EMERGENCY ACTION PLAN — FRED HAIGH DAM (ID 0272)

ISSUE: 9.1 **EXPIRY DATE:** 1 May 2029

Sunwater Approval Date: 24 March 2026

Prepared by Sunwater Limited

Controlled Copy No.

Gated: No	Staffed: Yes

Type: Zone earth-fill embankment with central clay core

Project: Fred Haigh EAP **File no.:** 08-000367/001

Address: use Lat/Long details

Location: Lat. -24.872970° Long. 151.850700°
24°52’22.69”S 151°51’02.52”E

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

[Intentionally blank]

Emergency activation quick reference – Dam Hazards

The Emergency Action Plan (EAP) for Fred Haigh 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 Dam Safety Technical Decision Maker (DSTDM) or Flood Operations Decision Maker (FODM) is responsible for the decision to activate the EAP. The Incident Coordinator (IC) will coordinate the EAP under the direction of the DSTDM or FODM. Should the IC be uncontactable, the Local Event Coordinator (LEC) or Dam Duty Officer (DDO) is responsible for the coordination of the EAP.

Table 1: Emergency activation quick reference - Dam Hazards

Dam Hazards and section numbers	Activation levels for dam hazards			
	Alert	Lean Forward	Stand Up	Stand Down
Flood operations See section 5	• Storage EL 75.46 m and rising • (0.1 m below FSL)	• Storage above FSL EL 75.56 m	• Storage above EL 77.06 m • (Moderate flood classification level)	• Storage EL 75.86 m and falling with no forecast increase in EL for 48 hours
Piping: embankment, foundation, or abutments See section 6	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments with cloudy water	• Piping condition has been established	• Risk assessment has determined that failure risk has reduced
Earthquake See section 7	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • Intensity less than 5 MMI	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • Intensity greater than or equal to 5 MMI, OR • Intensity less than 5 MMI and change detected during surveillance inspection	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • A possible failure path has been identified	• Risk assessment has determined that failure risk has reduced
Terrorist threat/activity or high energy impact See section 8	• Not applicable	• Not applicable	• Possible terrorist activity noticed at dam or threat received • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) • Failure in progress or likely due to impact or explosion, and sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced

CONTINUED NEXT PAGE

Emergency activation quick reference – Other Emergency Situations

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

Note: The Dam Safety Technical Decision Maker (DSTDM) or Flood Operations Decision Maker (FODM) is responsible for the decision to activate the EAP. The Incident Coordinator (IC) will coordinate the EAP under the direction of the DSTDM or FODM. Should the IC be uncontactable, the Local Event Coordinator (LEC) or Dam Duty Officer (DDO) is responsible for the coordination of the EAP.

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/ORR
	Activation triggers for other emergency situations		
Comms Failure **See section 9**	• Unable to communicate to or from dam site	• Unable to communicate to or from local area	• Unable to communicate to or from Sunwater Brisbane

Space

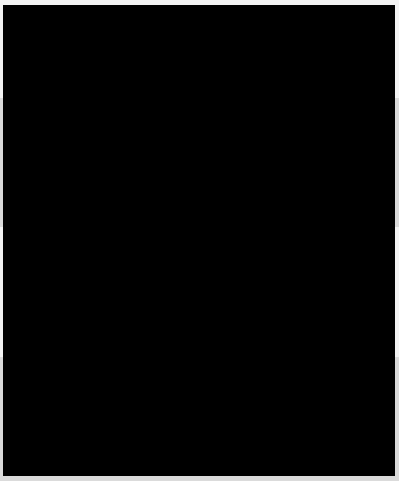
Table of contents

List of Tables

List of Figures

Document control

Authorisation of document

Position/role	Signature	Date
EAP Program Manager Prepared for submission		23/03/2026
Principal Engineer – Dam Safety Compliance — Approved for submission		24/03/2026
Head of Dam Safety — Approved for submission		
EGM – Engineering and Asset Management (or delegate) — Dam Owner Authorising Officer		24/03/2026

Document revision history

Version	Review Start Date	Prepared by	Reason for change	Ref. no.
2	May 2008		Significant changes of Fred Haigh Dam Emergency Action Plan to reflect Sunwater Management structure and other minor changes.	739102
3	October 2011		Significant changes of Fred Haigh Dam Emergency Action Plan to reflect current Sunwater Management structure and other changes.	1060331
4	October 2015		New Emergency Action Plan developed at expiry of 3E approval. Issued for consultation with Relevant Disaster Management Groups.	1688946
5	October 2016	[redacted]	Contact details updated and Emergency alert polygon updated.	2036690
6	August 2017	[redacted]	Revised and reviewed Emergency Action Plan developed at expiry of approval. Also includes updates that reflect the Water Legislation (Dam Safety) Amendment Act 2017, implementation of changes to Sunwater management structure, new event management roles and addition of new Emergency Activation section (Other Emergency Situations).	2148429
7	September 2018	[redacted]	Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	2367179
7.1	September 2019	[redacted]	Yearly update of contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Added Downstream Notification map. Minor error corrections and other non-substantive changes.	2467062
7.2	September 2020	[redacted]	Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Minor error corrections and other non-substantive changes.	2571776
8.0	August 2021	[redacted]	Revised and reviewed at expiry of approval. Error corrections and other non-substantive changes to improve readability and useability. Incorporated global non-substantive EAP changes resulting from feedback from previous internal and external reviews. Amended to comply with the new Sunwater branding. Amended contacts and associated sections, e.g., Organisation chart & Controlled Copy Holders list. Updated access and catchment maps. Updated messaging to new standard for consistency. Updated Roles and Responsibilities.	2590343
8.1	October 2021	[redacted]	Replaced outdated Discharge Curves with new version. Minor error corrections and updates including most recent Schedules of Matters.	2661675
8.2	September 2022	[redacted]	Amended contacts and associated sections. Minor error corrections and other non-substantive changes. The Chemical Hazard section has been removed as it is not a Dam Safety Hazard and is dealt with in other more relevant documents.	2725899
8.3	September 2023	[redacted]	Added Section 2.5 Fatigue Management Plan. Non-substantive updates as part of Annual Safety Statement. Minor error corrections and readability improvements.	2812536
8.4	September 2024	[redacted]	Wet Season Preparedness – Contact Updates	2865418
9.0	June 2025	[redacted]	Full review pending expiry Unpublished	2898731
9.1	March 2026	[redacted]	Updated to incorporate DSR requested amendments from SOM for Issue 9.0	9085501

Controlled document distribution list

Copy no.	Position	Location
1	Senior Storage Operator	Sunwater, Fred Haigh Dam
2	General Manager, Burnett & Lower Mary	Sunwater, Bundaberg
3	Operations Centre	Sunwater, Brisbane
4	Local Disaster Coordinator — Local Disaster Management Group (LDMG)	Bundaberg Regional Council
NOTE: Communication information for each 'Controlled Copy Holder' is attached in Appendix A.		

Electronic document distribution list

Printed electronic copies are considered uncontrolled copies.

Communication information for each Electronic Copy holder is contained 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	https://www.legislation.qld.gov.au/view/whole/pdf/inforce/current/act-2008-034
B	Emergency action plan for referable dam guideline	https://www.resources.qld.gov.au/__data/assets/pdf_file/0018/84015/eap-guideline.pdf
C	Queensland's Disaster Management Arrangements	Interim-Queensland-State-Disaster-Management-Plan-2024-25.pdf
D	Queensland Government arrangements for coordinating public information in a crisis	L1159-DPC2739-Crisis-Communication-Document.pdf (disaster.qld.gov.au)
E	Queensland Emergency Alert Manual – M.1.174	M.1.174 Queensland Emergency Alert Manual (disaster.qld.gov.au)
F	Sunwater website — Emergency Action Plans, Flood Maps and Dam Emergency Sirens	Emergency Management - Sunwater
G	Sunwater website — Emergency Notification Service	Sunwater Emergency Notification Service - Sunwater
H	Professional Engineers Act 2002 (RPEQ)	Professional Engineers Act 2002
I	Sunwater Fred Haigh Dam Failure Impact Assessment June 2017	Sunwater internal document
J	Sunwater Fred Haigh Dam Comprehensive Risk Assessment (May 2022)	Sunwater internal document
K	Sunwater Operations Fred Haigh Dam — Hazard Management Toolkit (HMT)	Sunwater internal document
L	Sunwater Strategic Event Procedure	Strategic Event Procedure
M	Sunwater Fred Haigh Dam Safety Condition Schedule	Sunwater internal document
N	Queensland Disaster Management Act 2003	Disaster Management Act 2003 (legislation.qld.gov.au)
O	Queensland Disaster Management Guidelines	https://www.disaster.qld.gov.au/__data/assets/pdf_file/0032/359465/Interim-QPPRR-Disaster-Management-Guideline-2024-25.pdf
P	Guidelines on Safety Assessments for Referable Dams	https://www.rdmw.qld.gov.au/__data/assets/pdf_file/0011/158918 6/guidelines-safety-assessments-referable-dams.pdf
Q	Queensland Dam Safety Management Guidelines	Queensland Dam Safety Management Guidelines
R	Sunwater Fred Haigh Dam Operation and Maintenance Manual	Sunwater internal document
S	Guidelines on Consequence Categories for Dams	ANCOLD ISBN: 978-0-9808192-5-0
T	Guideline for Failure Impact Assessment of Water Dams	Guideline for failure impact assessment of water dams
U	Sunwater Emergency Alert Protocol	Sunwater internal document
V	Water Act 2000	https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2000-034
W	Sunwater Fatigue Management Procedure	Sunwater internal document
X	Sunwater Design Hydrology Report	Sunwater internal document
Y	Sunwater Operations Centre Procedure	Sunwater internal document

1.2. Abbreviations and acronyms

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AMTD	Adopted Mean Thread Distance
ANCOLD	Australian National Committee on Large Dams
AWS	Australian Warning System
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
EA	Emergency Alert
EER	Emergency Event Report
EGMO	Executive General Manager Operations
EL	Elevation Level
ELT	Executive Leadership Team
EMC	Emergency Management Coordinator
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
KML	Keyhole Markup Language (file type)
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
MMI	Modified Mercalli Intensity
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
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
SCADA	Supervisory Control and Data Acquisition
SCTN	Security and Counter Terrorism Network
SDCC	State Disaster Coordination Centre
SDF	Sunny Day Failure
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
U/S	Upstream

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 (AWS)	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
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 (DMP)	Of a *district group* or local government, means the group's District Disaster Management Plan (DDMP) or local government's Local Disaster Management Plan (LDMP) under ref N.
District group (DDMG)	For an EAP, means a district group established under ref N, section 22 whose disaster district under that Act could, under the plan, be affected by a *dam hazard*.
Emergency Alert (EA)	Emergency Alert 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 ref N, 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 (LDMG)	For an EAP, means a local group established under ref N, section 29 whose local government area could, under the plan, be affected by a *dam hazard*.
Notice response	A dam owner's written response to a notice following an assessment of an EAP by a local government or *district group*.
Referable dam	A dam, or a proposed dam after its construction, will be a referable dam if: • a failure impact assessment of the dam, or the proposed dam, is carried out under the Act, AND • the assessment states the dam has, or the proposed dam after its construction will have, a category one or category two failure impact rating, AND • the Chief Executive has, under section 349 of the Act, accepted the assessment. Also, a dam is a referable dam if: • under section 342B of the Act, the owner of a dam is given a referable dam notice and, before the effective day for the notice, does not give the Chief Executive a failure impact assessment for the dam, AND • the Chief Executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam.
Relevant entity	Means each of the following under the EAP for the dam: • the persons who may be affected, or whose property may be affected, if a *dam hazard event* or *emergency event* were to happen for the dam, e.g., the owners of parcels of farmland adjacent to the dam or residents of a township • each *local group* and *district group* for the EAP

Term	Definition
	• 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 Arrangements	
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. Concurrent flooding is only accounted for during the two extreme events which are the DCF and PMF events.
Dam crest level	The lowest elevation of the non-overflow crest section of the dam excluding handrails, parapets or wave walls that have not been designed to store water.
Dam crest flood (DCF)	The flood event that causes reservoir levels to reach the lowest point of non-overflow section of a dam.
Dam failure	Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.
Downstream releases	Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam.
Earthquake	A sudden release of energy in the earth's crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity, resulting in the generation of seismic waves that can be destructive. The potential consequences of an earthquake include: • settlement, sliding, or overturning of monoliths in the dam wall

Term	Definition
	• 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 (PMF)	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 (PMP)	The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin.
Probable maximum precipitation flood (PMPF)	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 (SDF)	A failure that occurs at the FSL and there is no concurrent rain associated flooding.
Terrorist activity	A deliberate attempt to damage, fail or contaminate a dam.

2. Introduction

2.1. Context

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

This EAP has been prepared in accordance with Chapter 4 of the Act and the Emergency action plan for referable dam guideline (DLGW 2023) (ref B) and the Queensland State Disaster Management Plan 2023 (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 district group for the plan.

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

The local government whose area may be affected by a dam hazard for Fred Haigh Dam has been assessed as **Bundaberg Regional Council (BRC)**. Sunwater has provided the **Bundaberg Local Disaster Management Group (LDMG)** with a copy of the draft EAP for assessment.

Section 352HC of the Act states that a district group may review the EAP for consistency with its disaster management plan. The district group for Fred Haigh Dam is **Bundaberg Police 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
- to minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam happens
- to identify dam hazards that could occur at Fred Haigh Dam and the area likely to be affected for each hazard
- to prescribe emergency actions taken by the dam owners and operating personnel in identifying and responding to dam hazards and notifying relevant entities.

It is possible for more than one dam hazard to exist at Fred Haigh 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 Fred Haigh 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 Bundaberg Regional Council Local Disaster Management Plan (LDMP) and associated sub plans.

2.3. Scope

The Fred Haigh 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 a dam hazard event or emergency event
- alignment of the EAP trigger levels for flood with the Australian Warning System (AWS) warning levels
- roles and responsibilities in responding to a dam hazard event or emergency event
- notification, warning, and communication protocols
- inspection, monitoring, and reporting protocols during emergencies (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 hazards.

2.4. Sunwater training

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

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

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

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

Sunwater is also working towards carrying out a full test once annually involving each local authority and disaster management stakeholders. Where there is more than one referable dam in a local area, the exercise could involve more than one dam, or the location will be rotated. This full test would involve the State Disaster Coordination

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

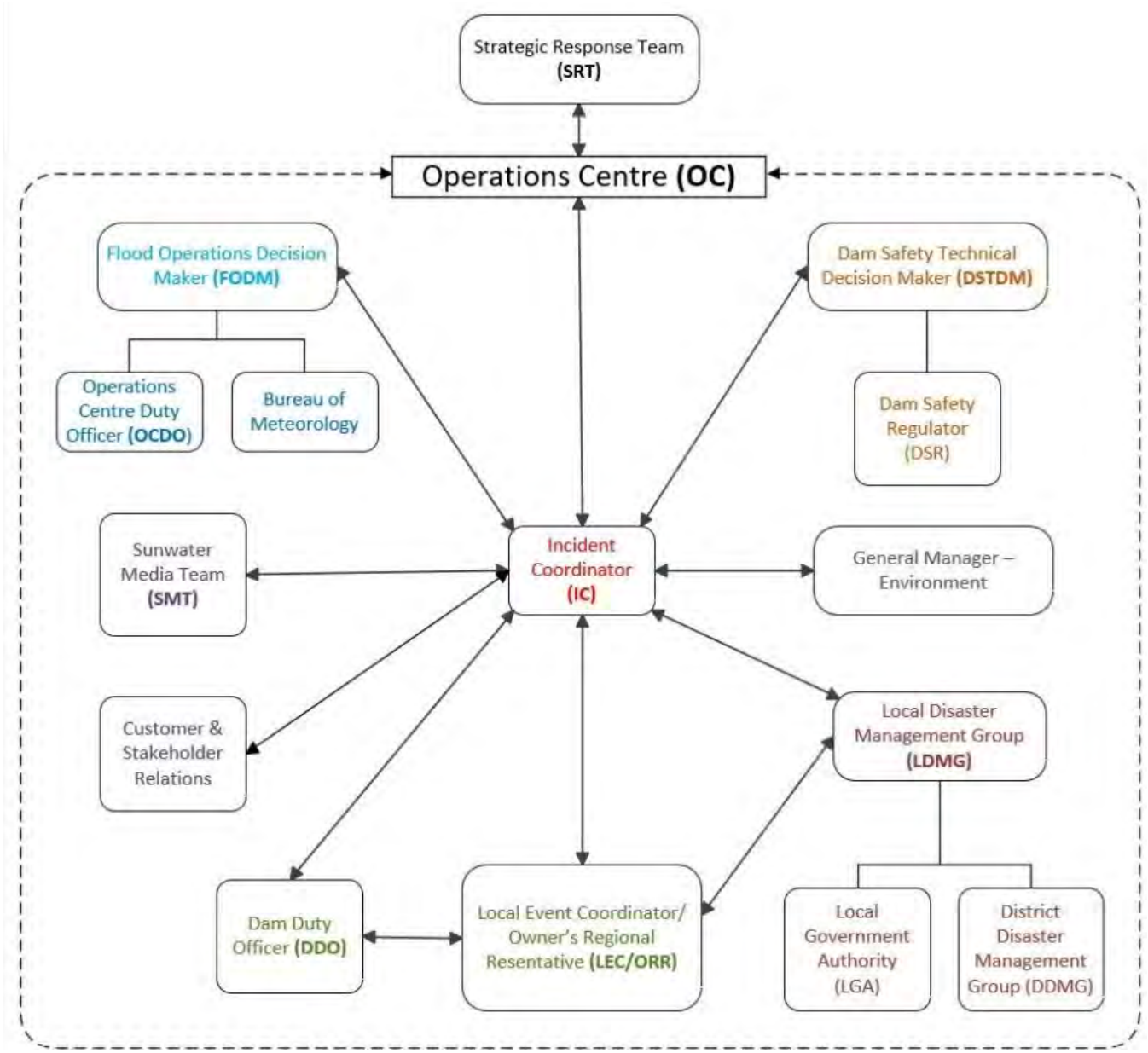
2.5. Fatigue management plan

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

2.6. Dam emergency management within Sunwater

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

Figure 1: Sunwater dam hazard management framework



Key aspects of the emergency management framework are:

- Central to the framework is the role of Incident Coordinator (IC) for any dam hazard at a dam. The IC will maintain overall responsibility for the coordination of the EAP. If the IC loses all communications during a

dam hazard, then as a fail-safe position, the LEC followed by the DDO will assume the duties and responsibility of the IC. However, loss of communications could result in some communication processes defined in this EAP not being carried out.

- The DSTDM or FODM is responsible for the decision to activate the EAP. Should the DSTDM or FODM be uncontactable, the Local Event Coordinator (LEC) followed by the Dam Duty Officer (DDO) is responsible for the decision to activate. The FODM and DSTDM roles are filled by Registered Professional Engineers of Queensland (RPEQ) and are suitably qualified professionals who can make engineering decisions and provide engineering decisions as defined in the ***Professional Engineers Act of Queensland***.
- The DSTDM is primarily responsible for analysing dam safety and providing expert technical advice in this regard. They will be expected to discuss dam hazards with peers and other technical experts and make sound decisions to mitigate risks and to determine a response to incidents and emerging issues. The DSTDM is the key communication contact with the Dam Safety Regulator.
- The FODM has responsibility for all matters involving flood modelling and forecasting and determining the associated impact to Sunwater storages/infrastructure. The FODM may pre-emptively activate the EAP in accordance with available hydrology forecast information in accordance with the OCP. For example, if an EAP trigger level is predicted to be exceeded based on forecast dam inflows derived from observed rainfall and streamflow conditions upstream of the dam, the EAP may be activated to the predicted level. Regarding the operation of the OC, the FODM must liaise with the IC as necessary to inform of decisions made.

2.7. Community information

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

Sunwater currently provides information externally to customers, downstream (D/S) residents and the community in a range of methods or channels in relation to dam hazards and emergency situations. Individuals can access information through Facebook, the Sunwater website (sunwater.com.au), Sunwater Community App (sunwater.com.au/community/sunwater-app/) and at several show/field days across regional Queensland where Sunwater may have stalls and information available. This engagement provides the community with tools to assist in self-management during emergencies.

In the event of an activation of this EAP, immediate D/S residents will be notified via short message service (SMS) 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 the SDCC. The process Sunwater follows is documented in Appendix A7.

A copy of all Sunwater approved EAPs are available to the public on the Sunwater website - https://www.sunwater.com.au/community/preparing-for-emergencies/emergency-management/
These copies are redacted to protect people's personal information.

2.8. Lessons learnt

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

3. Dam details

3.1. General dam information

Location: The Fred Haigh Dam is located approximately 30 km north of Gin Gin at AMTD 76.4 km on the Kolan River. A dam locality plan can be found in Appendix B5.

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 was constructed in 1974, as a zoned earth embankment with a concrete spillway. In 2006, a 2m high crest parapet wall was added to the top of the embankment.

Specification: The table below lists general specifications of Fred Haigh Dam.

Table 3: Fred Haigh Dam key specifications

Description	Specification
Stream and AMTD	Kolan River 76.4 m
Catchment Area	1308 km^2
Main Dam Type	Zone earth-fill embankment with central clay core
Full Supply Level (FSL)	EL 75.56 m
Storage capacity at FSL	562,045 ML
Reservoir surface area at FSL	5,345 ha
Dam Crest Level (DCL)	Design level (including crest wall): EL 85.98 m (Top of Concrete) Survey Level (including crest wall): EL 85.94 m (lowest level, Top of Concrete)
Maximum height of the dam	53.6 m from lowest level
Dam Crest length	569.6 m (excludes spillway)
Dam Crest width	7.3 m
Spillway type	Uncontrolled ogee crest with concrete lined chutes terminating with flip bucket dissipater
Spillway crest level	EL 75.56 m
Spillway capacity at DCL	2837 m^3/s (245,116 ML/d)
Spillway crest length	47.2 m
Saddle Dam Type	Zoned earth and rock fill with upstream rip rap protection
Saddle Dam Crest Elevation	From EL 85.94 m to EL 87.28
Saddle Dam Crest Length	120 m
Saddle Dam Crest Width	7.3 m
Saddle Dam Height above foundation	10.2 m
Outlet Works Description	1085 mm diameter line to the river outlet pipes 2159 mm diameter line to Monduran Pump Station

	300 mm diameter filling/draining line 2 x 914 mm guard valves 1 x 310 mm guard valve
	2 x 762 mm cone valves
	1 x 300 mm cone valve
River outlet works capacity	230 ML/d to keep below 6 m^3/s

All levels are to Australian Height Datum, AHD.
Conversion for Dam is AHD = ((State Datum in feet x 0.348) + 0.303) m.

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

3.2. Population at risk

The Population at Risk (PAR) from flood events through or failure of Fred Haigh Dam was assessed in the 2022 Comprehensive Risk Assessment (CRA) (ref J). The result of this assessment is that the dam is a Category 2 referable dam (ref T). Under DLGWV guidelines, Category 2 dams have a PAR of greater than 100. Under ANCOLD (2012) and DLGWV guidelines (ref S), the dam is classed as 'High B' for Sunny day Failure and 'Extreme' for Incremental Flood failure (the assigned consequence categories are based on PLL values, where a dam failure results in major damage and loss).

The Sunny Day Failure (SDF) of the dam would result in a PAR of 184 and a Potential Loss of Life (PLL) of 1. The largest incremental consequence from the flood failure scenarios modelled is for the Dam Crest Flood (DCF), with an incremental PAR of 739 and an incremental PLL of 59.

3.3. Spillway adequacy

The 2022 Comprehensive Risk Assessment (CRA), ref J, states that the spillway has a capacity of approximately 2,837 m^3/s based on the Computational Fluid Dynamics (CFD) analysis.

3.4. General arrangement

The general arrangement drawings are in Appendix B1

3.5. Emergency inspections and monitoring

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

3.5.1. Inspections

The following inspections are to be carried out:

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

4. Roles and responsibilities

Roles and responsibilities	Position holder
Owner (Sunwater) • Liaise with the Board and Minister. • Activate Sunwater Strategic Response and Business Continuity Plans, if required. • Ensure necessary resources are available to manage any dam hazard and emergency event. • Maintain an up-to-date list of notifiable D/S residents of Fred Haigh Dam. The downstream limit is indicated in the drawing in Appendix B2 by the zone labelled Limit of downstream notification area. • At all times, aim to provide timely advice and support to the LDMGs in the affected local government areas and the DDMGs in the affected disaster districts. • During a dam hazard emergency event that occurs with little or no warning, undertake the following actions to ensure the community is informed as soon as possible: o notify the residents listed in the EAP via SMS o contact SDCC to request an Emergency Alert as detailed in the Emergency Alert request and threat detection polygon. • Where a dam hazard event that occurs with adequate time to warn downstream residents, notify the residents listed in the EAP via SMS (unless otherwise agreed with the LDMGs). • Record communications, notifications and observations as required.	CEO EGMO EGM Engineering & Asset Management
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 are met • Ensure the work instructions are correct and the Operating Logs, SOPs, Data Books and EAPs are reviewed annually as per the Dam Condition Schedule. • Undertake and prepare the 5 yearly Comprehensive Inspection Reports with suitably qualified personnel within the time specified in the Dam Condition Schedule and that work orders are created for recommendations and work is undertaken as required. • Undertake Annual Inspections and prepare reports within the time frames specified in the Dam Condition Schedule and that work orders are created for recommendations and work is undertaken as required. • Review the Dam Safety Instrumentation Database and evaluate data to verify the structural integrity of the dams on a regular basis and maintain a spread sheet for verification for audit and quality control. • Record communications, notifications and observations as required.	Head of Dam Safety GM Asset Management
Owner's Regional Representative (ORR) • Liaise with the Senior Storage Operator/Operator Maintainer. • Arrange dam specific training and accreditation for relevant staff. • Ensure competent, trained and accredited personnel operate the storages. • Ensure necessary resources are available to manage any dam hazard and emergency event • Undertake the role of LEC as required. • Ensure all work orders, work instructions and lesson learned outcomes are fully implemented. • Record communications, notifications and observations as required.	GM Burnett & Lower Mary OS

Roles and responsibilities	Position holder
Strategic Response Team (SRT) • Facilitate the assessment, escalation and notification and management of strategic response and recovery for a high or extreme risk, or impact, event. Responsible for the following key activities: o initial and ongoing assessment of event status and requirements o development, and revision of, strategic objectives based on requirements o identifying, managing, and monitoring strategic risks o monitor media and stakeholder/customer impacts o managing/overseeing event communications including media, stakeholder, customer and internal communications. Record communications, notifications and observations as required.	Various ELT members as per SRT roster
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) • Responsible for the decision to activate/deactivate the EAP for dam safety hazards • 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) • Responsible for the decision to activate/deactivate the EAP for flood hazards • 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. • 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 • Assist the FODM 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 • Assist the FODM by utilising this data in predictive flood models • Liaise with the FODM 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. • Ensure the EAP is coordinated appropriately and carry out the IC role as required. • Record communications, notifications and observations as required.	Various personnel as per OC roster
Local Event Coordinator (LEC) • Liaise with the Local Disaster Coordinator or proxy • Activate the EAP when necessary, including when the IC is not available or unable to be contacted • Ensure the EAP is implemented appropriately and carry out the LEC role as required • Record communications, notifications and observations as required	Various personnel as per LEC roster

Roles and responsibilities	Position holder
Dam Duty Officer (DDO) • Should the DSTDM, FODM or LEC be uncontactable, DDP is responsible for coordinating the EAP until such a time as the relevant decision maker can activate the EAP • Complete accreditation to operate and maintain relevant storage. • Coordinate the EAP, when necessary, such as when both the IC and LEC are not available or are unable to be contacted • Ensure the EAP is implemented appropriately and carry out the DDO role as required. • Take direction from the DSTDM, FODM or 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. • IF the IC and LEC lose all communications during a dam hazard, then as a fail-safe position, the DDO may assume the duties and responsibilities of the IC • Record communications, notifications and observations as required.	SOM SSO OM
Councils Councils have legislated local government functions, as per Section 80 of the *Queensland Disaster Management Act (2003).* These include: • Ensure it has a disaster response capability. • Approve its local disaster management plan. • Ensure information about an event or a disaster in its area is promptly given to the DDMG for the disaster district in which area it is situated. • Perform other functions given to the local government under ref N. And as per Section 352HB of the *Water Supply (Safety and Reliability) Act 2008 (Qld):* • Must assess (in consultation with its LDMG) the EAP for consistency with the LDMP.	Bundaberg Regional Council
Disaster Management Groups/Personnel - (In addition to requirements outlined in the Queensland Disaster Management Act 2003) • LDMG o Assist Sunwater and the local Councils to ensure community education around messaging and impacts of EAP related events are undertaken and continually improved o Work with local Councils and Sunwater to ensure the EAP is regularly exercised o Identify and coordinate the use of manpower and resources that may be required for an EAP event o Identify and provide advice to DDMG about support services required by the LDMG to manage an EAP event • QPS o Work with dam owner and LDMGs to ensure Emergency Alert polygons are prepared, stored, and tested at the State Disaster Coordination Centre (SDCC). • DDMG o May review the EAP for consistency with the DDMP. • Security and Counter Terrorism Network (SCTN) o Identifies areas of concern during the preparation of disaster plans and provides advice during counter terrorism emergency events	LDMG QPS DDMG SCTN Coordinator
Dam Safety Regulator (DSR) • Liaise with relevant Minister on necessary actions. • Approve this document as required under legislation. • Liaise with Chief Executive as required in administering (regulating) the Act.	DDS

5. Dam hazard — flood operations

5.1. Overview

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

- A dam hazard is where natural catchment inflows fill Fred Haigh Dam to Full Supply Level (FSL) EL 75.56 m, and the rate of inflow exceeds the capacity of the outlet works. The spillway will then discharge water downstream into the Kolan River. These flood flows can create a dam hazard event. Inflows will also cause the storage to temporarily rise to above the FSL of the storage. NOTE:
  - The greater the rate of inflow, the higher the storage will rise.
  - The higher the storage level rises, the greater the loads on the dam structure.
  - Although unlikely, the greater the loading, the higher the likelihood of a dam failure.
  - Typically, the level of surveillance is increased during flood operations (refer Action tables in this section).
- Spillway discharge from the dam where there have been no indications that a dam failure may be initiating or in progress.

