EMERGENCY ACTION PLAN — JULIUS DAM (ID 0297)

ISSUE: 8.2 — September 2024

Expiry: 1 May 2027

Prepared by Sunwater Limited

Controlled Copy No.

Gated: No	Staffed: Yes

Type: Multiple inclined arches, barrels, and buttresses

Project: Julius Dam EAP

File no.: 08-000369/001

Address: use Lat/Long details

Location: Lat. -20.128710° Long. 139.719777°
20°07'43.22"S 139°43'11.12"E

Approved by the delegate of the Chief Executive, Department of Regional Development, Manufacturing and Water until 1 May 2027.

Emergency activation quick reference – Dam Hazards

The Emergency Action Plan (EAP) for Julius Dam covers dam hazards evaluated within Sunwater's Dam Safety Management Program. Use the following table to select the relevant section of the EAP that deals with the dam hazard.

NOTE: The Incident Coordinator (IC) is responsible for activating the EAP unless otherwise directed by the Flood Operations Decision Maker (FODM) or Dam Safety Technical Decision Maker (DSTDM). Should the IC be unavailable, the Local Event Coordinator (LEC), Owner's Regional Representative (ORR) or Dam Duty Officer (DDO) is responsible.

Table 1: Emergency activation quick reference – Dam Hazards

Dam Hazards and section numbers	Activation levels for dam hazards			
	Alert	Lean Forward	Stand Up	Stand Down
Flood operations **See section 5**	• EL 223.44 m and rising (0.1 m below FSL)	• Storage above FSL 223.54 m	• Storage above EL 228.17 m	• Storage EL 223.54 m and falling with no forecast increase in EL for 48 hours
Overturning or sliding of concrete structure **See Section 6**	• Indications of movement of concrete structure noted such as cracking, increased seepage, or opening of joints OR • Storage above 225.50 m (potential for Nappe vibration above this level)	• Storage above EL 228.17 m (above flood of record), OR • Increase in movement, pressures, or seepage	• Storage above EL 232.68 m (non-overflow abutment) OR • Obvious displacement of one or more parts of the structure, OR • Evidence of scouring at or near toe of dam	• Risk assessment has determined that failure risk has reduced
Piping: embankment, foundation, or abutments **See section 7**	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• Piping condition has been established	• Risk assessment has determined that failure risk has reduced
Earthquake **See section 8**	• Earthquake confirmed or felt in the area, AND • Intensity less than 5 Modified Mercalli (MM)	• Earthquake confirmed or felt in the area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection	• Earthquake confirmed or felt in the area, AND • A possible failure path has been identified	• Risk assessment has determined that failure risk has reduced
Terrorist threat/ activity or high energy impact **See section 9**	• Not applicable	• Not applicable	• Possible terrorist activity noticed at dam or threat received • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit) • Failure in progress or likely due to impact or explosion, and sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced

CONTINUED NEXT PAGE

Emergency activation quick reference – Other Emergency Situations

The EAP for Julius Dam covers one other emergency situation evaluated within Sunwater's Dam Safety Management Program. Use the following table to select the relevant scenario that deals with the emergency situation.

NOTE: The IC is responsible for the decision to activate the EAP. Should the IC be unavailable, the LEC or DDO is responsible for the decision.

Table 2: Emergency activation quick reference – Other Emergency Situations

Other Emergency Situations and section numbers	Activation levels		
	Communications Failure – Dam Site (DDO)	Communications Failure – Local Area (LEC/ORR)	Communications Failure – Brisbane (IC/DSTDM)
	• Site managed (DDO – becomes LEC)	• Brisbane managed by IC	• Locally managed by LEC
	Activation triggers for other emergency situations		
Comms Failure **See section 10**	• Unable to communicate to or from dam site	• Unable to communicate to or from local area	• Unable to communicate to or from Sunwater Brisbane

Table of contents

List of Tables

List of Figures

Document control

Authorisation of document

Name	Position/Role	Signature/Date
[redacted]	EAP Program Lead — Prepared for submission	[redacted] 20/09/2024

Document revision history

Issue	Date	Prepared by	Reason for change	eDOCS#
2	May 2008		Significant changes of Julius Dam Emergency Action Plan to reflect Sunwater Management structure and other minor changes.	
3	November 2011		Significant changes to all sections of Julius Dam Emergency Action Plan to reflect current Sunwater Management structure and other changes.	
3C	September 2013		Amendments due to new legislative requirements	608280
4	August 2016		New Emergency Action Plan developed at expiry of 3E approval. Issued for consultation with Relevant Disaster Management Groups.	1872524
5	October 2017		New Emergency Action Plan with minor amendments including contact list updates.	2094857
6	October 2018		Revised and reviewed Emergency Action Plan developed at expiry of approval. Also includes updates that reflect the Water Legislation (Dam Safety) Amendment Act 2017, implementation of changes to Sunwater management structure, new event management roles and addition of new Emergency Activation section (Other Emergency Situations).	2094857
6.1	September 2019		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	2471171
7.0	May 2020		Revised and reviewed at expiry of approval. Error corrections and other non-substantive changes to improve readability and useability	2521705
7.1	September 2020		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	2560925
7.2	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 (1.9) and simplifying FODM role in Activation triggers (4.2.1) including removing para 4.2.2.	2653027
8.0	October 2022		Revised and reviewed at expiry of approval. Error corrections and other non-substantive changes to improve readability and useability. Incorporated global non-substantive EAP changes resulting from feedback from previous internal and external reviews. Amended to comply with the new Sunwater branding. Updated access and catchment maps. Updated messaging and Roles and Responsibilities. The Chemical Hazard section has been removed as it is not a Dam Safety Hazard and is dealt with in other more relevant documents.	2722767
8.1	September 2023		Added Fatigue Management as section 2.5. Removed Hazard Management Toolkit from Appendix D. Removed references to chemical spill. Added Annexe and amended messaging in communication tables to comply with AWS requirements. Non-substantive updates as part of Annual Safety Statement. Minor error corrections and readability improvements.	2813092
8.2	September 2024		Wet season preparedness – contact updates	2865432

Controlled document distribution list

Copy no.	Position	Location
1	Operator Maintainer	Sunwater, Julius Dam
2	Operations Manager, North West	Sunwater, Mt Isa
3	Emergency Action Plan Coordinator	Sunwater, Brisbane
4	Local Disaster Coordinator — Local Disaster Management Group (LDMG1)	Mount Isa City Council, Mount Isa
5	Local Disaster Coordinator—Local Disaster Management Group (LDMG 2)	Cloncurry Shire Council, Cloncurry
6	Local Disaster Coordinator—Local Disaster Management Group (LDMG 3)	Burke Shire Council, Burke
7	Local Disaster Coordinator—Local Disaster Management Group (LDMG 4)	Carpentaria Shire Council, Normanton
8	Officer in Charge – Cloncurry Police Station	Police, Cloncurry
9	Manager, Central Engineering	Mt Isa Mines, Mt Isa
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
District Disaster Coordinator —District Disaster Management Group (DDMG)	Police, Mt Isa
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	Water Supply (Safety and Reliability) Act 2008 (May 2020)	https://www.legislation.qld.gov.au/view/whole/pdf/inforce/current/act-2008-034
B	Emergency action plan for referable dam guideline (DRDMW 2021)	https://www.resources.qld.gov.au/__data/assets/pdf_file/0018/84015/eap-guideline.pdf
C	Queensland State Disaster Management Plan 2018 (Queensland's Disaster Management Arrangements)	https://www.disaster.qld.gov.au/cdmp/Documents/Queensland-State-Disaster-Management-Plan.pdf
D	Queensland Government arrangements for coordinating public information in a crisis	https://www.disaster.qld.gov.au/dmg/Response/Pages/5-6.aspx
E	Guidelines for the Development of Communication Education, Awareness and Engagement Programs (2010)	https://knowledge.aidr.org.au/media/1970/manual-45-guidelines-for-the-development-of-communication-education-awareness-and-engagement-programs.pdf
F	Queensland Emergency Alert Manual – M.1.174 (February 2022)	https://www.disaster.qld.gov.au/dmg/st/Documents/M1174-Queensland-Emergency-Alert-Manual.pdf
G	Sunwater website — Emergency Action Plans, Flood Maps and Dam Emergency Sirens	https://www.sunwater.com.au/community/preparing-for-weather-events/emergency-management/
H	Sunwater website — Emergency Notification Service	https://www.sunwater.com.au/community/preparing-for-weather-events/stay-informed/emergency-notification-service/
I	Professional Engineers Act 2002 (RPEQ)	https://www.legislation.qld.gov.au/view/pdf/inforce/2013-09-23/act-2002-054
J	Julius Dam Comprehensive Risk Assessment 2022	Link available only to Sunwater staff
K	Sunwater (internal) Standing Operating Procedure (SOP) 12 – Dam Log Books	SOP12 Dam Log Books
L	Sunwater (internal) Strategic Event Procedure	Strategic Event Procedure
M	Sunwater (internal) Julius Dam 5 Yearly Comprehensive Dam Safety Inspection	eDOCS #2513705
N	Queensland Disaster Management Act 2003 (December 2020)	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2003-091
O	Queensland Disaster Management Guidelines	https://www.disaster.qld.gov.au/dmg/Pages/DM-Guideline.aspx
P	Guidelines on Selection of Acceptable Flood Capacity for Dams (ANCOLD, 2000)	ANCOLD
Q	Queensland Dam Safety Management Guidelines (DRDMW October 2020)	https://www.dnrme.qld.gov.au/__data/assets/pdf_file/0007/78838/dam-safety-management.pdf
R	Australian Rainfall and Runoff (ARR) 2019	http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com/
S	Julius Dam, Safety Condition Schedule—June 2015 (Sunwater internal access only)	eDOCS #1740585
T	Sunwater (internal) Inundation/Flooding of Public Roads Policy	https://sunwater.sharepoint.com/:b:/r/sites/policies-and-standards/PoliciesAndStandards/Public%20Safety%20Management%20Procedure.pdf?csf=1&web=1&e=jQQzGK
U	Sunwater (internal) Blue Green Algae (BGA) Monitoring Program Manual (EM29)	https://sunwater.sharepoint.com/:b:/r/sites/policies-and-standards/PoliciesAndStandards/EM29%20Blue-Green%20Algae%20Monitoring%20Procedure.pdf?csf=1&web=1&e=9aP7bu
V	Water Act 2000	https://www.legislation.qld.gov.au/view/pdf/2017-07-03/act-2000-034
W	Sunwater (internal) Julius Dam Operation and Maintenance Manual	Julius Dam Operation and Maintenance (O&M) Manual
X	Guidelines on Dam Safety Management (ANCOLD, 2003)	ANCOLD ISBN: 0-731027620
Y	Guidelines on Consequence Categories for Dams (ANCOLD, 2012)	ANCOLD ISBN: 978-0-9808192-5-0

Ref	Document title	Reference/location
Z	Guideline for Failure Impact Assessment of Water Dams (DNRME 2018)	https://www.resources.qld.gov.au/__data/assets/pdf_file/0005/78836/guidelines-failure-impact-assessment.pdf
AA	Fatigue Management Procedure WHS42 (Sunwater internal)	https://sunwater.sharepoint.com/sites/policies-and-standards/PoliciesAndStandards/WHS42%20Fatigue%20Management%20Procedure.pdf

1.2 Abbreviations and acronyms

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

1.3 Business Terms and definitions

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

Term	Definition
Terms defined in accordance with the Water Supply (Safety and Reliability) Act 2008 (the Act) (ref A)	
Dam hazard	Means a reasonably foreseeable situation or condition that may: • cause or contribute to the failure of the dam, if the failure may cause harm to persons or property, OR • require an automatic or controlled release of water from the dam if the release of the water may cause harm to persons or property. • NOTE: Various dam failure modes have been referred to as *hazards* in this document e.g. piping, instability, and overtopping.
Dam hazard event	Means an event arising from a *dam hazard* if: • persons or property may be harmed because of the event, AND • a coordinated response, involving two 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 District Disaster Management Plan (DDMP) or local government's Local Disaster Management Plan (LDMP) under ref O
District group	For an EAP, means a district group established under ref O, section 22 whose disaster district under that Act could, under the plan, be affected by a *dam hazard*.
Emergency event	Means an event arising from a *dam hazard* if: • persons or property may be harmed because of the event, AND • any of the following apply: o a coordinated response, involving two or more of the following *relevant entities*, is likely to be required; each *local group* and *district group* for the EAP, each local government whose area may be affected, the Chief Executive, another entity the owner of the dam considers appropriate, OR o the event may arise because of a disaster situation declared under ref O, OR o 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	For an EAP, means a local group established under ref O , 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*.
Referable dam	A dam, or a proposed dam after its construction, will be a referable dam if: • a failure impact assessment of the dam, or the proposed dam, is carried out under the Act, AND • the assessment states the dam has, or the proposed dam after its construction will have, a category one or category two failure impact rating, AND • the Chief Executive has, under section 349 of the Act, accepted the assessment. Also, a dam is a referable dam if: • under section 342B of the Act, the owner of a dam is given a referable dam notice and, before the effective day for the notice, does not give the Chief Executive a failure impact assessment for the dam, AND • the Chief Executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam.
Relevant entity	Means each of the following under the EAP for the dam: • the persons who may be affected, or whose property may be affected, if a *dam hazard event* or *emergency event* were to happen for the dam, e.g. the owners of parcels of farmland adjacent to the dam or residents of a township • each local group and district group for the EAP • each local government whose local government area may be affected if *a dam hazard event or emergency event* were to happen • the Chief Executive

Term	Definition
	• another entity the owner of the dam considers appropriate e.g. the Queensland Police Service (QPS).
Terms consistent with Queensland Disaster Management Guidelines (ref P)	
Activation levels	The four levels of EAP activation are: • **Alert:** A heightened level of vigilance due to the possibility of an event occurring. No further action may be required; however, the situation should be monitored by someone capable of assessing the potential of the threat. Moving to an Alert level indicates the dam owner is getting ready to activate the Lean Forward level of the EAP if the situation deteriorates. • **Lean Forward:** An operational state characterised by a heightened level of situational awareness of an impending disaster event and a state of operational readiness. Disaster coordination centres are on standby and prepared but not activated. • **Stand Up:** The operational state where resources are mobilised, personnel are activated, and operational activities commenced. Disaster coordination centres are activated. The dam owner needs to provide an Emergency Event Report (EER) in accordance with the provision of the Act. • **Stand Down:** Transition from responding to an event back to normal core business and/or continuance of recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present. The movement through these levels of activation is not necessarily sequential. It should be applied with flexibility and adaptability and be tailored to the location and event. Triggering one of these levels of activation may not necessarily mean a similar activation of LDMGs or DDMGs.
Bureau of Meteorology flood level classifications	The three levels of flooding are: • **Minor flooding:** This causes inconvenience such as closing of minor roads and the submergence of low-level bridges and makes the removal of pumps located adjacent to the river necessary. • **Moderate flooding:** This causes the inundation of low-lying areas requiring the removal of stock and/or the evacuation of some houses. Main traffic bridges may be closed by flood waters. • **Major flooding:** This causes inundation of large areas, isolating towns and cities. Major disruptions occur to road and rail links. Evacuation of many houses and business premises may be required. In rural areas widespread flooding of farmland is likely.
Concurrent Flooding	Flood flows downstream of a dam that are not a result of dam outflows; for instance, those from adjacent catchments or from the sea, and which occur in the same period as downstream releases or flooding from the dam.
Dam crest	The lowest elevation of the non-overflow crest section of the dam excluding handrails, parapets or wave walls that have not been designed to store water.
Dam crest flood	The flood event which, when routed through the reservoir, results in a still water reservoir level equivalent to the lowest dam crest level.
Dam failure	Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.
Downstream releases	Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam.
Earthquake	A sudden release of energy in the earth's crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity, resulting in the generation of seismic waves that can be destructive. The potential consequences of an earthquake include: • settlement, sliding, or overturning of monoliths in the dam wall • initiation of seepage lines in the foundations or abutments that could lead to piping damage and potential inoperability of appurtenant works.
Flood release	A flood release from a dam occurs when catchment inflows raise the storage level above the Full Supply Level (FSL) resulting in a discharge from the spillway of the dam.
Piping	Internal scour caused by the water flow and seepage that occurs through earth dams, dam foundations, or dam abutments. The internal scour can lead to the formation of a pipe, which can lead to a failure of the dam.
Plane strike or other impact	The impact of a plane, meteorite, or other high energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam.
Plane strike or other impact	The impact of a plane, meteorite, or other high energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam.
Probable maximum flood	The flood resulting from the *probable maximum precipitation* coupled with the worst flood-producing catchment conditions that can be realistically expected in the prevailing meteorological conditions.

Term	Definition
Probable maximum precipitation	The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin.
Probable maximum precipitation design flood	The flood resulting from the *probable maximum precipitation* coupled with typical catchment conditions.
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	A failure that occurs at the FSL and there is no concurrent rain associated flooding.
Terrorist activity	A deliberate attempt to damage, fail or contaminate a dam.

2. Introduction

2.1 Context

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

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

Summary of legal requirements – Section 352H

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

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

- identify the area likely to be affected by a dam hazard event or emergency event arising from the dam hazard
- identify each circumstance that indicates a material increase in the likelihood of the dam hazard event or emergency event happening
- 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
- 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
- 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 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 Julius Dam has been assessed as **Mount Isa City Council, Cloncurry Shire Council, Burke Shire Council and Carpentaria Shire Council.** Sunwater has provided all four councils the 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 Julius Dam is **Mount Isa District Disaster Management Group (DDMG)**. Sunwater has provided the DDMG with a copy of the draft EAP for review.

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.

2.2 Purpose

The purpose of this EAP is to:

- enable the dam owner and the LDMG to respond to dam hazard events or dam emergency events in a timely and effective manner
- minimise the risk of harm to persons or property if a dam hazard event or dam emergency event for the dam happens
- identify dam hazards that could occur at Julius Dam and the area likely to be affected for each hazard
- 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 Julius Dam at the one time. In such a circumstance, it may be necessary to act on the procedures within separate sections simultaneously.

The focus of this EAP is the management of dam hazards at Julius Dam by the owner of the dam (Sunwater) and the communication and notification of dam hazards to the LDMGs, DDMGs and broader community. However, the EAP sits within the broader emergency response framework. This EAP has been developed to be consistent with and support the objectives of the Mt Isa, Cloncurry Shire, Burke Shire and Carpentaria Shire Councils' Local Disaster Management Plans (LDMP).

2.3 Scope

The Julius Dam EAP covers:

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

2.4 Sunwater training

Training of the use and implementation of this EAP document is carried out at various times throughout the year. Specific pre-wet season training is undertaken leading up to the wet season. During this period, Sunwater staff complete work instructions for site preparations and from July to September carry out checks on; stores, supplies of fuel and the current EAP such as contact details for individuals and dam information.

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

NOTE: All enquiries regarding EAP training should be directed to

Sunwater is also working towards carrying out exercises involving each local authority and disaster management stakeholders. Where there is more than one referable dam in a local area, the exercise could involve more than one dam, or the location will be rotated. This full test would involve the State Disaster Coordination Centre (SDCC) and include the (non-live) testing of Emergency Alerts (EAs). The test results relating to numbers of alerts generated will be shared with local authority and disaster management stakeholders.

2.5 Fatigue Management Plan

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

2.6 Community information

Sunwater with the assistance of the local councils will ensure community education around messaging and impacts of the EAP and its related events is undertaken and continually improved by incorporating actions from Lessons learnt (section 2.7).

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

Notifiable D/S residents are also provided information in text messages, phone calls and emails in the event of an activation of this EAP.

In the event of an emergency event or when otherwise required, Sunwater and the affected local government also have the use of the National Emergency Alert System to send a voice message and SMS. This service is provided by Telstra and managed by Queensland Police Service FService (QPS) at the SDCC. The process Sunwater follows is documented in Appendix A8.

A copy of all Sunwater approved EAPs are available to the public on the Sunwater website (ref G). These copies are redacted to protect people's personal details.

2.7 Lessons learnt

Sunwater carries out Lessons Learnt workshops as part of its post event management. These Lessons Learnt can result in changes to the EAP. These are captured and if applicable to this document are implemented at the earliest opportunity and are made available in the next EAP update to the Dam Safety Regulator (DSR) 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 Department of Regional Development, Manufacturing and Water (RDMW) as appropriate.

