EMERGENCY ACTION PLAN — PARADISE DAM (ID 1997)

ISSUE: 12.0 — August 2024

Expiry: 1 June 2029

Prepared by Sunwater Limited

Controlled Copy No.

Gated: No	Staffed: No

Type: Roller compacted concrete

Project: Paradise Dam EAP

File no.: 08-000379/001

Address: 1671 Paradise Dam Road, Coringa

Location: Lat. -25.355445° Long. 151.919913°
25°21'19.64"S 151°55'11.69"E

Approved by the delegate of the Chief Executive, Department of Local Government, Water and Volunteers until 1 June 2029.

Emergency activation quick reference – Dam Hazards

The Emergency Action Plan (EAP) for Paradise 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 6	• Storage above EL 61.70 m (0.1 m below FSL) and rising	• Storage above EL 61.80 m (FSL)	• Storage above EL 64.30 m (Moderate Flood Level)	• Storage EL 63.30 m and falling with no forecast increase (Minor Flood Level)
Piping: embankment, foundation, or abutments See section 7	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• Piping condition has been established	• Risk assessment has determined that failure risk has reduced
Overturning or sliding of monoliths See section 8	• Indications of movement of monoliths noted such as cracking, increased seepage, spilling, OR • Damage to the upstream membrane, OR • Apron Slab Integrity System loss of fluid (not during spill event)	• Apron Slab Integrity System loss of fluid during spill event	• Unconfirmed displacement of one or more monoliths, OR • Evidence of scouring at or near toe of dam	• Risk assessment has determined that sliding or overturning risk has reduced
Releases through Environmental Outlet See section 9	• Releases commenced through Environmental Outlet	• Inspection indicates possible leakage in Outlet Building Sump from failure of Environmental Conduit/interconnected wall, AND • Sump pumps (#1 & #2) have been working at a longer than usual rate, OR • Dewatering pump (#3) has started to operate	• Confirmed uncontrolled releases through the Environmental Outlet	• Releases have ceased
Earthquake See section 10	• Earthquake confirmed (by DSTDM) or felt in the area, AND • Intensity less than 5 Modified Mercalli (MM)	• Earthquake confirmed (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection	• Earthquake confirmed (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Risk assessment has determined that failure risk has reduced

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Dam Hazards and section numbers	Activation levels for dam hazards			
	Alert	Lean Forward	Stand Up	Stand Down
Terrorist threat/ activity or high energy impact See section 11	• Not applicable	• Not applicable	• Possible terrorist activity noticed at dam or threat received • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit) • Failure underway or likely due to impact or explosion, and sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced

Emergency activation quick reference – Other Emergency Situations

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

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

Table 2: Emergency activation quick reference - Other Emergency Situations

Other Emergency Situations and section numbers	Activation levels		
	Communications Failure – Dam Site (DDO)	Communications Failure – Local Area (LEC/ORR)	Communications Failure – Brisbane (IC/DSTDM)
	• Site managed (DDO – becomes LEC)	• Brisbane managed by IC	• Locally managed by LEC
	Activation triggers for other emergency situations		
Communications Failure See section 12	• Unable to communicate to or from Dam site	• Unable to communicate to or from Local Area	• Unable to communicate to or from Sunwater Brisbane

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Document control

Authorisation of document

Name	Position/role	Signature	Date
[redacted]	EAP Program Lead — Prepared for submission	[redacted]	01/05/2025
[redacted]	Principal Engineer – Dam Safety Compliance — Approved for submission	[redacted]	01/05/2025
[redacted]	GM Asset Integrity — Approved for submission	[redacted]	07/05/2025
[redacted]	EGM Engineering and Water Resources (or delegate) — Dam Owner Authorising Officer	[redacted]	12/05/2025

Document revision history

Issue	Date	Prepared by	Reason for change	eDOCS#
2.0	November 2005		Substantial review following completion of construction of Paradise Dam and Acquisition by Sunwater	2487207 (Reconstructed version only)
3A	October 2011		Amendments to all sections following 2011 floods	2483118
3B	November 2012		Amendments to sections 1, 2, 3, 4, 5, 6, and 10	2483121
3C	March 2013		Amendments to: Emergency Evaluation Procedure (Action 3), Comm. Plan (Action 3) & Contact List, Flood of Record and Emergency Event Alert Levels, Phone and SMS messaging	2483122
3D	September 2013		Amendments due to new legislative requirements	2483123
3E	November 2013		Amendments relating to possible dam failure modes, from recent findings	2483124
4	August 2014		New EAP developed at expiry of 3E approval. Issued for consultation with relevant disaster management groups	1619470 (Draft only)
4A	June 2015		Improvements and clarifications made following review of new EAP by Sunwater staff	1636380
5	October 2016		Improvements and clarifications made following review of EAP by Sunwater staff and contacts updated	2031671
6	October 2017		Contacts and notification lists updated, plus minor amendments	2224228
7	December 2017		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).*	2088696
8	September 2018		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holders List. Minor error corrections and other non-substantive changes.	2367705
9	February 2019		Rewrite of section 6 'Overview' and changed trigger levels. Emergency Siren details added to sections 5, 6, 10, 11 & 12. Minor error corrections and updates.	2414366
9.1	September 2019		Minor amendments, error corrections, contact updates and added protocol with actions for new Emergency Alert siren.	2453004
10.0	November 2019		Withdrawn – not approved.	2477407
10.1	December 2019		Various amendments to Trigger levels and associated Actions because of a recent CRA. New Emergency Alerts (EA's) and updated EA voice messages added to Overturning and Sliding triggers. Added level comparison table to section 5. Added catchment map. Clarified/rationalised actions in Action tables. Minor amendments, error corrections, contact updates.	2500047
10.2	February 2020		Added Council area to DS residents list and colour coded houses downstream as per IGEM review recommendations. Completed recommendations from previous Schedule of Matters. Minor amendments, error corrections, contact updates and layout changes for consistency.	2507623

Issue	Date	Prepared by	Reason for change	eDOCS#
10.3	May 2020		Created upon expiry due to regulatory requirements. Minor amendments, error corrections and contact updates.	2535600
10.4	October 2020		Added new Addendum A.2. Replaced EA polygon with two that cover the same area. Corrected URL link in messages. Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holder list. Minor error corrections and other non-substantive changes.	2572777
10.5	March 2020		Added new Addendum A.3. which contains updated triggers for Overturning hazard. Amended contacts and associated sections, minor error corrections and other non-substantive changes to main EAP document.	2607603
10.6	March 2021		Amended contacts and associated sections, e.g. Organisation chart & Controlled Copy Holder list. Minor error corrections and other non-substantive changes such as removing Comprehensive Risk Assessments description (2.9) and simplifying FODM role in Activation triggers (5.2.1) including removing para 5.2.2.	2653383
11.0	September 2022		Updated to new Sunwater Branding and incorporated various layout improvements. Amended contacts and associated sections. Minor error corrections and other non-substantive changes. Merged two Environmental Release Hazards in to one. To reflect current physical characteristics of Dam, updated Flood and Overturning Hazards and included new drawings and maps. The Chemical Hazard section has been removed as it is not a Dam Safety Hazard and is dealt with in other more relevant documents. All messaging revised.	2694188
11.1	October 2022		Added three new Overview Inundation Maps. Removed at their request, Bundaberg DDMG from Hard copy list. Added ABC acronym. Added missing EA Instructions.	2744426
11.2	September 2023		Non-substantive updates as part of Annual Safety Statement. Minor error correction and readability improvements.	2812839
12.0	August 2024	EAP Team	Full review pending expiry.	2861048

Controlled document distribution list

Copy no.	Position	Location
1	Operator Maintainer	Sunwater, Paradise Dam
2	General Manager, Burnett & Lower Mary	Sunwater, Bundaberg
3	Operations Centre	Sunwater, Brisbane
4	Local Disaster Coordinator — Local Disaster Management Group (LDMG 1)	Bundaberg Regional Council, Bundaberg
5	CEO & Local Disaster Coordinator – Local Disaster Management Group (LDMG 2)	North Burnett Regional Council, Gayndah
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
Executive Officer — Bundaberg District Disaster Management Group (DDMG)	Police, Bundaberg
Emergency Management Coordinator	Queensland Fire Department, Caloundra Queensland Police Service Maryborough
Senior Flood Forecaster	Bureau of Meteorology, Brisbane
NOTE: Communication information for each 'Electronic Copy Holder' is in Appendix A.	

1. References, abbreviations, and definitions

1.1 References/associated documents

Ref	Document title	Reference/location
A	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	Interim Queensland State Disaster Management Plan 2024-2025 (Queensland's Disaster Management Arrangements)	Interim-SDMP-202425-v-2.pdf
D	Queensland Government arrangements for coordinating public information in a crisis	L1159-DPC2739-Crisis-Comm https://www.disaster.qld.gov.au/__data/assets/pdf_file/0032/359465/QLD-Disaster-Management-Guideline.pdf unication-Document.pdf
E	Guidelines for the Development of Communication Education, Awareness and Engagement Programs (2010)	https://knowledge.aidr.org.au/media/1970/manual-45-guidelines-for-the-development-of-communication-education-awareness-and-engagement-programs.pdf
F	Queensland Emergency Alert Manual – M.1.174 (December 2023)	M.1.174 Queensland Emergency Alert M https://www.disaster.qld.gov.au/__data/assets/pdf_file/0032/359465/QLD-Disaster-Management-Guideline.pdf annual
G	Sunwater website — Emergency Action Plans, Flood Maps and Dam Emergency Sirens	https://www.sunwater.com.au/community/preparing-for-weather-events/emergency-management/
H	Sunwater website — Emergency Notification Service	https://www.sunwater.com.au/community/preparing-for-weather-events/stay-informed/emergency-notification-service/
I	Professional Engineers Act 2002 (RPEQ) (September 2013)	https://www.legislation.qld.gov.au/view/pdf/inforce/2013-09-23/act-2002-054
J	Sunwater (internal) Paradise Dam Improvement Project — Hydrology, Dambreak Modelling and Consequence Assessment Report (August 2021)	Sunwater Internal Document
K	Sunwater Operations (internal) Paradise Dam — Hazard Management Toolkit (HMT)	Sunwater Internal Document Only available with Sunwater internal versions of EAPs
L	Sunwater (internal) Paradise Dam, Post Essential Works Primary Spillway Crest Lowering and Capping, Emergency Action Plan (EAP) Addendum, Primary Spillway Monolith Overturning or Sliding Failure Modes, Stand Up 2 & 3 Activation Levels, Proposed Amendment of Triggers (Feb 2021)	Sunwater Internal Document
M	Sunwater (internal) Paradise Dam Operation and Maintenance Manual	Paradise_Dam_OM_Manual
N	Sunwater Operations (internal) — OC Toolkit	OC Toolkit
O	Sunwater (internal) Strategic Event Procedure	https://sunwater.sharepoint.com/:b:/r/sites/policies-and-standards/PoliciesAndStandards/Strategic%20Event%20Procedure.pdf?csf=1&web=1&e=Hgwi7r
P	Sunwater (internal) Paradise Dam Safety Condition Schedule	Sunwater Internal Document
Q	Queensland Disaster Management Act 2003 (July 2024	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2003-091

Ref	Document title	Reference/location
R	Queensland Disaster Management Guidelines (January 2018)	https://www.disaster.qld.gov.au/__data/assets/pdf_file/0032/359465/Interim-QPPRR-Disaster-Management-Guideline-2024-25.pdf
S	Guidelines on Safety Assessments for Referable Dams (November 2023) Version 8	Guidelines on Safety Assessments for Referable DamsLocal Government, Water and Volunteers (https://www.dlgwv.qld.gov.au)
T	Queensland Dam Safety Management Guidelines (RDMW August 2024)	https://www.dnrme.qld.gov.au/__data/assets/pdf_file/0007/78838/dam-safety-management.pdf
U	Australian Rainfall and Runoff (ARR) 2016	http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com/
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
Y	Sunwater (internal) Emergency Alert Protocol	Sunwater Internal Document
Z	Water Act 2000 (September 2024)	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2000-034
AA	Sunwater (internal) Fatigue Management Procedure	Sunwater Internal Document

1.2 Abbreviations and acronyms

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

1.3 Business terms and definitions

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

Term	Definition
Terms defined in accordance with the **Water Supply (Safety and Reliability) Act 2008** (the Act) (ref A)	
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: cause or contribute to the failure of the dam, if the failure may cause harm to persons or property, OR require an automatic or controlled release of water from the dam if the release of the water may cause harm to persons or property. NOTE: Various dam failure modes have been referred to as *hazards* in this document e.g. piping, instability, and overtopping.
Dam hazard event	Means an event arising from a *dam hazard* if: persons or property may be harmed because of the event, AND a coordinated response, involving two or more of the following *relevant entities*, is unlikely to be required; each *local group* and *district group* for the EAP, each local government whose area may be affected, the Chief Executive, another entity the owner of the dam considers appropriate, AND the event is not an *emergency event*.
Disaster management plan	Of a *district group* or local government, means the group's District Disaster Management Plan (DDMP) or local government's Local Disaster Management Plan (LDMP) .
District group (DDMG)	For an EAP, means a district group established under the Queensland Disaster Management Act 2003 (ref Q), section 22 whose disaster district under that Act could, under the plan, be affected by a *dam hazard*.
Emergency Alert	Emergency Alert (EA) is a national telephone warning system enabling local and state agencies within Australia to issue warnings about a likely or actual disaster or emergency. This communication channel can send voice messages to landlines and text messages to mobiles within a defined spatial area (e.g. a threat direction polygon). It supplements other public information and warning methods.
Emergency event	Means an event arising from a *dam hazard* if: • persons or property may be harmed because of the event, AND • any of the following apply: o a coordinated response, involving two or more of the following relevant entities, is likely to be required; each local group and district group for the EAP, each local government whose area may be affected, the Chief Executive, another entity the owner of the dam considers appropriate, OR o the event may arise because of a disaster situation declared under the Queensland Disaster Management Act 2003 (ref Q), OR o an entity performing functions under the State Disaster Management Plan may, under that plan, require the owner of the dam to give the entity information about the event.
Local group	For an EAP, means a local group established under the Queensland Disaster Management Act 2003 (ref Q), section 29 whose local government area could, under the plan, be affected by a *dam hazard*.
Notice response	A dam owner's written response to a notice following an assessment of an EAP by a local government or *district group*.
Referable dam	A dam, or a proposed dam after its construction, will be a referable dam if: • a failure impact assessment of the dam, or the proposed dam, is carried out under the Act, AND • the assessment states the dam has, or the proposed dam after its construction will have, a category one or category two failure impact rating, AND • the Chief Executive has, under section 349 of the Act, accepted the assessment. Also, a dam is a referable dam if: • under section 342B of the Act, the owner of a dam is given a referable dam notice and, before the effective day for the notice, does not give the Chief Executive a failure impact assessment for the dam, AND • the Chief Executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam.

Term	Definition
Relevant entity	Means each of the following under the EAP for the dam: • the persons who may be affected, or whose property may be affected, if a *dam hazard event* or *emergency event* were to happen for the dam, e.g. the owners of parcels of farmland adjacent to the dam or residents of a township • each local group and district group for the EAP • each local government whose local government area may be affected if *a dam hazard event or emergency event* were to happen • the Chief Executive • another entity the owner of the dam considers appropriate, e.g. the Queensland Police Service (QPS).
Terms consistent with Queensland Disaster Management Guidelines (ref R)	
Activation levels	The four levels of EAP activation are: • **Alert:** A heightened level of vigilance due to the possibility of an event occurring. No further action may be required; however, the situation should be monitored by someone capable of assessing the potential of the threat. Moving to an Alert level indicates the dam owner is getting ready to activate the Lean Forward level of the EAP if the situation deteriorates. • **Lean Forward:** An operational state characterised by a heightened level of situational awareness of an impending disaster event and a state of operational readiness. Disaster coordination centres are on standby and prepared but not activated. • **Stand Up:** The operational state where resources are mobilised, personnel are activated, and operational activities commenced. Disaster coordination centres are activated. The dam owner needs to provide an Emergency Event Report (EER) in accordance with the provision of the Act. • **Stand Down:** Transition from responding to an event back to normal core business and/or continuance of recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present. The movement through these levels of activation is not necessarily sequential. It should be applied with flexibility and adaptability and be tailored to the location and event. Triggering one of these levels of activation may not necessarily mean a similar activation of LDMGs or DDMGs.
AWS Warning Levels	The three AWS warning levels are: • **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. Notes: These AWS Warning levels do not change the Activation Levels of the EAP and are intended for external public facing information only. There is no Stand Down equivalent in AWS warning levels
Bureau of Meteorology flood level classifications	The three levels of flooding are: • Minor flooding: This causes inconvenience such as closing of minor roads and the submergence of low-level bridges and makes the removal of pumps located adjacent to the river necessary. • Moderate flooding: This causes the inundation of low-lying areas requiring the removal of stock and/or the evacuation of some houses. Main traffic bridges may be closed by flood waters. • Major flooding: This causes inundation of large areas, isolating towns and cities. Major disruptions occur to road and rail links. Evacuation of many houses and business premises may be required. In rural areas widespread flooding of farmland is likely.
Concurrent Flooding	Flood flows downstream of a dam that are not a result of dam outflows; for instance, those from adjacent catchments or from the sea, and which occur in the same period as downstream releases or flooding from the dam.
Dam crest	The lowest elevation of the non-overflow crest section of the dam excluding handrails, parapets or wave walls that have not been designed to store water.
Dam crest flood	The flood event 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.

Term	Definition
Downstream releases	Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam.
Earthquake	A sudden release of energy in the earth's crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity, resulting in the generation of seismic waves that can be destructive. The potential consequences of an earthquake include: • settlement, sliding, or overturning of monoliths in the dam wall • initiation of seepage lines in the foundations or abutments that could lead to piping damage and potential inoperability of appurtenant works.
Flood release	A flood release from a dam occurs when catchment inflows raise the storage level above the Full Supply Level (FSL) resulting in a discharge from the spillway of the dam.
Piping	Internal scour caused by the water flow and seepage that occurs through earth dams, dam foundations, or dam abutments. The internal scour can lead to the formation of a pipe, which can lead to a failure of the dam.
Plane strike or other impact	The impact of a plane, meteorite, or other high energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam.
Probable maximum flood	The flood resulting from the *probable maximum precipitation* coupled with the worst flood-producing catchment conditions that can be realistically expected in the prevailing meteorological conditions.
Probable maximum precipitation	The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin.
Probable maximum precipitation flood	The flood resulting from the *probable maximum precipitation* coupled with typical catchment conditions.
Stability, main embankment	High foundation pore pressure peaks may reduce the Factor of Safety against slip circle failure to an unacceptable level.
'Sunny Day' failure	A failure that occurs at the FSL and there is no concurrent rain associated flooding.
Terrorist activity	A deliberate attempt to damage, fail or contaminate a dam.

2. Introduction

2.1 Context

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

This EAP has been prepared in accordance with Chapter 4 of the Act and the *Emergency action plan for referable dam guideline* (ref B) and the *Queensland State Disaster Management Plan 2018* (ref C). The content requirements for EAPs are contained in section 352H of the Act.

Summary of legal requirements – Section 352H

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

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

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

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

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

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

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

The local government whose area may be affected by a dam hazard for Paradise Dam has been assessed as **Bundaberg Regional Council (BRC)** and the **North Burnett Regional Council (NBRC)**. Sunwater has provided the **Bundaberg** and **North Burnett Local Disaster Management Groups (LDMGs)** with a copy of the draft EAP for assessment.

Section 352HC of the Act states that a district group may review the EAP for consistency with its disaster management plan. The district group for Paradise Dam is **Bundaberg District Disaster Management Group (DDMG)**. Sunwater has provided the DDMG with a copy of the draft EAP for review.

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

2.2 Purpose

The purpose of this EAP is to:

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

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

2.3 Scope

The Paradise 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
- alignment of the EAP trigger levels for flood with the Australian Warning System (AWS) warning levels
- notification, warning, and communication protocols
- inspection, monitoring, and reporting protocols during emergencies in accordance with the *Queensland Government arrangements for coordinating public information in a crisis* (ref D)
- other relevant information that may assist with identifying the area affected by a dam hazard event or emergency event, and the management of such.

2.4 Sunwater training

Training of the use and implementation of this EAP document is carried out at various times throughout the year, 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, on the current EAP such as contact details for individuals and dam information.

The EAP training that is carried out on site include walkthroughs of new changes, scenario (role play) and Q & A to check the knowledge and competency of all those who attended. The training is presented to relevant Sunwater staff (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 SDCC and include the (non-live) testing of Emergency Alerts. The test results relating to numbers of alerts generated will be shared with local authority and disaster management stakeholders.

2.5 Community information

Sunwater with the assistance of the local councils will ensure community education around messaging and impacts of the EAP and its related events is undertaken and continually improved by incorporating actions from Lessons learnt (section 2.6).

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

In the event of an activation of this EAP, immediate D/S residents will be notified via short message service system.

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

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

2.6 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 Local Government, Water and Volunteers (DLGWV) as appropriate.

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

2.7 Fatigue Management Plan

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

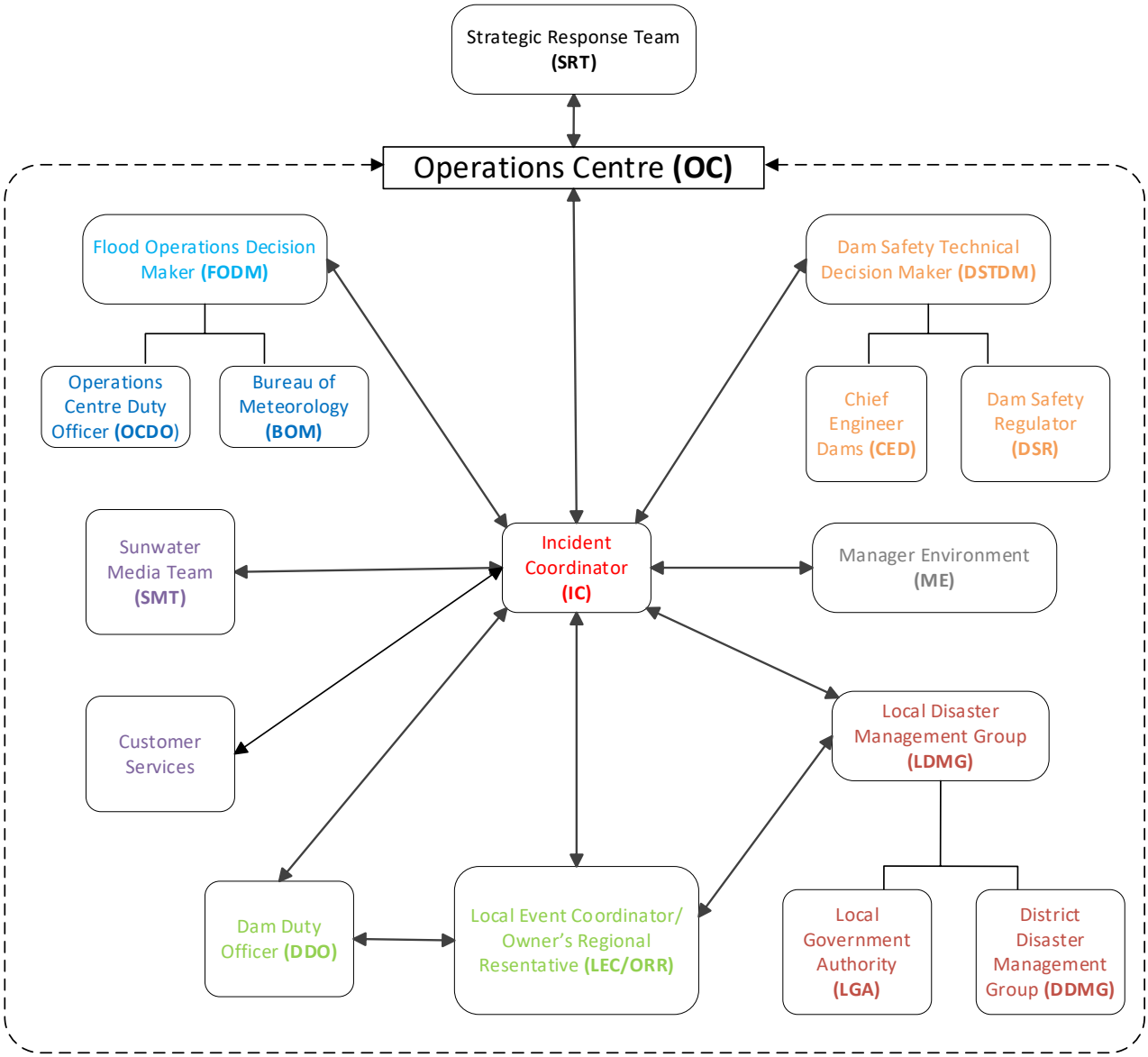
2.8 Dam hazard management within Sunwater

Key aspects of the dam hazard management framework are:

- Central to the framework is the role of IC for any dam hazard at a dam. The IC will maintain overall responsibility for a coordinated response to the dam hazard incident.
- The IC is responsible for activating the EAP when the dam reaches an EAP activation level, unless instructed to activate by the FODM or the DSTDM who have determined that it is reasonable likely that the dam could reach an EAP activation level.
    - Should the IC be unavailable, the LEC followed by the DDO is responsible for the activation.
    - If the IC loses all communications during a dam hazard, then as a fail-safe position, the LEC followed by the DDO will assume the duties and responsibilities of the IC. This is an identified risk, and guidance has been provided to assist with mitigating this risk in Section 12.
- Sunwater's in-house engineering (includes FODM and DSTDM) and technical staff will provide technical advice to the IC, LEC and DDO on an as needs basis. The FODM and DSTDM will also make flood and dam engineering decisions respectively during a dam hazard. These roles are filled by Registered Professional Engineers of Queensland (RPEQs), or by experienced engineers under the direct supervision of an RPEQ and are suitably qualified professionals. Such advice will be provided within an established framework of SOPs, models, standards, and manuals wherever possible.

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

Figure 1: Sunwater dam hazard management framework



3. Dam details

3.1 General dam information

Location: The Paradise Dam is situated in the north of the Southeast Queensland region located approximately 100 km by road West of Bundaberg on the Burnett River at AMTD 131.4 km.

Purpose: The purpose of the dam is to supply irrigation water to the Bundaberg Irrigation Area and water for urban and industrial development in the region.

Construction: The dam is constructed of roller compacted concrete and was completed in 2005. The original full supply level was EL 67.60 m AHD. The dam spillway was lowered to the current height in 2021. The right abutment is designed to be a high flow Secondary Spillway, the left abutment is not designed for flow.

Table 3: Paradise Dam specifications

Description	Specification
Main Dam	Roller compacted concrete
Reduced Full Supply Level (RSL)	EL 61.80 m
Dam Crest Level (DCL)	EL 83.00 m
Length across crest	915 m
Maximum Height above riverbed	Left abutment – 52.0 m Secondary Spillway – 47.0 m Primary Spillway – 30.8 m
Storage volume at RSL	158,574ML
Catchment area	>33,000 km^2
Spillway	Ogee Crest and Dissipater Slab
Spillway crest level	EL 61.80 m
Spillway crest length	315.0 m
Right Abutment (Secondary Spillway) crest level	EL 78.00 m
Left abutment crest level	EL 83.00 m
Environmental Outlet	270 m^3/s (23,300 ML/d) @ FSL 18 m^3/s (temporary restricted capacity)
Outlet control/Irrigation release outlets	Regulating gate comprising of two 1400 mm dia. Vertical axis submerged discharge regulating valves with two 1400 mm diz. U/S guard valves

All levels are to Australian Height Datum, AHD.

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

3.2 Population at risk

The Population at Risk (PAR) from flood events through or failure of Paradise Dam was re-assessed in 2020 and 2021 to reflect the change in risk due to the height reduction at the dam (ref J). This document is the latest assessment of failure risk using the dam's current configuration.

Results from this assessment indicated an incremental PAR of 4,434 (1 in 270 AEP event) for a flood related to failure of the primary spillway and 16 for a Sunny Day Failure (SDF). Paradise Dam has a Failure Impact Rating of Category 2.

3.3 Spillway adequacy

The hydrology and dam breaching assessment for Paradise Dam was updated in 2021 (ref J). This assessment determined that the Primary Spillway can pass 37,440 m^3/s, an estimated return frequency of 1 in 10,000-year Annual Exceedance Probability (AEP) flood event.

The Secondary Spillway is utilised above EL 78.00 m AHD. When the peak flood level is at Dam Crest Level (DCF) (EL 83.00 m AHD) the combined discharge from both spillways is 66,630 m^3/s with a return frequency of 1 in 500,000-year AEP flood event.

3.4 General arrangement

The general arrangement drawings are in Appendix B1.

4. Dam Safety Management Program

4.1 Inspections and monitoring

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

4.1.1 Inspections

- Routine Visual Inspection: Conducted as per routine surveillance Work Order or as directed by the DSTDM
- Detailed Inspection: Conducted annually
- Comprehensive Inspection: Conducted 5-yearly

4.2 Emergency inspections and monitoring

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

NOTE: Documentation relating to inspections and monitoring can be found in the Hazard Management Toolkit (HMT) (ref K), which is a Sunwater internal document.

5. Roles And Responsibilities

Roles and responsibilities	Position holder
Owner (Sunwater) • Liaise with the Board and Minister. • Execute Sunwater Strategic Event Procedure (ref O) and Business Continuity Plans, if required. • Ensure necessary resources are available to manage any dam hazard and emergency events. • Maintain an up-to-date list of notifiable D/S residents (Appendix A4) of Paradise Dam. The downstream limit is indicated in the drawing in Appendix B2 by the zone labelled *Limit of downstream notification area*. • At all times, aim to provide timely advice and support to the LDMGs in the affected local government areas and the DDMGs in the affected disaster districts. • During a dam hazard emergency event that occurs with little or no warning, undertake the following actions to ensure the community is informed as soon as possible: o notify the downstream residents listed in Appendix A4 via SMS o contact State Disaster Coordination Centre (SDCC) to request an Emergency Alert campaign s detailed in the emergency alert request and threat direction polygon o 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) o Record communications, notifications and observations as required.	CEO EGMO EGM E&WR
Strategic Response Team (SRT) • Facilitate the assessment, escalation and notification and management of strategic response and recovery for a high or extreme risk, or impact, event. Responsible for the following key activities: o initial and ongoing assessment of event status and requirements o development, and revision of, strategic objectives based on requirements o identifying, managing, and monitoring strategic risks o monitor media and stakeholder/customer impacts o managing/overseeing event communications including media, stakeholder, customer and internal communications. o Record communications, notifications and observations as required.	Various ELT members as per SRT roster
Owner's Head Office Representative • Authorise the issuing of EAPs, SOPs and O&M Manuals and amendments. • Facilitate Dam Safety Training Courses for Service Managers, Operations Supervisor, Dam Operators, and other staff as appropriate and ensure that all staff required to undertake Dam Safety work are trained and accredited. • Ensure that risks identified in CRAs, or other technical reports undertaken in relation to Dam Safety are included in the EAP. • Ensure visual inspections and instrumentation monitoring frequencies conform to ANCOLD Guidelines. • Ensure all Dam Safety work orders, work instructions and lesson learned outcomes are fully implemented. • Ensure requirements of the Dam Condition Schedule (ref P) are met • Ensure the work instructions are correct and the Operating Logs, SOPs, Data Books and EAPs are reviewed annually as per Dam Condition Schedule (ref P). • Undertake and prepare the 5 yearly Comprehensive Inspection Reports with suitably qualified personnel within the time specified in the Dam Condition Schedule (ref P) and that work orders are created for recommendations and work is undertaken as required. • Undertake Annual Inspections and prepare reports within the time frames specified in the Dam Condition Schedule (ref P) and that work orders are created for recommendations and work is undertaken as required. • Review the Dam Safety Instrumentation Database and evaluate data to verify the structural integrity of the dams on a regular basis and maintain a spread sheet for verification for audit and quality control. • Record communications, notifications and observations as required.	GM Asset Integrity GM Asset Management

Roles and responsibilities	Position holder

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

Technical Advisor • Analyse the situation and provide expert technical advice. • Discuss issues with peers and other technical experts and make sound decisions to mitigate the risk • Determine response to incidents and emerging issues. • Record communications, notifications and observations as required.	GM Environment
Dam Safety Technical Decision Maker (DSTDM) • Maintain current RPEQ accreditation. • Analyse the situation and provide expert technical advice in relation to Dam Safety. • Discuss dam hazards with peers and other technical experts and make sound decisions to reduce the risk. • Determine response to dam safety incidents and emerging issues. • Issue warning on dam failure and advise on potential remedial measures. • Liaise with DSR as required. • Ensure the EAP is implemented appropriately from a dam safety perspective and carry out the DSTDM role as required. • Record communications, notifications and observations as required.	Various personnel as per OC roster
Flood Operations Decision Maker (FODM) • Maintain current RPEQ accreditation. • Provide hydrological advice in relation to predicted and actual dam outflows including assessment of weather and flood warnings, and other related matters as identified in the OC Procedure. • Interpret and apply rainfall data in accordance with the OC Procedure, including, as required under the OC Procedure liaising with the Bureau of Meteorology. • 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 OC roster
Operations Centre Duty Officer (OCDO) • Assist in identifying if a flood is imminent and record modes of operation as directed by the FODM. • Extract data relevant to the event from available sources. • Utilise this data in predictive flood models and present the results to the FODM for approval. • Liaise with the FODM and IC to update current flood risk information. • Record communications, notifications, and observations as required.	Various personnel as per OC roster
Sunwater Media Team (SMT) • Analyse sensitive issues, discuss with the Owner, and issue media releases. • Handle public and customer comments (including social media) and advise the Owner if necessary. • Liaise with the IC and update QDMC of flood events. • Record communications, notifications and observations as required.	Various personnel as per Media Team roster
Incident Coordinator (IC) • Notify LDMGs, or councils if LDMGs not Stood Up, of intent to use the Emergency Alert. • Activate the EAP, when necessary. • Ensure the EAP is implemented appropriately and carry out the IC role as required. • Arrange Situation Reports and determine frequency, as required. • Record communications, notifications and observations as required.	Various personnel as per OC roster

Roles and responsibilities	Position holder
Local Event Coordinator (LEC) • Refer to ORR role.	Various personnel as per LEC roster
Dam Duty Officer (DDO) • Complete accreditation to operate and maintain relevant storage. • Ensure the EAP is implemented appropriately and carry out the DDO role as required. • Take direction from the DSTDM and IC as requested. • Arrange immediate site inspection and make informed assessment of the situation. • Escalate any issue not covered in the EAP or where actions are not clear. • Record communications, notifications and observations as required. • Activate the EAP when necessary, such as when both the IC and LEC are not available or are unable to be contacted.	SSO SOM
Councils Councils have legislated local government functions, as per Section 80 of the Queensland Disaster Management Act 2003 (ref Q). These include: • Ensure it has a disaster response capability. • Approve its local disaster management plan. • Ensure information about an event or a disaster in its area is promptly given to the DDMG for the disaster district in which area it is situated. • Perform other functions given to the local government under the Queensland Disaster Management Act 2003 (ref Q). And as per Section 352HB of the Act: • *Must* assess (in consultation with its LDMG) the EAP for consistency with the LDMP.	
Queensland Police Service (QPS) • Manage the initial situation based on local operational procedures; including but not limited to: o conduct emergency operations o coordinate and support Sunwater during a declared emergency at the dam o liaise with relevant organisations o evacuation of persons if required o control of essential traffic o security of specific area.	Local Police
Disaster Management Groups/Personnel – (In addition to requirements outlined in Queensland Disaster Management Act 2003 (ref Q). • **LDMG** o As per IGEM review recommendation, work together with Sunwater and the councils to ensure community education around messaging and impacts of EAP related events is undertaken and continually improves. o Work with councils and Sunwater to ensure the EAP is regularly exercised. o Identify and coordinate the use of resources and support services that may be required for an EAP event, noting that for safety events unique to the dam Sunwater will approach councils to initiate. o During a dam hazard/emergency event, providing they are Stood Up, the LDMGs in the affected local government areas will take the lead role in notifying the broader community. o Identify and provide advice to the relevant DDMGs about support services required by the LDMG to manage an EAP event. o Provide reports and make recommendations to the relevant DDMGs about matters relating to EAP events. • **QPS** o Work with dam owner and LDMGs to ensure Emergency Alert polygons are prepared, stored, and tested at the SDCC. • **DDMG** o May review the EAP for consistency with the DDMP. • **SCTN** (Security and Counter Terrorism Network) Coordinator o Identifies Areas of Concern during the preparation of disaster plans and provides advice during counter terrorism emergency events	LDMG QPS DDMG SCTN Coordinator

Roles and responsibilities	Position holder
Dam Safety Regulator (DSR) • Liaise with relevant Minister on necessary actions. • Approve this document as required under legislation. • Liaise with Chief Executive as required in administering (regulating) the Act.	DDS

6. Dam hazard — flood operations

6.1 Overview

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

- A dam hazard where catchment inflows fill Paradise Dam to Full Supply Level (FSL) EL 61.80 m, and the rate of inflow exceeds the capacity of the outlet works. The Primary Spillway will then discharge water downstream into the Burnett River. These 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 underway.

