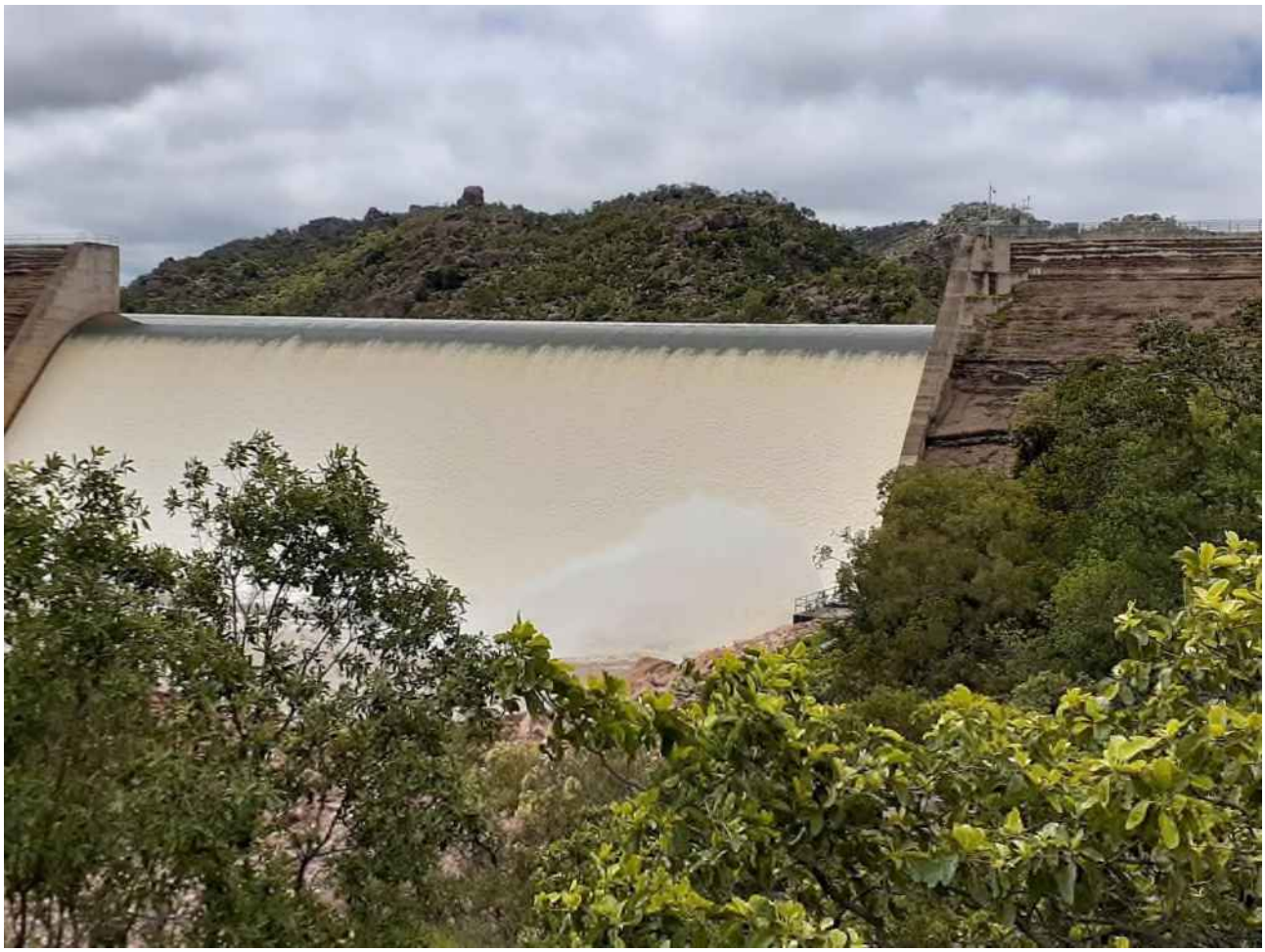
COPPERFIELD RIVER GORGE DAM
(ID 256)
Emergency Action Plan
Technical Services
September 2025



Prepared by:
Technical Services
Department of Natural Resources and Mines,
Manufacturing and Regional and Rural Development

PREPARATION AND AUTHORISATION

Queensland Government

Approved by the delegate of the Chief Executive,
Department of Local Government, Water and Volunteers
until 1 December 2028.

Emergency Event - Activation Quick Guide

The Emergency Action Plan (EAP) for the Copperfield River Gorge Dam covers five emergency events. Use the following table to select the relevant section of the EAP that deals with the emergency event.

Table 1 - Emergency Event Activation Quick Guide (Note: at Stand Up 2 for Flooding, evacuation at Einasleigh advice provided to LDMG)

Activation Level	Normal Spillway Discharges	Alert	Lean Forward	Stand Up			Stand Down
Decision Authority	EEC	EEC	EEM and DM	EEM and DM			EEM and DM
Activation triggers for emergency events relating to controlled and uncontrolled dam release hazards, including downstream release hazards (Flooding)							
Flooding (Section 6.1) (Rising reservoir water level, spillway operations)	Reservoir water level above: EL 586.0m (FSL)	Reservoir water level above: EL 587.0m	Reservoir water level above: EL 587.5m	**STAND UP 1** Reservoir water level above: EL 589.5 m (230mm below Historical Maximum[1])	**STAND UP 2** Reservoir water level above: EL 594.0m and dam failure possible		Reservoir water level below: EL 587.0m and falling
Activation triggers for emergency events relating to dam failure hazards, including downstream release hazards							
Structural (Section 6.2) (Seepage progression, cracking or movement of dam structures)	Not applicable	Increasing seepage through an embankment, the foundations or an abutment	Increasing seepage through an embankment, the foundations or an abutment with cloudy water	**STAND UP 1** Structural condition has been established, seepage increasing and/or cloudy	**STAND UP 2** Failure in progress or possible due to structural damage		Risk assessment has determined that failure risk has reduced
Chemical/Toxic Spill (Section 6.3) (Biological contamination or toxic spills within the reservoir)	Not applicable	Reports of contamination or potential contamination in the catchment area of the storage and/or potential downstream release hazards to RDSWU	Not applicable	Confirmation of or high probability of a large amount of Chemical/Toxic Spill condition found in the storage/catchment			Risk assessment that risk has reduced or no longer exists Confirmation that significant contamination has **not** occurred All clear water quality test result
Terrorist Threat/Activity or High Energy Impact (Section 6.4) (Damage resulting from terrorism/ vandalism/ accident)	Not applicable	Not applicable	Possible terrorist activity/suspicions noticed at the dam	**STAND UP 1** Possible terrorist activity noticed at the dam or threat received	**STAND UP 2** Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	**STAND UP 3** Failure in progress or possible due to impact or explosion	Risk assessment has determined that failure risk has reduced
Earthquake (Section 6.5) (Damage resulting from an earthquake)	Not applicable	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	**STAND UP 1** Earthquake confirmed or felt in the area **AND** A possible failure path has been identified	**STAND UP 2** Failure possible or in progress due to earthquake		Risk assessment has determined that failure risk has reduced

[1]Historical Maximum Reservoir Water Level reached 2002

Contents

EAP ELECTRONIC DISTRIBUTION LIST

Control Copy Number	Position
1	Dam Inspection Officers, Etheridge Shire Council (ESC)
2	Emergency Event Coordinator, Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD)
3	Emergency Event Manager, DNRMMRRD
4	Director Asset Management, DNRMMRRD
5	Executive Director, Technical Services, DNRMMRRD
6	Deputy Director-General, Georesources, DNRMMRRD
7	Director-General, DNRMMRRD
8	Etheridge Shire Local Disaster Management Group (LDMG)
9	Mareeba District Disaster Management Group (DDMG)
10	Officer in Charge, Police Georgetown, Queensland Police Service (QPS)

ENDORSEMENT SHEET

This Emergency Action Plan was prepared by Technical Services (TS) officers in liaison with Etheridge Shire Local Disaster Management Group (LDMG).

Preparation

Name (Print Name): [redacted]

Position: Senior Engineer, Technical Services

Signed: _____ [redacted] _____ Date: 15 / 09 / 2025

Reviewed

Name (Print Name): [redacted]

Position: Principal Engineer, Technical Services

Signed: _____ [redacted] _____ Date: 15 / 09 / 2025

Endorsed:

Name (Print Name): [redacted]

Position: A/ Director Asset Management, Technical Services

Signed: [redacted] Digitally signed by [redacted] Date: 2025.09.17 12:18:41 +10'00' Date: ___/___/_____

DOCUMENT REVISION HISTORY

Rev	Date	Revision Description
0	November 2005	Interim Issue
1	February 2007	Contacts list updated and documentation revision
2	September 2007	Contacts list updated
3	March 2008	Contacts list updated
4	October 2009	Contacts list updated and documentation revision
5	May 2010	Contacts list updated and documentation revision
6	October 2011	Document review incorporating comments from OWSR and Flood Commission recommendations
7	December 2012	Contacts list updated and documentation revision Departmental name change-not issued
8	May 2013	Contacts list updated and documentation revision
9	October 2013	Update documentation to include Dam Safety Guidelines
9.1	November 2013	Contacts and PAR list updated
9.2	March 2015	Contacts and PAR lists updated and documentation revision for change of personnel
10	October 2015	Contacts and PAR lists updated. Update for change provider of EAP Officers to Etheridge Shire Council and updated telemetry integration.
11	December 2015	Review and update of EAP undertaken by SMEC including outcomes of scenario training exercise at Mt Garnet and telemetry integration, not distributed.
12	September 2016	Review by NCA for Floating Intake and IGEM Recommendations.
13	September 2017	Contacts list updated and documentation revision
14	April 2018	Review and update of EAP
15	September 2018	Annual review of EAP
16	September 2019	Updating of information including remote controlled camera. PAR updated following 2018 flood modelling assessment.
17	August 2020	Updating of information such as PAR contact details; non substantive changes
18	August 2021	Updating of PAR contact details and other non-substantive changes; Queensland Dam Safety Management Guideline update
19	August 2022	Updated to incorporate Copperfield Dam Failure Impact Assessment Report, May 2022 Change to wording regarding Earthquakes Updating of PAR contact details Change of supplier of telemetry and camera equipment from Hydroscot to Qteq Pty Ltd
20	September 2023	Contact lists and title of roles updated. Dam Inspection Engineer role added for consistency with portfolio. Corrected grammatical errors and applied minor amendments to wording and formatting for greater consistency and clarification of communication responsibilities.
21	September 2024	Contact lists and title of roles updated. Referenced documents and guidelines updated. Corrected grammatical errors and applied minor amendments to wording and formatting for greater consistency and clarification of communication responsibilities.

22	September 2025	Contact lists and title of roles updated. Distribution list updated. Earthquake trigger updated. Communication flowchart added. Department names updated. Emergency communication text messages updated. Corrected grammatical errors and minor amendments to wording and formatting for greater consistency. Additional information on the identification and escalation of emergency events.

LIST OF ACRONYMS

Acronym	Full Title	Description
AEP	Annual Exceedance Probability	Lieklihood that a specific rainfall or flood event will be exeeded in any given year
AHD	Australian Height Datum	Datum for elevations in the EAP
AM	Asset Management	Staff of the Asset Management business unit of the Department
ANCOLD	Australian National Committee on Large Dams	Australian organisation which provides guidelines on the operation and maintenance of dams
BOM	Bureau of Meteorology	Australian Government agency responsible for providing weather data and weather warnings
CEO	Chief Executive Officer	Chief Executive Officer of Etheridge Shire Council (ESC)
DCF/DCFF	Dam Crest Flood Failure	Failure of a dam with inflow from a flood that will reach and overtop the crest of embankment by a small amount.
DCL	Dam Crest Level	The level (generally measured in m AHD) of the crest of the dam embankment
DDGGEO	Deputy Director-General, Georesources	Deputy Director-General, Georesources, Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
DDMG	District Disaster Management Group	Assist and enable local government to fulfil their functions under the *Disaster Management Act* 2003
DDS	Director, Dam Safety	Director, Dam Safety for Department of Local Government, Water and Volunteers (DLGWV)
DE	Dam Inspection Engineer	RPEQ Engineer responsible for undertaking special inspections as required.
DG	Director-General	Director-General of the Department
DIO	Dam Inspection Officer	Person provided by ESC responsible for undertaking inspections
DM	Director Asset Management	Director responsible for Asset Management, DNRMMRRD
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development	Queensland Government department that owns and manages Copperfield River Gorge Dam
DEMU	DNRMMRRD Emergency and Disaster Management Unit	Emergency Management section of the Department
DTMR	Department of Transport and Main Roads	Department of Transport and Main Roads (DTMR)
E	Email	Method of notification
EAP	Emergency Action Plan	The Emergency Action Plan for Copperfield River Gorge Dam (this document)

Acronym	Full Title	Description
Earthquake Intensity	Modified Mercali (MM) 5 Or Magnitude Scale 5	Earthquake which is felt outdoors. Sleepers awakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing. Pictures on wall move. Pendulum clocks stop.
EDTS	Executive Director, Technical Services	Executive Director, Technical Services, DNRMMRRD
EEC	Emergency Event Coordinator	Person responsible for activating the EAP and coordinates emergency actions
EER	Emergency Event Report	Document prepared by EEC and/ EEM and forwarded to DM and, once approved, sent to DDS. Document written only if required according to *Water Supply (Safety and Reliability) Act 2008.*
EL	Elevation	Elevation above Mean Sea Level in (m) AHD
EEM	Emergency Event Manager	Person responsible for management of the dam emergency event
ERT	Emergency Response Team	Internal TS team which carries out EAP communications and actions
ESC	Etheridge Shire Council	The appointed contractor that operates and maintains the dam on behalf of Queensland Government
FSL	Full Supply Level	Level reached for dam to spill
GDA	Geocentric Datum Australia	Datum for position (Latitudes and Longitudes)
LDC	Local Disaster Coordinator	Person nominated in the Shire Disaster Plan as the coordinator of responses in an emergency event
LDCC	Local Disaster Coordination Centre	Centre established in an emergency to manage the response to the emergency
LDMG	Local Disaster Management Group	Management group established to manage the response to an emergency event
M	Metres	Unit of distance
ML	Megalitres	Unit of measurement
MM	Modified Mercalli (MM) 5 or Magnitude Scale 5	An earthquake which is felt outdoors. Sleepers awakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing. Pictures move. Pendulum clocks stop.
P	Phone	Method of notification
PAR	Population at Risk	Population exposed to danger as a result of the event leading to the emergency situation
PMF	Possible Maximum Flood	Maximum flood level from the estimated largest possible event.
PMP	Possible Maximum Precipitation	Rainfall from the estimated largest possible event.

Acronym	Full Title	Description
PMPDF/ PMPFF	Probable Maximum Precipitation Dam Failure	The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular catchment area which fails the dam. It represents the largest flood failure for a given dam using reasonable parameters
QFD	Queensland Fire Department	Primary provider of fire and rescue services in Queensland
QPS	Queensland Police Service	Primary law enforcement agency in Queensland
RDSWU	Riparian Downstream Water Users	Landholders bordering the watercourse who use water downstream of the dam.
RPEQ	Registered Professional Engineer Queensland	Engineer with qualifications and experience registered to undertake engineering work in Queensland
RSAS	Remote Sensing and Alert System	Electronic monitoring system that can be accessed remotely and provides alarms
RWL	Reservoir Water Level	Water level in reservoir
S	SMS (text messages)	Method of notification
SDCC	State Disaster Coordination Centre	Facility responsible for coordinating the state-level operational response to disaster events in Queensland.
SDF	Sunny Day Failure	Failure of a dam without any inflow from a flood. Can be at FSL or below.
SES	State Emergency Service	Volunteer-based organisation, provides emergency response support services.
SMS	Short Message Service (text messages)	Service provided on mobile phones for sending messages
SOP	Standard Operating Procedure	Documented procedure for undertaking a defined activity
SR	SitRep	Status report that provides a rapid understanding of a current situation.
TS	Technical Services	Staff of the Technical Services division of the Department
UHF	Ultra-High Frequency	Form of communication using radio waves sent usually by line of sight

BUSINESS TERMS AND DEFINITIONS

The meanings of the terms used in this section are set out in accordance with relevant legislation, the Emergency Action Plan guideline and dam industry terminology.

Term	Definition
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.
BOM 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.
Chemical spill/toxic condition	The contamination of water in the storage of the dam that could create a dam hazard.
Dam Crest Failure	Dam crest flood is when failure occurs during a flood event with the water level at the crest of the non-overflow section of the dam embankment
Dam emergency event	Means an event arising from a dam hazard if:

Term	Definition
	persons or property may be harmed because of the event, AND any of the following; a coordinated response, involving 2 or more of the following relevant entities, is required to respond to the event; the event may arise because of a disaster situation declared under the *Disaster Management Act 2003*; 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.
Dam Failure	Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents. 'Sunny day' dam failure is where the failure occurs at the full supply level or below and there is no concurrent rain-associated flooding.
Dam hazard	Means a reasonably foreseeable situation or condition that may: cause or contribute to the failure of the dam, if the failure may cause harm to persons or property, OR require an automatic or controlled release of water from the dam, if the release of the water may cause harm to persons or property.
Dam hazard event	Means an event arising from a dam hazard if: persons or property may be harmed because of the event, AND a coordinated response, involving 2 or more of the following relevant entities, is unlikely to be required; each local group and district group for the EAP, each local government whose area may be affected, the chief executive, another entity the owner of the dam considers appropriate, AND the event is not an emergency event.
Disaster management plan	Of a district group or local government, means the group's or local government's disaster management plan under the *Disaster Management Act 2003*.
District group (District Disaster Management Group)	For an emergency action plan (EAP), means a district group established under the *Disaster Management Act 2003*, section 22 whose disaster district under that Act could, under the plan, be affected by a *dam hazard.*
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.
Notice response	A dam owner's written response to a notice following an assessment of an EAP by a local government or *district group*.
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 to lead to a failure of the dam.
Probable maximum flood	Probable maximum flood is the flood resulting from probable maximum precipitation coupled with the worst catchment conditions that can be realistically expected.
Probable maximum precipitation	Probable maximum precipitation is the theoretical greatest depth of precipitation physically possible based on generalised methods.
Probable maximum precipitation design flood	Probable maximum precipitation design flood is the flood resulting from probable maximum precipitation coupled with standard catchment conditions that can be expected.

Term	Definition
Referable dam	A dam, or a proposed dam after its construction, will be a referable dam if: a failure impact assessment of the dam, or the proposed dam, is carried out under the *Water Supply (Safety and Reliability) 2008*, AND the assessment states the dam has, or the proposed dam after its construction will have, a category 1 or category 2 failure impact rating, AND the chief executive has, under section 349 of the Act, accepted the assessment. Also, a dam is a referable dam if: under section 342B of the Act, the owner of a dam is given a referable dam notice and, before the effective day for the notice, does not give the chief executive a failure impact assessment for the dam, AND the chief executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam.
Relevant entity	Means each of the following under the EAP for the dam: the persons who may be affected, or whose property may be affected, if a *dam hazard event* or *emergency event* were to happen for the dam, e.g. the owners of parcels of farm land adjacent to the dam or residents of a township each *local group* and *district group* for the EAP each local government whose local government area may be affected if a dam hazard event or emergency event were to happen the chief executive another entity the owner of the dam considers appropriate, e.g. the Queensland Police Service.
Terrorist activity	A deliberate attempt to damage or fail a dam.

2. Introduction

This Emergency Action Plan (EAP) has been prepared to guide the Department and relevant entities in the event of an incident or flood flows from the Copperfield River Gorge Dam that compromises the safety of persons and/or property immediately downstream of the dam.

The dam is located on the Copperfield River approximately 70 kilometres south of the township of Einasleigh. Locations of population at risk (PAR) in a dam hazard or emergency event include the camping area near the dam, the townships of Kidston and Einasleigh, Rycon Homestead and Oaks Homestead.

The EAP provides an overview of the dam (including technical data), activation and trigger levels with respect to the five potential emergency events and the roles and responsibilities of officers/entities for each emergency event. Activity Tables for each of the five emergency events have been developed for quick reference of actions, including the priority order for notifications, warnings and evacuations of the population at risk (PAR); and event and review reporting.

A failure impact assessment (FIA) completed by Royal HaskoningDHV in 2022 determined that:

- The dam is assessed to have a Category 1 failure rating and is referable.
- The critical failure event producing the maximum PAR is the 1:1000 AEP.
- The PAR is estimated to be up to 12 people.
- An indicative distance downstream potentially affected by a breach of the dam is approximately 60km.

The 2022 FIA identified the highest dam failure PAR to be 12 persons, resulting from a dam failure scenario during a 1 in 1,000 Annual Exceedance Probability (AEP) flood failure (critical flood failure, or CFF) event. Zero properties were identified to be impacted from sunny day failure of the dam. In both the DCFF and PMFF events there are up to 12 total PAR.

Flood inundation maps included in this EAP update are considered to be current based on a review of the failure impact zone.

2.1 Dam Owner

The Copperfield River Gorge Dam is an un-gated dam owned by the State and managed by Resources. ESC is the appointed contractor that performs inspections and works at the dam.

2.2 Outline of the Dam

The location of the dam is shown in **Figure 2.2.1 – Copperfield Dam Locality Plan**.

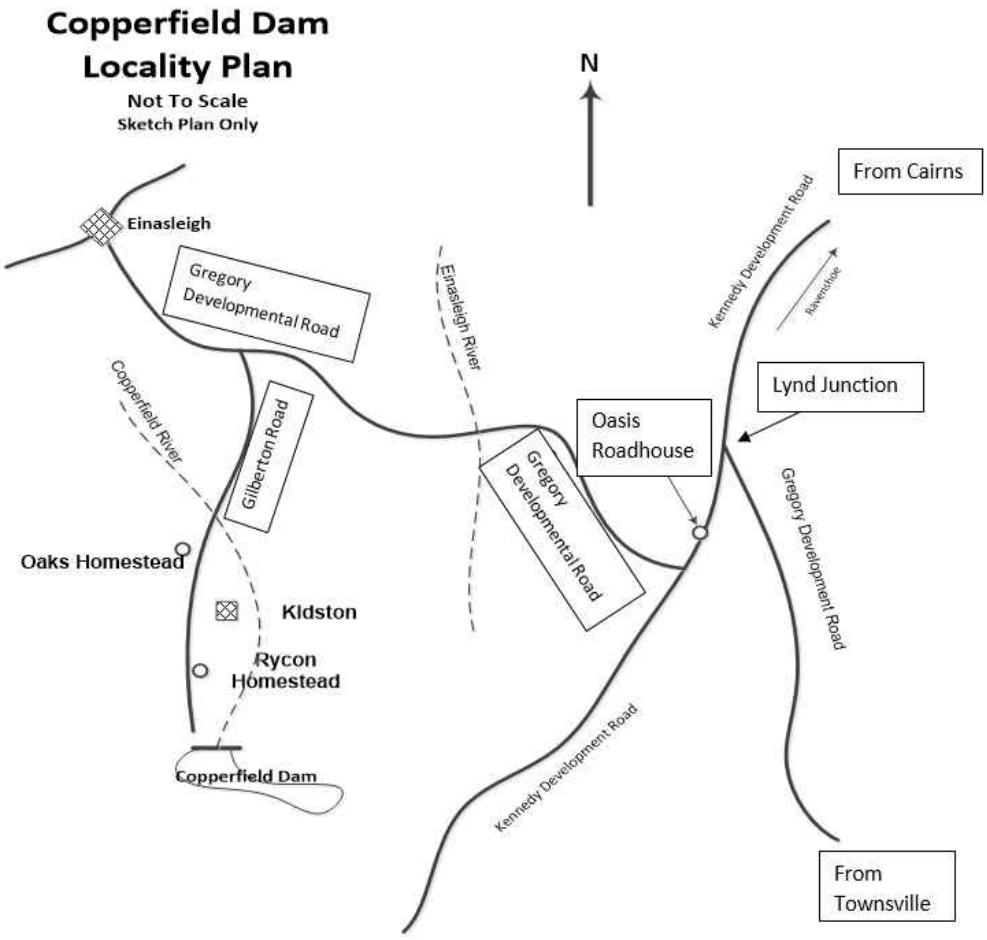


Figure 2.2.1 Copperfield Dam Locality Plan

The dam is a Roller Compacted Concrete dam built in 1984. It is one of the earliest dams constructed in Australia using this type of construction. The dam has a typical profile and cross section that is normally associated with concrete gravity dam construction. A drainage gallery extending from the left to right abutments has been provided.

The dam has a centrally placed spillway with an ogee crest that discharges into a downstream plunge pool. The plunge pool has a circular profile (roller bucket) that dissipates energy before water is discharged over a broad crest into the Copperfield River.

A fuse plug spillway has been constructed on the right of the main dam in a saddle area. Any discharges from the fuse plug spillway will flow back into the Copperfield River downstream of the dam.

The fuse plug in the dam is designed to erode and operate at the 1:1000 AEP event.

Houses in the township of Kidston and residences at Rycon Homestead, Oaks Homestead and Narrawa Station may be inundated during flood failure events. It is estimated that up to 12 PAR and any campers may need to be evacuated if these events occur.

Houses in Einasleigh may be inundated from flood failure events exceeding the 1:1000 AEP event, including the Dam Crest Flood Failure (DCFF) or Probable Maximum Flood (PMF) events. Flood modelling indicates that there will be zero PAR including those at Rycon Homestead, Kidston township, Oaks Homestead and Narrawa Station affected by a Sunny

Day Failure. Residents of these properties will still be notified of these events, though itinerant PAR in the Copperfield Dam camp site or swimming in the Copperfield River downstream of the dam may be impacted. A maximum of 74 PAR would be affected by a DCFF (Dam Crest Flood Failure) event or a PMF (Probable Maximum Flood) event.

Dam failure at Stand Up 1 level (EL 589.50 m) is estimated to affect a maximum of 8 PAR, including the Rycon Station property, one property at Kidston Township, one property at Oaks Homestead and one property at Einasleigh Township.

The isolated location of the dam prevents it from being easily accessed and monitored manually during heavy rainfall events. In 2015, telemetry was installed at the dam to remotely monitor storage RWL, tailwater level, rainfall and v-notch weir levels (seepage). Automatically activated Short Message Service (SMS) alerts are sent to key Department personnel at predetermined critical trigger levels. In 2018, a camera was installed on top of the left abutment to enable staff to monitor the dam's storage water level, the dam embankment and spillway and will verify the RSAS data and performance of the dam's embankment and spillway during an emergency event. See Appendix 6 – Rainfall and Reservoir Water Level Information.

2.3 Travel Directions and Vehicle Access to Copperfield River Gorge Dam

Please note the following when travelling to Copperfield Dam:

- There is no mobile phone coverage in or around the dam or at Einasleigh and only very poor signal from about an hour west of Townsville and Atherton.
- Persons should carry a satellite phone/communicator.
- Persons should check the Department of Main Roads and Transport and Etheridge Shire Council Disaster Dashboard websites for closed roads before you leave.
- Persons should carry plenty of water with you as there are few roadhouses/service stations in the region
- Driving at night is not recommended due to kangaroos and cattle on the roads.
- The roads within 100 km of the dam are mostly unsealed, narrow, dirt roads and extra caution needs to be taken. A 4WD vehicle is recommended (not all-wheel drive).

You can download maps to use offline from Google Maps. You'll still be able to navigate to the dam using the offline maps.

Road Directions

From Cairns (approx. 5.5 hours)
From Cairns, travel south-west along the Kennedy Highway (Route 1) for 166kms to Mt Garnet. Staying on the same road from Mt Garnet, travel 65kms to where the road becomes Kennedy Developmental Road (Route 62). Staying on this road travel approximately 102kms to the Lynd Junction. At the Lynd Junction turn right and after 2kms the Oasis Roadhouse on your left. There is accommodation and fuel at this roadhouse and it is the last place to fuel up before the dam (you'll be about 1.5 hours from the dam).

After leaving Oasis Roadhouse drive one kilometre then turn right onto Gregory Developmental Road. Drive a further 52kms north west and turn left into Gilberton Road (see map 2) and travel 19kms and on your right will be Oaks Rush Camp (accommodation closest to the dam; [redacted]

From Oak Rush Camp travel south along Gilberton Road for 15 km then turn left at the "Rycon Station" sign. Travel a further 13 km to the dam. A grid is located at Rycon Homestead with a gate, which may be closed if local conditions make access to the dam difficult.

From Einasleigh (approx. 40 minutes)
From Einasleigh travel south on Georgetown-Mt Garnet Road and after approximately 21kms turn right onto Gilberton Road, travel 19kms and on your right will be Oaks Rush Camp (accommodation closest to the dam;

From Oak Rush Camp travel south along Gilberton Road for 15km then turn left at the "Rycon Station" sign. A grid is located at Rycon Homestead with a gate, which may be closed if local conditions make access to the dam difficult.

From Townsville (approx. 4.5 hours)
Head west on Hervey Range Road out of Townsville (Route 72). At the end of Hervey Range Road, turn right onto Gregory Developmental Road (Route 63). Drive through Greenvale (there is a roadhouse on the right). After 60kms you will reach the Lynd Junction. At the Lynd Junction turn left and you'll be on the Kennedy Developmental Road. After 2kms there is the Oasis Roadhouse on your left. There is accommodation and fuel at the roadhouse and it is the last place to fuel up before the dam (you'll be about 1.5 hours from the dam).

After leaving Oasis Roadhouse drive one kilometre then turn right (you'll be back on Gregory Developmental Road). Drive a further 52kms north west and turn left into Gilberton Road and travel 19kms and on your right will be Oaks Rush Camp (accommodation closest to the dam;

From Oak Rush Camp travel south along Gilberton Road for 15 km then turn left at the "Rycon Station" sign. A grid is located at Rycon Homestead with a gate, which may be closed if local conditions make access to the dam difficult.

Vehicular access to the left abutment crest and over the causeway immediately downstream of the dam is by 4WD vehicle at all times. During high rainfall events, when there is a possibility that the EAP will be enacted, the township of Kidston and Rycon Homestead may be isolated by flooding in surrounding creeks and gullies. Access to Copperfield River Gorge Dam will then be possible only by helicopter.