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

2.8 Downstream notification lists

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

2.9 Dam hazard management within Sunwater

Key aspects of the dam hazard management framework are:

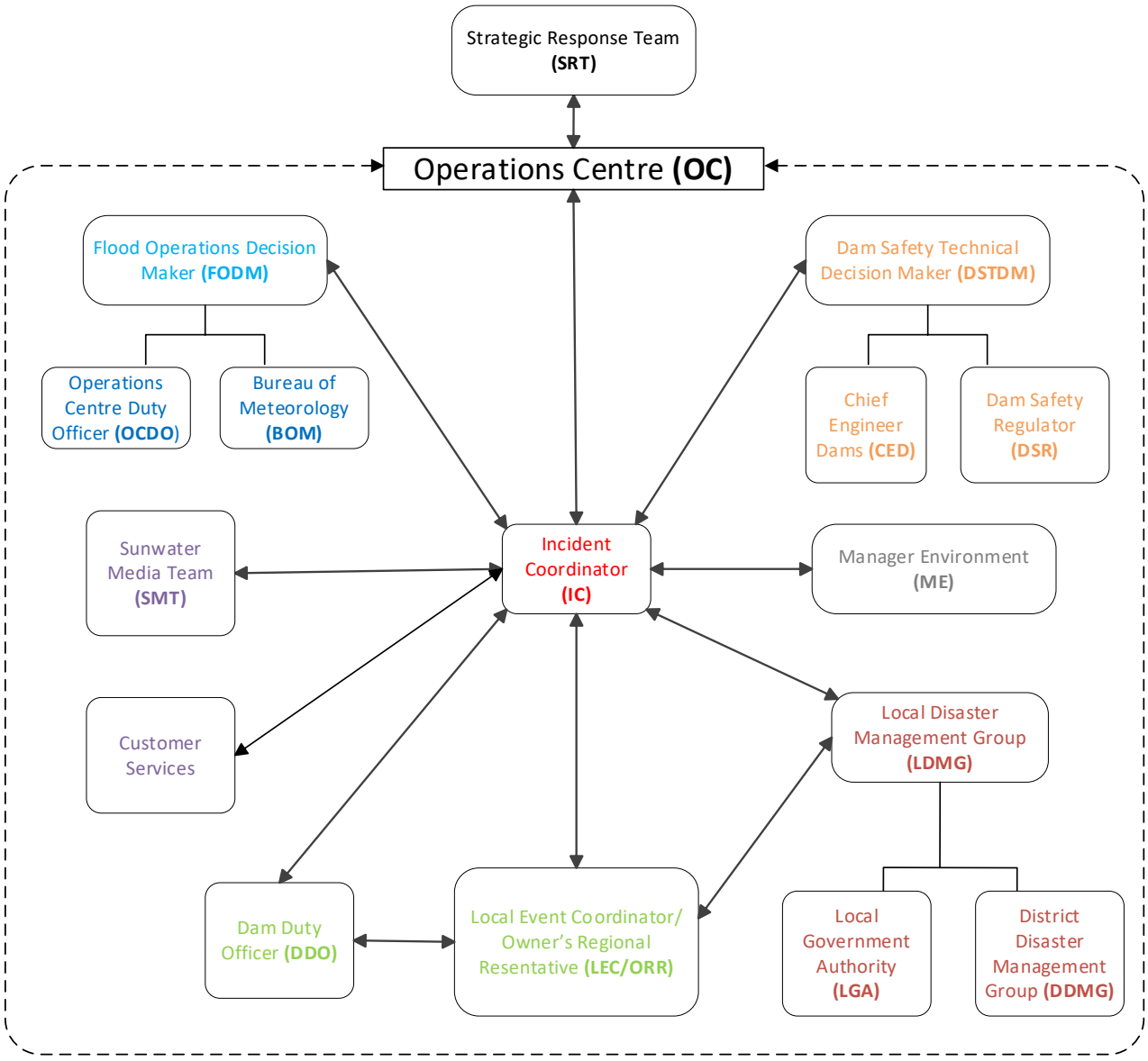
- Central to the framework is the role of IC for any dam hazard at a dam. The IC will maintain overall responsibility for a coordinated response to the dam hazard incident.
- The IC is responsible for activating the EAP when the dam reaches an EAP activation level, unless instructed to activate by the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

risk, guidance has been provided to assist with mitigating this risk in Section 10 (Other emergency situation — communications failure).

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

The Sunwater dam hazard management framework is illustrated in Figure 1 below.

Figure 1: Sunwater dam hazard management framework



3. Roles and responsibilities

Roles and responsibilities	Position holder
Owner (Sunwater) • Liaise with the Board and Minister. • Execute Sunwater Strategic Event Procedure (ref M) and Business Continuity Plans, if required. • Ensure necessary resources are available to manage any event. • Maintain an up-to-date list of notifiable D/S residents (Appendix A4 and Appendix A5) of Julius Dam. The downstream limit is indicated in the drawing in Appendix B2 by the zone labelled *Limit of downstream notification area*. • At all times, aim to provide timely advice and support to the LDMGs in the affected local government areas and the DDMGs in the affected disaster districts. • During a dam hazard emergency event that occurs with little or no warning, undertake the following actions to ensure the community is informed as soon as possible: o notify the residents listed in Appendix A4 and Appendix A5 via SMS o contact SDCC Watch Desk to request an Emergency Alert campaign throughout the Julius Dam Emergency polygons • During a dam hazard event that occurs with adequate warning; notify the residents listed in Appendix A4 and Appendix A5 via SMS, **unless otherwise agreed with the LDMGs**. • Record communications, notifications and observations as required.	CEO EGMO EGM E&WR
Strategic Response Team (SRT) • Facilitate the assessment, escalation and notification and management of strategic response and recovery for a high or extreme risk, or impact, event. Responsible for the following key activities: o initial and ongoing assessment of event status and requirements o development, and revision of, strategic objectives based on requirements o identifying, managing, and monitoring strategic risks o monitor media and stakeholder/customer impacts o managing/overseeing event communications including media, stakeholder, customer, and internal communications • Record communications, notifications and observations as required.	Various ELT members as per SRT roster
Owner's Head Office Representative • Authorise the issuing of EAPs, SOPs and O&M Manuals and amendments. • Facilitate Dam Safety Training Courses for Service Managers, Operations Supervisor, Dam Operators, and other staff as appropriate and ensure that all staff required to undertake Dam Safety work are trained and accredited. • Ensure that risks identified in CRAs or other technical reports undertaken in relation to Dam Safety are included in the EAP. • Ensure visual inspections and instrumentation monitoring frequencies conform to ANCOLD Guidelines. • Ensure all Dam Safety work orders, work instructions and lesson learned outcomes are fully implemented. • Ensure requirements of the Dam Condition Schedule (ref T) met • Ensure the work instructions are correct and the Logbooks, SOPs, Data Books and EAPs are reviewed annually as per ref N. • Undertake and prepare the 5 yearly Comprehensive Inspection Reports with suitably qualified personnel within the time specified in ref N 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 ref N 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.	SCED PDSE MAP
Owner's Regional Representative (ORR) • Liaise with the Storage Supervisor/Operator Maintainer • Arrange dam specific training and accreditation for relevant staff • Ensure competent, trained, and accredited personnel operate the storages • Undertake the role of LEC as required: o liaise with the Local Disaster Coordinator (LDC) or proxy o activate the EAP, when necessary o ensure the EAP is implemented appropriately and carry out the LEC role as required	GM North OCO OS

Roles and responsibilities	Position holder
• Ensure all work orders, work instructions and lesson learned outcomes are fully implemented • Record communications, notifications and observations as required.	
Technical Advisor • Analyse the situation and provide expert technical advice. • Discuss issues with peers and other technical experts and make sound decisions to mitigate the risk • Determine response to incidents and emerging issues. • Record communications, notifications and observations as required.	GM Environment
Dam Safety Technical Decision Maker (DSTDM) • Maintain current RPEQ accreditation. • Analyse the situation and provide expert technical advice in relation to Dam Safety. • Discuss dam hazards with peers and other technical experts and make sound decisions to reduce the risk. • Determine response to dam safety incidents and emerging issues. • Issue warning on dam failure and advise on potential remedial measures. • Liaise with DSR as required. • Ensure the EAP is implemented appropriately from a dam safety perspective and carry out the DSTDM role as required. • Record communications, notifications and observations as required.	Various personnel as per DSTDM roster
Flood Operations Decision Maker (FODM) • Maintain current RPEQ accreditation. • Provide hydrological advice in relation to predicted and actual dam outflows including assessment of weather and flood warnings and other related matters as identified in the OC SOP. • 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
Sunwater Media Team (SMT) • Analyse sensitive issues, discuss with the Owner, and issue media releases. • Handle public and customer comments (including social media) and advise the Owner if necessary. • Liaise with the IC and update QDMC of flood events. • Record communications, notifications and observations as required.	Various personnel as per Media Team roster
Incident Coordinator (IC) • Notify LDMGs, or councils if LDMGs not Stood Up, of intent to use the Emergency Alert. • Activate the EAP, when necessary. • 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) • Refer to ORR role.	Various personnel as per LEC roster
Dam Duty Officer (DDO) • Complete accreditation to operate and maintain relevant storage. • Ensure the EAP is implemented appropriately and carry out the DDO role as required. • Take direction from the DSTDM and IC as requested. • Arrange immediate site inspection and make informed assessment of the situation. • Escalate any issue not covered in the EAP or where actions are not clear. • Record communications, notifications and observations as required.	SOM SS OM

Roles and responsibilities	Position holder
Councils Councils have legislated local government functions, as per Section 80 of ref O. These include: • Ensure it has a disaster response capability. • Approve its local disaster management plan. • Ensure information about an event or a disaster in its area is promptly given to the DDMG for the disaster district in which area it is situated. • Perform other functions given to the local government under ref O. And as per Section 352HB of the Act: • *Must* assess (in consultation with its LDMG) the EAP for consistency with the LDMP.	
Queensland Police Service (QPS) Manage the initial situation based on local operational procedures; including but not limited to: • conduct emergency operations • coordinate and support Sunwater during a declared emergency at the dam • liaise with relevant organisations • evacuation of persons if required • control of essential traffic • security of specific area.	Local Police
Disaster Management Groups/Personnel - (In addition to requirements outlined in the Disaster Management Act 2003.) • LDMG o As per IGEM review recommendation, work together with Sunwater and the councils to ensure community education around messaging and impacts of EAP related events is undertaken and continually improves. o Work with councils and Sunwater to ensure the EAP is regularly exercised. o Identify and coordinate the use of resources and support services that may be required for an EAP event, noting that for safety events unique to the dam Sunwater will approach councils to initiate. o During a dam hazard/emergency event, providing they are Stood Up, the LDMGs in the affected local government areas will take the lead role in notifying the broader community. o Identify and provide advice to the relevant DDMGs about support services required by the LDMG to manage an EAP event. o Provide reports and make recommendations to the relevant DDMGs about matters relating to EAP events. • QFD o Work with dam owner and LDMGs to ensure Emergency Alert polygons are prepared, stored, and tested at the State Watch Desk. • DDMG o May review the EAP for consistency with the DDMP. • SCTN (Security and Counter Terrorism Network) Coordinator o Identifies Areas of Concern during the preparation of disaster plans and provides advice during counter terrorism emergency events	LDMG QFD DDMG SCTN Coordinator
Dam Safety Regulator (DSR) • Liaise with relevant Minister on necessary actions. • Approve this document as required under legislation. • Liaise with Chief Executive as required in administering (regulating) the Act.	DDS

4. Dam details

4.1 General dam information

Location: The Julius Dam is a multiple-arch, concrete, buttress dam located on the Leichhardt River at AMTD 391.1 km. The dam is situated approximately 120 km north-east of Mt Isa. A dam locality plan can be found in Appendix B5.

Purpose: Julius Dam is used to supply industrial and town water supply to Mt Isa and Cloncurry.

Construction: The dam was completed in 1976.

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

Table 3: Julius Dam specifications

Description	Specification
Main Dam	**Multiple inclined arch, barrels and buttresses**
Full Supply Level (FSL)	EL 223.54 m
Historical recorded max storage – Jan 2004	EL 228.17 m
Storage capacity at FSL	107,500 ML
Storage area at FSL	1,255 ha
Catchment area	4,845 km^2
Maximum drawdown level	EL 207.69 m
Dam Crest Level (DCL)	EL 232.68 m
Crest length along the axis	399.3 m
Maximum height of dam (lowest D/S toe)	35.6 m
Maximum height of dam (above lowest foundation)	39 m
Maximum height of dam (spillway section)	26.5 m
Spillway	**Straight overflow with precast ogee crest slabs**
Spillway crest level	EL 223.54 m
Spillway crest length	219.46 m
Spillway design capacity	13,800 m^3/s
Outlet Works – main embankment	**A 914 mm, low-level conduit with 610 mm cone valve between buttresses 5 and 6**
Outlet capacity (at FSL)	375ML/d (3.6 m^3/s)
Outlet capacity (at DCL)	372ML/d (4.3 m^3/s)

All levels are to Australian Height Datum, AHD.

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

The rating and storage curves for Julius Dam can be found in Appendix C2, Appendix C3, and Appendix C4.

4.2 Population at risk

A Comprehensive Risk Assessment (CRA) was completed for Julius Dam in 2022 (reference J). The CRA quantifies the population at risk (PAR) in a number of dam failure scenarios. The CRA found that the total PAR for the Sunny Day Failure (SDF) was estimated to be 12. The Dam Crest Flood (DCF) incremental PAR is 13 and the Probable Maximum Flood (PMF) incremental PAR is 0.

The CRA also quantified the Probable Loss of Life (PLL) for the same scenarios. The incremental PLL for all scenarios is less than 1. This is typically due to flood wave warning time.

4.3 Flood adequacy

The 2022 Comprehensive Risk Assessment (CRA) for Julius Dam (ref J) found that the dam can safely pass a 1 in 100 AEP flood event over the spillway without flow over the abutment sections. This corresponds to a flow rate of 13,600 m3/s.

Further information on flood and spillway adequacy is available from the 2022 CRA upon request.

4.4 General arrangement

The general arrangement drawings are in Appendix B1.

4.5 Emergency inspections and monitoring

If required, triggers for emergency inspections and monitoring of Julius Dam are detailed in the action tables across all the dam hazard scenarios.

To maintain the dam and comply with regulatory requirements, the following is applicable to Julius Dam.

4.5.1 Inspections

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

4.5.2 Instrumentation and monitoring

The following instrumentation is monitored at Julius Dam.

- Settlement/movement measurement:
  - 14 spillway settlement points
  - 3 Survey Control Point Monuments (2 downstream, and one on the left bank
- Two storage level gauges (Julius Dam Intake and Julius Dam Boat Ramp)
- A rain gauge.

NOTE: The location of instrumentation and monitoring equipment is detailed in the drawings in Appendix B1.

If telemetry is not operating, the receipt of local intelligence and monitoring of the Bureau of Meteorology web site (www.bom.gov.au) on predicted rainfall and weather conditions will provide updates to any situation until telemetry and communications resume.

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 Julius Dam to Full Supply Level (FSL) 223.54 m, and the rate of inflow exceeds the capacity of the outlet works. The spillway will then discharge water downstream into the Leichardt River. These flood flows can create a dam hazard event. Inflows will also cause the storage to temporarily rise to above the FSL of the storage. NOTE:
  - The greater the rate of inflow, the higher the storage will rise
  - The higher the storage level rises, the greater the loads on the dam structure
  - Although unlikely, the greater the loading, the higher the likelihood of a dam failure
  - Typically, the level of surveillance is increased during flood operations (refer Action tables in this section)
- Spillway discharge from the dam where there have been no indications that a dam failure may be initiating or in progress.

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

- As the rate of discharge increases there will be an impact on low-level road crossings of the Leichhardt River and other infrastructure in the river such as pump sites
- Detailed information on downstream flood impacts, including tables and maps, is presented in Appendix B.

In flood events, it is likely that the dam access road will be cut by floodwaters. Telecommunications may or may not be affected, depending on the nature of the event.

Julius Dam is located approximately 75 km downstream from the Leichhardt River dam. A discharge from Leichhardt River Dam is expected to affect Lake Julius around 5 to 6 hours later. Discharge from Leichhardt River Dam under flooding and/or dam break events is not expected to affect the Julius Dam integrity, however rising waters may affect the safety of operators on or near the water's edge.

The following table shows historical floods experienced at Julius Dam.
(Source: Bureau of Meteorology — http://www.bom.gov.au/qld/flood/brochures/leichhardt/leichhardt.shtml?)

Note: Julius Dam spillway gauge does not have a minor, moderate and major flood warning classification

Table 4: Historical floods experienced at Julius Dam

Flood rank	Date	Peak height EL (AHD)	Peak height (m over crest)
1	January 2004	228.17 m	4.63 m
2	March 1997	228.07 m	4.53 m
3	January 2009	226.64 m	3.10 m
4	March 2006	226.56 m	3.02 m
5	February 2019	226.49 m	2.95 m

5.1.1 Activation triggers

Table 4: Flood emergency activation trigger summary

Alert	• EL 223.44 m and rising (0.1 m below FSL)
Lean Forward	• Storage Level above FSL 223.54 m
Stand Up	• Storage above EL 228.17 m (flood of record—January 2004)
Stand Down	• Storage EL 223.54 m and falling, with no forecast increase in EL for 48 hours

While this EAP is not triggered until Julius Dam reaches the Alert trigger, Sunwater and the Mount Isa City Council, Cloncurry Shire Council, Burke Shire Council and Carpentaria Shire Council LDMGs will work cooperatively and will endeavour to share intelligence of any rainfall event 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.

5.1.2 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).

Table 5: Flood operations – DDO emergency action				
Activation level	**Alert**	**Lean Forward**	**Stand Up (Greater than flood of record)**	**Stand Down**
Activation trigger	• EL 223.44 m and rising (0.1 m below FSL)	• Storage above FSL 223.54	• Storage above EL 228.17	• Storage EL 223.54 m and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Inspect the dam daily (or as instructed by the DSTDM) and photograph/video and record using approved forms and send to DSTDM and IC • Undertake site preparations including but not limited to checking (if not already): o fuel and operation of backup generator o food preparations o communication systems (including backup radio, satellite, phones, fax, and internet) • Notify the SO • Record the Storage Level daily (or as instructed by the DSTDM) using gauge boards and confirm accuracy of gauging station • Record rainfall — daily • Update Dam Logbook as per SOP 12	• As per previous activation level, AND • Continue to inspect the dam daily (or as instructed by the DSTDM) with particular attention to: o visual inspection of flow patterns over spillway and dissipator for evidence of scouring o inspect embankment for leaks, deformation, and slumping o obvious signs of seepage, in particular on the Saddle Dam downstream slopes • Read dam instrumentation daily (or as instructed by the DSTDM) • Report any unusual readings or observations to the DSTDM and IC as soon as practical • Monitor the water profile over the crest and report any change in shape or irregularity • Photograph area below spillway regularly (particularly at higher flow rates) • Confirm that any personnel on-site are aware that areas may be cut off and isolated	• As per previous activation level, AND • Inspect the dam 6-hourly (or as instructed by the DSTDM) and photograph/video and record using approved forms and send to DSTDM and IC NOTE: Refer Section 6 (Overturning or Sliding). That section activates to Lean Forward at this level if not already activated	• Inspect the dam for any damage and photograph any damage identified during the event • Advise IC status of access roads, if flooded or damaged • If required, forward all relevant communication including emails, and inspection sheets for EER to: [redacted] • Update Dam Logbook as per SOP 12 • Return to routine surveillance activities and frequencies
Notifications	IC SO LEC	IC SO DSTDM (as required)	IC SO DSTDM (as required)	Inform all previously notified contacts of stand down

Table 6: Flood operations – LEC emergency action				
Activation level	Alert	Lean Forward	Stand Up (Greater than flood of record)	Stand Down
Activation trigger	• EL 223.44 m and rising (0.1 m below FSL)	• Storage above FSL 223.54 m	• Storage above EL 228.17 m	• Storage FSL 223.54 m and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Develop/implement staff roster and check food supplies for staff *NOTE: IC to contact LDMGs unless LDMG1 is *Stood Up*	• As per previous activation level, AND • Ensure all abnormal observations or damage has been reported to DSTDM and IC	As per previous activation level NOTE: Refer Section 6 (Overturning or Sliding). That section activates to Lean Forward at this level if not already activated	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	DDO IC LDMG 1* LDMG 2*	DDO IC LDMG 1* LDMG 2*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	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 7: Flood operations – IC emergency action

Activation Level	Alert	Lean Forward	Stand Up	Stand Down
Activation Trigger	• Storage EL 223.44 m and rising (0.1 m below FSL)	• Storage above FSL 223.54 m	• Storage above EL 228.17 m	• Storage level FSL 223.54 and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles • Create Incident Report record • Update intranet with EAP status *NOTE: IC to contact LDMGs unless LDMG1 is *Stood Up*	• As per previous activation level, AND • Ensure all abnormal observations or damage has been reported to DSTDM • Consider the need to appoint a Sunwater Recovery Coordinator. The Sunwater Recovery Coordinator is responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance – if required.	• As per previous activation level NOTE: Refer Section 6 (Overturning or Sliding). That section activates to Lean Forward at this level if not already activated	• Liaise with DDO for status of access roads. If they are flooded or damaged, include in message that roads are unsafe • Deactivate EAP • Complete all notifications • Forward all relevant communication, including emails for EER to: [redacted] • Close out Incident Report record • Update intranet with EAP status • Return to routine activities
Notifications	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* DDMG DDO DSTDM FODM LEC/ORR SMT SRT	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* DDMG DDO DSTDM FODM LEC/ORR SMT SRT	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* DDMG DDO DSTDM FODM LEC/ORR SMT SRT	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

[redacted]

Table 8: Flood operations – LEC and IC external communications plan				
Activation Level	**Trigger for Communications**	**Group to contact**	**Method**	**Message text**
Alert	• EL 223.44 m and rising (preparedness)	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level
Lean Forward	• Storage above FSL 223.54 m (not spilling)	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level and whether any flood releases are due to commence Discuss any potential road/bridge closures
Stand Up	• Storage above EL 228.17 m	• D/S Residents	•	
		• LDMG 1 • LDMG 2 • LDMG 3* • LDMG 4* • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? (Storage is greater than flood of record) Advise of current storage level Advise of any forecasts you are aware of
Stand Down	• Storage EL 223.54 m and falling with no forecast increase in EL for 48 hours *NOTE: Contact LDMG 3 & 4 if previously contacted *at Stand Up*	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS
		• LDMG 1 • LDMG 2 • LDMG 3* • LDMG 4* • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level Advise EAP has been deactivated

Table 9: Flood operations – DSTDM emergency action				
Activation level	**Alert**	**Lean Forward**	**Stand Up (Greater than flood of record)**	**Stand Down**
Activation trigger	• Storage EL 223.44 m and rising (0.1 m below FSL)	• Storage above FSL 223.54 m	• Storage above EL 228.17 m	• Storage level FSL 223.54 m and falling with no forecast increase in EL for 48 hours
Action	• Record all communication • Provide technical advice to DDO and IC on a need's basis • Review surveillance reports and determine if any additional responses are required • Review instrumentation data and determine if any additional responses are required • Advise DSR of EAP activation	• As per previous activation level	• As per previous activation level NOTE: Refer Section 6 (Overturning or Sliding). That section activates to Lean Forward at this level if not already activated	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	IC DDO DSR	IC DDO DSR	IC DDO DSR	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

[redacted]

Table 10: Flood operations – FODM emergency action				
Activation level	**Alert**	**Lean Forward**	**Stand Up (Greater than flood of record)**	**Stand Down**
Activation trigger	• Storage EL 223.44 m and rising (0.1 m below FSL)	• Storage above FSL 223.54 m	• Storage above EL 228.17 m	• Storage level FSL 223.54 m and falling with no forecast increase in EL for 48 hours
Action	• Record all communication • Extract relevant data from available sources • Update flood models as per SOP OC (Sunwater internal) • Update and issue flood operations report • Update DSTDM and IC re: current flood situation and PFRM results	• As per previous activation level	• As per previous activation level NOTE: Refer Section 6 (Overturning or Sliding). That section activates to Lean Forward at this level if not already activated	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	IC DSTDM BOM	IC DSTDM BOM	IC DSTDM BOM	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

6. Dam hazard — overturning or sliding of concrete structure

6.1 Overview

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

If one or more concrete buttress sections become unstable or structural damage occurs to the arch-barrels, a dam failure may result. If movement is detected early, remedial actions may be possible depending on the nature of the damage.

