EMERGENCY ACTION PLAN — CALLIDE DAM (ID 239)

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Prepared by **Sunwater Limited**

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

Emergency activation quick reference-Dam Hazards

The Emergency Action Plan (EAP) for Callide 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 FODM or DSTDM. Should the IC be unavailable, the Local Event Coordinator (LEC) or Dam Duty Officer (DDO) is responsible.**

Table 1: Emergency activation quick reference

Dam Hazards and section numbers	Activation levels for dam hazards			
	Alert	**Lean Forward**	**Stand Up**	**Stand Down**
Flood operations **See section 5**	• Outflows are forecast to exceed 200 m³/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m3/s	• Storage above EL 215.50 m with observed rainfall, OR • Outflows up to 370 m3/s	• Storage is above EL 216.37 m, OR • Outflows up to 750 m3/s	• Storage at EL 215.60 m and falling, and no forecast rainfall
Piping: embankment, foundation, or abutments **See section 6**	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Risk assessment has determined that failure risk has reduced
Earthquake **See section 7**	• Earthquake confirmed 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 8**	• Not applicable	• Not applicable	• Possible terrorist activity noticed at dam or threat received • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) • Failure in progress or likely due to impact or explosion • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Gate malfunction **See section 9**	• Loss of control* of one or more gates with insufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates with sufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates; AND • Storage level above EL 215.5 m.	• Confirmation that all gates are functioning correctly ***Includes uncontrolled gate vibration**

NEXT PAGE: Emergency activation quick reference – Other Emergency Situations

Emergency activation quick reference – Other Emergency Situations

The EAP for Callide Dam covers one other emergency situation evaluated within Sunwater's Dam Safety Management Program. Use the following table to select the relevant section of the EAP that deals with the other emergency situation. **Note: The Incident Coordinator (IC) is responsible for activating the EAP unless otherwise directed by the FODM or DSTDM. Should the IC be unavailable, the Local Event Coordinator (LEC) or Dam Duty Officer (DDO) is responsible.**

Table 1: Emergency activation quick reference (continued)

Other Emergency Situations and section numbers	Activation levels		
	Communications Failure – Dam Site (DDO)	**Communications Failure – Local Area (LEC/ORR)**	**Communications Failure – Brisbane (IC/DSTDM)**
	• Site managed (DDO – becomes LEC)	• Brisbane managed by Incident Coordinator (IC)	• Locally managed by Local Event Coordinator (LEC)
	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

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Document control

Authorisation of document

Name	Position/role	Signature	Date
[redacted]	EAP Program Lead — Prepared for submission	[redacted]	29/09/2023

Document revision history

Version	Date	Prepared by	Reason for change	Ref. no.
2	May 2008		Significant changes of Callide Dam Emergency Action Plan to reflect Sunwater Management structure and other minor changes. **Note:** Refer to HB # 710727 for amendments issued.	
3	October 2011		Significant changes to all sections of Callide Dam Emergency Action Plan to reflect current Sunwater Management structure and other changes.	
4	October 2015		New Emergency Action Plan developed at expiry of 3G approval. Issued for consultation with Relevant Disaster Management Groups.	HB # 1824667
5	October 2016		Addition of Flood Impact Mapping to Section five. Updates to notification & communication lists and Emergency Alert sections.	HB # 2026932
6	October 2017		Revised and reviewed Emergency Action Plan developed at expiry of approval. Also includes updates that reflect the Water Legislation (Dam Safety) Amendment Act 2017, implementation of changes to Sunwater management structure, new event management roles and addition of new Emergency Activation section (Other Emergency Situations).	HB # 2086721
7	September 2018		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	HB # 2367029
8	October 2019		Amended contacts and associated sections, added new hazard for Gate failures, added emergency siren instructions and removed DSTDM involvement from Chemical hazard section. Incorporated global changes. Reviewed by Flood operations and Dam Safety personnel.	HB # 2438172
8.1	February 2020		Amended Dam hazard, flood operations; Lean Forward trigger – reduction of gate opening from 1.0 m to 0.75 m. Minor error corrections and other non-substantive changes.	HB # 2505374
8.2	September 2020		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	HB # 2572569
8.3	September 2021		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes such as removing Comprehensive Risk Assessments description (2.9) and simplifying FODM role in Activation triggers (5.2.1) including removing para 5.2.2. Added clarification regarding Operations Actions associated with gate vibration issue.	HB # 2617575
8.4	June 2022		Required for inclusion with a new Addendum A.2.1. Minor error corrections and contact updates. Non-substantive update.	HB # 2675311
8.5	November 2022		Removal of Addendum A.2.1. 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.	eDOCS #2756936
8.6	September 2023		Added Fatigue Management Plan. Deleted Chemical Spill. Non-substantive updates as part of Annual Safety Statement. Minor error corrections and readability improvements.	2813192

Controlled document distribution list

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1.	Operations Supervisor	Sunwater, Callide
2.	Operations Manager	Sunwater, Biloela
3.	EAP Coordinator	Sunwater, Brisbane
4.	Deputy Local Disaster Coordinator — Banana Local Disaster Management Group	Banana Shire Council, Biloela
5.	Officer in Charge	Police, Biloela
6.	District Disaster Coordinator — Gladstone District Disaster Management Group	Police, Gladstone
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Position	Location
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 — Current as of 01 July 2019	https://www.legislation.qld.gov.au/view/whole/pdf/inforce/current/act-2008-034
B	Natural Resources and Other Legislation Amendment Bill 2019	https://www.legislation.qld.gov.au/view/html/bill.first/bill-2018-056
C	Queensland Disaster Management Act 2003 Current as at 1 July 2023	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2003-091
D	Queensland Disaster Management Guidelines	https://www.disaster.qld.gov.au/dmg/Pages/DM-Guideline.aspx
E	Guidelines on Selection of Acceptable Flood Capacity for Dams (ANCOLD, 2000)	ANCOLD
F	Queensland Dam Safety Management Guidelines (DNRME October 2020)	https://www.resources.qld.gov.au/__data/assets/pdf_file/0007/78838/dam-safety-management.pdf
G	Australian Rainfall and Runoff (ARR) 2016	http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com/
H	Emergency action plan for referable dam guideline (DRDMW 2021)	https://www.resources.qld.gov.au/__data/assets/pdf_file/0018/84015/eap-guideline.pdf
I	Queensland State Disaster Management Plan 2023 (Queensland's Disaster Management Arrangements)	https://www.disaster.qld.gov.au/__data/assets/pdf_file/0027/339336/Interim-2023-QSDMP-V1.2.pdf
J	Queensland Government arrangements for coordinating public information in a crisis	https://www.disaster.qld.gov.au/dmg/Response/Pages/5-6.aspx
K	Professional Engineers Act 2002 (RPEQ)	https://www.legislation.qld.gov.au/view/pdf/inforce/2013-09-23/act-2002-054
L	Guidelines for the Development of Communication Education, Awareness and Engagement Programs (Australian Institute for Disaster Resilience 2002)	Manual 45 - ADRGHC Guidelines
M	Queensland Emergency Alert Manual – M.1.174	https://www.disaster.qld.gov.au/__data/assets/pdf_file/0027/339417/M1174-Queensland-Emergency-Alert-Manual.pdf
N	Sunwater website — list of referable dams	https://www.sunwater.com.au/community/preparing-for-emergencies/emergency-management/
O	Sunwater (internal) Strategic Event Procedure	Strategic Event Procedure (internal)
P	Callide Dam Safety Condition Schedule	HB # 05-009144/003
Q	Guidelines on Consequence Categories for Dams (ANCOLD, 2012)	ANCOLD ISBN: 978-0-9808192-5-0
R	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

Ref.	Document title	Reference/location
S	Callide Dam Failure Impact Assessment — Sunwater, May 2018	HB # 17-002758/001
T	Callide Dam Safety Review — SMEC, January 2019	HB # 17-004748/001
U	2015 Callide Creek Flood Review — IGEM, 2015	https://www.igem.qld.gov.au/callide-creek-flood-review
V	Callide Valley Flood Mitigation Study — DEWS and Sunwater, 2017	https://cabinet.qld.gov.au/documents/2018/Apr/CallideSt/Attachments/Report.PDF
W	Queensland Rainfall and River Conditions (BOM-Flood Warning)	http://www.bom.gov.au/qld/flood/index.shtml?ref=hdr
X	Sunwater (internal) Blue Green Algae (BGA) Monitoring Program Manual (EM29)	Blue-green Algae Monitoring Procedure (EM29)
Y	Callide Dam Operation and Maintenance (O&M) Manual (includes Spill Operations Manual (SOM))	Callide Dam O&M Manual; eDOCS # 2369173 (Sunwater internal)
Z	Callide Dam Comprehensive Risk Assessment — Sunwater, July 2018	HB # 15-001692/001
AA	Water Act 2000 Current as at 1 March 2023	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2000-034
BB	Sunwater Emergency Alert Protocol	HB # 15-001003/001
CC	Guidelines on Dam Safety Management (ANCOLD, 2003)	ANCOLD ISBN: 0-731027620
DD	Sunwater (internal) Standing Operating Procedure (SOP) 12 – Dam Log Books	Policies, Procedures and Guidelines - SOP12 Dam Log Books - All Documents - Default (Function and Activity) (sharepoint.com)
EE	Callide Dam Hazard Management Toolkit	Only available with Sunwater internal versions of EAPs
FF	Fatigue Management Procedure WHS42 (Sunwater internal)	Fatigue Management Plan

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
BOM	Bureau of Meteorology
CED	Chief Engineer Dams
CEO	Chief Executive Officer
CRA	Comprehensive Risk Assessment
CTG	Counter Terrorism Group
D/S	Downstream
DCF	Dam Crest Flood
DCL	Dam Crest Level
DDC	District Disaster Coordinator
DDMG	District Disaster Management Group
DDMP	District Disaster Management Plan
DDO	Dam Duty Officer
DDS	Director Dam Safety
DSR	Dam Safety Regulator
DSSC	Dam Safety Surveillance Coordinator
DSTDM	Dam Safety Technical Decision Maker
EAP	Emergency Action Plan
EA	Emergency Alert
EER	Emergency Event Report
EGMO	Executive General Manager Operations
EGME&WR	Executive General Manager Engineering & Water Resources
EL	Elevation Level
FCL	Fixed Crest Level
FODM	Flood Operations Decision Maker
FSL	Full Supply Level
GM	General Manager
IC	Incident Coordinator
IFHC	Incremental Flood Hazard Category
IGEM	Inspector-General Emergency Management
LB	Left Bank
LDC	Local Disaster Coordinator
LDMG	Local Disaster Management Group
LDMP	Local Disaster Management Plan
LEC	Local Event Coordinator
MAP	Manager Asset Planning
Max. OL	Maximum Operating Level
ME	Manager Environment
MM	Modified Mercalli
O&M	Operation & Maintenance
OB	Observation Bore
OC	Operations Centre
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
QFES	Queensland Fire & Emergency Services
QPS	Queensland Police Service
RB	Right Bank
RC	Regional Council
RCC	Roller Compacted Concrete
RDMW	Department of Regional Development, Manufacturing and Water
ROC	Regional Operations Centre
RPEQ	Registered Professional Engineer of Queensland
RSL	Reduced Supply Level
SCED	Senior Civil Engineer Dams
SCTN	Security and Counter Terrorism Network
SDCC	State Disaster Coordination Centre
SDF	Sunny Day Failure
SDTE	Senior Dam Technical Engineer
SES	State Emergency Service
SMS	Short Message Service
SMT	Sunwater Media Team
SO	Standby Operator
SOP	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 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.
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 (DDMP or LDMP)	Of a *district group* or local government, means the group's or local government's disaster management plan as per Queensland Disaster Management Act 2003 (ref C).
District group (DDMG)	For an EAP, means a district group established under the Queensland Disaster Management Act 2003 (ref C) section 22 whose disaster district under that Act could, under the plan, be affected by a *dam hazard*.

Emergency event	Means an event arising from a *dam hazard* if:
	• persons or property may be harmed because of the event, AND
	• any of the following apply:
	  ○ a coordinated response, involving 2 or more of the following *relevant entities*, is likely to be required; each *local group* and *district group* for the EAP, each local government whose area may be affected, the Chief Executive, another entity the owner of the dam considers appropriate, OR
	  ○ the event may arise because of a disaster situation declared under ref C, OR
	  ○ an entity performing functions under the State Disaster Management Plan may, under that plan, require the owner of the dam to give the entity information about the event.

Local group (LDMG)	For an EAP, means a local group established under the Queensland Disaster Management Act 2003 (ref C), section 29 whose local government area could, under the plan, be affected by a *dam hazard*.
Notice response	A dam owner's written response to a notice following an assessment of an EAP by a local government or *district group*.

Term	Definition
Referable dam	A dam, or a proposed dam after its construction, will be a referable dam if: • a failure impact assessment of the dam, or the proposed dam, is carried out under the Act, AND • the assessment states the dam has, or the proposed dam after its construction will have, a category 1 or category 2 failure impact rating, AND • the Chief Executive has, under section 349 of the Act, accepted the assessment. Also, a dam is a referable dam if: • under section 342B of the Act, the owner of a dam is given a referable dam notice and, before the effective day for the notice, does not give the Chief Executive a failure impact assessment for the dam, AND • the Chief Executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam.
Relevant entity	Means each of the following under the EAP for the dam: • the persons who may be affected, or whose property may be affected, if a *dam hazard event* or *emergency event* were to happen for the dam e.g., the owners of parcels of farmland adjacent to the dam or residents of a township • each *local group* and *district group* for the EAP • each local government whose local government area may be affected if a *dam hazard event* or *emergency event* were to happen • the Chief Executive • another entity the owner of the dam considers appropriate e.g., the Queensland Police Service.
Terms consistent with *Queensland Disaster Management Guidelines* (ref D)	
Activation levels	The four levels of EAP activation are: • **Alert:** A heightened level of vigilance and potential requirement for actions where specific conditions are met (particularly Dam Hazard, Flood Operations section) 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 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. **Notes:** The movement through these levels of activation is not necessarily sequential. It should be applied with flexibility and adaptability and be tailored to the location and event. Triggering one of these levels of activation may not necessarily mean a similar activation of LDMGs or DDMGs.

Term	Definition
Bureau of Meteorology flood level classifications	The three levels of flooding are: • **Minor flooding:** This causes inconvenience such as closing of minor roads and the submergence of low-level bridges and makes the removal of pumps located adjacent to the river necessary. • **Moderate flooding:** This causes the inundation of low-lying areas requiring the removal of stock and/or the evacuation of some houses. Main traffic bridges may be closed by flood waters. • **Major flooding:** This causes inundation of large areas, isolating towns and cities. Major disruptions occur to road and rail links. Evacuation of many houses and business premises may be required. In rural areas widespread flooding of farmland is likely.
Concurrent Flooding	Flood flows downstream of a dam that are not a result of dam outflows; for instance, those from adjacent catchments or from the sea, and which occur in the same period as downstream releases or flooding from the dam.
Dam crest (ref E)	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 (ref E)	The flood event which, when routed through the reservoir, results in a still water reservoir level equivalent to the lowest dam crest level.
Dam failure	Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.
Downstream releases	Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam.
Earthquake	A sudden release of energy in the earth's crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity, resulting in the generation of seismic waves that can be destructive. The potential consequences of an earthquake include: • settlement, sliding, or overturning of monoliths in the dam wall • initiation of seepage lines in the foundations or abutments that could lead to piping damage and potential inoperability of appurtenant works.
Flood release	A flood release from a dam occurs when catchment inflows raise the storage level above the Full Supply Level (FSL) resulting in a discharge from the spillway of the dam.
Piping	Internal scour caused by the water flow and seepage that occurs through earth dams, dam foundations, or dam abutments. The internal scour can lead to the formation of a pipe, which can lead to a failure of the dam.
Plane strike or other impact	The impact of a plane, meteorite, or other high energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam.
Probable maximum flood (ref F)	The flood resulting from the probable maximum precipitation coupled with the worst flood-producing catchment conditions that can be realistically expected in the prevailing meteorological conditions.
Probable maximum precipitation (ref E)	The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin.
Probable maximum precipitation design flood (ref G)	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 or fail or contaminate a dam.

2. Introduction

2.1 Context

Under the *Water Supply (Safety and Reliability) Act (2008)* (ref A), 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 and the *Emergency action plan for referable dam guideline* (ref H) and the *Queensland State Disaster Management Plan 2023* (ref I). The content requirements for EAPs are contained in section 352H of the Act. This EAP also reflects the outcomes and principles outlined in the 2015 Callide Review issued by the Inspector General Emergency Management.

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):

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

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

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

Section 352HB of the Act states that the local government must assess the EAP for consistency with its disaster management plan. In its assessment, the local government must consult with the local 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 Callide Dam has been determined as **Banana Shire Council (BSC)**. Sunwater has provided the BSC 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 Callide Dam is **Gladstone 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 emergencies. However, there is considerable uncertainty about how any emergency might develop and progress. Factors such as the weather, the location, the mechanics, and the rate and size of any actual failure can considerably affect any resulting flood discharges. Therefore, a significant number of assumptions have had to be made in compiling sections of the EAP. Some variation in outcome should be expected where the event differs from the assumed behaviour.

2.2 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
- to minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam happens
- to identify dam hazards that could occur at Callide Dam and the area likely to be affected for each hazard
- to prescribe emergency actions taken by the dam owners and operating personnel in identifying and responding to dam hazards and notifying relevant entities.

It is possible for more than one dam hazard to exist at Callide 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 Callide 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 Banana Shire Council Local Disaster Management Plan (LDMP) and is a sub-plan of the LDMP.

2.3 Scope

The Callide 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 or emergency event
- 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 and/or emergency event, and the management of such.

2.4 Sunwater provides training

Training of the use and implementation of this EAP document is carried out at various times throughout the year. 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. FODM and DSTDM information sessions are carried out once a year with the same walkthrough of new changes and Q & A, but this is not specific to any one dam. New Sunwater employees in these various roles also have a walkthrough of the EAP.

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 SDCC and include the (non- live) testing of emergency alerts. The test results relating to numbers of alerts generated will be shared with local authority and disaster management stakeholders.

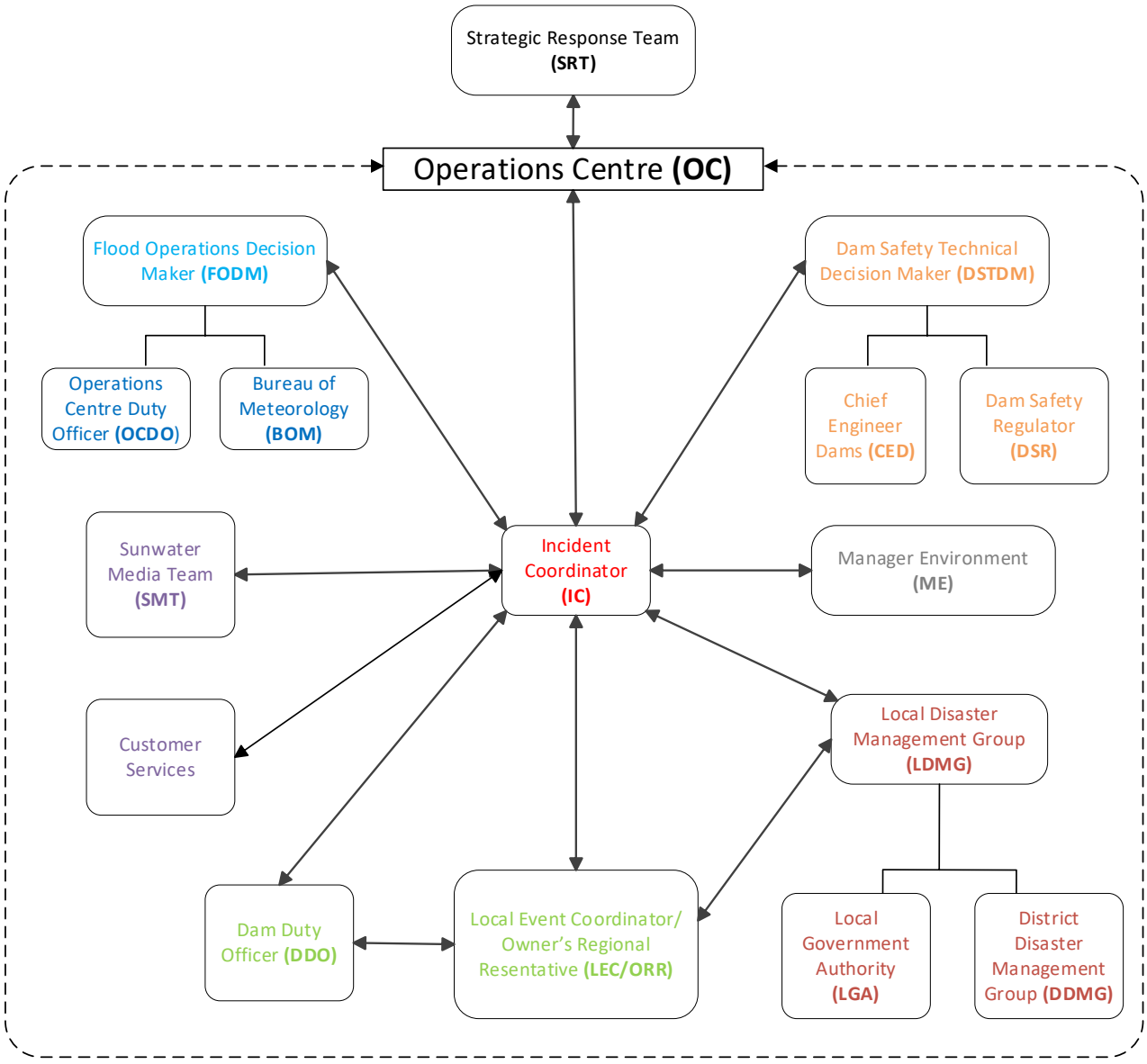
2.5 Fatigue Management Plan

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

2.6 Dam emergency organisation within Sunwater

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

Figure 1: Sunwater emergency response organisation



Key aspects of the emergency management framework are:

- Central to the framework is the role of IC for any dam hazard at a dam. The IC will maintain overall responsibility for a coordinated response to the dam hazard incident.
- The DSTDM is primarily responsible for analysing dam safety and providing expert technical advice in this regard. They will be expected to discuss dam hazards with peers and other technical experts and make sound decisions to mitigate risks and to determine a response to incidents and emerging issues. The DSTDM is the key communication contact with the Dam Safety Regulator.
- The FODM has responsibility for all matters involving flood modelling and forecasting and determining the associated impact to Sunwater storages/infrastructure and EAP actions. The FODM may pre-emptively advise the IC to activate the EAP in accordance with available hydrology forecast information. For example, if an EAP trigger level is predicted to be exceeded based on forecast dam inflows derived from observed rainfall and streamflow conditions upstream of the dam, the EAP may be activated to the predicted level. Regarding the operation of the OC, the FODM must liaise with the IC as necessary to inform of decisions made.
-

- The IC is responsible for 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 reasonably 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, loss of communications could result in some communication processes defined in this EAP not being carried out.
- 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 RPEQs (or by experienced engineers under the direct supervision of an RPEQ) and are suitably qualified professionals as defined in ref K. Such advice will be provided within an established framework of SOPs, models, standards and manuals.

2.7 Community information

Sunwater as part of its public education has developed a Callide Dam factsheet:

- the factsheet was supplied to all downstream residents of Callide Dam within the identified sections and included flood impact mapping
- the map specifically colours flood extents which correspond to the fridge magnet the resident was sent
- magnets help the resident to identify which section their property sits within the map as a visual reminder
- emergency messages within the Callide EAP have been developed based on coloured flood impact map
- other information in the factsheet defines the catchment extent, how the gates operate and general dam information.

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

Sunwater currently provides information externally to customers, 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. This engagement provides the community with tools to assist in self-management during emergencies.

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

In the event of an emergency event or when otherwise required, Sunwater and the affected local government also have the use of the National Emergency Alert System to send a voice message and SMS in accordance with ref M. This service is provided by Telstra and managed by QFES 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 - https://www.sunwater.com.au/community/preparing-for-emergencies/emergency-management/
These copies are redacted to protect people's personal details.

2.8 Lessons learnt

Sunwater carries out Lessons Learnt workshops as part of its post event management. These Lessons Learnt can result in changes to the EAP. These are captured and if applicable to this document are implemented at the earliest opportunity and are made available in the next EAP update to the 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 RDMW as appropriate.

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

2.9 Downstream notifications lists

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

3. Roles and responsibilities

Roles and responsibilities	Position holder

Owner (Sunwater)
• Liaise with the Board and Minister
• Activate Sunwater Strategic Response (ref O) and Business Continuity Plans if required
• Ensure necessary resources are available to manage any event
• Maintain an up-to-date list of immediate D/S residents (Appendix A4) of Callide Dam:
  ○ As part of the response to the 2015 IGEM Callide review, Sunwater extended the downstream notification area for Appendix A4 to include areas as far downstream as the Jambin Dakenba Road. It is at this point that concurrent flows limit Sunwater's ability to provide valid messaging to areas further downstream. The flood impact extents are indicated in the drawing in Appendix B2.
• At all times, aim to provide timely advice and support to the LDMGs in the affected local government areas and the DDMGs in the affected disaster districts
• During a dam hazard event that occurs with little or no warning, undertake the following actions to ensure the community is informed as soon as possible:
  ○ notify the residents listed in Appendix A4 via SMS
  ○ contact SDCC Watch Desk to request an Emergency Alert campaign throughout the Callide Dam Emergency polygon
• During a dam hazard event that occurs with adequate warning, notify the residents listed in Appendix A4 via SMS, **unless otherwise agreed with the LDMGs**
• Record communications, notifications and observations as required
	CEO
	EGMO
	EGMWR&DS

Owner's Head Office Representative • Authorise the issuing of EAPs, SOPs and ref Y • 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 P) are met • Ensure the work instructions are correct and the Logbooks, SOPs, Data Books and EAPs are reviewed annually as per ref P • Undertake and prepare the five yearly Comprehensive Inspection Reports with suitably qualified personnel within the time specified in ref P 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 P 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 spreadsheet for verification for audit and quality control • Record communications, notifications and observations as required	GM Asset Integrity GM Asset Management

Roles and responsibilities	Position holder

Owner's Regional Representative (ORR)
• Liaise with the Storage Supervisor/Operator Maintainer
• Arrange dam specific training and accreditation for relevant staff
• Ensure competent, trained and accredited personnel operate the storages
• Undertake the role of LEC as required:
  ○ Liaise with the LDC or proxy
  ○ Activate the EAP, when necessary
  ○ Ensure the EAP is implemented appropriately and carry out the LEC role as required
• Ensure all work orders, work instructions and lesson learned outcomes are fully implemented.
• Record communications, notifications and observations as required
	GM Central
	OCO
	OS

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	SCED CED EGMWR&DS ME
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 mitigate the risk • Determine response to incidents and emerging issues • Issue warning on dam failure and advise on protective measures • Ensure the EAP is implemented appropriately and carry out the DSTDM role as required • Liaise with DSR as required • Record communications, notifications and observations as required	Various personnel as per DSTDM roster
Flood Operations Decision Maker (FODM) • Maintain current RPEQ accreditation • Provide hydrological advice in relation to predicted and actual dam outflows including assessment of weather and flood warnings and other related matters as identified in the OC SOP (Sunwater internal). • Interpret and apply rainfall data in accordance with the OC SOP, including, as required under the OC SOP, liaising with BOM • Ensure the EAP is implemented appropriately and carry out the FODM role as required • Record communications, notifications and observations as required	Various personnel as per FODM roster
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 (EA) • 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

Roles and responsibilities	Position holder
Local Event Coordinator (LEC) • Refer to ORR role	
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
Banana Shire Council Council has legislated local government functions, as per Section 80 of ref C. 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 C 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: o Conduct emergency operations o Coordinate and support Sunwater during a declared emergency at the dam o Liaise with relevant organisations o Evacuation of persons if required o Control of essential traffic o Security of specific area	Local Police
Disaster Management Groups/Personnel - (In addition to requirements outlined in **ref** C) LDMG • As per Inspector-General Emergency Management (IGEM) review recommendation, work together with Sunwater and the councils to ensure community education around messaging and impacts of EAP related events is undertaken and continually improves • Work with councils and Sunwater to ensure the EAP is regularly exercised • Identify and coordinate the use of resources and support services that may be required for an EAP event, noting that for safety events unique to the dam Sunwater will approach councils to initiate • During a dam hazard/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 • Identify and provide advice to the relevant DDMGs about support services required by the LDMG to manage an EAP event • Provide reports and make recommendations to the relevant DDMGs about matters relating to EAP events QFES • Work with dam owner and LDMGs to ensure Emergency Alert polygons are prepared, stored and tested at the State Watch Desk And as per Section 352HC of the Act: DDMG • May review the EAP for consistency with the DDMP	LDMG QFES DDMG

Roles and responsibilities	Position holder
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: Callide Dam is situated approximately 10km east of Biloela, in Central Queensland, at AMTD 80.1km on Callide Creek.