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

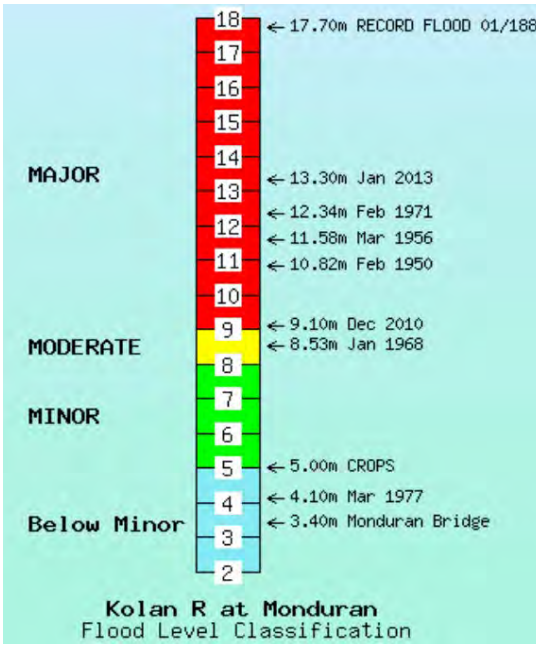
- When the storage height exceeds FSL (EL 75.56 m), there will be an impact on low-level road crossings of the Kolan River and other infrastructure in the river such as pump sites.

  When the storage height exceeds the minor flood level (1.0 m over the spillway), EL 76.56 m, low-lying areas next to watercourses are inundated. Minor roads may be closed and low-level bridges submerged. In rural areas removal of stock and equipment may be required.
- When the storage height exceeds the moderate flood level (1.5 m over the spillway), EL 77.06 m, main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be required. In rural areas, removal of stock is required.
- When the storage height exceeds the major flood level (2.0 m over the spillway) EL 77.56 m, extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated and major rail and traffic routes closed. Evacuation of flood affected areas may be required. Utility services may be impacted.

An indication of the maximum area that may be affected by this dam hazard is presented in the PMPF inundation map Appendix B3.

The following table shows flood classification triggers as defined by the Bureau of Meteorology (BoM) at Fred Haigh Dam and associated downstream location at Monduran.

Table 4: Flood classification triggers

	Flood classification level	Depth over spillway (m)	Storage elevation (m AHD)
	Major	2.00	77.56
	Moderate	1.50	77.06
	Minor	1.00	76.56

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

The following table shows historical floods experienced at Fred Haigh Dam — Sunwater Station# 135009A.

Table 5: Historical floods experienced at Fred Haigh Dam

Flood rank	Date	Peak height EL (AHD)	Peak height (m over crest)
1	January 2013	82.42 m	6.86 m
2	October 2017	79.58 m	4.01 m
3	December 2010	79.43 m	3.86 m
4	March 2013	78.03 m	2.47 m
5	March 2012	77.63 m	2.07 m

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

5.2. Emergency actions

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

5.2.1. Activation triggers

Table 6: Flood emergency activation trigger summary

EAP Flood Activation Trigger	Trigger Summary	AWS
Alert	• Storage EL 75.46 m and rising (0.1 m below FSL)	
Lean Forward	• Storage above FSL 75.56 m	Advice
Stand Up 1 greater than moderate flood level	• Storage above EL 77.06 m (Moderate flood classification level)	Watch and Act
Stand Up 2 greater than flood of record	• Storage above EL 82.42 m (Flood of record January 2013)	
Stand Up 3 overtopping of crest parapet wall	• Storage above EL 85.94 m (Top of crest parapet wall concrete section) — risk of dam breach (allowing for Wave Action), OR • As advised by the DSTDM	Emergency
Stand Down	• Storage EL 75.86 m and falling with no forecast increase in EL for 48 hours	Advice

While this EAP is not triggered until Fred Haigh Dam reaches a level of 75.46 m, Sunwater and the Bundaberg LDMG will work cooperatively and will endeavour to share intelligence of any rainfall event when either organisation becomes aware of a situation that could result in the activation of the EAP.

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

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

5.2.2. 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 greater than moderate flood level**	**Stand Up 2 greater than flood of record**	**Stand Up 3 overtopping of crest parapet wall**	**Stand Down**
Activation trigger	• Storage EL 75.46 m and rising (0.1 m below FSL)	• Storage above FSL EL 75.56 m	• Storage above EL 77.06 m	• Storage above EL 82.42 m	• Storage above EL 85.95 m (Top of crest parapet wall concrete section) — risk of dam breach (allowing for Wave Action), OR • As advised by the DSTDM	• Storage EL 75.86 m and falling with no forecast increase in EL for 48 hours
Actions	• 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 o communication systems (including backup radio, satellite phone, and internet) • Record the Storage Level daily (or as instructed by the DSTDM) using gauge boards and confirm accuracy of gauging station • Record river height at the tailwater gauge daily (or as instructed by DSTDM) • Record rainfall daily • 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 spillway and dissipator for evidence of scouring o inspect embankment for leaks, deformation, and slumping o obvious signs of seepage, in particular on the Saddle Dam downstream slopes • Read dam instrumentation daily (or as instructed by the DSTDM). Instrumentation drawings are located in the HMT	• As per previous activation level, AND • Inspect the dam twice daily (or as instructed by the DSTDM) • Close road access to crest of dam — to vehicles and public • Close public access downstream of saddle dam • Liaise with Campground Manager re: situation • At EL 79.42 m isolate power supply to the inlet tower, deck of inlet tower	• As per previous activation level, AND • Inspect the dam 6-hourly (or as instructed by the DSTDM) • Close the dam crest wall gate (prior to the storage level reaching EL 83.5 m)	• As per previous activation level, AND • Remotely inspect the dam four times daily (or as instructed by the DSTDM) • Frequently photograph the spillway and tailwater areas, and after overtopping of the downstream abutment • Inspect for scouring or slope failures downstream of the spillway in the vicinity of the Monduran Pump Station	• Inspect the dam for any damage and photograph any damage identified during the event • Forward all EER material to IC email as required • Return to routine surveillance activities and frequencies • Update Operating Log as per SOP 12

Table 7: Flood operations DDO emergency action						
Activation level	**Alert**	**Lean Forward**	**Stand Up 1 greater than moderate flood level**	**Stand Up 2 greater than flood of record**	**Stand Up 3 overtopping of crest parapet wall**	**Stand Down**
	• Record all communication					
Notifications	• IC • SO • LEC/ORR • DSTDM	• As per previous activation level •	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down
AWS		**Advice**	**Watch and Act**		**Emergency**	**Advice**

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

[redacted]

Table 8: Flood operations LEC emergency action						
Activation level	**Alert**	**Lean Forward**	**Stand Up 1 greater than moderate flood level**	**Stand Up 2 greater than flood of record**	**Stand Up 3 overtopping of crest parapet wall**	**Stand Down**
Activation trigger	• Storage EL 75.46 m and rising (0.1 m below FSL)	• Storage above FSL EL 75.56 m	• Storage above EL 77.06 m	• Storage above EL 82.42 m	• Storage above EL 85.95 m (Top of crest parapet wall concrete section) — risk of dam breach (allowing for Wave Action), OR • As advised by the DSTDM	• Storage EL 75.86 m and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Liaise with LDMG re: situation • Develop/implement staff roster • **Note: IC to do all LEC external notifications until LDMG is stood up**	• As per previous activation level, AND • Prepare DDO and SO to stay onsite for up to a week if forecasts are trended towards further inflows • Ensure all abnormal observations or damage has been reported to DSTDM and IC	• As per previous activation level	• 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 • DDO • LDMG • DDMG	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down
AWS		**Advice**	**Watch and Act**		**Emergency**	**Advice**

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

[redacted]

Table 9: Flood operations — IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1 greater than moderate flood level	Stand Up 2 greater than flood of record	Stand Up 3 overtopping of crest parapet wall	Stand Down
Activation trigger	• Storage EL 75.46 m and rising (0.1 m below FSL)	• Storage above FSL EL 75.56 m	• Storage above EL 77.06 m	• Storage above EL 82.42 m	• Storage above EL 85.95 m (Top of crest parapet wall concrete section) — risk of dam breach (allowing for Wave Action), OR • As advised by the DSTDM	• Storage EL 75.86 m and falling with no forecast increase in EL for 48 hours
Actions	• Record all communication • Liaise with Sunwater Media on-call to send SMS and email to D/S residents and phone those without mobiles • Liaise with the DDO, DSTDM and the FODM • **Note: IC to do all LEC external notifications until LDMG is stood up**	• As per previous activation level, AND • Confirm that DDO and SO are prepared to stay onsite for up to a week if forecasts are trended towards further inflows • Ensure all abnormal observations or damage has been reported to DSTDM	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Complete all notifications • Compile EER and deliver to DSR if required • Return to routine activities
Notifications	• DDO • FODM • DSTDM • LEC/ORR • SMT • SRT • CEO • D/S Residents	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level and • SDCC	• Inform all previously notified contacts of Stand Down
AWS		Advice	Watch and Act		Emergency	Advice

Table 10: Flood operations LEC and IC external communication plan					
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**	**AWS**
Alert	• Storage EL 75.46 m and rising • (0.1 m below FSL)	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage 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 message Refer to Annexe for sample message	
Lean Forward	• Storage above FSL EL 75.56 m	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level and whether any flood releases are due to commence Discuss any potential road/bridge closures	**Advice**
		• 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 message Refer to Annexe for sample message	
Stand Up 1 greater than moderate flood level	• Storage above EL 77.06 m	• LDMG • 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	**Watch and Act**
		• 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 message Refer to Annexe for sample message	

Table 10: Flood operations LEC and IC external communication plan					
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**	**AWS**
Stand Up 2 greater than flood of record	• Storage above EL 82.42 m	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? (storage is greater than flood of record) Advise of current storage level Advise of any forecasts you are aware of	
		• 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 message Refer to Annexe for sample message	
Stand Up 3 overtopping of crest parapet wall	• Storage above EL 85.95 m (Top of crest parapet wall concrete section) — risk of dam breach (allowing for Wave Action), OR • As advised by the DSTDM	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level Advise of any forecasts you are aware of	**Emergency**
		• SDCC	• Phone & Email	Complete Emergency Alert Request Form and send to SDCC	
		• 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 message Refer to Annexe for sample message	
Stand Down	• Storage EL 75.86 m and falling with no forecast increase in EL for 48 hours	• All previously notified contacts	• Phone	Describe current situation with dam: What is the event? What is the status? Advise of current storage level Advise EAP has been deactivated	**Advice**
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), FODM and/or DSTDM to send appropriate message Refer to Annexe for sample message	

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

[redacted]

Table 11: Flood operations — DSTDM emergency action						
Activation level	**Alert**	**Lean Forward**	**Stand Up 1 greater than moderate flood level**	**Stand Up 2 greater than flood of record**	**Stand Up 3 overtopping of crest parapet wall**	**Stand Down**
Activation trigger	• Storage EL 75.46 m and rising (0.1 m below FSL)	• Storage above FSL EL 75.56 m	• Storage above EL 77.06 m	• Storage above EL 82.42 m	• Storage above EL 85.95 m (Top of crest parapet wall concrete section) — risk of dam breach (allowing for Wave Action), OR • As advised by the DSTDM	• Storage EL 75.86 m and falling with no forecast increase in EL for 48 hours
Action	• Record all communication • Provide technical advice to DDO and IC • Review surveillance reports and determine if any additional responses are required • Review instrumentation data and determine if any additional responses are required • Advise DSR of EAP activation	• As per previous activation level	• As per previous activation level	• As per previous activation level, AND • Confirm the dam crest wall gate has been closed, prior to the storage level reaching EL 83.5 m	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down
AWS		**Advice**	**Watch and Act**		**Emergency**	**Advice**

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

[redacted]

Table 12: Flood operations — FODM emergency action						
Activation level	**Alert**	**Lean Forward**	**Stand Up 1 greater than moderate flood level**	**Stand Up 2 greater than flood of record**	**Stand Up 3 overtopping of crest parapet wall**	**Stand Down**
Activation trigger	• Storage EL 75.46 m and rising (0.1 m below FSL)	• Storage above FSL EL 75.56 m	• Storage above EL 77.06 m	• Storage above EL 82.42 m	• Storage above EL 85.95 m (Top of crest parapet wall concrete section) — risk of dam breach (allowing for Wave Action), OR • As advised by the DSTDM	• Storage EL 75.86 m and falling with no forecast increase in EL for 48 hours
Action	• Confirm with IC that trigger conditions have been met and direct IC to coordinate the EAP activation • Update flood models as per OC Procedure • Update DSTDM re: current situation • Record all communication	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Confirm Stand Down triggers have been met and direct IC to coordinate the deactivation of the EAP • Forward all EER material to IC email as required • Return to routine activities
Notifications	• IC • DSTDM	• As per previous activation level	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down
AWS		**Advice**	**Watch and Act**		**Emergency**	**Advice**

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

[redacted]

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

6.1. Overview

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

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

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

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

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

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

An increase in seepage or a new area of seepage is a circumstance that could indicate an occurrence of piping. This circumstance is the trigger for the Alert status for piping.
Cloudy seepage water is a circumstance that could indicate an increased likelihood of piping. This circumstance is the trigger for the Lean Forward status for piping.

6.2. Emergency action roles

Table 13 to specify emergency actions for the following roles.

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

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

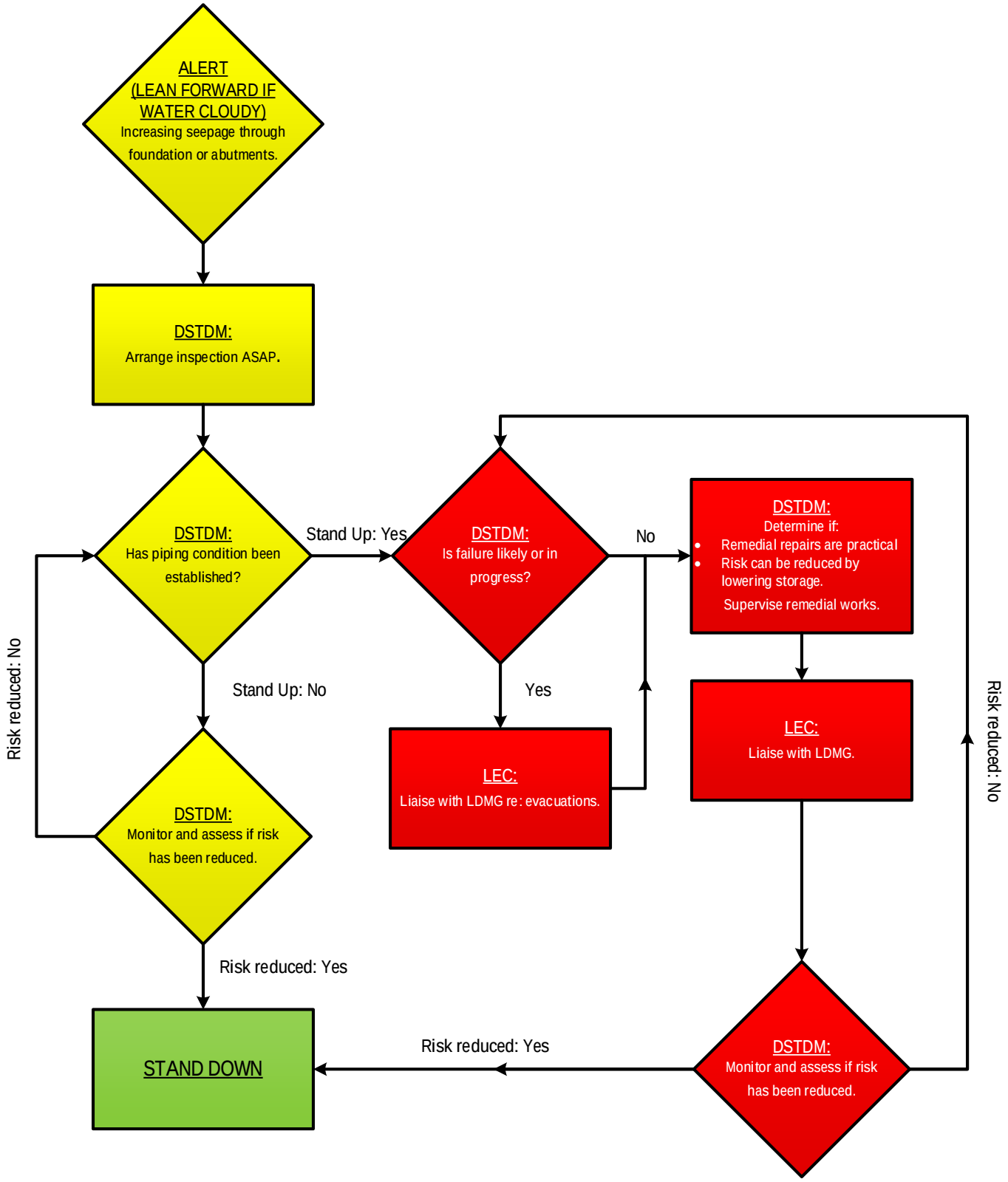


Table 13: Piping: embankment, foundation, or abutments DDO emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Increasing leakage through an embankment, the foundations, or abutments	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• Piping condition has been established	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • Monitor flows every 6 hours (or as otherwise instructed by the DSTDM) • Photograph/video the piping from a safe point and record using approved forms and send to DSTDM & IC • Update Operating Log as per SOP 12	• 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 if not already closed by others • Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public	• As per previous activation level, AND • Vacate the immediate vicinity of the piping condition	• Inspect the dam for any damage and photograph any damage identified during the event • Forward all EER material to IC email as required • Return to routine surveillance activities and frequencies • Update Operating Log as per SOP 12
Notifications	• DSTDM • IC • SO • LEC/ORR	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

Table 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 in progress or likely due to piping, and • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • Liaise with DDO and IC • **Note: IC to do all LEC external notifications until LDMG is stood up**	• As per previous activation level	• As per previous activation level, AND • Liaise with relevant council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • LDMG	• As per previous activation level, AND • DDMG	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

Table 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 in progress or likely due to piping, and • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Record all communication • **Note: IC to do all LEC external notifications until LDMG is stood up**	• As per previous activation level, AND • Investigate availability of machinery and materials (if insufficient stockpiles available) • Place machinery operators on standby if directed by DSTDM	• As per previous activation level, AND • Liaise with Sunwater Media on-call, LDMG(s) and DSTDM to send appropriate message • Mobilise resources to undertake remedial works if directed by DSTDM	• As per previous activation level, AND • Liaise with the DSTDM to confirm that dam failure is in progress • Direct remedial works to cease if directed by the DSTDM and plant and personnel to be moved to a safe location • Liaise with DDO and DSTDM re: potential for evacuations	• Complete all notifications • Compile EER and deliver to DSR if required • Return to routine activities
Notifications	• DSTDM • DDO • LEC/ORR • SMT • SRT • CEO	• As per previous activation level	• As per previous activation level and • D/S Residents • SDCC	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

Table 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	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — piping condition*) What is the status? (Unconfirmed piping — Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice
Lean Forward	• Increasing leakage through an embankment, the foundations, or abutments WITH cloudy water	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — piping condition*) What is the status? (Unconfirmed piping — Investigation continues) Advise of current storage level Advise any issues you are aware of Standby for further advice
Stand Up 1	• Piping condition has been established	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? *(Dam safety risk —piping condition).* What is the status? (Confirmed piping condition) Advise of current storage level Discuss any potential road/bridge closures
		• SDCC	• Email & Phone	Complete Emergency Alert Request Form as per instructions and email to SDCC
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate message Refer to Annexe for sample message

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

[redacted]

Table 16: Piping: embankment, foundation, or abutments LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Stand Up 2	• Failure in progress or likely due to piping; AND • Sufficient water in storage to create a dam hazard	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? *(Confirmed piping risk)* What is the status? (Possible dam failure or Dam failure in progress) Advise of current storage level
		• SDCC	• Email & Phone	Complete Emergency Alert Request Form as per instructions and email to SDCC
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate message Refer to Annexe for sample message
Stand Down	• Risk assessment has determined that failure risk has reduced	• All previously notified contacts	• Phone	Describe current situation with dam: What is the event? *(Dam safety risk — piping)* What is the status? (Dam hazard stood down) Advise risk assessment has determined that piping risk has reduced, and EAP has been deactivated
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), FODM and/or DSTDM to send appropriate message Refer to Annexe for sample message

Table 17: Piping: embankment, foundation, or abutments — DSTDM emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• 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 in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Action	• Confirm with IC that trigger conditions have been met and direct IC to coordinate the EAP activation • Arrange an inspection of the dam to assess its condition as soon as possible, when safe to do so • Determine if piping condition has been established • Monitor situation and assess risks • Record all communication	• As per previous activation level	• As per previous activation level, AND • Assess risk and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawdown based on latest available data and advise in writing to IC and DDO) • Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision.	• As per previous activation level, AND • Liaise with the IC and advise on need to recommend evacuations	• Confirm Stand Down triggers have been met and direct IC to coordinate the deactivation of the EAP • Forward all EER material to IC email as required • Return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

7. Dam hazard — earthquake

7.1. Overview

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

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

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

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

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

7.2. Emergency action roles

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

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

Figure 3: Earthquake flowchart

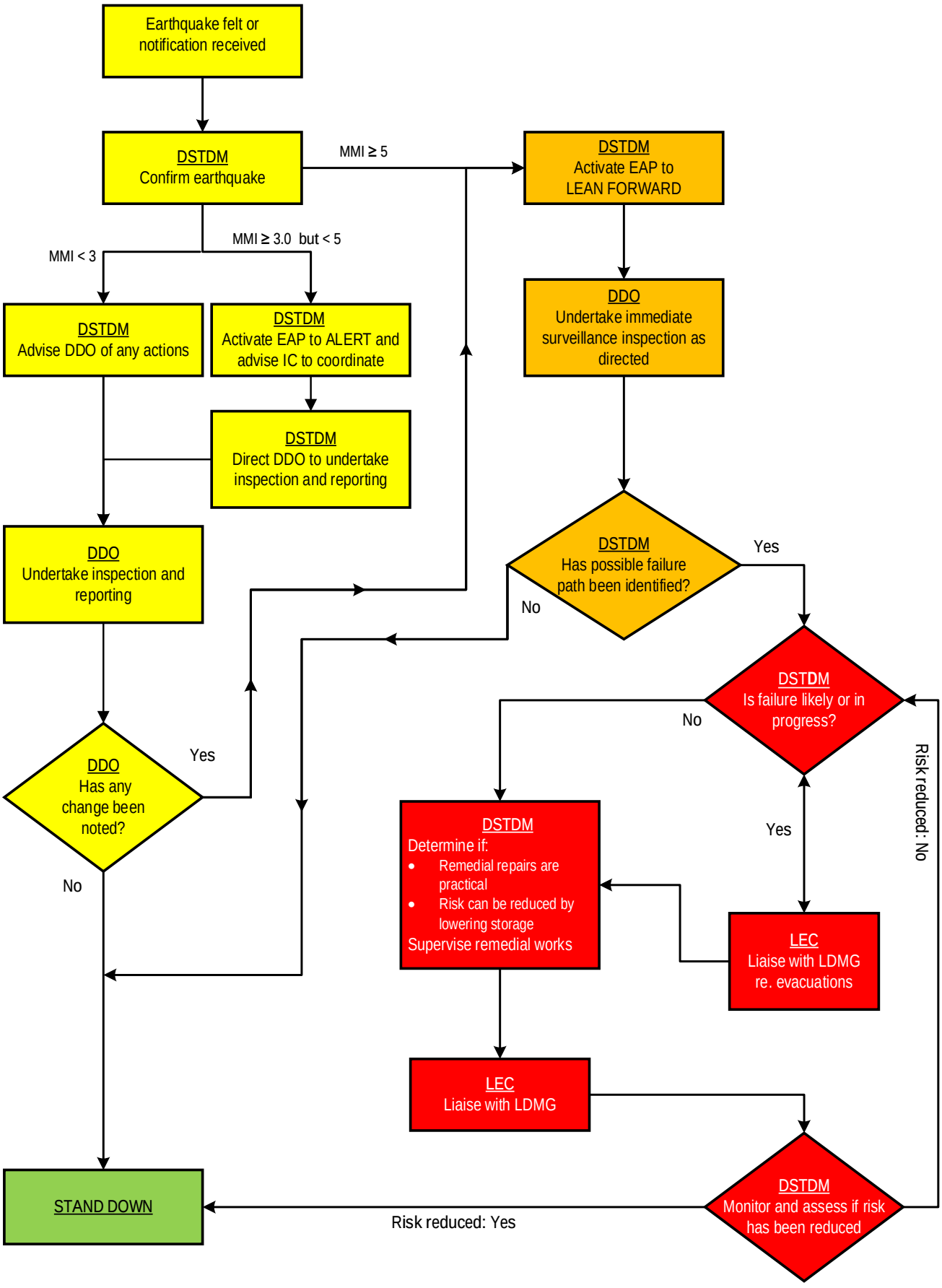


Table 18: Earthquake DDO emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Earthquake **confirmed** (by DSTDM) or felt in the area, AND • Intensity less than 5 MMI	• Earthquake **confirmed** (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5 MMI OR • Intensity less than 5 MMI and change detected during surveillance inspection	• Earthquake **confirmed** (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• **Confirmed** is defined as an earthquake alert received from Geoscience Australia that advises that an earthquake has occurred with an intensity ≥3.0 MMI at the dam • If an earthquake is felt in the area, the DDO is to contact the DSTDM as soon as reasonably practicable • If an earthquake is **confirmed** by the DSTDM, the DSTDM will direct the DDO to carry out inspection of the dam and associated structures • A record of all inspections, including photographs, videos, and condition reports (using the approved forms) is to be sent to DSTDM for review as soon as reasonably practical • The condition report must include, at a minimum, records of instrumentation readings, leaks, deformation, erosion, structural damage and any observed uncontrolled releases • The DDO is to update Operating Log as per SOP 12 • Record all communications	• As per previous activation level, AND • Repeat the inspection as directed by the DSTDM	• As per previous activation level, AND • Support/supervise remedial work as directed by the DSTDM • Lower the storage if direct by the DSTDM • Liaise with IC regarding potential road closure • Maintain surveillance of area immediately downstream of dam or Saddle Dam (if safe to do so) and move on any members of the public • Vacate the immediate vicinity of the embankment and Monduran Pump Station	• As per previous activation level, AND • Ensure remedial works cease and plant and personnel have been moved to a safe location • Record/photograph the earthquake damage and/or dam failure from a safe point	• Inspect the dam for any damage and photograph any damage identified during the event as directed by the DSTDM • Forward all EER material to IC email as required • The DDO is to update Operating Log as per SOP 12 • Return to routine activities
Notifications	• DSTDM • IC • LEC/ORR	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