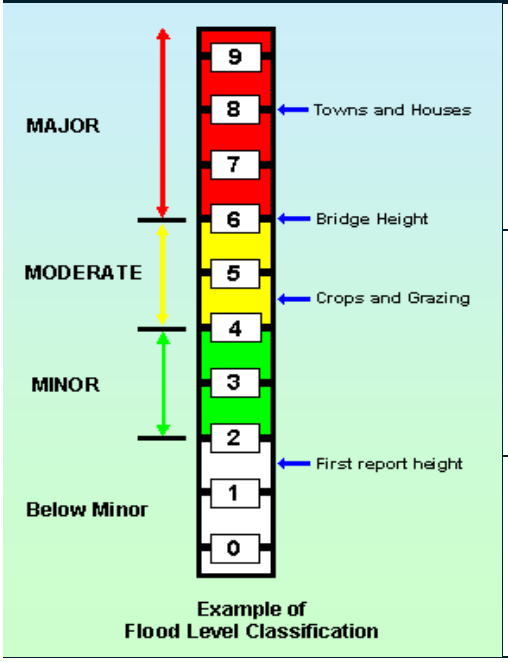
The area likely to be affected by this dam hazard is described as:

- As the rate of discharge increases there will be an impact on low level road crossings of the Burnett River and other infrastructure in the river such as pump sites.
  - Detailed information on downstream flood impacts is presented in Appendix B3. The Booyal crossing is the first crossing to be impacted.
  - Booyal crossing is impacted at flows above about 40.5 m^3/s (3500 ML/d) (when water level exceeds 62.05 m).
- When the storage height exceeds Moderate Flood Level EL 64.30 m (2.5 m over the spillway), flows will begin to break out of the riverbanks and inundate low lying areas.
- When the storage height exceeds major flood levels EL 65.30 m (3.5 m over the spillway) flows will impact on urban areas.

Flood levels above EL 73.30 m trigger additional dam hazards – see section 8 (Dam hazard – overturning or sliding of monoliths).

The following table shows Flood classification triggers as defined by Bureau of Meteorology at Paradise Dam.

Table 4: Flood classification triggers

	Flood level classification	Depth over spillway (m)	Storage elevation (m AHD)
	Major	3.50	65.30
	Moderate	2.50	64.30
	Minor	1.50	63.30

Source: Bureau of Meteorology — http://www.bom.gov.au/qld/flood/brochures/burnett/burnett.shtml

The following table depicts historical floods experienced at Paradise Dam — Sunwater Station 136024A. Given the changes in the Paradise dam spillway, historic events are presented in peak flow.

Table 5: Historical floods experienced at Paradise Dam

Flood rank	Date	Peak flow	
		m^3/s	ML/day
1	January 2013	16520	1,427,330
2	December 2010	9030	780,190
3	January 2011	5220	451,000
4	March 2013	4530	391,400
5	January 2022	2420	209,100

Detailed information on downstream flood impacts is presented in Appendix B3.

The Discharge Rating Curve and Table are provided in Appendix C3 and Appendix C4.

6.1.1 Activation triggers

Table 6: Flood hazard activation trigger summary

EAP Flood Activation Trigger	Trigger Summary	AWS Warning Level
Alert	• Storage above EL 61.70 m (0.1 m below FSL) and rising	
Lean Forward	• Storage above EL 61.80 m (FSL)	Advice
Stand Up 1	• Storage above EL 64.30 m (Moderate Flood Level)	Watch And Act
Stand Up 2	• Storage above EL 71.40 m (Equivalent flow from 2013 event)	Emergency
Refer to Overturning or sliding of Monoliths Section 8 in this EAP		
Stand Down	• Storage EL 63.30 m and falling (Minor Flood Level)	

While this EAP is not triggered until Paradise Dam reaches the alert trigger; Sunwater, the Bundaberg Regional Council (LDMG 1), and the North Burnett Regional Council (LDMG 2) will work cooperatively and will endeavour to share intelligence of any rainfall event when whichever organisation becomes aware of a situation that could result in the activation of the EAP.

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

6.2 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).

Definitions can be found in section 1.3.

Table 7: Flood operations — DDO emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Storage above EL 61.70 m (0.1 m below FSL) and rising	• Storage above EL 61.80 m (FSL)	• Storage above EL 64.30 m (Moderate Flood Level)	• Storage above EL 71.40 m (Equivalent flow from 2013 event)	• Storage EL 63.30 m and falling (Minor Flood Level)
Actions	• Record all communication • Inspect the dam daily (or as instructed by the DSTDM) and photograph/video and record using approved forms and send to DSTDM, IC • Undertake site preparations including but not limited to checking (if not already): o fuel and operation of backup generator o operations of sump pump o seal of outlet building and hydro power station o communication systems (including backup radio, satellite, phones, and internet) • Record the Storage Level –- twice daily (or as instructed by the DSTDM) using the gauge boards or dip and confirm accuracy of gauging station • Record rainfall – daily • Evacuate any plant and/or vehicles to higher ground • Update Operating Log as per SOP 12	• As per previous activation level, AND • Continue to inspect the dam daily (or as instructed by the DSTDM) with particular attention to: o visual inspection of flow patterns over apron slab for evidence of scouring o variations in readings in the apron slab monitoring system o measurement of joint pins o signs of any movement of monoliths o obvious signs of seepage • Report any unusual readings or observations to the DSTDM and IC as soon as practical • NOTE: Booyal Crossing is impacted with flows exceeding 3500 ML/day • NOTE: Close Boat Ramp and confirm with IC	• As per previous activation level	• As per previous activation level, AND • Remotely inspect the dam four times daily (or as instructed by the DSTDM) • View the embankment (with binoculars) • NOTE: Flood levels above 73.30 m trigger the Overturning condition – Section 6	• Inspect the dam for any damage and photograph any damage identified during the event • Forward all EER material to IC email as required • Update Operating Log as per SOP 12 • Return to routine surveillance activities and frequencies • NOTE: Open Boat Ramp at EL 61.80 m and falling
Notifications	• IC • SO • LEC	• IC • SO • LEC • DSTDM	• IC • SO • LEC • DSTDM	• IC • SO • LEC • DSTDM	• 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 Down**
Activation trigger	• Storage above EL 61.70 m (0.1 m below FSL) and rising	• Storage above EL 61.80 m (FSL)	• Storage above EL 64.30 m (Moderate Flood Level)	• Storage above EL 71.40 m (Equivalent flow from 2013 event)	• Storage EL 63.30 m and falling (Minor Flood Level)
Actions	• Record all communication • Develop/implement staff roster • NOTE: IC to contact LDMGs unless LDMG1 is Stood Up	• As per previous activation level, AND • Ensure all abnormal observations or damage has been reported to DSTDM and IC • NOTE: Booyal Crossing is impacted with flows exceeding 3500 ML/day	• As per previous activation level	• As per previous activation level • NOTE: Flood levels above 73.30 m trigger the Overturning condition – Section 6	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• 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 Down
Activation trigger	• Storage above EL 61.70 m (0.1 m below FSL) and rising	• Storage above EL 61.80 m (FSL)	• Storage above EL 64.30 m (Moderate Flood Level)	• Storage above EL 71.40 m (Equivalent flow from 2013 event)	• Storage EL 63.30 m and falling (Minor Flood Level)
Actions	• Record all communication • Liaise with Sunwater Media on-call to send SMS and email to D/S residents and phone those without mobiles • Update Sunwater Intranet with EAP status • NOTE: IC to contact LDMGs unless LDMG1 is Stood Up	• As per previous activation level, AND • Ensure all abnormal observations or damage has been reported to DSTDM • Check BRC LDCC contact centre 1300 883 699 is active • NOTE: Booyal Crossing is impacted with flows exceeding 3500 ML/day • NOTE: Confirm with DDO that Boat Ramp has been closed and pass on details to MSQ, SMT and NBRC Media. • Confirm EAs and other messages are prepared in advance – if required	• As per previous activation level, AND • Ensure access for staff in case of isolation	• As per previous activation level • NOTE: Flood levels above 73.30 m trigger the Overturning condition – Section 6	• Deactivate EAP • Complete all internal and external notifications • Compile EER and deliver to DSR if required • Update Sunwater Intranet with EAP status • NOTE: Confirm with DDO that Boat Ramp was opened at EL 61.80 m (and falling) and pass on details to MSQ, SMT and NBRC Media. • Return to routine activities
Notifications	• FODM • DDO • LEC/ORR • DSTDM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• FODM • DDO • LEC/ORR • DSTDM • SMT • D/S Residents • LDMG 1 • LDMG 2 • DDMG • SRT	• FODM • DDO • LEC/ORR • DSTDM • SMT • D/S Residents • LDMG 1 • LDMG 2 • DDMG • SRT	• FODM • DDO • LEC/ORR • DSTDM • SMT • D/S Residents • LDMG 1 • LDMG 2 • DDMG • SRT	• 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	• Storage above EL 61.70 m (0.1 m below FSL) and rising	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level	
Lean Forward	• Storage above EL 61.80 m (FSL)	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s), FODM and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.	**ADVICE**
		• LDMG 1 • LDMG 1 • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level Discuss potential closure of Booyal Crossing	
Stand Up 1	• Storage above EL 64.30 m (Moderate Flood Level)	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s), FODM and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.	**WATCH AND ACT**
		• LDMG 1 • LDMG 2 • DDMG	• 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	
Stand Up 2	• Storage above EL 71.40 m (Equivalent flow from 2013 event)	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s), FODM and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.	**EMERGENCY**
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? (Storage is well above Major Flood Level) Advise of current storage level Advise of any forecasts you are aware of	

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	• Storage EL 63.30 m (Minor Flood Level)	• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s), FODM and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.	
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level Advise EAP has been deactivated	

Table 11: Flood operations — DSTDM emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Storage above EL 61.70 m (0.1 m below FSL) and rising	• Storage above EL 61.80 m (FSL)	• Storage above EL 64.30 m (Moderate Flood Level)	• Storage above EL 71.40 m (Equivalent flow from 2013 event)	• Storage EL 63.30 m and falling (Minor Flood Level)
Action	• Record all communication • Provide technical advice to DDO and IC on a need's basis • Review surveillance reports and determine if any additional responses are required	• As per previous activation level	• As per previous activation level	• As per previous activation level • NOTE: Flood levels above EL 73.30 m trigger the Overturning condition – Section 6	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• IC • DDO • DSR	• IC • DDO • DSR	• IC • DDO • DSR	• IC • DDO • DSR	• 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 Down**
Activation trigger	• Storage above EL 61.70 m (0.1 m below FSL) and rising	• Storage above EL 61.80 m (FSL)	• Storage above EL 64.30 m (Moderate Flood Level)	• Storage above EL 71.40 m (Equivalent flow from 2013 event)	• Storage EL 63.30 m and falling (Minor Flood Level)
Action	• Record all communication • Forecast flood level based on observed rainfall and Bureau of Meteorology forecast rainfall • Extract relevant data from available sources • Update Flood models as per OC Procedure	• As per previous activation level	• As per previous activation level	• As per previous activation level • NOTE: Flood levels above 73.30 m trigger the Overturning condition – Section 6	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• IC • DSTDM	• IC • DSTDM	• IC • DSTDM	• IC • DSTDM	• 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

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

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

- If dam failure does not occur, then there will not be any area affected
- If dam failure does occur, then the maximum area affected area is the level shown on the maps in Appendix B3.

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

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

An increase in seepage through an embankment, the foundations or abutments is a circumstance that could indicate an occurrence of piping. This circumstance is the trigger for the Alert status for piping.

Increasing seepage through an embankment, the foundations or abutments with cloudy water is a circumstance that could indicate an increased likelihood of piping. This circumstance is the trigger for the Lean Forward status for piping.

7.2 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).

Definitions can be found in section 1.3.

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

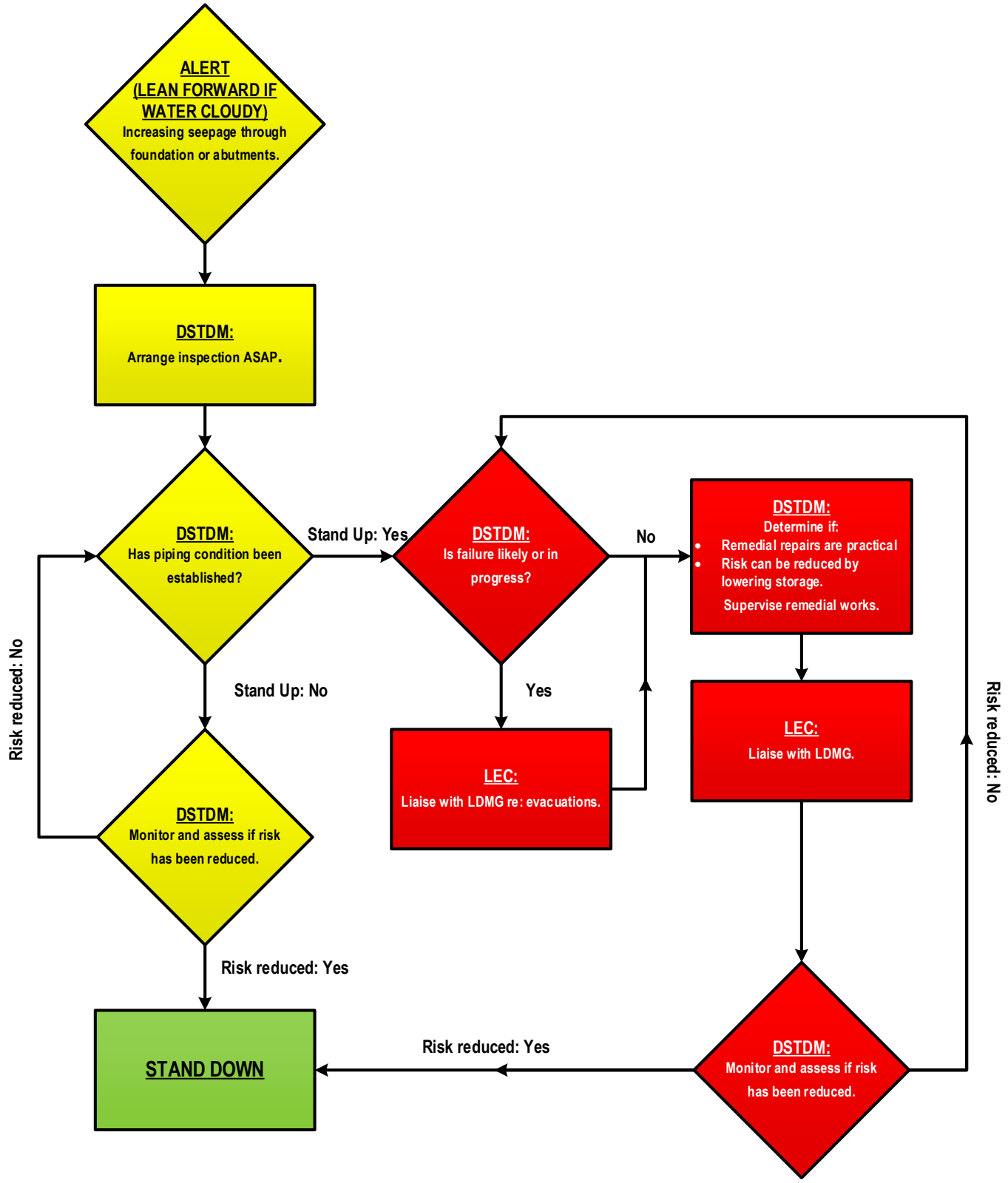


Table 13: Piping: embankment, foundation, or abutments — DDO emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• Piping condition has been established	• Failure underway or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • Monitor flows every 6 hours (or as otherwise instructed by the DSTDM) • Photograph/video the piping from a safe point and record using the approved forms and send to DSTDM and IC • Update Operating Log as per SOP 12 • Note: IC to contact LDMGs unless LDMG1 is stood up	• As per previous activation level	• As per previous activation level, AND • Support/supervise remedial works as required. Supervise means to provide technical oversight to the work. It does not necessarily mean on-site supervision. • Lower the storage if directed • Close any affected roads as directed • Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on members of the public	• As per previous activation level, AND • Vacate the immediate vicinity of the embankment	• Inspect the dam for any damage and photograph any damage identified during the event • Forward all EER material to IC email as required • Update Operating Log as per SOP 12 • Return to routine surveillance activities and frequencies
Notifications	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• Inform all previously notified contacts of Stand Down

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	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• Piping condition has been established	• Failure underway or likely due to piping, and • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication	• As per previous activation level	• As per previous activation level, AND • Liaise with relevant Council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• 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	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• Piping condition has been established	• Failure underway or likely due to piping, and • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • Update Sunwater Intranet with EAP status • *NOTE: IC to contact LDMGs unless LDMG1 is Stood Up	• As per previous activation level, AND • Investigate availability of machinery and materials (if insufficient stockpiles available) • Place machinery operators on standby if directed by DSTDM • Consider the need to appoint a recovery coordinator. The recovery coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance – if required	• As per previous activation level, AND • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level, AND • Liaise with the DSTDM to confirm when dam failure is underway and ensure activation of the Emergency Siren when confirmed • Confirm that remedial works have ceased if directed by the DSTDM and plant and personnel have been moved to a safe location	• Deactivate EAP • Complete all internal and external notifications • Compile EER and deliver to DSR if required • Update Sunwater Intranet with EAP status • Return to routine activities
Notifications	• DDO • LEC/ORR • DSTDM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • SDCC (if required) • D/S Residents • ABC Radio (If required) • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • SDCC • D/S Residents • ABC Radio • Emergency Siren • LDMG 1 • LDMG 2 • DDMG • SRT	• Inform all previously notified contacts of Stand Down

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

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	• Increasing leakage through an embankment, the foundations, or abutments	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Unconfirmed piping risk) What is the status? (Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further information
Lean Forward	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Unconfirmed piping risk) What is the status? (Investigation continues) Advise of current storage level Advise any issues you are aware of – Discuss possible EA messaging and prepare all messaging Standby for further information
Stand Up 1 (Possible)	• Piping condition has been established	• SDCC	• Email & Phone	Complete Emergency Alert Request Form if required (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Confirmed piping risk). What is the status? (Possible dam failure) Advise of current storage level Advise any issues you are aware of. Discuss any potential road/bridge closures Consider possible evacuations

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 (Likely)	• Failure likely due to piping, AND • Sufficient water in storage to create a dam hazard	• SDCC	• Email & Phone	Develop messages in consultation with DSTDM — and LDMG if time permits Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Confirmed piping risk) What is the status? (Likely Dam Failure) Advise of current storage level Advise any issues you are aware of Confirm understanding that failure now becomes likely at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure

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 (Underway)	• Dam Failure underway	• SDCC	• Email & Phone	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• Emergency Siren	• Phone & Email	Complete Emergency Siren instructions in Appendix A9 and notify SRT. Not to be used UNLESS confirmed dam failure is underway, and the Emergency Alert is being sent out.
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Confirmed piping risk) What is the status? (Dam Failure Underway) Advise of current storage level Advise any issues you are aware of Confirm understanding that failure now underway at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure
Stand Down	• Risk assessment has determined that piping risk has reduced	SDCC	• Email & Phone	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Confirmed piping risk) What is the status? (Dam Failure Underway) Advise of current storage level Advise any issues you are aware of Confirm understanding that failure now underway at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure

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	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• Piping condition has been established	• Failure underway or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Action	• Record all communication • Arrange an inspection of the dam to assess its condition as soon as possible, when safe to do so • Determine if piping condition has been established • Monitor situation and assess risks	• As per previous activation level, AND • Confirm availability of machinery and materials and that machinery operators are on standby if required	• As per previous activation level, AND • 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 to provide technical oversight to the work. It does not necessarily mean on-site supervision.	• As per previous activation level, AND • Assess risk and determine if failure likely or underway • Liaise with the IC and confirm need to sound Emergency Siren due to dam failure • Liaise with the IC and LEC and advise on need to recommend evacuations	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• DDO • IC • DSR	• DDO • IC • LEC/ORR • DSR	• DDO • IC • LEC/ORR • DSR	• Inform all previously notified contacts of Stand Down

8. Dam hazard — overturning or sliding of monoliths

8.1.1 Activation triggers

Table 18: Overturning or sliding activation trigger summary

Alert	• Indications of movement of monoliths noted such as cracking, increased seepage, spilling, OR • Damage to the upstream membrane, OR • Apron Slab Integrity System loss of fluid (not during spill event)
Lean Forward	• Apron Slab Integrity System loss of fluid during spill event
Stand Up 1	• Unconfirmed displacement of one or more monoliths, OR • Evidence of scouring at or near toe of dam
Stand Up 2 (Failure possible)	• At or above Paradise Dam Headwater EL 73.30 m, OR • Primary Spillway failure possible due to sliding or overturning (e.g. due to obvious displacement or concrete scour of one or more monoliths), AND • Sufficient water in storage to create a dam hazard
Stand Up 3 (Failure likely)	• At or above Paradise Dam Headwater EL 77.00 m, OR • Primary Spillway failure likely due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard
Stand Up 3 (Failure underway)	• Secondary Spillway failure underway due to scour due to the Secondary Spillway overtopping, OR • Primary Spillway failure underway due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard
Stand Down	• Risk Assessment has determined that sliding or overturning risk has reduced

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

If one of more monoliths become unstable, a dam failure may result. If movement is detected early, remedial actions may be possible depending on the nature of the damage.

The flood outlines in Appendix B3 are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by overturning or sliding of monoliths, The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is underway or likely due to overturning or sliding of monoliths 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 underway or likely due to overturning or sliding of monoliths and concurrent flooding or downstream releases are occurring or expected to occur.

Overturning or sliding of a monolith is an identified potential dam failure hazard that could lead to a dam failure. Overturning or sliding of a monolith could be caused by scouring at or near the toe of a monolith during a flood event that overtops the Secondary Spillway or by the loss of the Primary Spillway apron, or from flood loads leading to increased uplift.

The Paradise Dam Essential Works (PDEW) Project, that involves lowering (including capping) of the Primary Spillway Crest to EL 61.80 m, was completed in 2021. The activation triggers have been determined considering the Memorandum “Paradise Dam, Post Essential Works Primary Spillway Crest Lowering and Capping, Emergency Action Plan (EAP) Addendum, Primary Spillway Monolith Overturning or Sliding Failure Modes, Stand Up 2 & 3 Activation Levels, Proposed Amendment of Triggers, Feb 2021” (ref L).

Paradise Dam suffered considerable scour damage to the dissipator of the Primary Spillway to an area immediately downstream of the dissipator. This damage has since been repaired; however, the repairs have only been tested to historical flood events. As a precaution the repairs have incorporated a dissipator slab integrity monitoring system. The purpose of the system is to provide early warning of potential scouring of the dissipator slab on the Primary Spillway. If potential scour has been indicated the DSTDM will review the outputs from the system and assess the likelihood that scouring is in progress.

Paradise Dam incorporates a Secondary Spillway as the right abutment of the dam. The Secondary Spillway overtops when the storage level reaches EL 78.00 m (16.2 m over the Primary Spillway). There is the potential for scouring downstream of the Secondary Spillway when there is significant flow over the Secondary Spillway. This scouring could lead to failure when water over tops the Secondary Spillway.

If the DSTDM forms the view that significant scouring or is occurring or a sliding failure mechanism is considered likely to occur, then the need for the evacuations should be considered by disaster management authorities.

8.2 Apron Slab Integrity System

The primary dissipator of Paradise Dam has 21 separate slabs. The Apron Slab Integrity System has been installed in eight of the slabs. Each of the eight slabs has a separate circuit of 6.0 mm diameter nylon tube. The tube is filled with a green liquid. Each of the eight circuits terminates in a pair of sight tubes in a termination box on the crest on the right abutment of the dam. If a slab with the integrity system installed suffers scour damage, the tube should be ruptured and result in loss of liquid. This will be indicated by the loss of liquid from the pair of sight tubes.

Loss of liquid from a sight tube should not be automatically assumed to indicate a dam failure is underway. The sight tubes are topped up at regular intervals. A slow loss of liquid from one circuit may indicate a failure of the system, not the slab. If loss of liquid is observed from one circuit, then the operator should attempt to refill the circuit and observe. The simultaneous loss of liquid from multiple circuits could indicate that the conduit from the dissipator to the sight tube cabinet has been compromised rather than damage to the slabs.

It is noted that the level readings will only be possible up to EL 77.25 m AHD, as above this the Secondary Spillway soon becomes impassable due to water overtopping at EL 78.00 m AHD.

Any loss of liquid from the Apron Slab Integrity System should be carefully evaluated by the DSTDM.

Figure 3: Slab pressure sensors eye glass image

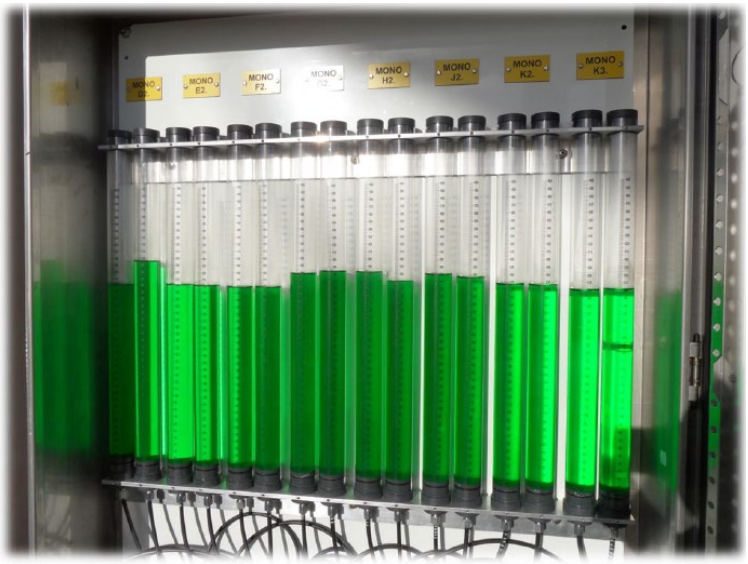
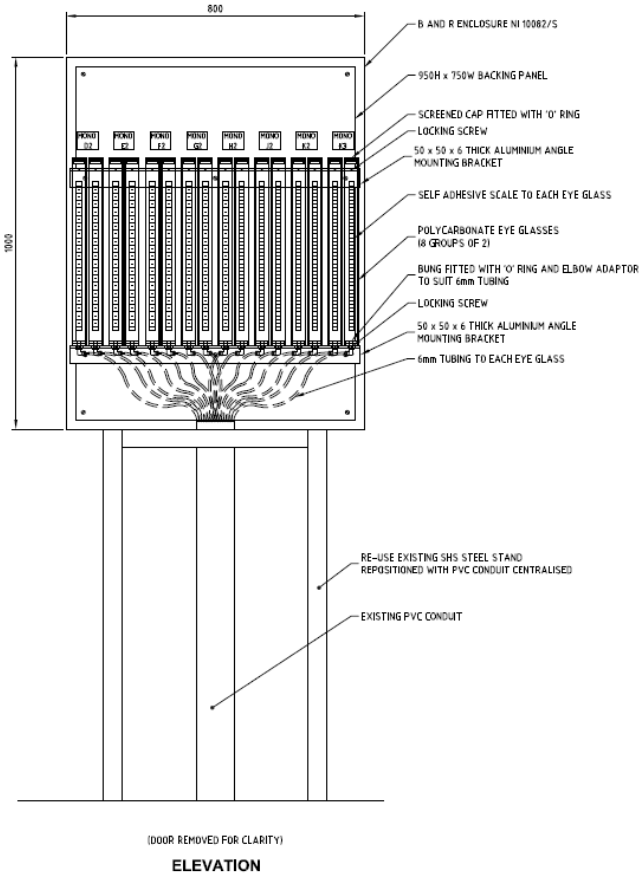


Figure 4: Slab pressure sensors eye glass set up drawing



A drawing of the Apron Slab Sensors is in Appendix B1.

8.3 Emergency action roles

Table 19 to Table 23 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: Overturning or sliding of monoliths flowchart

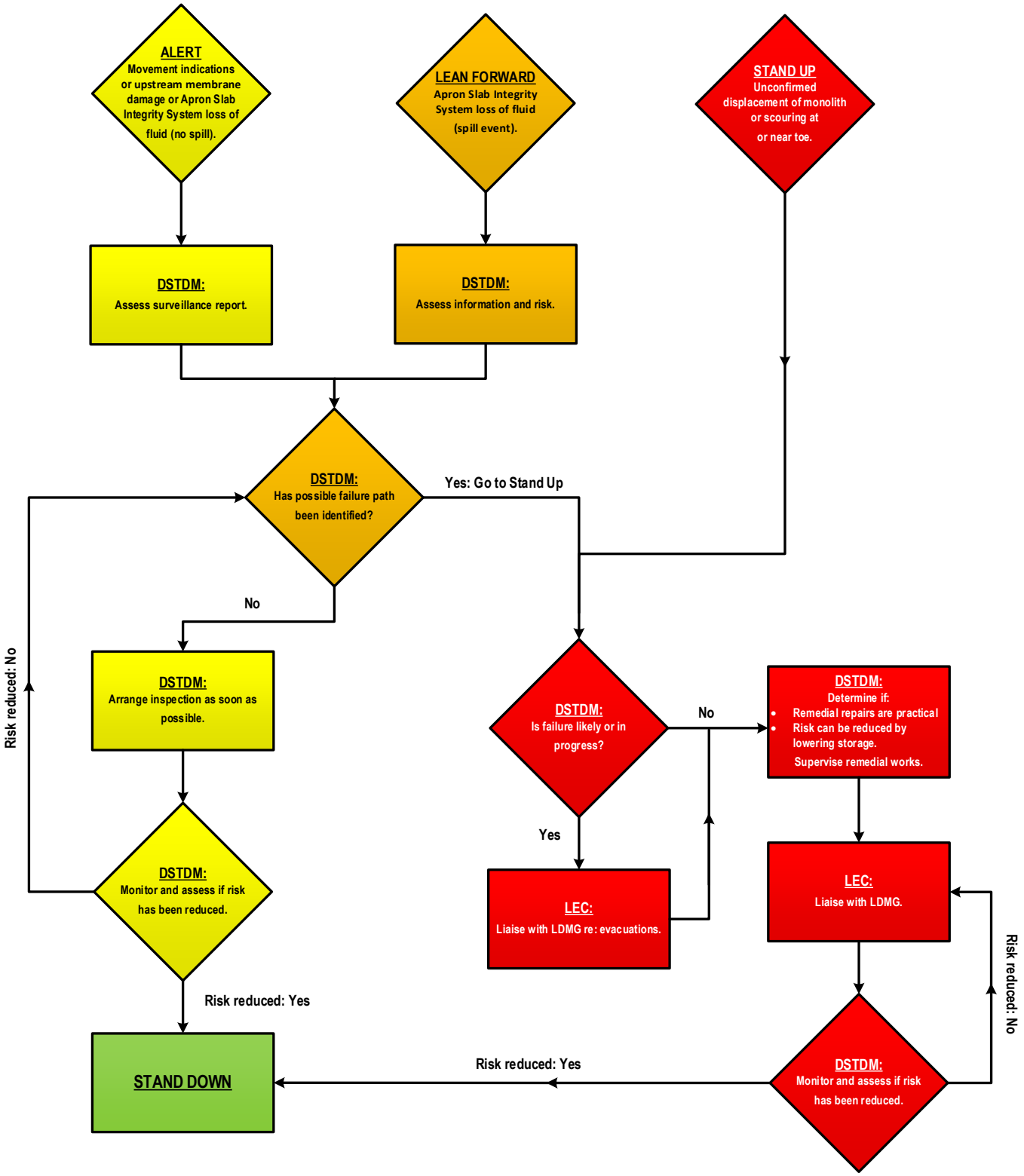


Table 19: Overturning or sliding of monoliths — DDO emergency action							
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2 (Possible)**	**Stand Up 3 (Likely)**	**Stand Up 3 (Underway)**	**Stand Down**
Activation trigger	• Indications of movement of monoliths noted such as cracking, increased seepage, spilling, OR • Damage to the upstream membrane, OR • Apron Slab Integrity System loss of fluid (not during spill event)	• Apron Slab Integrity System loss of fluid during spill event	• Unconfirmed displacement of one or more monoliths, OR • Evidence of scouring at or near toe of dam	• At or above Paradise Dam Headwater EL 73.30 m, OR • Primary Spillway failure possible due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• At or above Paradise Dam Headwater EL 77.00 m, OR • Primary Spillway failure likely due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• Secondary Spillway failure underway due to scour due to the Secondary Spillway overtopping, OR • Primary Spillway failure underway due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that sliding or overturning risk has reduced
Actions	• Record all communication • Monitor dam every 6 hours (or as otherwise instructed by the DSTDM) until a decreasing trend is observable or as directed by the DSTDM • Maintain photographic record • Update Operating Log as per SOP 12	• As per previous activation level, AND • If loss of apron integrity system liquid, attempt to refill • Monitor for signs of damage to toe (if possible) or movement of monoliths	• As per previous activation level, AND • Continual visual monitoring of dam structure (or as instructed by the DSTDM) • Support/supervise remedial works as required. Supervise means to provide technical oversight to the work. It does not necessarily mean on-site supervision. • Lower the storage if directed • Close road access to dam as directed • Maintain surveillance of area immediately downstream of dam (if safe to do so) and 'move on' members of the public	• As per previous activation level	• As per previous activation level, AND • Vacate the immediate vicinity of the dam wall if levels are expected to reach EL 77.25 m	• As per previous activation level	• Inspect the dam and photograph any damage identified during the event • Forward all EER material to IC email as required • Update Operating Log as per SOP 12 • Return to routine surveillance activities and frequencies
Notifications	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• 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 20: Overturning or sliding of monoliths — LEC emergency action							
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2 (Possible)**	**Stand Up 3 (Likely)**	**Stand Up 3 (Underway)**	**Stand Down**
Activation trigger	• Indications of movement of monoliths noted such as cracking, increased seepage, spilling, OR • Damage to the upstream membrane, OR • Apron Slab Integrity System loss of fluid (not during spill event)	• Apron Slab Integrity System loss of fluid during spill event	• Unconfirmed displacement of one or more monoliths, OR • Evidence of scouring at or near toe of dam	• At or above Paradise Dam Headwater EL 73.30 m, OR • Primary Spillway failure possible due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• At or above Paradise Dam Headwater EL 77.00 m, OR • Primary Spillway failure likely due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• Secondary Spillway failure underway due to scour due to the Secondary Spillway overtopping, OR • Primary Spillway failure underway due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that sliding or overturning risk has reduced
Actions	• Record all communication • Develop/implement staff roster • NOTE: IC to contact LDMGs unless LDMG1 is Stood Up	• As per previous activation level, AND • Place machinery operators on standby if directed by DSTDM	• As per the previous activation level, AND • Liaise with IC and LDMGs re: potential for evacuations • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Forward all EER material to IC email as required • Update Operating Log as per SOP 12 • Return to routine activities
Notifications	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• 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 21: Overturning or sliding of monoliths — IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2 (Possible)	Stand Up 3 (Likely)	Stand Up 3 (Underway)	Stand Down
Activation trigger	• Indications of movement of monoliths noted such as cracking, increased seepage, spilling, OR • Damage to the upstream membrane, OR • Apron Slab Integrity System loss of fluid (not during spill event)	• Apron Slab Integrity System loss of fluid during spill event	• Unconfirmed displacement of one or more monoliths, OR • Evidence of scouring at or near toe of dam	• At or above Paradise Dam Headwater EL 73.30 m, OR • Primary Spillway failure possible due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• At or above Paradise Dam Headwater EL 77.00 m, OR • Primary Spillway failure likely due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• Secondary Spillway failure underway due to scour due to the Secondary Spillway overtopping, OR • Primary Spillway failure underway due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that sliding or overturning risk has reduced
Actions	• Record all communication • Update Sunwater Intranet with EAP status • NOTE: IC to contact LDMGs unless LDMG1 is Stood Up	• As per previous activation level, AND • Place machinery operators on standby if directed by DSTDM • Confirm EAs and other messages are prepared in advance – if required	• As per the previous activation level, AND • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles • Liaise with DDO, LEC & DSTDM re: potential for evacuations • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level	• As per previous activation level	• As per previous activation level, AND • Liaise with the DSTDM to confirm when dam failure is underway and ensure activation of the Emergency Siren when confirmed	• Deactivate EAP • Compile EER and deliver to DSR if required • Update Sunwater Intranet with EAP status • Return to routine activities
Notifications	• DDO • LEC/ORR • DSTDM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • SDCC (if required) • D/S Residents • ABC Radio (If required) • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • SDCC • D/S Residents • ABC Radio • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • SDCC • D/S Residents • ABC Radio • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • SDCC • D/S Residents • ABC Radio • Emergency Siren • LDMG 1 • LDMG 2 • DDMG • SRT	• Inform all previously notified contacts of Stand Down

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

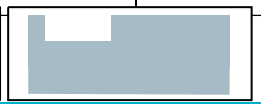


Table 22: Overturning or sliding of monoliths — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Alert	• Indications of movement of monoliths noted such as cracking, increased seepage, spilling, OR • Damage to the upstream membrane, OR • Apron Slab Integrity System loss of fluid (not during spill event)	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam — What is the event? What is the status? (Investigation underway) Advise current storage level
Lean Forward	• Apron Slab Integrity System loss of fluid during spill event	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? (Unconfirmed or potential instability of dam – under investigation) Advise current storage level Advise any issues you are aware of – Discuss possible EA messaging and prepare all messaging Standby for further information
Stand Up 1	• Unconfirmed displacement of one or more monoliths, OR • Evidence of scouring at or near toe of dam	• SDCC	• SMS • Email	Complete Emergency Alert Request Form if required (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on call, LDMG(s), FODM and/or DSTDM to send appropriate messaging
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the type of event and potential scenarios? What is the status (Confirmed – instability of dam OR cannot confirm stability) Advise current storage level Advise any issues you are aware of. Discuss any potential road/bridge closures Consider possible evacuations

Table 22: Overturning or sliding of monoliths — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Stand Up 2 (Possible)	• At or above Paradise Dam Headwater EL 73.3 m, OR • Primary Spillway failure possible due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• SDCC	• SMS • Phone (for those without mobiles)	Complete Emergency Alert Request Form if required (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the type of event and potential scenarios? What is the status (Possible dam failure)? Advise current storage level Advise any issues you are aware of Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure
Stand Up 3 (Likely)	• At or above Paradise Dam Headwater EL 77.0 m, OR • Primary Spillway failure likely due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• SDCC	• SMS • Email	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the type of event and potential scenarios? What is the status (Likely dam failure) Advise current storage level Advise any issues you are aware of Confirm understanding that failure now becomes likely at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure

Table 22: Overturning or sliding of monoliths — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Stand Up 3 (Underway)	• Secondary Spillway failure underway due to scour due to the Secondary Spillway overtopping, OR • Primary Spillway failure underway due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• SDCC	• SMS • Email	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• Emergency Siren	• Phone & Email	Complete Emergency Siren instructions in Appendix A9 and notify SRT. Not to be used UNLESS confirmed dam failure is underway, and the Emergency Alert is being sent out.
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam — What is the type of event and potential scenarios? What is the status (dam failure underway) Advise current storage level Advise any issues you are aware of Confirm understanding that failure now underway at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure
Stand Down	• Risk assessment that has determined that sliding or overturning risk has reduced	• SDCC	• SMS • Email	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam — What is the type of event and potential scenarios? What is the status (dam failure underway) Advise current storage level Advise any issues you are aware of Confirm understanding that failure now underway at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure

Table 23: Overturning or sliding of monoliths — DSTDM emergency action							
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2 (Possible)**	**Stand Up 3 (Likely)**	**Stand Up 3 (Underway)**	**Stand Down**
Activation trigger	• Indications of movement of monoliths noted such as cracking, increased seepage, spilling, OR • Damage to the upstream membrane, OR • Apron Slab Integrity System loss of fluid (not during spill event)	• Apron Slab Integrity System loss of fluid during spill event	• Unconfirmed displacement of one or more monoliths, OR • Evidence of scouring at or near toe of dam	• At or above Paradise Dam Headwater EL 73.30 m, OR • Primary Spillway failure possible due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• At or above Paradise Dam Headwater EL 77.00 m, OR • Primary Spillway failure likely due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• Secondary Spillway failure underway due to scour due to the Secondary Spillway overtopping, OR • Primary Spillway failure underway due to sliding or overturning, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that sliding or overturning risk has reduced
Actions	• Record all communication • Review surveillance inspection of the dam and assess its condition as soon as possible • Determine if there are possible failure paths from report damage • Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so • Confirm with DDO that Apron Slab Integrity System is topped up with fluid • Monitor situation and assess risks	• As per previous activation level, AND • Assess result from Apron Slab Integrity System and determine likelihood of failure • Continually assess scour risk • Assess risk and determine if failure likely or underway • Review available Vibrating Wire Piezometer data	• As per the previous activation level, AND • 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 to provide technical oversight to the work. It does not necessarily mean on-site supervision.	• As per previous activation level, AND	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations	• As per previous activation level, AND • Liaise with the IC and confirm need to sound the Emergency Siren due to dam failure	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• DDO • IC • DSR	• DDO • IC • DSR	• DDO • IC • DSR	• DDO • IC • DSR	• DDO • IC • DSR	• Inform all previously notified contacts of Stand Down

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

9. Dam hazard — Releases through Environmental Outlet

9.1 Overview

Releases through the Environmental Outlet can be a hazard in two forms:

- Controlled releases
  - Downstream flows can impact low level road crossings and in-river infrastructure.
  - When releases exceed 40.5 m^3/s (3500 ML/d) Booyal Crossing is impacted.
- Uncontrolled releases
  - It has been identified that there is a possibility of failure to part of the structure associated with the Environmental Outlet. If this was to occur an uncontrolled release of water would commence.

