

EMERGENCY ACTION PLAN — FAIRBAIRN DAM (ID 0269)

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Prepared by Sunwater Limited

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Approved by the delegate of the Chief Executive,
Department of Local Government, Water and Volunteers
until 14 March 2028.

Emergency activation quick reference – Dam Hazards

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

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

Table 1: Emergency activation quick reference - Dam Hazards

Dam Hazards and section numbers	Activation levels for dam hazards			
	Alert	Lean Forward	Stand Up	Stand Down
Flood operations See section 5	<ul style="list-style-type: none"> EL 204.13 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above FSL 204.23 m 	<ul style="list-style-type: none"> Storage above EL 207.73 m (Moderate flood classification level) 	<ul style="list-style-type: none"> Storage EL 204.73 m and falling with no forecast increase in EL for 48 hours
Piping: embankment, foundation, or abutments See section 6	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments WITH cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Earthquake See section 7	<ul style="list-style-type: none"> Earthquake confirmed (by DSTDM) or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> Earthquake confirmed (by DSTDM) or felt in the area, AND Intensity greater than or equal to 5MM~ OR Intensity less than 5MM~ and change detected during surveillance inspection 	<ul style="list-style-type: none"> Earthquake confirmed (by DSTDM) or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Terrorist threat/ activity or high energy impact See section 8	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Possible terrorist activity noticed at dam or threat received Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) Failure in progress or likely due to impact or explosion, and sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Stability, main embankment See Section 9	<ul style="list-style-type: none"> Foundation pore pressures readings abnormally high as discerned by the DSTDM 	<ul style="list-style-type: none"> Scarps, cracks, wet and soft areas, toe bulge have been identified 	<ul style="list-style-type: none"> Slip circle failure condition has been established 	<ul style="list-style-type: none"> Risk assessment has determined that Slip circle failure risk has reduced
Stability, spillway chute See Section 10	<ul style="list-style-type: none"> Increasing seepage noticed with spillway, OR Visual displacement of Spillway apron. 	<ul style="list-style-type: none"> Removal of localised section of spillway apron; OR Flow disturbance noticed which is likely caused by removal of a localised section of spillway apron 	<ul style="list-style-type: none"> Scour of the spillway to the base of the spillway monoliths. 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced

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



Emergency activation quick reference – Other Emergency Situations

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

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

Table 2: Emergency activation quick reference - Other Emergency Situations

Other Emergency Situations and section numbers	Activation levels		
	Communications Failure – Dam Site (DDO)	Communications Failure – Local Area (LEC/ORR)	Communications Failure – Brisbane (IC/DSTDM)
	Site managed (DDO – becomes LEC)	Brisbane managed by IC	Locally managed by LEC
Comms Failure See section 11	<ul style="list-style-type: none"> Unable to communicate to or from dam site 	<ul style="list-style-type: none"> Unable to communicate to or from local area 	<ul style="list-style-type: none"> Unable to communicate to or from Sunwater Brisbane



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



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Document control

Authorisation of document

This document has been reviewed and accepted by the following:

Name	Position/role	Signature	Date
	EAP Program Lead — Prepared for submission		17/12/2024
 	Principal Engineer Dam Safety Compliance — Approved for submission		17/12/2024
 	GM Asset Integrity — Approved for submission		17/12/2024
	EGM – Engineering and Water Resources (or delegate) — Dam Owner Authorising Officer		18/12/2024

Document revision history

Issue	Date	Prepared by	Reason for change	eDOCS#
2	January 2008		Substantial review of Fairbairn Dam Emergency Action Plan to reflect Sunwater Management structure and updated inundation maps.	
3	October 2011		Significant changes to all sections of Fairbairn Dam Emergency Action Plan to reflect current Sunwater Management structure and other changes	
4	August 2014		New Emergency Action Plan developed at expiry of version 3 approval. Issued for consultation with Relevant Disaster Management Groups.	1619468
5	June 2015		New Emergency Action Plan developed at expiry of version 4. Issued for consultation with Relevant Disaster Management Groups	1732842
6	August 2016		Emergency Action Plan amended to include new Emergency Condition: Stability, main embankment.	1975524
6.1	December 2016		Updates to Notification and Communication lists. Update to Emergency Alert Polygon. Formatting and layout corrections.	1975524
7	September 2017		Updates to Notification and Communication lists. Formatting and layout corrections.	2224203
8	May 2018		Revised and reviewed Emergency Action Plan 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).	2288312
9	September 2018		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	2347187
9.1	July 2019		Added emergency siren instructions, updated Sunwater contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections.	2455713
9.2	September 2020		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	2571775
9.3	September 2021		Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	2655006
10.0	June 2022		Revised and reviewed at expiry of approval. Incorporated global non-substantive EAP changes resulting from feedback from previous internal and external reviews. Amended to comply with the new Sunwater branding. Amended contacts and associated sections. Updated access and catchment maps. Updated messaging and Roles and Responsibilities. Updated Triggers to reflect recent CRA. Added two new Dam Stability Hazards.	2602396
10.1	September 2022		Amended contacts and associated sections. Minor error corrections and other non-substantive changes. The Chemical Hazard section has been removed as it is not a Dam Safety Hazard and is dealt with in other more relevant documents.	2725896
10.2	September 2023		Non-substantive updates as part of Annual Safety Statement. Minor error corrections and readability improvements. Added fatigue management section.	2787893

Issue	Date	Prepared by	Reason for change	eDOCS#
11.0	May 2024		Full review pending expiry	2844569

Controlled document distribution list

Copy no.	Position	Location
1	Storage Supervisor	Sunwater, Fairbairn Dam
2	Operations Manager	Sunwater, Fairbairn Dam
3	Emergency Action Plan Lead	Sunwater, Brisbane
4	Local Disaster Coordinator — Local Disaster Management Group (LDMG1)	Central Highlands Regional Council
5	Chair — Local Disaster Management Group (LDMG1)	Central Highlands Regional Council
6	Local Disaster Coordinator — Local Disaster Management Group (LDMG2)	Isaac Regional Council, Moranbah
7	Officer in Charge — Emerald Police Station	Police, Emerald
8	Emergency Management Coordinator	Queensland Police Service – Rockhampton
NOTE: Communication information for each ‘Controlled Copy Holder’ is in Appendix A.		

Electronic document distribution list

Printed electronic copies are considered uncontrolled copies.

Position	Location
Police Communications Centre	Police, Mackay
District Disaster Coordinator — Rockhampton District Disaster Management Group (DDMG1)	Police, Rockhampton
Executive Officer — Mackay District Disaster Management Group (DDMG2)	Police, Mackay
Chair — Local Disaster Management Group (LDMG2)	Isaac Regional Council
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 (July 2024)	https://www.legislation.qld.gov.au/view/whole/pdf/inforce/current/act-2008-034
B	Emergency action plan for referable dam guideline (RDMW 2023)	https://www.resources.qld.gov.au/__data/assets/pdf_file/0018/84015/eap-guideline.pdf
C	Queensland Government arrangements for coordinating public information in a crisis	L1159-DPC2739-Crisis-Communication-Document.pdf (disaster.qld.gov.au)
D	Guidelines for the Development of Communication Education, Awareness and Engagement Programs (2010)	https://knowledge.aidr.org.au/media/1970/manual-45-guidelines-for-the-development-of-communication-education-awareness-and-engagement-programs.pdf
E	Sunwater website — Emergency Action Plans, Flood Maps and Dam Emergency Sirens	https://www.sunwater.com.au/community/preparing-for-weather-events/emergency-management/
F	Sunwater website — Emergency Notification Service	https://www.sunwater.com.au/community/preparing-for-weather-events/stay-informed/emergency-notification-service/
G	Professional Engineers Act 2002 (RPEQ)	https://www.legislation.qld.gov.au/view/pdf/inforce/2013-09-23/act-2002-054
H	Sunwater (Internal) Fairbairn Dam Consequence Assessment (April 2021)	eDOCS# 2592657
I	AECOM (Sunwater Internal) Fairbairn Dam Comprehensive Risk Assessment (2022)	eDOCS# 2699807
J	Sunwater Operations (internal) Fairbairn Dam — Hazard Management Toolkit	Only available with Sunwater internal versions of EAPs
K	Sunwater (Internal) Fairbairn Dam Piezometers Investigate Piezometers Rising Pressure, June 2016	eDOCS# 1967296
L	NSW Dam Safety Committee - Dam Safety Surveillance Manual (Sunwater Internal, August 2014)	eDOCS# 1606070
M	Sunwater (internal) Strategic Event Procedure	Strategic Event Procedure
N	Fairbairn Dam Safety Condition Schedule	eDOCS# 619379
O	Disaster Management Act 2003	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2003-091
P	Queensland Disaster Management Guidelines (January 2018)	QLD-Disaster-Management-Guideline.pdf
Q	Guidelines on Safety Assessments for Referable Dams (November 2023 (Version 8)	Guidelines on Safety Assessments for Referable Dams (rdmw.qld.gov.au)
R	Queensland Dam Safety Management Guidelines (RDMW August 2024)	https://www.dnrme.qld.gov.au/__data/assets/pdf_file/0007/78838/dam-safety-management.pdf
S	Australian Rainfall and Runoff (ARR) 2016	ISBN 978-1-925848-36-6 http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com/
T	Sunwater (Internal) Fairbairn Dam Operation and Maintenance Manual	Fairbairn Dam Operations and Maintenance Manual
U	Sunwater (Internal) Fairbairn Dam — Dam safety Review (Aurecon November 2017)	eDOCS# 2264937
V	Guidelines on Dam Safety Management (ANCOLD, 2003)	ANCOLD ISBN: 0-731027620
W	Guidelines on Consequence Categories for Dams (ANCOLD, 2012)	ANCOLD ISBN: 978-0-9808192-5-0
X	Guideline for Failure Impact Assessment of Water Dams (DNRME 2018)	Guideline for failure impact assessment of water dams (resources.qld.gov.au)
Y	Water Act 2000 (September 2024)	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2000-034
Z	Sunwater (internal) Fatigue Management Procedure	Fatigue Management Procedure

1.2 Abbreviations and acronyms

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

1.3 Business terms and definitions

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

Term	Definition
Terms defined in accordance with the <i>Water Supply (Safety and Reliability) Act 2008</i>	
Australian Warning System	A national approach to information and warnings during emergencies like bushfire, flood, storm, extreme heat, and severe weather.
Dam hazard	Means a reasonably foreseeable situation or condition that may: <ul style="list-style-type: none"> cause or contribute to the failure of the dam, if the failure may cause harm to persons or property, OR require an automatic or controlled release of water from the dam if the release of the water may cause harm to persons or property. NOTE: Various dam failure modes have been referred to as <i>hazards</i> in this document e.g., piping, instability, and overtopping.
Dam hazard event	Means an event arising from a <i>dam hazard</i> if: <ul style="list-style-type: none"> persons or property may be harmed because of the event, AND a coordinated response, involving two or more of the following <i>relevant entities</i>, is unlikely to be required; each <i>local group</i> and <i>district group</i> for the EAP, each local government whose area may be affected, the Chief Executive, another entity the owner of the dam considers appropriate, AND the event is not an <i>emergency event</i>.
Disaster management plan	Of a <i>district group</i> or local government, means the group's District Disaster Management Plan (DDMP) or local government's Local Disaster Management Plan (LDMP) under the <i>Disaster Management Act 2003</i> .
District group (District Disaster Management Group)	For an EAP, means a district group established under the <i>Disaster Management Act 2003</i> , section 22 whose disaster district under that Act could, under the plan, be affected by a <i>dam hazard</i> .
Emergency event	Means an event arising from a <i>dam hazard</i> if: <ul style="list-style-type: none"> persons or property may be harmed because of the event, AND any of the following apply: <ul style="list-style-type: none"> a coordinated response, involving two or more of the following <i>relevant entities</i>, is likely to be required; each <i>local group</i> and <i>district group</i> for the EAP, each local government whose area may be affected, the Chief Executive, another entity the owner of the dam considers appropriate, OR the event may arise because of a disaster situation declared under the <i>Disaster Management Act 2003</i>, OR an entity performing functions under the State <i>Disaster Management Plan</i> may, under that plan, require the owner of the dam to give the entity information about the event.
Local group (Local Disaster Management Group)	For an EAP, means a local group established under the <i>Disaster Management Act 2003</i> , , section 29 whose local government area could, under the plan, be affected by a <i>dam hazard</i> .
Notice response	A dam owner's written response to a notice following an assessment of an EAP by a local government or <i>district group</i> .
Referable dam	A dam, or a proposed dam after its construction, will be a referable dam if: <ul style="list-style-type: none"> a failure impact assessment of the dam, or the proposed dam, is carried out under the Act, AND the assessment states the dam has, or the proposed dam after its construction will have, a category one or category two failure impact rating, AND the Chief Executive has, under section 349 of the Act, accepted the assessment. Also, a dam is a referable dam if: <ul style="list-style-type: none"> under section 342B of the Act, the owner of a dam is given a referable dam notice and, before the effective day for the notice, does not give the Chief Executive a failure impact assessment for the dam, AND

Term	Definition
	<ul style="list-style-type: none"> the Chief Executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam.
Relevant entity	<p>Means each of the following under the EAP for the dam:</p> <ul style="list-style-type: none"> the persons who may be affected, or whose property may be affected, if a dam hazard event or emergency event were to happen for the dam, e.g., the owners of parcels of farmland adjacent to the dam or residents of a township each local group and district group for the EAP each local government whose local government area may be affected if a <i>dam hazard event or emergency event</i> were to happen the Chief Executive another entity the owner of the dam considers appropriate e.g. the Queensland Police Service (QPS).
Terms consistent with Queensland Disaster Management Guidelines	
Activation levels	<p>The four levels of EAP activation are:</p> <ul style="list-style-type: none"> Alert: A heightened level of vigilance due to the possibility of an event occurring. No further action may be required; however, the situation should be monitored by someone capable of assessing the potential of the threat. Moving to an Alert level indicates the dam owner is getting ready to activate the Lean Forward level of the EAP if the situation deteriorates. Lean Forward: An operational state characterised by a heightened level of situational awareness of an impending disaster event and a state of operational readiness. Disaster coordination centres are on standby and prepared but not activated. Stand Up: The operational state where resources are mobilised, personnel are activated, and operational activities commenced. Disaster coordination centres are activated. The dam owner needs to provide an Emergency Event Report (EER) in accordance with the provision of the Act. Stand Down: Transition from responding to an event back to normal core business and/or continuance of recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present. <p>The movement through these levels of activation is not necessarily sequential. It should be applied with flexibility and adaptability and be tailored to the location and event.</p> <p>Triggering one of these levels of activation may not necessarily mean a similar activation of LDMGs or DDMGs.</p>
AWS Warning Levels	<p>The three AWS warning levels are:</p> <ul style="list-style-type: none"> Advice: The first warning level of the Australian Warning system meaning an incident has started but there is no immediate danger. Stay up to date in case the situation changes Watch and Act: The second warning level of the Australian Warning System meaning there is a heightened level of threat. Conditions are changing you need to start taking action now to protect you and your family. Emergency: The third and highest warning level of the Australian Warning System meaning lives may be in danger and action should be taken immediately. <p>Notes:</p> <p>These AWS Warning levels do not change the Activation Levels of the EAP and are intended for external public facing information only</p> <p>There is no Stand Down equivalent in AWS warning levels.</p>
Bureau of Meteorology flood level classifications	<p>The three levels of flooding are:</p> <ul style="list-style-type: none"> Minor flooding: This causes inconvenience such as closing of minor roads and the submergence of low-level bridges and makes the removal of pumps located adjacent to the river necessary. Moderate flooding: This causes the inundation of low-lying areas requiring the removal of stock and/or the evacuation of some houses. Main traffic bridges may be closed by flood waters. Major flooding: This causes inundation of large areas, isolating towns and cities. Major disruptions occur to road and rail links. Evacuation of many houses and business premises may be required. In rural areas widespread flooding of farmland is likely.

Term	Definition
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 level	The lowest elevation of the non-overflow crest section of the dam excluding handrails, parapets or wave walls that have not been designed to store water.
Dam crest flood	The flood event that causes reservoir levels to reach the lowest point of non-overflow section of a dam.
Dam failure	Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.
Downstream releases	Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam.
Earthquake	A sudden release of energy in the earth's crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity, resulting in the generation of seismic waves that can be destructive. The potential consequences of an earthquake include: <ul style="list-style-type: none"> • settlement, sliding, or overturning of monoliths in the dam wall • initiation of seepage lines in the foundations or abutments that could lead to piping damage and potential inoperability of appurtenant works.
Flood release	A flood release from a dam occurs when catchment inflows raise the storage level above the Full Supply Level (FSL) resulting in a discharge from the spillway of the dam.
Piping	Internal scour caused by the water flow and seepage that occurs through earth dams, dam foundations, or dam abutments. The internal scour can lead to the formation of a pipe, which can lead to a failure of the dam.
Plane strike or other impact	The impact of a plane, meteorite, or other high energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam.
Probable maximum flood	The flood resulting from the <i>probable maximum precipitation</i> coupled with the worst flood-producing catchment conditions that can be realistically expected in the prevailing meteorological conditions.
Probable maximum precipitation	The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin.
Probable maximum precipitation flood	The flood resulting from the <i>probable maximum precipitation</i> coupled with typical catchment conditions.
Stability, main embankment	High foundation pore pressure peaks may reduce the Factor of Safety against slip circle failure to an unacceptable level.
'Sunny Day' failure	A failure that occurs at the FSL and there is no concurrent rain associated flooding.
Terrorist activity	A deliberate attempt to damage, fail or contaminate a dam.

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

2. Introduction

2.1 Context

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

This EAP has been prepared in accordance with Chapter 4 of the Act, the Emergency Action Plan for Referable Dam Guideline (RDMW 2023) and the Queensland State Disaster Management Plan 2023. The content requirements for EAPs are contained in section 352H of the Act.

Summary of legal requirements – Section 352H

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

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

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

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

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

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

The local governments whose areas may be affected by a dam hazard for Fairbairn Dam have been assessed as **Central Highlands Regional Council (CHRC)** and **Isaac Regional Council (IRC)**. Sunwater have provided the **Central Highlands Local Disaster Management Group (LDMG)** and the **Isaac LDMG** 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 groups for Fairbairn Dam are the **Rockhampton District Disaster Management Group (DDMG)** and **Bundaberg DDMG**. Sunwater have provided the DDMGs with copies of the draft EAP for review.

2.2 Purpose

The purpose of this EAP is:

- to minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam happens
- to identify dam hazards that could occur at Fairbairn 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 Fairbairn 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 Fairbairn 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 Central Highlands Regional Council and Isaac Regional Council Local Disaster Management Plans (LDMPs) and is a sub-plan of each LDMP.

2.3 Scope

The Fairbairn Dam EAP covers:

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

2.4 Sunwater training

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

During this period, Sunwater staff complete work instructions for site preparations, and during July to September carry out checks on stores, supplies of fuel, 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. The training is presented to relevant Sunwater staff (DDO's, LEC's and IC's) and disaster management stakeholders. DSTDM and FODM information sessions are carried out once a year with the same walkthrough of new changes and Q&A, but this is not specific to any one Dam. New Sunwater employees in these various roles also have a walkthrough of the EAP.

Note: All enquiries regarding EAP training should be directed to [REDACTED]

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

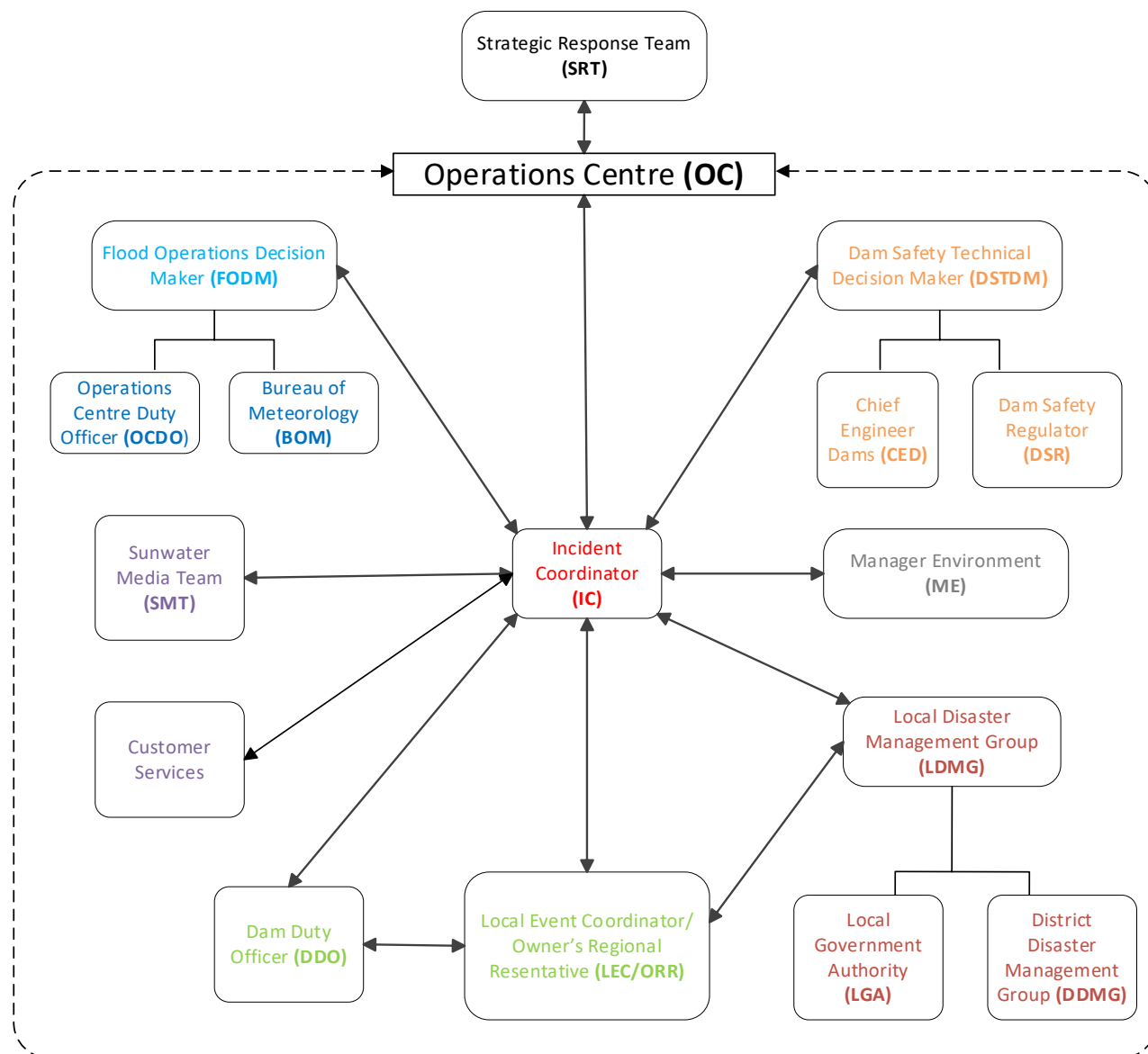
2.5 Fatigue management plan

Sunwater has a Fatigue Management Procedure. 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 hazard management within Sunwater

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

Figure 1: Sunwater dam hazard management framework



Key aspects of the dam hazard management framework are described below:

- Central to the framework is the role of IC for any dam hazard at a dam. The IC will maintain overall responsibility for a coordinated response to the dam hazard incident.
- The IC is responsible for the decision to activate the EAP. Should the IC be unavailable, the Local Event Coordinator (LEC) followed by the Dam Duty Officer (DDO) is responsible for the decision. If the IC loses all communications during a dam hazard, then as a fail-safe position, the LEC followed by the DDO will assume the duties and responsibility of the IC. However, loss of communications could result in some communication processes defined in this EAP not being carried out.
- The DSTDM is primarily responsible for analysing dam safety and providing expert technical advice in this regard. They will be expected to discuss dam hazards with peers and other technical experts and make sound

decisions to mitigate risks and to determine a response to incidents and emerging issues. The DSTDM is the key communication contact with the Dam Safety Regulator.

- The FODM has responsibility for all matters involving flood modelling and forecasting and determining the associated impact to Sunwater storages/infrastructure and EAP actions. The FODM may pre-emptively advise the IC to activate the EAP in accordance with available hydrology forecast information. For example, if an EAP trigger level is predicted to be exceeded based on forecast dam inflows derived from observed rainfall and streamflow conditions upstream of the dam, the EAP may be activated to the predicted level. Regarding the operation of the OC, the FODM must liaise with the IC as necessary to inform of decisions made. Sunwater's in-house engineering and technical staff will provide technical advice to the IC, LEC and DDO on an as needs basis. The Flood Operations Decision Maker (FODM) and Dam Safety Technical Decision Maker (DSTDM) will provide flood and dam engineering advice respectively during a dam hazard. Such advice will be provided within an established framework of Standing Operating Procedures (SOPs), models, standards, and manuals. This is an advisory role only and does not diminish the decision responsibility of the IC, LEC or DDO.
- If unusual circumstances develop during a dam hazard it will be necessary to escalate to either the FODM or DSTDM. These roles are filled by Registered Professional Engineers of Queensland (RPEQ) and are suitably qualified professionals as defined in the Professional Engineers Act of Queensland. These decision-making roles are providing direct engineering supervision to the advisors through the established framework of SOPs, models, standards, and manuals or through direct supervision.

2.7 Community information

Sunwater with the assistance of the local councils will ensure community education around messaging and impacts of the EAP and its related events is undertaken and continually improved.

Sunwater currently provides information externally to customers, downstream (D/S) residents, and the community in a range of methods or channels in relation to dam hazards and emergency situations. Individuals can access information through Facebook, the Sunwater web page ([sunwater.com.au](https://www.sunwater.com.au)), Sunwater App ([sunwater.com.au/community/sunwater-app/](https://www.sunwater.com.au/community/sunwater-app/)) and at several show/field days across regional Queensland where Sunwater may have stalls and information available.

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

In the event of an emergency event or when otherwise required, Sunwater and the affected local government also have the use of the National Emergency Alert System to send a voice message and SMS. This service is provided by Telstra and is managed by the State Disaster Coordination Centre (SDCC). The process Sunwater follows is documented in Appendix A10.

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 Dam Safety Regulator (DSR) as part of Sunwater's continual improvement of its EAPs. The Lessons Learnt actions if relevant are provided to stakeholders, such as the LDMGs, DDMGs, other dam owners and Department of Regional Development, Manufacturing and Water (RDMW) as appropriate.

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

3. Dam details

3.1 General dam information

Location: Fairbairn Dam is situated approximately 16 km south-west of Emerald, on the Nogoa River at AMTD 685.6 km. A dam locality plan can be found in Appendix B4.

Purpose: Fairbairn Dam is the main source of supply for the Nogoa Mackenzie Water Supply Scheme. The dam is operated in conjunction with Selma, Bedford, Bingegang, and Tartrus Weirs to regulate supplies along the Mackenzie River and downstream to the Springton Creek junction. The dam also releases into the Selma and Weemah channel systems to supply irrigators. The scheme is the source of supply for six industrial water supply pipelines serving the Central Queensland coalfields area.

Construction: Completed in 1972, Fairbairn Dam is a zoned, rock-filled embankment dam with a central clay core.

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

Table 3: Fairbairn Dam specifications

Description	Specification
Main Dam	Zoned rock-filled embankment with central clay core
Full Supply Level (FSL)	EL 204.23 m
Embankment crest level	EL 218.86 m
Historical recorded max storage — Dec 2010 Flood	EL 209.80 m (5.57 m above FSL)
Length across crest	823 m
Dam height above foundation	46.33 m (approx.)
Storage capacity at FSL	1,301,000 ML
Storage area at FSL	15,000 ha
Catchment area (Nogoa River at Fairbairn dam)	16,320 km ²
Spillway	Chute with uncontrolled ogee crest
Spillway crest level	EL 204.23 m
Spillway capacity at DCF	1,425,600 ML/d (16,500 m ³ /s) — over the spillway only
Spillway crest length	167.64 m (163.07 m excluding width of bridge piers)
Saddle Dam	Homogeneous earth-fill
Number of Saddle Dams	Six with a combined length of 8.4 km
Saddle Dam Minimum Crest Levels (surveyed 2015)	Saddle Dam 1 – EL 217.71 m Saddle Dam 2 – EL 218.51 m Saddle Dam 3 – EL 218.74 m Saddle Dam 4 – EL 218.78 m Saddle Dam 5 – EL 217.62 m Saddle Dam 6 – EL 217.39 m
Outlet Works	
Right Bank Outlet	Intake tower with outlets into the Nogoa River and the Weemah Channel
Right Bank Outlet Capacity	1,200 ML/day
Left Bank Outlet	Dual inlet (Channel inlet and Selma Pump Station) with a combined outlet into Selma Channel
Max. LB Outlet Design capacity	690 ML/day
Left bank Max operating capacity	770 ML/day
Left Bank Siphon Max Design Capacity	250 ML/day

The rating and storage curves for Fairbairn Dam can be found in Appendix C2 and Appendix C3.

3.2 Population at risk

Fairbairn Dam is classified as an 'Extreme' hazard category dam. The dam has a PAR of 12,355 people in the Sunny Day Failure event. The population at risk for flood failure or Sunny Day failure events are in Emerald, which lies directly downstream.

Sunwater carried out an updated Population at Risk (PAR) assessment (ref H) in 2021 and a Comprehensive Risk Assessment (ref I) in 2022. Further details on the population at risk and outcomes of these assessments can be provided upon request.

3.3 Spillway adequacy

A dam crest flood (DCF) is the flood event which results in a still water level in the storage, excluding wind and wave effects. This equates to the approximate height of the first non-overflow section of the dam.

The analysis considered the dam crest to be equal to the minimum surveyed level of Saddle Dam 6 (217.4 m AHD).

The estimated frequency of the dam crest flood is approximately a 1 in 20,000 AEP event. The outflow from the spillway for this event is estimated to be 16,500 m³/s. Sunwater assessed the hydrology and spillway capacity in 2021.

Further detail on the spillway capacity and hydrology can be provided upon request.

3.4 General arrangement

The general arrangement drawings are in Appendix B1.