Table 19: 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 5 MMI	• Earthquake **confirmed** (by DSTDM) or felt in the area, AND • Intensity greater than or equal to 5 MMI OR • Intensity less than 5 MMI and change detected during surveillance inspection	• Earthquake **confirmed** (by DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• The LEC is to record all communications • **Note: The IC is to do all LEC external notifications until LDMG is stood up**	• As per previous activation level	• As per previous activation level, AND • The LEC is to liaise with relevant council(s) regarding potential road/bridge closures	• As per previous activation level	• Forward all EER material to IC email as required • The LEC is to return to routine activities
Notifications	• DDO • IC • LDMG	• As per previous activation level, AND • DDMG	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

Table 20: Earthquake — IC emergency action

Activation level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation trigger	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • Intensity less than 5 MMI •	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • Intensity greater than or equal to 5 MMI OR • Intensity less than 5 MMI and change detected during surveillance inspection	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Actions	• When the IC advised by the DSTDM that an earthquake has occurred with an intensity of ≥ 3.0 at the dam, the IC is to coordinate the EAP to ALERT • The IC is to send notifications to nominated parties as listed below • The IC is to advise the DSTDM when all notifications have been sent • The IC is to record all communications	• As per previous activation level, AND • Investigate availability of machinery and materials (if insufficient stockpiles available) • The IC is to place machinery operators on standby if directed to do so by the DSTDM • The IC is to assess the need to appoint a Sunwater Recovery Coordinator. The Sunwater Recovery Coordinator is responsible for the follow through on actions to close out all matters and works outstanding after the initial emergency is over • Confirm EA and other messages are prepared in advance – if required	• As per previous activation level, AND • Liaise with Sunwater Media on-call to send appropriate messaging and phone those without mobiles • The IC is to coordinate resources to undertake remedial works if directed by the DSTDM	• As per previous activation level, AND • The IC is to liaise with the DSTDM who is to confirm that dam failure is in progress • The IC is to confirm that any remedial works have ceased if directed to do so by the DSTDM and the plant and personnel have been moved to a safe location • The IC is to liaise with DDO and DSTDM regarding the potential need for evacuations	• Complete all internal and external notifications • Compile EER and deliver to DSR if required
Notifications	• DDO • DSTDM • SMT • SRT • CEO	• As per previous activation level	• As per previous activation level, AND • SDCC • Head of Resilience • D/S Residents	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

Table 21: Earthquake LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Alert	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • Intensity less than 5 MMI	• LDMG	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — Earthquake damage*) What is the status? (Under investigation) Advise of current storage level Advise EAP has been activated Stand by for further information
Lean Forward	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • Intensity greater than or equal to 5 MMI, OR • Intensity less than 5 MMI and change detected during surveillance inspection	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — Earthquake damage*) What is the status? (Under investigation) Advise of current storage level Advise EAP has been activated Stand by for further information
Stand Up 1	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • A possible failure path has been identified	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — Earthquake felt or reported in area*) What is the status? (Possible earthquake damage to dam) Advise current storage level. Discuss any potential road/ bridge closures Activate emergency response
		• SDCC	• Phone & Email	Complete Emergency Alert Request Form as per instructions and email to SDCC.
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate message Refer to Annexe for sample message

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

[redacted]

Table 21: Earthquake LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Stand Up 2	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• LDMG • DDMG	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — Earthquake damage*) What is the status? (Dam failure likely or in progress) Advise of current storage level. Discuss any potential road/bridge closures
		• SDCC	• Email & Phone	Complete Emergency Alert Request Form as per instructions and email to SDCC. .
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate message Refer to Annexe for sample message
Stand down	• Risk assessment has been determined that failure risk has reduced	• All previously notified contacts	• Phone	Describe current situation with dam: What is the event? *(Dam safety risk — Earthquake damage)* What is the status? (Dam hazard stood down) Advise risk assessment has determined that failure risk has reduced, and that EAP has been deactivated
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate message Refer to Annexe for sample message

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

Table 22: Earthquake — DSTDM emergency action					
Activation level	**Alert**	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Activation trigger	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • Intensity less than 5 MMI	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • Intensity greater than or equal to 5 MMI OR • Intensity less than 5 MMI and change detected during surveillance inspection	• Earthquake **confirmed** (by the DSTDM) or felt in the area, AND • A possible failure path has been identified	• Failure in progress or likely due to earthquake, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has been determined that failure risk has reduced
Action	• Confirmed is defined as an earthquake alert received from Geoscience Australia that advises an earthquake with an intensity ≥ 3.0 MMI has occurred at the dam • Confirm with IC that trigger conditions have been met and direct IC to coordinate the EAP activation • If an earthquake is confirmed, the DSTDM will direct the DDO to carry out inspections of the dam and associated structures • The DSTDM is to advise the DSR of the EAP activation to ALERT • The DSTDM is to monitor situation at the dam and associated structures and continue to assess the risks • The DSTDM is to record all communications	• As per previous activation level, AND • The DSTDM is to review all surveillance inspections undertaken at the dam and assess its condition as soon as possible • Determine if there are any possible failure paths from reported damage	• As per previous activation level, AND • the DSTDM is to arrange an inspection of the dam and the associated structures and assess the condition as soon as possible, when safe to do so • The DSTDM is to assess risk and determine if failure likely or in progress • The DSTDM is to determine if risks can be reduced by lowering storage (if the storage is required to be drawn down, then the DSTDM, then the DSTDM needs to assess the maximum rate of drawdown based on latest available data and provide the necessary advice in writing to IC and DDO • The DSTDM is to provide technical support and oversight of any remedial repairs (if applicable) • The DSTDM is to monitor situation at the dam and associated structures and continue to assess the risks	• As per previous activation level	• Confirm Stand Down triggers have been met and direct IC to coordinate the deactivation of the EAP • Forward all EER material to IC email as required • The DSTDM is to return to routine activities
Notifications	• DDO • IC • DSR	• As per previous activation level	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

8.1. Overview

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

The vulnerability of Fred Haigh Dam to a terrorist attack is low.

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

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

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

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

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

8.2. Emergency action roles

Table 23 to Table 27 specify emergency actions for the following roles:

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

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

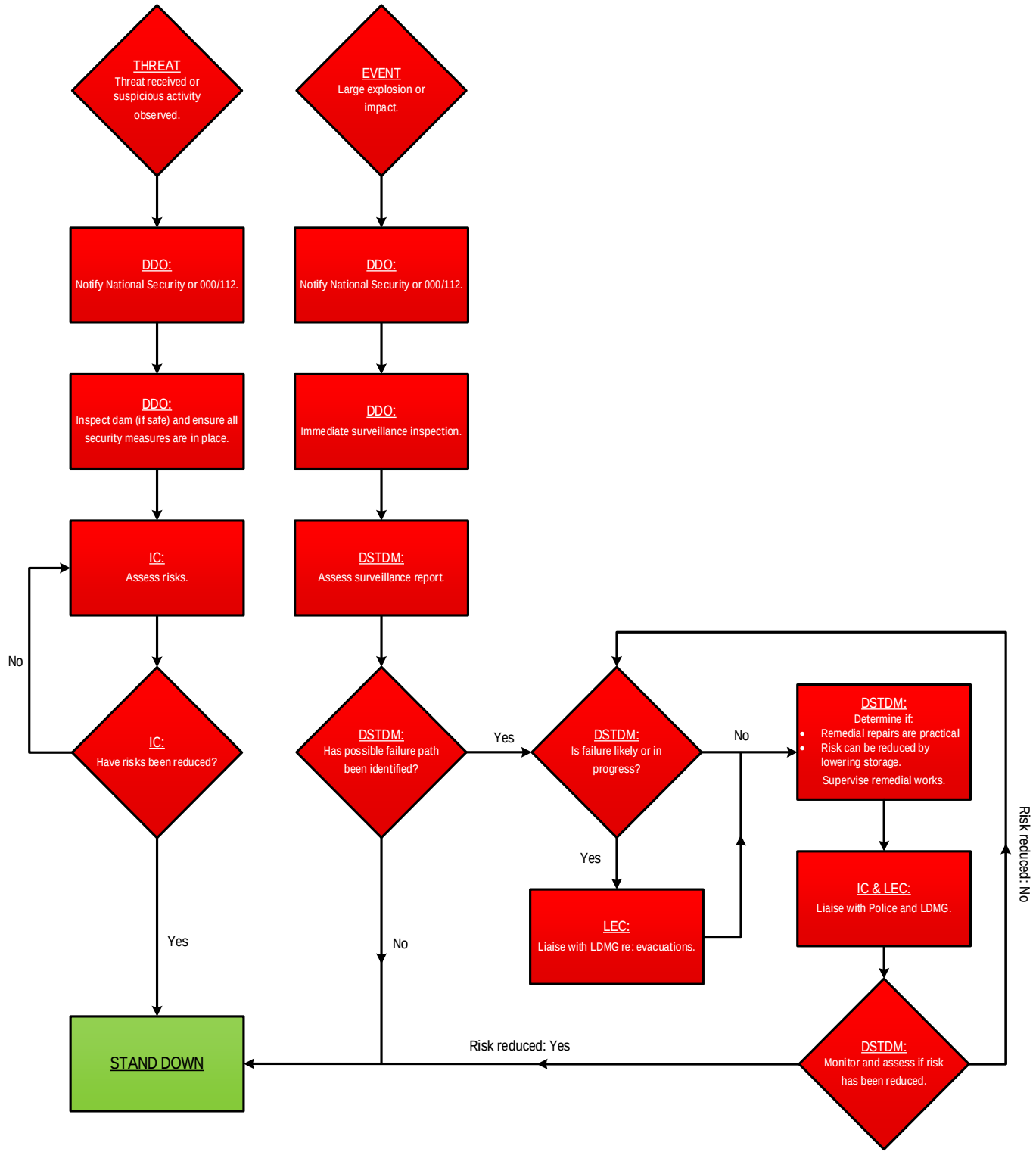


Table 23: Terrorist threat/activity or high energy impact DDO emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Up 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Not applicable	• **In an emergency call 000.** • Record all communication • NOTE: If any suspicious behaviour noticed, contact DSTDM for advice, and if instructed or if threat received, complete the following: • Inspect dam (if safe) and ensure all security measures are in place (locked gates, etc.) • Photograph/video the damage from a safe point and record using the approved forms and send to DSTDM & IC • Close any affected roads, if not already closed by others • Update Operating Log as per SOP 12 • If Police appoint Incident Manager support and follow instructions	• As per previous activation level, AND • Vacate the immediate vicinity of the affected area	• As per previous activation level, AND • Lower reservoir level, if directed by DSTDM	• Inspect the dam for any damage and photograph any damage identified during the event • Forward all EER material to IC email as required • Update Operating Log as per SOP 12 • Return to routine surveillance activities and frequencies
Notifications	• Not applicable	• **#000 Emergency** • DSTDM • IC • LEC/ORR • SO	• As per previous activation level	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

Table 24: Terrorist threat/activity or high energy impact LEC emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Up 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Not applicable	• Record all communication • If Police appoint Incident Manager support and follow instructions • Monitor situation and assess risks • Liaise with relevant council(s) regarding possible road/bridge closures • **Note: IC to do all LEC external notifications until LDMG is stood up**	• As per previous activation level	• As per previous activation level, AND • Liaise with DDO, DSTDM, and LDMG re: potential for evacuations	• Forward all EER material to IC email as required • Return to routine activities
Notifications	• Not applicable	• DDO • IC • LDMG • DDMG	• As per previous activation level	• As per previous activation level, AND • 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

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

Activation level	Alert/Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Actions	• Not applicable	• Record all communication • Liaise with DDO, DSTDM, and LEC/ORR • If Police appoint Incident Manager support and follow instructions • Monitor situation and assess risks • **Note: IC to do all LEC external notifications until LDMG is stood up**	• As per previous activation level, AND • Liaise with Sunwater Media on-call and communications to send appropriate messaging via SMS	• As per previous activation level, AND • Liaise with DDO, DSTDM, and LEC/ORR re: potential for evacuations • Mobilise resources to undertake remedial works if directed by DSTDM	• Complete all notifications • Compile EER and deliver to DSR if required • Return to routine activities
Notifications	• Not applicable	• DDO • DSTDM • LEC/ORR • SMT • SRT • Head of Resilience • CTG • QPS • CEO	• As per previous activation level, AND • SDCC • D/S Residents	• As per previous activation level	• Inform all previously notified contacts of Stand Down

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

[redacted]

Table 26: Terrorist threat/activity or high energy impact LEC and IC external communication plan				
Activation level	**Trigger for communications**	**Group to contact**	**Method**	**Message text**
Alert	ALERT NOT APPLICABLE			
Lean Forward	LEAN FORWARD NOT APPLICABLE			
Stand Up 1	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	• LDMG • DDMG • CTG • QPS	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — Security threat/ impact/explosion, etc.*) What is the status? (Received/noted terrorist threat) Discuss any potential road/bridge closures Activate emergency response
Stand Up 2	**EVENT** • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)	• LDMG • DDMG • CTG • QPS	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — Security threat/ impact/explosion, etc.*) What is the status? (Under investigation) Discuss any potential road/bridge closures
		• SDCC	• Phone & Email	Complete Emergency Alert Request Form as per instructions and email to SDCC.
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate message Refer to Annexe for sample message
Stand Up 3	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• LDMG • DDMG • CTG • QPS	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — Security threat/ impact/ explosion, etc.*) What is the status? (Dam failure likely/In progress)
		• SDCC	• Phone & Email	Complete Emergency Alert Request Form as per instructions and email to SDCC.
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate message Refer to Annexe for sample message
Stand Down	• Risk assessment has determined that failure risk has reduced	• All previously notified contacts	• Phone	Describe current situation with dam: What is the event? (*Dam safety risk — Security threat/ impact/explosion, etc.*) What is the status? (Dam hazard stood down) Advise that failure risk has been reduced, and EAP has been deactivated
		• D/S Residents	• SMS • Phone (for those without mobiles)	Liaise with Sunwater Media on-call, LDMG(s), and DSTDM to send appropriate message Refer to Annexe for sample message

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

[redacted]

Table 27: Terrorist threat/activity or high energy impact — DSTDM emergency action					
Activation level	**Alert/Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Up 3**	**Stand Down**
Activation trigger	• Not applicable	**THREAT** • Possible terrorist activity/suspicious behaviour noticed at the dam, OR • Threat received	**EVENT** • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit)	**RESPONSE** • Failure in progress or likely due to impact or explosion, AND • Sufficient water in storage to create a dam hazard	• Risk assessment has determined that failure risk has reduced
Action	• Not applicable	• Confirm with IC that trigger conditions have been met and direct IC to coordinate the EAP activation • Assess risks • Record all communication	• As per previous activation level, AND • Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so • Monitor situation, assess risks, and determine if failure likely or in progress • Determine if remedial repairs are practical • Determine if risks can be reduced by lowering storage — if the storage is required to be drawn down, then the DSTDM needs to assess the maximum rate of drawdown based on latest available data and advise in writing to IC and DDO • Supervise remedial repairs (if applicable). Supervise means provide technical oversight to the work. It does not necessarily mean on-site supervision	• As per previous activation level, AND • Liaise with the IC and LEC/ORR and advise on need to recommend evacuations	• Confirm Stand Down triggers have been met and direct IC to coordinate the deactivation of the EAP • Forward all EER material to IC email as required • Return to routine activities
Notifications	• Not applicable	• IC • DDO • SRT • DSR	• As per previous activation level	• As per previous activation level and • LEC/ORR	• 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. Other emergency situation — communications failure

9.1. Overview

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

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

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

9.2. Emergency actions

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

9.2.1. Activation triggers

Table 28: 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)

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 (Sunwater internal). They will escalate to the IC any warnings that have the potential to generate an inflow event.

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

9.2.2. Emergency action roles

Table 29 to Table 34 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 29: 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/ORR • 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 • Record all communication and attempts via Operating Log entries as per SOP 12 and communications log if EAP event is current	• Determine if LEC/ORR is in communication and if not, assume the LEC/ORR 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 • 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/ORR • SO

Table 30: 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 • Record all communication and attempts • Assume that the DDO is carrying out LEC/ORR 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 • 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 • FODM • SO • LDMG • DDMG	• DDO • SO • LDMG • DDMG

Table 31: 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	• 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 • 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	• 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 • Record all communication and attempts • Liaise with the DDO and carry out functions of the LEC/ORR 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 • FODM • SO • LDMG • DDMG	• DDO • DSTDM • FODM • SO • LDMG • DDMG

Table 32: 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/ORR • DSTDM • FODM • SO • LDMG • DDMG	Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
Comms Failure Local Area	• Unable to communicate to or from local area including LEC /ORR	• DDO • DSTDM • FODM • SO • LDMG • DDMG	Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?
Comms Failure Brisbane	• Unable to communicate to or from Sunwater Brisbane	• DDO • SO • LDMG • DDMG	Phone	Describe current situation with dam communications. What is the status – estimated time to restore communications?

Table 33: 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/ORR
Actions	• Provide technical advice to IC or LEC/ORR as needed • 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 as needed • 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/ORR • SRT • CEO • DSR	• IC • DDO • SRT • CEO • DSR

Table 34: 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/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/ORR • DSTDM	• IC • DDO • DSTDM

APPENDIX A NOTIFICATION AND COMMUNICATION LISTS

Appendix A1: Sunwater regional notification list

Appendix A2: Sunwater Brisbane notification list

Appendix A3: External notification list

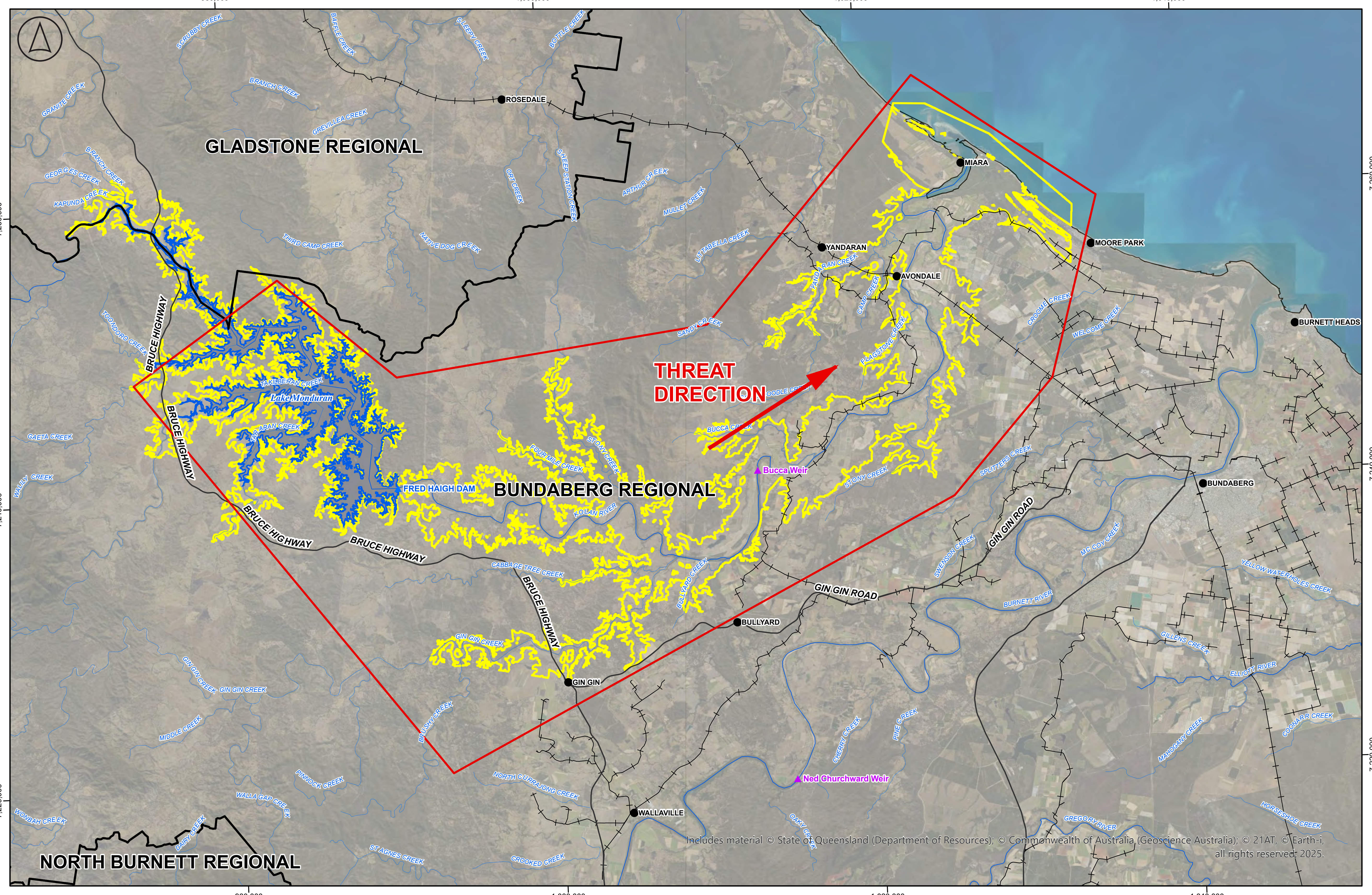
Appendix A4: D/S residents' notification list

Appendix A5: Other reference contacts

Appendix A6: Emergency alert polygon

Appendix A7: Dam failure emergency alert request

Appendix A1 - A5 have been redacted.



Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\249576-C.pgx
Date Exported: 31/07/2025 4:40 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION	DATE		REMARKS	CKD	PSD
	31/07/25	C	UPDATED EXTENT LAYER	CC	MGH
	03/09/18	B	ALERT AREA AMENDED	MB	MH
	23/01/18	A	ISSUED FOR USE	MB	MH

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:250,000
0 4,000 8,000 12,000 m

LEGEND
- Emergency Alert Area
- Maximum Flood Event
- Dam Full Supply Level
- Major Road
- Qld Rail Network
- Local Government Area Boundary
- Settlements

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED MB	CHECKED
APPROVED [redacted] 23/1/2018	

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
EMERGENCY ACTION PLAN
EMERGENCY ALERT AREA

CONTRACT NUMBER

DRAWING NUMBER: 249576 | REV.: C

SHEET 1

DATE JANUARY 2018

Appendix A7: Dam failure Emergency Alert request

Queensland Emergency Alert request guidelines

An Emergency Alert request form should be completed, if required (see Section 5 to Section 8) and sent to the SDCC to activate the Fred Haigh Dam Emergency Polygon.

Instructions

1. Emergency Alert request forms are not to be used UNLESS an Emergency Event has been declared
2. Print the Queensland Emergency Alert request form on the following page
3. Telephone the SDCC on [redacted] or [redacted] and tell them your intention to use the EA for an Emergency Event for Fred Haigh Dam.
4. A polygon for this dam is stored on the Disaster Management Portal. Ask the SDCC operative to locate the polygon. It will be a KML file called Fred Haigh Dam_Emergency_Polygon.
5. Give them your phone number, confirm their name, and end the call after advising the form will be sent shortly
6. Send filled out Emergency Alert request form to SDCC email: [redacted] The form MUST be sent from a Sunwater email address and come from an authorised Sunwater employee.
7. Phone back SDCC to check that the message has been sent and ask for email confirmation.
8. Create a record to advise of completion of EA campaign

The following text is a copy of that contained in the prefilled Emergency Alert request:

Filename:	Voice Message:	SMS:
Fred Haigh_Dam_ Emergency_Polygon	FLOOD EMERGENCY WARNING from Sunwater. People downstream of Fred Haigh Dam including Mun doo ran and Bucca must LEAVE IMMEDIATELY. Fred Haigh 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, or visit disaster dot Bundaberg dot q l d dot gov dot a u	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Fred Haigh Dam including Monduran and Bucca must LEAVE IMMEDIATELY. Fred Haigh 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, or visit disaster.bundaberg.qld.gov.au

The following page contains a pre-filled copy of the Fred Haigh Dam EA Request form.

Queensland Government

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

EMERGENCY ALERT REQUEST

Location of Alert: Fred Haigh 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. 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 Fred Haigh Dam including Mun doo ran and Bucca must LEAVE IMMEDIATELY. Fred Haigh 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, or visit disaster dot Bundaberg dot q l d dot gov dot a u.