This document is necessary to ensure a rapid response to these events, so communications can occur promptly.

NOTE: The location of the (Environmental) Outlet Building is outlined in Section 6.2 of the O&M Manual (ref M). The Outlet Building contains both the Valve Room and Outlet Control Room. The Valve Room is under the Outlet Control Room and has three Sump Pumps. These Sump Pumps are described in Section 6.2.2.1. of (ref M).

9.2 Maximum possible releases from Paradise Dam

The maximum release that would occur has been estimated at 300 m^3/s (25,920 ML/d). This maximum release would remain within the bed and banks of the river. At worst case, this would drain the storage over a period of up to 14 days prior to ceasing.

9.3 Downstream Flooding Impacts

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

- For small flows the water will be contained within the river and will not create a downstream release hazard
- As the rate of discharge increases there will be an impact on low level road crossings of the Burnett River and other infrastructure in the river such as pump sites. The Booyal crossing is the first crossing to be impacted. Booyal crossing is impacted at flows above 40.5 m^3/s (3500 ML/d).
- The maximum flow rate possible is approximately one third of the flow rate associated with a Minor Flood Level over the spillway. As such, wider impacts to property are not expected.

9.3.1 Activation triggers

Table 24: Releases through Environmental Outlet trigger summary

Alert	• Releases commenced through Environmental Outlet
Lean Forward	• Inspection indicates possible leakage in Outlet Building Sump from failure of Environmental Conduit/interconnected wall, AND • Sump pumps (#1 & #2) have been working at a longer than usual rate, OR • Dewatering pump (#3) has started to operate
Stand Up	• Confirmed uncontrolled releases through the Environmental Outlet
Stand Down	• Releases have ceased

9.4 Emergency Action Roles

Table 25 to Table 30 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 25: Releases through Environmental Outlet — DDO emergency action				
Activation level	**Alert**	**Lean Forward**	**Stand Up**	**Stand Down**
Activation trigger	• Releases commenced through Environmental Outlet	• Inspection indicates possible leakage in Outlet Building Sump from failure of Environmental Conduit/interconnected wall, AND • Sump pumps (#1 & #2) have been working at a longer than usual rate, OR • Dewatering pump (#3) has started to operate	• Confirmed uncontrolled releases through the Environmental Outlet	• Releases have ceased
Actions	• Record all communication • Operate Environmental Outlet as per requirements of O&M Manual • Monitor D/S gauging station • Inspect the dam daily (or as instructed by the DSTDM) utilising the on-site cameras • NOTE: Booyal Crossing is impacted with flows exceeding 3500 ML/day • Update Operating Log as per SOP 12	• As per previous activation level, AND • Inspect the dam daily (or as instructed by the DSTDM), photograph/video and record using approved forms and send to DSTDM and IC	• As per previous activation level	• Inspect the dam and photograph any damage identified during the event • Update Operating Log as per SOP 12 • Forward all EER material to IC email as required • Return to routine activities
Notifications	• DSTDM • IC • LEC	• DSTDM • IC • LEC	• DSTDM • IC • LEC	• 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: Releases through Environmental Outlet — LEC emergency action				
Activation level	**Alert**	**Lean Forward**	**Stand Up**	**Stand Down**
Activation trigger	• Releases commenced through Environmental Outlet	• Inspection indicates possible leakage in Outlet Building Sump from failure of Environmental Conduit/interconnected wall, AND • Sump pumps (#1 & #2) have been working at a longer than usual rate, OR • Dewatering pump (#3) has started to operate	• Confirmed uncontrolled releases through the Environmental Outlet	• Releases have ceased
Actions	• Record all communication • Develop/implement staff roster • NOTE: Booyal Crossing is impacted with flows exceeding 3500 ML/day • NOTE: IC to contact LDMGs unless LDMG1 is Stood Up	• As per previous activation level, AND • Ensure all abnormal observations or damage has been reported to DSTDM and IC	• As per previous activation level, AND • Confirm that uncontrolled releases are underway	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• 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 27: Releases through Environmental Outlet — IC emergency action

Activation level	Alert	Lean Forward	Stand Up	Stand Down
Activation trigger	• Releases commenced through Environmental Outlet	• Inspection indicates possible leakage in Outlet Building Sump from failure of Environmental Conduit/interconnected wall, AND • Sump pumps (#1 & #2) have been working at a longer than usual rate, OR • Dewatering pump (#3) has started to operate	• Confirmed uncontrolled releases through the Environmental Outlet	• Releases have ceased
Actions	• Record all communication • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without • NOTE: Booyal Crossing is impacted with flows exceeding 3500 ML/day • NOTE: IC to contact LDMGs unless LDMG1 is Stood Up • Update Sunwater Intranet with EAP status	• As per previous activation level, AND • Ensure all abnormal observations or damage has been reported to DSTDM • Confirm EAs and other messages are prepared in advance – if required	• As per previous activation level, AND • Confirm that uncontrolled releases are underway	• Deactivate EAP • Complete all internal and external notifications • Compile EER and deliver to DSR if required • Update Sunwater Intranet with EAP status • Return to routine activities
Notifications	• DDO • LEC/ORR • DSTDM • FODM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • FODM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • FODM • SMT • D/S Residents • LDMG 1 • LDMG 2 • DDMG • SRT	• Inform all previously notified contacts of Stand Down

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

Table 28: Releases through Environmental Outlet — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Alert	• Controlled releases from the Environmental Outlet	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storge level Discuss potential closure of Booyal Crossing
Lean Forward	• Inspection indicates possible leakage in Outlet Building Sump from failure of Environmental Conduit/interconnected wall, AND • Sump pumps (#1 & #2) have been working at a longer than usual rate, OR • Dewatering pump (#3) has started to operate	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Possible Uncontrolled Releases) What is the status? (Under Investigation) Advise of current storage level Advise any issues you are aware of – Discuss possible messaging and prepare all messaging Standby for further information
Stand Up	• Confirmed uncontrolled releases through the Environmental Outlet	• D/S Residents	• SMS • Phone (for those without mobiles	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call.
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Uncontrolled Releases) What is the status? (Investigation Continues) Advise of current storage level Advise of any issues you are aware of
Stand down	• Releases have ceased	• D/S Residents	• SMS • Phone (for those without mobiles	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call.
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Uncontrolled Releases) What is the status? (Investigation Continues) Advise of current storage level Advise of any issues you are aware of

Table 29: Releases through Environmental Outlet — DSTDM emergency action				
Activation level	**Alert**	**Lean Forward**	**Stand Up**	**Stand Down**
Activation trigger	• Releases commenced through Environmental Outlet	• Inspection indicates possible leakage in Outlet Building Sump from failure of Environmental Conduit/interconnected wall, AND • Sump pumps (#1 & #2) have been working at a longer than usual rate, OR • Dewatering pump (#3) has started to operate	• Confirmed uncontrolled releases through the Environmental Outlet	• Releases have ceased
Actions	• Record all communication • Provide technical advice to DDO and IC on a need's basis	• As per previous activation level, AND • Review surveillance reports and determine if any additional responses are required	• As per previous activation level, AND • Evaluate impacts to adjoining structures • Ensure all staff on site are safe and accounted for	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• DDO • IC • DSR	• DDO • IC • DSR	• Inform all previously notified contacts of Stand Down

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

Table 30: Releases through Environmental Outlet — FODM emergency action				
Activation level	**Alert**	**Lean Forward**	**Stand Up**	**Stand Down**
Activation trigger	• Releases commenced through Environmental Outlet	• Inspection indicates possible leakage in Outlet Building Sump from failure of Environmental Conduit/interconnected wall, AND • Sump pumps (#1 & #2) have been working at a longer than usual rate, OR • Dewatering pump (#3) has started to operate	• Confirmed uncontrolled releases through the Environmental Outlet	• Releases have ceased
Actions	• Record all communication • Extract relevant data from available sources • Update Flood models as per OC Procedure	• As per previous activation level	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• IC • DSTDM	• IC • DSTDM	• IC • DSTDM	• 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 — earthquake

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

- If dam failure does not occur, then there will not be any area affected
- If dam failure does occur, then the maximum area affected area is the level shown by the SDF line on the maps in Appendix B3

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

10.2 Emergency action roles

Table 31 to Table 35 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 6: Earthquake flowchart

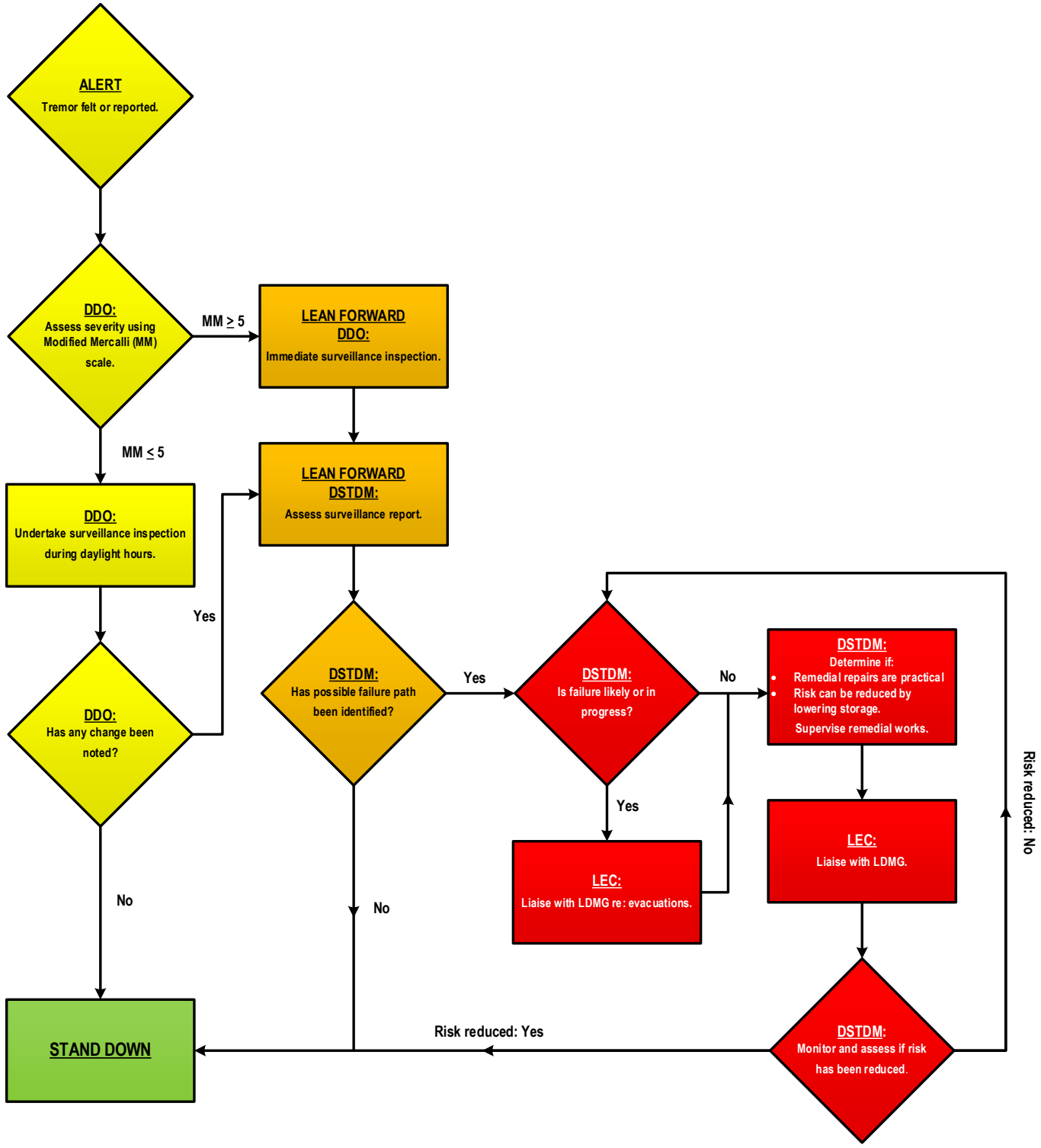


Table 31: Earthquake — DDO emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5MM~ OR • Intensity less than 5MM~ and change detected during surveillance inspection	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure underway or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• DDO to assess magnitude as per HMT and Modified Mercalli (MM) Scale, at dam location. • ~NOTE: The MM Scale is in the HMT. • *NOTE: 'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam. • Record all communication • Inspect the Dam Wall, Spillway Structure and Abutments in daylight hours (if safe to do so). Photograph/video and record using approved forms and send to DSTDM and IC • Check for leaks, deformation, erosion, and concrete damage • Maintain photographic record • Update Operating Log as per SOP 12	• As per previous activation level, AND • Immediately inspect the dam wall, spillway structure, and abutments (if safe to do so), and report to the IC & DSTDM (unless inspection completed in Alert Stage) • Repeat the inspection as directed	• As per previous activation level, AND • Support/supervise remedial work as required. Supervise means to provide technical oversight to the work. It does not necessarily mean on-site supervision. • Lower the storage if directed • Close any affected roads as directed • Maintain surveillance of area immediately downstream of dam (if safe to do so) and 'move on' members of the public • Photograph the damage from a safe point • Vacate the immediate vicinity of the embankment	• As per previous activation level	• Inspect the dam and photograph any damage identified during the event • Update Operating Log as per SOP 12 • Forward all EER material to IC email as required • Return to routine activities
Notifications	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• DSTDM • IC • SO • LEC	• 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 32: Earthquake — LEC emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM~	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5MM~ OR • Intensity less than 5MM~ and change detected during surveillance inspection	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure underway or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• Record all communication • NOTE: IC to contact LDMGs unless LDMG1 is Stood Up • ~NOTE: The MM Scale is in the HMT. • *NOTE: 'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.	• As per previous activation level	• As per previous activation level, AND • Liaise with DDO and relevant Council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• DDO • IC • LDMG 1 • LDMG 2	• 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 33: Earthquake — IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM~	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5MM~ OR • Intensity less than 5MM~ and change detected during surveillance inspection	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure underway or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• Record all communication • Update Sunwater Intranet with EAP status • NOTE: IC to contact LDMGs unless LDMG1 is *Stood Up* • ~NOTE: The MM Scale is in the HMT. • *NOTE: 'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam.	• As per previous activation level, AND • Investigate availability of machinery and materials (if insufficient stockpiles available) • Place machinery operators on standby if directed by DSTDM • Consider the need to appoint a recovery coordinator. The recovery coordinator is then responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over. • Confirm EAs and other messages are prepared in advance – if required	• As per previous activation level, AND • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles • Liaise with relevant Council(s) regarding potential road/bridge closures • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level, AND • Liaise with the DSTDM to confirm when dam failure is underway and ensure activation of the Emergency Siren when confirmed • Confirm that remedial works have ceased if directed by the DSTDM and plant and personnel have been moved to a safe location	• Deactivate EAP • Complete all Internal and External notifications • Compile EER and deliver to DSR if required • Update Sunwater Intranet with EAP status • Return to routine activities
Notifications	• DDO • LEC/ORR • DSTDM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • SDCC (if required) • D/S Residents • LDMG 1 • LDMG 2 • DDMG • SRT	• DDO • LEC/ORR • DSTDM • SMT • SDCC • D/S Residents • Emergency Siren • LDMG • LDMG 2 • DDMG • SRT	• Inform all previously notified contacts of Stand Down

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

Table 34: Earthquake — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Alert	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake felt or reported in area) What is the status? (Under investigation) Advise of current storage level Stand by for further information
Lean Forward	• 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	• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake felt or reported in area) What is the status? (Investigation continues) Advise of current storage level Advise any issues you are aware of – Discuss possible EA messaging and prepare all messaging Stand by for further information
Stand Up 1 (Possible)	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• SDCC	• Phone & Email	Complete Emergency Alert Request Form if required (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake felt or reported in area) What is the status? (Possible earthquake damage to dam) Advise current storage level. Advise any issues you are aware of. Discuss any potential road/bridge closures Consider possible evacuations

Table 34: Earthquake — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Stand Up 2 (Likely)	• Failure likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• SDCC	• Email & Phone	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call.
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Likely Dam Failure) Advise of current storage level. Advise any issues you are aware of Confirm understanding that failure now becomes likely at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure
Stand Up 2 (Underway)	• Dam Failure underway	• SDCC	• Email & Phone	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• Emergency Siren	• Email & Phone	Complete Emergency Siren instructions in Appendix A9 and notify SRT. Not to be used UNLESS confirmed dam failure is underway, and the Emergency Alert is being sent out.
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Dam Failure Underway) Advise of current storage level Advise any issues you are aware of Confirm understanding that failure now underway at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure

Table 34: Earthquake — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Stand down	• Risk assessment has been determined that failure risk has reduced	• SDCC	• Email & Phone	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Earthquake damage) What is the status? (Dam Failure Underway) Advise of current storage level Advise any issues you are aware of Confirm understanding that failure now underway at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure

Table 35: Earthquake — DSTDM emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity less than 5MM~	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5MM~ OR • Intensity less than 5MM~ and change detected during surveillance inspection	• Earthquake confirmed* (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure underway or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Action	• ~NOTE: The MM Scale is in the HMT. • *NOTE: 'Confirmed' is defined as an alert received from Geoscience Australia or other source that advises an earthquake >4.9ML (Richter Scale) has occurred within a 200km radius of the dam. • Record all communication • Review surveillance inspection of the dam and assess its condition as soon as possible • Review instrumentation data and determine if any additional responses are required • Monitor situation and assess risks	• As per previous activation level, AND • Determine if there are any possible failure paths from reported damage	• As per previous activation level, AND • Assess risk and determine if failure likely or underway • 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 to provide technical oversight to the work. It does not necessarily mean on-site supervision.	• As per previous activation level • Liaise with the IC and confirm need to sound Emergency Siren due to dam failure	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• DDO • IC • DSR	• DDO • IC • DSR	• DDO • IC • DSR	• Inform all previously notified contacts of Stand Down

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

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

11.1 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 Paradise Dam to a terrorist attack is low.

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

- If dam failure does not occur, then there will not be any area affected
  If dam failure does occur, then the maximum area affected area is the level shown by the SDF line on the maps in Appendix B3

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

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

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

11.2 Emergency action roles

Table 36 to Table 40 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: Terrorist threat/activity or high energy impact flowchart

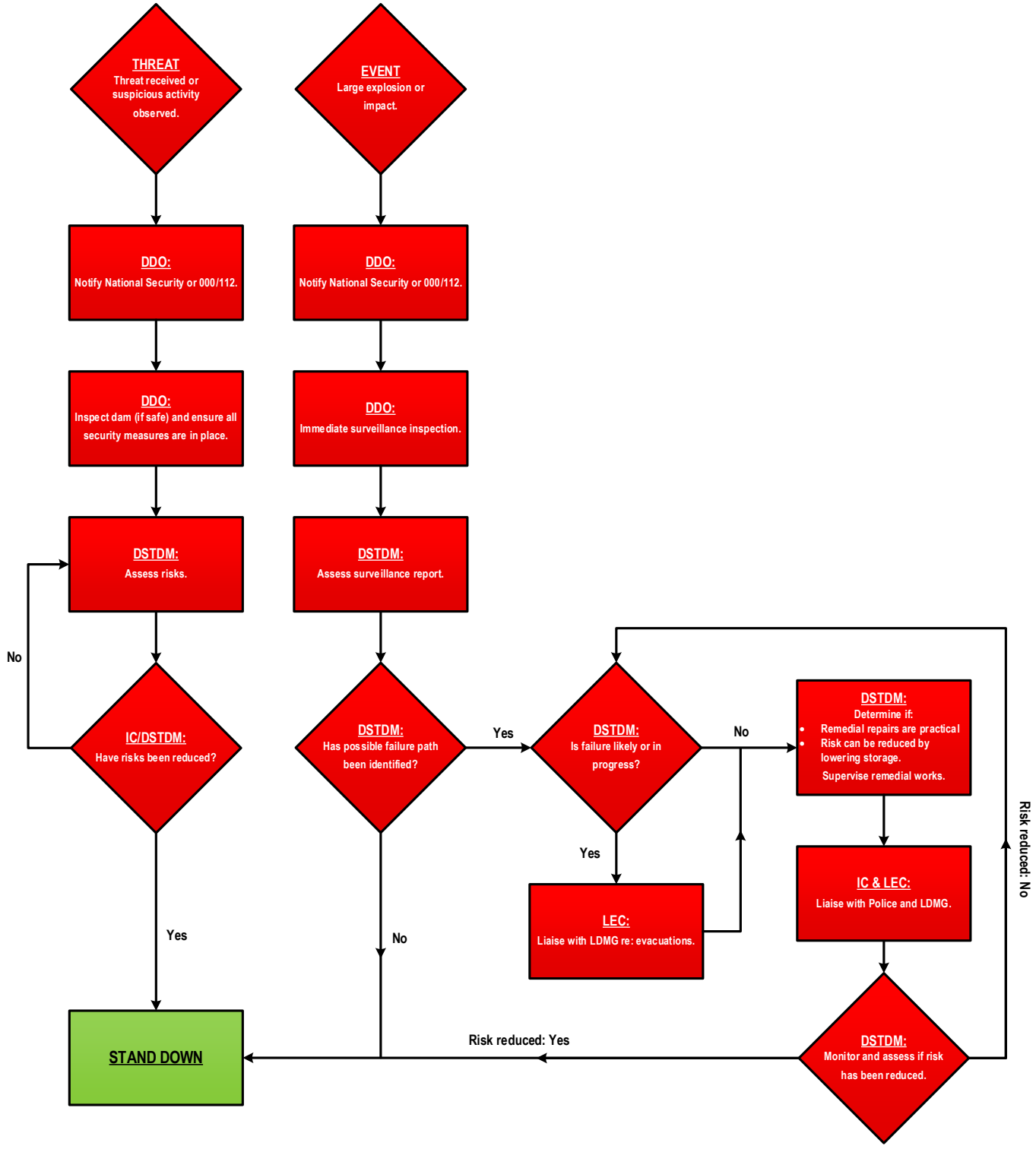


Table 36: Terrorist threat/activity or high energy impact — DDO emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Up 3**	**Stand Down**
Activation trigger	Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**RESPONSE** • Failure underway or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	Not applicable	• In an emergency call 000. • Record all communication • If any suspicious behaviour noticed, contact DSTDM for advice and if instructed or if threat received, complete the following: o Inspect dam (if safe) and ensure all security measures are in place (locked gates, etc.) o Photograph/video suspicious items from a safe point and record using the approved forms and send to DSTDM and IC o If Police appoint incident manager support and follow instructions • Close any affected roads as directed and move on members of the public • Update Operating Log as per SOP 12	• As per previous activation level, AND • Vacate the immediate vicinity of the affected area	• As per previous activation level, AND • Lower reservoir level, if directed by DSTDM	• Inspect the dam and photograph any damage identified during the event • Update Operating Log as per SOP 12 • Forward all EER material to IC email as required • Return to routine activities
Notifications	• Not applicable	• #000 Emergency • DSTDM • IC • SO • LEC	• #000 Emergency • DSTDM • IC • SO • LEC	• #000 Emergency • DSTDM • IC • SO • LEC	• 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 37: Terrorist threat/activity or high energy impact — LEC emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Up 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**RESPONSE** • Failure underway or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Not applicable	• NOTE: IC to contact LDMGs unless LDMG1 is Stood Up • Record all communication • If Police appoint incident manager support and follow instructions • Monitor situation and assess risks • Liaise with relevant Council(s) regarding possible road/bridge closures	• As per previous activation level	• As per previous activation level, AND • Liaise with DDO, DSTDM, and LDMGs re: potential for evacuations	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• Not applicable	• IC • DDO • LDMG 1 • LDMG 2	• IC • DDO • LDMG 1 • LDMG 2	• IC • DDO • LDMG 1 • LDMG 2	• 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 38: Terrorist threat/activity or high energy impact — IC emergency action

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**RESPONSE** • Failure underway or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Not applicable	• NOTE: IC to contact LDMGs unless LDMG1 is Stood Up • Record all communication • Contact National Security • If Police appoint incident manager support and follow instructions • Update Sunwater Intranet with EAP status • Confirm EAs and other messages are prepared in advance – if required	• As per previous activation level, AND • Liaise with Sunwater Customer Support to send SMS and email to D/S residents and phone those without mobiles • Mobilise resources to undertake remedial works if directed by DSTDM • 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.	• As per previous activation level, AND • Liaise with the DSTDM to confirm when dam failure is underway and ensure activation of the Emergency Siren when confirmed • Confirm that remedial works have ceased if directed by the DSTDM and plant and personnel have been moved to a safe location	• Deactivate EAP • Complete all Internal and External notifications • Compile EER and deliver to DSR if required • Update Sunwater Intranet with EAP status • Return to routine activities
Notifications	• Not applicable	• CTG (If required) • DDO • LEC/ORR • DSTDM • SMT • LDMG 1 • LDMG 2 • DDMG • SRT	• CTG (If required) • DDO • LEC/ORR • DSTDM • SMT • SDCC (if required) • D/S Residents • LDMG 1 • LDMG 2 • DDMG • SRT	• CTG (If required) • DDO • LEC/ORR • DSTDM • SMT • SDCC • D/S Residents • Emergency Siren • LDMG 1 • LDMG 2 • DDMG • SRT	• Inform all previously notified contacts of Stand Down

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

Table 39: Terrorist threat/activity or high energy impact — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Alert	ALERT NOT APPLICABLE			
Lean Forward	LEAN FORWARD NOT APPLICABLE			
Stand Up 1	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	• CTG (If required) • LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Possible terrorist activity/Threat received etc.) What is the status? (Received/noted terrorist threat) Discuss any potential road/bridge closures Advise of current storage level Advise any issues you are aware of – Discuss possible EA messaging and prepare all messaging Stand by for further information
Stand Up 2 (Possible)	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	• SDCC	• Phone & Email	Complete Emergency Alert Request Form if required (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• CTG (If required) • LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Security threat/ impact/explosion, etc.) What is the status? (Possible damage to dam) Advise current storage level. Advise any issues you are aware of. Discuss any potential road/bridge closures (if not discussed at Stand Up — 1) Consider possible evacuations

Table 39: 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 (Likely)	**RESPONSE** • Failure likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• SDCC	• Email & Phone	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging Refer to Annexe for sample message.
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• CTG (If required) • LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Security threat/ impact/ explosion, etc.) What is the status? (Likely Dam Failure) Advise of current storage level. Advise any issues you are aware of Confirm understanding that failure now becomes likely at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure
Stand Up 3 (Underway)	**RESPONSE** • Failure Underway	• SDCC	• Email & Phone	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• Emergency Siren	• Phone & Email	Complete instructions in Appendix A9 and notify SRT. Not to be used UNLESS confirmed dam failure is underway, and the Emergency Alert is being sent out.
		• CTG (If required) • LDMG 1 • LDMG 2DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Security threat/ impact/ explosion, etc.) What is the status? (Dam Failure Underway) Advise of current storage level Advise any issues you are aware of Confirm understanding that failure now underway at this trigger

Table 39: Terrorist threat/activity or high energy impact — LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
				Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure
Stand Down	• Risk assessment has determined that failure risk has reduced	• SDCC	• Email & Phone	Complete Emergency Alert Request Form (pre-filled in Appendix A8) and email to SDCC to distribute to Polygon
		• D/S Residents	• SMS • Email • Phone (for those without mobiles)	Liaise with Sunwater Media on call, LDMG(s) and/or DSTDM to send appropriate messaging
		• ABC Radio	• Phone	Liaise with Sunwater Media on-call
		• CTG (If required) • LDMG 1 • LDMG 2DDMG	• Phone	Describe current situation with dam: What is the event? (Dam Safety Risk — Security threat/ impact/ explosion, etc.) What is the status? (Dam Failure Underway) Advise of current storage level Advise any issues you are aware of Confirm understanding that failure now underway at this trigger Advise directed evacuations should be implemented for those areas assessed by the DDC to be impacted by dam failure

Table 40: Terrorist threat/activity or high energy impact — DSTDM emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Up 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**RESPONSE** • Failure underway or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Action	• Not applicable	• Record all communication • Assess risks	• As per previous activation level, AND • Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so • Monitor situation, assess risks, and determine if failure likely or underway • 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 to provide technical oversight to the work. It does not necessarily mean on-site supervision.	• As per previous activation level, AND • Liaise with the IC and confirm need to sound Emergency Siren due to dam failure • Liaise with the IC and LEC and advise on need to recommend evacuations	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• Not applicable	• DDO • IC • DSR	• DDO • IC • LEC/ORR • DSR	• DDO • IC • LEC/ORR • DSR	• Inform all previously notified contacts of Stand Down

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

12. Other emergency situation — communications failure

12.1 Overview

The emergency action described in this section (other emergency situation — communications failure) relates to either:

- An emergency situation where all means of communication at the Dam site have been lost.
- An emergency situation where all means of communication with the Local area have been lost.
- An emergency situation where all means of communication with Brisbane site have been lost.

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

12.2 Emergency actions

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

12.2.1 Activation triggers

Table 41: Communications failure emergency activation trigger summary

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

12.2.2 Assessment of circumstances that indicates the likelihood of communications failure escalating the activation level of a current Dam Hazard

The FODM will assess the weather and flood warnings daily in accordance with the OC Procedure . They will escalate to the IC any warnings that have the potential to cause a significant communications failure.

The on-call IC will escalate to the FODM any local intelligence on conditions that could increase the probability of a significant communications failure.

