

EMERGENCY ACTION PLAN — ISIS BALANCING STORAGE (ID 2233)

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Prepared by **Sunwater Limited**

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Type: Earth-fill embankment

Project: Isis Balancing Storage EAP

File no.: 08-000368/001

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Approved by the delegate of the Chief Executive, Department of Regional Development, Manufacturing and Water until 1 April 2028.
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Emergency activation quick reference

The Emergency Action Plan (EAP) for Isis Balancing Storage covers dam hazards evaluated within Sunwater's Dam Safety Management Program.

Use the following table to select the relevant section of the EAP that deals with the dam hazard. **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.**

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.

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 64.10m and rising	• Storage above EL 64.30m	• Storage above EL 64.53m	• Storage level EL 64.30m and falling with no forecast increase in EL
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



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



Emergency activation quick reference – Other Emergency Situations

The EAP for Isis Balancing Storage covers one other emergency situation evaluated within Sunwater’s Dam Safety Management Program. Use the following table to select the relevant section of the EAP that deals with the other emergency situation. **Note: The Incident Coordinator (IC) is responsible for activating the EAP unless otherwise directed by the FODM or DSTDM.** 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.

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)
	<ul style="list-style-type: none"> Site managed (DDO – becomes LEC) 	<ul style="list-style-type: none"> Brisbane managed by Incident Coordinator (IC) 	<ul style="list-style-type: none"> Locally managed by Local Event Coordinator (LEC)
Activation triggers for other emergency situations			
Comms Failure See section 9	<ul style="list-style-type: none"> Unable to communicate to or from dam site 	<ul style="list-style-type: none"> Unable to communicate to or from local area 	<ul style="list-style-type: none"> Unable to communicate to or from Sunwater Brisbane



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



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Document control

Authorisation of document

Name	Position/role	Signature	Date
	EAP Program Lead — Prepared for submission		24/09/2024

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Document revision history

Issue	Date	Prepared by	Reason for change	Ref no.
1	March 2008		Significant changes of Isis Balancing Storage Emergency Action Plan to reflect Sunwater Management structure and other minor changes.	HB # 728228
2			Created but not issued—will be issued as Issue 3 consistent with all EAPs to be issued in 2011.	
3			Significant changes to all sections of Isis Balancing Storage Emergency Action Plan to reflect Sunwater Management structure and other changes.	HB # 1060413
4	March 2015		New Emergency Action Plan developed at expiry of 3E approval. Issued for consultation with Relevant Disaster Management Groups.	HB # 1738319
5	October 2016		Contact details updated and Emergency alert polygon updated.	HB # 2036687
6	October 2017		New Emergency Action Plan with minor amendments including contact list updates.	HB # 2103677
7	July 2018		Revised and reviewed Emergency Action Plan developed at expiry of approval. Also includes updates that reflect the Water Legislation (Dam Safety) Amendment Act 2017, implementation of changes to Sunwater management structure, new event management roles and addition of new Emergency Activation section (Other Emergency Situations).	HB # 2103677
8	December 2018		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	HB # 2367589
8.1	September 2019		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	HB # 2471374
8.2	September 2020		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	HB # 2571778
8.3	September 2021		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes such as removing Comprehensive Risk Assessments description (2.9) and simplifying FODM role in Activation triggers (5.2.1) including removing para 5.2.2.	HB # 2652939

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Issue	Date	Prepared by	Reason for change	Ref no.
8.4	September 2022		Amended contacts and associated sections. Minor error corrections and other non-substantive changes. The Chemical Hazard section has been removed as it is not a Dam Safety Hazard and is dealt with in other more relevant documents.	HB # 2725949
9.0	March 2023		Addition of visual inspection to Lean forward actions in Table 5. Updated EA alert request message in Appendix A7. Fatigue Management Procedure section added as section 2.6. Added SOP 12 to Section 1 References, abbreviations and definitions. Deleted HMT page saver. Minor error corrections and improvements to readability.	eDOCS # 2743889
10.0	August 2023		Amendments to dam details in section 3 due to latest CRA, including specifications and PAR. Updates to Activation trigger for flood operations in section 5, along with flood of record. Updates to maps in Appendix B. Updated EA alert request message in Appendix A7.	#2804353
10.1	September 2024		Wet season preparedness – contacts update	#2865419

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Controlled document distribution list

Copy no.	Position	Location
1.	Operator Maintainer	Sunwater, Bundaberg
2.	General Manager, Burnett & Lower Mary	Sunwater, Bundaberg
3.	Emergency Action Plan Coordinator	Sunwater, Brisbane
4.	Local Disaster Coordinator—Local Disaster Management Group (LDMG)	Bundaberg Regional Council

Note: Communication information for each 'Controlled Copy Holder' is attached in Appendix A.

Electronic document distribution list

Printed electronic copies are considered uncontrolled copies.

Position	Location
Executive Officer—Bundaberg District Disaster Management Group (DDMG)	Police, Bundaberg
Emergency Management Coordinator	Queensland Police Service, Maryborough
Senior Flood Forecaster	Bureau of Meteorology, Brisbane

Note: Communication information for each 'Electronic Copy Holder' is in Appendix A.

1. References, abbreviations, and definitions

1.1 References/associated documents

Ref.	Document title	Reference/Location
A	Sunwater (internal) Strategic Event Procedure	Strategic Event Procedure
B	Sunwater (internal) Isis Balancing Storage Operation and Maintenance Manual	Isis Balancing Storage O&M Manual
C	Sunwater (internal) Isis Balancing Storage Safety Condition Schedule	eDOCS# 1740570
D	Queensland Disaster Management Guidelines	https://www.disaster.qld.gov.au/dmg/Pages/DM-Guideline.aspx
E	Queensland Rainfall and River Conditions (Flood Warning)	http://www.bom.gov.au/qld/flood/index.shtml?ref=hdr
F	Sunwater (internal) Emergency Alert Protocol	eDOCS# 2156253
G	Isis Balancing Storage Comprehensive Risk Assessment (CRA) August 2022	eDOCS # 2720014
H	Sunwater (internal) Fatigue Management Procedure	Fatigue Management Procedure
I	Sunwater (internal) Standing Operating Procedure (SOP) 12 – Dam Logbooks	SOP12 Dam Log Books
J	Professional Engineers Act 2002 (Qld)	Professional Engineers Act 2002
K	Water Supply (Safety and Reliability) Act 2008 (Qld)	Water Supply (Safety and Reliability) Act 2008
L	Disaster Management Act 2003 (Qld)	Disaster Management Act 2003
M	Isis Balancing Storage Failure Impact Assessment (FIA) 2017	eDocs # 2175663

1.2 Abbreviations and acronyms

ABC	Australian Broadcasting Corporation	ORR	Owner's Regional Representative
AEP	Annual Exceedance Probability	PAR	Population at Risk
AHD	Australian Height Datum	PDSE	Principal Dam Safety Engineer
AMTD	Adopted Mean Thread Distance	PFRM	Predictive Flood Routing Model
ANCOLD	Australian National Committee on Large Dams	PLL	Probable Loss of Life
		PMF	Probable Maximum Flood
AWS	Australian Warning System	PMP	Probable Maximum Precipitation
BOM	Bureau of Meteorology	PMPF	Probable Maximum Precipitation Flood
CED	Chief Engineer Dams	PWRE	Principal Water Resources Engineer
CEO	Chief Executive Officer	QDMC	Queensland Disaster Management Committee
CRA	Comprehensive Risk Assessment		
CTG	Counter Terrorism Group	QFD	Queensland Fire Department
D/S	Downstream	QPS	Queensland Police Service
DCF	Dam Crest Flood	RB	Right Bank
DCL	Dam Crest Level	RC	Regional Council
DDC	District Disaster Coordinator	RCC	Roller Compacted Concrete
DDMG	District Disaster Management Group	RDMW	Department of Regional Development, Manufacturing and Water
DDMP	District Disaster Management Plan		
DDO	Dam Duty Officer	ROC	Regional Operations Centre
DDS	Director Dam Safety	RPEQ	Registered Professional Engineer of Queensland
DSR	Dam Safety Regulator		
DSSC	Dam Safety Surveillance Coordinator	RSL	Reduced Supply Level
DSTDM	Dam Safety Technical Decision Maker	SCED	Senior Civil Engineer Dams
EAP	Emergency Action Plan	SCTN	Security and Counter Terrorism Network
EA	Emergency Alert	SDCC	State Disaster Coordination Centre
EER	Emergency Event Report	SDF	Sunny Day Failure
EGMO	Executive General Manager Operations	SDTE	Senior Dam Technical Engineer
EGME&WR	Executive General Manager Engineering & Water Resources	SES	State Emergency Service
		SMS	Short Message Service
EL	Elevation Level	SMT	Sunwater Media Team
FCL	Fixed Crest Level	SO	Standby Operator
FODM	Flood Operations Decision Maker	SOP	Standing Operating Procedure
FSL	Full Supply Level	SRT	Strategic Response Team
GM	General Manager	SS	Storage Supervisor
IC	Incident Coordinator	SWL	Storage Water Level
IFHC	Incremental Flood Hazard Category	SWRE	Senior Water Resources Engineer
IGEM	Inspector-General Emergency Management	U/S	Upstream
		WHS	Workplace Health & Safety
LB	Left Bank	WQ	Water Quality
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		

1.3 Business terms and definitions

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

Term	Definition
Terms set out in section 352A of the <i>Water Supply (Safety and Reliability) Act 2008</i> (Qld, ref K)	
Dam hazard	Means a reasonably foreseeable situation or condition that may: <ul style="list-style-type: none"> • 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 <i>dam hazard</i> if: <ul style="list-style-type: none"> • 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 (ref L).
District group (District Disaster Management Group)	For an emergency action plan (EAP), means a district group established under the Disaster Management Act (ref L), section 22 whose disaster district under that Act could, under the plan, be affected by a <i>dam hazard</i> .
Emergency event	Means an event arising from a <i>dam hazard</i> if: <ul style="list-style-type: none"> • persons or property may be harmed because of the event, AND • any of the following apply: <ul style="list-style-type: none"> ○ a coordinated response, involving 2 or more of the following <i>relevant entities</i>, is likely to be required; each <i>local group</i> and <i>district group</i> 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 (ref L), 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	<p>A dam, or a proposed dam after its construction, will be a referable dam if:</p> <ul style="list-style-type: none"> • 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. <p>Also, a dam is a referable dam if:</p> <ul style="list-style-type: none"> • 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	<p>Means each of the following under the EAP for the dam:</p> <ul style="list-style-type: none"> • the persons who may be affected, or whose property may be affected, if a dam hazard event or emergency event were to happen for the dam, e.g. the owners of parcels of farmland adjacent to the dam or residents of a township • each local group and district group for the EAP • each local government whose local government area may be affected if a dam hazard event or emergency event were to happen • the Chief Executive • another entity the owner of the dam considers appropriate e.g., the Queensland Police Service.
Terms consistent with Queensland Disaster Management Arrangements:	
Activation levels	<p>The four levels of EAP activation are:</p> <ul style="list-style-type: none"> • Alert: A heightened level of vigilance due to the possibility of an event occurring. No further action may be required; however, the situation should be monitored by someone capable of assessing the potential of the threat. Moving to an Alert level indicates the dam owner is getting ready to activate the Lean Forward level of the EAP if the situation deteriorates. • Lean Forward: An operational state characterised by a heightened level of situational awareness of an impending disaster event and a state of operational readiness. • Stand Up: The operational state where resources are mobilised, personnel are activated, and operational activities commenced. The dam owner needs to provide an Emergency Event Report (EER) in accordance with the provision of the Act. • Stand Down: Transition from responding to an event back to normal core business and/or continuance of recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present. <p>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.</p> <p>Triggering one of these levels of activation may not necessarily mean a similar activation of LDMGs, DDMGs or Disaster Coordination Centres.</p>

Term	Definition
Bureau of Meteorology flood level classifications	<p>The three levels of flooding are:</p> <ul style="list-style-type: none"> • 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 failure	<p>Dam crest flood is when failure occurs during a flood event with the water level at the crest of the non-overflow section of the dam embankment:</p> <ul style="list-style-type: none"> • for an embankment dam, is the lowest point of the embankment crest • for a concrete dam, is the level of the non-overflow section of the dam, excluding handrails and parapets if they do not store water against them • for a concrete faced rockfill dam, is the lowest point of the crest structure.
Dam failure	Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.
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	<p>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:</p> <ul style="list-style-type: none"> • 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 (additional structures such as spillways) 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	Probable maximum flood is the flood resulting from probable maximum precipitation coupled with the worst catchment conditions that can be realistically expected.

Term	Definition
Probable maximum precipitation	Probable maximum precipitation is the theoretical greatest depth of precipitation physically possible based on generalised methods.
Probable maximum precipitation flood	Probable maximum precipitation flood is the flood resulting from probable maximum precipitation coupled with standard catchment conditions that can be expected.
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 situation might develop and progress. Factors such as the weather, the location, the mechanics, and the rate and size of any actual failure can considerably affect any resulting flood discharges. Therefore, a significant number of assumptions have had to be made in compiling sections of the EAP. Some variation in outcome should be expected where the event differs from the assumed behaviour.

2. Introduction

2.1 Context

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

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

Summary of legal requirements – Section 352H

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

1. identify the area likely to be affected by a dam hazard event or emergency event arising from the dam hazard; and
2. identify each circumstance that indicates a material increase in the likelihood of the dam hazard event or emergency event happening; and
3. state when and how the owner of the dam plans to warn persons who may be harmed, or whose property may be harmed by an event caused by the dam hazard, if one happens, and/or there is a material increase in the likelihood of an occurrence, including the order of priority in which the persons or categories of persons are to be warned; and
4. state when and how the owner plans to notify the relevant entities for the dam, if a dam hazard event or emergency event happens or, there is a material increase in the likelihood of such an occurrence, including the order of priority in which the relevant entities are to be notified; and
5. state the actions the owner of the dam plans to take in response to a dam hazard event or emergency event.

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

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

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

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

The local government whose area may be affected by a dam hazard for Isis Balancing Storage has been assessed as **Bundaberg Regional Council (BRC)**. Sunwater has provided the BRC 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 Isis Balancing Storage is **Bundaberg Police District Disaster Management Group (DDMG)**. Sunwater has provided the DDMG with a copy of the draft EAP for review.

2.2 Purpose

The purpose of this EAP is:

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

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

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

2.3 Scope

The Isis Balancing Storage EAP covers:

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

2.4 Sunwater provides training

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

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

The EAP training that is carried out on site include walkthroughs of new changes, scenario (role play) and Q & A to check the knowledge and competency of all those who attended. The training is presented to relevant Sunwater staff (DDOs, LEC and ICs) and disaster management stakeholders. The Dam Safety Technical Decision Maker (DSTDM) information sessions are carried out once a year with the same walkthrough of new changes and Q & A (but not specific to any one dam). New Sunwater employees in these various roles have a walkthrough of the EAP.

Sunwater works towards carrying out a full test once annually involving each local government and LDMG. Where there is more than one referable dam in a local area, the exercise could involve more than one dam, or the location will be rotated. This full test would involve the SDCC and include the (non-live) testing of emergency alerts.

2.5 Principles used in developing this EAP

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

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

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

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

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

During a flood event, the LDMG in the Bundaberg area will take the lead role in notifying all relevant persons. Sunwater will support the LDMG by undertaking the following actions to ensure the community is informed as soon as possible:

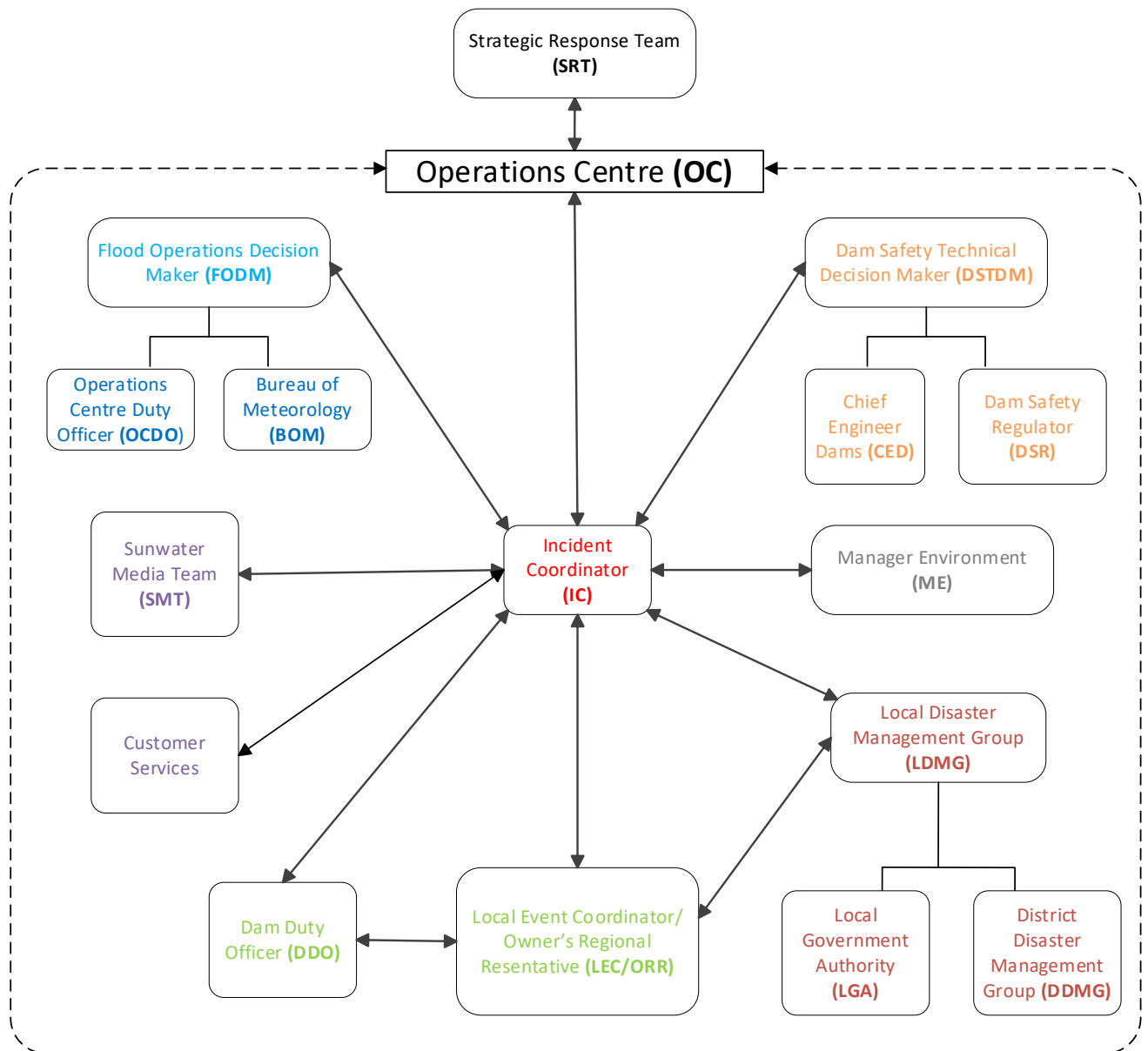
- maintain an up-to-date list of immediate D/S residents of Isis Balancing Storage. The downstream limit is shown in the plan in Appendix B2 by the zone labelled *Limit of downstream notification area*
- provide the LDMG with a copy of the list of residents (immediately D/S) annually for inclusion in the LDMG's SMS alert system
- provide timely advice to the LDMG

Sunwater will aim to inform and support the Bundaberg DDMG.