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 Fred Haigh Dam including Monduran and Bucca must LEAVE IMMEDIATELY. Fred Haigh 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, or visit disaster.bundaberg.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] and telephone [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 B DRAWINGS AND MAPS

Appendix B1: General Arrangement

Appendix B2: Downstream Notification area

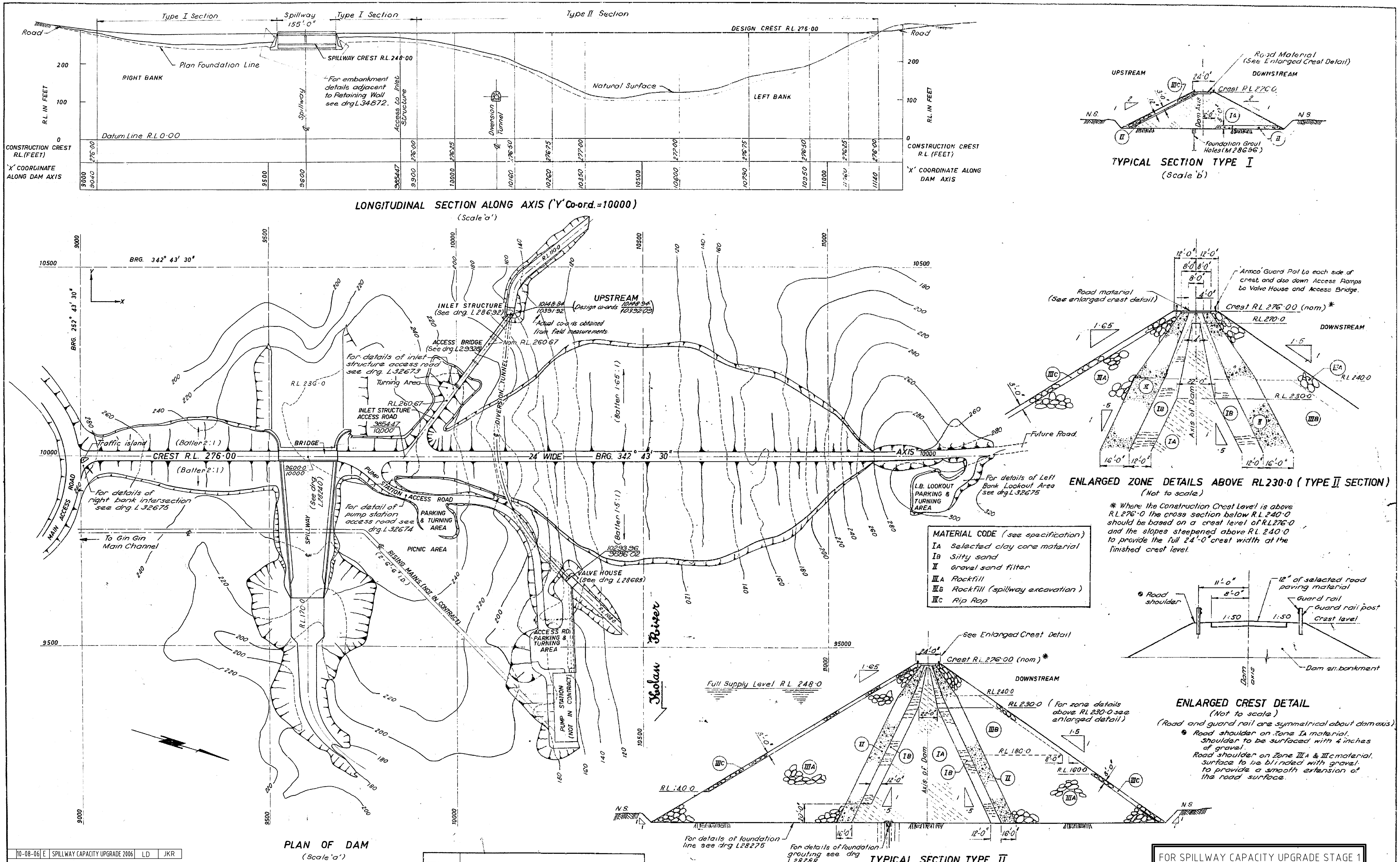
Appendix B3: Inundation maps

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.



FOR SPILLWAY CAPACITY UPGRADE STAGE 1 IN 2006 REFER DWG. 225688 & 225730

AZIMUTH DATUM:- C.A.M.
LEVELS DATUM :- Kolan Datum (B.M.A1W48 = R.L.150·03)
(To equate to Australian Height Datum subtract 0·18)

Revision

Date		Remarks	Ckd	Psd
10-08-06	E	SPILLWAY CAPACITY UPGRADE 2006	LD	JKR
6-6-73	D	Co-ords of inlet tower altered	[illegible]	KDV
3·10·72	C	Access roads to pump stn. & inlet tower altered.	[illegible]	KDV
14·9·72	B	Details of access roads added	R.McA	KDV
21·3·72	A	Access to Inlet Structure Added.	R.McA	KDV

Drawing Schedule

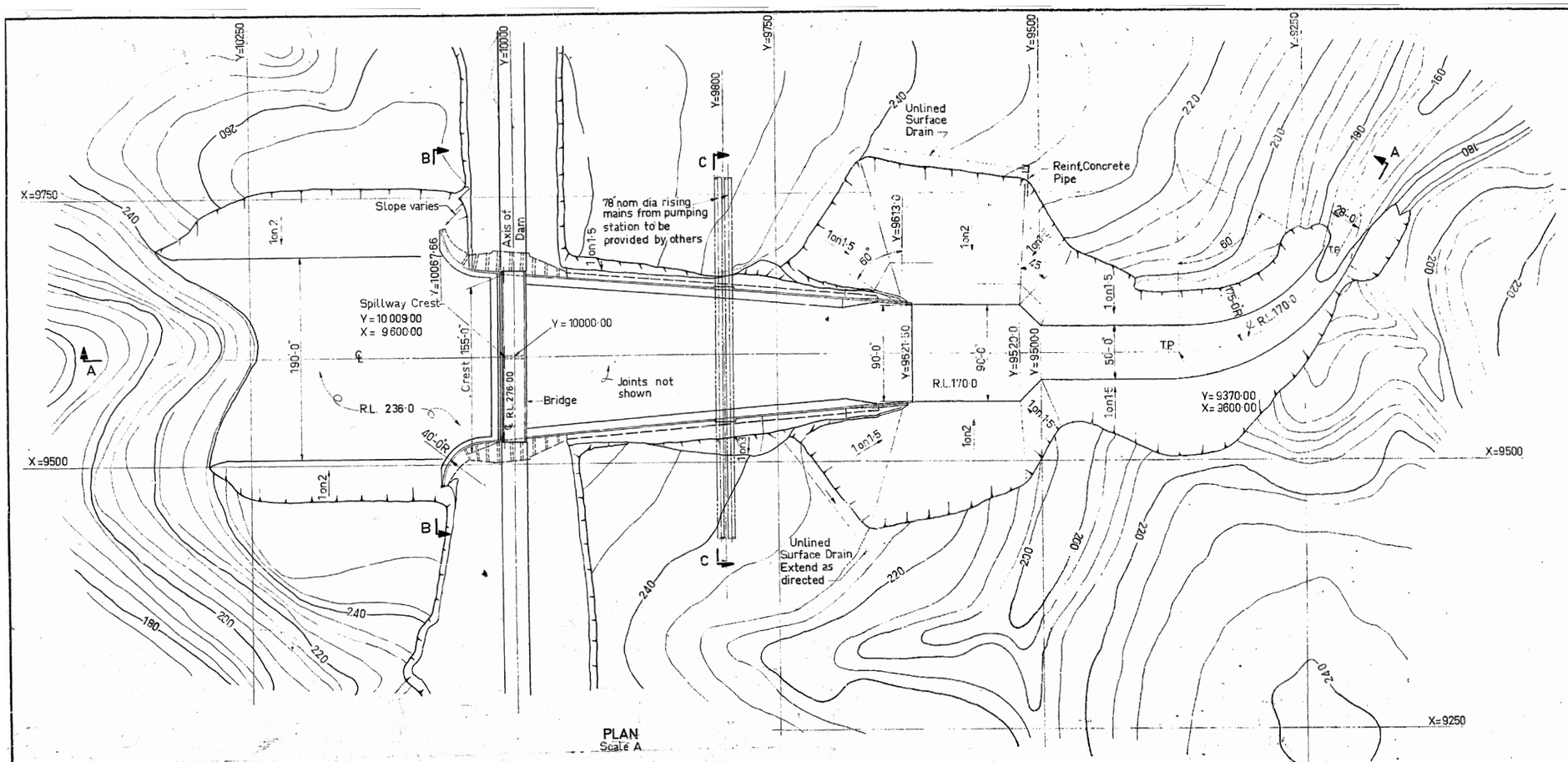
L28692	Inlet Structure - R.L.140·0 to R.L.280·33 - General Aggrt.
L28696	Foundation Grouting Stage 2
L28288	Foundation Grouting Stage 1
L28240	Spillway General Arrangement
L28275	Foundation Excavations
L26924	Foundation Investigations
L28271	Inlet Structure to R.L.140·0 - Concrete Details
L34872	Embankment Details Adjacent to Retaining Wall.
M33205	Road sections and details
L32675	Right bank & left bank access roads
L32674	Pump station access road
L32673	Inlet structure access road
L29328	Inlet Tower - Access Bridge - General Arrangement.
L28694	Diversion Tunnel - Plug to Valve House - Aggrt. & Details
L28269	Diversion Tunnel - Concrete and Reinforcement Details
L28699	Outlet Works - Suction Line & Retaining Wall - Access Area
L33201	Valve House - General Arrangement

Scale 'a' - Feet 100 50 0 100 200 300 400 Feet
Scale 'b' - Feet 40 20 0 40 80 120 160 Feet

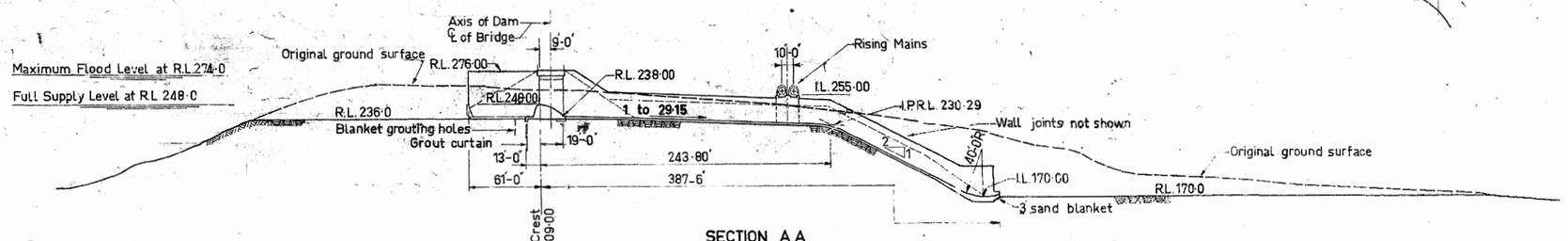
CONTRACT No 1918

Design	Drafting	Recommended
Prep. [illegible]	Dn [illegible]	[signature] Chief Designing Engineer
Ckd	Ckd [illegible]	Approved [signature] 12.1.72. Commissioner
Supv. KDV	Supv. R.McA	
Submitted [signature] Executive Engineer		

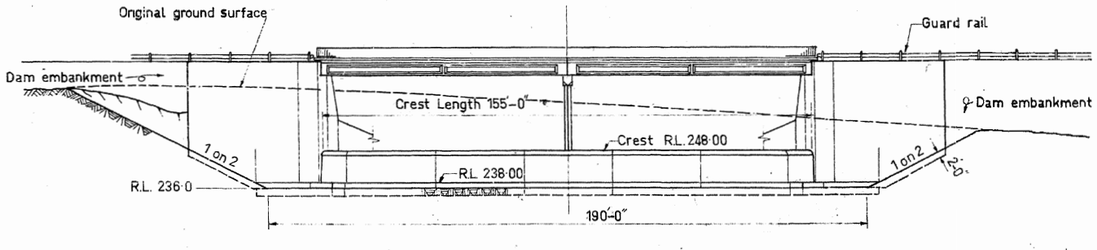
IRRIGATION AND WATER SUPPLY COMMISSION
KOLAN RIVER 47·5M - MONDURAN DAM
GENERAL ARRANGEMENT AND DETAILS
12-1-72 L28697 A B C D E



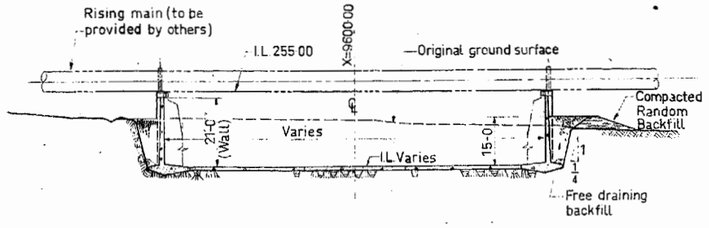
PLAN
Scale A



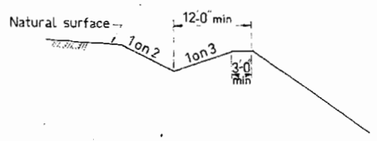
SECTION A A
Scale A



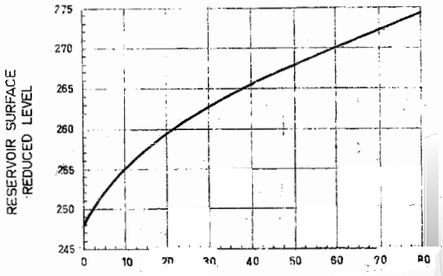
SECTION B B
Scale B



SECTION C C
Scale B



UNLINED SURFACE DRAIN
Scale C



SPILLWAY DISCHARGE CURVE

REFERENCE DRAWINGS

Kolan River – Monduran Dam

General Arrangement	L28697
Spillway Details (Sheet 1 of 2)	L28241
Spillway Details (Sheet 2 of 2)	L28242
Spillway Bridge – Precast unit details	L28244

NOTES

1. Actual excavation may vary from assumed excavation lines shown.
2. All structures shall be founded on sound material as determined by the Engineer.
3. The co-ordinates shown are in feet and refer to the local X-Y grid.
4. Reinforcement and anchor bars and foundation drains are required but not shown.
5. Foundation drainage is required but shown only in Section AA and CC.
6. For concrete requirements see Drawing L28242.
7. For reinforcement see Drawing L28243.

FOR SPILLWAY CAPACITY UPGRADE STAGE 1
IN 2006 REFER DWG. 225688

Revisions					Drawing Schedule	Survey Books		
Date	Remarks		Checked	Passed			Field	Level
11/8/06	A	SPILLWAY CAPACITY UPGRADE 2006	LD	JKR				

SCALES
Scale A 50 0 50 100 150 200
Scale B 20 0 20 40 60 80
Scale C 10 0 10 20 30 40
Scale of Feet

CONTRACT No. 1918

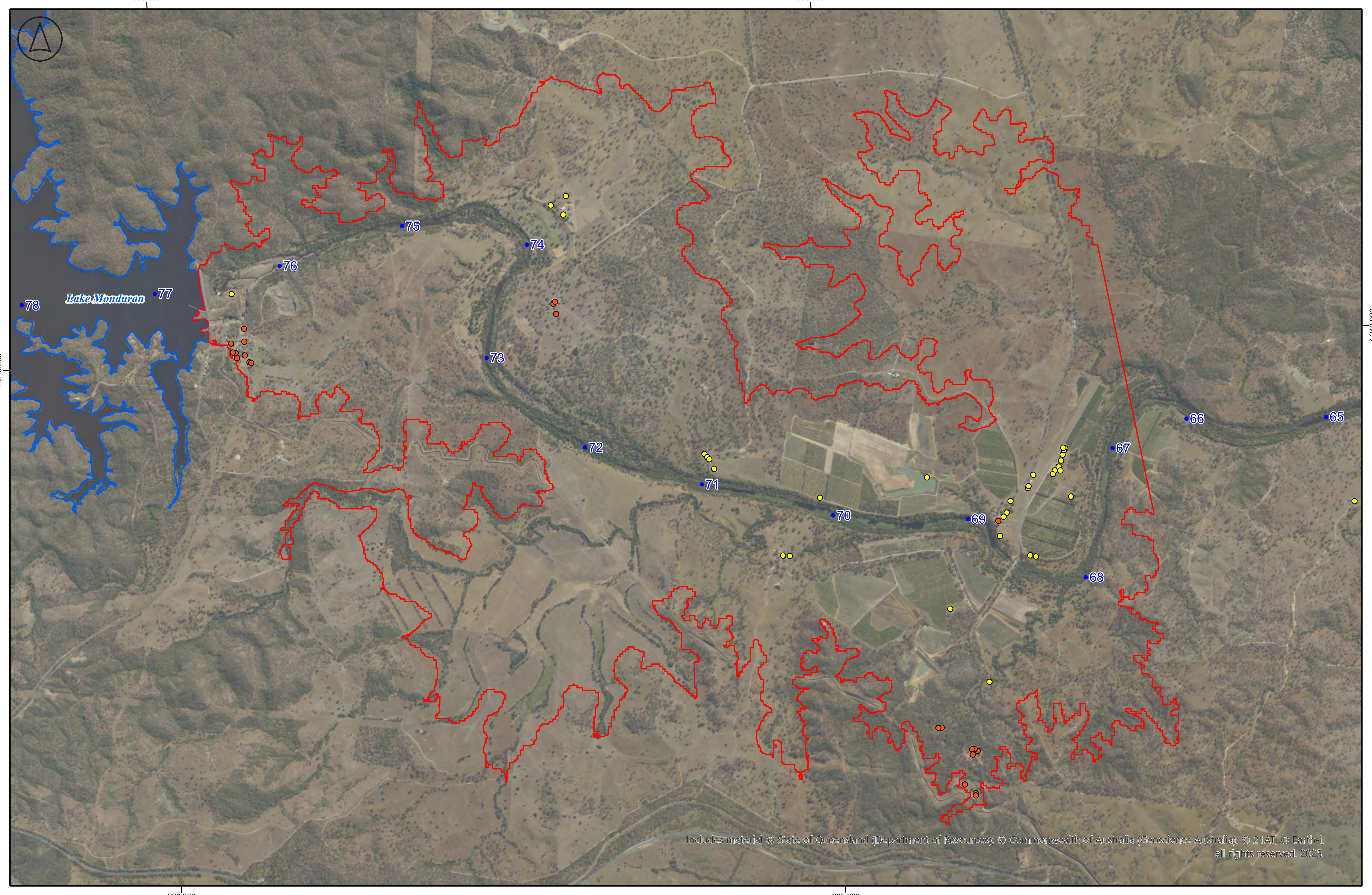
QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION
CHIEF DESIGNING ENGINEER
COMMISSIONER

SNOWY MOUNTAINS ENGINEERING CORPORATION
Drawn W.W.
Traced B.B.
Checked
Submitted
Recommended
Approved

QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION
KOLAN RIVER — MONDURAN DAM

SPILLWAY GENERAL ARRANGEMENT

L28240 A



Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271077-A.pagx
Date Exported: 31/07/2025 4:42 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:30,000
0 500 1,000 1,500 m

LEGEND
- Limit of Downstream Notification Area
- Dam Full Supply Level
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)

DRAWN	DESIGNED
HS	
CHECKED CC	CHECKED
APPROVED [redacted] 31/07/25 [redacted]	

sunwater

© Sunwater Limited
ACN 131 034 985

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DOWNSTREAM NOTIFCATION AREA

CONTRACT NUMBER

DRAWING NUMBER 271077 | REV. A

SHEET 1

DATE JULY 2025

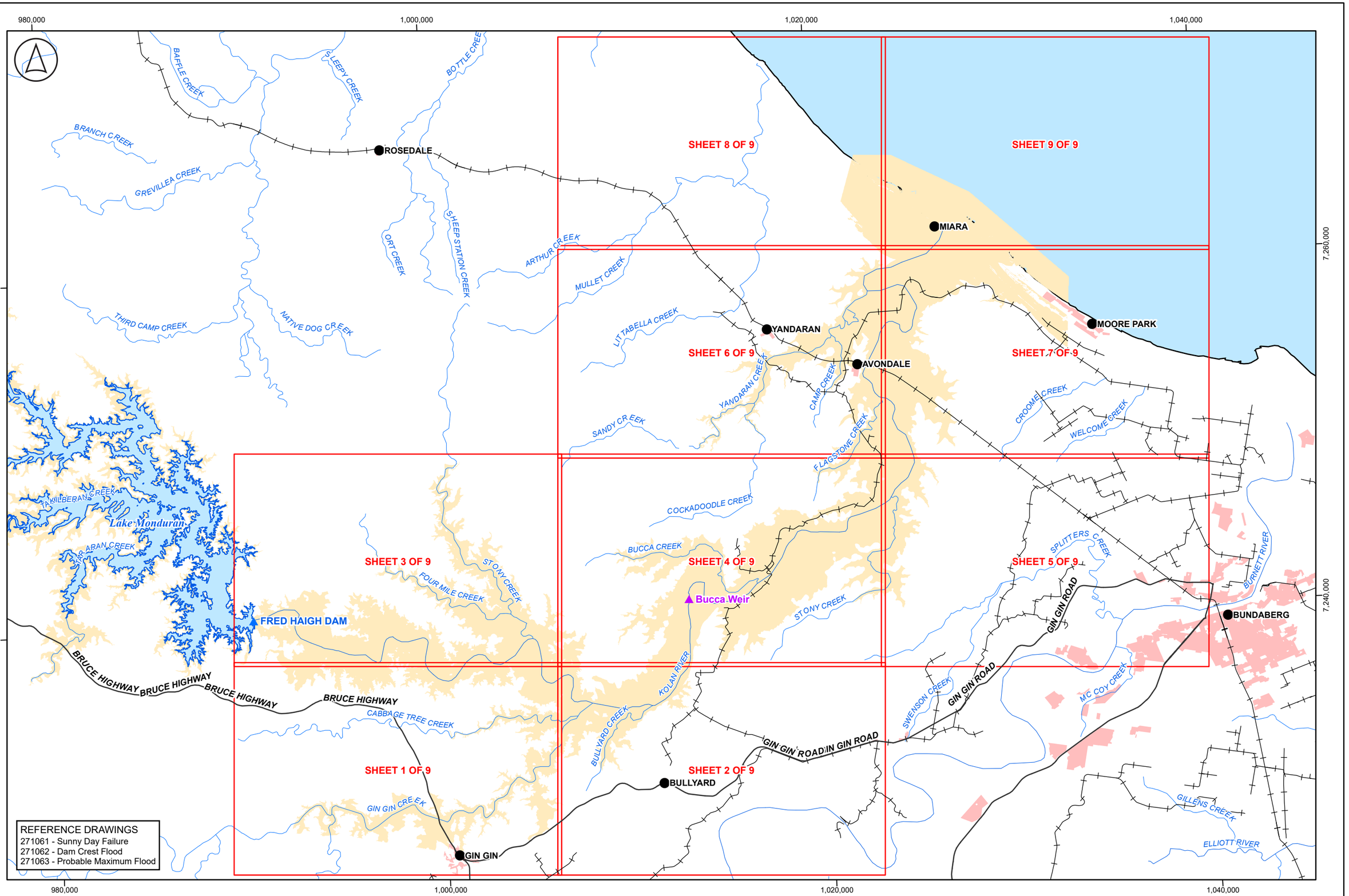
Appendix B3: Inundation maps

The following pages contain the Inundation Maps for Fred Haigh Dam

Drawings:

- Key Map
- Sunny Day Failure
- Dam Crest Flood
- Probable Maximum Precipitation Design Flood

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



REFERENCE DRAWINGS
271061 - Sunny Day Failure
271062 - Dam Crest Flood
271063 - Probable Maximum Flood

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:200,000
0 2,000 4,000 6,000 8,000 10,000 m

LEGEND
- Settlements
- Built Up Areas
- Maximum Flood Event
- Major Road
- Qld Rail Network
- Dam Full Supply Level
- Sunwater Storages
  - Dam
  - Offstream Storage
  - Weir
  - Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
INUNDATION PLANS
KEY MAP

CONTRACT NUMBER

DRAWING NUMBER	REV.
271060	A

SHEET 1

DATE JULY 2025

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271060-A.pagx
Date Exported: 31/07/2025 2:53 PM

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND

- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

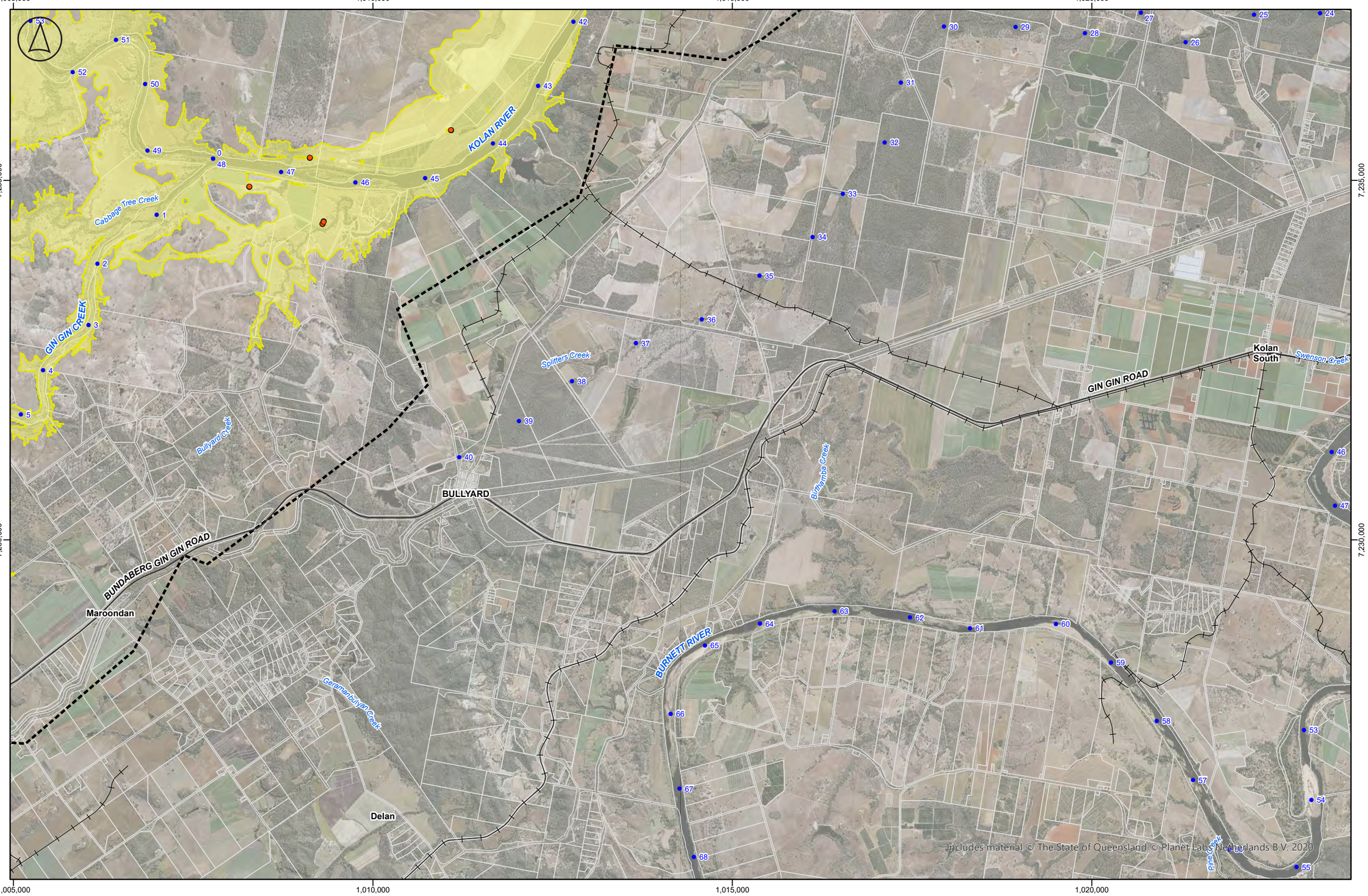
FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271061	A
SHEET 1 of 9	
DATE JULY 2025	