Failure of the concrete buttress can occur by overturning and sliding of the concrete monoliths on the foundation, caused by structural failure of the buttress or by erosion of the abutments and foundation downstream. Erosion of abutments and foundation downstream is likely to be caused during flood events, especially during events where the non-overflow concrete abutment is overtopped (EL 232.68 m).

Failure of the arch barrels can occur by structural damage to the concrete material. Indications of this failure are cracking, increased seepage, or opening of joints.

The flood outlines in Appendix B3 are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by overturning or sliding of concrete structure. 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 overturning or sliding of a concrete structure 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 overturning or sliding of a concrete structure and concurrent flooding or downstream releases are occurring or expected to occur.

6.2 Activation Triggers

Table 11: Overturning or sliding of concrete structure emergency trigger summary

Alert	• Indications of movement of concrete structure noted such as cracking, increased seepage, or opening of joints, OR • Storage above 225.50 m (potential for Nappe vibration above this level)
Lean Forward	• Storage above EL 228.17 m (Flood of record), OR • Increase in movement, pressures, or seepage
Stand Up	• Storage above EL 232.68 m (non-overflow abutment) OR • Obvious displacement of one or more parts of the structure, OR • Evidence of scouring at or near toe of dam
Stand Down	• Risk assessment has determined that failure risk has reduced

6.3 Emergency action roles

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

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

Figure 2: Overturning or sliding of concrete structure flowchart

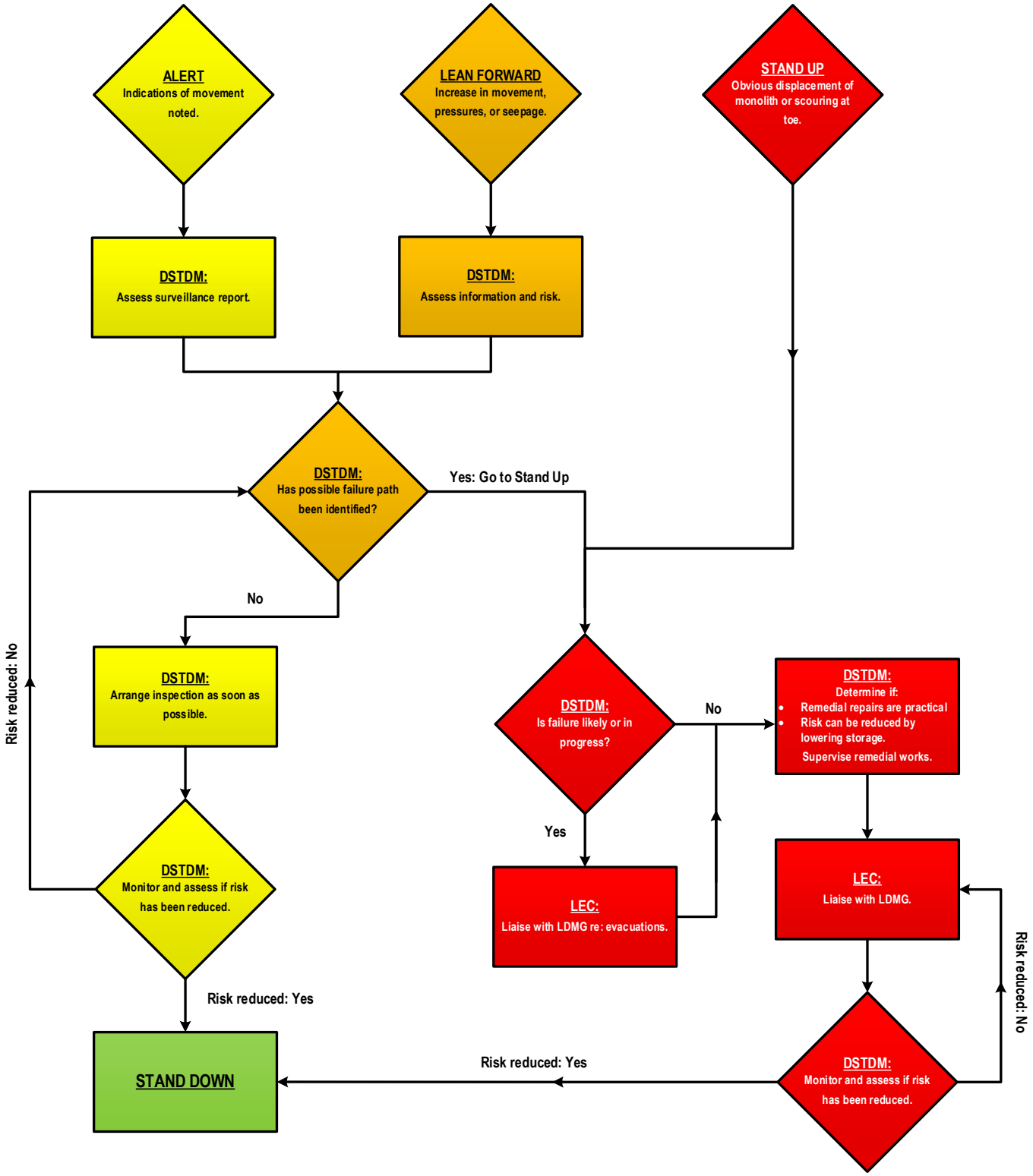


Table 12: Overturning or sliding of concrete structure – DDO emergency action					
Activation Level	**Alert**	**Lean Forward**	**Stand Up – 1**	**Stand Up – 2**	**Stand Down**
Activation Trigger	• Indications of movement of concrete structure noted such as cracking, increased seepage, or opening of joints, OR • Storage above EL 225.50 m (potential for nappe vibration above this level)	• Storage above EL 228.17 m (Flood of record), OR • Increase in movement, pressures, or seepage	• Storage above EL 232.68 m (non-overflow abutment) OR • Obvious displacement of one or more parts of the structure, OR • Evidence of scouring at or near toe of dam	• Failure in progress or likely due to overturning or sliding	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • Monitor dam 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 damage from a safe point and record using approved forms and send to DSTDM and IC • Update Dam Logbook as per SOP 12	• As per previous activation level	• As per previous activation level, AND • Support/supervise remedial works as required • Lower the storage if directed by DSTDM • Close road access to dam if not already closed by others • Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public	• As per previous activation level, AND • Vacate the immediate vicinity of the embankment	• Inspect the dam for any damage and photograph any damage identified during the event • If required, forward all relevant communication including emails, and inspection sheets for EER to: [redacted] • Update Dam Logbook as per SOP 12 • Return to routine surveillance activities and frequencies
Notifications	DSTDM IC SO LEC	DSTDM IC SO	DSTDM IC SO	DSTDM IC SO	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 13: Overturning or sliding of concrete structure – LEC emergency action					
Activation Level	**Alert**	**Lean Forward**	**Stand Up – 1**	**Stand Up – 2**	**Stand Down**
Activation Trigger	• Indications of movement of concrete structure noted such as cracking, increased seepage, or opening of joints, OR • Storage above EL 225.50 m (potential for nappe vibration above this level)	• Storage above EL 228.17 m (Flood of record), OR • Increase in movement, pressures, or seepage	• Storage above EL 232.68 m (non-overflow abutment) OR • Obvious displacement of one or more parts of the structure, OR • Evidence of scouring at or near toe of dam	• Failure in progress or likely due to overturning or sliding	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication *NOTE: IC to contact LDMGs unless LDMG1 is *Stood Up*	• As per previous activation level	• As per previous activation level, AND • Liaise with relevant Council(s) regarding potential road/bridge closures	• As per previous activation level, AND • Liaise with DDO, IC, and LDMG re: potential for evacuations	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	DDO IC LDMG 1* LDMG 2*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	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

[redacted]

Table 14: Overturning or sliding of concrete structure – IC emergency action

Activation Level	Alert	Lean Forward	Stand Up – 1	Stand Up – 2	Stand Down
Activation Trigger	• Indications of movement of concrete structure noted such as cracking, increased seepage, or opening of joints, OR • Storage above EL 225.50 m (potential for nappe vibration above this level)	• Storage above EL 228.17 m (Flood of record), OR • Increase in movement, pressures, or seepage	• Storage above EL 232.68 m (non-overflow abutment) OR • Obvious displacement of one or more parts of the structure, OR • Evidence of scouring at or near toe of dam	• Failure in progress or likely due to overturning or sliding	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • Create Incident Report record • Update intranet with EAP status *NOTE: IC to contact LDMGs unless LDMG1 is *Stood Up*	• As per previous activation level, AND • Investigate availability of machinery and materials (if insufficient stockpiles available) • Place machinery operators on standby if directed by DSTDM • Consider the need to appoint a Sunwater Recovery Coordinator. The Sunwater Recovery Coordinator is responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance – if required	• As per previous activation level, AND • Liaise with Sunwater Customer Support to send SMS to D/S residents and phone those without mobiles • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level, AND • Liaise with the DSTDM to confirm that dam failure is in progress • Direct remedial works to cease if directed by the DSTDM and plant and personnel to be moved to a safe location • Liaise with DDO and DSTDM re: potential for evacuations	• Deactivate EAP • Complete all notifications • Forward all relevant communication, including emails for EER to: [redacted] • Close out Incident Report record • Update intranet with EAP status • Return to routine activities
Notifications	D/S Residents LDMG 1* LDMG 2* DDMG DDO DSTDM LEC/ORR SMT SRT	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* DDMG DDO DSTDM LEC/ORR SMT SRT	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* SDCC DDMG DDO DSTDM LEC/ORR SMT SRT	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* SDCC DDMG DDO DSTDM LEC/ORR SMT SRT	Inform all previously notified contacts of stand down

Table 15: Overturning or sliding of concrete structure – LEC and IC external communication plan				
Activation Level	Trigger for Communications	Group to contact	Method	Message text
Alert	• Indications of movement of concrete structure noted such as cracking, increased seepage, or opening of joints, OR • Increasing leakage through an embankment, the foundations, or abutments. • Storage above 225.50 m (potential for nappe vibration above this level)	• LDMG 1 • LDMG 2	• Phone	Describe current situation with dam: — What is the event? (Dam Safety Risk—overturning/sliding – Unconfirmed piping risk) What is the status? (Unconfirmed instability of dam leakage — Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice
Lean Forward	• Storage above EL 236.77 m (Flood of record), OR • Increase in movement, pressures, or seepage increasing leakage through an embankment, the foundations, or abutments with cloudy water	• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam: — What is the event? (Dam Safety Risk—overturning/sliding – Unconfirmed piping risk) What is the status? (Unconfirmed instability of dam — Investigation continues – Unconfirmed leakage — Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice
Stand Up 1	• Storage above EL 232.68 m (non-overflow abutment) OR • Obvious displacement of one or more parts of the structure, • OR • Evidence of scouring at or near toe of dam	• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Email & Phone	*Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents*
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG • SRT	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk—overturning/sliding). What is the status? (Possible instability of dam) Advise of current storage level Advise any issues you are aware of Discuss any potential road/bridge closures Discuss possible evacuations

Table 15: Overturning or sliding of concrete structure – LEC and IC external communication plan				
Activation Level	Trigger for Communications	Group to contact	Method	Message text
Stand Up 2 – Failure Likely	• Failure likely due to overturning or sliding	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Email & Phone	*Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents*
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG • SRT	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk—overturning/sliding). What is the status? (Possible instability of dam) Advise of current storage level Advise any issues you are aware of. Discuss any potential road/bridge closures Discuss possible evacuations
Stand Up 2 – Failure in Progress	• Failure in progress due to overturning or sliding	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Email & Phone	*Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents*
Stand Up 2 – Failure in Progress		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk—overturning/sliding) What is the status? (Dam Failure In Progress) Advise of current storage level Coordinate evacuations of affected Downstream Residents and move people to higher ground
Stand Down	• Risk assessment has determined that failure risk has reduced	• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk—overturning/sliding) What is the status? (Dam hazard stood down) Advise risk assessment has determined that piping risk has reduced, and EAP has been deactivated

Table 16: Overturning or sliding of concrete structure – DSTDM emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Down**
Activation trigger	• Indications of movement of concrete structure noted such as cracking, increased seepage, or opening of joints, OR • Storage above EL 225.50 m (potential for nappe vibration above this level)	• Storage above EL 228.17 m (Flood of record), OR • Increase in movement, pressures, or seepage	• Storage above EL 232.68 m (non-overflow abutment) OR • Obvious displacement of one or more parts of the structure, OR • Evidence of scouring at or near toe of dam	• Failure in progress or likely due to overturning or sliding	• Risk assessment has determined that failure risk has reduced
Action	• Record all communication • Review surveillance inspection of the dam and assess its condition as soon as possible • Determine if there are possible failure paths from reported damage • Assess results from foundation drain pressure measurements • Arrange an inspection of the dam and assess its condition as soon as possible • Monitor situation and assess risks • Notify DSR	• As per previous activation level	• As per previous activation level, AND • Assess risk and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) • Supervise* remedial repairs (if applicable)	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	DDO IC DSR	DDO IC DSR	DDO IC DSR	DDO IC DSR	Inform all previously notified contacts of stand down

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

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

[redacted]

7. Dam hazard — piping through foundations

7.1 Overview

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

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

The flood outlines in Appendix 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.

7.2 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.

7.3 Emergency action roles

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

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

Figure 3: Piping: through foundations flowchart

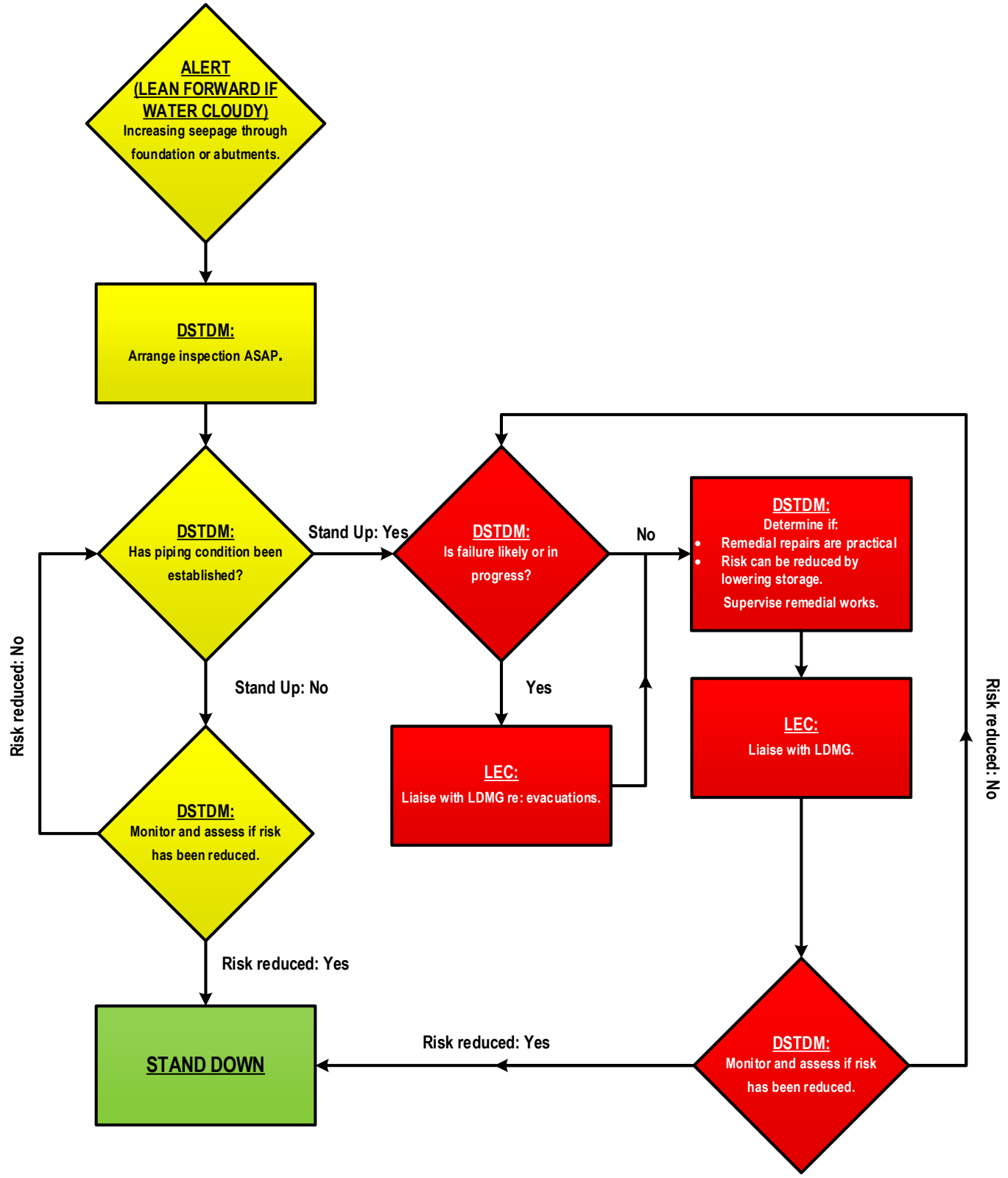


Table 17: Piping through foundations – DDO emergency actions					
Activation level	**Alert**	**Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Down**
Activation trigger	• Increasing leakage through the foundations	• Increasing leakage through the foundations, • WITH cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • Monitor flows every 6 hours (or as otherwise instructed by the DSTDM) • 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	• As per previous activation level	• As per previous activation level, AND • Support/supervise remedial works as required • Lower the storage if directed • Close any affected roads if not already closed by others • Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public	• As per previous activation level, AND • Vacate the immediate vicinity of the piping condition	• Inspect the dam for any damage and photograph any damage identified during the event • If required, forward all relevant communication including emails, and inspection sheets for EER to: [redacted] • Update Dam Logbook as per SOP 12 • Return to routine surveillance activities and frequencies
Notifications	DSTDM IC SO LEC	DSTDM IC SO	DSTDM IC LEC/ORR SO	DSTDM IC LEC/ORR SO	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

[redacted]

Table 18: Piping through foundations – LEC emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Down**
Activation trigger	• Increasing leakage through the foundations	• Increasing leakage through the foundations • WITH cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, and • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication *NOTE: IC to carry out LEC actions unless LDMG is *stood up*	• As per previous activation level	• As per previous activation level, AND • Liaise with relevant council(s) regarding potential road/bridge closures	• As per previous activation level	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	DDO IC LDMG 1* LDMG 2*	DDO IC LDMG 1* LDMG 2*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	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

[redacted]

Table 19: Piping through foundations – IC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Increasing leakage through the foundations	• Increasing leakage through the foundations • WITH cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, and • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • Create Incident Report record • Update intranet with EAP status *NOTE: IC to carry out LEC actions unless LDMG is *Stood Up*	• As per previous activation level, AND • Investigate availability of machinery and materials (if insufficient stockpiles available) • Place machinery operators on standby if directed by DSTDM • Consider the need to appoint a Sunwater Recovery Coordinator. The Sunwater Recovery Coordinator is responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance – if required.	• As per previous activation level, AND • Liaise with Sunwater Customer Support to send SMS to D/S residents and phone those without mobiles • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level, AND • Liaise with the DSTDM to confirm that dam failure is in progress • Direct remedial works to cease if directed by the DSTDM and plant and personnel to be moved to a safe location • Liaise with DDO and DSTDM re: potential for evacuations	• Deactivate EAP • Complete all notifications • Forward all relevant communication, including emails for EER to: [redacted] • Close out Incident Report record • Update intranet with EAP status • Return to routine activities
Notifications	DDO LEC/ORR DSTDM SMT SRT	DDO LEC/ORR DSTDM SMT DDMG SRT	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* SDCC DDMG DDO DSTDM LEC/ORR SMT SRT	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* SDCC DDMG DDO DSTDM LEC/ORR SMT SRT	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

[redacted]

Table 20: Piping through foundations – LEC and IC external communications plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Alert	• Increasing leakage through the foundations	• LDMG 1 • LDMG 2	• Phone	Describe current situation with dam: What is the event? *(Dam Safety Risk - Unconfirmed piping risk)* What is the status? (Unconfirmed leakage — Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice
Lean Forward	• Increasing leakage through the foundations • WITH cloudy water	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? *(Dam Safety Risk -Unconfirmed piping risk)* What is the status? (Unconfirmed leakage — Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice
Stand Up — 1	• Piping condition has been established	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Email & Phone	Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam: What is the event? *(Confirmed piping risk).* What is the status? (Confirmed piping/leakage) Advise of current storage level Advise any issues you are aware of. Discuss any potential road/bridge closures Prepare for possible evacuations

Table 20: Piping through foundations – LEC and IC external communications plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Stand Up — 2 (Likely)	• Failure likely due to piping; AND • Sufficient water in storage to create a dam hazard	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Email & Phone	Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam: What is the event? *(Confirmed piping risk)* What is the status? (Possible Dam Failure) Advise of current storage level Prepare coordinated evacuations
Stand Up — 2 (In Progress)	• Dam Failure in progress	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Email & Phone	Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam: What is the event? *(Confirmed piping risk)* What is the status? (*Dam Failure In Progress*) Advise of current storage level Coordinate evacuations of affected Downstream Residents and move people to higher ground
Stand Down	• Risk assessment has determined that failure risk has reduced	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with Dam: What is the event? *(Dam Safety Risk — piping condition)* What is the status? (*Dam hazard stood down)* Advise risk assessment has determined that piping risk has reduced, and EAP has been deactivated

Table 21: Piping through foundations – DSTDM emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Down**
Activation trigger	• Increasing leakage through the foundations	• Increasing leakage through the foundations • With cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Action	• Record all communication • Arrange an inspection of the dam to assess its condition as soon as possible, when safe to do so • Determine if piping condition has been established • Monitor situation and assess risks • Notify DSR of EAP activation	• As per previous activation level	• As per previous activation level, AND • Assess risk and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) • Supervise* remedial repairs (if applicable)	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	DDO IC DSR	DDO IC DSR	DDO IC DSR	DDO IC DSR	Inform all previously notified contacts of stand down

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

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

[redacted]

8. Dam hazard — Earthquake

8.1 Overview

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

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

The flood outlines in Appendix B3 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 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 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.