3.5 Emergency inspections and monitoring

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

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

3.5.1 Inspections

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

4. Roles and responsibilities

Roles and responsibilities	Position holder
Owner (Sunwater) <ul style="list-style-type: none"> • Liaise with the Board and Minister. • Activate Sunwater Strategic Response and Business Continuity Plans, if required. • Ensure necessary resources are available to manage any dam hazard and emergency events. • Record communications, notifications and observations as required. • Maintain an up-to-date list of notifiable D/S residents of Fairbairn Dam. • At all times, aim to provide timely advice and support to the local disaster management groups (LDMGs) in the affected local government areas and the district disaster management groups (DDMGs) in the affected disaster districts. • During a dam hazard emergency event that occurs with little or no warning, undertake the following actions to ensure the community is informed as soon as possible: <ul style="list-style-type: none"> ○ notify the residents listed in Appendix A4 EAP via SMS ○ contact the SDCC to request an Emergency Alert campaign as detailed in the emergency alert request and threat direction polygon. • Where a dam hazard event occurs with adequate time to warn downstream residents, notify the residents listed in the EAP via SMS (unless otherwise agreed with the LDMGs) 	CEO EGMO EGM E&WR
Owner's Head Office Representative <ul style="list-style-type: none"> • Authorise the issuing of EAPs, SOPs and O&M Manuals and amendments. • Facilitate Dam Safety Training Courses for Service Managers, Operations Supervisor, Dam Operators, and other staff as appropriate and ensure that all staff required to undertake Dam Safety work are trained and accredited. • Ensure that risks identified in CRAs or other technical reports undertaken in relation to Dam Safety are included in the EAP. • Ensure visual inspections and instrumentation monitoring frequencies conform to ANCOLD Guidelines. • Ensure all Dam Safety work orders, work instructions and lesson learned outcomes are fully implemented. • Ensure requirements of the Dam Condition Schedule are met • Ensure the work instructions are correct and the Logbooks, SOPs, Data Books and EAPs are reviewed annually as per the Dam Condition Schedule. • Undertake and prepare the five yearly Comprehensive Inspection Reports with suitably qualified personnel within the time specified and that work orders are created for recommendations and work is undertaken as required. • Undertake Annual Inspections and prepare reports within the time frames specified in ref N and that work orders are created for recommendations and work is undertaken as required. • Review the Dam Safety Instrumentation Database and evaluate data to verify the structural integrity of the dams on a regular basis and maintain a spread sheet for verification for audit and quality control. • Record communications, notifications and observations as required. 	GM Asset Integrity GM Asset Management
Owner's Regional Representative (ORR) <ul style="list-style-type: none"> • Liaise with the Storage Supervisor/Operator Maintainer. • Arrange dam specific training and accreditation for relevant staff. • Ensure competent, trained, and accredited personnel operate the storages. • Ensure necessary resources are available to manage any dam hazard and emergency events. • Undertake the role of LEC as required. • Ensure all work orders, work instructions and lesson learned outcomes are fully implemented. • Record communications, notifications and observations as required. 	GM Central OS

Roles and responsibilities	Position holder
Strategic Response Team (SRT) <ul style="list-style-type: none"> Facilitate the assessment, escalation and notification and management of strategic response and recovery for a high or extreme risk, or impact, event. Initial and ongoing assessment of event status and requirements Development, and revision of, strategic objectives based on requirements Identifying, managing, and monitoring strategic risks Monitor media and stakeholder/customer impacts Managing/overseeing event communications including media, stakeholder, customer, and internal communications. Record communications, notifications and observations as required. 	Various ELT members as per SRT roster
Technical Advisor <ul style="list-style-type: none"> Analyse the situation and provide expert technical advice. Discuss issues with peers and other technical experts and make sound decisions to mitigate the risk Determine response to incidents and emerging issues. Record communications, notifications and observations as required. 	GM Environment
Dam Safety Technical Decision Maker (DSTDM) <ul style="list-style-type: none"> 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 dam safety incidents and emerging issues. Issue warning on dam failure and advise on protective measures. Liaise with DSR as required. Ensure the EAP is implemented appropriately and carry out the DSTDM role as required. Record communications, notifications and observations as required. 	Various personnel as per DSTDM roster
Flood Operations Decision Maker (FODM) <ul style="list-style-type: none"> Maintain current RPEQ accreditation. Provide hydrological advice in relation to predicted and actual dam outflows including assessment of weather and flood warnings, and other related matters as identified in the OC Procedure. Interpret and apply rainfall data in accordance with the OC Procedure, including, as required under the OC Procedure, Liaising with the Bureau. Ensure the EAP is implemented appropriately and carry out the FODM role as required. Record communications, notifications and observations as required. 	Various personnel as per FODM roster
Operations Centre Duty Officer (OCDO) <ul style="list-style-type: none"> Decide if a flood imminent and record modes of operation. Extract data relative to the event from available sources. Utilise this data in predictive flood models and determine results from these models for approval by FODM. Liaise with the FODM or IC to update current flood situation and routing data. Record communications, notifications and observations as required. 	Various personnel as per OC roster
Sunwater Media Team (SMT) <ul style="list-style-type: none"> Analyse sensitive issues, discuss with the Owner and issue media releases. Handle public and customer comments (including social media) and advise the Owner if necessary. Liaise with the IC and update QDMG of flood events. Record communications, notifications and observations as required. 	Various personnel as per Media Team roster

Roles and responsibilities	Position holder
Incident Coordinator (IC) <ul style="list-style-type: none"> • Notify LDMGs, or councils if LDMGs not Stood Up, of intent to use the Emergency Alert. • Activate the EAP, when necessary. • Ensure the EAP is implemented appropriately and carry out the IC role as required. • Arrange Situation Reports and determine frequency, as required. • Record communications, notifications and observations as required. 	Various personnel as per IC roster
Local Event Coordinator (LEC) <ul style="list-style-type: none"> • Liaise with the Local Disaster Coordinator or proxy • Activate the EAP when necessary • Ensure the EAP is implemented appropriately and carry out the LEC role as required • Record communications, notifications and observations as required 	Various personnel as per LEC roster
Dam Duty Officer (DDO) <ul style="list-style-type: none"> • Complete accreditation to operate and maintain relevant storage. • Ensure the EAP is implemented appropriately and carry out the DDO role as required. • Take direction from the DSTDM and IC as requested. • Arrange immediate site inspection and make informed assessment of the situation. • Escalate any issue not covered in the EAP or where actions are not clear. • Record communications, notifications and observations as required. 	SS OM
Councils Councils have legislated local government functions, as per Section 80 of the Qld Disaster Management Act (2003). These include: <ul style="list-style-type: none"> • Ensure it has a disaster response capability. • Approve its local disaster management plan. • Ensure information about an event or a disaster in its area is promptly given to the DDMG for the disaster district in which area it is situated. • Perform other functions given to the local government under the Qld Disaster Management Act (2003). And as per Section 352HB of the Water Legislation (Dam Safety) Amendment Act (2017): <ul style="list-style-type: none"> • <i>Must</i> 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: <ul style="list-style-type: none"> • conduct emergency operations • coordinate and support Sunwater during a declared emergency at the dam • liaise with relevant organisations • evacuation of persons if required • control of essential traffic • security of specific area. 	Local Police

Roles and responsibilities	Position holder
<p>Disaster Management Groups/Personnel – (In addition to requirements outlined in the Disaster Management Act (2003))</p> <ul style="list-style-type: none"> • LDMG <ul style="list-style-type: none"> ○ Assist Sunwater and the Councils to ensure 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 and any support required. • QPS <ul style="list-style-type: none"> ○ Work with dam owner and LDMGs to ensure Emergency Alert polygons are prepared, stored, and tested at the State Disaster Coordination Centre • DDMG <ul style="list-style-type: none"> ○ May review the EAP for consistency with the DDMP. • SCTN (Security and Counter Terrorism Network) Coordinator <ul style="list-style-type: none"> ○ Identifies Areas of Concern during the preparation of disaster plans and provides advice during counter terrorism emergency events 	<p>LDMG</p> <p>QPS</p> <p>DDMG</p> <p>SCTN Coordinator</p>
<p>Dam Safety Regulator (DSR)</p> <ul style="list-style-type: none"> • Liaise with relevant Minister on necessary actions. • Approve this document as required under legislation. • Liaise with Chief Executive as required in administering (regulating) the Water Supply (Safety and Reliability) Act 2008 	<p>DDS</p>

5. Dam hazard — flood operations

5.1 Overview

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

- A dam hazard where natural catchment inflows fill Fairbairn Dam to Full Supply Level (FSL) 204.23 m, and the rate of inflow exceeds the capacity of the outlet works. The spillway will then discharge water downstream into the Nogoa River. These flood flows can create a dam hazard event. Inflows will also cause the storage to temporarily rise to above the FSL of the storage. **NOTE:**
 - The greater the rate of inflow, the higher the storage will rise.
 - The higher the storage level rises, the greater the loads on the dam structure.
 - Although unlikely, the greater the loading, the higher the likelihood of a dam failure.
 - Typically, the level of surveillance is increased during flood operations (refer Action tables in this section).
- Spillway discharge from the dam where there have been no indications that a dam failure may be initiating or in progress.

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

- As the rate of discharge increases or when the storage height exceeds minor flood level, 207.03 m (2.8m above the spillway) there will be an impact on low-level road crossings of the Nogoa and McKenzie Rivers and other infrastructure in the river such as pump sites
- When the storage height exceeds moderate flood level, 207.73 m (3.5 m above the spillway) there will be an impact on low-lying areas and parks. There may be early evacuations at this point to prevent isolation of east Emerald.
- When the storage height exceeds major flood level of 208.23 m (4.0 m over the spillway), flows will impact on urban areas, including Emerald. The Vince Lester Bridge is expected to be overtopped. The maximum area impacted will be less than that inundated in the 2010 flood (Figure B68 and Figure B79).

The following table shows Flood classification triggers as defined by Bureau of Meteorology (BOM) at Fairbairn Dam.

Table 4: Flood classification triggers

	Flood classification level	Depth over spillway (m)	Storage elevation (m AHD)
<p>Example of Flood Level Classification</p>	Major	4.00	208.23
	Moderate	3.50	207.73
	Minor	2.80	207.03

Source: Bureau of Meteorology — <http://www.bom.gov.au/qld/flood/networks/section4.shtml>

The following table shows historical floods experienced at Fairbairn Dam — Sunwater Station# 130216A.

Table 5: Historical floods experienced at Fairbairn Dam

Flood rank	Date	Peak height EL (AHD)	Peak height (m over crest)
1	December 2010	209.80 m	5.57 m
2	February 2008	208.67 m	4.44 m
3	February 1984	207.05 m	2.82 m
4	February 1978	207.02 m	2.79 m
5	May 1983	206.67 m	2.44 m

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

5.1.1 Activation triggers

While this EAP is not triggered until Fairbairn Dam reaches a level of 204.13 m, Sunwater, Central Highlands LDMG and Isaac LDMG will work cooperatively and will endeavour to share intelligence of any rainfall event when any organisation becomes aware of a situation that could result in the activation of the EAP.

The activation of Stand Up 3 requires consideration of wave action. For example, if the gauge reading was forecast to reach 1 m below the dam crest level and the DDO reported 1 m high waves, Stand Up 3 will be triggered. Furthermore, the DSTDM may also trigger this activation if there are any dam safety concerns as the storage approaches dam crest level.

EAP trigger levels may be activated before the levels are reached at the discretion of the FODM. Forecast rainfall and pre-escalation of triggers must be undertaken in accordance with the Operations Centre Procedure (OC Procedure)

Table 6: Flood emergency activation trigger summary

EAP Flood Activation Trigger	Trigger Summary	AWS Warning Level
Alert	<ul style="list-style-type: none"> Storage EL 204.13 m and rising (0.1 m below FSL) 	
Lean Forward	<ul style="list-style-type: none"> Storage above FSL 204.23 m 	ADVICE
Stand Up 1	<ul style="list-style-type: none"> Storage above EL 207.73 m (3.5 m above FSL – greater than Moderate Flood Level) 	WATCH AND ACT
Stand Up 2	<ul style="list-style-type: none"> Storage above EL 209.80 m (5.57 m above FSL – greater than Flood of Record) 	
Stand Up 3	<ul style="list-style-type: none"> Storage above EL 217.39 m (Above Saddle Dam 6 – allowing for Wave Action), OR As advised by the DSTDM 	EMERGENCY
Stand Down	<ul style="list-style-type: none"> Storage EL 204.73 m and falling with no forecast increase in EL for 48 hours 	

5.1.2 Emergency action roles

Table 7 to Table 12 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 7: Flood operations — DDO emergency action


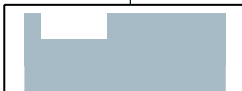
Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none">Storage EL 204.13 m and rising (0.1 m below FSL)	<ul style="list-style-type: none">Storage above FSL 204.23 m	<ul style="list-style-type: none">Storage above EL 207.73 m (3.5 m above FSL)	<ul style="list-style-type: none">Storage above EL 209.80 m (5.57 m above FSL)	<ul style="list-style-type: none">Storage above EL 217.39 m (Allowing for Wave Action), ORAs advised by DSTDM	<ul style="list-style-type: none">Storage EL 204.73 m and falling with no forecast increase in EL for 48 hours
Actions	<ul style="list-style-type: none">Record all communicationInspect the dam daily (or as instructed by the DSTDM) and photograph/video and record using approved forms and send to DSTDM & ICUndertake site preparations including but not limited to checking (if not already):<ul style="list-style-type: none">fuel and operation of backup generatorseal of Selma Gatehouse and confirm the guard gates and cover plates are closedcheck the pump station and right bank towercommunication systems (including backup radio, satellite, phones, and internet)Record the Storage Level daily (or as instructed by the DSTDM) using gauge boards and confirm accuracy of gauging stationRecord river height at the tailwater gauge daily or as instructedRecord rainfall daily	<ul style="list-style-type: none">As per previous activation level, ANDContinue with daily dam inspections with attention to:<ul style="list-style-type: none">visual inspection of flow patterns over spillway and dissipator for evidence of scouringvariations in readingsobvious signs of seepageRead dam instrumentation daily (or as instructed by the DSTDM)Report any unusual readings or observations as soon as practical	<ul style="list-style-type: none">As per previous activation level, ANDInspect the dam twice dailyInspections to include Saddle Dams from the time water level reaches the U/S toeMaintain surveillance of dam wall and spillway access points if requirement determined	<ul style="list-style-type: none">As per previous activation level, ANDView the embankment (with binoculars)Photograph spillway discharge area daily and email to Owner’s RepresentativeInspect the dam at 6-hourly intervals (or as instructed by the DSTDM), and photograph/video and record using approved forms and send to IC & DSTDMIf Storage Level is predicted to approach EL 217.39 m, consider evacuating site.	<ul style="list-style-type: none">As per previous activation level	<ul style="list-style-type: none">Inspect the dam for any damage and photograph any damage identified during the eventForward all EER material to IC email as requiredUpdate Dam Logbook as per SOP 12Return to routine surveillance activities and frequencies
<div><div></div><div>ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO e.g. taking photographs/video, dam inspections, instrument readings</div></div>			<div></div>		CONTINUED	NEXT PAGE

Table 7: Flood operations — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
	<ul style="list-style-type: none"> Update Dam Logbook as per SOP 12 Liaise with LEC to manage access to dam wall and spillway by members of the public If scour observed at any level, immediately notify DSTDM and refer to Stand Up 1 for Stability – Spillway Chute Discuss bridge closure with IC & DSTDM 					
Notifications	<ul style="list-style-type: none"> IC SO LEC External notifications as required 	<ul style="list-style-type: none"> IC SO LEC DSTDM External notifications as required 	<ul style="list-style-type: none"> IC SO LEC DSTDM External notifications as required 	<ul style="list-style-type: none"> IC SO LEC DSTDM External notifications as required 	<ul style="list-style-type: none"> IC SO LEC DSTDM External notifications as required 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
AWS Warning Level		ADVICE	WATCH AND ACT		EMERGENCY	



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



Table 8: Flood operations — LEC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Storage EL 204.13 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above FSL 204.23 m 	<ul style="list-style-type: none"> Storage above EL 207.73 m (3.5 m above FSL) 	<ul style="list-style-type: none"> Storage above EL 209.80 m (5.57 m above FSL) 	<ul style="list-style-type: none"> Storage above EL 217.39 m (Allowing for wave action), OR As advised by DSTDM 	<ul style="list-style-type: none"> Storage EL 204.73 m and falling with no forecast increase in EL for 48 hours
Actions	<ul style="list-style-type: none"> Record all communication Develop/implement staff roster Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level, AND Ensure all abnormal observations or damage has been reported to DSTDM and IC Liaise with DDO and CHRC to manage access to dam wall and spillway by members of the public 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND If storage level is predicted to approach EL 217.39 m, consider evacuating site. 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward all EER material to IC as required Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO IC LDMG 1 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
AWS Warning Level		ADVICE	WATCH AND ACT		EMERGENCY	



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



Table 9: Flood operations — IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Storage EL 204.13 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above FSL 204.23 m 	<ul style="list-style-type: none"> Storage above EL 207.73 m (3.5 m above FSL) 	<ul style="list-style-type: none"> Storage above EL 209.80 m (5.57 m above FSL) 	<ul style="list-style-type: none"> Storage above EL 217.39 m (Allowing for wave action), OR As advised by DSTDM 	<ul style="list-style-type: none"> Storage EL 204.73 m and falling with no forecast increase in EL for 48 hours
Actions	<ul style="list-style-type: none"> Record all communication Liaise with FODM and obtain PFRM results Create Incident Report record Update Sunwater intranet with EAP status Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level, AND Ensure all abnormal observations or damage has been reported to DSTDM Liaise with CHRC regarding obtaining community messages for sharing 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with DDO and DSTDM re: potential for evacuations 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with the DSTDM to confirm that dam failure is in progress 	<ul style="list-style-type: none"> Deactivate EAP Complete all internal and external notifications Compile EER and deliver to DSR if required Close Incident Report record Update intranet with EAP status Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM FODM SMT SRT DDMG 1 QPS 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM FODM SMT SRT LDMG 1 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM FODM SMT SRT DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM FODM SMT SRT DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM FODM SMT SRT DDMG 1 DDMG 2 QPS EMERGENCY SIREN 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
AWS Warning Level		ADVICE	WATCH AND ACT		EMERGENCY	



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



Table 10: Flood operations — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text	AWS Warning Level
Alert	<ul style="list-style-type: none">Storage EL 204.13 m and rising	<ul style="list-style-type: none">LDMG 1DDMG 1QPS	<ul style="list-style-type: none">Phone	Describe current situation with dam — What is the event? What is the status? Advise of current storage level	
		No SMS messaging to D/S residents and no Community messaging			
Lean Forward	<ul style="list-style-type: none">Storage above FSL 204.23m	<ul style="list-style-type: none">LDMG 1LDMG 2DDMG 1DDMG 2QPS	<ul style="list-style-type: none">Phone	Describe current situation with dam — What is the event? What is the status? Advise of current storage level Discuss any potential road/bridge closures	ADVICE
		CHRC are responsible for D/S resident SMS messaging, no SMS required for Lean Forward. Sunwater will communicate AWS advice level on community channels, which CHRC will share.			
Stand Up 1	<ul style="list-style-type: none">Storage above EL 207.73 m (3.5 m above FSL)	<ul style="list-style-type: none">LDMG 1LDMG 2DDMG 1DDMG 2QPS	<ul style="list-style-type: none">Phone	Describe current situation with dam — What is the event? What is the status? (Storage is greater than moderate flood level) Advise of current storage level Advise of any forecasts you are aware of	WATCH AND ACT
		DOWNSTREAM FLOODING, ROAD CLOSURES & EVACUATION MESSAGES: CHRC sends SMS messaging to D/S residents. CHRC updates Emergency Mgt Dashboard and takes lead on Community messaging which Sunwater shares. To ensure consistent community messaging, CHRC higher level of emergency communications overrides the Sunwater AWS levels. Note only one message is sent at each AWS trigger level.			
Stand Up 2	<ul style="list-style-type: none">Storage above EL 209.80 m (Flood of Record - 5.57 m above FSL)	<ul style="list-style-type: none">LDMG 1LDMG 2DDMG 1DDMG 2QPS	<ul style="list-style-type: none">Phone	Describe current situation with dam—What is the event? What is the status? (Storage is greater than flood of record) Advise of current storage level Advise of any forecasts you are aware of	WATCH AND ACT
		DOWNSTREAM FLOODING, ROAD CLOSURES & EVACUATION MESSAGES: CHRC sends SMS messaging to D/S residents and Emergency Alerts. CHRC updates Emergency Mgt Dashboard and takes lead on Community messaging which Sunwater shares. To ensure consistent community messaging, CHRC higher level of emergency communications overrides the Sunwater AWS levels. Note only one message is sent at each AWS trigger level.			



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



Table 10: Flood operations — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text	AWS Warning Level
Stand Up 3 (Dam Failure likely)	<ul style="list-style-type: none"> Storage above EL 217.39 m (Allowing for Wave Action), OR As advised by DSTDM 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	<p>Describe current situation with dam—What is the event? What is the status? (Dam Failure Likely) Advise of current storage level Advise of any forecasts you are aware of Confer with DSTDM and LDMGs & discuss Emergency Alert Message</p> <p><i>DOWNSTREAM FLOODING, ROAD CLOSURES & EVACUATION MESSAGES:</i> CHRC sends SMS messaging to D/S residents and emergency alerts. CHRC updates Emergency Mgt Dashboard and takes lead on Community messaging which Sunwater shares.</p> <p><i>SPECIFIC FAIRBAIRN DAM EMERGENCY MESSAGES:</i> Sunwater sends SMS messaging to D/S residents and Emergency Alerts in consultation with LDMG if time permits. Liaise with Sunwater Media on-call, LDMG(s), FODM and/or DSTM to send appropriate messaging. Refer to Annexe for sample message. Sunwater takes lead on Community messaging which CHRC shares. CHRC updates Emergency Mgt Dashboard and links to Sunwater website. Note only one message is sent at each AWS trigger level, if the emergency message is issued at 'Dam Failure Likely' additional messaging at 'Dam Failure in Progress' is NOT required. <i>If time does not permit use prepopulated template at Appendix A10.</i> Complete Emergency Alert Request Form as per instructions and send to the SDCC to send to D/S Residents.</p>	EMERGENCY
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	<p>Describe current situation with dam—What is the event? What is the status? (Dam Failure in Progress) Advise of current storage level Advise of any forecasts you are aware of Confer with DSTDM and LDMGs & discuss Emergency Alert Message</p> <p><i>DOWNSTREAM FLOODING, ROAD CLOSURES & EVACUATION MESSAGES:</i> CHRC sends SMS messaging to D/S residents and Emergency Alerts. CHRC updates Emergency Mgt Dashboard and takes lead on Community messaging which Sunwater shares.</p> <p><i>SPECIFIC FAIRBAIRN DAM EMERGENCY MESSAGES:</i> Sunwater sends SMS messaging to D/S residents and Emergency Alerts in consultation with LDMG if time permits. Liaise with Sunwater Media on-call, LDMG(s), FODM and/or DSTM to send appropriate messaging. Refer to Annexe for sample message. Sunwater takes lead on Community messaging which CHRC shares. CHRC updates Emergency Mgt Dashboard and links to Sunwater website. Note only one message is sent at each AWS trigger level, if the emergency message has NOT been issued at 'Dam Failure Likely' emergency messaging at 'Dam Failure in Progress' is required. <i>If time does not permit use prepopulated template at Appendix A10.</i> Complete Emergency Alert Request Form as per instructions and send to the SDCC to send to D/S Residents.</p>	
Stand Up 3 (Dam Failure in progress)	<ul style="list-style-type: none"> Storage above EL 217.39 m (Allowing for Wave Action), OR As advised by DSTDM 	<ul style="list-style-type: none"> Emergency Siren 	<ul style="list-style-type: none"> Phone and email 	<p>Complete emergency siren instructions in Appendix A11 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.</p>	

Table 10: Flood operations — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text	AWS Warning Level
Stand Down	<ul style="list-style-type: none">Storage EL 204.73 m and falling with no forecast increase in EL for 48 hours	<ul style="list-style-type: none">LDMG 1LDMG 2DDMG 1DDMG 2QPS	<ul style="list-style-type: none">Phone	Describe current situation with dam — What is the event? What is the status? Advise of current storage level Advise EAP has been deactivated	
		No SMS messaging to D/S residents but Sunwater takes lead on Community messaging which CHRC shares.			



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



Table 11: Flood operations — DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Storage EL 204.13 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above FSL 204.23 m 	<ul style="list-style-type: none"> Storage above EL 207.73 m (3.5 m above FSL) 	<ul style="list-style-type: none"> Storage above EL 209.80 m (5.57 m above FSL) 	<ul style="list-style-type: none"> Storage above EL 217.39 m (Allowing for wave action), OR As advised by DSTDM 	<ul style="list-style-type: none"> Storage EL 204.73 m and falling with no forecast increase in EL for 48 hours
Action	<ul style="list-style-type: none"> 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 Review instrumentation data and determine if any additional responses are required Advise DSR of EAP activation 	<ul style="list-style-type: none"> As per previous activation level, AND Review provided reports and monitor for scour risk. If scour detected, refer to stability hazards 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Review condition of saddle dams and advise if EAP should be activated to Stand Up 3 level (Flood) 	<ul style="list-style-type: none"> As per previous activation level, AND If failure is likely or in progress, decision required—advise IC of decision Liaise with the IC and confirm need to sound emergency siren due to dam failure 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> IC DDO DSR 	<ul style="list-style-type: none"> IC DDO DSR 	<ul style="list-style-type: none"> IC DDO DSR 	<ul style="list-style-type: none"> IC DDO DSR 	<ul style="list-style-type: none"> IC DDO DSR 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
AWS Warning Level		ADVICE	WATCH AND ACT		EMERGENCY	



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



Table 12: Flood operations — FODM emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Storage EL 204.13 m and rising (0.1 m below FSL) 	<ul style="list-style-type: none"> Storage above FSL 204.23 m 	<ul style="list-style-type: none"> Storage above EL 207.73 m (3.5 m above FSL) 	<ul style="list-style-type: none"> Storage above EL 209.80 m (5.57 m above FSL) 	<ul style="list-style-type: none"> Storage above EL 217.39 m (Allowing for wave action), OR As advised by DSTDM 	<ul style="list-style-type: none"> Storage EL 204.73 m and falling with no forecast increase in EL for 48 hours
Action	<ul style="list-style-type: none"> Record all communication Extract relevant data from available sources Update Flood models as per OC Procedure Update and issue flood operations report Liaise with BOM Update DSTDM and IC re: current flood situation and PFRM results 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> IC DSTDM BOM 	<ul style="list-style-type: none"> IC DSTDM BOM 	<ul style="list-style-type: none"> IC DSTDM BOM 	<ul style="list-style-type: none"> IC DSTDM BOM 	<ul style="list-style-type: none"> IC DSTDM BOM 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down
AWS Warning Level		ADVICE	WATCH AND ACT		EMERGENCY	



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



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 B2 are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by piping. The use of these flood outlines is prescribed below:

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

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

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

An increase in seepage or a new area of seepage is a circumstance that could indicate an occurrence 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 13 to Table 17 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: Piping: embankment, foundation, or abutments flowchart

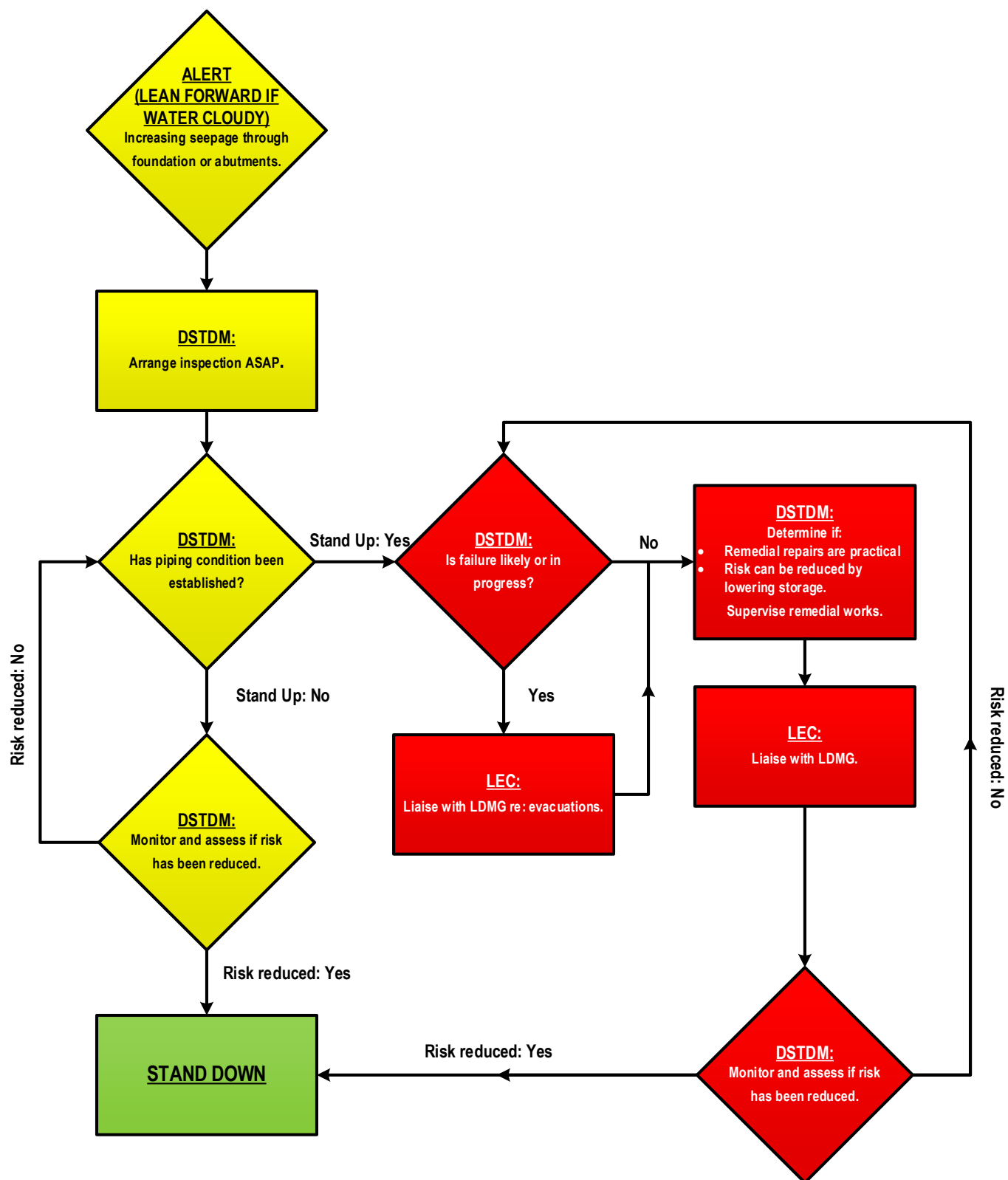


Table 13: Piping: embankment, foundation, or abutments — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments WITH cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to piping, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Monitor flows every 6 hours (or as otherwise instructed by the DSTDM) Photograph/video the piping from a safe point and record using the approved forms and send to DSTDM & IC Update Dam Logbook as per SOP 12 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Support/supervise remedial works as required Lower the storage if directed Close any affected roads if not already closed by others Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public 	<ul style="list-style-type: none"> As per previous activation level, AND Ensure remedial works cease and plant and personnel have been moved to a safe location Vacate the immediate vicinity of the piping condition Record/photograph the piping damage and/or dam failure from a safe point 	<ul style="list-style-type: none"> Inspect the dam for any damage and photograph any damage identified during the event Forward all EER material to IC email as required Update Dam Logbook as per SOP 12 Return to routine surveillance activities and frequencies
Notifications	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