Purpose: Callide Dam is filled by natural inflows from Callide Creek and water pumped from Awoonga Dam through the Awoonga-Callide pipeline to Stag Creek. Its main purpose is to supply water for the cooling towers at the Callide A and Callide B Power Stations. The dam's other purpose is to supply the Biloela area's water supply and to recharge the aquifer.

Catchment: The soil types in the catchment consist of shallow loams and grey-brown, medium, shallow, cracking clays. Predominant vegetation is grassed, open forest that is home to species of blood wood, gum-topped box, and silver-leaf ironbark. Some sections of the streambed upstream of the dam can be observed carrying baseflow many months after the last rainfall event.

Construction: Callide Dam is an earth and rockfill dam that was constructed to full height in 1988. The dam was constructed in two stages — stage 1 was completed in 1965 and stage 2 was completed in 1988 — when the automatically operated radial gates were added.

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

Table 2: Callide Dam specifications

Description	Specification
Dam type	**Earth and Rockfill**
Reduced Supply Level (RSL)	*EL 215.50 m (129,041 ML/1,202 ha)*
Dam Crest Level (DCL)	Left Bank (minimum dam crest elevation) – EL 219.13 m Right Bank (minimum dam crest elevation) – EL 219.15 m* ***Note: This is the minimum elevation stated on drawing number 244529, near the right-side spillway training wall. A request has been made to confirm this elevation as part of 2020's deformation survey.**
Historical recorded storage — Feb 2015	EL 217.203 m
Storage capacity at FSL (216.10 m)	136,370 ML
Storage area at FSL (216.10 m)	1,240 ha
Catchment area	518 km^2
Max height of dam above foundation	37 m (approx.)
Length across crest	2008 m
Spillway type	**Automatically operated radial gate and controlled, reinforced, concrete ogee crest**
Spillway crest level	EL 207.57 m
Spillway crest length	79.25 m
Spillway capacity (at DCL)	6,034 m^3/s (521,300 ML/d)
Radial gates	3 pairs — 25.6 m wide x 9.14 m high
Top of gates elevation (when closed)	EL 216.81 m

Description	Specification
Outlet works	**2 x 1220 mm dia. concrete-lined MS pipes within a reinforced, concrete outlet conduit**
Outlet control	Callide Creek outlet: • 1 x 600 mm cone valve & 1 x 300 mm cone valve Kroombit & Kariboe Creek outlet: • 1 x 914 mm butterfly valve • 2 x 1200 mm butterfly valves to isolate Callide B and Biloela water supply pipes. Callide B & C outlets: • 2 x 850 mm pipes (not operated by Sunwater) Banana Shire Council O/T: • 2 x 450 mm gate valves (not operated by Sunwater)

4.2 Population at risk

Callide Dam is deemed to have a Category 2 failure impact rating ,which means that its failure has the potential to result in more than 100 Population at Risk (PAR).

Callide Dam is classified as an 'High A' hazard category dam based on a Population at Risk (PAR) of 663 for the Sunny Day Failure (SDF) event, with the severity of damage and loss assessed as 'Major'. The estimated maximum PAR for a flood failure of Callide Dam is 533, which corresponds to a 1:100 AEP flood failure of the right embankment.

The dam was assessed for flood events as having a 'High A' Incremental Flood Hazard Category (IFHC) rating. This rating was based on an incremental potential loss of life of 46 and 'Major' damage and loss for the incremental flood impact zone between the PMF Dam Failure and PMF No Dam Failure, in accordance with ref Q. Accordingly, the Acceptable Flood Capacity (AFC) for this rating is the Probable Maximum Precipitation Design Flood (PMPDF), based on ref E.

4.3 Spillway adequacy

Callide Dam can overtop in flood events rarer than the Dam Crest Flood (DCF), which has been estimated as ~1 in 8,900-year event (ref Z). However, the societal risk profile of Callide dam is below the ANCOLD (2003) recommended limit of tolerability for existing dams.

Stability issues have been identified with the left embankment since the 2010 CRA. As an interim risk reduction measure, the storage is operated at a Reduced Supply Level (RSL), which is currently 0.6 m below the design FSL.

The 2015 flood event generated by Cyclone Marcia provided valuable data on the embankment's response to higher storage levels. Investigations are currently underway and will provide guidance on:

- resuming operation at the design FSL, or
- reducing the maximum operating level permanently, or
- undertaking a dam safety upgrade

4.4 General arrangement

The General Arrangement drawings are in Appendix B1.

4.5 Emergency inspections and monitoring

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

4.5.1 Inspections

The following inspections are to be carried out:

- **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

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

- **Settlement/movement measurement**
  - 16 surface settlement points along the crest of the dam
  - 5 survey control stations.
- **Seepage measurement**
  - 5 x V-notch weir seepage measurement instruments located downstream of the left and right embankments
- **Pore pressure measurements**
  - 24 x hydraulic piezometers installed on the right embankment with readings undertaken using telemetry
  - 24 x vibrating wire piezometers installed on the left and right embankments with readings undertaken manually

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

5. Dam hazard — flood operations

5.1 Overview

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

- A dam hazard that occurs where natural catchment inflows fill Callide Dam to EL 215.50 m (RSL) and the rate of inflow exceeds the capacity of the outlet works. The spillway will then discharge water downstream into the Callide Creek. These flood flows can create a dam hazard. Inflows will also cause the storage to temporarily rise to above the RSL 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.
- Spillway discharge from the dam where there have been no indications that a dam failure may be initiating or in progress.

Refer to Spill Operations Manual (ref Z) for spillway gate operation during flood events.

Note: for spillway gate operations, 'above' means at or above.

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 Callide Creek (ref U) and other infrastructure in the creek such as pump sites. The following table shows historical floods experienced at Callide Dam.

Table 3: Historical floods experienced at Callide Dam

Flood rank	Date	Peak height EL (m)	Peak height (m over RSL)
1	Feb 2015	217.203	1.703
2	Jan 2013	216.682	1.182
3	Mar 2017	216.32	0.82
4	Mar 2011	216.25	0.75
5	Jan 2011	216.23	0.73

Following flooding in the reach of Callide Creek downstream of the dam associated with Cyclone Marcia in February 2015, a key outcome of the IGEM review was to investigate the use of Callide Dam as a flood mitigation dam. The study to resolve this question concluded that this was not feasible but that early releases could assist in visual clues to the community that significant dam outflows may be imminent. Sunwater agreed to implement such early releases once gate controls were in place and these have now been installed.

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

5.2 Emergency actions

Regarding the emergency action tables in this section, each level of activation includes both its own actions and the actions of any lower level, unless those lower-level actions are superseded.

5.2.1 Activation triggers

Table 4: Flood emergency activation trigger summary

Alert	• Outflows are forecast to exceed 200 m^3/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m^3/s
Lean Forward	• Storage is above EL 215.50 m, OR • Outflows up to 370 m^3/s
Stand Up — 1	• Storage is above EL 216.37 m, OR • Outflows up to 750 m^3/s
Stand Up — 2	• Storage is above EL 216.49 m, OR • Outflows up to 1500 m^3/s
Stand Up — 3	• Storage is above EL 216.66 m, OR • Outflows up to 3500 m^3/s
Stand Up — 4 greater than flood of record	• Storage is above EL 217.20 m (flood of record), OR • Outflows greater than 3500 m^3/s
Stand Up — 5	• Storage is above EL 218.66 m (0.5 m below DCL — all gates are expected to be fully open at this level. However, if referred from Gate Malfunction Hazard, all gates may not necessarily be fully open)
Stand Down	• Storage at EL 215.60 m and falling, and no forecast rainfall

While this EAP is not activated until Callide Dam reaches the Alert trigger, Sunwater and the Banana LDMG will work cooperatively and will endeavour to share intelligence when whichever organisation becomes aware of a condition that could result in the activation of the EAP.

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

With regard to determining the outflow estimates, the Callide Dam Operation and Maintenance (O&M) Manual (ref Z) should be used to derive the cumulative flow through all gates based on observed water level and gate opening heights.

5.2.2 Emergency action roles

Table 5 to Table 10 specify emergency actions for the following roles:

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

Table 5: Flood operations — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Up — 3	Stand Up — 4	Stand Up — 5	Stand Down
Activation trigger	• Outflows are forecast to exceed 200 m³/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m3/s	• Storage is above EL 215.50 m, OR • Outflows up to 370 m3/s	• Storage is above EL 216.37 m, OR • Outflows up to 750 m3/s	• Storage is above EL 216.49 m, OR • Outflows up to 1500 m3/s (trigger level for outer gates)	• Storage is above EL 216.66 m, OR • Outflows up to 3500 m3/s	• Storage is above EL 217.20 m (flood of record), OR • Outflows greater than 3500 m3/s	• Storage is above EL 218.66 m •	• Storage at EL 215.60 m and falling, and no forecast rainfall
Actions	• Record all communication • Undertake site preparations, including but not limited to checking: • fuel and operation of backup generator • operations of sump pump • seal of outlet building • communication systems (including backup, radio, satellite, phones, fax, and internet) • Confirm with FODM and IC that trigger conditions have been met, and refer to the Spill Operations Manual (ref Z) • Record rainfall daily	• As per previous activation level, AND • Attention will be given to: • visual inspection of flow patterns over spillway and dissipater for evidence of scouring • inspect embankment for leaks, deformation, and scour • obvious signs of seepage • Continue to monitor the dam in accordance with the Spill Operations Manual (ref Z)	• As per previous activation level, AND • Inspect the dam twice daily (or as instructed by the DSTDM) and photograph/video and record using the approved forms and send to IC & DSTDM • Photograph the gates and discharge area	• As per previous activation level, AND • View the embankment with binoculars • Photograph spillway discharge area daily and email to Owner's Representative	• As per previous activation level	• As per previous activation level, AND • Monitor and report gate openings to IC • Fully check all elements of gate operating mechanisms are in their guides • Remotely inspect the dam 6-hourly (or as instructed by the DSTDM) and photograph/video and record using the approved forms in and send to IC & DSTDM • Consider staff evacuation options.	• As per previous activation level, AND • Evacuate any plant and/or vehicles to higher ground • Monitor and record the Storage Level at four-hourly intervals (or as instructed by the DSTDM)	• Return to routine surveillance activities and frequencies • Inspect the dam and photograph any damage identified during the event • Forward all communication and inspection sheets for EER to [redacted] • Update Dam Logbook as per SOP 12 ref EE

NOTE: Continuously monitor gate operation for indications of vibration and if observed go to Section 9 — Gate Malfunction Hazard and notify DSTDM

NOTE: DDO Emergency Actions continued next page

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

[redacted]

Table 5 (Continued): Flood Operations — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Up — 3	Stand Up — 4	Stand Up — 5	Stand Down
Activation trigger	• Outflows are forecast to exceed 200 m³/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m3/s	• Storage is above EL 215.50 m, OR • Outflows up to 370 m3/s	• Storage is above EL 216.37 m, OR • Outflows up to 750 m3/s	• Storage is above EL 216.49 m, OR • Outflows up to 1500 m3/s (trigger level for outer gates)	• Storage is above EL 216.66 m, OR • Outflows up to 3500 m3/s	• Storage is above EL 217.20 m (flood of record), OR • Outflows greater than 3500 m3/s	• Storage is above EL 218.66 m	• Storage at EL 215.60 m and falling, and no forecast rainfall
Actions	• (continued) • Inspect the dam daily (or as instructed by the DSTDM) and photograph/video and record using the approved forms and send to IC & DSTDM • Record the Storage Level daily (or as instructed by the DSTDM) using gauge boards and confirm accuracy of gauging station • Measure and record vibrating wire piezometers and seepage weirs daily, unless otherwise directed by DSTDM • Record rainfall — daily • Update Dam Logbook as per SOP 12 (ref EE)	• (continued) • Ensure left embankment drainage pipes are clear of blockages and no embankment material is being lost	**NOTE: Continuously monitor gate operation for indications of vibration and if observed go to Section 9 — Gate Malfunction Hazard and notify DSTDM**				• (continued) • NOTE: All gates are expected to be fully open at this level. However, if referred from Gate Malfunction Hazard, all gates may not necessarily be fully open	
Notifications	IC SO LEC	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level

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

Table 6: Flood operations — LEC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Up — 3	Stand Up — 4	Stand Up — 5	Stand Down
Activation trigger	• Outflows are forecast to exceed 200 m³/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m3/s	• Storage is above EL 215.50 m, OR • Outflows up to 370 m3/s	• Storage is above EL 216.37 m, OR • Outflows up to 750 m3/s	• Storage is above EL 216.49 m, OR • Outflows up to 1500 m3/s (trigger level for outer gates)	• Storage is above EL 216.66 m, OR • Outflows up to 3500 m3/s	• Storage is above EL 217.20 m (flood of record), OR • Outflows greater than 3500 m3/s	• Storage is above EL 218.66 m	• Storage at EL 215.60 m and falling, and no forecast rainfall
Actions	• Record all communication • Develop/ implement staff roster **NOTE**: IC to carry out LEC actions unless LDMG 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	• As per previous activation level • In the event of gates failing to open, liaise with DDO and DSTDM • When Gates 1/2 & 5/6 are opened, advise DSTDM	• As per previous activation level	• As per previous activation level, AND • When approaching EL 218.66 m, discuss evacuations with staff onsite	• As per previous activation level, AND • Ensure staff have evacuated the office • NOTE: All gates are expected to be fully open at this level. However, if referred from Gate Malfunction Hazard, all gates may not necessarily be fully open	• Forward all communications including relevant emails for EER to [redacted] • Return to routine activities
Notifications	DDO IC DDMG	As per previous activation level	As per previous activation level	As per previous activation level, AND DSTDM (if required)	As per previous activation level	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

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

[redacted]

Table 7: Flood operations — IC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Up — 3	Stand Up — 4	Stand Up — 5	Stand Down
Activation trigger	• Outflows are forecast to exceed 200 m³/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m3/s	• Storage is above EL 215.50 m, OR • Outflows up to 370 m3/s	• Storage is above EL 216.37 m, OR • Outflows up to 750 m3/s	• Storage is above EL 216.49 m, OR • Outflows up to 1500 m3/s (trigger level for outer gates)	• Storage is above EL 216.66 m, OR • Outflows up to 3500 m3/s	• Storage is above EL 217.20 m (flood of record), OR • Outflows greater than 3500 m3/s	• Storage is above EL 218.66 m	• Storage at EL 215.60 m and falling, and no forecast rainfall
Actions	• Record all communication • Confirm with FODM that trigger conditions have been met and direct DDO to initiate manual gate operations • Liaise with Sunwater Customer Support to send SMS to D/S residents • Create Incident Report Record • Update Sunwater intranet with dam status	• 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 **NOTE**: IC to carry out LEC actions unless LDMG is *stood up*	• As per previous activation level	• As per previous activation level, AND • In the event of gates failing to open, liaise with DDO, LEC and DSTDM • When Gates 1/2 & 5/6 are opened, advise DSTDM	• As per previous activation level	• As per previous activation level, AND • When approaching EL 218.66 m, discuss evacuations with staff onsite	• As per previous activation level, AND • Liaise with the DSTDM to confirm that dam failure is in progress •	• Complete all internal and external notifications • Forward all communications including relevant emails for EER to • Close Incident Report Record • Update Sunwater intranet with dam status • Return to routine activities
Notifications	FODM DDO LEC/ORR DSTDM SMT D/S Residents LDMG DDMG QPS Mine Power Station SRT	As per previous activation level	As per previous activation level, AND SDCC Watch Desk	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level AND Emergency siren	Inform all previously notified contacts of stand down

Table 8: Flood operations — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• Outflows are forecast to exceed 200 m^3/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m3/s	• D/S Residents	• SMS • Email • Phone for those without mobiles	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• 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
Lean Forward	• Storage is above EL 215.50 m, OR • Outflows up to 370 m3/s **NOTE:** If 1st message issued as spillway discharge likely, and it is 1 hour before outflow occurs, 2nd message should be sent.	• D/S Residents	• SMS • Email • Phone for those without mobiles	Liaise with Sunwater customer support and communications to send appropriate messaging via SMS
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level and describe gates opening if appropriate Discuss any potential road/bridge closures
Stand Up — 1	• Storage is above EL 216.37 m, OR • Outflows up to 750 m^3/s	• 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 and email to SDCC Watch Desk to send.** Liaise with Sunwater customer support and communications
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• Phone & email	Describe current situation with dam: What is the event? What is the status? Advise of current storage level and describe gates opening if appropriate Advise of any forecasts you are aware of

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

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

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up — 2	• Storage is above EL 216.49 m, OR • Outflows up to 1500 m^3/s (trigger level for outer gates)	• D/S Residents	• SMS • Email • Phone for those without mobiles	Laise 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 and email to SDCC Watch Desk to send. Liaise with Sunwater Customer Support to send SMS**
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level and describe gates opening if appropriate Advise of any forecasts you are aware of
Stand Up — 3	• Storage is above EL 216.66 m, OR • Outflows up to 3500 m^3/s	• 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 and email to SDCC Watch Desk to send. Liaise with Sunwater Customer Support and Communications.
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level and describe gates opening if appropriate Advise of any forecasts you are aware of

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

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up — 4	• Storage is above EL 217.20 m (flood of record), OR • Outflows greater than 3500 m^3/s	• 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 and email to SDCC Watch Desk to send. Liaise with Sunwater Customer Support to send SMS.**
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• 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 and describe gates opening if appropriate Advise of any forecasts you are aware of
Stand Up — 5	• Storage is above EL 218.66 m • NOTE: All gates are expected to be fully open at this level. However, if referred from Gate Malfunction Hazard, all gates may not necessarily be fully open	• LDMG • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level and describe gates opening if appropriate Advise of any forecasts you are aware of
		• 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 (copies in Appendix A8) and email to SDCC Watch Desk to send. Liaise with Sunwater Customer Support to send SMS.**
		• Emergency siren	• Phone & Email	**Complete emergency siren instructions in Appendix A9 and notify SRT.** Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.
Stand Down	• Storage at EL 215.60 m and falling, and no forecast rainfall	• D/S Residents	• SMS • Email • Phone for those without mobiles	Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• 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 — 1		Stand Up — 2	Stand Up — 3	Stand Up — 4	Stand Up — 5	Stand Down
Activation trigger	• Outflows are forecast to exceed 200 m³/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m3/s	• Storage is above EL 215.50 m, OR • Outflows up to 370 m³/s	• Storage is above EL 216.37 m, OR • Outflows up to 750 m³/s		• Storage is above EL 216.49 m, OR • Outflows up to 1500 m³/s (trigger level for outer gates)	• Storage is above EL 216.66 m, OR • Outflows up to 3500 m³/s	• Storage is above EL 217.20 m (flood of record), OR • Outflows greater than 3500 m³/s	• Storage is above EL 218.66 m	• Storage at EL 215.60 m and falling, and no forecast rainfall
Action	• Record all communication • Provide technical advice to DDO and IC on a needs basis • Review surveillance reports and determine if any additional responses are required	• As per previous activation level **NOTE: Confirm that gate operation is being monitored for indications of vibration**	• As per previous activation level	• As per previous activation level, AND • **In the event of gates failing to operate, provide advice to DDO, IC and LEC on rectification**	• As per previous activation level	• As per previous activation level	• As per previous activation level, AND • Liaise with the IC and confirm need to sound emergency siren due to dam failure • NOTE: All gates are expected to be fully open at this level. However, if referred from Gate Malfunction Hazard, all gates may not necessarily be fully open	• Forward all communications and relevant emails for EER to [redacted] • Return to routine activities	
Notifications	DDO IC DSR	As per previous activation level	As per previous activation level		As per previous activation level, AND LEC	As per previous activation level	As per previous activation level	As per previous activation level, AND CEO — if time permits	Inform all previously notified contacts of stand down

Table 10: Flood operations — FODM emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Up — 3	Stand Up — 4	Stand Up — 5	Stand Down
Activation trigger	• Outflows are forecast to exceed 200 m^3/s based on 12 hour forecast rainfall, AND • Storage above EL 212.50 m (70% volume), AND • Rainfall/streamflow is observed in the catchment, OR • Outflows up to 130 m3/s	• Storage is above EL 215.50 m, OR • Outflows up to 370 m^3/s	• Storage is above EL 216.37 m, OR • Outflows up to 750 m^3/s	• Storage is above EL 216.49 m, OR • Outflows up to 1500 m^3/s (trigger level for outer gates)	• Storage is above EL 216.66 m, OR • Outflows up to 3500 m^3/s	• Storage is above EL 217.20 m (flood of record), OR • Outflows greater than 3500 m^3/s	• Storage is above EL 218.66 m	• Storage at EL 215.60 m and falling, and no forecast rainfall
Action	• Record all communication • Confirm with IC that trigger conditions have been met and to activate EAP • Continue to monitor catchment conditions • Update Flood models as per SOP OC (Sunwater internal) • Update and issue flood operations report • Update IC and DSTDM re: current flood situation and PFRM results	• As per previous activation level, AND • Issue a Flood Situation Report — daily	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level • **NOTE: All gates are expected to be fully open at this level. However, if referred from Gate Malfunction Hazard, all gates may not necessarily be fully open**	• Forward all communications and relevant emails for EER to [redacted] • Return to routine activities
Notifications	IC DSTDM DDO	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

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

6.1 Overview

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

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

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

- Use the 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 PMF outline when a dam failure is in progress or likely due to piping and concurrent flooding or downstream releases are occurring or expected to occur.

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

6.1.1 Assessment of circumstances that indicates an increase in the likelihood of piping

An increase in seepage or a new area of seepage is a circumstance that could indicate an increased likelihood of piping. This circumstance is the trigger for the alert status for piping.