8.2 Emergency action roles

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

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

Figure 4: Earthquake flowchart

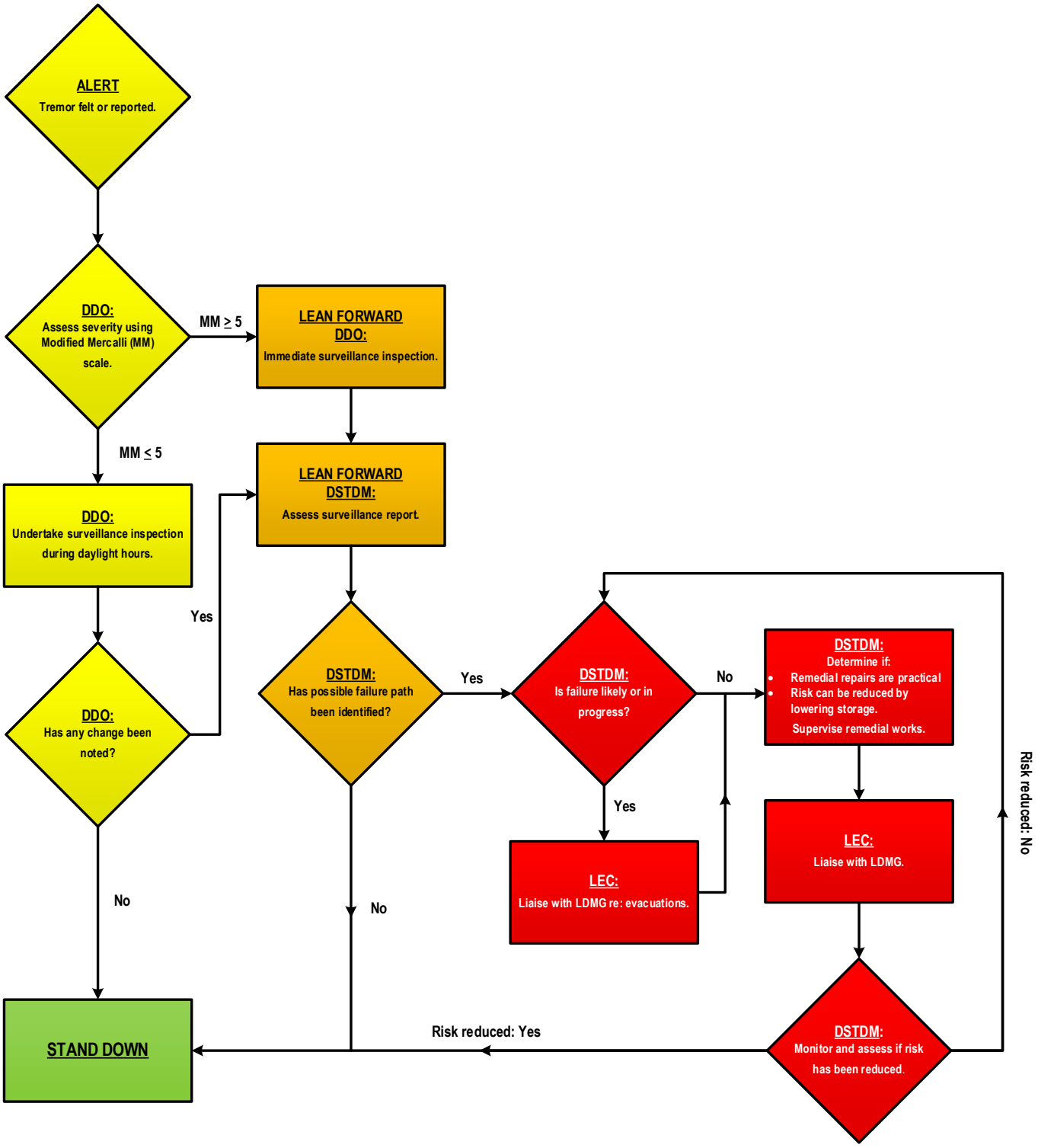


Table 22: Earthquake – DDO emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Down**
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM~ ~DDO to assess magnitude (MM scale) at dam location	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5MM~ OR • Intensity less than 5MM~ and change detected during surveillance inspection	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions *'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.	• Record all communication • Inspect the main embankment, spillway structure, abutments, and Saddle Dam in daylight hours (if safe to do so). Photograph/ video and record using approved forms and send to DSTDM and IC • Check for leaks, deformation, erosion, and concrete damage • Notify SO • Update Dam Logbook as per SOP 12	• As per previous activation level, AND • Immediately inspect the main embankment, spillway structure, abutments, and Saddle Dam (if safe to do so) • Inspect for leakage and evidence of initiation of piping of embankment slips on both upstream and downstream slopes and in the abutments • Repeat the inspection as directed	• As per previous activation level, AND • Support/supervise remedial work as required • Lower the storage if directed • Close any affected roads if not already closed by others • Maintain surveillance of area immediately downstream of dam or Saddle Dam (if safe to do so) and move on any members of the public • Vacate the immediate vicinity of the embankment	• As per previous activation level	• Inspect the dam for any damage and photograph any damage identified during the event • If required, forward all relevant communication including emails, and inspection sheets for EER to: [redacted] • Update Dam Logbook as per SOP 12 • Return to routine surveillance activities and frequencies
Notifications	DSTDM IC SO LEC	DSTDM IC SO	DSTDM IC SO	DSTDM IC SO	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

[redacted]

Table 23: Earthquake – LEC emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Down**
Activation trigger	• Earthquake confirmed^ (by DSTDM) or felt in the area, AND • Intensity less than 5MM~ ~DDO to assess magnitude (MM scale) at dam location.	• Earthquake confirmed^ (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5MM~ OR • Intensity less than 5MM~ and change detected during surveillance inspection	• Earthquake confirmed^ (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions ^'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.	• Record all communication *NOTE: IC to carry out LEC actions unless LDMG is *stood up*	• As per previous activation level	• As per previous activation level, AND • Mobilise resources to undertake remedial works if directed by IC • Liaise with DDO and relevant council(s) regarding potential road/bridge closures	• As per previous activation level	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	DDO IC LDMG 1* LDMG 2*	DDO IC LDMG 1* LDMG 2*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	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

[redacted]

Table 24: Earthquake – IC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Earthquake confirmed^ or felt in the area, AND • Intensity less than 5MM~ ~DDO to assess magnitude (MM scale) at dam location	• Earthquake confirmed^ or felt in the area, AND • Intensity greater than or equal to 5MM~ OR • Intensity less than 5MM~ and change detected during surveillance inspection	• Earthquake confirmed^ or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions ^'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.	• Record all communication • Create Incident Report Record • Update intranet with EAP status *NOTE: IC to carry out LEC actions unless LDMG1 is stood up	• As per previous activation level, AND • Investigate availability of machinery and materials (if insufficient stockpiles available) • Place machinery operators on standby if directed by DSTDM • Consider the need to appoint a Recovery Coordinator. The Recovery Coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance – if required.	• As per previous activation level, AND • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level, AND • Liaise with the DSTDM to confirm that dam failure is in progress • Cease remedial works if directed by the DSTDM and plant and personnel to be moved to a safe location	• Deactivate EAP • Complete all notifications • Forward all relevant communication, including emails for EER to: [redacted] • Close out Incident Report record • Update intranet with EAP status • Return to routine activities
Notifications	DDO LEC/ORR DSTDM SMT SRT	DDO LEC/ORR DSTDM SMT SRT DDMG	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* SDCC Watch Desk DDMG DDO DSTDM LEC/ORR SMT SRT	D/S Residents LDMG 1* LDMG 2* LDMG 3* LDMG 4* SDCC Watch Desk DDMG DDO DSTDM LEC/ORR SMT SRT	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

[redacted]

Table 25: Earthquake – LEC and IC external communications plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Alert	• Earthquake confirmed or felt in the area, AND • Intensity less than 5MM	• LDMG 1 • LDMG 2	• Phone	Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Under investigation) Advise of current storage level Advise EAP has been activated Stand by for further information
Lean Forward	• Earthquake confirmed or felt in the area, AND • Intensity greater than or equal to 5 MM, OR • Intensity less than 5 MM and change detected during surveillance inspection	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Under investigation) Advise of current storage level Advise EAP has been activated Stand by for further information
Stand Up — 1 (Confirmed earthquake)	• Earthquake confirmed or felt in the area, AND • A possible failure path has been identified	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Phone & Email	Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording) and send to SDCC Watch Desk to send to D/S Residents.
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake felt or reported in area) What is the status? (Possible earthquake damage to dam) Advise current storage level. Discuss any potential road/ bridge closures Activate emergency response
Stand Up — 2 (Failure likely)	• Failure likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Email & Phone	Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents.
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam: What is the event? (*Dam Safety Risk — Earthquake damage)* What is the status? (*Dam Failure Likely*) Advise of current storage level. Discuss any potential road/bridge closures Prepare for coordinated evacuation

Table 25: Earthquake – LEC and IC external communications plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Stand Up – 2 (Failure in progress)	• Dam failure in progress	• D/S Residents • Treated water supply users	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
Stand Up – 2 (Failure in progress) *continued*		• SDCC Watch Desk	• Email & Phone	Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents
		• LDMG1 • LDMG2 • DDMG1 • DDMG2 • QPS	• Phone	Describe current situation with dam — What is the event? (*Dam Safety Risk — Earthquake damage*) What is the status? (*Dam Failure in progress*) Advise of current storage level. Discuss any potential road/bridge closures Coordinate evacuation
Stand down	• Risk assessment has been determined that failure risk has reduced	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG	• Phone	Describe current situation with dam: What is the event? *(Dam Safety Risk — Earthquake damage)* What is the status? *(Dam hazard Stood Down*) Advise risk assessment has been determined that failure risk has reduced, and that EAP has been deactivated

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

Table 26: Earthquake – DSTDM emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Down**
Activation trigger	• Earthquake confirmed* or felt in the area, AND • Intensity less than 5MM~ ~DDO to assess magnitude (MM scale) at dam location	• Earthquake confirmed* or felt in the area, AND • Intensity greater than or equal to 5MM~ OR • Intensity less than 5MM~ and change detected during surveillance inspection	• Earthquake confirmed* or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Action *'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.	• Record all communication • Review surveillance inspection of the dam and assess its condition as soon as possible • Review instrumentation data and determine if any additional responses are required • Monitor situation and assess risks • Advise DSR of EAP activation	• As per previous activation level, AND • Review surveillance inspection of the dam and assess its condition as soon as possible • Determine if there are any possible failure paths from reported damage	• As per previous activation level, AND • 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) ^Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.	• As per previous activation level	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	DDO IC DSR	DDO IC DSR	DDO IC CEO – if time permits DSR	DDO IC CEO – if time permits DSR	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

[redacted]

9. Dam hazard — terrorist threat/activity or high energy impact

9.1 Overview

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

The vulnerability of Julius Dam to a terrorist attack is low.

The flood outlines in Appendix B3 are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by a terrorist attack. The use of these flood outlines is prescribed below:

- Use the SDF outline when a dam failure is in progress or likely due to a terrorist attack and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the PMF outline when a dam failure is in progress or likely due to a terrorist attack and concurrent flooding or downstream releases are occurring or expected to occur.

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

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

9.2 Emergency action roles

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

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

Figure 5: Terrorist threat/activity or high energy impact flowchart

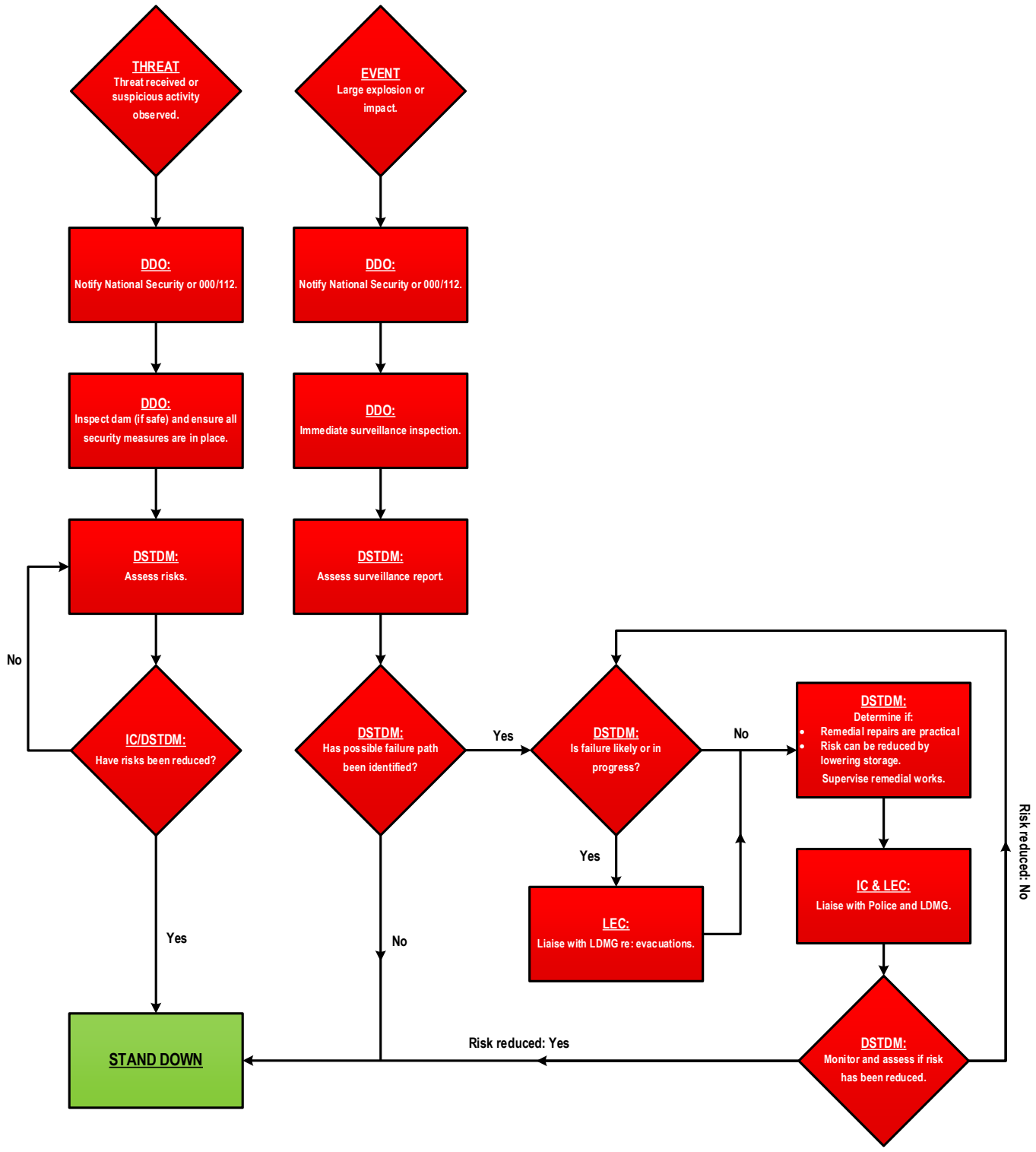


Table 27: Terrorist threat/activity or high energy impact – DDO emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Up — 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Not applicable	• In an emergency call 000. • Record all communication • If any suspicious behaviour noticed, contact DSTDM for advice and if instructed or if threat received, complete the following: • Inspect dam (if safe) and ensure all security measures are in place (locked gates, etc.) • Photograph/video suspicious items from a safe point and record using approved forms and send to DSTDM and IC • If Police appoint Incident Manager support and follow instructions • Close any affected roads as directed • Update Dam Logbook as per SOP 12	• As per previous activation level, AND • Vacate the immediate vicinity of the affected area	• As per previous activation level, AND • Lower reservoir level, if directed by DSTDM	• Inspect the dam for any damage and photograph any damage identified during the event • If required, forward all relevant communication including emails, and inspection sheets for EER to: [redacted] • Update Dam Logbook as per SOP 12 • Return to routine surveillance activities and frequencies
Notifications	Not applicable	#000 Emergency DSTDM IC SO LEC	#000 Emergency DSTDM IC SO	#000 Emergency DSTDM IC SO	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

[redacted]

Table 28: Terrorist threat/activity or high energy impact – LEC emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Up — 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Not applicable	• Record all communication • If Police appoint Incident Manager support and follow instructions • Monitor situation and assess risks • Liaise with relevant council(s) regarding possible road/bridge closures *NOTE: IC to carry out LEC actions unless LDMG is *stood up*	• As per previous activation level	• As per previous activation level, AND • Liaise with DDO, DSTDM, and LDMG re: potential for evacuations	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	Not applicable	DDO IC LDMG 1* LDMG 2*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	DDO IC LDMG 1* LDMG 2* LDMG 3* LDMG 4*	As required

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

[redacted]

Table 29: Terrorist threat/activity or high energy impact – IC emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Up — 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Not applicable	• Record all communication • Contact National Security • If Police appoint Incident Manager support and follow instructions • Monitor situation and assess risks • Create Incident Report record • Update intranet with EAP status *NOTE: IC to carry out LEC actions unless LDMG1 is stood up	• As per previous activation level, AND • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles • Consider the need to appoint a Sunwater Recovery Coordinator. The Sunwater Recovery Coordinator is responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance – if required.	• As per previous activation level, AND • Liaise with DDO, DSTDM, and LEC re: potential for evacuations • Mobilise resources to undertake remedial works if directed by DSTDM	• Deactivate EAP • Complete all notifications • If required, forward all relevant communication, including emails for EER to: [redacted] • Close out Incident Report Record • Update intranet with EAP status • Return to routine activities
Notifications	Not applicable	CTG (if required) DDMG DDO LEC/ORR DSTDM SMT SRT	CTG (if required) D/S Residents LDMG 1* LDMG 2* SDCC Watch Desk DDMG DDO DSTDM LEC/ORR SMT SRT	CTG (if required) D/S Residents LDMG 1* LDMG 2* SDCC Watch Desk DDMG DDO DSTDM LEC/ORR SMT SRT	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

[redacted]

Table 30: Terrorist threat/activity or high energy impact – LEC and IC external communications plan				
Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	ALERT NOT APPLICABLE			
Lean Forward	LEAN FORWARD NOT APPLICABLE			
Stand Up — 1	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	• LDMG 1 • LDMG 2 • DDMG • CTG	• Phone	Describe current situation with dam: What is the event? (*Dam Safety Risk — Security threat/ impact/explosion, etc.*) What is the status? (Received/noted terrorist threat) Discuss any potential road/bridge closures Activate emergency response
Stand Up — 2	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch desk	• Phone & Email	Complete Emergency Alert Request Form (as per instructions in Appendix A8 using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG • CTG	• Phone	Describe current situation with dam: What is the event? (*Dam Safety Risk — Security threat/ impact/explosion, etc.*) What is the status? (Under Investigation) Discuss any potential road/bridge closures (if not discussed at Stand Up — 1) Prepare coordinated evacuation

Table 30: Terrorist threat/activity or high energy impact – LEC and IC external communications plan				
Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up — 3	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• SDCC Watch Desk	• Email & Phone	Complete Emergency Alert Request Form (as per instructions in Appendix A8) using pre-populated wording and send to SDCC Watch Desk to send to D/S Residents
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG • CTG	• Phone	Describe current situation with dam — What is the event? (*Dam Safety Risk — Security threat/ impact/ explosion, etc.*) What is the status? (*Dam Failure Likely/In Progress*) Discuss/Initiate evacuations
Stand Down	• Risk assessment has determined that failure risk has reduced	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS.
		• LDMG 1 • LDMG 2 • LDMG 3 • LDMG 4 • DDMG • CTG	• Phone	Describe current situation with dam: What is the event? (*Dam Safety Risk — Security threat/ impact/explosion, etc.*) What is the status? (Dam hazard Stood Down) Advise that failure risk has been reduced and EAP has been deactivated

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

Table 31: Terrorist threat/activity or high energy impact – DSTDM emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up — 1**	**Stand Up — 2**	**Stand Up — 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Action	• Not applicable	• Record all communication • Advise DSR of EAP activation	• 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 • Monitor situation, assess risks, and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage — if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO • Supervise^ remedial repairs (if applicable)	• As per previous activation level, AND • Liaise with the IC and LEC and advise on need to recommend evacuations ^Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.	• If required, forward all relevant communication, including emails for EER to: [redacted] • Return to routine activities
Notifications	Not applicable	IC DDO SRT DSR	IC DDO SRT DSR	IC DDO LEC/ORR SRT DSR	As required

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

[redacted]

10. Other emergency situation — communications failure

10.1 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.