2.5.1 Dam emergency organisation within Sunwater

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

Figure 1: Sunwater emergency response organisation



Key aspects of the emergency management framework are:

- Central to the framework is the role of 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 Flood Operations Decision Maker (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 Operations Centre (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 (ref J).

2.6 Fatigue Management Plan

Sunwater has a Fatigue Management Procedure (ref H). 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.

2.7 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.

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 Isis Balancing Storage are also provided information in text message/phone calls in the event of an activation of this EAP.

In the event of a dam failure or when required, Sunwater also have the use of the National Emergency Alert System to send a voice message and SMS. This service is provided by Telstra and is managed by the State Disaster Coordination Centre (SDCC) and the process Sunwater follows is documented in Appendix A7.

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

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

2.8 Lessons learnt

Sunwater carries out Lessons Learnt workshops as part of its post event management. These Lessons Learnt can result in changes to the EAP. These are captured and if applicable to this document, are implemented at the earliest opportunity and are made available in the next EAP update to the Regulator as part of Sunwater's continual improvement of its EAPs. The Lessons Learnt actions if relevant are provided to stakeholders, such as the LDMGs, DDMGs, other dam owners and RDMW as appropriate.

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

2.9 Downstream notification lists

Sunwater has compiled the notification lists through an iterative process. At least every 5 years, Sunwater writes to all lot on plan landholders that are impacted in the downstream zones. In addition to individual letters, advertisements are placed yearly in local papers to capture any new residents in the areas. All year, 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: Isis Balancing Storage is located at an unnamed tributary of Elliot River. The storage is located approximately 20 km south-west of Bundaberg.

Catchment: Isis Balancing Storage has a catchment area of 12.8 km².

Storage Capacity: The storage capacity at FSL is 6,160 ML (at maximum operating level).

Construction: The storage was completed in 1986 and is used to provide irrigation water to farmers on the Isis channel system.

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

Table 2: Isis Balancing Storage specifications

Description	Specification
Dam type	Earth-fill embankment
Full Supply Level (FSL)	EL 64.20 m
Max. operating level (MOL)	EL 64.00 m
Embankment crest level	EL 65.75 m (Design) EL 66.02 m (2015 Survey)
Embankment crest length	721 m
Embankment crest width	6.0 m
Built height (above lowest bed)	14.2 m
Historical recorded max storage—Jan 2022	EL 64.53 m (first-filling conditions will apply above this level*)
Storage Capacity	6,160 ML (at MOL) 6,440 ML (at FSL)
Reservoir surface area	167 ha (at FSL)
Dam Crest Level Flood (DCF)	1 in 10,000,000 AEP (CRA 2022, ref G)
Emergency spillway	
Spillway type	Ungated broad crested weir control structure
Spillway crest level	EL 64.2m
Spillway crest width	200 m
DCF spillway capacity	453 m ³ /s (CRA 2022, ref G)
Maximum spillway depth at DCF	1.82 m
Outlet works	Outlet control structure at CH 9652m discharging to Isis main channel and outlet to channel IS2 at CH 50m
Isis main channel outlet	Outlet consists of an intake structure, regulator gate, and stilling basin
Channel IS2 outlet	Intake structure fitted with a 675 dia. batescrew slide gate and 675 mm RC delivery pipe

All levels are to Australian Height Datum (AHD).

Conversion for Dam is AHD = ((State Datum in feet x 0.348) + 0.303) m

* First-filling conditions are when the storage level is above the historical maximum and is rising at a rate of rise equal to or greater than 300 mm/day. The dam should be inspected at 4-hourly intervals.

3.2 Population at risk

Isis Balancing Storage is considered a Category 1 referable dam as defined under the Water Supply (Safety and Reliability) Act 2008 (ref K) (i.e. incremental population at risk of between 2 and 100 people). The 2017 Failure Impact Assessment (FIA, ref M) is the currently adopted assessment which shows an incremental population at risk (PAR) of 4 (total PAR 24) for the PMF scenario.

A difference was identified between the 2017 FIA (ref M) and the 2022 comprehensive risk assessment (CRA, ref G) in relation to the number of identified PAR. The 2022 CRA indicated that there was no incremental PAR for all dam failure scenarios assessed in contrast to the 2017 FIA that determined there are 4 incremental PAR. This discrepancy is due to a difference in downstream coincident flooding assumptions between the two assessments, with the 2017 FIA being the more conservative of the two.

A revised FIA is currently in progress to confirm the total and incremental PAR for Isis Balancing Storage. Until a revised FIA study is available, the 2017 FIA maps will be included in this EAP as it provides a higher incremental PAR estimate and is considered the more conservative investigation in this regard. The 2017 FIA data will also continue to be used to inform the Emergency Alert notification area and downstream notification area maps.

3.3 General Arrangement

The general arrangement drawing is in Figure B1.

3.4 Emergency inspections and monitoring

The Isis Balancing Storage has been designed to conform to modern design standards, so that its failure is highly unlikely. To maintain the dam in a safe condition and detect any dam hazards, as soon as it begins to develop, or becomes apparent, the following is applicable to Isis Balancing Storage.

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 5-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 Isis Balancing Storage.

- **Settlement/movement measurement**
 - 7 surface points located along the crest of the embankment—see Figure B2.
- **Piezometers**
 - 3 Standpipe Piezometers (BH01/P1, BH02/P2, BH03/P3)
 - 5 Vibrating Wire Piezometers BH04/57.37, BH04/53.07, BH04/45.87, BH05/54.25, BH06/49.30.

The 3 Standpipe Piezometers and the 5 Vibrating Wire Piezometers were installed in 2018 and are shown in Figure B1.

- **Monitoring**
 - Rainfall
 - CCTV remote monitoring camera.
 - Storage level gauging station and gauge boards.

The dam is regularly monitored by physically inspecting the structure and reading instruments that record water storage levels. The storage is surveyed every year using defined points to determine whether any movement has occurred. Remote surveillance is by way of a remote camera installation that provides images of the balancing storage capable of real time processing. Sub-hourly storage level can be monitored via the Sunwater Seeq platform.

4. Roles and responsibilities

Roles and responsibilities	Position holder
Owner <ul style="list-style-type: none"> • 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 • Record communications, notifications and observations as required 	CEO EGMO EGM E&WR
Owner's Head Office Representative <ul style="list-style-type: none"> • Authorise the issuing of EAPs, SOPs and O&M Manuals and Amendments. • Facilitate Dam Safety training courses for Service Managers, Operations Supervisor, Dam Operators and other staff as appropriate and ensure that all staff required to undertake dam safety work are trained and accredited. • Ensure that risks identified in CRAs or other technical reports undertaken in relation to dam safety are included in the EAP. • Ensure visual inspections and instrumentation monitoring frequencies conform to ANCOLD Guidelines. • Ensure all dam safety work orders, work instructions and lesson learned outcomes are fully implemented. • Ensure requirements of the Dam Condition Schedule are met. • Ensure the work instructions are correct and the logbooks, SOPs, Data Books, and EAPs are reviewed annually as per the Condition Schedule. • Undertake and prepare the 5 yearly Comprehensive Inspection Reports with suitably qualified personnel within the time specified in the Condition Schedule and that work orders are created for recommendations and work is undertaken as required. • Undertake Annual Inspections and prepare reports within the time frames specified in the Condition Schedule and that work orders are created for recommendations and work is undertaken as required. • Review the Dam Safety Instrumentation database and evaluate data to verify the structural integrity of the dams on a regular basis and maintain a spread sheet for verification for audit and quality control. • Record communications, notifications and observations as required 	GM Asset Integrity GM Asset Management
Owner's Regional Representative (ORR) <ul style="list-style-type: none"> • Liaise with the Storage Supervisor/Operator Maintainer. • Arrange dam specific training and accreditation for relevant staff. • Ensure competent, trained and accredited personnel operate the storages. • Undertake the role of LEC as required. • Record communications, notifications and observations as required. • Ensure all work orders, work instructions and lesson learned outcomes are fully implemented. 	GM Burnett & Lower Mary OCO OS
Technical Advisor <ul style="list-style-type: none"> • 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

Roles and responsibilities	Position holder
Dam Safety Technical Decision Maker (DSTDM) <ul style="list-style-type: none"> Analyse the situation and provide expert technical advice in relation to dam safety. Discuss dam hazard with peers and other technical experts and make sound decisions to mitigate the risk. Determine response to incidents and emerging issues. Issue warning on dam failure and advise on protective measures. Ensure the EAP is implemented appropriately and carry out the DSTDM role as required. Maintain current RPEQ accreditation. Liaise with Regulator as required. Record communications, notifications and observations as required. 	Various personnel as per DSTDM roster
Flood Operations Decision Maker (FODM) <ul style="list-style-type: none"> 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. 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) <ul style="list-style-type: none"> 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) <ul style="list-style-type: none"> 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
Incident Coordinator (IC) <ul style="list-style-type: none"> Notify LDMG/s, or council/s if LDMG not Stood Up, of intent to use the Emergency Alert (EA). Activate the EAP. Ensure the EAP is implemented appropriately and carry out the IC role as required. Arrange situation reports and determine frequency, as required. Record communications, notifications and observations as required. 	Various personnel as per IC roster
Local Event Coordinator (LEC) <ul style="list-style-type: none"> 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

Roles and responsibilities	Position holder
<p>Dam Duty Officer (DDO)</p> <ul style="list-style-type: none"> • 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. 	<p>SOM SS OM</p>
<p>Bundaberg Regional Council</p> <p>Council has legislated local government functions, as per Section 80 of the Disaster Management Act (ref L). These include:</p> <ul style="list-style-type: none"> • 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. <p>And as per Section 352HB of the Water Legislation (Dam Safety) Amendment Act (2017):</p> <ul style="list-style-type: none"> • Assess (in consultation with its LDMG) the EAP for consistency with the Local Disaster Management. 	
<p>Disaster Management Groups/Personnel – (In addition to requirements outlined in the Disaster Management Act (ref L).</p> <p>LDMG</p> <ul style="list-style-type: none"> • Assist Sunwater and Bundaberg Regional Council to ensure community education around messaging and impacts of EAP related events is undertaken and continually improves. • Work with Bundaberg Regional Council and Sunwater to ensure the EAP is regularly exercised. • Identify and coordinate the use of manpower and resources that may be required for an EAP event. • Identify and provide advice to DDMG about support services required by the LDMG to manage an EAP event. • Provide reports and make recommendations to the relevant DDMG about matters relating to EAP events and any support required. <p>QFD</p> <ul style="list-style-type: none"> • Work with dam owner and LDMGs to ensure Emergency Alerts polygons are prepared, stored and tested. <p>DDMG</p> <ul style="list-style-type: none"> • DDMG may review plan with consistency with the District Disaster Management Plan. 	<p>LDMG DDMG QFD</p>
<p>Dam Safety Regulator (DSR)</p> <ul style="list-style-type: none"> • 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 (ref K). 	<p>DDS</p>

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 Isis Balancing Storage above the Maximum Operating Level EL 64.0 m and the rate of inflow exceeds the capacity of the outlet works. The spillway will then discharge water downstream into the Elliott River. These flood flows can create a dam hazard. Inflows will also cause the storage to temporarily rise to above the FSL of the storage. Note:
 - The greater the rate of inflow, the higher the storage will rise.
 - The higher the storage level rises, the greater the loads on the dam structure.
 - Although unlikely, the greater the loading, the higher the likelihood of a dam failure.

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

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

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

- For small flows, the water will be contained within the river and will not create a dam hazard.
- As the rate of discharge increases, there will be an impact on low-level road crossings of the Elliott River and other infrastructure in the river such as pump sites.
- Except for the case of dam failure, outflows from the dam provide a relatively minor contribution to downstream flooding compared to the downstream catchment area.

5.2 Emergency actions

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

5.2.1 Activation triggers

Table 3: Flood emergency activation trigger summary

Alert	<ul style="list-style-type: none"> EL 64.10 m and rising (0.1 m below spillway crest level)
Lean Forward	<ul style="list-style-type: none"> Storage above EL 64.30 m (0.1 m above spillway crest level)
Stand Up — 1	<ul style="list-style-type: none"> Storage above EL 64.53 m (Flood of Record January 2022)
Stand Up — 2	<ul style="list-style-type: none"> Storage above EL 65.65 m (0.1 m below Dam Crest Level)
Stand Down	<ul style="list-style-type: none"> Storage level EL 64.30 m and falling with no forecast increase in EL

While this EAP is not activated until Isis Balancing Storage reaches a level of EL 64.10 m, Sunwater and the Bundaberg Regional Council LDMG will work cooperatively and endeavour to share intelligence of any rainfall event as and when either organisation becomes aware of a situation that could result in the activation of the EAP.

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

5.2.2 Emergency action roles

Table 5 to Table 10 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).

The following table shows historical floods experienced at Isis Balancing Storage.

Table 4: Historical floods experienced at Isis Balancing Storage

Flood rank	Date	Peak height (m) EL	Peak height (m) over spillway crest
1	Jan 2022	64.53	0.33
2	Dec 2010	64.40	0.20
3	Mar 2017	64.25	0.05

Table 5: Flood operations—DDO emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> EL 64.10 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above EL 64.30 m* 	<ul style="list-style-type: none"> Storage above EL 64.53m 	<ul style="list-style-type: none"> Storage above EL 65.65m (0.1 m below Dam Crest Level) 	<ul style="list-style-type: none"> Storage Level EL 64.30 m and falling with no forecast increase in EL
Actions	<ul style="list-style-type: none"> Inspect the storage daily (or as instructed by the DSTDM) and photograph/video and record using approved forms and send to DSTDM and IC Once storage level rises above max. OL (EL 64.0 m), increase the discharge through the main channel by adjusting the outlet regulator gate Maintain storage between min. and max. operating levels (EL 63.0 m and EL 64.0 m), if possible Undertake site preparations including but not limited to: <ul style="list-style-type: none"> Check communication systems (including backup, radio, satellite, phones, fax, and internet) Monitor catchment conditions 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 Record all communication Update Dam Logbook as per SOP 12 	<ul style="list-style-type: none"> As per previous activation level, AND If site is safe to access, inspect the storage daily otherwise remotely inspect (or as instructed by the DSTDM) and photograph/video and record using approved forms and send to DSTDM and IC. Attention will be given to: <ul style="list-style-type: none"> visual inspection of flow patterns over spillway and dissipater for evidence of scouring inspect embankment for leaks, deformation, and erosion obvious signs of seepage, known inspection points visual inspection of the embankment to ensure there are no leaks or cracks that could lead to potential instability issues Report any unusual readings or observations to the DSTDM and IC as soon as practical Photograph spillway discharge area—monitor and record any signs of bank erosion <div> <p>NOTE: If channels are full, it is unlikely that releases can be made, as the regulator gate is shut. If the regulator gate is required to be operated, a crane may be required.</p> </div>	<ul style="list-style-type: none"> As per previous activation level, AND If site is safe to access, inspect the storage twice daily otherwise remotely inspect (or as instructed by the DSTDM) and photograph/video and record using approved forms and send to DSTDM and IC Check that the regulator gate at the outlet is in good working condition <div> <p>*NOTE: At EL 64.3 m, road may be closed, and access then is only across the spillway, which may be discharging.</p> </div>	<ul style="list-style-type: none"> As per previous activation level, AND If site is safe to access, inspect the storage three times daily otherwise remotely inspect (or as instructed by the DSTDM) and photograph/video and record using approved forms and send to DSTDM and IC. Report any damage to the dam due to water overtopping the embankments. Monitor tailwater and photograph any turbulent areas 	<ul style="list-style-type: none"> Return to routine surveillance activities and frequencies—inspect the dam for any damage and photograph any damage identified Forward information for EER to IC email Update Dam Logbook as per SOP 12
Internal notifications	<ul style="list-style-type: none"> IC SO 	<ul style="list-style-type: none"> As previous activation level 	<ul style="list-style-type: none"> As previous activation level 	<ul style="list-style-type: none"> As previous activation level 	<ul style="list-style-type: none"> As previous activation level
External notifications	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As previous activation level

Table 6: Flood operations—LEC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> EL 64.10 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above EL 64.30 m 	<ul style="list-style-type: none"> Storage above EL 64.53 m 	<ul style="list-style-type: none"> Storage above EL 65.65 m (0.1 m below Dam Crest Level) 	<ul style="list-style-type: none"> Storage Level EL 64.30 m, and falling with no forecast increase in EL
Actions	<ul style="list-style-type: none"> Liaise with LDMG re: situation Develop/implement staff roster Record all communication 	<ul style="list-style-type: none"> As per previous activation level, AND Ensure all abnormal observations or damage has been reported to DSTDM & IC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward information for EER to IC email Return to routine activities
Internal notifications	<ul style="list-style-type: none"> IC DDO 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As previous activation level
External notifications	<ul style="list-style-type: none"> LDMG 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As previous activation level