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

6.2 Emergency action roles

Table 11 to Table 15 specify emergency actions for the following roles:

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

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

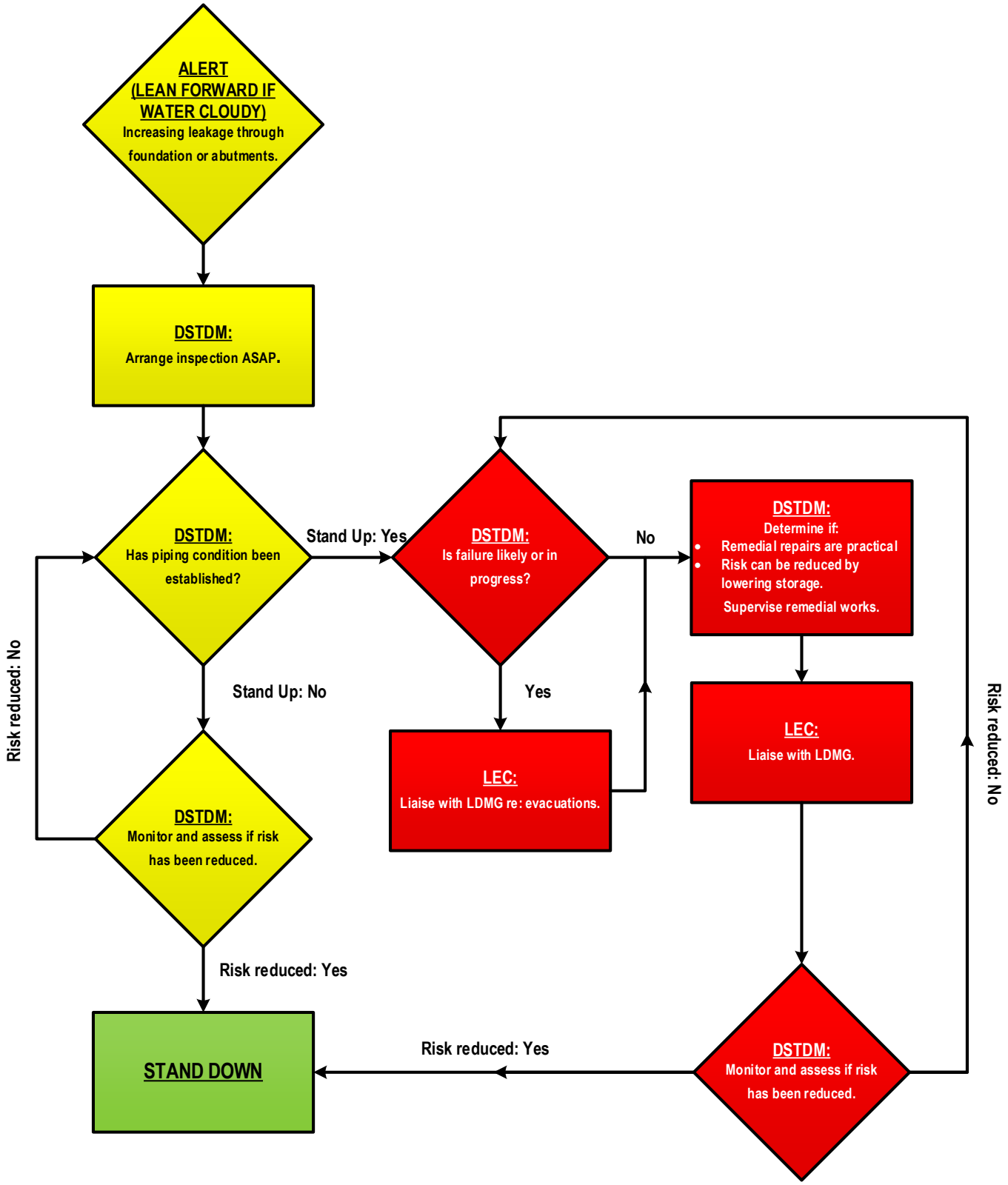


Table 11: Piping: embankment, foundation, or abutments — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Increasing leakage through the embankment, the foundations, or abutments	• Increasing leakage through the embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that piping risk has reduced
Actions	• Record all communication • Monitor flows every 6 hours (or as otherwise instructed by the DSTDM) until a decreasing trend is observable, or as directed by the IC • Photograph/video the piping from a safe point and record using the approved forms and send to IC & DSTDM • Update Dam Logbook as per SOP 12 (ref DD)	• As per previous activation level	• As per previous activation level, AND • Support/supervise remedial works as required • Lower the storage if directed • Sound gate operations siren if required • 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 • Ensure remedial works cease and plant and personnel have been moved to a safe location	• Forward all communication and inspection sheets for EER to [redacted] • Update Dam Logbook as per SOP 12 (ref DD) • Return to routine activities
Notifications	DSTDM IC SO	As per previous activation level	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

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

[redacted]

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

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Increasing leakage through the embankment, the foundations, or abutments	• Increasing leakage through the embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that piping risk has reduced
Actions	• Record all communication **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 and relevant council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward all communications including relevant emails for EER to • Return to routine activities
Notifications	DDO IC LDMG – if required	As per previous activation level	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

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

…king photographs/video, dam inspections, instrument readings

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

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Increasing leakage through the embankment, the foundations, or abutments	• Increasing leakage through the embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, and • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that piping risk has reduced
Actions	• Record all communication • Create Incident Report Record • Update Sunwater intranet with dam status **NOTE**: IC to carry out LEC actions unless LDMG is *stood up*	• As per previous activation level, AND • Investigate availability of machinery and materials (if insufficient stockpiles available) • Place machinery operators on standby if directed by DSTDM • Consider the need to appoint a Recovery Coordinator. The Recovery Coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance – if required	• As per previous activation level, AND • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level, AND • Direct remedial works to cease if directed by the DSTDM and plant and personnel to be moved to a safe location • Liaise with the DSTDM to confirm that dam failure is in progress	• Complete all internal and external notifications • Forward all communications including relevant emails for EER to [redacted] • Close Incident Report Record • Update Sunwater intranet with dam status • Return to routine activities
Notifications	DSTDM DDO LEC/ORR SMT SRT	As per previous activation level, AND DDMG QPS	As per previous activation level, AND D/S Residents SDCC Watch Desk Callide Mine Power Station	As per previous activation level, AND Emergency Siren	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: Piping: embankment, foundation, or abutments — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• Increasing leakage through an embankment, the foundations, or abutments	• LDMG	Phone	Describe current situation with dam: What is the event? (Unconfirmed piping risk) What is the status? (Unconfirmed leakage — Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice
Lean Forward	• Increasing leakage through an embankment, the foundations, or abutments with cloudy water	• LDMG • QPS • DDMG	Phone	Describe current situation with dam: What is the event? (Unconfirmed piping risk) What is the status? (Unconfirmed leakage — Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice
Stand Up — 1	• Piping condition has been established	• 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 and email to SDCC Watch Desk to send.
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• 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 14 (Continued) Piping: embankment, foundation, or abutments — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up — 2	• Failure likely due to piping, AND • Sufficient water in storage to create a dam 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 and email to SDCC Watch Desk to send.
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• 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
	• Dam failure in progress	• 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 (copies in Appendix A8) and email to SDCC Watch Desk to send. Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• 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
		• Emergency siren	• Phone & Email	Complete emergency siren instructions in Appendix A9 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.
Stand Down	• Risk assessment has determined that piping 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 • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Piping) What is the status? (Dam hazard Stood Down) Advise risk assessment has determined that piping risk has reduced and EAP has been deactivated

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

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Increasing leakage through the embankment, the foundations, or abutments	• Increasing leakage through the embankment, the foundations or abutments with cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that piping risk has reduced
Action	• Record all communication • Arrange an inspection of the dam to assess its condition as soon as possible, when safe to do so • Determine if piping condition has been established • Monitor situation and assess risks	• As per previous activation level	• 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 confirm need to sound emergency siren due to dam failure • Liaise with the IC and advise on need to recommend evacuations	• Forward all communications and relevant emails for EER to [redacted] • Return to routine activities
Notifications	DDO IC DSR	As per previous activation level	As per previous activation level, AND LEC/ORR	As per previous activation level, AND CEO — if time permits	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 — earthquake

7.1 Overview

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

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

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

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

7.2 Emergency action roles

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

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

Figure 3: Earthquake flowchart

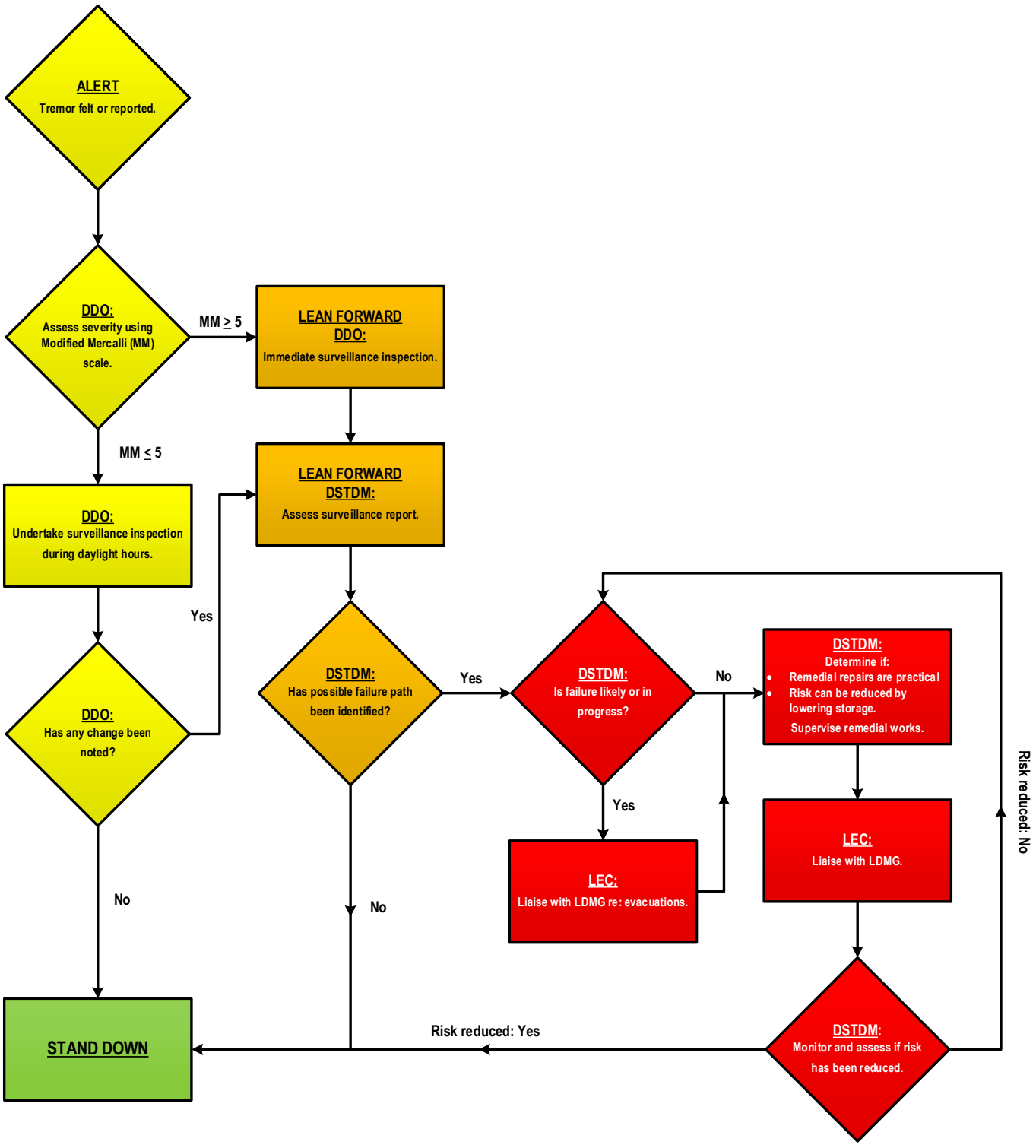


Table 16: Earthquake — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Earthquake reported or felt in the area, AND • Intensity less than 5MM*	• Earthquake reported or felt in the area, AND • Intensity greater than or equal to 5MM*, OR • Intensity less than 5MM* and change detected during surveillance inspection	• Earthquake reported or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• Record all communication • Inspect the dam wall, spillway structure and abutments in daylight hours (if safe to do so) and report to the DSTDM and IC — photograph/video and record using the approved forms and send to IC & DSTDM • Check for leaks, deformation, scour, and concrete damage • Maintain photographic record • Notify SO • Update Dam Logbook as per SOP 12 (ref DD)	• As per previous activation level, AND • Immediately 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 • Sound gate operations siren if required • Close any affected roads, if not already closed by others • Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public • Vacate the immediate vicinity of the embankment	• As per previous activation level, AND • Ensure remedial works cease and plant and personnel have been moved to a safe location	• Forward all communication and inspection sheets for EER to [redacted] • Update Dam Logbook as per SOP 12 (ref DD) • Return to routine activities
Notifications	DSTDM IC SO	As per previous activation level	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

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

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

Table 17: Earthquake — LEC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Earthquake reported or felt in the area, AND • Intensity less than 5MM	• Earthquake reported or felt in the area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection	• Earthquake reported or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• Record all communication	• As per previous activation level	• As per previous activation level, AND • Liaise with DDO and relevant council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward all communications including relevant emails for EER to [redacted] • Return to routine activities
Notifications	IC DDO LDMG	As per previous activation level	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

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

[redacted]

Table 18: Earthquake — IC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Earthquake reported or felt in the area, AND • Intensity less than 5MM	• Earthquake reported or felt in the area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection	• Earthquake reported or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• Record all communication **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 • Create Incident Report Record • Update Sunwater intranet with dam status • Consider the need to appoint a Sunwater Recovery Coordinator. The Sunwater Recovery Coordinator is responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance if required	• As per previous activation level. AND • Liaise with DDO and relevant council(s) regarding potential road/bridge closures • 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	• Complete all internal and external notifications • Forward all communications including relevant emails for EER to • Close Incident Report Record • Update Sunwater intranet with dam status • Return to routine activities
Notifications	DDO DSTDM LEC/ORR SMT SRT	As per previous activation level, AND DDMG QPS	As per previous activation level, AND D/S Residents SDCC Watch Desk Callide Mine Power Station	As per previous activation level, AND Emergency Siren	Inform all previously notified contacts of stand down

Table 19: Earthquake — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• Earthquake reported or felt in the area, AND • Intensity less than 5MM	• LDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Under investigation) Advise of current storage level Stand by for further information
Lean Forward	• Earthquake reported or felt in the area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection	• LDMG • DDMG • QPS	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Under investigation) Advise of current storage level Stand by for further information
Stand Up — 1	• Earthquake reported 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	• Email & Phone	Complete Emergency Alert Request Form as per instructions and email to SDCC Watch Desk to send.
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake felt or reported in area) What is the status? (Possible earthquake damage to dam) Advise of current storage level Discuss any potential road/ bridge closures Activate emergency response

Table 19 (Continued): Earthquake — LEC and IC external Communication Plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up — 2	• Failure likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• 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 and email to SDCC Watch Desk to send.** Develop messages in consultation with DSTDM
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• 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 coordinated evacuation
	• 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 (copies in Appendix) and email to SDCC Watch Desk to send. Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS**
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Dam Failure in progress) Advise of current storage level Coordinate evacuation of Downstream Residents and move people to higher ground
		• Emergency siren	• Phone & Email	**Complete emergency siren instructions in Appendix A9 and notify SRT.** **Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.**

Activation level	Trigger for communications	Group to contact	Method	Message text
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 • QPS • DDMG • Callide Mine • Power Station	• 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

Table 20: Earthquake — DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	• Earthquake reported or felt in the area, AND • Intensity less than 5MM	• Earthquake reported or felt in the area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection	• Earthquake reported or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Action	• Record all communication • Monitor situation and assess risks **NOTE:** 'Reported' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.	• As per previous activation level, AND • Review surveillance inspection of the dam and assess its condition as soon as possible • Determine if there are any possible failure paths from reported damage	• As per previous activation level, AND • Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so • Assess risk and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) • Supervise* remedial repairs (if applicable) • Monitor situation and assess risks	• As per previous activation level, AND • Liaise with the IC and confirm need to sound emergency siren due to dam failure	• Forward all communications and relevant emails for EER to [redacted] • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level, AND • CEO — if time permits	• As per previous activation level	• 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 — terrorist threat/activity or high energy impact

8.1 Overview

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

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

Note: Risk is higher due to gated nature of spillway.

The flood outlines in Appendix B are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by a terrorist threat/activity or a high energy impact. 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 threat/activity or a high energy impact 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 threat/activity or a high energy impact and concurrent flooding or downstream releases are occurring or expected to occur.

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

8.1.1 Assessment of circumstances that 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.

8.2 Emergency action roles

Table 21 to Table 25 specify emergency actions for the following roles:

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

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

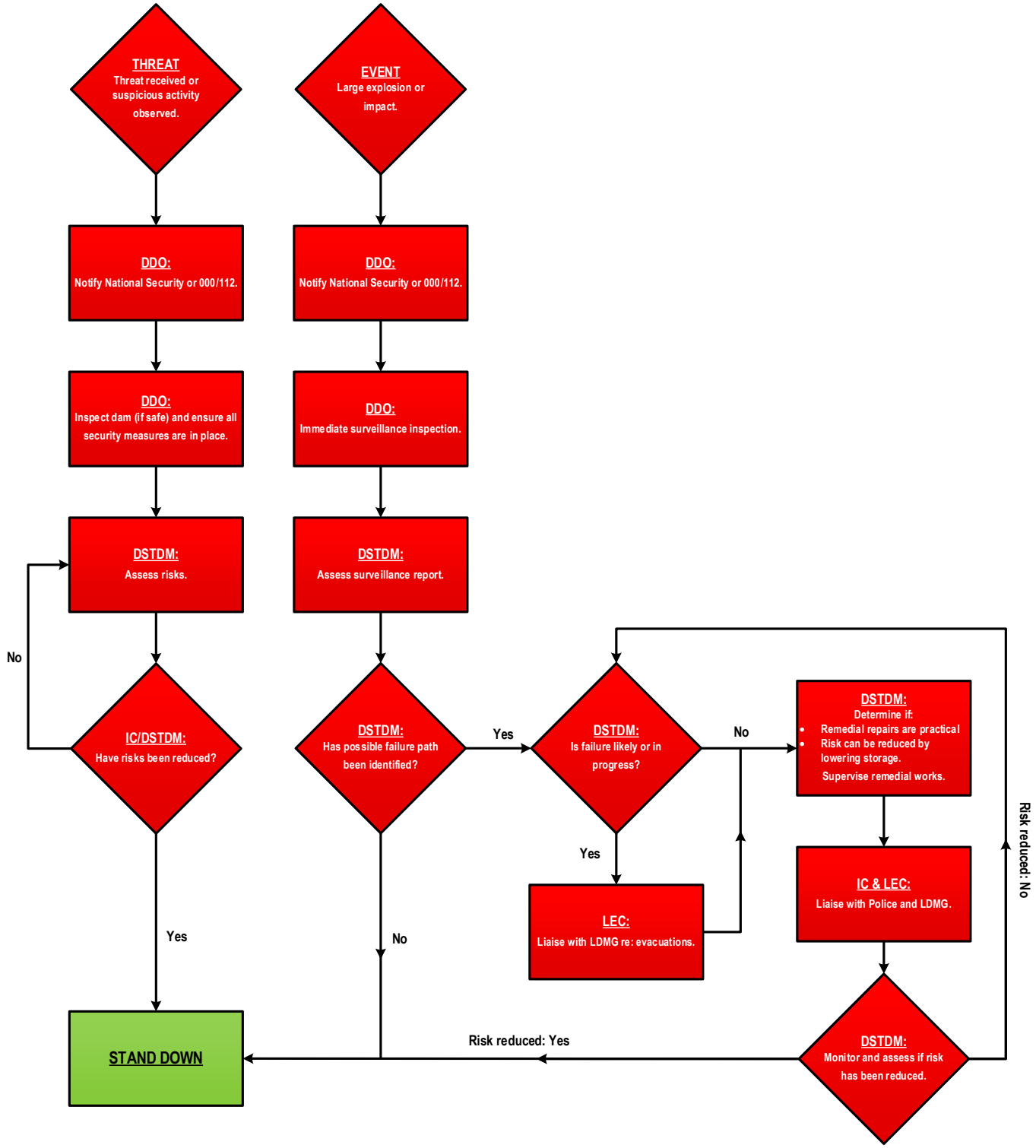


Table 21: Terrorist threat/activity or high energy impact — DDO emergency action

Activation level	Alert/Lean Forward	Stand Up — 1 THREAT	Stand Up — 2 EVENT	Stand Up — 3 RESPONSE	Stand Down
Activation trigger	• Not applicable	• Possible terrorist activity/suspicious behaviour noticed at the dam • 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
Actions	• Not applicable	• In an emergency call 000. • Record all communication • If any suspicious behaviour noticed, contact DSTDM for advice. If instructed by DSTDM, of if threat received, complete the following: • Inspect dam (if safe) and ensure all security measures in place (locked gates, etc.) • Photograph/video suspicious items from a safe point and record using the approved forms and send to IC & DSTDM • If Police appoint Incident Manager support and follow instructions • Close any affected roads as directed • Update Dam Log Book as per SOP 12 (ref DD)	• As per previous activation level, AND • Vacate the immediate vicinity of the affected area	• As per previous activation level, AND • Lower storage level if directed by DSTDM • Sound gate operations siren if required	• Forward all communication and inspection sheets for EER to [redacted] • Update Dam Logbook as per SOP 12 (ref DD) • Return to routine activities
Notifications	Not applicable	#000 Emergency DSTDM IC SO	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

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

[redacted]

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

Activation level	Alert/Lean Forward	Stand Up — 1 THREAT	Stand Up — 2 EVENT	Stand Up — 3 RESPONSE	Stand Down
Activation trigger	• Not applicable	• Possible terrorist activity/suspicious behaviour noticed at the dam • 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
Actions	• Not applicable **NOTE**: IC to carry out LEC actions unless LDMG is *stood up*	• Record all communication • If Police appoint Incident Manager support and follow instructions • Monitor situation and assess risks • Liaise with DDO and relevant council(s) regarding possible road/bridge closures	• As per previous activation level	• As per previous activation level, AND • Liaise with DDO and LDMG re: potential for evacuations	• Forward all communications including relevant emails for EER to [redacted] • Return to routine activities
Notifications	Not applicable	DDO IC LDMG	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

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

[redacted]

Table 23: Terrorist threat/activity or high energy impact — IC emergency action

Activation level	Alert/Lean Forward	Stand Up — 1 THREAT	Stand Up — 2 EVENT	Stand Up — 3 RESPONSE	Stand Down
Activation trigger	• Not applicable	• Possible terrorist activity/suspicious behaviour noticed at the dam • 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
Actions	• Not applicable	• Record all communication • Contact National Security • If Police appoint Incident Manager support and follow instructions • Create Incident Report Record • Update Sunwater intranet with dam status **NOTE**: IC to carry out LEC actions unless LDMG is *stood up*	• As per previous activation level • 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 the DSTDM to confirm that dam failure is in progress • Liaise with DDO, DSTDM, and LEC re: potential for evacuations • Mobilise resources to undertake remedial works if directed by DSTDM	• Complete all internal and external notifications • Forward all communications including relevant emails for EER to [redacted] • Close Incident Report Record • Update Sunwater intranet with dam status • Return to routine activities
Notifications	Not applicable	CTG QPS DDMG DDO DSTDM LEC/ORR SMT SRT	As per previous activation level, AND D/S Residents SDCC Callide Mine Power Station	As per previous activation level, AND Emergency siren	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: Terrorist threat/activity or high energy impact — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	ALERT NOT APPLICABLE			
Lean Forward	LEAN FORWARD NOT APPLICABLE			
Stand Up — 1 THREAT	• Possible terrorist activity/ suspicious behaviour noticed at the dam • Threat received	• LDMG • QPS • 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	• Email & Phone	Complete Emergency Alert Request Form as per instructions and email to SDCC Watch Desk to send.
		• LDMG • QPS • DDMG • CTG • Callide Mine • Power Station	• 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 24 (Continued): Terrorist threat/activity or high energy impact — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up — 3 RESPONSE	• Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• 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 (copies in Appendix A8) and email to SDCC Watch Desk to send. Liaise with Sunwater Customer Support and Communications to send appropriate messaging via SMS
		• LDMG • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Security threat/ impact/ explosion, etc.) What is the status? (Dam Failure Likely/In Progress) Initiate evacuations
		• Emergency siren	• Phone & Email	Complete emergency siren instructions in Appendix A9 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.
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 • QPS • DDMG • Callide Mine • Power Station	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Security threat/ impact/explosion, etc.) What is the status? (Dam Hazard Stood Down) Advise that failure risk has been reduced and EAP has been deactivated

Table 25: Terrorist threat/activity or high energy impact — DSTDM emergency action

Activation level	Alert/Lean Forward	Stand Up — 1 THREAT	Stand Up — 2 EVENT	Stand Up — 3 REPONSE	Stand Down
Activation trigger	• Not applicable	• Possible terrorist activity/suspicious behaviour noticed at the dam • 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
Action	• Not applicable	• Record all communication • Assess risks	• As per previous activation level, AND • Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so • Assess risk and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) • Supervise* remedial repairs (if applicable) • Monitor situation and assess risks	• As per previous activation level, AND • Liaise with the IC and confirm need to sound emergency siren due to dam failure • Liaise with the IC and LEC and advise on need to recommend evacuations	• Forward all communications and relevant emails for EER to [redacted] • Return to routine activities
Notifications	Not applicable	IC DDO SRT DSR	As per previous activation level, AND LEC/ORR	As per previous activation level	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]

9. Dam hazard — gate malfunction

9.1 Overview

The emergency action described in this section relates to the malfunction of one or more gates, including uncontrolled vibration.

9.1.1 Assessment of circumstances that indicates an increase in the likelihood of gate malfunction occurring

The following EAP dam hazards could indicate an increased likelihood of gate malfunction:

- flood operations/blockage
- earthquake
- terrorist threat.

Mechanical or electrical failure during an operational test could also result in gate malfunction.

9.2 Emergency action roles

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

Table 26 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)
- Flood operations Decision Maker (FODM).

Table 26: Gate malfunction — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• Loss of control* of one or more gates with insufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates with sufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates; AND • Storage level above EL 215.5 m.	• Confirmation that all gates are functioning correctly
Actions	• Record all communication • Refer to the Spill Operations Manual (ref Y) • Support/supervise remedial works as required • Update Dam Logbook as per SOP 12 (ref DD)	• As per previous activation level, AND • Lower the storage if directed • Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public **NOTE: Continuously monitor for indications of vibration and if observed, notify DSTDM**	• As per previous activation level, AND • Close any affected roads if not already closed by others	• Forward all communication and inspection sheets for EER to • Update Dam Logbook as per SOP 12 (ref DD) • Return to routine activities
Notifications	DSTDM IC SO	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

***Includes uncontrolled gate vibration**

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

Table 27: Gate malfunction — LEC emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• Loss of control* of one or more gates with insufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates with sufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates; AND • Storage level above EL 215.5 m.	• Confirmation that all gates are functioning correctly
Actions	• Record all communication **NOTE**: IC to carry out LEC actions unless LDMG is *stood up*	• As per previous activation level, AND • Liaise with relevant council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward all communications including relevant emails for EER to [redacted] • Return to routine activities
Notifications	DDO IC LDMG	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

***Includes uncontrolled gate vibration**

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

[redacted]

Table 28: Gate malfunction — IC emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• Loss of control* of one or more gates with insufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates with sufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates; AND • Storage level above EL 215.5 m.	• Confirmation that all gates are functioning correctly
Actions	• Record all communication • Complete Situation Report (initial) unless otherwise directed • Create Incident Report Record • Update Sunwater intranet with dam status **NOTE**: IC to carry out LEC actions unless LDMG is *stood up*	• As per previous activation level • 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: Review Flood Operation (Section 5) Triggers**	• Complete all internal and external notifications • Forward all communications including relevant emails for EER to [redacted] • Close Incident Report Record • Update Sunwater intranet with dam status • Return to routine activities
Notifications	DSTDM DDO LEC/ORR SMT SRT	As per previous activation level, AND QPS DDMG	As per previous activation level	Inform all previously notified contacts of stand down

***Includes uncontrolled gate vibration**

Table 29: Gate malfunction — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	• Loss of control* of one or more gates with insufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• LDMG	• Phone	Describe current situation with gates What is the status? (e.g. time to repair?) Advise of current storage level Advise any issues you are aware of — Investigation continues Standby for further advice
Lean Forward	• Loss of control* of one or more gates with sufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• LDMG • QPS • DDMG	• Phone	Describe current situation with gates What is the status? (e.g. time to repair?) Advise of current storage level Advise any issues you are aware of — Investigation continues Discuss any potential road/bridge closures Standby for further advice
Stand Up — 1	• Loss of control* of one or more gates; AND • Storage level above EL 215.5 m.	• LDMG • QPS • DDMG	• Phone	Describe current situation with gates What is the status? (unknown time to repair?) Advise of current storage level Advise of flooding risk if loss of control of gates continue Advise any issues you are aware of — investigation continues Prepare for possible evacuations
Stand Down	• Confirmation that all gates are functioning correctly	• LDMG • QPS • DDMG	• Phone	Describe current situation with gates What is the status? (Dam hazard Stood Down) Confirmation that all gates are functioning correctly and EAP has been deactivated

***Includes uncontrolled gate vibration**

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

Table 30: Gate malfunction — DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• Loss of control* of one or more gates with insufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates with sufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates; AND • Storage level above EL 215.5 m.	• Confirmation that all gates are functioning correctly
Action	• Record all communication. • Arrange an inspection of the dam to assess its condition as soon as possible, when safe to do so • Monitor situation and assess risks • Liaise with FODM and obtain PFRM results **NOTE: Confirm that gates are being monitored for indications**	• As per previous activation level, AND • Determine if risks can be reduced by lowering storage • Supervise remedial repairs (if applicable)	• Assess risk and determine if failure likely or in progress	• Forward all communications and relevant emails for EER to [redacted] • Return to routine activities
Notifications	FODM DDO IC LEC/ORR DSR	As per previous activation level	As per previous activation level	Inform all previously notified contacts of stand down

***Includes uncontrolled gate vibration**

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

Table 31: Gate malfunction — FODM emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• Loss of control* of one or more gates with insufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates with sufficient forecast inflows to exceed storage level EL 215.5 m in the next 4-day forecast period.	• Loss of control* of one or more gates; AND • Storage level above EL 215.5 m.	• Confirmation that all gates are functioning correctly
Actions	• Record all communication • Undertake hydrological inflow assessment based on the 4-day forecast period	• As per previous activation level	• As per previous activation level, Liaise with DSTDM regarding outflow estimates due to gate malfunction	• Complete all Internal and External notifications
Notifications	IC DSTDM	As per previous activation level,	As per previous activation level	Inform all previously notified contacts of stand down

***Includes uncontrolled gate vibration**

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

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 or ORR)
Comms Failure – Brisbane	• Unable to communicate to or from Sunwater Brisbane (could affect DSTDM or FODM & will affect IC)

10.2.2 Assessment of circumstances that indicates the likelihood of communications failure escalating the activation level of a current dam hazard

The FODM will assess the weather and flood warnings daily in accordance with the OC SOP (Sunwater internal) and ref W. They will escalate to the IC any warnings that have the potential to generate an inflow event.