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

Table 42 to Table 47 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 42: Communications failure — DDO emergency action		
Activation level	**Comms Failure – Local Area**	**Comms Failure – Brisbane**
Activation trigger	• Unable to communicate to Local Area including LEC/ORR	• Unable to communicate to Sunwater Brisbane including IC or DSTDM or FODM
Actions	• As much as practicable assume the role of LEC • Continue tasks in accordance with any other current Emergency Action • Every hour attempt communications noting the following: o Mobile phone-try texting instead of voice, much higher probability of success o Satellite phone-needs to access open sky unless external antenna fitted o Social media-e.g. Facebook (Internet may be available via landline) • Record all communication and attempts via Operating Log entries as per SOP 12 and communications log if EAP event is current	• Determine if LEC is in communication and if not, assume the LEC role as much as is practicable • Continue tasks in accordance with any other current Emergency Action • Every hour attempt communications noting the following: o Mobile phone-try texting instead of voice, much higher probability of success o Satellite phone-needs to access open sky unless external antenna fitted o Social media-e.g. Facebook (Internet may be available via landline) • Record all communication and attempts via Operating Log entries as per SOP 12 and communications log if EAP event is current
Notifications	• IC • SO	• LEC • SO

Table 43: Communications failure — LEC emergency action		
Activation level	**Comms Failure – Dam Site**	**Comms Failure – Brisbane**
Activation trigger	• Unable to communicate to Dam site	• Unable to communicate to Sunwater Brisbane including IC, DSTDM or FODM
Actions	• Every hour attempt communications noting the following: o Mobile phone-try texting instead of voice, much higher probability of success o Satellite phone-needs to access open sky unless external antenna fitted o Social media-e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Assume that the DDO is carrying out LEC role at site as much as practicable • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action	• Every hour attempt communications noting the following: o Mobile phone-try texting instead of voice, much higher probability of success o Satellite phone-needs to access open sky unless external antenna fitted o Social media-e.g. Facebook (Internet may be available via landline) • Record all communication and attempts • Liaise with the DDO and assume IC role • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action
Notifications	• IC • DSTDM • SO • LDMG 1 • LDMG 2	• DDO • DSTDM • SO • LDMG 1 • LDMG 2 • DDMG

Table 44: Communications failure — IC emergency action		
Activation level	**Comms Failure – Dam Site**	**Comms Failure – Local Area**
Activation trigger	• Unable to communicate to Dam site	• Unable to communicate to Local Area including LEC/ORR

Actions	• Issue Sunwater Incident Alert
	• Every hour attempt communications noting the following:
	  o Mobile phone-try texting instead of voice, much higher probability of success
	  o Satellite phone-needs to access open sky unless external antenna fitted
	  o Social media-e.g. Facebook (Internet may be available via landline)
	• Record all communication and attempts
	• As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action
		• Issue Sunwater Incident Alert
		• Every hour attempt communications noting the following:
		  o Mobile phone-try texting instead of voice, much higher probability of success
		  o Satellite phone-needs to access open sky unless external antenna fitted
		  o Social media-e.g. Facebook (Internet may be available via landline)
		• Record all communication and attempts
		• Liaise with the DDO and carry out functions of the LEC as much as practicable
		• As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action

Notifications	• LEC/ORR • DSTDM • SO • DDMG	• DDO • DSTDM • SO • LDMG 1 • LDMG 2 • DDMG

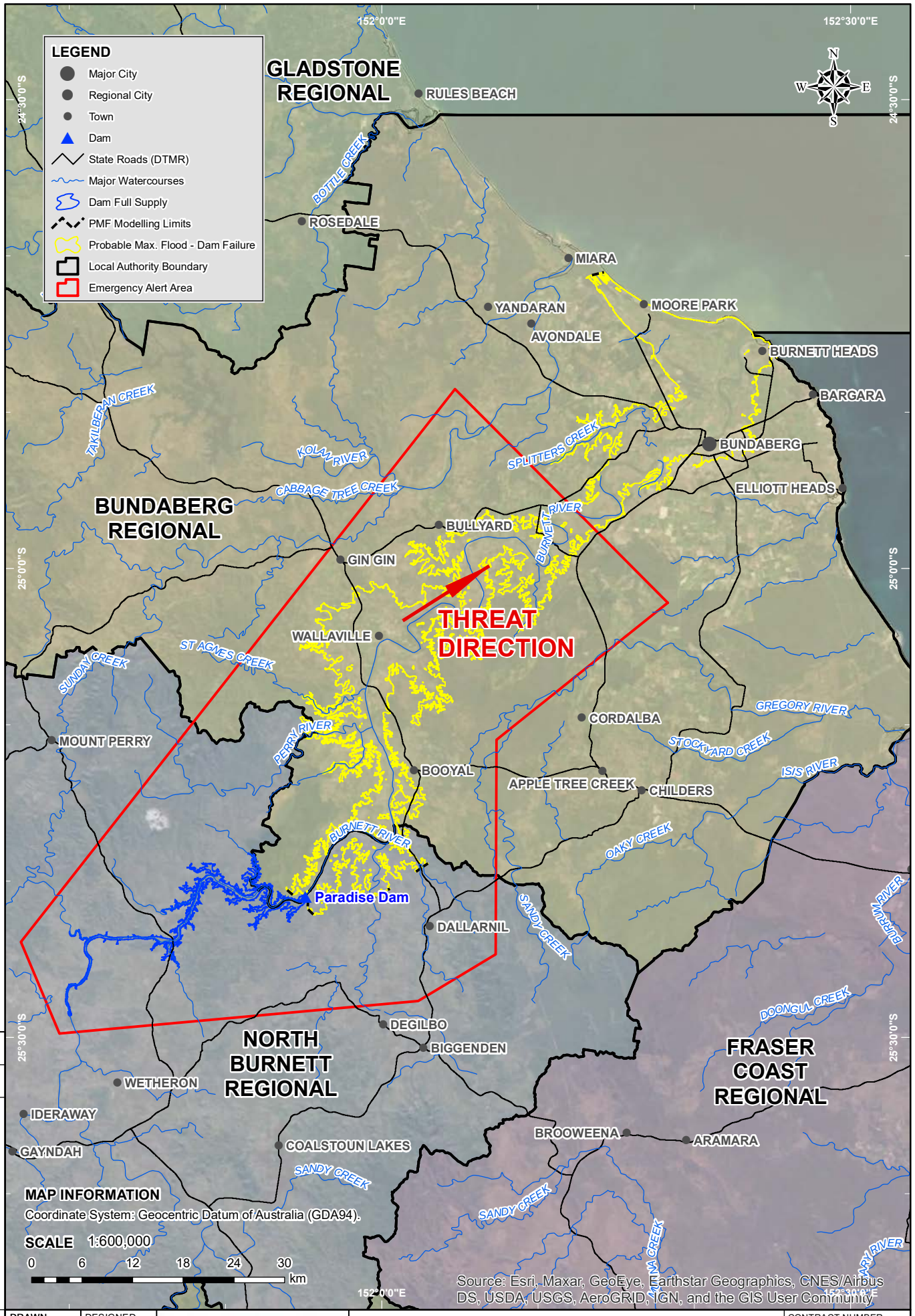
Table 45: Communications failure — LEC and IC communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Comms Failure – Site	• Unable to communicate to or from Dam site, AND • DDO is at Dam site	• IC/LEC • DSTDM • SO • LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		IC to record		EAP Alert Notification — Paradise Dam — Site Communications Failure
Comms Failure – Local Area	• Unable to communicate to or from Local Area including LEC and ORR	• DDO • DSTDM • SO • LDMG 1 • LDMG 2 • DDMGs	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		IC to record		EAP Alert Notification — Paradise Dam — Local Area Communications Failure
Comms Failure – Brisbane	• Unable to communicate to or from Sunwater Brisbane	• DSTDM • LDMG 1 • LDMG 2 • DDMG	• Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
		LEC to record		EAP Alert Notification — Sunwater Brisbane Communications Failure

Table 46: Communications failure — DSTDM emergency action		
Activation level	**Comms Failure – Site**	**Comms Failure – Local Area**
Activation trigger	• Unable to communicate to Dam site	• Unable to communicate to Local Area including LEC and ORR
Actions	• Provide technical advice to IC/LEC on a need's basis • Record all communication • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action	• Provide technical advice to IC on a need's basis • Record all communication • Assume that the DDO is assisting IC with LEC role • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action
Notifications	• IC • LEC • CEO – if time permits • DSR – if applicable	• IC • DDO • CEO – if time permits • DSR – if applicable

Table 47: Communications failure — FODM emergency action		
Activation level	**Comms Failure – Site**	**Comms Failure – Local Area**
Activation trigger	• Unable to communicate to Dam site	• Unable to communicate to Local Area including LEC and ORR
Actions	• Record all communication • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action	• Record all communication • Assume that the DDO is assisting IC with LEC role • As much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action
Notifications	• IC • LEC • DSTDM	• IC • DDO • DSTDM

APPENDIX A Notification and communication lists

Appendix A1 to Appendix A6 have been redacted



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Printed: Tuesday, 21/07/2020 02:21:56 PM

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

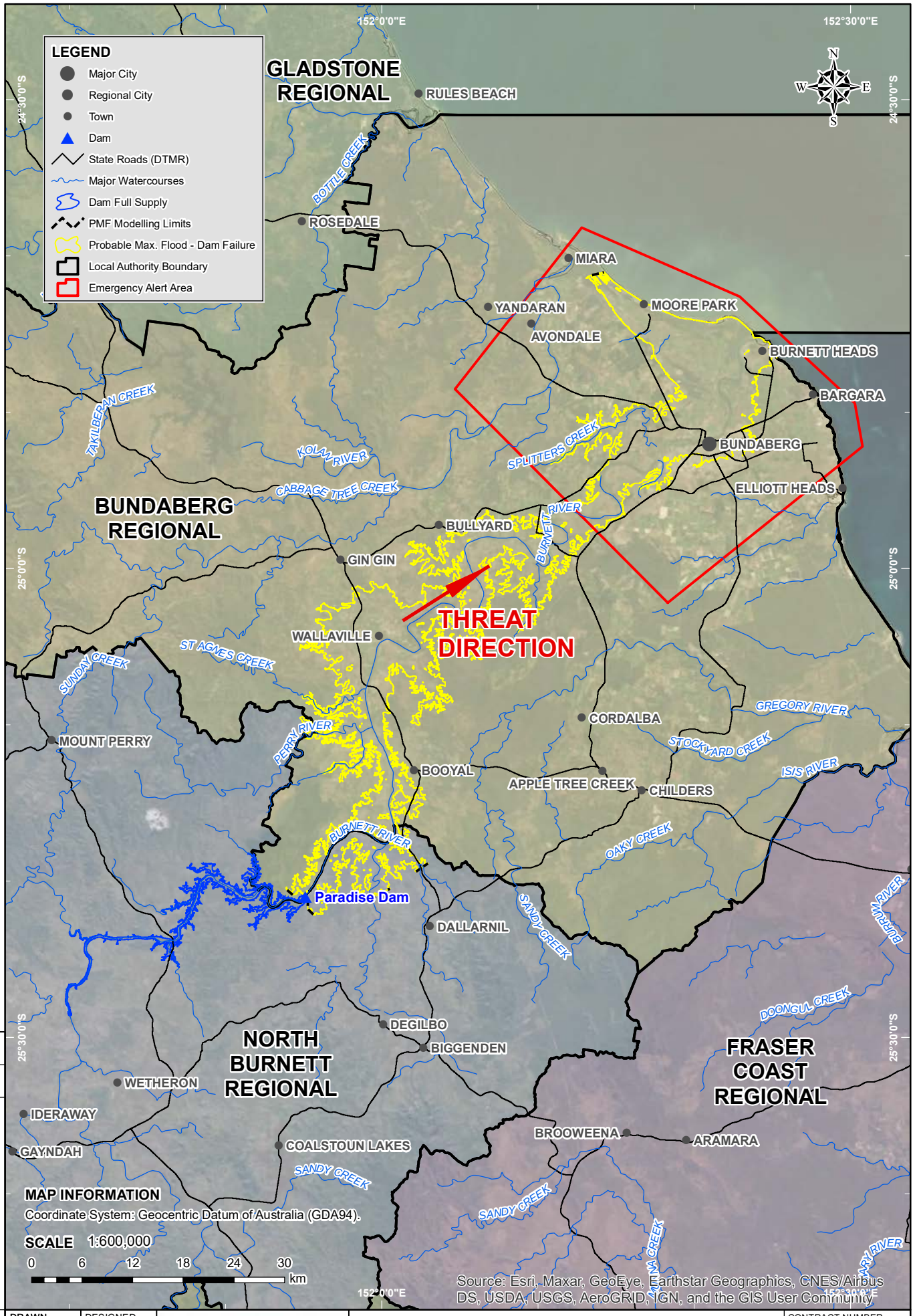
REVISION	DATE	REMARKS	CKD	PSD
C	21/07/20	AMENDED TO ALERT AREA 1	MB	MH
B	03/09/18	ALERT AREA AMENDED	MB	MH

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

sunwater

PARADISE DAM
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA 1

CONTRACT NUMBER
DRAWING NUMBER 249584 | REV. C
SHEET 1 OF 1
DATE JANUARY 2018



Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-WSRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\Emergency Alerts\252977-A.mxd
Printed: Tuesday, 21/07/2020 02:24:32 PM

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

REVISION	DATE	REMARKS	MB	CKD	MH	PSD
A	21/07/20	ISSUED FOR USE				

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
MB	
APPROVED	
M. HUGHES 21/7/2020	

sunwater

PARADISE DAM
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA 2

CONTRACT NUMBER	
DRAWING NUMBER	REV.
252977	A
SHEET 1 OF 1	
DATE JULY 2020	

Appendix A9: 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 two Paradise Dam Emergency Polygons.

Instructions

1. EA Request forms are not to be used for Flood UNLESS a flood has triggered an Emergency Event.
2. Log on (details in OC Toolkit, ref N) to the Sunwater area of the Disaster Management Portal in the EA area to complete the appropriate MS Word format form for Paradise Dam.
3. Telephone the [redacted] and tell them your intention to use the EA for an Emergency Event for Paradise Dam.
    a. Two KML polygons for this dam is stored in the Sunwater area of the Disaster Management Portal in the EA area. Ask the SDCC operative to locate the polygon. There will be two KML files 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 (and Media) will work together to craft a message relevant to the hazard and discuss with the LDMG if there is time. If time does not permit, use approved pre-filled form/s on the Disaster Management Portal.
5. Send filled out EA form/s and the two Paradise Threat Direction polygons (PDF in OC Toolkit, ref N) to SDCC email: [redacted] The form/s MUST be sent from a Sunwater email address and come from the IC, DSTDM, or member of the Sunwater Executive.
6. Phone back SDCC to check that the message has been sent and ask for email confirmation.
7. Record the completion of EA campaign.

Filename:	Voice Message:	SMS:
[redacted]	FLOOD EMERGENCY WARNING from Sunwater. People downstream of Paradise Dam must LEAVE IMMEDIATELY. Paradise 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 Bundaberg Regional Council disaster dot Bundaberg dot que el dee dot guv dot aye you and North Burnett Regional Council emergency dot north Burnett dot que el dee dot guv dot aye you.	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Paradise Dam must LEAVE IMMEDIATELY. Paradise 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 Bundaberg Regional Council disaster.bundaberg.qld.gov.au/ and North Burnett Regional Council emergency.northburnett.qld.gov.au.

The following page contains a pre-filled copy of the Paradise Dam Emergency Alert Request form.

Queensland Government

PHONE THE [redacted] – ADVISE EA IS BEING DEVELOPED

EMERGENCY ALERT REQUEST

Location of Alert: Paradise Dam (e.g. Suburb, Town) | **Date:**

LGA/Agency requesting: | **Time:**

Requesting Officer (e.g. Disaster Coordinator/Incident Controller)
Name:
Agency/Position:

Telephone:
(SDCC Watch Desk may telephone you)

Email:

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

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

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

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

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

Threat Direction Required? (e.g. Fire, Chemical Spill, Dam Spill) ☐ YES ☐ N/A

Threat location indicated on map? Only For Emergency Warning Voice & Service Address SMS ☒ YES ☐ N/A

EA Messaging Filename (Doc, Pdf):

Polygon Filename, (Kml, Kmz, Gml, GeoJSON):

Number of polygons _____ (if multiple, attach list in order of priority)

Supplied via: ☐ DM Portal ☐ Email ☐ Verbal ☐ Other
Other (please specify):

Supplied via: ☒ DM Portal ☐ Email ☐ Verbal ☐ Other
Other (please specify):

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

FLOOD EMERGENCY WARNING from Sunwater. People downstream of Paradise Dam must LEAVE IMMEDIATELY. Paradise 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 Bundaberg Regional Council disaster dot Bundaberg dot que el dee dot guv dot aye you and North Burnett Regional Council emergency dot north Burnett dot que el dee dot guv dot aye you.

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

FLOOD EMERGENCY WARNING from Sunwater: People downstream of Paradise Dam must LEAVE IMMEDIATELY. Paradise 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 Bundaberg Regional Council disaster.bundaberg.qld.gov.au/ and North Burnett Regional Council emergency.northburnett.qld.gov.au.

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

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

Send to [redacted] to confirm receipt

FOR USE BY SDCC

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

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

EA User Name:
Signature: Date: / /

Emergency Alert No:

Authorising Officer Name:
Signature: Date: / /

EMS EA Campaign Report ID:

Report provided to Requestor on EA outcomes: ☐ YES ☐ NO

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

Appendix A10: 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 Paradise 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. Record 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 **Remote Desktop Connection** 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 and Instrumentation drawings

Appendix B2: Downstream Notification area

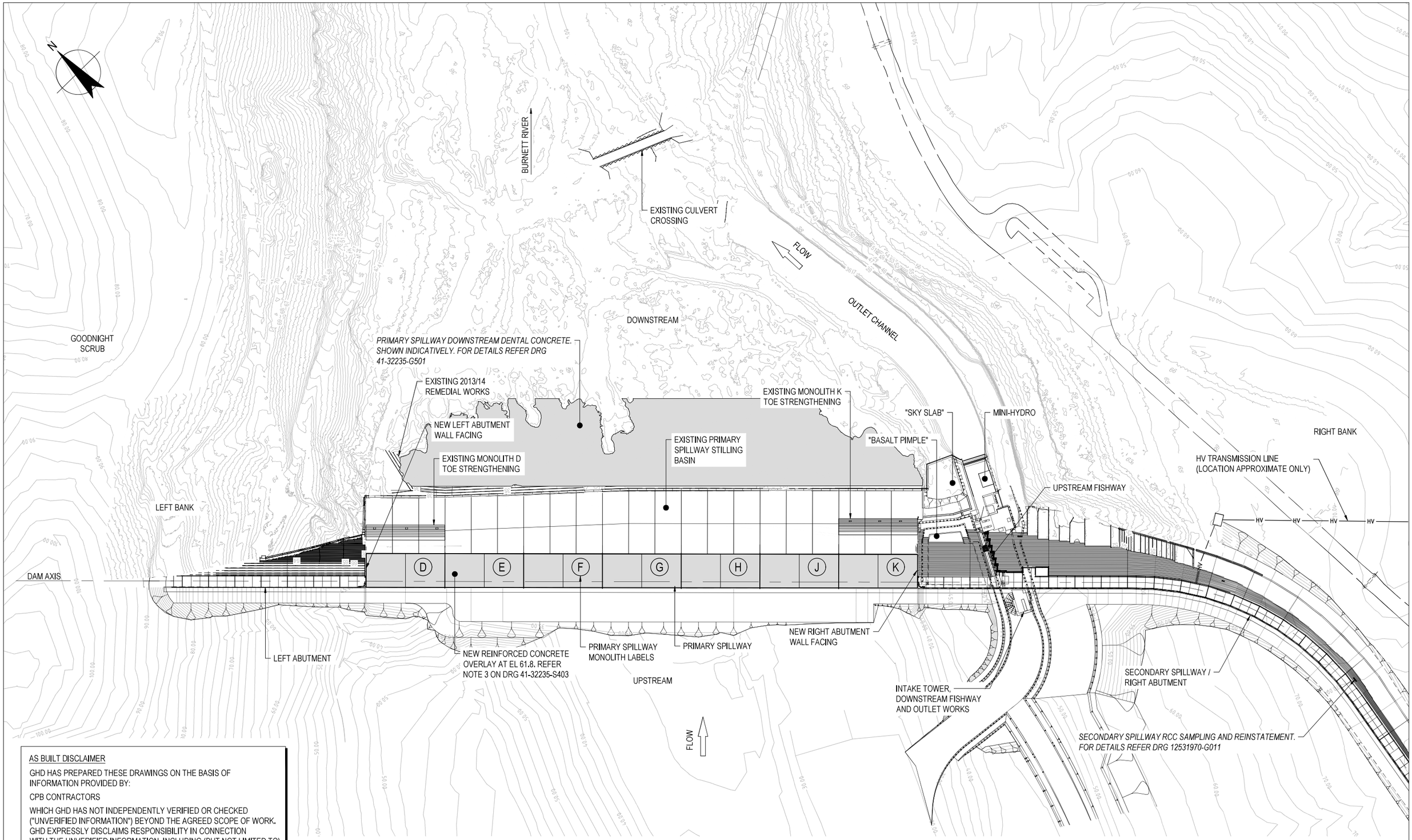
Appendix B3: Inundation maps

Appendix B4: Access routes during fair and adverse weather conditions

Appendix B5: Locality plan

Appendix B6: Catchment area

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



AS BUILT DISCLAIMER

GHD HAS PREPARED THESE DRAWINGS ON THE BASIS OF INFORMATION PROVIDED BY:

CPB CONTRACTORS

WHICH GHD HAS NOT INDEPENDENTLY VERIFIED OR CHECKED ("UNVERIFIED INFORMATION") BEYOND THE AGREED SCOPE OF WORK. GHD EXPRESSLY DISCLAIMS RESPONSIBILITY IN CONNECTION WITH THE UNVERIFIED INFORMATION, INCLUDING (BUT NOT LIMITED TO) ERRORS IN, OR OMISSIONS FROM, THE DRAWINGS, WHICH WERE CAUSED OR CONTRIBUTED BY THE UNVERIFIED INFORMATION.

GENERAL ARRANGEMENT PLAN

SCALE 1:1000

AS BUILT

No	Revision	Drawn	Job Manager	Project Director	Date
2	ISSUED AS BUILT	AL		RE*	28.01.22
1	CREST DETAILS MODIFIED	AL	JW*	RE*	16.06.20
0	ISSUED FOR CONSTRUCTION	KK	JW*	RE*	27.03.20

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE

sunwater

SUNWATER DRAWING No. 251988

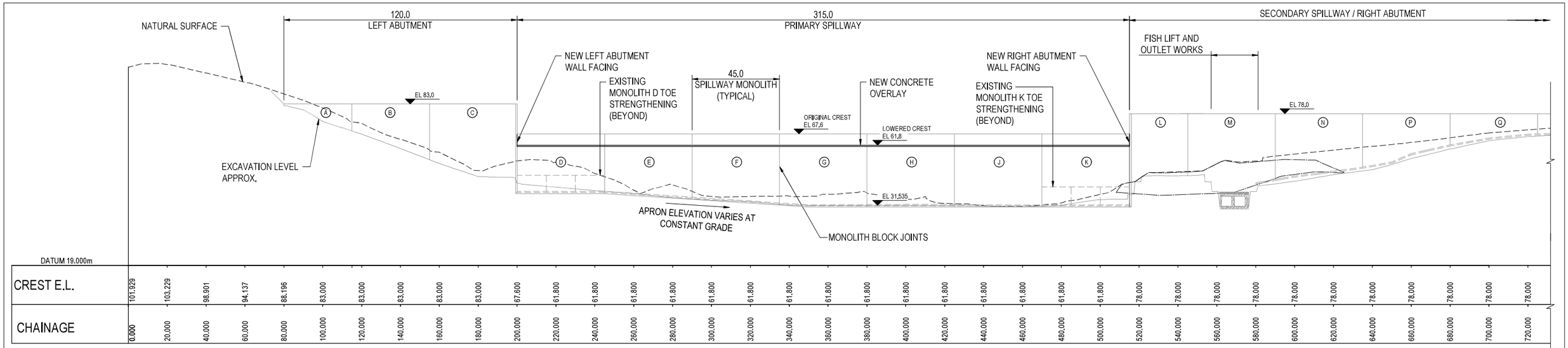
GHD
145 Ann St Brisbane QLD 4000 Australia
GPO Box 668 Brisbane QLD 4001
T 61 7 3316 3000 F 61 7 3319 6038
E bnemail@ghd.com W www.ghd.com

Drawn	A. LEE	Designer	A. FORBES
Drafting Check	W. HAWKSWELL*	Design Check	J. WILLEY*
Approved (Project Director)	R. EVANS*		
Date	27.03.20		
Scale	1:1000	This Drawing must not be used for Construction unless signed as Approved	

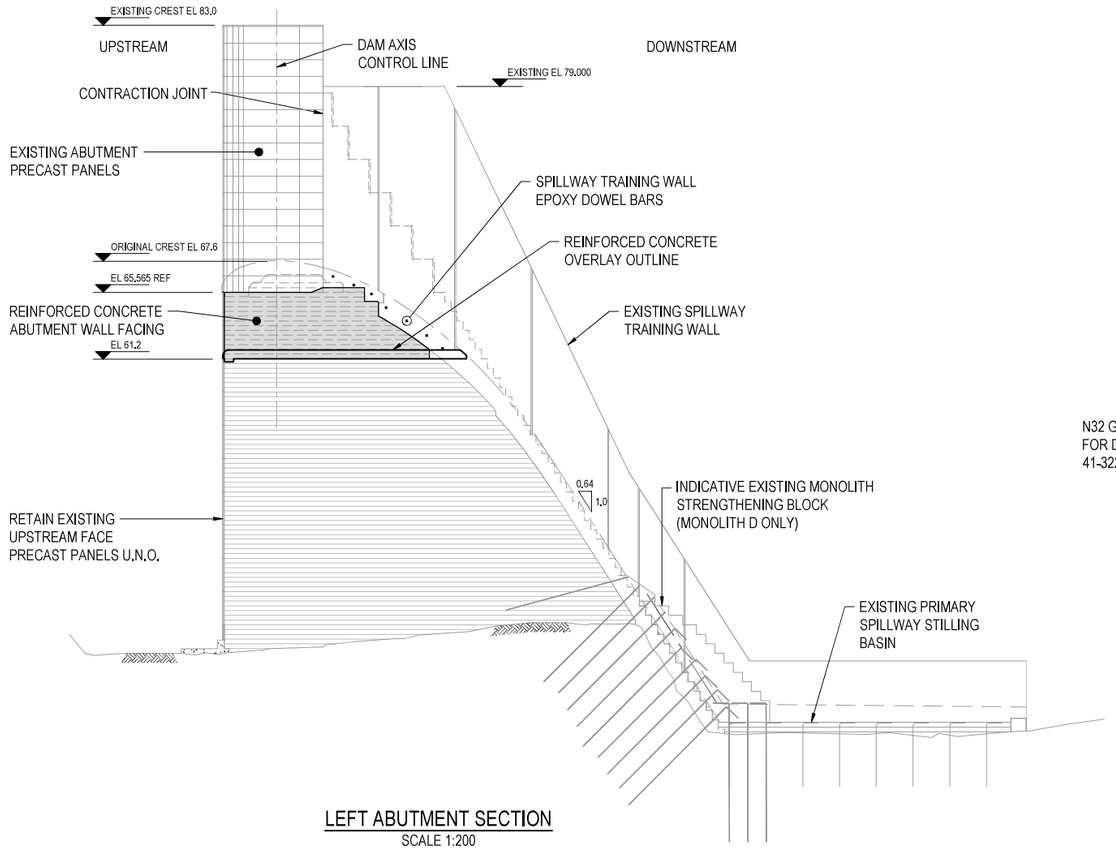
Client SUNWATER
Project PARADISE DAM SPILLWAY - ESSENTIAL WORKS (EL 61.8)
Title GENERAL ARRANGEMENT

Original Size A1
Drawing No: 41-32235-S401
Rev: 2

Plot Date: 24 January 2022 - 5:38 PM Plotted by: Amy Lee Cad File No: G:\41\32235\CADD\Drawings\41-32235-S401.dwg

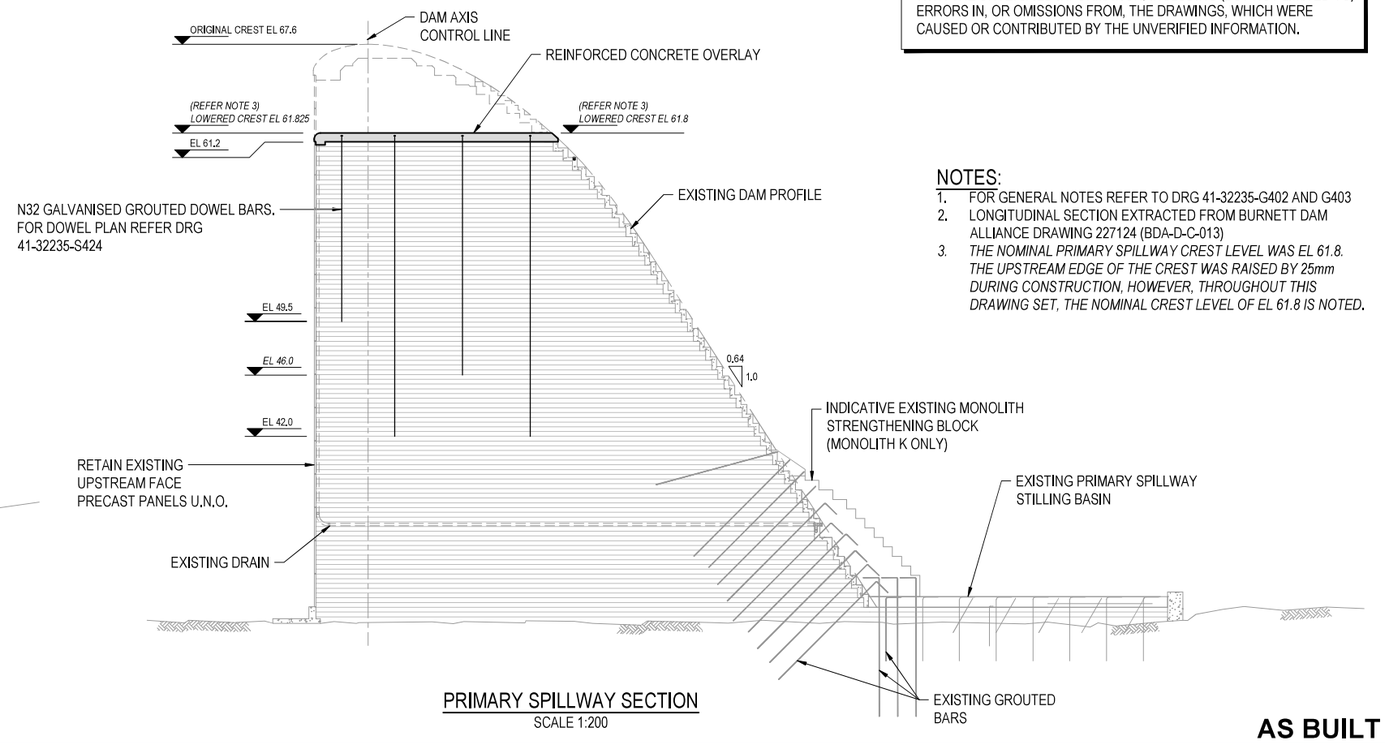


LONGITUDINAL SECTION
SCALE 1:1000



LEFT ABUTMENT SECTION
SCALE 1:200

(RIGHT ABUTMENT SECTION SIMILAR)



PRIMARY SPILLWAY SECTION
SCALE 1:200

NOTES:
1. FOR GENERAL NOTES REFER TO DRG 41-32235-G402 AND G403
2. LONGITUDINAL SECTION EXTRACTED FROM BURNETT DAM ALLIANCE DRAWING 227124 (BDA-D-C-013)
3. *THE NOMINAL PRIMARY SPILLWAY CREST LEVEL WAS EL 61.8. THE UPSTREAM EDGE OF THE CREST WAS RAISED BY 25mm DURING CONSTRUCTION, HOWEVER, THROUGHOUT THIS DRAWING SET, THE NOMINAL CREST LEVEL OF EL 61.8 IS NOTED.*

AS BUILT

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
4	ISSUED AS BUILT		AL		CB*	28.01.22
3	CREST DOWEL ARRANGEMENT MODIFIED		AL	JW*	CB*	25.09.20
2	CREST DETAILS MODIFIED		AL	JW*	CB*	28.08.20
1	CREST DETAILS MODIFIED		AL	JW*	RE*	16.06.20
0	ISSUED FOR CONSTRUCTION		KK	JW*	RE*	27.03.20

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SCALE 1:1000 AT ORIGINAL SIZE

0 2 4 6 8 10m
SCALE 1:200 AT ORIGINAL SIZE

sunwater

SUNWATER DRAWING No. 251989

GHD
145 Ann St Brisbane QLD 4000 Australia
GPO Box 668 Brisbane QLD 4001
T 61 7 3316 3000 F 61 7 3319 6038
E bnemail@ghd.com W www.ghd.com

DO NOT SCALE

Drawn	A. LEE	Designer	A. FORBES
Drafting Check	W. HAWKSWELL*	Design Check	J. WILLEY*
Approved (Project Director)	R. EVANS*		
Date	27.03.20		
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client SUNWATER
Project PARADISE DAM SPILLWAY - ESSENTIAL WORKS (EL 61.8)
Title TYPICAL SECTIONS

Original Size A1
Drawing No: 41-32235-S402
Rev: 4

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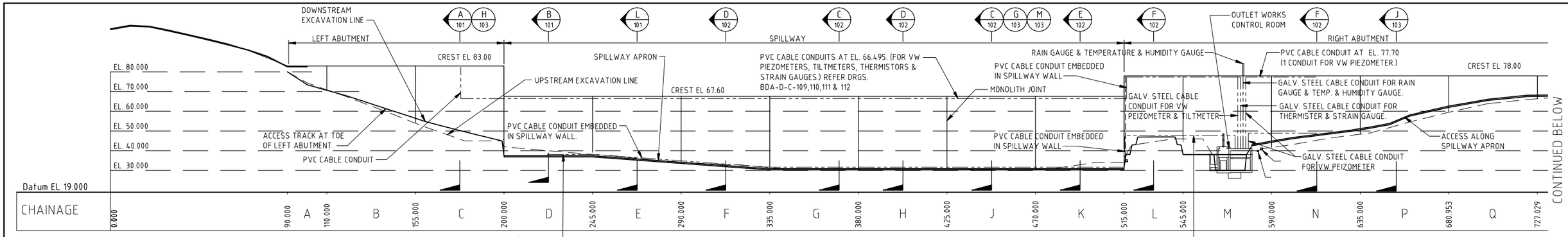

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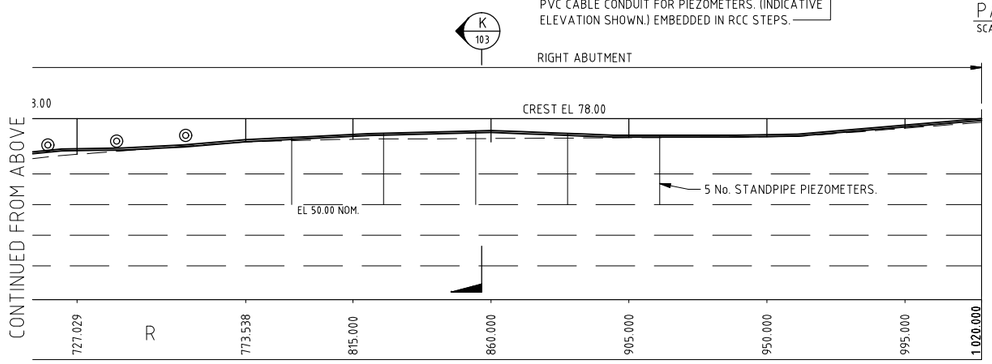


PART LONGITUDINAL SECTION - (CONTINUED FROM ABOVE)

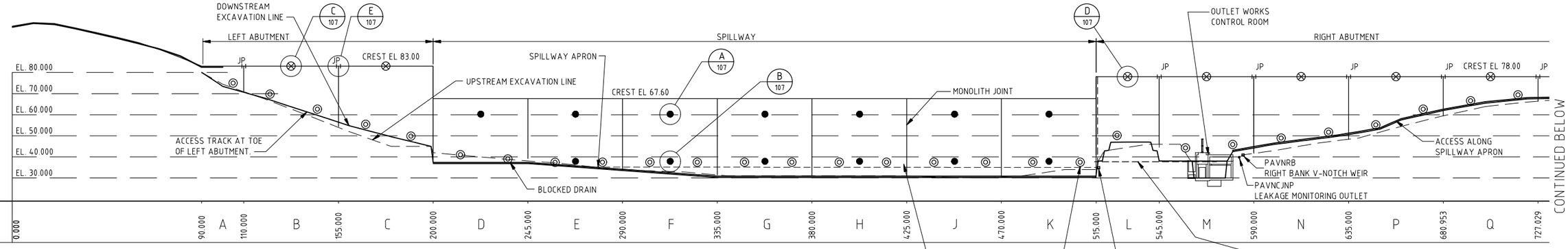
SECTION SHOWS LOCATION OF PIEZOMETERS, THERMISTORS, THERMOCOUPLES AND STRAIN GAUGES

STANDPIPE LOCATIONS	
CHAINAGE	SECTION
785 NOM.	K
815 NOM.	K
845 NOM.	K
875 NOM.	K
905 NOM.	K

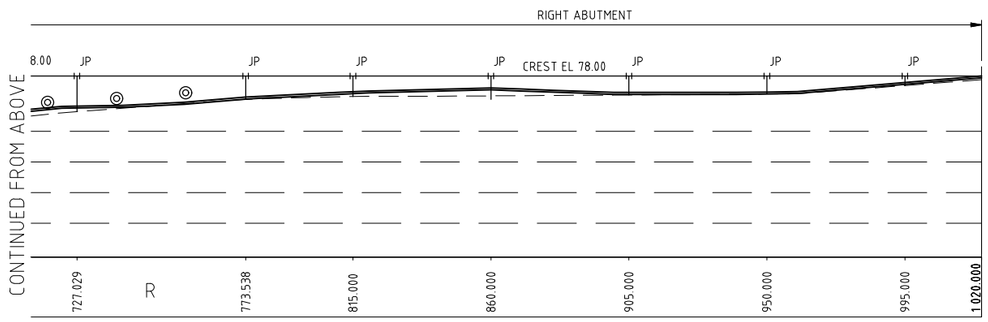
PIEZOMETER LOCATIONS	
CHAINAGE	SECTION
178.15	A
222.65	B
267.65	L
312.65	D
357.65	C
402.65	D
447.65	C
492.65	E
532.65	F
612.65	F

THERMISTOR AND STRAIN GAUGE LOCATION	
CHAINAGE	SECTION
447.50	G

THERMOCOUPLE LOCATION	
CHAINAGE	SECTION
177.50	H
642.50	J



PART LONGITUDINAL SECTION - (CONTINUED BELOW)
SCALE 1:1000



PART LONGITUDINAL SECTION - (CONTINUED FROM ABOVE)

SECTION SHOWS LOCATION OF SURVEY TARGETS, JOINT PINS AND LEAKAGE MEASUREMENT SYSTEM.
NOTE:
SURVEY CONTROL LOCATIONS NOT SHOWN. (REFER DAM INSRUMENTATION SPECIFICATION.)

NOTES:
1. DETAILS OF DAM DRAINAGE OMITTED FOR CLARITY.
2. ALL INSTRUMENTATION CABLE CONDUITS TERMINATE AT OUTLET WORKS CONTROL ROOM. THE FINAL LOCATION OF CONDUIT RUNS INTO THE OUTLET WORKS CONTROL ROOM SHALL BE DETERMINED USING THE DETAILS SHOWN ON DWG. No. BDA-F-M-016.
3. CABLE CONDUITS ALONG THE DAM CREST SHALL BE EMBEDDED IN CREST CONCRETE.
4. FOR DETAILS OF INSTRUMENTATION INSTALLATION, REFERENCE TO THE DAM INSTRUMENTATION SPECIFICATION SHALL BE MADE.