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



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Table 7: Flood operations—IC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> EL 64.10 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above EL 64.30 m 	<ul style="list-style-type: none"> Storage above EL 64.53 m 	<ul style="list-style-type: none"> Storage above EL 65.65m (0.1 m below Dam Crest Level) 	<ul style="list-style-type: none"> Storage Level EL 64.30 m, and falling with no forecast increase in EL
Actions	<ul style="list-style-type: none"> Liaise with Sunwater Customer Support to send SMS to D/S residents and phone those without mobiles Liaise with the DDO and DSTDM re: situation Obtain catchment conditions from the DDO Create Incident Report Record Update Sunwater intranet with dam status Record all communication <div> <p>NOTE: IC to carry out LEC actions unless LDMG is stood up</p> </div>	<ul style="list-style-type: none"> As per previous activation level, AND Ensure all abnormal observations or damage has been reported to DSTDM 	<ul style="list-style-type: none"> As per previous activation level, AND Consider stationing DDO on Isis side of storage 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Complete all internal and external notifications Forward all communications including relevant emails for EER to Close Incident Report Record Update Sunwater intranet with dam status Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DDO DSTDM FODM LEC/ORR SMT SRT 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
External notifications	<ul style="list-style-type: none"> D/S Residents DDMG 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND SDCC Watch Desk ABC 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



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Table 8: Flood operations—LEC and IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	<ul style="list-style-type: none"> When EL 64.10 m and rising (0.1 m below FSL) (preparedness) 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? What is the status and are any flood releases due to commence? Advise of current storage level
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS
Lean Forward	<ul style="list-style-type: none"> Storage above EL 64.30 m 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> 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 Advise EAP has been activated
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS
Stand Up — 1	<ul style="list-style-type: none"> Storage above EL 64.53m 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> 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
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS



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



ISIS BS — i10.1

Table 8 (Continued): Flood operations—LEC and IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up — 2	<ul style="list-style-type: none"> Storage above EL 65.65 m (0.1 m below Dam Crest Level) 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? What is the status? Advise of current storage level Advise of any forecasts you are aware of
		<ul style="list-style-type: none"> SDCC Watch Desk 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form as per instructions and email to SDCC Watch Desk to send.
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS.
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	To be determined.
Stand Down	<ul style="list-style-type: none"> Storage level EL 64.30 m and falling with no forecast increase in EL 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? What is the status? (storage is greater than minor flood level, as set by BOM) Advise of current storage level Advise EAP has been deactivated
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS



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



ISIS BS — i10.1

Table 9: Flood operations—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> EL 64.10 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above EL 64.30 m 	<ul style="list-style-type: none"> Storage above EL 64.53 m 	<ul style="list-style-type: none"> Storage above EL 65.65 m (0.1 m below Dam Crest Level) 	<ul style="list-style-type: none"> Storage Level EL 64.30 m and falling with no forecast increase in EL
Action	<ul style="list-style-type: none"> Provide technical advice to DDO and IC on a needs basis Review surveillance reports and determine if any additional responses are required Record all communication Notify DSR 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward information for EER to IC email Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DDO IC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND CEO—if time permits 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> DSR 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level



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



ISIS BS — i10.1

Table 10: Flood operations—FODM emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> EL 64.10 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above EL 64.30 m 	<ul style="list-style-type: none"> Storage above EL 64.53 m 	<ul style="list-style-type: none"> Storage above EL 65.65 m (0.1 m below Dam Crest Level) 	<ul style="list-style-type: none"> Storage Level EL 64.30 m and falling with no forecast increase in EL
Action	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward information for EER to IC email Return to routine activities
Internal notifications	<ul style="list-style-type: none"> IC DDO DSTDM 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> BOM 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> 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 hazard due to a piping condition through the embankment, foundations, or dam abutment. An early indicator of a piping condition can be an increase in seepage or a new area of seepage. If the seepage water is cloudy or has become cloudy, this may indicate that material is being transported and a pipe is being established.

If a pipe is established and progresses, then a dam failure may result. If a potential pipe is detected early, remedial repairs may be 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 B3 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 11 to Table 15 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

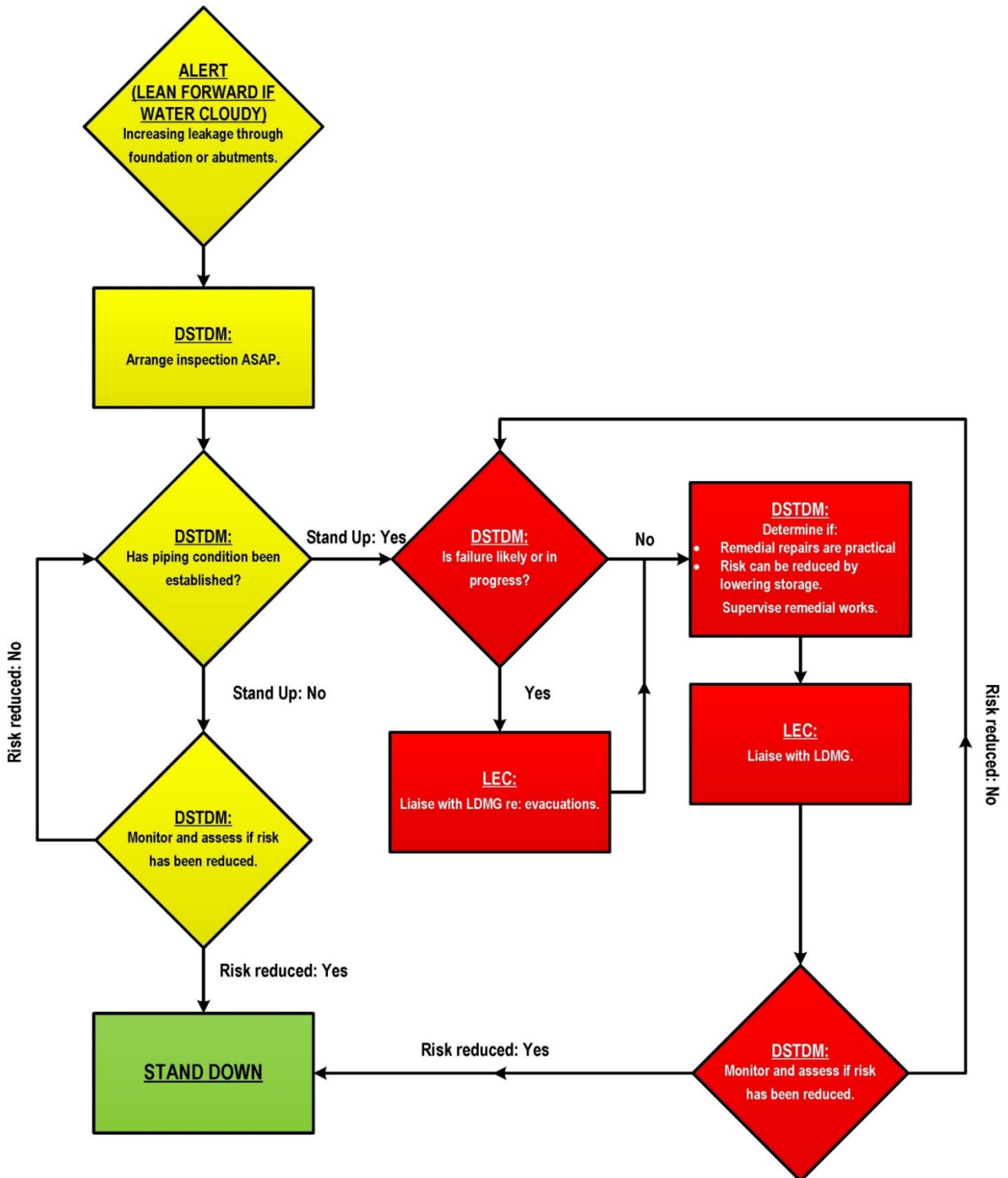


Table 11: Piping: embankment, foundation, or abutments—DDO emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing leakage through the embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing leakage through the embankment, the foundations, or abutments with cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to piping, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that piping risk has reduced
Actions	<ul style="list-style-type: none"> 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 approved forms and send to DSTDM and IC Notify SO Update Dam Logbook as per SOP 12 Record all communication 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Support/supervise remedial works as required Lower the storage if directed Close any affected roads if not already closed by others Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 SOP 12 Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DSTDM SO IC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As per previous activation level



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



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

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing leakage through the embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing leakage through the embankment, the foundations, or abutments with cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to piping, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that piping risk has reduced
Actions	<ul style="list-style-type: none"> Liaise with DDO and IC Record all communication 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with relevant council(s) regarding potential road/bridge closures 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward information for EER to IC email Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DDO IC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> LDMG 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level



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



Table 13: Piping: embankment, foundation, or abutments—IC emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing leakage through the embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing leakage through the embankment, the foundations, or abutments with cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to piping, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that piping risk has reduced
Actions	<ul style="list-style-type: none"> Liaise with DDO, DSTDM and LEC re: situation Create Incident Report Record Update Sunwater intranet with dam status Record all communication <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>NOTE: IC to carry out LEC actions unless LDMG is <i>Stood Up</i></p> </div>	<ul style="list-style-type: none"> As per previous activation level, AND Investigate availability of machinery and materials (if insufficient stockpiles available) Place machinery operators on standby if directed by DSTDM Consider the need to appoint a Recovery Coordinator. The Recovery Coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over Confirm EAs and other messages are prepared in advance – if required. 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with DDO, DSTDM, and LDMG re: situation 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Complete all internal and external notifications Forward all communications including relevant emails for EER to [REDACTED] Close Incident Report Record Update Sunwater intranet with dam status Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DSTDM DDO LEC/ORR SMT SRT 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
External notifications	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As per previous activation level, AND DDMG 	<ul style="list-style-type: none"> As per previous activation level, AND D/S Residents SDCC Watch Desk ABC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 14: Piping: embankment, foundation, or abutments—LEC & IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	<ul style="list-style-type: none"> Increasing leakage through an embankment, the foundations, or abutments 			N/A internal notifications only
Lean Forward	<ul style="list-style-type: none"> Increasing leakage through an embankment, the foundations, or abutments with cloudy water 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Unconfirmed piping risk</i>) What is the status? (<i>Unconfirmed leakage—Investigation continues</i>) Advise of current storage level Advise any issues you are aware of Standby for further advice
Stand Up—1	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Confirmed piping risk</i>). What is the status? (<i>Confirmed piping/leakage</i>) Advise of current storage level Advise any issues you are aware of. Discuss any potential road/bridge closures Prepare for possible evacuations
		<ul style="list-style-type: none"> SDCC Watch Desk 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form as per instructions (copies in Appendix A7) and email to SDCC Watch Desk to send. <i>Develop messages in consultation with DSTDM</i>
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS.
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	To be determined.



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



Table 14 (Continued): Piping: embankment, foundation, or abutments—LEC & IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up—2	<ul style="list-style-type: none"> Failure likely due to piping, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Confirmed piping risk</i>) What is the status? (<i>Possible Dam Failure</i>) Advise of current storage level Prepare coordinated evacuations
		<ul style="list-style-type: none"> SDCC Watch Desk 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form as per instructions (copies in Appendix A7) and email to SDCC Watch Desk to send. <i>Develop messages in consultation with DSTDM</i>
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	To be determined.
	<ul style="list-style-type: none"> Dam Failure in progress 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Confirmed piping risk</i>) What is the status? (<i>Dam Failure In Progress</i>) Advise of current storage level Coordinate evacuations of affected Downstream Residents and move people to higher ground
		<ul style="list-style-type: none"> SDCC Watch Desk 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form as per instructions (copies in Appendix A7) and email to SDCC Watch Desk to send.
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	To be determined.
Stand Down	<ul style="list-style-type: none"> Risk assessment has determined that piping risk has reduced 	<ul style="list-style-type: none"> LDMG (if from Lean Forward) DDMG (if from Lean Forward) 	<ul style="list-style-type: none"> Phone 	Describe current situation with Dam—What is the event? (<i>Dam Safety Risk—piping</i>) What is the status? (<i>Dam Hazard Stood Down</i>) Advise risk assessment has determined that piping risk has reduced, and EAP has been deactivated
		<ul style="list-style-type: none"> D/S Residents (if from Stand Up) 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS



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



Table 15: Piping: embankment, foundation, or abutments—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing leakage through the embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing leakage through the embankment, the foundations or abutments with cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to piping, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that piping risk has reduced
Action	<ul style="list-style-type: none"> 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 Record all communication Notify DSR 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with the IC and advise on need to recommend evacuations 	<ul style="list-style-type: none"> Forward information for EER to IC email Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DDO IC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> DSR 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level

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



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



7. Dam Hazard—earthquake

7.1 Overview

The emergency action described in this section relates to a potential dam hazard due to an earthquake causing damage to the dam embankment (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.

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

7.2 Emergency action roles

Table 16 to Table 20 specify emergency actions for the following roles:

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

Figure 3: Earthquake flowchart

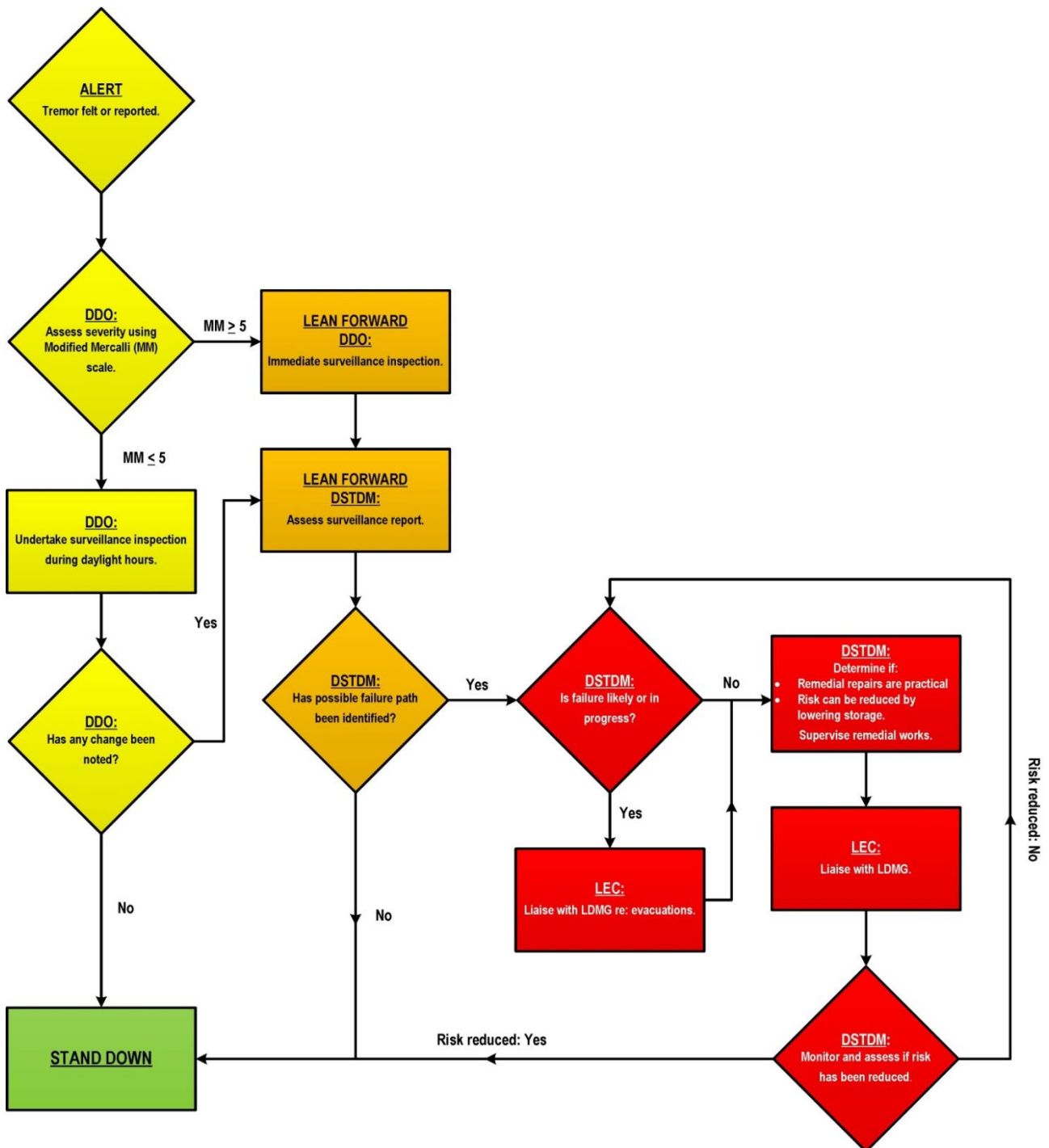


Table 16: Earthquake—DDO emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND Intensity less than 5MM* 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Inspect the dam wall, embankment, spillway structure, and abutments in daylight hours (if safe to do so) and report to the DSTDM and IC—photograph/video and record using approved and send to DSTDM and IC Check for leaks, deformation, erosion, and concrete damage Maintain photographic record Update Dam Logbook as per SOP 12 Record all communication 	<ul style="list-style-type: none"> As per previous activation level, AND Immediately inspect the dam wall, embankment, spillway structure, and abutments (if safe to do so) and report to the DSTDM and IC (unless inspection completed in Alert Stage)—photograph/video and record using approved forms and send to DSTDM and IC Repeat the inspection as directed 	<ul style="list-style-type: none"> 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 . 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward information for EER to IC email Update Dam Logbook as per SOP 12 Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DSTDM IC SO 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required

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



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



Table 17: Earthquake—LEC emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Liaise with IC and DDO re: situation Record all communication 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with LDMG re: situation 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with relevant council(s) regarding potential road/bridge closures 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward information for EER to IC email Return to routine activities
Internal notifications	<ul style="list-style-type: none"> IC DDO 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> LDMG 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level