The on-call IC will escalate to the FODM any local intelligence on catchment conditions that could increase the probability of inflows to the dam.

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

10.2.3 Emergency action roles

Table 32 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 or ORR	• Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
Actions	• As much as practicable, assume the role of LEC • Continue tasks in accordance with any other current emergency action • Every hour, attempt communications noting the following: – Mobile phone - try texting instead of voice, much higher probability of success – Satellite phone - needs to access open sky unless external antenna fitted – Social media - e.g. Facebook (Internet may be available via landline) • Record all communication and attempts via Dam Logbook entries as per SOP 12 (ref DD) and communication 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: – Mobile phone - try texting instead of voice, much higher probability of success – Satellite phone - needs to access open sky unless external antenna fitted – Social media - e.g. Facebook (Internet may be available via landline) • Record all communication and attempts via Dam Logbook entries as per SOP 12 (ref DD) 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 or DSTDM or FODM
Actions	• Every hour, attempt communications noting the following: – Mobile phone - try texting instead of voice, much higher probability of success – Satellite phone - needs to access open sky unless external antenna fitted – Social media - e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Assume that the DDO is carrying out LEC role at site as much as practicable • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action	• Issue Sunwater Incident Alert • Every hour, attempt communications noting the following: – Mobile phone - try texting instead of voice, much higher probability of success – Satellite phone - needs to access open sky unless external antenna fitted – Social media - e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Liaise with the DDO and assume IC role • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Notifications	• IC • DSTDM • SO (if available) • LDMG	• 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 and ORR
Actions	• Issue Sunwater Incident Alert • Every hour, attempt communications noting the following: – Mobile phone - try texting instead of voice, much higher probability of success – Satellite phone - needs to access open sky unless external antenna fitted – Social media - e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action	• Issue Sunwater Incident Alert • Every hour, attempt communications noting the following: – Mobile phone - try texting instead of voice, much higher probability of success – Satellite phone - needs to access open sky unless external antenna fitted – Social media - e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Liaise with the DDO and carry out functions of the LEC as much as practicable • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Notifications	• LEC • DSTDM • SO (if available) • DDMG	• DDO (if available) • DSTDM • SO (if available) • LDMG (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 — Callide 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 — Callide 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

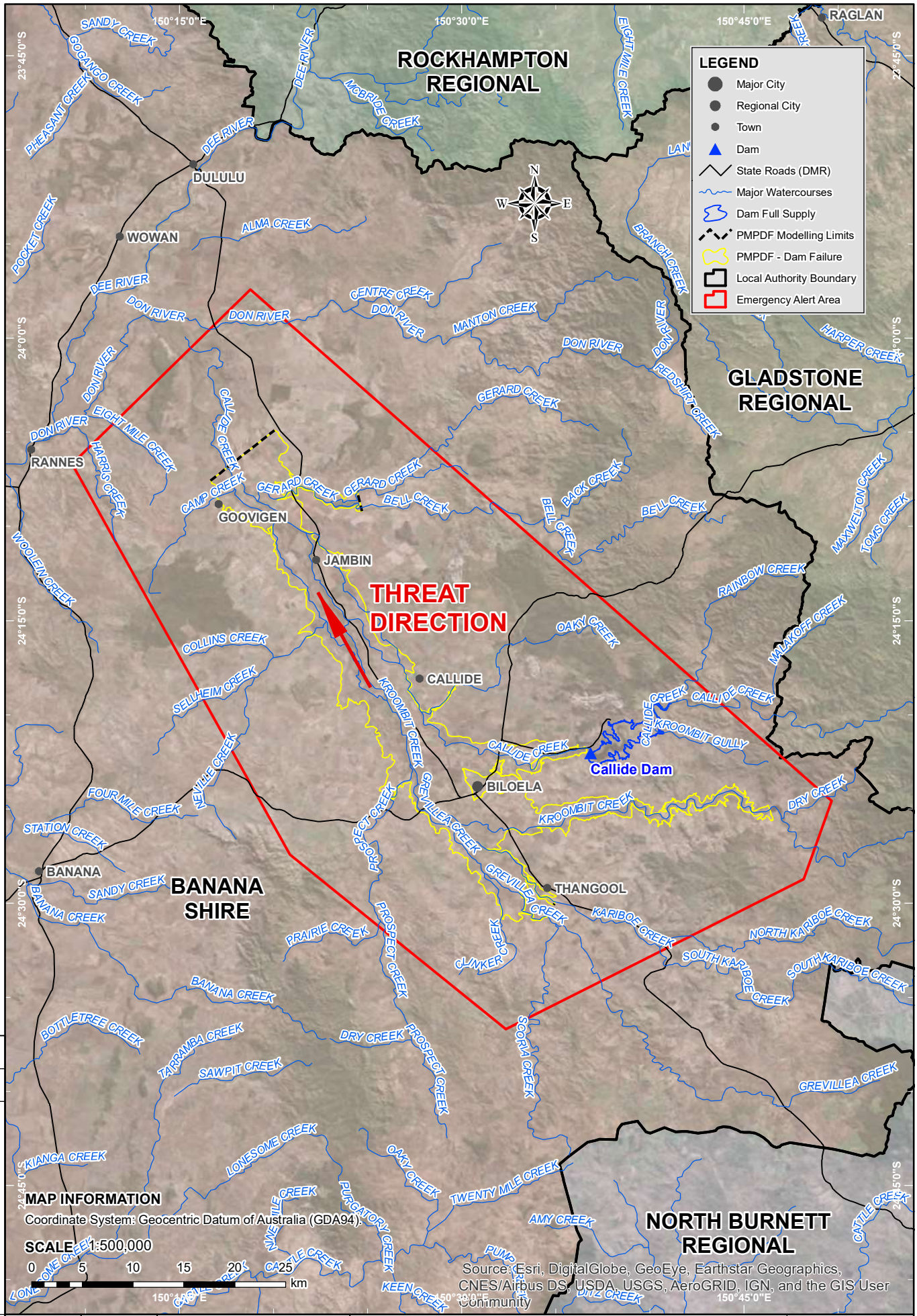
Activation level	Comms Failure – Site	Comms Failure – Local Area
Activation trigger	• Unable to communicate to dam site	• Unable to communicate to local area including LEC and ORR
Actions	• Provide technical advice to IC/LEC on a needs basis • Record all communication • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action	• Provide technical advice to IC on a needs basis • Record all communication • Assume that the DDO is assisting IC with LEC role • As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action
Notifications	IC LEC CEO (if time permits) DSR (if applicable)	IC DDO (if available) CEO (if time permits) DSR (if applicable)

Table 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 have been redacted



MAP INFORMATION

Coordinate System: Geocentric Datum of Australia (GDA94).

SCALE 1:500,000

0 5 10 15 20 25 km

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

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:\BW Asset Delivery\SW-BW Service Delivery\R-WSR\W-38-01-05-01 EAP Mapping\Drawings\ArcMap\Emergency Alerts\249571-B.mxd
Printed: Monday, 03/09/2018 03:32:51 PM

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

REVISION	DATE		REMARKS
B	03/09/18	MB	ALERT AREA AMENDED
A	23/01/18	MB	ISSUED FOR USE

MH	MH	PSD	
MB	MB	CKD	

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

CALLIDE DAM
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA

CONTRACT NUMBER

DRAWING NUMBER 249571 | REV. B

SHEET 1 OF 1

DATE JANUARY 2018

Appendix A8: Dam failure emergency alert request

Queensland emergency alert request guidelines

An Emergency Alert Request form should be completed, if required (see Section 5 to Section 9 for actions) and sent to the SDCC Watch Desk to activate the Callide Dam Emergency Polygon.

Instructions

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

Filename:	Voice Message:	SMS:
[redacted]	FLOOD EMERGENCY WARNING from Sunwater. People downstream of Callide Dam and those in the Callide Valley must LEAVE IMMEDIATELY. Callide Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. More information available at Banana Shire Council ee em dee dot banana dot que eye tee plus dot com.	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Callide Dam and those in the Callide Valley must LEAVE IMMEDIATELY. Callide Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. More information here: Banana Shire Council emd.banana.qitplus.com/

The next pages contain a pre-filled copy of the Callide Dam Emergency Alert Request form.

Queensland Government

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

EMERGENCY ALERT REQUEST

Location of Alert: Callide 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 Callide Dam and those in the Callide Valley must LEAVE IMMEDIATELY. Callide Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. More information available at Banana Shire Council ee em dee dot banana dot que eye tee plus dot com.

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 Callide Dam and those in the Callide Valley must LEAVE IMMEDIATELY. Callide Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. More information here: Banana Shire Council emd.banana.qitplus.com/

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	
GUIDE TO COMPLETE STEPS 1 – 4	
STEP 1.	EA Polygon Area (e.g. detailed description and location reference to allow positive identification of message area, including street names with cross street, areas of interest such as parks, rivers, dams, coastal areas) it is preferable to attach a map identifying the message area. If a Threat Direction has been requested, please clearly indicate it on the map.
STEP 2.	Tick applicable box and note the file name.
STEP 3.	Voice Message: type or handwritten the required message. As the message will be translated by a text-to-speech process it is important that words are not unintelligible when translated e.g. "qld" used in a web site address must be entered as "q l d", similarly the word "dot" must be entered into a web address instead of a full stop. Voice Message ideally should have no more than 450 characters including spaces. Do not use special characters – refer to EA Manual for details. Warning message must start with "Emergency Emergency"
STEP 4.	SMS Is restricted to a maximum of 160 characters including spaces and punctuation. Either type the message or handwrite the characters into the boxes.

Example: *SMS Flash Flood Warning from SES for Opal Valley-immediate threat to life/property-Warn others-Leave area/prepare NOW or seek higher ground-Listen to local radio*

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

//RELEVANTAUTHORITY//

//DIRECTIONANDAREA//

//NAME//

//NUMBER//

//TIME//

//TIMEandDAY//

//DIRECTIONandPLACE//

//HOURSMINUTES//

//PLACE//

//PLACEPLACE//

//EXTERNAL/INTERNAL//

//SUBURBS//

//FireIncident//

Appendix A9: Dam failure emergency siren activation

Emergency siren activation

Notes:** The emergency siren is not to be activated UNLESS; **a confirmed dam failure is in progress, the appropriate EAP trigger has been exceeded and the Emergency Alert is being sent out via SDCC and/or an Emergency broadcast by ABC radio.

IC will take the lead to initiate the activation of the emergency siren but may delegate to on-call DSTDM or FODM depending on the situation; noting that EA and Emergency broadcast are priority. The CEO or Executive Leadership Team member should be made aware if time permits.

Instructions

1. Telephone the [redacted] and tell them your intention to use the dam failure emergency siren for an emergency event for Callide Dam.
2. Email previously sent Emergency Alert Request form to: [redacted]
3. Advise the LDMGs, Media and CEO if time permits, or ASAP after siren activation otherwise.
4. Sound emergency siren following Technical Instructions below.
5. Create Sunwater Incident report to advise of the completion of the sounding of the siren.

Technical Instructions

The emergency siren alarm sequence is activated remotely via the SiRcom SMART Alert (*SiSA) software. The SiSA software is accessed either via the client software installed on the local PC located in the Sunwater Operations Centre or via the SiSA web portal which can be accessed via the Sunwater 'Jump Box' infrastructure. Jump Box can be accessed by following this procedure:*

1) navigate to the Citrix Remote Access [redacted]
2) log in using your **Sunwater user credentials** (*you will also be prompted for a security code via Office 365)*
3) go to the **APPS** section
4) select the **Remote Desktop Connection** application and **Open**
5) type the IP address [redacted] into the 'Computer' field and click **Connect**
6) once prompted, enter your **Sunwater user credentials** into the fields in the dialogue box (*if you are prompted with a security prompt, click the **'Yes'** button)*
7) once you are logged into the **Jump-Box** click the **Start Menu** button and type [redacted] again to open a new **Remote Desktop Connection** session
8) type the address [redacted] into the 'Computer' field and click **Connect** (*you may be prompted, enter your **Sunwater user credentials** into the fields in the dialogue box again).*

Once the User has access to the SiSA software, the alarm is activated by following this procedure:

1) Log on to (SiSA) software.
2) Select the Siren/s that require activation using the **SELECT UNITS** button.
3) Once the Siren/s are selected press the **EVACUATE** button.
4) Confirm activation request by selecting the **ACTIVATE** button. Once the alarm is activated the **SiRcom icon** will flash red.
5) Allow the Alarm sequence to run to end. If the Alarm needs to be cancelled before the sequence is completed press the **STOP ACTIVE SCRIPT** button.

APPENDIX B Drawings and maps

B1 Drawings

B2 Flood impact — downstream

B3 Inundation maps

B4 Catchment maps (Queensland river maps from the BOM website)

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.

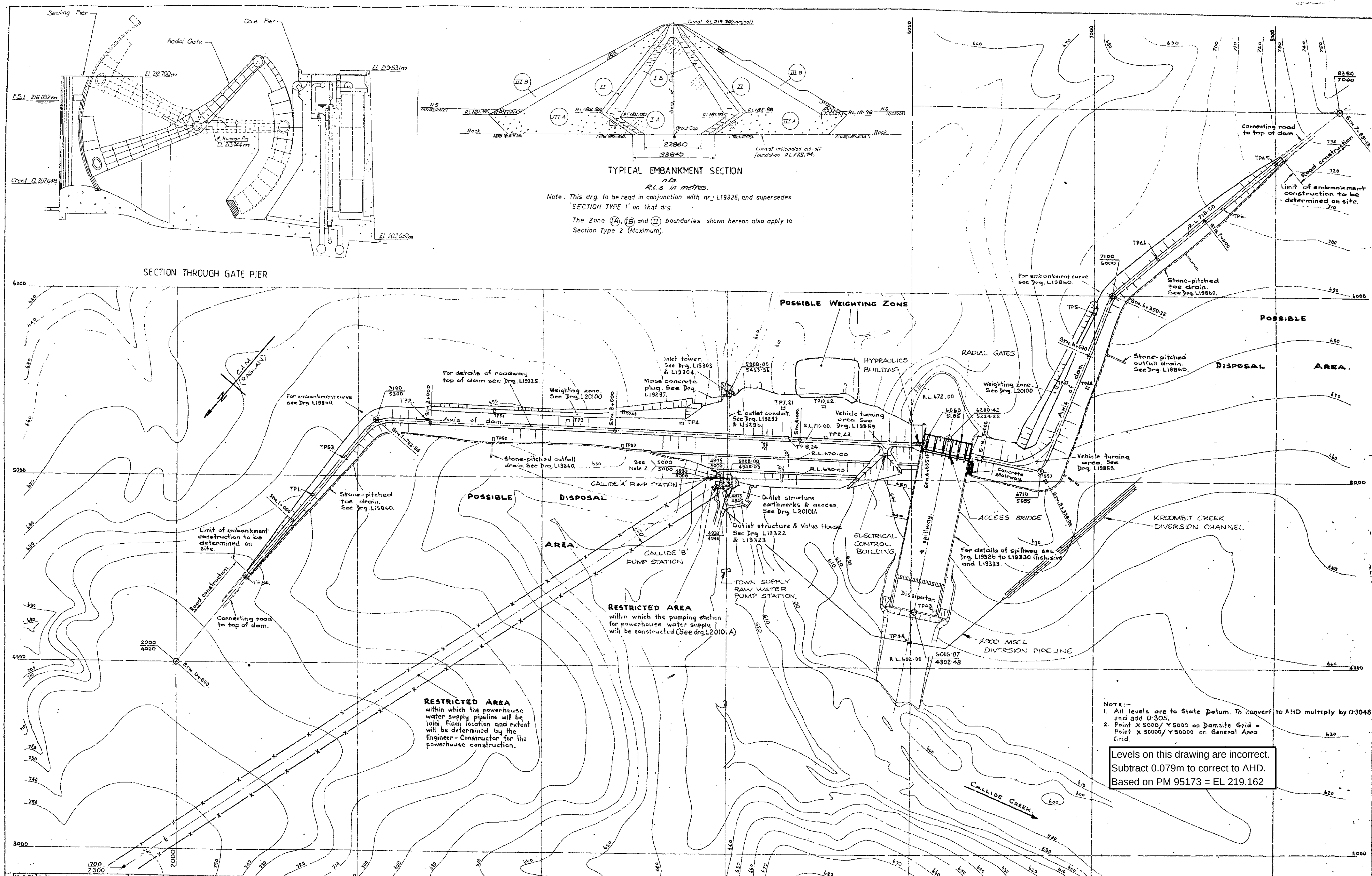
Appendix B1: Drawings

The following drawings are applicable to the General Arrangement:

- General Arrangement
- Spillway General Arrangement
- Outlet works General Arrangement
- II General Arrangement

The following drawing displays the instrumentation and monitoring equipment:

- Instrumentation layout



Date	Revision	Remarks	Checked	Passed
16-5-74	D	Amended contours & added		
26-6-63	C	Amended vehicle turn. area, wt zone & restricted area. Added drg. references		
13-4-93	E	GENERAL MODS.		

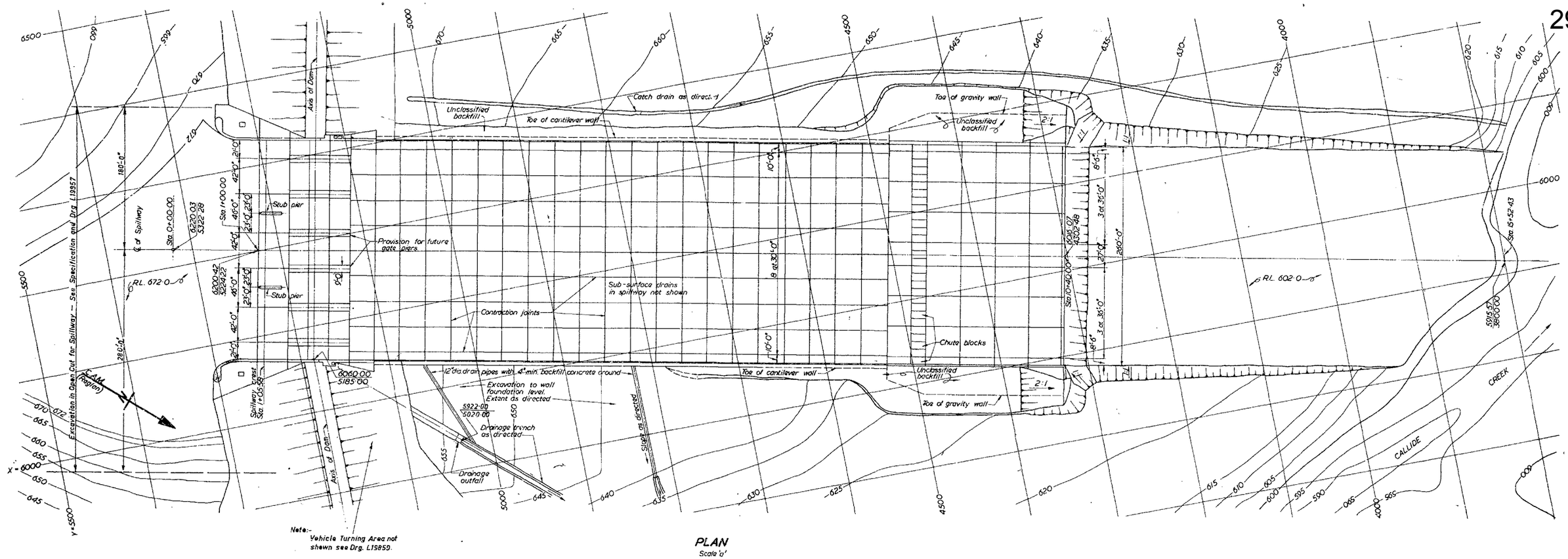
Drawing Schedule.

L19333	L19322
L19304	L20101
L19296	L19326 to
L19293	L19330 incl.
L19303	L19859
L19297	L19860
L19325	L20100

Design. Prep. Ckd. Supv.
Drafting. Dr. Ckd. Supv.
Submitted — Senior Engineer.
Recommended — Chief Designing Engineer.
Approved 13.10.62. — Commissioner.

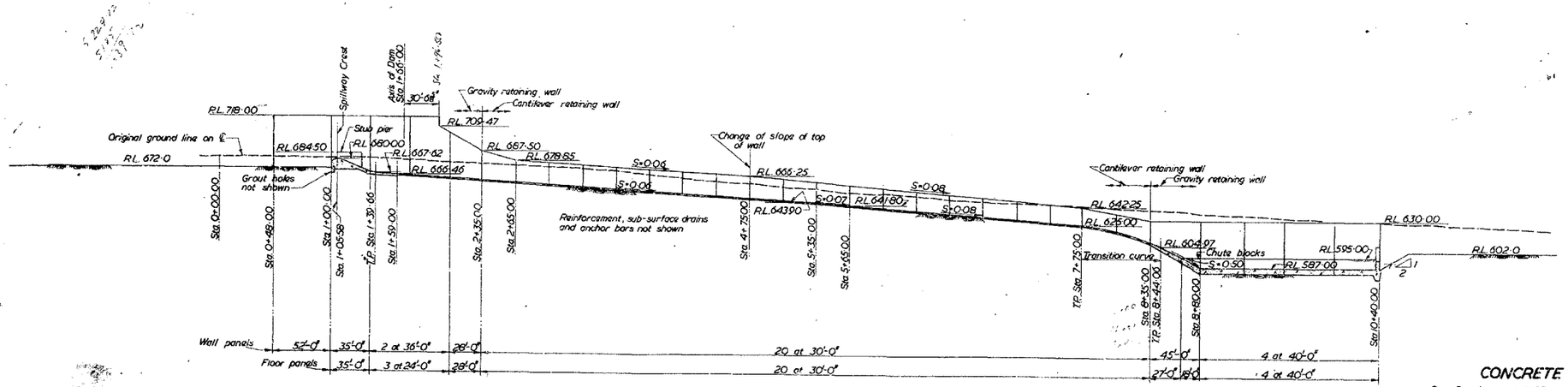
IRRIGATION AND WATER SUPPLY COMMISSION
CALLIDE CREEK — A.M.T.M. 49.8 mi
CALLIDE DAM
GENERAL ARRANGEMENT
Sheet 1 of 2. [illegible] L19324

DWG 19324E.tif

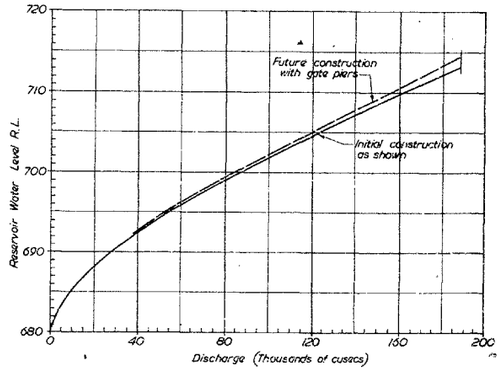


Note:- Vehicle Turning Area not shewn see Drg. L19859.