TYPE OF INSTRUMENT	LEGEND
VIBRATING WIRE PIEZOMETERS	P
ABUTMENT SURVEY TARGET	⊗
SPILLWAY SURVEY TARGET	●
JOINT PINS	JP
NEAR HORIZ. DRAIN OUTLET	◎
TILTMETERS	Ti
STRAIN GAUGES	S
THERMOCOUPLES/THERMISTERS	T

SunWater

DRAWING No: 226878-B

0 20 40 60 80 100m
SCALE 1: 1000 (ON A1 SHEET)

Filename: C:\Users\navruka.SUNWATER\appdata\local\temp\AcPublish_7008\226878-B.dwg by navruka

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A	01/06/16	R/B V-NOTCH AND LEAKAGE OUTLET ADDED	MJC
2	11-11-05	AS BUILT	G.O.
1	20-07-04	CHAINAGES AMENDED	T.G.
0	13-05-04	FOR CONSTRUCTION	

TITLE	INITIAL	SIGNATURE	DATE
DRAFTER	B.S.	B.SIMIC	12-05-04
DRAFTING CHECK	C.H.	C.HIGGINS	12-05-04
DESIGNER	J.S.	J. SHEEDY	12-05-04
DESIGN CHECK	T.G.	T.GRIGGS	12-05-04
DESIGN MANAGER	A.N.	A.NEUMAIER	13-05-04
PROJECT/CONST. MANAGER	M.H.H.	M.H.HAMILTON	13-05-04

BURNETT WATER Pty Ltd

BURNETT DAM ALLIANCE

PROJECT TITLE
BURNETT RIVER DAM AMTD 131.4km
DAM - CIVIL
INSTRUMENTATION
GENERAL ARRANGEMENT PLAN

SCALE.	DRAWING STATUS.	PROJECT / DRAWING No.	ISSUE
AS SHOWN	CONSTRUCTION	BDA-D-C-100	2

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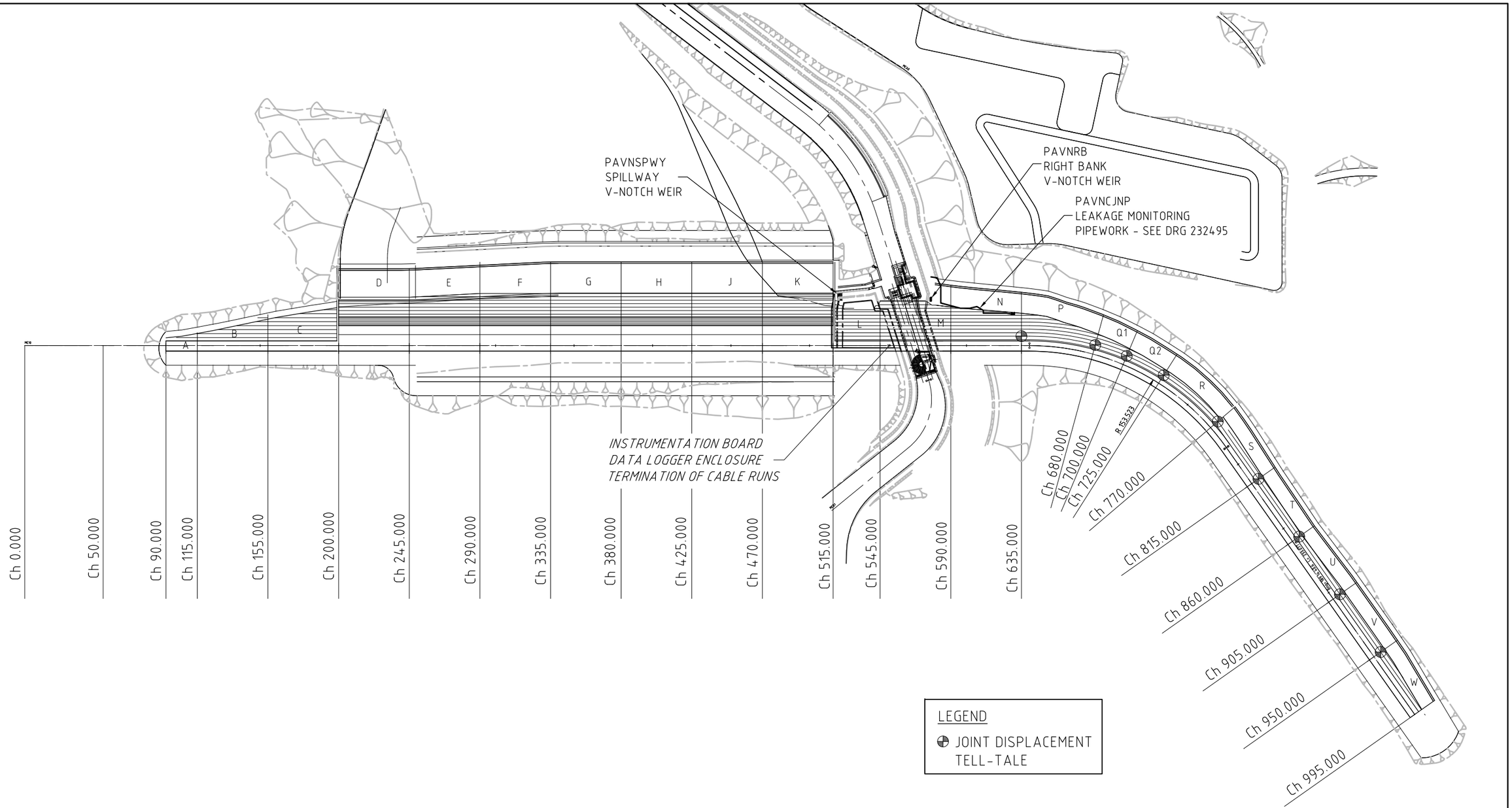

LEGEND

⊕ JOINT DISPLACEMENT TELL-TALE

AS BUILT

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SunWater DRAWING No:**227571-B**

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150 mm ON ORIGINAL

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A	31.08.15	DATA LOGGER MOVED	RB
1	08-12-05	~~AS BUILT~~	W.C.
0	13-05-04	FOR CONSTRUCTION	

ISSUE	DATE	AMENDMENT / ISSUE DESCRIPTION	APPROVAL

TITLE	INITIAL	SIGNATURE	DATE
DRAFTER	B.S.	B.SIMIC	12-05-04
DRAFTING CHECK	C.H.	C.HIGGINS	12-05-04
DESIGNER	J.S.	J. SHEEDY	12-05-04
DESIGN CHECK	T.G.	T.GRIGGS	12-05-04
DESIGN MANAGER	A.N.	A.NEUMAIER	13-05-04
PROJECT/CONST. MANAGER	M.H.H.	M.H.HAMILTON	13-05-04

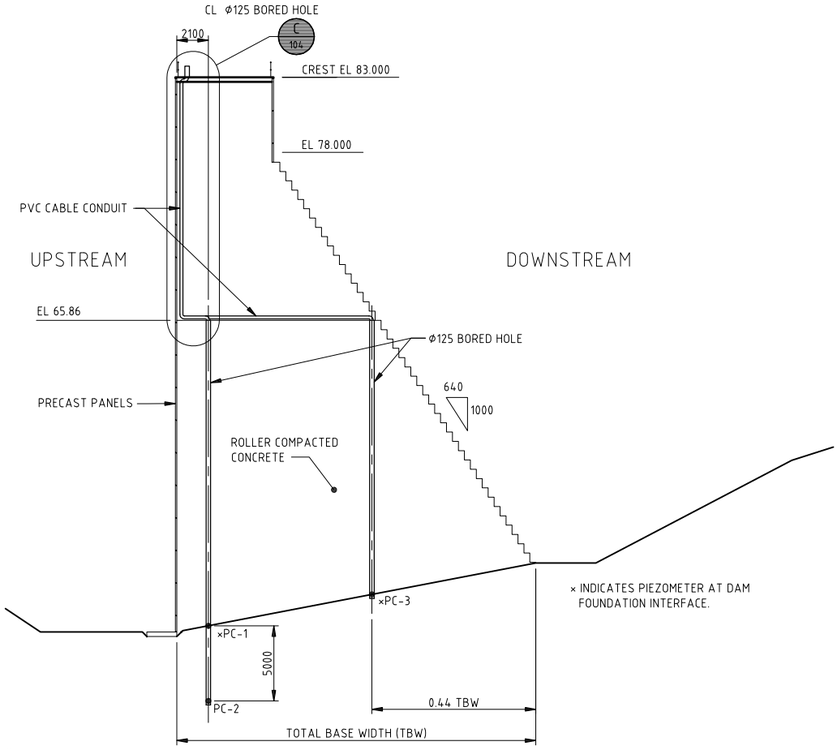
BURNETT WATER Pty Ltd

BURNETT DAM ALLIANCE

PROJECT TITLE

BURNETT RIVER DAM AMTD 131.4km
DAM - CIVIL
INSTRUMENTATION
GENERAL ARRANGEMENT PLAN

SCALE	DRAWING STATUS	PROJECT / DRAWING No.	ISSUE
AS SHOWN	CONSTRUCTION	~~BDA-D-C-115~~	~~1~~



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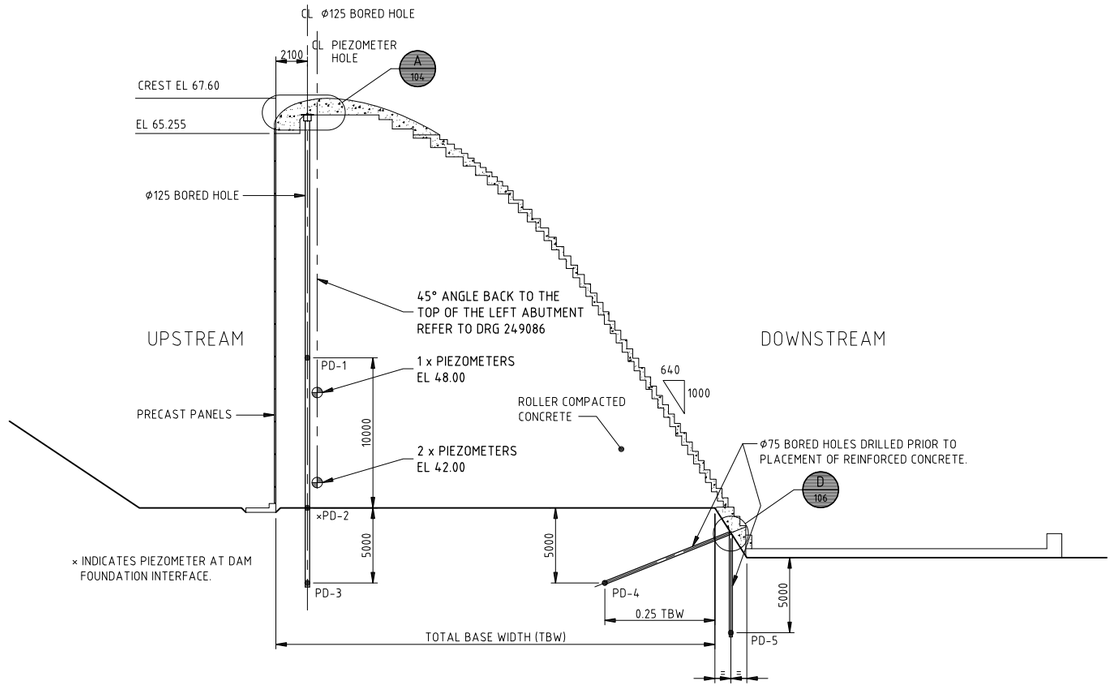
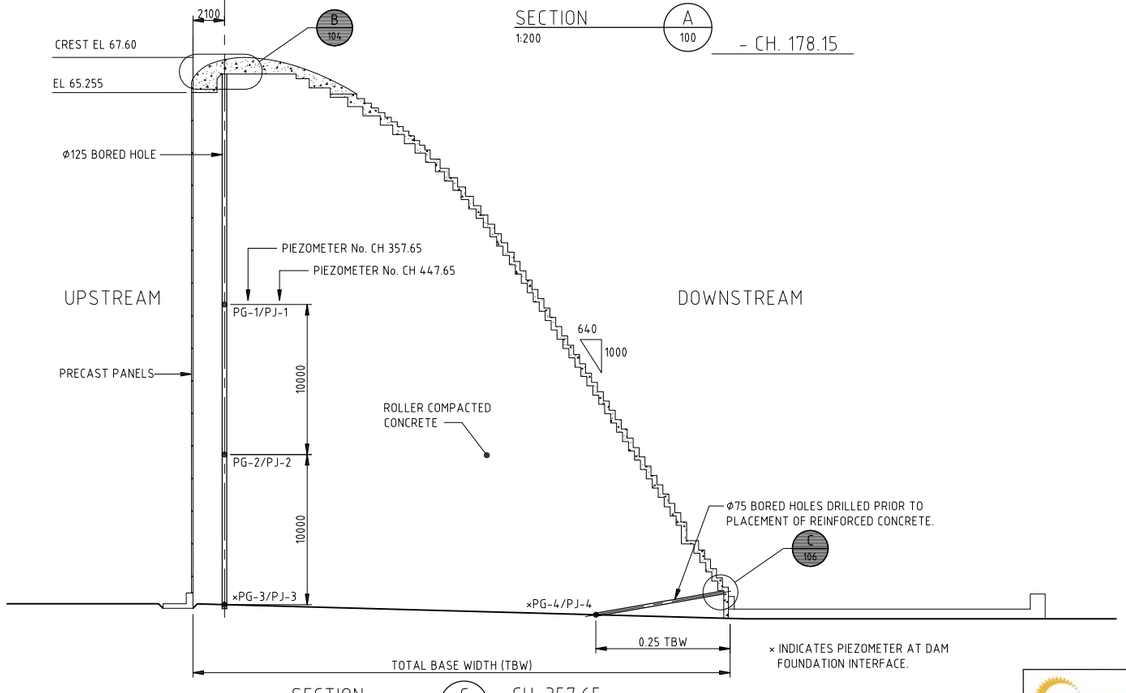
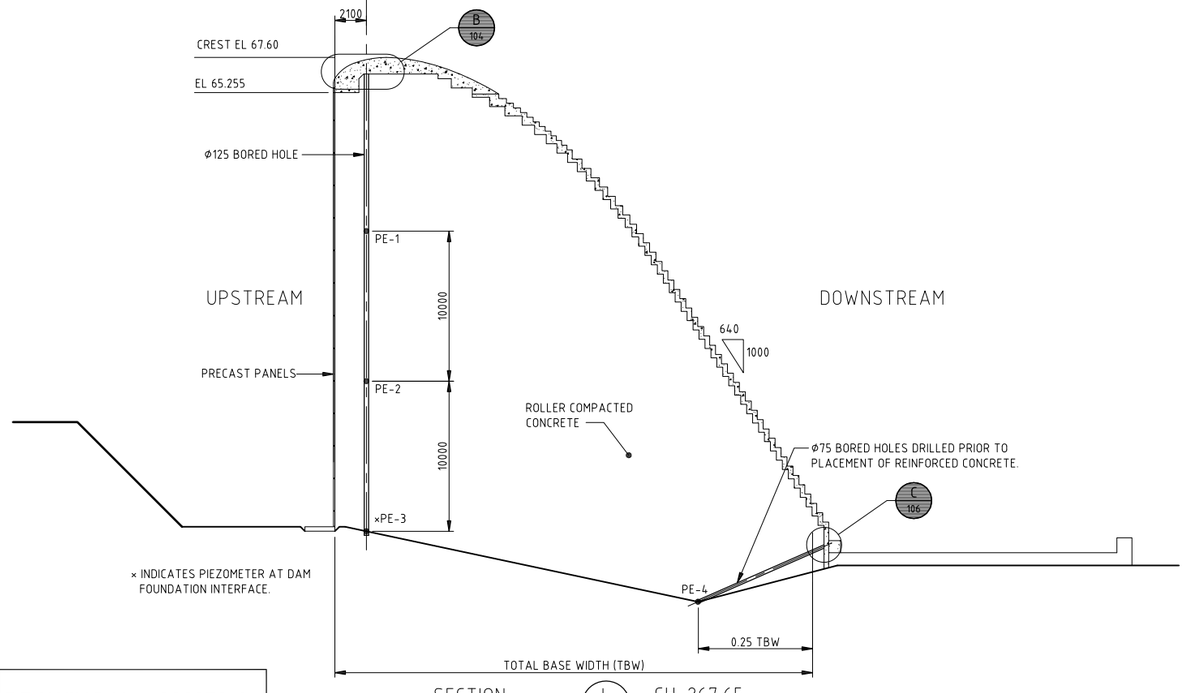


SECTION B 1:200 100 – CH. 222.65



SECTION C 1:200 100 – CH. 357.65 CH 447.65 SIM.



SECTION L 1:200 100 – CH. 267.65

0 5 10 15 20m
SCALE 1: 200 (ON A1 SHEET)

SunWater DRAWING No: **226879-A**

Filename: S:\BW Asset Delivery\SW-Bundaberg WSS\Paradise Dam Burnett Water Drawings\SunWater Nos\AutoCAD\226879-A.dwg by balshar

ISSUE	DATE	AMENDMENT / ISSUE DESCRIPTION	APPROVAL
A	15/11/17	PIEZO NOTES ADDED TO SECTION B	BV
2	11-11-05	AS BUILT	G.O.
1	20-07-04	DOWNSTREAM STEPS AMENDED, CALLUPS AMENDED	T.G.
0	13-05-04	FOR CONSTRUCTION	

TITLE	INITIAL	SIGNATURE	DATE
DRAFTER	B.S.	B.SIMIC	12-05-04
DRAFTING CHECK	C.H.	C.HIGGINS	12-05-04
DESIGNER	J.S.	J. SHEEDY	12-05-04
DESIGN CHECK	T.G.	T.GRIGGS	12-05-04
DESIGN MANAGER	A.N.	A.NEUMAIER	13-05-04
PROJECT/CONST. MANAGER	M.H.H.	M.H.HAMILTON	13-05-04

BURNETT WATER Pty Ltd

BURNETT DAM ALLIANCE

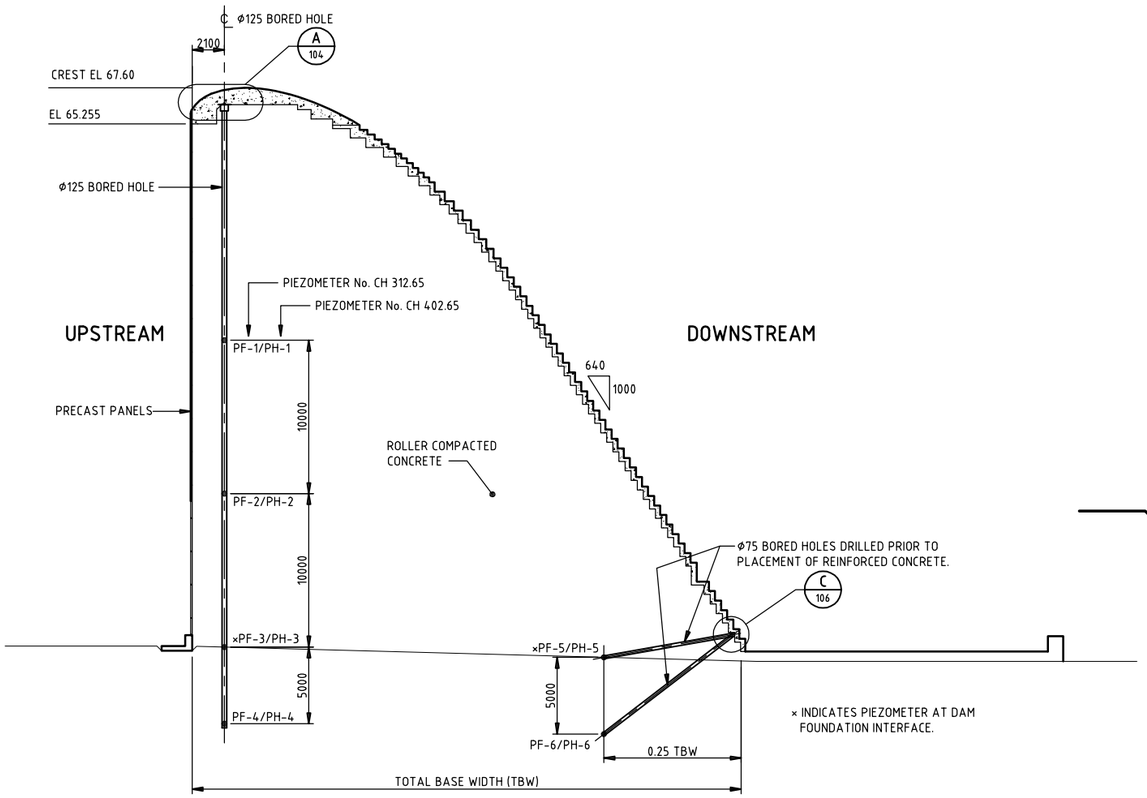
PROJECT TITLE
BURNETT RIVER DAM AMTD 131.4km
DAM – CIVIL
INSTRUMENTATION
SECTIONS
SHEET 1 OF 3

SCALE.	DRAWING STATUS.	PROJECT / DRAWING No.	ISSUE
AS SHOWN	CONSTRUCTION	BDA-D-C-101	2

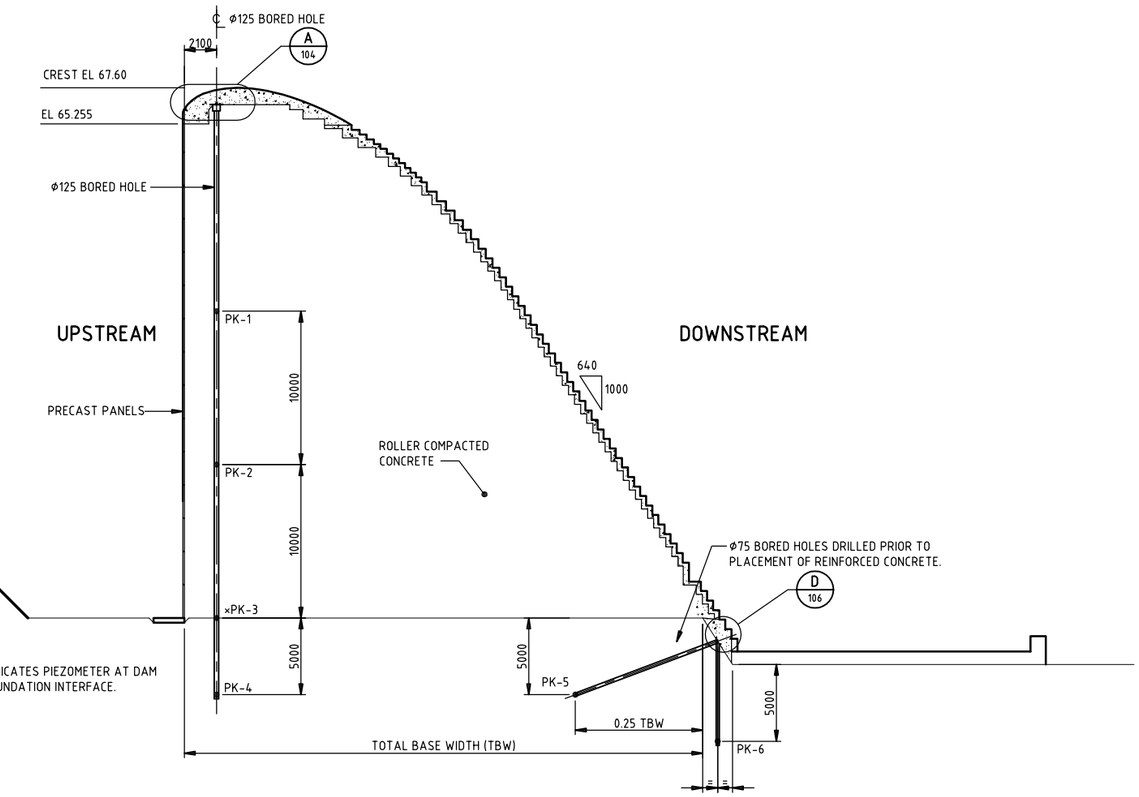
S:\BW Asset Delivery\SW-Bundaberg WSS\Paradise Dam Burnett Water Drawings\SunWater Nos\AutoCAD\226879-A.dwg
04 Dec 2017 11:23 AM

Plot Info. Date: 04/12/2017 Time: 11:27:06

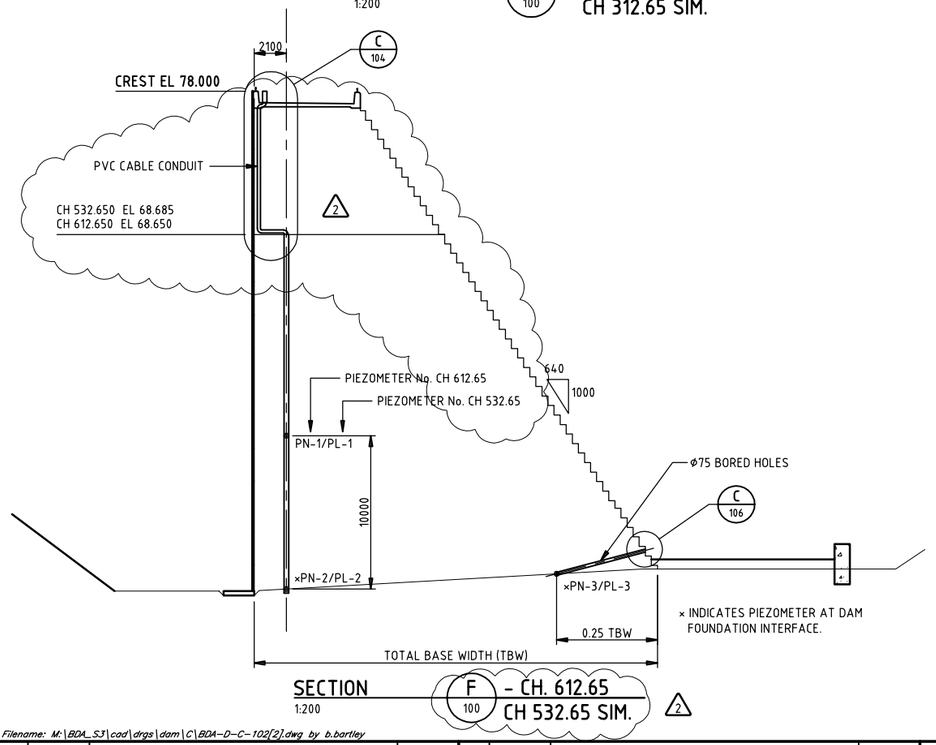
150 mm ON ORIGINAL



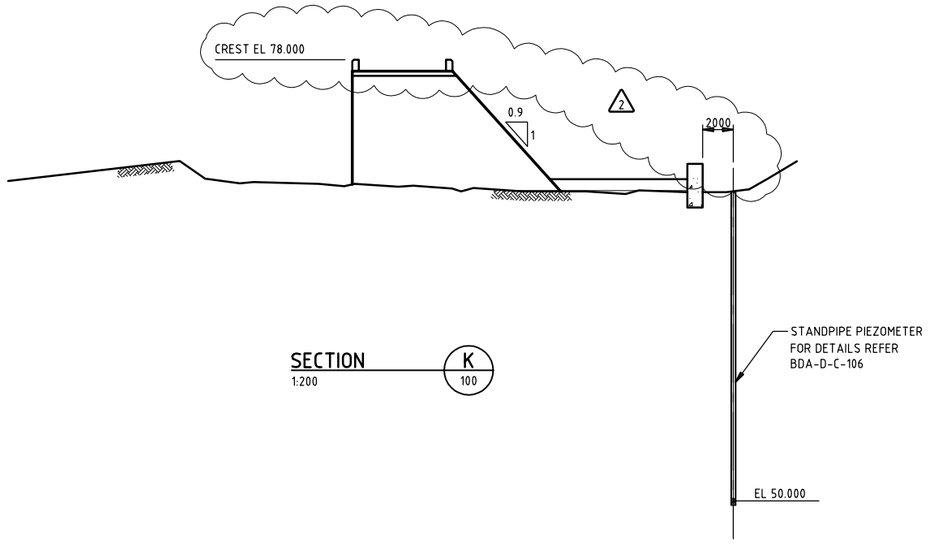
SECTION D – CH. 402.65
1:200 100 CH 312.65 SIM.



SECTION E – CH. 492.65
1:200 100



SECTION F – CH. 612.65
1:200 100 CH 532.65 SIM.



SECTION K
1:200 100

Sunwater No: 226880

0 5 10 15 20m
SCALE 1: 200 (ON A1 SHEET)

Filename: M:\BDA_SJ\cad\drgs\dam\C\BDA-D-C-102[2].dwg by b.bartley

ISSUE	DATE	AMENDMENT / ISSUE DESCRIPTION	APPROVAL
2	11-11-05	AS BUILT	G.G.
1	20-07-04	DOWNSTREAM STEPS AMENDED, CALLUPS AMENDED	T.G.
0	13-05-04	FOR CONSTRUCTION	

ISSUE	DATE	AMENDMENT / ISSUE DESCRIPTION	APPROVAL

TITLE	INITIAL	SIGNATURE	DATE
DRAFTER	B.S.	B.SIMIC	12-05-04
DRAFTING CHECK	C.H.	C.HIGGINS	12-05-04
DESIGNER	J.S.	J. SHEEDY	12-05-04
DESIGN CHECK	T.G.	T.GRIGGS	12-05-04
DESIGN MANAGER	A.N.	A.NEUMAIER	13-05-04
PROJECT/CONST. MANAGER	M.H.H.	M.H.HAMILTON	13-05-04

BURNETT WATER Pty Ltd

BURNETT DAM ALLIANCE

PROJECT TITLE: BURNETT RIVER DAM AMTD 131.4km
DAM - CIVIL
INSTRUMENTATION SECTIONS SHEET 2 OF 3

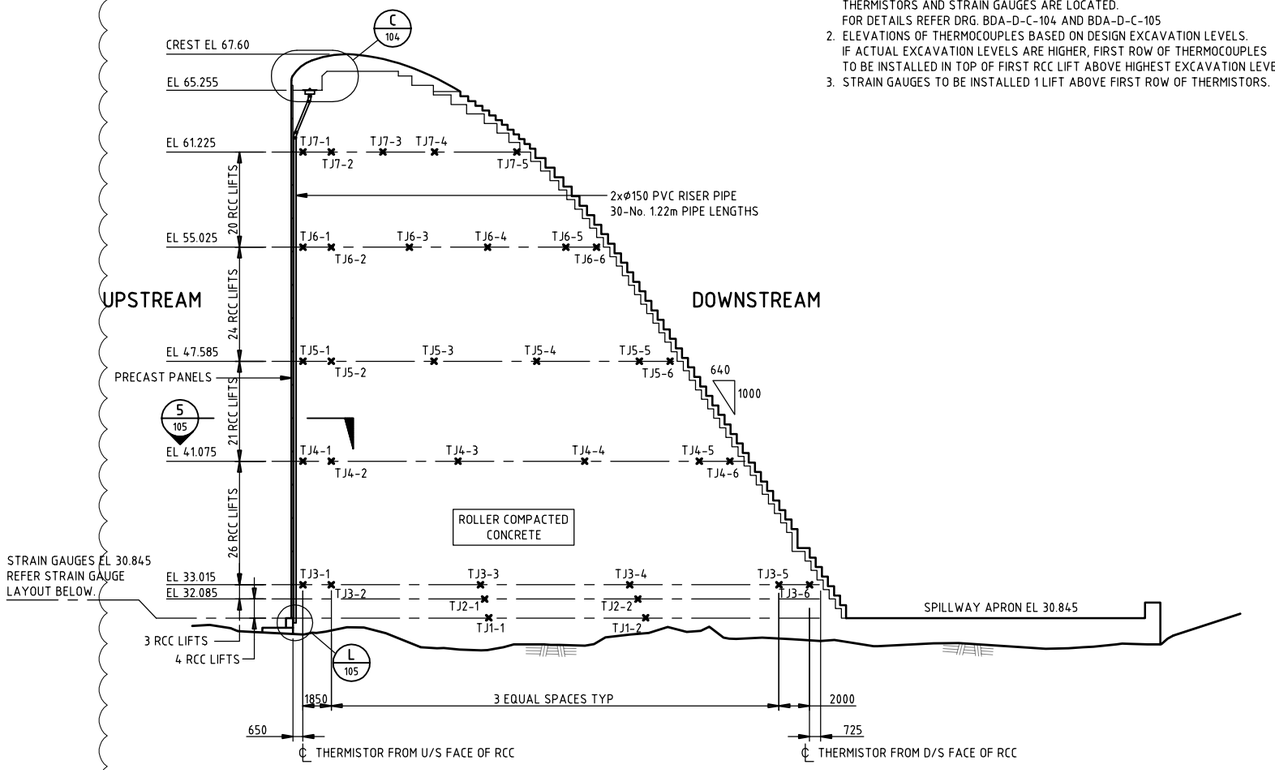
SCALE.	DRAWING STATUS.	PROJECT / DRAWING No.	ISSUE
AS SHOWN	CONSTRUCTION	BDA-D-C-102	2

Plot Info. Date: 11/11/2005 Time: 16:47:17

150 mm ON ORIGINAL

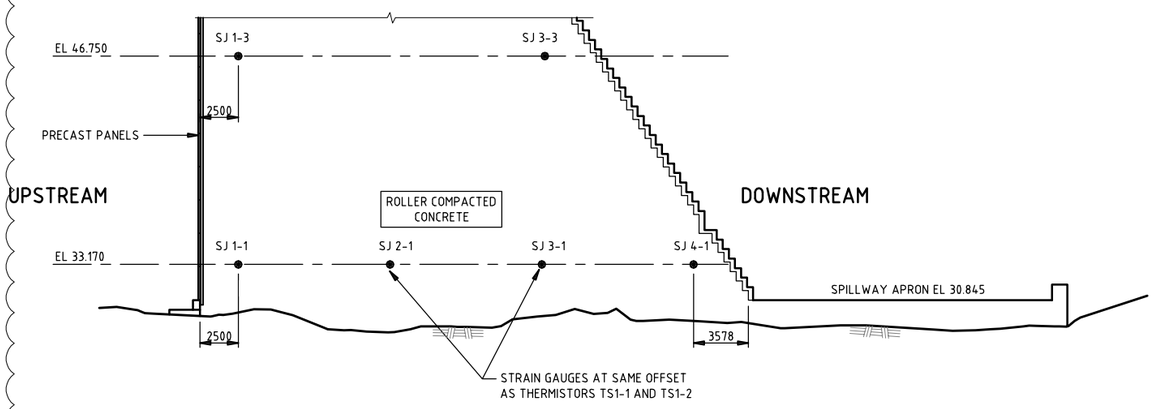
NOTE:-

1. ELEVATIONS SHOWN DENOTE TOP OF LIFT IN WHICH THERMOCOUPLES, THERMISTORS AND STRAIN GAUGES ARE LOCATED. FOR DETAILS REFER DRG. BDA-D-C-104 AND BDA-D-C-105
2. ELEVATIONS OF THERMOCOUPLES BASED ON DESIGN EXCAVATION LEVELS. IF ACTUAL EXCAVATION LEVELS ARE HIGHER, FIRST ROW OF THERMOCOUPLES TO BE INSTALLED IN TOP OF FIRST RCC LIFT ABOVE HIGHEST EXCAVATION LEVEL.
3. STRAIN GAUGES TO BE INSTALLED 1 LIFT ABOVE FIRST ROW OF THERMISTORS.