After high rainfall events, the road and culverts on the access to the dam from the Rycon grid may be damaged. Care should be taken when driving on this road and any damage reported to the EEM.

2.4 Flood Releases and Agreed Coordinated Response

A flood release from the dam occurs when catchment inflows raise the storage level above the FSL of EL 586.0 m resulting in a discharge from the spillway of the dam.

See the activity tables in section 6 of this document for the agreed coordinated response by DNRMMRRD and LDC. The tables set out the operations and activities that the relevant parties will undertake for each emergency event. Discussions with relevant stakeholders regarding the operations will be ongoing as necessary.

2.5 EAP Requirements Under the *Water Supply (Safety & Reliability) Act 2008*

Under the *Water Supply (Safety and Reliability) Act 2008* (the Act), the owner of a referable dam must have an approved EAP for the dam. Referable dams, by definition, would place 2 or more lives at risk if they were to fail.

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 (e.g. flood operations):

1. Identify the area likely to be affected by a dam hazard event or emergency event arising from the dam hazard, including, for example, by attaching to the plan maps showing areas vulnerable to flooding if the event were to happen; and
2. Identify each circumstance that indicates a material increase in the likelihood of the dam hazard event or emergency event happening; and
3. State when and how the owner of the dam plans to warn persons who may be harmed, or whose property may be harmed, by the dam hazard event or emergency event, including the order of priority in which the persons or categories of persons are to be warned; and State when and how the owner plans to notify the relevant entities for the dam, if a dam hazard event or emergency event happens or, there is a material increase in the likelihood of such an occurrence, including the order of priority in which the relevant entities are to be notified; and
4. State the actions the owner of the dam plans to take in response to a dam hazard event or emergency event.

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

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

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

The local government whose area may be affected by a dam hazard for Copperfield Dam has been assessed as Etheridge Shire Council (ESC). ESC, through the LDMG, is provided a draft copy of the EAP following each comprehensive review to ensure consistency with its disaster management plans.

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 reasons why it considers the EAP is not consistent. The EAP must include any such notices, provided to the owner of the dam by 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 the regulation.

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 Copperfield Dam is Mareeba Disaster Management Group (DDMG).

2.6 Objective of the Copperfield Dam EAP

The objective of this EAP is to:

1. Outline a detailed plan for TS officers to follow to minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam occurs.
2. Identify dam hazard events that could occur at Copperfield Dam and the areas likely to be affected.
3. Provide emergency actions taken by the dam owners and operating personnel in identifying and responding to dam hazard emergency/emergency events and notifying and coordinating responses for relevant entities.
4. Outline the communications and actions for informing ESC, relevant disaster management groups (DMGs) and the broader community during the activation of this EAP.

2.7 Development of the Copperfield Dam EAP and Continuous Improvement

This EAP has been prepared in accordance with Chapter 4 of the Act and has involved continuous collaboration over several years with local government, DMGs and downstream PAR. Operational elements of the EAP have been refined over time as the lessons have been identified during various activations of the EAP.

The triggers and messages have been carefully crafted based on discussions and feedback from all relevant entities that have been identified within this EAP. Each year TS staff will:

Consult with all relevant stakeholders with the aim of improving the EAP when it is reviewed.

Meet or talk with the downstream PAR, ESC and DMG representatives to discuss any proposed changes to the EAP.

Be involved in the Mareeba DDMG as liaison officers, to ensure that the Mareeba DDMG is well informed on the dam safety issues surrounding Copperfield Dam. This allows all parties to understand their role and responsibility during the activation of the EAP, and what actions they may need to take.

Actively seek feedback from all relevant entities to ensure that improvements can be made on a continual basis.

2.7.1 Training

TS has a proactive and collaborative approach to EAP training and running exercises. Each year, typically before the wet season, TS runs a series of internally coordinated workshops and scenarios to test the effectiveness of the EAP. Depending on availabilities, external agencies and/or Local Government are included to test various scenarios. This ensures that all stakeholders understand their role and responsibility under this EAP and that it appropriately aligns with local and district disaster management plans. New and relevant employees to TS are given a briefing and walkthrough of the EAP to understand their role and responsibilities during an event. If an event occurs, new employees will be assisted through the processes to ensure all important communications and actions are undertaken.

2.8 EAP Activation Decision Making Process

This EAP can be activated by the EEC in conjunction with the EEM or DM (refer to section 5.1.1) when the situation reaches ALERT except in the event of a terrorist threat or event which goes straight to STANDUP 1.

When a dam hazard event or emergency event is occurring, an ERT, under the DM, is formed to monitor the event and undertake actions where required. To escalate or de-escalate the EAP, the ERT will discuss the current situation at the dam and any logistical issues which need to be managed (e.g. the management of staff resourcing, the timing of contacting PAR) before making a decision. Although ultimately it is the DM's call, an outcome is agreed amongst the ERT before a formal decision is made. As an example, for a flood event the following information would be assessed on a qualitative and/or quantitative basis as part of the decision-making process;

Current reservoir water level, the rate of rise and any measured inflow from Spanner Waterhole gauge

Recorded rainfall by nearby pluviometers

The BOM radar and the intensity of rainfall over the dam catchment

The 1-7 day forecast for Einasleigh

Time of day – when should notifications be made to ensure a high likelihood that they are seen/heard.

Once the ERT has an agreed position, actions will be undertaken as outlined by the EAP.

2.8.1 Logistical Issues

To ensure logistical flexibility for the ERT during a dam hazard event or emergency event, the ERT may elect to modify some of actions and communications within the EAP, including (but not limited to):

Timing of EAP activation, notifications and warnings – It is important to note that each event is unique in circumstance and that the ERT may elect to activate the EAP before said triggers are reached if the above information sources suggest that the EAP will require activation. The EAP may be pre-emptively activated if it can be established that trigger levels are likely to be reached late at night or very early in the morning. This proactive approach allows a 'plan of attack' for the ERT to be put in place and for messaging to be sent out during normal community waking hours.

The content of the notifications and warnings messaging may be changed subject to minor change by approval of EEM to reflect the unique circumstances of the dam hazard event or dam emergency event.

2.9 Dam Hazard Identification

The emergency action planning for Copperfield Dam has identified the following potential hazards relevant to the dam and outlined how these could escalate into a dam hazard event or a dam emergency event. The areas likely to be impacted by a dam hazard event or dam emergency event can vary greatly depending on the circumstances of the event, the RWL and whether the dam fails. This EAP contains the likely impacts during SDF, DCFF and PMPDF scenarios; therefore, covering the areas likely to be impacted in 'worst case' scenarios.

Dam hazard	May become a dam hazard event or emergency event when
Flood event	Spillway outflows from the dam may harm persons or property or there is a failure of the dam, where the water level is between FSL and DCL, which dam may harm persons or property.
Chemical/toxic spill	A chemical or toxic spill may harm persons or property.
Structural issue	The embankment is breached, causing a dam failure and the subsequent outflows from the dam may harm persons or property.
Earthquake	A structural issue is caused which initiates a dam failure and outflows from the dam may harm persons or property.
Terrorist Threat/Activity or High Energy Impact	A structural issue is caused which initiates a dam failure and outflows from the dam may harm persons or property.

Although not reportable to the Queensland Dam Safety Regulator, water contamination events within the dam storage are managed in accordance with the procedures included in this EAP.

Dam hazard event
A dam hazard becomes a **dam hazard event** when persons or property may be harmed due to the event, but the actions undertaken by the dam owner is unlikely to require a coordinated response involving two or more relevant entities. This applies when notifications are given to all relevant entities but there is no requirement for an evacuation.

Dam emergency event
A **dam emergency event** is an event arising from a dam hazard where persons or property may be harmed and coordinated response involving two or more relevant entities is needed. This applies when warnings are given during Stand Up to all relevant entities and evacuations have been recommended.

Emergency Event Report
An Emergency Event Report (EER) will be provided as required by section 352T of the Act. Generally, an EER will be provided by the EEM to DS if there has been a flood of record or the dam has reached Stand Up activation level and a coordinated response with relevant entities is needed.

The following colour coding has been used in this EAP that corresponds to each level of alert or status:

Table 2 Alert Status Colour Coding

Status	Description / Situation
NORMAL SPILLWAY DISCHARGES (SOP 14)	Conditions identified or developing that could escalate and impact on Copperfield Dam and may include: Observed, monitored or forecast rainfall to result in inflows and Reservoir Water Level (RWL) rising above full supply level (discharge through the main spillway above EL 586.0m) Normal spillway discharges up to EL 587.0m
ALERT	Conditions identified or developing that could escalate and impact on Copperfield Dam include: Development of conditions (or received information) that warrants more frequent or continuous monitoring of weather forecasts, rainfall, RWL or seepage Reservoir Level (RWL) is above EL 587.0m Other situations or issues that compromises the structural integrity of Copperfield Dam resulting in possible failure of the dam.
LEAN FORWARD	Conditions identified or developing that have the potential to place a population and/or property at risk (i.e. flooding, identified, observed or reported dam safety issues) include: Observed, monitored or forecast rainfall resulting in inflows and RWL rising above EL 587.5m Potential for the Copperfield Dam fuse plug to fail Identification of dam structural issues that may compromise the structural integrity of the dam. The dam embankments are intact but there is the potential for it to fail.
STAND UP 1 and 2	Conditions have been identified or exist where an emergency situation has been identified and there is a population and/or property at risk from flooding include: Observed, monitored or forecast rainfall resulting in inflows and RWL rising above full supply level (discharge through the main spillway above EL 589.5m for Stand Up 1 and EL 594.0m for Stand Up 2) Discharges taking place or forecast to take place through both the main spillway and fuse plug spillway Forecast for Reservoir Levels to reach or exceed dam crest level if the fuse plug has triggered Major flooding downstream of Copperfield Dam requiring evacuations to take place. Reports of significant damage to the dam.
STAND DOWN	Conditions exist or are developing where rainfall and inflows to the Dam are reducing and discharges from the dam are reducing. Conditions may include: Reduction in RWL and spillway discharges to EL 587.0m and falling with no rain forecast in the catchment. Downstream flooding has reduced and is no longer a threat to the public and PAR. Risks are reassessed as being low.

2.10 Communications

2.10.1 Notifications and Warnings

Flooding in the Copperfield River (and discharges from Copperfield Dam) is expected as a result of a low pressure or a cyclonic rain system over the area. The activity tables provided in this EAP provide when notifications, warnings and, if required, evacuations of impacted landholders/residents need to take place. It is however noted that for other reasons initial warnings and evacuation of impacted residents at an earlier stage than that outlined in this EAP may have occurred (i.e. other local emergency plans have been activated, for example the Local Disaster Management Plan held by ESC).

There is considerable uncertainty in the flood travel times and thus early warning will be given to PAR on being aware of a potential dam break event or flooding issues from the dam. A proactive response and early notification, warning and/or evacuation may occur, rather than waiting for dam RWL triggers to be reached. During a dam hazard event or dam emergency event TS maintains an open line of communication with relevant entities to ensure that all parties are kept well informed. Contextualised messaging, contact lists and evacuation plans are contained in the subsequent sections and appendices of this EAP. Messaging for each activation level has been developed based to reflect the level of attention or urgency needed by the downstream community, local government or relevant DMGs.

Messaging may be subject to minor change by approval of EEM to reflect the unique circumstances of the dam hazard event or dam emergency event.

The residents of Einasleigh will be notified of an emergency event by the LDMG instead of TS staff. Between the dam and the township of Einasleigh there are no gauging stations or other means for TS staff to monitor the local weather, rainfall and waterway conditions and information passed to the residents may not be accurate or provided at the appropriate time. In addition, the 2022 FIA modelling showed that DCFF and PMF events may result in the inundation of the township however, there may be other variables that could cause significant flooding in Einasleigh such as flooding in the Einasleigh River, flooding from other catchments and waterways. Therefore, LDMG/DDMG/emergency services will be warned to carry out warnings and evacuations for all residents in Einasleigh.

The process for issuing notifications and warnings is outlined in the activity tables in Chapter 6 of this EAP and notification flowcharts in Appendix 2. It is important to note that priority order is implied by the order in which persons/entities are listed within the communication tables in Chapter 6. During an event where the EAP is activated, TS aims to keep all entities well informed with sitreps provided at stated times or if the conditions affecting the dam change. It is important to note that:

Internal sitreps are sent by the EEM to the ERT via email.

External sitreps are sent by the EEM or DM. It will include a summary of the dam/s status and the required actions.

An example SitRep template is provided below. The content of sitreps may be altered to suit the circumstances of individual dam hazard events or dam emergency events.

Template SitRep for Stakeholders (to be modified according to situation)

Department of Natural Resources and Mines,
Manufacturing, and Regional and Rural Development

SITUATION REPORT – COPPERFIELD RIVER GORGE DAM Technical Services Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development		
EVENT: Flooding		
Event - Sitrep No:	Date:	Timing:
XXX	DAY MONTH YEAR	e.g. 0800hrs
Reviewed		
Emergency Event Manager	[redacted] <<< OR >>> [redacted]	
Approved and from:		
Director Asset Management	[redacted]	

Copperfield River Gorge Dam

- Located 60km south of Einasleigh in North Queensland
- https://www.qld.gov.au/environment/water/catchments/state-owned-dams

Current Status

- EAP activation status: ALERT/LEAN FORWARD/STAND UP/STAND DOWN
- Reservoir water level trend is steady/rising/falling
- Current level is XXX.XXm (XXX.XXm over spillway) (current at DATE/TIME)
- BOM forecast is XXX
- Upstream gauging station shows XXXX

Current actions:

- Frequency of monitoring – as required
- Inspections – weekly dam inspections will resume after flooded access roads are re-opened
- Dam is closed to public access

Background Information about Copperfield Dam and EAP

- Full Supply Level 586.00m
- Moderate Flood Level (Alert) occurs at 587.0m – Provide notifications
- Moderate/Major Flood Level (Lean Forward) occurs at 587.5m – Prepare for evacuations
- Major Flood Level (Stand Up) occurs at 589.5m – Advise evacuations

2.10.2 Communication Systems

Communications shall include both communication to the PAR as well as communications between the dam owner and the relevant entities required to deliver the appropriate response, scalable to the emergency event.

The means of communication to be engaged for this EAP shall include:

Face to face meetings – DIO/other visiting and notifying the PAR
Landline Telephone
Mobile Telephone (no coverage in the Kidston area)
Satellite Telephone
Email
SMS/Text message
DNRMMRRD website (located at https://www.qld.gov.au/environment/water/catchments/state-owned-dams)
ESC Facebook for broader community messaging.

2.10.3 Redundancy Plan – Communication

In the event that landlines, mobiles and satellite phones are not operating in this remote location, the use of UHF radio will be the main means of local communication until all communication systems resume. A UHF repeater map has been provided by the Etheridge Shire Council (ESC) and is in Appendix 15.

2.11 References and Associated Documents

The following list of references, including relevant legislation and key documentation applicable to this EAP:

Water Supply (Safety and Reliability) Act 2008
Disaster Management Act 2003
Department of Regional Development, Manufacturing and Water "*Dam Safety Management Guideline, March 2024*"
Department of Natural Resources, Mines and Energy "*Guideline for failure impact assessment of water dams, November 2018*"
Department of Regional Development, Manufacturing and Water "*Emergency Action Plan for Referable Dam Guideline, October 2023*"
Australia National Committee on Large Dams (ANCOLD) Guidelines
IGEM Review of Seqwater and SunWater Warnings Communications Report 1/2016
IGEM Review of Paradise Dam Preparedness Review Report 1/2019

2.12 Other Risks and Issues

The weather event(s) likely to lead to activation of this EAP may also have the following implications:

Local emergency services may already occupied with other storm-related incidents
Limited resources are available within the Kidston area to support implementation of the EAP.
Roads to and from Copperfield Dam, including the Gregory Developmental Road (Conjuboy-Einasleigh Road), Gilberton Road, and Rycon Road (dam access road) may be impassable due to localised flooding, downed power lines and trees or vegetation across the roads

Roads leading from the township Kidston to Copperfield Dam is a gravel road and it may become impassable due to:

- localised flooding
- muddy or slippery road conditions
- washouts
- high winds making road travel difficult or unsafe
- road closures

Irrespective of the weather conditions, road conditions generally pose the following risks:

uneven surfaces including rutting and corrugations
native wildlife (kangaroos etc) or farm animals on or beside the road
large vehicles (road trains) and extensive dust trails left by these and other vehicles

In the event of the dam's fuse plug failing (fuse plug eroded away with discharges taking place through the fuse plug channel), there will be no access to the right abutment of the dam as the discharge through the fuse plug will inundate the access road.

Communication in this region is limited to landline or satellite phones and local UHF radios only. There is no mobile phone coverage. This also restricts the use of polygons and SMS Burst messaging. Use of an Emergency Alert through Queensland Fire and Emergency Service is not considered to be viable due to the lack of mobile phone coverage in the area. During emergency events TS staff continue to ring landlines until an answer is received.

The monitoring system at the dam relies on a telemetry system that utilises the satellite phone network. Storm damage to the satellite phone network or damage to the onsite equipment (such as from a lightning strike) may make the system inoperable. Similarly, adverse weather conditions may impact on the site being able to connect to the satellite phone system. In 2018, a camera was installed on the left embankment which enables TS staff to monitor the dam's storage water level, the dam embankment and spillway and will verify the RSAS data and performance of the dam's embankment and spillway during an emergency event.

Any dam operators or other persons located at the dam during a storm event may be isolated until such time as the flood waters recede or alternative arrangements are made to rescue them. This will be dependent on suitable weather conditions prevailing or the access roads being passable or safe to travel on.

2.13 Technical Data

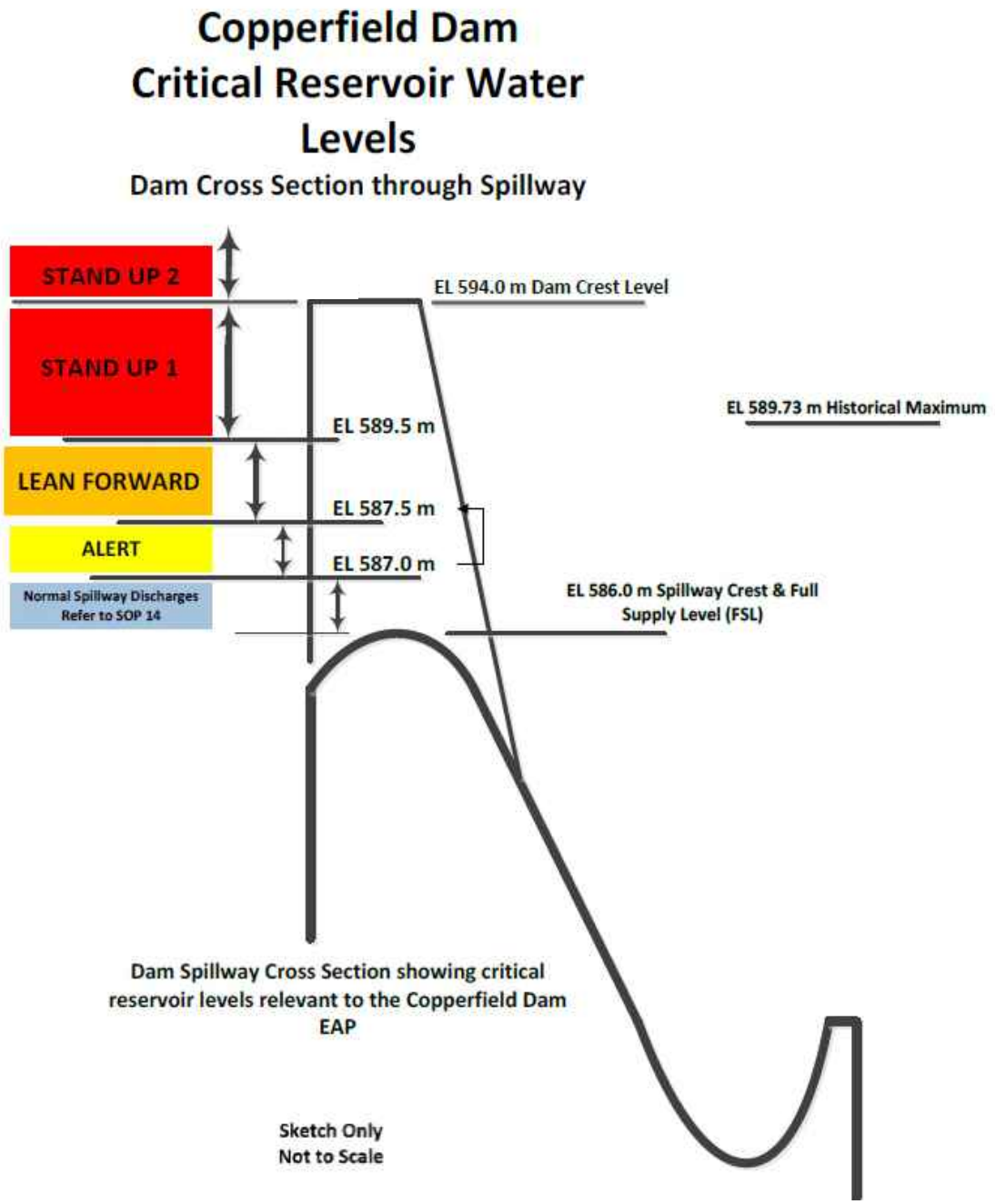
The following technical data is provided for Copperfield Dam:

Table 3 Copperfield Dam Technical Data

Name and location	
Name of Dam	Copperfield River Gorge Dam
Other Names	Kidston Dam, Copperfield Dam
Lot and Plan	2PY11 – Lands Lease
Location	Latitude 19° 02’ 10” Longitude 144° 07’ 48”
Region	North
Shire	Etheridge
Nearest Town	Einasleigh 60 km north
Stream and AMTD	Copperfield River 72 km
Licence No	36192K
Current Owner	Queensland Government (managed by Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development)
Designer (Date)	Gutteridge Haskins and Davey Pty Ltd (1984)
Construction Supervision	Gutteridge Haskins and Davey Pty Ltd
Construction Contractor	Hornibrook
Safety review dates	2005, 2020 (as part of the Portfolio Risk Assessment), 2026 (next required)
Techncial data	
Dam Type	Roller compacted concrete with central ogee concrete spillway and fuse plug emergency spillway
Purpose	Initially constructed as the water supply to Kidston Gold Mine. Now utilised for Genex Pumped Hydro Project and stock water supply
Main Dam Height (above lowest toe)	32 m to spillway with main crest to 40 m
Main Dam Length	340 m
Fuse Plug details	The fuse plug is an earthfill/sand embankment with a clay core founded on a RCC sill at EL584.5m. The crest of the fuse plug is EL593.5m; therefore the height of the fuse plug is 9m.
Fuse Plug length	140 m
Spillway Type	Service – Central uncontrolled ogee spillway – Crest EL 586.0 m Fuse Plug – Uncontrolled return slope to river – Crest EL 593.5 m
Spillway Description	Service – Spillway width of 100 m Fuse Plug – Spillway width of 140 m
Outlet Description	River release outlet works consisting of 800 mm diameter steel pipe with 8 mm wall thickness and coated internally with an epoxy paint system through the dam encased in conventional concrete, controlled by a 600mm diameter cone dispersion valve as a flow regulator at the downstream end and a bulkhead gate at the upstream end. An 800 mm diameter butterfly guard valve is located upstream in the valve chamber.

	Mine pipeline release outlet works consist of two 508 mm diameter steel pipes with 6mm wall thickness and 10 mm thick cement mortar lining through the dam encased in conventional concrete. One of the pipes is not used and has been sealed at both ends with blank flanges. The service pipe is controlled by 500mm diameter butterfly valves to the mine supply pipeline and to the scour to the roller bucket. This pipe is connected to a floating intake.
Storage characteristics	
Full supply level (FSL)	EL 586.0 m
Storage capacity	20,600 ML
Surface area	240 ha at FSL
Length of shoreline	Unknown
Main Spillway capacity	4,230m^3/s at Dam Crest Level EL 594.00m
Fuse Plug Spillway capacity	3,300m^3/s at Dam Crest Level EL 594.00m
Outlet capacity River release	3m^3/s with storage at or above EL 575.00m
Dam crest level (DCL)	EL 594.0 m
Catchment area	124,100 ha (1,241 km^2)
Catchment description	Flat basalt covered plain with an area of hilly granitic terrain at the dam site.
Design Rainfall Review	FIA 2022
Methods	Developed in accordance with ARR 2019
Original Spillway Design Flood	Design Report-RCC Dam-GHD 1984
Maximum Level	EL 593.5 m
Flood volume	Unknown
Peak Discharge	4 700 m^3/s
AEP of Flood	1 in 500
Freeboard, original	0.5 m (approx)
Probable Maximum Flood	FIA 2022
Maximum Level	EL 598.90 m
Flood Volume	Unknown
Peak Discharge (12 hour)	20,107 m^3/s
AEP of Flood	Probable Maximum Flood
Freeboard	None
Dam Crest Flood (DCF)	As per FIA (RHDHV, 2022)
Maximum Level	EL 594.05 m
Peak Discharge	7,602 m^3/sec
AEP of Flood	1 in 8,000 AEP, 24 hour
Freeboard	None
PMP Design Flood (PMP-DF)	As per FIA (RHDHV, 2022)
Maximum Level	EL 598.90 m AHD
Peak Discharge	20,107 m^3/s
Freeboard	None – wall overtopped by 4.9m

2.14 Critical Reservoir Water Level Triggers



Refer to Appendix 10 – Critical Reservoir Water Levels

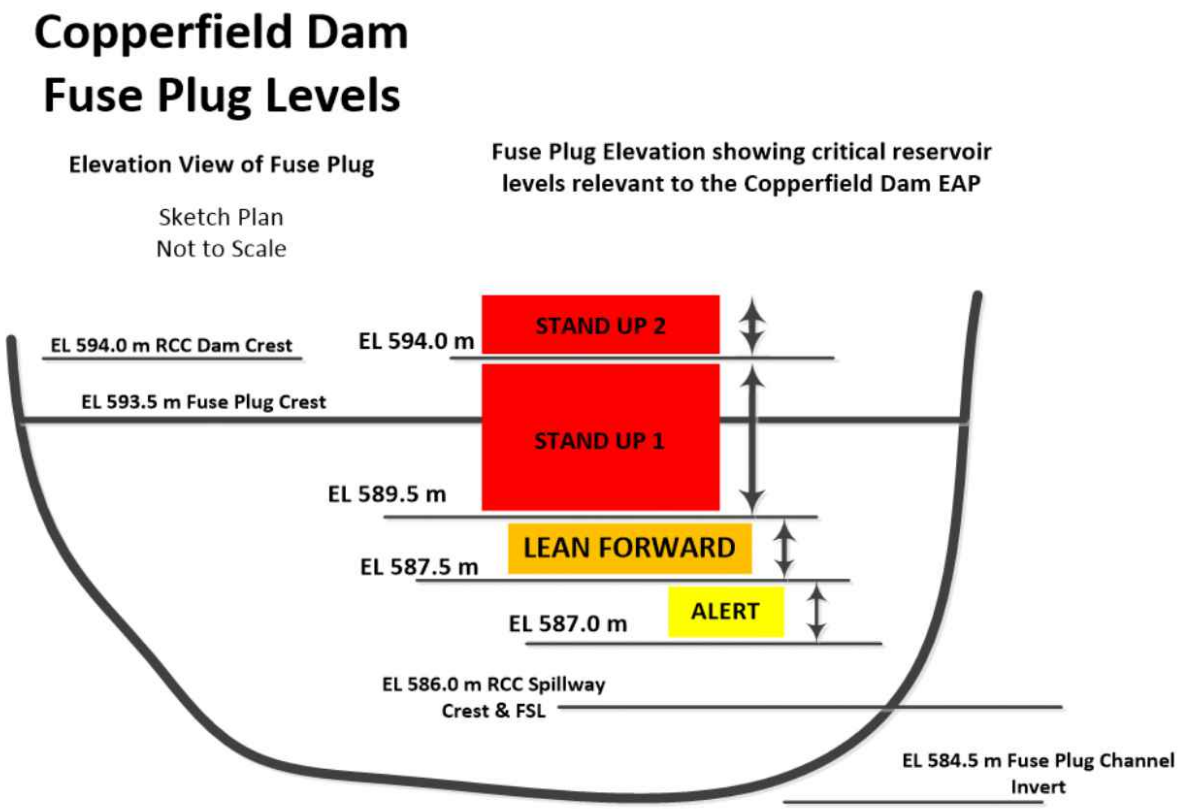


Figure 2.14.2 Key Fuse Plug Reservoir Water Levels

2.15 Copperfield Dam - Remote Sensing and Alert System (RSAS) and IR Camera

A Remote Sensing and Alert System (RSAS) has been installed at the dam to provide:

- real time monitoring of key RWLs and forwarding of data.
- activation of alarms when critical RWLs have been reached.
- monitoring of the dam embankment drainage gallery seepage V-Notch weirs.
- rainfall.
- voltage of the batteries powering the onsite instruments and controls.

The system uses the satellite system to communicate the site data to the Eagle IO web-based data monitoring portal, which is accessed by the ERT. Eagle IO is maintained by Qteq Pty Ltd under a contract with the Department.

The RSAS records the input from a number of site instruments and forwards the details either on a regular basis (pre-set time interval) or in the event of an alarm level being reached an immediate update of site conditions.

The RSAS and the site instruments are powered by batteries which are electrically maintained by solar panels located on the top of each cabinet. The systems are capable of operating for several days of heavy cloud cover. However, cloudy conditions and wet weather may create poor satellite phone reception at the site and result in communication failure with the RSAS system.

The RWLs monitored and recorded by the RSAS system include:

- Upstream dam reservoir water level;
- V-notch weirs (2 No.) located in pits at each entrance to the dam's drainage gallery;

Downstream river level (Copperfield River); and
Rainfall.

The Infra-Red Camera

An infrared high-resolution camera with day/night visibility was installed on the left abutment beside the RSAS cabinet in 2018. The solar powered camera provides a single image each day based on a carousel of pre-set angles and is viewed via the DisasterWatch internet data portal.