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



Table 18: Earthquake—IC emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Liaise with DDO, DSTDM and LEC re: situation Create Incident Report Record Update Sunwater intranet with dam status Record all communication <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> NOTE: IC to carry out LEC actions unless LDMG is <i>Stood Up</i> </div>	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> As per previous activation level, AND Mobilise resources to undertake remedial works if directed by DSTDM 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Complete all internal and external notifications Forward all communications including relevant emails for EER to [REDACTED] Close Incident Report Record Update Sunwater intranet with dam status Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
External notifications	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As per previous activation level, AND DDMG 	<ul style="list-style-type: none"> As per previous activation level, AND D/S residents SDCC Watch Desk ABC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 19: Earthquake—LEC & IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND Intensity less than 5MM 			N/A—Internal communications only
Lean Forward	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	<p>Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Earthquake damage</i>)</p> <p>What is the status? (<i>Under investigation</i>)</p> <p>Advise of current storage level</p> <p>Advise EAP has been activated</p> <p>Stand by for further information</p>
Stand Up—1	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND A change detected from surveillance, OR A possible failure path has been identified 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	<p>Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Earthquake felt or reported in area</i>)</p> <p>What is the status? (<i>Possible earthquake damage to dam</i>)</p> <p>Advise of current storage level. Discuss any potential road/ bridge closures</p> <p>Activate emergency response</p>
		<ul style="list-style-type: none"> SDCC Watch Desk 	<ul style="list-style-type: none"> Phone & Email 	<p>Complete Emergency Alert Request Form as per instructions (copies in Appendix A7) and email to SDCC Watch Desk to send.</p> <p><i>Develop messages in consultation with DSTDM</i></p>
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	<p>Liaise with Sunwater Customer Support to send SMS</p>
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	<p>To be determined.</p>



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



Table 19 (Continued): Earthquake—IC Communication Plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up—2	<ul style="list-style-type: none"> Failure likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Earthquake damage</i>) What is the status? (<i>Dam Failure Likely</i>) Advise of current storage level. Discuss any potential road/bridge closures (if not discussed at Stand Up—1) Prepare coordinated evacuation
		<ul style="list-style-type: none"> SDCC Watch Desk 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form as per instructions and email to SDCC Watch Desk to send. <i>Develop messages in consultation with DSTDM</i>
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	To be determined.
	<ul style="list-style-type: none"> Dam Failure in progress 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Earthquake damage</i>) What is the status? (<i>Dam Failure In Progress</i>) Advise of current storage level Coordinate evacuation of Downstream Residents and move people to higher ground
		<ul style="list-style-type: none"> SDCC Watch Desk 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form as per instructions (copies in Appendix A7) and email to SDCC Watch Desk to send.
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	To be determined.
Stand Down	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced 	<ul style="list-style-type: none"> LDMG DDMG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Earthquake damage</i>) What is the status? (<i>Dam Hazard Stood Down</i>) Advise risk assessment has been determined that failure risk has reduced, and that EAP has been deactivated
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS



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



Table 20: Earthquake—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up—1	Stand Up—2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Earthquake reported or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced
Action	<ul style="list-style-type: none"> Monitor situation and assess risks Liaise with DDO and IC Record all communication Notify DSR <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>NOTE: 'Reported' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.</p> </div>	<ul style="list-style-type: none"> As per previous activation level, AND Review surveillance inspection of the dam and assess its condition as soon as possible Determine if there are any possible failure paths from reported damage 	<ul style="list-style-type: none"> As per previous activation level, AND Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so Assess risk and determine if failure likely or in progress Liaise with the IC Determine if remedial repairs are practical Determine if risks can be reduced by lowering storage Supervise* remedial repairs (if applicable) Monitor situation and assess risks 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward information for event report to IC Return to routine activities
Internal notifications	<ul style="list-style-type: none"> DDO IC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> DSR 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level

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



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



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

8.1 Overview

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

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

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

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to a terrorist attack or a high energy impact and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) 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 of 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 21 to Table 25 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

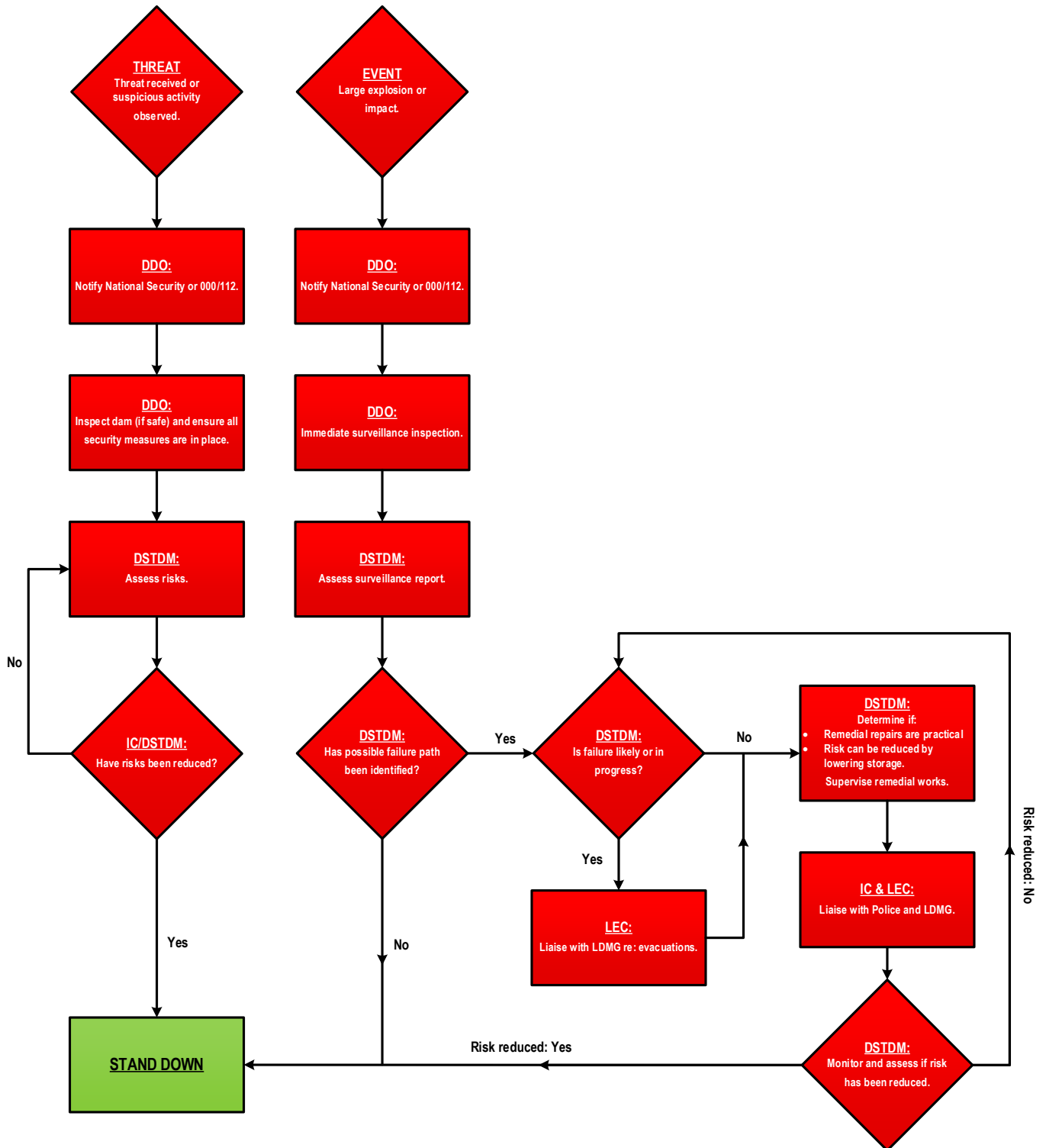


Table 21: Terrorist threat/activity or high energy impact—DDO emergency action

Activation level	Alert/Lean Forward	Stand Up—1	Stand Up—2	Stand Up—3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Not applicable 	THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g.bomb explosion, aircraft hit) 	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 approved forms and send to IC & DSTDM If Police appoint Incident Manager, support and follow instructions Close any affected roads as directed Notify SO Update Dam Logbook as per SOP 12 	<ul style="list-style-type: none"> As per previous activation level, AND Undertake surveillance inspect dam (if safe) Vacate the immediate vicinity of the affected area 	<ul style="list-style-type: none"> As per previous activation level, AND Lower reservoir level, if directed 	<ul style="list-style-type: none"> Forward information for EER to IC email Update Dam Logbook as per SOP 12 Return to routine activities
Internal notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> DSTDM IC SO 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> #000 Emergency 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level



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



Table 22: 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	<ul style="list-style-type: none"> Not applicable 	THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) 	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Liaise with DDO, IC, and LDMG re: situation If Police appoint Incident Manager, support and follow instructions Liaise with relevant council(s) regarding possible road/bridge closures Record all communication 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with DDO, IC, and LDMG re: potential for evacuations 	<ul style="list-style-type: none"> Forward information for EER to IC email Return to routine activities
Internal notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> DDO IC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> LDMG 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level



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



Table 23: 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	<ul style="list-style-type: none"> Not applicable 	THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit) 	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Record all communication Liaise with DDO, DSTDM and LEC Contact National Security If Police appoint Incident Manager, support and follow instructions Create Incident Report Record Update Sunwater intranet with dam status <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> NOTE: IC to carry out LEC actions unless LDMG1 is <i>Stood Up</i> </div>	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Mobilise resources to undertake remedial works if directed by DSTDM 	<ul style="list-style-type: none"> Complete all internal and external notifications Forward all communications including relevant emails for EER to [REDACTED] Close Incident Report Record Update Sunwater intranet with dam status Return to routine activities
Internal notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
External notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> CTG DDMG 	<ul style="list-style-type: none"> As per previous activation level, AND D/S Residents SDCC Watch Desk ABC 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 24: 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 <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	<ul style="list-style-type: none"> DDMG LDMG CTG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Security threat/ impact/explosion, etc.</i>) What is the status? (<i>Received/noted terrorist threat</i>) Discuss any potential road/bridge closures Activate emergency response
Stand Up—2	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) 	<ul style="list-style-type: none"> LDMG DDMG CTG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Security threat/ impact/explosion, etc.</i>) What is the status? (<i>Under Investigation</i>) Discuss any potential road/bridge closures (if not discussed at Stand Up—1) Prepare coordinated evacuation
		<ul style="list-style-type: none"> SDCC Watch desk 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form as per instructions (copies in Appendix A7) and email to SDCC Watch Desk to send.
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS.
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	To be determined.



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



Table 24 (continued): LEC & IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up—3	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> LDMG DDMG CTG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Security threat/ impact/ explosion, etc.</i>) What is the status? (<i>Dam Failure Likely/In Progress</i>) Initiate evacuations
		<ul style="list-style-type: none"> SDCC Watch desk 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form as per instructions (copies in Appendix A7) and email to SDCC Watch Desk to send.
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS.
		<ul style="list-style-type: none"> ABC 	<ul style="list-style-type: none"> Phone 	To be determined.
Stand Down	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced 	<ul style="list-style-type: none"> LDMG DDMG CTG 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Security threat/ impact/explosion, etc.</i>) What is the status? (<i>Emergency Condition Dam Hazard Stood Down</i>) Advise that failure risk has been reduced and EAP has been deactivated
		<ul style="list-style-type: none"> D/S Residents 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Support to send SMS.



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



Table 25: 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	<ul style="list-style-type: none"> Not applicable 	THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam Threat received 	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit) 	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, and Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Action	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Record all communication Liaise with IC and DDO Assess risks Liaise with SRT Notify DSR 	<ul style="list-style-type: none"> As per previous activation level, AND Arrange an inspection of the dam and assess its condition as soon as possible when safe to do so Assess risk and determine if failure likely or in progress Liaise with the IC Determine if remedial repairs are practical Determine if risks can be reduced by lowering storage. Supervise* remedial repairs (if applicable) Monitor situation and assess risks 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with the IC and advise on need to recommend evacuations 	<ul style="list-style-type: none"> Forward information for EER to IC email Return to routine activities
Internal notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> DDO IC SRT 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level
External notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> DSR 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level

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



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



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 26: Communications failure emergency activation trigger summary

Comms Failure – Site	<ul style="list-style-type: none"> • Unable to communicate to or from dam site (usually affects DDO)
Comms Failure – Local area	<ul style="list-style-type: none"> • Unable to communicate to or from local area (likely to affect LEC or ORR)
Comms Failure – Brisbane	<ul style="list-style-type: none"> • 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 (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 27 to Table 32 specify emergency actions for the following roles:

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

Table 27: Communications failure—DDO emergency action

Activation level	Comms Failure – Local Area	Comms Failure – Brisbane
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to local area including LEC or ORR 	<ul style="list-style-type: none"> Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
Actions	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted Fax – generally uses fixed landline and is therefore less likely to have failed Social media – e.g. Facebook (Internet may be available via landline) Record all communication and attempts via Dam Logbook entries as per SOP 12 and communications log if EAP event is current 	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted Fax – generally uses fixed landline and is therefore less likely to have failed Social media – e.g. Facebook (Internet may be available via landline) Record all communication and attempts via Dam Logbook entries as per SOP 12 and communications log if EAP event is current
Internal notifications	<ul style="list-style-type: none"> IC SO (if available) 	<ul style="list-style-type: none"> LEC SO (if available)
External notifications	<ul style="list-style-type: none"> As required 	<ul style="list-style-type: none"> As required



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



Table 28: Communications failure—LEC emergency action

Activation level	Comms Failure – Dam Site	Comms Failure – Brisbane
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to dam site 	<ul style="list-style-type: none"> Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
Actions	<ul style="list-style-type: none"> Every hour, attempt communications by any and all means noting the following: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted Fax – generally uses fixed landline and is therefore less likely to have failed Social media – e.g. Facebook (Internet may be available via landline) Record all communication and attempts Assume that the DDO is carrying out LEC role at site as much as practicable Liaise with IC Liaise with DSTDM As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action 	<ul style="list-style-type: none"> Issue Sunwater Incident Alert Every hour, attempt communications by any and all means noting the following: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted Fax – generally uses fixed landline and is therefore less likely to have failed Social media – e.g. Facebook (Internet may be available via landline) 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
Internal notifications	<ul style="list-style-type: none"> IC DSTDM SO (if available) 	<ul style="list-style-type: none"> DDO DSTDM (if available) SO
External notifications	<ul style="list-style-type: none"> LDMGs 	<ul style="list-style-type: none"> LDMGs DDMG



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



Table 29: Communications failure—IC emergency action

Activation level	Comms Failure – Dam Site	Comms Failure – Local Area
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to dam site 	<ul style="list-style-type: none"> Unable to communicate to Local Area including LEC and ORR
Actions	<ul style="list-style-type: none"> Issue Sunwater Incident Alert Every hour, attempt communications by any and all means noting the following: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted Fax – generally uses fixed landline and is therefore less likely to have failed Social media – e.g. Facebook (Internet may be available via landline) Record all communication and attempts Liaise with LEC Liaise with DSTDM As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action 	<ul style="list-style-type: none"> Issue Sunwater Incident Alert Every hour, attempt communications by any and all means noting the following: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted Fax – generally uses fixed landline and is therefore less likely to have failed Social media – e.g. Facebook (Internet may be available via landline) 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
Internal notifications	<ul style="list-style-type: none"> LEC DSTDM SO (if available) 	<ul style="list-style-type: none"> DDO (if available) DSTDM SO (if available)
External notifications	<ul style="list-style-type: none"> DDMG 	<ul style="list-style-type: none"> LDMGs (if available) DDMG (if available)



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



Table 30: Communications failure—LEC and IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message code	Message text
Comms Failure – Site	<ul style="list-style-type: none">• Unable to communicate to or from dam site, AND• DDO is at dam site	<ul style="list-style-type: none">• IC/LEC• DSTDM• SO (if available)• LDMGs• DDMG	<ul style="list-style-type: none">• Phone		Describe current situation with dam communications. What is the status – estimated time to restore communications?
	IC to create Incident report record				EAP Alert Notification—Isis Balancing Storage—Site Communications Failure
Comms Failure – Local Area	<ul style="list-style-type: none">• Unable to communicate to or from local area including LEC and ORR	<ul style="list-style-type: none">• DDO (if available)• DSTDM• SO (if available)• LDMGs (if available)• DDMG (if available)	<ul style="list-style-type: none">• Phone		Describe current situation with dam communications. What is the status – estimated time to restore communications?
	IC to create Incident report record				EAP Alert Notification—Isis Balancing Storage—Local Area Communications Failure
Comms Failure – Brisbane	<ul style="list-style-type: none">• Unable to communicate to or from Sunwater Brisbane	<ul style="list-style-type: none">• DSTDM (if available)• LDMGs• DDMG	<ul style="list-style-type: none">• Phone		Describe current situation with dam communications. What is the status – estimated time to restore communications?
	LEC to create Incident report record				EAP Alert Notification—Sunwater Brisbane Communications Failure



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



Table 31: Communications failure—DSTDM emergency action

Activation level	Comms Failure – Site	Comms Failure – Local Area
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to dam site 	<ul style="list-style-type: none"> Unable to communicate to local area including LEC and ORR
Actions	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Provide technical advice to IC on a needs basis Record all communication Assume that the DDO is assisting IC with LEC role As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Internal notifications	<ul style="list-style-type: none"> IC LEC And CEO (if time permits) 	<ul style="list-style-type: none"> IC DDO (if available) And CEO (if time permits)
External notifications	<ul style="list-style-type: none"> DSR (if applicable) 	<ul style="list-style-type: none"> DSR (if applicable)



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



Table 32: Communications failure—FODM emergency action

Activation level	Comms Failure – Site	Comms Failure – Local Area
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to dam site 	<ul style="list-style-type: none"> Unable to communicate to local area including LEC and ORR
Actions	<ul style="list-style-type: none"> Liaise with IC Record all communication As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action 	<ul style="list-style-type: none"> Liaise with IC Record all communication Assume that the DDO is assisting IC with LEC role As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Internal notifications	<ul style="list-style-type: none"> IC LEC DSTDM 	<ul style="list-style-type: none"> IC DDO (if available) DSTDM
External notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable



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



APPENDIX A Notification and communication lists

- A1 Sunwater regional notification list
- A2 Sunwater Brisbane notification list
- A3 External notification lists
- A4 D/S resident notification list
- A5 Other reference contacts
- A6 Emergency alert polygon
- A7 Dam failure emergency alert request