PLAN
Scale '0'



SECTION ALONG ℄ OF SPILLWAY
Scale '0'



SPILLWAY DISCHARGE CURVE

Levels on this drawing are in feet to State Datum (SD).
Conversion to AHD: AHD = SD x 0.3048 + 0.305m
Based on PM 95173 = EL 219.162m

CONCRETE REQUIREMENTS
See Drawing L19327

REINFORCEMENT
See Drawing L19327

NOTES
For general notes see Drawing L19327

REFERENCE DRAWINGS

Spillway – Crest Details – Sheet 1 of 3	L19327
Spillway – Crest Details – Sheet 2 of 3	L19328
Spillway – Crest Details – Sheet 3 of 3	L19329
Spillway – Chute – Sections and Details	L19330
Spillway – Dissipator – Plan and Sections	L19333
Spillway – Panel and Block Designation System	L19815
Spillway – Reinforcement in Spillway Walls	L19816 to L19829 inclusive
Spillway – Reinforcement in Spillway Floor Slabs	L19830 to L19837 inclusive
Spillway – Proposed Excavation	L19857

AS BUILT

19326 A

Revision	Date	Remarks	Checked	Passed
3-463 A		Holdsare Turn Area, Sway Excav. Dry Stone Outfall Levels. Reference Drawings		

Drawing Schedule: L19333, L19330, L19329, L19328, L19327

Survey Books — Field — Level

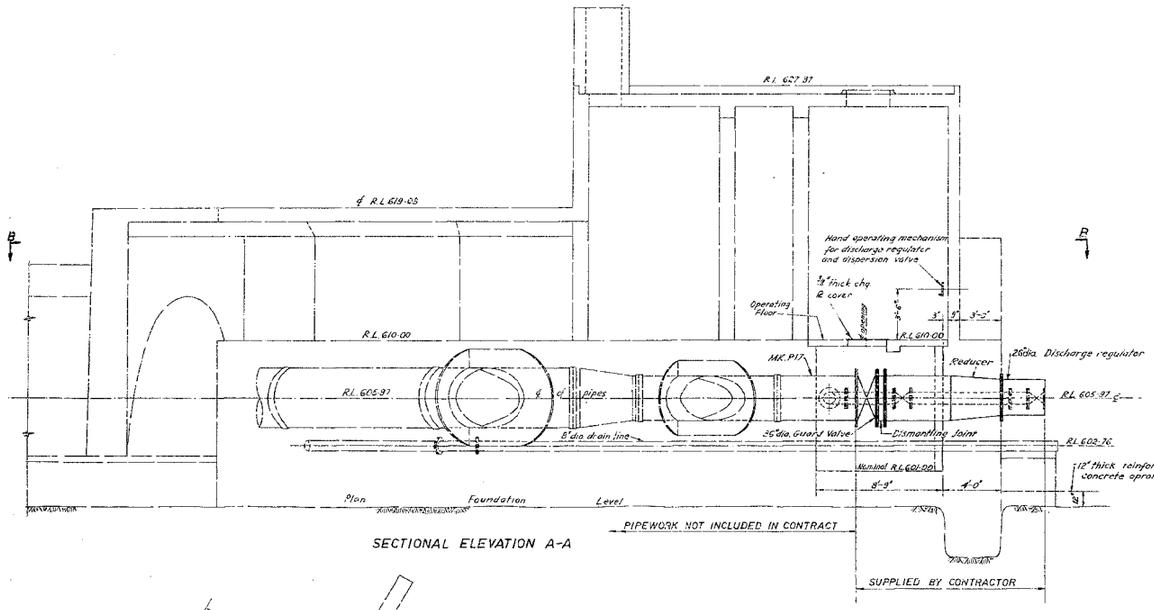
SCALE :
'0' 20 0 20 40 60 80 100 120 140 160 180 200
Scale of Feet

QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION — Chief Engineer

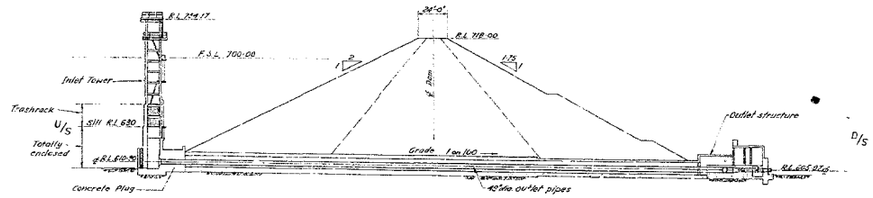
SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY — Chief Engineer — Submitted — Recommended — Chief Engineer

QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION
CALLIDE CREEK – A.M.T.M. 49·8
CALLIDE DAM
SPILLWAY
GENERAL ARRANGEMENT
L 19326 A

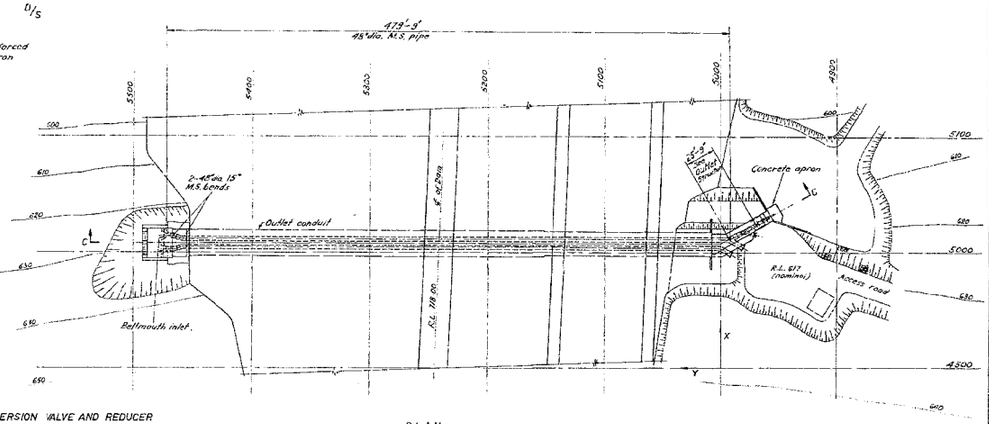
DWG 19326A.tif



SECTIONAL ELEVATION A-A

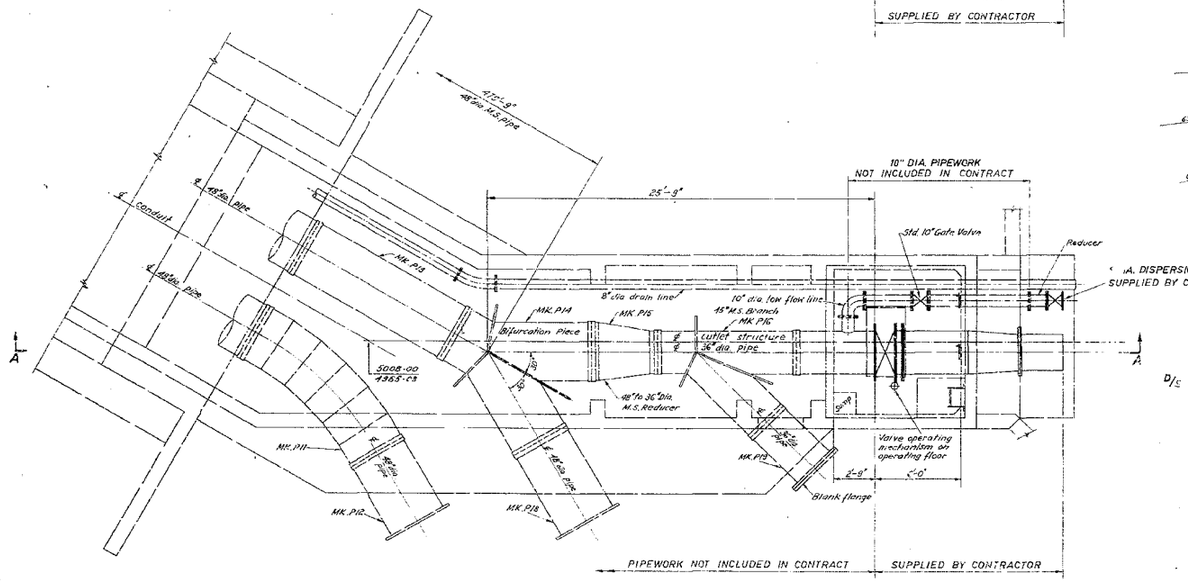


DEVELOPED SECTIONAL ELEVATION C-C



PLAN

ARRANGEMENT OF OUTLET WORKS
(Scale b)



SECTIONAL PLAN B-B

OUTLET STRUCTURE
(Scale a)

Notes.
1. All levels are to State Datum
2. This drawing to be read in conjunction with Specification "Manufacture, Supply and Delivery of Regulating and Guard Valves for Callide Dam".

Levels on this drawing are in feet to State Datum (SD).
Conversion to AHD: AHD = SD x 0.3048 + 0.305m
Based on PM 95173 = EL 219.162m

Revision	Date	Remarks	Ckd.	Ysd.
	23-5-63	A Reducer added to 10dia pipe	W. R.	A.J.R.

Drawing Schedule

Scale a — Inches 12 6 0 1 2 3 4 5 ½ 6 Feet

Scale b — Feet 50 0 50 100 Feet

Design.	Drafting	Approved
Prep.	Dr. A.T.	
Ckd.	Ckd. [illegible]	2-11-62
Supr. W.R.R.	Supr. [illegible]	Chief Designing Engineer
Submitted		
		Senior Engineer

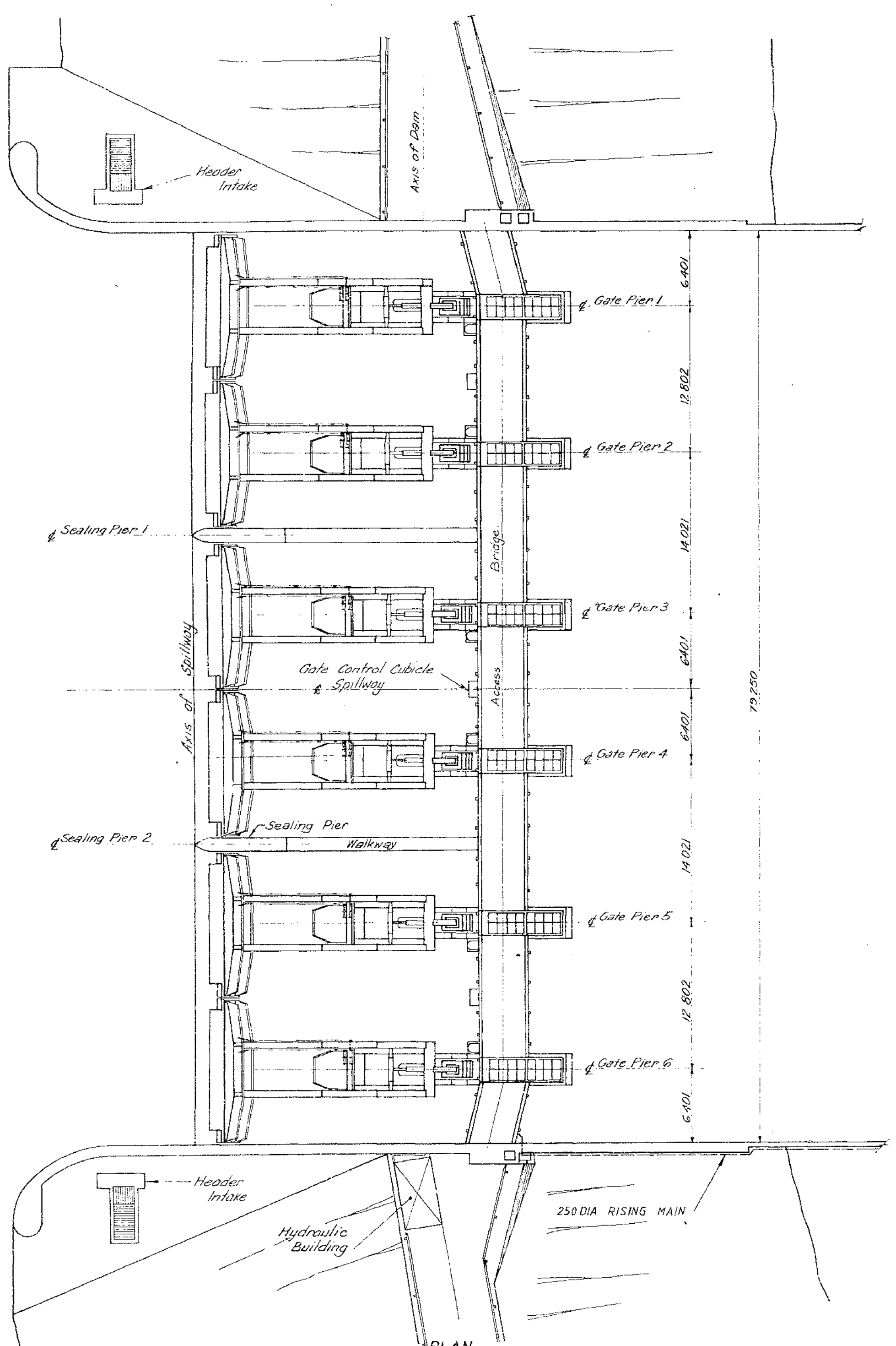
IRRIGATION AND WATER SUPPLY COMMISSION

CALLIDE CREEK A.M.T.M. 49-6

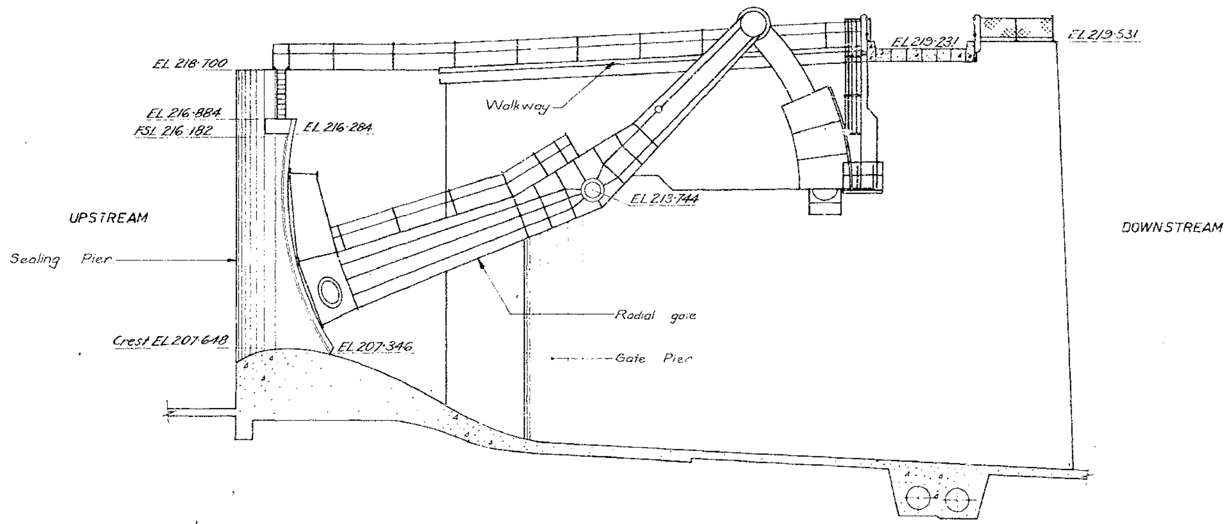
CALLIDE DAM - OUTLET WORKS

GENERAL ARRANGEMENT

2-11-62 | L 13331 | A



PLAN
Scale 'a'



ELEVATION
Scale 'b'

Note:-
1. All dimensions are in millimetres and Elevations are in metres
2. All materials and workmanship are to be in accordance with the specification
3. Levels Datum : All levels are to AHD (BM #IW 45·8 = EL 191·094)

Levels on this drawing are incorrect.
Subtract 0.079m to correct to AHD.
Based on PM 95173 = EL 219.162

AS BUILT
By [signature]
Class'n [illegible]
Date [illegible]

Revision				
4·2·85	B	General Amend	[signature]	[initials]
1·5·84	A	Tender to Working Drg	[signature]	[initials]
Date		Remarks	Ckd	Psd

Drawing Schedule

A1-75685	Rising Main - General Layout & Sections
L44243	Header Trash Racks - General Arrangement
L34599	Access Bridge Arrangement
L34620	Access Ladders - General Arrangement Sh.1
L34635	Walkway - General Arrangement
L34608	Gate Pier - Arrangement & Details. Sh 1 of 2
M44216	Sealing Pier - General Arrangement

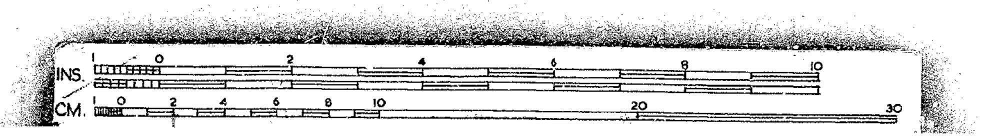
Scale 'a' 0 5 10 15 20m (1:200 Scale Before Reduction)

Scale 'b' 0 5 10m (1:100 Scale Before Reduction)

Design	Drafting	Recommended [signature]
Prep [initials]	Dr G.H.	
Ckd [initials]	Ckd [initials]	Chief Designing Engineer
Supr [initials]	Supr [initials]	Approved [signature]
Submitted R. Russo		
Senior Engineer Designs		Commissioner

QUEENSLAND WATER RESOURCES COMMISSION
CALLIDE CREEK AMTD 80·1 km
CALLIDE DAM — STAGE II
GENERAL ARRANGEMENT

20·5·83 | L 34610 | A | B



DWG 34610G.tif

SURFACE MOVEMENT STATION

No	EASTING	NORTHING	ELEVATION
SS01	7728.030	2258.507	219.998
SS02	7756.736	2353.905	219.994
SS03	7783.433	2449.639	220.020
SS04	7766.225	2545.633	220.196
SS05	7744.613	2645.030	220.083
SS06	7739.576	2737.891	220.249
SS07	7820.975	2796.909	220.106
SS08	7914.757	2839.504	220.101
SS09	7999.566	2893.077	220.264
SS10	8083.618	2946.048	220.210
SS11	8189.767	3013.721	220.317
SS12	8254.296	3054.305	220.363
SS13	8337.398	3107.180	220.189
SS14	8421.210	3160.191	220.291
SS15	8505.096	3213.344	220.034
SS16	8592.019	3268.456	220.100

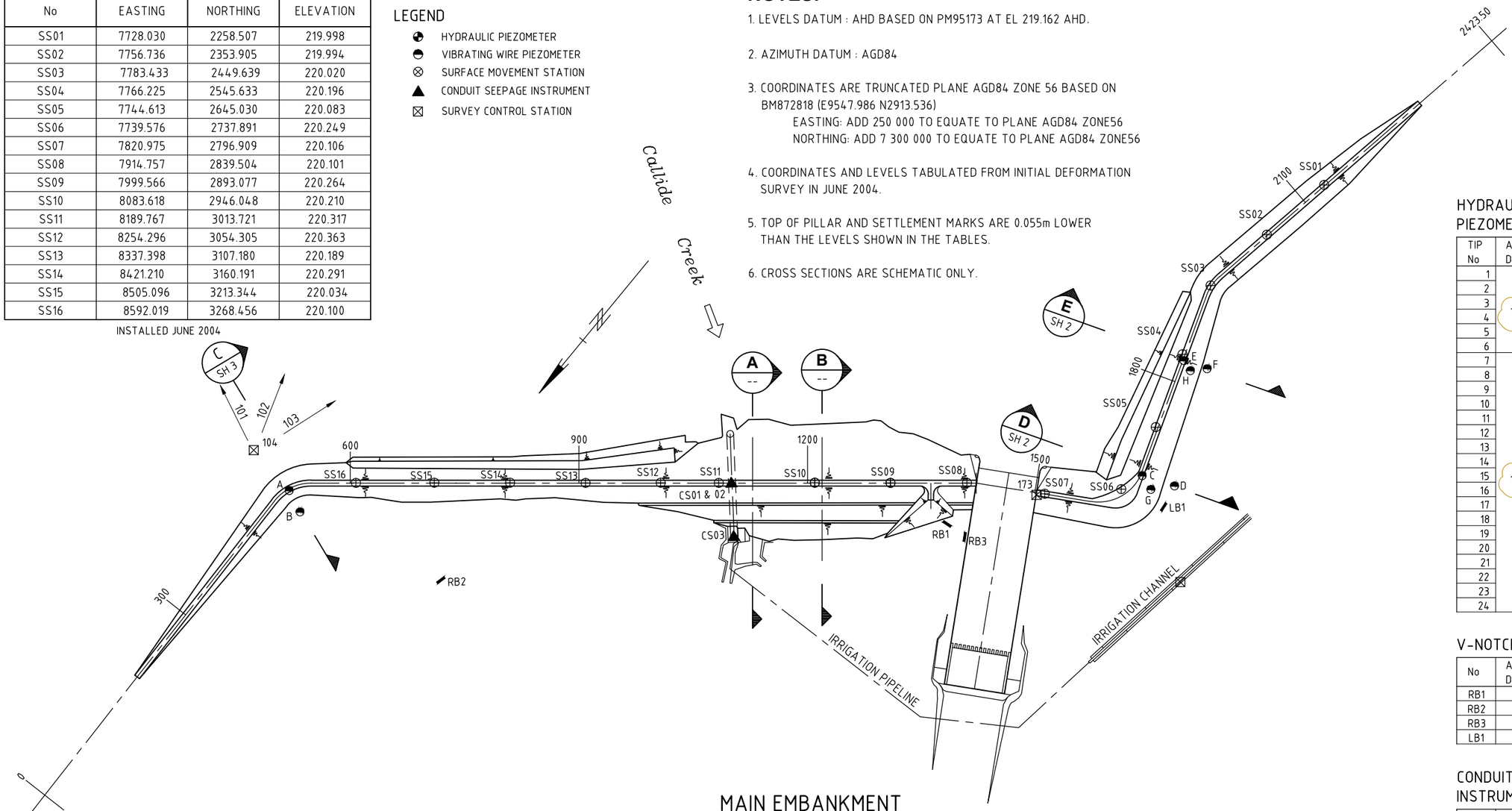
INSTALLED JUNE 2004

LEGEND

- HYDRAULIC PIEZOMETER
- VIBRATING WIRE PIEZOMETER
- SURFACE MOVEMENT STATION
- CONDUIT SEEPAGE INSTRUMENT
- SURVEY CONTROL STATION

NOTES:

1. LEVELS DATUM : AHD BASED ON PM95173 AT EL 219.162 AHD.
2. AZIMUTH DATUM : AGD84
3. COORDINATES ARE TRUNCATED PLANE AGD84 ZONE 56 BASED ON BM872818 (E9547.986 N2913.536)
   EASTING: ADD 250 000 TO EQUATE TO PLANE AGD84 ZONE56
   NORTHING: ADD 7 300 000 TO EQUATE TO PLANE AGD84 ZONE56
4. COORDINATES AND LEVELS TABULATED FROM INITIAL DEFORMATION SURVEY IN JUNE 2004.
5. TOP OF PILLAR AND SETTLEMENT MARKS ARE 0.055m LOWER THAN THE LEVELS SHOWN IN THE TABLES.
6. CROSS SECTIONS ARE SCHEMATIC ONLY.



MAIN EMBANKMENT
SCALE 1:6000

HYDRAULIC PIEZOMETER INSTALLATIONS

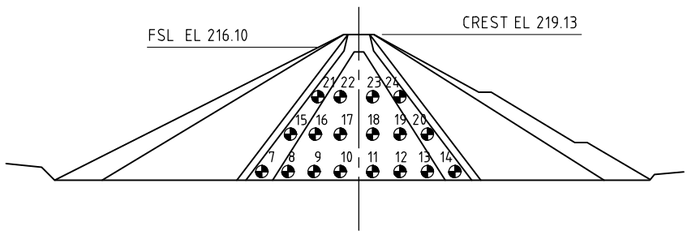
TIP No	AXIS DISTANCE	OFFSET FROM AXIS	ELEVATION
1	1219.20	17.37 U/S	176.56
2		10.97 U/S	176.56
3		4.57 U/S	176.56
4		0.00	176.56
5		6.09 D/S	176.56
6		12.19 D/S	176.56
7	1127.76	23.77 U/S	185.70
8		17.37 U/S	185.70
9		10.97 U/S	185.70
10		4.57 U/S	185.70
11		3.35 D/S	185.70
12		10.05 D/S	185.70
13		16.76 D/S	185.70
14		23.47 D/S	185.70
15		16.76 U/S	194.85
16		10.66 U/S	194.85
17		4.57 U/S	194.85
18		3.35 D/S	194.85
19		10.05 D/S	194.85
20		16.76 D/S	194.85
21		10.05 U/S	204.00
22		4.57 U/S	204.00
23		3.35 D/S	204.00
24		10.05 D/S	204.00

V-NOTCH WEIR

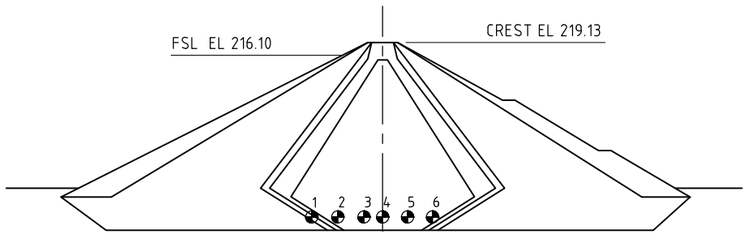
No	AXIS DISTANCE	COMMENTS
RB1	1380	INTERFACE SEEPAGE
RB2	715	FOUNDATION SEEPAGE
RB3	1420	SPILLWAY UNDERDRAINAGE OUTLET
LB1	1650	TOE DRAIN SEEPAGE

CONDUIT SEEPAGE INSTRUMENT INSTALLATIONS

No	LOCATION
CS01	EITHER SIDE OF CONDUIT CHAMBER
CS02	JOINT AT CONDUIT DISTANCE 70.52
CS03	LOCATED IN OUTLET STRUCTURE VALVE CHAMBER SUMP



SECTION A
SCALE NTS



SECTION B
SCALE NTS

SURVEY CONTROL STATIONS

No	EASTING	NORTHING	ELEVATION	REMARKS
101	9469.387	2850.908	217.765	PILLAR
102	8997.565	1949.941	225.000	PILLAR
103	8085.712	1902.477	220.979	PILLAR
104	8734.718	3294.103	214.549	PILLAR
173	7828.689	2803.687	219.241	PM95173

REVISION					REFERENCE DRAWINGS	
28.03.18	G	PIEZOMETER AXIS DISTANCES CORRECTED	BT	A. BLACK		
16.11.15	F	V-NOTCH WEIRS UPDATED	MC	K. EHM		
21.08.15	E	SECTIONS C, D & E UPDATED	MC	K. EHM		
18.06.15	D	SECTIONS ADD:SHEET 2 ADD. CREST LEVEL REV.	MC	K. EHM		
18.10.13	C	VIBRATING WIRE PIEZOMETER INSTALLATIONS	AN	MR		
29.06.10	B	AUTHORIZATION		KE	244529	CREST LEVEL SURVEY
06.05.05	A	CONTROL STNS, MOVEMENT POINTS & NOTES	DH	D HOUSTON	A3-73653	PIEZOMETER INSTALLATIONS
DATE		REMARKS	CKD	PASSED	L 19324	GENERAL ARRANGEMENT

SCALES (A3 SIZE)
0 50 100 150 200 250 300 METRES
1:6000

DRAWN BY | DESIGNED
CHECKED | CHECKED
APPROVED
K. EHM
HEADWORKS ASSESSMENT MANAGER

SunWater

DAM SAFETY INVESTIGATIONS
CALLIDE DAM
INSTRUMENTATION LAYOUT

CONTRACT NUMBER
DRAWING NUMBER
102267
SHEET 1 OF 3
DATE MAY 2005
G

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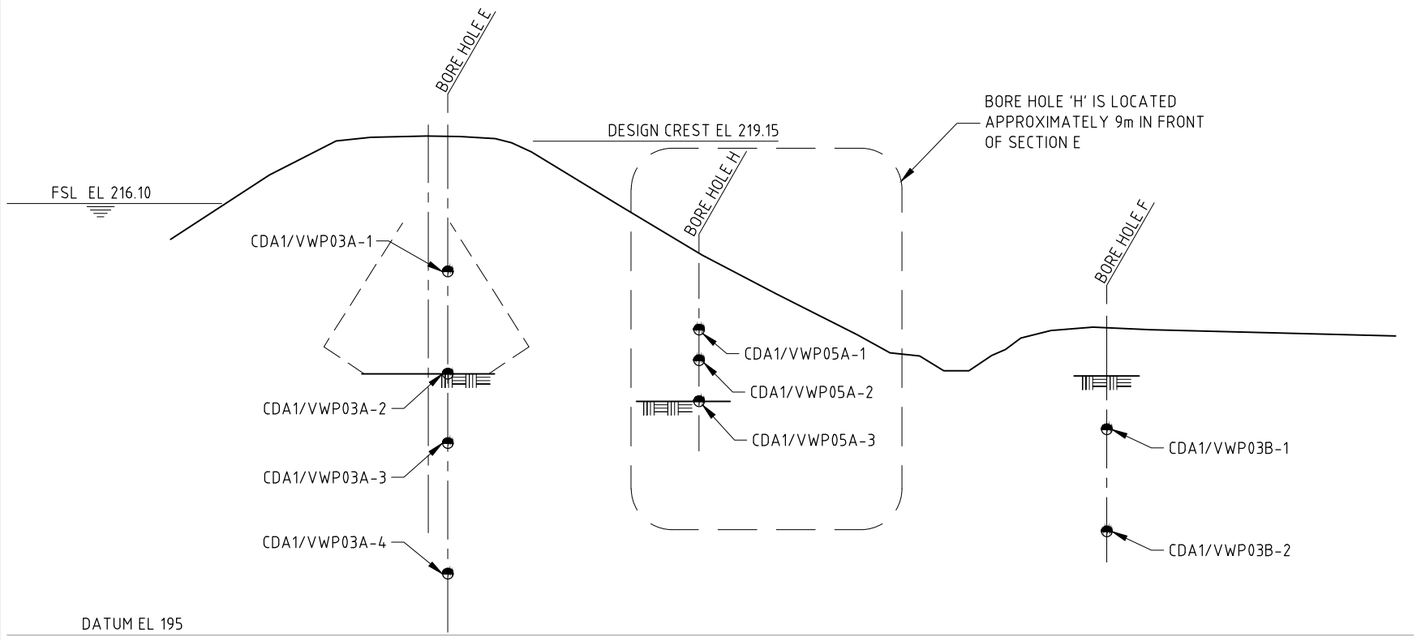
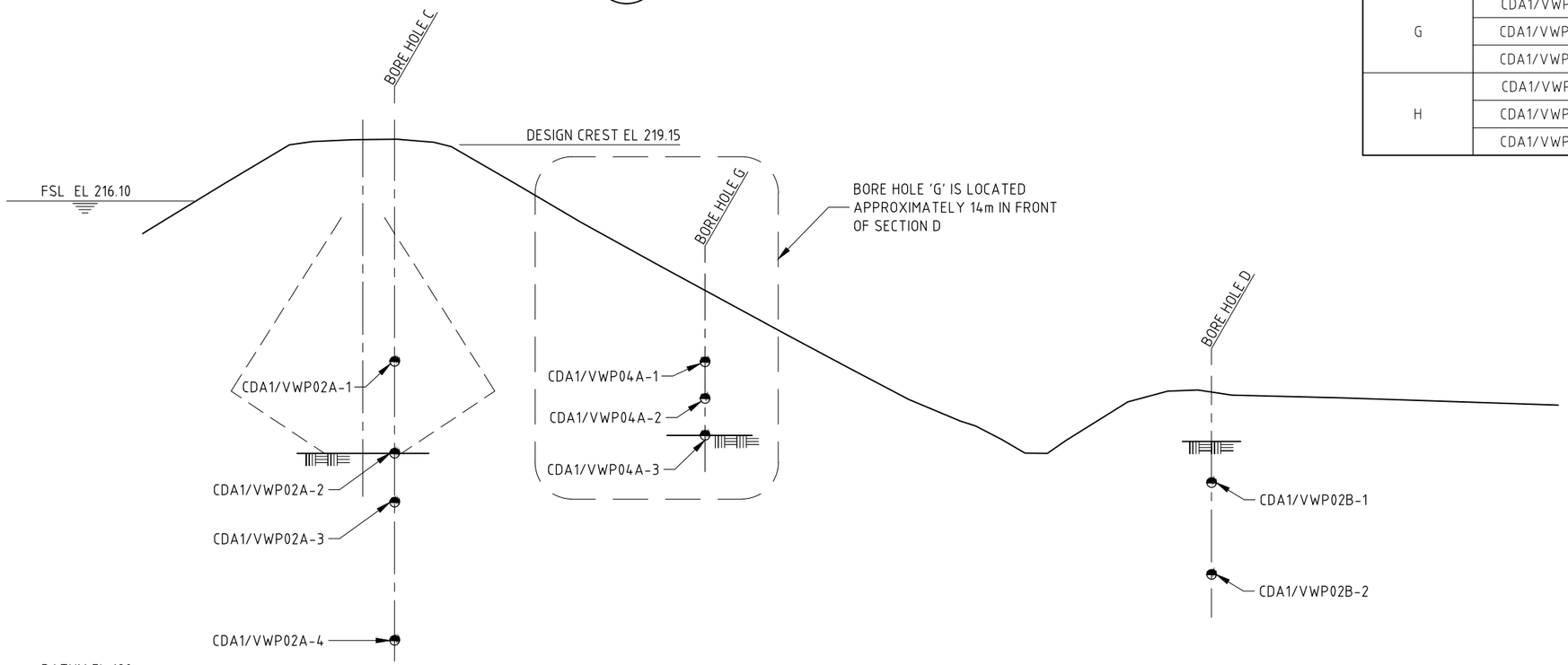