When satellite conditions allow, the camera can be remotely operated live by TS staff and has automatic tilt, pan and zoom features.

The camera enables staff to further monitor the dam's storage water level, the dam embankment and spillway and will verify the RSAS data and performance of the dam during an emergency event.

2.16 RSAS Redundancy Plan

If telemetry and the RSAS are not operating, the receipt of local intelligence and monitoring of the BOM website (www.bom.gov.au) on predicted rainfall and weather conditions will provide updates to any situation until telemetry and communications resume.
Inflows to the dam can be obtained at Spanner Waterhole (Appendix 7 - Rainfall and Reservoir Water Level Information).

2.17 Bureau of Meteorology (BOM)

Useful information can be obtained from the BOM website (including RSAS data) that can assist in assessing the potential rainfall and development of flood inflows to the dam. The information includes "weather radar" images (refer to the Cairns based radar site).

Details on the use of the BOM site and accessing information from Spanner Waterhole are in Appendix 7 – Rainfall and Reservoir Water Level Information.

2.18 Maintenance and Inspections

The dam is maintained and inspected in accordance with the safety conditions applied to the dam and the Queensland Dam Safety Management Guidelines (DRDMW, 2024).

The dam is inspected regularly, including:
periodic inspections by experienced operators on a weekly basis.
quarterly inspections by a qualified dam engineer (RPEQ) from Technical Services.
comprehensive inspections on a 5 yearly basis.
dam safety reviews (currently in progress, last one completed in 2005).

Special inspections are also undertaken following any major event such as major flood inflows and discharges through the dam spillway or reports of any major damage or interference to the dam. Refer to SOP 7.

3. Controlled and Uncontrolled Releases

Controlled releases may be made from the dam in August/September to provide water for downstream users and to supplement the waterholes in Einasleigh Gorge, depending on the water storage level in the dam and other circumstances. During these releases, the cone valve release is set so that downstream infrastructure is not affected. Refer to Standard Operating Procedure 16 – River Releases.

Uncontrolled releases occur when the spillway is operating for instance, during a flooding event. The dam is closed to public access when the spillway is operating, and for some time following, for safety reasons.

4. Downstream Release Hazards

4.1 Persons

The FIA 2022 determined that a dam failure at EL 593.52m (CFF) may impact on 20 Total PAR including itinerant PAR. However, the PAR will already have been advised to evacuate at EL 589.5m (EAP Stand Up 1).

There is estimated to be 4 itinerant PAR, but zero residential properties impacted as a result of a Sunny Day Failure event. The latest flood modelling indicated that there would be a maximum of 74 Total PAR in the PMF event, as the majority of properties are already inundated prior to dam failure.

For any event which includes a failure of the dam, the LDMG and DDMG (including emergency services) will be advised to carry out warnings and evacuations for all residents in Einasleigh.

Table 4 shows the estimated PAR affected by possible emergency events.

4.2 Property

Controlled releases from the dam flood the culvert immediately downstream of the dam. These releases are generally limited to 30% of the maximum release rate so that downstream fences and infrastructure are not affected.

Uncontrolled releases impact several creek crossings, and a bridge below Oaks Rush Camp.

4.3 Roads

Public road inundation and the need for road closures may need to be implemented by ESC when uncontrolled releases occur from the dam.

Roads known to be impacted include:

- Rycon Road (dam access road)
- Gilberton-Kidston Road
- Gregory Developmental Road (Conjuboy – Einasleigh Road)
- Narrawa Road
- Roads in and around Einasleigh township

Figure 4.3.1 Location of the roads known to be impacted

Figure 4.3.2 Location of the roads at Einasleigh

ESC will coordinate road closures, signage and barricades. ESC will seek assistance from other local entities when required, i.e. Queensland Police Service (QPS), Department of Transport and Main Roads (DTMR), and where required the local State Emergency Service (SES).

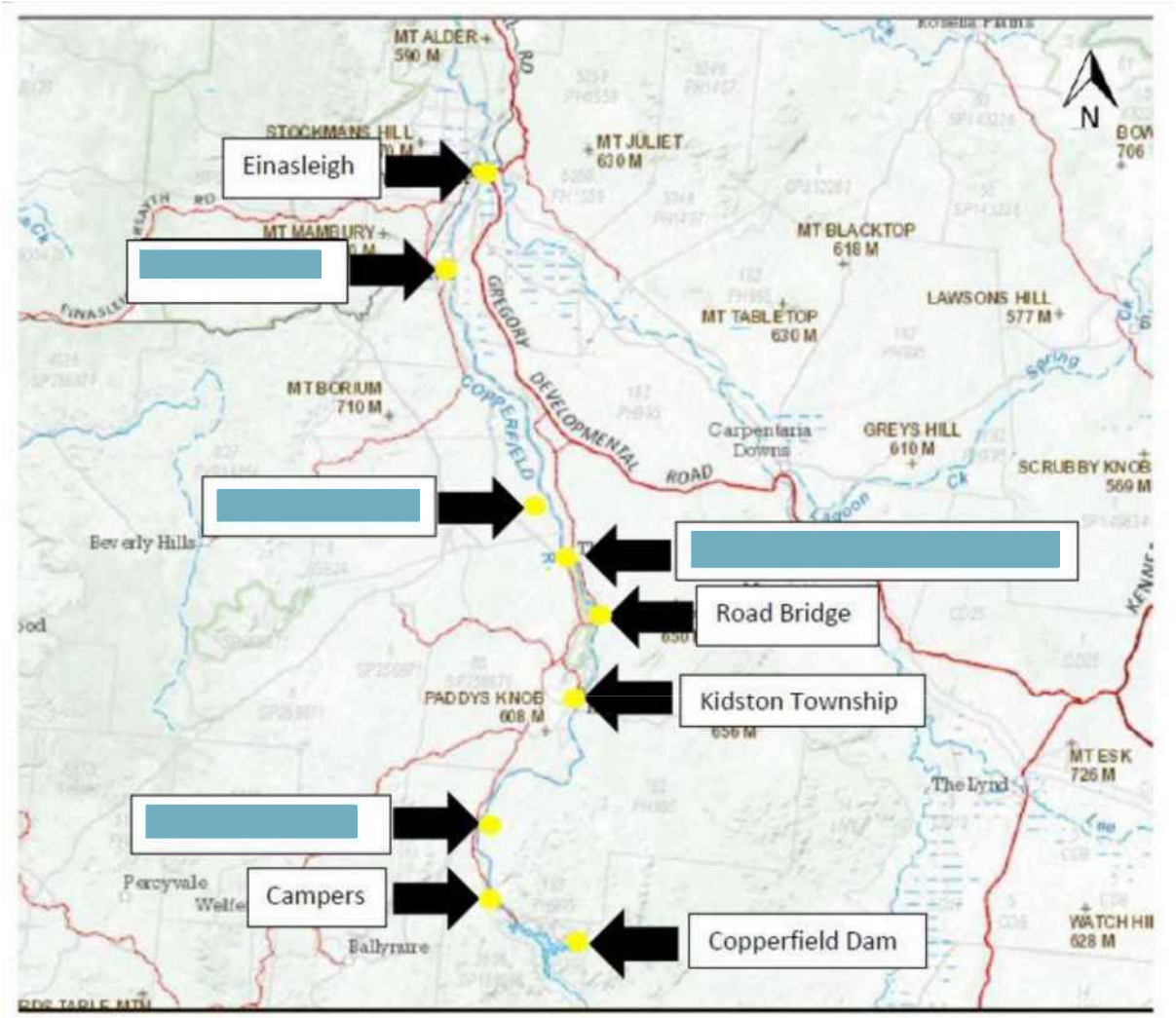


Figure 4.3.3 Downstream populations and property

5. EAP Roles and Responsibilities

5.1 The Department as Dam Owner

DNRMMRRD acts on behalf of the State Government as owner of the dam. The dam owner is responsible for developing a regulator approved EAP under the *Water Supply (Safety and Reliability) Act 2008*. Resources has a contract with ESC to deliver certain functions under this EAP on its behalf as outlined below.

5.1.1 Emergency Event Coordinator (EEC)

The EEC is the Technical Services officer who is responsible for coordinating an emergency event and activating the EAP.

During an event the EEC shall:

Activate the EAP in consultation with the EEM as per tables indicated in section 6.

Advise the EEM that the EEC is coordinating the response to the event and confirm that the EAP is activated in response to an event.

Monitor conditions at the dam using a combination of reports from the DIO, RSAS, Spanner Waterhole, and BOM websites.

Monitor all emergency events.

When an event at the dam has reached or is likely to reach a dam safety trigger level, make notifications as per Tables 3, 11, 19, 27 and 35.

Refer high risk activities to the EEM, as appropriate and/or as per departmental policy.

Evaluate reports from the DIO and provide direction where required in this plan.

Provide regular updates during emergency events to the Local Disaster Coordinator.

Maintain an event log of all communications received, communications sent, actions taken and observations.

5.1.2 Dam Inspection Officer (DIO)

The nominated or duty DIO shall undertake the following:

Notify the DIO Backup officer when the EAP is activated.

Advise the campers at the dam to leave the site; close and lock the gate at Rycon Homestead and display the sign that states the road is closed.

Monitor the dam for any potential emergency events (high rainfall or storm events forecasted, dam safety issues, earthquakes, sabotage or vandalism).

Follow the EAP relevant for the specific emergency event outlined in this document. Immediately notify the EEC when an emergency event or potential emergency event has been identified.

In the event of determining that a Structural/Sunny Day Failure, Terrorist Threat, or Earthquake is developing or has occurred, immediately advise the EEC.

In an emergency event, take steps to ensure personal safety and the safety of self, other DIOs and the public.

When an event at the dam has reached or is likely to reach a dam safety trigger level, make notifications as per Tables 2, 10, 18, 26 and 34.

If safe to do so, attend the site, monitor and report site conditions / situation. If unable to attend site or site attendance is to be greater than 2 hours after receipt of request, advise EEC of delay and likely time to arrive at site.

Record details of the emergency event in the event log. This shall include details of all communications received and sent, observations and actions taken.

Take relevant photographs (dam safety issues, reservoir water levels etc.) and forward them to the EEC.

Provide regular reports / updates / changes to the EEC for evaluation during the emergency event. Updates are to be provided in the first instance verbally and followed up by email.

During an emergency event, the DIO should refer all requests from the media for

comments to the Executive Officer, LDMG.

In the likelihood that the DIO is unable to fulfil the duties, advise the DIO Backup of any intended absence from the area and leave a point of contact. Advise EEC of changes.

Immediately notify DIO Backup officer(s) when the EAP is being initiated.

Keep the EAP in a clean, secure location that can be readily accessed at short notice.

After an emergency event, send a copy of the event log to the EEC within 15 days.

5.1.3 DIO Backup

The nominated DIO Backup shall undertake the following:

Assist the DIO in times of emergency.

Follow the EAP relevant to the identified emergency event outlined in this document.

Undertake the role and responsibilities of the DIO should that person be unavailable.

Attend the dam if possible and safe to do so.

- During an event, DIO Backup shall attempt to establish communications with the DIO.
- Maintain an event log of all communications received, communications sent, actions taken and observations.
- Keep the EAP in a clean, secure location that can be readily accessed at short notice.

5.1.4 Dam Inspection Engineer (DE)

If directed by the EEC, the Dam Inspection Engineer will undertake a special inspection of the dam. A verbal update is provided in the first instance, followed up by comprehensive report including observations and photographs.

5.1.5 Emergency Event Manager (EEM)

The EEM on-duty rotates each fortnight, or as required for fatigue management, between the primary and secondary EEM. The EEM shall undertake the following:

Annually:

Review the EAP prior to 1 October each year.

Check that the DIO, DIO Backup(s) and disaster management entities are conversant with the EAP.

Distribute the EAP and any amendments / updates according to the EAP distribution list.

When required, supervise PAR door knock with the EEC and LDMG to distribute updated evacuation plans.

During an event:

Monitor conditions at the dam using a combination of reports from the EEC, Spanner Waterhole, RSAS and BOM websites.

Confirm that this EAP is implemented in response to an event at the dam.

In the event that this EAP is activated, provide technical assistance and information

to the LDMG as necessary to assist in the implementation of this EAP.

Make notifications and Sitreps as per Tables 4, 12, 20, 28, 36.

Refer high risk activities to the DM, as appropriate and/or as per Departmental policy.

Maintain an event log of all communications received, communications sent, actions taken and observations.

Within thirty (30) days of an emergency event Stand Down, present an EER (if required) to the DM.

5.1.6 Director, Asset Management (DM), Resources

The DM shall undertake the following:

Annually:

Review the EAP in consultation with the EEM prior to 1 October each year.

Authorises/approves this EAP.

Initiate a review as and when there are changes to the operating environment or assessed risk.

During an Event:

Review sitreps and notifications as per tables 5, 13, 21, 29, 37.

Provide advice and/or assistance to the EEC and EEM as required.

Provide warning or notifications to the LDMG, DDMG and other DMG entities in accordance with this plan.

Direct the actions of departmental personnel during an emergency to protect life and property to the maximum extent considered possible under the prevailing conditions and with the resources available.

Coordinates staff rostering and fatigue management of ERT personnel in accordance with the relevant Award (clause 4.3 of the *State Government Entities Certified Agreement 2023*).

Maintain an event log of all communications received, communications sent, actions taken and observations.

Approve repairs and procurement for the emergency event and subsequent.

5.1.7 Executive Director, Technical Services, DNRMMRRD

The Executive Director of Technical Services shall undertake the following:

Ensure departmental personnel protect life and property to the maximum extent considered possible under the prevailing conditions and with the resources available.
Review event reports and notify the Deputy Director-General, Georesources Division, DNRMMRRD of the event.

5.1.8 Deputy Director-General, Georesources, DNRMMRRD

The Deputy Director-General, Georesources, Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development shall undertake the following:

Notify the Director-General, Resources of the event.

5.1.9 Director-General, Resources

The Director-General, Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development shall undertake the following:

Keep the Minister informed.

Note the EER.

5.2 Local Government

The local government has responsibilities related to this EAP under the *Local Government Act 2009* and the *Disaster Management Act 2003*.[1]

5.2.1 Mayor of Etheridge Shire Council (ESC)

The Mayor, ESC, as chair of the LDMG, shall undertake the following actions:

Responsible for preparing a local disaster management plan for Etheridge Shire Council, with the assistance of the LDMG including arrangements for public information and warnings.
Coordinating community education activities, including information on warnings.
Have a disaster response capability available for ESC.
Performing other functions given to local government under the *Disaster Management Act 2003.*

5.2.2 CEO of Etheridge Shire Council, Local Disaster Management Group (LDMG)

The CEO, ESC, as Local Disaster Coordinator (LDC) of the LDMG, shall undertake the following actions:

Annually:

Ensuring disaster management and disaster operations in the area are consistent with the state group's strategic policy framework for disaster management.
Developing effective disaster management with ESC and regularly reviewing and assessing the disaster management.
Identifying and providing advice to the Mareeba Disaster District Management Group about support services required by the LDMG to facilitate disaster management and disaster operations as required for an event.
Ensuring the community is aware of ways of mitigating the adverse effects of an event. Maintaining and distributing the polygon when mobile coverage is available.

[1] Office of the IGEM 2015-16, Review of Seqwater and SunWater Warnings Communications, p87

During an Event:

Assist with emergency response and evacuation processes for Kidston township, Oaks Homestead, Rycon Station and Narrawa Station during emergency events as identified in this EAP.
Carry out notifications, warnings and evacuations (if required) for residents in Einasleigh for DCFF and PMPFF events and local flooding events.
Ensure information about a disaster in the area is promptly given to the Mareeba Disaster District Management Group.
Issue all media releases and responses to media communications. Liaise with QPS and other agencies as necessary on wording of media releases.

5.3 Queensland Police Service (QPS)

The QPS has responsibilities related to this EAP under the *Disaster Management Act 2003*. The Queensland Police Communications Centre shall respond to notification of terrorist threat or activity. The QPS will coordinate its resources and responses as required for a terrorist threat or activity. The QPS is a member of the Etheridge Shire LDMG and all messaging and responses shall be coordinated through the LDMG so there is no breakdown in communication, particularly during evacuation activities.

6. Emergency Events and Action Tables

In a flood and dam safety emergency situation, all persons involved in activation, management and implementation of this EAP are to note the following:

Weather situations likely to lead to the implementation of this EAP are also likely to see intense rainfall conditions elsewhere in the area. This will increase the hazards and risks associated with implementing this plan. Hazards may include dangerous road conditions, reduced visibility, flooding of local roads, downed power lines and trees being blown over.
DNRMMRRD required to respond to a dam safety event at the dam may be limited due to these resources being previously deployed elsewhere in the region as a result of the wet weather event (downed trees, house roof damage etc.), and the limited number of resources available locally.

Under this EAP the following scenarios / situations are provided as a guide to the possible dam safety events and emergency situations associated with the dam:

1) Flood Events – Section 6.1
2) Structural Issues/Sunny Day Failure – Section 6.2
3) Chemical/Toxic Spill – Section 6.3
4) Terrorist Threat or High Energy Impact – Section 6.4
5) Earthquake – Section 6.5

6.1 Flood Events

6.1.1 Dam Hazard Overview

A flood event occurs at Copperfield Dam when natural catchment inflows raises the storage level above the threshold for normal spillway operation (SOP 14, EL 587.0 m). The greater the inflow rate, the higher the storage level will rise. Increased storage levels place greater loads on the dam structure and increases the risk of dam failure.

Increased inflows also result in greater spillway discharges. As discharge rates increase, the likelihood of downstream flood impacts increases at low-level road crossings and at properties along Copperfield River and within the townships of Kidston and Einasleigh. Detailed information on downstream flood impacts, including inundation maps, is presented in Appendix 18.

Remote dam monitoring activities is intensified during flood events. However, the performance of routine inspection is likely to be affected as floodwaters are likely to cut off road access to the dam. There is no mobile phone coverage around the dam and the only method to access to the dam during a flood event is via helicopter.

Forecasts of heavy rainfall from the Bureau of Meteorology (BOM) and rising streamflow trends from the upstream gauging station (Copperfield River at Spanner Waterhole) are circumstances which indicate an increased likelihood of a flood event dam hazard occurring.

6.1.2 Estimated Population at Risk (PAR)

The following table outlines estimates of potential dam failure PAR, based on information taken from the 2022 FIA and a review of population within the failure impact zone, undertaken in conjunction with ESC in August 2025. It estimated 2 PAR reside in each dwelling, based on ABS census data for the area.

Table 4 Summary of Estimated Total PAR

Location	SDF	DCF	PMF
Campers at the dam	Up to 30 campers	Up to 30 campers	Up to 30 campers
Rycon Homestead	0	2	2
Kidston Township (4 residences)	0	4	8
Oaks Homestead	0	4	4
Narrawa Road	0	2	2
Einasleigh	0	58	62

Note that for flooding events, campers are removed from site when the spillway operations commence (at SOP14).

6.1.3 Flood Travel Times

The following table outlines flood travel times between the dam and key downstream locations for a range of flood events, based on information taken from the 2022 FIA.

Table 5 Estimated Flood Travel Times for Locations

Location	Sunny Day Failure	1:1000 AEP (EL593.52m)	DCF with dam failure	PMF with dam failure
Rycon Homestead	30 minutes	10 minutes	10 minutes	10 minutes
Kidston township	2 hours, 55 minutes	1 hour, 10 minutes	1 hour	1 hour
Oaks Homestead	4 hours, 50 minutes	1 hour, 55 minutes	1 hour, 50 minutes	1 hours, 45 minutes
Narrawa Road	10 hours, 50 minutes	4 hours, 40 minutes	4 hours, 35 minutes	3 hours, 50 minutes
Einasleigh	12 hours, 40 minutes	5 hours, 25 minutes	5 hours, 15 minutes	4 hours, 45 minutes

6.1.4 Flood Durations

For a Sunny Day Failure event the flood duration (expected period of time that flood conditions will exist) at the above locations is estimated to be in the order of 1.5 hours.

Flood duration for floods that are due to storm related events is likely to be longer than 1.5 hours and will depend on the nature of the storm and other factors. Storm related flooding is likely to be in excess of one day.

6.1.5 Flood Depths

The predicted depth of flooding above plinth level at each location is presented in the table below. It is noted that the levels identified below are maximum modelled water depths above the plinth level of the building in question. For areas with more than one affected building the building with the maximum depth of inundation has been utilised. Levels below are not presented as absolute or tied to a particular height datum.

Table 6 Predicted Depth of Flooding

Location	Sunny Day Dam Failure	1: 1,000 AEP (EL593.52m)	DCF with dam failure	PMP with dam failure
Rycon Homestead	0 m	3.4 m	4.5 m	8.4 m
Kidston Township	0 m	1.0 m	2.6 m	7.3 m
Oaks Homestead	0 m	0.8 m	2.1 m	5.2 m
Narrawa Road	0 m	2.0 m	3.8 m	7.1 m
Einasleigh	0 m	1.0 m	4.4 m	7.8 m

Activity Table 1 – Flood Events - Summary of Trigger Points and Actions

Reservoir Water Level (RWL) and Trigger Points	Action at Trigger Point	Action if RWL is rising or RWL is steady and further heavy rainfall is likely	Action if no further heavy rainfall is likely and RWL is falling
EL 586m Water at spillway level	ESC to advise campers to leave, then lock gate and display the Dam Closed sign. EEC to change the website to state dam is closed		Open gate at Rycon Homestead when RWL is less than EL 586m and access road and dam site is assessed as safe.
EL 586m – 587.0m <u>Controlled Release</u> EL 586.55m Cone Valve opened to 30%	Notify ESC that water is likely to be over the downstream causeway.	SOP 14 for minor flows applies (refer Appendix 9 – SOP 14 – Small to Medium Spillway Overflows)	
EL 587.0m End of SOP 14	Alert Status EEC notifies EEM, LDC and DDMG that the EAP is activated		Stand Down when a receding trend is established, no additional rain occurring or forecast in the catchment and RWL is less than EL 587.0m.
EL 587.0m – 587.5m		Monitor and report Update EEM and LDC	
EL 587.5m	Lean Forward Status Notify EEM, LDC and DDMG and PAR Warning		
EL 587.5m - 589.5m		Monitor and report Update EEM, LDC and PAR	
EL 589.5m	Stand Up 1 Status WARNING to PAR to EVACUATE EVACUATE PAR WARNING to LDC and DDMG		Stand Down when a receding trend is established, no additional rain occurring or forecast in the catchment and RWL is less than EL 587.0m.
EL >589.5m (589.73m^2 - Historical Maximum)		Monitor and report Update EEM, LDC AND PAR	Water receding. Continue to monitor and report. Update EEM, LDC and PAR. Notify EEM, LDC and PAR that the event is over. Notify Update PAR (Rycon, Kidston township, Oaks) and LDC until event is concluded.

Stand Up 2 EL594.0m Dam Crest Failure possible EL >594m	Stand Up 2 Status WARNING to LDC and DDMG to evacuate township of Einasleigh, if not already evacuated		Stand Down when a receding trend is established, no additional rain occurring or forecast in the catchment and RWL is less than EL 587.0m. Water receding. Continue to monitor and report. Update EEM, LDC and DDMG and PAR Notify EEM, LDC, DDMG and PAR that the event is over. Notify Update PAR (Rycon, Kidston township, Oaks) and LDC and DDMG until event is concluded
Stand Up 2 >EL594.0m Dam Crest Failure in progress		Monitor and report Update EEM, LDC AND PAR	

[2] Historical Maximum Reservoir Water Level reached since 2002.

Activity Table 2 – Flood Events – DIO Emergency Actions

Activation Level	Normal Spillway Discharges SOP 14	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Reservoir water level above EL 586.0m (FSL)	Reservoir water level above EL 587.0m	Reservoir water level above EL 587.5m	Reservoir water level above EL 589.5m (230mm below Historical Maximum)	Reservoir water level above dam crest EL 594.0 m and Dam Crest Failure possible	Reservoir water level below EL 587.0m and falling
Actions	Ask campers to leave Continue weekly inspections (or as advised by DNRMMRRD) if it is safe to do so Shut gate at Rycon Homestead and display “Dam Closed” sign Follow BOM as per Appendix 7 - Rainfall and Reservoir Water Level Information.	Notify DIO Backup Officer when EAP is activated Cease inspections when RWL is greater than EL 586.55m Follow BOM as per Appendix 7 Record data of the event and maintain an event log of all actions and communications.	Follow BOM as per Appendix 7 Record data of the event and maintain an event log of all actions and communications.	Follow BOM as per Appendix 7 Record data of the event and maintain an event log of all actions and communications.	Follow BOM as per Appendix 7 Record data of the event and maintain an event log of all actions and communications.	Identify any damage or irregularities when safe to do so and forward to DNRMMRRD In consultation with EEC inspections are to commence when RWL is less than EL 586.55m and falling and is safe to do so. DIO to decide when the dam site is safe and request approval from the Department to reopen. If approved, remove the “Dam Closed” sign at Rycon Homestead

						when below EL 586.0m and when it is safe to do so and notify EEC. Send a copy of the event log to the EEC within 15 days after the event has ceased.
Notifications	Campers	DIO Backup Officer				EEC

Activity Table 3 – Flood Events – EEC Emergency Actions

Activation Level	Normal Spillway Discharges SOP 14	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Reservoir water level above (FSL) EL 586.0m	Reservoir water level above EL 587.0m	Reservoir water level above EL 587.5m	Reservoir water level above EL 589.5m (230mm below Historical Max.)	Reservoir water level above dam crest EL 594.0m and Dam Crest Failure possible	Reservoir water level below EL 587.0m and falling
Actions	Notify EEM that SOP 14 is in place Follow SOP 14 Notify DIO that the dam is spilling and the downstream causeway is operating and request they ask the campers to leave, close and lock the gate at Rycon Homestead and display "Dam Closed" sign Request EEM approval to change website to advise dam is closed. Notify RDSWU that the dam is spilling Request ESC Admin to update	Activate EAP in consultation with EEM Notify EEM, LDC and DDMG that EAP is activated Monitor regional and local weather conditions Record data of the event and maintain an event log of all actions and communications Provide SitRep to EEM	As per previous activation status, plus Notify EEM Notify the following of EAP escalation: ○ PAR (at Rycon Station, Kidston township, and Oaks Homestead) ○ LDC ○ DDMG	As per previous activation status, plus Notify EEM Notify the following of EAP escalation ○ PAR ○ LDC WARNING to PAR (at Rycon Station, Kidston township, and Oaks Homestead) to EVACUATE	As per previous activation status, plus Notify EEM Notify the following of EAP escalation ○ PAR (at Rycon Station, Kidston township, Oaks Homestead, and Narrawa Station) LDC WARNING to LDC and DDMG (in consultation with EEM/DM) to evacuate	Notify EEM, LDC, all PAR and RDSWU that event is over Request DIO to open gate if RWL is less than EL 586.0m and DIO assesses the site is safe for public access Request approval from EEM to change website that dam is open Recommend DIO to recommence weekly inspections once RWL is less than EL 586.0m and falling and is safe to do so

	their website to advise dam is closed.				township of Einasleigh	Debrief with EEM and other DNRMMRRD staff as appropriate
Notifications and Warnings	EEM DIO RDSWU ESC ADMIN	EEM LDC DDMG SitRep	EEM LDC DDMG PAR (at Rycon Station, Kidston township, and Oaks Homestead) SitRep	WARNING to PAR (at Rycon Station, Kidston township, and Oaks Homestead) to EVACUATE EEM LDC DDMG SitRep	WARNING TO PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station) WARNING to LDC and DDMG (in consultation with EEM/DM) to evacuate township of Einasleigh SitRep	–Advise all that event is over

Activity Table 4 – Flood Events – EEM Emergency Actions

Activation Level	Normal Spillway Discharges SOP 14	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Reservoir water level above (FSL) EL 586.0m	Reservoir water level above EL 587.0m	Reservoir water level above EL 587.5m	Reservoir water level above EL 589.5m (230mm below Historical Max.)	Reservoir water level above dam crest EL 594.0 m and Dam Crest Failure possible	Reservoir water level below EL 587.0m and falling
Actions	Advise DM that the website for the dam is closed due to flooding	Activate EAP in consultation with the EEC Notify DM Provide SitRep to DM	As per previous activation consultation with the EEC plus Notify DM of EAP escalation Provide SitRep to DM	As per previous activation consultation with the EEC plus Notify DM of EAP escalation Provide SitRep to DM	As per previous activation, consultation with the EEC plus Notify DM of EAP escalation Provide SitRep to DM	Consult with the EEC to deactivate the EAP Notify DM that the event is over Advise the DM that the dam website is open Prepare and forward EER[1], if required to DM
Notifications and Warnings	DM	DM Sitrep	DM SitRep	DM SitRep	DM SitRep	– Advise all that event is over – DM – EER, if required

[1] DM to provide report to DDS within 30 working days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 5 – Flood Events – DM Emergency Actions

Activation Level	Normal Spillway Discharges SOP 14	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Reservoir water level above EL 586.0m (FSL)	Reservoir water level above EL 587.0m	Reservoir water level above EL 587.5m	Reservoir water level above EL 589.5m (230mm below Historical Maximum)	Reservoir water level above dam crest EL 594.0 m and Dam Crest Failure possible	Reservoir water level below EL 587.0m and falling
Actions	Note website access	Provide SitRep to EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep to EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep to EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep to EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Notify EDTS, DDS[1], DEMU and DDGGEO and external stakeholders (Police, LDMG, SDCC) that event is over Review EER[2], if required and forward to DDS
Notifications and Warnings	EEM	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders

[1] Notify DDS within 48 hours of event [2] Forward EER to DDS within 30 days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 6 – Flood Events – DIO Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Normal Spillway Discharges SOP 14	Reservoir water level above (FSL) EL 586.0m Updates from RSAS, BoM and Spanner Waterhole	Campers	Face to Face	The spillway is likely to overflow. All visitors should leave the area immediately.
Alert	Notification from EEC that the EAP is activated.	DIO Backup officer	Phone	EAP has been activated.
Lean Forward	Not applicable			N/A
Stand Up 1	Not applicable			N/A
Stand Up 2	Not applicable			N/A
Stand Down	Notification from EEC that the EAP is de-activated.	DIO Backup officer	Phone	EAP has been de-activated.