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

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments WITH cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to piping, and Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with relevant council(s) regarding potential road/bridge closures 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



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

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments WITH cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to piping, and Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Create Incident Report record Update Sunwater intranet with EAP status Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level, AND Investigate availability of machinery and materials (if insufficient stockpiles available) Place machinery operators on standby if directed by DSTDM Consider the need to appoint a Recovery Coordinator. The Recovery Coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Mobilise resources to undertake remedial works if directed by DSTDM 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with the DSTDM to confirm that dam failure is in progress Confirm that remedial works have ceased if directed by the DSTDM and plant and personnel have been moved to a safe location Liaise with DDO and DSTDM re: potential for evacuations 	<ul style="list-style-type: none"> Deactivate EAP Complete all internal and external notifications Compile EER and deliver to DSR if required Close Incident Report record Update Sunwater intranet with EAP status Return to routine activities
Notifications	<ul style="list-style-type: none"> DSTDM DDO LEC/ORR SMT SRT External notifications as required 	<ul style="list-style-type: none"> DSTDM DDO LEC/ORR SMT SRT DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DSTDM DDOLEC/ORR SMT SRT SDCC D/S Residents Treated Water Supply Users DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DSTDM DDO LEC/ORR SMT SRT SDCC D/S Residents Treated Water Supply Users Emergency Siren DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 16: Piping: embankment, foundation, or abutments — LEC and IC external communication plan

Activation level	Trigger for communications			Group to contact	Method	Message text
Alert	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Phone 			<p>Describe current situation with dam — What is the event? (<i>Unconfirmed piping risk</i>)</p> <p>What is the status? (Unconfirmed leakage — Investigation continues)</p> <p>Advise of current storage level</p> <p>Advise any issues you are aware of</p> <p>Standby for further information</p>
Lean Forward	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments with cloudy water 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 			<p>Describe current situation with dam — What is the event? (<i>Unconfirmed piping risk</i>)</p> <p>What is the status? (Unconfirmed leakage — Investigation continues)</p> <p>Advise of current storage level</p> <p>Advise any issues you are aware of</p> <p>Standby for further information</p>
Stand Up 1	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 			Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents.
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 			Liaise with Sunwater Media on-call LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 			<p>Describe current situation with dam — What is the event? (<i>Confirmed piping risk</i>).</p> <p>What is the status? (Confirmed piping/leakage)</p> <p>Advise of current storage level</p> <p>Advise any issues you are aware of. Discuss any potential road/bridge closures</p> <p>Prepare for possible evacuations</p>
Stand Up 2 (Failure likely)	<ul style="list-style-type: none"> Failure likely due to piping; AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 			Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents.
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 			Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 			<p>Describe current situation with dam — What is the event? (<i>Confirmed piping risk</i>)</p> <p>What is the status? (Possible Dam Failure)</p> <p>Advise of current storage level</p> <p>Prepare coordinated evacuations</p>

Table 16: 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 in progress)	<ul style="list-style-type: none"> Dam Failure in progress 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents.		
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message		
		<ul style="list-style-type: none"> Emergency siren 	<ul style="list-style-type: none"> Phone and Email 	Complete emergency siren instructions in Appendix A11 and notify SRT Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out		
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (<i>Confirmed piping risk</i>) What is the status? (Dam Failure in Progress) Advise of current storage level Coordinate evacuations of affected Downstream Residents and move people to higher ground		
Stand Down	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with Dam — What is the event? (<i>Dam Safety Risk — piping</i>) What is the status? (Dam hazard stood down) Advise risk assessment has determined that piping risk has reduced, and EAP has been deactivated		
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Customer Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message		

Table 17: Piping: embankment, foundation, or abutments — DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments 	<ul style="list-style-type: none"> Increasing seepage or leakage through an embankment, the foundations, or abutments with cloudy water 	<ul style="list-style-type: none"> Piping condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to piping, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Action	<ul style="list-style-type: none"> Record all communication Arrange an inspection of the dam to assess its condition as soon as possible, when safe to do so Determine if piping condition has been established Monitor situation and assess risks Advise DSR of EAP activation 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Assess risk and determine if failure likely or in progress Determine if remedial repairs are practical Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC LEC/ORR DSR 	<ul style="list-style-type: none"> DDO IC LEC/ORR DSR 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



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 B2 are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by earthquake damage. The use of these flood outlines is prescribed below:

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

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

7.2 Emergency action roles

Table 18 to Table 22 to specify emergency actions for the following roles.

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

Figure 5: Earthquake flowchart

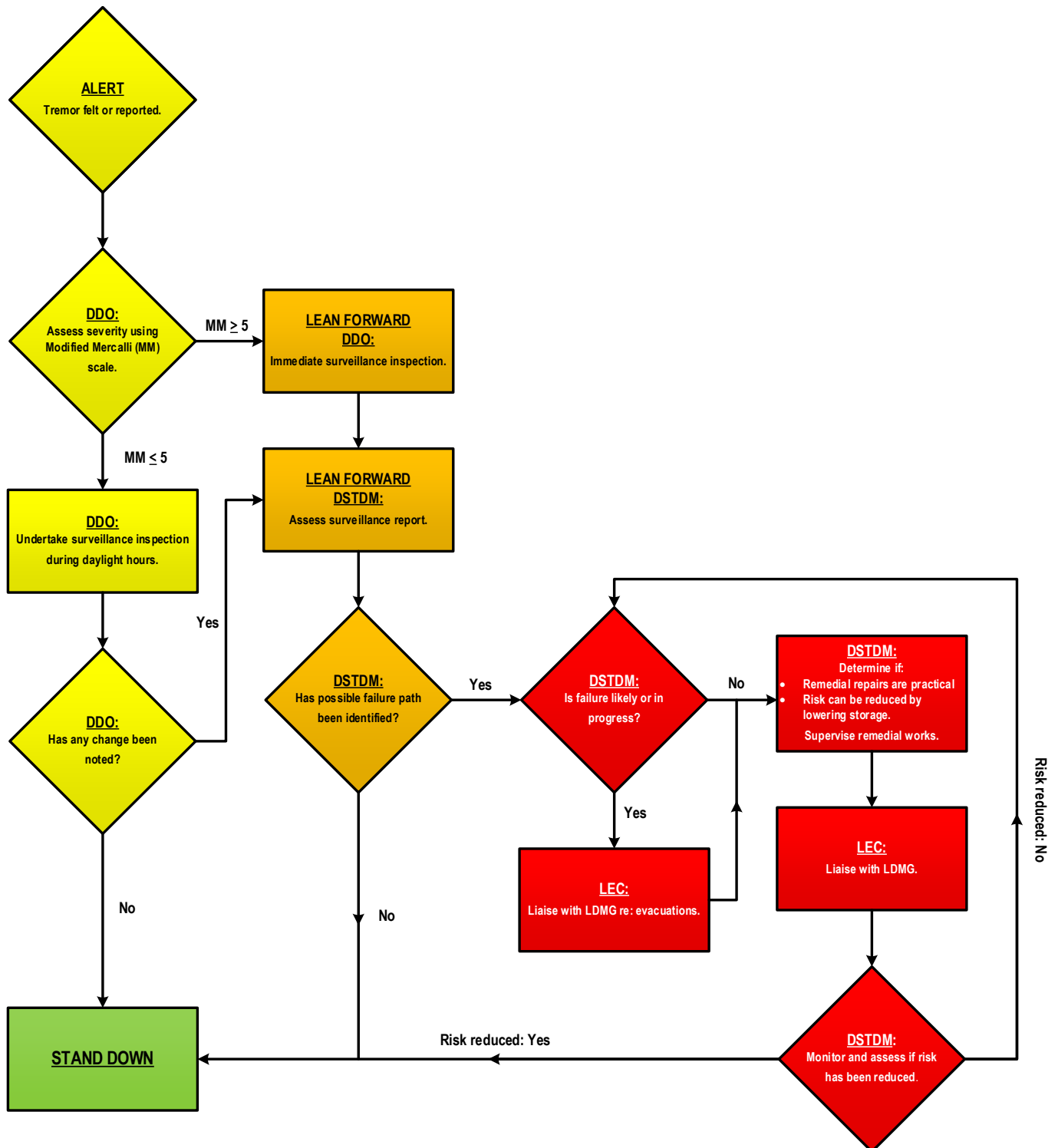


Table 18: Earthquake — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Earthquake confirmed* (by DSTDM) or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> Earthquake confirmed* (by DSTDM) or felt in the area, AND Intensity greater than or equal to 5MM OR Intensity less than 5MM and change detected during surveillance inspection 	<ul style="list-style-type: none"> Earthquake confirmed* (by DSTDM) or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> DDO to assess magnitude (MM Scale) at dam location Record all communication Inspect the main embankment, spillway structure, abutments, and saddle dam in daylight hours (if safe to do so). Photograph/video and record using approved forms and send to DSTDM & IC Check for leaks, deformation, erosion, and concrete damage Update Dam Logbook as per SOP 12 	<ul style="list-style-type: none"> As per previous activation level, AND Immediately inspect the dam wall, spillway structure, and abutments (if safe to do so), and report to the IC & DSTDM (unless inspection completed in Alert Stage) Repeat the inspection as directed 	<ul style="list-style-type: none"> As per previous activation level, AND Support/supervise remedial work as required Lower the storage if directed Close any affected roads as directed Maintain surveillance of area immediately downstream of dam or saddle dam (if safe to do so) and move on any members of the public Vacate the immediate vicinity of the embankment 	<ul style="list-style-type: none"> As per previous activation level, AND Ensure remedial works cease and plant and personnel have been moved to a safe location Record/photograph the earthquake damage and/or dam failure from a safe point 	<ul style="list-style-type: none"> Inspect the dam for any damage and photograph any damage identified during the event Forward all EER material to IC email as required Update Dam Logbook as per SOP 12 Return to routine surveillance activities and frequencies
Notifications	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down

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



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



Table 19: Earthquake — LEC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Earthquake confirmed* (by DSTDM) or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> Earthquake confirmed* (by DSTDM) or felt in the area, AND Intensity greater than or equal to 5MM OR Intensity less than 5MM and change detected during surveillance inspection 	<ul style="list-style-type: none"> Earthquake confirmed* (by DSTDM) or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with DDO and relevant council(s) regarding potential road/bridge closures 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down

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



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



Table 20: Earthquake — IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Earthquake confirmed* or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Earthquake confirmed* or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Liaise with DDO, LEC and DSTDM Create Incident Report Record Update Sunwater intranet with EAP status Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level, AND Investigate availability of machinery and materials (if insufficient stockpiles available) Place machinery operators on standby if directed by DSTDM Consider the need to appoint a Recovery Coordinator. The Recovery Coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles Mobilise resources to undertake remedial works if directed by DSTDM 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with the DSTDM to confirm that dam failure is in progress Confirm that remedial works have ceased if directed by the DSTDM and plant and personnel have been moved to a safe location Liaise with DDO and DSTDM re: potential for evacuations 	<ul style="list-style-type: none"> Deactivate EAP Complete all Internal and External notifications Compile EER and deliver to DSR if required Close Incident Report record Update Sunwater Intranet with EAP status Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM SMT SRT External notifications as required 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM SMT SRT DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM SMT SRT SDCC D/S Residents DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM SMT SRT SDCC D/S Residents Emergency siren DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down

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



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



Table 21: Earthquake — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	<ul style="list-style-type: none"> Earthquake confirmed or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake felt or reported in area) What is the status? (Under investigation) Advise of current storage level Stand by for further information
Lean Forward	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake felt or reported in area) What is the status? (Under investigation) Advise of current storage level Stand by for further information
Stand Up 1	<ul style="list-style-type: none"> Earthquake confirmed or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents.
		<ul style="list-style-type: none"> D/S Residents Treated Water Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake felt or reported in area) What is the status? (Possible earthquake damage to dam) Advise current storage level. Discuss any potential road/ bridge closures Activate emergency response
Stand Up 2 (Failure likely)	<ul style="list-style-type: none"> Failure likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents.
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPSs 	<ul style="list-style-type: none"> 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



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



Table 21: Earthquake — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up 2 (Failure in progress)	<ul style="list-style-type: none"> Dam Failure in progress 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents.
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Dam Failure in progress) Advise of current storage level. Discuss any potential road/bridge closures Coordinate evacuation
		<ul style="list-style-type: none"> Emergency siren 	<ul style="list-style-type: none"> Phone and Email 	Complete emergency siren instructions in and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.
Stand down	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (<i>Dam Safety Risk — Earthquake damage</i>) What is the status? (Dam hazard Stood Down) Advise risk assessment has been determined that failure risk has reduced, and that EAP has been deactivated
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message



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



Table 22: Earthquake — DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Earthquake confirmed* or felt in the area, AND Intensity less than 5MM 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Earthquake confirmed* or felt in the area, AND A possible failure path has been identified 	<ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced
Action	<ul style="list-style-type: none"> Record all communication Review surveillance inspection of the dam and assess its condition as soon as possible Review instrumentation data and determine if any additional responses are required Monitor situation and assess risks Advise DSR of EAP activation 	<ul style="list-style-type: none"> As per previous activation level, AND Determine if there are any possible failure paths from reported damage 	<ul style="list-style-type: none"> As per previous activation level, AND Assess risk and determine if failure likely or in progress Determine if remedial repairs are practical Determine if risks can be reduced by lowering storage — if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision. 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC 	<ul style="list-style-type: none"> DDO IC 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down

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



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



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

8.1 Overview

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

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

The flood outlines in Appendix B2 are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by a terrorist attack. The use of these flood outlines is prescribed below:

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

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

8.2 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.

8.3 Emergency action roles

Table 23 to Table 27 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 6: Terrorist threat/activity or high energy impact flowchart

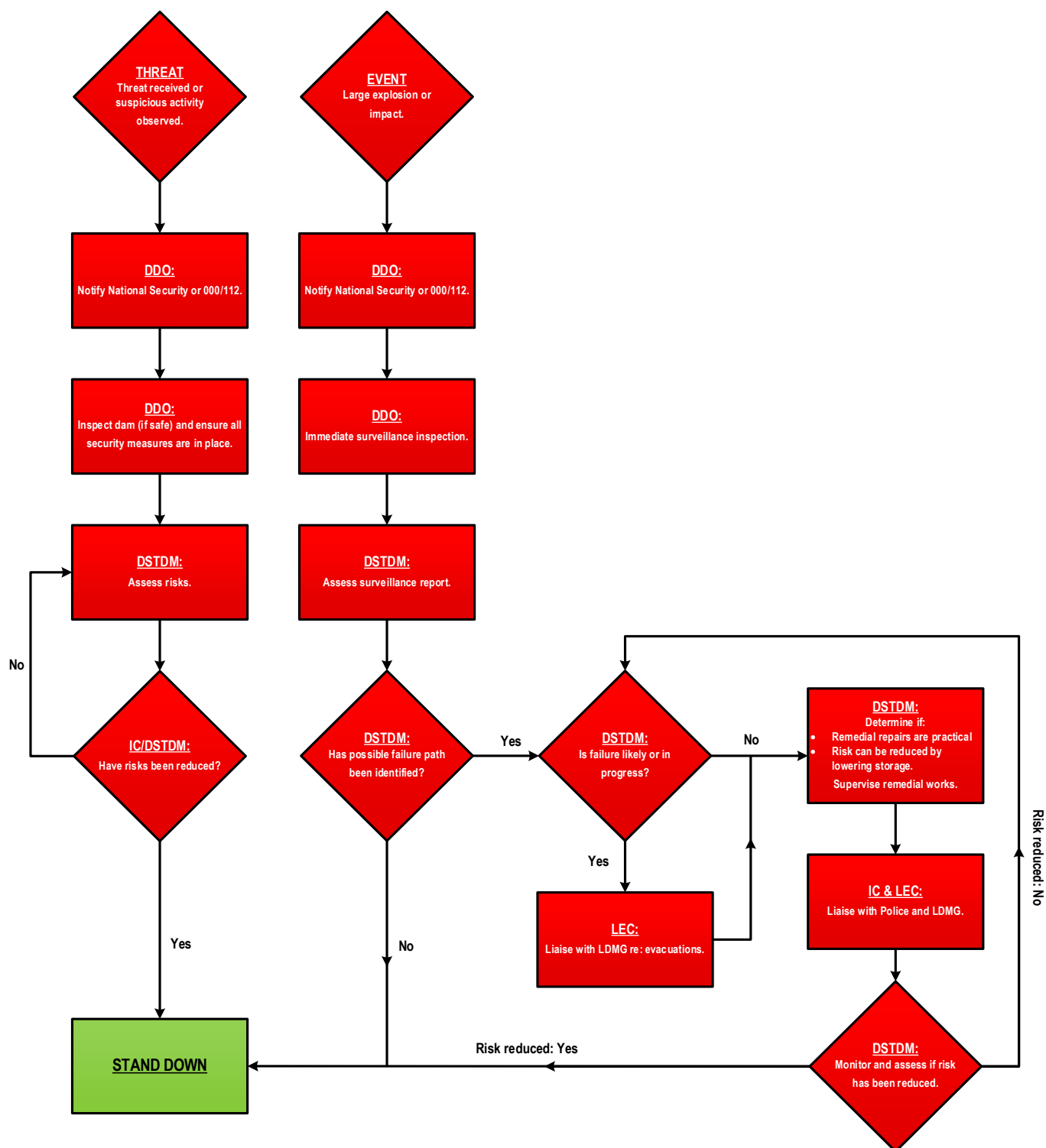


Table 23: Terrorist threat/activity or high energy impact — DDO emergency action

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Not applicable 	THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) 	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> In an emergency call 000. Record all communication If any suspicious behaviour noticed, contact DSTDM for advice and if instructed or if threat received, complete the following: <ul style="list-style-type: none"> Inspect dam (if safe) and ensure all security measures are in place (locked gates, etc.) Photograph/video suspicious items from a safe point and record using approved forms and send to DSTDM & IC If Police appoint Incident Manager support and follow instructions Close any affected roads as directed and move on any members of the public Update Dam Logbook as per SOP 12 	<ul style="list-style-type: none"> As per previous activation level, AND Vacate the immediate vicinity of the affected area 	<ul style="list-style-type: none"> As per previous activation level, AND Lower reservoir level, if directed by DSTDM 	<ul style="list-style-type: none"> Inspect the dam for any damage and photograph any damage identified during the event Forward all EER material to IC email as required Update Dam Logbook as per SOP 12 Return to routine surveillance activities and frequencies
Notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> DSTDM IC SO LEC # 000 Emergency 	<ul style="list-style-type: none"> DSTDM IC SO LEC # 000 Emergency 	<ul style="list-style-type: none"> DSTDM IC SO LEC # 000 Emergency 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



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

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Not applicable 	THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) 	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Record all communication If Police appoint Incident Manager support and follow instructions Liaise with relevant council(s) regarding possible road/bridge closures Note: IC to contact LDMGs unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with DDO, DSTDM, and LDMGs re: potential for evacuations 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO IC LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



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

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Not applicable 	THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) 	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Record all communication If Police appoint Incident Manager support and follow instructions Create Incident Report record Update Sunwater intranet with EAP status Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles Consider the need to appoint a 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. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Deactivate EAP Complete all internal and external notifications Compile EER and deliver to DSR if required Close Incident Report Record Update Sunwater intranet with EAP status Return to routine activities
Notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM SMT SRT CTG (if required) DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM SMT SRT SDCC D/S Residents CTG DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> DDO LEC/ORR DSTDM SMT SRT SDCC D/S Residents Emergency Siren CTG DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 26: 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 <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS CTG 	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents. Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS CTG 	<ul style="list-style-type: none"> 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 26: 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 <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents. Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> Emergency siren 	<ul style="list-style-type: none"> Phone & Email 	Complete emergency siren instructions in Appendix A11 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS CTG 	<ul style="list-style-type: none"> 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
Stand Down	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced 	<ul style="list-style-type: none"> D/S Residents & Treated Water Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS CTG 	<ul style="list-style-type: none"> 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 27: Terrorist threat/activity or high energy impact — DSTDM emergency action

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	<ul style="list-style-type: none"> Not applicable 	THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at the dam, OR Threat received 	EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) 	RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Action	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Record all communication Advise DSR of EAP activation 	<ul style="list-style-type: none"> As per previous activation level, AND Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so Monitor situation, assess risks, and determine if failure likely or in progress Determine if remedial repairs are practical Determine if risks can be reduced by lowering storage — if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> IC DDO SRT DSR 	<ul style="list-style-type: none"> IC DDO SRT DSR 	<ul style="list-style-type: none"> IC DDO LEC/ORR SRT DSR 	<ul style="list-style-type: none"> As required



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



9. Dam Hazard — stability: main embankment

9.1 Overview

The emergency action described in this section relates to a potential dam hazard due to a slip circle failure of the main embankment.

If a slip circle failure initiates, a dam failure may result. If the early signs of slip circle failure are detected, remedial actions may be possible depending on the nature of the circumstances.

Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to a slip circle failure and no concurrent flooding or downstream releases are occurring or expected to occur, or

Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to a slip circle failure 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.

9.2 Emergency actions roles

Table 28 to Table 32 specify emergency actions for the following roles:

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

Figure 7: Stability: main embankment flowchart

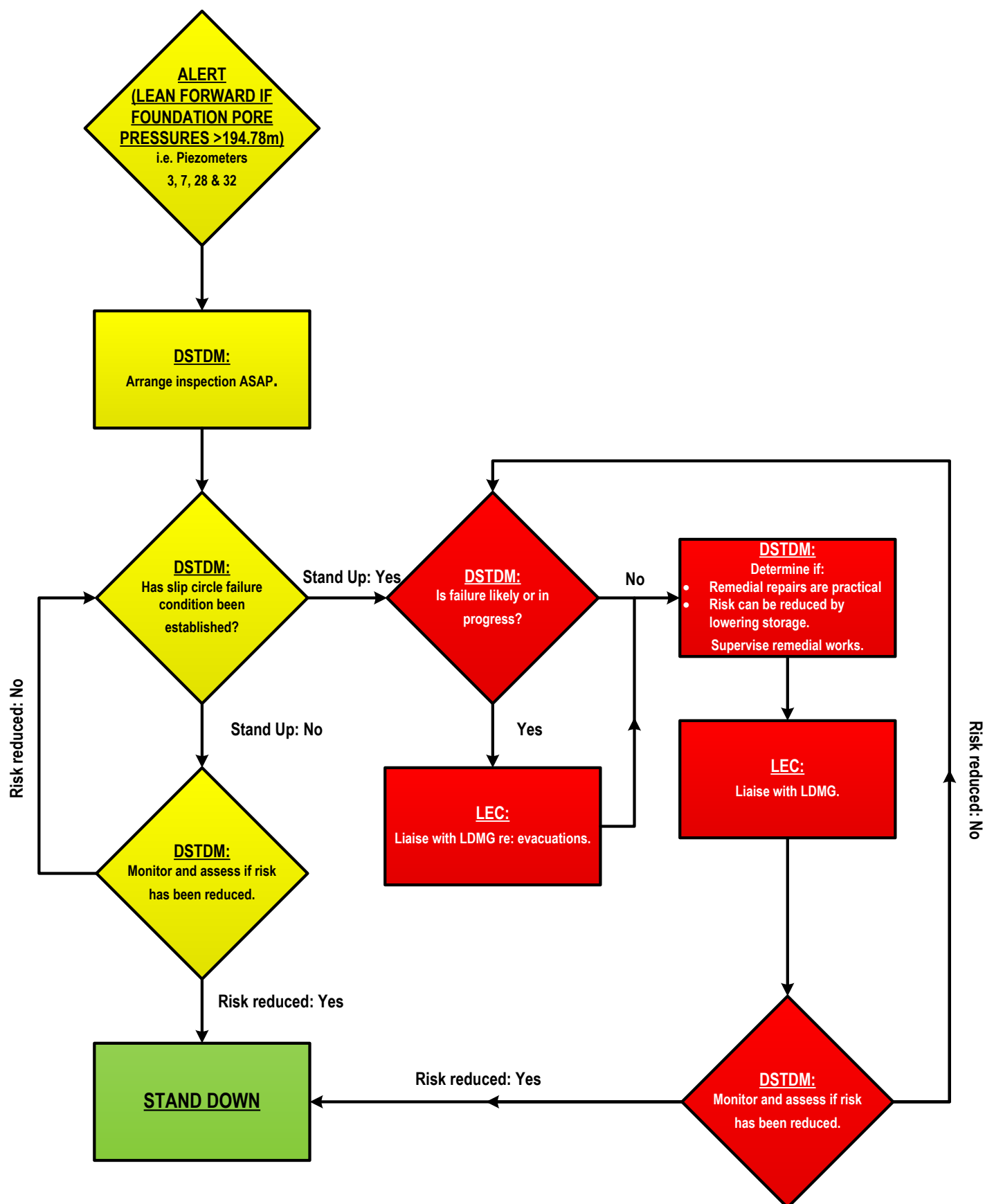


Table 28: Stability: main embankment — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Foundation pore pressures readings abnormally high as discerned by the DSTDM. 	<ul style="list-style-type: none"> Scarps, cracks, wet and soft areas, toe bulge have been identified 	<ul style="list-style-type: none"> Slip circle failure condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to slip circle failure, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that slip circle failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Inspect the complete area of the upstream/downstream embankment areas, crest, weighted berm and toe for the main embankment daily for any signs of a potential slide, i.e., scarps, cracks, wet and soft areas, toe bulge etc., and record using approved forms and send to DSTDM, IC. Inspect for deficiencies — instability (or as otherwise instructed by the DSTDM) Update Dam Logbook as per SOP 12 	<ul style="list-style-type: none"> As per previous activation level, AND Maintain photographic record 	<ul style="list-style-type: none"> As per previous activation level, AND Support/supervise remedial works as required Lower the storage if directed Close any affected roads as directed Maintain surveillance of upstream/downstream embankment areas, Crest, Weighted Berm and Toe (if safe to do so) and move on any members of the public or other parties 	<ul style="list-style-type: none"> As per previous activation level, AND Vacate the immediate vicinity of the slip circle failure condition Ensure remedial works cease and plant and personnel have been moved to a safe location Record/photograph the slip circle failure from a safe point 	<ul style="list-style-type: none"> Inspect the dam for any damage and photograph any damage identified during the event Forward all EER material to IC email as required Update Dam Logbook as per SOP 12 Return to routine surveillance activities and frequencies
Notifications	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 29: Stability: main embankment — LEC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Foundation pore pressures readings abnormally high as discerned by the DSTDM 	<ul style="list-style-type: none"> Scarps, cracks, wet and soft areas, toe bulge have been identified 	<ul style="list-style-type: none"> Slip circle failure condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to slip circle failure, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that slip circle failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with DDO and relevant Council(s) regarding potential road/bridge closures 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward all EER material to IC email as required
Notifications	<ul style="list-style-type: none"> IC DDO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> IC DDO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> IC DDO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> IC DDO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 30: Stability: main embankment—IC emergency action

Activation level	Alert	Lean Forward	Stand Up — 1	Stand Up — 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Foundation pore pressures readings abnormally high as discerned by the DSTDM 	<ul style="list-style-type: none"> Scarps, cracks, wet and soft areas, toe bulge have been identified 	<ul style="list-style-type: none"> Slip circle failure condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to slip circle failure, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that slip circle failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Create Incident Report record Update Sunwater intranet with EAP status Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level, AND Investigate availability of machinery and materials (if insufficient stockpiles available) Place machinery operators on standby if directed by DSTDM Consider the need to appoint a Recovery Coordinator. The Recovery Coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with Sunwater Customer Support to send SMS to D/S residents and phone those without mobiles Mobilise resources to undertake remedial works if directed by DSTDM 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with the DSTDM to confirm that dam failure is in progress Confirm that remedial works have ceased if directed by the DSTDM and plant and personnel have been moved to a safe location Liaise with DDO and DSTDM re: potential for evacuations 	<ul style="list-style-type: none"> Deactivate EAP Complete all internal and external notifications Compile EER and deliver to DSR if required Close Incident Report record Update Sunwater intranet with EAP status Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT External notifications as required 	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT DDMG 1 DDMG 2 	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT SDCC D/S Residents Treated Water Supply Users DDMG 1 DDMG 2 	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT SDCC D/S Residents Treated Water Supply Users Emergency siren DDMG 1 DDMG 2 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 31: Stability: main embankment — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	<ul style="list-style-type: none"> Foundation pore pressures readings abnormally high as discerned by the DSTDM 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Unconfirmed main dam embankment stability risk</i>) What is the status? (Under Investigation) Advise of current storage level Advise any issues you are aware of Standby for further information
Lean Forward	<ul style="list-style-type: none"> Scarps, cracks, wet and soft areas, toe bulge have been identified 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Unconfirmed main dam embankment stability risk</i>) What is the status? (Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further information
Stand Up 1	<ul style="list-style-type: none"> Slip circle failure condition has been established 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Phone & Email 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents. Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Confirmed main dam embankment stability risk</i>) What is the status? (Possible Dam Safety Issue) Advise of current storage level Advise any issues you are aware of. Discuss any potential road/bridge closures Prepare for possible evacuations

Table 31: Stability: main embankment — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up 2 (Failure likely)	<ul style="list-style-type: none"> Dam Failure likely due to slip circle failure, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents. Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — Main dam embankment stability) What is the status? (Dam Failure likely) Advise of current storage level. Discuss any potential road/bridge closures Prepare coordinated evacuation
Stand Up 2 (Failure in progress)	<ul style="list-style-type: none"> Dam Failure in progress 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents. Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> Emergency siren 	<ul style="list-style-type: none"> Phone & Email 	Complete emergency siren instructions in Appendix A11 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — Main dam embankment stability) What is the status? (Dam Failure in Progress) Advise of current storage level Coordinate evacuation of Downstream Residents and move people to higher ground
Stand down	<ul style="list-style-type: none"> Risk assessment has been determined that failure risk has reduced 	<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — Main dam embankment stability) 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 32: Stability: main embankment—DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Foundation pore pressures readings abnormally high as discerned by the DSTDM 	<ul style="list-style-type: none"> Scarps, cracks, wet and soft areas, toe bulge have been identified 	<ul style="list-style-type: none"> Slip circle failure condition has been established 	<ul style="list-style-type: none"> Failure in progress or likely due to slip circle failure, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that slip circle failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Review surveillance inspection of the dam and assess its condition as soon as possible Review instrumentation data and determine if any additional responses are required Monitor situation and assess risks Advise DSR of EAP activation 	<ul style="list-style-type: none"> As per previous activation level, AND Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so Determine if a slip circle failure condition has been established 	<ul style="list-style-type: none"> As per previous activation level, AND Assess risk and determine if failure likely or in progress Determine if remedial repairs are practical Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Forward all EER material to IC email as required
Notifications	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



10. Dam Hazard – stability: spillway chute

10.1 Overview

The emergency action described in this section relates to a potential dam hazard due to instability and/or erosion failure of the spillway chute. This failure mode includes sliding directly beneath the ogee crest or overturning about the toe of the ogee crest and for global stability along a weak seam further down in the foundation of the spillway.

