datum: Australian Height Datum (AHD = State Datum +0.355 m)
BM961301 on Crest EL 569.976 m AHD
Computed from DTM produced from Oct 1957 photography & 1969 photography
Digital data & volumes computed to EL 580m AHD
Spillway Crest Level: EL 562.71 m AHD [112,476 ML ; 848 ha]
Catchment Area: 142 sq km
Latitude: 21 08 10 Longitude: 148 23 25

NATURAL RESOURCES

BROKEN RIVER - BASIN 120
EUNGELLA DAM - AMTD 71.8 km
TOTAL STORAGE

STORAGE CURVE

A3-205005

23/01/97

205005 (TIF)

EL (M)	AREA (HA)	VOLUME (ML)	
		TOTAL	COMM
580.00	1647	324782	
579.50	1621	316611	
579.00	1596	308570	
578.50	1570	300657	
578.00	1542	292876	
577.50	1516	285232	
577.00	1490	277718	
576.50	1465	270330	
576.00	1441	263065	
575.50	1417	255922	
575.00	1393	248900	
574.50	1369	241997	
574.00	1345	235211	
573.50	1322	228544	
573.00	1298	221996	
572.50	1274	215567	
572.00	1251	209254	
571.50	1227	203058	
571.00	1204	196981	
570.50	1181	191019	
570.00	1158	185173	
569.50	1134	179445	
569.00	1110	173835	
568.50	1087	168342	
568.00	1065	162962	
567.50	1043	157693	
567.00	1021	152536	
566.50	1000	147485	
566.00	979	142539	
565.50	958	137697	
565.00	939	132952	
564.50	920	128305	
564.00	900	123756	
563.50	880	119304	
563.00	860	114953	
562.50	841	110701	
562.00	821	106548	
561.50	802	102493	
561.00	784	98530	
560.50	765	94658	
560.00	747	90878	
559.50	728	87190	
559.00	711	83593	
558.50	693	80085	
558.00	676	75663	
557.50	658	73328	
557.00	641	70080	
556.50	625	66915	
556.00	608	63833	
555.50	591	60834	

EL (M)	AREA (HA)	VOLUME (ML)	
		TOTAL	COMM
555.00	574	57920	
554.50	555	55100	
554.00	537	52370	
553.50	520	49728	
553.00	502	47173	
552.50	485	44704	
552.00	468	42320	
551.50	451	40023	
551.00	432	37814	
550.50	410	35707	
550.00	391	33707	
549.50	374	31795	
549.00	358	29963	
548.50	342	28212	
548.00	326	26542	
547.50	312	24948	
547.00	300	23420	
546.50	288	21951	
546.00	275	20541	
545.50	265	19188	
545.00	253	17894	
544.50	241	16658	
544.00	230	15482	
543.50	218	14361	
543.00	207	13297	
542.50	197	12286	
542.00	186	11330	
541.50	177	10422	
541.00	169	9555	
540.50	161	8730	
540.00	152	7948	
539.50	144	7206	
539.00	136	6504	
538.50	127	5845	
538.00	118	5233	
537.50	109	4667	
537.00	100	4146	
536.50	93	3663	
536.00	85	3218	
535.50	78	2810	
535.00	71	2437	
534.50	65	2096	
534.00	59	1784	
533.50	53	1504	
533.00	46	1256	
532.50	40	1041	
532.00	34	857	
531.50	28	703	
531.00	22	580	
530.50	18	480	

EL (M)	AREA (HA)	VOLUME (ML)	
		TOTAL	COMM
530.00	16	395	
529.50	14	320	
529.00	12	256	
528.50	11	199	
528.00	9	150	
527.50	8	109	
527.00	6	74	
526.50	5	46	
526.00	4	25	
525.50	2	12	
525.00	1	3	
524.50	0	0	

Levels on this drawing are in metres
based on BM 961301 = EL 569.976m AHD (Derived)

Level Datum: Australian Height Datum (AHD = State Datum +0.355 m)
BM961301 on Crest EL 569.976 m AHD
Computed from DTM produced from, Oct 1957 photography & 1969 photography
Digital data & volumes computed to EL 580m AHD
Spillway Crest Level: EL 562.71 m AHD [112,476 ML ; 848 ha]
Catchment Area: 142 sq km
Latitude: 21 08 10 Longitude: 148 23 25