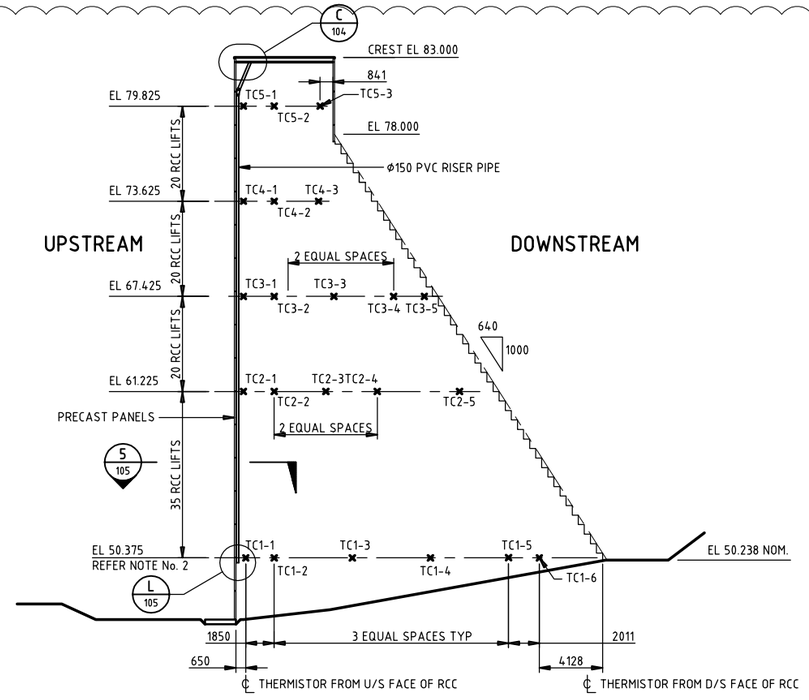
SECTION G 100 - CH. 447.50
SCALE 1:200

THERMISTOR LAYOUT



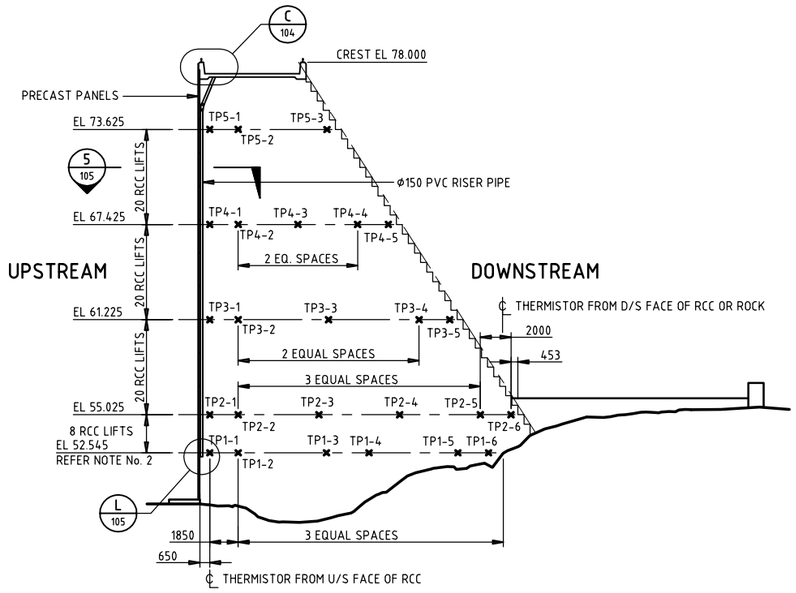
SECTION M 100 - CH. 447.50
SCALE 1:200

STRAIN GAUGE LAYOUT



SECTION H 100 - CH. 177.50
SCALE 1:200

THERMOCOUPLE LAYOUT



SECTION J 100 - CH. 642.50
SCALE 1:200

THERMOCOUPLE LAYOUT

Sunwater No: 226881

0 5 10 15 20m
SCALE 1: 200 (ON A1 SHEET)

Filename: M:\BDA_S3\cad\drgs\dam\C\BDA-D-C-103[3].dwg by b.bartley

ISSUE	DATE	AMENDMENT / ISSUE DESCRIPTION	APPROVAL
3	11-11-05	AS BUILT	G.D.
2	09-09-04	AS CONSTRUCTED EXCAVATED SURFACE ADDED	R.H.
1	02-07-04	THERMOCOUPLE, THERMISTOR & STRAIN GAGUE LAYOUT AMENDED	A.N.
0	13-05-04	FOR CONSTRUCTION	

TITLE	INITIAL	SIGNATURE	DATE
DRAFTER	B.S.	B.SIMIC	12-05-04
DRAFTING CHECK	C.H.	C.HIGGINS	12-05-04
DESIGNER	J.S.	J. SHEEDY	12-05-04
DESIGN CHECK	T.G.	T.GRIGGS	12-05-04
DESIGN MANAGER	A.N.	A.NEUMAIER	13-05-04
PROJECT/CONST. MANAGER	M.H.H.	M.H.HAMILTON	13-05-04

BURNETT WATER Pty Ltd

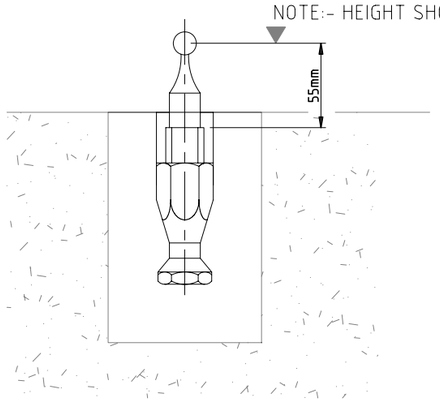
BURNETT DAM ALLIANCE

PROJECT TITLE: BURNETT RIVER DAM AMTD 131.4km
DAM - CIVIL
INSTRUMENTATION SECTIONS
SHEET 3 OF 3

SCALE.	DRAWING STATUS.	PROJECT / DRAWING No.	ISSUE
AS SHOWN	CONSTRUCTION	BDA-D-C-103	3

Plot Info. Date: 11/11/2005 Time: 16:47:24

150 mm ON ORIGINAL



NOTE:- HEIGHT SHOWN ON TABLES

FOR DETAILED INFORMATION
REFER TO 226885
(BDA-D-C-107)

CONTROL STATIONS COORDINATES

STN	EASTING	NORTHING	EL	ITEM
stn 101	391084.776	7196149.567	73.378	PILLAR
stn 102	391360.471	7195932.290	57.694	PILLAR
stn 103	391389.674	7195804.201	62.592	PILLAR
stn 104	391384.470	7195705.468	67.084	PILLAR
stn 105	390932.298	7196074.875	87.324	PILLAR
stn 106	391016.658	7196001.165	84.485	PILLAR
stn 107	391243.343	7195778.685	79.495	PILLAR

SETTLEMENT POINT CO-ORDINATES

ss 1	390970.111	7196048.267	84.074	
ss 2	391002.212	7196016.753	84.087	
ss 3	391259.162	7195764.585	78.998	
ss 4	391282.613	7195745.693	77.944	
ss 5	391312.504	7195713.096	77.972	
ss 6	391344.922	7195679.525	77.976	
ss 7	391368.520	7195639.133	77.972	
ss 8	391041.857	7195992.895	60.266	
ss 9	391073.967	7195961.381	60.250	
ss 10	391106.136	7195929.870	60.266	
ss 11	391138.209	7195898.375	60.264	
ss 12	391170.332	7195866.836	60.295	
ss 13	391202.473	7195835.307	60.262	
ss 14	391234.551	7195803.837	60.269	
ss 15	391084.523	7195972.123	37.974	
ss 16	391116.698	7195940.611	37.962	
ss 17	391148.753	7195909.115	37.976	
ss 18	391180.881	7195877.552	37.977	
ss 19	391213.001	7195846.049	37.978	
ss 20	391245.125	7195814.542	37.981	

DEEP/ROD SITE LEVEL CONTROL

NORTHING	EASTING	EL
7196073.542	391030.324	62.198

NOTES:

1. LEVEL DATUM :- AHD BASED ON PM 31275 @ EL 103.891 METRES AHD.
2. CO-ORDINATES ARE PLANE MGA94 ZONE 56. BASED ON PM 126344 @ E 391908.835 N 7195477.909.
3. TOP OF PILLARS AND SETTLEMENT MARKS ARE 0.055M LOWER THAN LEVELS SHOWN IN TABLES.
4. INITIAL SURVEY OCTOBER 2005.

SunWater No 227317A

Filename: P:\G-80102_Burnett Water\02_Burnett River Dam\04_ParadiseDamDeformation\Drafting\227317A.dwg by navruka

ISSUE	DATE	AMENDMENT / ISSUE DESCRIPTION	APPROVAL
A	30.10.06	REVISED - CO ORDS AND NOTES ADDED.	DNH
0	15-11-05	AS BUILT	

TITLE	INITIAL	SIGNATURE	DATE
DRAFTER	D.O'S.	D.O'SULLIVAN	15-11-05
DRAFTING CHECK	W.C.	W.CURLEWIS	15-11-05
DESIGNER	T.G.	T.GRIGGS	15-11-05
DESIGN CHECK	R.H.	R.HERWEYNEN	15-11-05
DESIGN MANAGER	R.H.	R.HERWEYNEN	15-11-05
PROJECT/CONST. MANAGER	M.H.H.	M.H.HAMILTON	15-11-05

PROJECT TITLE: BURNETT RIVER DAM AMTD 131.4km
DAM - CIVIL

DAM DEFORMATION SURVEY
PILLAR AND TARGET LOCATIONS

SCALE.	DRAWING STATUS.	PROJECT / DRAWING No.	ISSUE
AS SHOWN	CONSTRUCTION	BDA-D-C-228	0

P:\G-80102_Burnett Water\02_Burnett River Dam\04_ParadiseDamDeformation\Drafting\227317A.dwg
09 Nov 2006 8:28 AM
Plot Info. Date: 09/11/2006 Time: 16:39:58
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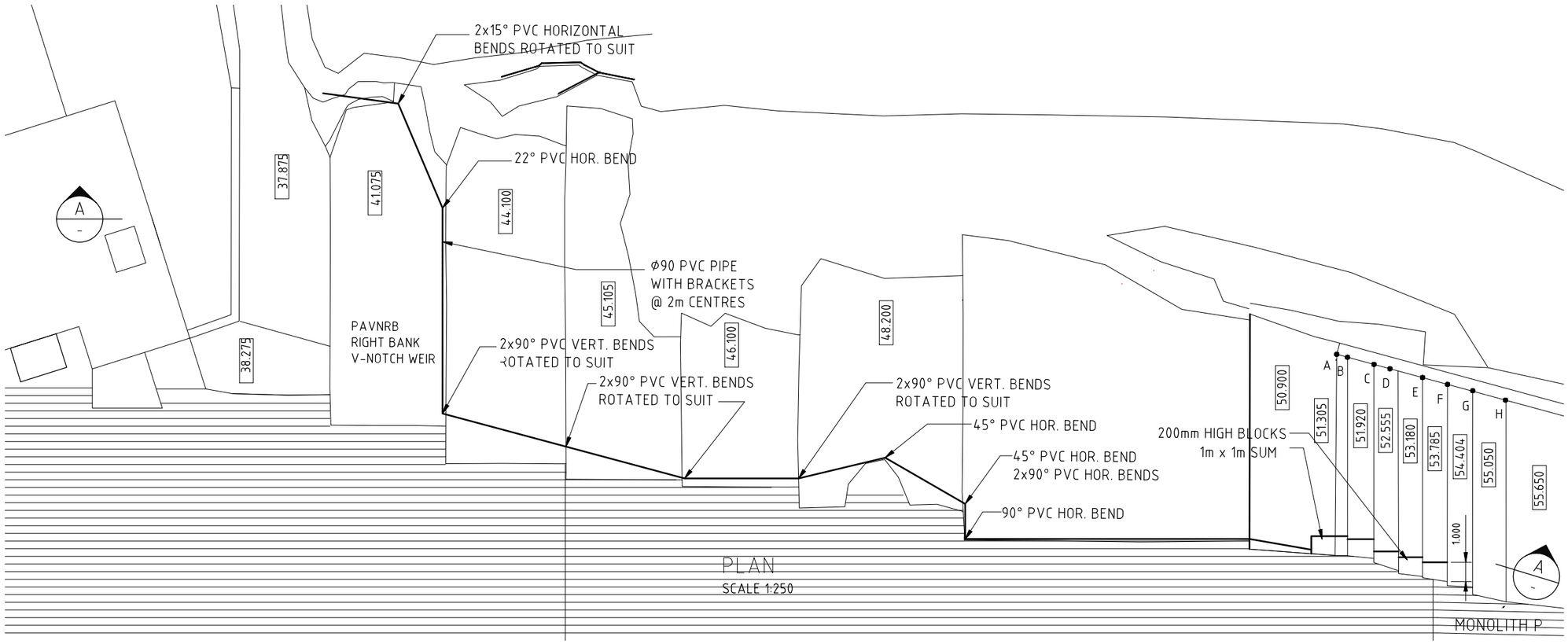
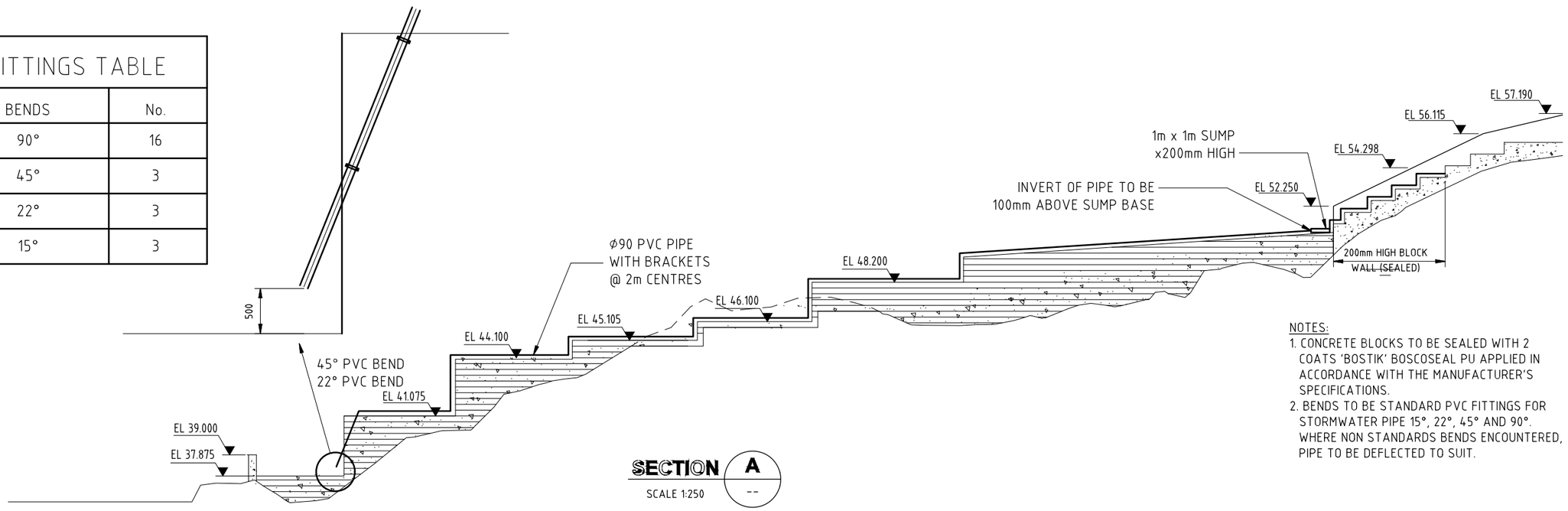


PLAN

SCALE 1:250

FITTINGS TABLE	
BENDS	No.
90°	16
45°	3
22°	3
15°	3



SECTION A

SCALE 1:250

NOTES:
1. CONCRETE BLOCKS TO BE SEALED WITH 2 COATS 'BOSTIK' BOSCOSEAL PU APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
2. BENDS TO BE STANDARD PVC FITTINGS FOR STORMWATER PIPE 15°, 22°, 45° AND 90°. WHERE NON STANDARDS BENDS ENCOUNTERED, PIPE TO BE DEFLECTED TO SUIT.

CAD File: S:\BW Asset Delivery\SW-Bundaberg WSS\Paradise\Drawings\AutoCAD\EAP\232495.dwg
DATE PLOTTED: 6 January 2025 2:50 PM BY - FLYNN WEBBER

Drawing Produced By:
Sunwater Ltd
Tel: (07) 3120 0000

REVISION	DATE	REMARKS	CKD	PASSED

SCALES (A3 SIZE)

0 2.5 5 7.5 10 12.5 METRES
1:250

DRAWN	DESIGNED
SE	PR
CHECKED	CHECKED
APPROVED	
P.Richardson	
CHIEF DESIGN ENGINEER	

sunwater

PARADISE DAM
SECONDARY SPILLWAY
LEAKAGE MONITORING SYSTEM
MONOLITH JOINT N/P
PLAN AND SECTION

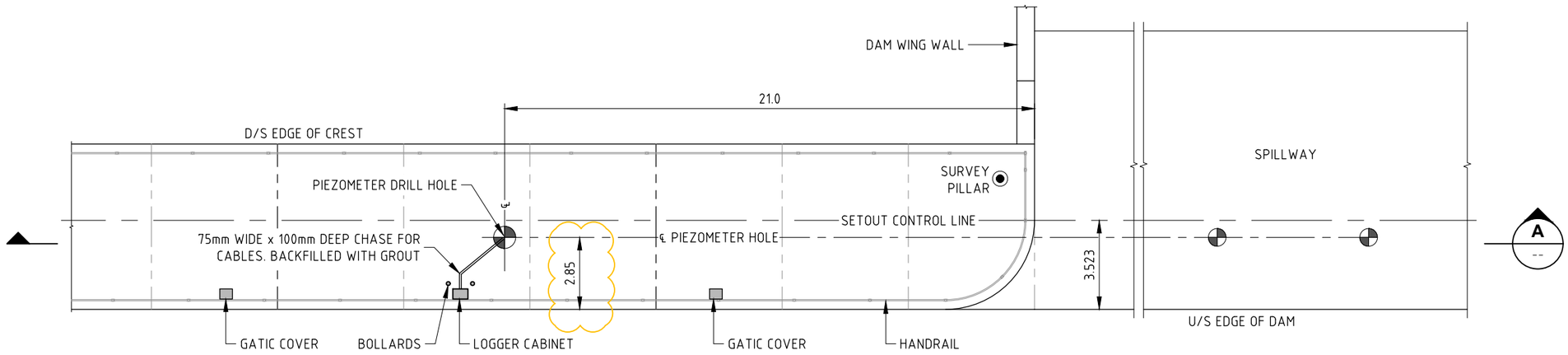
CONTRACT NUMBER

DRAWING NUMBER 232495

REV.

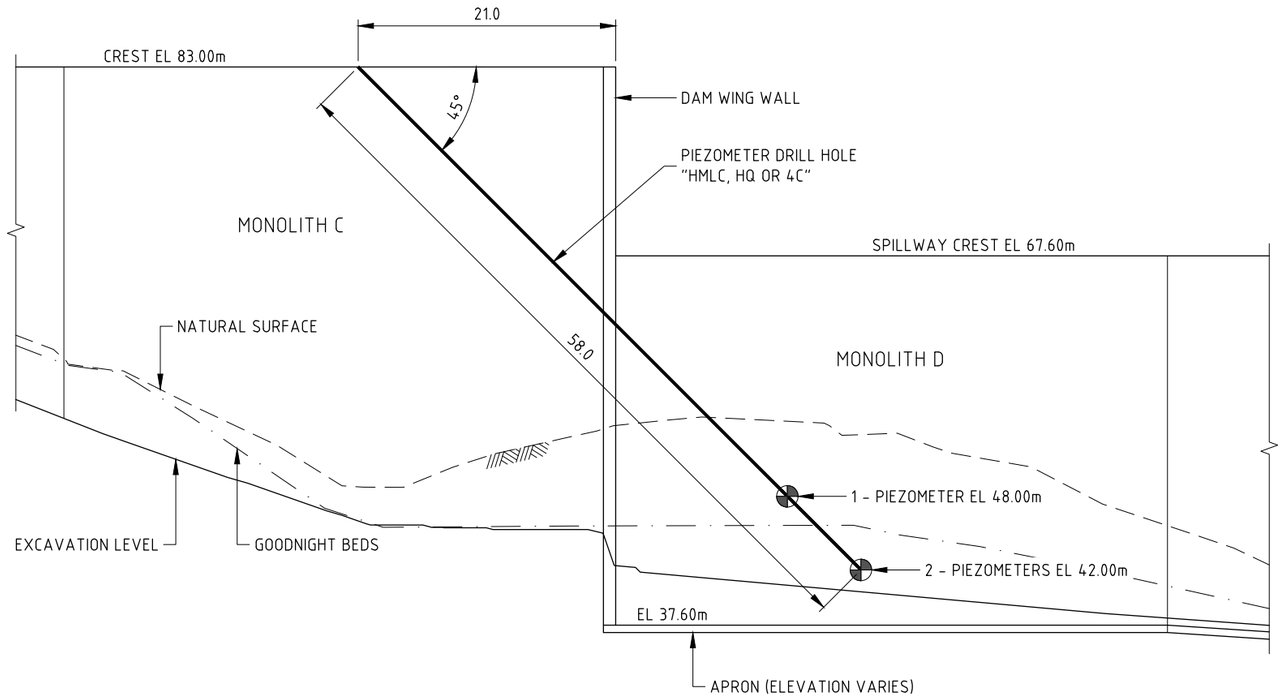
SHEET NOV. 2008

DATE



PLAN

SCALE 1:200



SECTION A

SCALE 1:500

(HANDRAIL AND CABINET REMOVED FOR CLARITY)

NOTES:

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

LEGEND:

- PIEZOMETER
- CONSTRUCTION JOINT

CAD File: S:\BW Asset Delivery\SW-Bundaberg WSS\N-WBXB-04-06-10-AA - Paradise Dam - Dam Safety Upgrade Stage 2\Drawings\AutoCAD\249086-2.dwg
DATE PLOTTED: 6 Jan 2025 3:18 PM BY : FLYNN WEBBER

Drawing Produced By:
Sunwater Ltd
Tel: (07) 3120 0000

REVISION					REFERENCE DRAWINGS	
27/07/17	2	DRILL HOLE MOVED 0.25m DOWNSTREAM	AN	PGR		
05/07/17	1	CABLE CHASE ADDED	RB	PGR		
04/07/17	0	ISSUED FOR CONSTRUCTION	RB	PGR		
DATE		REMARKS	CKD	PASSED	227124	LONGITUDINAL SECTION

SCALES (A3 SIZE)

0 5 10 METRES 1:200

0 5 10 15 20 25 METRES 1:500

DRAWN	DESIGNED
	DS
CHECKED	CHECKED
RB	DF
APPROVED	
P.G. RICHARDSON	
4/7/17	RPEQ 3641

sunwater

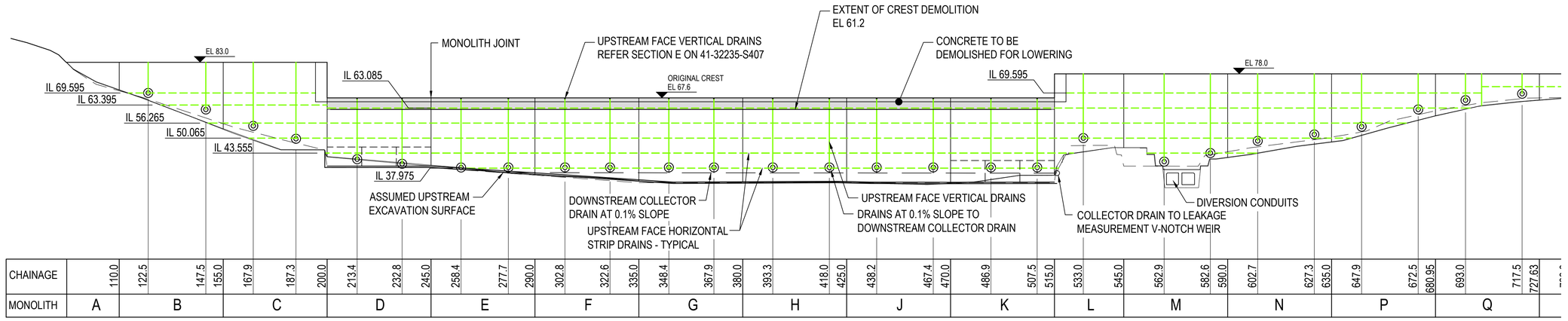
PARADISE DAM
INSTRUMENTATION
SPILLWAY MONOLITH D
PIEZOMETER INSTALLATION ARRANGEMENT

CONTRACT NUMBER

DRAWING NUMBER	REV.
249086	2

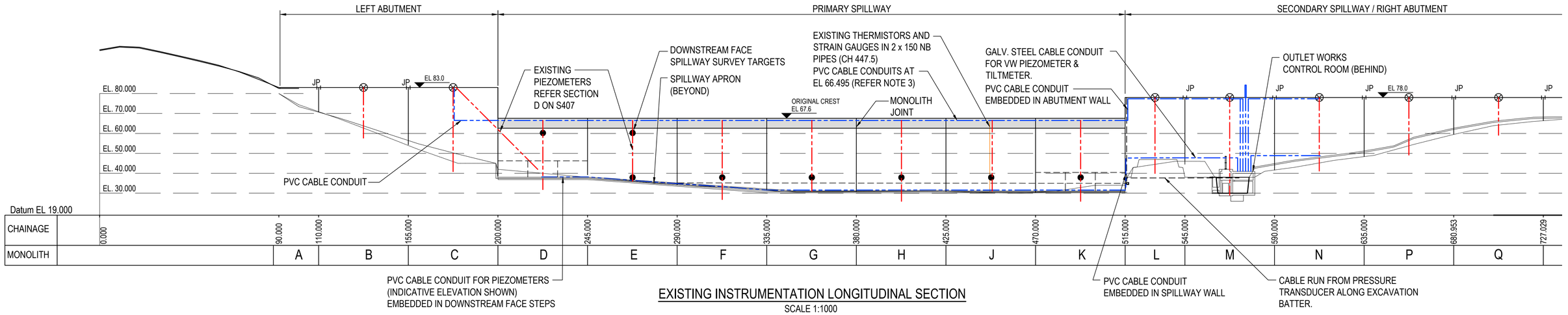
SHEET 1 OF 1

DATE JUNE 2017



EXISTING DRAINAGE LONGITUDINAL SECTION

SCALE 1:1000



EXISTING INSTRUMENTATION LONGITUDINAL SECTION

SCALE 1:1000

TYPE OF INSTRUMENT	LEGEND
VIBRATING WIRE PIEZOMETER GROUP	
ABUTMENT SURVEY TARGET	⊗
SPILLWAY SURVEY TARGET	●
JOINT PINS	JP
NEAR HORIZ. DRAIN OUTLET	◎
UPSTREAM FACE VERTICAL DRAINS	
UPSTREAM FACE HORIZ. STRIP DRAINS	
CABLE CONDUIT	
STRAIN GAUGE AND THERMISTOR	

PIEZOMETER LOCATIONS	
CHAINAGE	MONOLITH
178.15	C
222.65	D
267.65	E
312.65	F
357.65	G
402.65	H
447.65	J
492.65	K
532.65	L
612.65	N

THERMISTOR AND STRAIN GAUGE LOCATION	
CHAINAGE	MONOLITH
447.50	J

INSTRUMENTATION TABLES

AS BUILT DISCLAIMER

GHD HAS PREPARED THESE DRAWINGS ON THE BASIS OF INFORMATION PROVIDED BY:

CPB CONTRACTORS

WHICH GHD HAS NOT INDEPENDENTLY VERIFIED OR CHECKED ("UNVERIFIED INFORMATION") BEYOND THE AGREED SCOPE OF WORK.
GHD EXPRESSLY DISCLAIMS RESPONSIBILITY IN CONNECTION WITH THE UNVERIFIED INFORMATION, INCLUDING (BUT NOT LIMITED TO) ERRORS IN, OR OMISSIONS FROM, THE DRAWINGS, WHICH WERE CAUSED OR CONTRIBUTED BY THE UNVERIFIED INFORMATION.

NOTES:

1. FOR GENERAL NOTES REFER TO DRG 41-32235-G402 AND G403
2. LONGITUDINAL SECTIONS EXTRACTED FROM BURNETT DAM ALLIANCE DRAWING 227131 (BDA-D-C-084) AND 226878 (BDA-D-C-100)
3. FOR VW PIEZOMETERS, TILTMETERS, THERMISTORS & STRAIN GAUGES REFER SUNWATER DRGS. 226887 TO 226890 (BDA-D-C-109,110,111 & 112)

AS BUILT

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
2	ISSUED AS BUILT		AL	JW*	CB*	28.01.22
1	CREST DETAILS MODIFIED		AL	JW*	RE*	16.06.20
0	ISSUED FOR CONSTRUCTION		KK	JW*	RE*	27.03.20

0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE

sunwater
SUNWATER DRAWING No. 251990

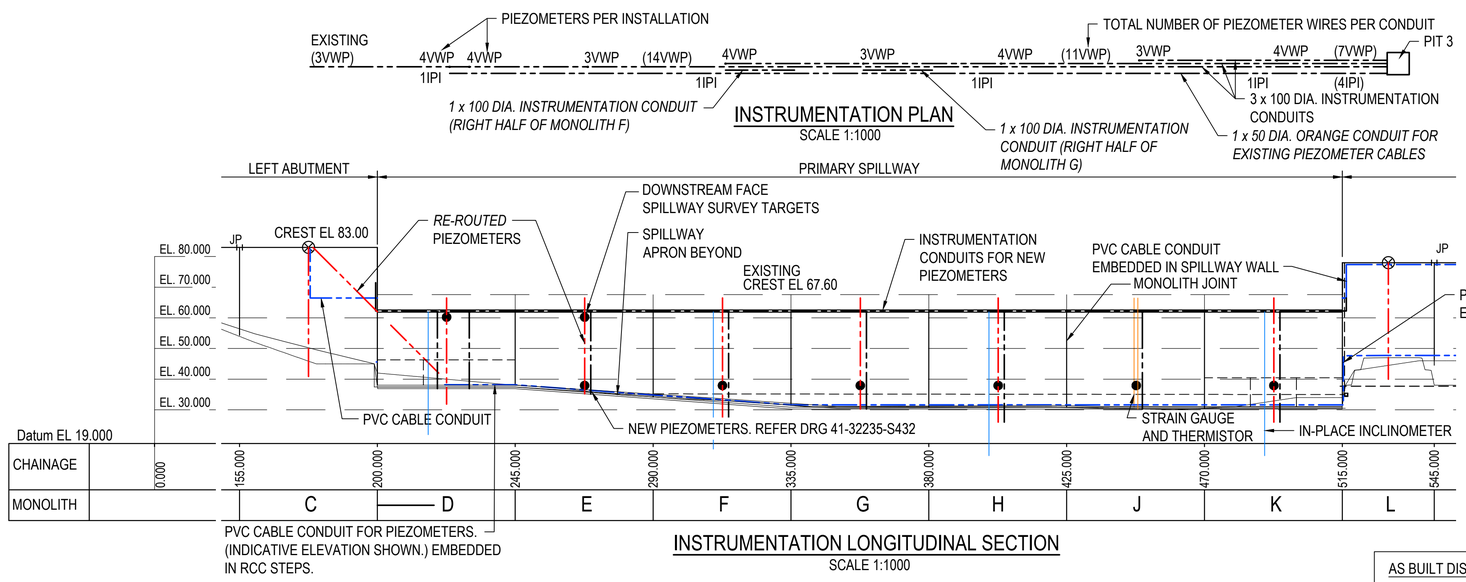
GHD
145 Ann St Brisbane QLD 4000 Australia
GPO Box 668 Brisbane QLD 4001
T 61 7 3316 3000 F 61 7 3319 6038
E bnemail@ghd.com W www.ghd.com

Drawn	A. LEE	Designer	A. FORBES
Drafting Check	W. HAWKSWELL*	Design Check	J. WILLEY*
Approved (Project Director)	R. EVANS*		
Date	27.03.20		
Scale	1:1000	This Drawing must not be used for Construction unless signed as Approved	

Client SUNWATER
Project PARADISE DAM SPILLWAY - ESSENTIAL WORKS (EL 61.8)
Title EXISTING INSTRUMENTATION AND DRAINAGE LONGITUDINAL SECTIONS

Original Size A1 | Drawing No: 41-32235-S403 | Rev: 2

Plot Date: 26 January 2022 - 10:18 AM Plotted by: Amy Lee Cad File No: G:\41\32235\CADD\Drawings\41-32235-S403.dwg

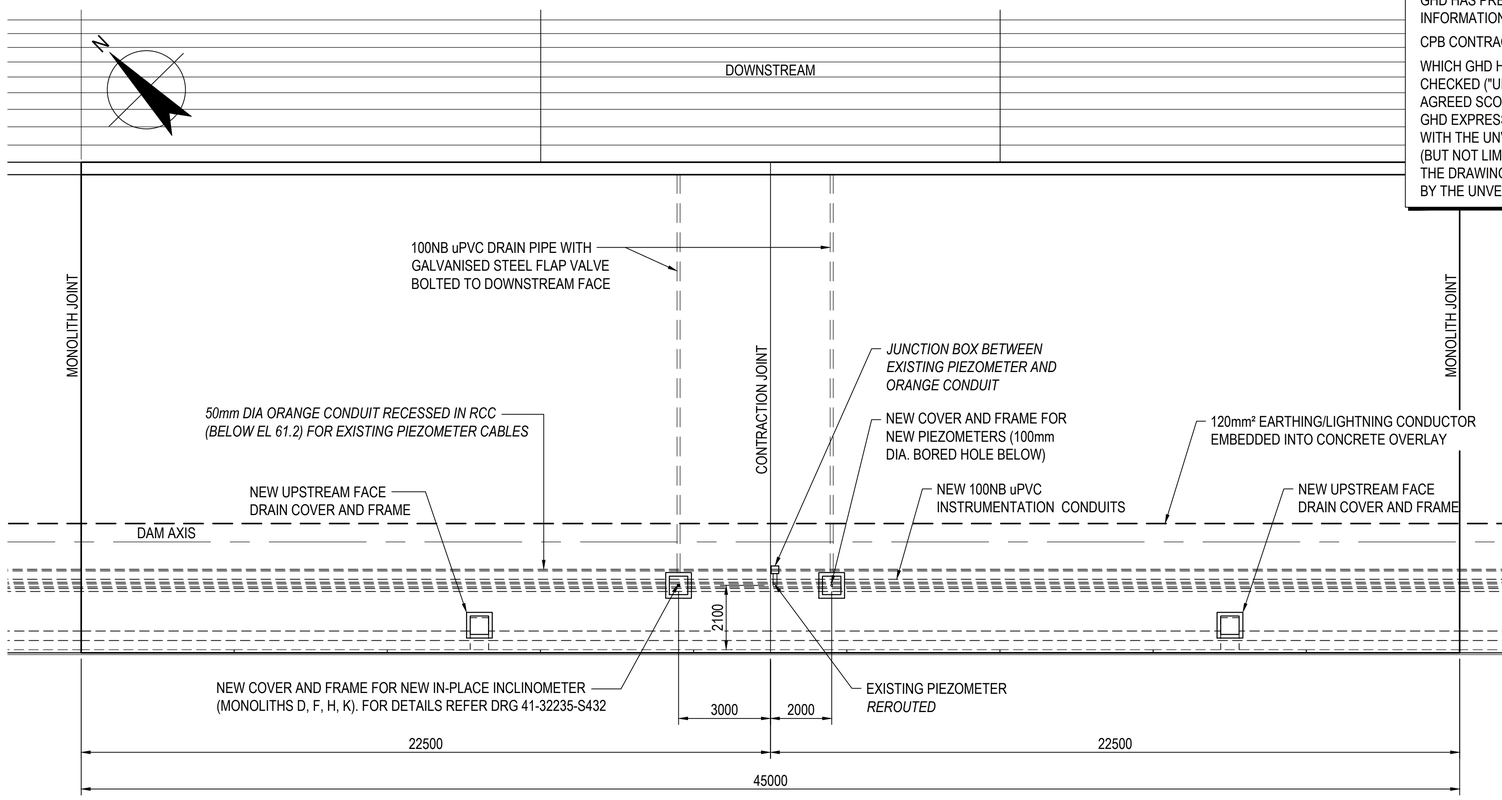


INSTRUMENTATION LONGITUDINAL SECTION
SCALE 1:1000

NOTE:
-DRAINS WERE INSPECTED FROM THE CREST THEREFORE BLOCKAGE ELEVATIONS RELATE TO THE TOP OF THE BLOCKAGE IDENTIFIED.
- FOR FURTHER DETAILS REFER TO SUNWATER DOCUMENT PDEW UPSTREAM DRAIN INSPECTION - POST-CONSTRUCTION

POST-CONSTRUCTION UPSTREAM DRAIN INSPECTION

SW DRAIN NUMBER	CHAINAGE	MONOLITH	DRAIN TYPE	ELEVATION OF BLOCKAGE (mAHD)	COMMENT
1	122.5	B	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
2	147.5	B	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
3	167.9	C	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
4	187.3	C	DETAIL 3	81.2	TOTALLY BLOCKED AT -1.8 m
5	213.4	D	DETAIL 2	61.8	DRAIN TOTALLY GROUTED UP & BLOCKED. PIT INSTALLED IF SUNWATER WANT TO ATTEMPT TO UNBLOCK DURING LATER WORKS
6	232.8	D	DETAIL 2	61.8	DRAIN ABANDONED - NO PIT PLACED - DRAIN TOTALLY GROUTED UP PREVIOUSLY AS NOTED ON 41-32235-S410
7	258.4	E	DETAIL 1	36.6	TOTAL BLOCKAGE, STANDING WATER AT 43.8 mAHD
8	277.7	E	DETAIL 1	39.1	PARTIAL BLOCKAGE
9	302.8	F	DETAIL 1	42.8	PARTIAL BLOCKAGE
10	322.6	F	DETAIL 1	45.3	PARTIAL BLOCKAGE
11	348.4	G	DETAIL 1	35.8	BLOCKAGE - RADIUS BEND
12	367.9	G	DETAIL 1	35.5	BLOCKAGE - RADIUS BEND, STANDING WATER AT 36.4 mAHD
13	393.3	H	DETAIL 1	35.3	BLOCKAGE - RADIUS BEND - HORIZONTAL
14	418	H	DETAIL 1	35.6	ELBOW AT -26.2 m - CAMERA WENT TO - 28.0m
15	438.2	J	DETAIL 1	35.4	ELBOW AT -26.1 m - CAMERA WENT TO 26.4 m
16	467.4	J	DETAIL 1	55.4	TOTALLY BLOCKED, STANDING WATER AT 57 mAHD
17	486.9	K	DETAIL 1	60	TOTALLY BLOCKED, STANDING WATER AT 61.1 mAHD
18	507.5	K	DETAIL 1	40.2	PARTIAL BLOCKAGE
19	533	L	DETAIL 3	78	TOTALLY BLOCKED - LIFTED LID TO VERIFY
20	562.9	M	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
21	582.6	M	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
22	602.7	N	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
23	627.3	N	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
24	647.9	P	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
25	672.5	P	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
26	693	Q	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
27	717.5	Q	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE
28	738	R	DETAIL 3	-	NOT INSPECTED AS OUTSIDE OF ESSENTIAL WORKS SCOPE



TYPICAL MONOLITH INSTRUMENTATION PLAN
SCALE 1:100

NOTE: PIEZOMETER AND INCLINOMETER LOCATIONS VARY AT MONOLITH D. FOR NEW INSTRUMENT LOCATIONS REFER DRGS 41-32235-S410 AND S432

0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE

AS BUILT DISCLAIMER

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CPB CONTRACTORS

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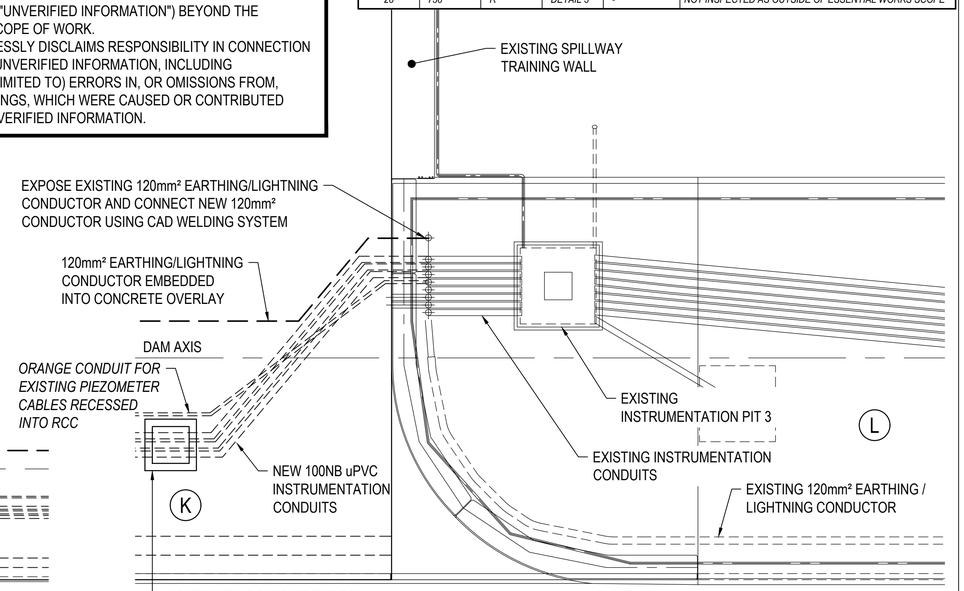