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

Document S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au



REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND

- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER

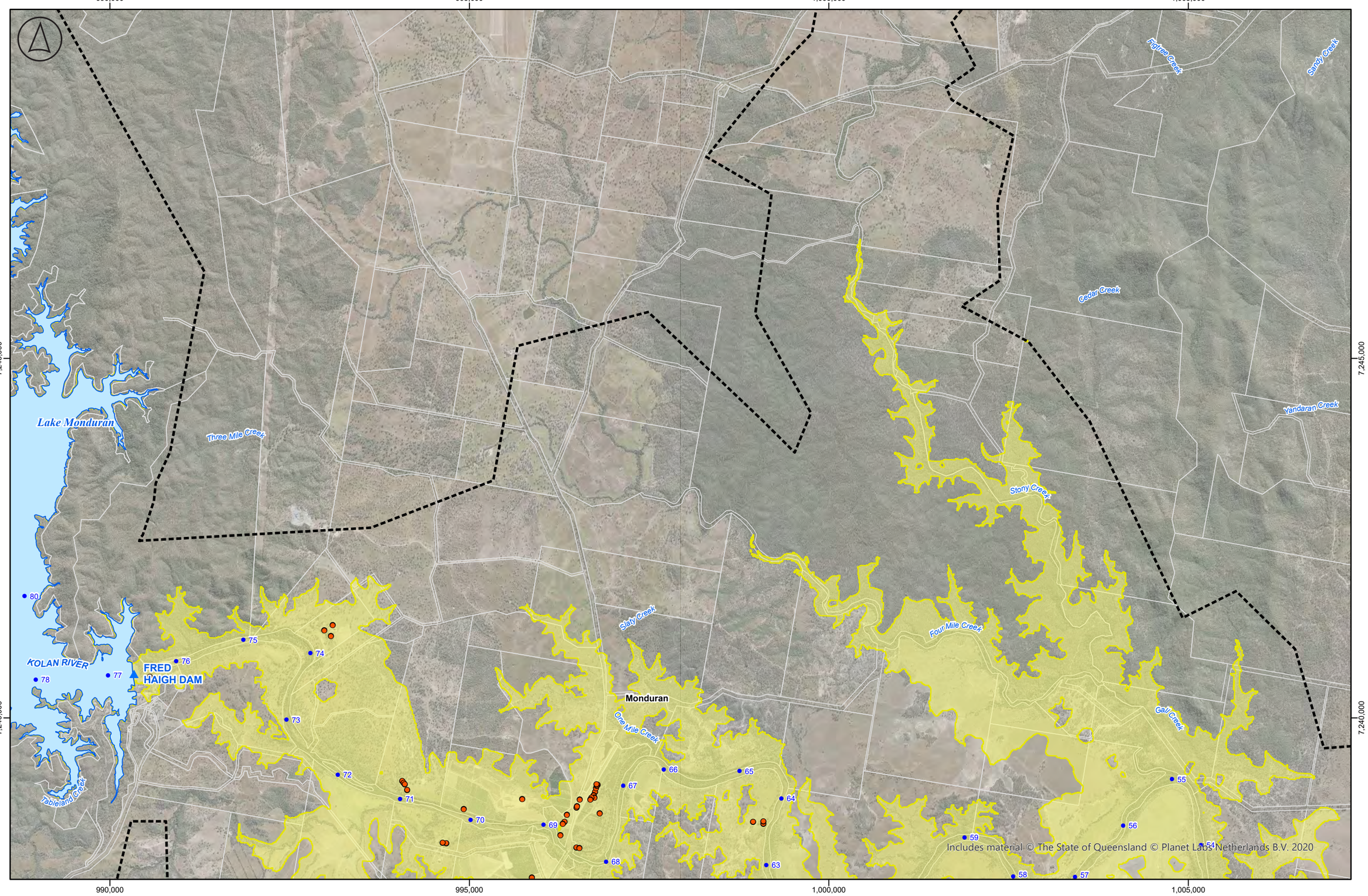
DRAWING NUMBER	REV.
271061	A

SHEET 2 of 9

DATE JULY 2025

Document S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au



REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND

- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER 271061	REV. A
SHEET 3 of 9	
DATE JULY 2025	

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

1,010,000 1,015,000 1,020,000

7,245,000

7,240,000

Flagstone Creek
Kanabar Creek
Cockatoodale Creek
Yandaran Creek
Bucca Creek
Gail Creek
Stony Creek
KOLAN RIVER
Invicta
Bucca
Kolan
Bucca Weir
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271061	A
SHEET 4 of 9	
DATE JULY 2025	

Document S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

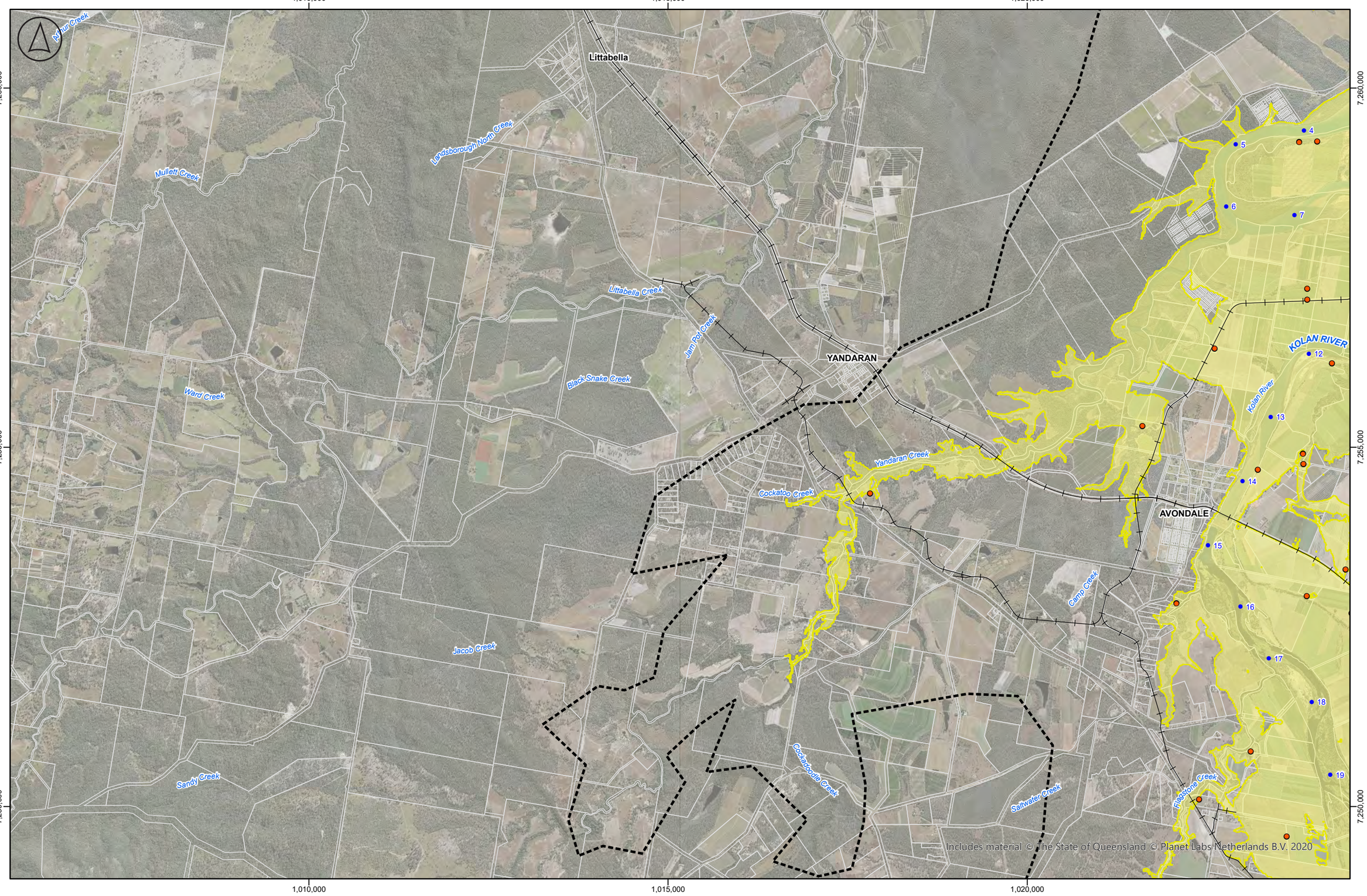
Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271061	A
SHEET 5 of 9	
DATE JULY 2025	



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

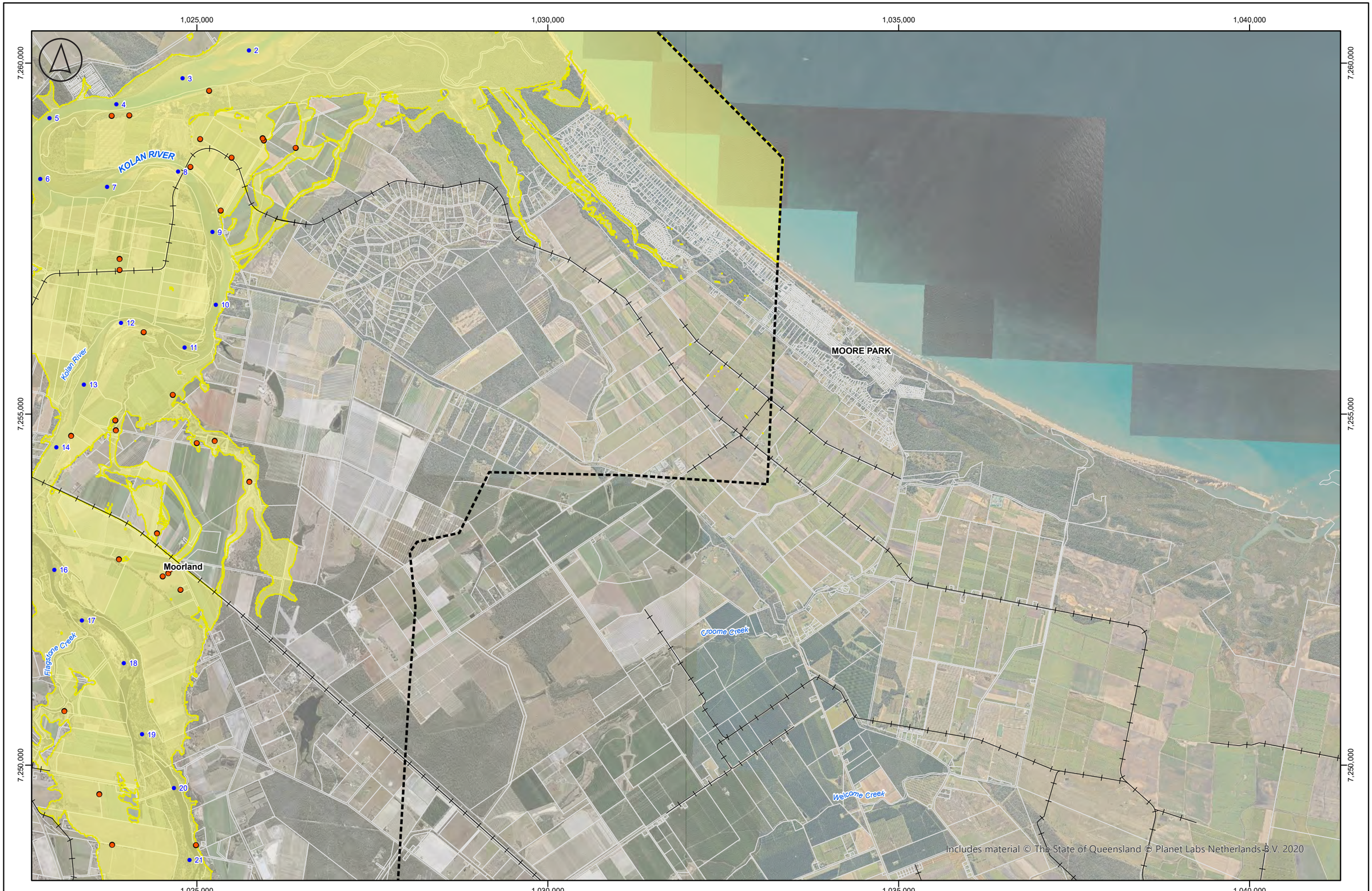
FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
271061	A

SHEET **6 of 9**

DATE **JULY 2025**



Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted] 31/07/25	

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER

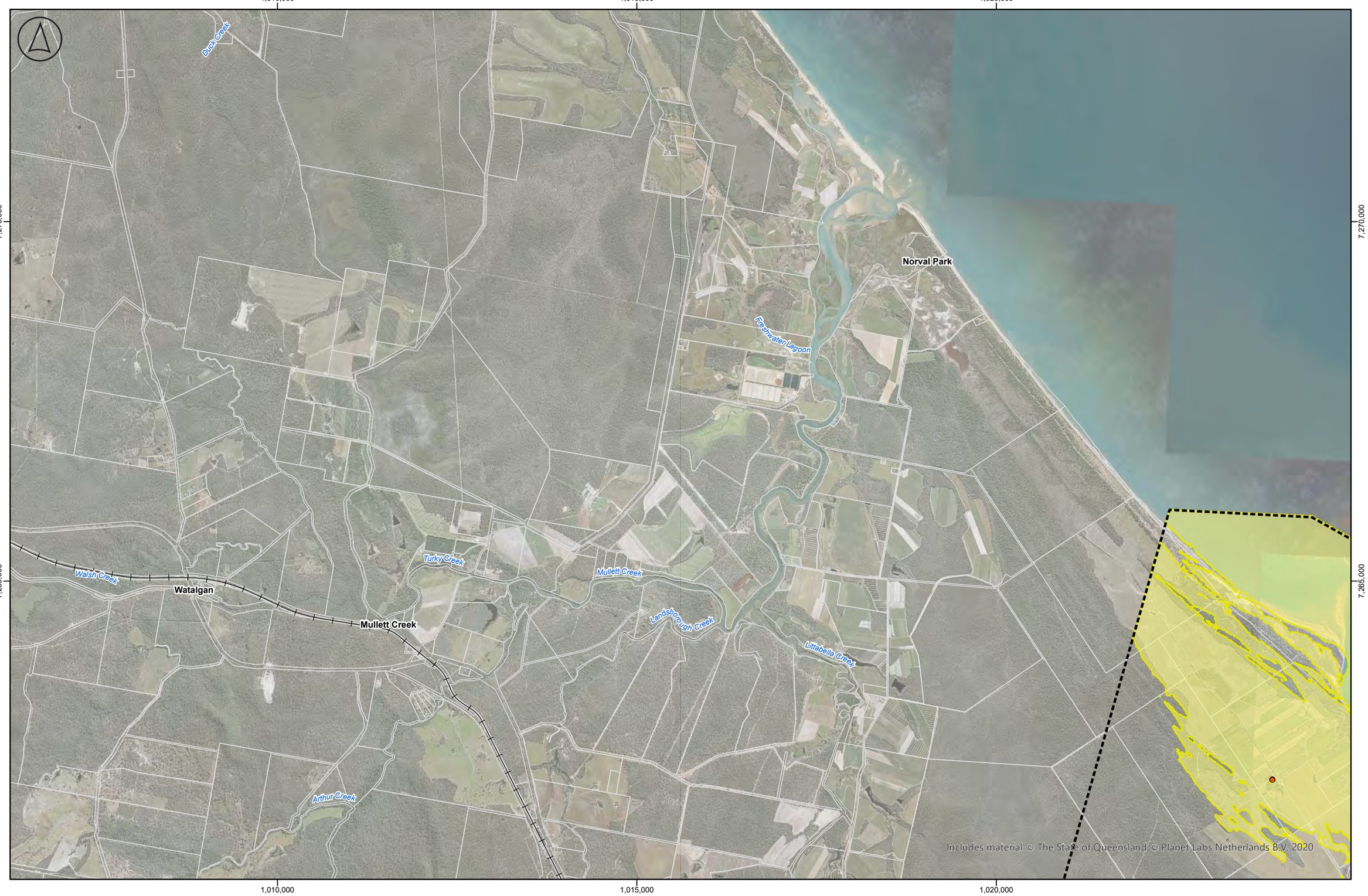
DRAWING NUMBER	REV.
271061	A

SHEET 7 of 9

DATE JULY 2025

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au



REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

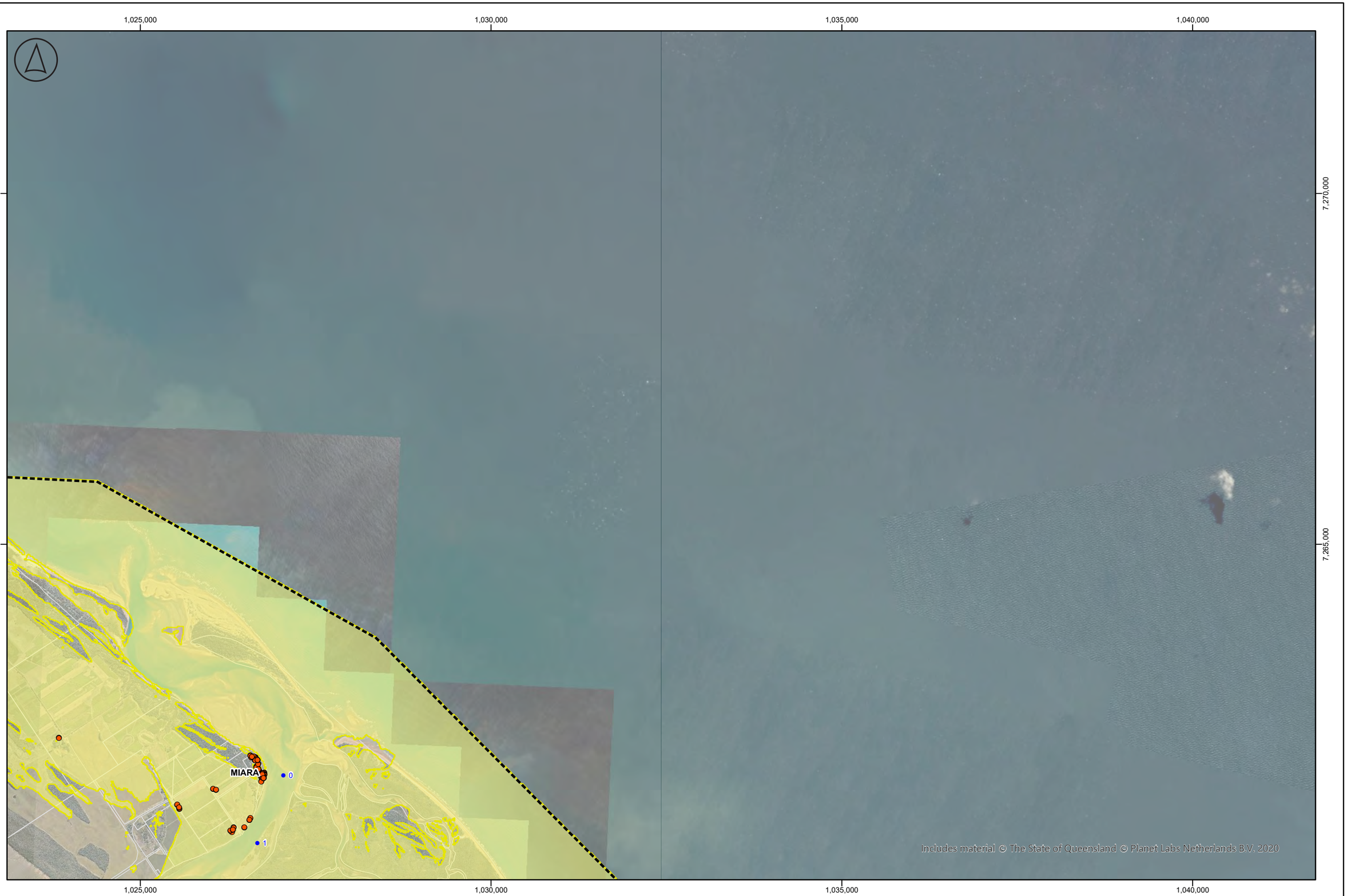
sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271061	A
SHEET 8 of 9	
DATE JULY 2025	

Document S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap271061-A.pagx
Date Exported: 31/07/2025 2:48 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au



REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000

0 500 1,000 1,500 2,000 2,500 m

LEGEND

- Sunny Day Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

- Dam
- Offstream Storage
- Weir
- Anabranch Weir

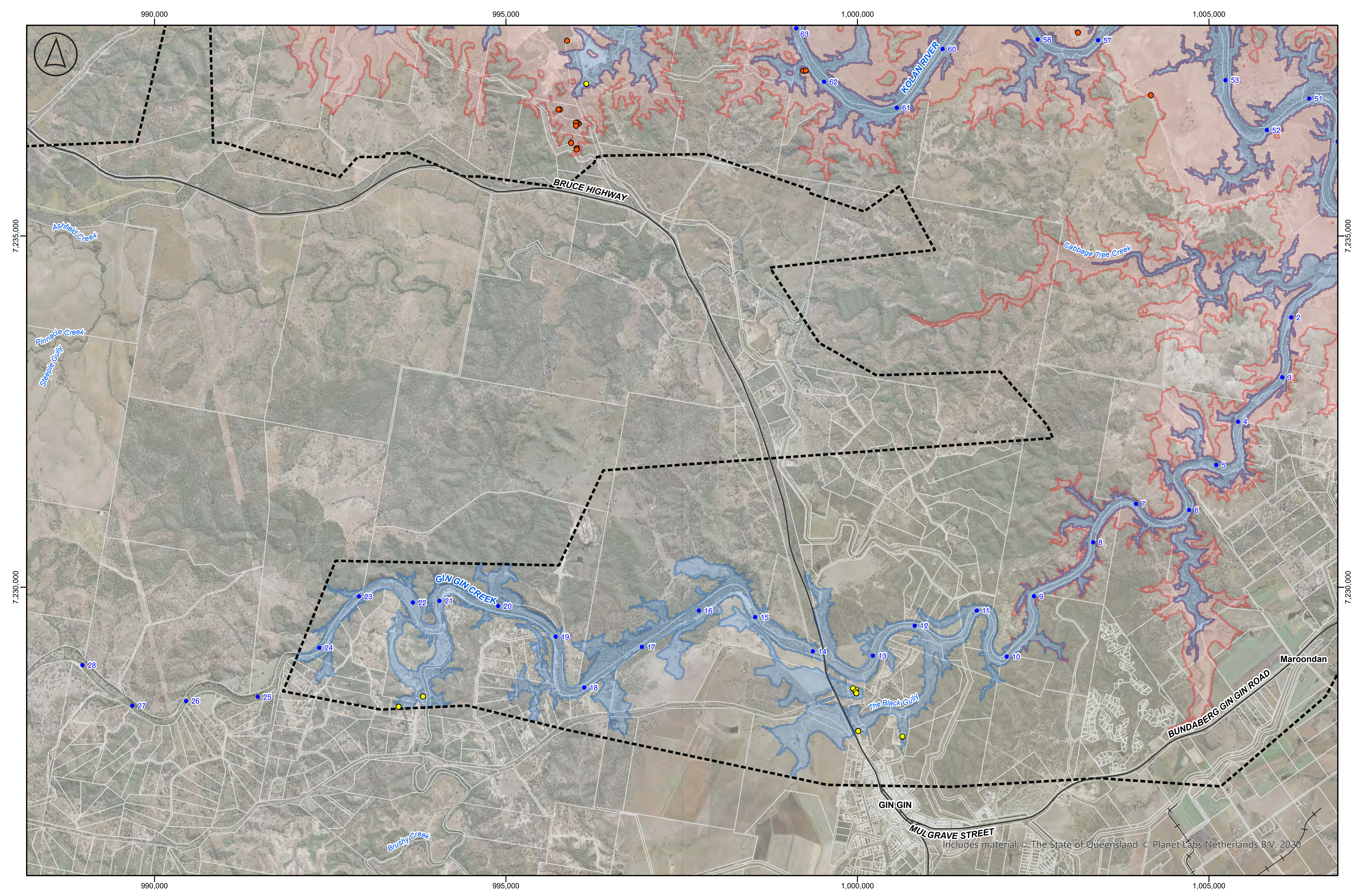
DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted] 31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
SUNNY DAY FAILURE
INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271061	A
SHEET 9 of 9	
DATE JULY 2025	

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED CC	CHECKED
APPROVED [redacted] 31/07/25 [redacted]	

sunwater

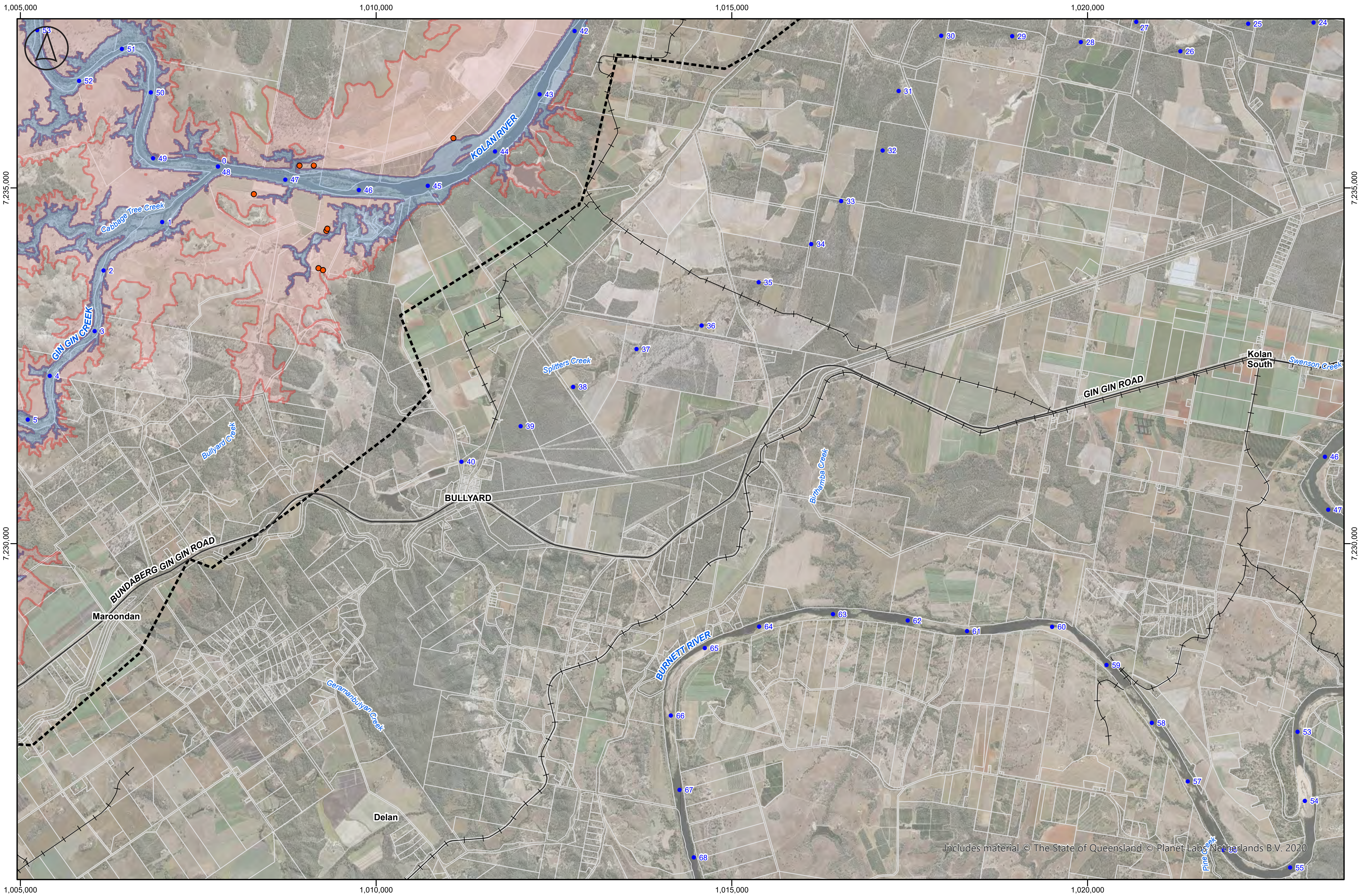
FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
271062	A