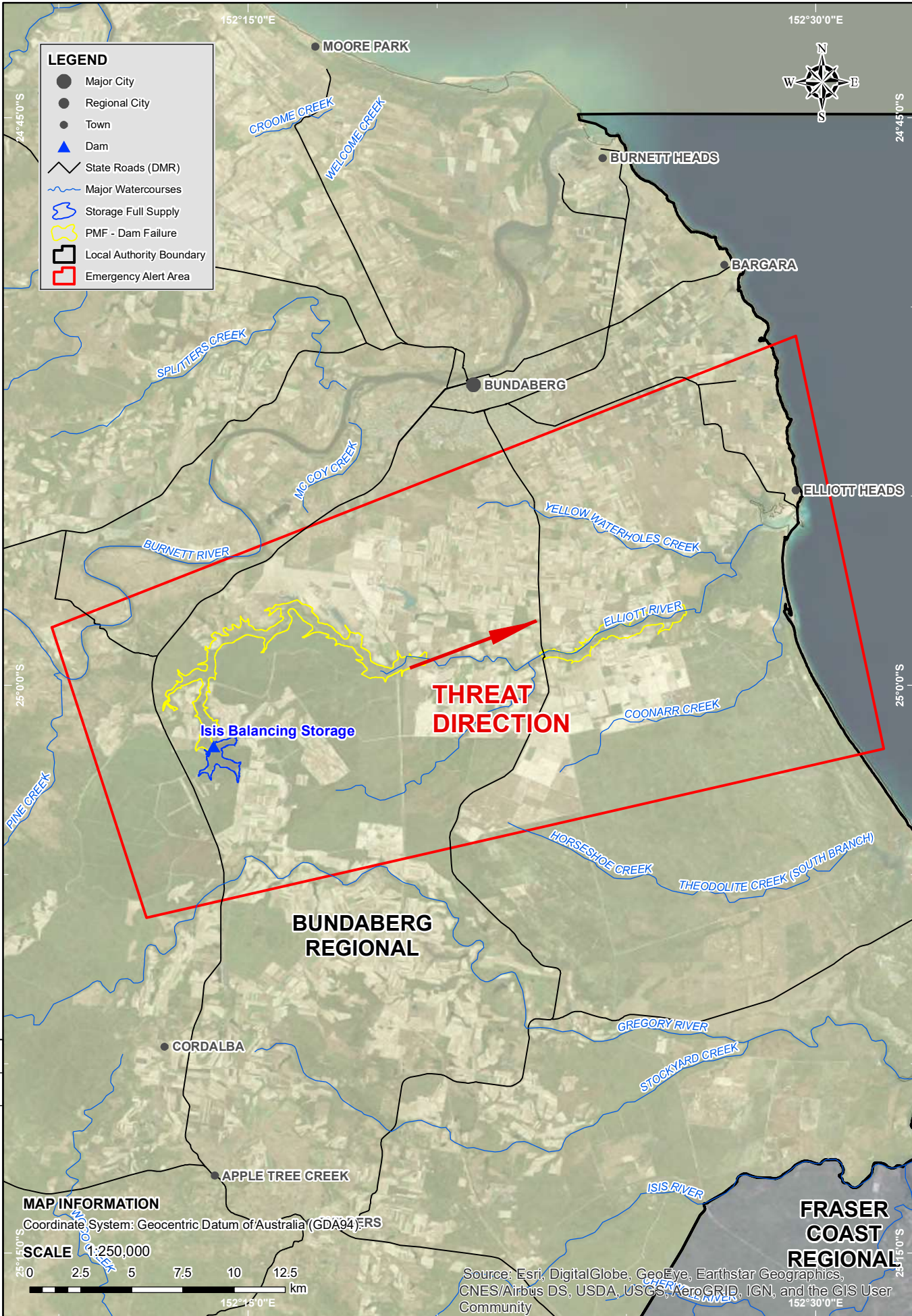
Appendix A1 to Appendix A5 have been redacted


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Printed: Tuesday, 23/01/2018 11:19:01 AM

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

REVISION	DATE	ISSUED FOR USE	REMARKS	MB	MH	PSD
	23/01/18	A				



DRAWN <i>IDH</i>		DESIGNED		 ©SUNWATER LIMITED ACN 131 034 985	CONTRACT NUMBER	
CHECKED <i>MB</i>		CHECKED			DRAWING NUMBER	REV.
APPROVED <i>M. HUGHES</i> <i>23/1/2018</i>					249578	A
					SHEET 1 OF 1	
					DATE JANUARY 2018	

Appendix A7: Dam failure emergency alert request

Queensland emergency alert request guidelines

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

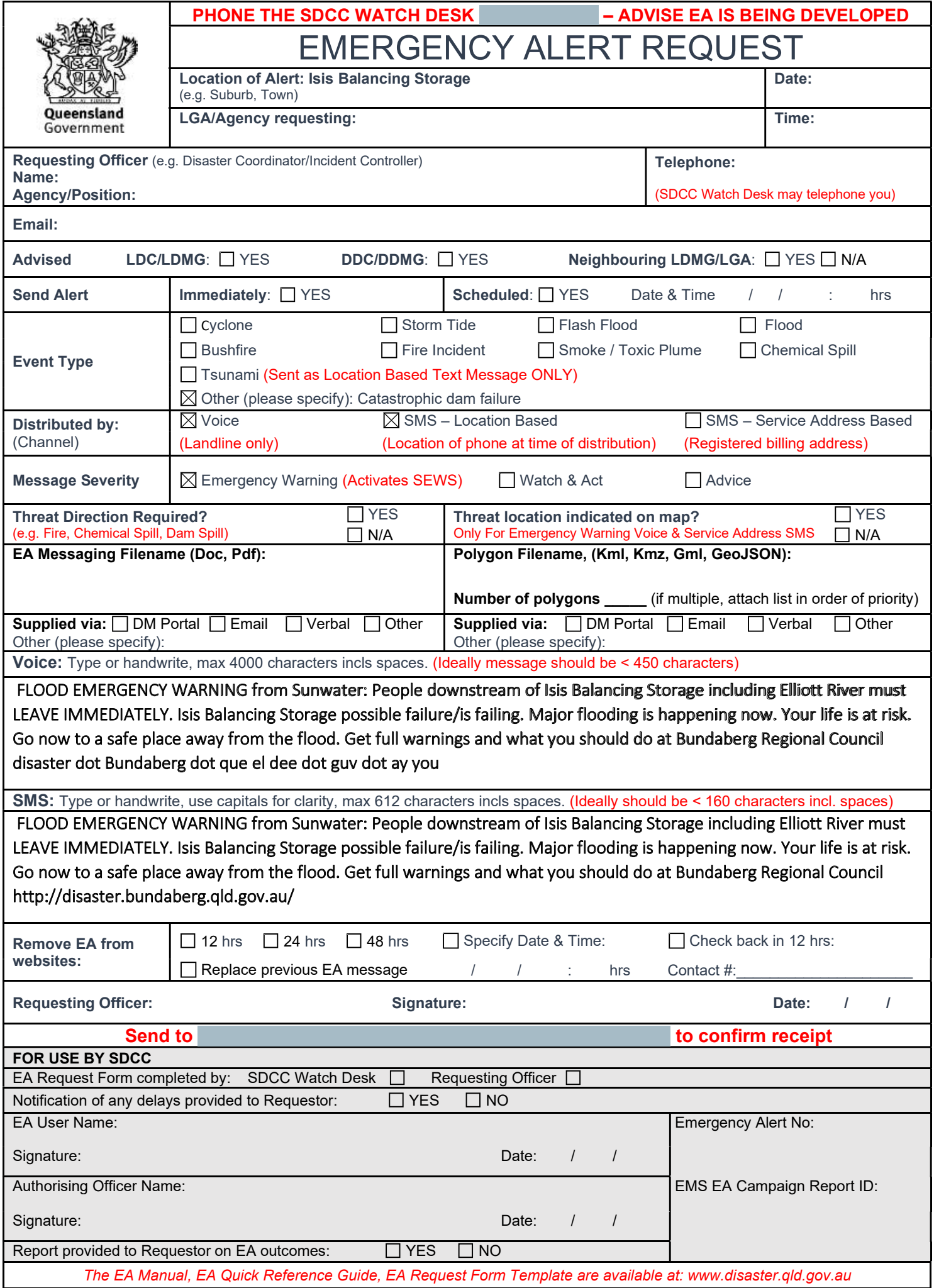
Instructions

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

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

Filename:	Voice Message:	SMS:
[REDACTED]	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Isis Balancing Storage including Elliott River must LEAVE IMMEDIATELY. Isis Balancing Storage possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Bundaberg Regional Council disaster dot Bundaberg dot que el dee dot guv dot ay you	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Isis Balancing Storage including Elliott River must LEAVE IMMEDIATELY. Isis Balancing Storage possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Bundaberg Regional Council http://disaster.bundaberg.qld.gov.au/

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



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.	<i>Sunwater Polygons are all in *.kml format.</i> Check applicable box.
STEP 4.	<i>Sunwater Messaging/spatial data is always supplied via DMportal.</i> 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:

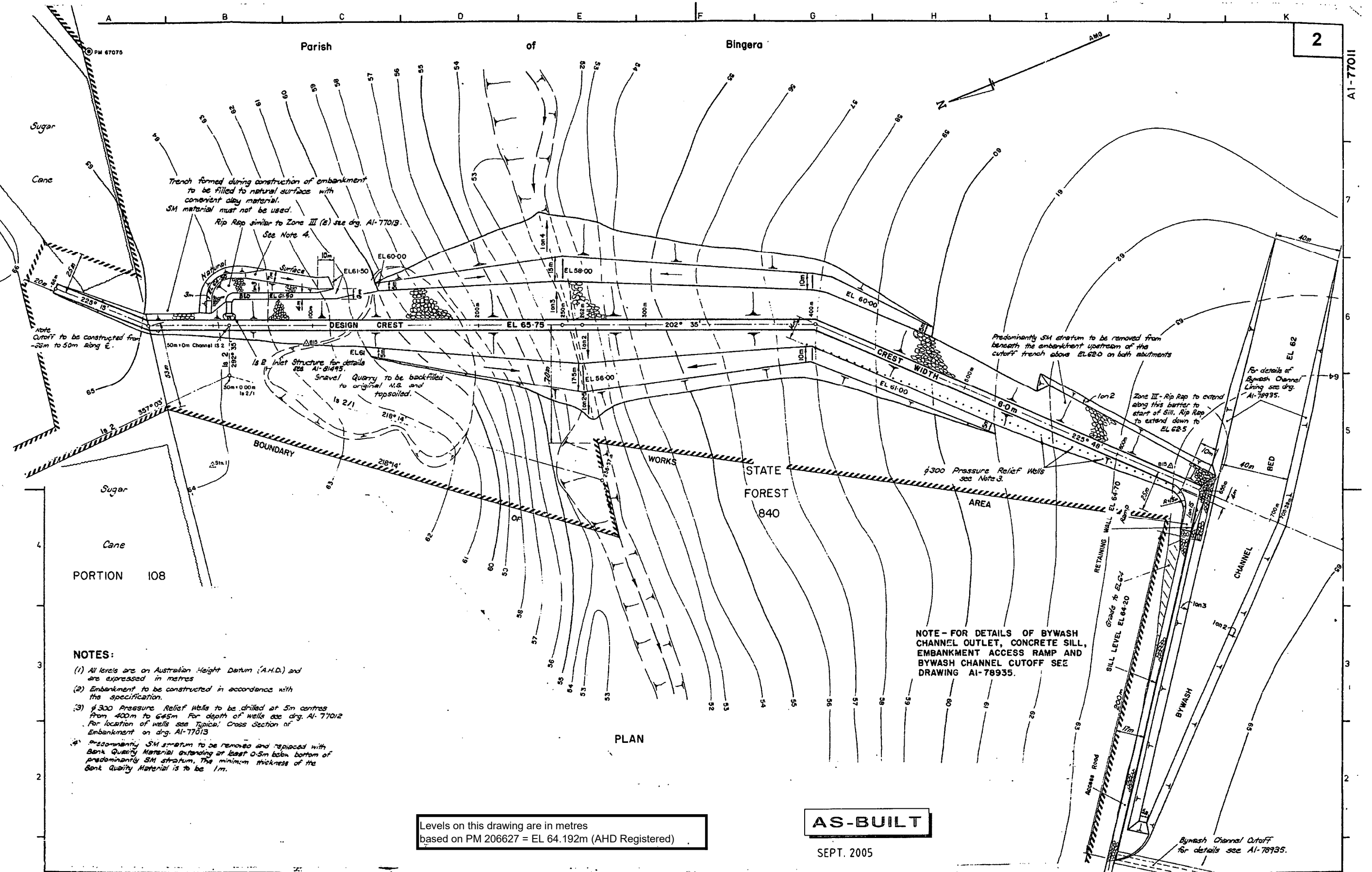
EMERGENCY. EMERGENCY. Sunwater advise imminent failure of Cania Dam. Take action to protect life and leave now. Moonford and Monto are at risk. Info on ABC Radio. Central Monto & Biloeila are safe.

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

APPENDIX B Drawings maps and emergency control measures

- B1 Drawings
- B2 Flood impact – downstream
- B3 Inundation Maps
- B4 Locality plan

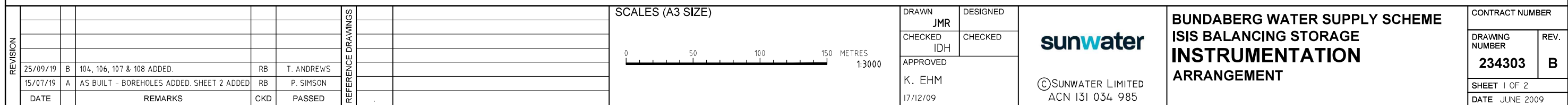
NOTE: Actual levels may differ from those shown in flood inundation maps due to variations in assumptions made in the models to actual flood events.

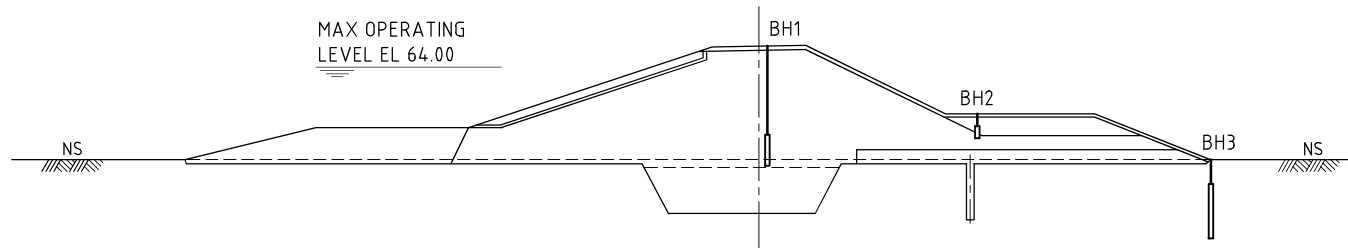


No.	EASTING	NORTHING	ELEVATION
SS11	2708.216	1724.094	67.040
SS12	2744.197	1758.813	67.046
SS13	2763.373	1804.988	66.853
SS14	2782.608	1850.999	67.010
SS15	2801.846	1897.182	66.831
SS16	2821.060	1943.524	67.040
SS17	2840.183	1989.606	67.221

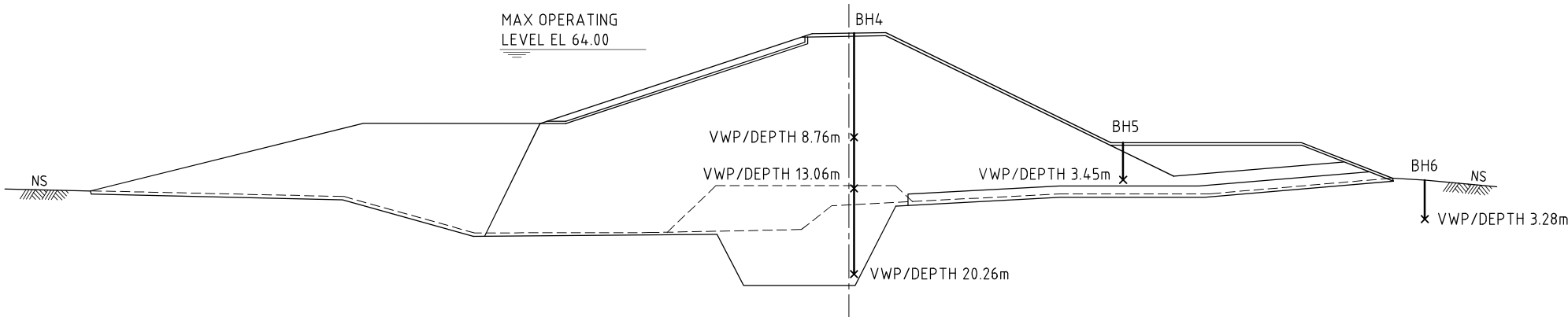
No.	EASTING	NORTHING	ELEVATION	REMARKS
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103	2434.376	1462.325	66.827	PILLAR
104	2673.513	1681.157	65.983	STAR PICKET IN DAM WALL
106	2565.654	1578.672	65.999	STAR PICKET IN DAM WALL
107	2812.960	1906.641	66.049	STAR PICKET IN DAM WALL
108	2754.626	1765.345	66.051	STAR PICKET IN DAM WALL

No.	EASTING	NORTHING	ELEVATION
BH1	2744.59	1755.89	66.13
BH2	2731.97	1762.96	61.62
BH3	2717.46	1770.43	58.37
BH4	2801.09	1886.33	66.13
BH5	2779.76	1889.55	57.70
BH6	2749.52	1887.47	52.58