Activity Table 7 – Flood Events – EEC Communications

Activation Level	Trigger for Communications	Contact Priority Order[1]	Methods	Messages (subject to minor change by approval of EEM)
Normal Spillway Discharges SOP 14	Reservoir water level above (FSL) EL 586.0m Updates from RSAS, BoM and Spanner Waterhole	EEM LDC DDMG DIO RDSWU ESC ADMIN	Phone Email	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Spillway Discharge STATUS: Normal Spillway Discharge – Reservoir Water Level: EL 586.0m and rising/steady/falling. ACTION: Note Copperfield Dam is closed to public access while spillway discharges are occurring. UPDATE: Further updates will be provided only as required.
Alert	Reservoir water level above EL 587.0m Updates from RSAS, BoM and Spanner Waterhole	EEM LDC DDMG PAR (at Rycon Station, Kidston township and Oaks Homestead) DIO	Phone SMS SitRep Email	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Flooding STATUS: ADVICE – EAP Activated. Reservoir Water Level: EL 587.0m and rising/steady/falling. ACTION: Monitor local weather conditions and forecasts. Standby for further notifications. UPDATE: Further updates will be provided as required.
Lean Forward	Reservoir water level above EL 587.5m Updates from RSAS, BoM and Spanner Waterhole	EEM LDC DDMG PAR (at Rycon Station, Kidston township and Oaks Homestead) DIO	Phone SMS SitRep Email	DEPARTMENT OF NATURAL RESOURCES WATCH AND ACT DAM: Copperfield Dam EVENT: Flooding STATUS: WATCH AND ACT – Reservoir Water Level: EL 587.5m and rising/steady/falling. ACTION: Consider your evacuation preparedness. Await further notifications or self-evacuate at early at signs of increased flooding. UPDATE: Further updates will be provided as required.
Stand Up 1	Reservoir water level above EL 589.5m (230mm below Historical Maximum) Updates from RSAS, BoM and Spanner Waterhole	EEM LDC DDMG PAR (at Rycon Station, Kidston township and	Phone SMS SitRep Email	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Flooding STATUS: EMERGENCY WARNING – Reservoir Water Level: EL 589.5m and rising/steady/falling.

Activation Level	Trigger for Communications	Contact Priority Order[1]	Methods	Messages (subject to minor change by approval of EEM)
		Oaks Homestead) DIO		ACTION: Act now to stay safe! Follow your evacuation plan. Move to higher ground if safe to do so. If your life is in danger, call Triple Zero (000) immediately. UPDATE: Further updates will be provided as required.
Stand Up 2	Reservoir water level above EL 594.0m Dam Crest Flood failure possible Updates from RSAS, BoM and Spanner Waterhole	EEM LDC DDMG PAR at Narrawa Station *(Note: PAR at Einasleigh to be evacuated by LDMG)*	Phone SMS SitRep Email	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Flooding STATUS: EMERGENCY WARNING – Dam failure possible. Reservoir Water Level: EL 594.0m and rising/steady/falling. ACTION: Act now to stay safe! Follow your evacuation plan. Move to higher ground if safe to do so. If your life is in danger, call Triple Zero (000) immediately. UPDATE: Further updates will be provided as required.
Stand Down	Reservoir water level below EL 587.0m and falling Updates from RSAS, BoM and Spanner Waterhole	EEM LDC DDMG ALL PAR DIO RDSWU	Phone SMS SitRep Email	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Flooding STATUS: ADVICE – Event over. Reservoir Water Level: EL 587.0m and falling. ACTION: No action required. Note Copperfield Dam will remain closed to public access while spillway discharges continue. UPDATE: No further updates provided for this event.

[1] PAR only to be contacted when activation level reaches Lean Forward and Stand Up

Activity Table 8 – Flood Events – EEM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Normal Spillway Discharges SOP 14	Reservoir water level above EL 586.0m (FSL) RSAS and BoM	DM	Email	Approve request from EEC to change website that the dam is closed.
Alert	Reservoir water level above EL 587.0m Updates from RSAS, BOM and Spanner Waterhole	DM	Phone SMS SitRep Email	Internal SitReps are prepared by the EEM as required to suit the circumstances of individual dam hazard events or dam emergency events. These SitReps will be distributed by Email to the DM. Refer to SitRep template in Section 2.10.1.
Lean Forward	Reservoir water level above EL 587.5m Updates from RSAS, BoM and Spanner Waterhole	DM	Phone SMS SitRep Email	
Stand Up 1	Reservoir water level above EL 589.5m (230mm below Historical Maximum) Updates from RSAS, BoM and Spanner Waterhole	DM	Phone SMS SitRep Email	
Stand Up 2	Reservoir water level above EL 594.0m Dam Crest Flood failure possible Updates from RSAS, BoM and Spanner Waterhole	DM	Phone SMS SitRep Email	
Stand Down	Reservoir water level below EL 587.0m and falling Updates from RSAS, BoM and Spanner Waterhole	DM	Phone SMS SitRep Email Email -Report	

Activity Table 9 – Flood Events – DM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Normal Spillway Discharges SOP 14	Reservoir water level above EL 586.0m (FSL) Updates from RSAS and BoM	EEM	Email	
Alert	Reservoir water level above EL 587.0m Updates from RSAS, BoM and Spanner Waterhole	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SitRep Email	External SitReps are escalated by the DM as required to suit the circumstances including a summary dam(s) event status, hazards and required actions. These SitReps will be distributed by Email to the DEMU and Department Senior Management. Refer to SitRep template in Section 2.10.1.
Lean Forward	Reservoir water level above EL 587.5m Updates from RSAS, BoM and Spanner Waterhole	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SitRep Email	
Stand Up 1	Reservoir water level above EL 589.5m (230mm below Historical Maximum) Updates from RSAS, BoM and Spanner Waterhole	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SitRep Email	
Stand Up 2	Reservoir water level above EL 594.0m Dam Crest Flood failure possible Updates from RSAS, BoM and Spanner Waterhole	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SitRep Email	
Stand Down	Reservoir water level below EL 587.0m and falling Updates from RSAS, BoM and Spanner Waterhole	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SitRep Email	

6.2 Structural Issues / Sunny Day Failure

6.2.1 Dam Hazard Overview

Concerns may arise if the structural stability of the dam structure and/or its ancillary works are compromised. Dam safety structural issues may include:

Differential movement or settlement of the dam wall or fuse plug
Instability of the dam wall or fuse plug
Overturning or sliding of monoliths
Failure through the outlet works

Circumstances which indicate an increased likelihood of a structural issue dam hazard occurring include:

Abnormal instrument readings
Cracking, including transverse or longitudinal cracks
Opening of joints
Increasing seepage or development of new seepage areas with cloudy water (through the dam wall, fuse plug, foundations, abutments, or downstream toe).

A Sunny Day Failure (SDF) is the failure of the dam, resulting in the uncontrolled release of stored water, when there is low or no rainfall inflow to the dam and no inclement weather. This type of failure is unexpected and may occur with little or no warning.

If the dam wall is breached (considered to have failed), it is expected that the breach will increase in size with a corresponding increase in water discharges through the breach until such time as the dam water level drains down. Breach flows are likely to cause the following access issues:

Accessibility to the dam may be impeded by flood waters
Rycon Homestead residents may be isolated by flood waters

An SDF may develop gradually, with early signs including increased rate of seepage, noticeable cracks, displacement or deformation of concrete, and water flow through the cracks. It is however difficult to determine the precise timing for a dam safety issue to develop to the point where failure of the dam occurs. Responses to potential dam safety issues under these circumstances should be initiated early in the event, rather than waiting for structural collapse to commence. Due to its remote location, it is not likely that rapid repairs or mitigation works could be carried out during an event to arrest or slow the progression of a structural issue once identified.

The dam has a low-level outlet and release valve to the Copperfield River. An initial action in response to a structural concern at the dam where failure is possible is to lower the reservoir level to reduce the pressure on the upstream face of the dam wall. The outlet works have a limited discharge capacity, so achieving a significant reduction in water level may take considerable time (i.e. several weeks). During a flood event, the volume of water that can be released is minimal compared to the inflow and is unlikely to lower storage levels sufficiently within a reasonable timeframe.

The 2022 FIA indicates there are no PAR as a result of SDF.

Activity Table 10 – Structural/Sunny Day Failure – DIO Emergency Actions

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	Structural condition has been established	Failure in progress or likely due to structural damage	Risk Assessment has determined that structural risk has reduced
Actions	Notify EEC Notify DIO Backup Officer EAP has been activated Advise campers to leave the site, close and lock the gate at Rycon Homestead and display the “Dam Closed” sign Monitor flows every 6 hours (or as instructed by EEC) until a decreasing trend is observable or as directed by EEC Maintain photographic record Record data of the event and maintain an event log of all actions and communications Log Book entry	As per previous activation level Operate river release valve as directed by EEC	As per previous activation level Support/supervise remedial works as required Lower the storage levels as directed by EEC Maintain surveillance of the area immediately downstream Log Book entry	As per previous activation level	Prepare and forward EER including photos for EEC within 15 days. Dam Log Book is to be updated after every Emergency Event Return to routine activities and weekly inspections if it is safe to do so, in consultation with EEC Close the cone valve if a release was made Logbook entry Request approval from EEC to open the gate at Rycon Homestead and remove the “Dam Closed” sign
Notifications	EEC DIO Backup Officer Campers	EEC	EEC	EEC	EEC

Activity Table 11 – Structural/Sunny Day Failure – EEC Emergency Actions

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	Structural condition has been established, seepage increasing and/or cloudy.	Failure in progress or possible due to structural damage	Risk Assessment has determined that structural risk has reduced
Actions	Notify EEM, LDC, DDMG, DIO that EAP is activated Request DIO to shut gate at Rycon Homestead and display "Dam Closed" sign Provide SitRep to EEM Request approval from EEM to change website that dam is closed Notify RDSWU that the dam is spilling	Notify EEM, LDC, PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DDMG, DIO, RDSWU Request DIO to fully open river release valve to lower RWL to at least below EL 586.0m if safe to do so. Make preparations for mobilisation of remedial work materials and machinery if required Provide SitRep to EEM	As per previous activation level Notify EEM, LDC, DDMG, PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO, RDSWU Provide SitRep to EEM	As per previous activation level Notify EEM WARNING to LDC, DDMG WARNING to PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), to EVACUATE Notify RDSWU, DIO Provide SitRep to EEM	Deactivate EAP in consultation with EEM Notify EEM, LDC, DDMG, all PAR, DIO and RDSWU that the event is over Request approval from EEM to change website that dam is open
Notifications and Warnings	EEM LDC DDMG DIO Rycon Homestead RDSWU	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), RDSWU DIO

Activity Table 12 – Structural/Sunny Day Failure – DE Emergency Actions

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	Structural condition has been established, seepage increasing and/or cloudy.	Failure in progress or possible due to structural damage	Risk Assessment has determined that structural risk has reduced
Actions	None	Conduct inspection of the dam if requested by EEC and safe to do so Report findings to EEC immediately after inspection Prepare report including any observations, photographs, sketches or data collected during inspection and provide to EEC	Provide advice to the EEC and EEM regarding the current condition of the dam and the structural risk	Provide advice to the EEC and EEM regarding the current condition of the dam and the structural risk	Provide advice to the EEC and EEM regarding the current condition of the dam and the structural risk Prepare and forward event report including any observations, photos data and sketches collected to EEC
Notifications and Warnings	None	EEC	EEC EEM	EEC EEM	EEC EEM

Activity Table 13 – Structural/Sunny Day Failure – EEM Emergency Actions

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	Structural condition has been established	Failure in progress or possible due to structural damage	Risk Assessment has determined that structural risk has reduced
Actions	Notify DM Provide SitRep to DM Request approval from DM to change website that dam is closed	Update DM Direct EEC to fully open river release valve to lower RWL to at least below EL 586.0m if safe to do so. Request DIO undertake inspection of dam if safe to do so. Provide SitRep to DM	As per previous activation level Provide SitRep to DM	As per previous activation level Notify DM Provide SitRep to DM	Approve EEC request to change website that dam is open. Notify DM that the event is over Prepare and forward EER[1], if required to DM
Notifications and Warnings	DM SitRep	DM SitRep	DM SitRep	DM SitRep	DM EER, if required

[1] Forward EER to DM. DM to provide report within 30 working days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 14 – Structural/Sunny Day Failure – DM Emergency Actions

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	Structural condition has been established	Failure in progress or possible due to structural damage	Risk Assessment has determined that structural risk has reduced
Actions	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC) Approve EEM request to change website that dam is closed	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep to EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (LDMG, DDMG, SDCC) Review EER[2], if required, and forward to DDS
Notifications and Warnings	EDTS DDS DEMU DDGGEO External Stakeholders EEM	EDTS DDS DEMU DDGGEO External Stakeholders	EDTS DDS DEMU DDGGEO External Stakeholders	EDTS DDS DEMU DDGGEO External Stakeholders	EDTS DDS DEMU DDGGEO External Stakeholders EEM

[1] Notify DDS within 48 hours of event [2] Forward EER to DDS within 30 days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 15 – Structural/Sunny Day Failure – DIO Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Increasing leakage through an embankment, the foundations or abutments	EEC DIO Backup Officer	Phone UHF	COPPERFIELD DAM DIO ADVICE Possible Structural Damage – under investigation. Dam Water level: XXX.XX m AHD
		Campers	Face to Face	An investigation is underway at the dam relating to a potential structural concern. All visitors should leave the area immediately.
Lean Forward	Increasing leakage through an embankment, the foundations or abutments with cloudy water	EEC	Phone UHF	COPPERFIELD DAM DIO WATCH AND ACT Unconfirmed leakage under investigation LEAN FORWARD Reservoir Water level: XXX.XX AHD UPDATE: Next update due by XX am/pm.
Stand Up 1	Structural damage has been established	EEC	Phone UHF	COPPERFIELD DAM DIO EMERGENCY WARNING Confirmed structural leakage STAND UP 1 Reservoir Water level: XXX.XX AHD UPDATE: Next update due by XX am/pm.
Stand Up 2	Failure in progress or possible due to structural damage	EEC	Phone	COPPERFIELD DAM DIO EMERGENCY WARNING Possible dam failure confirmed STAND UP 2 Reservoir Water level: XXX.XX AHD UPDATE: Next update due by XX am/pm
	Dam failure in progress	EEC	Phone	COPPERFIELD DAM DIO EMERGENCY WARNING Dam Failure in progress ACTION: Move PAR to higher ground UPDATE: Next update due by XX am/pm
Stand Down	Risk Assessment has determined that structural risk has reduced	EEC	Phone	COPPERFIELD DAM DIO ADVICE STAND DOWN Reservoir Water level: XXX.XXm AHD ACTION: Stand Down

Activity Table 16 – Structural/Sunny Day Failure – EEC Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages (subject to minor change by approval of EEM)
Alert	Increasing leakage through an embankment, the foundations or abutments	EEM LDC DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Structural Concerns STATUS: An investigation is underway at the dam. Houses are not at risk. ACTION: No action is required. UPDATE: Further updates will be provided as required.
Lean Forward	Increasing leakage through an embankment, the foundations or abutments with cloudy water	EEM LDC PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO	Phone SMS Email SitRep	DEPARTMENT OF NATURAL RESOURCES WATCH AND ACT DAM: Copperfield Dam EVENT: Structural Concerns STATUS: A structural concern affecting Copperfield Dam has been identified. Investigations are currently ongoing. Houses are not at risk. ACTION: Await further notifications. UPDATE: Further updates will be provided as required
Stand Up 1	Structural damage has been established	EEM LDC PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO	Phone SMS Email SitRep	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Structural Concerns STATUS: A structural concern affecting Copperfield Dam has been identified. Structural damage has been established. ACTION: Follow emergency services instructions. Avoid fast flowing or deep water near waterways and floodplains. UPDATE: Further updates will be provided as required.

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages (subject to minor change by approval of EEM)
Stand Up 2	Failure possible due to structural damage	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO	Phone SMS Email SitRep	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Structural Concerns STATUS: Failure of Copperfield Dam is in progress/possible as at [time, day, date, year]. Water levels in Copperfield River and connecting streams may rise rapidly. ACTION: Follow emergency services instructions. Move to higher ground if safe to do so. Avoid fast flowing or deep water near waterways and floodplains. UPDATE: Further updates will be provided as required.
	Dam failure in progress	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO	Phone SMS Email SitRep	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Structural Concerns STATUS: Failure of Copperfield Dam is in progress/possible as at [time, day, date, year]. Water levels in Copperfield River and connecting streams may rise rapidly. ACTION: Follow emergency services instructions. Move to higher ground if safe to do so. Avoid fast flowing or deep water near waterways and floodplains. UPDATE: Further updates will be provided as required.
Stand Down	Risk Assessment has determined that structural risk has reduced	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO RDSWU	Phone SMS Email SitRep	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Structural Concerns STATUS: Stand Down – event over. Copperfield Dam is not affected by a structural concern. ACTION: No action required. UPDATE: No further updates will be provided for this event.

Activity Table 17 – Structural/Sunny Day Failure – DE Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Lean Forward	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Stand Up 1	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Stand Up 2	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Stand Down	Risk Assessment has determined that structural risk has reduced	EEC EEM	Phone Report	N/A

Activity Table 18 – Structural/Sunny Day Failure – EEM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Increasing leakage through an embankment, the foundations or abutments	DM	Phone SMS SitRep Email	Internal SitReps are prepared by the EEM as required to suit the circumstances of individual dam hazard events or dam emergency events. These SitReps will be distributed by Email to the DM. Refer to SitRep template in Section 2.10.1.
Lean Forward	Increasing leakage through an embankment, the foundations or abutments with cloudy water	DM	Phone SMS SitRep Email	
Stand Up1	Structural damage has been established	DM	Phone SMS SitRep Email	
Stand Up 2	Failure in progress or possible due to structural damage	DM	Phone SMS SitRep Email	
	Dam failure in progress	DM	Phone SMS SitRep Email	
Stand Down	Risk Assessment has determined that structural risk has reduced	DM	Phone SMS SitRep Email	

Activity Table 19 – Structural/Sunny Day Failure – DM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Increasing leakage through an embankment, the foundations or abutments	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SMS Email	External SitReps are prepared by the EEM as required to suit the circumstances of individual dam hazard events or dam emergency events. These SitReps will be distributed by Email to the DM. Refer to SitRep template in Section 2.10.1.
Lean Forward	Increasing leakage through an embankment, the foundations or abutments with cloudy water	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SMS Email SitRep	
Stand Up1	Structural damage has been established as failure possible	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SMS Email SitRep	
Stand Up 2	Failure in progress or possible due to structural damage	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SMS Email SitRep	
	Dam failure in progress	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SMS Email SitRep	

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Stand Down	Risk Assessment has determined that structural risk has reduced	EDTS DDS DEMU DDGGEO External Stakeholders (Police, LDMG, SDCC)	Phone SMS Email SitRep	

NB: Undertake Risk Assessment before considering action.

[2]Emergency Event Report (EER) to EEM within 30 business days of the event if stand up is reached, as specified in the *Water Supply (Safety and Reliability) Act 2008*

6.3 Chemical/Toxic Spill Event

6.3.1 Dam Hazard Overview

Contamination of the dam storage could be the result of a toxic spill incident, biological processes, or chemical pollution from current or past activities in the dam catchment**.**

Biological events within the dam water storage include blue-green algae blooms or a high level of microscopic pathogens such as cryptosporidium and giardia. After long periods of low inflow, oxygen depletion can cause fish deaths, polluting the water storage as the fish decay.

The contamination of dam water may have an impact on upstream and downstream riparian water users and others water users connected to the dam water pipeline.

During periods of dry weather, with no discharge from Copperfield Dam, any water contamination will be contained within the impounded water of Copperfield Dam but may be released to the downstream pipeline.

In the event that contamination takes place during a period when water is discharging through the spillway, any toxicity is likely to be diluted and have less of an impact.

Activity Table 20 – Chemical/Toxic Spill – DIO Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up	Stand Down
Activation Trigger	Reports of contamination or potential contamination in the catchment area of the storage	Not Applicable	Confirmation of or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment	Risk Assessment that risk has reduced Confirmation that significant contamination has not occurred All clear water quality test result
Actions	Notify EEC and DIO Backup Officer Advise campers to leave the site, close and lock the gate at Rycon Homestead and display the “Dam Closed” sign Undertake investigations to ascertain the accuracy and details of reports Sketch, measure, photograph and locate contamination position in the storage/catchment Log Book entry	Not Applicable	Notify EEC Contact Police 000 Update Blue Green Algae warning sign indicator if relevant Collect water samples if directed by DNRMMRRD Close all outlet works if directed by DNRMMRRD Log Book entry	Notify EEC Prepare and forward EER to EEM Forward all photographs, sketches to EEM Log book entry Open the gate at Rycon Homestead and remove the “Dam Closed” sign Return to routine activities and weekly inspections if it is safe to do so, in consultation with EEC Open the outlet works if directed by EEC
Notifications	EEC and DIO Backup Officer Campers	Not Applicable	EEC Police	EEM EEC

Activity Table 21 – Chemical/Toxic Spill – EEC Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up	Stand Down
Activation Trigger	Reports of contamination or potential contamination in the catchment area of the storage	Not Applicable	Confirmation of or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment	Risk Assessment that risk has reduced Confirmation that significant contamination has not occurred All clear water quality test result
Actions	Notify EEM, LDC, DDMG, PAR (at Rycon Station, Kidston township, and Oaks Homestead), RDSWU, DIO Record data of the event and maintain an event log of all actions and communications Request approval from EEM to change website that dam is closed	Not Applicable	Update EEM, LDC, PAR (at Rycon Station, Kidston township, and Oaks Homestead), DIO WARNING to RDSWU not to use the water and that supply is cut off until further notice Record data of the event and maintain an event log of all actions and communications	Deactivate EAP in consultation with EEM Notify EEM, LDC, PAR (at Rycon Station, Kidston township, and Oaks Homestead), and RDSWU that the event is over Request approval from EEM to change website that dam is open
Notifications and Warnings	EEM LDC, DDMG PAR (at Rycon Station, Kidston township, and Oaks Homestead) RDSWU DIO Rycon Homestead	Not Applicable	EEM LDC, DDMG PAR (at Rycon Station, Kidston township, and Oaks Homestead) DIO RDSWU	EEM LDC, DDMG PAR (at Rycon Station, Kidston township, and Oaks Homestead) RDSWU DIO

Activity Table 22 – Chemical/Toxic Spill – EEM Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up	Stand Down
Activation Trigger	Reports of contamination or potential contamination in the catchment area of the storage	Not Applicable	Confirmation of or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment	Risk Assessment that risk has reduced Confirmation that significant contamination has not occurred All clear water quality test result
Actions	Notify DM Request approval from DM to change website that dam is closed Provide SitRep to DM	Not Applicable	Update DM Provide SitRep to DM	Notify DM that the event is over Prepare and forward EER1, if required, to DM Provide approval to EEC to change website that dam is open.
Notifications and Warnings	DM SitRep Update website	Not Applicable	DM SitRep	DM

[1] DM to provide report to DDS within 30 working days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 23 – Chemical/Toxic Spill – DM Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up	Stand Down
Activation Trigger	Reports of contamination or potential contamination in the catchment area of the storage	Not Applicable	Confirmation of or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment	Risk Assessment that risk has reduced Confirmation that significant contamination has not occurred All clear water quality test result
Actions	Notify EDTS, DDS[1], DEMU, DDGGEO and External stakeholders (Police, LDMG, SDCC)	Not Applicable	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC) Review EER[2], if required, and forward to DDS
Notifications and Warnings	EDTS DDS DEMU DDGGEO External stakeholders	None	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders

[1] Notify DDS within 48 hours of event. [2] Forward EER to DDS within 30 days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 24 – Chemical/Toxic Spill – DIO Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Reports of contamination or potential contamination in the catchment area of the storage	EEC DIO Backup Officer	Phone	COPPERFIELD DAM DIO ADVICE POSSIBLE CHEMICAL SPILL INVESTIGATION UNDER WAY UPDATE: Next update due by XX am/pm
		Campers	Face to Face	An investigation is underway at the dam relating to a potential chemical or toxic spill in the catchment area of the storage. All visitors should leave the area immediately.
Lean Forward				
Stand Up	Confirmation of or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment	EEC	Phone	COPPERFIELD DAM DIO EMERGENCY WARNING WATER SUPPLY CONTAMINATION UPDATE: Next update due by XX am/pm
Stand Down	Risk Assessment that risk has reduced Confirmation that significant contamination has not occurred All clear water quality test result	EEC	Phone Email	COPPERFIELD DAM DIO ADVICE WATER SAFE TO USE Prepare report for EEM with number of PAR evacuated, where to etc. and other relevant information. Open gate, remove dam closed sign if safe to do so.

Activity Table 25 – Chemical/Toxic Spill – EEC Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages (subject to minor change by approval of EEM)
Alert	Reports of contamination or potential contamination in the catchment area of the storage	EEM LDC PAR (at Rycon Station, Kidston township, and Oaks Homestead) RDSWU	Phone SMS SitRep Email	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Chemical Spill/Water Supply Contamination STATUS: ADVICE – Potential contamination reported. Investigation underway. ACTION: Do not use water. Standby for further notifications. UPDATE: Next update due by XX am/pm
Lean Forward				
Stand Up	Confirmation of or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment	EEM LDC PAR (at Rycon Station, Kidston township, and Oaks Homestead) RDSWU	Phone SMS SitRep Email	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Chemical Spill/Water Supply Contamination STATUS: EMERGENCY WARNING - Confirmation/high probability of water supply contamination. ACTION: Avoid use or contact with water. Standby for further notifications. UPDATE: Next update due by XX am/pm
Stand Down	Risk Assessment that risk has reduced Confirmation that significant contamination has not occurred All clear water quality test result	EEM LDC PAR (at Rycon Station, Kidston township, and Oaks Homestead) RDSWU	Phone SMS SitRep Email Email-Report	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Chemical Spill/Water Supply Contamination STATUS: ADVICE – Event over. ACTION: No contamination detected. DIO to open valve.

Activity Table 26 – Chemical/Toxic Spill – EEM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Reports of contamination or potential contamination in the catchment area of the storage	DM	Phone SitRep Email	Internal SitReps are prepared by the EEM as required to suit the circumstances of individual dam hazard events or dam emergency events. These SitReps will be distributed by Email to the DM. Refer to SitRep template in Section 2.10.1.
Lean Forward				
Stand Up	Confirmation of or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment	DM	Phone SitRep Email	Internal SitReps are prepared by the EEM as required to suit the circumstances of individual dam hazard events or dam emergency events. These SitReps will be distributed by Email to the DM. Refer to SitRep template in Section 2.10.1.
Stand Down	Risk Assessment that risk has reduced Confirmation that significant contamination has not occurred All clear water quality test result	DM	Phone SitRep Email	

Activity Table 27 – Chemical/Toxic Spill – DM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Reports of contamination or potential contamination in the catchment area of the storage	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone Email SitRep	External SitReps are escalated by the DM as required to suit the circumstances including a summary dam(s) event status, hazards and required actions. These SitReps will be distributed by Email to the DEMU and Department Senior Management. Refer to SitRep template in Section 2.10.1.
Lean Forward				
Stand Up	Confirmation of or high probability of a large amount of Chemical Spill/Toxic Conditions found in the storage/catchment	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone Email SitRep	External SitReps are escalated by the DM as required to suit the circumstances including a summary dam(s) event status, hazards and required actions. These SitReps will be distributed by Email to the DEMU and Department Senior Management. Refer to SitRep template in Section 2.10.1.
Stand Down	Risk Assessment that risk has reduced Confirmation that significant contamination has not occurred All clear water quality test result	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone Email SitRep	

6.4 Terrorist Threat or High Energy Impact

6.4.1 Dam Hazard Overview

There is infrastructure located at the dam that may be the target of sabotage or vandalism. This infrastructure includes:

Copperfield Dam embankment, spillways, cone valve and downstream outlet valve pit
downstream pipeline to Kidston township
drainage gallery
security fences
remote monitoring systems and cameras.

Damage to the outlet works may result in uncontrolled releases of water to the Copperfield River. The flow of water from the damaged outlet works may result in localised erosion taking place but is not expected to have an immediate impact on the safety or integrity of the dam.

Advice from local authorities of a specific risk to dam infrastructure or concerning observations reported during routine inspections (i.e., suspicious behaviour or vandalism) are circumstances that indicate an increased likelihood of a terrorist threat dam hazard occurring.

Any sabotage or vandalism actions that are identified should be treated as serious and the following actions are recommended:

immediately report the incident reported to EEC;
take photographs of the damage or incident site;
If possible and safe to do so, record and photograph unusual vehicle details including registration, description, time, date etc.
barricade the area to enable the incident site to be inspected and investigated;
report the incident to police; and
conduct a dam safety inspection to confirm if the incident has caused other damage to the dam.