If instability and/or erosion initiates, a dam failure may result. If the early signs of instability and/or erosion failure are detected, remedial actions may be possible depending on the nature of the circumstances.

The flood outlines in Appendix B2 are there to provide an indicative outline of the maximum potentially affected area of a dam hazard caused by dam spillway instability. The use of these flood outlines is prescribed below:

Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to a spillway failure and no concurrent flooding or downstream releases are occurring or expected to occur, or

Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to a spillway failure and concurrent flooding or downstream releases are occurring or expected to occur.

10.2 Emergency actions roles

Table 33 to Table 37 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 8: Instability: Spillway chute flowchart

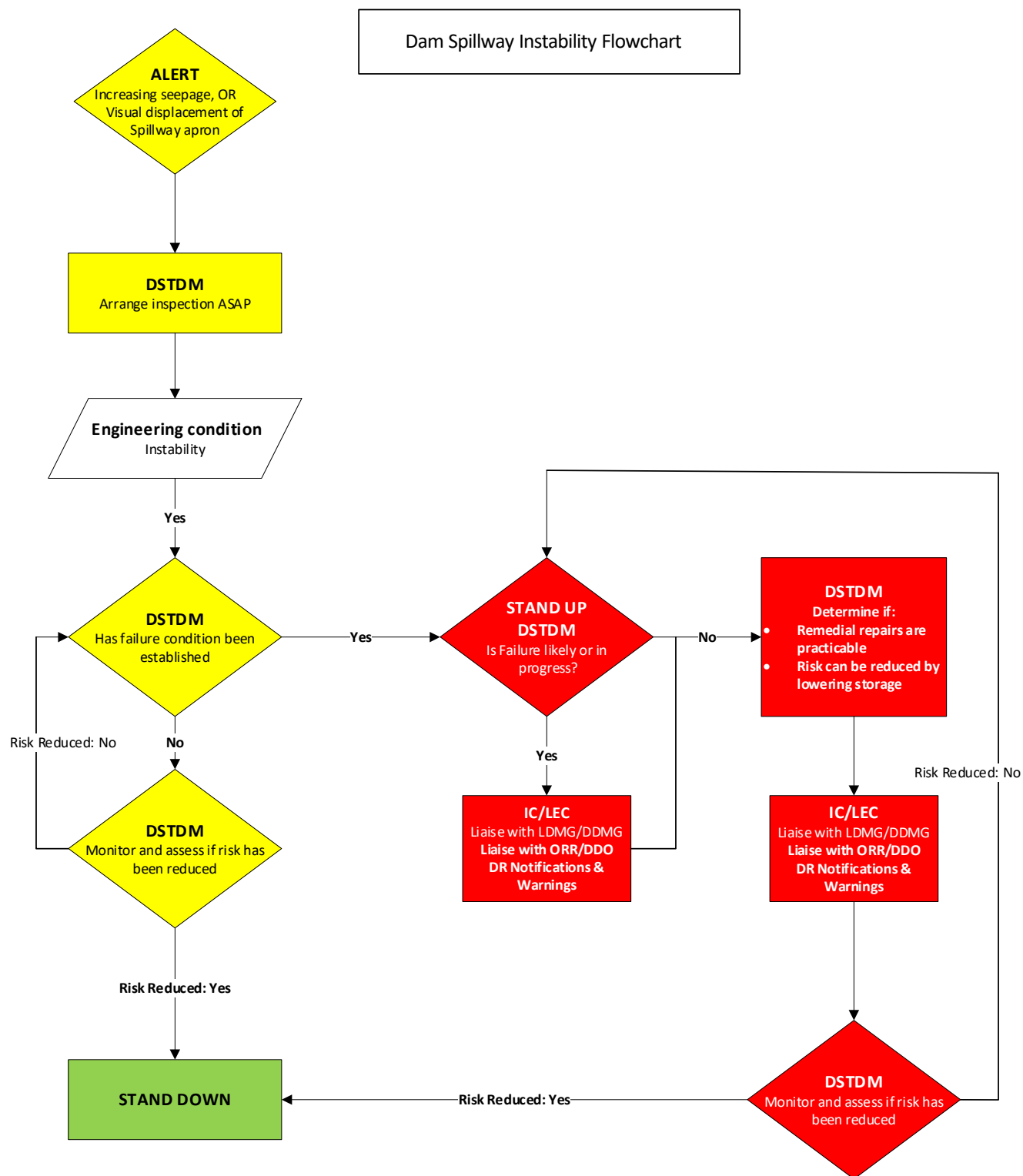


Table 33: Stability: spillway chute — DDO emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing seepage noticed with spillway, OR Visual displacement of spillway apron 	<ul style="list-style-type: none"> Removal of localised section of spillway apron, OR Flow disturbance noticed which is likely caused by removal of a localised section of spillway apron 	<ul style="list-style-type: none"> Scour of the spillway to the base of the spillway monoliths 	<ul style="list-style-type: none"> Failure of the spillway monoliths in progress or likely, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Inspect the complete area of the spillway chute for deficiencies (including sidewall embankment areas and crest) shall be visually inspected daily for any signs of a potential slide, i.e., scarps, cracks, wet and soft areas, back cutting etc., and record using the approved forms and send to DSTDM, IC. Update Dam Logbook as per SOP 12 	<ul style="list-style-type: none"> As per previous activation level, AND Maintain photographic record 	<ul style="list-style-type: none"> As per previous activation level, AND Support/supervise remedial works as required Lower the storage if directed Close any affected roads as directed, if not already closed by others Maintain surveillance of spillway chute (including sidewall embankment areas and crest) for any signs of a potential erosion (if safe to do so) and move-on any members of the public or other parties 	<ul style="list-style-type: none"> As per previous activation level, AND Ensure remedial works cease and plant and personnel have been moved to a safe location Vacate the immediate vicinity of the spillway Record/photograph the spillway monoliths failure from a safe point 	<ul style="list-style-type: none"> Inspect the dam for any damage and photograph any damage identified during the event Forward all EER material to IC email as required Update Dam Logbook as per SOP 12 Return to routine surveillance activities and frequencies
Notifications	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> DSTDM IC SO LEC External notifications as required 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 34: Stability: spillway chute — LEC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing seepage noticed with spillway, OR Visual displacement of spillway apron 	<ul style="list-style-type: none"> Removal of localised section of spillway apron, OR Flow disturbance noticed which is likely caused by removal of a localised section of spillway apron 	<ul style="list-style-type: none"> Scour of the spillway to the base of the spillway monoliths 	<ul style="list-style-type: none"> Failure of the spillway monoliths in progress or likely, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with DDO and relevant council(s) regarding potential road/bridge closures 	<ul style="list-style-type: none"> As per previous activation level 	<ul style="list-style-type: none"> Forward all EER material to IC email as required
Notifications	<ul style="list-style-type: none"> IC DDO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> IC DDO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> IC DDO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> IC DDO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 35: Stability: spillway chute — IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing seepage noticed with spillway, OR Visual displacement of spillway apron 	<ul style="list-style-type: none"> Removal of localised section of spillway apron, OR Flow disturbance noticed which is likely caused by removal of a localised section of spillway apron 	<ul style="list-style-type: none"> Scour of the spillway to the base of the spillway monoliths 	<ul style="list-style-type: none"> Failure of the spillway monoliths in progress or likely, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Create Incident Report Record Update Sunwater intranet with EAP status Note: IC to contact LDMG's unless LDMG 1 is Stood Up 	<ul style="list-style-type: none"> As per previous activation level, AND Investigate availability of machinery and materials (if insufficient stockpiles available) Place machinery operators on standby if directed by DSTDM Consider the need to appoint a Recovery Coordinator. The Recovery Coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send SMS and email to D/S residents and phone those without mobiles Mobilise resources to undertake remedial works if directed by DSTDM 	<ul style="list-style-type: none"> As per previous activation level, AND Liaise with the DSTDM to confirm that dam failure is in progress Confirm that remedial works have ceased if directed by the DSTDM and plant and personnel have been moved to a safe location Liaise with DDO and DSTDM re: potential for evacuations 	<ul style="list-style-type: none"> Deactivate EAP Complete all internal and external notifications Compile EER and deliver to DSR if required Close Incident Report record Update Sunwater intranet with EAP status Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT External notifications ad required 	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT DDMG 1 DDMG 2 	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT D/S Residents Treated Water Supply Users SDCC DDMG 1 DDMG 2 	<ul style="list-style-type: none"> DDO DSTDM LEC/ORR SMT SRT D/S Residents Treated Water Supply Users SDCC Emergency siren DDMG 1 DDMG 2 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



Table 36: Stability: spillway chute — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Alert	<ul style="list-style-type: none"> Increasing seepage noticed with spillway, OR Visual displacement of spillway apron 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Unconfirmed spillway chute stability risk</i>) What is the status? (Under Investigation) Advise of current storage level Advise any issues you are aware of Standby for further information
Lean Forward	<ul style="list-style-type: none"> Removal of localised section of spillway apron; OR Flow disturbance noticed which is likely caused by removal of a localised section of spillway apron 	<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Unconfirmed spillway chute stability risk</i>) What is the status? (Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further information
Stand Up 1	Scour of the spillway to the base of the spillway monoliths	SDCC	Phone & Email	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents. Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam—What is the event? (<i>Confirmed spillway chute stability risk</i>) What is the status? (Possible Dam Safety Issue) Advise of current storage level Advise any issues you are aware of. Discuss any potential road/bridge closures Prepare for possible evacuations

Table 36: Stability: spillway chute — LEC and IC external communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Stand Up 2 (Failure likely)	<ul style="list-style-type: none"> Failure of the spillway monoliths in progress or likely, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents. Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — spillway chute stability) What is the status? (Dam Failure Likely) Advise of current storage level. Discuss any potential road/bridge closures Prepare coordinated evacuation
Stand Up 2 (Failure in progress)	Dam Failure in progress	<ul style="list-style-type: none"> SDCC 	<ul style="list-style-type: none"> Email & Phone 	Complete Emergency Alert Request Form and email to the SDCC to send to D/S Residents Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> Emergency siren 	<ul style="list-style-type: none"> Phone & Email 	Complete emergency siren instructions in Appendix A11 and notify SRT. Not to be used UNLESS confirmed dam failure is in progress and the Emergency Alert is being sent out.
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — spillway chute stability) What is the status? (Dam Failure in Progress) Advise of current storage level Coordinate evacuation of Downstream Residents and move people to higher ground
Stand down	Risk assessment has been determined that failure risk has reduced	<ul style="list-style-type: none"> D/S Residents Treated Water Supply Users 	<ul style="list-style-type: none"> SMS Phone (for those without mobiles) 	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate messaging Refer to Annexe for sample message
		<ul style="list-style-type: none"> LDMG 1 LDMG 2 DDMG 1 DDMG 2 QPS 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam — What is the event? (Dam Safety Risk — Spillway chute stability) 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 37: Stability: spillway chute — DSTDM emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	<ul style="list-style-type: none"> Increasing seepage noticed with spillway, OR Visual displacement of spillway apron 	<ul style="list-style-type: none"> Removal of localised section of spillway apron, OR Flow disturbance noticed which is likely caused by removal of a localised section of spillway apron 	<ul style="list-style-type: none"> Scour of the spillway to the base of the spillway monoliths 	<ul style="list-style-type: none"> Failure of the spillway monoliths in progress or likely, AND Sufficient water in storage to create a dam hazard 	<ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced
Actions	<ul style="list-style-type: none"> Record all communication Review surveillance inspection of the dam and assess its condition as soon as possible Review instrumentation data and determine if any additional responses are required Monitor situation and assess risks Advise DSR of EAP activation 	<ul style="list-style-type: none"> As per previous activation level, AND Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so Determine if a spillway failure condition has been established 	<ul style="list-style-type: none"> As per previous activation level, AND Assess risk and determine if failure likely or in progress Determine if remedial repairs are practical Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawn down based on latest available data and advise in writing to IC and DDO) Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Forward all EER material to IC email as required Return to routine activities
Notifications	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> DDO IC DSR 	<ul style="list-style-type: none"> Inform all previously notified contacts of stand down



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



11. Other emergency — communications failure

11.1 Overview

The emergency action described in this section (Other emergency — communications failure) relates to either of the following three situations when the EAP is activated:

- An emergency where all means of communication at the dam site have been lost.
- An emergency where all means of communication with the local area have been lost.
- An emergency where all means of communication with Brisbane site have been lost.

This section specifies actions and provides guidance for the three situations.

11.2 Emergency actions

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

11.2.1 Activation triggers

Table 38: Communications failure emergency activation trigger summary

Comms Failure – Site	<ul style="list-style-type: none"> • Unable to communicate to or from dam site (usually affects DDO)
Comms Failure – Local area	<ul style="list-style-type: none"> • Unable to communicate to or from local area (likely to affect LEC/ORR)
Comms Failure – Brisbane	<ul style="list-style-type: none"> • Unable to communicate to or from Sunwater Brisbane (could affect DSTDM or FODM & will affect IC)

11.2.2 Emergency action roles

Table 39 to Table 44 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 39: Communications failure — DDO emergency action

Activation level	Comms Failure – Local Area	Comms Failure – Brisbane
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to Local Area including LEC/ORR 	<ul style="list-style-type: none"> Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
Actions	<ul style="list-style-type: none"> As much as practicable, assume the role of LEC Continue tasks in accordance with any other current emergency action Every hour, attempt communications by all means noting the following: <ul style="list-style-type: none"> Mobile phone - try texting instead of voice, much higher probability of success Satellite phone - needs to access open sky unless external antenna fitted Social media - e.g. Facebook (Internet may be available via landline) Record all communication and attempts via Dam Logbook entries as per SOP 12 and communications log if EAP event is current 	<ul style="list-style-type: none"> Determine if LEC is in communication and if not, assume the LEC role as much as is practicable Continue tasks in accordance with any other current Emergency Action Every hour, attempt communications by all means noting the following: <ul style="list-style-type: none"> Mobile phone - try texting instead of voice, much higher probability of success Satellite phone - needs to access open sky unless external antenna fitted Social media - e.g. Facebook (Internet may be available via landline) Record all communication and attempts via Dam Logbook entries as per SOP 12 and communications log if EAP event is current
Notifications	<ul style="list-style-type: none"> IC SO External notifications as required 	<ul style="list-style-type: none"> LEC SO External notifications as required



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



Table 40: Communications failure — LEC emergency action

Activation level	Comms Failure – Dam Site	Comms Failure – Brisbane
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to Dam site 	<ul style="list-style-type: none"> Unable to communicate to Sunwater Brisbane including IC, DSTDM or FODM
Actions	<ul style="list-style-type: none"> Every hour, attempt communications by all means noting the following: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted Social media – e.g. Facebook (Internet may be available via landline) Assume that the DDO is carrying out LEC role at site as much as practicable Liaise with IC and DSTDM As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action 	<ul style="list-style-type: none"> Create Incident Report Record Every hour, attempt communications by all means noting the following: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted 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	<ul style="list-style-type: none"> IC DSTDM SO LDMG 1 LDMG 2 	<ul style="list-style-type: none"> DDO DSTDM SO LDMG 1 LDMG 2 DDMG 1 DDMG 2



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



Table 41: Communications failure — IC emergency action

Activation level	Comms Failure – Dam Site	Comms Failure – Local Area
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to Dam site 	<ul style="list-style-type: none"> Unable to communicate to Local Area including LEC/ORR
Actions	<ul style="list-style-type: none"> Issue Sunwater Incident Alert Every hour, attempt communications by all means noting the following: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted Social media – e.g. Facebook (Internet may be available via landline) Record all communication and attempts Liaise with LEC and DSTDM As much as is practicable, continue other tasks associated with the role in accordance with any other current emergency action 	<ul style="list-style-type: none"> Issue Sunwater Incident Alert Every hour, attempt communications by all means noting the following: <ul style="list-style-type: none"> Mobile phone – try texting instead of voice, much higher probability of success Satellite phone – needs to access open sky unless external antenna fitted 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	<ul style="list-style-type: none"> LEC/ORR DSTDM SO DDMG 1 DDMG 2 	<ul style="list-style-type: none"> DDO DSTDM SO LDMG 1 LDMG 2 DDMG 1 DDMG 2



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



Table 42: Communications failure — LEC and IC communication plan

Activation level	Trigger for communications	Group to contact	Method	Message text
Comms Failure – Site	<ul style="list-style-type: none"> Unable to communicate to or from dam site, AND DDO is at dam site 	<ul style="list-style-type: none"> IC/LEC DSTDM SO LDMG 1 LDMG 2 DDMG 1 DDMG 2 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		IC to create Incident Report record		EAP Alert Notification — Fairbairn Dam — Site Communications Failure
Comms Failure – Local Area	<ul style="list-style-type: none"> Unable to communicate to or from local area including LEC and ORR 	<ul style="list-style-type: none"> DDO DSTDM SO LDMG 1 LDMG 2 DDMG 1 DDMG 2 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		IC to create Incident Report record		EAP Alert Notification — Fairbairn Dam — Local Area Communications Failure
Comms Failure – Brisbane	<ul style="list-style-type: none"> Unable to communicate to or from Sunwater Brisbane 	<ul style="list-style-type: none"> DSTDM LDMG 1 LDMG 2 DDMG 1 DDMG 2 	<ul style="list-style-type: none"> Phone 	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		LEC to create Incident Report record		EAP Alert Notification — Sunwater Brisbane Communications Failure

Note:

Central Highlands Regional Council has invested heavily in redundant communication which provides multiple back-up communication modalities which is imperative in emergency preparedness planning. Past experience demonstrates that emergency agencies cannot depend on just one or two means for communication. Some examples of CHRC redundant communication include digital radio network upgrade, fixed and mobile satellite communications, and fibre optic network redundancy. These communication systems will enhance interoperability and capacity for wider coverage, disaster-proofness, and broadcast capability. If communication networks fail during an EAP activation event, CHRC will work closely with Sunwater and where able provide contingency to sustain communication systems and reduce downtime.

Table 43: Communications failure — DSTDM emergency action

Activation level	Comms Failure – Site	Comms Failure – Local Area
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to dam site 	<ul style="list-style-type: none"> Unable to communicate to local area including LEC and ORR
Actions	<ul style="list-style-type: none"> Provide technical advice to IC/LEC on a need's basis Record all communication As much as is practicable continue other tasks associated with the role in accordance with any other current emergency action 	<ul style="list-style-type: none"> Provide technical advice to IC on a need's basis Record all communication Assume that the DDO is assisting IC with LEC role As much as is practicable continue other tasks associated with the role in accordance with any other current emergency action
Notifications	<ul style="list-style-type: none"> IC LEC SRT DSR 	<ul style="list-style-type: none"> IC DDO SRT DSR



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



Table 44: Communications failure — FODM emergency action

Activation level	Comms Failure – Site	Comms Failure – Local Area
Activation trigger	<ul style="list-style-type: none"> Unable to communicate to dam site 	<ul style="list-style-type: none"> Unable to communicate to local area including LEC and ORR
Actions	<ul style="list-style-type: none"> Liaise with IC Record all communication As much as is practicable continue other tasks associated with the role in accordance with any other current emergency action 	<ul style="list-style-type: none"> Liaise with IC Record all communication Assume that the DDO is assisting IC with LEC role As much as is practicable continue other tasks associated with the role in accordance with any other current emergency action
Notifications	<ul style="list-style-type: none"> IC LEC DSTDM 	<ul style="list-style-type: none"> IC DDO DSTDM



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



APPENDIX A Notification and communication lists

Appendix A1: Sunwater regional notification list

Appendix A2: Sunwater Brisbane notification list

Appendix A3: External notification list

Appendix A4: D/S residents notification list

Appendix A5: Non-D/S residents notification list

Appendix A6: Fairbairn Treated Water Customers

Appendix A7: Fairbairn Irrigation Network

Appendix A8: Other reference contacts

Appendix A9: Emergency alert polygon

Appendix A10: Dam failure emergency alert request

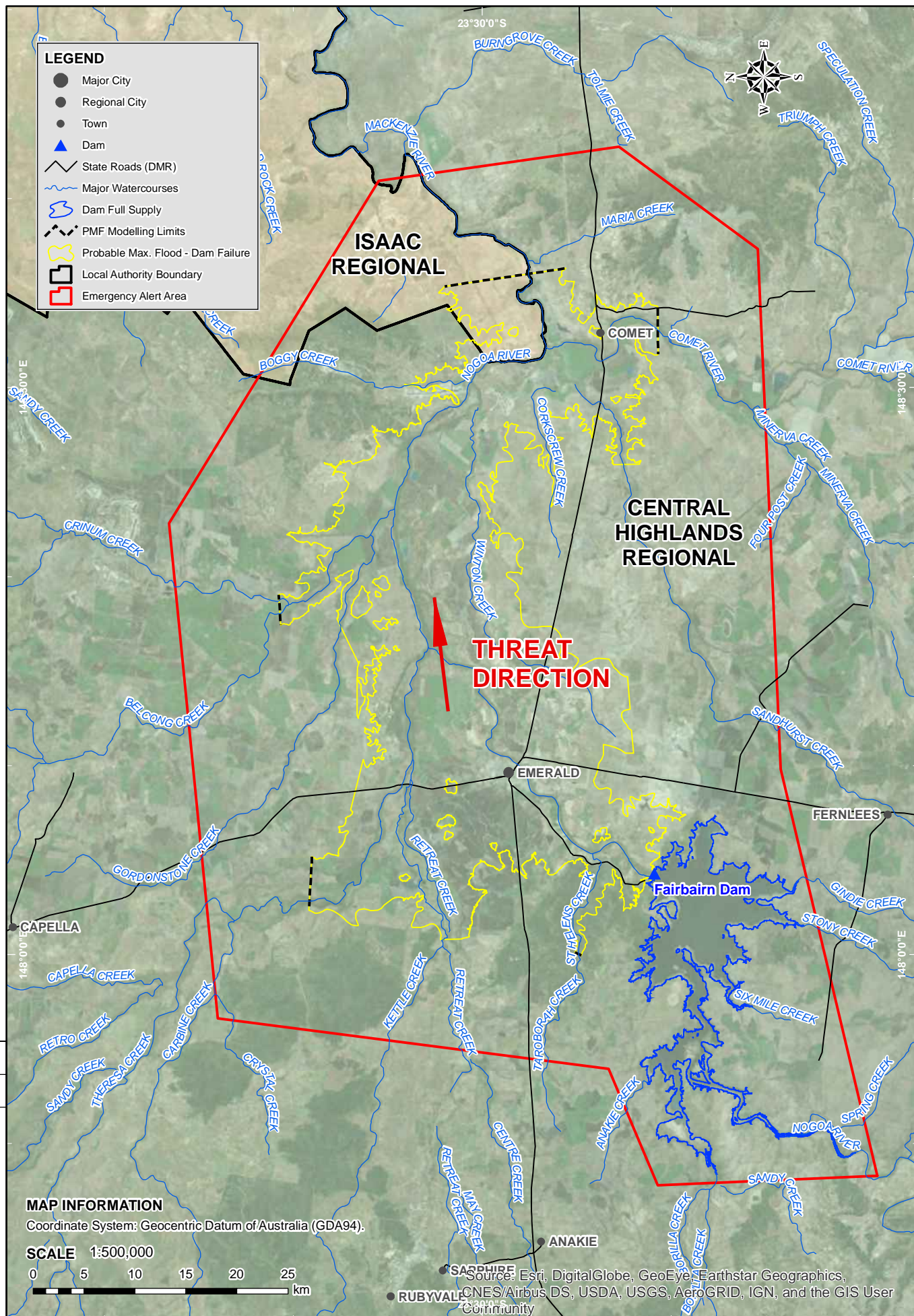
Appendix A11: Dam failure emergency siren activation

Appendix A1 to Appendix A8 have been redacted

Document: S:\BW Asset Delivery\SW-BW Service Delivery\RW-SRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\Emergency Alerts\249575-A.mxd
Printed: Tuesday, 23/01/2018 11:03:21 AM

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

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



**FAIRBAIRN DAM
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA**

CONTRACT NUMBER	
DRAWING NUMBER 249575	REV. A
SHEET 1 OF 1	
DATE JANUARY 2018	

Appendix A10: Dam failure emergency alert request

Queensland emergency alert request guidelines

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


Instructions

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

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

Filename:	Voice Message:	SMS:
[REDACTED]	FLOOD EMERGENCY WARNING from Sun water. People downstream of Fair burn Dam must LEAVE IMMEDIATELY. Fair burn Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Central Highlands Regional Council be prepared dot sea haych are sea dot que el dee dot gov dot ay you and Isaac Regional Council dashboard dot isaac dot que el dee dot gov dot ay you.	FLOOD EMERGENCY WARNING from Sunwater. People downstream of Fairbairn Dam must LEAVE IMMEDIATELY. Fairbairn Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Central Highlands Regional Council beprepared.chrc.qld.gov.au and Isaac Regional Council dashboard.isaac.qld.gov.au

The next two pages contain a pre-filled copies of the Fairbairn Dam EA Request forms and instructions:

 Queensland Government	PHONE THE – ADVISE EA IS BEING DEVELOPED	
	<h1>EMERGENCY ALERT REQUEST</h1>	
	Location of Alert: Fairbairn 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: <input type="checkbox"/> YES DDC/DDMG: <input type="checkbox"/> YES Neighbouring LDMG/LGA: <input type="checkbox"/> YES <input type="checkbox"/> N/A		
Send Alert	Immediately: <input type="checkbox"/> YES	Scheduled: <input type="checkbox"/> YES Date & Time / / : hrs
Event Type	<input type="checkbox"/> Cyclone <input type="checkbox"/> Storm Tide <input type="checkbox"/> Flash Flood <input type="checkbox"/> Flood <input type="checkbox"/> Bushfire <input type="checkbox"/> Fire Incident <input type="checkbox"/> Smoke / Toxic Plume <input type="checkbox"/> Chemical Spill <input type="checkbox"/> Tsunami (Sent as Location Based Text Message ONLY) <input checked="" type="checkbox"/> Other (please specify): Catastrophic dam failure	
Distributed by: (Channel)	<input checked="" type="checkbox"/> Voice <input checked="" type="checkbox"/> SMS – Location Based <input type="checkbox"/> SMS – Service Address Based (Landline only) (Location of phone at time of distribution) (Registered billing address)	
Message Severity	<input checked="" type="checkbox"/> Emergency Warning (Activates SEWS) <input type="checkbox"/> Watch & Act <input type="checkbox"/> Advice	
Threat Direction Required? <input type="checkbox"/> YES <input type="checkbox"/> N/A (e.g. Fire, Dam Spill)		Threat location indicated on map? <input type="checkbox"/> YES <input type="checkbox"/> N/A Only For Emergency Warning Voice & Service Address SMS
EA Messaging Filename (Doc, Pdf):		Polygon Filename, (Kml, Kmz, Gml, GeoJSON): Number of polygons _____ (if multiple, attach list in order of priority)
Supplied via: <input type="checkbox"/> DM Portal <input type="checkbox"/> Email <input type="checkbox"/> Verbal <input type="checkbox"/> Other Other (please specify):		Supplied via: <input type="checkbox"/> DM Portal <input type="checkbox"/> Email <input type="checkbox"/> Verbal <input type="checkbox"/> Other Other (please specify):
Voice: Type or handwritten, max 4000 characters incl. spaces. (Ideally message should be < 450 characters)		
FLOOD EMERGENCY WARNING from Sun water. People downstream of Fair burn Dam must LEAVE IMMEDIATELY. Fair burn Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Central Highlands Regional Council be prepared dot sea haych are sea dot que el dee dot gov dot ay you and Isaac Regional Council dashboard dot isaac dot que el dee dot gov dot ay you.		
SMS: Type or handwritten, use capitals for clarity, max 612 characters incl. spaces. (Ideally should be < 160 characters incl. spaces)		
FLOOD EMERGENCY WARNING from Sunwater. People downstream of Fairbairn Dam must LEAVE IMMEDIATELY. Fairbairn Dam possible failure/is failing. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Central Highlands Regional Council beprepared.chrc.qld.gov.au and Isaac Regional Council dashboard.isaac.qld.gov.au		
Remove EA from websites:	<input type="checkbox"/> 12 hrs <input type="checkbox"/> 24 hrs <input type="checkbox"/> 48 hrs <input type="checkbox"/> Specify Date & Time: <input type="checkbox"/> Check back in 12 hrs: <input type="checkbox"/> Replace previous EA message / / : hrs Contact #: _____	
Requesting Officer:		Signature: Date: / /
Send to to confirm receipt		
FOR USE BY SDCC		
EA Request Form completed by: SDCC Watch Desk <input type="checkbox"/> Requesting Officer <input type="checkbox"/>		
Notification of any delays provided to Requestor: <input type="checkbox"/> YES <input type="checkbox"/> NO		
EA User Name: Signature: Date: / /		Emergency Alert No: EMS EA Campaign Report ID:
Authorising Officer Name: Signature: Date: / /		
Report provided to Requestor on EA outcomes: <input type="checkbox"/> YES <input type="checkbox"/> NO		
The EA Manual, EA Quick Reference Guide, EA Request Form Template are available at: www.disaster.qld.gov.au		

DO NOT SEND THIS PAGE

(Sunwater internal use only)

Emergency Alert (EA) Request instructions

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

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

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

An Emergency Warning message must start with “EMERGENCY EMERGENCY” Do not use special characters.