NATURAL RESOURCES

BROKEN RIVER - BASIN 120
EUNGELLA DAM - AMTD 71.8 km
TOTAL STORAGE

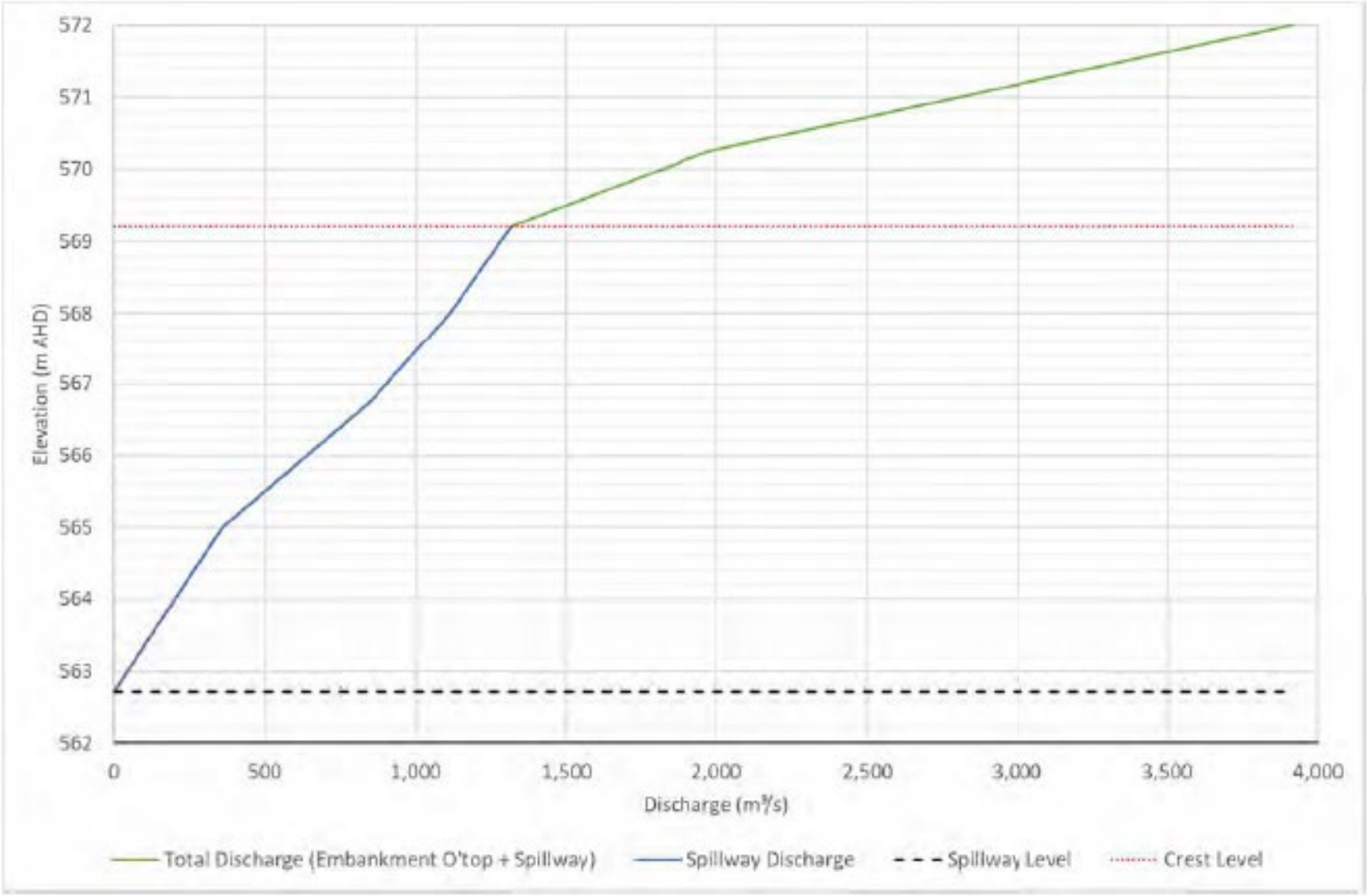
STORAGE DATA

A3-205006

23/01/97

205006 (TIF)