Activity Table 28 – Terrorist Threat/Activity or High Energy Impact – DIO Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation Trigger	Not Applicable	Possible terrorist activity/suspicions noticed at the dam	Threat received indicating potential sabotage of dam	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	Failure in progress or possible due to impact or explosion	Risk Assessment has determined that failure risk has reduced
Actions	Not Applicable	Notify EEC and DIO Backup Officer Advise campers to leave the site, close and lock the gate at Rycon Homestead and display the "Dam Closed" sign Inspect dam (if safe to do so) and ensure all security measures in place Maintain photo record Log Book entry If police appoint incident manager, follow instructions	As per previous activation status Undertake surveillance, inspection dam (if safe to do) Log Book entry	As per previous activation level plus Vacate the immediate vicinity of the embankment and downstream areas Log Book entry	As per previous activation level plus Vacate the immediate vicinity of the embankment and downstream areas Close gate at Rycon Station and display Dam Closed sign	Prepare and forward EER including photos to EEM Dam Log Book is to be updated after every Emergency Event Return to routine activities and weekly inspections if it is safe to do so, in consultation with EEC Log Book entry Reopen dam if safe to do so
Notifications	Not Applicable	EEC and DIO Backup Officer Campers	As per previous activation level	As per previous activation level	As per previous activation level	As per previous activation level, plus EEM

Activity Table 29 – Terrorist Threat/Activity or High Energy Impact – EEC Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation Trigger	Not Applicable	Possible terrorist activity/suspicions noticed at the dam	Threat received indicating possible sabotage of dam	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	Failure in progress or possible due to impact or explosion	Risk Assessment has determined that failure risk has reduced
Actions	Not Applicable	Phone National Security Hotline and Police Activate EAP in consultation with EEM Phone LDC Phone DIO If police appoint incident manager support and follow instructions Monitor situation and assess risks Provide SitRep to EEM	As per previous activation level Notify the following of EAP Activation RDSW PAR (at Rycon Station, Kidston township, and Oaks Homestead)	As per previous activation level Request DIO to undertake an inspection of the dam when safe to do so	As per previous activation level	Stand Down EAP in consultation with EEM and DIO (if applicable) Phone LDC Phone Police Notify the following of EAP Stand Down ○ DIO ○ RDSWU ○ PAR (at Rycon Station, Kidston township and Oaks Homestead) ○ EEM Prepare and forward EER to EEM within 30 days if the Activation Status reaches Stand Up 2 or dam requires remedial work

Notifications and Warnings	Not Applicable	National Security Hotline Police Link or Police on 000 EEM LDC DIO	Police Link or Police on 000 EEM LDC DIO REDSWU PAR (at Rycon Station, Kidston township, and Oaks Homestead)	Police on 000 EEM LDC DIO RDSWU PAR (at Rycon Station, Kidston township, and Oaks Homestead)	Police on 000 EEM LDC DIO RDSWU PAR (at Rycon Station, Kidston township, and Oaks Homestead)	National Security Hotline Police Link or Police on 000 EEM LDC DIO RDSWU PAR (at Rycon Station, Kidston township, and Oaks Homestead)

Activity Table 30 – Terrorist Threat/Activity or High Energy Impact – DE Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation Trigger	Not Applicable	Possible terrorist activity/suspicions noticed at the dam	Threat received indicating possible sabotage of dam	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	Failure in progress or possible due to impact or explosion	Risk Assessment has determined that failure risk has reduced
Actions	None	None	None	Conduct inspection of the dam if requested by EEC and safe to do so Report findings to EEC immediately after inspection Prepare report including any observations, photographs, sketches or data collected during inspection and provide to EEC	Provide advice to the EEC and EEM regarding the current condition of the dam and the structural risk	Provide advice to the EEC and EEM regarding the current condition of the dam and the structural risk Prepare and forward event report including any observations, photos data and sketches collected to EEC
Notifications and Warnings	None	None	None	EEC	EEC EEM	EEC EEM

Activity Table 31 – Terrorist Threat/Activity or High Energy Impact – EEM Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation Trigger	Not Applicable	Possible terrorist activity/suspicions noticed at the dam	Threat received indicating possible sabotage of dam	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	Failure in progress or possible due to impact or explosion	Risk Assessment has determined that failure risk has reduced
Actions	Not Applicable	Notify DM of EAP Activation with SitReps If police appoint incident manager support and follow instructions Monitor situation and assess risks	Notify DM of EAP Activation or Update DM if applicable with SitReps If police appoint incident manager support and follow instructions Monitor situation and assess risks	As per previous activation level Update DM Provide SitRep to DM	As per previous activation level	Notify DM of EAP Stand Down with SitRep Prepare and Forward EER[1] to DM within 30 days if the Activation status reaches Stand Up 2 or dam requires remedial work
Notifications and Warnings	Not Applicable	DM	DM	DM	DM	DM

[1] DM to provide report to DDS within 30 working days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 32 – Terrorist Threat/Activity or High Energy Impact – DM Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Up 3	Stand Down
Activation Trigger	Not Applicable	Possible terrorist activity/suspicions noticed at the dam	Threat received indicating possible sabotage of dam	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	Failure in progress or possible due to impact or explosion	Risk Assessment has determined that failure risk has reduced
Actions	Not Applicable	Provide SitRep to EDTS, DDS, DEMU, DDGGEO and external stakeholders (including Police, LDC, SDCC)	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep to EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC) Review EER[2], if required and forward to DDS
Notifications and Warnings	Not Applicable	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders

[1] Notify DDS within 48 hours of event. [2] Forward EER to DDS within 30 days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 33 – Terrorist Threat/Activity or High Energy Impact – DIO Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Not applicable			
Lean Forward	Possible terrorist activity/suspicions noticed at the dam	EEC DIO Backup Officer	Phone	DIO WATCH AND ACT DAM: Copperfield Dam EVENT: Terrorist or High Energy Impact STATUS: Lean Forward. Possible terrorist activity/suspicions noticed at the dam: [Provide detail of threat/suspicious observations, any immediate safety concerns, and actions taken]. UPDATE: Next update due by XX am/pm.
		Campers	Face to Face	An investigation is underway at the dam relating to a possible terrorist threat. All visitors should leave the area immediately.
Stand Up1	Threat received indicating potential sabotage of dam	EEC	Phone	DIO EMERGENCY WARNING DAM: Copperfield Dam EVENT: Terrorist threat or high energy impact. STATUS: Stand Up 1. Threat received indicating potential sabotage of dam: [Provide detail of threat/suspicious observations, any immediate safety concerns, and actions taken since last update]. UPDATE: Next update due by XX am/pm.
Stand Up 2	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	EEC	Phone	DIO EMERGENCY WARNING DAM: Copperfield Dam EVENT: Terrorist or High Energy Impact STATUS: Stand Up 2. Large explosion heard/observed at dam: [Provide detail of threat/suspicious observations, any immediate safety concerns, and actions taken since last update]. UPDATE: Next update due by XX am/pm.
Stand Up 3	Failure in progress or possible due to impact or explosion	EEC	Phone	DIO EMERGENCY WARNING DAM: Copperfield Dam EVENT: Terrorist or High Energy Impact STATUS: Stand Up 3. Failure in progress or possible due to impact or explosion: [Provide detail of threat/suspicious observations, any immediate safety concerns, and actions taken since last update]. UPDATE: Next update due by XX am/pm.

Stand Down	Risk Assessment has determined that failure risk has reduced	EEC	Phone	COPPERFIELD DAM DIO ADVICE STAND DOWN ACTION: Prepare report for EEM with number of PAR evacuated, where to etc. and other relevant information.

Activity Table 34 – Terrorist Threat/Activity or High Energy Impact – EEC Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages (subject to minor change by approval of EEM)
Alert	Not applicable			
Lean Forward	Possible terrorist activity/suspicions noticed at the dam	National Security Hotline Police Link/Police on 000 EEM LDC DDMG DIO	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES WATCH AND ACT DAM: Copperfield Dam EVENT: Terrorist or High Energy Impact STATUS: Possible terrorist activity/suspicions noticed at Copperfield Dam. An investigation is underway at the dam. Houses are unlikely to be at risk. ACTION: Await further notifications. UPDATE: Further updates will be provided as required.
Stand Up1	Threat received indicating potential sabotage of dam	Police Link/Police on 000 EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Terrorist or High Energy Impact STATUS: Threat received indicating potential sabotage of Copperfield Dam. An investigation is underway at the dam. Houses are unlikely to be at risk. ACTION: Follow emergency services instructions. UPDATE: Further updates will be provided as required.
Stand Up 2	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	Police on 000 EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Terrorist or High Energy Impact STATUS: Terrorist threat confirmed at Copperfield. Large explosion reported at the dam. Investigations are currently ongoing. Houses are unlikely to be at risk. ACTION: Follow emergency services instructions. UPDATE: Further updates will be provided as required.

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages (subject to minor change by approval of EEM)
Stand Up 3	Failure in progress or possible due to impact or explosion	Police on 000 EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Terrorist or High Energy Impact STATUS: Failure of Copperfield Dam is in progress/possible as at [time, day, date, year]. Water levels in Copperfield River and connecting streams may rise rapidly. Flood waters will be contained in waterways – houses are unlikely to be at risk. ACTION: Follow emergency services instructions. Move to higher ground if safe to do so. Avoid fast flowing or deep water near waterways and floodplains. UPDATE: Further updates will be provided as required.
Stand Down	Risk Assessment has determined that failure risk has reduced	National Security Hotline Police Link/Police on 000 EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Terrorist or High Energy Impact STATUS: Stand down – Event over. Copperfield Dam is not affected by a structural concern. WHAT YOU SHOULD DO: No action required. UPDATE: No further updates will be provided.

Activity Table 35 – Terrorist Threat/Activity or High Energy Impact – DE Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Not applicable			
Lean Forward	Not applicable			
Stand Up1	Not applicable			
Stand Up 2	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Stand Up 3	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Stand Down	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A

Activity Table 36 – Terrorist Threat/Activity or High Energy Impact – EEM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Not applicable			
Lean Forward	Possible terrorist activity/suspicions noticed at the dam	DM	Phone SMS Email	Internal SitReps are prepared by the EEM as required to suit the circumstances of individual dam hazard events or dam emergency events. These SitReps will be distributed by Email to the DM. Refer to SitRep template in Section 2.10.1.
Stand Up1	Threat received indicating potential sabotage of dam	DM	Phone SMS Email	
Stand Up 2	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	DM	Phone SMS Email	
Stand Up 3	Failure in progress or possible due to impact or explosion	DM	Phone SMS Email	
Stand Down	Risk Assessment has determined that failure risk has reduced	DM	Phone SMS Email	

Activity Table 37 – Terrorist Threat/Activity or High Energy Impact – DM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Not applicable			
Lean Forward	Possible terrorist activity/suspicions noticed at the dam	EDTS DDS DEMU DDGGEO	Phone SMS Email	External SitReps are escalated by the DM as required to suit the circumstances including a summary dam(s) event status, hazards and required actions. These SitReps will be distributed by Email to the DEMU and Department Senior Management. Refer to SitRep template in Section 2.10.1.
Stand Up1	Threat received indicating potential sabotage of dam	EDTS DDS DEMU DDGGEO External stakeholders (LDMG, SDCC)	Phone SMS Email	
Stand Up 2	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	
	Large explosion heard/observed at dam (e.g. bomb explosion, aircraft hit)	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	
Stand Up 3	Failure in progress or possible due to impact or explosion	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Stand Down	Risk Assessment has determined that failure risk has reduced	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	

6.5 Earthquake

6.5.1 Dam Hazard Overview

An Earthquake event in close proximity to the dam could lead to the following issues:

- cracking of the embankment
- slipping or slumping of the fuse plug
- increased rate of seepage
- damage to the concrete spillway flip bucket
- slumping of the sides of the fuse plug channel
- instability around the upstream rim of the dam and localised land slips.

An earthquake notification from Geoscience Australia or report from someone who has felt an earthquake in the area are circumstances that indicate an increased likelihood of an earthquake dam hazard occurring.

In the event of an earthquake being reported in the area that meets or exceeds the EAP Alert trigger threshold, the following actions are recommended:

- Log into and review the readings for the dam on the RSAS. Continue to monitor the RSAS for any changes on a regular basis (at least 3 hourly) over the next 48 hours.
- Consider arranging for a dam inspection to be undertaken as soon as possible.

Opening of the discharge (cone valve) is only to be undertaken on approval from the EEM.

Activity Table 38 – Earthquake – DIO Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	Earthquake reported or felt in the area **AND** A possible failure path has been identified	Failure possible or in progress due to earthquake	Risk assessment has determined that failure risk has reduced
Actions	Notify EEC and DIO Backup Officer Advise campers to leave the site, close and lock the gate at Rycon Station, and display the "Dam Closed" sign on gate Inspect the Dam Wall, Spillway, Abutments and Fuse Plug (if safe to do so) and report to EEC for leaks Check for leaks, deformation, erosion and concrete damage Maintain photographic record Record data of the event and maintain an event log of all actions and communications Log Book entry	As per previous activation level; plus Repeat the inspection as directed by EEC Provide inspection report to EEC	As per previous activation level Support/ supervise remedial works as required Lower the storage levels if directed by EEC Maintain surveillance of the area immediately downstream Log Book entry	As per previous activation level	Prepare and forward EER including photos to EEM Dam Log Book is to be updated after every Emergency Event Return to routine activities and weekly inspections if it is safe to do so, in consultation with EEC Remove the "Dam Closed" sign at Rycon Homestead when the event is over and notify EEC Close the cone valve if a release was made to lower the level
Notifications	EEC and DIO Backup Officer Campers	As per previous activation level EEC	As per previous activation level	As per previous activation level	EEM EEC

Activity Table 39 – Earthquake – EEC Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	Earthquake reported or felt in the area **AND** A possible failure path has been identified	Failure possible or in progress due to earthquake	Risk assessment has determined that failure risk has reduced
Actions	Activate the EAP in consultation with EEM Notify EEM, LDC, DDMG DIO, RDSWU Notify PAR (at Rycon Station, Kidston township, Oaks Homestead) Request approval from EEM to change website that dam is closed	Escalate EAP in consultation with EEM Notify DIO, EEM, LDC, DDMG, PAR (at Rycon Station, Kidston township, Oaks Homestead) Investigate availability of machinery and materials (if sufficient stockpiles available) Place machinery operators on stand by Provide SitRep to EEM	As per previous activation level Provide SitRep to EEM	As per previous activation level WARNING to LDC WARNING to PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), to EVACUATE Provide SitRep to EEM	Notify EEM, LDC, DDMG, PAR (at Rycon Station, Kidston township, Oaks Homestead and Narrawa Station), DIO, RDSWU that the event is over Request approval from EEM to change website that dam is open
Notifications and Warnings	EEM LDC DDMG DIO PAR (at Rycon Station, Kidston township, Oaks Homestead) RDSWU	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead) DIO SitRep	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead) DIO SitRep	EEM LDC, DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead) DIO SitRep	EEM LDC, DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead) RDSWU DIO

Activity Table 40 – Earthquake – DE Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	Earthquake reported or felt in the area **AND** A possible failure path has been identified	Failure possible or in progress due to earthquake	Risk assessment has determined that failure risk has reduced
Actions	None	Conduct inspection of the dam if requested by EEC and safe to do so Report findings to EEC immediately after inspection Prepare report including any observations, photographs, sketches or data collected during inspection and provide to EEC	Provide advice to the EEC and EEM regarding the current condition of the dam and the structural risk	Provide advice to the EEC and EEM regarding the current condition of the dam and the structural risk	Provide advice to the EEC and EEM regarding the current condition of the dam and the structural risk Prepare and forward event report including any observations, photos data and sketches collected to EEC
Notifications and Warnings	None	EEC	EEC EEM	EEC EEM	EEC

Activity Table 41 – Earthquake – EEM Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	Earthquake reported or felt in the area **AND** A possible failure path has been identified	Failure possible or in progress due to earthquake	Risk assessment has determined that failure risk has reduced
Actions	Notify DM	Update DM Provide SitRep to DM	Update DM Provide SitRep to DM	Update DM Provide SitRep to DM	Notify DM that the event is over Prepare and forward EER[1], if required, to DM
Notifications and Warnings	DM	DM SitRep	DM SitRep	DM SitRep	DM

[1] DM to provide report to DDS within 30 working days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 42 – Earthquake – DM Emergency Actions

Activation Level	Alert	Lean Forward	Stand Up 1	Stand Up 2	Stand Down
Activation Trigger	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	Earthquake reported or felt in the area **AND** A possible failure path has been identified	Failure possible or in progress due to earthquake	Risk Assessment has determined that failure risk has reduced
Actions	None	None	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC)	Provide SitRep EDTS, DDS[1], DEMU, DDGGEO and external stakeholders (Police, LDMG, SDCC) Review EER[2] if required, and forward to DDS
Notifications and Warnings	None	None	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders	EDTS DDS DEMU DDGGEO External stakeholders

[1] Notify DDS within 48 hours of event. [2] Forward EER to DDS within 30 days of the event as specified in the *Water Supply (Safety and Reliability) Act 2008*

Activity Table 43 – Earthquake – DIO Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	EEC DIO Backup Officer	Phone	DIO ADVICE DAM: Copperfield Dam EVENT: Earthquake STATUS: Alert - Earthquake reported or felt in the area, Investigation underway. UPDATE: Next update due by XX am/pm
		Campers	Face to Face	An investigation is underway at the dam relating to an earthquake in the area. All visitors should leave the area immediately.
Lean Forward	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	EEC	Phone	DIO WATCH AND ACT DAM: Copperfield Dam EVENT: Earthquake STATUS: Lean Forward– Earthquake confirmed, dam affected, surveillance continuing: [Provide detail of dam observations including reservoir and v-notch water levels]. UPDATE: Next update due by XX am/pm
Stand Up1	Earthquake reported or felt in the area **AND** A possible failure path has been identified	EEC	Phone UHF	DIO EMERGENCY WARNING DAM: Copperfield Dam EVENT: Earthquake STATUS: Stand Up 1 – A possible failure path has been identified: [Provide detail of dam observations including reservoir and v-notch water levels]. UPDATE: Next update due by XX am/pm
Stand Up 2	Failure possible or in progress due to earthquake	EEC	Phone UHF	DIO EMERGENCY WARNING EVENT: Earthquake STATUS: Stand Up 2 – Failure possible or in progress due to earthquake. UPDATE: Next update due by XX am/pm

Stand Down	Risk Assessment has determined that failure risk has reduced	EEC	Phone UHF	DIO ADVICE DAM: Copperfield Dam EVENT: Earthquake STATUS: Stand down - Risk Assessment has determined that failure risk has reduced: [Provide detail of dam observations including reservoir and v-notch water levels].

Activity Table 44 – Earthquake – EEC Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages (subject to minor change by approval of EEM)
Alert	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	EEM LDC DDMG DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Earthquake STATUS: Earthquake felt or reported in proximity to Copperfield Dam. An investigation is underway at the dam. Houses are not at risk from the dam. ACTION: No action required. UPDATE: Further updates will be provided as required
Lean Forward	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead) DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES WATCH AND ACT DAM: Copperfield Dam EVENT: Earthquake STATUS: Intense earthquake felt or reported in proximity to Copperfield Dam. Dam may be affected. Investigations are currently ongoing. Houses are not at risk from dam. ACTION: Await further notifications. UPDATE: Further updates will be provided as required.
Stand Up 1	Earthquake reported or felt in the area **AND** A possible failure path has been identified	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead) DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Earthquake STATUS: Copperfield Dam has been affected by earthquake. A possible pathway to failure of the dam has been identified. Flood waters will be contained in waterways – houses are not at risk. ACTION: Follow emergency services instructions. Avoid fast flowing or deep water near waterways and floodplains. UPDATE: Further updates will be provided as required.
Stand Up 2	Failure possible or in progress due to earthquake	EEM LDC DDMG PAR (at Rycon Station, Kidston	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES EMERGENCY WARNING DAM: Copperfield Dam EVENT: Earthquake STATUS: Failure of Copperfield Dam is in progress/possible as at [time, day, date, year]. Water levels in Copperfield River and

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages (subject to minor change by approval of EEM)
		township, Oaks Homestead) DIO RDSWU		connecting streams may rise rapidly. Flood waters will be contained in waterways – houses are not at risk. ACTION: Follow emergency services instructions. Move to higher ground if safe to do so. Avoid fast flowing or deep water near waterways and floodplains. UPDATE: Further updates will be provided as required.
Stand Down	Risk Assessment has determined that failure risk has reduced	EEM LDC DDMG PAR (at Rycon Station, Kidston township, Oaks Homestead) DIO RDSWU	Phone SMS Email	DEPARTMENT OF NATURAL RESOURCES ADVICE DAM: Copperfield Dam EVENT: Earthquake STATUS: Stand down – Event over. Copperfield Dam is not affected by a structural concern. ACTION: No action required. UPDATE: No further updates will be provided.

Activity Table 45 – Earthquake – DE Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Not applicable			
Lean Forward	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Stand Up 1	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Stand Up 2	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A
Stand Down	Request from EEC or EEM for advice regarding dam condition and/or structural risk	EEC EEM	Phone Report	N/A

Activity Table 46 – Earthquake – EEM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	DM	Phone SMS Email	Internal SitReps are prepared by the EEM as required to suit the circumstances of individual dam hazard events or dam emergency events. These SitReps will be distributed by Email to the DM. Refer to SitRep template in Section 2.10.1.
Lean Forward	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	DM	Phone SMS Email	
Stand Up 1	Earthquake reported or felt in the area **AND** A possible failure path has been identified	DM	Phone SMS Email	
Stand Up 2	Failure possible or in progress due to earthquake	DM	Phone SMS Email	
Stand Down	Risk Assessment has determined that failure risk has reduced.	DM	Phone SMS Email	

Activity Table 47 – Earthquake – DM Communications

Activation Level	Trigger for Communications	Contact Priority Order	Methods	Messages
Alert	Earthquake confirmed or felt in the area **AND** Intensity less than 5MM	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	External SitReps are escalated by the DM as required to suit the circumstances including a summary dam(s) event status, hazards and required actions. These SitReps will be distributed by Email to the DEMU and Department Senior Management. Refer to SitRep template in Section 2.10.1.
Lean Forward	Earthquake confirmed or felt in the area **AND** Intensity greater than or equal to 5MM **OR** Intensity less than 5MM and change detected during surveillance	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	
Stand Up 1	Earthquake reported or felt in the area **AND** A possible failure path has been identified	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	
Stand Up 2	Failure possible or in progress due to earthquake	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	
Stand Down	Risk Assessment has determined that failure risk has reduced	EDTS DDS DEMU DDGGEO External stakeholders (Police, LDMG, SDCC)	Phone SMS Email	

Appendix 1 Notification Lists and Contact Details

Summary of Emergency Event Contact List tables provided in Appendix 1:

Table A – Population at Risk (PAR) to be contacted by Technical Services

Table B – PAR to be contacted by LDMG

Table C – Riparian Downstream Water Users

Table D – Dam Inspection Officers, Etheridge Shire Council

Table E – EAP Officers, Technical Services

Table F – Dam Safety Regulator

Table G – Local Disaster Management Group

Table H – District Disaster Management Group

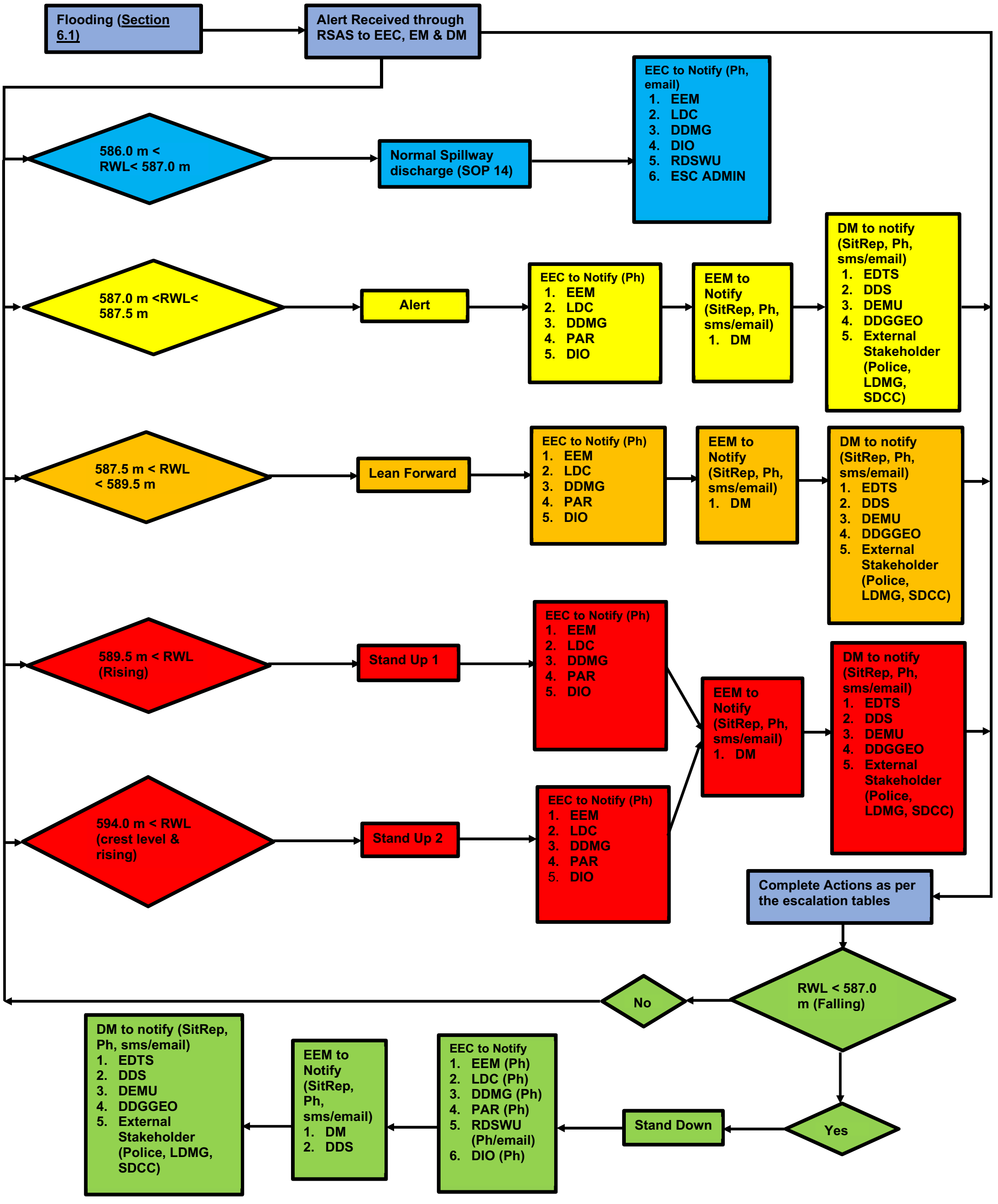
Table I – State Disaster Coordination Centre