SMS: Either type the message or handwrite the characters into the boxes.

Capitals only required as per normal grammar rules, but an Emergency Warning message must start with “EMERGENCY EMERGENCY” (in capitals). Do not use special characters.

Voice example:

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

SMS example:

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

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

Appendix A11: 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 the SDCC and/or an Emergency broadcast by ABC radio.

The 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 Fairbairn Dam.
2. Email previously sent Emergency Alert Request form to: [REDACTED]
3. Advise the LDMGs and Media if time permits, or ASAP after siren activation otherwise.
4. Sound emergency siren following Technical Instructions below.
5. Create Sunwater Incident Report Record to advise of the completion of the sounding of the siren.

Technical Instructions

The siren alarm sequence is activated remotely via the SiSA software. The SiSA software is accessed 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. Access [REDACTED]
2. Log in using your **Sunwater user credentials** via Authenticator.
3. Log in to [REDACTED] (SCADA Environment) using your **Sunwater user credentials**.
4. Click [REDACTED] which will download a remote desktop link [REDACTED]
5. Click the [REDACTED] link and log in.

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

Open the **Microsoft Edge** browser and enter URL

- Log on as [REDACTED] to test system – this **WILL NOT** sound the sirens
 - 1) Logon:
 - 2) Password:
- Log on as [REDACTED] to sound the siren – this **WILL** sound the siren/s
 - 1) Logon:
 - 2) Password:
- Click 'Select Units' and select the siren/s that you wish to activate or test.
- Click the appropriate RED BUTTON:
 - 1) "Silent Test Selected Sirens"
 - 2) "Get Selected Siren Status"
 - 3) "Test Alarm"
 - 4) "DAM EMERGENCY"

APPENDIX B Drawings and Maps

Appendix B1: General Arrangement drawings

Appendix B2: Inundation plans & maps

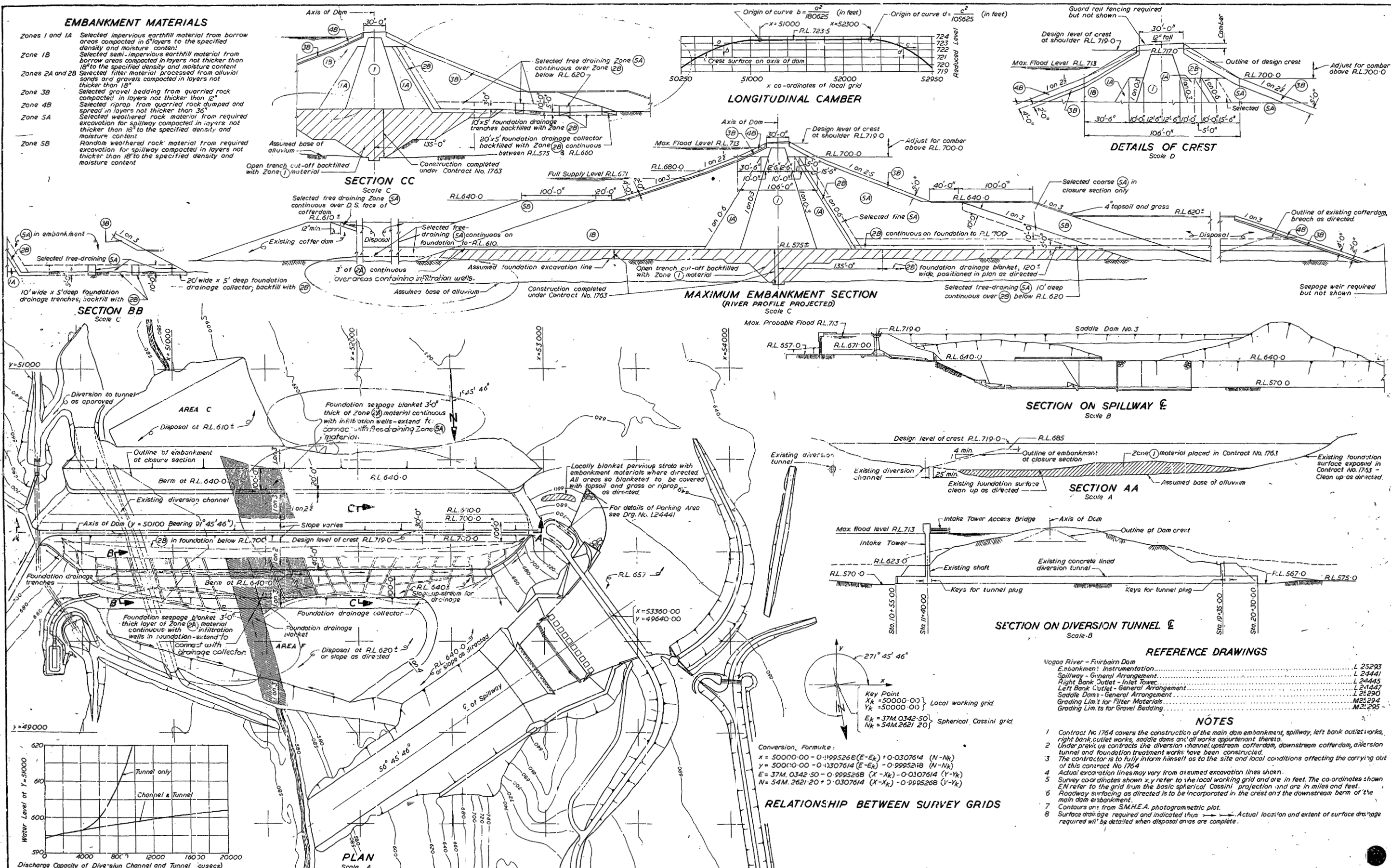
Appendix B3: Emergency access routes

Appendix B4: Locality plan

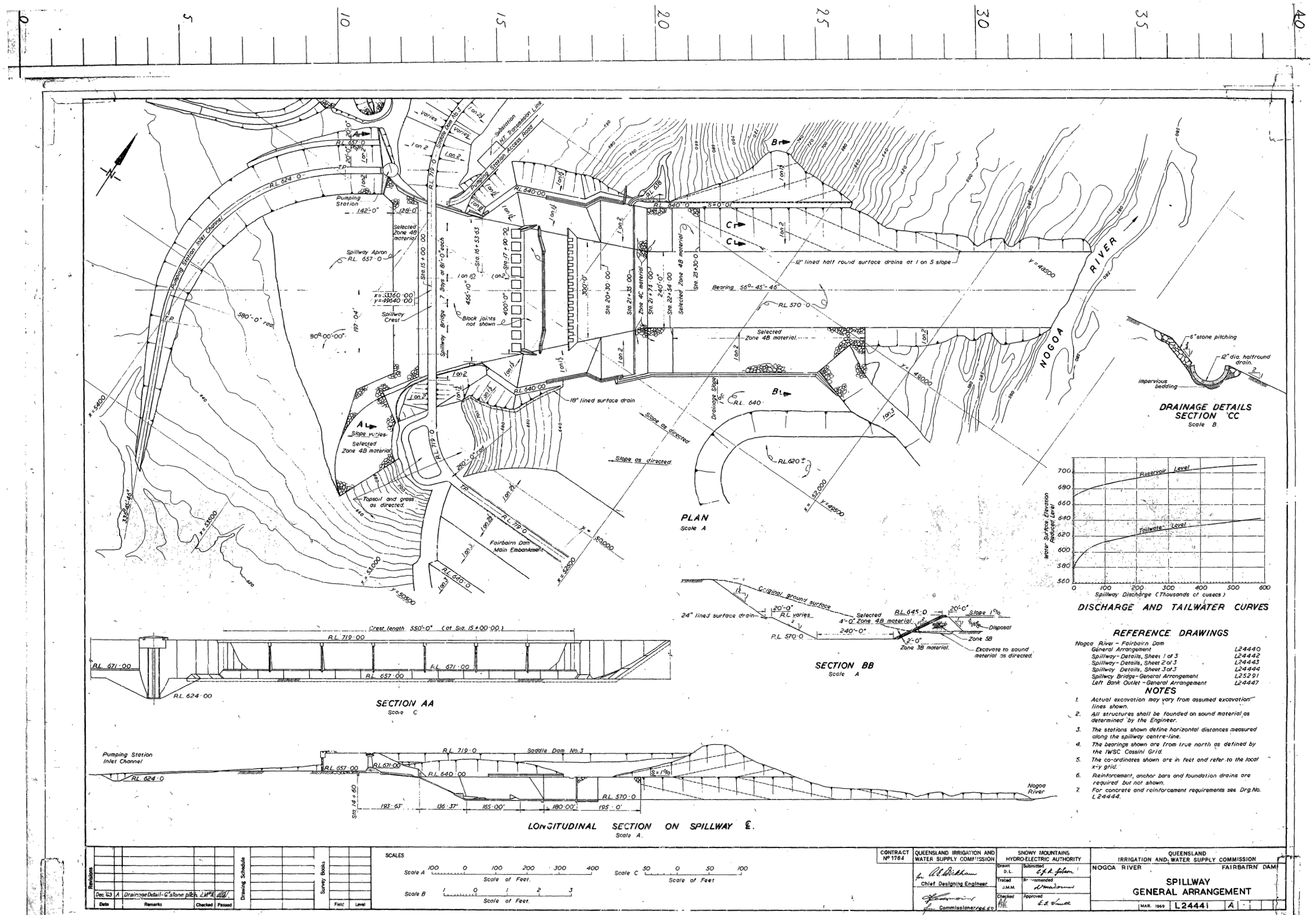
Appendix B5: Catchment area

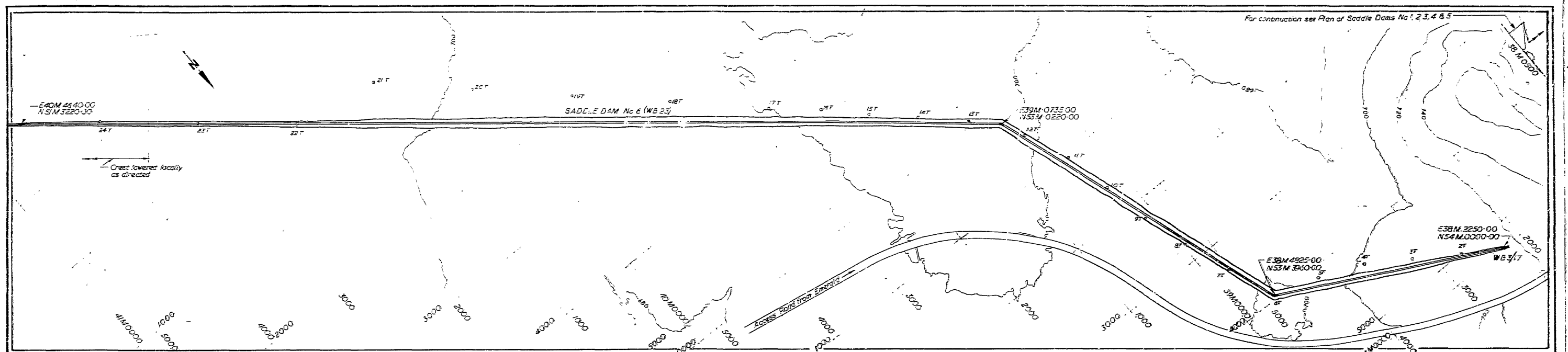
NOTE: Actual levels may differ from those shown in flood inundation maps due to variations in assumptions made in the models to actual flood events.

Zones 1 and 1A	Selected impervious earthfill material from borrow areas compacted in layers to the specified density and moisture content.
Zone 1B	Selected semi-impervious earthfill material from borrow areas compacted in layers not thicker than 18" to the specified density and moisture content.
Zones 2A and 2B	Selected filter material processed from alluvial sands and gravels compacted in layers not thicker than 18".
Zone 3B	Selected gravel bedding from quarried rock compacted in layers not thicker than 12".
Zone 4B	Selected riprap from quarried rock dumped and spread in layers not thicker than 36".
Zone 5A	Selected weathered rock material from required excavation for spillway compacted in layers not thicker than 18" to the specified density and moisture content.
Zone 5B	Random weathered rock material from required excavation for spillway compacted in layers not thicker than 18" to the specified density and moisture content.

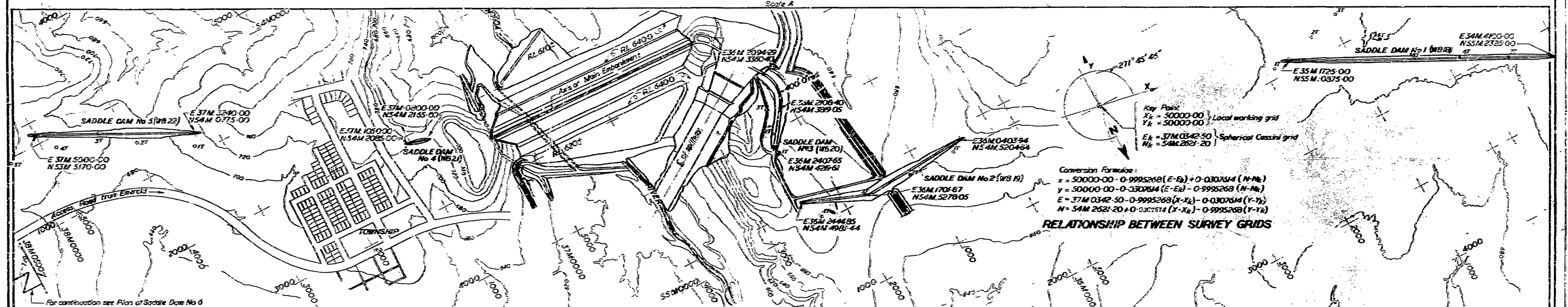


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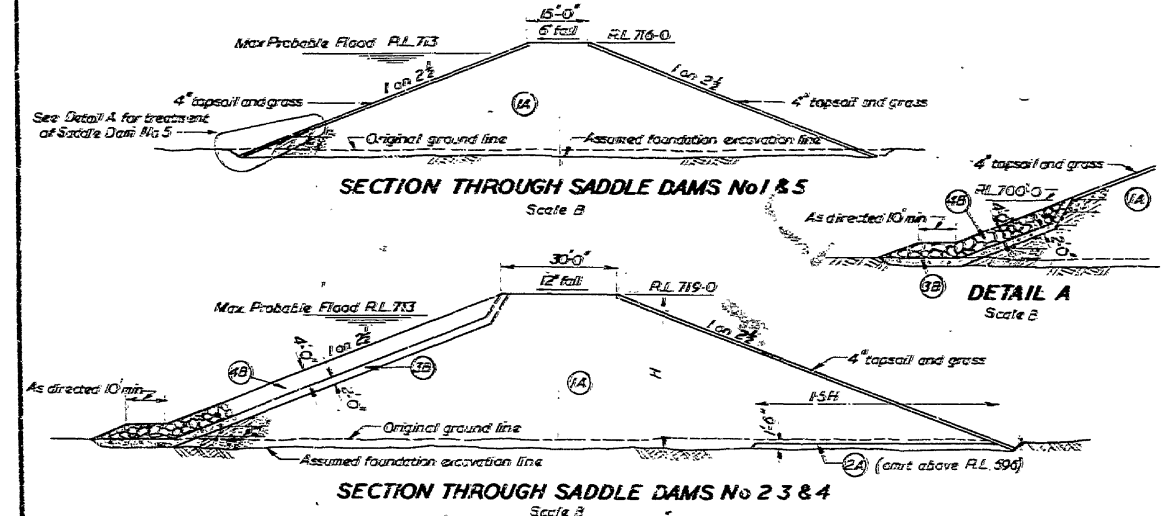




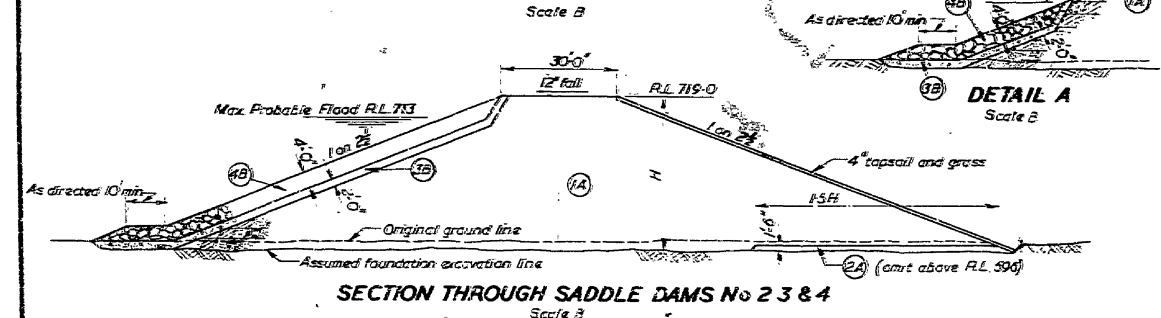
PLAN OF SADDLE DAM No 6



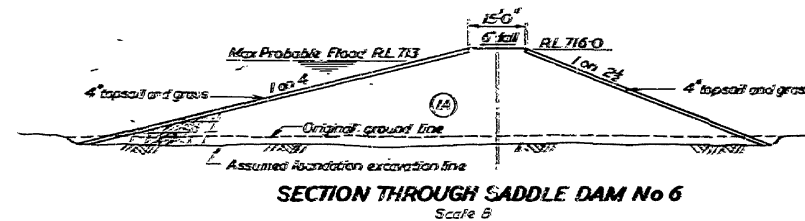
PLAN OF SADDLE DAMS No 1, 2, 3 & 5



SECTION THROUGH SADDLE DAMS No 1 & 5



SECTION THROUGH SADDLE DAMS No 2, 3 & 4



SECTION THROUGH SADDLE DAM No 6

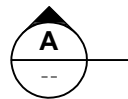
REFERENCE DRAWINGS

Nogoa River - Fairbairn Dam	
General Arrangement	L24440
Spillway - General Arrangement	L24441
Left Bank Outlet - General Arrangement	L24442
Works Area Plan	L25294

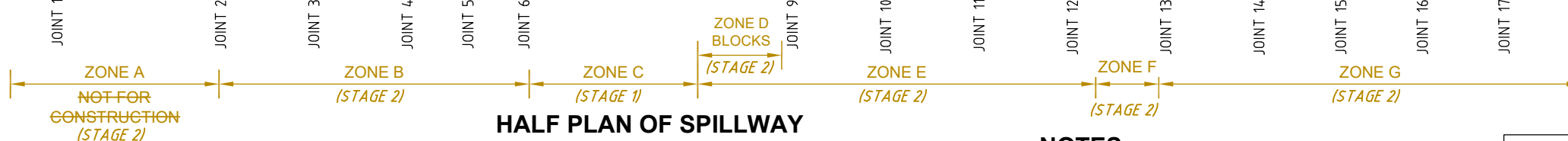
NOTES

- Survey coordinates shown E/N refer to the grid from the British Spheroidal Cassini Projection and are in miles and feet. Co-ordinates shown X/Y refer to the local working grid and are in feet.
- Contours are from S.M.H.E.A. photogrammetric plot.
- For saddle dam materials see Dwg No L24440.
- Roadway surfacing as directed to be incorporated in the crests of Saddle Dams No 2 and 3.
- For detailed location and logs of geological exploration in the vicinity of the Saddle Dams see: Drgs No L25300, L25307 to L25310.

CONTRACT No. 1764				QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION				SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY				QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION			
Chief Designing Engineer				Chief Designing Engineer				Chief Designing Engineer				Chief Designing Engineer			
Commissioner				Commissioner				Commissioner				Commissioner			
JUN 1964				JUN 1964				JUN 1964				JUN 1964			
L 25290				L 25290				L 25290				L 25290			

FLOW
→

168 (FULL WIDTH OF CREST)

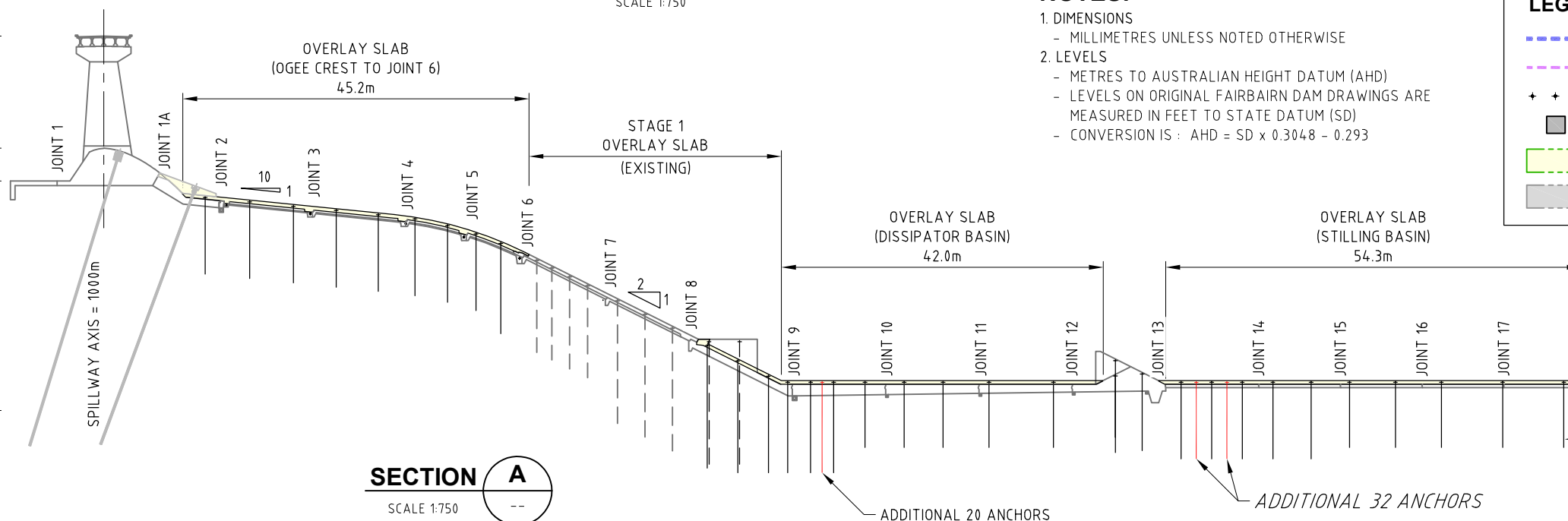
POST TENSIONED ANCHORS
ARRANGEMENT & DETAILS
SEE DRG 249627MASS CONCRETE GRAVITY WALLS (STAGE 3)
GRAVITY WALLS
SEE DRG 249343

DECK EL 218.858

CREST EL 204.228

EL 199.961

DATUM EL 170m AHD

**NOTES:**

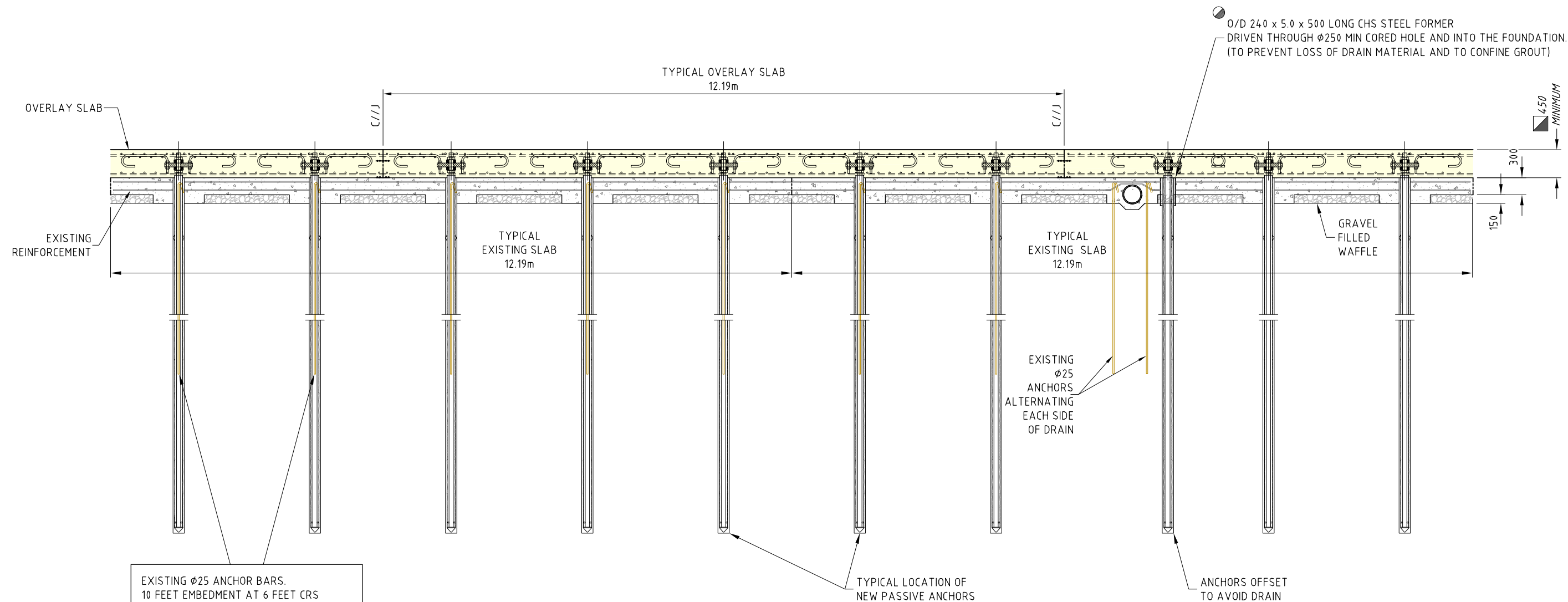
1. DIMENSIONS
- MILLIMETRES UNLESS NOTED OTHERWISE
2. LEVELS
- METRES TO AUSTRALIAN HEIGHT DATUM (AHD)
- LEVELS ON ORIGINAL FAIRBAIRN DAM DRAWINGS ARE
MEASURED IN FEET TO STATE DATUM (SD)
- CONVERSION IS : AHD = SD x 0.3048 - 0.293

LEGEND

- EXISTING DRAINAGE PIPE (Ø300)
- UNDER-DRAIN REPLACEMENT (Ø200)
- + + + PASSIVE ANCHORS
- INSPECTION PIT LOCATION
- OVERLAY SLAB
- STAGE 1



REVISION	DATE	REMARKS	CKD	PASSED	REFERENCE DRAWINGS	GENERAL ARRANGEMENT	SCALES (A3 SIZE)	DRAWN	DESIGNED	FAIRBAIRN DAM SPILLWAY IMPROVEMENT PROJECT CHUTE & DISSIPATOR RECTIFICATION GENERAL ARRANGEMENT	CONTRACT NUMBER
08/04/21	4	AS BUILT	SG	L. ANDERSON	249343	GENERAL ARRANGEMENT		KP/AN	BW (GHD)		
03/09/19	3	ADDITIONAL 20 ANCHORS ADDED IN ZONE E	CSS	R. WARK	249627	POST TENSIONED ANCHORS ARRANGEMENT & DETAILS		CHECKED	CHECKED		
27/08/18	2	GRAVITY WALLS	KP	D. RYAN	247303	ANCHOR BARS - OVERALL LAYOUT		KP	PF (MWH)		
28/04/17	1	ZONE B - IFC, SLAB NAMES	KP	D. RYAN	247304	OVERLAY SLAB - STILLING BASIN		APPROVED			
18/04/17	0	ISSUED FOR CONSTRUCTION	KP	D. RYAN	247299	OVERLAY SLAB - DISSIPATOR BASIN		D. RYAN			
					247298	OVERLAY SLAB - OGEE CREST TO JOINT 6		18/04/17	RPEQ 2665		
					247296	UNDER-DRAIN REPLACEMENT					



SECTION B

SCALE 1:75

SH 1

CHS STEEL FORMER TO BE USED WHERE ANCHOR HOLE IS DRILLED THROUGH GRAVELED FILLED WAFFLE (300 THICK SLAB)

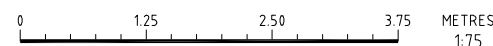
OVERLAY CONCRETE > 450mm THICK FOR ALL LOCATIONS OF SPILLWAY WITHIN ZONES B TO G. CONFORMANCE SURVEY COMPLETED PER SUB LOT TO ENSURE MINIMUM OF 450mm THICKNESS WAS BUILT AS PER REQUIREMENTS OF DCC SPECIFICATION

AS BUILT

REVISION	DATE	REMARKS	CKD	PASSED
08/04/21	4	AS BUILT	SG	L. ANDERSON
03/09/19	3	ADDITIONAL 20 ANCHORS ADDED IN ZONE E	CSS	R. WARK
27/08/18	2	GRAVITY WALLS	KP	D. RYAN
28/04/17	1	ZONE B - IFC, SLAB NAMES	KP	D. RYAN
18/04/17	0	ISSUED FOR CONSTRUCTION	KP	D. RYAN

REFERENCE DRAWINGS	GENERAL ARRANGEMENT
249343	GENERAL ARRANGEMENT
249627	POST TENSIONED ANCHORS ARRANGEMENT & DETAILS
247303	ANCHOR BARS - OVERALL LAYOUT
247304	OVERLAY SLAB - STILLING BASIN
247299	OVERLAY SLAB - DISSIPATOR BASIN
247298	OVERLAY SLAB - OGEE CREST TO JOINT 6
247296	UNDER-DRAIN REPLACEMENT

SCALES (A3 SIZE)