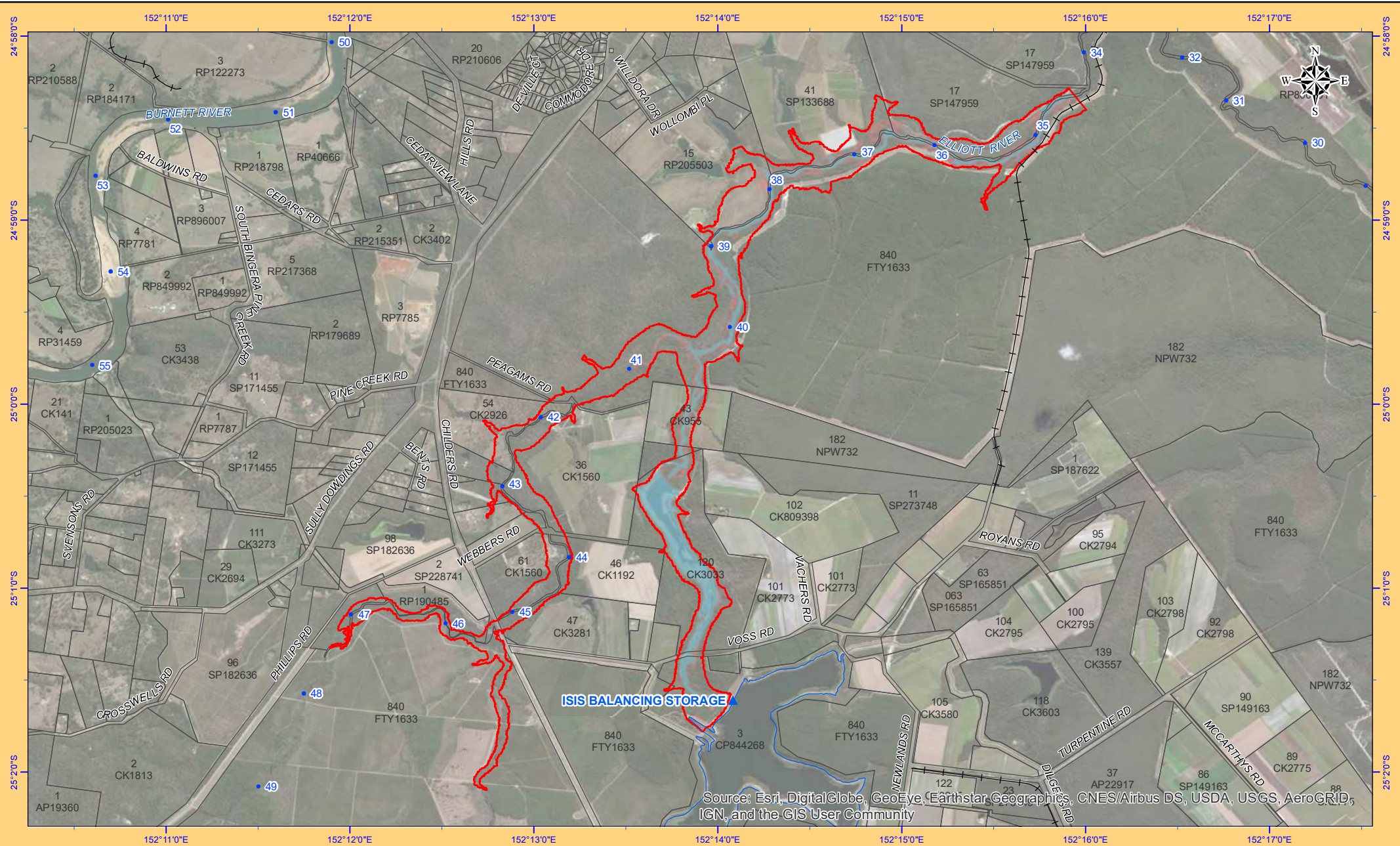
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SCALE 1:500 (APPROX)
SH 1



SECTION B
SCALE 1:500 (APPROX)
SH 1

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25 Sep 2019 10:12 AM

REVISION						REFERENCE DRAWINGS			SCALES (A3 SIZE)	DRAWN	DESIGNED	 ©SUNWATER LIMITED ACN 131 034 985	BUNDABERG WATER SUPPLY SCHEME ISIS BALANCING STORAGE INSTRUMENTATION ARRANGEMENT	CONTRACT NUMBER			
										RB				DRAWING NUMBER	REV.		
										CHECKED	CHECKED			234303	B		
	25/09/19	B	SHEET 1 REVISED		R. BALSHAW					APPROVED				SHEET 2 OF 2			
	15/07/19	A	AS BUILT - BOREHOLES ADDED. SHEET 2 ADDED	RB	P. SIMSON									DATE JULY 2019			
	DATE		REMARKS	CKD	PASSED												



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MAP INFORMATION

Coordinate System: Geocentric Datum of Australia (GDA94).

SCALE (A4 SIZE)

0 500 1,000 1,500 2,000 2,500 m 1:50,000

LEGEND

- AMTD (Markers)
- Balancing Storage Full Supply Level
- Limit of Downstream Notification Area
- Widespread flooding with significant impacts overbank
- Flows breaking banks with appreciable impacts overbank
- Flows generally in-bank with slight impacts overbank

**ISIS BALANCING STORAGE
DOWNSTREAM NOTIFICATION AREA**

NOTES

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

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DRAWING No. 250714 A

Appendix B3: Inundation Maps

Drawings:

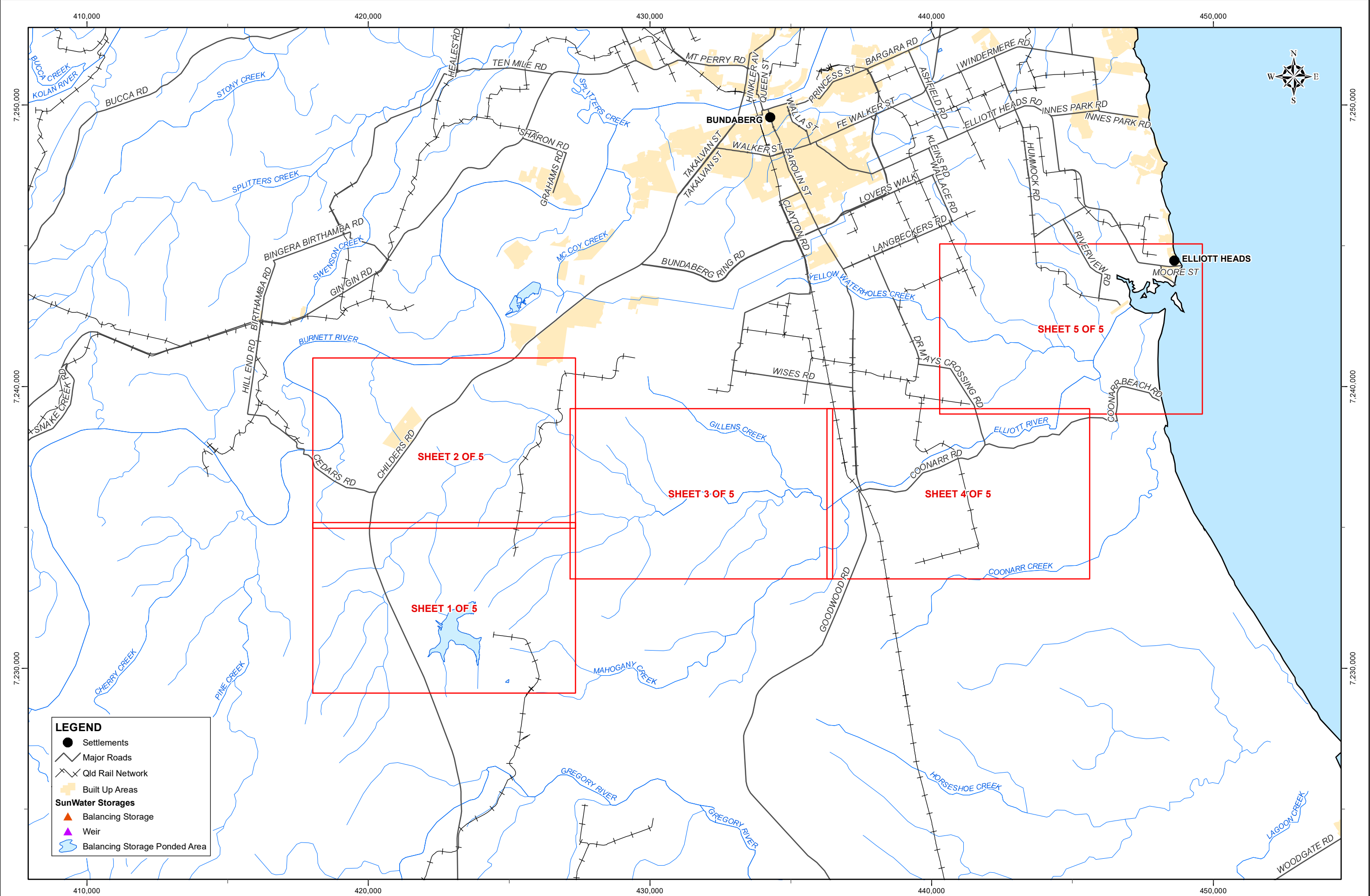
- Keymap
- SDF
- PMF

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MAP PRODUCED BY:
WATER RESOURCES AND DAM SAFETY
TEL: (07) 3120 0000



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29/11/18	A	ISSUED FOR USE		IDH	MGH
DATE		REMARKS		CKD	PSD

MAP INFORMATION	
Projected Coordinate System: Mapping Grid of Australia (MGA94) Zone 56.	
REFERENCE DRAWINGS	
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250012 - Probable Maximum Flood	

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CHECKED		CHECKED	MGH
APPROVED		M.G. HUGHES	
29/11/2018		RPEQ: 18351	



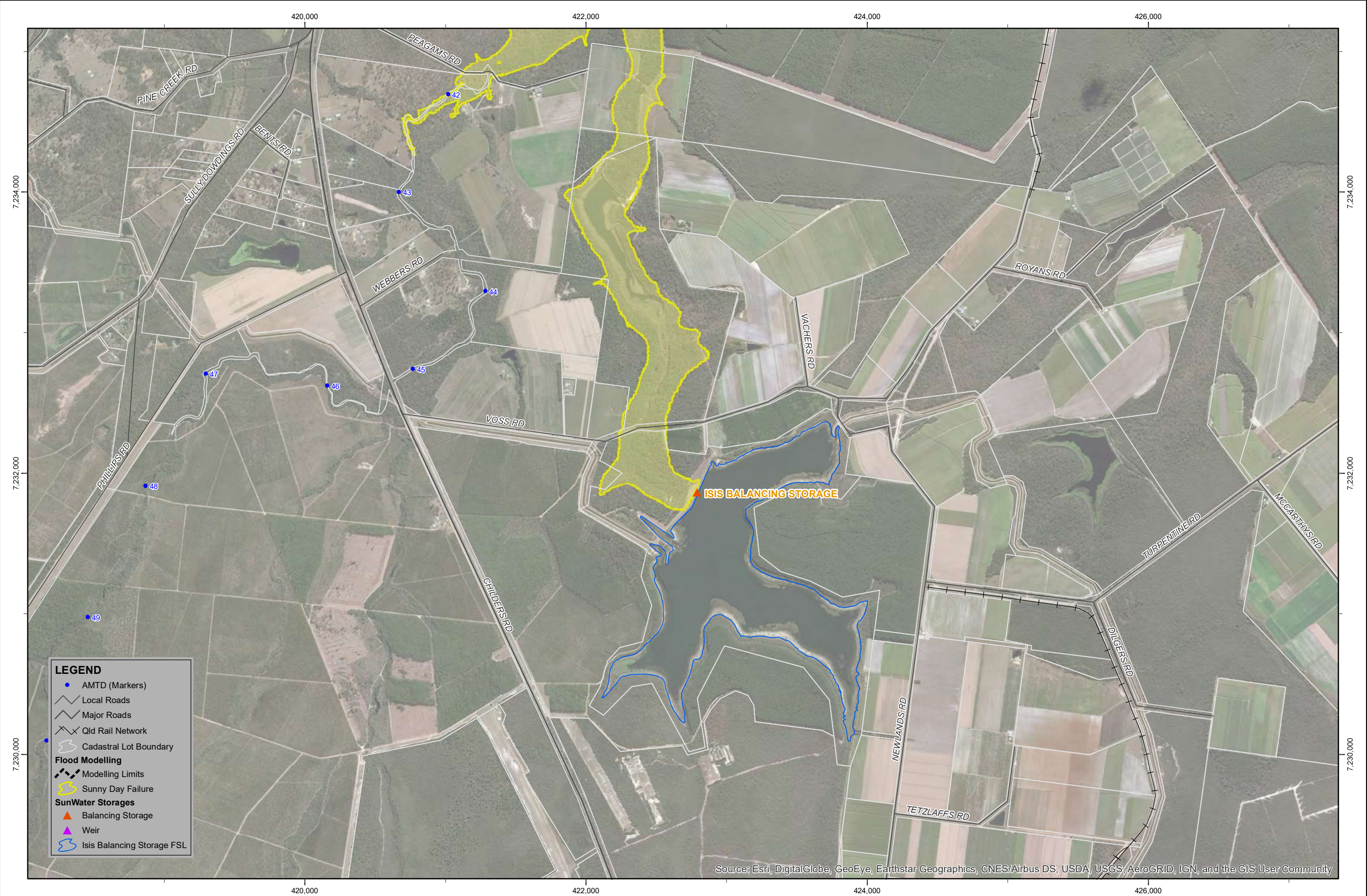
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CONTRACT NUMBER	
DRAWING NUMBER	REV.
250010	A
SHEET 1 OF 1	
DATE JUNE 2018	

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DATE		REMARKS		CKD	PSD

MAP INFORMATION	
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REFERENCE DRAWINGS	
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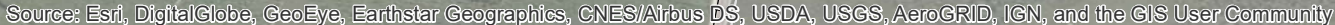
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APPROVED			
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DATE		JUNE 2018	

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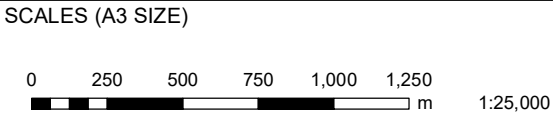