SECTION E
SCALE 1:300 SH 1



SECTION D
SCALE 1:300 SH 1

VIBRATING WIRE PIEZOMETER INSTALLATIONS

BORE HOLE INSTALLATION	INSTRUMENT No	SERIAL No	EASTING	NORTHING	SENSOR EL
A	CDA1/VWP01A-1	11-6772	8660.57	3323.94	215.19
	CDA1/VWP01A-2	11-6765			210.19
	CDA1/VWP01A-3	11-6762			206.54
	CDA1/VWP01A-4	11-6767			204.89
B	CDA1/VWP01B-1	11-6775	8633.55	3340.14	207.44
	CDA1/VWP01B-2	11-6769			202.44
C	CDA1/VWP02A-1	11-6773	7725.71	2708.42	207.35
	CDA1/VWP02A-2	11-6766			202.35
	CDA1/VWP02A-3	11-6763			199.68
	CDA1/VWP02A-4	11-6759			192.15
D	CDA1/VWP02B-1	11-6776	7682.67	2697.02	200.75
	CDA1/VWP02B-2	11-6770			195.75
E	CDA1/VWP03A-1	11-6774	7760.15	2551.71	212.78
	CDA1/VWP03A-2	11-6768			207.78
	CDA1/VWP03A-3	11-6764			204.38
	CDA1/VWP03A-4	11-6761			198.00
F	CDA1/VWP03B-1	11-6812	7728.77	2544.31	205.06
	CDA1/VWP03B-2	11-6771			200.06
G	CDA1/VWP04A-1	1301826	7706.26	2717.54	207.33
	CDA1/VWP04A-2	1301827			205.33
	CDA1/VWP04A-3	1301828			203.33
H	CDA1/VWP05A-1	1301478	7745.94	2558.28	209.93
	CDA1/VWP05A-2	1301479			208.43
	CDA1/VWP05A-3	1301825			206.43

NOTE:
1. REFER SHEET 1 FOR DETAILED NOTES.
2. ROCKLINE

REVISION					REFERENCE DRAWINGS		
28.03.18	G	PIEZOMETER AXIS DISTANCES CORRECTED (SH 1)	BT	A. BLACK			
16.11.15	F	V-NOTCH WEIRS UPDATED	MC	K. EHM			
21.08.15	E	SECTIONS C, D & E UPDATED	MC	K. EHM			
18.06.15	D	SECTIONS ADD. SHEET 2 ADD. CREST LEVEL REV	MC	K EHM			
DATE		REMARKS	CKD	PASSED			

SCALES (A3 SIZE)
0 5 10 15 METRES
1:300

DRAWN	DESIGNED
KFP	
CHECKED	CHECKED
AN	

APPROVED
K. EHM
HEADWORKS ASSESSMENT MANAGER

DAM SAFETY INVESTIGATIONS
CALLIDE DAM
INSTRUMENTATION LAYOUT

CONTRACT NUMBER

DRAWING NUMBER
102267
SHEET 2 OF 3

DATE AUG 2015

G

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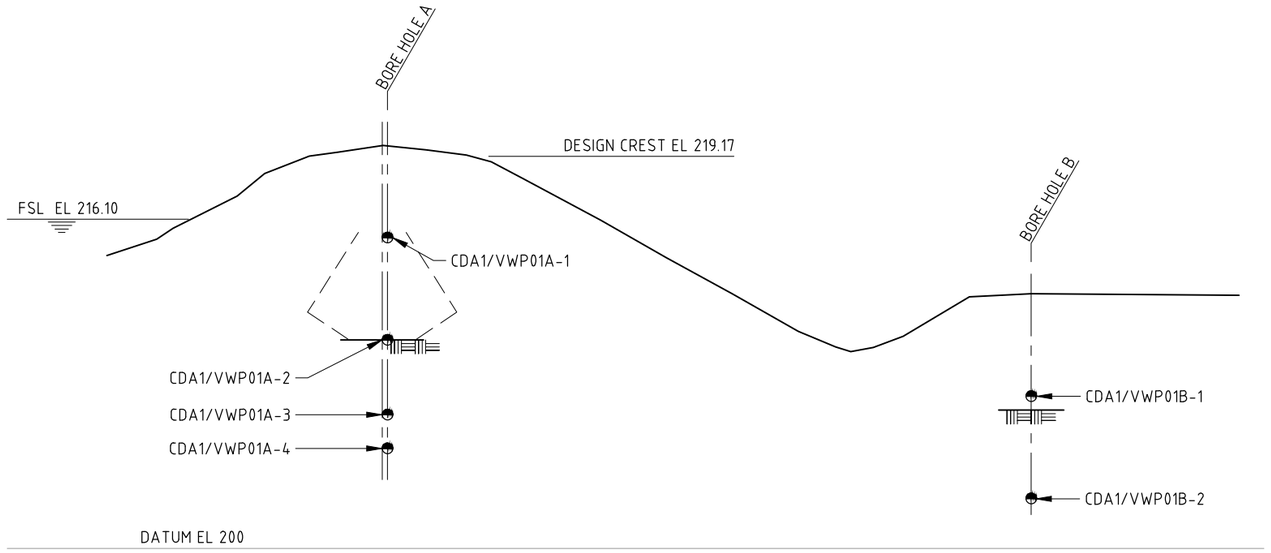

SECTION C
SCALE 1:300
SH 1

NOTE:
1. REFER SHEET 1 FOR DETAILED NOTES.
2. ROCKLINE

REVISION					
28.03.18	G	PIEZOMETER AXIS DISTANCES CORRECTED (SH 1)	BT	A. BLACK
16.11.15	F	V-NOTCH WEIRS UPDATED	MC	K. EHM
21.08.15	E	SECTIONS C, D & E UPDATED (SHEET 3 ADDED)	MC	K. EHM
DATE		REMARKS	CKD	PASSED

REFERENCE DRAWINGS

SCALES (A3 SIZE)
0 5 10 15 METRES
1:300

DRAWN KFP | DESIGNED
CHECKED AN | CHECKED
APPROVED K. EHM
HEADWORKS ASSESSMENT MANAGER

DAM SAFETY INVESTIGATIONS
CALLIDE DAM
INSTRUMENTATION LAYOUT

CONTRACT NUMBER
DRAWING NUMBER **102267**
SHEET 3 OF 3
DATE AUG 2015
G

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Appendix B2: Flood impact downstream

The following information relates to or describes downstream flood impact:

- Most crossings over Callide Creek are flooded under most considered scenarios.
- The road bridge on Dawson Highway, AMTD 69.4km on Callide Creek (north of Biloela) would not be overtopped for the case of the 'Sunny Day' failure of spillway gates. However, this bridge would be overtopped by 2.25m and 3.8m for the Sunny Day Failure (SDF) and Probable Maximum Flood (PMF) embankment failure cases.
- Other major bridges would be overtopped by a minimum of 0.5m for the 'Sunny Day' gate failure scenario and up to 5m for the 'Sunny Day' embankment failure case.
- The PMF events would cause the overtopping of all crossings over Callide, and its tributaries downstream of Callide Dam. Most bridges would be overtopped in this case by more than 3m.
- For the SDF, it would take approximately 2 hours until the level of the water would begin to rise at Biloela. The time to water rise increases up to 12 hours at locations further downstream. For locations further downstream, the time to water rise increases is up to 12 hours
- For the PMF failure, the time until the level of Callide Creek begins to rise significantly is one hour or less. The calculated time does not vary significantly along the main stream due to the flow contribution from tributaries.
- The time to peak flood levels along the main stream varies between approximately four hours to 29 hours for the SDF of the embankment and between 6.5 hours to 19.5 hours for the PMF cases.
- The time available for evacuation at Biloela is just under four hours. This does not provide sufficient warning time to evacuate the Population at Risk (PAR) in Biloela.
- The time to peak flood levels is more than 12 hours at both Jambin and Goovigen. This is considered to provide sufficient time to evacuate.
- According to the ANCOLD guidelines, the Acceptable Flood Capacity (AFC) fallback alternative for a 'High A' Incremental Flood Hazard Category (IFHC) dam is the PMF.

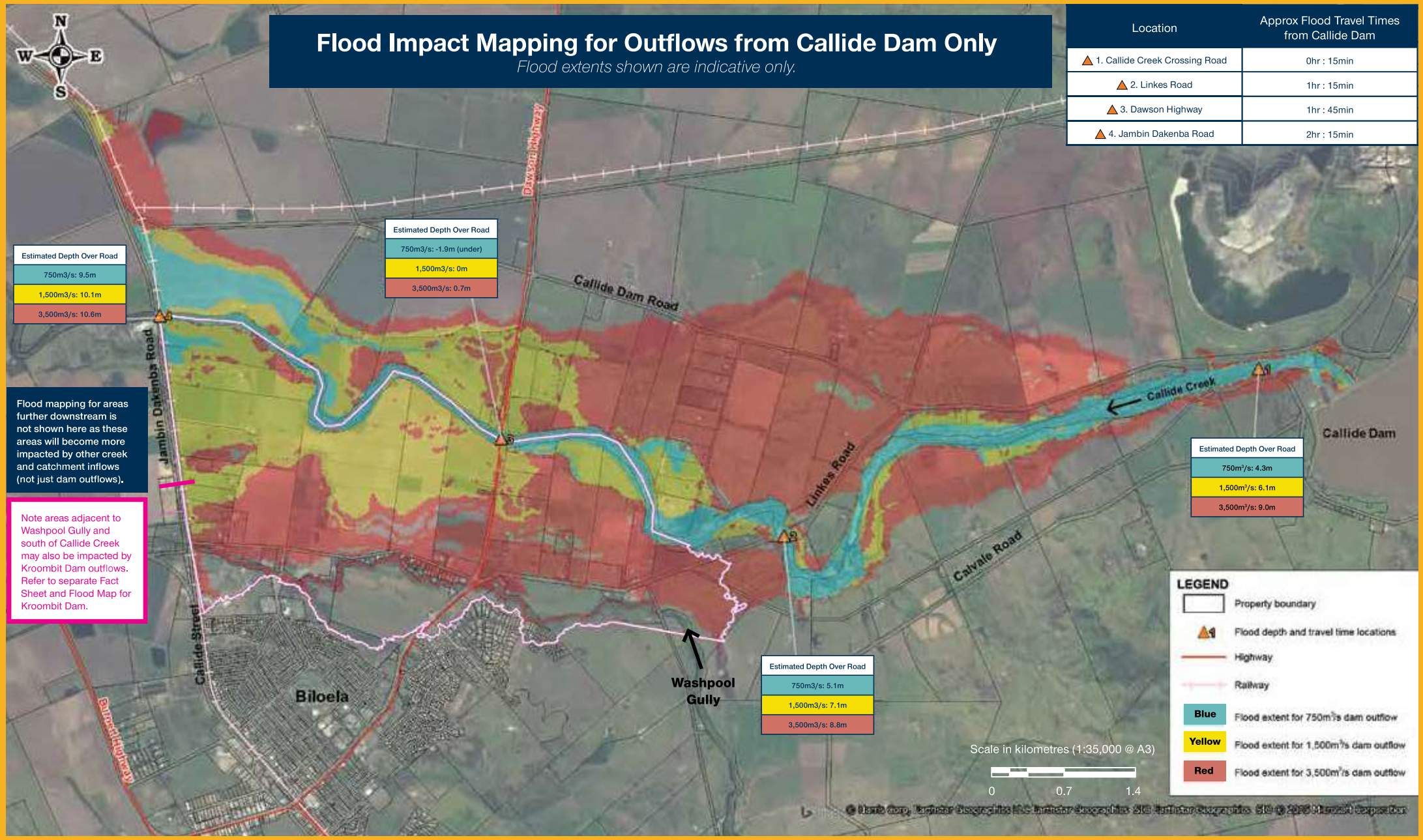
Flood Impact Mapping

The next page indicates Flood Impact Mapping for outflows from Callide Dam.

Flood Impact Mapping for Outflows from Callide Dam Only

Flood extents shown are indicative only.

Location	Approx Flood Travel Times from Callide Dam
1. Callide Creek Crossing Road	0hr : 15min
2. Linkes Road	1hr : 15min
3. Dawson Highway	1hr : 45min
4. Jambin Dakenba Road	2hr : 15min



Note:

1. Areas further downstream will progressively become more impacted by other rainfall and inflows that occur downstream of the dam (not shown here).
2. Areas adjacent to Washpool Gully may also be impacted by flows from Kroombit Creek and Kroombit Dam outflows. Refer to separate Fact Sheet and Flood Map for Kroombit Dam.
3. Flood Travel Times are indicative times for flow to reach the downstream locations as shown, following outflow from the dam. The time for peak flows to occur will typically take longer following commencement of dam outflows.
4. Depth at locations as shown as indicative depths over (or under) existing road crossings.
5. Maximum historical dam outflow is approximately 3,500 m3/s, which excludes Washpool Gully flows (refer Note 2). Higher dam outflows than this are possible.

Appendix B3: Inundation maps

The following maps have been produced from the Callide dam Failure Impact Assessment 2018 (reference S)

Drawings:

1. Keymap
2. Sunny Day Failure
3. Dam Crest Flood
4. Probable Maximum Flood

Disclaimer: Every effort has been made to ensure the currency of the flood inundation maps reproduced in this EAP.

Document: S:\BW_Water\Resources\GIS_Data\SW_Callide Valley WSS\CallideDam_EAP2022\Drawings\ArcMap\250794-D.mxd
Printed: Friday, 28/10/2022 06:58:07 AM

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

200,000 220,000 240,000 260,000 280,000

7,320,000 7,300,000 7,280,000

RANNES
GOOVIGEN
JAMBIN
CALLIDE
BILOELA
BANANA
THANGOOL

SHEET 6 OF 6 (PMF)
SHEET 4 OF 4 (SDF & DCF)
SHEET 5 OF 6 (PMF)
SHEET 3 OF 4 (SDF & DCF)
SHEET 4 OF 6 (PMF)
SHEET 2 OF 4 (SDF & DCF)
SHEET 3 OF 6 (PMF)
SHEET 1 OF 4 (SDF & DCF)
SHEET 2 OF 6 (PMF)
SHEET 1 OF 6 (PMF)

BURNETT HIGHWAY
DAWSON HIGHWAY
LEICHHARDT HIGHWAY

BANANA SHIRE COUNCIL
GLADSTONE REGIONAL COUNCIL
NORTH BURNETT REGIONAL COUNCIL

Spring Creek, Garden Creek, Dee River, Eight Mile Creek, Harris Creek, Don River, Cooper Downs Creek, Woolein Creek, Six Mile Creek, Wandoo Creek, Police Camp Creek, Banana Creek, Four Mile Creek, Station Creek, Sandy Creek, Camp Creek, Gerard Creek, Smoky Creek, Back Creek, Redshirt Creek, Alma Creek, Calliope River, Zig Zag Creek, Running Creek, Doubtful Creek, Lost Spring Creek, Toms Creek, Bell Creek, Maxwelton Creek, Rocky Creek, Rainbow Creek, Fanes Creek, Fannys Creek, Malakoff Creek, Stag Creek, Oaky Creek, Collins Creek, Neville Creek, Callide Creek, Sellheim Creek, Orange Creek, Crimean Creek, Kroombit Gully, Dry Creek, Kroombit Creek, Grevillea Creek, Kariboe Creek, Prospect Creek, Prairie Creek, Clinker Creek, Scoria Creek, North Kariboe Creek, South Kariboe Creek

Stag Creek Weir
STAG CREEK PIPELINE
Callide Creek Weir
CALLIDE DAM
KROOMBIT DAM

LEGEND
- Settlements
- Major Road
- Secondary Road
- Qld Rail Network
- Major Watercourse
- Minor Watercourse
- Built Up Areas
- Qld Local Government Area
- Maximum Flood Event
- Sunwater Pipeline

Sunwater Storage Infrastructure
- Dam
- Weir
- Dam Ponded Area

REVISION					
28/10/22	D	LOCAL GOVERNMENT AREA BOUNDARY	LH	MGH	
25/10/22	C	UPDATED TO 2022 FORMAT	LH	MGH	
06/03/19	B	MAJOR ROADS, SCALE	IDH	MGH	
03/12/18	A	ISSUED FOR USE	IDH	MGH	
DATE		REMARKS	CKD	PSD	

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

REFERENCE DRAWINGS
250795 - Sunny Day Failure
250796 - Dam Crest Flood
250797 - Probable Maximum Flood

SCALES (A3 SIZE)
0 2.5 5 7.5 10 12.5 km
1:250,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	MGH
APPROVED	
M.G. HUGHES 3/12/2018	
RPEQ: 18351	

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
INUNDATION PLANS
KEYMAP

CONTRACT NUMBER

DRAWING NUMBER	REV.
250794	D

SHEET 1 OF 1

DATE SEPTEMBER 2018

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Printed: Tuesday, 25/10/2022 10:23:49 AM

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

246,000 248,000 250,000 252,000 254,000 256,000 258,000 260,000 262,000

7,308,000 7,306,000 7,304,000 7,302,000 7,300,000 7,298,000

Oaky Creek
GREVELLS ROAD
DUDARKOS ROAD
DAWSON HIGHWAY
JAMBIN DAKENBA ROAD
SHEPHERDSONS ROAD
SHORTS ROAD
IAN MCCAULEY WAY
COAL ROAD
BILOELA CALLIDE ROAD
COCUPS ROAD
CALLIDE CREEK
Callide Creek
LAKE CALLIDE DRIVE
MUIRS ROAD
LINKES ROAD
CALVALE ROAD
TOGNOLINI BALDWIN ROAD
PAINES ROAD
TAN DRIVE
ROAD
BURNETT HIGHWAY
QUARRIE ROAD
DUNN STREET
TIAMBY STREET
STATE FARM ROAD
RAINBOW STREET
BELL STREET
KARIBOE STREET
CALLIDE STREET
GLADSTONE ROAD
BAILEYS LANE
MEISSNERS ROAD
PEAKES HUNGERFORD ROAD
VALENTINE PLAINS ROAD
KROOMBIT CREEK

Dakenba

Lake Callide
CALLIDE DAM

62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 46 47

LEGEND
- AMTD (Markers)
- Major Road
- Secondary Road
- Qld Rail Network
- Cadastral Lot Boundary

Flood Modelling
- PAR - Dam Failure
- Modelling Limits
- Sunny Day Failure

Sunwater Storages
- Dam
- Weir
- Callide Dam FSL

REVISION					
25/10/22	B	UPDATED TO 2022 FORMAT	LH	MGH	
03/12/18	A	ISSUED FOR USE	IDH	MGH	
DATE		REMARKS	CKD	PSD	

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

REFERENCE DRAWINGS
250794 - Keymap

SCALES (A3 SIZE)
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1:50,000

DRAWN IDH | DESIGNED
CHECKED | CHECKED MGH
APPROVED M.G. HUGHES 3/12/2018 RPEQ: 18351

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
SUNNY DAY FAILURE
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER 250795 | REV. B
SHEET 1 OF 4
DATE SEPTEMBER 2018

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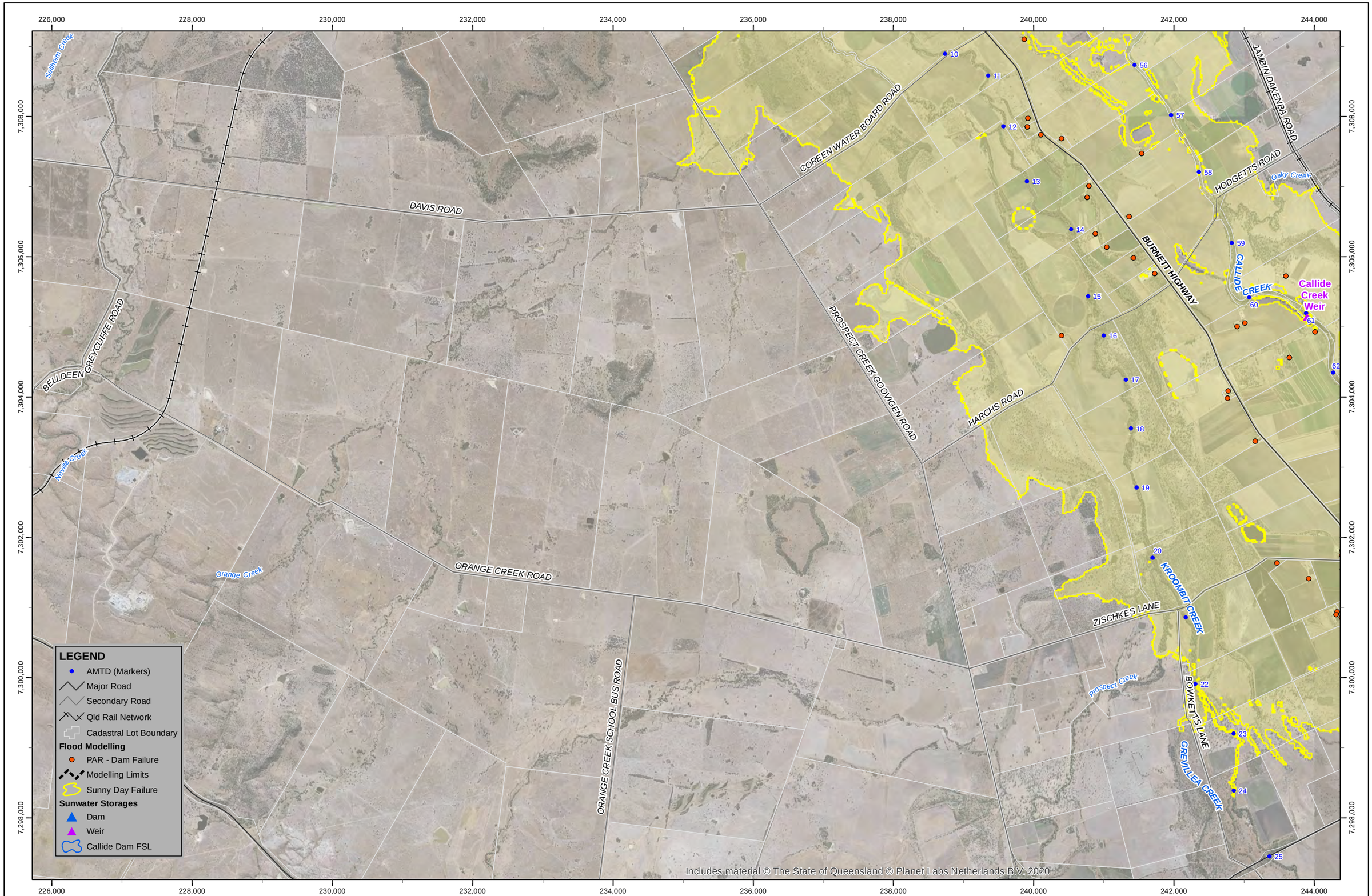
MAP PRODUCED BY:
WATER RESOURCES AND DAM SAFETY
TEL: (07) 3120 0000



REVISION					
25/10/22	B	UPDATED TO 2022 FORMAT	LH	MGH
03/12/18	A	ISSUED FOR USE	IDH	MGH
DATE		REMARKS	CKD	PSD

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

REFERENCE DRAWINGS
250794 - Keymap

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

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	MGH

APPROVED
M.G. HUGHES
3/12/2018
RPEQ: 18351

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
SUNNY DAY FAILURE
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
250795	B

SHEET 2 OF 4
DATE SEPTEMBER 2018

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

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COWANS LANE
MELCERS ROAD
LEIGHTONS ROAD
PROSPECT CREEK GOOVIGEN ROAD
BONGERS LANE
EARLSFIELD ROAD
EARLSFIELD PIT ROAD
JAMBIN DAKENBA ROAD
ARGOON KILBURNIE ROAD
MALLINSONS ROAD
MCCAINS ROAD
BURNETT HIGHWAY
KROOMBIT CREEK
Argoon
ARGOON ROAD
Callide Creek (Old Channel)
BLACKS ROAD
CALLIDE CREEK
CALLIDE KILBURNIE ROAD
CALLIDE HIGHWAY ROAD
PEACOCKS LANE
REIMERS ROAD
Collins Creek
Neville Creek
DEEN GREYCLIFFE ROAD

40 41 42 43 0 44 1 45 46 2 47 3 48 4 49 5 50 6 51 52 53 7 54 8 55 9

LEGEND
- AMTD (Markers)
- Major Road
- Secondary Road
- Qld Rail Network
- Cadastral Lot Boundary