SHEET 1 of 9
DATE JULY 2025

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

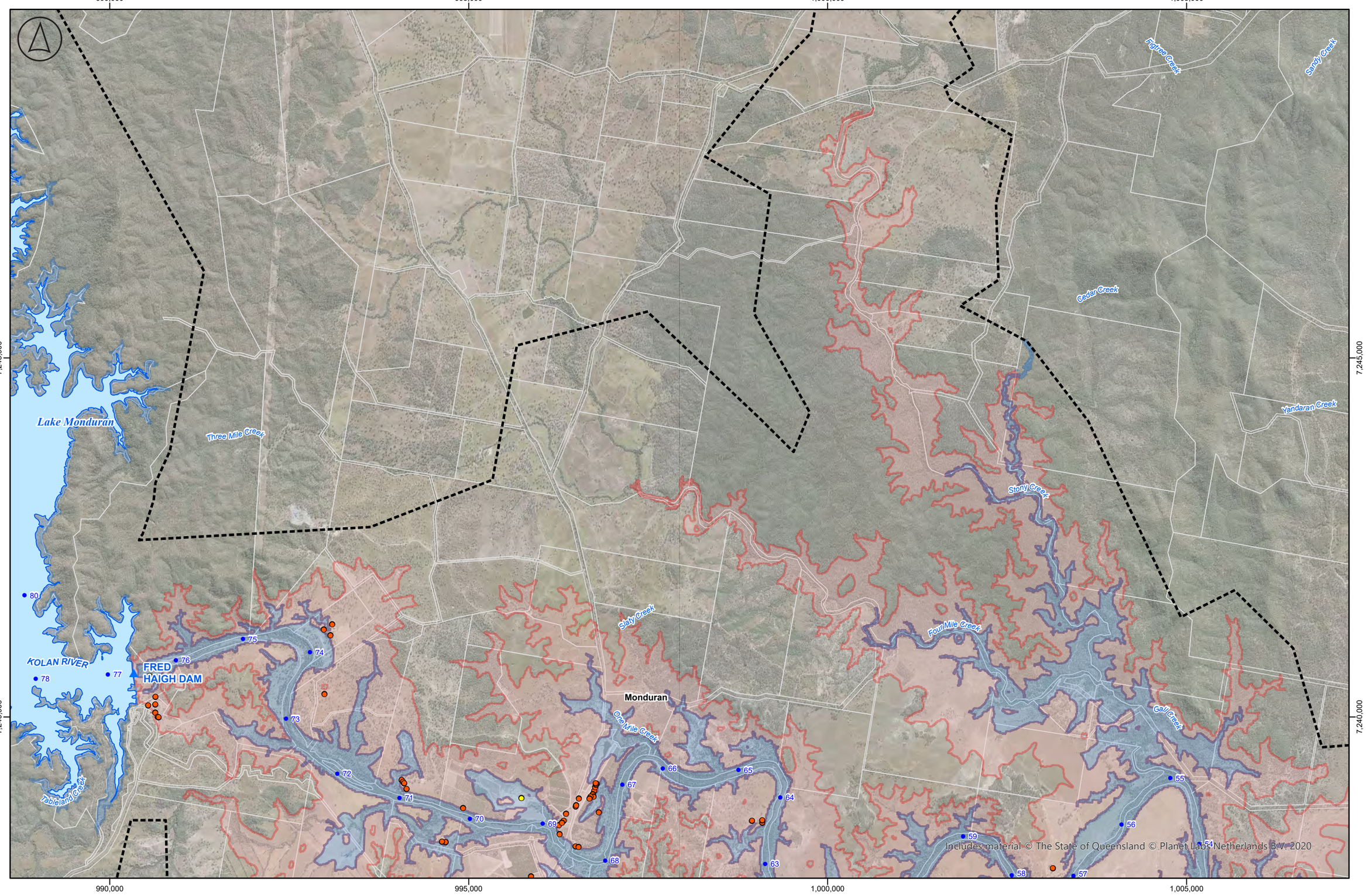
DRAWN: HS
DESIGNED:
CHECKED: CC
CHECKED:
APPROVED: [redacted]
31/07/25 [redacted]

sunwater
© Sunwater Limited
ACN 131 034 985

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER: 271062
REV.: A
SHEET 2 of 9
DATE JULY 2025

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

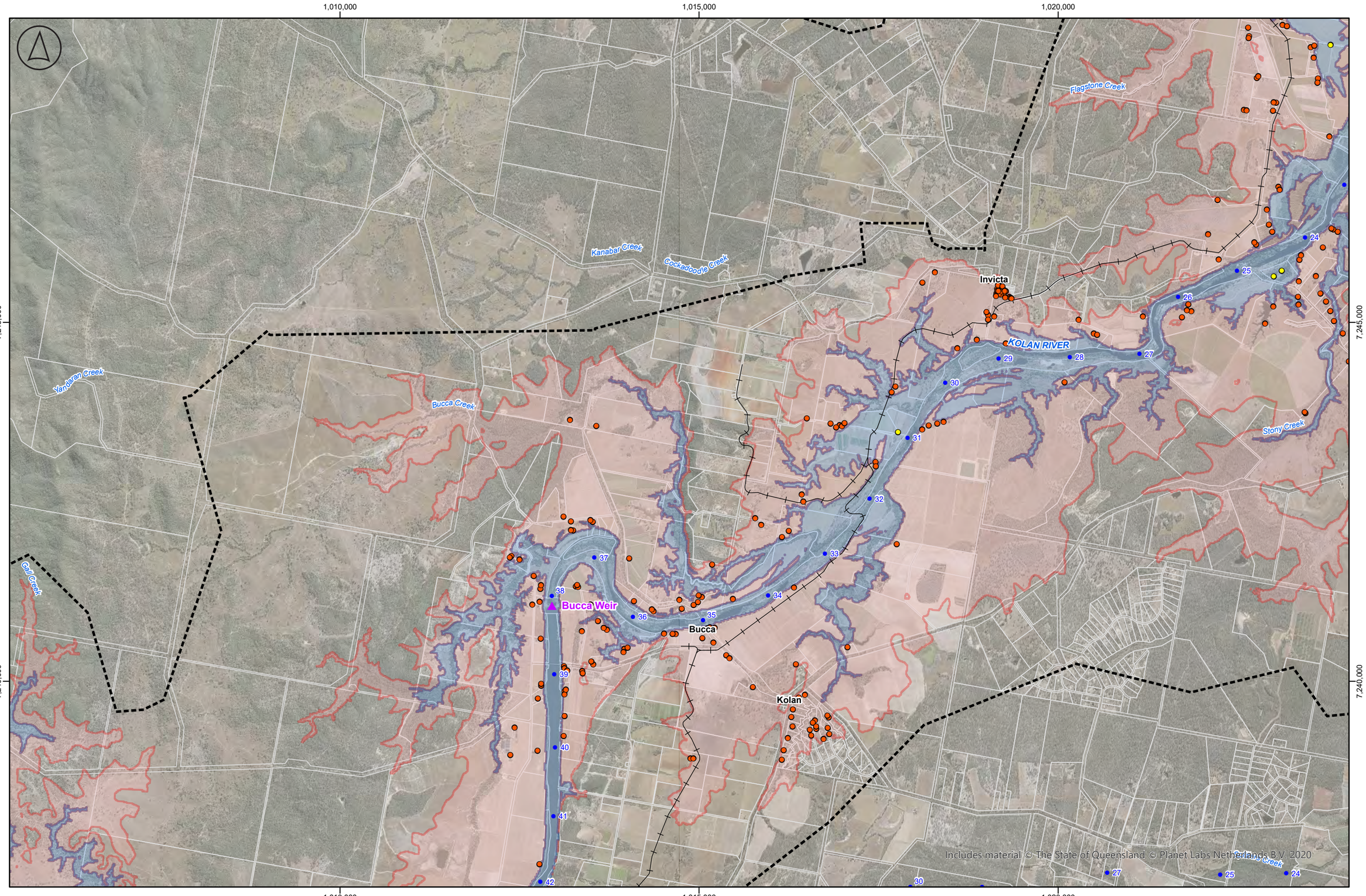
Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271062	A
SHEET 3 of 9	
DATE JULY 2025	



Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted] 31/07/25	

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER

DRAWING NUMBER	REV.
271062	A

SHEET **4 of 9**

DATE **JULY 2025**

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

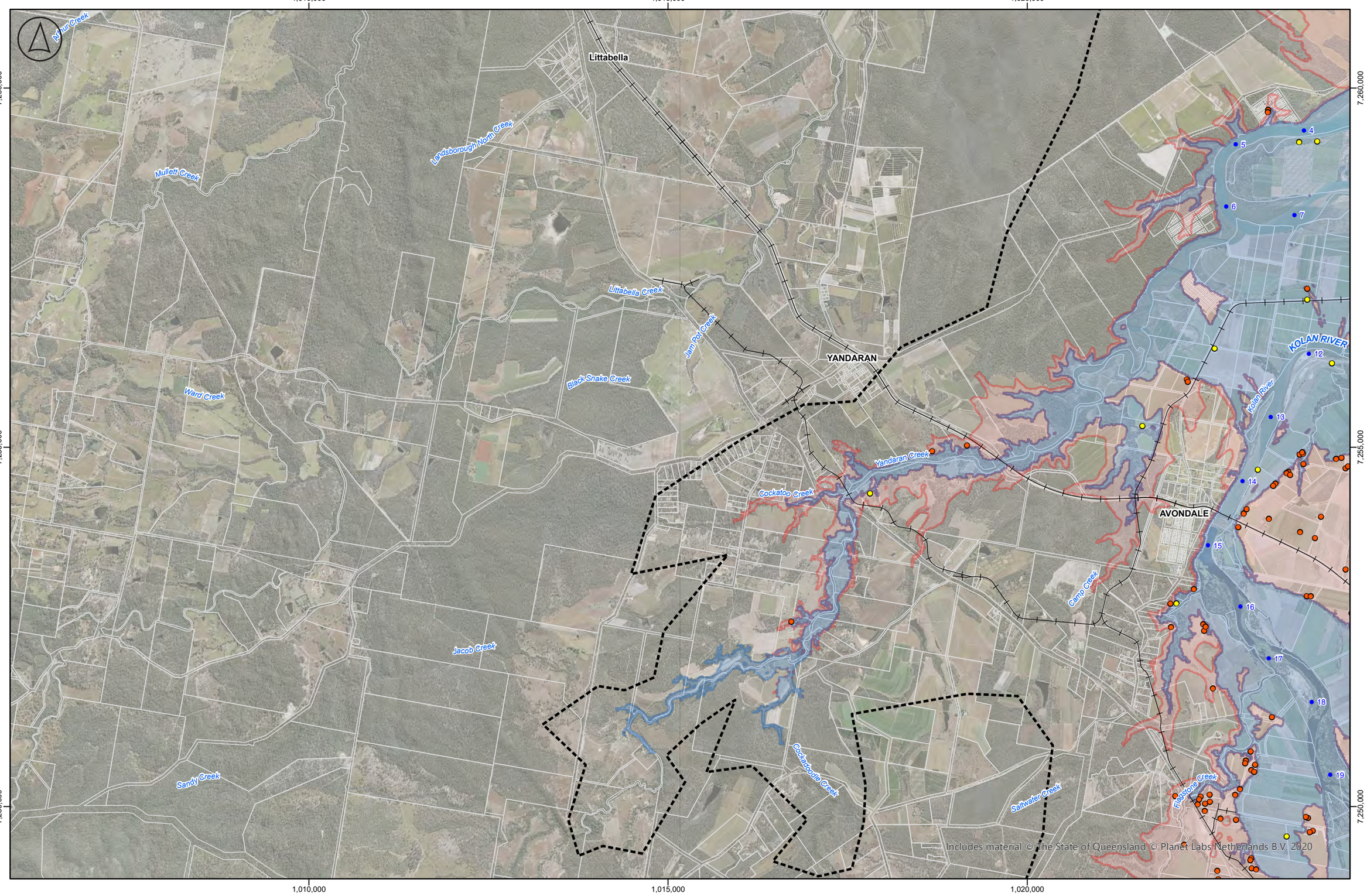
sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER 271062	REV. A
SHEET 5 of 9	
DATE JULY 2025	

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au



REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND

- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted] 31/07/25	

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER

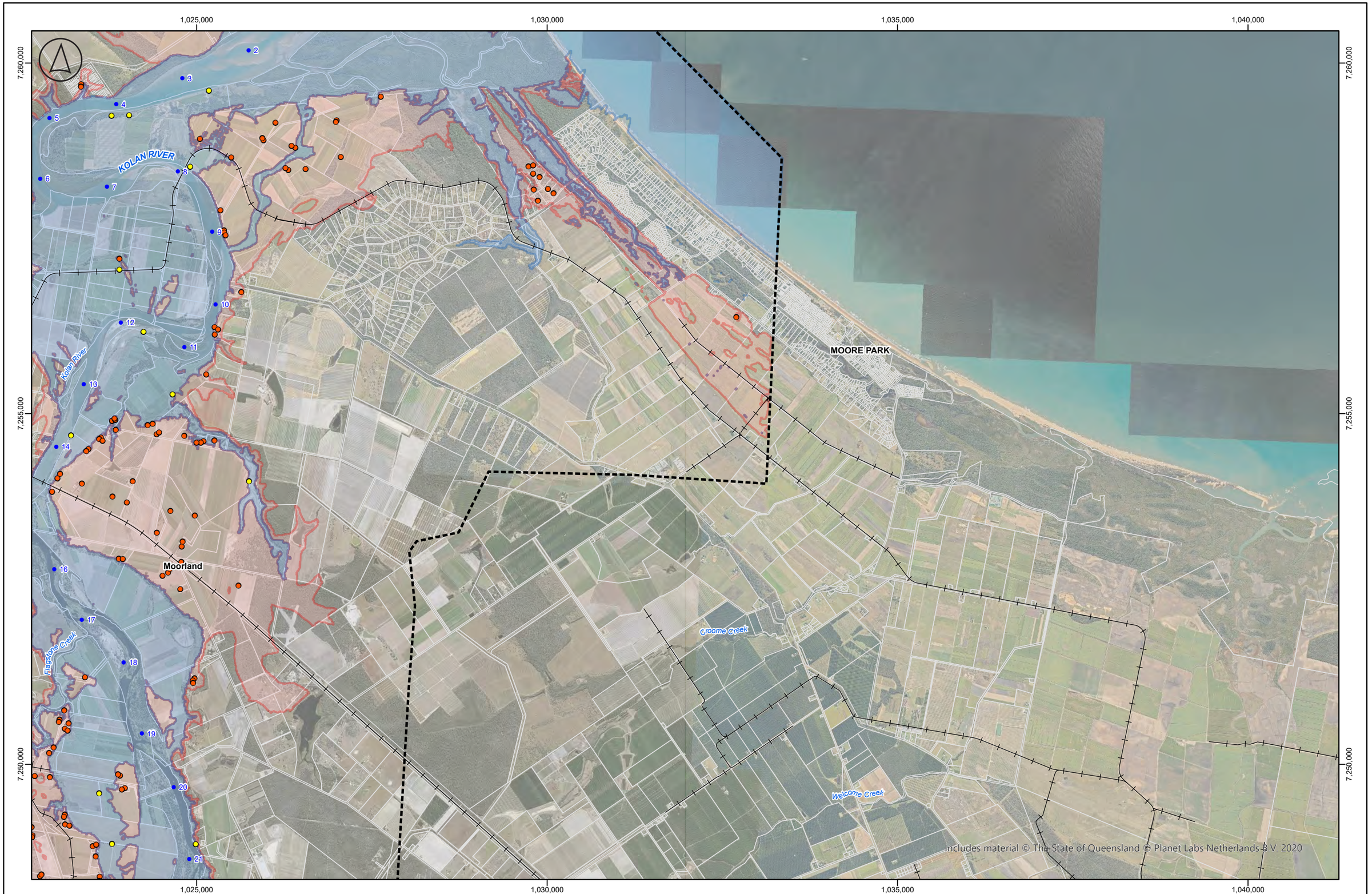
DRAWING NUMBER	REV.
271062	A

SHEET 6 of 9

DATE JULY 2025

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au



REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND

- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

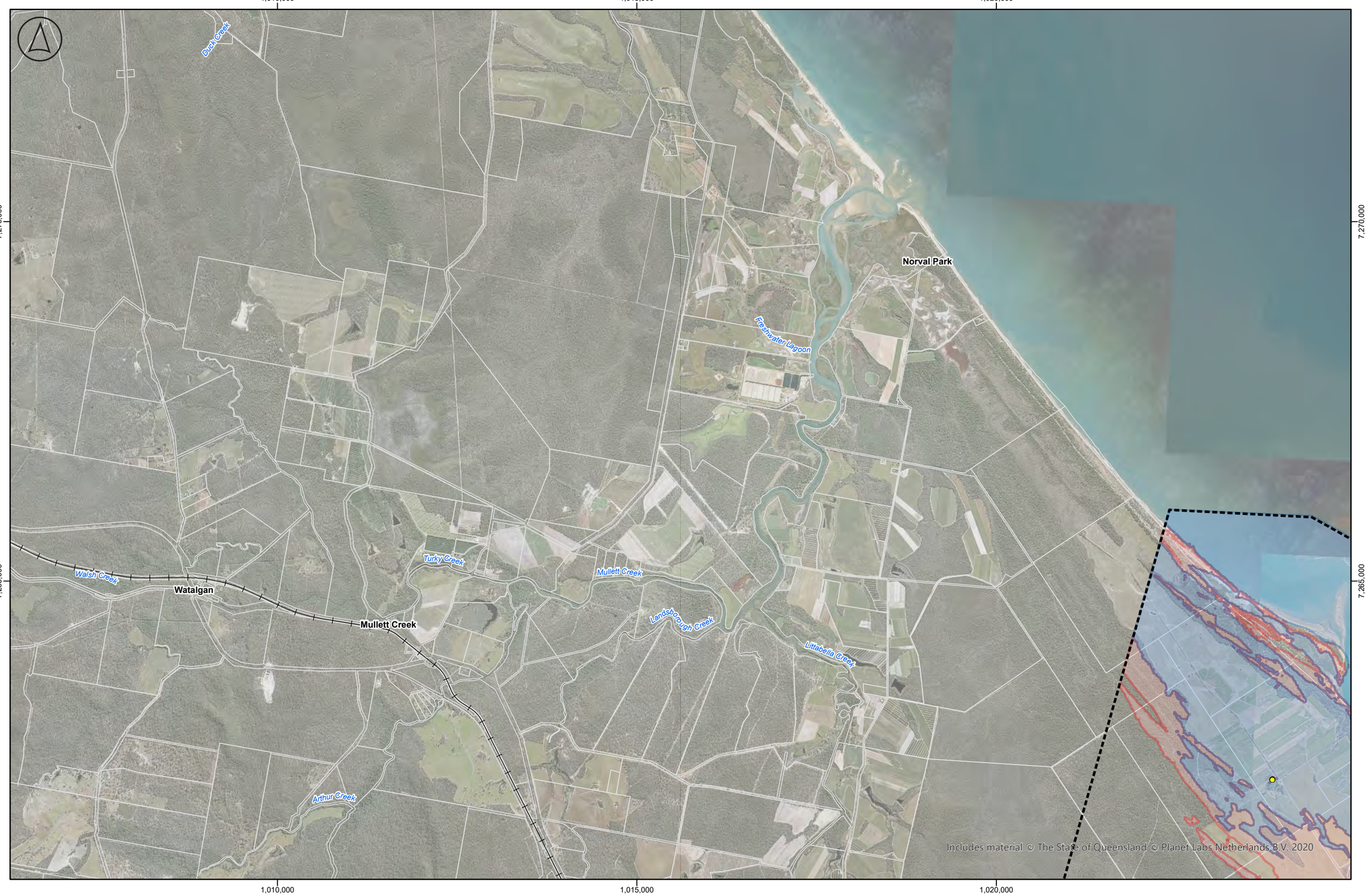
sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271062	A
SHEET 7 of 9	
DATE JULY 2025	

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au



REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND

- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

- Dam
- Offstream Storage
- Weir
- Anabranch Weir

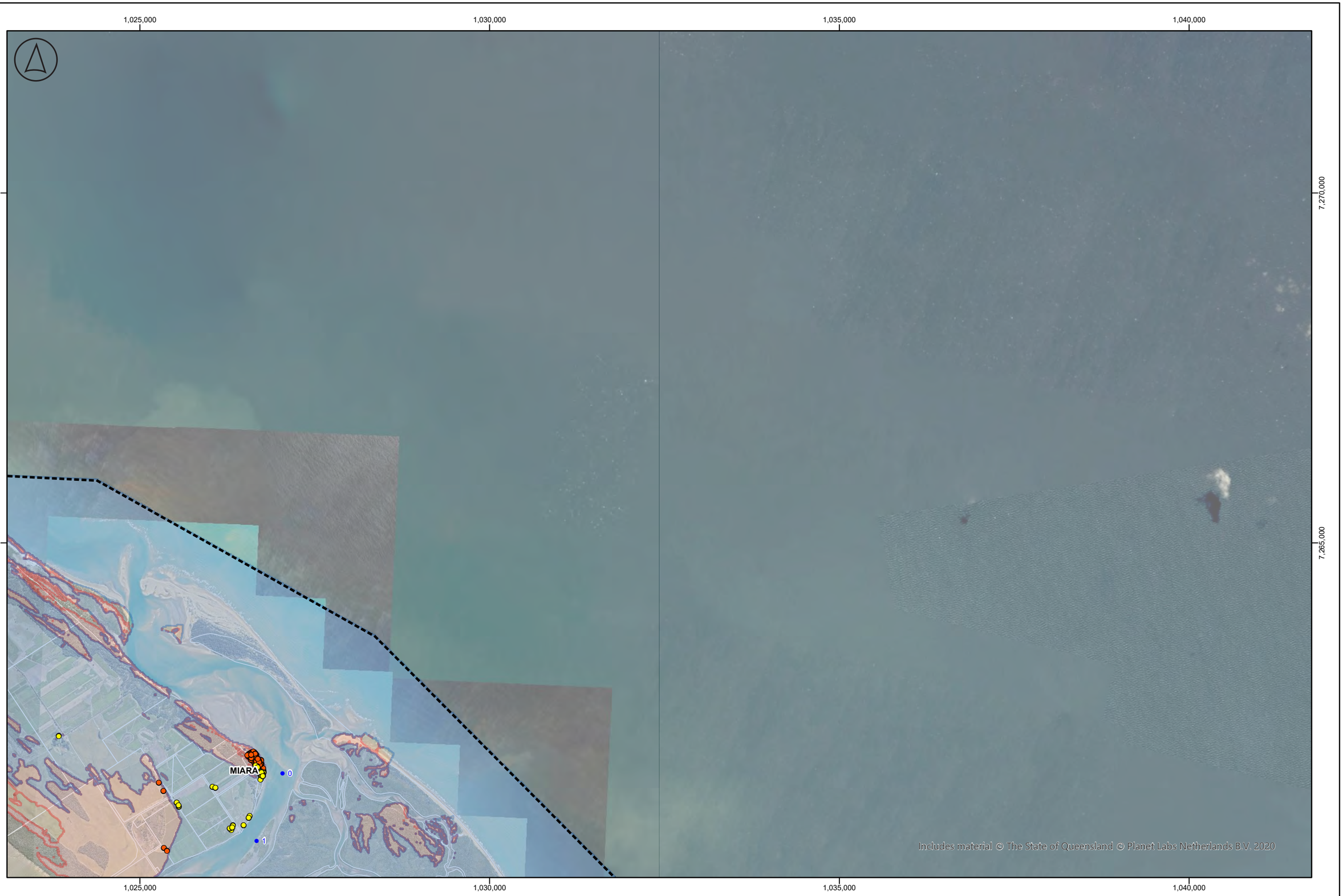
DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271062	A
SHEET 8 of 9	
DATE JULY 2025	

Document S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271062-A.pagx
Date Exported: 31/07/2025 2:43 PM



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- DCF - No Dam Failure
- DCF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

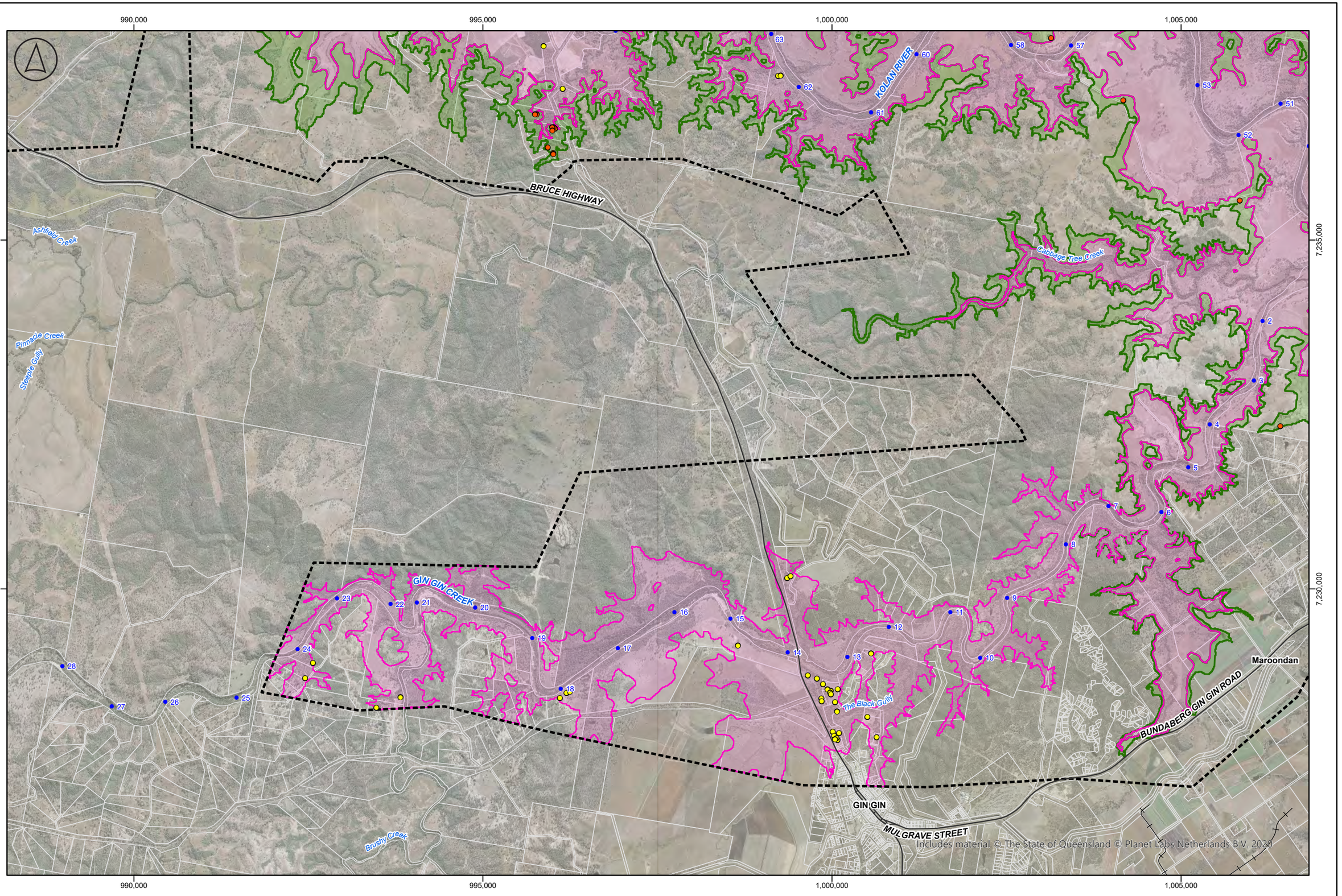
Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
DAM CREST FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271062	A
SHEET 9 of 9	
DATE JULY 2025	