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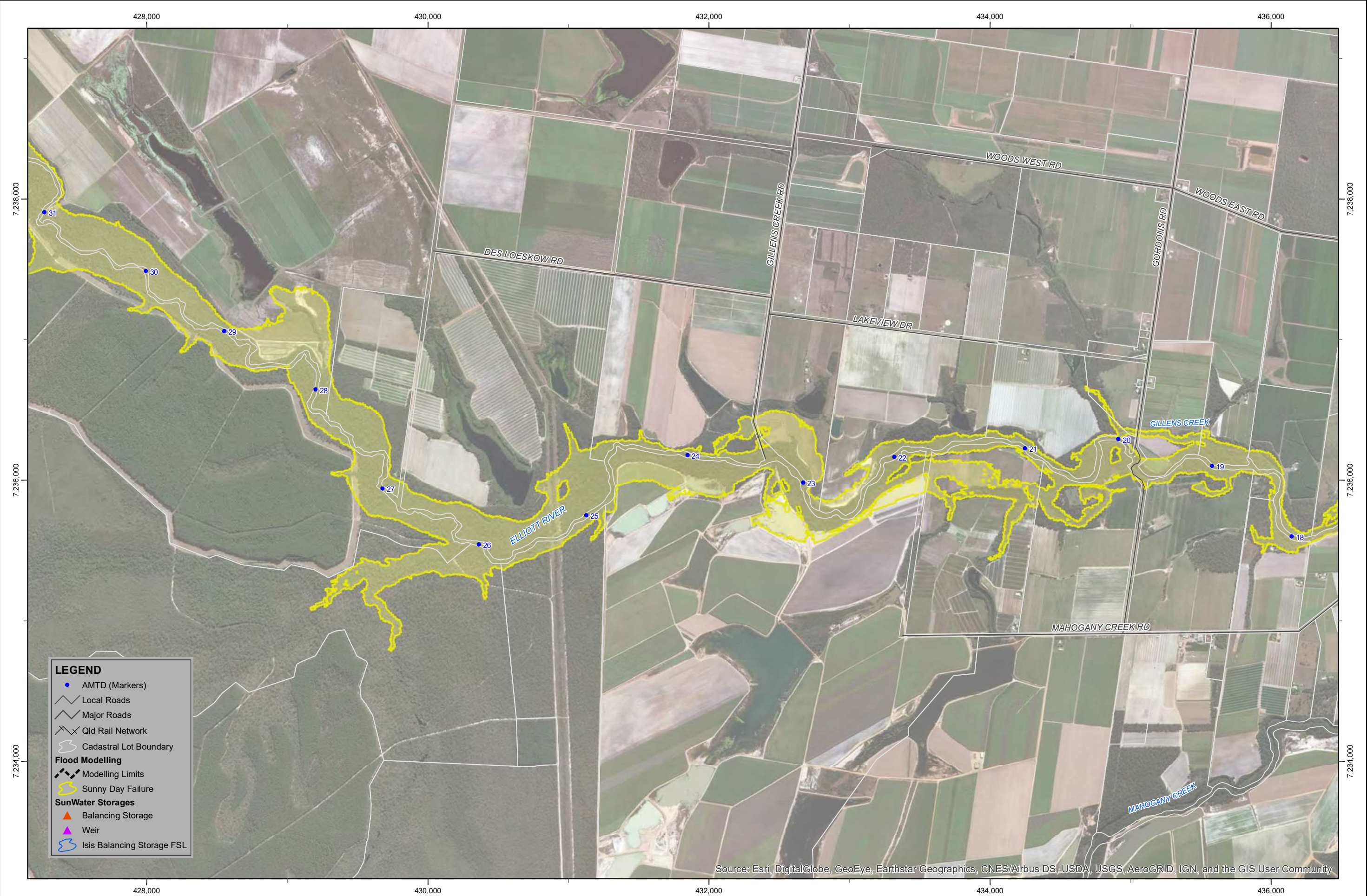
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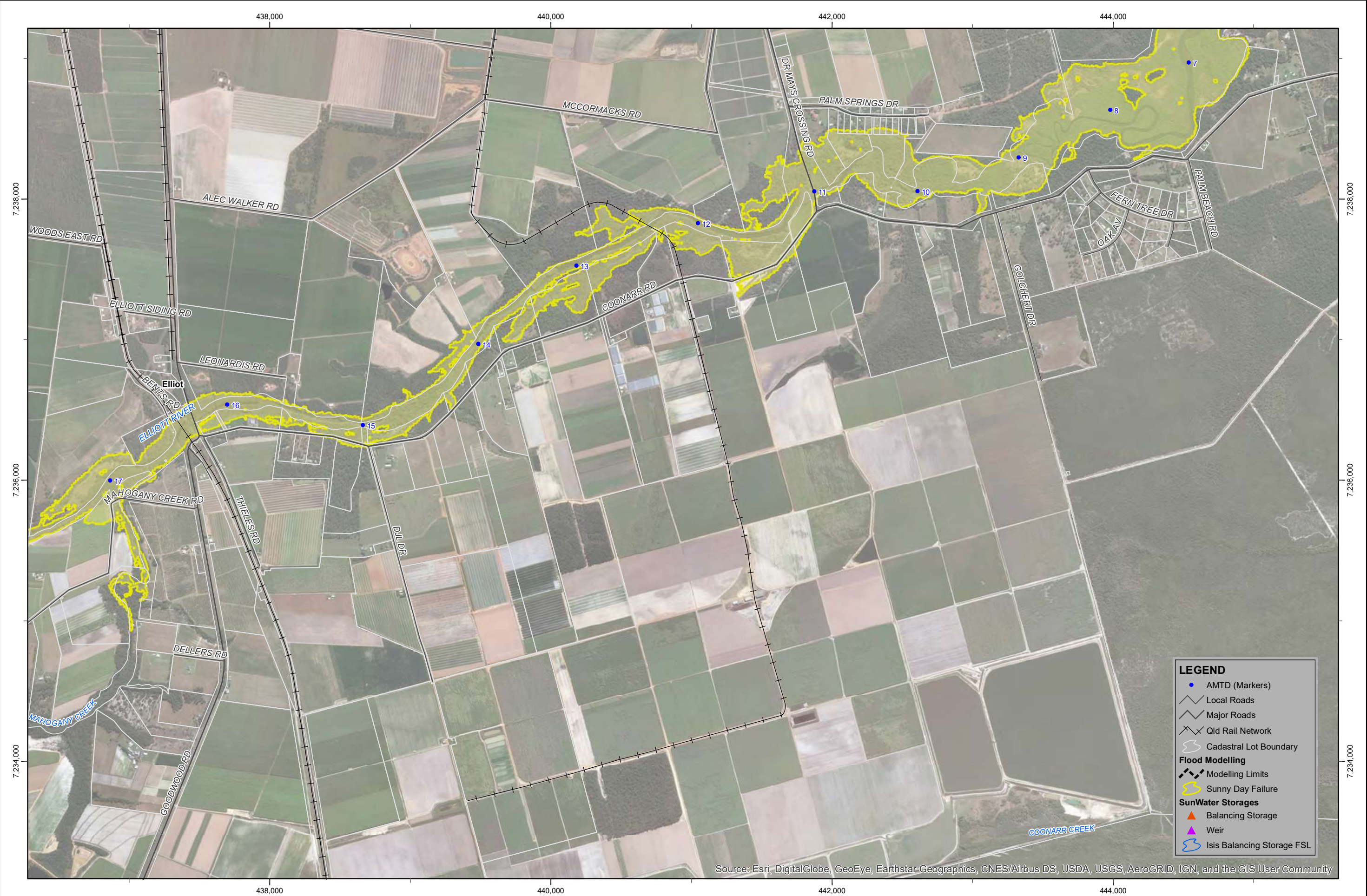
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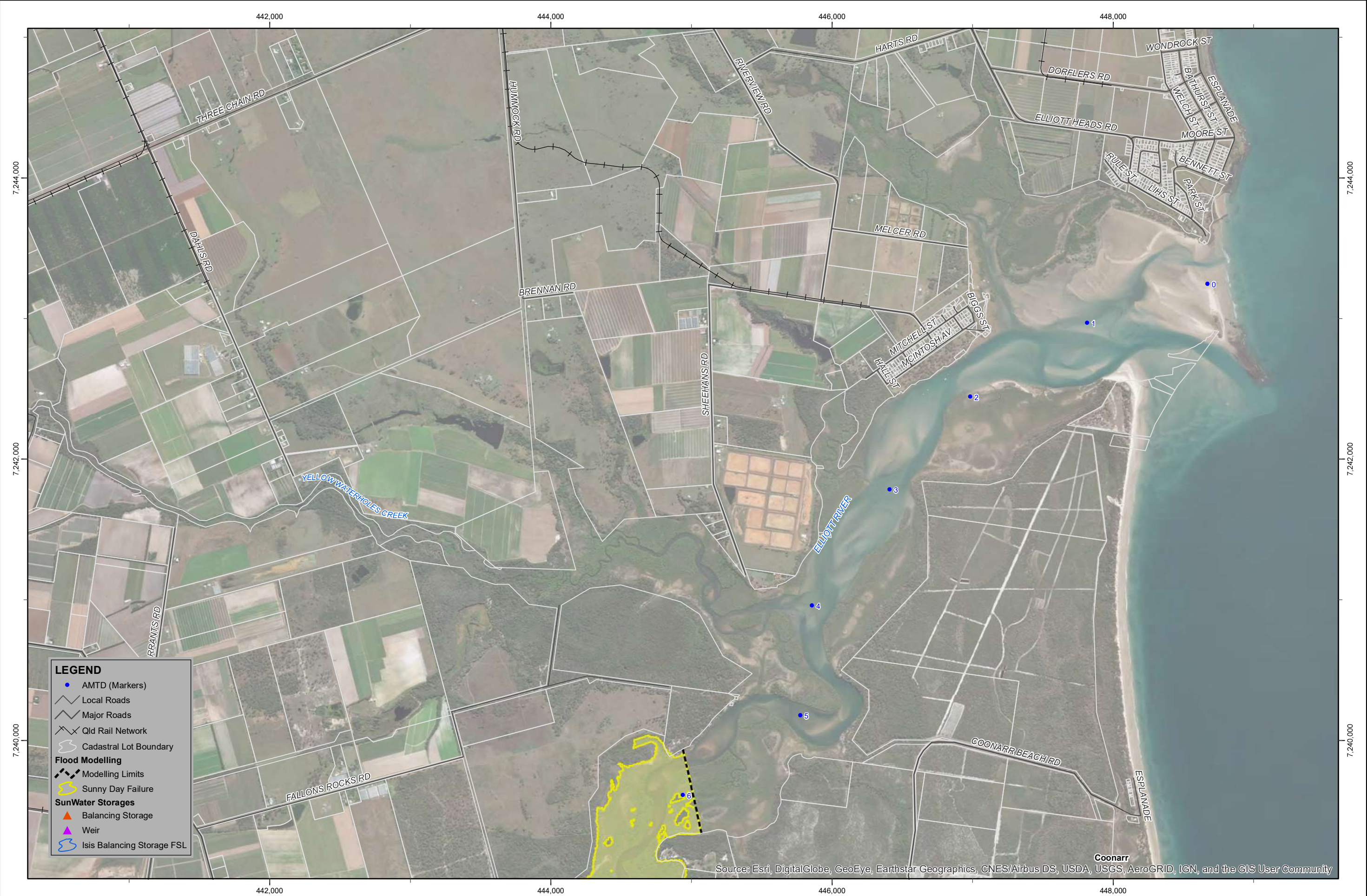
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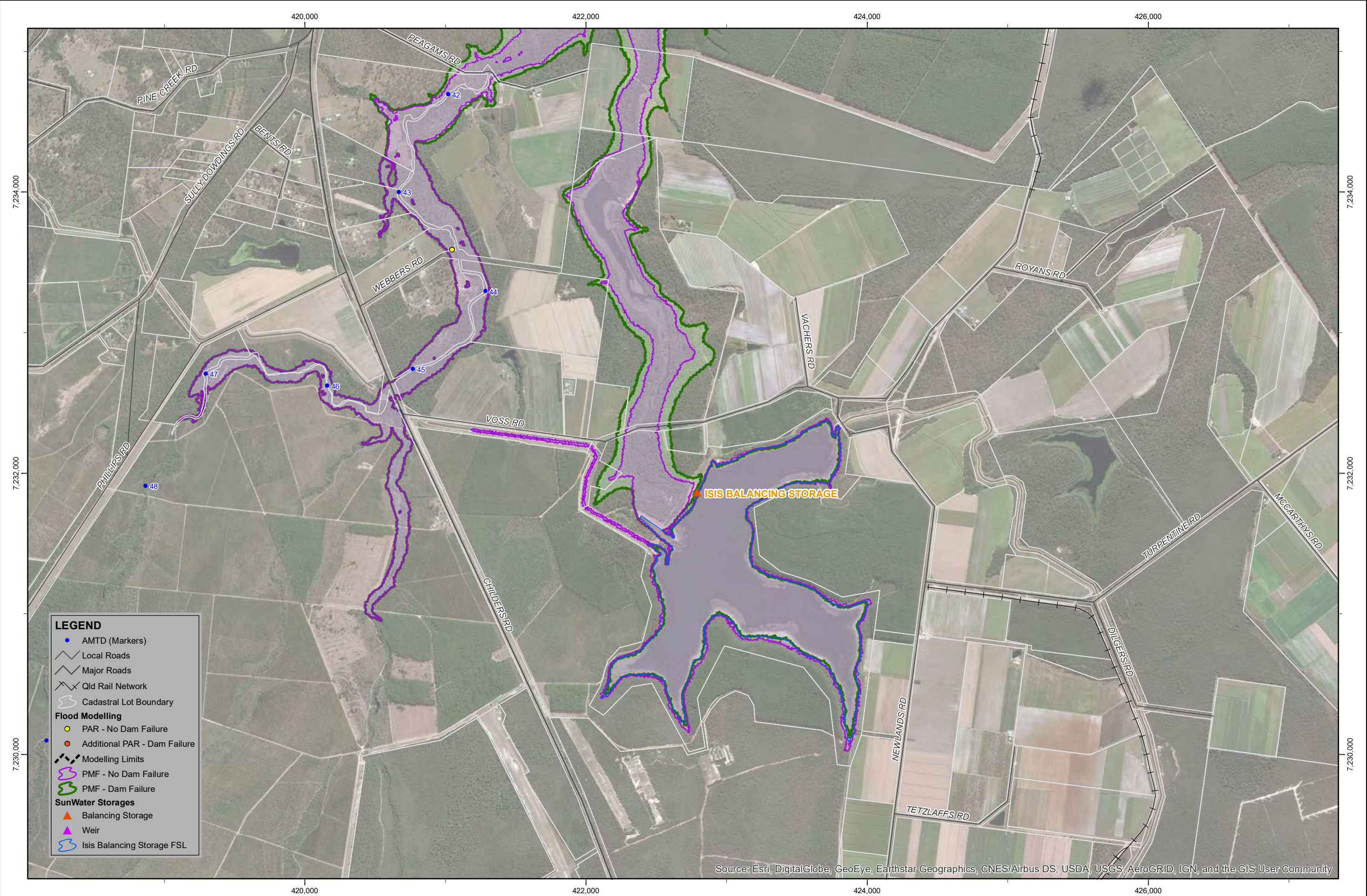


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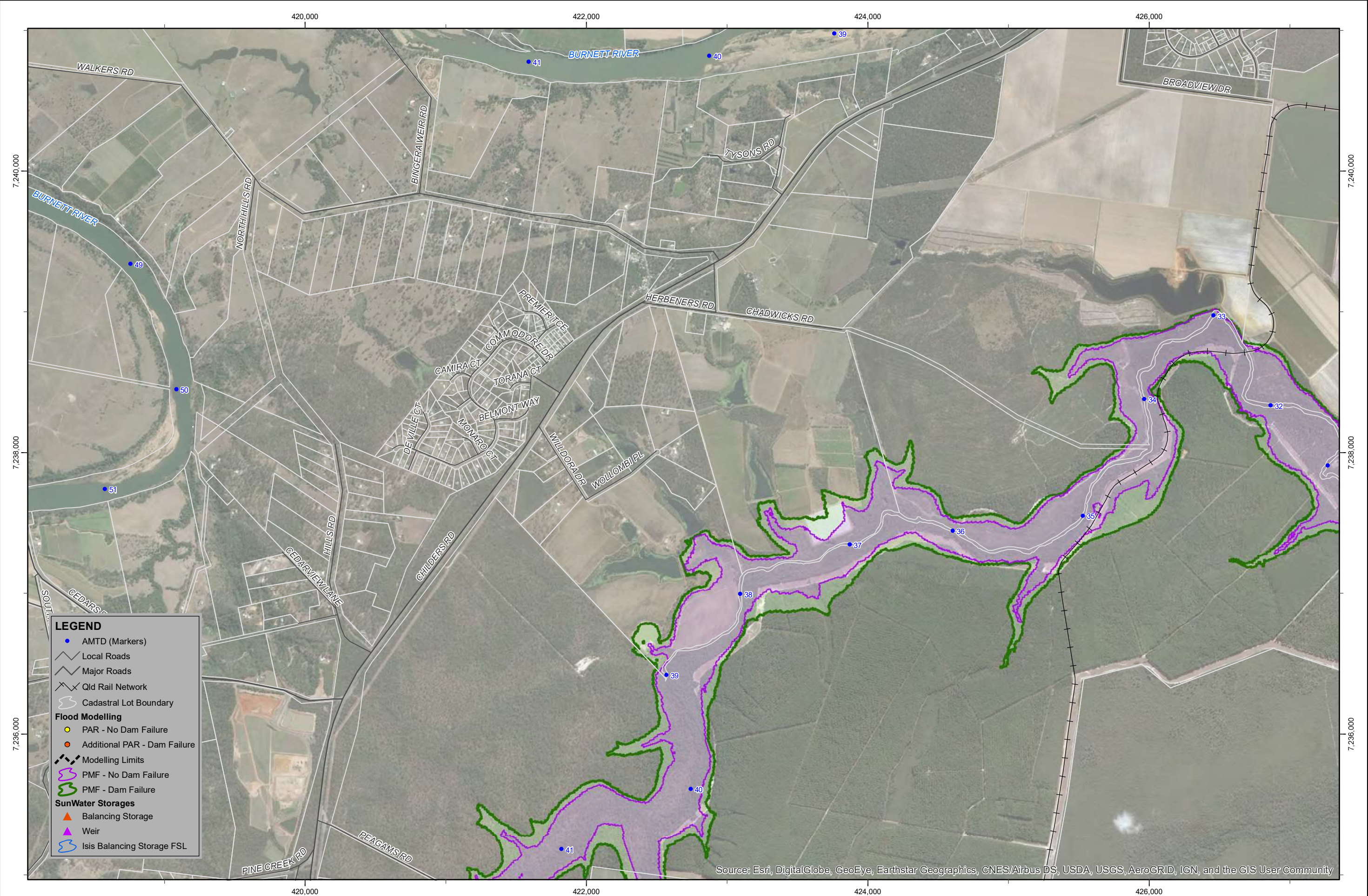
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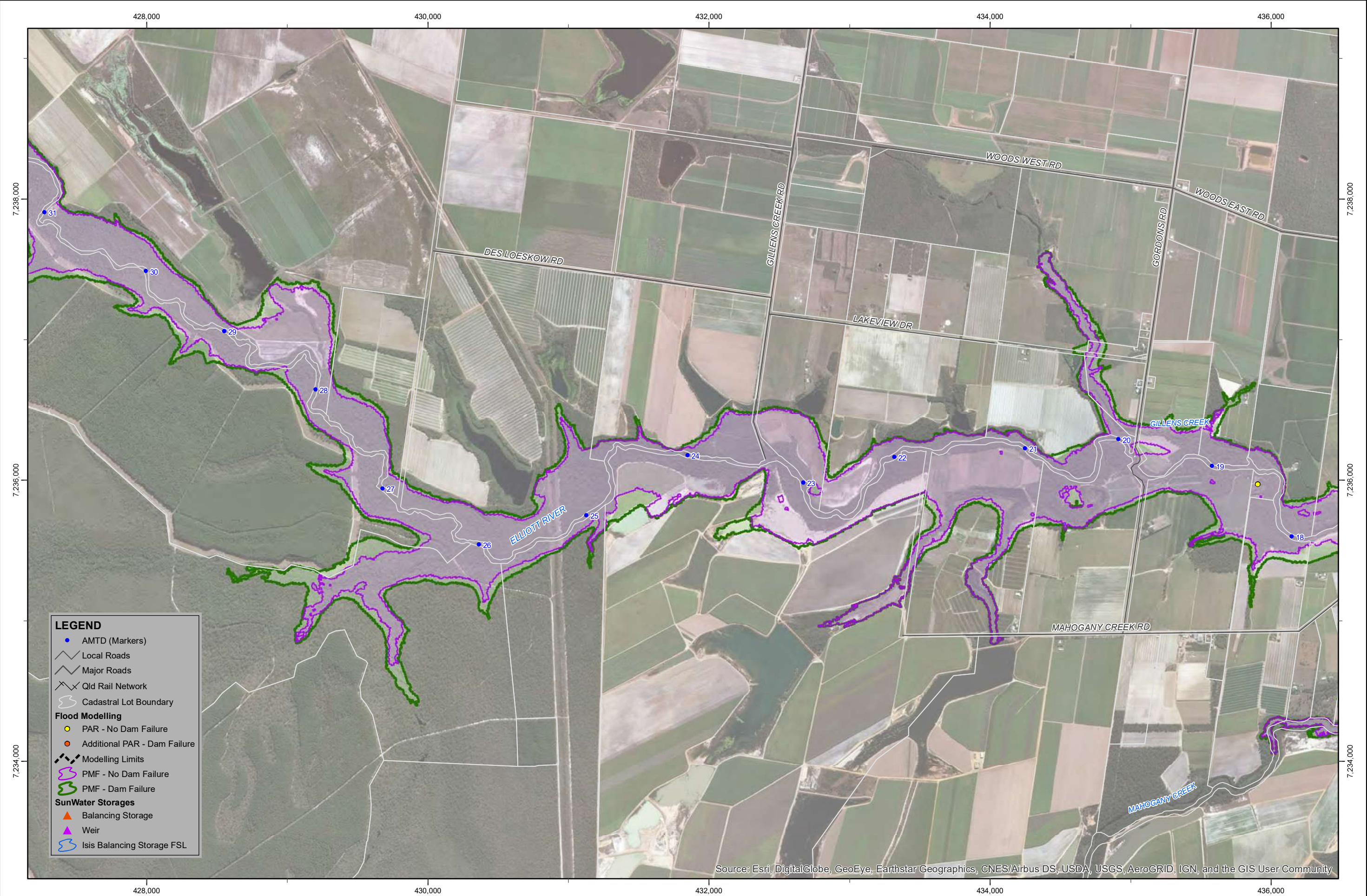