Table J – Toxic Spills

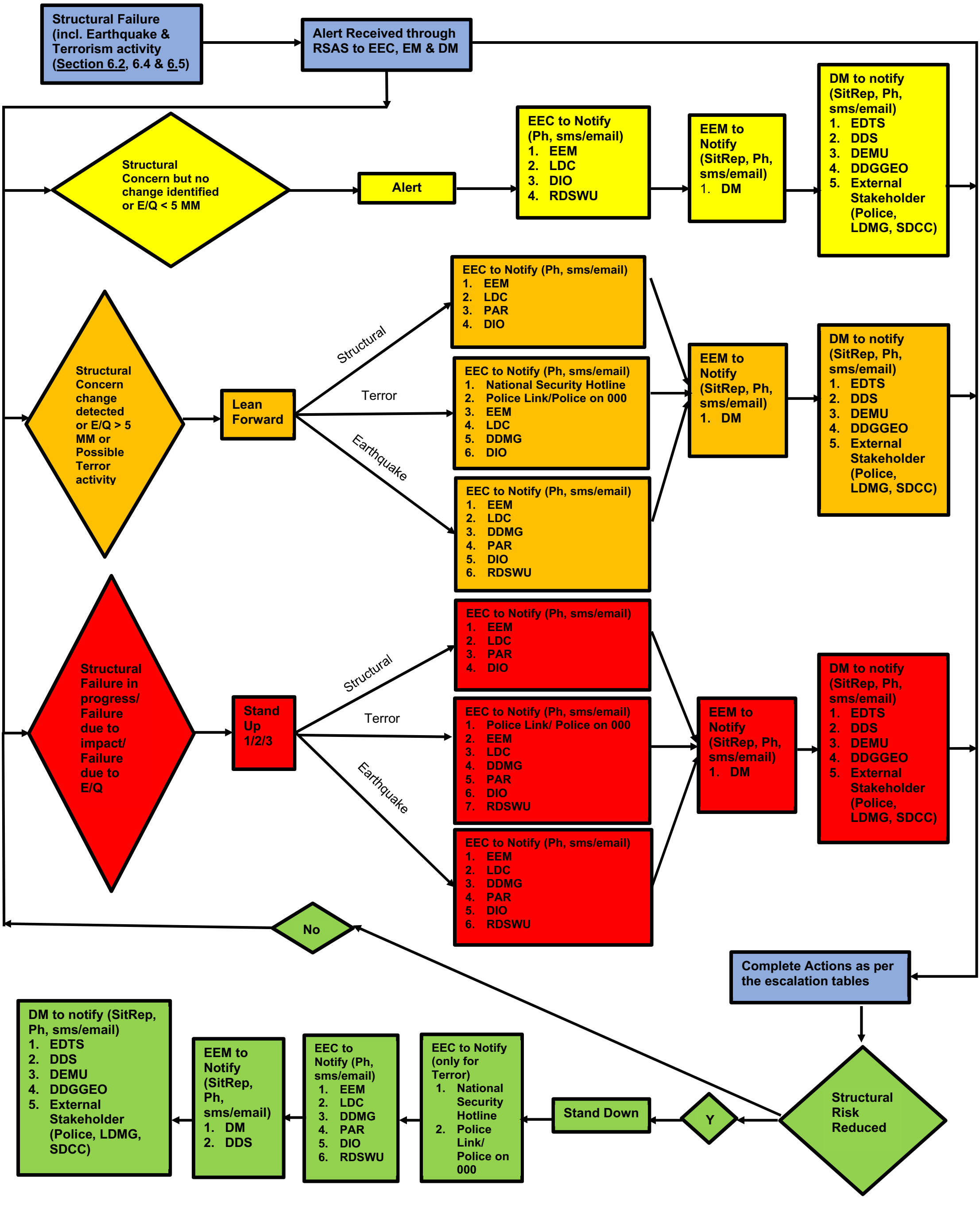
Appendix 1 has been redacted

Appendix 2 Notification Flow Charts

1. Flooding Notification Flow Chart



2. Structural Deficiency (including Earthquake & Terrorism activity) Notification Flow Chart



Appendix 3 Location of Dam and Access Route

Figure 3.1 Location of Dam

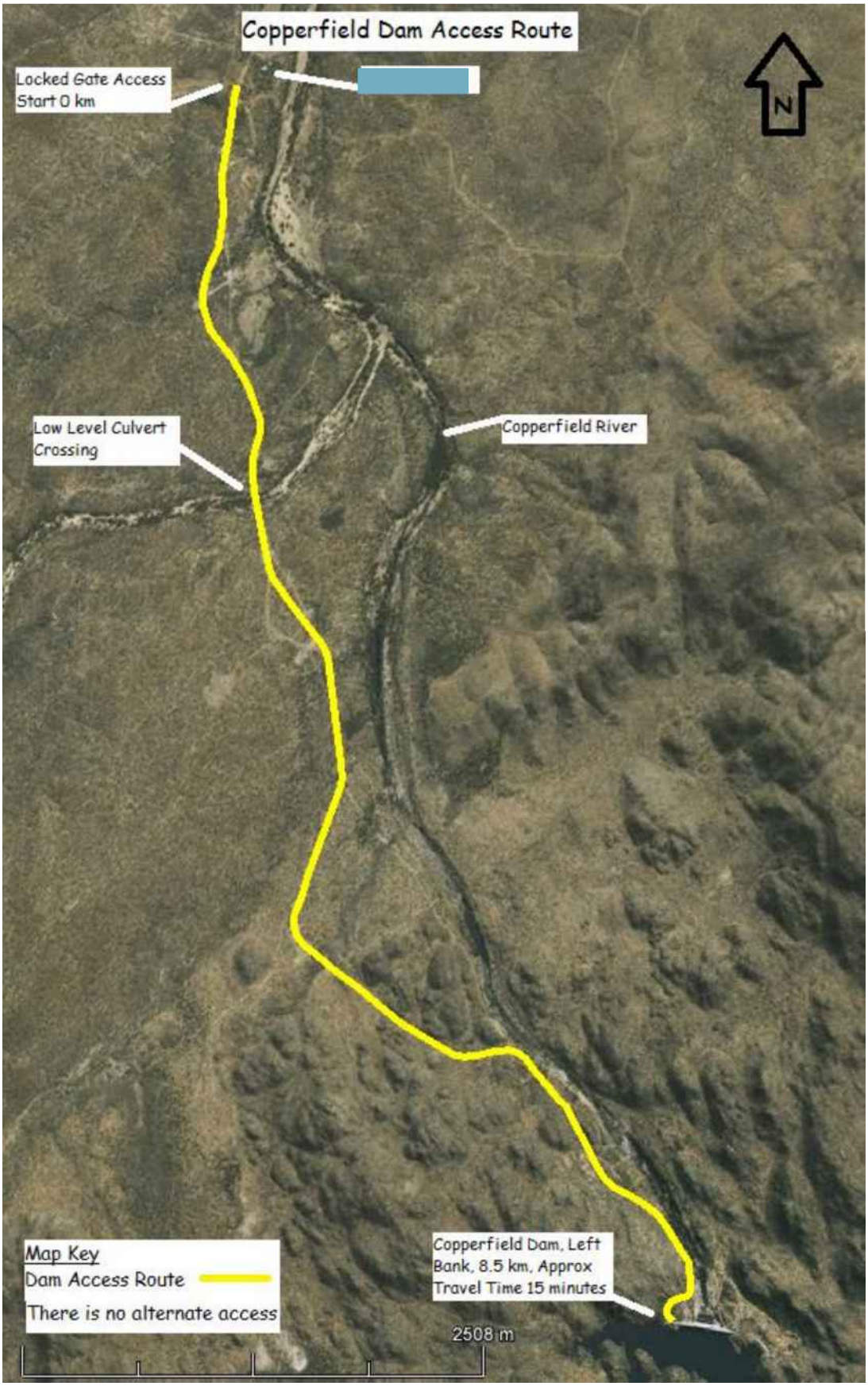


Figure 3.2 Access Routes

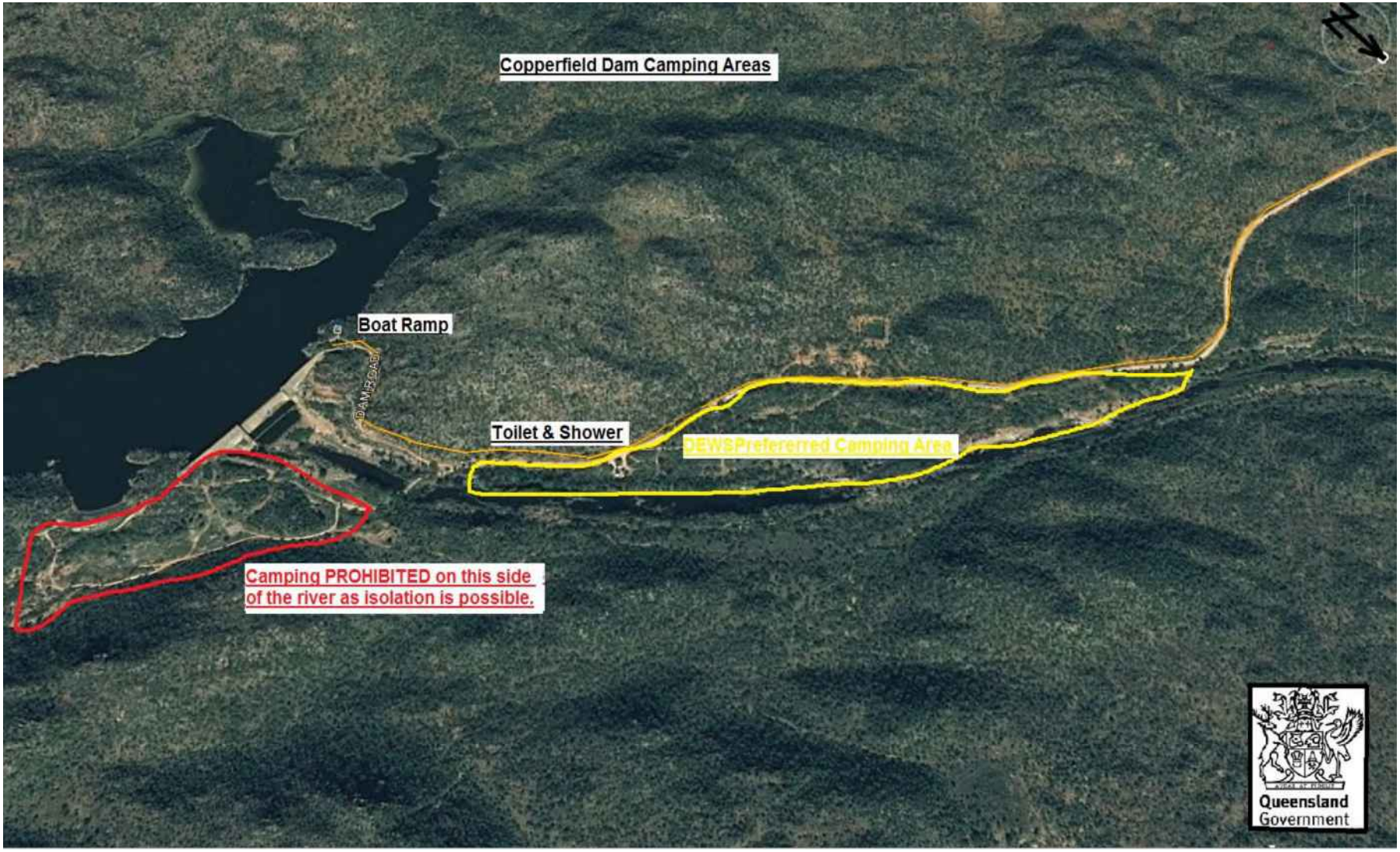
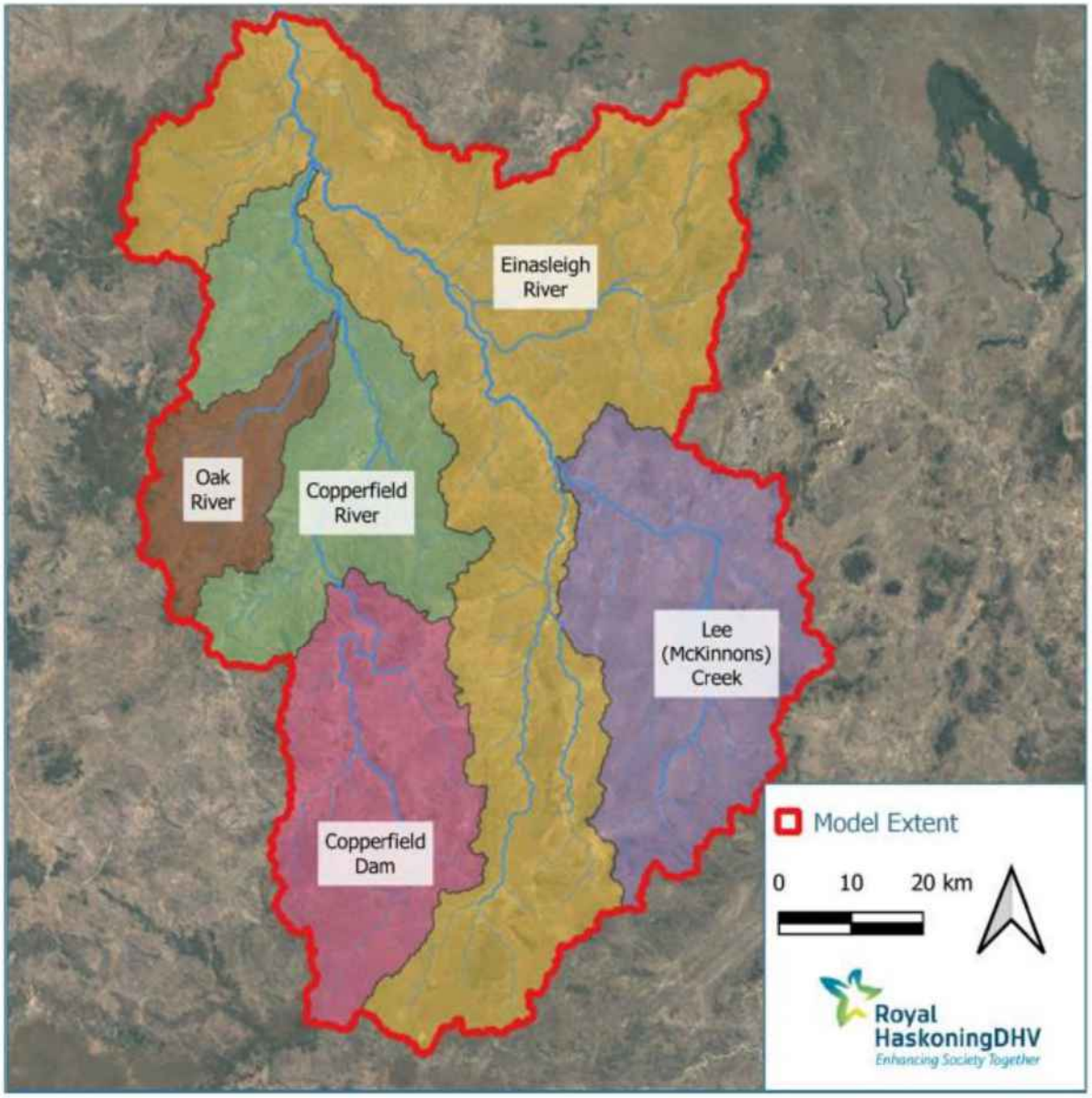


Figure 3.3 Copperfield Dam Camping Areas

Appendix 4 Catchment Boundary Plan



Appendix 5 Inspection Safety Protocol

All EAP officers who visit the dam site are to observe this protocol.

(1) The site is to be accessed by a 4WD vehicle.
(2) A hand-held satellite phone/communicator with backup battery must be carried for all inspections.
(3) Two officers must be present at each inspection.
(4) Inspections are to be carried out when conditions are deemed to be safe as per inspection and risk assessment/s.
(5) During an emergency event access to the dam structure, main spillway and fuse plug emergency spillways is not to be made by boat.
(6) Only EAP officers are authorised to visit the dam site during emergency events.
The gallery and valve chamber are considered to be “confined spaces”. Entry is only permitted by prior approval of the EEM and in accordance with a confined space entry permit issued by a suitably qualified person.

Safe Work Practice procedures and requirements are documented in SOP 4 – Safety and Health.

Appendix 6 Individual Evacuation Plans

Evacuation routes are considered current as of August 2025.

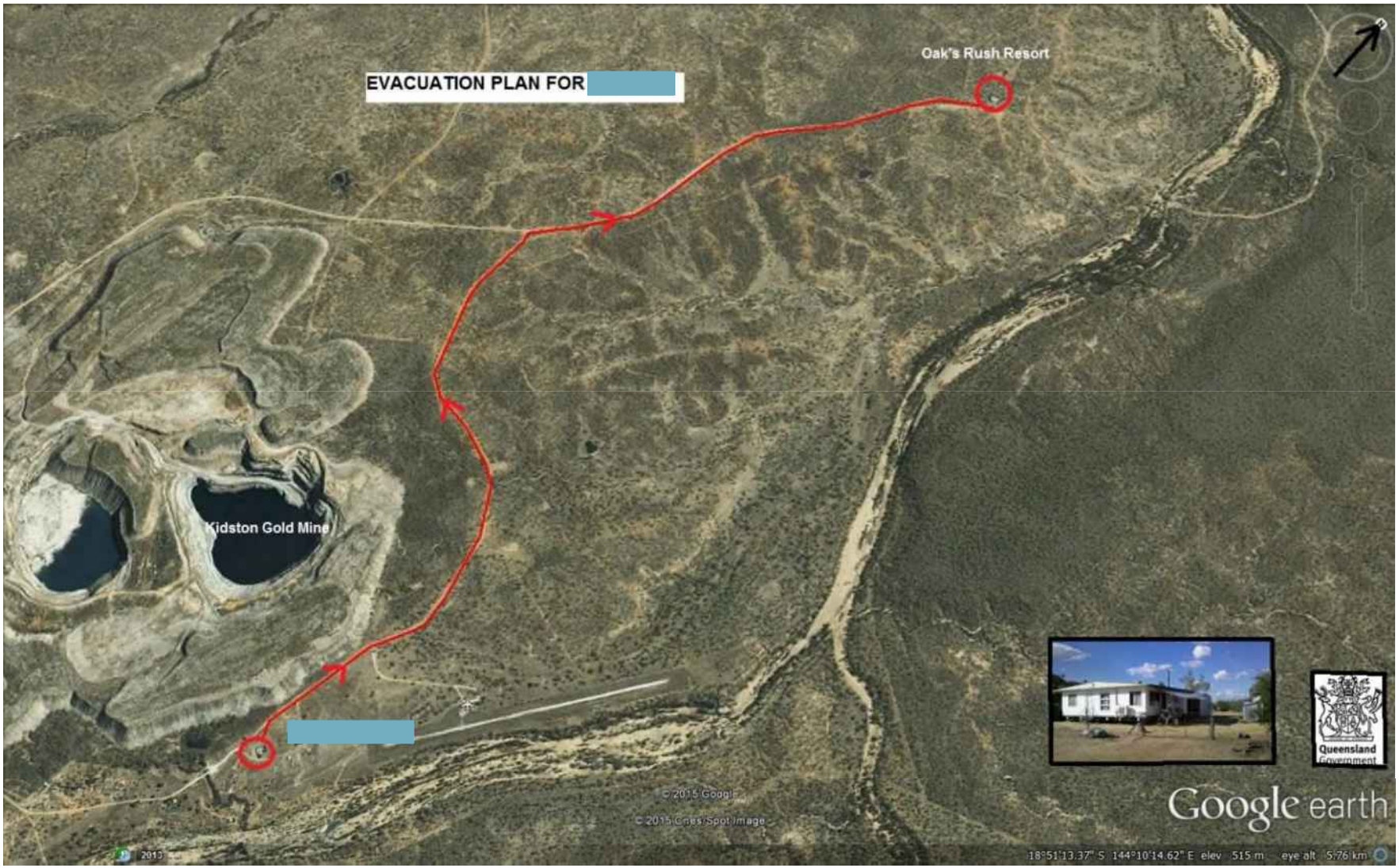
When required by update, the EEM shall visit each at-risk house/structure immediately downstream of the dam to communicate the revised evacuation plan accordingly. The EEM shall post revised plans to each resident if not available on the day.

Note that Kidston Houses 1a, 2 and 3 are currently vacant.


EVACUATION PLAN FOR
Assembly Point
Queensland
Google earth


Evacuation Plan for
All occupants Evacuate to Oaks Rush Resort
Hishon St
© State of Queensland 2017
Google earth

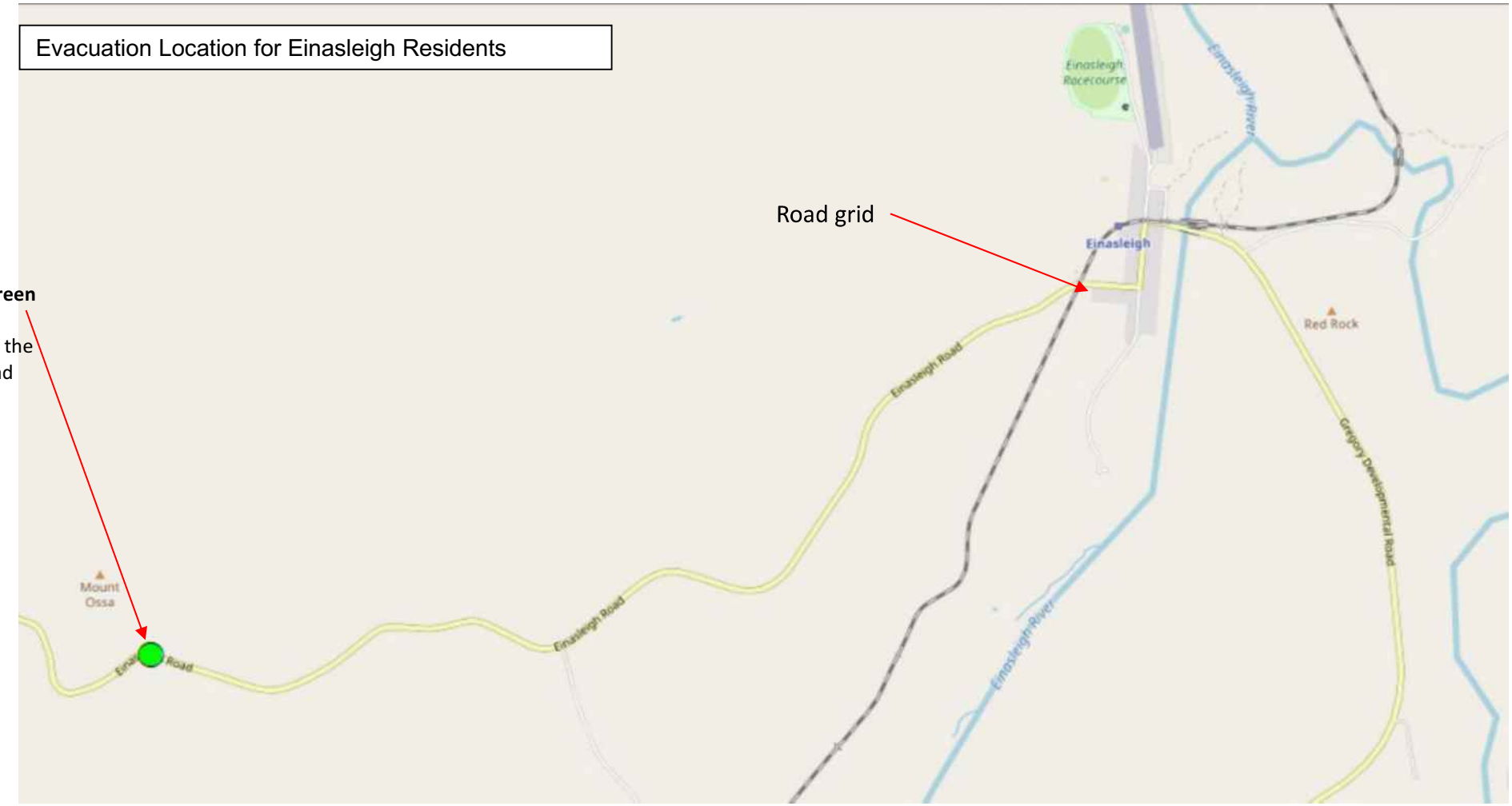

EVACUATION PLAN FOR
Oak's Rush Resort
Kidstone Gold Mine
Queensland
Google earth


EVACUATION PLAN FOR
Oak's Rush Resort
Kidston Gold Mine
Queensland Government
© 2015 Google
© 2015 Cnes Spot Image
Google earth


EVACUATION PLAN FOR
Oak's Rush Resort
Queensland Government
Google earth


Evacuation Plan for
Oaks Rush Resort
© 2016 Google
© 2016 Cnes/Spot Image
Google earth


EVACUATION PLAN FOR
Oaks Rush Camp



Evacuation Location (green dot on map)
8kms from road grid on the Einasleigh-Forsayth Road
GPS:
Latitude 18°32’24” S
Longitude 144°1’33” E

Appendix 7 Rainfall and Reservoir Water Level Information

Remote Sensing and Alert System (RSAS)

The RSAS telemetry and camera equipment is serviced and maintained by Qteq Pty Ltd.

The following alarm levels have been set in the RSAS system.

Table 1 – Remote Sensing Alarm Triggers

RSAS Alarm	Normal	Alert	Lean Forward	Stand Up 1	Stand Up 2
Copperfield River Gorge Reservoir Water Level	586.0 – 587.0m EAP Trigger SPILLWAY	587.0 to 587.5 m EAP Trigger ALERT	587.5 to 588.5m EAP Trigger LEAN FORWARD	588.5 to 594.0m EAP Trigger STAND UP1	>594.0m EAP Trigger STAND UP 2
V-Notch (Left)	0 to 0.099m	N/A	N/A	+0.10 m above V-Notch	
V-Notch (Right)	0 to 0.099m	N/A	N/A	+0.10 m above V-Notch	

#Note: V-notch weirs readings may be affected by high rainfall events.

The information and data obtained from the RSAS can be used in the following ways to provide useful information for resources managing an emergency event, including:-

- Plotting of reservoir and downstream river level rate of rise to provide a prediction of when trigger levels will be reached, spillway discharges to commence and likely timing of triggering of the fuse plug;
- Plotting of rainfall to identify if the storm event is still developing or has passed; and
- Obtaining overall rainfall totals for the site.

In the event that an alarm level in RSAS is triggered, the system will generate SMS alerts to nominated DNRMMRRD personnel, forming the ERT for that dam. Refer to SOP 15 – Emergency Event Coordination.

Table 2 – Resources RSAS Notification List

Name	EAP Role	Resources Position
[redacted]	DM	Director Asset Management
[redacted]	EEM (Primary)	Central Operations Manager
[redacted]	EEM (Secondary)	Principal Engineer
[redacted]	EEC	Senior Engineer

Any person, who receives an SMS Alert for the dam and who is not the EEM, shall immediately notify the EEM of the alert and if uncontactable, take the appropriate action and notify the rest of the officers on the notification list what action was/will be taken.

A site log book is located in the main RSAS cabinet (on the dam crest). This log book is used by dam operators to record their attendance at site and any observations or notes from their regular dam inspections. This site log book is not to be confused with the incident log to record communications and actions taken during an emergency situation.

Resources – Camera

An infrared high-resolution camera with day/night visibility was installed on the left abutment beside the RSAS cabinet in 2018. The solar powered camera provides a single image each day based on a carousel of pre-set angles and is viewed via the DisasterWatch internet data portal.

When satellite conditions allow, the camera can be remotely operated live by TS staff and has automatic tilt, pan and zoom features.

The camera enables staff to further monitor the dam's storage water level, the dam embankment and spillway and will verify the RSAS data and performance of the dam during an emergency event.

DNRMMRRD – Water Monitoring Portal

A stream gauging station is located 8km upstream of the dam which provides useful detailed information including daily stream inflows, megalitres day (ML/day) into the dam.

Station number: 917115A Copperfield River at Spanner Waterhole

To access this information go to:

https://water-monitoring.information.qld.gov.au

At the top of the menu on the left hand side under **Streamflow Data,** select the **search function** and enter the station number or name provided above, click on the station description that appears in the same search box.

Latest instantaneous values are provided or past 8 day summary by left clicking on the **latest flows** table in the middle of the page to enlarge the data.

A last loaded date and time indicator is also displayed at the bottom of the home station page.

The location of this station can be saved as a bookmark in the top right corner by selecting **bookmark this page**

Bureau of Meteorology (BOM)

A large amount of useful information can be obtained from the BOM web site (www.bom.gov.au) that can assist in assessing the potential rainfall and development of flood inflows to the dam. The information includes “weather radar” images (refer to the Cairns based radar site and also the Greenvale rain radar).

It is important to note that the information available from this site may be up to 10 minutes out of date (i.e. radar images are refreshed at intervals of approximately 10 minutes).

Other BOM rainfall gauge sites that may be useful in providing information on rainfall, including the spread of the rainfall system and whether the rainfall is uniform or otherwise across the area include:

Oak Park Station
Spanner Waterhole TM
Lyndhurst Station

To see these three sites, go to BOM website and to Rain and River Data, then Gulf and Cape Rivers and see 1h, 3hr and 24 hr information.

The weather stations located in the area around the dam are shown on the attached map (copied from BOM web site). The catchment boundary plan is located in Appendix 3 – Location of Dam and Access Route.

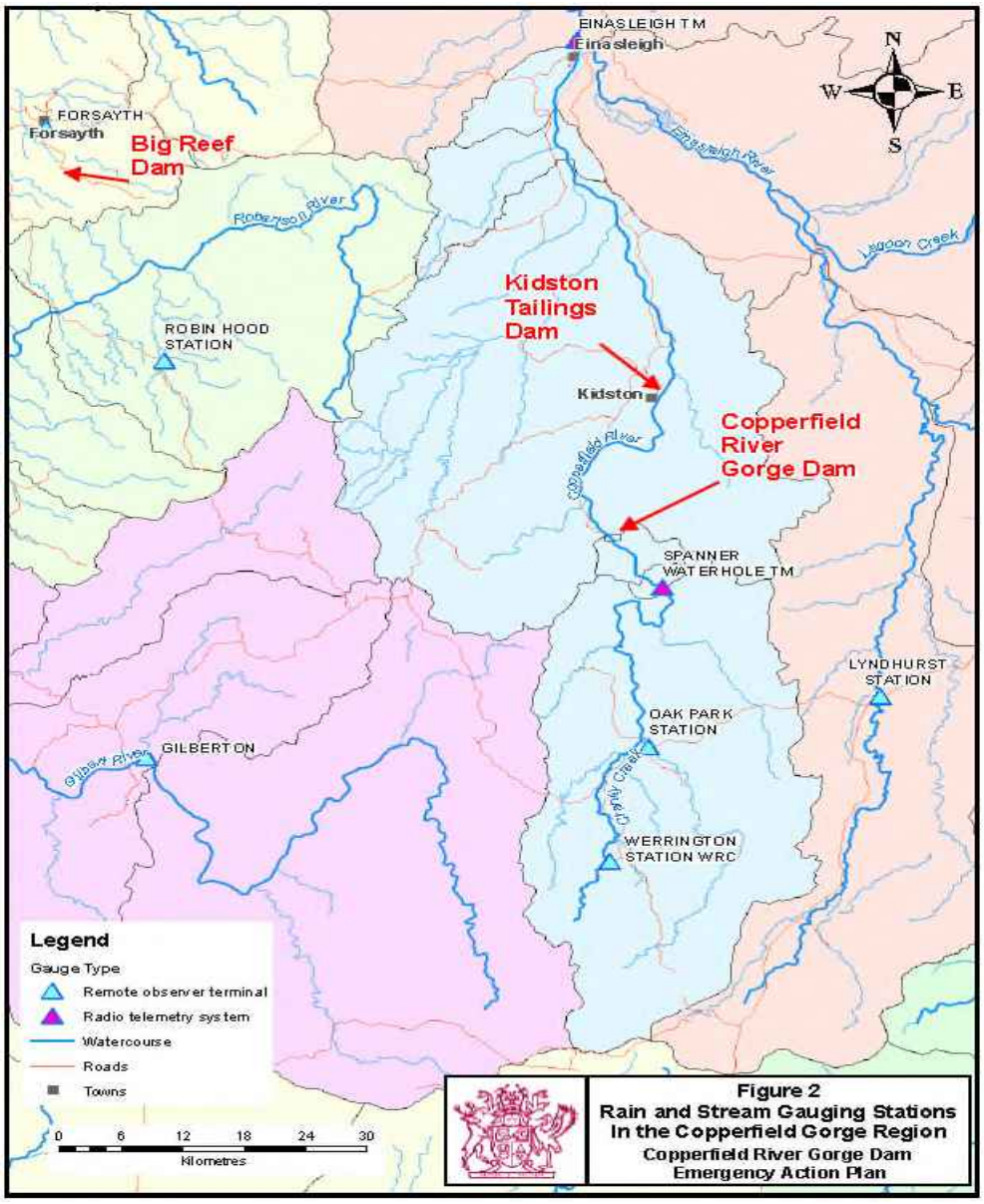


Figure 7.1 Spanner Waterhole Location

Radar Image of Rainfall Prediction

The BOM website provides radar images of rainfall that might be approaching the catchment area.

Go to the website: www.bom.gov.au

Left click on the Rain Radars Icon

Left click on the Cairns or the Greenvale location

Left click on the 512 km composite icon

Move the pointer so that the bottom two cells in Pointer data reads 275 km away and 218 Degrees. This is the approximate location of the dam.