10.2 Emergency actions

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

10.2.1 Activation triggers

Table 32: Communications failure emergency activation trigger summary

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

10.2.2 Emergency action roles

Table 33 to Table 38 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 33: Communications failure – DDO emergency action		
Activation level	**Comms Failure – Local Area**	**Comms Failure – Brisbane**
Activation trigger	• Unable to communicate to local area including LEC/ORR	• Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
Actions	• As much as practicable, assume the role of LEC • Continue tasks in accordance with any other current emergency action • Every hour, attempt communications noting the following: o Mobile phone – try texting instead of voice, much higher probability of success o Satellite phone – needs to access open sky unless external antenna fitted o Social media – e.g. Facebook (Internet may be available via landline) • Record all communication and attempts via Dam Logbook entries as per SOP 12 and communications log if EAP event is current	• Determine if LEC is in communication and if not, assume the LEC role as much as is practicable • Continue tasks in accordance with any other current emergency action • Every hour, attempt communications noting the following: o Mobile phone – try texting instead of voice, much higher probability of success o Satellite phone – needs to access open sky unless external antenna fitted o Social media – e.g. Facebook (Internet may be available via landline) • Record all communication and attempts via Dam Logbook entries as per SOP 12 and communications log if EAP event is current
Notifications	• IC • SO – if available	• LEC • SO – if available

Table 34: Communications failure – LEC emergency action		
Activation level	**Comms Failure – Dam Site**	**Comms Failure – Brisbane**
Activation trigger	• Unable to communicate to dam site	• Unable to communicate to Sunwater Brisbane including IC, DSTDM, or FODM
Actions	• Every hour, attempt communications noting the following: o Mobile phone – try texting instead of voice, much higher probability of success o Satellite phone – needs to access open sky unless external antenna fitted o Social media – e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Assume that the DDO is carrying out LEC role at site as much as practicable • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action	• Create Incident Report Record • Every hour, attempt communications noting the following: o Mobile phone – try texting instead of voice, much higher probability of success o Satellite phone – needs to access open sky unless external antenna fitted o Social media – e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Liaise with the DDO and assume IC role • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Notifications	• IC • DSTDM • SO – if available • LDMG	• DDO • DSTDM – if available • SO • LDMG • DDMG

Table 35: Communications failure – IC emergency action		
Activation level	**Comms Failure – Dam Site**	**Comms Failure – Local Area**
Activation trigger	• Unable to communicate to dam site	• Unable to communicate to local area including LEC/ORR
Actions	• Issue Sunwater Incident Alert • Every hour, attempt communications noting the following: o Mobile phone – try texting instead of voice, much higher probability of success o Satellite phone – needs to access open sky unless external antenna fitted o Social media – e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action	• Issue Sunwater Incident Alert • Every hour, attempt communications noting the following: o Mobile phone – try texting instead of voice, much higher probability of success o Satellite phone – needs to access open sky unless external antenna fitted o Social media – e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Liaise with the DDO and carry out functions of the LEC as much as practicable • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Notifications	• LEC/ORR • DSTDM • SO – if available • DDMG	• DDO – if available • DSTDM • SO – if available • LDMG – if available • DDMG – if available

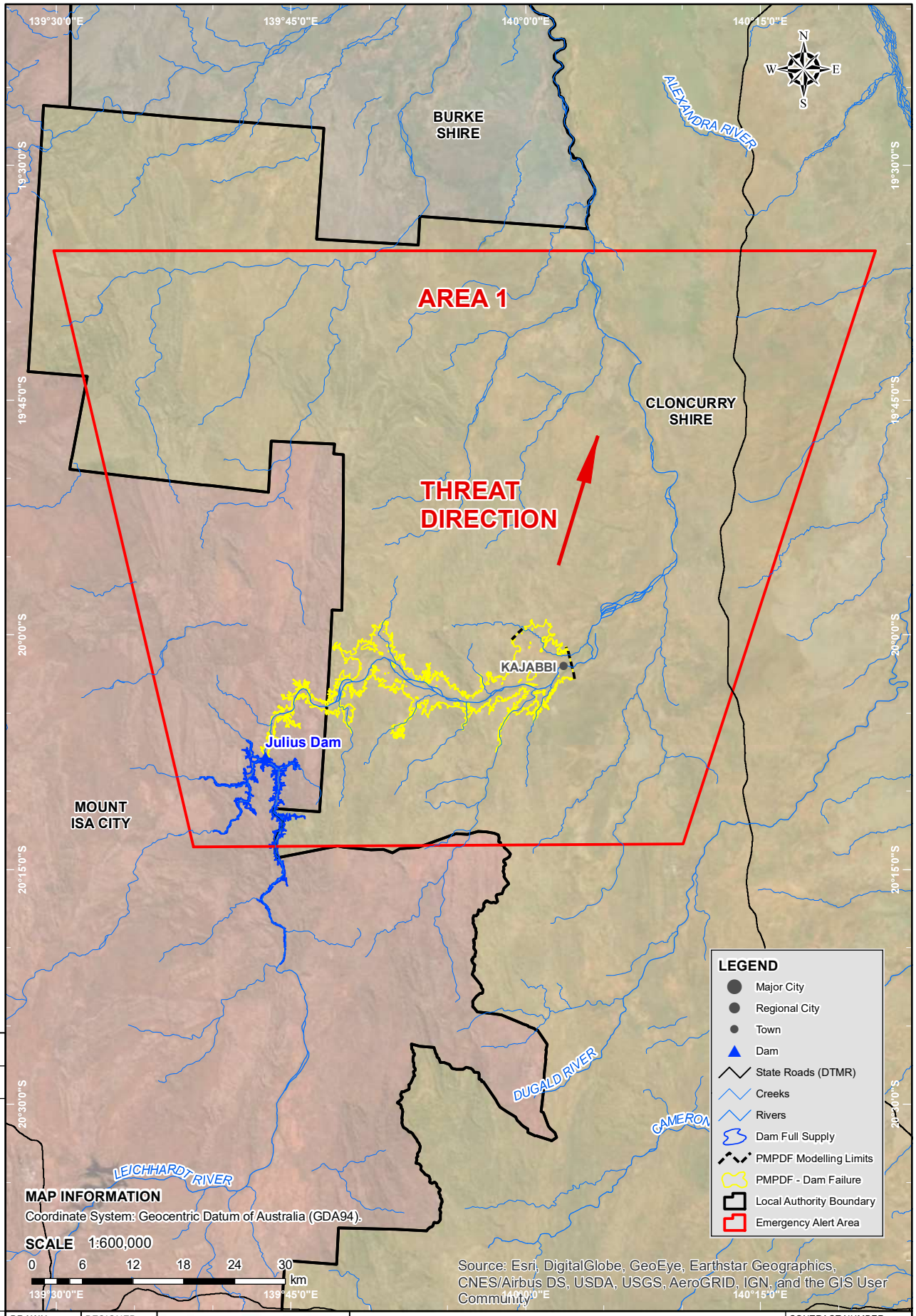
Table 36: Communications failure – LEC and IC communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Comms Failure – Site	• Unable to communicate to or from dam site, AND • DDO is at dam site	IC/LEC DSTDM SO – if available LDMG DDMG	Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		IC to create Incident Report record		EAP Alert Notification — Julius Dam — Site Communications Failure
Comms Failure – Local Area	• Unable to communicate to or from local area including LEC and ORR	DDO – if available DSTDM SO – if available LDMG – if available DDMG – if available	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 — Julius Dam — Local Area Communications Failure
Comms Failure – Brisbane	• Unable to communicate to or from Sunwater Brisbane	DSTDM – if available LDMG DDMG	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

Table 37: Communications failure – DSTDM emergency action		
Activation level	**Comms Failure – Site**	**Comms Failure – Local Area**
Activation trigger	• Unable to communicate to dam site	• Unable to communicate to local area including LEC and ORR
Actions	• Provide technical advice to IC/LEC on a need's basis • Record all communication • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action	• Provide technical advice to IC on a need's basis • Record all communication • Assume that the DDO is assisting IC with LEC role • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Notifications	• IC • LEC • SRT • DSR – if applicable	• IC • DDO – if available • SRT • DSR – if applicable

Table 38: Communications failure – FODM emergency action		
Activation level	**Comms Failure – Site**	**Comms Failure – Local Area**
Activation trigger	• Unable to communicate to dam site	• Unable to communicate to local area including LEC and ORR
Actions	• Record all communication • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action	• Record all communication • Assume that the DDO is assisting IC with LEC role • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Notifications	• IC • LEC • DSTDM	• IC • DDO – if available • DSTDM

APPENDIX A Notification and communication lists

Appendix A1 to Appendix A6 has been redacted



Document: S:\BW\Asset Delivery\SW-BW Service Delivery\PR-WSRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\Emergency Alerts\249579-B-Sh1of2.mxd
Printed: Wednesday, 18/03/2020 07:19:30 AM

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

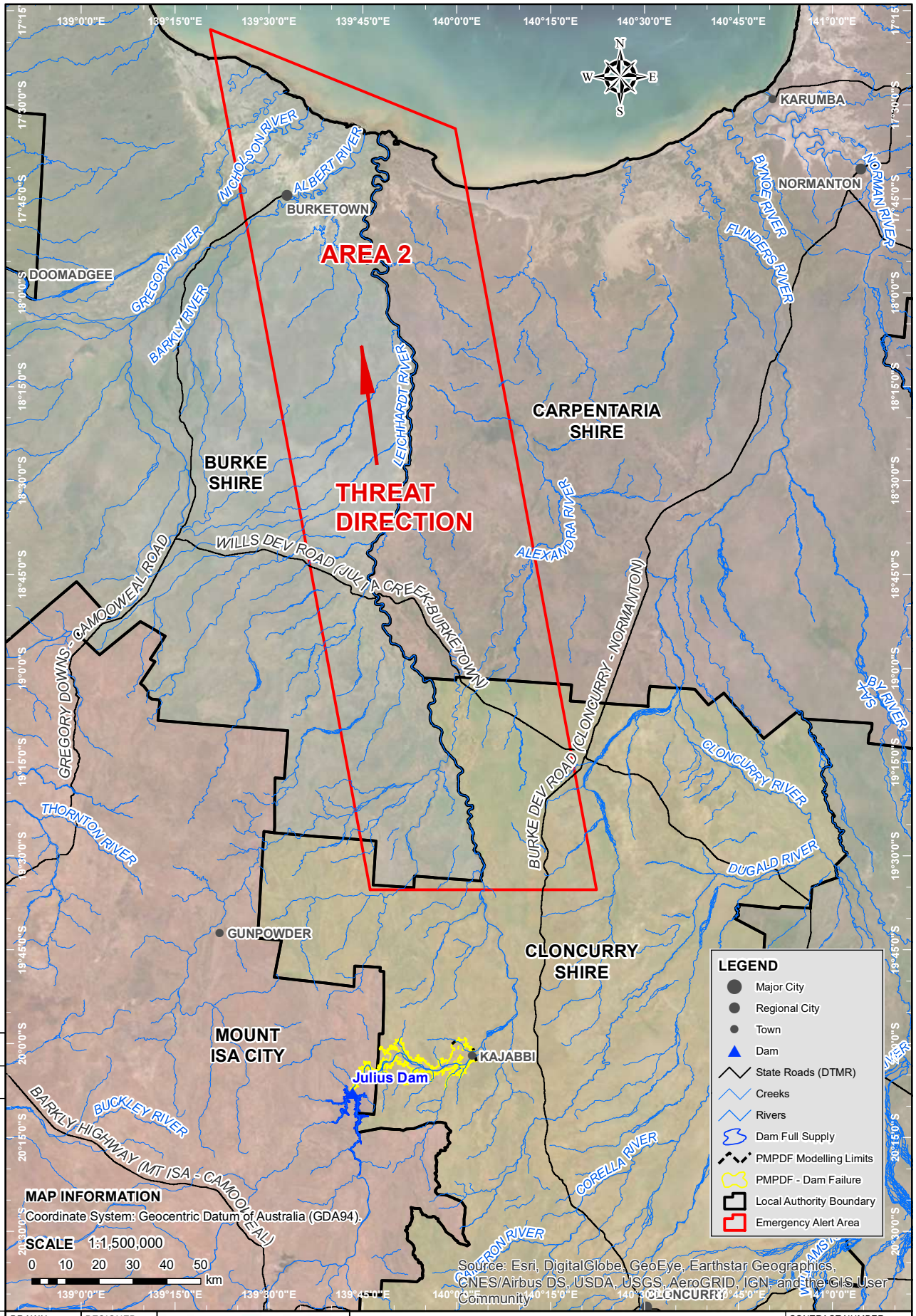
REVISION	DATE	REMARKS	CKD	PSD
B	18/03/20	UPDATED	MB	MH
A	23/01/18	ISSUED FOR USE	MB	MH

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

sunwater

JULIUS DAM
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA

CONTRACT NUMBER
DRAWING NUMBER 249579 | REV. B
SHEET 1 OF 2
DATE JANUARY 2018



Document: S:\BW\Asset Delivery\SW-BW Service Delivery\PR-WSRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\Emergency Alerts\249579-B-Sh2of2.mxd
Printed: Wednesday, 18/03/2020 07:27:03 AM

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

REVISION	DATE	REMARKS	DRAWN	CHECKED	APPROVED
B	18/03/20	UPDATED	IDH	MB	M. HUGHES 23/1/2018
A	23/01/18	ISSUED FOR USE	DESIGNED	CHECKED	
MB	MH	CKD			
MH	PSD				

sunwater

JULIUS DAM
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA

CONTRACT NUMBER

DRAWING NUMBER	REV.
249579	B

SHEET 2 OF 2

DATE JANUARY 2018

Appendix A8: DAM FAILURE EMERGENCY ALERT REQUEST

Queensland emergency alert request guidelines

An Emergency Alert (EA) Request form should be completed, if required (see dam hazard sections for actions) and sent to the SDCC Watch Desk to activate the Julius Dam Emergency Polygon.

Instructions

1. EA Request forms are not to be used for flood UNLESS a flood has triggered an Emergency Event.
2. Log on to the Sunwater area of the Disaster Management Portal in the EA area to complete the appropriate MS Word format form for Julius Dam.
3. Telephone the SDCC Watch Desk on [redacted] and tell them your intention to use the EA for an Emergency Event for Julius Dam.
    a. A Polygon for this dam is stored in the Sunwater area of the Disaster Management Portal in the EA area. Ask the SDCC operative to locate the polygon. It will be a KML file called [redacted]
    b. Give them your phone number, confirm their name, and end the call after advising the form/s will be sent shortly.
4. IC and DSTDM will work together to craft a message relevant to the hazard and discuss with the LDMG if there is time. If time does not permit use approved pre-filled form/s on the Disaster Management Portal.
5. Send filled out EA form/s and the Julius 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] Emergency Warning (Failure Possible)	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Julius Dam must LEAVE IMMEDIATELY. Julius Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. XX and XX are safe. More info available at Mount Eye Sah City Council dash board dot mount eye sah dot que el dee dot guv dot aye you.	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Julius Dam must LEAVE IMMEDIATELY. Julius Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. XX and XX are safe. Get full warnings and what you should do at Mount Isa City Council https://mountisa.qld.gov.au

The next page contains a pre-filled copy of the Julius Dam EA Request form:

Queensland Government

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

EMERGENCY ALERT REQUEST

Location of Alert: Julius Dam (e.g. Suburb, Town)	**Date:**
LGA/Agency requesting:	**Time:**

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

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

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

Event Type

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

Distributed by: (Channel)

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

Message Severity

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

Threat Direction Required? (e.g. Fire, Chemical Spill, Dam Spill) ☐ YES ☐ N/A	**Threat location indicated on map?** Only For Emergency Warning Voice & Service Address SMS ☒ YES ☐ N/A
EA Messaging Filename (Doc, Pdf):	**Polygon Filename, (Kml, Kmz, Gml, GeoJSON):** **Number of polygons** _____ (if multiple, attach list in order of priority)
Supplied via: ☒ DM Portal ☐ Email ☐ Verbal ☐ Other Other (please specify):	**Supplied via:** ☒ DM Portal ☐ Email ☐ Verbal ☐ Other Other (please specify):

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

FLOOD EMERGENCY WARNING from Sunwater: People downstream of Julius Dam must LEAVE IMMEDIATELY. Julius Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. XX and XX are safe. More info at Mount Eye sah City Council dashboard dot mount eye sah dot que el dee dot guv dot aye you

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

FLOOD EMERGENCY WARNING from Sunwater: People downstream of Julius Dam must LEAVE IMMEDIATELY. Julius Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. XX and XX are safe. More information at: Mount Isa City Council dashboard.mountisa.qld.gov.au

Remove EA from websites:

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

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

Send to [redacted] to confirm receipt

FOR USE BY SDCC

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

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

EA User Name: Signature: Date: / /	Emergency Alert No:
Authorising Officer Name: Signature: Date: / /	EMS EA Campaign Report ID:
Report provided to Requestor on EA outcomes: ☐ YES ☐ NO	

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

DO NOT SEND THIS PAGE

(Sunwater internal use only)

Emergency Alert (EA) Request instructions

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

STEP 1.	EA Polygon Area (e.g., detailed description and location reference to allow positive identification of message area, including street names with cross street, areas of interest such as parks, rivers, dams, coastal areas) it is preferable to attach a map identifying the message area. If a Threat Direction has been requested, please clearly indicate it on the map. Check applicable box.
STEP 2.	Enter the Polygon file name/s.
STEP 3.	*Sunwater Polygons are all in *.kml format.* Check applicable box.
STEP 4.	*Sunwater Messaging/spatial data is always supplied via DMportal.* Check applicable box. Enter the file name.

Voice Message: Either type or handwrite the required message in CAPITALS. As the message will be translated by a text-to-speech process it is important that words are not unintelligible when translated e.g., “qld” used in a web site address must be entered as “Q L D”, similarly the word “DOT” must be entered into a web address instead of a full stop.
An Emergency Warning message must start with “EMERGENCY EMERGENCY” Do not use special characters.

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

Voice example:

EMERGENCY. EMERGENCY. SUN WATER ADVISE IMMINENT FAILURE OF CANIA DAM. RESIDENTS DOWNSTREAM OF THE DAM NEED TO ACT TO PROTECT LIFE AND LEAVE IMMEDIATELY. FAILURE OF THE DAM WILL RESULT IN EXTREMELY DANGEROUS FLOODING DOWNSTREAM INCLUDING: MOONFORD AND MONTO. DO NOT DELAY. LEAVE NOW. CENTRAL MONTO AND BILOELA ARE SAFE LOCATIONS.

SMS example:

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

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

APPENDIX B Drawings and Maps

Appendix B1: General Arrangement and Instrumentation drawings

Appendix B2: Downstream Notification area

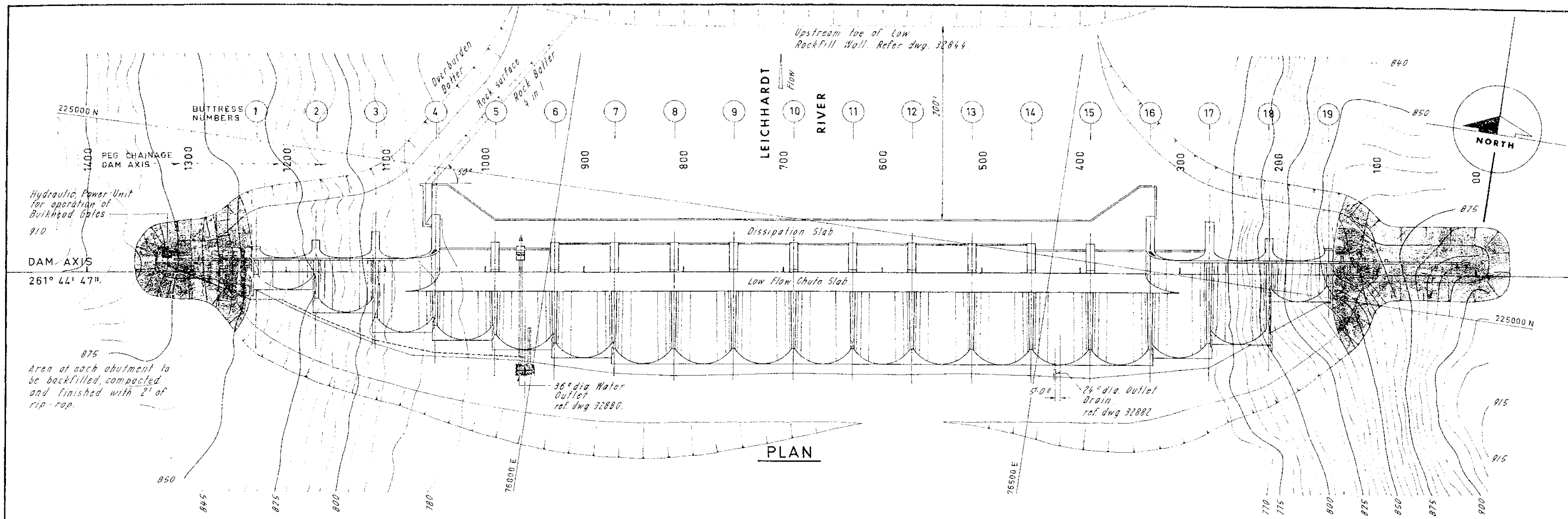
Appendix B3: Inundation maps

Appendix B4: Access routes during fair and adverse weather conditions

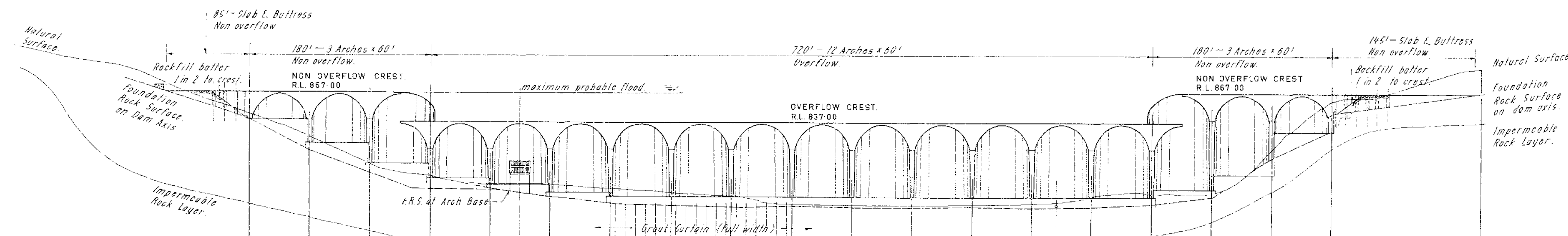
Appendix B5: Locality plan

Appendix B6: Catchment area

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



PLAN



BUTTRESS NUMBERS.

R.L. 670.00

BUTTRESS NUMBERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
PLANNED FOUNDATION LEVELS ON DAM AXIS	834.0	798.0	775.0	748.0	747.0	742.0	742.0	742.0	743.0	745.0	743.0	743.0	745.0	743.0	739.0	741.0	753.0	791.0	844.0
FOUNDATION ROCK SURFACE ON DAM AXIS (INTERPOLATED)	840.0	808.0	788.0	772.0	760.0	752.0	750.0	750.5	751.0	753.0	752.0	751.5	752.5	751.0	747.5	747.5	764.0	802.0	847.0
THROUGH CHAINAGE BUTTRESS LOCATIONS	1230	1170	1110	1050	990	930	870	810	750	690	630	570	510	450	390	330	270	210	150

PEGGED CHAINAGE ON AXIS WITH N.S. LEVELS														
Chainage	1300	1200	1100	1000	900	800	700	600	500	400	300	200	100	00
N.S. Level	870.9	835.0	790.9	775.6	772.6	766.0	756.0	754.4	755.3	760.1	766.0	821.9	866.1	893.0

ELEVATION

From Upstream.