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

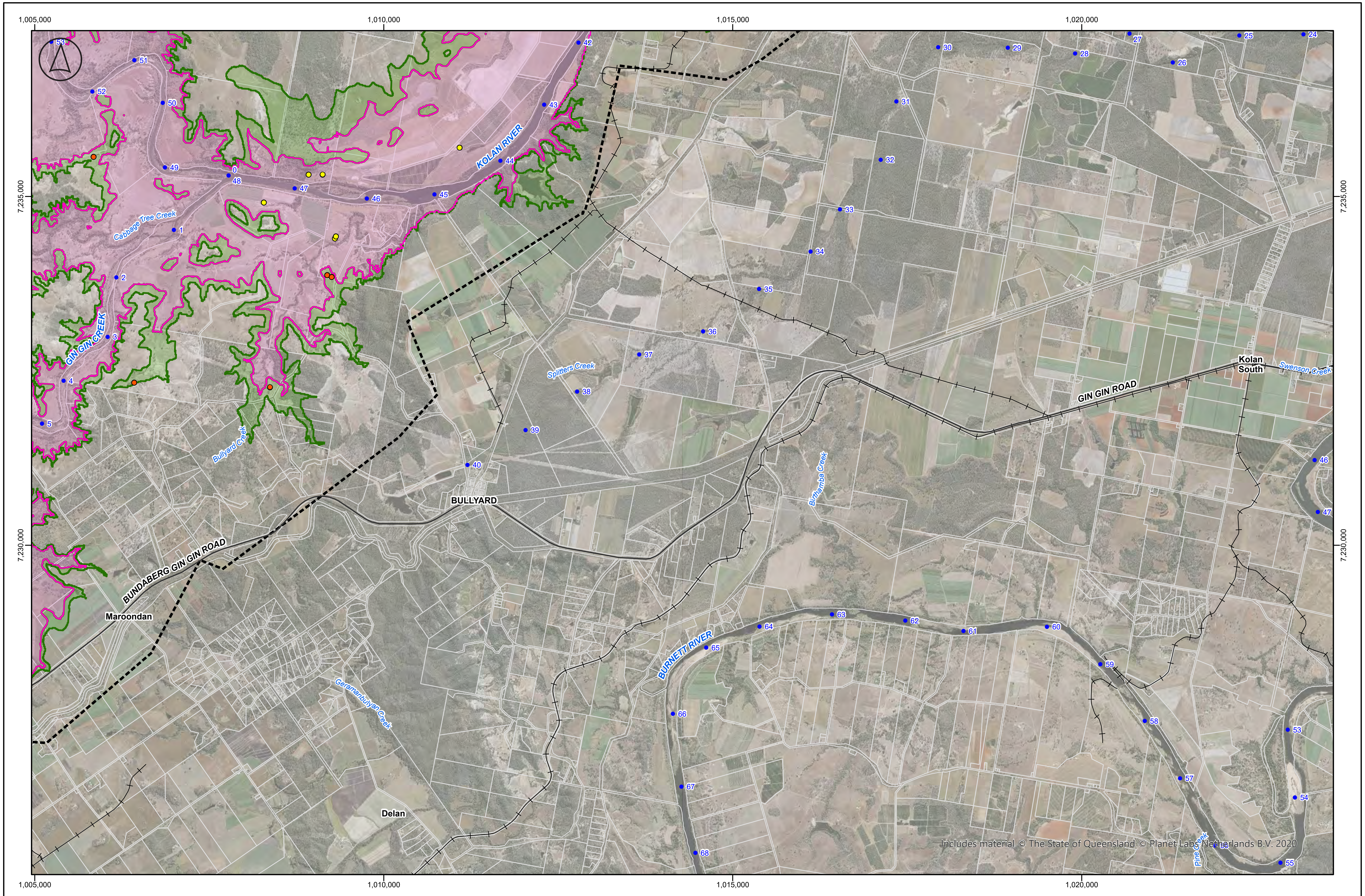
sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER 271063	REV. A
SHEET 1 of 9	
DATE JULY 2025	

This data is provided for general information only, and does not constitute professional advice. While reasonable efforts have been made to ensure the accuracy of the data at the time of publication, Sunwater makes no representation or warranties as to its accuracy, reliability, completeness or fitness for any particular purpose. This data may be subject to change without notice and should be independently verified. Sunwater disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including direct or consequential damage) and costs which you may incur in connection with your use of the data.

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

DATE		REMARKS	CKD	PSD
31/07/25	A	ISSUED FOR USE	CC	MGH

REVISION

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted] 31/07/25 [redacted]	

sunwater
© Sunwater Limited
ACN 131 034 985

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD
INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER 271063
REV. A
SHEET 2 of 9
DATE JULY 2025

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

990,000 995,000 1,000,000 1,005,000

7,245,000

7,240,000

Lake Monduran
Three Mile Creek
Figtree Creek
Sandy Creek
Cedar Creek
Yandaran Creek
Stony Creek
Slaty Creek
Four Mile Creek
Gal Creek
One Mile Creek
Tableland Creek
KOLAN RIVER
FRED HAIGH DAM
Monduran

80 75 76 74 78 77 73 72 71 70 69 68 67 66 65 64 63 59 58 57 56 55 54

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

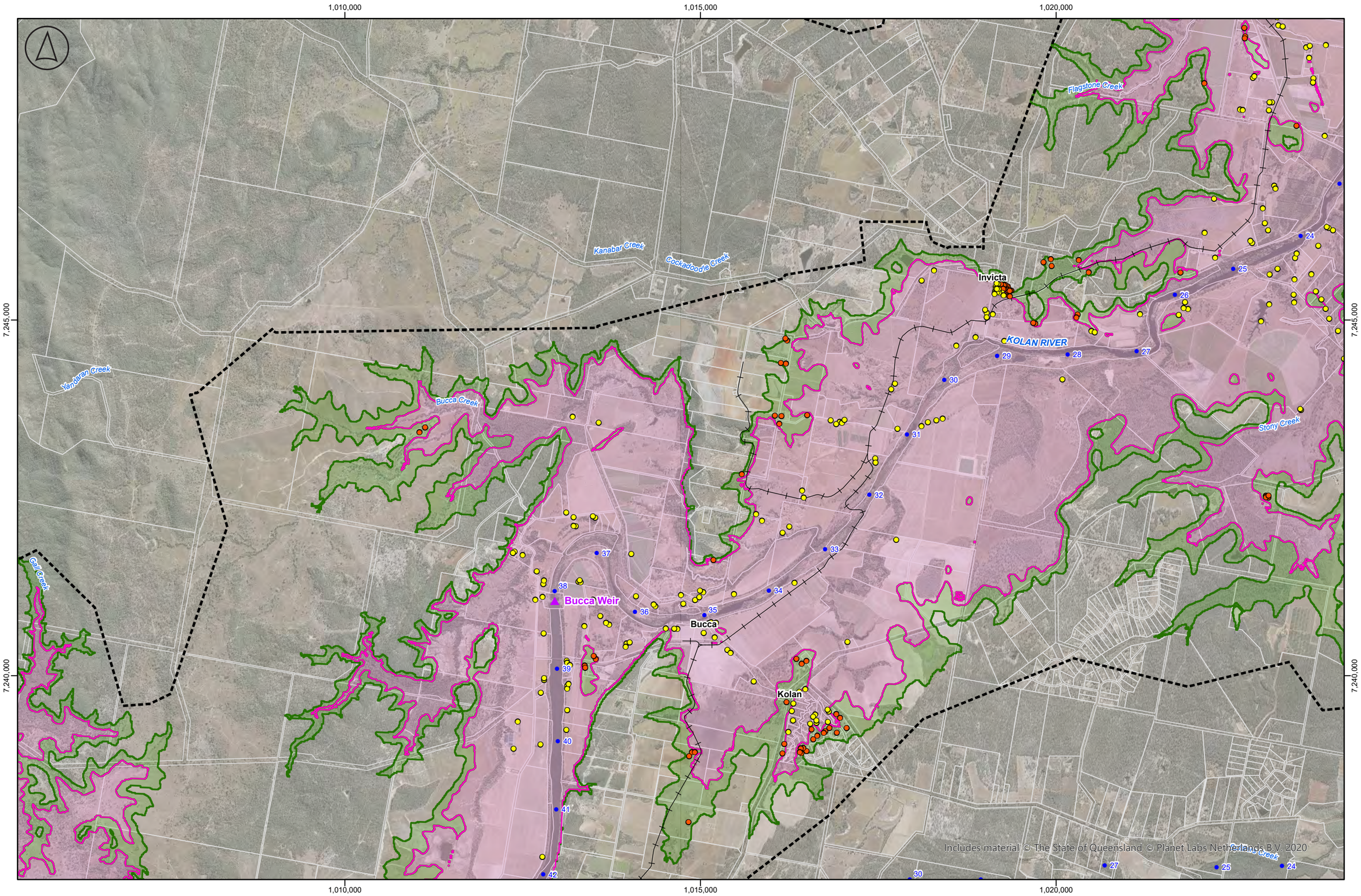
Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER 271063	REV. A
SHEET 3 of 9	
DATE JULY 2025	



Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted] 31/07/25	

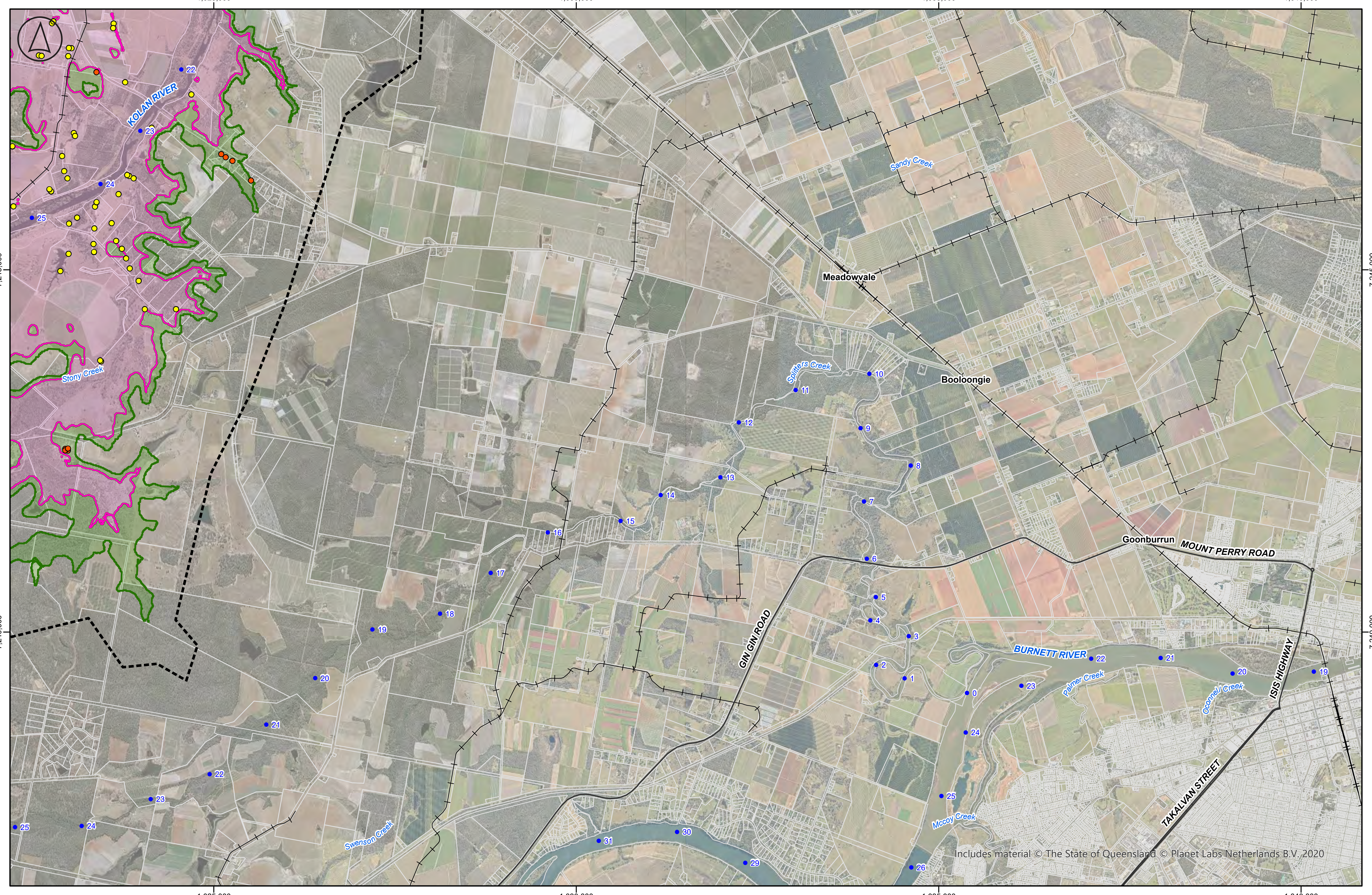
sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER 271063	REV. A
SHEET 4 of 9	
DATE JULY 2025	

This data is provided for general information only, and does not constitute professional advice. While reasonable efforts have been made to ensure the accuracy of the data at the time of publication, Sunwater makes no representation or warranties as to its accuracy, reliability, completeness or fitness for any particular purpose. This data may be subject to change without notice and should be independently verified. Sunwater disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including direct or consequential damage) and costs which you may incur in connection with your use of the data.

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2023\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM



REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED CC	CHECKED
APPROVED [redacted] 31/07/25 [redacted]	

sunwater

FRED HAIGH DAM DAM BREAK ANALYSIS 2022 PROBABLE MAXIMUM FLOOD INUNDATION PLAN

CONTRACT NUMBER

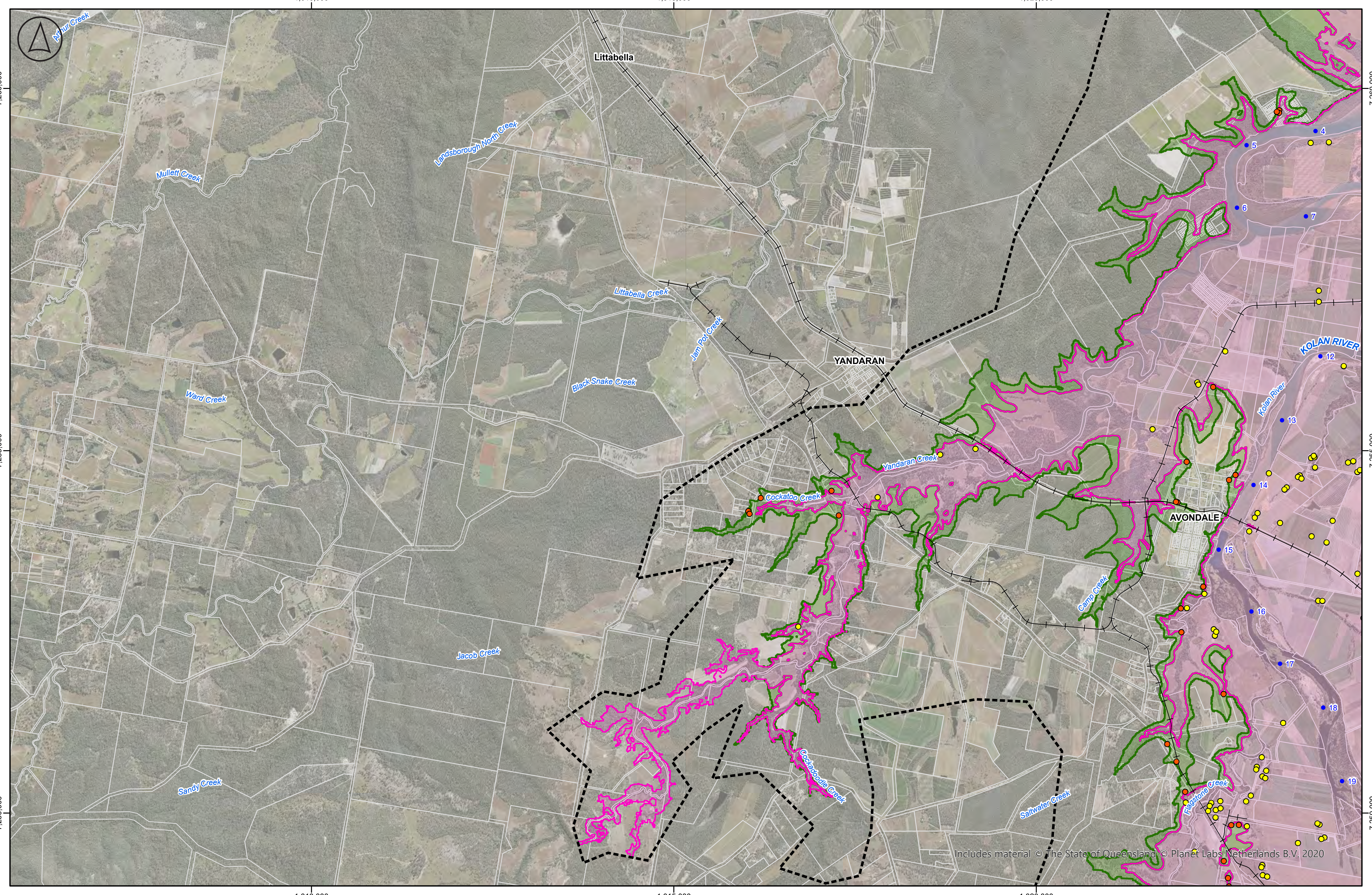
DRAWING NUMBER 271063 | REV. A

SHEET 5 of 9

DATE JULY 2025

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN HS
DESIGNED
CHECKED CC
CHECKED
APPROVED [redacted]
31/07/25 [redacted]

sunwater

© Sunwater Limited
ACN 131 034 985

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD
INUNDATION PLAN

CONTRACT NUMBER
DRAWING NUMBER 271063
REV. A
SHEET 6 of 9
DATE JULY 2025

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

1,025,000 1,030,000 1,035,000 1,040,000

7,260,000 7,255,000 7,250,000

KOLAN RIVER
Kolan River
Moorland
MOORE PARK
Flagstone Creek
Croome Creek
Welcome Creek

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND
- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

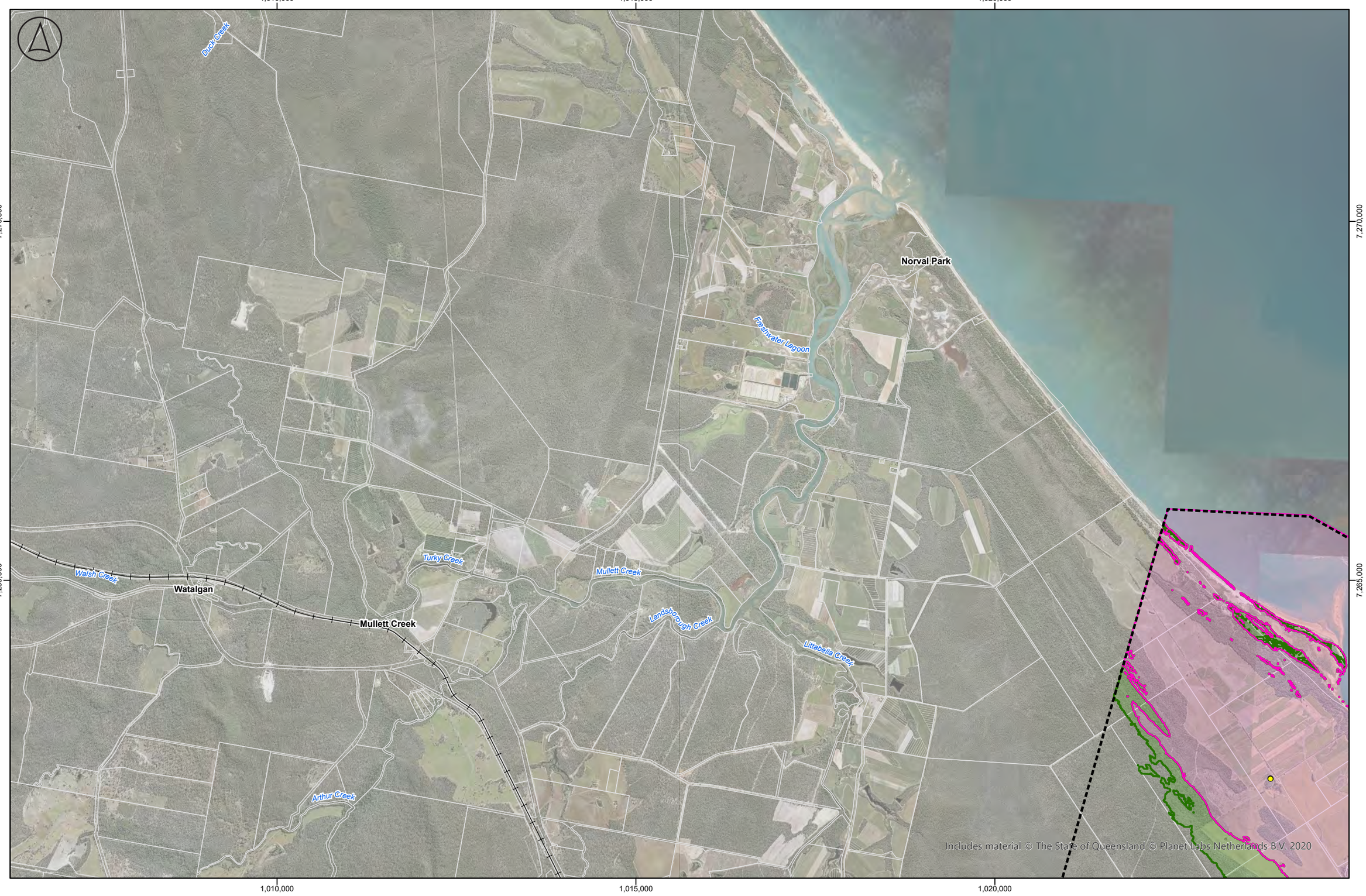
Sunwater Storages
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted] 31/07/25	

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER 271063	REV. A
SHEET 7 of 9	
DATE JULY 2025	



Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM

Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION					
31/07/25	A	ISSUED FOR USE	CC	MGH	
DATE		REMARKS	CKD	PSD	

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND

- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD INUNDATION PLAN

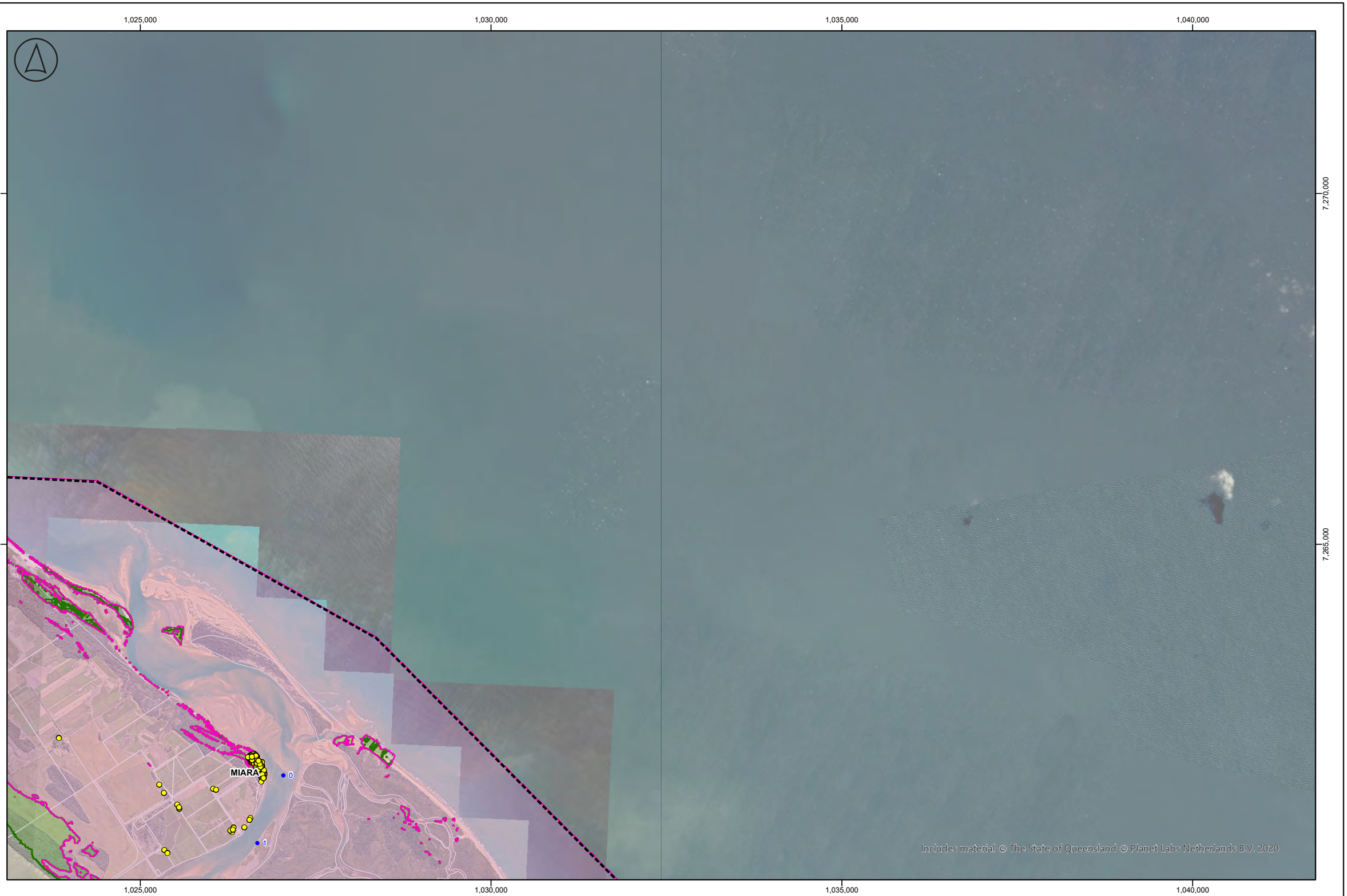
CONTRACT NUMBER

DRAWING NUMBER	REV.
271063	A

SHEET 8 of 9

DATE JULY 2025

Document: S:\BW_WaterResources\GIS_Data\SW_Bundaberg WSS\FredHaighDam_EAP2025\ArcMap\271063-A.pagx
Date Exported: 31/07/2025 2:37 PM



Map Produced By:
Sunwater GIS
GISAdmin@sunwater.com.au

REVISION				
31/07/25	A	ISSUED FOR USE	CC	MGH
DATE		REMARKS	CKD	PSD

MAP INFORMATION
GDA 94 Zone 56.