RIGHT ABUTMENT INSTRUMENTATION DETAIL
SCALE 1:50

LEGEND:

VWP DENOTES VIBRATING WIRE PIEZOMETER
IPI DENOTES IN-PLACE INCLINOMETER

NOTES:

1. FOR GENERAL NOTES REFER TO DRG 41-32235-G402 AND G403
2. FOR INSTRUMENTATION DETAILS REFER TO DRG 41-32235-S431 AND 41-32235-S432
3. LONGITUDINAL SECTIONS EXTRACTED FROM BURNETT DAM ALLIANCE DRAWING 226878 (BDA-D-C-100)

AS BUILT

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
2	ISSUED AS BUILT		AL	JW*	CB*	28.01.22
1	CREST DETAILS MODIFIED AND EARTHING DETAILS ADDED		AL	JW*	RE*	16.06.20
0	ISSUED FOR CONSTRUCTION		KK	JW*	RE*	27.03.20

0 1000 2000 3000 4000 5000mm
SCALE 1:100 AT ORIGINAL SIZE

0 500 1000 1500 2000 2500mm
SCALE 1:50 AT ORIGINAL SIZE

sunwater

SUNWATER DRAWING No. 252005

GHD
145 Ann St Brisbane QLD 4000 Australia
GPO Box 668 Brisbane QLD 4001
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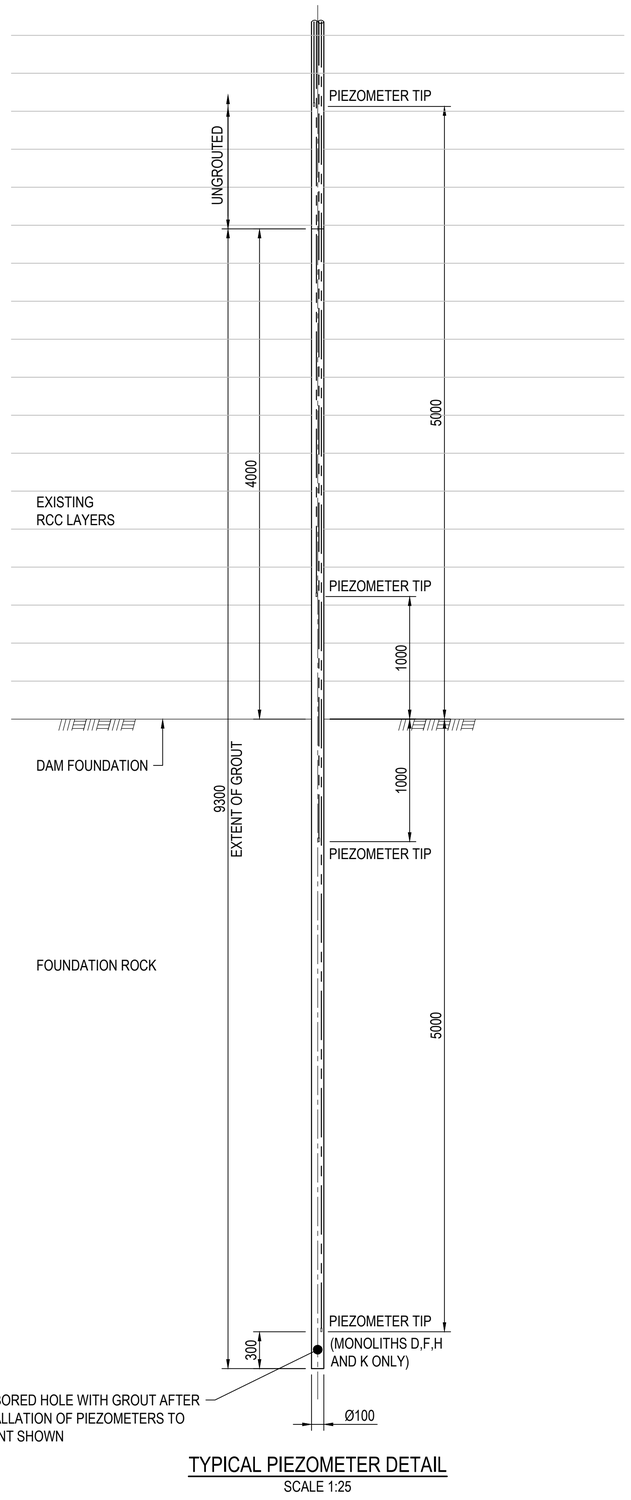
E bnemail@ghd.com W www.ghd.com

DO NOT SCALE

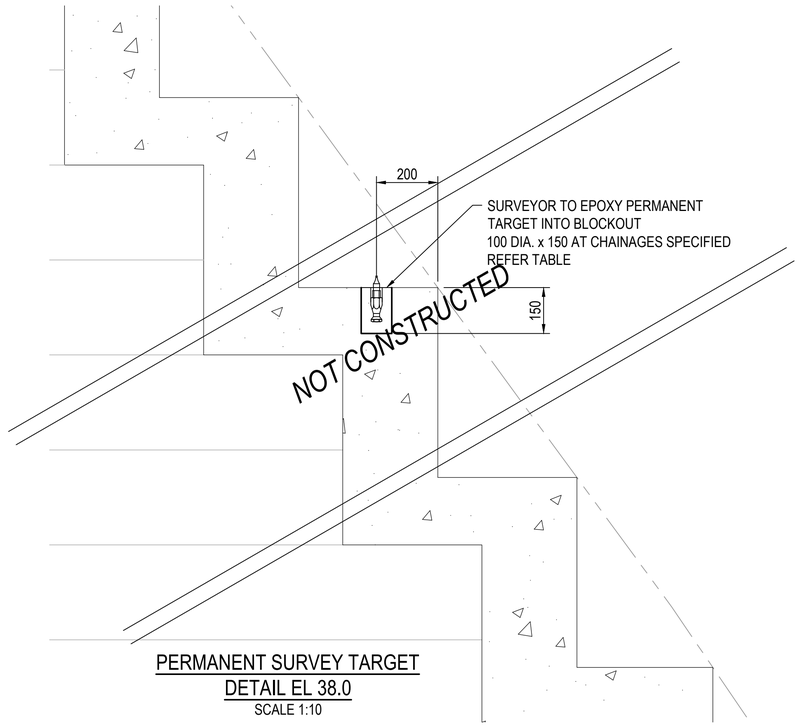
Drawn	A. LEE	Designer	A. FORBES
Drafting Check	W. HAWKSWELL*	Design Check	J. WILLEY*
Approved (Project Director)	R. EVANS*		
Date	27.03.20		
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client	SUNWATER
Project	PARADISE DAM SPILLWAY - ESSENTIAL WORKS (EL 61.8)
Title	INSTRUMENTATION AND DRAINAGE PLAN AND LONGITUDINAL SECTION
Original Size	A1
Drawing No:	41-32235-S430
Rev:	2

Plot Date: 28 January 2022 - 9:46 AM Plotted by: Amy Lee Cad File No: G:\41\32235\CADD\Drawings\41-32235-S430.dwg

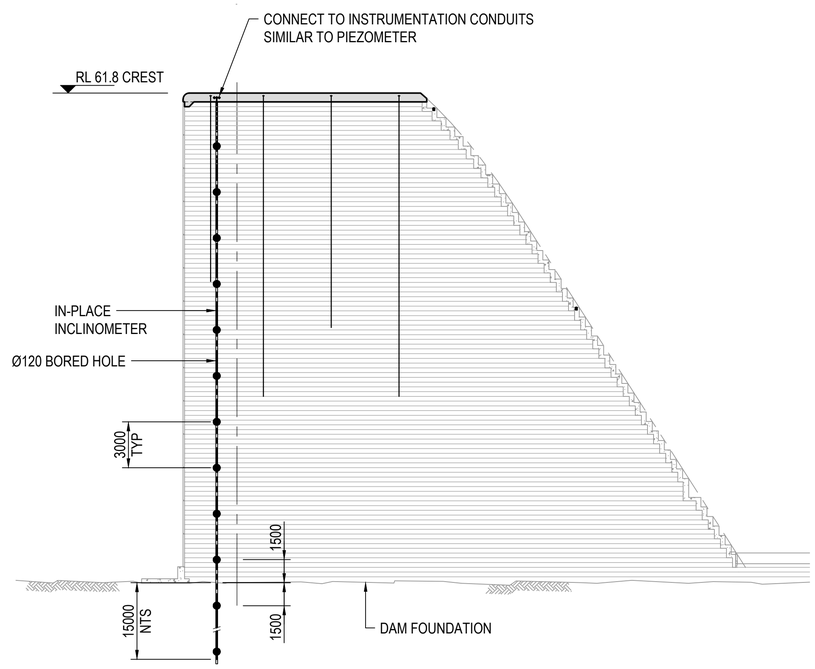


TYPICAL PIEZOMETER DETAIL
SCALE 1:25



PERMANENT SURVEY TARGET DETAIL EL 38.0
SCALE 1:10

PERMANENT SURVEY TARGET TABLE	
MONOLITH	CHAINAGE
D	221.5
E	266.5



INDICATIVE IN-PLACE INCLINOMETER SCHEMATIC
SCALE 1:200

INCLINOMETER TABLE	
MONOLITH	CHAINAGE
D	217.5
F	309.5
H	399.5
K	489.5

NOTE:
- ALL INCLINOMETERS SHALL BE GEOKON MODEL 6150F SERIES

PIEZOMETER TABLE											
MONOLITH	*OLD CHAINAGE*	*NEW CHAINAGE*	*EL DAM FOUNDATION*	*PX-101*	*PX-102*	*PX-103*	*PX-104*	*PX-105*	*PX-106*	*PX-106*	*PX-106*
D	*222.65*	*220.50*	*37.813*	*42.813 (+5)*	*38.813 (+1)*	*36.813 (-1)*	*32.813 (-5)*	-	-	-	-
D	-	*235.00*	*37.813*	-	-	-	-	*42.813 (+5)*	*38.813 (+1)*	*36.813 (-1)*	*32.813 (-5)*
E	*267.65*	*269.50*	*31.478*	*36.478 (+5)*	*32.478 (+1)*	*30.478 (-1)*	-	-	-	-	-
F	*312.65*	*314.50*	*31.784*	*36.784 (+5)*	*32.784 (+1)*	*30.784 (-1)*	*26.784 (-5)*	-	-	-	-
G	*357.65*	*359.50*	*30.892*	*35.892 (+5)*	*31.892 (+1)*	*29.892 (-1)*	-	-	-	-	-
H	*402.65*	*404.50*	*29.779*	*34.779 (+5)*	*30.779 (+1)*	*28.779 (-1)*	*24.779 (-5)*	-	-	-	-
H	-	*406.75*	*29.779*	*34.779 (+5)*	*30.779 (+1)*	*28.779 (-1)*	*24.779 (-5)*	-	-	-	-
J	*447.65*	*449.50*	*29.909*	*34.909 (+5)*	*30.909 (+1)*	*28.909 (-1)*	-	-	-	-	-
J	-	*451.75*	*29.909*	*34.909 (+5)*	*30.909 (+1)*	*28.909 (-1)*	-	-	-	-	-
K	*492.65*	*494.50*	*32.152*	*37.152 (+5)*	*33.152 (+1)*	*31.152 (-1)*	*27.152 (-5)*	-	-	-	-
N	-	*614.00*	*42.200*	*47.060 (+5)*	*43.200 (+1)*	*41.270 (-1)*	*37.400 (-5)*	-	-	-	-

NOTE:
- PIEZOMETER LEVELS IN BRACKETS ARE RELATIVE TO THE DAM FOUNDATION INTERFACE LEVEL EXRESSED IN METRES (m).
- FINAL PIEZOMETER TIP LEVELS TO BE CONFIRMED ON SITE BY THE SUPERINTENDENT.
- ALL PIEZOMETERS SHALL BE GEOKON 4500S VW PIEZOMETERS OAE.
- *NEW PIEZOMETERS WERE INSTALLED INTO MONOLITH N DURING THE GEOTECHNICAL INVESTIGATION WORKS UNDERTAKEN IN 2021. THE ARRANGEMENT OF THE PIEZOMETERS IN MONOLITH N WAS TYPICALLY THE SAME AS SHOWN ON THIS DRAWING. THE DETAILS OF THE BOREHOLE INTO WHICH THE PIEZOMETERS WERE INSTALLED ARE AS FOLLOWS:*
  - ** COLLAR COORDINATES: E391312.2, N7195708.6*
  - ** BOREHOLE INCLINATION: 76° TO HORIZONTAL*
  - ** AZIMUTH: 353°*

NOTES:
1. FOR GENERAL NOTES REFER TO DRG 41-32235-G402 AND G403

AS BUILT DISCLAIMER

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CPB CONTRACTORS

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AS BUILT

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
4	ISSUED AS BUILT		AL	JW*	CB*	28.01.22
3	CREST DOWEL ARRANGEMENT MODIFIED		AL	JW*	CB*	25.09.20
2	CREST DETAILS MODIFIED		AL	JW*	CB*	28.08.20
1	CREST DETAILS MODIFIED		AL	JW*	RE*	16.06.20
0	ISSUED FOR CONSTRUCTION		KK	JW*	RE*	27.03.20

0 100 200 300 400 500mm
SCALE 1:10 AT ORIGINAL SIZE

0 250 500 750 1000 1250mm
SCALE 1:25 AT ORIGINAL SIZE

sunwater

SUNWATER DRAWING No. 252007

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GPO Box 668 Brisbane QLD 4001
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E bnemail@ghd.com **W** www.ghd.com

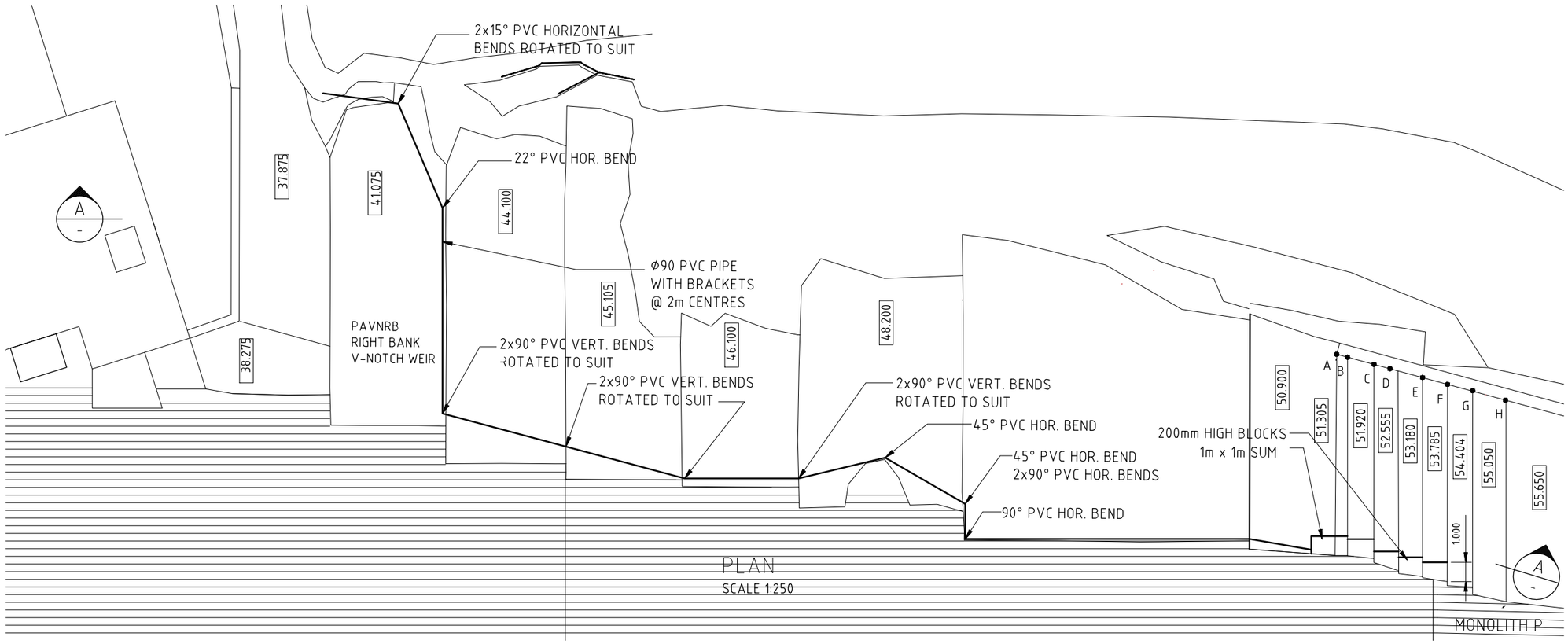
DO NOT SCALE

Drawn	A. LEE	Designer	A. FORBES
Drafting Check	W. HAWKSWELL*	Design Check	J. WILLEY*
Approved (Project Director)	R. EVANS*		
Date	27.03.20		
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client **SUNWATER**
Project **PARADISE DAM SPILLWAY - ESSENTIAL WORKS (EL 61.8)**
Title **INSTRUMENTATION AND DRAINAGE DETAILS - SHEET 2**

Original Size **A1**
Drawing No: 41-32235-S432 **Rev: 4**

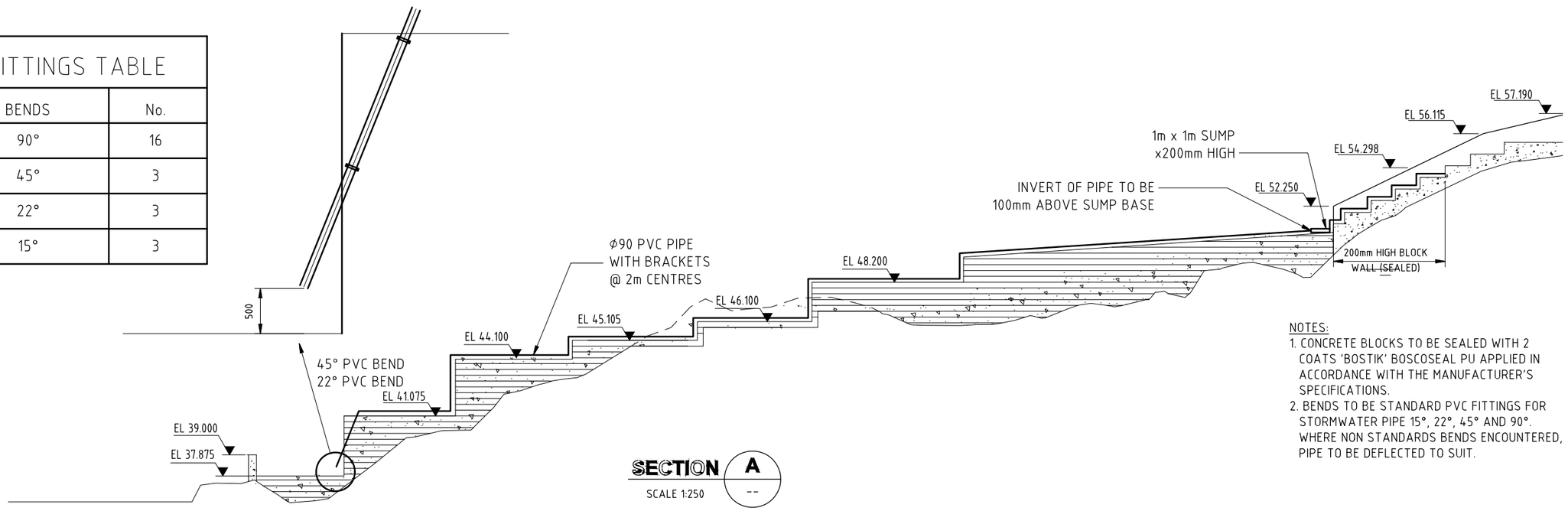
Plot Date: 26 January 2022 - 8:57 AM Plotted by: Amy Lee Cad File No: G:\41\32235\CADD\Drawings\41-32235-S432.dwg



PLAN

SCALE 1:250

FITTINGS TABLE	
BENDS	No.
90°	16
45°	3
22°	3
15°	3



SECTION A

SCALE 1:250

NOTES:
1. CONCRETE BLOCKS TO BE SEALED WITH 2 COATS 'BOSTIK' BOSCOSEAL PU APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
2. BENDS TO BE STANDARD PVC FITTINGS FOR STORMWATER PIPE 15°, 22°, 45° AND 90°. WHERE NON STANDARDS BENDS ENCOUNTERED, PIPE TO BE DEFLECTED TO SUIT.

CAD File: S:\BW Asset Delivery\SW-Bundaberg WSS\Paradise\Drawings\AutoCAD\EAP\232495.dwg
DATE PLOTTED: 6 January 2025 2:50 PM BY - FLYNN WEBBER

Drawing Produced By:
Sunwater Ltd
Tel: (07) 3120 0000

REVISION	DATE	REMARKS	CKD	PASSED

SCALES (A3 SIZE)

0 2.5 5 7.5 10 12.5 METRES
1:250

DRAWN	DESIGNED
SE	PR
CHECKED	CHECKED
APPROVED	
P.Richardson	
CHIEF DESIGN ENGINEER	

sunwater

PARADISE DAM
SECONDARY SPILLWAY
LEAKAGE MONITORING SYSTEM
MONOLITH JOINT N/P
PLAN AND SECTION

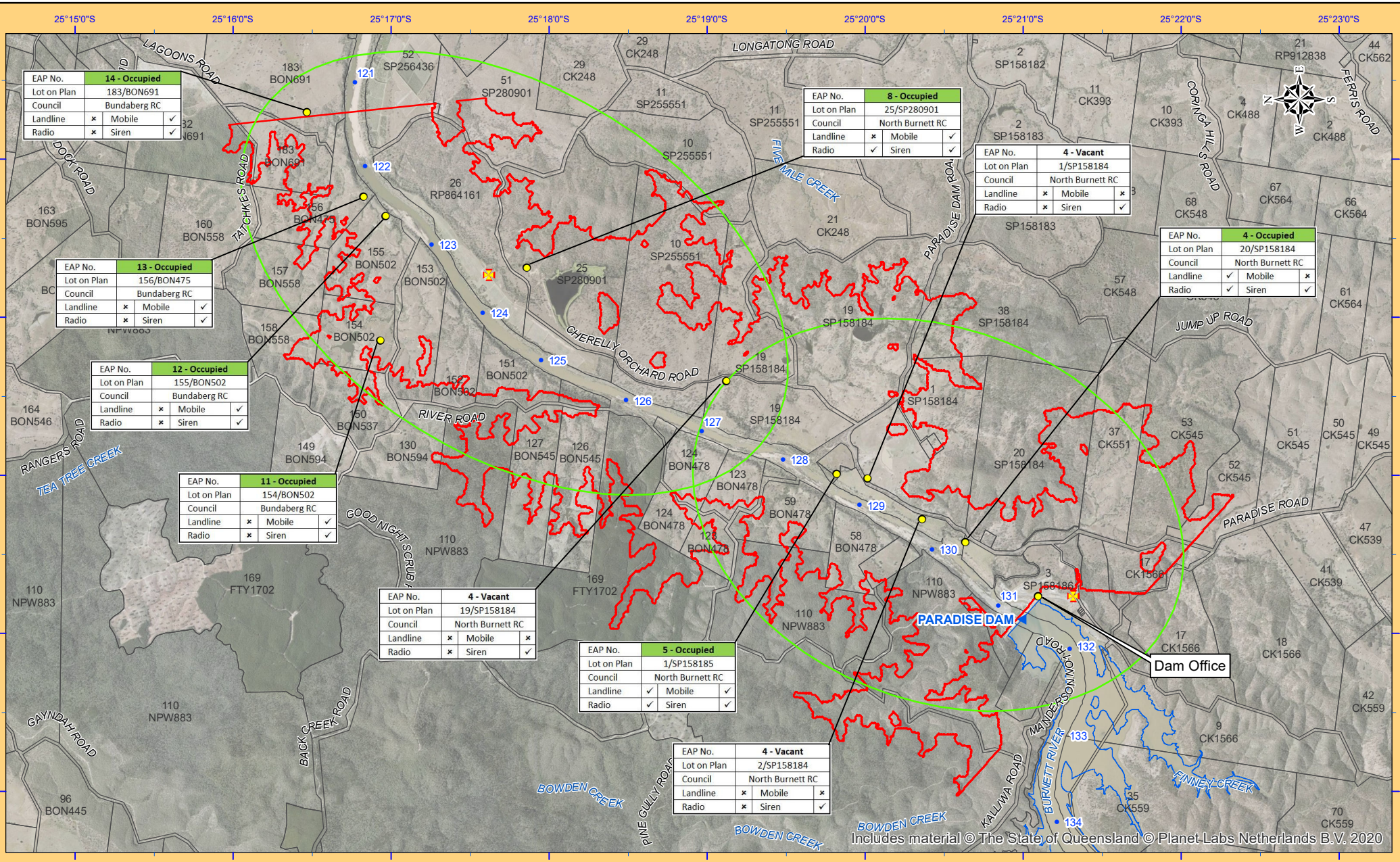
CONTRACT NUMBER

DRAWING NUMBER 232495

REV.

SHEET NOV. 2008

DATE



MAP INFORMATION

Coordinate System: Geocentric Datum of Australia (GDA94).

SCALE (A4 SIZE)

0 600 1,200 1,800 2,400 3,000 m 1:60,000

LEGEND

- AMTD (Markers)
- Population at Risk
- Alert Siren
- Dam Full Supply Level
- Limit of Downstream Notification Area
- Alert Siren (Approx. Audible Area)

PARADISE DAM DOWNSTREAM NOTIFICATION AREA

NOTES

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

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Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-WSRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\DS Notification Area\250719-E.mxd
Printed: Wednesday, 06/07/2022 01:37:34 PM

Appendix B3: INUNDATION MAPS

The following is a complete list of the Inundation maps for Paradise Dam. However, due to the space requirements of the large volume of individual maps, only the Keymap and three Overview Maps are presented in the EAP. The individual Inundation maps are available from Sunwater by request or downloading from the following link *if you have been provided access*: Paradise Dam Inundation Maps.pdf. Please send access requests to [redacted]

Drawings:

- Keymap
- Sunny Day Failure Overview
- EL 77.0 m Stand Up 3 Flood – Primary Spillway Failure
- Probable Maximum Flood – Primary Spillway Failure
- Sunny Day Failure
- 2013 Flood Comparison – Primary Spillway Failure
- EL 73.3 m Stand Up 2 Flood – Primary Spillway Failure
- EL 77.0 m Stand Up 3 Flood – Primary Spillway Failure
- EL 78.0 m Secondary Spillway – Primary Spillway Failure
- Dam Crest Flood (EL 83.0 m) – Primary Spillway Failure
- Probable Maximum Flood – Primary Spillway Failure

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

Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-W\xxx-01-07-01 EAP Flood Inundation Mapping\Drawings\ArcMap\Paradise\254799-B.mxd
Printed: Monday, 08/08/2022 02:14:23 PM

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

7280000 7260000 7240000 7220000 7200000 7180000

440000 420000 400000 380000

ELLIOTT HEADS
BARGARA
BURNETT HEADS
BUNDABERG
MOORE PARK
MIARA
AVONDALE
YANDARAN
BULLYARD
WALLAVILLE
GIN GIN
CHILDERS
APPLE TREE CREEK
CORDALBA
BOOYAL
DALLARNIL
BIGGENDEN
DEGILBO
PARADISE DAM
Ned Churchward Weir
Bucca Weir
FRED HAIGH DAM

SHEET 1 OF 13
SHEET 2 OF 13
SHEET 3 OF 13
SHEET 4 OF 13
SHEET 5 OF 13
SHEET 6 OF 13
SHEET 7 OF 13
SHEET 8 OF 13
SHEET 9 OF 13
SHEET 10 OF 13
SHEET 11 OF 13
SHEET 12 OF 13
SHEET 13 OF 13

Elliott Heads Road
Bundaberg - Port Road
Bundaberg Ring Road
Goodwood Road
Moore Park Road
Bundaberg - Miriam Vale Road
Bundaberg - Gin Gin Road
The Cedars Road
Booyal - Dallarnil Road
Isis Highway
Bruce Highway
Gin Gin - Mount Perry Road
Gooroolba - Biggenden Road

YELLOW WATERHOLES CREEK
ELLIOTT RIVER
COONARR CREEK
HORSESHOE CREEK
GREGORY RIVER
STOCKYARD CREEK
PEEP CREEK
ISIS RIVER
CHERWELL RIVER
PIG CREEK
WOOLMER CREEK
HARWOOD CREEK
POWELL CREEK
KOLBORE CREEK
DUCKINWILLA CREEK
BINNEY CREEK
DOONGUL CREEK
SARAHANA CREEK
PARKER CREEK
AGNES VALE CREEK
NOBBY CREEK
SMITH CREEK
OAKY CREEK
GILLENS CREEK
MAHOGANY CREEK
MC COY CREEK
WELCOME CREEK
GROOME CREEK
SPLITTERS CREEK
SWENSON CREEK
LOGGING CREEK
EDWARD CREEK
WOCO CREEK
GOLDEN FLEECE CREEK
BOUNDARY CREEK
SANDY CREEK
CORFIELD CREEK
FLAGSTONE CREEK
STONY CREEK
PINE CREEK
CHERRY CREEK
OAKY CREEK
BURNETT RIVER
EMU CREEK
NINE MILE CREEK
MUNGORE CREEK
MERARIE CREEK
LITTABELLA CREEK
YANDARAN CREEK
COCKATOODLE CREEK
KOLAN RIVER
BUCCA CREEK
BULLYARD CREEK
MULLET CREEK
DUCK CREEK
ARTHUR CREEK
SANDY CREEK
GRANITE CREEK
FIVE MILE CREEK
DEGILBO CREEK
CHOWEY CREEK
CHIN CHIN CREEK
TEA TREE CREEK
TENNINGERING CREEK
BOTTLE CREEK
SHEEP STATION CREEK
BRANDY CREEK
STONY CREEK
ORT CREEK
FOUR MILE CREEK
CABBAGE TREE CREEK
NORTH CURRAJONG CREEK
CROOKED CREEK
ST AGNES CREEK
EIGHT MILE CREEK
DEEP CREEK
STONY CREEK
DIDCOT CREEK
NATIVE DOG CREEK
MURPHY CREEK
GIN GIN CREEK
BRUSHY CREEK
PINNOCK CREEK
NEURUM CREEK
THREE MILE CREEK
FIG TREE CREEK
PERRY RIVER
BRIGGS CREEK
KALLIWA CREEK
YARRABIL CREEK
DEEP CREEK
BIN BIN CREEK
THIRD CAMP CREEK
TARAMAN CREEK

LEGEND
- Settlements
- State Roads (DTMR)
- Approximate Maximum Flood Extent

SunWater Storages
- Dam
- Offstream Storage
- Weir
- Paradise Dam Full Supply Level 61.80m

REVISION				
08/08/22	B	SUNNY DAY FAILURE REF. DRAWING	IDH	RJ
10/01/22	A	ISSUED FOR USE	IDH	MG H
DATE		REMARKS	CKD	PSD

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA94) Zone 56.

REFERENCE DRAWINGS
254800 - 2013 Flood
254801 - 73.3m Stand Up 2 Flood
254802 - 77.0m Stand Up 3 Flood
254803 - 78.0m Secondary Spillway
254804 - Dam Crest Flood (83.0m)
254805 - Probale Maximum Flood
256315 - Sunny Day Failure

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

DRAWN	DESIGNED
IDH	AB
CHECKED	CHECKED
	RJ

APPROVED
M.G. HUGHES
10/1/2022
RPEQ: 18351

sunwater

PARADISE DAM
POST ESSENTIAL WORKS
DAM BREAK ANALYSIS 2021
KEYMAP

CONTRACT NUMBER
DRAWING NUMBER 254799
REV. B
SHEET 1 OF 1
DATE DECEMBER 2021

Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-Wxxx-01-07-01 EAP Flood Inundation Mapping\Drawings\ArcMap\Paradise\256409-A.mxd
Printed: Wednesday, 19/10/2022 07:55:30 AM

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

7260000 7240000 7220000 7200000

440000 420000 400000

BURNETT HEADS
FAIRYMEAD
BUNDABERG
CLAYTON
ELLIOT
KINKUNA
GOODWOOD
DOOLBI
CHILDERS
MOORE PARK
BINGERA
CORDALBA
APPLE TREE CREEK
MIARA
AVONDALE
YANDARAN
BULLYARD
WATALGAN
MAROONDAN
WALLAVILLE
BOOYAL
DALLARNIL
MONDURAN
GIN GIN
TIRROAN
ROSEDALE
PARADISE DAM

Bundaberg - Port Road
Bundaberg - Bargara Road
Elliott Heads Road
Bundaberg Ring Road
Goodwood Road
Gregory River
Bruce Highway
Moore Park Road
Isis Highway
Kolan River
Bundaberg - Gin Gin Road
The Cedars Road
Golden Fleece Creek
Sandy Creek
Burnett River
Ned Churchward Weir
Bucca Weir
Bundaberg - Miriam Vale Road
Booyal - Dallarnil Road
Gin Gin Creek
Gin Gin - Mount Perry Road
Goodwood - Biggenden Road

LEGEND
- Town
- State Road (DTMR)

Flood Modelling
- Model Limits
- Flood - Sunny Day Failure

Sunwater Storages
- Dam
- Weir
- Paradise Dam Essential Works FSL 61.80m

REVISION					
19/10/22	A	ISSUED FOR USE	IDH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA94) Zone 56.
Levels Datum: Australian Height Datum (AHD)

REFERENCE DRAWINGS
256315 - Sunny Day Primary Spillway Failure Inundation Plan

SCALES (A3 SIZE)
0 2,400 4,800 7,200 9,600 12,000 m
1:250,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	MGH

APPROVED
M.G. HUGHES
19/10/2022
RPEQ: 18351

sunwater

PARADISE DAM
POST ESSENTIAL WORKS
DAM BREAK ANALYSIS 2021
SUNNY DAY
PRIMARY SPILLWAY FAILURE
OVERVIEW INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
256409	A

SHEET 1 OF 1

DATE OCTOBER 2022

Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-Wxxx-01-07-01 EAP Flood Inundation Mapping\Drawings\ArcMap\Paradise\256410-A.mxd
Printed: Wednesday, 19/10/2022 08:01:18 AM

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

7260000 7240000 7220000 7200000

440000 420000 400000

BURNETT HEADS
FAIRYMEAD
BUNDABERG
CLAYTON
ELLIOT
KINKUNA
GOODWOOD
DOOLBI
CHILDERS
MOORE PARK
BINGERA
CORDALBA
APPLE TREE CREEK
MIARA
AVONDALE
YANDARAN
BULLYARD
BOOYAL
DALLARNIL
WATALGAN
MAROONDAN
WALLAVILLE
GIN GIN
MONDURAN
TIRROAN
ROSEDALE
PARADISE DAM

Bundaberg - Port Road
Bundaberg - Bagara Road
Elliott Heads Road
Bundaberg Ring Road
Goodwood Road
Gregory River
Bruce Highway
Moore Park Road
Isis Highway
Bundaberg - Gin Gin Road
The Cedars Road
Kolan River
Burnett River
Ned Churchward Weir
Bucca Weir
Bundaberg - Miriam Vale Road
Booyal - Dallarnil Road
Gin Gin Creek
Gin Gin - Mount Perry Road
Goovigen - Biggenden Road
Golden Fleece Creek
Sandy Creek

LEGEND
- Town
- State Road (DTMR)

Flood Modelling
- Model Limits
- 1 in 6200 Flood - No Dam Failure
- 1 in 6200 Year Flood - Dam Failure

Sunwater Storages
- Dam
- Weir
- Paradise Dam Essential Works FSL 61.80m

REVISION					
DATE		REMARKS	CKD	PSD	
19/10/22	A	ISSUED FOR USE	IDH	MGH	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA94) Zone 56.
Levels Datum: Australian Height Datum (AHD)

REFERENCE DRAWINGS
254802 - EL 77.0m Stand Up 3 Flood (1 in 6200) Primary Spillway Failure Inundation Plan

SCALES (A3 SIZE)
0 2,400 4,800 7,200 9,600 12,000 m
1:250,000

DRAWN: IDH	DESIGNED:
CHECKED:	CHECKED: MGH
APPROVED: M.G. HUGHES 19/10/2022	RPEQ: 18351

sunwater

PARADISE DAM
POST ESSENTIAL WORKS
DAM BREAK ANALYSIS 2021
EL 77.0m STAND UP 3 FLOOD (1 in 6200)
PRIMARY SPILLWAY FAILURE
OVERVIEW INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER: 256410
REV.: A
SHEET 1 OF 1
DATE OCTOBER 2022

Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-Wxxx-01\07-01 EAP Flood Inundation Mapping\Drawings\ArcMap\Paradise\256411-A.mxd
Printed: Wednesday, 19/10/2022 08:03:05 AM

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

7260000 7240000 7220000 7200000

440000 420000 400000

BURNETT HEADS
FAIRYMEAD
BUNDABERG
CLAYTON
MOORE PARK
BINGERA
MIARA
AVONDALE
YANDARAN
WATALGAN
ROSEDALE
BULLYARD
MONDURAN
MAROONDAN
TIRROAN
GIN GIN
WALLAVILLE
KINKUNA
ELLIOT
GOODWOOD
DOOLBI
CHILDERS
APPLE TREE CREEK
CORDALBA
BOOYAL
DALLARNIL
PARADISE DAM

Bundaberg - Port Road
Bundaberg - Bargara Road
Elliott Heads Road
Bundaberg Ring Road
Goodwood Road
Moore Park Road
Isis Highway
Bundaberg - Gin Gin Road
The Cedars Road
Kolan River
Bundaberg - Miriam Vale Road
Burnett River
Gin Gin Creek
Gin Gin - Mount Perry Road
Gregory River
Bruce Highway
Booyal - Dallarnil Road
Goodwood - Biggenden Road
Golden Fleece Creek
Sandy Creek