Flood Modelling
- PAR - Dam Failure
- Modelling Limits
- Sunny Day Failure

Sunwater Storages
- Dam
- Weir
- Callide Dam FSL

REVISION					
25/10/22	B	UPDATED TO 2022 FORMAT	LH	MGH
03/12/18	A	ISSUED FOR USE	IDH	MGH
DATE		REMARKS	CKD	PSD

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

REFERENCE DRAWINGS
250794 - Keymap

SCALES (A3 SIZE)
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1:50,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	MGH
APPROVED	
M.G. HUGHES 3/12/2018	
RPEQ: 18351	

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
SUNNY DAY FAILURE
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER 250795
REV. B
SHEET 3 OF 4
DATE SEPTEMBER 2018

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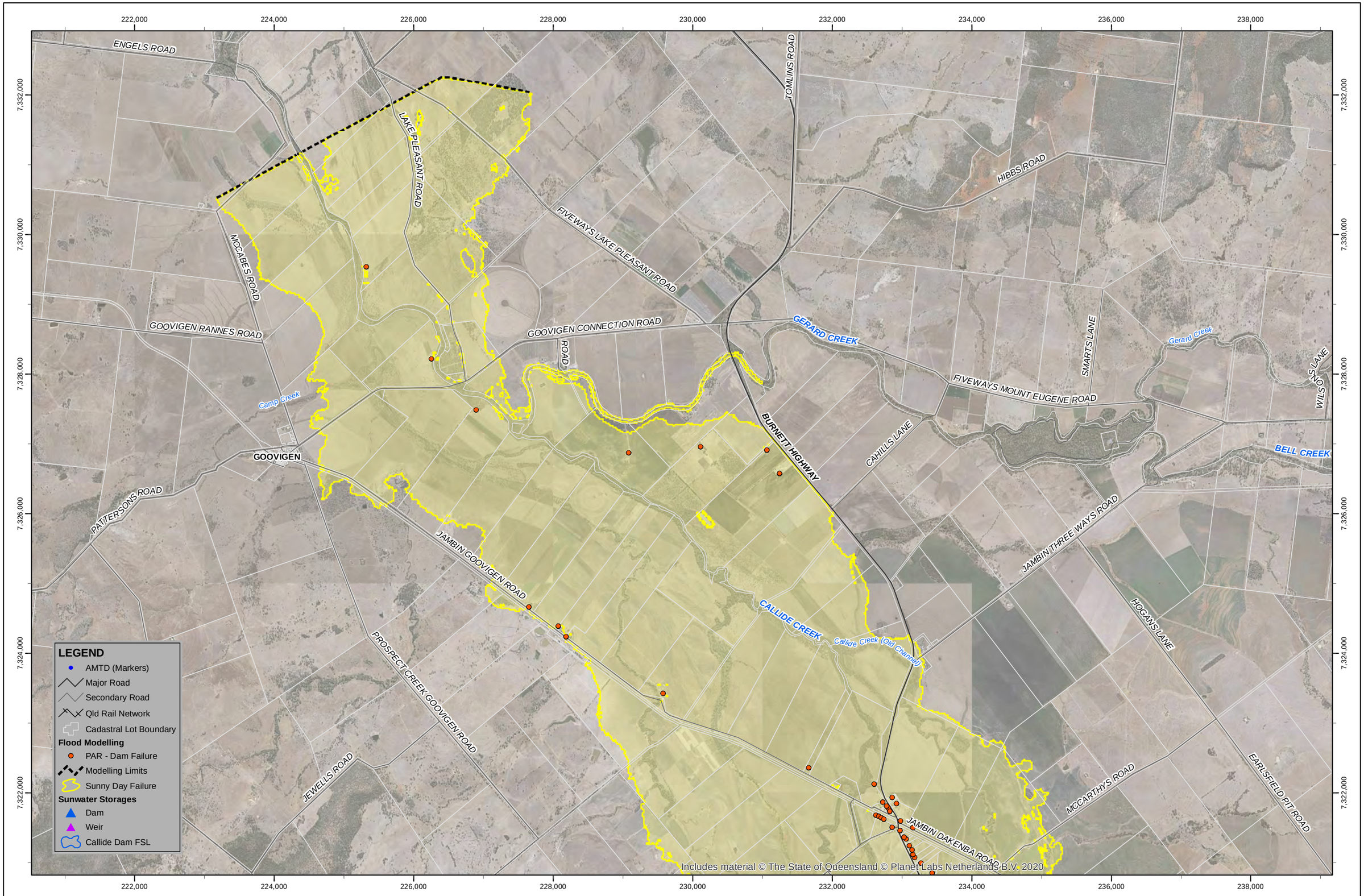

REVISION					
DATE		REMARKS	CKD	PSD	
25/10/22	B	UPDATED TO 2022 FORMAT	LH	MGH	
03/12/18	A	ISSUED FOR USE	IDH	MGH	

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

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DESIGNED	
CHECKED	
CHECKED	MGH
APPROVED	M.G. HUGHES 3/12/2018
RPEQ: 18351	

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
SUNNY DAY FAILURE
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER 250795
REV. B
SHEET 4 OF 4
DATE SEPTEMBER 2018

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7,308,000 7,306,000 7,304,000 7,302,000 7,300,000 7,298,000

Oaky Creek
GREVELLS ROAD
DUDARKOS ROAD
DAWSON HIGHWAY
SHORTS ROAD
IAN MCCAULEY WAY
JAMBIN DAKENBA ROAD
SHEPHERDSONS ROAD
Dakenba
BILOELA CALLIDE ROAD
CALLIDE CREEK
GOCUPS ROAD
CALLIDE DAM
LAKE CALLIDE DRIVE
Callide Creek
MUIRS ROAD
LINKES ROAD
CALVALE ROAD
TOGNOLINI BALDWIN ROAD
PAINES ROAD
TAN DRIVE
ROAD
BURNETT HIGHWAY
QUARRIE ROAD
DUNN STREET
TIAMO STREET
STATE FARM ROAD
RAINBOW STREET
BELL STREET
KARIBOE STREET
CALLIDE STREET
GLADSTONE ROAD
BAILEYS LANE
MEISSNERS ROAD
PEAKES HUNGERFORD ROAD
VALENTINE PLAINS ROAD
KROOMBIT CREEK

62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 88 46 47 48 49 50

LEGEND

- AMTD (Markers)
- Major Road
- Secondary Road
- Qld Rail Network
- Cadastral Lot Boundary

Flood Modelling

- PAR - No Dam Failure
- Additional PAR - Dam Failure
- Modelling Limits
- DCF - No Dam Failure
- DCF - Dam Failure

Sunwater Storages

- Dam
- Weir
- Dam Full Supply Level

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

REVISION					
25/10/22	B	UPDATED TO 2022 FORMAT	LH	MGH
03/12/18	A	ISSUED FOR USE	IDH	MGH
DATE		REMARKS	CKD	PSD

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M.G. HUGHES
3/12/2018
RPEQ: 18351

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
DAM CREST FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
250796	B

SHEET 1 OF 4
DATE NOVEMBER 2018

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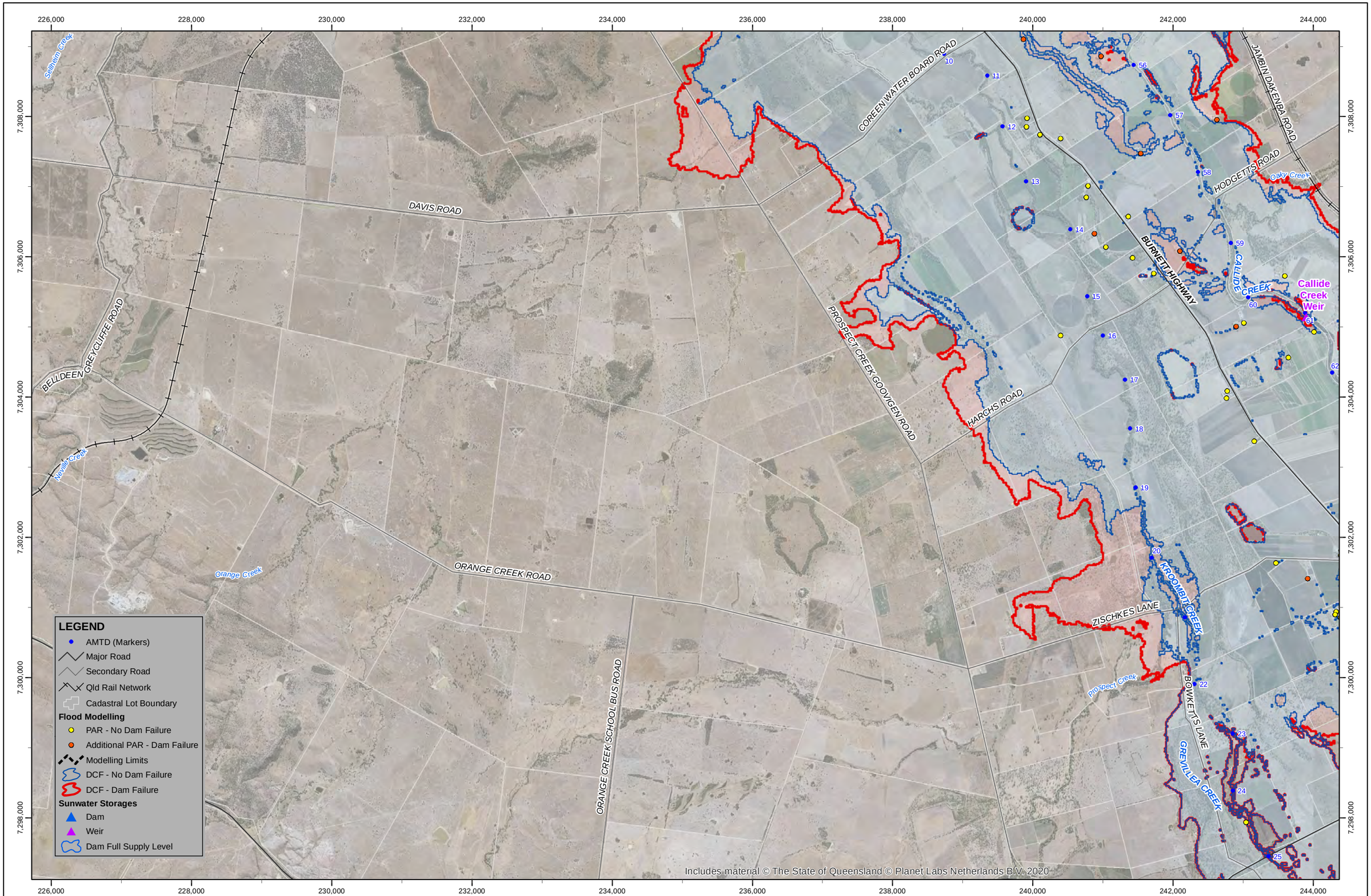

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CALLIDE DAM
DAM BREAK ANALYSIS 2017
DAM CREST FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
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SHEET 2 OF 4
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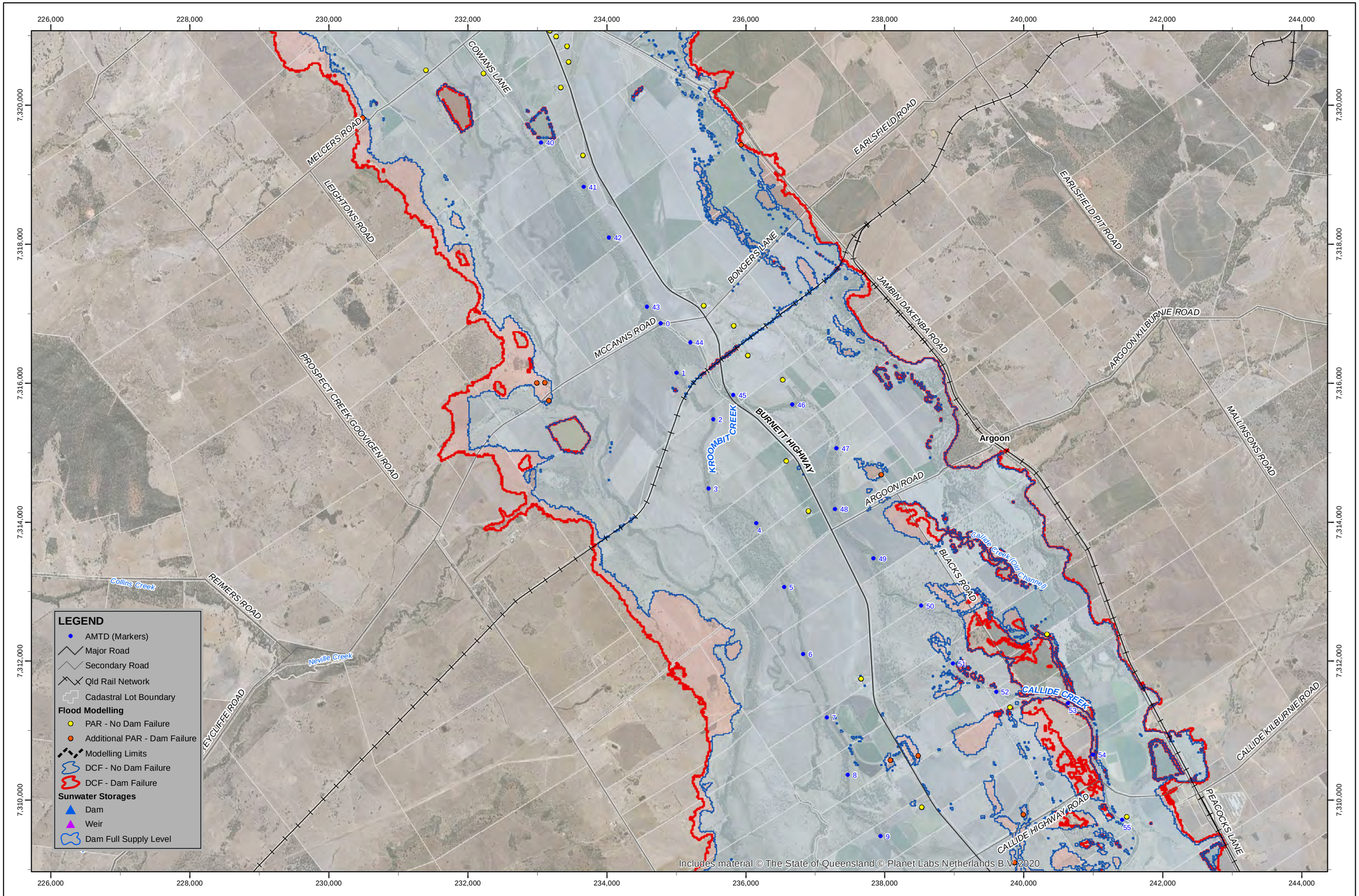

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APPROVED	
M.G. HUGHES 3/12/2018	
RPEQ: 18351	

sunwater
©SUNWATER LIMITED
ACN 131 034 985

CALLIDE DAM
DAM BREAK ANALYSIS 2017
DAM CREST FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER 250796
REV. B
SHEET 3 OF 4
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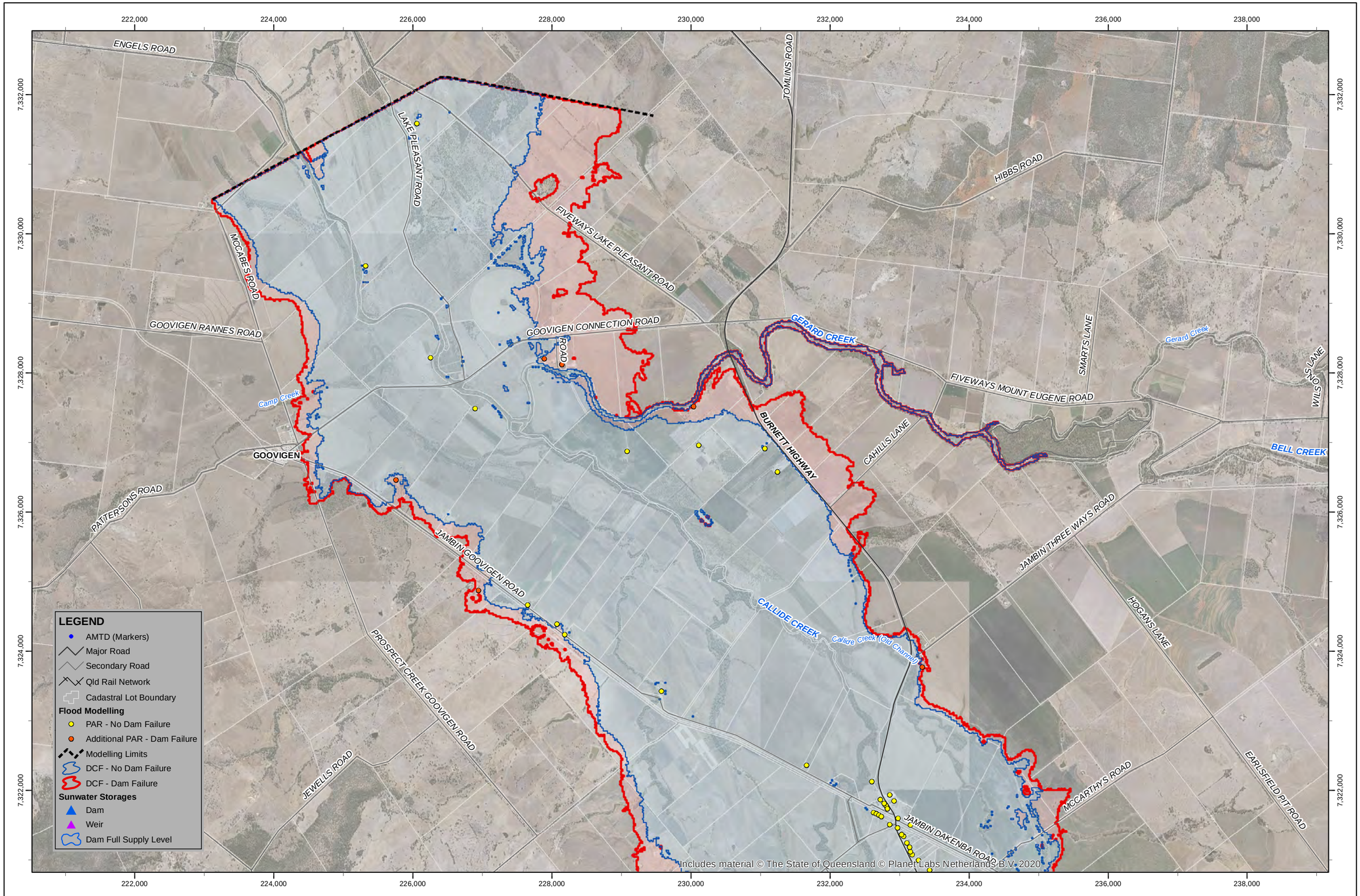
Tel: (07) 3120 0000



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03/12/18	A	ISSUED FOR USE	IDH	MGH
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APPROVED	
M.G. HUGHES 3/12/2018	
RPEQ: 18351	

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CALLIDE DAM
DAM BREAK ANALYSIS 2017
DAM CREST FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER 250796 | REV. B

SHEET 4 OF 4

DATE NOVEMBER 2018

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Tel: (07) 3120 0000

246,000 248,000 250,000 252,000 254,000 256,000 258,000 260,000 262,000

7,296,000 7,294,000 7,292,000 7,290,000 7,288,000 7,286,000

SARAS LANE
VALENTINE PLAINS ROAD
VAN ITALLIES ROAD
KROOMBIT CREEK
SCHLOSS ROAD
EICHMANNS ROAD
MULLERS ROAD
COX MILLARD ROAD
Grevillea Creek
GREVILLEA CREEK
MULLERS LANE
MEISSNERS ROAD
SEMPLES ROAD
HINTONS LANE
BLANCHS ROAD
Clinker Creek
THANGOOL
AERODROME ROAD
KARIBOE CREEK
RUSSIAN CLUB ROAD
DRUMBURLE ROAD
MAGGACISIS ROAD
RUSSELLS LANE
THANGOOL LOOKERBIE ROAD
TOLLEMACHES ROAD
BURNETT HIGHWAY
BLACKS ROAD
DIMITRIEFFS LANE
KIRKWOODS LANE
RED HILL ROAD
MCLAUGHLINS ROAD
Scotia Creek

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 47

LEGEND

- AMTD (Markers)
- Major Road
- Secondary Road
- Qld Rail Network
- Cadastral Lot Boundary

Flood Modelling

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

Sunwater Storages

- Dam
- Weir
- Dam Full Supply Level

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APPROVED M.G. HUGHES 3/12/2018 RPEQ: 18351

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
PROBABLE MAXIMUM FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER 250797 | REV. B
SHEET 1 OF 6
DATE NOVEMBER 2018

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CALLIDE DAM
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PROBABLE MAXIMUM FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER 250797	REV. B
SHEET 2 OF 6	
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7,308,000 7,306,000 7,304,000 7,302,000 7,300,000 7,298,000

Oaky Creek
GREVELLS ROAD
DUDARKOS ROAD
DAWSON HIGHWAY
IAN MCCAULEY WAY
JAMBIN DAKENBA ROAD
SHEPHERDSONS ROAD
SHORTS ROAD
BILLOELA CALLIDE ROAD
COCUPS ROAD
CALLIDE CREEK
Callide Creek
CALLIDE DAM
LAKE CALLIDE DRIVE
Dakenba
MUIRS ROAD
LINKES ROAD
CALVALE ROAD
PAINES ROAD
TOGNOLINI BALDWIN ROAD
TAN DRIVE
ROAD
BURNETT HIGHWAY
QUARRIE ROAD
DUNN STREET
TIAMBY STREET
STATE FARM ROAD
RAINBOW STREET
BELL STREET
KARIBOE STREET
CALLIDE STREET
GLADSTONE ROAD
BAILEYS LANE
MEISSNERS ROAD
PEAKES HUNGERFORD ROAD
VALENTINE PLAINS ROAD
KROOMBIT CREEK

62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 88 46 47 48 49 50

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CHECKED	CHECKED
	MGH

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M.G. HUGHES
3/12/2018
RPEQ: 18351

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CALLIDE DAM
DAM BREAK ANALYSIS 2017
PROBABLE MAXIMUM FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
250797	B

SHEET 3 OF 6
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226,000 228,000 230,000 232,000 234,000 236,000 238,000 240,000 242,000 244,000

7,308,000 7,306,000 7,304,000 7,302,000 7,300,000 7,298,000

Sellheim Creek
DAVIS ROAD
BELLDEEN GREYCLIFFE ROAD
Neville Creek
Orange Creek
ORANGE CREEK ROAD
ORANGE CREEK SCHOOL BUS ROAD
COREEN WATER BOARD ROAD
PROSPECT CREEK GOOVIGEN ROAD
HARCHS ROAD
BURNETT HIGHWAY
HODGETTS ROAD
JAMBIN DAKENBA ROAD
Oaky Creek
CALLIDE CREEK
Callide Creek Weir
ZISCHKES LANE
KROOMBIT CREEK
Prospect Creek
BOWKETTS LANE
GREVILLEA CREEK

10 11 12 13 14 15 16 17 18 19 20 22 23 24 25 56 57 58 59 60 61 62

LEGEND

- AMTD (Markers)
- Major Road
- Secondary Road
- Qld Rail Network
- Cadastral Lot Boundary

Flood Modelling

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

Sunwater Storages

- Dam
- Weir
- Dam Full Supply Level

REVISION					
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DATE		REMARKS	CKD	PSD	

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	MGH

APPROVED
M.G. HUGHES
3/12/2018
RPEQ: 18351

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
PROBABLE MAXIMUM FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
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SHEET 4 OF 6

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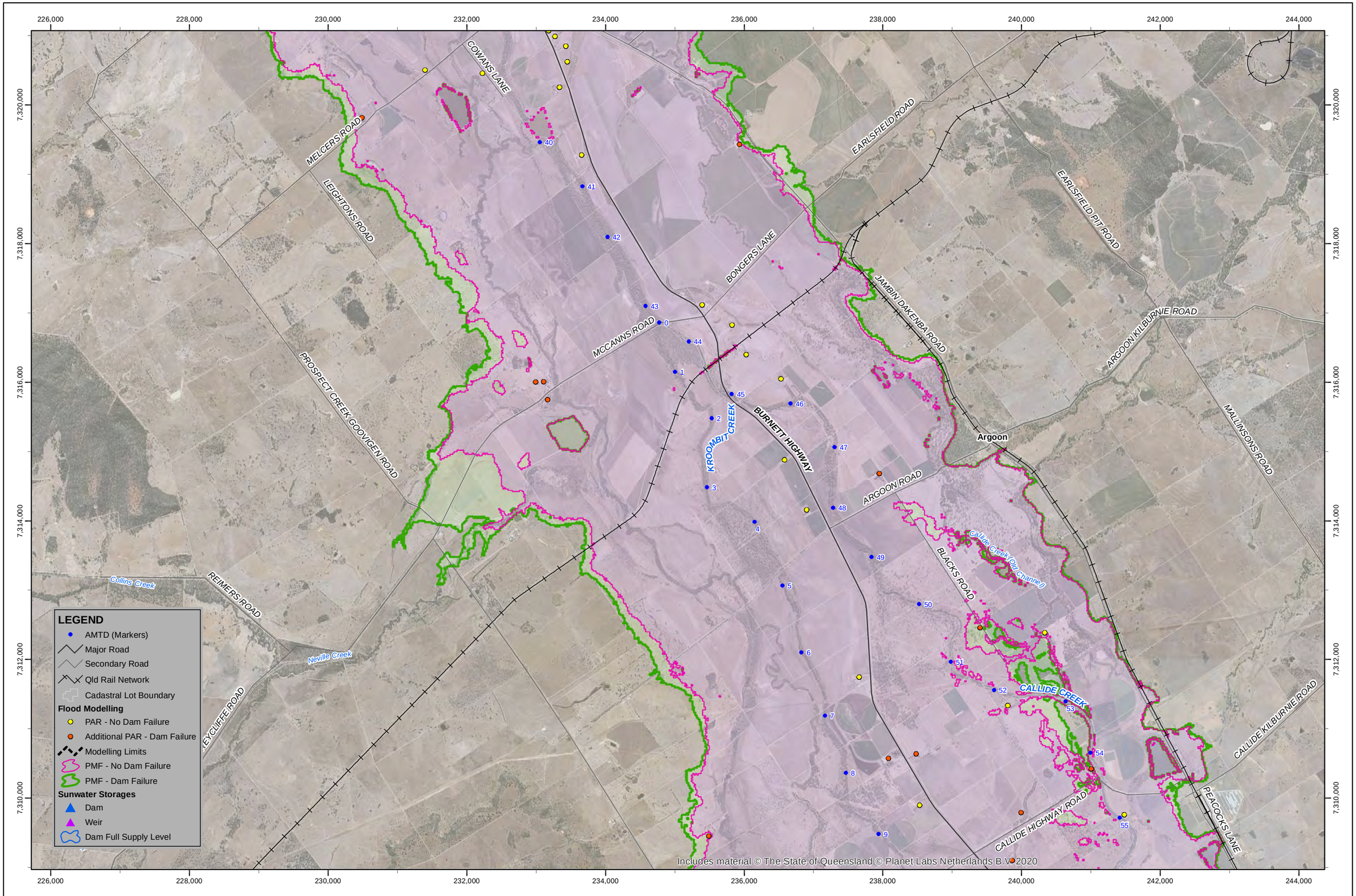