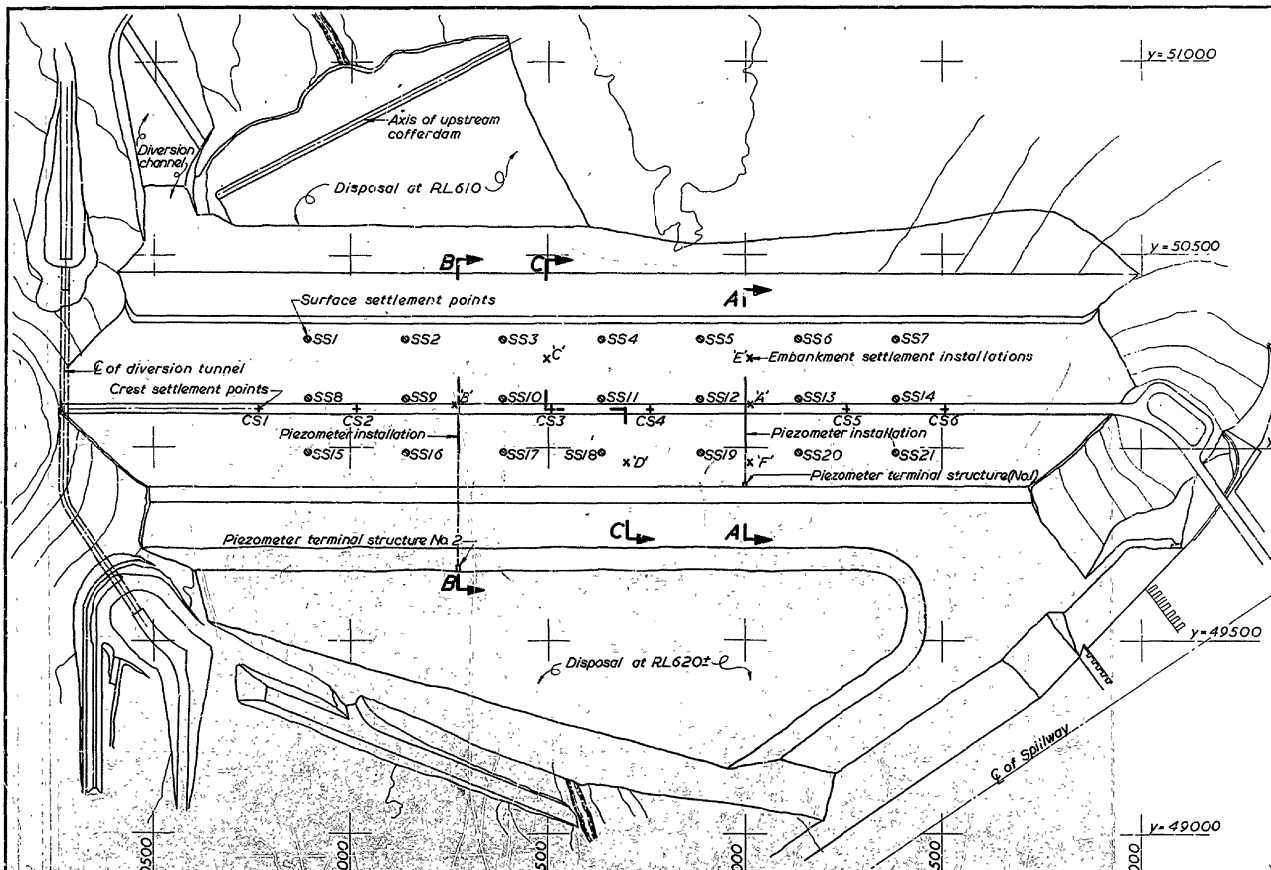


DRAWN KP/AN	DESIGNED BW (GHD)
CHECKED KP	CHECKED PF (MWH)
APPROVED D. RYAN	
18/04/17	RPEQ 2665

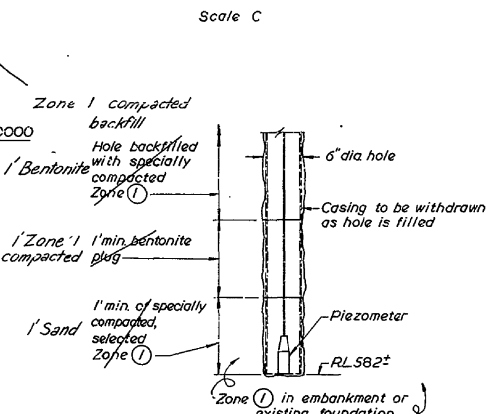


**FAIRBAIRN DAM
SPILLWAY IMPROVEMENT PROJECT
CHUTE & DISSIPATOR RECTIFICATION
GENERAL ARRANGEMENT**

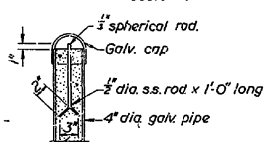
CONTRACT NUMBER	
DRAWING NUMBER	REV.
247295	4
SHEET 2 OF 2	
DATE APRIL 2017	



DETAILS OF CREST SETTLEMENT POINTS



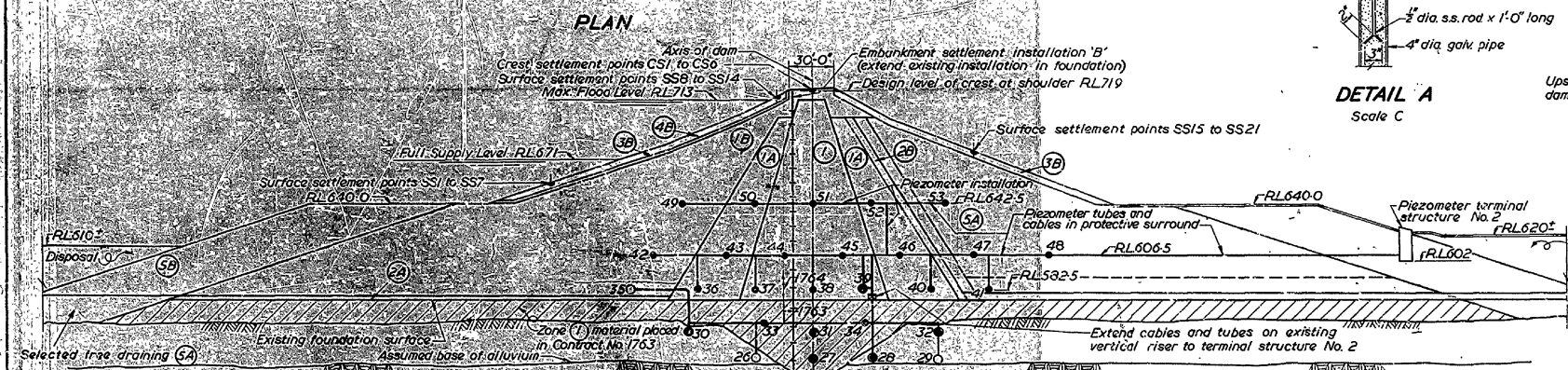
DETAILS OF INSTALLATION OF PIEZOMETERS 10 TO 15 INCLUSIVE AND 36 TO 41 INCLUSIVE



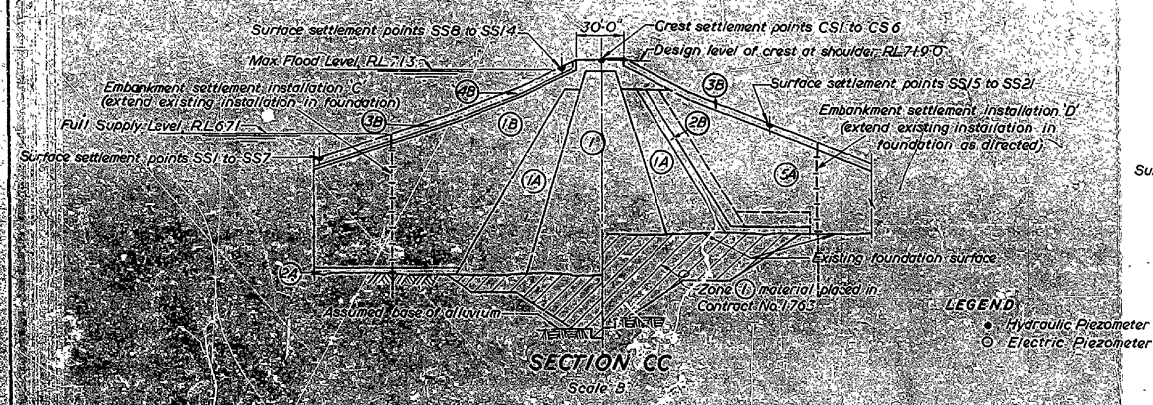
PIEZOMETER INSTALLATION					
TIP No.	X CO-ORDINATE INDICATED	ACTUAL	OFFSET FROM AXIS INDICATED	ACTUAL	INSTALLED AT RL
10	51996-0	65 1/2	65 1/2	600-20	600-20
11	51996-0	25 1/4	25 1/4	600-20	600-20
12	51996-0	25 1/4	25 1/4	600-10	600-10
13	51996-0	65 1/2	65 1/2	600-00	600-00
14	51996-0	135 1/2	135 1/2	605-0	605-0
15	51996-0	105 1/4	105 1/4	620-0	620-0
16	51996-0	60 1/4	60 1/4	625-00	625-00
17	51996-0	20 1/4	20 1/4	625-00	625-00
18	51996-0	20 1/4	20 1/4	625-00	625-00
19	51995-0	60 1/4	60 1/4	625-00	625-00
20	51995-0	105 1/4	105 1/4	623-80	623-80
21	51996-0	80 1/4	80 1/4	654-84	654-84
22	51996-0	40 1/4	40 1/4	654-80	654-80
23	51996-0	0	0	654-88	654-88
24	51996-0	40 1/4	40 1/4	654-79	654-79
25	51996-0	80 1/4	80 1/4	654-80	654-80
35	51268-0	125 1/4	134 1/4	518-22	518-22
36	51269-0	80 1/4	80 1/4	582-50	582-50
37	51269-0	40 1/4	40 1/4	582-50	582-50
38	51269-0	0	0	582-50	582-50
39	51269-0	35 1/4	35 1/4	583-00	583-00
40	51269-0	80 1/4	80 1/4	582-00	582-00
41	51269-0	120 1/4	120 1/4	582-00	582-00
42	51269-0	110 1/4	110 1/4	606-45	606-45
43	51270-0	60 1/4	60 1/4	606-30	606-30
44	51270-0	20 1/4	20 1/4	606-30	606-30
45	51270-0	20 1/4	20 1/4	606-10	606-10
46	51269-0	60 1/4	60 1/4	606-46	606-46
47	51269-0	110 1/4	110 1/4	606-60	606-60
48	51266-0	160 1/4	159 1/4	606-20	606-20
49	51268-0	90 1/4	90 1/4	642-41	642-41
50	51268-0	40 1/4	40 1/4	642-25	642-25
51	51268-0	0	0	642-13	642-13
52	51268-0	40 1/4	40 1/4	642-29	642-29
53	51268-0	90 1/4	90 1/4	642-42	642-42

NOTE: Piezometers 1 to 9 inclusive and 26 to 34 inclusive have been installed in the embankment in Contract No. 1763. For location see Drg. No. 24415.

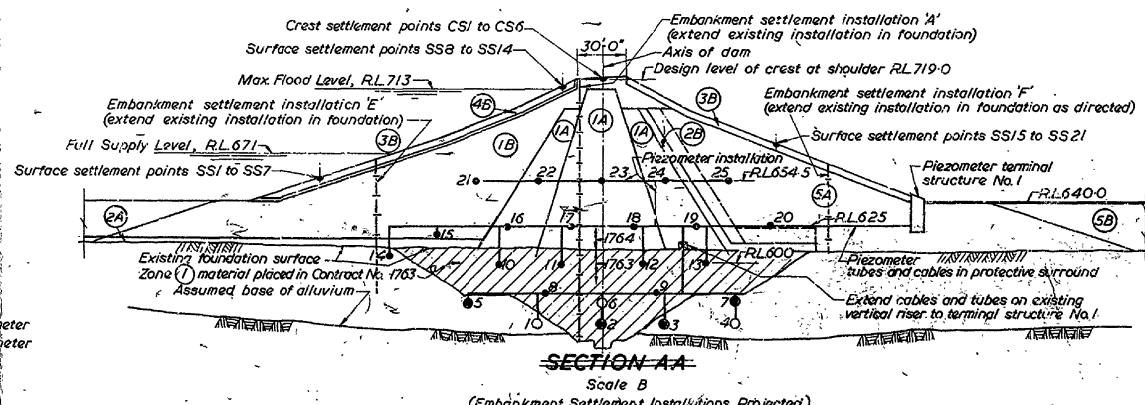
SETTLEMENT INSTALLATIONS					
No.	X CO-ORDINATE INDICATED	ACTUAL	OFFSET FROM AXIS INDICATED	ACTUAL	INSTALLED AT RL
SS1	50895	50898-1	180-75	653-47	653-47
SS2	51145	51153-7	177-84	654-78	654-78
SS3	51385		NOT INSTALLED		
SS4	51635	51634-8	180-30	654-35	654-35
SS5	51885	51887-5	180-14	654-75	654-75
SS6	52125	52128-1	179-08	655-25	655-25
SS7	52375	52376-1	180-67	653-48	653-48
SS8	50895	50897-0	25-93	716-92	716-92
SS9	51145	51151-5	25-13	717-54	717-54
SS10	51385	51385-1	24-87	717-66	717-66
SS11	51635	51635-3	25-07	717-62	717-62
SS12	51885	51889-4	21-72	718-57	718-57
SS13	52125	52125-8	24-09	717-57	717-57
SS14	52375	52372-0	23-76	718-75	718-75
SS15	50895	50895-8	107-44	675-06	675-06
SS16	51145	51147-8	108-30	678-58	678-58
SS17	51385	51386-6	108-63	680-23	680-23
SS18	51635	51636-6	109-45	679-22	679-22
SS19	51885	51885-4	109-84	678-11	678-11
SS20	52125	52127-35	110-54	679-14	679-14
SS21	52375		NOT INSTALLED		
CS1	50770	50770-7		722-808	722-808
CS2	51020	51020-5		723-182	723-182
CS3	51510	51510-4		723-259	723-259
CS4	51760	51760-4		723-199	723-199
CS5	52250	52250-2		723-304	723-304
CS6	52500	52500-2		723-024	723-024
COIL DATA (SEE ALSO TIP DATA BELOW)					
A	52005	52001	13'-3"	555-6	555-6
B	51265	51300	13'-6"	526-6	526-6
C	51500	51500	135'-1/2"	564-7	564-7
D	51700	51700	135'-1/2"	577-9	577-9
E	52005	51265	135'-1/2"	533-8	533-8
F	52005	52005	135'-1/2"	591-5	591-5



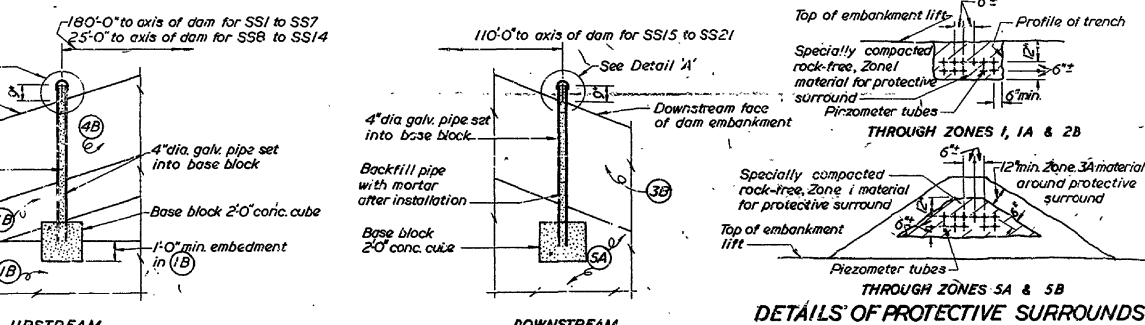
SECTION BB (River profile projected) Scale B



SECTION CC (Embankment Settlement Installations Projected) Scale B



SECTION AA (Embankment Settlement Installations Projected) Scale B



DETAILS OF SURFACE SETTLEMENT POINTS Scale D

REFERENCE DRAWINGS

Nogoa River - Fairbairn Dam
 Embankment - General Arrangement... L24440
 Embankment - Piezometer Terminal Structures at x=51270 and x=52000... L25296 and L24416
 Embankment - Electric Settlement Installation with Spearpoint and Base Plate Extensions... L24417

NOTES

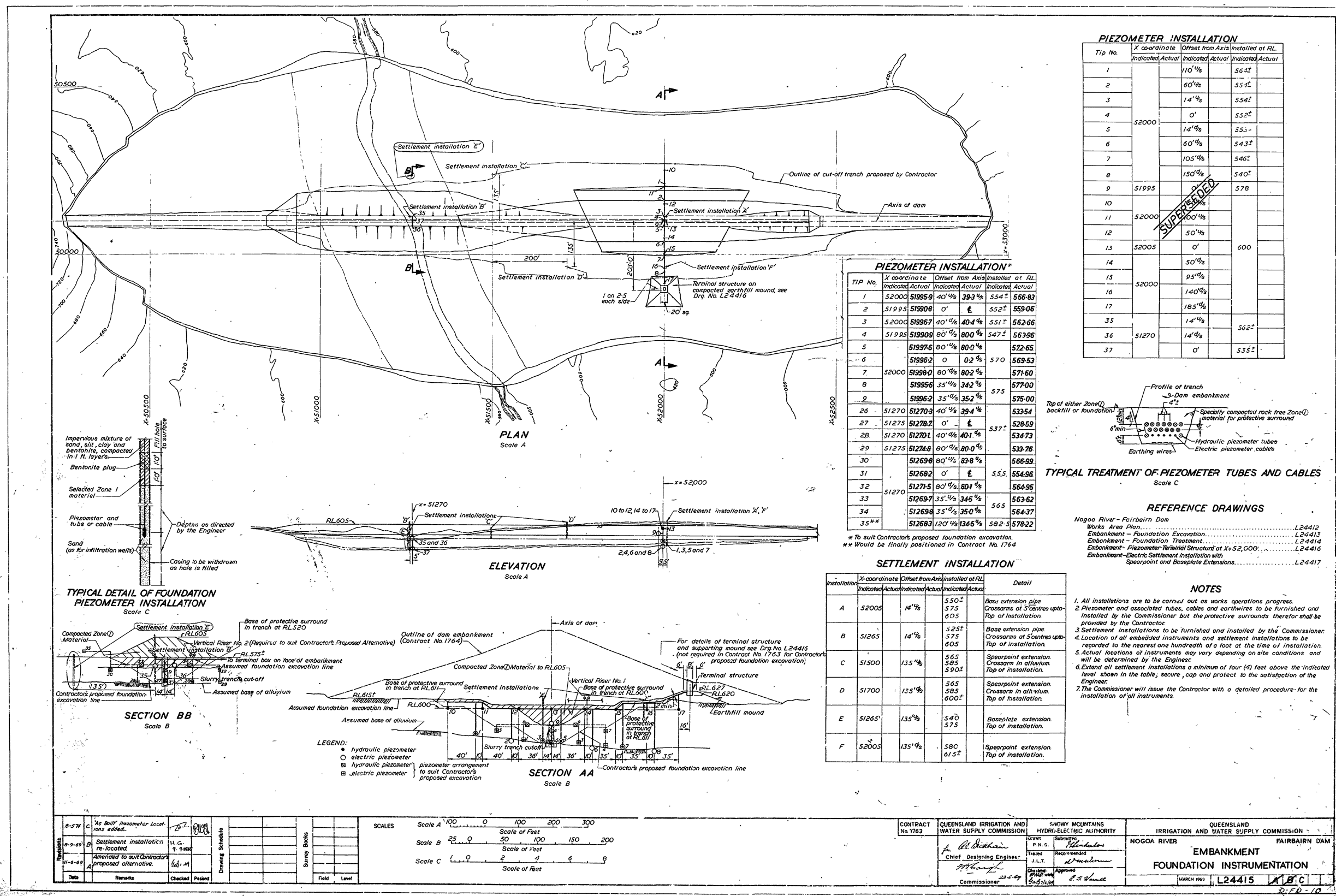
- All installations are to be carried out as the work proceeds.
- Piezometers and associated tubes to be furnished and installed by the Contractor but the protective surrounds therefor shall be provided by the Contractor.
- Settlement installations to be furnished and installed by the Contractor but the trenches and drilled holes therefor shall be provided by the Contractor.
- Location of all embedded instruments and settlement installations to be recorded to the nearest one hundredth of a foot at the time of installation by the Engineer.
- Actual locations of instruments may vary depending on site conditions and will be determined by the Engineer.
- Surface and crest settlement points to be supplied and installed by the Contractor.

SETTLEMENT INSTALLATIONS - TIP DATA

	A	B	C	D	E	F
52005	52002-4	51301-6	51497-9	51699-9	51264-7	52002-5
14' U/S	14' U/S	135' U/S	135' D/S	135' D/S	135' U/S	135' D/S
13-07' 5/16"	14-49'	136-40' 5/16"	134-77' 11/16"	140-09' 2/16"	135-35' 11/16"	135-35' 11/16"
723-62	723-19	669-40	669-13	664-90	668-82	668-82
8/12/72	25/10/72	11/5/72	15/9/72	11/5/72	7/9/72	7/9/72

Level Book FD-72-4
 Field Book FD-72-13

CONTRACT No. 1764	QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION	SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY	QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION
Chief Designing Engineer	Checked	Approved	NOGUA RIVER FAIRBAIRN DAM
Commissioner	Checked	Approved	EMBANKMENT INSTRUMENTATION
			JUNE 1960 L25293 A/B



Appendix B2: Inundation maps

The following is a complete list of the Inundation maps for Fairbairn Dam (source, 2022 CRA, ref I)

However, due to the space requirements of the large volume of individual maps, only the Keymap and Overview Inundation plans (for illustrative purposes) are presented in the EAP. The individual Inundation maps are available from Sunwater by request.

Drawings:

Keymap

- Keymap

SDF—Sunny Day Failure:

- Overview
- Maps 1-11 (Main Embankment)
- Maps 1-11 (Spillway)

PMF—Probable Maximum Flood:

- Overview
- Maps 1-12 (Main Embankment)

1 in 100 AEP Flood:

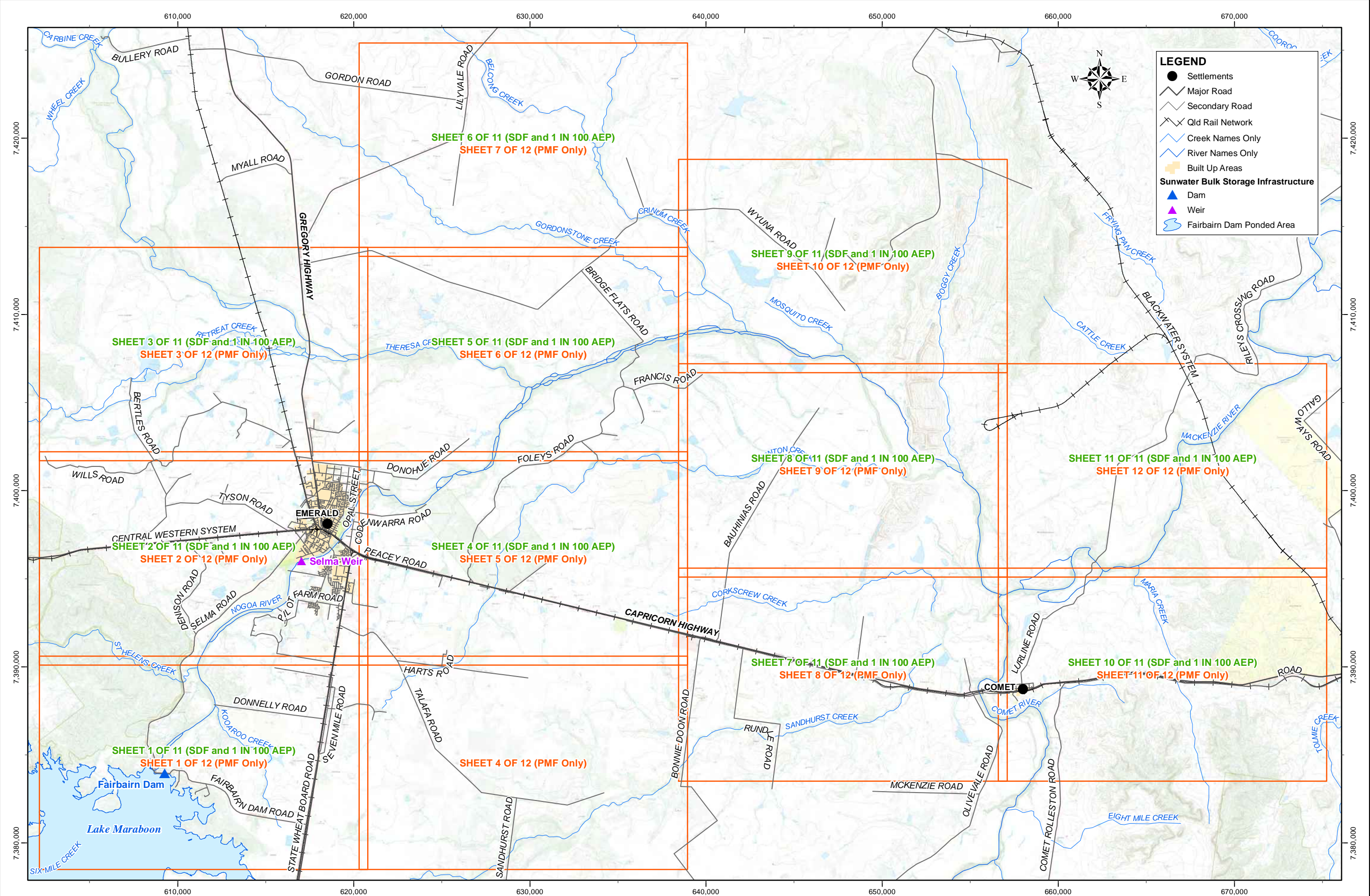
- Overview
- Maps 1-11 (No Failure)
- Inundation maps from 2010 flood of record event

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

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Document: S:\BW_WaterResources\GIS_Data\SW_Nogoa Mackenzie_WSS\FairbairnDam_EAP2022\Drawings\Map\255566-A.mxd
Printed: Tuesday, 17/05/2022 01:51:00 PM

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



REVISION					
17/05/22	A	ISSUED FOR USE		IDH	RJ
DATE		REMARKS		CKD	PSD

MAP INFORMATION
- Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.
- Refer eDocs #2592657.
REFERENCE DRAWINGS
255566 - Sunny Day Failure (Main Embankment)
255567 - Sunny Day Failure (Spillway)
255568 - Probable Maximum Flood
255569 - 1 in 100 AEP Flood

SCALES (A3 SIZE)

0 2 4 6 8 10 km 1:200,000

DRAWN	IDH	DESIGNED	AC
CHECKED		CHECKED	RJ
APPROVED		R. JENSEN	
		17/5/2022 RPEQ: 23733	

sunwater

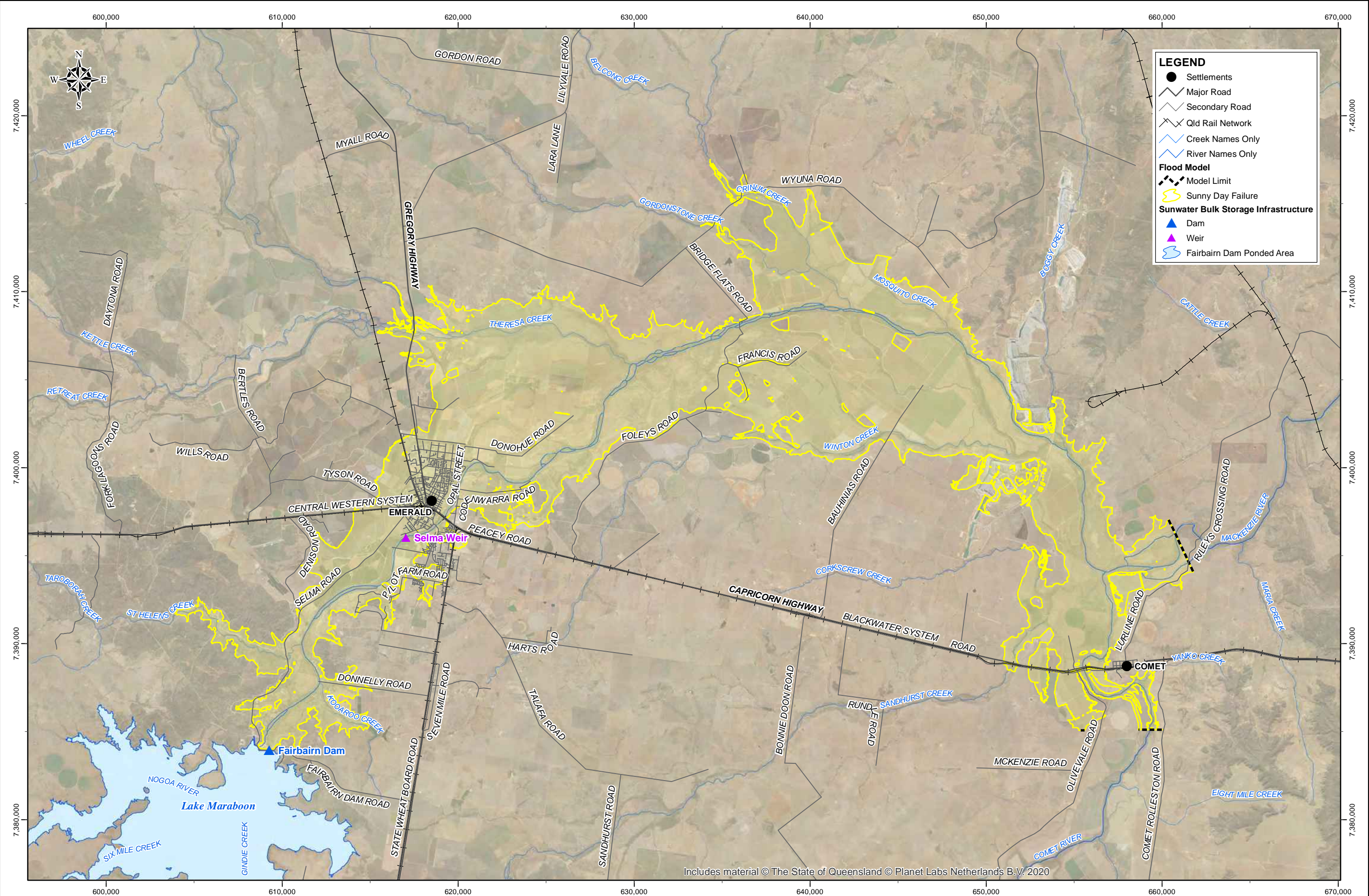
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ACN 131 034 985

FAIRBAIRN DAM DAM BREAK ANALYSIS 2022 INUNDATION PLANS KEYMAP		CONTRACT NUMBER	
		DRAWING NUMBER	REV.
		255565	A
		SHEET 1 OF 1	
		DATE MAY 2022	

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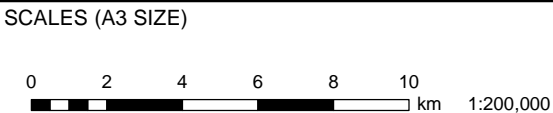
MAP PRODUCED BY:
WATER RESOURCES AND DAM SAFETY
TEL: (07) 3120 0000



REVISION					
17/05/22	A	ISSUED FOR USE		IDH	RJ
DATE		REMARKS		CKD	PSD

MAP INFORMATION
- Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.
- Refer eDocs #2592657.