Nº	DATE	DESCRIPTION	APPD.
D	10/07	OUTLET DRAIN DRAWING REFERENCE	PJM
C	1/74	HYDRAULIC POWER UNIT FOR BULKHEAD GATES ADDED EW	[signature]
B	9/73	PFL'S & Arch Base levels revised KG	[signature]
A	5/73	PFL'S revised and amended where F.R.S. below R.L. 752.0 ~ Arch Base revised.	ROA

REVISIONS

NOTES

- Contours are natural surface levels.
- For General Notes ref. dwg. 32846.
- For Legend, Reinf. Cover & Bending ref. dwg. 32884.

QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION

[signature]
CHIEF DESIGNING ENGINEER

[signature] 20.12.72.
COMMISSIONER

LEVEL DATUM Mount Isa Mines Datum.
REF. B.M. refer dwg. 32843.

AZIMUTH Mount Isa Mines Grid.

FIELD B.	———	DESIGNED	[signature]
LEVEL B.	———	DRAWN	[signature]
PLOTTED	———	CHECKED	C.L.

McINTYRE & ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS
QUEENSLAND · AUSTRALIA

PASSED [signature]
DATE 4.12.72.

QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION

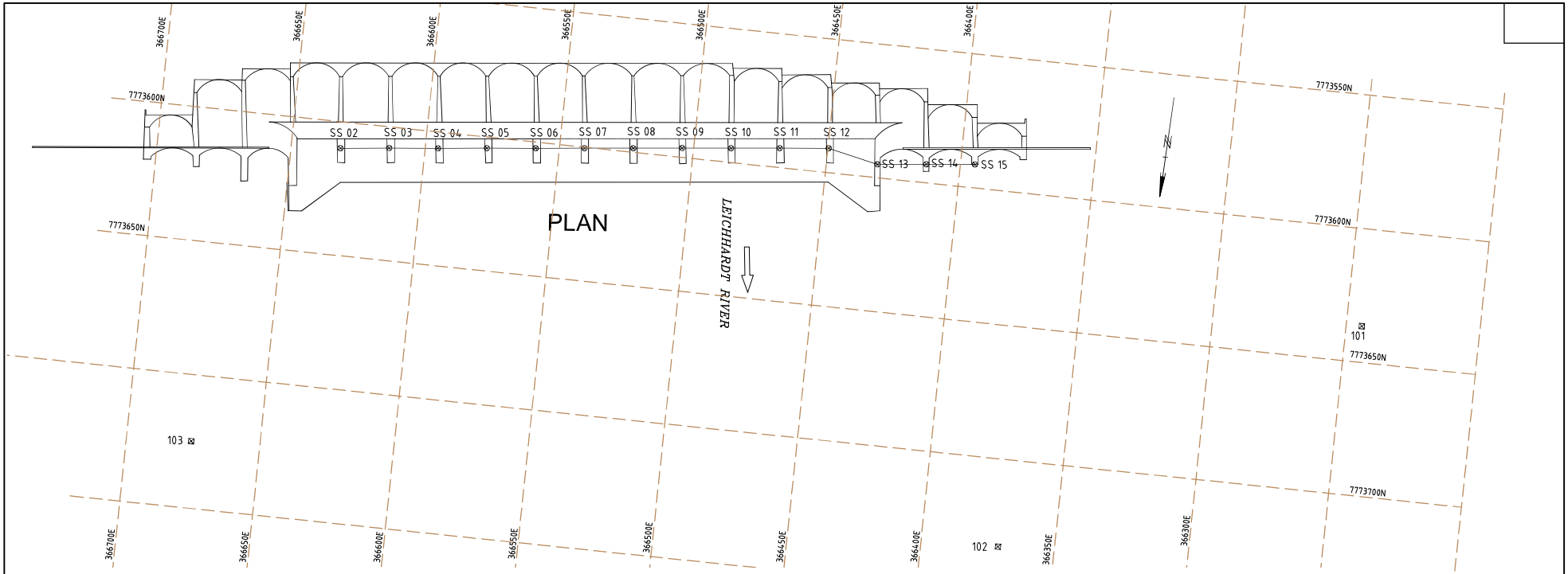
LEICHHARDT RIVER · JULIUS DAM

MULTIPLE ARCH BUTTRESS DAM

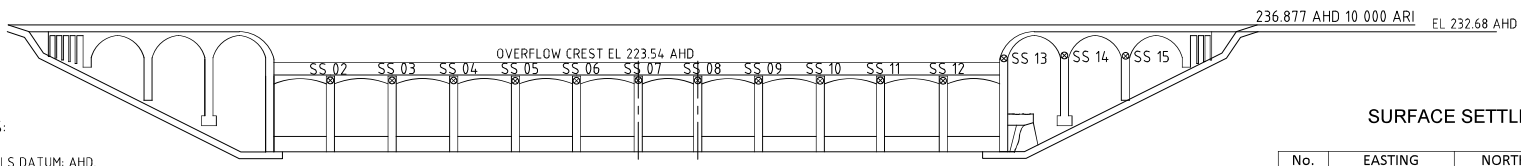
PLAN & ELEVATION FROM UPSTREAM

SCALE U.O.N. 0 — 50 Feet | SHEET 6 OF 50 | A1 – 32845 | D

W 268/20



PLAN



ELEVATION

NOTES:

1. LEVELS DATUM: AHD.
PM 120872 = EL 296.326

2. AZIMUTH DATUM : MGA94 ZONE 54.

3. COORDINATES : PLANE TRUNCATED.
PILLAR 101 MGA 94 E 366244.177
N 7773636.416
PLANE E 6244.177
N 3636.416

4. SETTLEMENT POINTS ARE ORIGINAL BOLTS IN THE BUTTRESSES

5. PILLAR ELEVATIONS ARE TO THE TOP OF THE BRASS ADAPTER

LEGEND:

SS 01 ⊗ SURFACE SETTLEMENT POINT
101 ☒ CONTROL PILLAR

SURFACE CONTROL STATIONS

No.	EASTING	NORTHING	ELEVATION	REMARKS
101	6244.177	3636.416	283.991	PILLAR
102	6371.097	3732.791	218.876	PILLAR
103	6675.729	3724.888	203.937	PILLAR
104	6214.039	3751.462	298.166	PILLAR

SURFACE SETTLEMENT INSTALLATIONS

No.	EASTING	NORTHING	ELEVATION	REMARKS
2	6631.577	3609.898	218.463	
3	6613.409	3607.948	218.529	
4	6595.225	3606.124	218.455	
5	6577.039	3604.171	218.534	
6	6558.844	3602.297	218.502	
7	6540.657	3600.374	218.531	
8	6522.478	3598.480	218.478	
9	6504.282	3596.540	218.504	
10	6486.087	3594.676	218.493	
11	6467.911	3592.746	218.587	
12	6449.715	3590.879	218.507	
13	6430.904	3594.991	224.883	
14	6412.709	3593.056	224.969	
15	6394.535	3591.198	224.861	

REVISION				
31/01/22	B	CONTROL POINT #104 ADDED	SG	J. DANN
01/12/20	A	SPILLWAY AND ABUTMENT LEVELS CORRECTED	KP	
DATE		REMARKS	CKD	PASSED

SCALES (A3 SIZE)
0 25 50 75 METRES
1:1500

DRAWN PL | DESIGNED
CHECKED AN | CHECKED
APPROVED 5/5/22

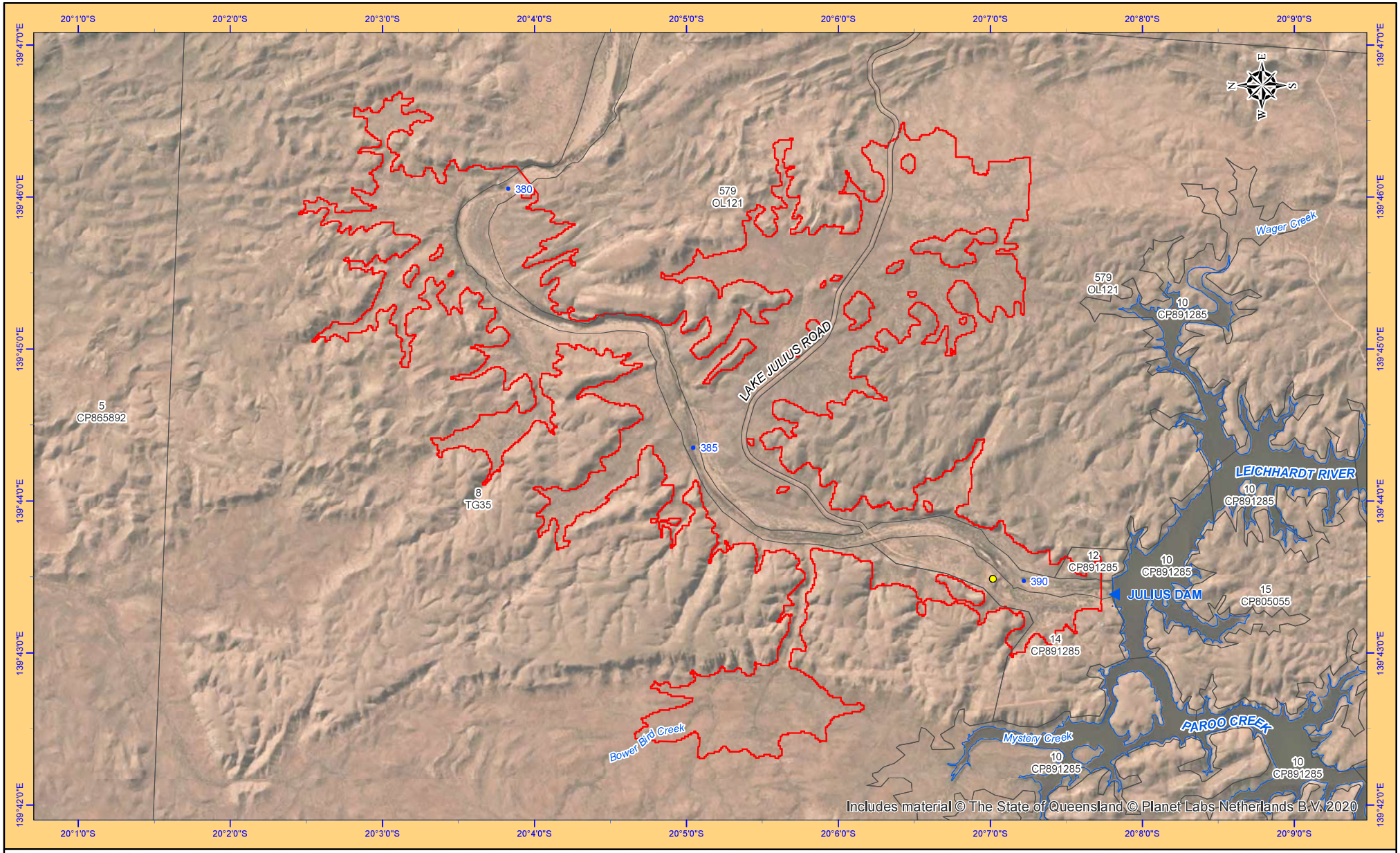
sunwater
©SUNWATER LIMITED
ACN 131 034 985

DAM SAFETY INVESTIGATION
JULIUS DAM
INSTRUMENTATION LAYOUT

CONTRACT NUMBER
DRAWING NUMBER 235460 | REV. B
SHEET 1 OF 1
DATE JAN 2022

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

S:\BW Asset Delivery\SW-Julius Dam WSS\T0005\7-50-09-00015200\14625 Julius Dam Drawing Update\Drawings\AutoCAD\235460-B.dwg
31 Jan 2022 1:07 PM



MAP INFORMATION

Coordinate System: Geocentric Datum of Australia (GDA2020).

SCALE (A4 SIZE)

0 590 1,180 1,770 2,360 2,950 m

1:60,000

LEGEND

- AMTD (Markers)
- Population at Risk
- Julius Dam Full Supply Level
- Limit of Downstream Notification Area

JULIUS DAM
DOWNSTREAM NOTIFICATION AREA

NOTES

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

sunwater

Document: S:\BW_WaterResources\GIS_Data\SW_Julius Dam WSS\JuliusDam_CRA2022\Drawings\ArcMap\250715-C.mxd
Printed: Tuesday, 25/10/2022 07:32:35 AM

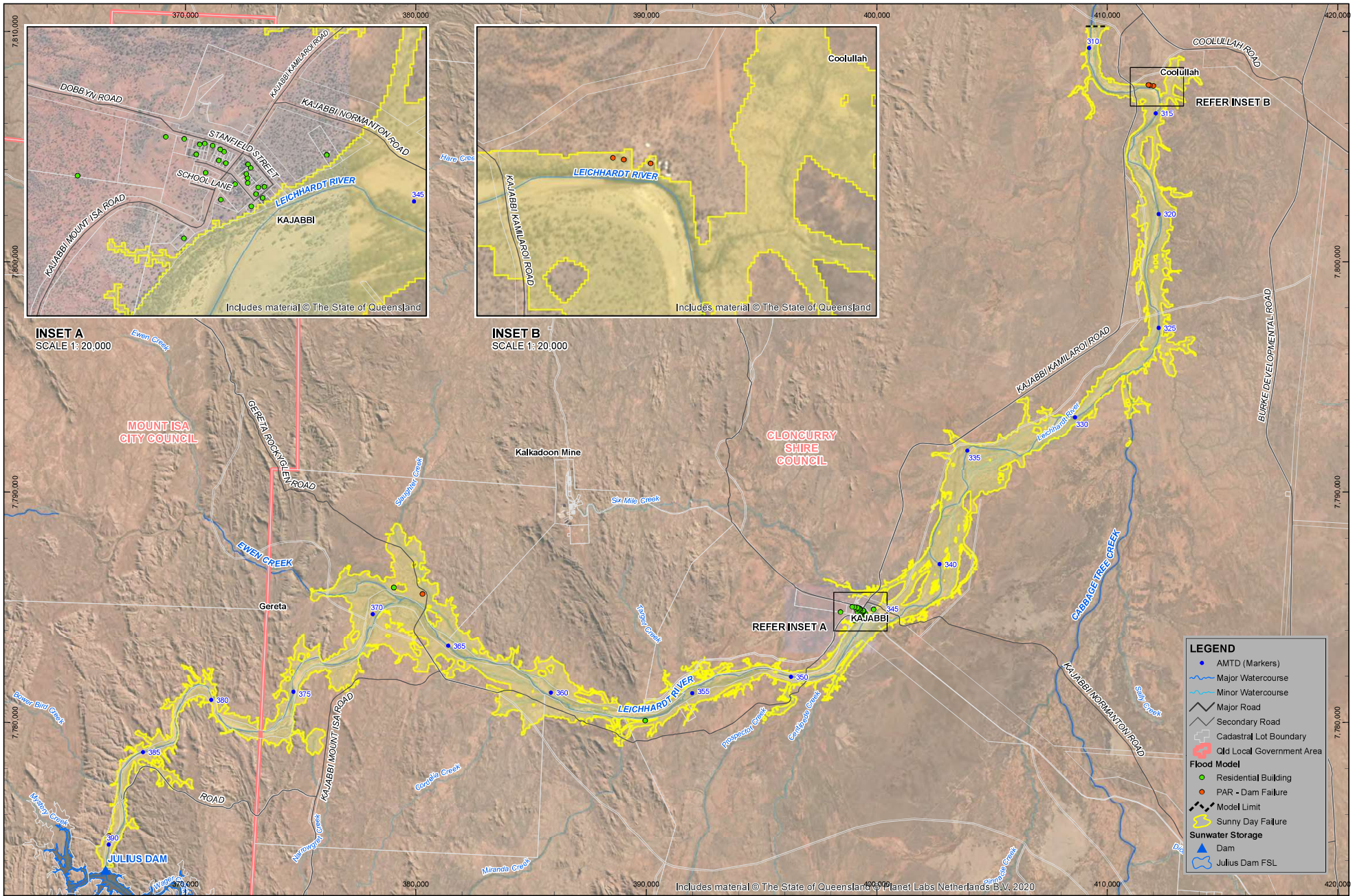
Appendix B3: INUNDATION MAPS

The following pages contain the Inundation Maps for Julius Dam

Drawings:

- Sunny Day Failure
- Dam Crest Flood
- Probable Maximum Flood
- 1% AEP Flood

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



Document: S:\BN_Water Resources\GIS_Data\SW_Julius Dam WSS\JuliusDam_CRA2022\Drawings\ArcMap\256199-B.mxd
Printed: Thursday, 27/10/2022 11:54:44 AM

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

REVISION				
27/10/22	B	LOCAL GOVERNMENT AREA BOUNDARY	LH	RJ
08/07/22	A	ISSUED FOR USE	JJ	RJ
DATE		REMARKS	CKD	PSD

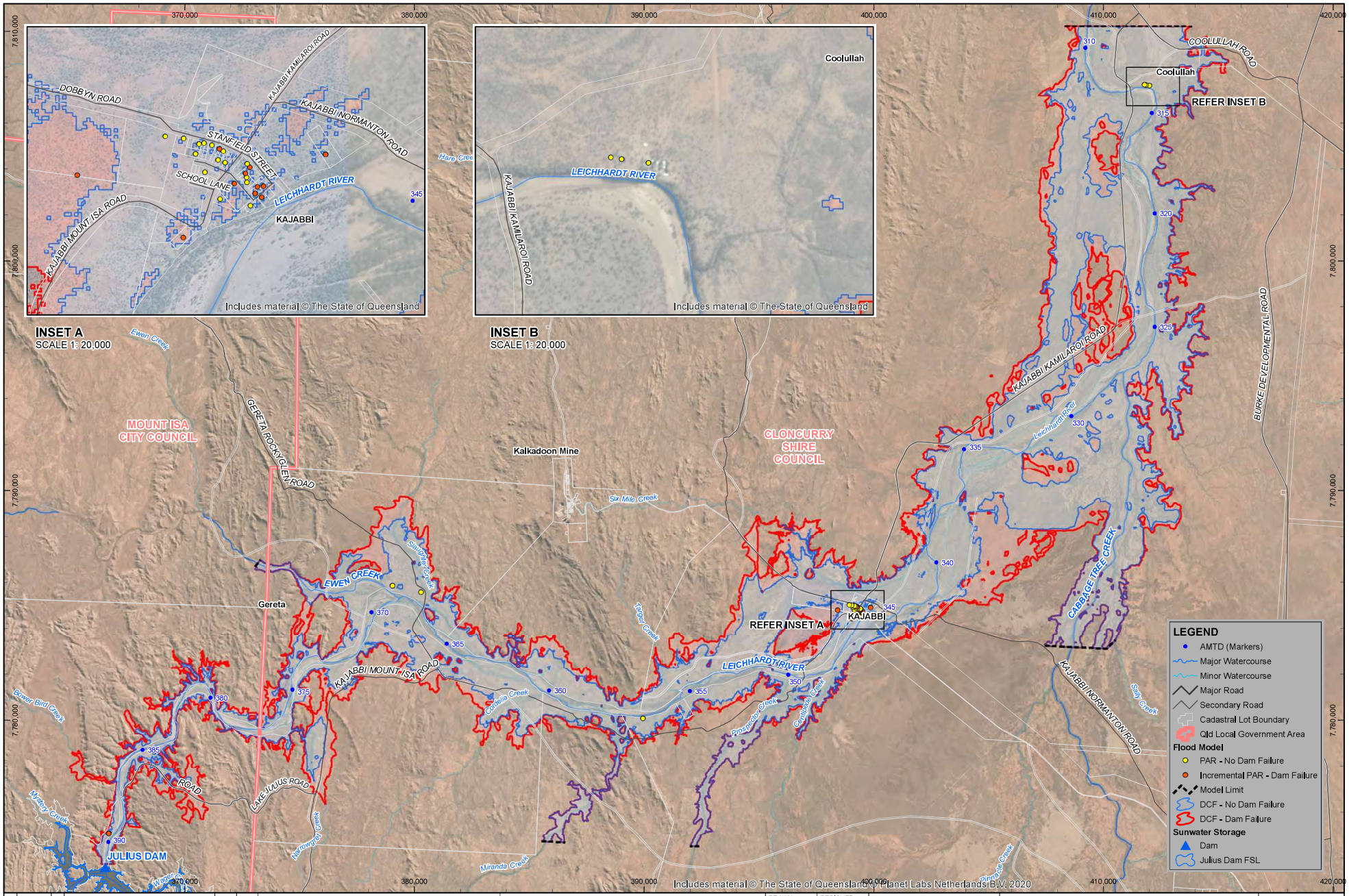
MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 54.

SCALES (A3 SIZE)
0 1,500 3,000 4,500 6,000 7,500 m
1:150,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	JJ
APPROVED	
R. JENSEN 8/7/2022	
RPEQ: 23733	

JULIUS DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
MAIN DAM FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
256199	B
SHEET 1 OF 1	
DATE JULY 2022	



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

Document: S:\BN_Water\Resources\GIS_Data\SW_Julius Dam WSS\JuliusDam_CRA2022\Drawings\ArcMap\256200-B.mxd
Printed: Thursday, 27/10/2022 11:56:45 AM

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

REVISION				
27/10/22	B	LOCAL GOVERNMENT AREA BOUNDARY	LH	RJ
08/07/22	A	ISSUED FOR USE	JJ	RJ
DATE		REMARKS	CKD	PSD

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 54.