Scale @A3: 1:50,000
0 500 1,000 1,500 2,000 2,500 m

LEGEND

- PMF - No Dam Failure
- PMF - Dam Failure
- PAR - No Dam Failure
- PAR - Dam Failure
- AMTD (Marker)
- Modelling Limits
- Major Road
- Qld Rail Network
- Dam Full Supply Level

Sunwater Storages

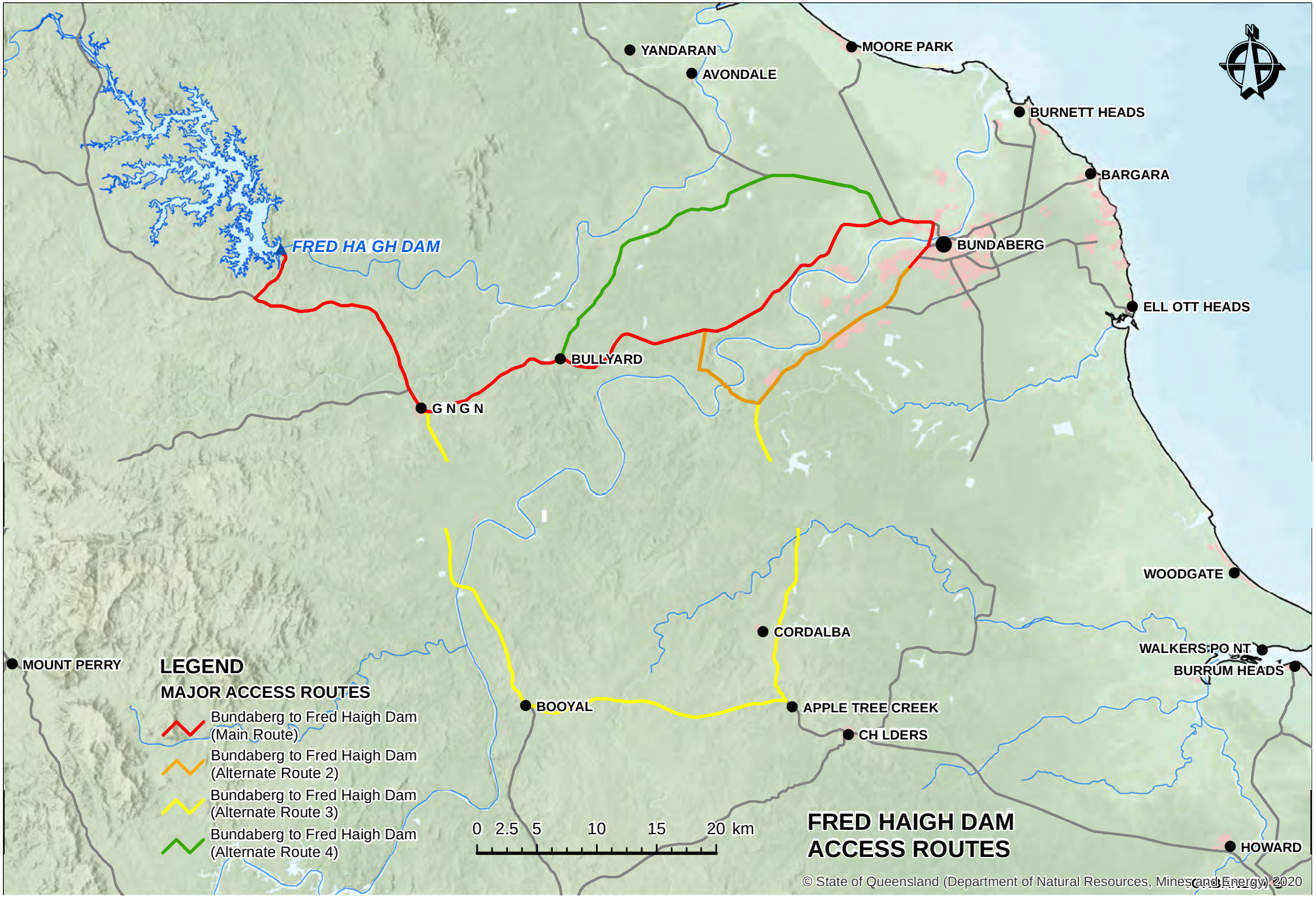
- Dam
- Offstream Storage
- Weir
- Anabranch Weir

DRAWN	DESIGNED
HS	
CHECKED	CHECKED
CC	
APPROVED	
[redacted]	
31/07/25	[redacted]

sunwater

FRED HAIGH DAM
DAM BREAK ANALYSIS 2022
PROBABLE MAXIMUM FLOOD INUNDATION PLAN

CONTRACT NUMBER	
DRAWING NUMBER	REV.
271063	A
SHEET 9 of 9	
DATE JULY 2025	



Document: S:\BW Asset Delivery\SW-BW Service Delivery\R-WSRW-38-01-05-01 EAP Mapping\Drawings\ArcMap\Mapping\FredHaigh\EAP_AccessRoads2.mxd
Printed: Friday, 29/01/2021 09:14:16 AM

Emergency access route information

Route 1 — Bundaberg to Fred Haigh Dam

From Bundaberg travel to Gin Gin on Bundaberg Gin Gin Rd. Head north on the Bruce Hwy for 19km. Turn right onto Monduran Dam Rd, drive a short distance to the Dam.

- Distance: Approx. 72km.
- Road Type: Bitumen.
- Speed Limit: 100km/h generally (drive to suit conditions).

Route 2 — Bundaberg to Fred Haigh Dam

From Bundaberg travel south on Isis Hwy for 19km. Turn right onto Cedars Rd and travel for 9.1km. Turn left onto Bundaberg Gin Gin Rd and travel to Gin Gin. Head north on the Bruce Hwy for 19km. Turn right onto Monduran Dam Rd, drive a short distance to the Dam.

- Distance: Approx. 77km.
- Road Type: Bitumen.
- Speed Limit: 100km/h generally (drive to suit conditions).

Route 3 — Bundaberg to Fred Haigh Dam

From Bundaberg travel south on Isis Hwy for 46km. Turn right onto Bruce Hwy and travel to Gin Gin for 67km. Head north on the Bruce Hwy for 19km. Turn right onto Monduran Dam Rd, drive a short distance to the Dam.

- Distance: Approx. 118km.
- Road Type: Bitumen.
- Speed Limit: 100km/h generally (drive to suit conditions).

Route 4 — Bundaberg to Fred Haigh Dam

From Bundaberg travel west on Bundaberg Gin Gin Rd for 4km. Turn right onto Rosedale Rd and travel for 10km. Turn left onto Bucca Rd and travel for 24km. Turn right onto Bundaberg Gin Gin Rd and travel to Gin Gin. Head north on the Bruce Hwy for 19km. Turn right onto Monduran Dam Rd, drive a short distance to the Dam.

- Distance: Approx. 74km.
- Road Type: Bitumen.
- Speed Limit: 100km/h generally (drive to suit conditions).

Document: S:\BW Asset Delivery\GIS_Data\Enterprise_GIS\Water_Supply_Schemes\Bundaberg\Drawings\ArcMap\254345-A.mxd
Printed: Thursday, 19/08/2021 08:46:37 AM

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

MANY PEAKS
LOWMEAD
GLADSTONE - MONTO ROAD
MILION CREEK
MT BEATRICE AL
MCLAREN CREEK
CEDAR CREEK
MINERVA CREEK
MT FORT WILLIAM AL
BROKEN CREEK
KALPOWAR
BACK CREEK
MIDDLE CREEK
GORGE CREEK
EIGHT MILE CREEK
ROCKY CREEK
PINNACLE CREEK
TENT CREEK
STREETERS RD AL
CAMP GULLY
GEORGES CREEK
KAPUNDA CREEK
BORILLA CREEK
ONE MILE CREEK
SPRINGFIELD AL
SPRINGFIELD TM
DINNER CREEK
GALATEA CREEK
FIVE MILE CREEK
SCRUB CREEK
HOUSE CREEK
GANDIE CREEK
TOONDORO CREEK
GAETA AL
TWO MILE CREEK
KALPOWAR ROAD
WALILY CREEK
GAETA CREEK
TAKILBERAN CREEK
TARARANG CREEK
NARAWONG CREEK
BUCANDY CREEK
FRED HAIGH DAM
135012A - KOLAN R AT FRED HAIGH DAM TW
135009A - KOLAN R AT FRED HAIGH DAM HW
FRED HAIGH HW AL
BUNDABERG - MIRIAM VALE ROAD
ROSEDALE
BANIA TM
CAMP CREEK
WONBAH FOREST AL
BRUCE HIGHWAY
GIN GIN CK AL
MOOLBOOLAMAN AL
GIN GIN - MOUNT PERRY ROAD
GIN GIN

151°20'0"E 151°25'0"E 151°30'0"E 151°35'0"E 151°40'0"E 151°45'0"E 151°50'0"E 151°55'0"E 152°0'0"E
24°35'0"S 24°40'0"S 24°45'0"S 24°50'0"S 24°55'0"S 25°0'0"S

N
W E
S

LOCALITY PLAN

LEGEND
- Rainfall Station
- Rainfall & River Station
- River Station
- MT BEATRICE AL
- State Roads (DTMR)

Sunwater Storage Infrastructure
- Sunwater Dam

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

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

sunwater

FRED HAIGH DAM
KOLAN RIVER
CATCHMENT MAP

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

DRAWING No. 254345 A

APPENDIX C EQUIPMENT AND TECHNICAL INFORMATION

Appendix C1: List of equipment available during an emergency

Appendix C2: Fred Haigh Dam discharge curve

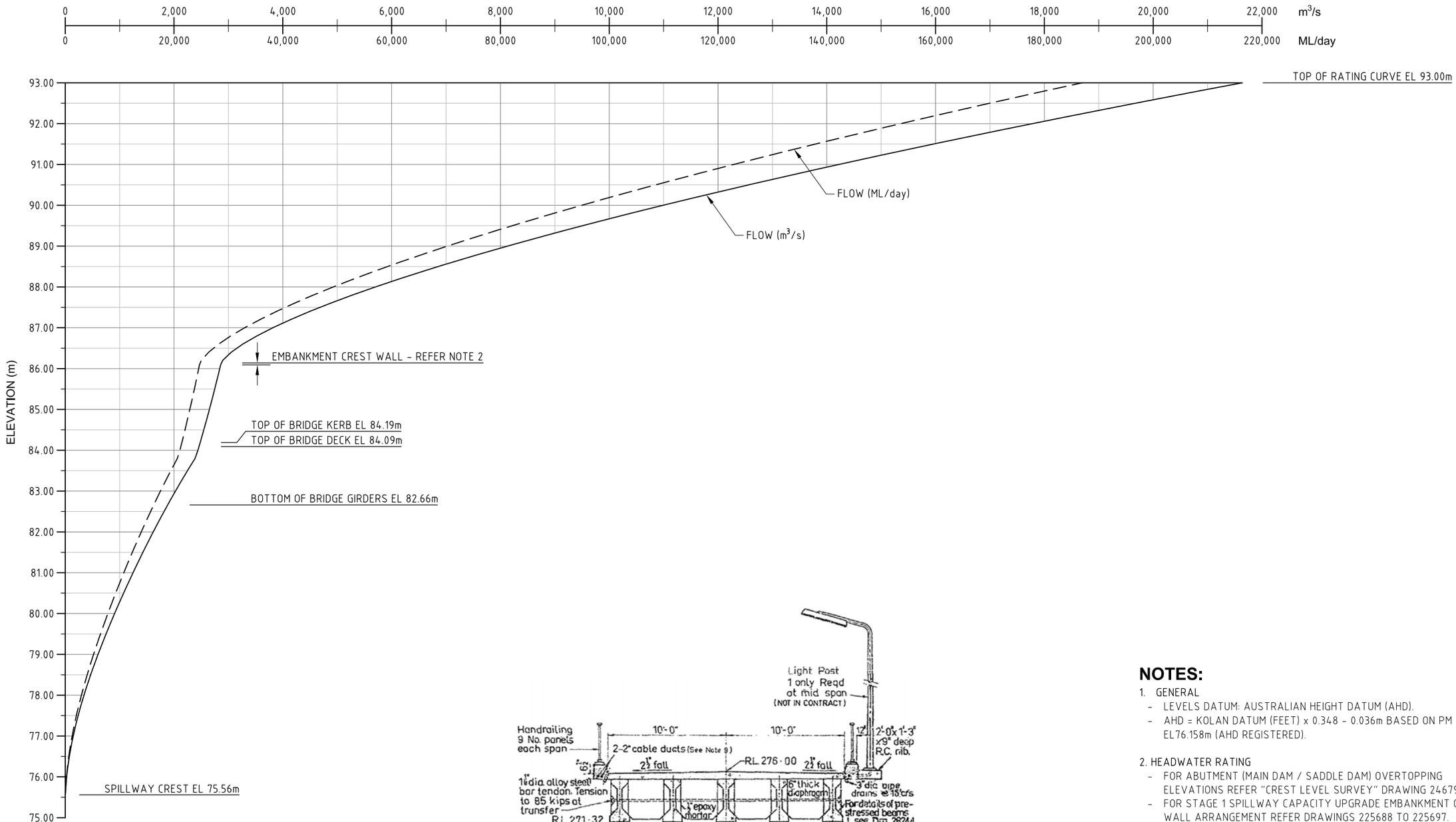
Appendix C3: Fred Haigh Dam storage curve

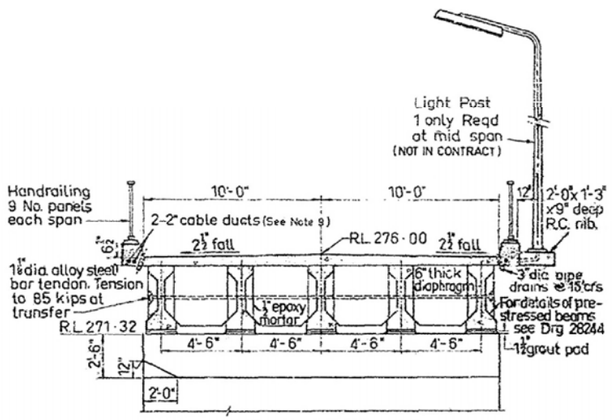
Appendix C1: List of equipment available during an emergency

Figure C1 Emergency equipment

Name of equipment	No.	Owner	Contact name	Contact number	Depot
Boat	1	Sunwater	[redacted]	[redacted]	Bundaberg
4WD vehicle	2+	Sunwater	[redacted]	[redacted]	Bundaberg
Workshop facilities		Sunwater	[redacted]	[redacted]	Bundaberg
Mobile crane hire	5+	Wide Bay Cranes	[redacted]	[redacted]	Bundaberg
Helicopter	3+	Stirling Helicopters	N/A	[redacted]	Rockhampton
Helicopter	3+	OMNI helicopters	[redacted]	[redacted]	Roma & Caloundra
Rock pile					Quarry close to Fred Haigh Dam (D/S)

NOTE: In addition to the above list, further resources can be accessed through Local, District, and State Disaster Management framework, when each Local Disaster Management Group is activated. See relevant pages in communication lists for contact details.





DETAIL OF BRIDGE

NOT TO SCALE
(DIMENSIONS IN FEET AND INCHES)
(ELEVATIONS IN FEET TO KOLAN DATUM)

NOTES:

1. GENERAL
   - LEVELS DATUM: AUSTRALIAN HEIGHT DATUM (AHD).
   - AHD = KOLAN DATUM (FEET) x 0.348 - 0.036m BASED ON PM 43780 EL76.158m (AHD REGISTERED).

2. HEADWATER RATING
   - FOR ABUTMENT (MAIN DAM / SADDLE DAM) OVERTOPPING ELEVATIONS REFER "CREST LEVEL SURVEY" DRAWING 246797.
   - FOR STAGE 1 SPILLWAY CAPACITY UPGRADE EMBANKMENT CREST WALL ARRANGEMENT REFER DRAWINGS 225688 TO 225697.
   - FOR SOURCE DATA REFER HUMMINGBIRD DOCUMENT #2624795 - "JACOBS - FRED HAIGH DAM CRA - SPILLWAY CAPACITY REPORT - 30 APRIL 2021".

3. SUPERSEDED DRAWING
   - THIS DRAWING SUPERSEDES DRAWING 28273.

S:\BW_WaterResources\projects\SW_Bundaberg WSS\Fred Haigh Dam Discharge Rating Curve\Drawings\AutoCAD\254666-A.dwg
20 Oct 2021 10:03 AM

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

REVISION					REFERENCE DRAWINGS	
20/10/21	A	ISSUED FOR USE	RJ	M.G. HUGHES	246797	CREST WALL, CREST LEVEL SURVEY, APRIL 2016
DATE		REMARKS	CKD	PASSED	225689	EMBANKMENT CREST WALL, ARRANGEMENT SH 2 OF 10

SCALES (A3 SIZE)

NOT TO SCALE

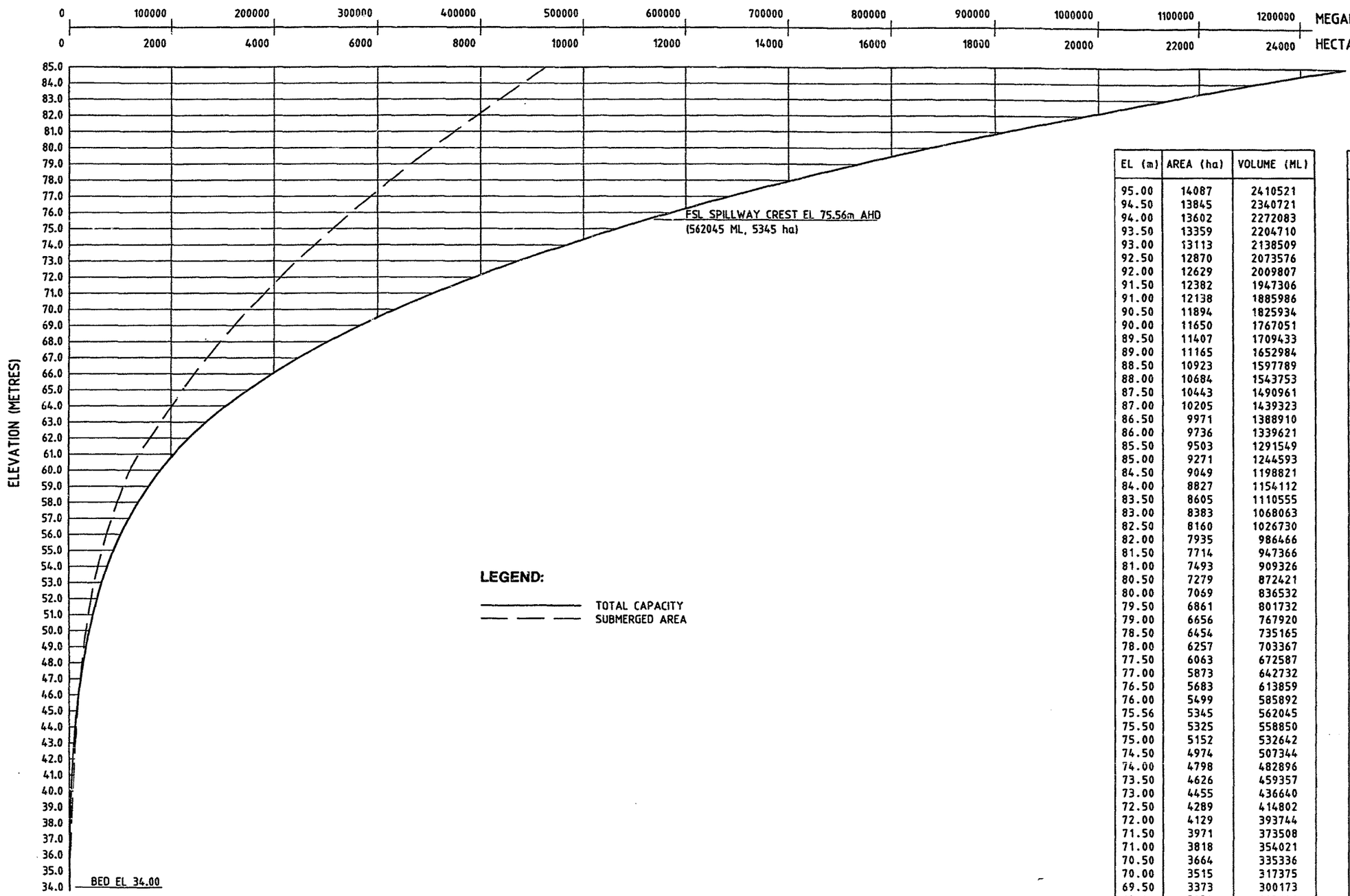
DRAWN	DESIGNED
IH	
CHECKED	CHECKED
	RJ
APPROVED	
[redacted]	

sunwater

FRED HAIGH DAM

DISCHARGE CURVES

CONTRACT NUMBER	
DRAWING NUMBER	REV.
254666	A
SHEET 1 OF 2	
DATE OCTOBER 2021	



LEGEND:

——————— TOTAL CAPACITY
— — — — SUBMERGED AREA

EL (m)	AREA (ha)	VOLUME (ML)
95.00	14087	2410521
94.50	13845	2340721
94.00	13602	2272083
93.50	13359	2204710
93.00	13113	2138509
92.50	12870	2073576
92.00	12629	2009807
91.50	12382	1947306
91.00	12138	1885986
90.50	11894	1825934
90.00	11650	1767051
89.50	11407	1709433
89.00	11165	1652984
88.50	10923	1597789
88.00	10684	1543753
87.50	10443	1490961
87.00	10205	1439323
86.50	9971	1388910
86.00	9736	1339621
85.50	9503	1291549
85.00	9271	1244593
84.50	9049	1198821
84.00	8827	1154112
83.50	8605	1110555
83.00	8383	1068063
82.50	8160	1026730
82.00	7935	986466
81.50	7714	947366
81.00	7493	909326
80.50	7279	872421
80.00	7069	836532
79.50	6861	801732
79.00	6656	767920
78.50	6454	735165
78.00	6257	703367
77.50	6063	672587
77.00	5873	642732
76.50	5683	613859
76.00	5499	585892
75.56	5345	562045
75.50	5325	558850
75.00	5152	532642
74.50	4974	507344
74.00	4798	482896
73.50	4626	459357
73.00	4455	436640
72.50	4289	414802
72.00	4129	393744
71.50	3971	373508
71.00	3818	354021
70.50	3664	335336
70.00	3515	317375
69.50	3373	300173
69.00	3234	283641
68.50	3099	267822
68.00	2967	252646
67.50	2837	238150
67.00	2707	224277
66.50	2582	211074
66.00	2465	198449
65.50	2347	186430
65.00	2233	174972

EL (m)	AREA (ha)	VOLUME (ML)
64.50	2124	164091
64.00	2018	153723
63.50	1911	143911
63.00	1807	134609
62.50	1701	125849
62.00	1593	117605
61.50	1484	109926
61.00	1379	102761
60.50	1283	96122
60.00	1205	89904
59.50	1138	84057
59.00	1078	78513
58.50	1018	73278
58.00	959	68334
57.50	905	63681
57.00	852	59285
56.50	802	55156
56.00	753	51264
55.50	705	47628
55.00	661	44210
54.50	619	41012
54.00	577	38018
53.50	539	35234
53.00	504	32623
52.50	471	30189
52.00	440	27907
51.50	412	25779
51.00	387	23779
50.50	362	21910
50.00	338	20158
49.50	316	18527
49.00	297	16993
48.50	279	15555
48.00	261	14202
47.50	244	12939
47.00	228	11757
46.50	212	10661
46.00	197	9640
45.50	183	8693
45.00	170	7812
44.50	159	6993
44.00	149	6225
43.50	139	5507
43.00	129	4835
42.50	120	4213
42.00	111	3635
41.50	102	3103
41.00	94	2612
40.50	84	2168
40.00	75	1770
39.50	66	1419
39.00	58	1110
38.50	50	842
38.00	42	613
37.50	34	423
37.00	27	268
36.50	21	147
36.00	13	61
35.50	5	18
35.00	1	4
34.50	0	1
33.80	0	0

Level Datum: Australian Height Datum (AHD = Kolan Datum -0.030 m)
Levelled from PM 48151 at EL 84.119m AHD in Feb 1983
PM 72763 at Lookout EL 110.587 m AHD
Computed from DTM produced in 1997 from 1973 & 1997 aerial photography
Digital data & volumes computed to EL 95m AHD
Catchment Area: 1308 sq km; Shoreline length: 384 km
Latitude: 24 52 35 Longitude: 151 51 00

Q:\MISC\survey group\W208867.dwg
10 Feb 1998 3:24 PM

REVISION					REFERENCE DRAWINGS	
DATE		REMARKS	CKD	PSD		

SCALES

DRAFTING IFE
DRAFTING CHK
DESIGN
DESIGN CHK
RECOMMENDED
APPROVED DNH
PRINCIPAL SURVEYOR

Services
Engineering
NATURAL RESOURCES

KOLAN RIVER - BASIN 135
FRED HAIGH DAM - AMTD 76.4 km
TOTAL STORAGE
STORAGE CURVE

CONTRACT NUMBER
DRAWING NUMBER
A3-208867
DATE FEB 1998

208867 (TIF)

APPENDIX D INTERACTION WITH LOCAL GOVERNMENT AND DISTRICT GROUPS

To be populated when EAP next completes a substantive review

Annexe — Fred Haigh Dam SMS Messages for flooding

	Advice Stay informed 	**Watch and Act** Prepare to leave 	**Emergency** Leave immediately To be issued in consultation with council 	**Advice** Stay informed 
SMS	ADVICE from Sunwater. Fred Haigh Dam is likely to spill/spilling excess water into Kolan River. People downstream of Fred Haigh Dam should STAY INFORMED and MONITOR CONDITIONS. Water flows from Fred Haigh 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.	FLOOD WATCH AND ACT from Sunwater. Excess water spilling from Fred Haigh Dam into Kolan River has increased significantly. Water flows from Fred Haigh Dam may contribute to dangerous/widespread flooding downstream. Expect increased river flows in 6-12 hours / later today/ overnight/ tomorrow. People downstream of Fred Haigh Dam must PREPARE TO LEAVE in case the flood gets worse. Call Triple Zero (000) if your life is in danger. Call the SES on 132500 for flood help. More information here: bit.ly/RecandSafety	FLOOD EMERGENCY WARNING from Sunwater: People downstream of Fred Haigh Dam including Monduran and Bucca must LEAVE IMMEDIATELY. Fred Haigh 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. Rosedale, Gin Gin and Bundaberg are safe. Get more information and what you should do at Bundaberg Regional Council , or visit /disaster.bundaberg.qld.gov.au	ADVICE from Sunwater. Fred Haigh Dam is continuing to spill/has stopped spilling excess water into Kolan River. Fred Haigh Dam has returned to regular operating conditions. Expect decreased river flows in timeframe.