REFERENCE DRAWINGS
255566 - Keymap
255566 - Sunny Day Failure (Main Embankment) Inundation Plan
255567 - Sunny Day Failure (Spillway) Inundation Plan



DRAWN	IDH	DESIGNED	AC
CHECKED		CHECKED	RJ
APPROVED			
R. JENSEN			
17/5/2022		RPEQ: 23733	

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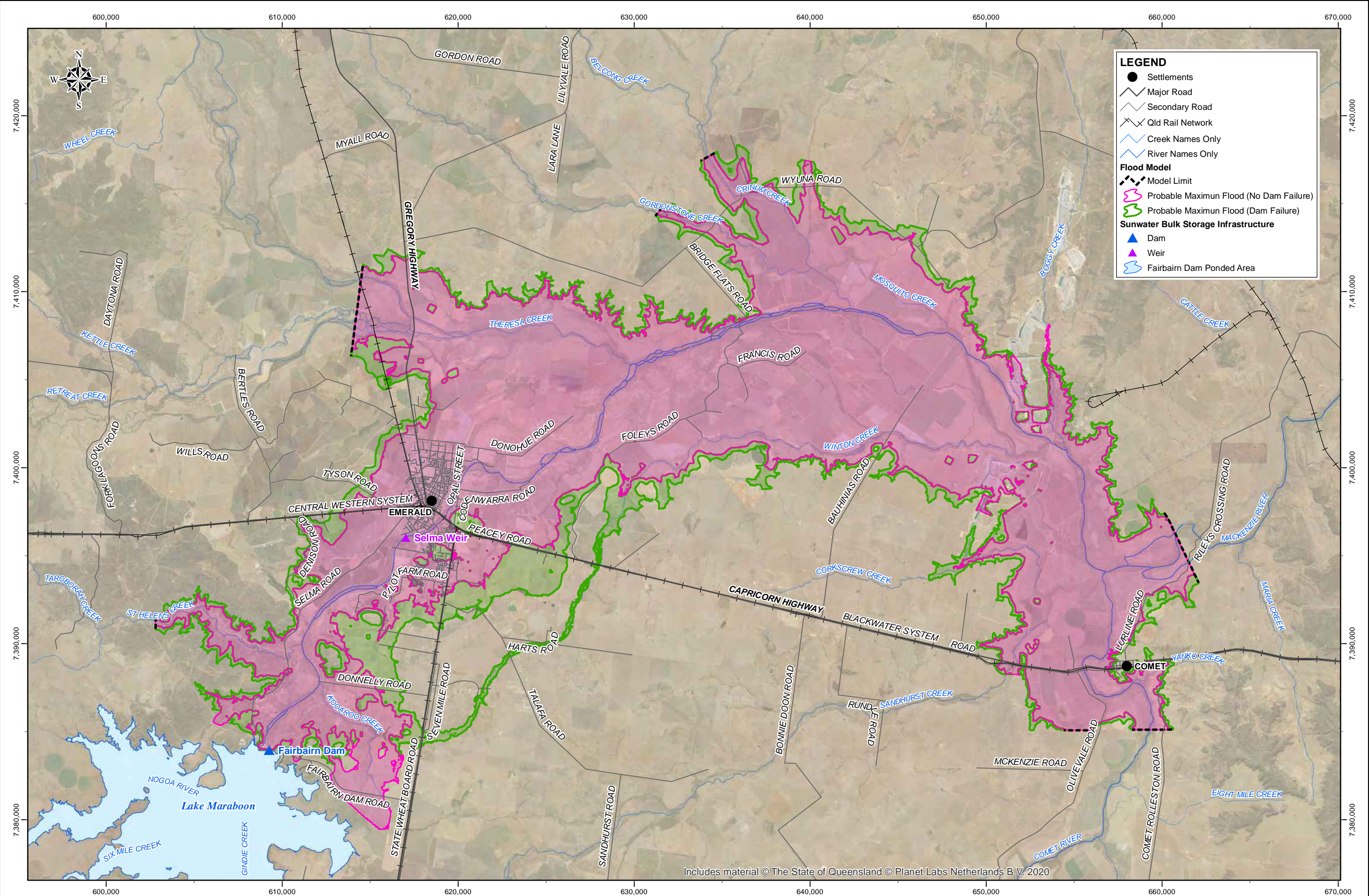
**FAIRBAIRN DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
OVERVIEW INUNDATION PLAN**

CONTRACT NUMBER	
DRAWING NUMBER	REV.
255570	A
SHEET 1 OF 1	
DATE MAY 2022	

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Document: S:\BW_WaterResources\GIS_Data\SW_Nogoa Mackenzie NSS\FairbairnDam_EAP2022\Drawings\Map\25571-A.mxd
Printed: Tuesday, 17/05/2022 01:54:00 PM

MAP PRODUCED BY:
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TEL: (07) 3120 0000



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REVISION					
17/05/22	A	ISSUED FOR USE		IDH	RJ
DATE		REMARKS		CKD	PSD

MAP INFORMATION	
- Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.	
- Refer eDocs #2592657.	
REFERENCE DRAWINGS	
255565	- Keymap
255568	- Probable Max. Flood (Main Embankment) Inundation Plan

SCALES (A3 SIZE)	
0 2 4 6 8 10 km 1:200,000	

DRAWN	IDH	DESIGNED	AC
CHECKED		CHECKED	RJ
APPROVED			
R. JENSEN			
17/5/2022		RPEQ: 23733	

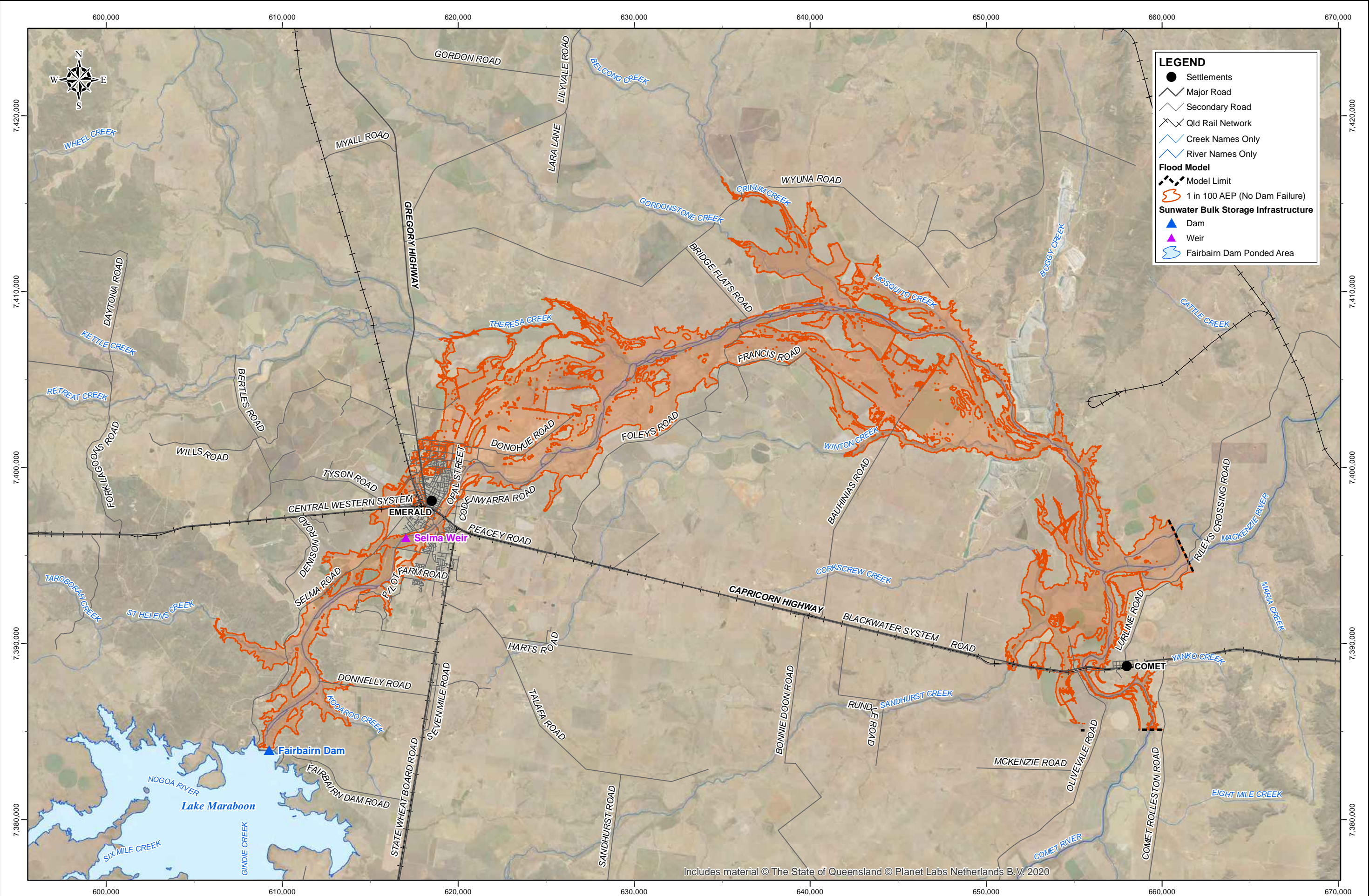

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FAIRBAIRN DAM DAM BREAK ANALYSIS 2022 PROBABLE MAXIMUM FLOOD OVERVIEW INUNDATION PLAN	
CONTRACT NUMBER	
DRAWING NUMBER	REV.
255571	A
SHEET 1 OF 1	
DATE MAY 2022	

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Document: S:\BW_WaterResources\GIS_Data\SW_Nogoa Mackenzie WSS\FairbairnDam_EAP2022\Drawings\Map\255572-A.mxd
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REVISION					
17/05/22	A	ISSUED FOR USE		IDH	RJ
DATE		REMARKS		CKD	PSD

MAP INFORMATION

- Projected Coordinate System: Mapping Grid of Australia (MGA2020) Zone 55.
- Refer eDocs #2592657.

REFERENCE DRAWINGS

255565 - Keymap
255569 - 1 in 100 AEP Flood (No Failure) Inundation Plan

SCALES (A3 SIZE)



DRAWN	DESIGNED
IDH	AC
CHECKED	CHECKED
	RJ
APPROVED	
R. JENSEN	
17/5/2022	
RPEQ: 23733	

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ACN 131 034 985

**FAIRBAIRN DAM
DAM BREAK ANALYSIS 2022
1 IN 100 AEP FLOOD
OVERVIEW INUNDATION PLAN**

CONTRACT NUMBER	
DRAWING NUMBER	REV.
255572	A
SHEET 1 OF 1	
DATE MAY 2022	

Figure B5: Inundation map (1 of 2) from 2010 flood of record event

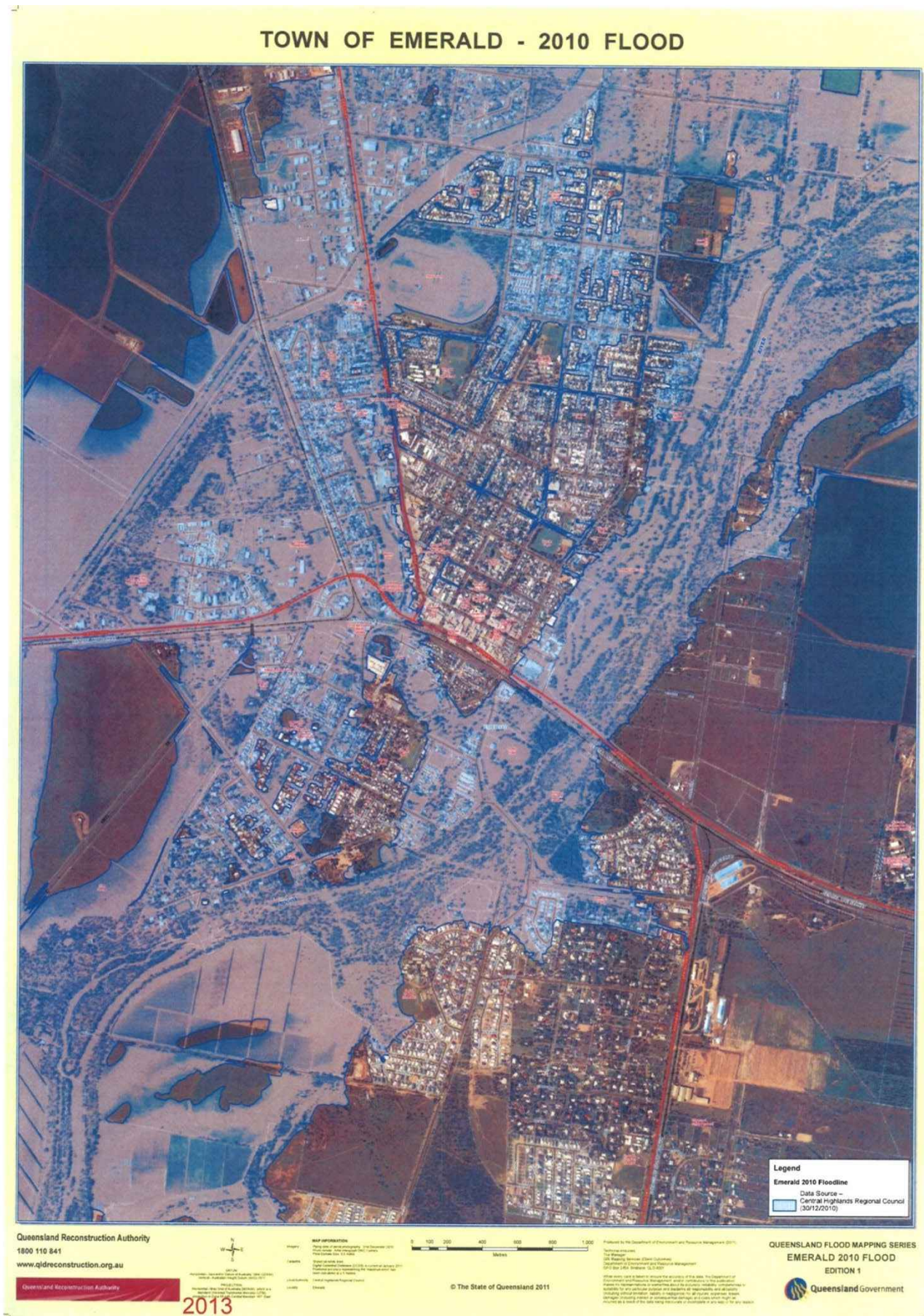
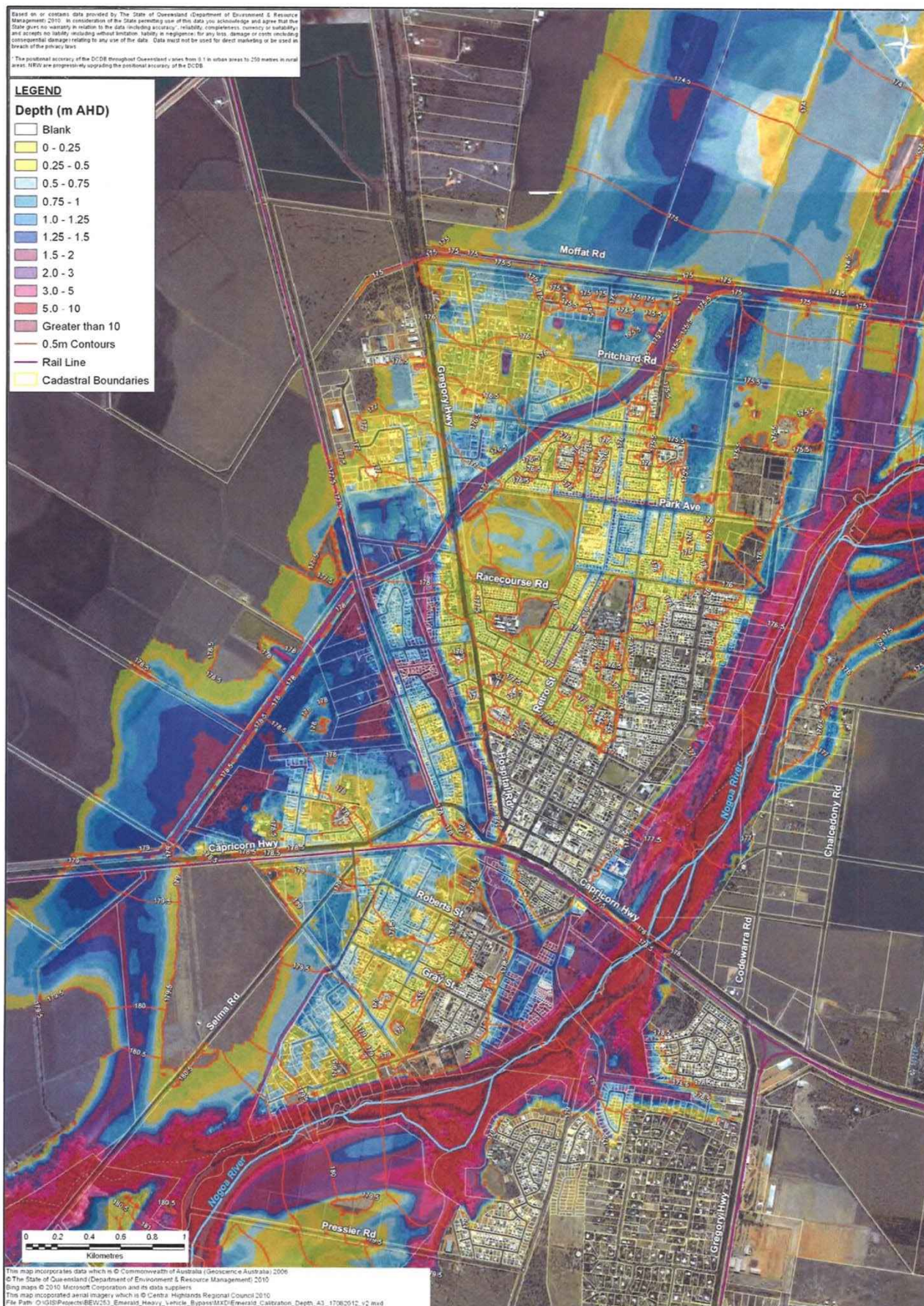
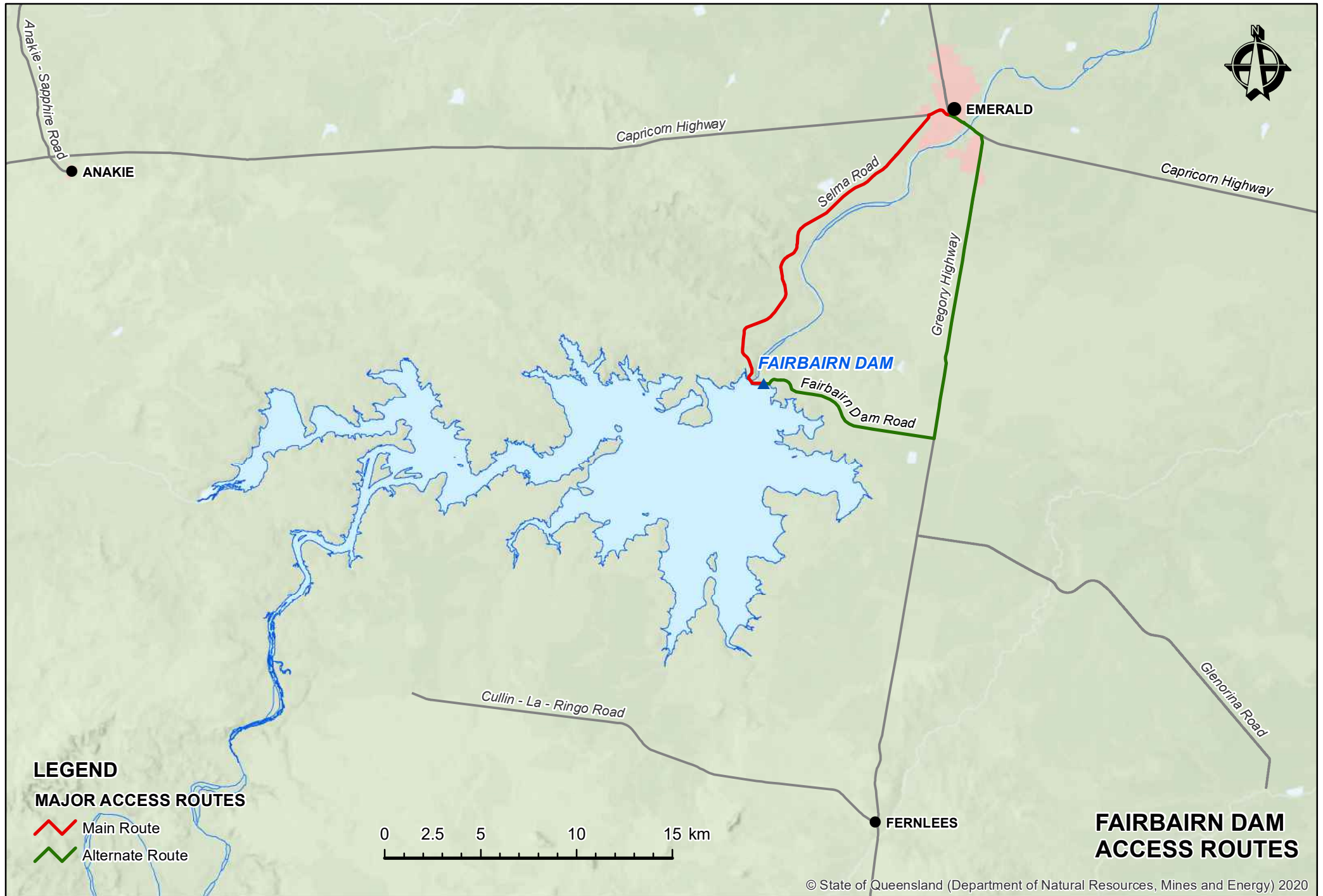


Figure B6: Inundation map (2 of 2) from 2010 flood of record event



Appendix A.1
Emerald 2010/11 Existing Flood Depth



Emergency access route information

Access to Fairbairn Dam from Emerald is via Selma Rd and Springsure Rd. Selma Rd is paved and open to all traffic except road trains. During flood events, Selma Rd is cut when flow reaches 1.27 m above spillway.

Access to Fairbairn Dam via Springsure Rd is a sealed road and is open always. When flow reaches 3.5 m above spillway, the Vince Lester Bridge is closed and there is no access out of Emerald. During flood events Department of Main Roads place load restrictions on all roads (permits required).

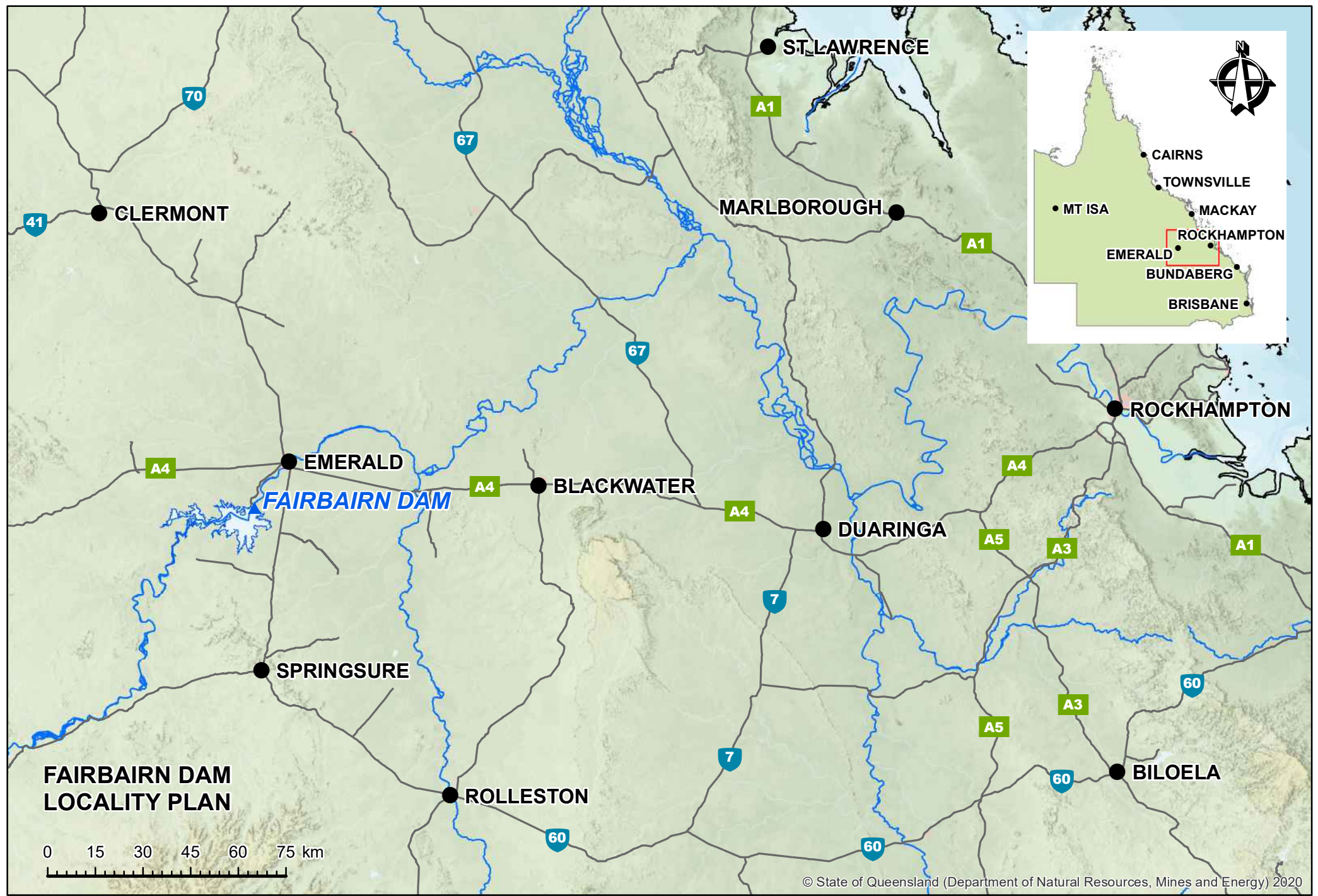
Distance: Approx. 20 km south of Emerald.

Travel Time: Approx. 20 minutes via Selma Rd/Approx. 30 minutes via Springsure Rd.

Road Type: Bitumen.

Note: When the downstream flood waters have inundated access route(s), then access to the dam will be by helicopter.