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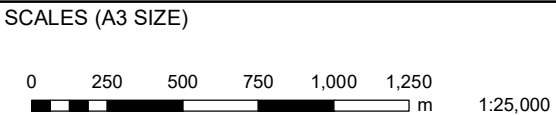
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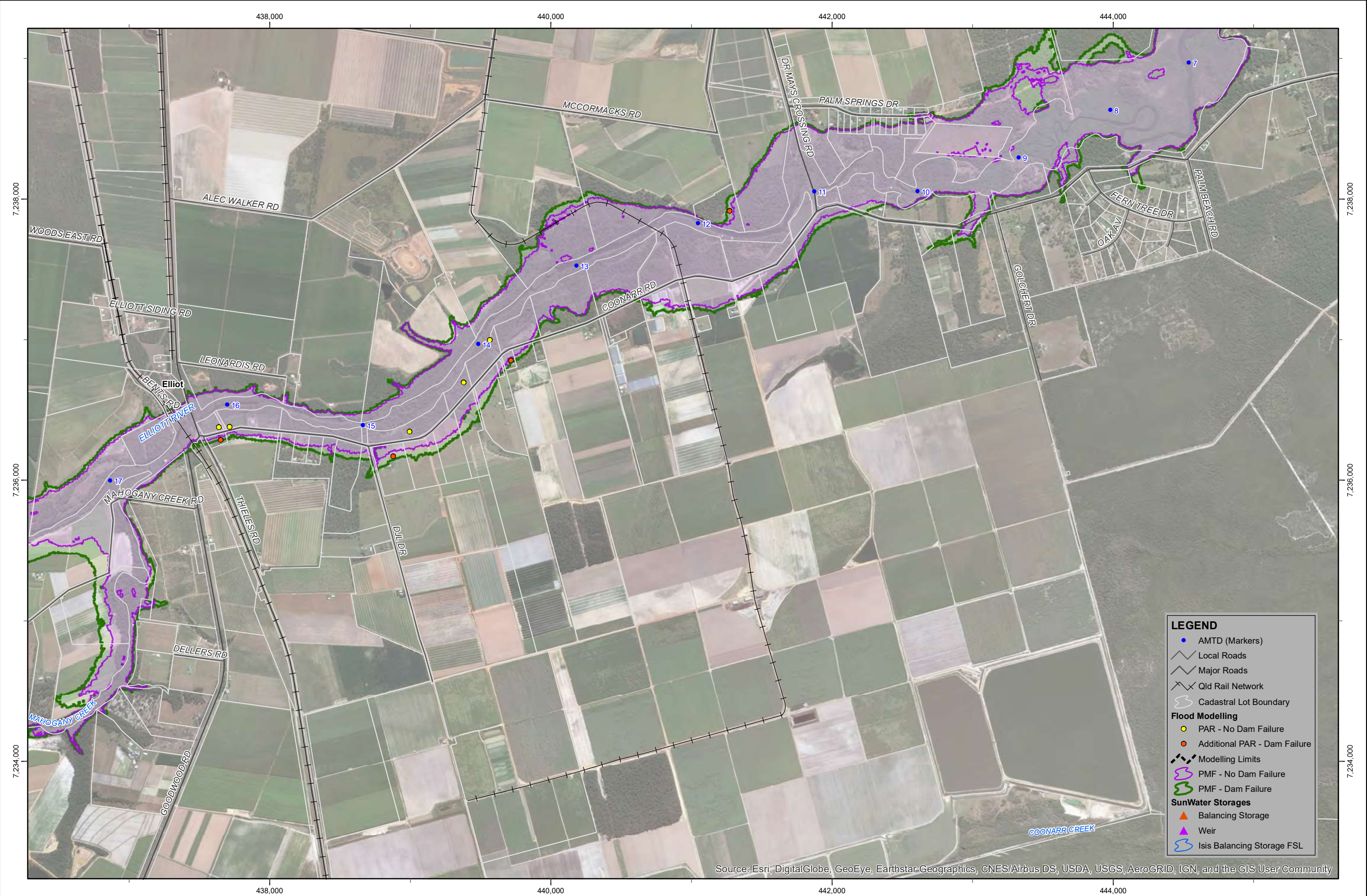


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LEGEND

- AMTD (Markers)
- Local Roads
- Major Roads
- Qld Rail Network
- Cadastral Lot Boundary
- Flood Modelling**
 - PAR - No Dam Failure
 - Additional PAR - Dam Failure
 - Modelling Limits
 - PMF - No Dam Failure
 - PMF - Dam Failure
- SunWater Storages**
 - Balancing Storage
 - Weir
 - Isis Balancing Storage FSL

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APPROVED **M.G. HUGHES**
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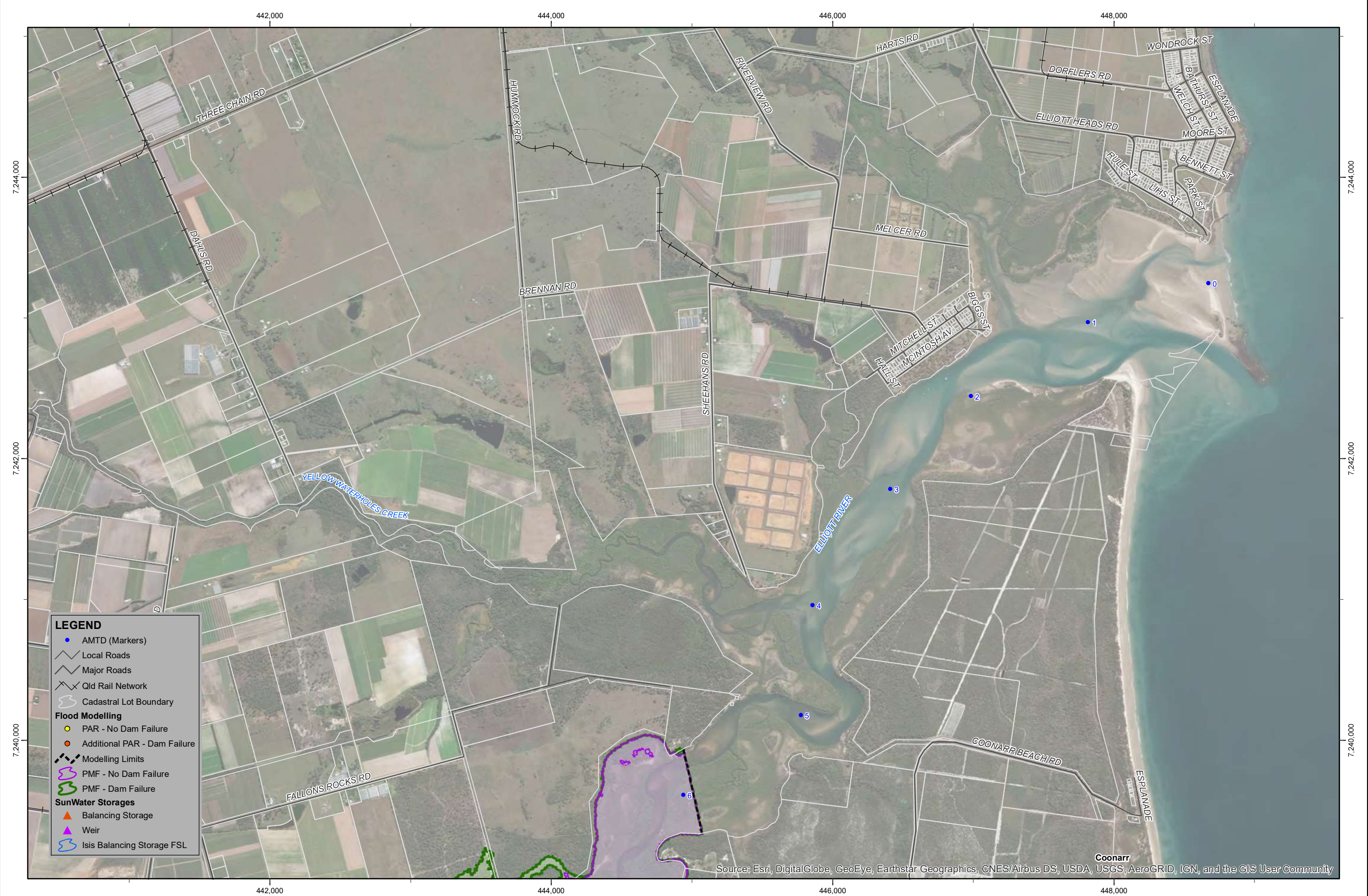
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DAM BREAK ANALYSIS 2017
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MAIN EMBANKMENT
INUNDATION PLAN**

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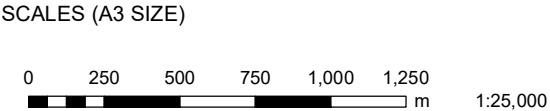


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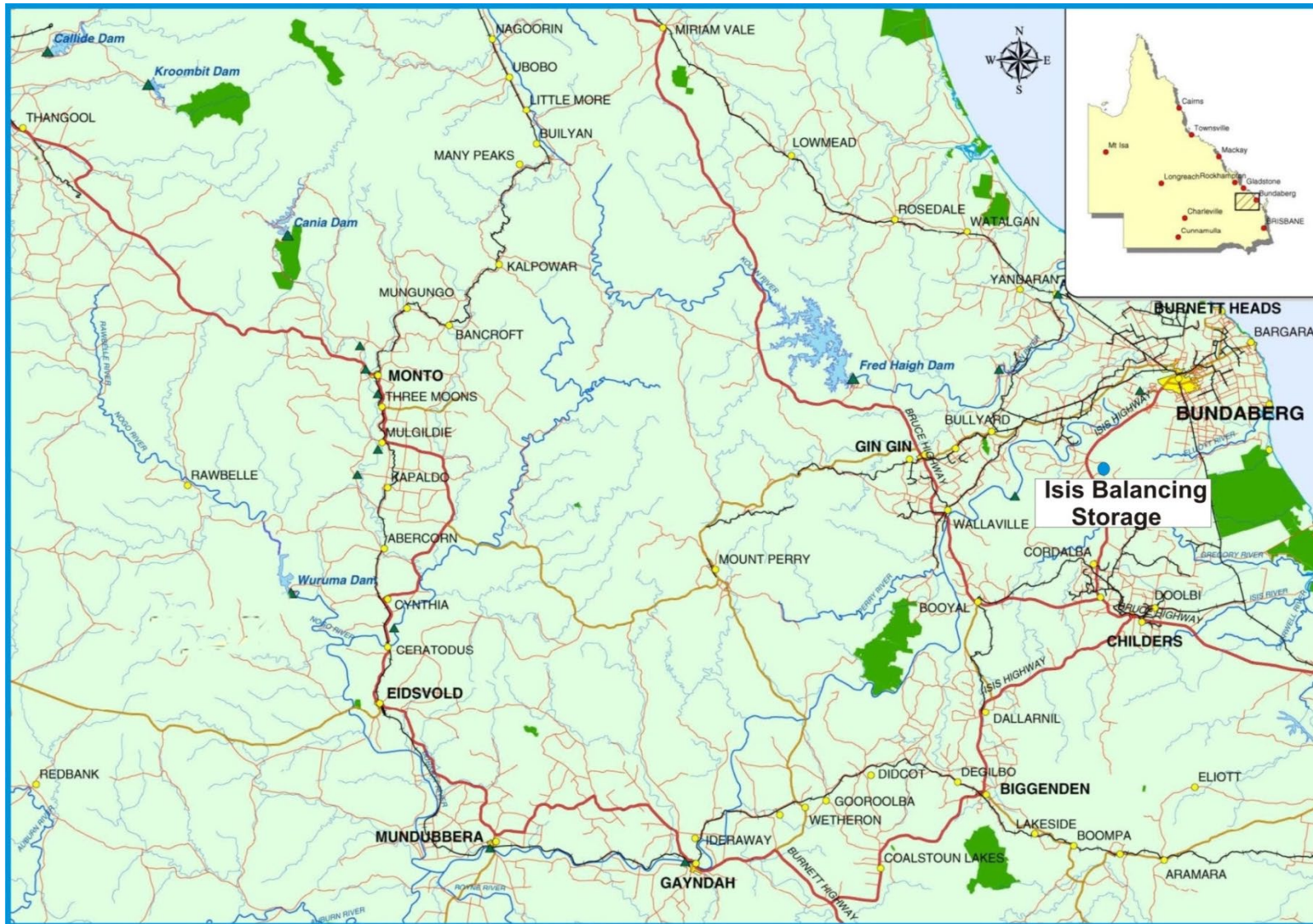


**ISIS BALANCING STORAGE
DAM BREAK ANALYSIS 2017
PROBABLE MAXIMUM FLOOD
MAIN EMBANKMENT
INUNDATION PLAN**

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Appendix B4: Locality plan

Figure B3: Isis Balancing Storage locality plan



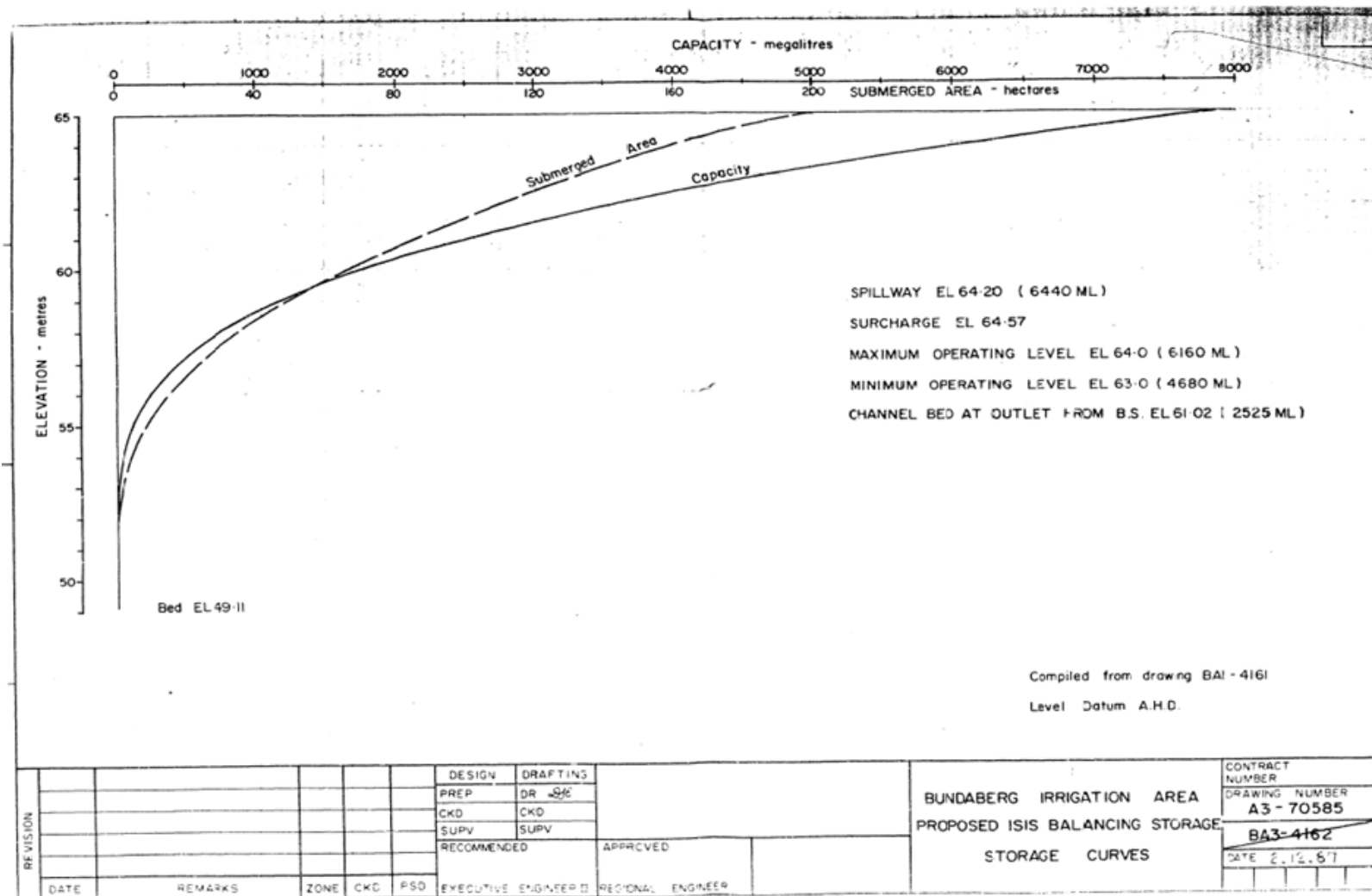
APPENDIX C Equipment and technical information

- C1 List of equipment available during an emergency
- C2 Isis Balancing Storage—storage curve

Appendix C1 has been redacted

Appendix C2: Isis Balancing Storage—storage curve

Figure C1: Isis Balancing Storage—storage curve



Appendix D Interaction with Local Government and District Groups

Annexe — Isis Balancing Storage 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. Isis Balancing Storage is releasing excess water. **People downstream of Isis Balancing Storage** should STAY INFORMED. Water flows from Isis Balancing Storage **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 danger yet. Call Triple Zero (000) if your life is in danger. Call the SES on 132 500 for flood help. Get full warnings and what you should do at <https://bit.ly/RecandSafety>

FLOOD WATCH AND ACT from Sunwater. Excess water releasing from Isis Balancing Storage has increased significantly. Water flows from Isis Balancing Storage may contribute to **dangerous/widespread flooding downstream**. Expect increased river flows in **6-12 hours / later today/ overnight/ tomorrow**. **People downstream of Isis Balancing Storage** must PREPARE TO LEAVE **in case the flood gets worse**. Tell others. Call Triple Zero (000) if your life is in danger. Call the SES on 132500 for flood help. Get full warnings and what you should do at <https://bit.ly/RecandSafety>

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