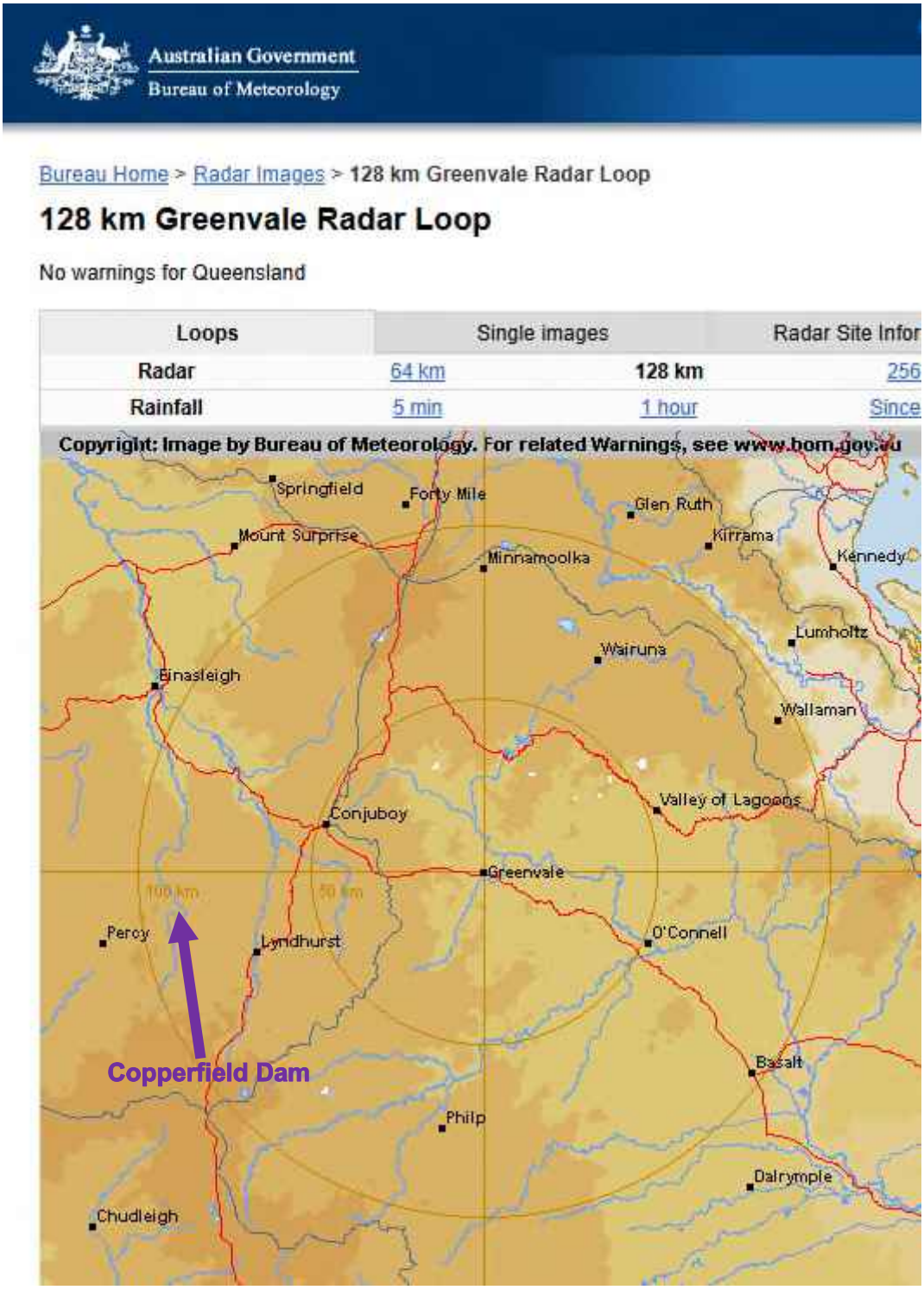


Figure 7.2 Location of Copperfield Dam on the BOM Radar Page

Appendix 8 Rating Tables

The Headwater table indicates the level the dam will reach based on the amount of water being discharged from Spanner Waterhole.

Use the Discharge m^3/sec reading from Spanner Waterhole website (look under Latest Instantaneous Values) then look at the rating table below and look for the m^3/sec reading off the gauge board height on the left hand side and top of the table.

Example: Discharge m^3/sec from Spanner Waterhole website: 485 m^3/sec, rating table = EL 587.83m.

Qld NRW SWDB HYRATAB V146 Output 12/03/2010

Site 917116A Copperfield River at Kidston Dam Headwater

Rating Table 1.00 24/01/1985 to Present Interpolation = Log CTF = 36.0000

Converting 100 Stream Water Level in Metres into 140 Stream Discharge in m3/second

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
586.00	0.0	0.196F	0.554F	1.02F	1.57F	2.19F	2.88F	3.63F	4.44F	5.29F
586.10	6.20F	7.15F	8.15F	9.19F	10.3F	11.4F	12.5F	13.7F	15.0F	16.2F
586.20	17.5F	18.9F	20.2F	21.6F	23.0F	24.5F	26.0F	27.5F	29.0F	30.6F
586.30	32.2F	33.8F	35.5F	37.2F	38.9F	40.6F	42.3F	44.1F	45.9F	47.7F
586.40	49.6F	51.5F	53.4F	55.3F	57.2F	59.2F	61.2F	63.2F	65.2F	67.2F
586.50	69.3F	71.4F	73.5F	75.6F	77.8F	80.0F	82.1F	84.4F	86.6F	88.8F
586.60	91.1F	93.4F	95.7F	98.0F	100F	103F	105F	108F	110F	112F
586.70	115F	117F	120F	122F	125F	127F	130F	132F	135F	138F
586.80	140F	143F	146F	148F	151F	154F	156F	159F	162F	165F
586.90	167F	170F	173F	176F	179F	182F	184F	187F	190F	193F
587.00	196F	199F	202F	205F	208F	211F	214F	217F	220F	223F
587.10	226F	229F	232F	235F	239F	242F	245F	248F	251F	254F
587.20	258F	261F	264F	267F	271F	274F	277F	281F	284F	287F
587.30	291F	294F	297F	301F	304F	307F	311F	314F	318F	321F
587.40	325F	328F	332F	335F	339F	342F	346F	349F	353F	357F
587.50	360F	364F	367F	371F	375F	378F	382F	386F	389F	393F
587.60	397F	400F	404F	408F	412F	415F	419F	423F	427F	431F
587.70	434F	438F	442F	446F	450F	454F	458F	462F	466F	469F
587.80	473F	477F	481F	485F	489F	493F	497F	501F	505F	509F
587.90	513F	517F	521F	526F	530F	534F	538F	542F	546F	550F

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
588.00	554F	559F	563F	567F	571F	575F	580F	584F	588F	592F
588.10	597F	601F	605F	609F	614F	618F	622F	627F	631F	635F
588.20	640F	644F	648F	653F	657F	662F	666F	670F	675F	679F
588.30	684F	688F	693F	697F	702F	706F	711F	715F	720F	724F
588.40	729F	733F	738F	742F	747F	752F	756F	761F	766F	770F
588.50	775F	779F	784F	789F	793F	798F	803F	808F	812F	817F
588.60	822F	827F	831F	836F	841F	846F	850F	855F	860F	865F
588.70	870F	874F	879F	884F	889F	894F	899F	904F	909F	913F
588.80	918F	923F	928F	933F	938F	943F	948F	953F	958F	963F
588.90	968F	973F	978F	983F	988F	993F	998F	1003F	1008F	1013F
589.00	1018F	1024F	1029F	1034F	1039F	1044F	1049F	1054F	1059F	1065F
589.10	1070F	1075F	1080F	1085F	1091F	1096F	1101F	1106F	1111F	1117F
589.20	1122F	1127F	1133F	1138F	1143F	1148F	1154F	1159F	1164F	1170F
589.30	1175F	1180F	1186F	1191F	1196F	1202F	1207F	1213F	1218F	1223F
589.40	1229F	1234F	1240F	1245F	1251F	1256F	1261F	1267F	1272F	1278F
589.50	1283F	1289F	1294F	1300F	1305F	1311F	1317F	1322F	1328F	1333F
589.60	1339F	1344F	1350F	1356F	1361F	1367F	1372F	1378F	1384F	1389F
589.70	1395F	1401F	1406F	1412F	1418F	1423F	1429F	1435F	1440F	1446F
589.80	1452F	1458F	1463F	1469F	1475F	1481F	1486F	1492F	1498F	1504F
589.90	1510F	1515F	1521F	1527F	1533F	1539F	1545F	1550F	1556F	1562F
590.00	1568F									

---------- Notes ----------

All rated data has been coded as reliable

Except where the following tags are used...

Fair

Qld NRW SWDB HYRATAB V146 Output 12/03/2010

Site 917118A Copperfield River at Kidston Dam Tailwater

Rating Table 3.00 27/11/1996 to Present Interpolation = Log CTF = 1.0000

Converting 100 Stream Water Level in Metres

Into 140 Stream Discharge in m3/second

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.30	0.00133	0.00184	0.00252	0.00342	0.0046	0.00558	0.00672	0.00807	0.00963	0.0114
1.40	0.0135	0.0160	0.0187	0.0219	0.0255	0.0285	0.0318	0.0353	0.0392	0.0434
1.50	0.0479	0.0528	0.0581	0.0638	0.0700	0.0773	0.0851	0.0937	0.103	0.113
1.60	0.124	0.135	0.147	0.161	0.175	0.190	0.206	0.224	0.242	0.267
1.70	0.296	0.329	0.365	0.404	0.446	0.492	0.543	0.597	0.657	0.721
1.80	0.791	0.867	0.949	1.04	1.13	1.24	1.33F	1.39F	1.45F	1.52F
1.90	1.58F	1.65F	1.72F	1.79F	1.86F	1.94F	2.02F	2.10F	2.18F	2.27F
2.00	2.36F	2.45F	2.54F	2.64F	2.73F	2.83F	2.94F	3.04F	3.15F	3.27F
2.10	3.38F	3.50F	3.62F	3.74F	3.87F	4.00F	4.11F	4.23F	4.35F	4.47F
2.20	4.59F	4.72F	4.85F	4.98F	5.11F	5.25F	5.39F	5.53F	5.67F	5.81F
2.30	5.96F	6.11F	6.27F	6.42F	6.65F	6.97F	7.29F	7.63F	7.99F	8.35F
2.40	8.73F	9.13F	9.54F	9.96F	10.4F	10.9F	11.3F	11.8F	12.3F	12.9F
2.50	13.4F	14.0F	14.6F	15.2F	15.8F	16.4F	17.1F	17.8F	18.5F	19.2F
2.60	20.0F	20.8P	21.6P	22.4P	23.2P	24.1P	25.0P	25.9P	26.9P	27.9P
2.70	28.9P	29.9P	31.0P	32.1P	33.3P	34.5P	35.7P	36.9P	38.2P	39.5P
2.80	40.9P	42.3P	43.7P	45.2P	46.7P	48.3P	49.9P	51.5P	53.2P	55.0P
2.90	56.8P	58.6P	60.5P	62.4P	64.4P	66.4P	68.5P	70.7P	72.9P	75.2P

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

3.00	77.5P	79.9P	82.3P	84.8P	87.4P	90.0P	91.9P	93.8P	95.8P	97.8P
3.10	99.8P	102P	104P	106P	108P	110P	113P	115P	117P	120P
3.20	122P	124P	127P	129P	132P	134P	137P	140P	142P	145P
3.30	148P	150P	153P	156P	159P	162P	165P	168P	171P	174P
3.40	177P	180P	184P	187P	190P	194P	197P	201P	204P	208P
3.50	211P	215P	219P	222P	226P	230P	234P	238P	242P	246P
3.60	250P	253P	255P	258P	260P	263P	266P	268P	271P	274P
3.70	276P	279P	282P	284P	287P	290P	293P	296P	298P	301P
3.80	304P	307P	310P	313P	316P	319P	322P	325P	328P	331P
3.90	334P	337P	340P	343P	346P	349P	352P	355P	358P	362P
4.00	365P	368P	371P	375P	378P	381P	384P	388P	391P	395P
4.10	398P	401P	405P	408P	412P	415P	419P	422P	426P	429P
4.20	433P	436P	440P	443P	447P	451P	454P	458P	462P	466P
4.30	469P	473P	477P	481P	484P	488P	492P	496P	500P	504P
4.40	508P	512P	516P	520P	524P	528P	532P	536P	540P	544P
4.50	548P	552P	557P	561P	565P	569P	573P	578P	582P	586P
4.60	591P	595P	599P	604P	608P	612P	617P	621P	626P	630P
4.70	635P	639P	644P	649P	653P	658P	662P	667P	672P	676P
4.80	681P	686P	691P	696P	700P	705P	710P	715P	720P	725P
4.90	730P	735P	740P	745P	750P	755P	760P	765P	770P	775P
5.00	780P	784P	789P	793P	797P	801P	806P	810P	814P	819P
5.10	823P	828P	832P	836P	841P	845P	850P	854P	859P	863P
5.20	868P	872P	877P	881P	886P	890P	895P	899P	904P	909P
5.30	913P	918P	922P	927P	932P	936P	941P	946P	951P	955P
5.40	960P	965P	970P	975P	980P	985P	989P	994P	999P	1004P
5.50	1009P	1014P	1019P	1024P	1029P	1034P	1040P	1045P	1050P	1055P
5.60	1060P	1065P	1070P	1075P	1081P	1086P	1091P	1096P	1102P	1107P
5.70	1112P	1117P	1123P	1128P	1133P	1139P	1144P	1149P	1155P	1160P
5.80	1166P	1171P	1176P	1182P	1187P	1193P	1198P	1204P	1209P	1215P
5.90	1220P	1226P	1231P	1237P	1243P	1248P	1254P	1260P	1265P	1271P

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
6.00	1277P	1282P	1288P	1294P	1299P	1305P	1311P	1317P	1323P	1328P

6.10	1334P	1340P	1346P	1352P	1358P	1364P	1369P	1375P	1381P	1387P
6.20	1393P	1399P	1405P	1411P	1417P	1423P	1429P	1435P	1442P	1448P
6.30	1454P	1460P	1466P	1472P	1478P	1484P	1491P	1497P	1503P	1509P
6.40	1516P	1522P	1528P	1534P	1541P	1547P	1553P	1560P	1566P	1572P
6.50	1579P	1585P	1592P	1598P	1605P	1611P	1618P	1624P	1631P	1637P
6.60	1644P	1650P	1657P	1663P	1670P	1677P	1683P	1690P	1696P	1703P
6.70	1710P	1716P	1723P	1730P	1737P	1743P	1750P	1757P	1764P	1771P
6.80	1777P	1784P	1791P	1798P						

---------- Notes ----------

All rated data has been coded as reliable

Except where the following tags are used...

Fair

Poor

Appendix 9 SOP 14 – Small to Medium Spillway Overflows

Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development

Copperfield River Gorge Dam

Standing Operating Procedure
For
Small to Medium Spillway Overflows

SOP - 14

Table of Contents

Purpose

This SOP exists to manage the small to medium spillway overflow events that occur at Copperfield River Gorge Dam.

This SOP applies when the dam storage level reaches 586.0m, and is below 587.0m. The dam is managed by DNRMMRRD. Etheridge Shire Council (ESC) is under contract to manage the operations and maintenance of the dam, including routine dam safety inspections.

Scope

This Procedure applies to spillway overflow events that are less than the alert trigger level of 587.0m. The personnel are the EEC, the EEM and the ESC DIO. Intel about the status of the dam is to be obtained from the Spanner Waterhole and BOM websites.

Personnel Affected and Responsibilities

Director, Asset Management, DNRMMRRD	The person responsible for authorising/approving the Emergency Action Plan, the Standing Operating Procedures and the Operation and Maintenance Manual.
Central Operations Manager, Technical Services, DNRMMRRD	The person responsible for approving the persons undertaking the role of ESC DIO and, for managing, receiving, storing and checking data for the dam, reviewing and authorising documentation produced by the ESC and consultants on the dam and initiating investigations into abnormal behaviour of the dam. Manages the Distribution, Approval and Revision Control relating to this Procedure.
DIO	The Dam Inspection Officer from ESC
EEC	The DNRMMRRD Emergency Event Coordinator
EEM	The DNRMMRRD Emergency Event Manager

Procedures

The EEC is responsible for checking the dam water levels, storage height and rainfall conditions and predict when the spillway is likely to overflow. If the storage level is predicted to reach the alert level trigger EL 587.0m, the EEC is to notify the EEM. The EEC is to inform the DIO when the spillway is likely to overflow.

The DIO should be aware of the rainfall conditions in the area. Details for obtaining information on rainfall are obtainable from the BOM website – see Appendix 7 - Rainfall and Reservoir Water Level Information.

When the dam level reaches EL 586.0m the DIO is to go to the dam site to check whether there are visitors/campers at the dam site and advise them that the spillway is likely to overflow and they should leave the area immediately. If they are unable to

leave the site because of local stream rises or other reasons they should seek higher ground above the dam crest on the left bank of the river and await evacuation by police and emergency services.

Once the visitors/campers have left the site, the gate located before the Rycon Homestead (see Figure 1: Location of Rycon Homestead Gate) should be closed and locked and the “Dam Closed” sign should be displayed. Rycon Homestead will confirm with the EEC that the gate has been closed and locked.

Figure 1 Location of the

Once approval has been given by the EEM/DM, the EEC will notify the DNRMMRRD media unit to change the wording on the Department website stating that the Copperfield River Gorge Dam is closed due to flooding.

The site may be closed for extended periods following an event due to flood waters on the access road. The road may also be closed by the DIO if deemed unsafe for travel.

If the overflow event reached lean forward activation status and the dam level has fallen to 586.55m, a dam inspection shall be conducted by the DIO or DNRMMRRD staff, if it is safe to do so. Appendix A gives a guide for inspecting the dam for deficiencies.

When the EEM or the DIO deems the dam site is safe to open for public access, the EEC will be notified. Once approval has been given from the EEM/DM the EEC is responsible for changing the DNRMMRRD website to state that the dam is open again.

If RSAS is Not Working/Unreliable

The EEC is to notify the EEM, the LDC and the DIO that the RSAS is not working/unreliable.

The EEC is to rely on intel from the local residents such as the amount of rain that is falling/has fallen in the past 24 hours. Local residents are not to be requested to go to the dam site to obtain information on the state of the dam.

Intel may also be obtained from Spanner Waterhole: https://water-monitoring.information.qld.gov.au/ Search under Streamflow Data for Spanner Waterhole 917115A

BOM also has rainfall information – see Appendix 7 – Rainfall and Reservoir Level Information.

All available intel is to be given to the EEM with recommendations on the possible courses of action.

References

Emergency Action Plan, Copperfield River Gorge Dam

Appendix A – Inspecting for Deficiencies

Inspecting for Deficiencies

INSPECTION OF CONCRETE AND MASONRY DAMS

INSPECTING FOR DEFICIENCIES: SUMMARY

TYPE OF DEFICIENCY	LOOK FOR
SURFACE DEFECTS	Honeycomb: Voids around aggregate. Stratification: Non-uniform layers of aggregate in concrete. Form Slippage: Uneven joints and surfaces. Stains. Impact damage.
DISPACEMENT	Displacement at joints between blocks. Volume change in concrete. Closing or opening of joints. Loss of joint filler. Cracking. Debonding of lifts. Tilting, shearing, or shifting of hardware or machinery.
LEAKAGE and SEEPAGE	Significant new leakage on downstream face or in galleries. Wetness in abutment or foundation adjacent to toe. Major changes in leakage/seepage pattern or flow. Water spurting or running out of joints or cracks. Turbidity of the seepage. Blocked drains.
MAINTENANCE CONCERNS	Vegetation in joints between concrete blocks. Large accumulations of debris. Missing or deteriorated joint filler. Quality and condition of previous repairs. Adequacy of ventilation inside dam.

INSPECTION OF EMBANKMENT DAMS

INSPECTING FOR DEFICIENCIES: SUMMARY

TYPE OF DEFICIENCY	LOOK FOR
SEEPAGE	A water flow or sand boil on the lower portion of the downstream slope or toe area, especially at the groins. Leakage around conveyance structures such as outlet works. Wet areas or areas where the vegetation appears greener or more lush on the embankment slope or toe area. Blocked toe drains. An increase in the amount of water being released from toe drains. (Remember to take into account changes in the reservoir water level.) Turbidity or cloudiness of the seepage.
CRACKING	Desiccation Cracking: A random honeycomb pattern of cracks usually found on the crest and the downstream slope. Transverse Cracking: Cracks that are perpendicular to the length of the dam usually found on the crest. Longitudinal Cracking: Cracks that are parallel to the length of the dam. Longitudinal cracks may be associated with stability problems in the slopes.
INSTABILITY	Slides on the upstream or downstream slopes. Bulging, especially at the toe of the dam.
DEPRESSIONS	Misalignment in the crest and embankment slopes found by sighting along fixed points. Sinkholes found by checking and probing each depression. Remember, sinkholes have steep, bucket like sides while minor depressions have gently sloping, bowl like sides.

MAINTENANCE CONCERNS	Inadequate Slope Protection: Check for bald areas or areas where the protection is sparse or damaged. Surface Runoff Erosion: Check for gullies or other signs of erosion. Make sure to check the low points along the upstream and downstream shoulders and groins since surface runoff can collect in these areas. Inappropriate Vegetative Growth: Check for excessive and deep rooted vegetative growth. Debris: Check for debris on and around the dam, especially near outlet works or spillway inlets. Animal Burrows: Check for damage caused by burrowing animals.

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered above are very serious. If you observe any of the following deficiencies, you should consult with the EEM:

Sand boils or turbid seepage.

Seepage that has increased since the last inspection (taking the reservoir water level into consideration).

Cracking that extends below the reservoir water level or potential reservoir water level.

Transverse and longitudinal cracking.

Deep seated slides or bulging associated with slides.

Sinkholes or other large depressions.

Deep rooted vegetation that might need to be removed.

If you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with the EEM.

Appendix 10 Critical Reservoir Water Levels

Background

The historical maximum flood level at Copperfield Dam is 589.73m AHD, 3.77m below the crest of the fuse plug. If the fuse plug breached at this level, Oaks Homestead would be at risk of inundation. Similar situations exist for Kidston Township and Rycon homestead.

The culvert below Oaks Rush Outback Camp will be affected by flooding and overtopping of the culvert occurs when Copperfield River Gorge Reservoir reaches EL 586.55m. The culvert estimation has been calculated using the culvert capacity and the cross-sectional flow over the crest of the dam.

Estimation of Critical Water Levels

Spillway flows have been estimated using the information available in Copperfield Dam Data Book. EL 587.0m has been set as the alert trigger level to allow sufficient time for TS and the LDMG to prepare for an event whilst ensuring that the alert level is not triggered too frequently. The water level has only exceeded this level on four occasions since 1986.

EL587.5m has been set as the lean forward trigger to allow sufficient time for all notifications to be made prior to stand up triggers being reached. As this is the first time the PAR is notified and communications are via landlines only this level is triggered soon after alert to allow a significant period of time for notifications to be undertaken.

EL589.5m has been set as the stand up 1 trigger, just below the flood of record for Copperfield Dam and allowing sufficient time to complete notifications and warnings prior to reaching the reservoir level at which the first PAR could be affected by flooding if a dam failure were to occur.

The fuse plug crest level is EL 593.5m, the 2022 FIA states that the erosion of the fuse plug will trigger during a 1:1,000 AEP event.

Breaches of the fuse plug without a dam failure have the potential to inundate houses downstream according to FIA 2022, including:

Rycon Station may be inundated up to 0.9m.
Narrawa Road Station may be inundated up to 1.5m.
The house identified as [redacted] will be inundated up to 0.6m.

EL594 has been set as the stand up 2 trigger and is the level at which the non-overflow section of the dam crest is overtopped, indicating that failure of the dam is likely to occur

Recommendations

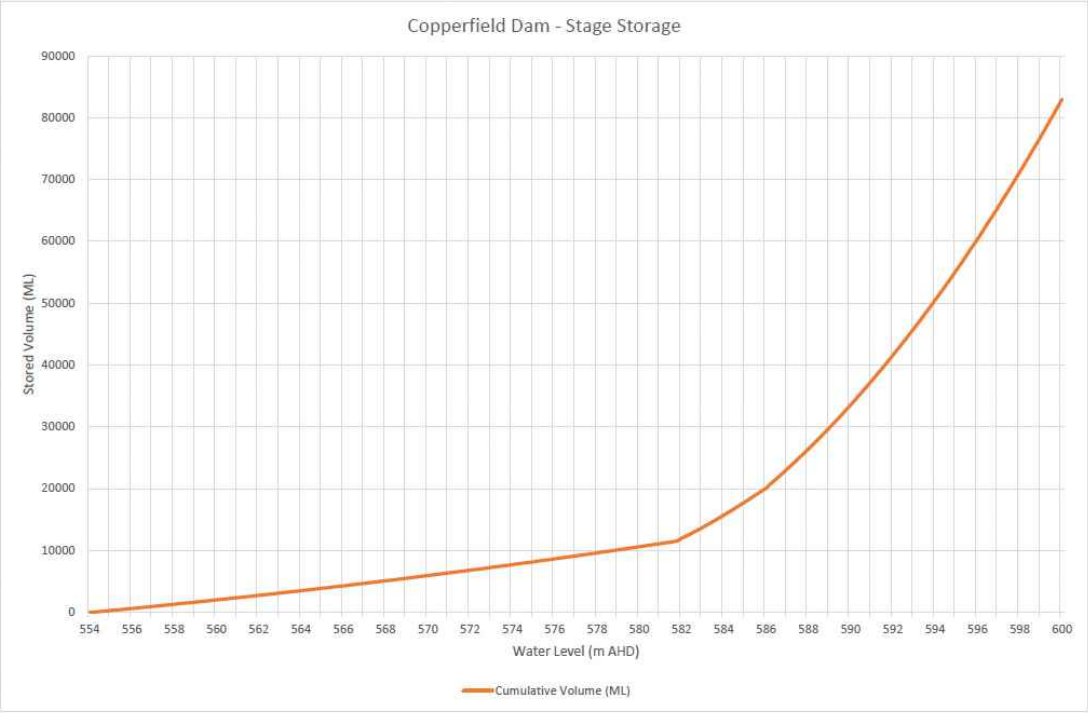
Rycon Homestead, Kidston township and the Oaks Homestead should be evacuated when the dam storage reaches 589.5m AHD.

As water reaches Rycon Homestead, Kidston Township then Oaks Homestead; the priority of notification is that order for all events.