Bucca Weir
Ned Churchward Weir

LEGEND
- Town
- State Road (DTMR)

Flood Modelling
- Model Limits
- Probale Maximum Flood - No Dam Failure
- Probable Maximum Flood - Dam Failure

Sunwater Storages
- Dam
- Weir
- Paradise Dam Essential Works FSL 61.80m

REVISION					
19/10/22	A	ISSUED FOR USE	IDH	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
Projected Coordinate System: Mapping Grid of Australia (MGA94) Zone 56.
Levels Datum: Australian Height Datum (AHD)

REFERENCE DRAWINGS
254805 - Probable Maximum Flood, Primary Spillway Failure Inundation Plan

SCALES (A3 SIZE)
0 2,400 4,800 7,200 9,600 12,000 m
1:250,000

DRAWN	DESIGNED
IDH	
CHECKED	CHECKED
	MGH
APPROVED	
M.G. HUGHES 19/10/2022	
RPEQ: 18351	

sunwater

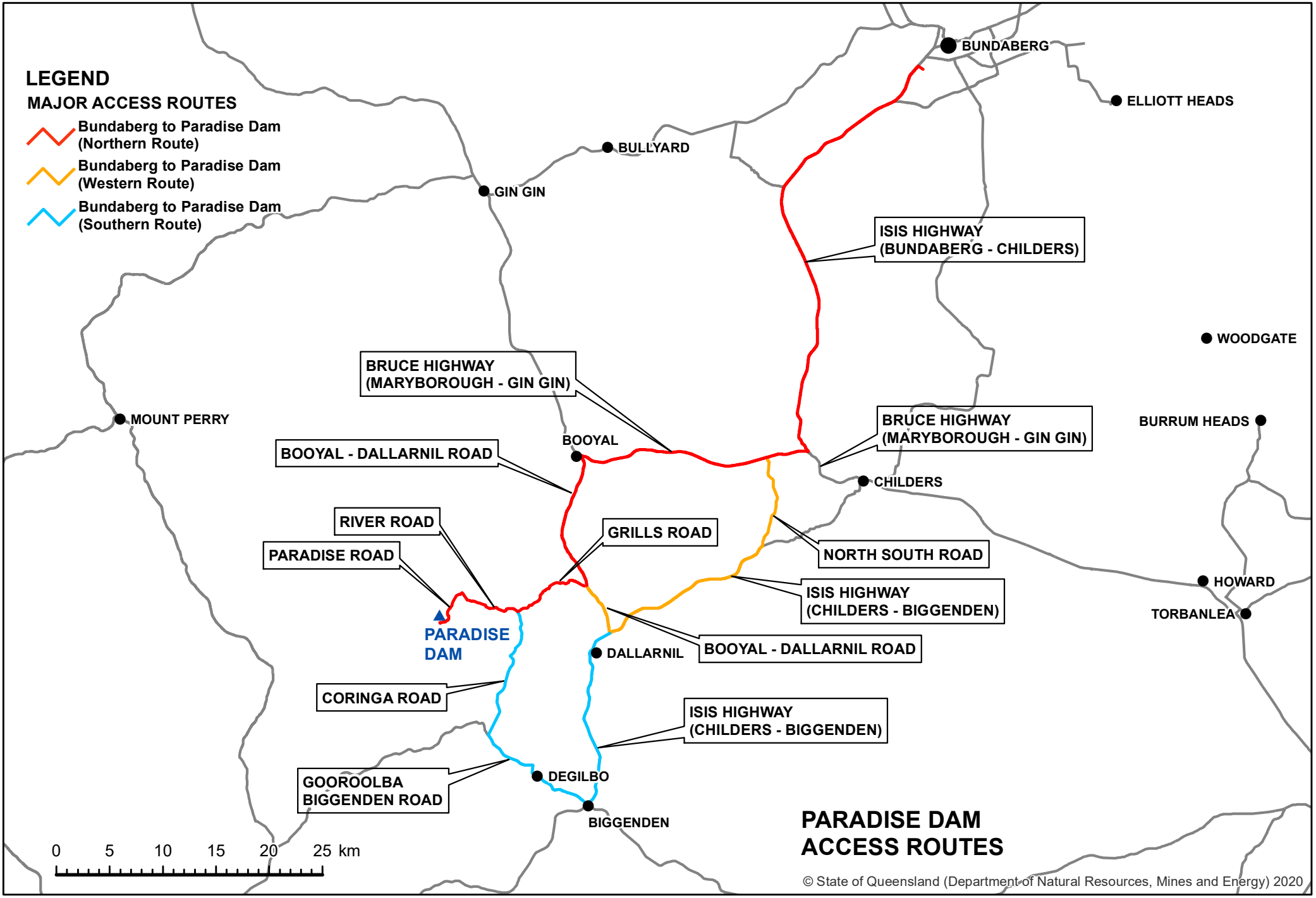
PARADISE DAM
POST ESSENTIAL WORKS
DAM BREAK ANALYSIS 2021
PROBABLE MAXIMUM FLOOD
PRIMARY SPILLWAY FAILURE
OVERVIEW INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
256411	A

SHEET 1 OF 1

DATE OCTOBER 2022



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Printed: Tuesday, 14/06/2022 11:39:20 AM

Emergency access route information

Route 1 (North):

From Bundaberg head West along Takalvan Street (Isis Highway) past Bundaberg Regional Airport, where it becomes Childers Road, and travel 40.8 km to Apple Tree Creek. At Apple Tree Creek turn right onto the Bruce Highway and travel 21 km to Booyal. At Booyal turn left onto Booyal-Dallarnil Road (signs for Biggenden) for 13 km and turn right onto Grills Road at the Paradise Dam/Coringa signs. After crossing the cement causeway over Degilbo Creek* (7.3 km) continue straight onto River Road for 5.5 km to Paradise Dam sign then left onto Paradise Road (was Campbells Road) ending at Paradise Dam (3.5 km).

Route 2 (West):

From Bundaberg head West along Takalvan Street (Isis Highway) past Bundaberg Regional Airport, where it becomes Childers Road, and travel 40.8 km to Apple Tree Creek. At Apple Tree Creek turn right onto the Bruce Highway and travel 3.3 km then turn left into North-South Road for 8.8 km then turn right onto the Isis Highway. Head towards Biggenden for 16 km and turn right into Booyal-Dallarnil Road (signs for Gin Gin) for 5 km and turn left into Grills Road at the Paradise Dam/Coringa signs. After crossing the cement causeway over Degilbo Creek* (7.3 km) continue straight onto River Road for 5.5 km to Paradise Dam sign then left onto Paradise Road (was Campbells Road) ending at Paradise Dam (3.5 km).

Route 3 (South):

From Bundaberg head West along Takalvan Street (Isis Highway) past Bundaberg Regional Airport, where it becomes Childers Road, and travel 40.8 km to Apple Tree Creek. At Apple Tree Creek turn right onto the Bruce Highway and travel 3.3 km then turn left into North-South Road for 8.8 km then turn right onto the Isis Highway. Travel 34 km to Biggenden through Dallarnil (15 km). Turn right onto Gooroolba-Biggenden Road (signs for Gooroolba/Degilbo). Travel the Gooroolba-Biggenden Road through Degilbo (5.4 km) and continue for another 5.8 km, turning right onto Coringa Road (Paradise Dam sign). Travel 12.7 km to the end of Coringa Road then turn left onto River Road for 5.5 km to Paradise Dam sign then left onto Paradise Road (was Campbells Road) ending at Paradise Dam (3.5 km).

*NOTE: At 2.1 m the causeway becomes impassable, please use Route 3.

Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-WSRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\Mapping\Paradise\EAP_AccessRoadsLocalityPlan.mxd
Printed: Tuesday, 14/06/2022 11:41:31 AM

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

Document: S:\BW Asset Delivery\GIS_Data\Enterprise_GIS\Water_Supply_Schemes\Upper Burnett\Drawings\ArcMap\252161-A.mxd
Printed: Wednesday, 04/12/2019 03:08:48 PM

150°30'0"E 151°0'0"E 151°30'0"E 152°0'0"E
24°30'0"S 25°0'0"S 25°30'0"S 26°0'0"S 26°30'0"S 27°0'0"S

BILOELA
MIRIAM VALE
BOOLAROO TOPS TM
MONAL RD AL
UPPER MONAL TM
UPPER MONAL AL
CANIA DAM HW TM
CANIA DAM HW AL
CANIA DAM
CANIA DAM TW TM
MT FORT WILLIAM AL
DAKIEL TM
DAKIEL AL
MUNGUNGO WEIR AL
CANIAVIEW AL
YOULAMBIE WEIR
MONTO WEIR
MONTO
MONTO AL
MONTO TM
BAZLEY WEIR
STEWARTS BRIDGE AL
COLODAN
AVIS WEIR
YARROL AL
YARROL TM
MULGILDIE WEIR
ABERCORN TM
ABERCORN AL
WURUMA HW AL
WURUMA DAM
WURUMA DAM HW TM
WURUMA DAM TW TM
LANDS END AL
LANDS END TM
GLENCOE RD AL
JOHN GOLEBY WEIR HW TM
JOHN GOLEBY WEIR
CERATODUS TM
CERATODUS AL
HOLLYWELL AL
KIRAR WEIR
EIDSVOLD
EIDSVOLD TM
EIDSVOLD AL
REDBANK AL
MARRIAGES AL
MARRIAGES TM
MUNDUBBERA
MUNDUBBERA HW TM
MUNDUBBERA AL
JONES WEIR
MUNDUBBERA TW TM
FLAGSTONE BRIDGE AL
DYKEHEAD TM
DYKEHEAD AL
HAWKWOOD RANGE AL
DERRA TM
DERRA AL
ARTHURS LOOKOUT AL
COORANGA TM
COORANGA (BOYNE R) AL
BROVINIA TM
BROVINIA AL
BAWNDUGGIE AL
BOONDOOMA HW AL
BOONDOOMA DAM HW TM
BOONDOOMA DAM
BOONDOOMA RPTR AL
PROSTON TM
CARTERS TM
BRIGOODA AL
DALBY
MT GAYNDAH AL
WHARTON WEIR TM
SAUERS TM
CLAUDE WHARTON WEIR
GAYNDAH
GAYNDAH AP
GAYNDAH FLUME TM
GAYNDAH FLUME AL
BAN BAN TM
BAN BAN AL
ETTIEWYN TM
STONELANDS TM
SILVERLEAF WEIR TW TM
SILVERLEAF WEIR HW TM
SILVERLEAF WEIR
MURGON
JOE SIPPEL WEIR TW TM
JOE SIPPEL WEIR
JOE SIPPEL WEIR HW TM
FICKS CROSSING TM
BJELKE-PETERSEN DAM TW TM
BJELKE-PETERSEN DAM
BJELKE-PETERSEN DAM HW TM
LITZOWS TM
WEST BARAMBAH TM
GLENMORE TM
WEENS BRIDGE TM
KINGAROY
NANANGO
BROOKLANDS TM
DANDABAH TM
ESK
DINGLE DELL
DINGLE DELL TM
MT PERRY AL
MT RAWDON AL
REID CK AL
REID CREEK TM
FIG TREE AL
FIG TREE TM
PARADISE DAM AL
PARADISE DAM
PARADISE DAM HW TM
CORINGA AL
CORINGA TM
SUNDAY CK RD AL
MINGO CROSSING AL
DALGANGAL RD AL
MT GOONANEMAN AL
DIDCOTT AL
BIGGENDEN TM
BIGGENDEN
BYRNESTOWN TM
MT LAWLESS AL
MT LAWLESS TM
MT WALSH AL
MOORE PARK TM
MOORE PARK AL
BURNETT HEADS TIDE TM
BUNDABERG PORT TIDE TM
FAIRYMEAD SUGAR MILL
BARGARA AL
BUNDABERG AL
BUNDABERG
BEN ANDERSON BARRAGE
BUNDABERG SOUTH AL
SPLITTERS CK AL
BRANYAN (WOONGARRA P/S) AL
WOONGARRA P/S TM
GIN GIN
BUNGADOO TM
ST KILDA AL
WALLA WEIR AL
WALLA WEIR TW TM
NED CHURCHWARD WEIR
WALLA WEIR HW TM
ST AGNES CK AL
WALLA AL
WALLA TM
EAST BOOYAL AL
CHILDERS

BURNETT HIGHWAY
GLADSTONE - MONTO ROAD
BRUCE HIGHWAY (GIN GIN - BENARABY)
RAWBELLE RIVER
NOGO RIVER
BURNETT RIVER
AUBURN RIVER
BOYNE R.
BOYNE RIVER
STUART RIVER
EIDSVOLD - THEODORE ROAD
MOUNT PERRY ROAD
DURONG ROAD
MUNDUBBERA
BURNETT HIGHWAY
BROOMENA - WOOLOOGA ROAD
WIDE BAY HIGHWAY
KILCOY - MURGON ROAD
CHINCHILLA - WONDAI ROAD
KINGAROY - BURRANDOWAN ROAD
KINGAROY - JANDOWAE ROAD
D'AGUILAR HIGHWAY
BUNYA MOUNTAINS ROAD
BURN ROAD

LEGEND
- Rainfall Station
- Rainfall & River Station
- River Station
- Sunwater Dam
- Sunwater Weir
- Sunwater Barrage
- Towns
- Streams
- Creeks
- Rivers
- State Roads (DTMR)
- Paradise Dam Catchment
- Burnett River Basin

N W E S

LOCALITY PLAN
CAIRNS
TOWNSVILLE
MOUNT ISA
MACKAY
ROCKHAMPTON
BUNDABERG
BRISBANE

sunwater

PARADISE DAM
BURNETT RIVER CATCHMENT
CATCHMENT MAP

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

SCALES (A3 SIZE)
0 10 20 30 40 50 km 1:900,000

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

DRAWING No. 252161 A

APPENDIX C Equipment and technical information

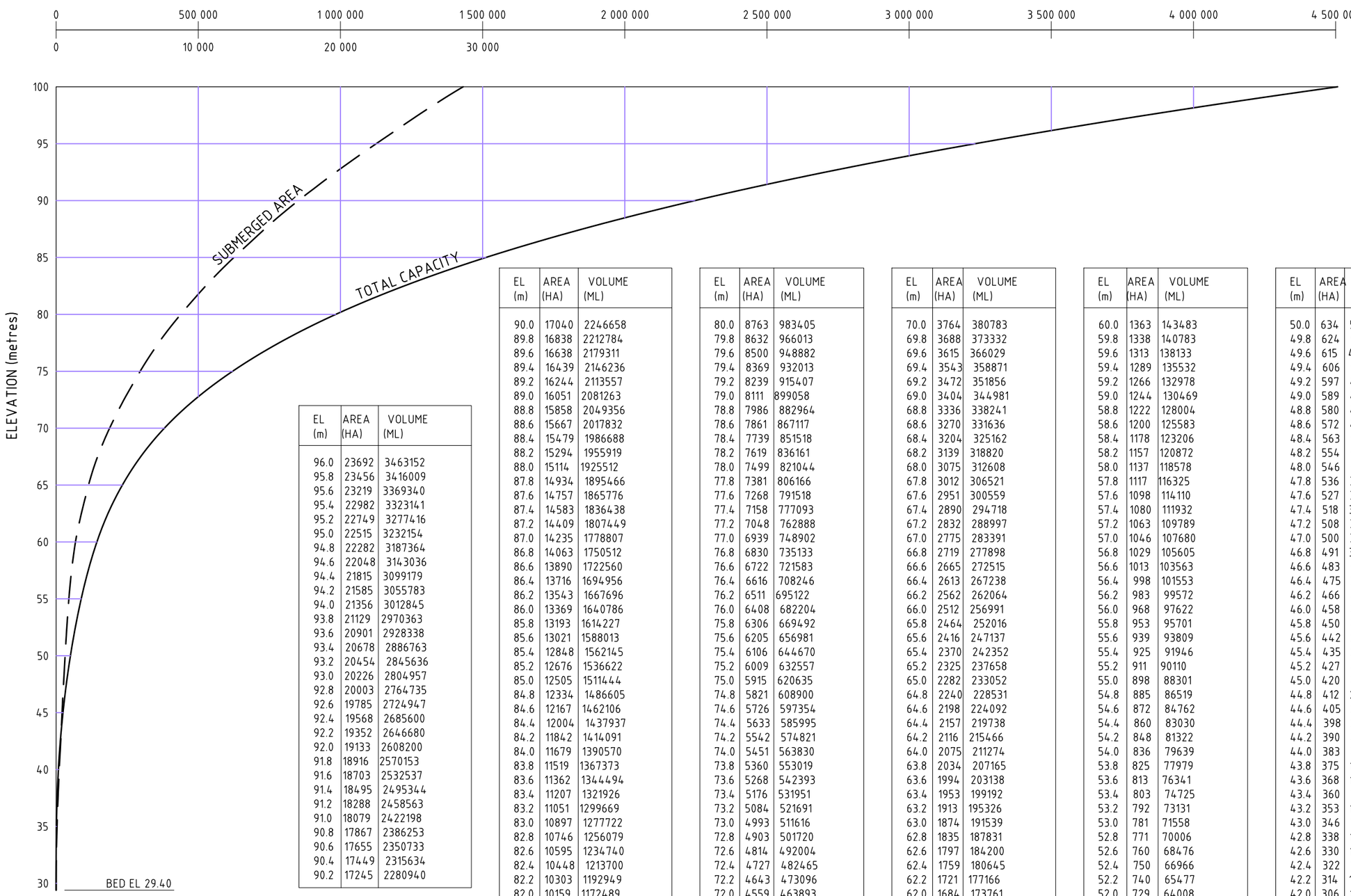
Appendix C1: List of equipment available during an emergency

Appendix C2: Paradise Dam Storage Curve

Appendix C3: Paradise Dam Discharge Curve

Appendix C4: Paradise Dam Discharge Table

Appendix C1 has been redacted



EL (m)	AREA (HA)	VOLUME (ML)
96.0	23692	3463152
95.8	23456	3416009
95.6	23219	3369340
95.4	22982	3323141
95.2	22749	3277416
95.0	22515	3232154
94.8	22282	3187364
94.6	22048	3143036
94.4	21815	3099179
94.2	21585	3055783
94.0	21356	3012845
93.8	21129	2970363
93.6	20901	2928338
93.4	20678	2886763
93.2	20454	2845636
93.0	20226	2804957
92.8	20003	2764735
92.6	19785	2724947
92.4	19568	2685600
92.2	19352	2646680
92.0	19133	2608200
91.8	18916	2570153
91.6	18703	2532537
91.4	18495	2495344
91.2	18288	2458563
91.0	18079	2422198
90.8	17867	2386253
90.6	17655	2350733
90.4	17449	2315634
90.2	17245	2280940

EL (m)	AREA (HA)	VOLUME (ML)
90.0	17040	2246658
89.8	16838	2212784
89.6	16638	2179311
89.4	16439	2146236
89.2	16244	2113557
89.0	16051	2081263
88.8	15858	2049356
88.6	15667	2017832
88.4	15479	1986688
88.2	15294	1955919
88.0	15114	1925512
87.8	14934	1895466
87.6	14757	1865776
87.4	14583	1836438
87.2	14409	1807449
87.0	14235	1778807
86.8	14063	1750512
86.6	13890	1722560
86.4	13716	1694956
86.2	13543	1667696
86.0	13369	1640786
85.8	13193	1614227
85.6	13021	1588013
85.4	12848	1562145
85.2	12676	1536622
85.0	12505	1511444
84.8	12334	1486605
84.6	12167	1462106
84.4	12004	1437937
84.2	11842	1414091
84.0	11679	1390570
83.8	11519	1367373
83.6	11362	1344494
83.4	11207	1321926
83.2	11051	1299669
83.0	10897	1277722
82.8	10746	1256079
82.6	10595	1234740
82.4	10448	1213700
82.2	10303	1192949
82.0	10159	1172489
81.8	10015	1152317
81.6	9874	1132429
81.4	9734	1112822
81.2	9592	1093498
81.0	9452	1074455
80.8	9313	1055691
80.6	9173	1037206
80.4	9036	1018999
80.2	8898	1001065

EL (m)	AREA (HA)	VOLUME (ML)
80.0	8763	983405
79.8	8632	966013
79.6	8500	948882
79.4	8369	932013
79.2	8239	915407
79.0	8111	899058
78.8	7986	882964
78.6	7861	867117
78.4	7739	851518
78.2	7619	836161
78.0	7499	821044
77.8	7381	806166
77.6	7268	791518
77.4	7158	777093
77.2	7048	762888
77.0	6939	748902
76.8	6830	735133
76.6	6722	721583
76.4	6616	708246
76.2	6511	695122
76.0	6408	682204
75.8	6306	669492
75.6	6205	656981
75.4	6106	644670
75.2	6009	632557
75.0	5915	620635
74.8	5821	608900
74.6	5726	597354
74.4	5633	585995
74.2	5542	574821
74.0	5451	563830
73.8	5360	553019
73.6	5268	542393
73.4	5176	531951
73.2	5084	521691
73.0	4993	511616
72.8	4903	501720
72.6	4814	492004
72.4	4727	482465
72.2	4643	473096
72.0	4559	463893
71.8	4475	454860
71.6	4394	445992
71.4	4313	437286
71.2	4234	428741
71.0	4154	420353
70.8	4075	412125
70.6	3995	404054
70.4	3916	396144
70.2	3840	388388

EL (m)	AREA (HA)	VOLUME (ML)
70.0	3764	380783
69.8	3688	373332
69.6	3615	366029
69.4	3543	358871
69.2	3472	351856
69.0	3404	344981
68.8	3336	338241
68.6	3270	331636
68.4	3204	325162
68.2	3139	318820
68.0	3075	312608
67.8	3012	306521
67.6	2951	300559
67.4	2890	294718
67.2	2832	288997
67.0	2775	283391
66.8	2719	277898
66.6	2665	272515
66.4	2613	267238
66.2	2562	262064
66.0	2512	256991
65.8	2464	252016
65.6	2416	247137
65.4	2370	242352
65.2	2325	237658
65.0	2282	233052
64.8	2240	228531
64.6	2198	224092
64.4	2157	219738
64.2	2116	215466
64.0	2075	211274
63.8	2034	207165
63.6	1994	203138
63.4	1953	199192
63.2	1913	195326
63.0	1874	191539
62.8	1835	187831
62.6	1797	184200
62.4	1759	180645
62.2	1721	177166
62.0	1684	173761
61.8	1648	170429
61.6	1611	167171
61.4	1577	163984
61.2	1542	160866
61.0	1510	157815
60.8	1478	154828
60.6	1447	151904
60.4	1417	149041
60.2	1389	146235

EL (m)	AREA (HA)	VOLUME (ML)
60.0	1363	143483
59.8	1338	140783
59.6	1313	138133
59.4	1289	135532
59.2	1266	132978
59.0	1244	130469
58.8	1222	128004
58.6	1200	125583
58.4	1178	123206
58.2	1157	120872
58.0	1137	118578
57.8	1117	116325
57.6	1098	114110
57.4	1080	111932
57.2	1063	109789
57.0	1046	107680
56.8	1029	105605
56.6	1013	103563
56.4	998	101553
56.2	983	99572
56.0	968	97622
55.8	953	95701
55.6	939	93809
55.4	925	91946
55.2	911	90110
55.0	898	88301
54.8	885	86519
54.6	872	84762
54.4	860	83030
54.2	848	81322
54.0	836	79639
53.8	825	77979
53.6	813	76341
53.4	803	74725
53.2	792	73131
53.0	781	71558
52.8	771	70006
52.6	760	68476
52.4	750	66966
52.2	740	65477
52.0	729	64008
51.8	719	62560
51.6	709	61131
51.4	700	59723
51.2	690	58333
51.0	681	56963
50.8	671	55612
50.6	662	54279
50.4	653	52965
50.2	643	51669

EL (m)	AREA (HA)	VOLUME (ML)
50.0	634	50393
49.8	624	49135
49.6	615	47896
49.4	606	46675
49.2	597	45472
49.0	589	44286
48.8	580	43118
48.6	572	41966
48.4	563	40831
48.2	554	39714
48.0	546	38614
47.8	536	37533
47.6	527	36470
47.4	518	35426
47.2	508	34400
47.0	500	33392
46.8	491	32401
46.6	483	31426
46.4	475	30469
46.2	466	29528
46.0	458	28603
45.8	450	27695
45.6	442	26802
45.4	435	25926
45.2	427	25064
45.0	420	24217
44.8	412	23386
44.6	405	22569
44.4	398	21767
44.2	390	20980
44.0	383	20207
43.8	375	19449
43.6	368	18706
43.4	360	17978
43.2	353	17265
43.0	346	16567
42.8	338	15884
42.6	330	15216
42.4	322	14564
42.2	314	13929
42.0	306	13309
41.8	297	12706
41.6	288	12121
41.4	278	11556
41.2	268	11010
41.0	260	10482
40.8	252	9971
40.6	244	9476
40.4	236	8996
40.2	228	8532

EL (m)	AREA (HA)	VOLUME (ML)
40.0	221	8083
39.8	213	7650
39.6	206	7231
39.4	199	6826
39.2	193	6434
39.0	185	6056
38.8	179	5692
38.6	172	5342
38.4	165	5006
38.2	158	4683
38.0	152	4372
37.8	146	4075
37.6	139	3791
37.4	133	3519
37.2	126	3260
37.0	120	3014
36.8	113	2782
36.6	107	2561
36.4	101	2353
36.2	95	2156
36.0	90	1971
35.8	85	1797
35.6	81	1632
35.4	76	1475
35.2	72	1327
35.0	67	1188
34.8	63	1058
34.6	59	936
34.4	54	823
34.2	50	719
34.0	46	622
33.8	42	533
33.6	38	452
33.4	34	380
33.2	30	317
33.0	26	261
32.8	22	214
32.6	19	172
32.4	16	138
32.2	13	109
32.0	11	86
31.8	9	67
31.6	7	51
31.4	6	37
31.2	5	26
31.0	4	18
30.8	3	11
30.6	2	7
30.4	1	3
30.2	1	2
30.0	0	1
29.8	0	0
29.6	0	0
29.4	0	0

Level Datum: Australian Height Datum - AHD from GPS control survey.
Volumes computed from DTM produced in 1998 from Feb 1998 aerial photography.
Latitude: 25 21 00 Longitude: 151 55 05
Based on drawing No A3-210373

CAD File: \\BNEFLS02\bw&is\BW Asset Delivery\SW-Bundaberg WSS\Paradise\Drawings\AutoCAD\EAP\219168.dwg
DATE PLOTTED: 6 January 2025 3:13 PM BY: FLYNN WEBBER

Drawing Produced By:
Sunwater Ltd
Tel: (07) 3120 0000

REVISION					
DATE		REMARKS		CKD	PASSED

SCALES (A3 SIZE)

DRAWN	DESIGNED
AJN	
CHECKED	CHECKED
APPROVED	
D HOUSTON	

BURNETT WATER Pty Ltd
sunwater

BURNETT RIVER - BASIN 136
BURNETT RIVER DAM - AMTD 131.4km
TOTAL VOLUME
STORAGE CURVE

CONTRACT NUMBER

DRAWING NUMBER 219168

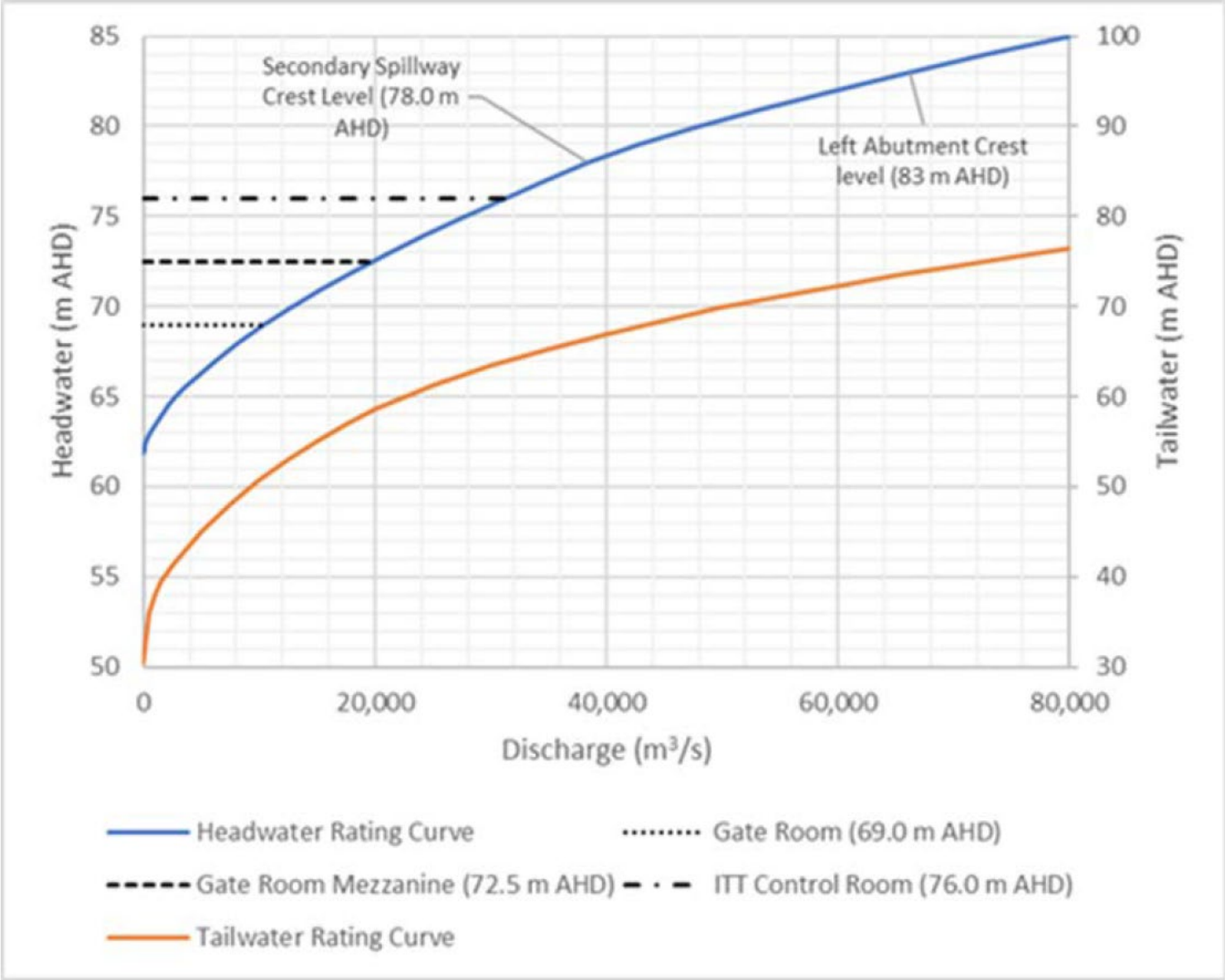
REV.

SHEET JAN 2003

DATE

Appendix C3: PARADISE DAM DISCHARGE CURVE

Figure C2: Paradise Dam discharge curve



Appendix C4: PARADISE DAM DISCHARGE TABLE

Figure C3: Paradise Dam discharge table

SunWater HYRATAB V195 11:27_01/06/2022

Site 136024A — Burnett R at Paradise Dam HW (Wall)
Rating Table 4.00 — Interpolation = Log CTF = 61.8000
Converting 130 — Reservoir Water Level in Metres
Into 141 — Stream Discharge in Megalitres/day

G.H.	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
61.0									0.0 D	1296 D
62.0	2592 D	5437 D	9197 D	13479 D	17998 D	22982 D	28297 D	33997 D	40062 D	46475 D
63.0	53222 D	60280 D	67645 D	75309 D	83263 D	91498 D	100012 D	108794 D	117838 D	127136 D
64.0	136685 D	146507 D	156572 D	166875 D	177412 D	188179 D	199224 D	210495 D	221990 D	233704 D
65.0	245635 D	257827 D	270233 D	282850 D	295675 D	308707 D	322005 D	335507 D	349212 D	363118 D
66.0	377222 D	391614 D	406205 D	420993 D	435976 D	451154 D	466524 D	482084 D	497833 D	513769 D
67.0	529891 D	546280 D	562855 D	579614 D	596558 D	613683 D	630989 D	648476 D	666140 D	683982 D
68.0	702000 D	720322 D	738822 D	757499 D	776353 D	795381 D	814584 D	833960 D	853508 D	873227 D
69.0	893117 D	913334 D	933725 D	954288 D	975022 D	995927 D	1017002 D	1038245 D	1059657 D	1081237 D
70.0	1102982 D	1125063 D	1147314 D	1169733 D	1192320 D	1215075 D	1237997 D	1261085 D	1284338 D	1307756 D
71.0	1331338 D	1354887 D	1378594 D	1402458 D	1426479 D	1450656 D	1474989 D	1499476 D	1524118 D	1548914 D
72.0	1573862 D	1598982 D	1624254 D	1649678 D	1675253 D	1700980 D	1726856 D	1752882 D	1779057 D	1805381 D
73.0	1831853 D	1858631 D	1885560 D	1912639 D	1939867 D	1967244 D	1994769 D	2022442 D	2050263 D	2078231 D
74.0	2106346 D	2134764 D	2163331 D	2192046 D	2220909 D	2249920 D	2279077 D	2308381 D	2337831 D	2367427 D
75.0	2397168 D	2426245 D	2455452 D	2484790 D	2514258 D	2543856 D	2573584 D	2603440 D	2633425 D	2663538 D
76.0	2693779 D	2723933 D	2754210 D	2784611 D	2815134 D	2845781 D	2876550 D	2907442 D	2938455 D	2969589 D
77.0	3000845 D	3031670 D	3062608 D	3093658 D	3124821 D	3156095 D	3187480 D	3218977 D	3250585 D	3282303 D
78.0	3314131 D	3351603 D	3389265 D	3427118 D	3465161 D	3503394 D	3541817 D	3580429 D	3619231 D	3658222 D
79.0	3697402 D	3740882 D	3784619 D	3828612 D	3872862 D	3917368 D	3962130 D	4007149 D	4052424 D	4097956 D
80.0	4143744 D	4191706 D	4239957 D	4288498 D	4337328 D	4386447 D	4435857 D	4485557 D	4535546 D	4585826 D
81.0	4636397 D	4689188 D	4742302 D	4795740 D	4849503 D	4903590 D	4958002 D	5012738 D	5067801 D	5123189 D
82.0	5178902 D	5231998 D	5285373 D	5339028 D	5392962 D	5447176 D	5501670 D	5556444 D	5611497 D	5666831 D
83.0	5722445 D	5779178 D	5836204 D	5893523 D	5951134 D	6009039 D	6067238 D	6125729 D	6184515 D	6243594 D
84.0	6302966 D	6364292 D	6425937 D	6487900 D	6550181 D	6612782 D	6675701 D	6738940 D	6802499 D	6866378 D
85.0	6930576 D	6995826 D	7061408 D	7127320 D	7193564 D	7260140 D	7327047 D	7394287 D	7461859 D	7529764 D
86.0	7598002 D	7666573 D	7735477 D	7804715 D	7874287 D	7944194 D	8014434 D	8085009 D	8155919 D	8227165 D
87.0	8298745 D	8370661 D	8442913 D	8515501 D	8588426 D	8661686 D	8733137 D	8804898 D	8876968 D	8949348 D
88.0	9022038 D	9095039 D	9168349 D	9241970 D	9315901 D	9390144 D	9464696 D	9539560 D	9614735 D	9690221 D
89.0	9766019 D	9842128 D	9918548 D	9995280 D	10072325 D	10149681 D	10227349 D	10305329 D	10383622 D	10462228 D
90.0	10541146 D	10615010 D	10689128 D	10763500 D	10838127 D	10913008 D	10988143 D	11063533 D	11139176 D	11215074 D
91.0	11291225 D	11367631 D	11444291 D	11521205 D	11598373 D	11675795 D	11753471 D	11831400 D	11909584 D	11988022 D
92.0	12066713 D	12145658 D	12224858 D	12304311 D	12384017 D	12463978 D				

Quality Summary
All rated data has been coded as reliable
except where the following tags are used...
Derived data

APPENDIX D Interaction with Local Government and District Groups

Appendix D has been redacted

Annexe — Paradise Dam SMS Message

	Advice Stay informed 	**Watch and Act** Prepare to leave 	**Emergency *** Leave immediately To be issued in consultation with council 
SMS	ADVICE from Sunwater. Paradise Dam is spilling excess water into Burnett River. People downstream of Paradise Dam should STAY INFORMED and MONITOR CONDITIONS. Water flows from Paradise 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. More information here: bit.ly/RecandSafety	WATCH AND ACT from Sunwater. Excess water spilling from Paradise Dam into Burnett River has increased significantly. Water flows from Paradise Dam may contribute to dangerous/widespread flooding downstream. Expect increased river flows in 6-12 hours / later today/ overnight/ tomorrow. People downstream of Paradise Dam must PREPARE TO LEAVE in case the flood gets worse. Tell others. Call Triple Zero (000) if your life is in danger. Call the SES on 132500 for flood help. More information here: bit.ly/RecandSafety	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Paradise Dam must LEAVE IMMEDIATELY. Paradise 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 Bundaberg Regional Council disaster.bundaberg.qld.gov.au/ and North Burnett Regional Council emergency.northburnett.qld.gov.au/

* This message should be used for dam failure. Flood emergency messaging is led by Bundaberg LDMG, Sunwater to share. If requested to issue our own flood emergency communication, FODM to instruct on using appropriate messaging.