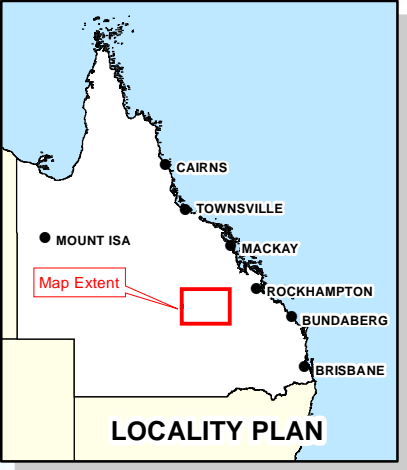
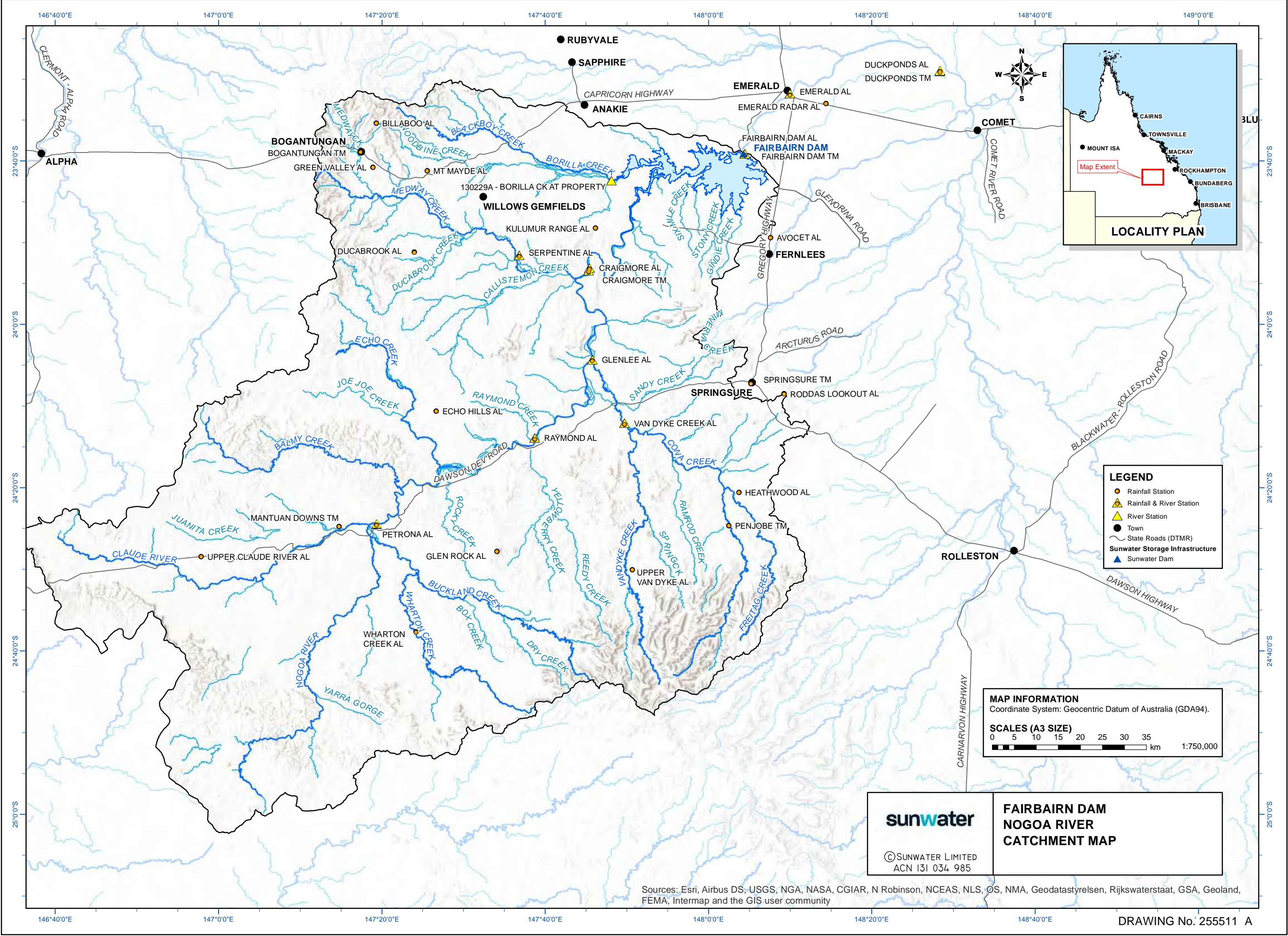
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Document: S:\BW Asset Delivery\GIS Data\Enterprise_GIS\Water_Supply_Schemes\Nogoa Mackenzie\Drawings\ArcMap\255511-A.mxd
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MAP PRODUCED BY:
SUNWATER LTD
TEL: (07) 3120 0000



LEGEND

- Rainfall Station
- Rainfall & River Station
- River Station
- Town
- State Roads (DTMR)
- Sunwater Storage Infrastructure
- Sunwater Dam

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

SCALES (A3 SIZE)
0 5 10 15 20 25 30 35 km 1:750,000

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ACN 131 034 985

**FAIRBAIRN DAM
NOGOA RIVER
CATCHMENT MAP**

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

APPENDIX C Equipment and technical information

Appendix C1: List of equipment available during an emergency

Appendix C2: Spillway discharge rating curve

Appendix C3: Storage capacity and submerged area curve

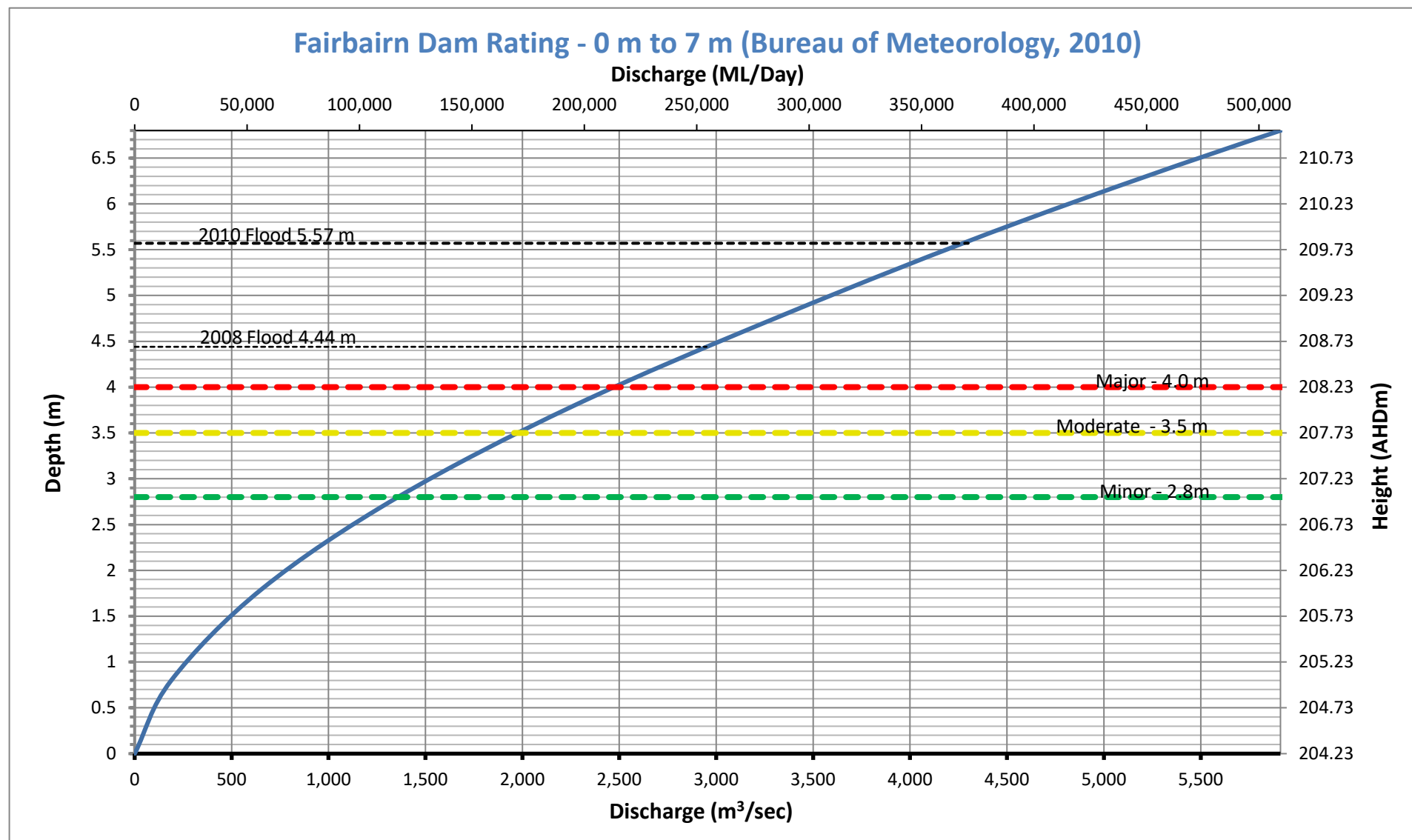
Appendix C4: Right bank outlet works—curves for rapid drawdown

Appendix C5: Left bank outlet works—curves for rapid drawdown

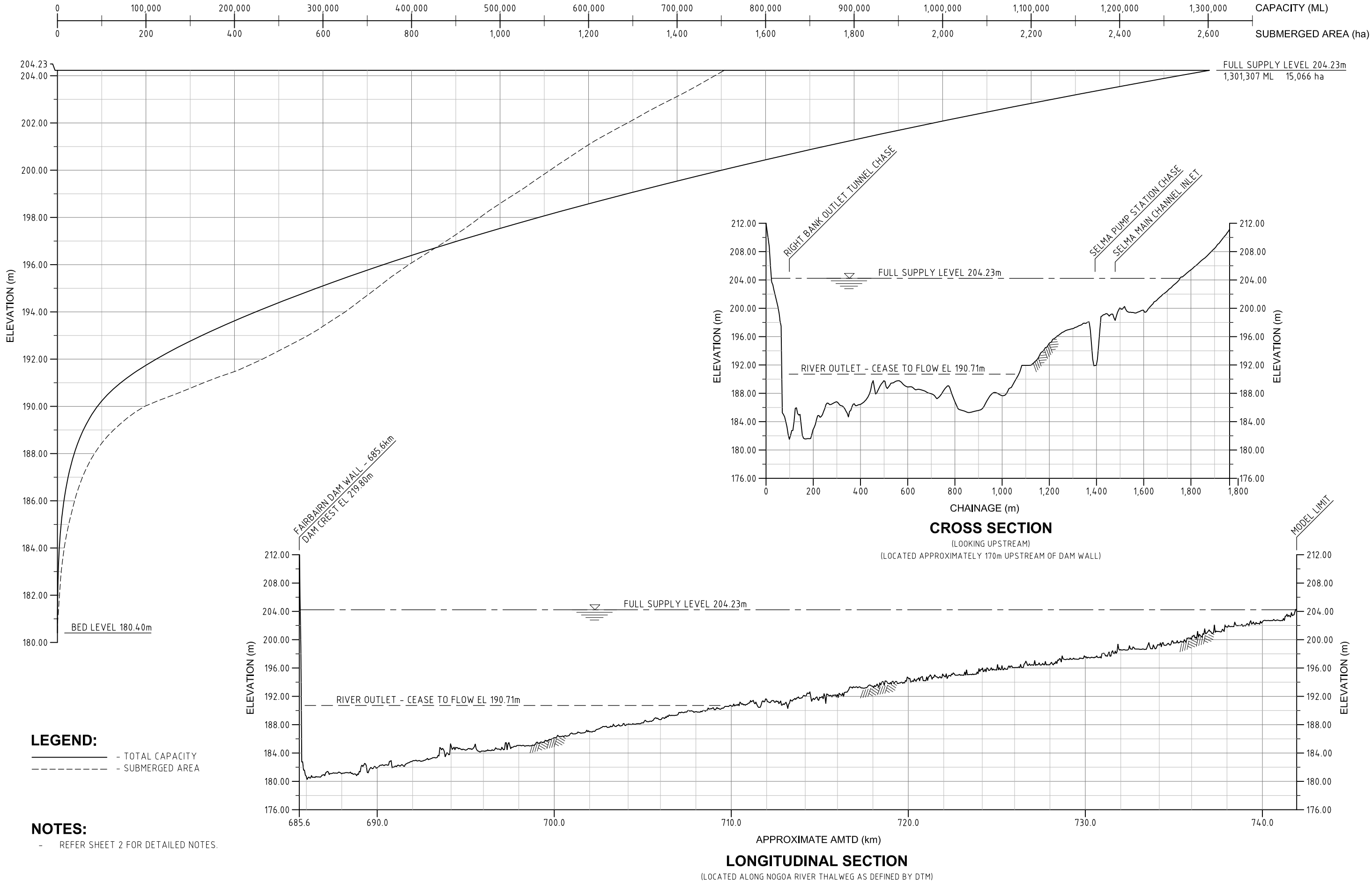
Appendix C1 has been redacted

Appendix C2: Fairbairn dam spillway discharge rating curve

Figure C1: Fairbairn Dam discharge curve



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23 Nov 2022 12:49 PM
DRAWING PRODUCED BY:
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TEL: (07) 3120 0000



REVISION						REFERENCE DRAWINGS			SCALES (A3 SIZE)	DRAWN IP	DESIGNED	NOGOA RIVER - BASIN 130 FAIRBAIRN DAM - AMTD 685.6km	CONTRACT NUMBER	
												STORAGE CURVE	DRAWING NUMBER	REV.
													203831	B
													SHEET 1 OF 2	
													DATE SEPT 2020	
	23/11/22	B	REVISED - LIDAR AND BATHYMETRIC SURVEYS		MH	L. CRISTE				APPROVED		sunwater ©SUNWATER LIMITED ACN 131 034 985		
	DATE		REMARKS		CKD	PASSED				23/11/2022	RPEQ 25812			

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23 Nov 2022 12:49 PM

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REVISION						REFERENCE DRAWINGS		
23/11/22	B	REVISED - LIDAR AND BATHYMETRIC SURVEYS			MH	L. CRISTE		
DATE		REMARKS			CKD	PASSED		

ELEVATION (m)	AREA (ha)	CUMMULATIVE VOLUME (M)	PERCENTAGE FULL
215.00	27680.3	3555308.5	273.21
214.50	27017.1	3418552.6	262.70
214.00	26355.6	3285129.3	252.45
213.50	25701.7	3154988.1	242.45
213.00	24999.3	3028202.4	232.70
212.50	24382.7	2904781.2	223.22
212.00	23757.3	2784423.9	213.97
211.50	23094.4	2667300.7	204.97
211.00	22464.4	2553398.9	196.22
210.50	21837.9	2442648.3	187.71
210.00	21199.5	2335055.4	179.44
209.50	20547.0	2230684.8	171.42
209.00	19911.7	2129561.3	163.65
208.50	19292.1	2031564.3	156.12
208.00	18715.9	1936556.6	148.82
207.50	18138.8	1844431.1	141.74
207.00	17640.3	1755014.2	134.87
206.50	17185.8	1667953.2	128.18
206.00	16733.9	1583156.8	121.66
205.50	16290.2	1500601.3	115.31
205.00	15824.5	1420302.6	109.14
204.50	15334.2	1342403.5	103.16
204.23	15066.4	1301307.3	100.00
204.00	14850.8	1266902.7	97.36
203.75	14616.8	1230068.2	94.53
203.50	14380.7	1193824.9	91.74
203.25	14134.5	1158177.5	89.00
203.00	13871.8	1123172.6	86.31
202.75	13607.9	1088823.5	83.67
202.50	13354.3	1055129.8	81.08
202.25	13123.0	1022031.4	78.54
202.00	12880.3	989525.2	76.04
201.75	12628.5	957641.5	73.59
201.50	12385.9	926374.0	71.19
201.25	12147.7	895714.4	68.83
201.00	11933.0	865617.2	66.52
200.75	11730.5	836041.8	64.25
200.50	11529.3	806968.3	62.01
200.25	11325.0	778402.9	59.82
200.00	11130.1	750335.8	57.66
199.75	10932.8	722757.1	55.54
199.50	10738.5	695671.0	53.46
199.25	10550.2	669062.4	51.41
199.00	10342.1	642939.6	49.41
198.75	10132.0	617353.7	47.44
198.50	9927.7	592278.5	45.51
198.25	9728.4	567715.4	43.63
198.00	9546.1	543626.4	41.78
197.75	9369.8	519979.2	39.96

REFER NOTES

ELEVATION (m)	AREA (ha)	CUMMULATIVE VOLUME (M)	PERCENTAGE FULL
197.50	9181.1	496788.3	38.18
197.25	8985.7	474081.6	36.43
197.00	8783.2	451870.5	34.72
196.75	8571.8	430175.4	33.06
196.50	8362.3	409010.0	31.43
196.25	8151.7	388365.6	29.84
196.00	7939.0	368257.4	28.30
195.75	7748.2	348651.5	26.79
195.50	7556.2	329524.0	25.32
195.25	7382.4	310852.9	23.89
195.00	7212.0	292608.9	22.49
194.75	7035.2	274798.6	21.12
194.50	6854.3	257440.9	19.78
194.25	6682.4	240516.2	18.48
194.00	6501.4	224038.7	17.22
193.75	6293.5	208035.1	15.99
193.50	6088.2	192552.5	14.80
193.25	5889.3	177582.9	13.65
193.00	5662.5	163133.0	12.54
192.75	5411.6	149291.4	11.47
192.50	5153.5	136084.6	10.46
192.25	4898.3	123521.4	9.49
192.00	4633.2	111604.8	8.58
191.75	4341.3	100389.2	7.71
191.50	4045.1	89904.2	6.91
191.25	3653.2	80271.8	6.17
191.00	3304.5	71585.0	5.50
190.75	2979.2	63731.2	4.90
190.50	2645.6	56688.0	4.36
190.25	2290.8	50500.6	3.88
190.00	1972.6	45208.0	3.47
189.75	1754.6	40558.3	3.12
189.50	1574.0	36402.7	2.80
189.25	1417.5	32664.5	2.51
189.00	1270.1	29308.8	2.25
188.75	1139.7	26302.8	2.02
188.50	1026.2	23599.2	1.81
188.25	925.9	21162.6	1.63
188.00	837.1	18960.2	1.46
187.75	754.7	16972.9	1.30
187.50	686.8	15172.6	1.17
187.25	622.8	13536.2	1.04
187.00	566.1	12051.3	0.93
186.75	514.5	10701.9	0.82
186.50	468.6	9474.0	0.73
186.25	424.7	8358.3	0.64
186.00	387.2	7344.5	0.56
185.75	352.2	6420.5	0.49
185.50	319.4	5580.9	0.43

ELEVATION (m)	AREA (ha)	CUMMULATIVE VOLUME (M)	PERCENTAGE FULL
185.25	285.7	4824.9	0.37
185.00	254.8	4149.2	0.32
184.75	226.8	3547.8	0.27
184.50	199.5	3014.8	0.23
184.25	174.0	2549.1	0.20
184.00	153.6	2139.6	0.16
183.75	135.3	1778.2	0.14
183.50	116.8	1462.7	0.11
183.25	100.6	1192.0	0.09
183.00	86.6	957.9	0.07
182.75	74.2	757.5	0.06
182.50	64.3	584.5	0.04
182.25	55.2	435.1	0.03
182.00	46.8	307.9	0.02
181.75	37.4	202.7	0.02
181.50	29.1	119.3	0.01
181.25	20.7	56.3	0.00
181.00	9.5	18.8	0.00
180.75	3.5	3.9	0.00
180.50	0.2	0.1	0.00
180.40	0.0	0.0	0.00

NOTES:

- LEVELS DATUM: AUSTRALIAN HEIGHT DATUM (AHD) 1971 DERIVED FROM PM47977 LHS BRIDGE TO INLET TOWER EL 219.068m.
- HORIZONTAL DATUM: PROJECTED COORDINATE SYSTEM - MAPPING GRID OF AUSTRALIA 1994 (MGA94) ZONE 55.
- VOLUME AND SUBMERGED AREA CALCULATED FROM DIGITAL TERRAIN MODEL COMPILED FROM LIDAR DATED 21st DECEMBER 2019 AND BATHYMETRIC SURVEY DATED AUGUST 2022.
- DUE TO LIMITATION OF THE SURVEY EXTENTS, THE CALCULATED VOLUMES AND SUBMERGED AREA ABOVE EL 210.00m ARE SLIGHTLY UNDERESTIMATED (<0.01%).
- CATCHMENT AREA: 16320 km².
- EASTING: 608615m NORTHING: 7384105m

SCALES (A3 SIZE)

NOT TO SCALE

DRAWN JC	DESIGNED
CHECKED	CHECKED MH
APPROVED L. CRISTE	
23/11/2022	RPEQ 25812



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ACN 131 034 985

NOGOA RIVER - BASIN 130
FAIRBAIRN DAM - AMTD 685.6km

STORAGE CURVE

CONTRACT NUMBER

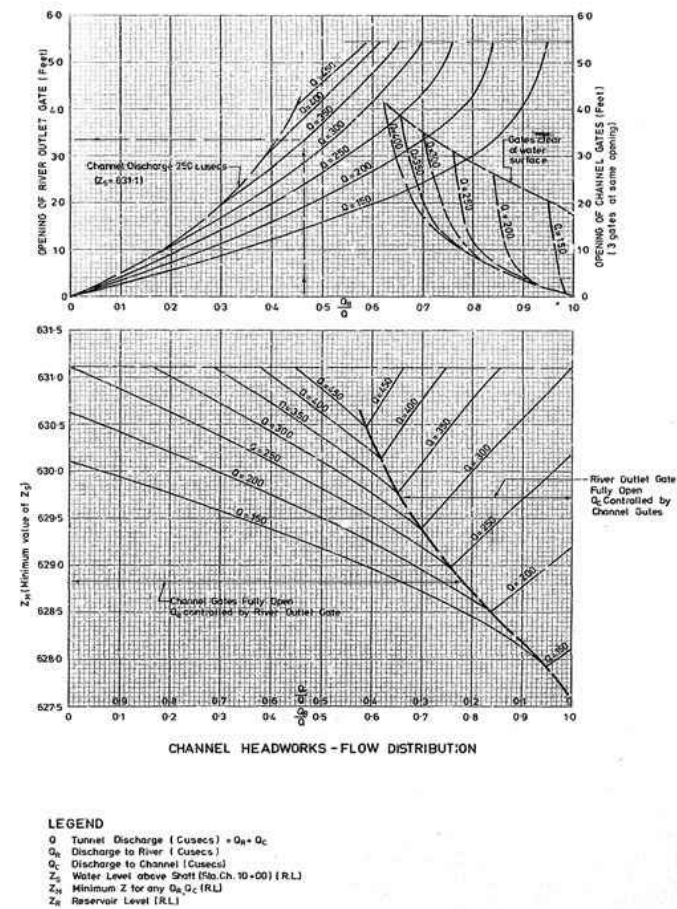
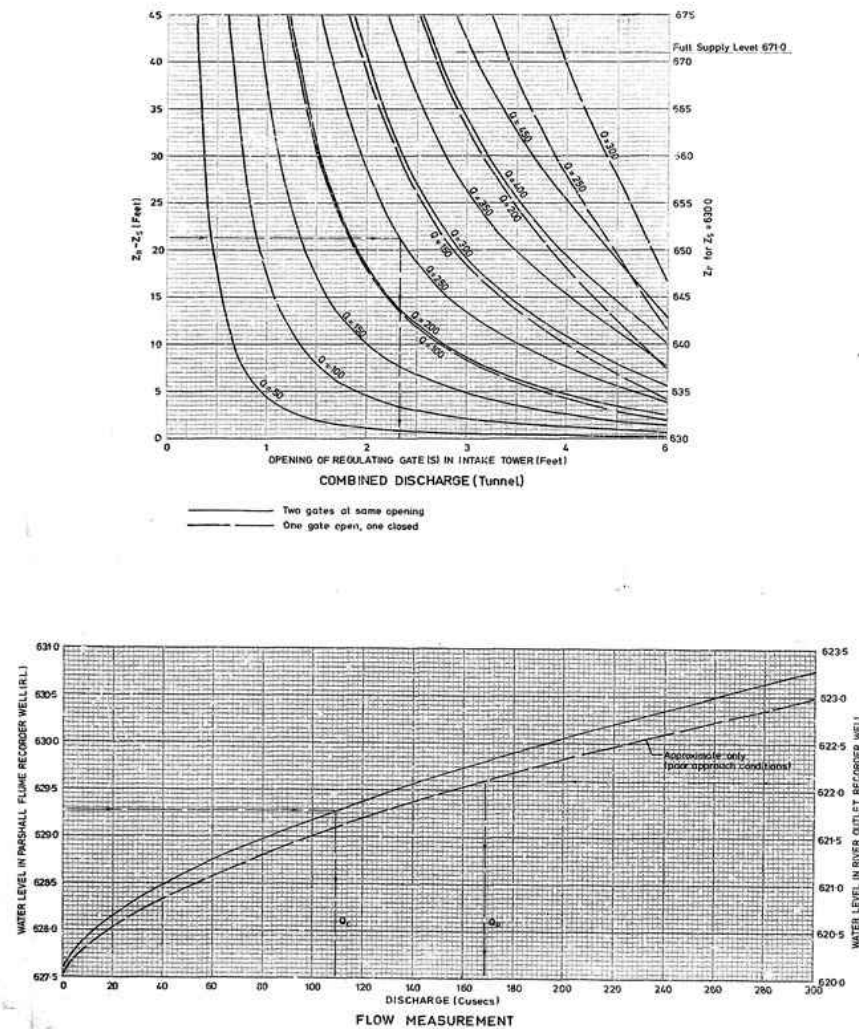
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SHEET 2 OF 2

DATE SEPT 2020

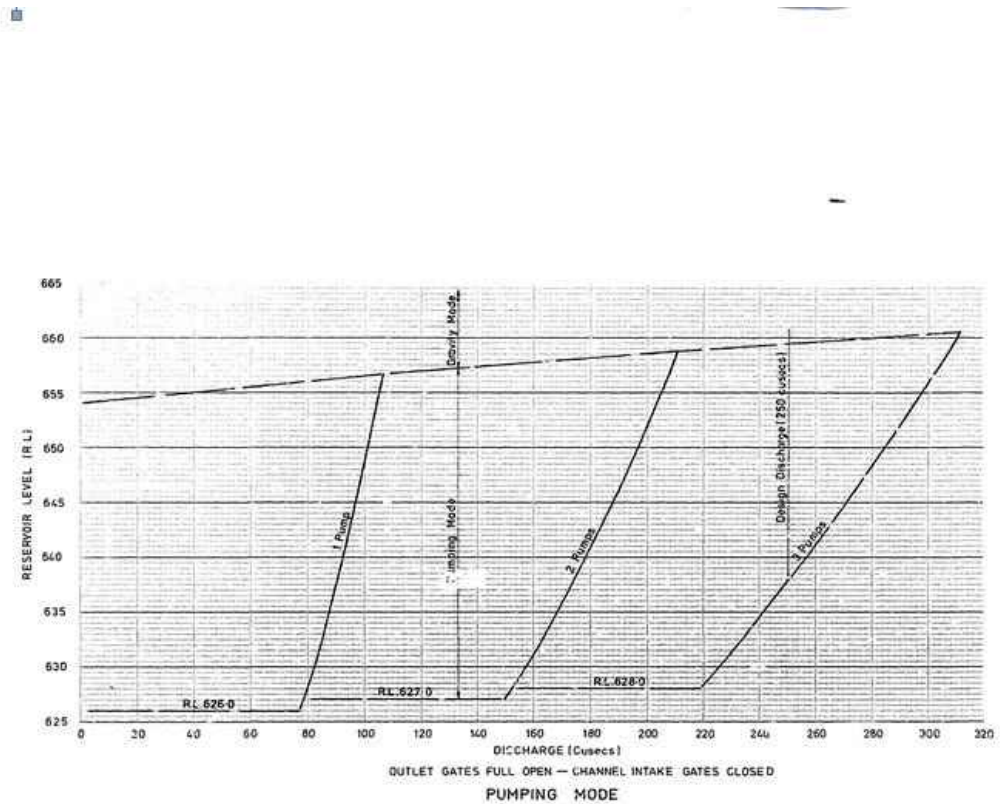
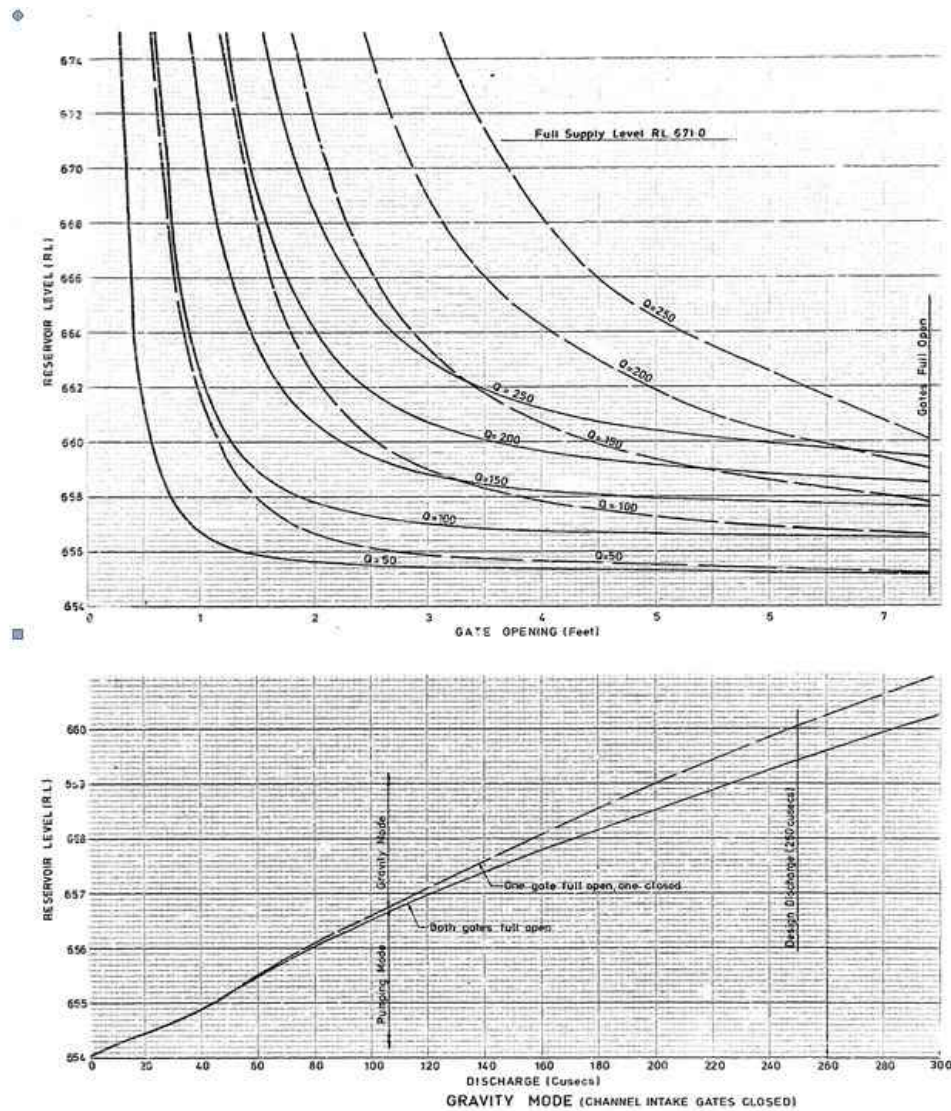
Appendix C4: Right bank outlet works – curves for rapid drawdown

Figure C6 Right bank outlet works—curves for rapid drawdown



Appendix C5: Left bank outlet works – curves for rapid drawdown

Figure C7 Left bank outlet works—curves for rapid drawdown

**NOTE**

The discharges plotted are those obtained with pump pre-sluices full open. Reduced discharges (or reduced efficiency) can be obtained by adjusting the pre-sluices towards the starting position.

APPENDIX D Interaction with local government and district groups

Appendix D has been redacted

Annexe — Fairbairn 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. Fairbairn Dam is spilling excess water into Nogoa River. People downstream of Fairbairn Dam should STAY INFORMED and MONITOR CONDITIONS. Water flows from Fairbairn Dam **expected to remain within beds and banks of river / may contribute to widespread / localised / overland flooding**. Expect increased river flows **in 6-12 hours / later today / overnight / tomorrow**. There is no immediate danger. More information here: bit.ly/RecandSafety

FLOOD WATCH AND ACT from Sunwater. Excess water spilling from Fairbairn Dam into Nogoa River has increased significantly. Water flows from Fairbairn Dam may contribute to **dangerous / widespread** flooding downstream. Expect increased river flows **in 6-12 hours / later today / overnight / tomorrow**. People downstream of Fairbairn Dam must PREPARE TO LEAVE in case the flood gets worse. Call Triple Zero (000) if your life is in danger. Call the SES on 132500 for flood help. More information here: bit.ly/RecandSafety

FLOOD EMERGENCY WARNING from Sunwater. People downstream of Fairbairn Dam must LEAVE IMMEDIATELY. Fairbairn Dam **possible failure / is failing**. Major flooding is happening now. Your life is at risk. Go now to a safe place away from the flood. Get full warnings and what you should do at Central Highlands Regional Council beprepared.chrc.qld.gov.au and Isaac Regional Council dashboard.isaac.qld.gov.au