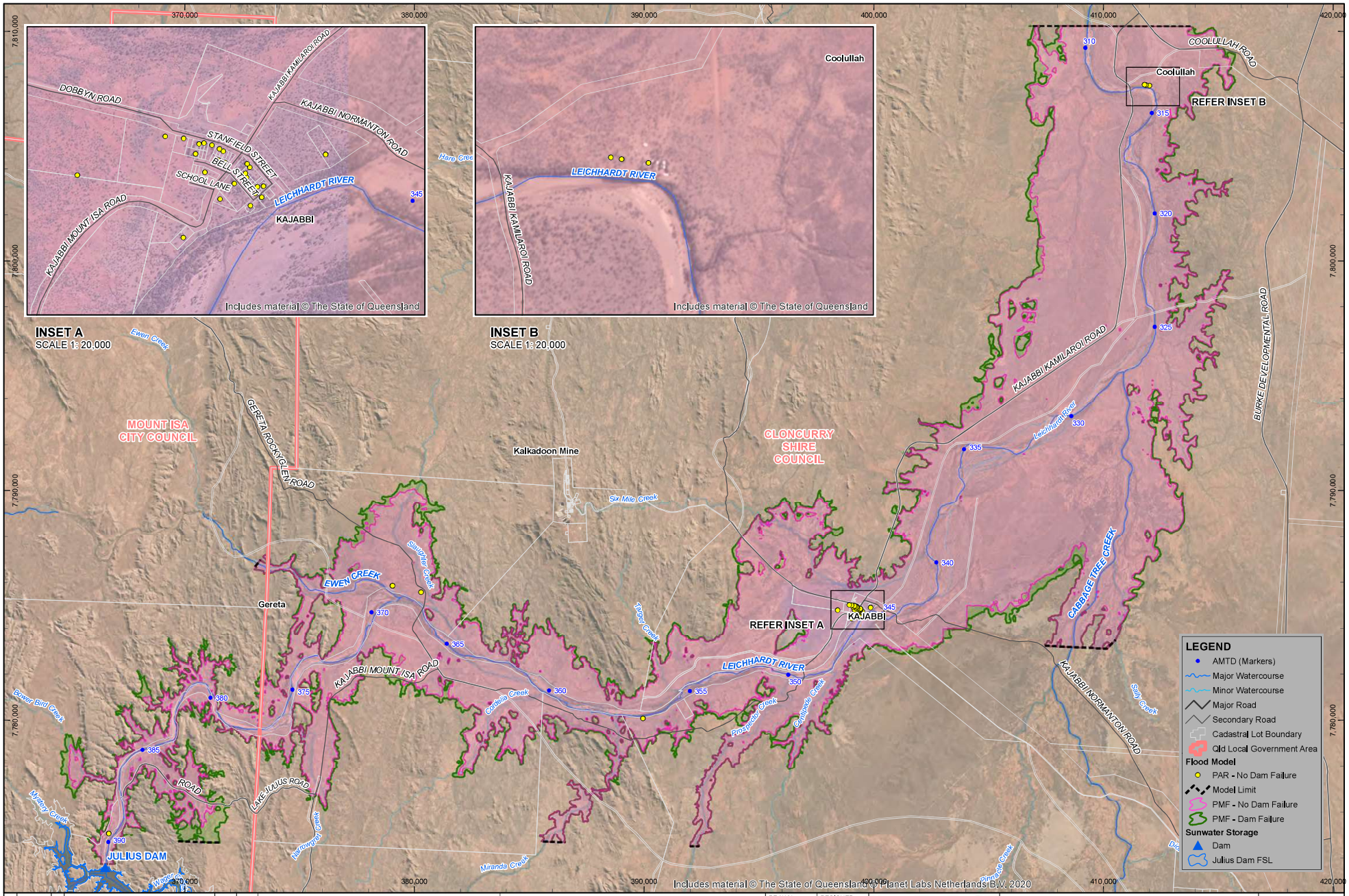
SCALES (A3 SIZE)
0 1,500 3,000 4,500 6,000 7,500 m
1:150,000

DRAWN	IDH
DESIGNED	
CHECKED	
CHECKED	JJ
APPROVED	R. JENSEN 8/7/2022
RPEQ: 23733	

sunwater

JULIUS DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD
MAIN DAM FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	256200
REV.	B
SHEET	1 OF 1
DATE	JULY 2022



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

Document: S:\BN_Water Resources\GIS_Data\SW_Julius Dam WSS\JuliusDam_CRA2022\Drawings\ArcMap\256201-B.mxd
Printed: Thursday, 27/10/2022 1:30:26 AM

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

REVISION				
27/10/22	B	LOCAL GOVERNMENT AREA BOUNDARY	LH	RJ
08/07/22	A	ISSUED FOR USE	JJ	RJ
DATE		REMARKS	CKD	PSD

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 54.

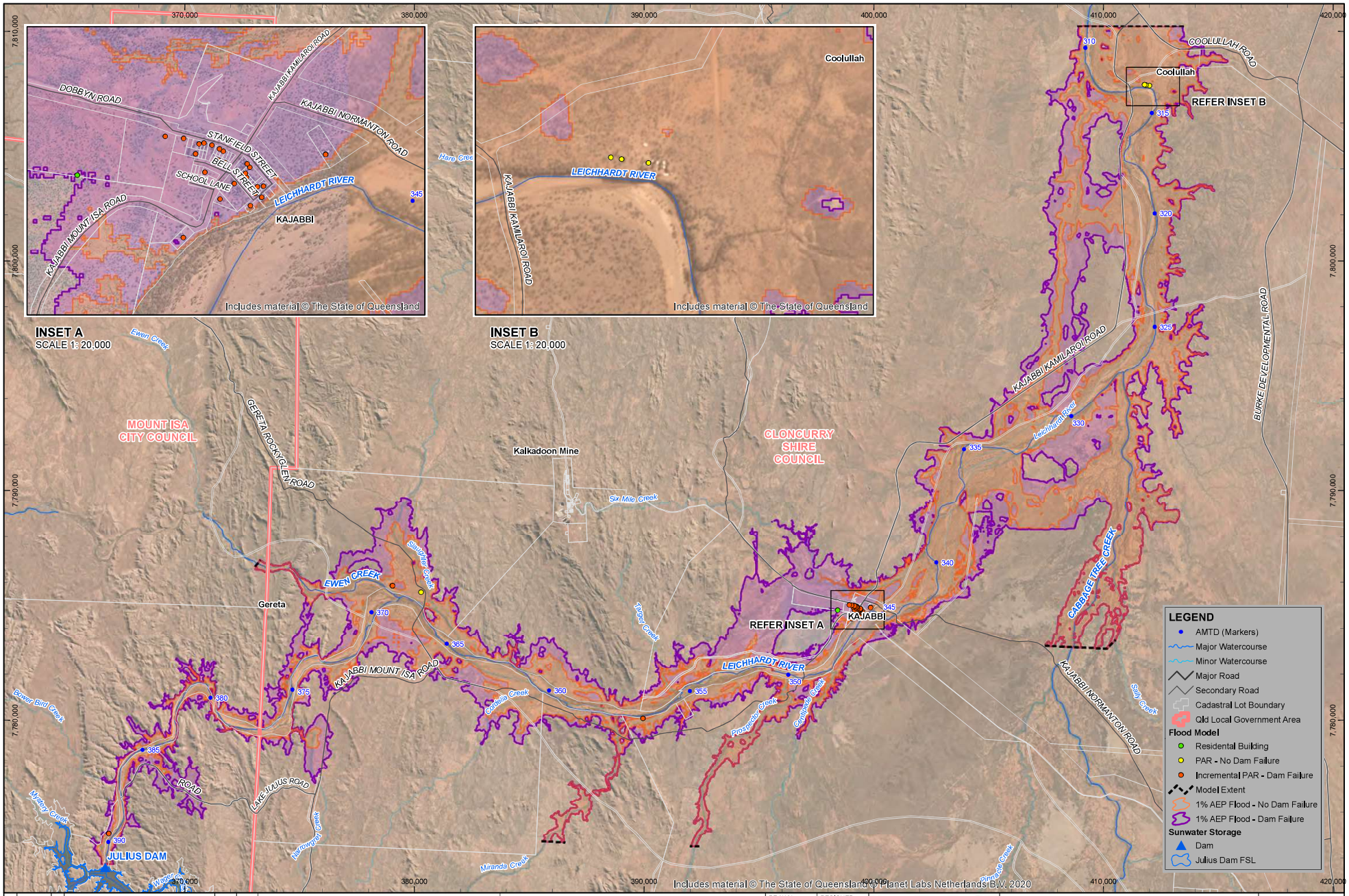
SCALES (A3 SIZE)
0 1,500 3,000 4,500 6,000 7,500 m
1:150,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	JJ
APPROVED	
R. JENSEN 8/7/2022	
RPEQ: 23733	

sunwater
©Sunwater Limited
ACN 131 034 985

JULIUS DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD
MAIN DAM FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
256201	B
SHEET 1 OF 1	
DATE JULY 2022	



Document: S:\BN_Water Resources\GIS_Data\SW_Julius Dam WSS\JuliusDam_CRA2022\Drawings\ArcMap\2562022B.mxd
Printed: Thursday, 27/10/2022, 12:00:01 PM

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

REVISION				
27/10/22	B	LOCAL GOVERNMENT AREA BOUNDARY	LH	RJ
08/07/22	A	ISSUED FOR USE	JJ	RJ
DATE		REMARKS	CKD	PSD

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 54.

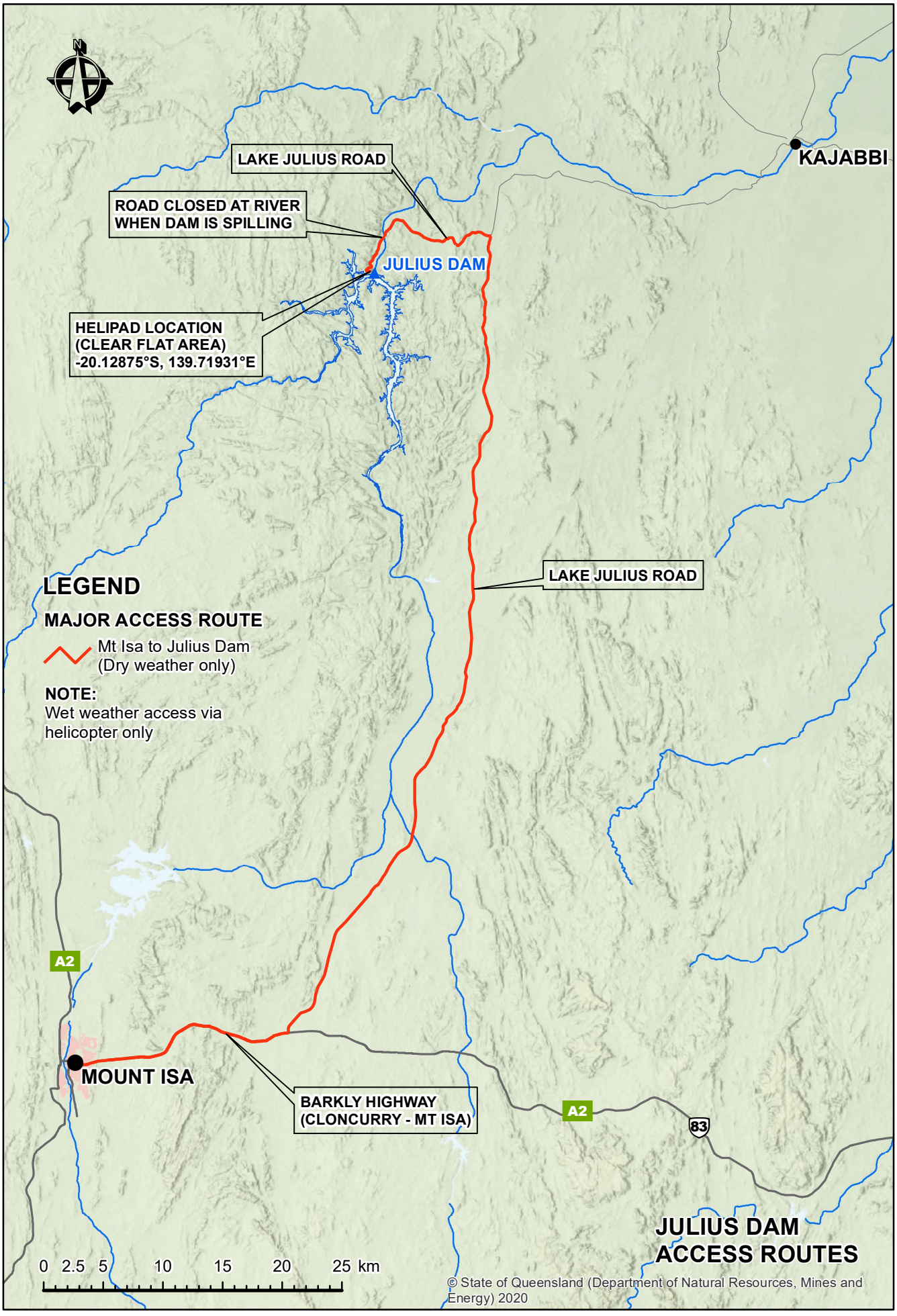
SCALES (A3 SIZE)
0 1,500 3,000 4,500 6,000 7,500 m
1:150,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	JJ
APPROVED	
R. JENSEN 8/7/2022	
RPEQ: 23733	

sunwater

JULIUS DAM
DAM BREAK ANALYSIS 2022
1% AEP FLOOD (1 IN 100 YEAR)
MAIN DAM FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
256202	B
SHEET 1 OF 1	
DATE JULY 2022	



Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-WSRW-38-01-05-01 EAP Mapping\Drawings\Acrobat PDF\Mapping\Julius\EAP_AccessRoads.mxd
Printed: Wednesday, 06/07/2022 10:31:39 AM

Major access route information (Dry weather only)

Route 1 — Mount Isa to Julius Dam

From Mount Isa travel east on Barkly Highway (NR83) for approx. 19 kms. Turn left onto Lake Julius Road and travel for approx. 73 kms. Turn left at intersection with Kajabbi Mt Isa Road to continue travelling on Lake Julius Road for approx. 14 kms to travel to dam (the last 3.5kms of the road is sealed).

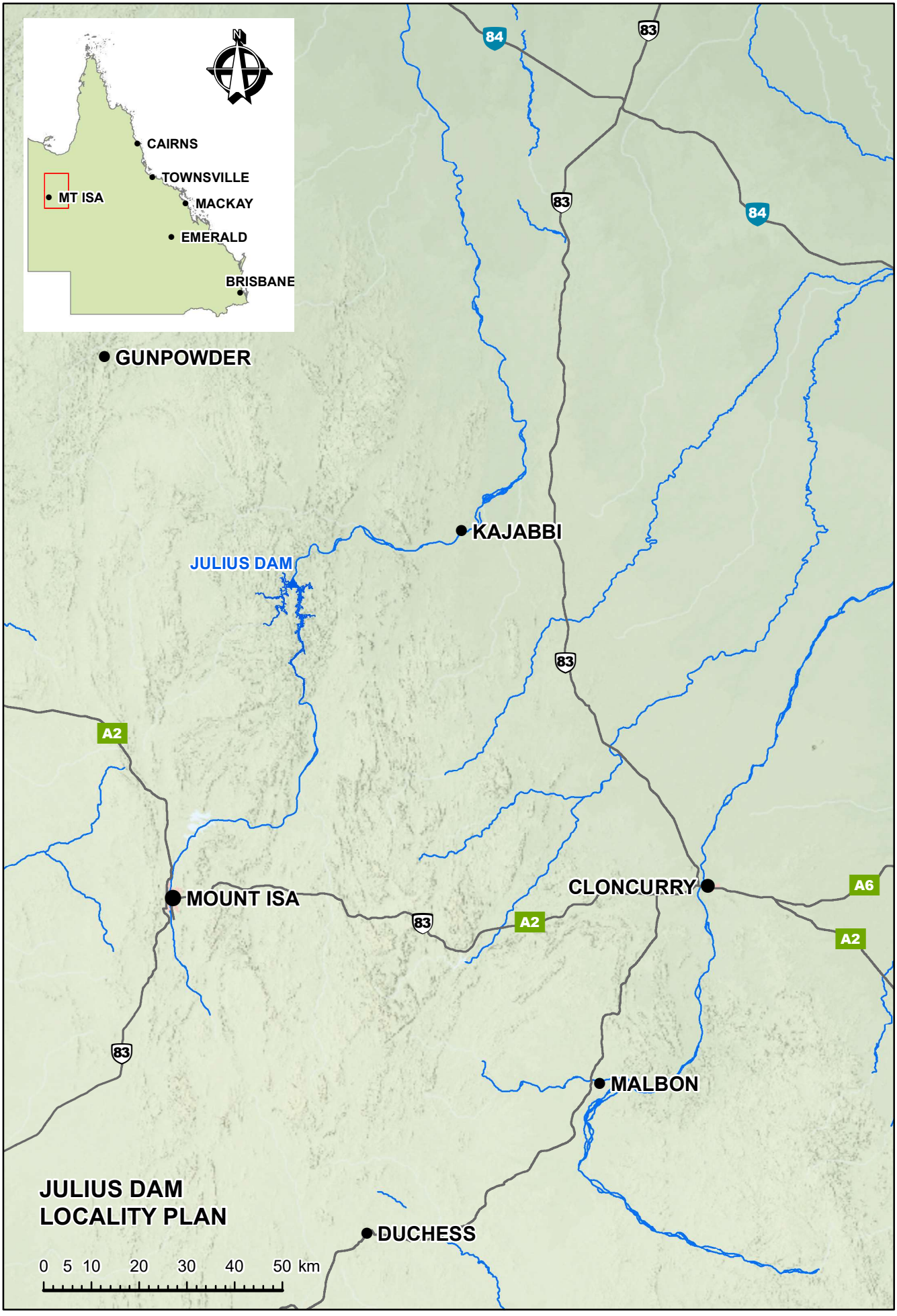
- Distance: Approx. 105 kms
- Road Type: Bitumen on Barkly Highway then dirt/gravel road (of variable quality) to dam
- Speed Limit: 100km/h generally on bitumen; 60 – 80 km/h (drive to suit conditions) on dirt in dry conditions
- Road cut off in wet weather.

Emergency access route information

In flood events, Lake Julius Road would be cut in several locations, most notably at the Leichardt River crossing at Lake Julius Causeway. During flood events the dam is only accessible by air.

NOTE: Wet weather access via helicopter only

Helipad location (clear flat area) @ coordinates -20.12875°S, 139.71931°E

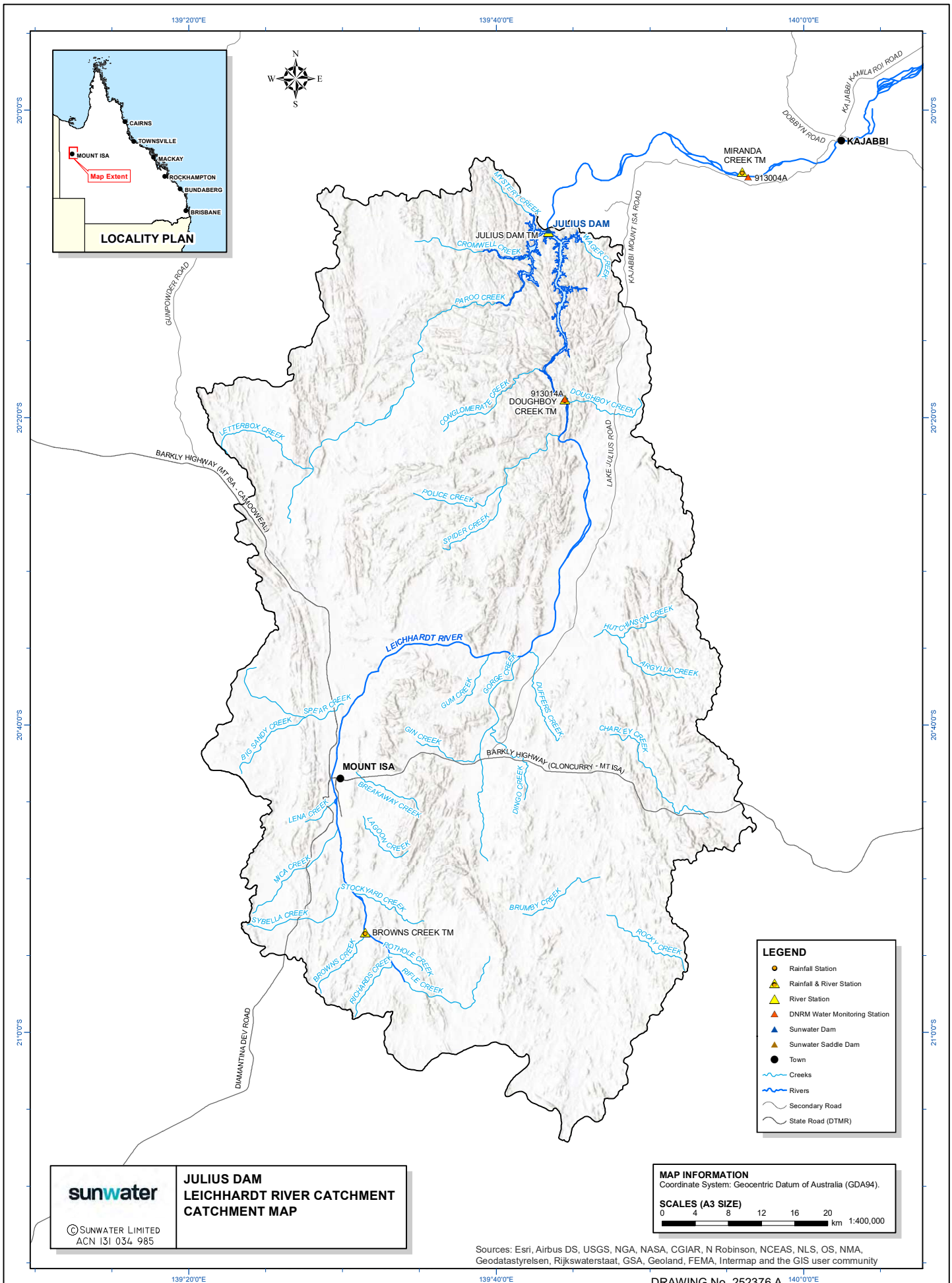


JULIUS DAM
LOCALITY PLAN

Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-WSRW-38-01-05-01 EAP Mapping\Drawings\Acrobat PDF\Preliminary Mapping\Julius\EAP_AccessRoadsLocalityPlan.mxd
Printed: Wednesday, 11/03/2020 07:47:16 AM