Appendix C4: Eungella Dam discharge curve



Appendix D Interaction with local government and district groups

To be populated when EAP next completes a substantive review

Annexe — Eungella Dam SMS Messages

	Advice Stay informed	**Watch and Act** Prepare to leave	**Emergency** Leave immediately To be issued in consultation with council
SMS	ADVICE from Sunwater. Eungella Dam is spilling excess water into Broken River. People downstream of Eungella Dam should STAY INFORMED and MONITOR CONDITIONS. Water flows from Eungella Dam expected to remain within beds and banks of river / may contribute to widespread / localised / overland flooding. Expect increased river flows in 6-12 hours / later today / overnight / tomorrow. There is no immediate danger. More information here: bit.ly/RecandSafety	FLOOD WATCH AND ACT from Sunwater. Excess water spilling from Eungella Dam into Broken River has increased significantly. Water flows from Eungella Dam may contribute to dangerous / widespread flooding downstream. Expect increased river flows in 6-12 hours / later today / overnight / tomorrow. People downstream of Eungella Dam must PREPARE TO LEAVE in case the flood gets worse. Call Triple Zero (000) if your life is in danger. Call the SES on 132500 for flood help. More information here: bit.ly/RecandSafety	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Eungella Dam must LEAVE IMMEDIATELY. Eungella Dam possible failure / is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. More information here: Mackay Regional Council http://disaster.mackay.qld.gov.au/ and Whitsunday Regional Council http://disaster.whitsundayrc.qld.gov.au/

Annexe — Eungella AWS warning levels mapping

EAP flood activation trigger	EAP trigger summary	Current EAP message (SMS)	AWS-aligned message (SMS)	AWS warning level
ALERT	EL 562.61m and rising (preparedness)	SUNWATER NOTIFICATION. Eungella Dam; spillway discharge likely due to rain in the catchment. Review your emergency plan. Refer www.sunwater.com.au for more details.	ADVICE from Sunwater. Eungella Dam is spilling excess water into Broken River. People downstream of Broken River should STAY INFORMED and MONITOR CONDITIONS. Water flows from Eungella Dam expected to remain within beds and banks of river / may contribute to widespread/ localised/ overland flooding. Expect increased river flows in 6-12 hours / later today/ overnight/ tomorrow. There is no immediate danger. More information here: bit.ly/RecandSafety	ADVICE
LEAN FORWARD (not spilling)	Storage level above FSL 562.71m	SUNWATER NOTIFICATION. Eungella Dam; now spilling excess water due to rain in the catchment. Avoid potential safety hazards downstream. Refer www.sunwater.com.au for more details.		
LEAN FORWARD (spilling)				
STAND UP 1 Greater than flood of record Align with council Only relevant to 10km	Storage above EL 566.04m	SUNWATER NOTIFICATION. Eungella Dam continues to spill due to continuing rain in the catchment. Review your emergency plan and stay alert for further advice. Refer www.sunwater.com.au for more details.	FLOOD WATCH AND ACT from Sunwater. Excess water spilling from Eungella Dam into the Broken River has increased significantly. Water flows from Eungella Dam may contribute to dangerous/widespread flooding downstream. Expect increased river flows in 6-12 hours / later today/ overnight/ tomorrow. People downstream of Eungella Dam must PREPARE TO LEAVE in case the flood gets worse. Call Triple Zero (000) if your life is in danger. Call the SES on 132500 for flood help. More information here: bit.ly/RecandSafety	WATCH AND ACT
STAND UP 2	Storage above EL 569.21m (overtopping of crest) Dam failure possible but not in progress	POSSIBLE FAILURE OF EUNGELLA DAM TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. DOWNSTREAM OF BROKEN RIVER IS AT RISK. INFO ON ABC RADIO. EUNGELLA VILLAGE IS SAFE	FLOOD EMERGENCY WARNING from Sunwater. People downstream of Eungella Dam must LEAVE IMMEDIATELY. Eungella Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. More information here: Mackay Regional Council disaster.mackay.qld.gov.au/ and Whitsunday Regional Council disaster.whitsundayrc.qld.gov.au/	EMERGENCY
STAND UP 3	Dam failure in progress	EUNGELLA DAM FAILING TAKE ACTION TO PROTECT LIFE AND LEAVE NOW. DOWNSTREAM OF BROKEN RIVER IS AT RISK. INFO ON ABC RADIO. EUNGELLA VILLAGE IS SAFE		
STAND DOWN	Storage level EL 563.00m and falling, no more rain observed in prior 12 hours	Sunwater Notification: Eungella Dam Emergency Action Plan stood down but dam still spilling. Refer to www.sunwater.com.au for more details.	n/a	ADVICE