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SCALES (A3 SIZE)
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APPROVED	
M.G. HUGHES 3/12/2018	RPEQ: 18351

sunwater

CALLIDE DAM
DAM BREAK ANALYSIS 2017
PROBABLE MAXIMUM FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
250797	B

SHEET 5 OF 6

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Tel: (07) 3120 0000

222,000 224,000 226,000 228,000 230,000 232,000 234,000 236,000 238,000

7,332,000 7,330,000 7,328,000 7,326,000 7,324,000 7,322,000

ENGELS ROAD
FIVEWAYS LAKE PLEASANT ROAD
LAKE PLEASANT ROAD
MCCABES ROAD
TOMLINS ROAD
HIBBS ROAD
GOOVIGEN RANNES ROAD
GOOVIGEN CONNECTION ROAD
ROAD
GERARD CREEK
Gerard Creek
SMARTS LANE
FIVEWAYS MOUNT EUGENE ROAD
WILSONS LANE
Camp Creek
BURNETT HIGHWAY
CAHILLS LANE
BELL CREEK
PATTERSONS ROAD
JAMBIN GOOVIGEN ROAD
JAMBIN THREE WAYS ROAD
HOGANS LANE
CALLIDE CREEK
Callide Creek (Old Channel)
PROSPECT CREEK GOOVIGEN ROAD
JEWELLS ROAD
MCCARTHYS ROAD
EARLSFIELD PIT ROAD
JAMBIN DAKENBA ROAD

LEGEND
- AMTD (Markers)
- Major Road
- Secondary Road
- Qld Rail Network
- Cadastral Lot Boundary

Flood Modelling
- PAR - No Dam Failure
- Additional PAR - Dam Failure
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- PMF - No Dam Failure
- PMF - Dam Failure

Sunwater Storages
- Dam
- Weir
- Dam Full Supply Level

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CALLIDE DAM
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PROBABLE MAXIMUM FLOOD
SPILLWAY EMBANKMENT
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
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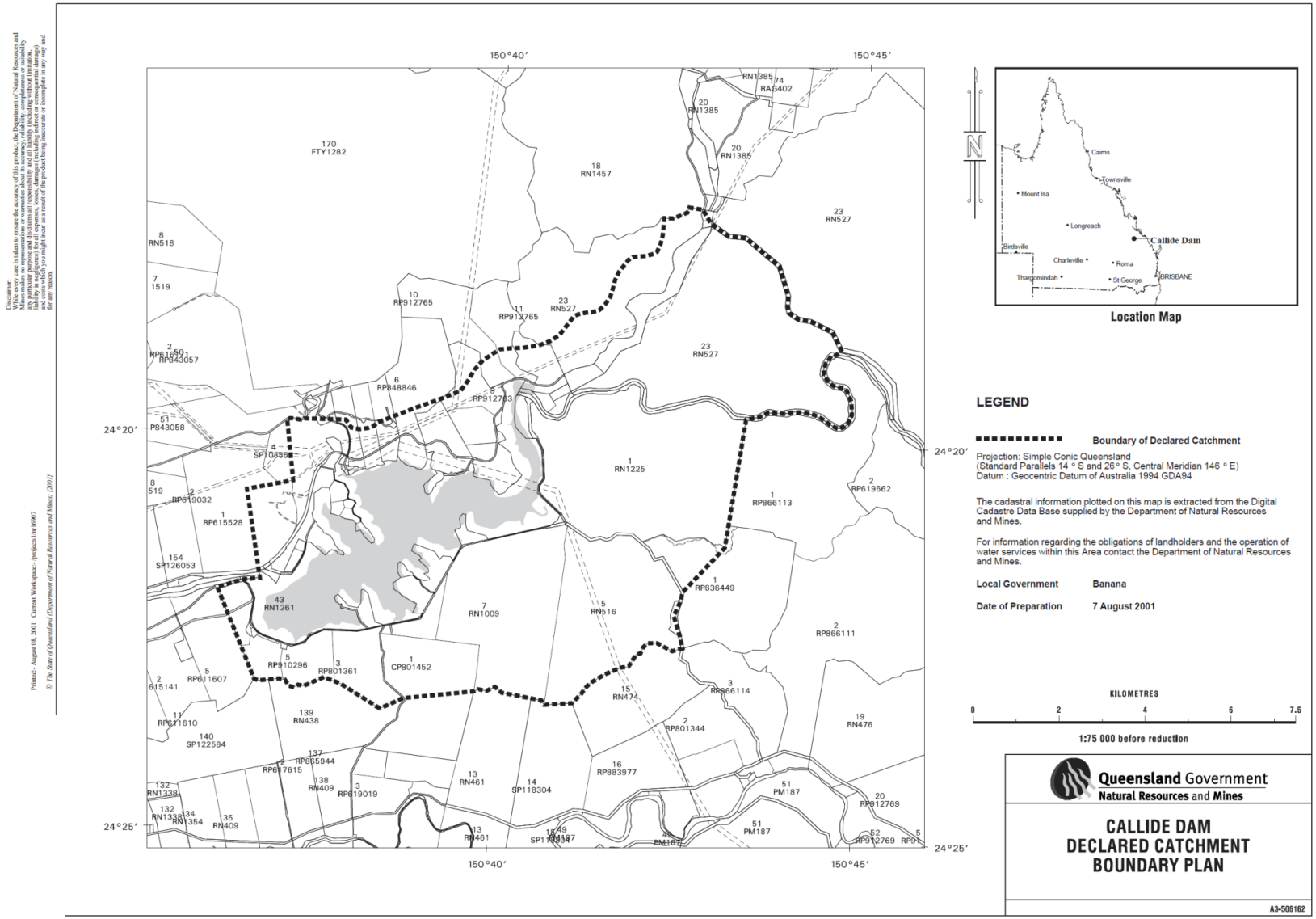
SHEET 6 OF 6

DATE NOVEMBER 2018

Appendix B4: Catchment area

Figure B1: Callide Dam declared catchment boundary plan

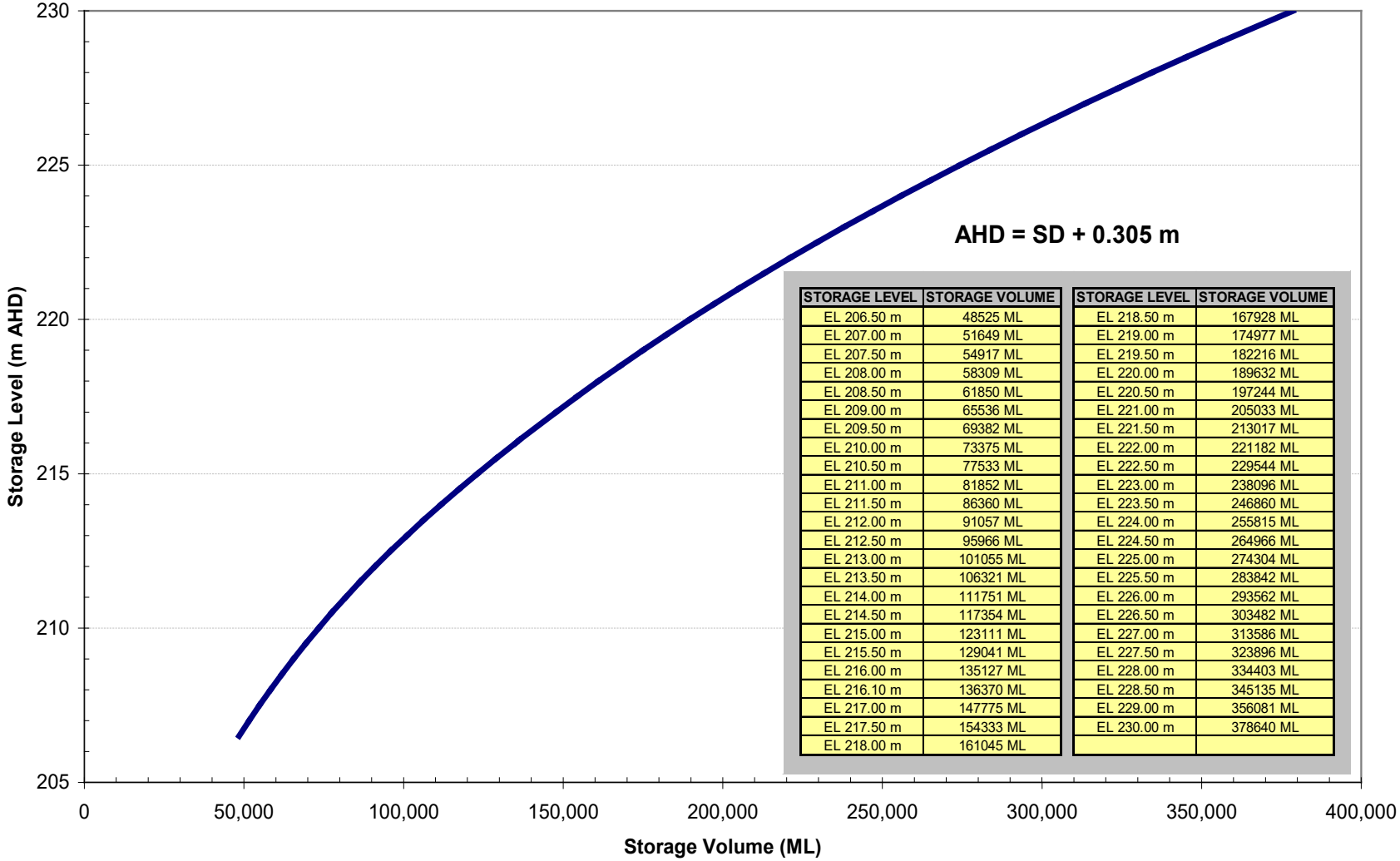


APPENDIX C Equipment and technical information

Appendix C1 has been redacted

Appendix C2: Callide Dam storage curve I

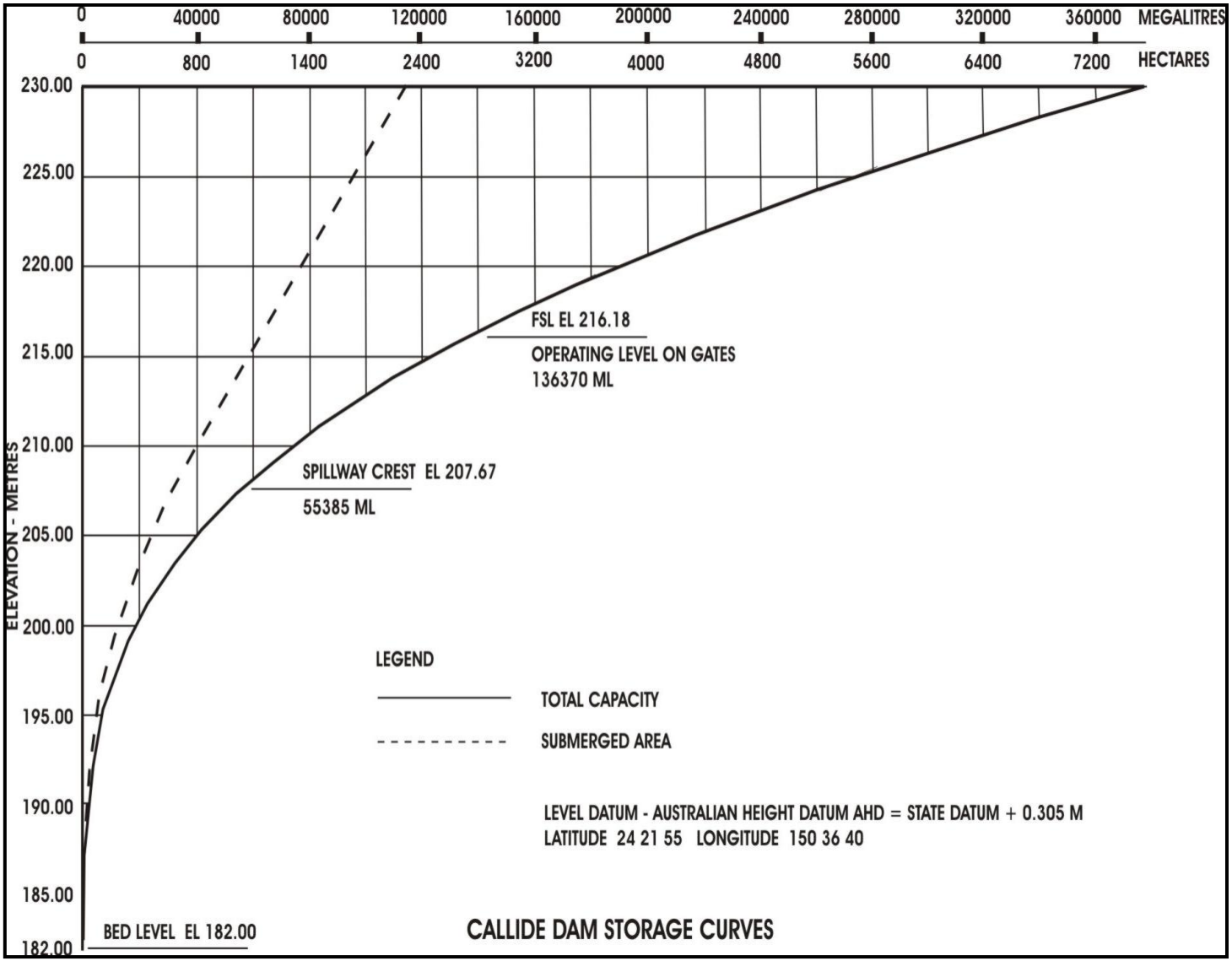
Figure C1: Callide Dam storage curve I



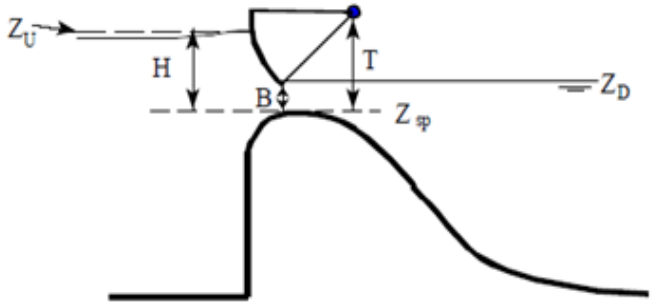
STORAGE LEVEL	STORAGE VOLUME	STORAGE LEVEL	STORAGE VOLUME
EL 206.50 m	48525 ML	EL 218.50 m	167928 ML
EL 207.00 m	51649 ML	EL 219.00 m	174977 ML
EL 207.50 m	54917 ML	EL 219.50 m	182216 ML
EL 208.00 m	58309 ML	EL 220.00 m	189632 ML
EL 208.50 m	61850 ML	EL 220.50 m	197244 ML
EL 209.00 m	65536 ML	EL 221.00 m	205033 ML
EL 209.50 m	69382 ML	EL 221.50 m	213017 ML
EL 210.00 m	73375 ML	EL 222.00 m	221182 ML
EL 210.50 m	77533 ML	EL 222.50 m	229544 ML
EL 211.00 m	81852 ML	EL 223.00 m	238096 ML
EL 211.50 m	86360 ML	EL 223.50 m	246860 ML
EL 212.00 m	91057 ML	EL 224.00 m	255815 ML
EL 212.50 m	95966 ML	EL 224.50 m	264966 ML
EL 213.00 m	101055 ML	EL 225.00 m	274304 ML
EL 213.50 m	106321 ML	EL 225.50 m	283842 ML
EL 214.00 m	111751 ML	EL 226.00 m	293562 ML
EL 214.50 m	117354 ML	EL 226.50 m	303482 ML
EL 215.00 m	123111 ML	EL 227.00 m	313586 ML
EL 215.50 m	129041 ML	EL 227.50 m	323896 ML
EL 216.00 m	135127 ML	EL 228.00 m	334403 ML
EL 216.10 m	136370 ML	EL 228.50 m	345135 ML
EL 217.00 m	147775 ML	EL 229.00 m	356081 ML
EL 217.50 m	154333 ML	EL 230.00 m	378640 ML
EL 218.00 m	161045 ML		

Appendix C3: Callide Dam storage curve II

Figure C2: Callide Dam storage curve II



Appendix C4: Gate discharge calculation



Example Radial Gate with an Ogee Spillway Crest

The flow through the gate is considered to be "Free Flow" when the downstream tailwater elevation (Z_D) is not high enough to cause an increase in the upstream headwater elevation for a given flow rate. The equation used for a Radial gate under free flow conditions is as follows:

$$Q = C\sqrt{2g}\, W\, T^{TE}\, B^{BE}\, H^{HE}$$

Where: Q = Flow rate in cfs
C = Discharge coefficient (typically ranges from 0.6 - 0.8)
W = Width of the gated spillway in feet
T = Trunnion height (from spillway crest to trunnion pivot point)
TE = Trunnion height exponent, typically about 0.16 (default 0.0)
B = Height of gate opening in feet
BE = Gate opening exponent, typically about 0.72 (default 1.0)
H = Upstream Energy Head above the spillway crest $Z_U - Z_{sp}$
HE = Head exponent, typically about 0.62 (default 0.5)
Z_U = Elevation of the upstream energy grade line
Z_D = Elevation of the downstream water surface
Z_{sp} = Elevation of the spillway crest through the gate

Co-efficients to use for maintaining Reduced Supply Level 215.50 m AHD:

C = **0.6**
g = **32.2**(ft./s^2)
W = width of one gate = **84**(ft.)
T = **20**(ft.)
TE = **0.16**
B = Height of opening in metres multiplied by 3.281 to convert to feet (so can be used in the above formula)
BE = **0.72**
H = **24.44**(ft.)
HE = **0.56**

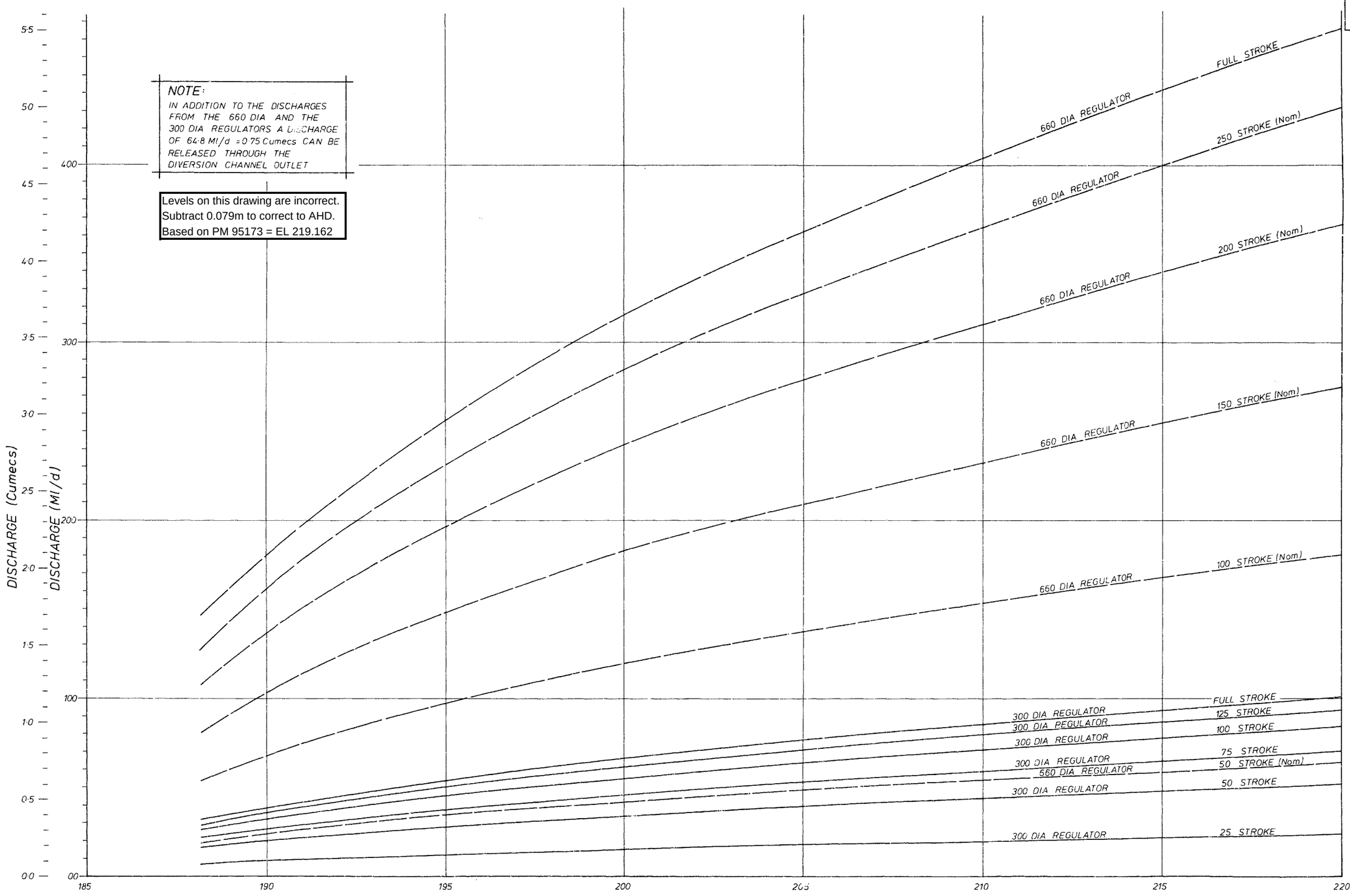
Formula above gives discharge for one gate in ft^3/s.

Multiply final answer from the formula by 2.45 to convert from ft^3/s to ML/d, for one gate.

A1-71546

NOTE:
IN ADDITION TO THE DISCHARGES FROM THE 660 DIA AND THE 300 DIA REGULATORS A DISCHARGE OF 64·8 Ml/d = 0·75 Cumecs CAN BE RELEASED THROUGH THE DIVERSION CHANNEL OUTLET

Levels on this drawing are incorrect.
Subtract 0.079m to correct to AHD.
Based on PM 95173 = EL 219.162



COMPILED FROM DRAWINGS A3-49764 & S 24095

REVISION					SCHEDULE	SCALE	DESIGN	DRAFTING
DATE	REMARKS	ZONE	CKD	PSD	DRAWING		PREP	DR GIG
							CKD	CKD M.J.C.
							SUPV	SUPV M.J.C.
							SUBMITTED	SUBMITTED
							EXEC ENGINEER	SUPV D'MAN

Queensland Water Resources Commission

RECOMMENDED R. Munro — SENIOR ENGINEER DESIGNS
APPROVED P.K. McLeod — CHIEF DESIGNING ENGINEER

CALLIDE CREEK AMTD 80·1 km
CALLIDE DAM - STAGE II

DISPERSION VALVES DISCHARGE CURVES

CONTRACT NUMBER
DRAWING NUMBER A1-71546
DATE 15-9-83

DWG 71546.TIF

Appendix C6 : Key Levels per EAP Phase

EAP Phase	Key Levels	Lake Level (m AHD)	Outer Gate 1&2 (m)	Centre Gate 3&4 (m)	Outer Gate 5&6 (m)	Total Discharge (m^3/s)	Total Discharge (ML/d)
Stand Down	Spillway Crest level	207.57	closed	closed	closed	-	-
Alert	**Pre-release (forecast to exceed 215.5 m AHD within 12 hours)**	**212.50**	**0.6**	**closed**	**closed**	**104**	**9,000**
Lean Forward	Temporary reduced full supply level (RSL)	215.50	**0.6**	closed	closed	132	11,405
	100mm below FSL and rising	**216.00**	**0.6**	**closed**	**closed**	**136**	**11,762**
	Full Supply Level (FSL)	216.10	**0.6**	closed	closed	137	11,837
	Start of auto for centre gates*	216.20	**0.6**	closed	closed	138	11,923
	Centre gates - point of inflection	216.23	**0.6**	0.1	closed	162	13,997
		216.30	**0.6**	0.57	closed	270	23,328
Stand-up – 1	Start of auto for outer gates*	216.37	**0.6**	1.01	closed	369	31,882
	Outer gates - point of inflection	216.39	**0.6**	1.16	0.04	411	35,510
		216.40	**0.6**	1.25	0.13	452	39,053
	Gates 1&2 transition to automatic mode	216.47	**0.6**	1.72	0.6	661	57,110
Stand-up – 2	**Minor flooding in Upper Callide Creek**	**216.49**	**0.73**	**1.85**	**0.73**	**750**	**64,800**
		216.50	0.81	1.93	0.81	800	69,120
		216.53	1.02	2.13	1.02	933	80,611
		216.55	1.15	2.27	1.15	1,021	88,214
		216.57	1.29	2.41	1.29	1,108	95,731
		216.60	1.49	2.61	1.49	1,236	106,790
Stand-up – 3	**Moderate flooding in Upper Callide Creek**	**216.66**	**1.92**	**3.03**	**1.92**	**1,500**	**129,600**
		216.70	2.18	3.29	2.18	1,661	143,510
	Gate top (when fully closed)	216.80	2.86	3.97	2.86	2,068	178,675
		216.90	3.54	4.65	3.54	2,462	212,717
		217.00	4.22	5.33	4.22	2,841	245,462
	Gate bottom (when fully open)	217.10	4.91	6.01	4.91	3,208	277,171
Stand-up – 4	**Flood of record**	**217.18**	**5.48**	**6.58**	**5.48**	**3,500**	**302,400**
	All gates commence rapid opening	217.20	6.9	7.64	6.9	4,234	365,818
		217.21	7.65	8.2	7.65	4,695	405,648
	Gates become fully open	217.23	9.8	9.8	9.8	4,725	408,240
		217.50	9.8	9.8	9.8	4,916	424,742
		218.00	9.8	9.8	9.8	5,265	454,896
		218.50	9.8	9.8	9.8	5,619	485,482
Stand-up – 5	**500mm below embankment crest**	**218.66**	**9.8**	**9.8**	**9.8**	**5,734**	**495,418**
	Embankment crest	219.16	9.8	9.8	9.8	6,095	526,608
		219.50	9.8	9.8	9.8	6,350	548,640
		219.50	9.8	9.8	9.8	6,400	552,960
		219.80	9.8	9.8	9.8	6,865	593,136
		220.00	9.8	9.8	9.8	7,451	643,766
		221.00	9.8	9.8	9.8	12,663	1,094,083
		222.00	9.8	9.8	9.8	20,174	1,743,034
		223.00	9.8	9.8	9.8	29,359	2,536,618

Appendix D Interaction with local government and district groups & schedule of matters

To be populated when EAP next completes a substantive review.

Annexe — Callide Dam SMS Messages

	Advice Stay informed 	**Watch and Act** Prepare to leave 	**Emergency** Leave immediately To be issued in consultation with council 
SMS	ADVICE from Sunwater. Callide Dam is releasing excess water into Callide Creek. People downstream of Callide Creek and those in the Callide Valley should STAY INFORMED and MONITOR CONDITIONS. Water flows from Callide Dam expected to remain within beds and banks of the creek / may contribute to widespread/ localised/ overland flooding. Expect increased 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 releasing from Callide Dam into Callide Creek has increased significantly. Water flows from Callide Dam may contribute to dangerous/widespread flooding in the Callide Valley in 6-12 hours / later today/ overnight/ tomorrow. People downstream of Callide Creek and those in the Callide Valley 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 Callide Creek and those in the Callide Valley must LEAVE IMMEDIATELY. Callide Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. More information here: Banana Shire Council http://emd.banana.qitplus.com/