Map Produced By:
Sunwater Ltd
Tel. (07)3120 0000

Document: S:\BW Asset Delivery\GIS_Data\Enterprise_GIS\Water_Supply_Schemes\Julius Dam\Drawings\ArcMap\252376-A.mxd
Printed: Thursday, 09/04/2020 12:38:46 PM



sunwater

JULIUS DAM
LEICHHARDT RIVER CATCHMENT
CATCHMENT MAP

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

SCALES (A3 SIZE)
0 4 8 12 16 20 km 1:400,000

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

DRAWING No. 252376 A

APPENDIX C Equipment and technical information

Appendix C1: List of equipment available during an emergency

Appendix C2: Julius Dam outlet discharge curve

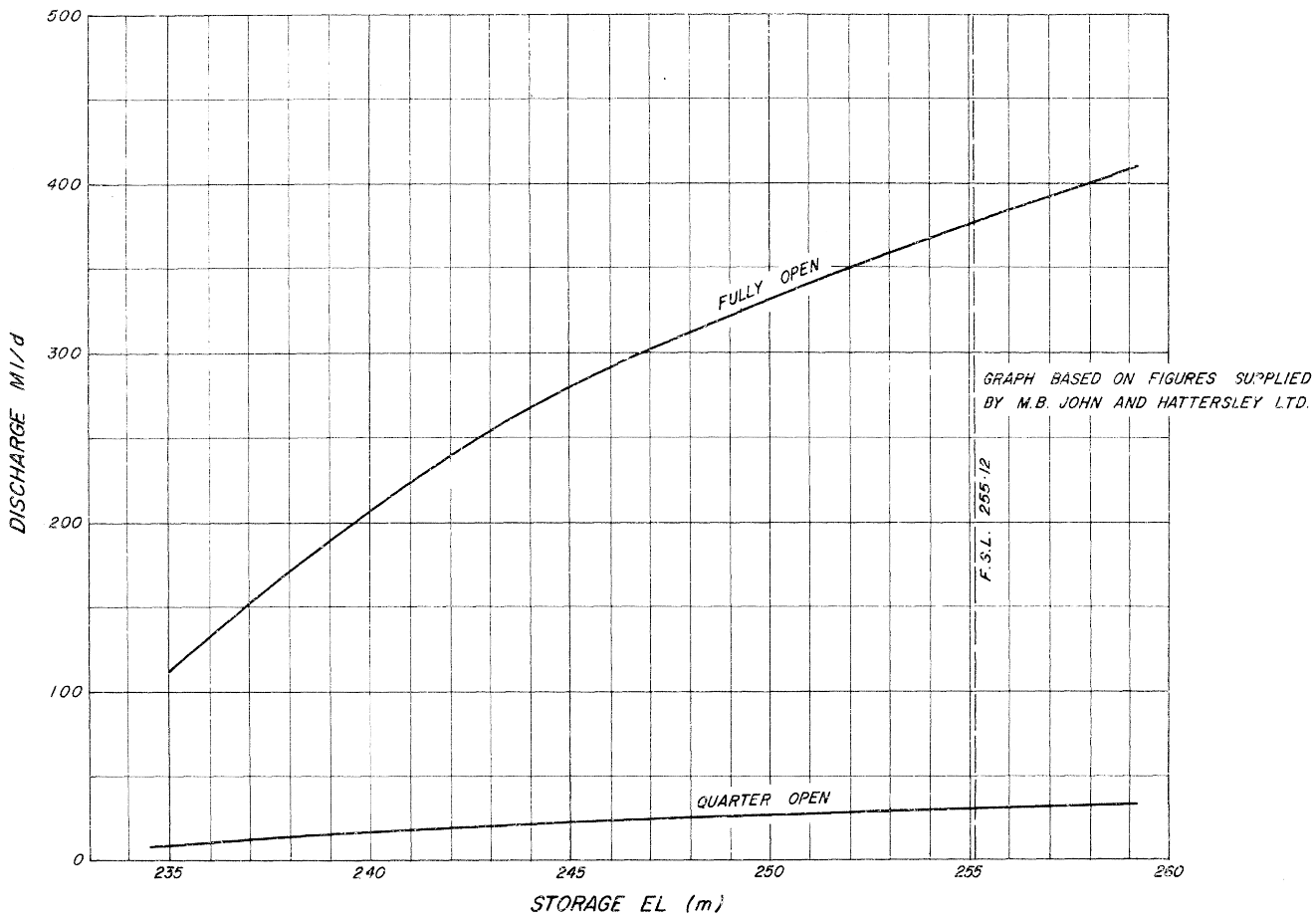
Appendix C3: Julius Dam storage curve

Appendix C4: Julius Dam rating curves

Appendix C5: Julius Dam spillway rating and configuration

Appendix C1 has been redacted

A3-49249



GRAPH BASED ON FIGURES SUPPLIED BY M.B. JOHN AND HATTERSLEY LTD.

Revision					Dwg. Schedule
Date	Remarks	Ckd.	Psd.		

Design	Drafting	Approved
Prep.	Dr.	18/7/77 Chief Irrig. Engr.
Ckd.	Ckd.	
Supv.	Supv.	
Recommended		
Senior Engineer		

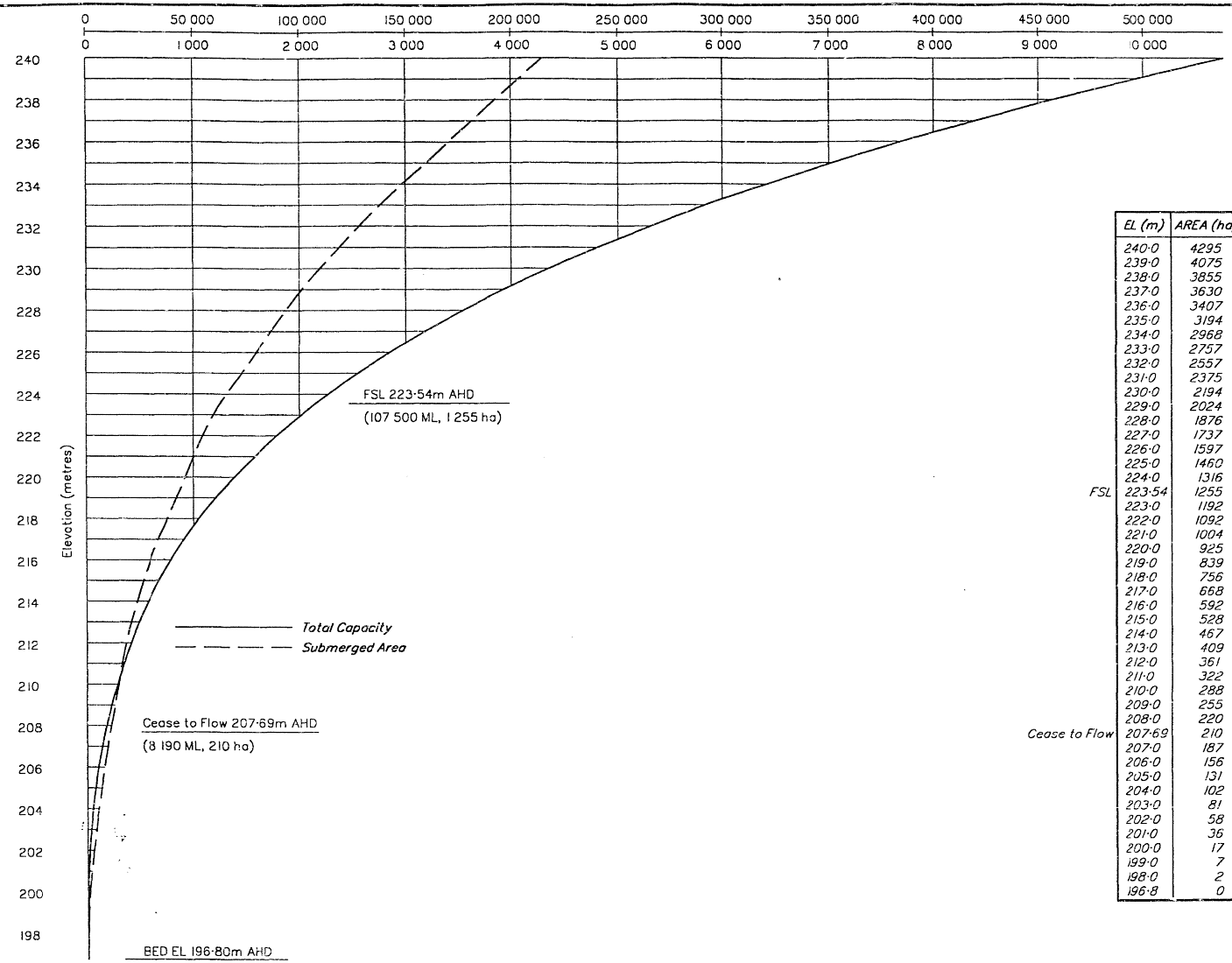
IRRIGATION AND WATER SUPPLY COMMISSION

JULIUS DAM

DISCHARGE CURVES FOR OUTLET VALVE

15-2-77 | A3-49249

DWG 49249.TIF



	EL (m)	AREA (ha)	VOLUME (ML)
	240·0	4295	538424
	239·0	4075	496578
	238·0	3855	456931
	237·0	3630	419508
	236·0	3407	384333
	235·0	3194	351328
	234·0	2968	320522
	233·0	2757	291898
	232·0	2557	265355
	231·0	2375	240699
	230·0	2194	217865
	229·0	2024	196795
	228·0	1876	177314
	227·0	1737	159257
	226·0	1597	142592
	225·0	1460	127292
	224·0	1316	113425
FSL	223·54	1255	107500
	223·0	1192	100905
	222·0	1092	89501
	221·0	1004	79033
	220·0	925	69391
	219·0	839	60562
	218·0	756	52585
	217·0	668	45465
	216·0	592	39183
	215·0	528	33582
	214·0	467	28610
	213·0	409	24234
	212·0	361	20393
	211·0	322	16988
	210·0	288	13942
	209·0	255	11229
	208·0	220	8846
Cease to Flow	207·69	210	8190
	207·0	187	6817
	206·0	156	5104
	205·0	131	3673
	204·0	102	2500
	203·0	81	1589
	202·0	58	893
	201·0	36	429
	200·0	17	170
	199·0	7	55
	198·0	2	9
	196·8	0	0

Level Datum: Australian Height Datum (AHD = MIM Datum − 31·58m)
Levelled from PM120872 at EL296·326m AHD.
Computed from DTM produced in 1999 from 1971 photography.
Digital data & volumes computed to EL 240m AHD.
Latitude: 20°07'55" Longitude: 139°43'10"
Catchment Area: 4,845 km²

REVISION					REFERENCE DRAWINGS		
15/10/99	B	Level Datum note Amended	DWL		A1-211657	Inundated Area	
6/9/99	A	Cease to Flow Added			A1-211003/5	Topographic Mapping 1:20 000	
DATE		REMARKS	CKD	PSD	A1-211002	Key to Topographic Mapping	

SCALES

SURVEY	RECOMMENDED
SURVEY CHK	
DRAFTING GWP	APPROVED Douglas N. Houston for Principal Surveyor
DRAFTING CHK	

Engineering Services — NATURAL RESOURCES

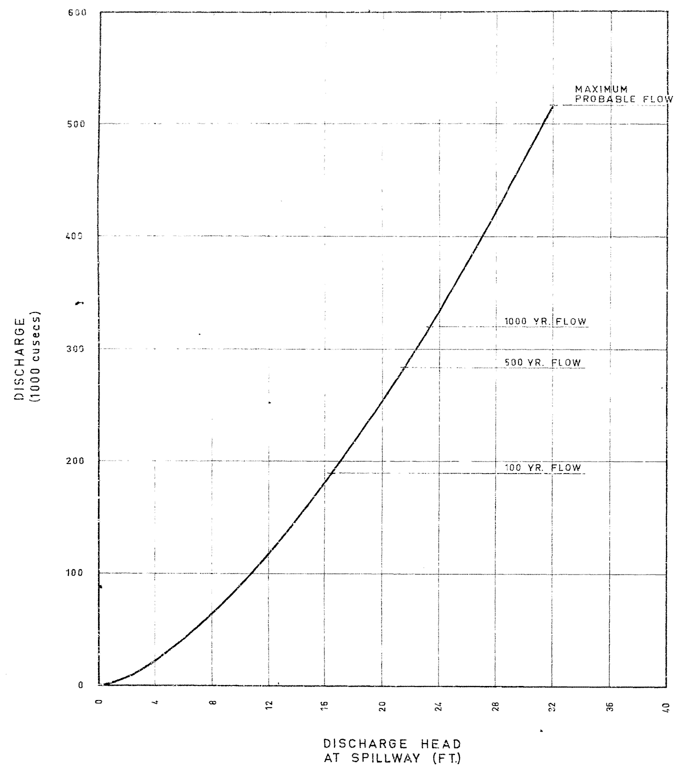
LEICHHARDT RIVER - BASIN 913
JULIUS DAM - AMTD 390.9KM

STORAGE CURVE

CONTRACT NUMBER
DRAWING NUMBER A3-211928
DATE 10/03/1999
A1 B

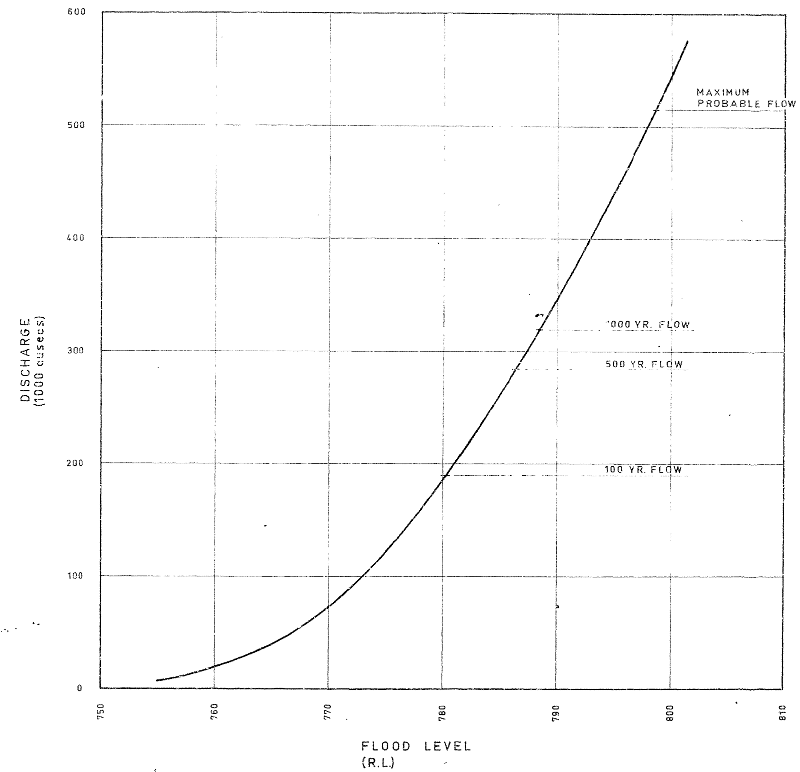
D:\AutoCAD\Julius Dam\211928.dwg
15th October 1999

211928B (tif)



SPILLWAY DISCHARGE RATING CURVE

Flood routing effects are neglected in calculation of rating curve.



TAILWATER RATING CURVE AT DAM SITE

Mannings "n" = 0.030

Levels on this drawing are in feet to Mt Isa Mines Datum (MD).
Conversion to AHD: AHD = MD x 0.3048 - 31.58m
based on PM 120872 = EL 296.326m (AHD Registered)

Nº	DATE	DESCRIPTION	APPD.
		REVISIONS	

NOTES

QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION

CHIEF DESIGNING ENGINEER

for COMMISSIONER 15.12.72

LEVEL DATUM *Mount Isa Mines Datum.*
REF. B.M. *ref. dwg. 32843.*
AZIMUTH
FIELD B. — DESIGNED C.L.
LEVEL B. — DRAWN K.G.R.
PLOTTED — CHECKED R.P.

McINTYRE & ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS
QUEENSLAND · AUSTRALIA

PASSED
DATE 4.12.72

QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION
LEICHHARDT RIVER · JULIUS DAM
MULTIPLE ARCH BUTTRESS DAM
RATING CURVES

SCALE U.O.N. — SHEET 46 OF 50 A1-32885

W268/60

INS. 0 2 4 6 8 10

DWG 32885.TIF

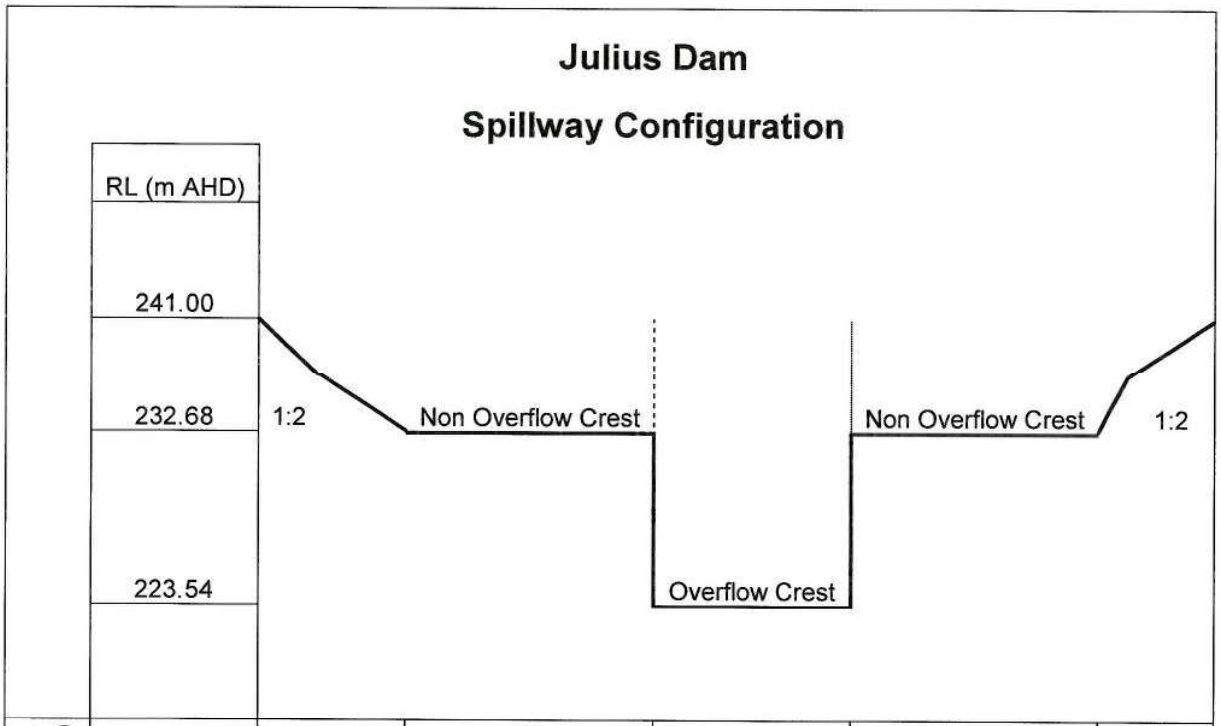
JULIUS DAM SPILLWAY RATING

	Overflow Crest				Non Overflow Crest				Total
RL	H	L	C	Q	H	L	C	Q	Q
223.54	0.00	219.45		0		0		0	0
224.00	0.46	219.45	2.19	150		0		0	150
225.00	1.46	219.45	2.07	800		0		0	800
226.00	2.46	219.45	2.01	1700		0		0	1700
227.00	3.46	219.45	2.09	2950		0		0	2950
228.00	4.46	219.45	2.10	4350		0		0	4350
229.00	5.46	219.45	2.14	6000		0		0	6000
230.00	6.46	219.45	2.19	7900		0		0	7900
231.00	7.46	219.45	2.18	9750		0		0	9750
232.00	8.46	219.45	2.22	12000		0		0	12000
232.68	**9.14**	**219.45**	**2.24**	13600	**0**	**180.2**	**2.24**	**0**	**13600**
233.00	9.46	219.45	2.24	14320	0.32	181.5	2.24	74	14394
234.00	10.46	219.45	2.24	16650	1.32	185.5	2.24	630	17280
235.00	11.46	219.45	2.24	19094	2.32	189.5	2.24	1500	20594
236.00	12.46	219.45	2.24	21647	3.32	193.4	2.24	2621	24268
237.00	13.46	219.45	2.24	24305	4.32	197.4	2.24	3971	28276
238.00	14.46	219.45	2.24	27063	5.32	201.4	2.24	5537	32599
239.00	15.46	219.45	2.24	29918	6.32	205.4	2.24	7311	37229
240.00	16.46	219.45	2.24	32867	7.32	209.4	2.24	9290	42157
241.00	17.46	219.45	2.24	35908	8.32	213.4	2.24	11472	47379

Notes:

1. RL 223.54 to RL 232.68 from Leichhardt River – Julius Dam Rating Curves A1-32995
2. RL 223.68 to RL 241.00 - Calculated from weir formula

JULIUS DAM – STAGE-DISCHARGE AND STAGE-STORAGE DATA



Ch (m)		0.0	80.8	300.3	399.4	
Ch (m)	0.0	16.6	97.4	316.9	416.0	432.6

APPENDIX D Interaction with local government and district groups

To be populated when EAP next completes a substantive review

Annexe — Julius Dam AWS 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. Julius Dam is spilling excess water into Leichhardt River. People downstream of Julius Dam should STAY INFORMED and MONITOR CONDITIONS. Water flows from Julius Dam expected to remain within beds and banks of river / may contribute to widespread/ localised/ overland flooding. Expect increased river flows in 6-12 hours / later today/ overnight/ tomorrow. There is no immediate danger. More information here: bit.ly/RecandSafety	FLOOD WATCH AND ACT from Sunwater. Excess water spilling from Julius Dam into Leichhardt River has increased significantly. Water flows from Julius Dam may contribute to dangerous/widespread flooding downstream. Expect increased river flows in 6-12 hours / later today/ overnight/ tomorrow. People downstream of Julius Dam must PREPARE TO LEAVE in case the flood gets worse. Call Triple Zero (000) if your life is in danger. Call the SES on 132500 for flood help. More information here: bit.ly/RecandSafety	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Julius Dam must LEAVE IMMEDIATELY. Julius Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. XXX and XXX are safe. More information here: Mount Isa City Council https:// dashboard.mountisa.qld.gov.au