References

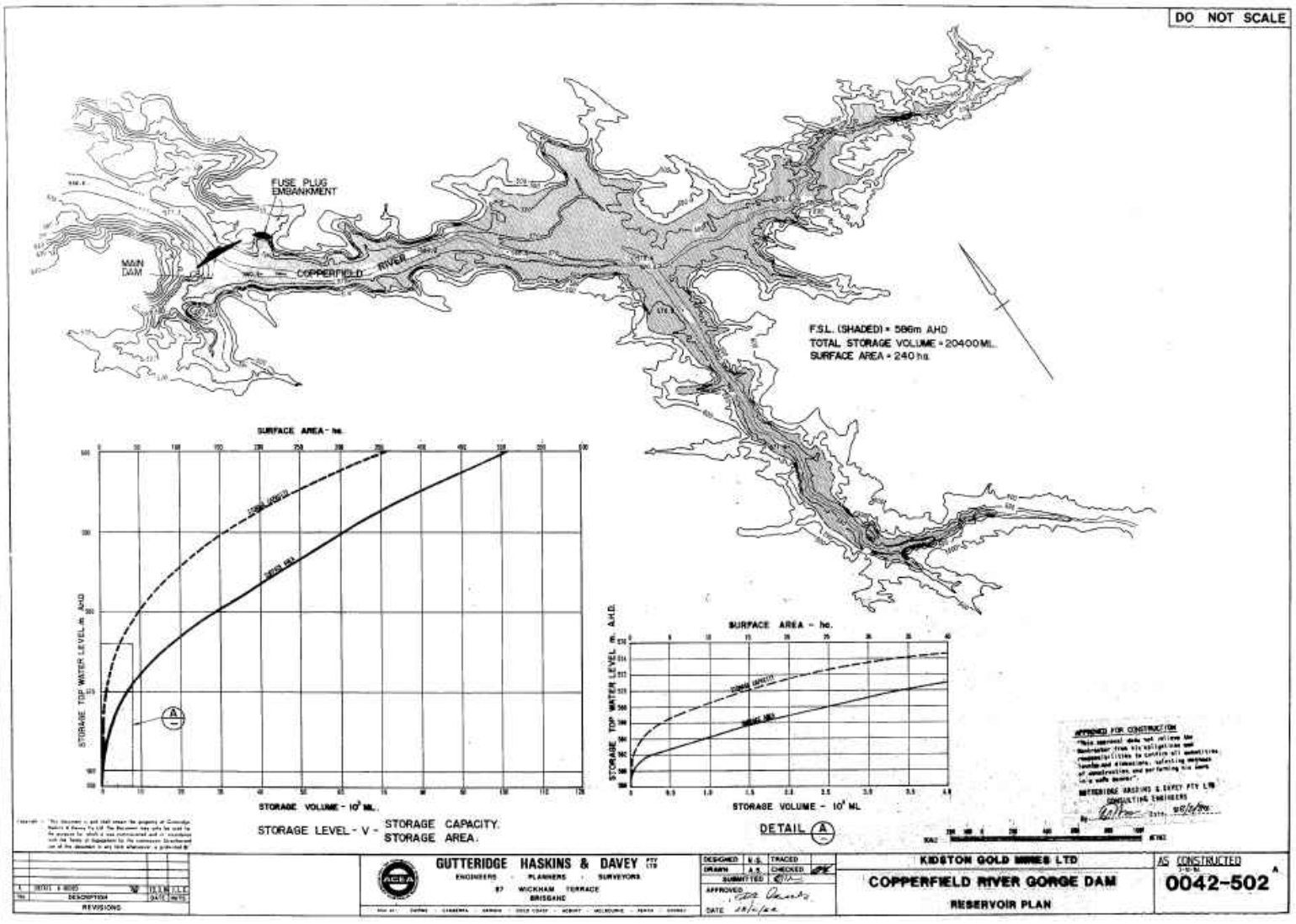
1. Department of Natural Resources, Mines and Energy "*Guideline for failure impact assessment of water dams, November 2018"*
2. Copperfield Dam – FIA May 2022, Royal HaskoningDH

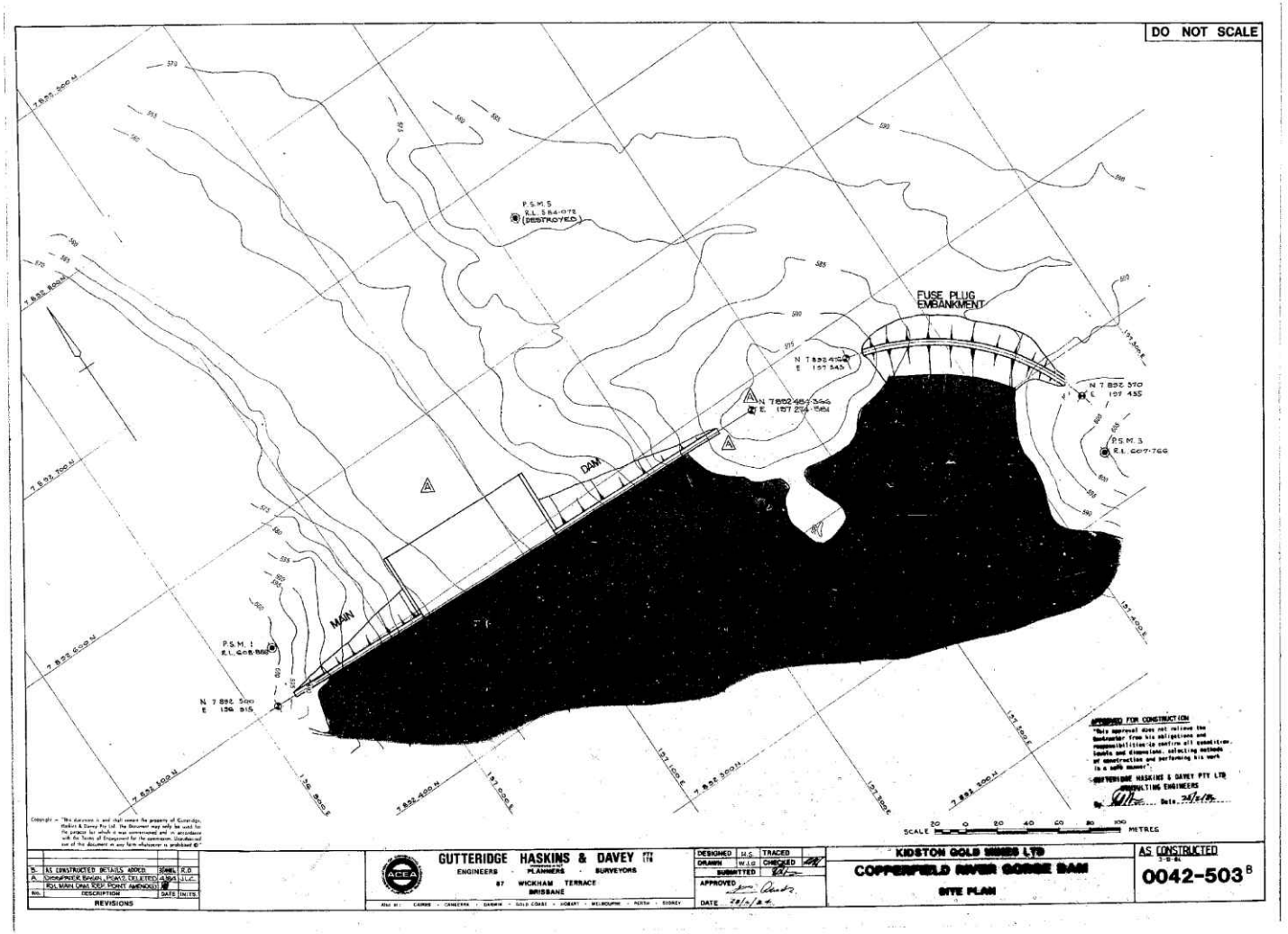
Appendix 11 Storage Capacity Curve



Appendix 12 Drawings

Reservoir Plan
Site Plan
Fuse Plug Embankment General Arrangement
Instrumentation General Arrangement and Details


DO NOT SCALE
FUSE PLUG EMBANKMENT
MAIN DAM
COPPERFIELD RIVER
F.S.L. (SHADED) = 586m AHD
TOTAL STORAGE VOLUME = 20400 ML.
SURFACE AREA = 240 ha.
SURFACE AREA - ha.
STORAGE TOP WATER LEVEL m AHD
STORAGE VOLUME - 10³ ML.
STORAGE LEVEL - V - STORAGE CAPACITY.
STORAGE AREA.
DETAIL A
GUTTERIDGE HASKINS & DAVEY PTY LTD
ENGINEERS · PLANNERS · SURVEYORS
97 WICKHAM TERRACE BRISBANE
KIDSTON GOLD MINES LTD
COPPERFIELD RIVER GORGE DAM
RESERVOIR PLAN
AS CONSTRUCTED
0042-502 A


DO NOT SCALE
FUSE PLUG EMBANKMENT
DAM
MAIN
P.S.M.5
R.L. 584.078
(DESTROYED)
P.S.M.3
R.L. 607.766
P.S.M.1
R.L. 608.882
N 7 892 500
E 156 915
SCALE
METRES
GUTTERIDGE HASKINS & DAVEY PTY LTD
ENGINEERS · PLANNERS · SURVEYORS
87 WICKHAM TERRACE
BRISBANE
KIDSTON GOLD MINES LTD
COPPERFIELD RIVER GORGE DAM
SITE PLAN
AS CONSTRUCTED
0042-503 B
REVISIONS

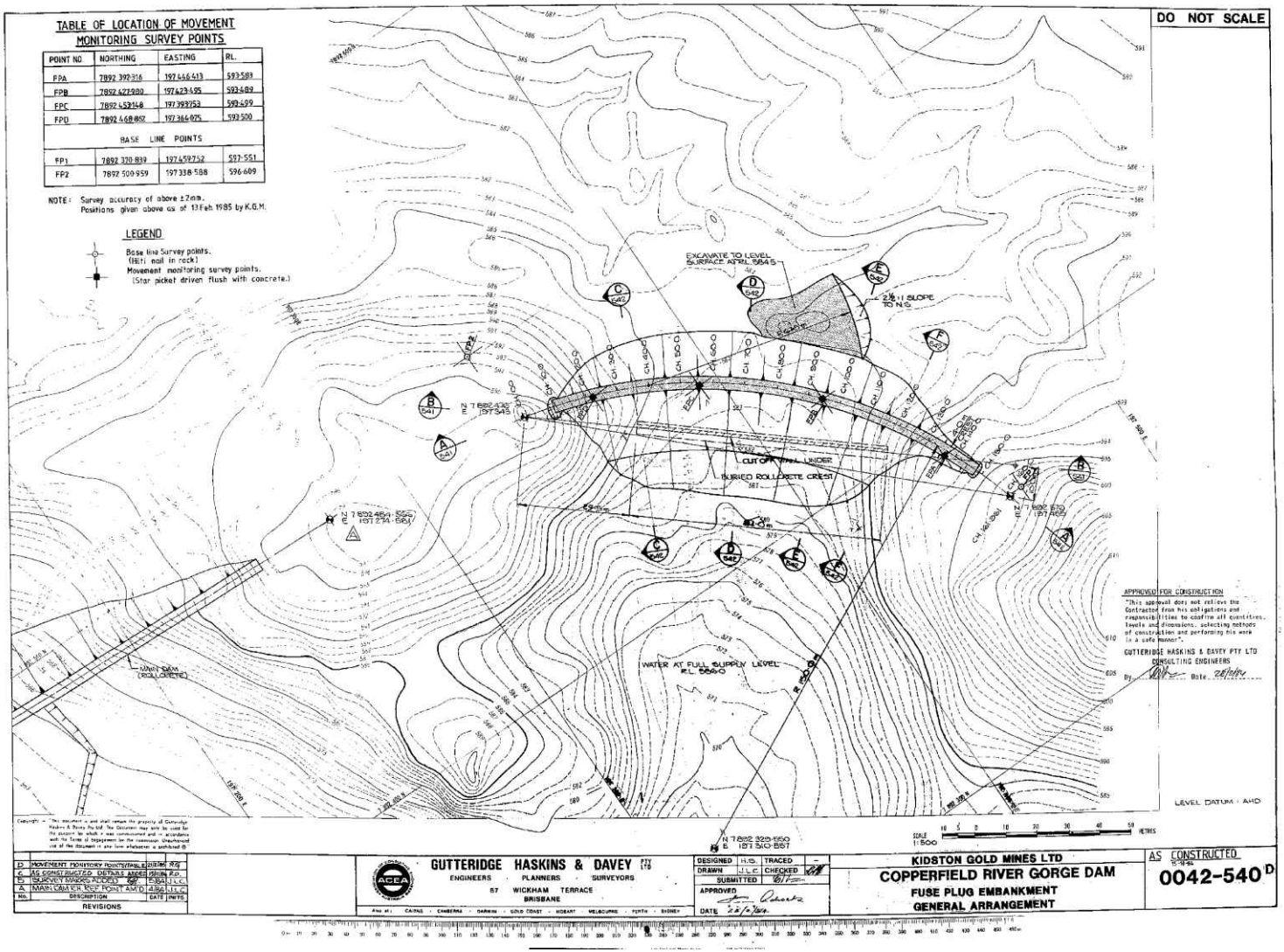
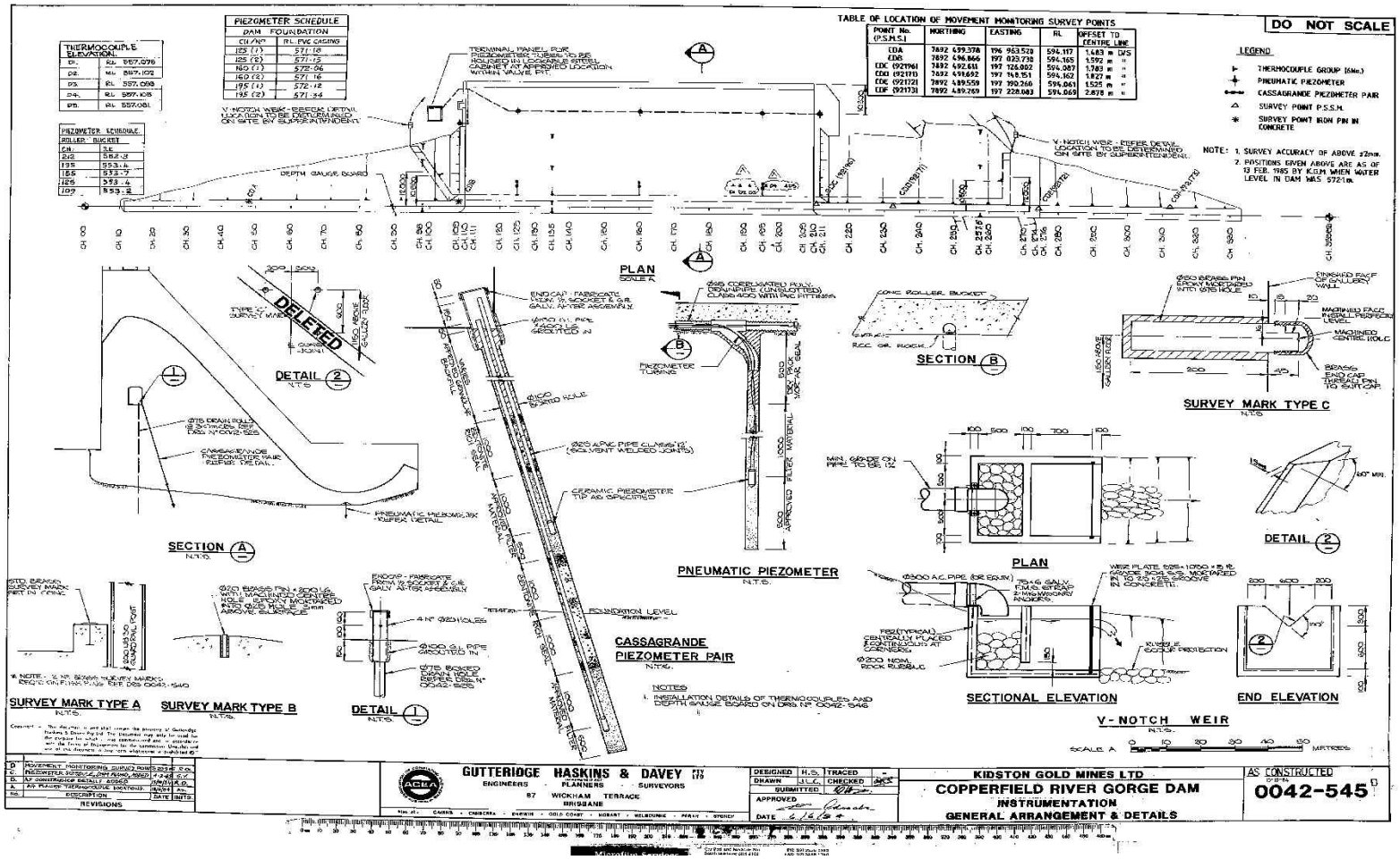


TABLE OF LOCATION OF MOVEMENT MONITORING SURVEY POINTS
POINT NO. | NORTHING | EASTING | RL.
FPA | 7892 392·316 | 197 446·413 | 593·583
FPB | 7892 427·980 | 197 423·495 | 593·489
FPC | 7892 452·148 | 197 393·753 | 593·499
FPD | 7892 468·862 | 197 364·075 | 593·500
BASE LINE POINTS
FP1 | 7892 370·839 | 197 459·752 | 597·551
FP2 | 7892 500·959 | 197 338·588 | 596·609
NOTE: Survey accuracy of above ±7mm.
Positions given above as at 13 Feb 1985 by K.G.M.
LEGEND
Base line Survey points. (Bolt, nail in rock)
Movement monitoring survey points. (Star picket driven flush with concrete.)
DO NOT SCALE
EXCAVATE TO LEVEL SURFACE AT RL 584.5
2½:1 SLOPE TO N.S.
CUT OFF WALL UNDER BURIED ROLLCRETE CREST
WATER AT FULL SUPPLY LEVEL R.L. 580.0
LEVEL DATUM : AHD
APPROVED FOR CONSTRUCTION
GUTTERIDGE HASKINS & DAVEY PTY LTD CONSULTING ENGINEERS
GUTTERIDGE HASKINS & DAVEY PTY LTD
ENGINEERS · PLANNERS · SURVEYORS
67 WICKHAM TERRACE BRISBANE
KIDSTON GOLD MINES LTD
COPPERFIELD RIVER GORGE DAM
FUSE PLUG EMBANKMENT
GENERAL ARRANGEMENT
AS CONSTRUCTED
0042-540 D


DO NOT SCALE
PIEZOMETER SCHEDULE
DAM FOUNDATION
TABLE OF LOCATION OF MOVEMENT MONITORING SURVEY POINTS
LEGEND
THERMOCOUPLE GROUP (6No.)
PNEUMATIC PIEZOMETER
CASSAGRANDE PIEZOMETER PAIR
SURVEY POINT P.S.S.M.
SURVEY POINT IRON PIN IN CONCRETE
NOTE: 1. SURVEY ACCURACY OF ABOVE ±2mm.
2 POSITIONS GIVEN ABOVE ARE AS OF 13 FEB. 1985 BY K.G.M. WHEN WATER LEVEL IN DAM WAS 572.1m.
PLAN
SECTION B
SECTION A
DETAIL 2
DETAIL 1
SURVEY MARK TYPE C
PNEUMATIC PIEZOMETER
CASSAGRANDE PIEZOMETER PAIR
SURVEY MARK TYPE A
SURVEY MARK TYPE B
SECTIONAL ELEVATION
END ELEVATION
V-NOTCH WEIR
GUTTERIDGE HASKINS & DAVEY PTY LTD
ENGINEERS PLANNERS SURVEYORS
87 WICKHAM TERRACE BRISBANE
KIDSTON GOLD MINES LTD
COPPERFIELD RIVER GORGE DAM
INSTRUMENTATION
GENERAL ARRANGEMENT & DETAILS
AS CONSTRUCTED
0042-545

Appendix 13 Training

Training shall be organised by the EEM. These will include TS officers, ESC Officers and the appropriate Local Disaster Management Group personnel. In addition, mock exercises may be organised from time to time.

A record of the training is to be entered into the table below.

Officer	Role	Dam Safety Training	EAP Scenario Training
[redacted]	DIO	September 2022	N/A
[redacted]	Backup DIO	April 2024	N/A
[redacted]	Backup DIO	April 2024	N/A
[redacted]	Backup DIO	April 2024	N/A
[redacted]	LDC	N/A	TBC
[redacted]	EEC	April 2025	TBC
[redacted]	EEM	September 2023	November 2024
[redacted]	EEM	September 2023	November 2024
[redacted]	DM	TBC	November 2024
[redacted]	Backup EEC	September 2023	November 2024
[redacted]	Backup EEC	September 2023	November 2024

Last updated August 2025.

Appendix 14 DNRMMRRD Website Procedure

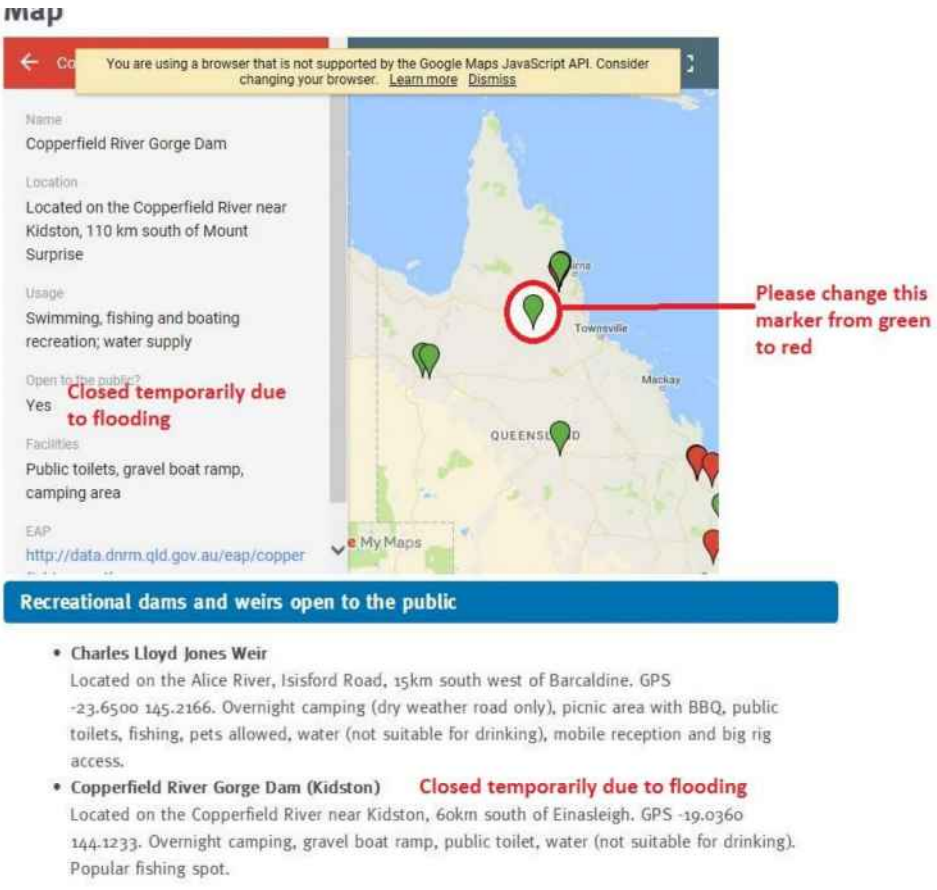
The Queensland Government website provides information to the public about each referable dam. This includes facilities available at each dam, the status of each dam, and if there are road and/or dam closures.

The link to this page on the website is:
https://www.qld.gov.au/environment/water/catchments/state-owned-dams

It may be necessary during an event, to update the website for a dam; for instance, if public access to the dam has been closed due to flooding.

The procedure for changing the information on the website is as follows:-

Seek approval from the EEM/DM to change the website to state the dam is closed. Once approval has been given, provide to Communications the changes that are required. Below is an example of the changes requested to be made to the website. Make a copy of the website as it is currently, e.g. by using the Snipping Tool to capture the map and details, then make the required changes in Paint.



Communications prefer a photograph of the dam in flooding. These are available on the g:drive under G:\Mines2\Technical Services\ Water Assets\Assets\Copperfield Dam\Media photos videos

Ring/email Communications and provide information on what is to be changed on the website and state the required timeframe (usually a

turnaround of one day). It is important that the website is changed as soon as the dam has been closed so the public do not travel to the dam and find it closed.

Information regarding the dam closure can also be shared on Twitter and other relevant social media. Suggested wording is:

> *Due to heavy rainfall in northern Queensland, Copperfield (Kidston)Dam is currently discharging over the spillway and the dam is temporarily closed. This closure includes all public access, camping and day visits to the dam. The department is monitoring the situation and has notified the relevant parties.*

If Copperfield Dam is to be closed for an extended period and/or over a public holiday, a media release may be considered and approval must be sought from the EEM/DM. Suggested wording for a media release is:

> *The Department advises that Copperfield (Kidston) Dam, located south of Einasleigh in Etheridge Shire is temporarily closed. This is due to flood damage to the roads leading to the dam, continual spilling of the dam, and the likelihood of further rainfall. This closure includes all public access, camping and day visits to the dam. The road to the dam is currently locked and will remain locked over the Easter holiday period. The department will advise when public access to the dam re-opens.*
>
> *For updates, refer to the Queensland Government website www.qld.gov.au.*

Etheridge Shire Council has a website and a Facebook page and can be requested to include information on dam closures. The above wording can be provided to them.

The Oasis Roadhouse [redacted] at the Lynd Junction can be requested to provide information to the public regarding the closure of Copperfield (Kidston) Dam. The above wording can be provided to her.

NOTE: It is important that once the DIO has deemed the dam site is safe for public access, approval is sought from the EEM/DM and the website is updated.

Communications Contact:

[redacted]
Principal Communications Officer
Strategic Communication and Engagement
Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
[redacted]

[redacted]
Communication Coordinator
Strategic Communication and Engagement
Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
[redacted]

Appendix 15 UHF Radio Coverage

UHF coverage may be available through a series of repeater stations in the vicinity of Copperfield River Gorge Dam. The dam is surrounded by high rocky ground and this may restrict coverage in the immediate vicinity; however UHF coverage may be useful as the DIO egresses from the dam to warn the PAR and the RDSWU. It appears as if the repeaters on Beverly Hills Station (Channel 1), Agate Creek Station (Channel 6), Racecourse Station (Channel 6) and particularly Werrington Station (Channel 7) may be accessible either from the dam or as the DIO egresses.

The coverage maps for the aforementioned in the area are shown below with the dam marked on them.

Figure 15.1 Overall UHF coverage

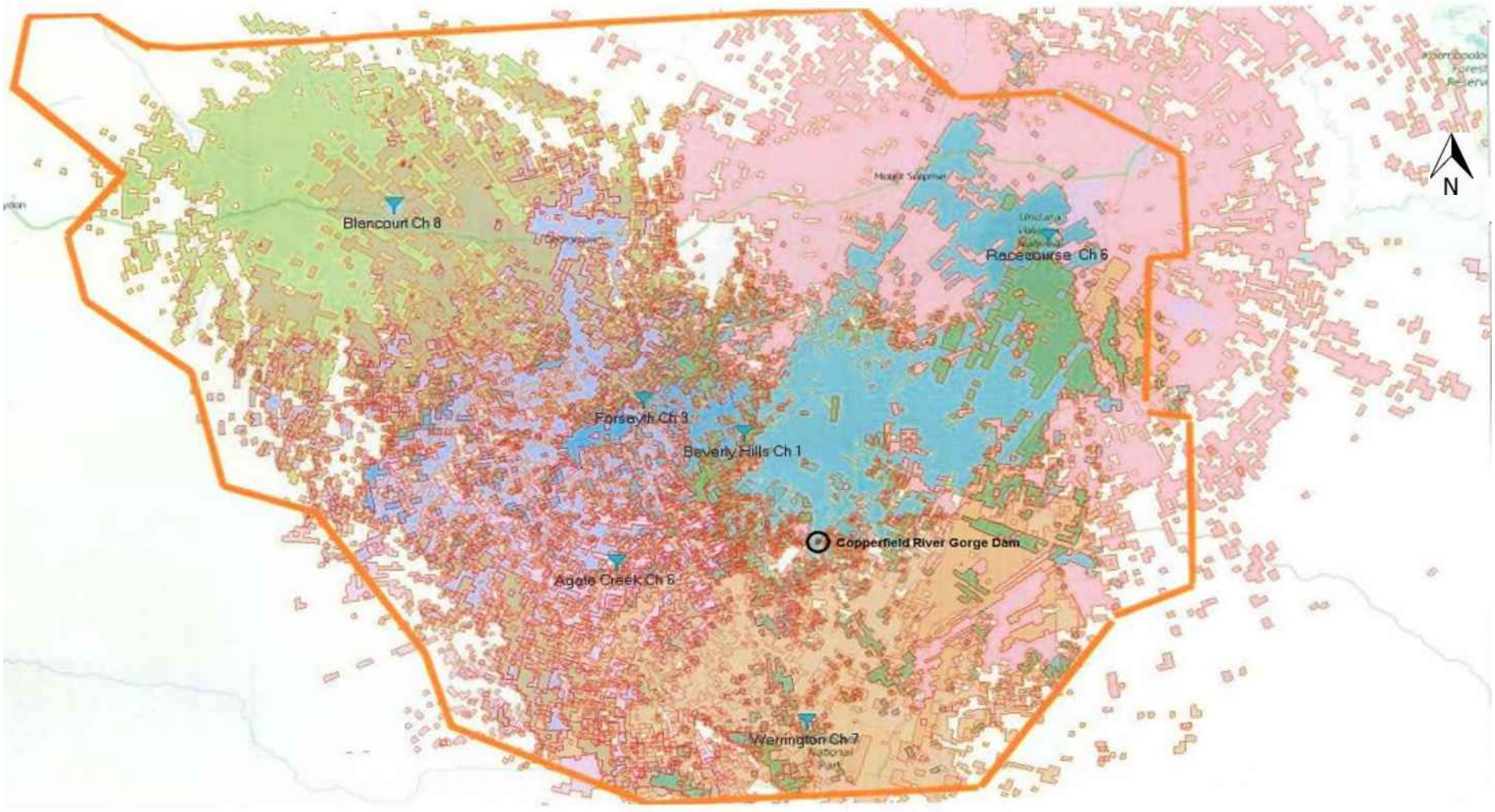


Figure 15.2 Beverly Hills Station (Channel 1) coverage

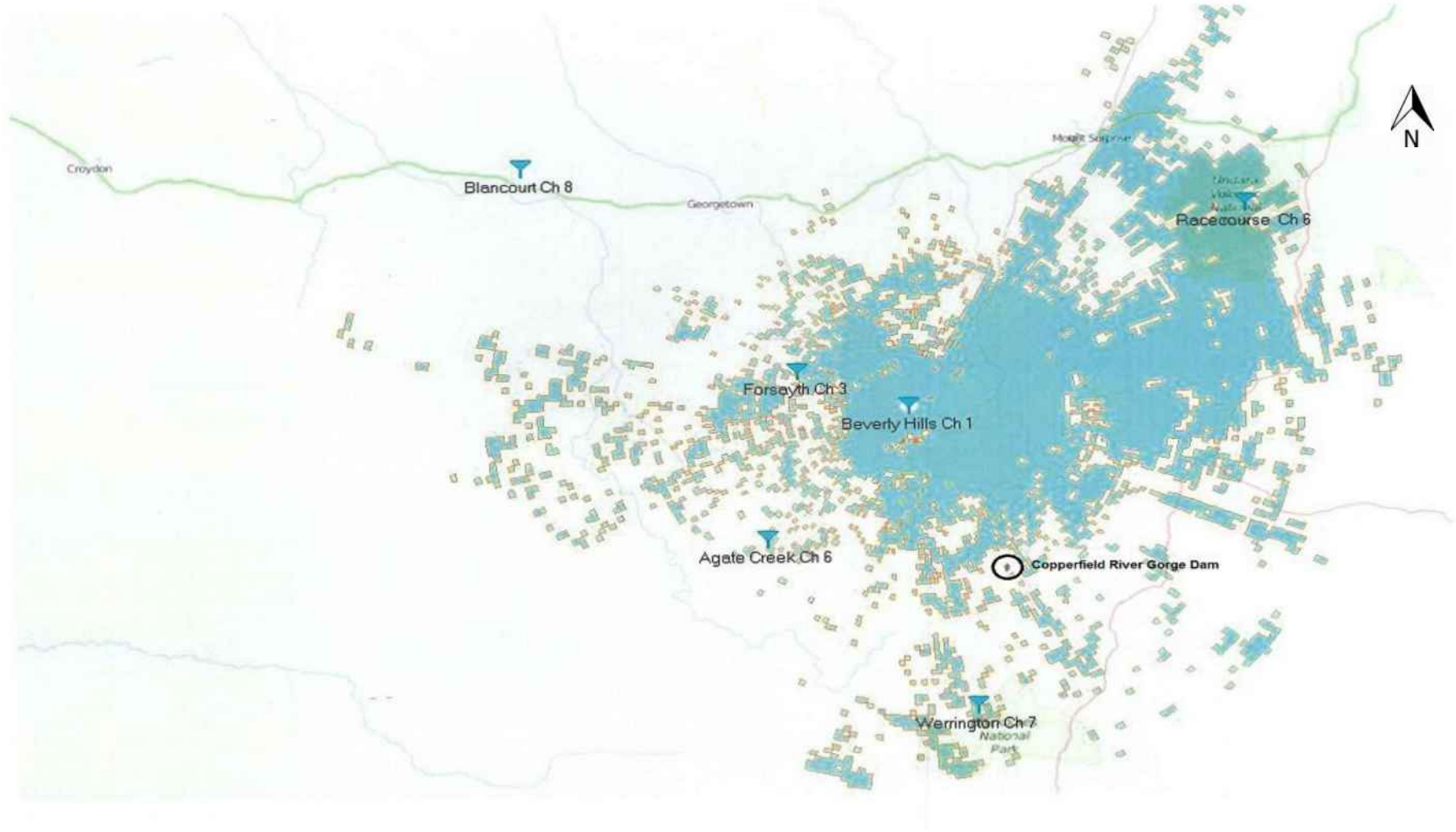


Figure 15.3 Agate Creek Station UHF (Channel 6) coverage

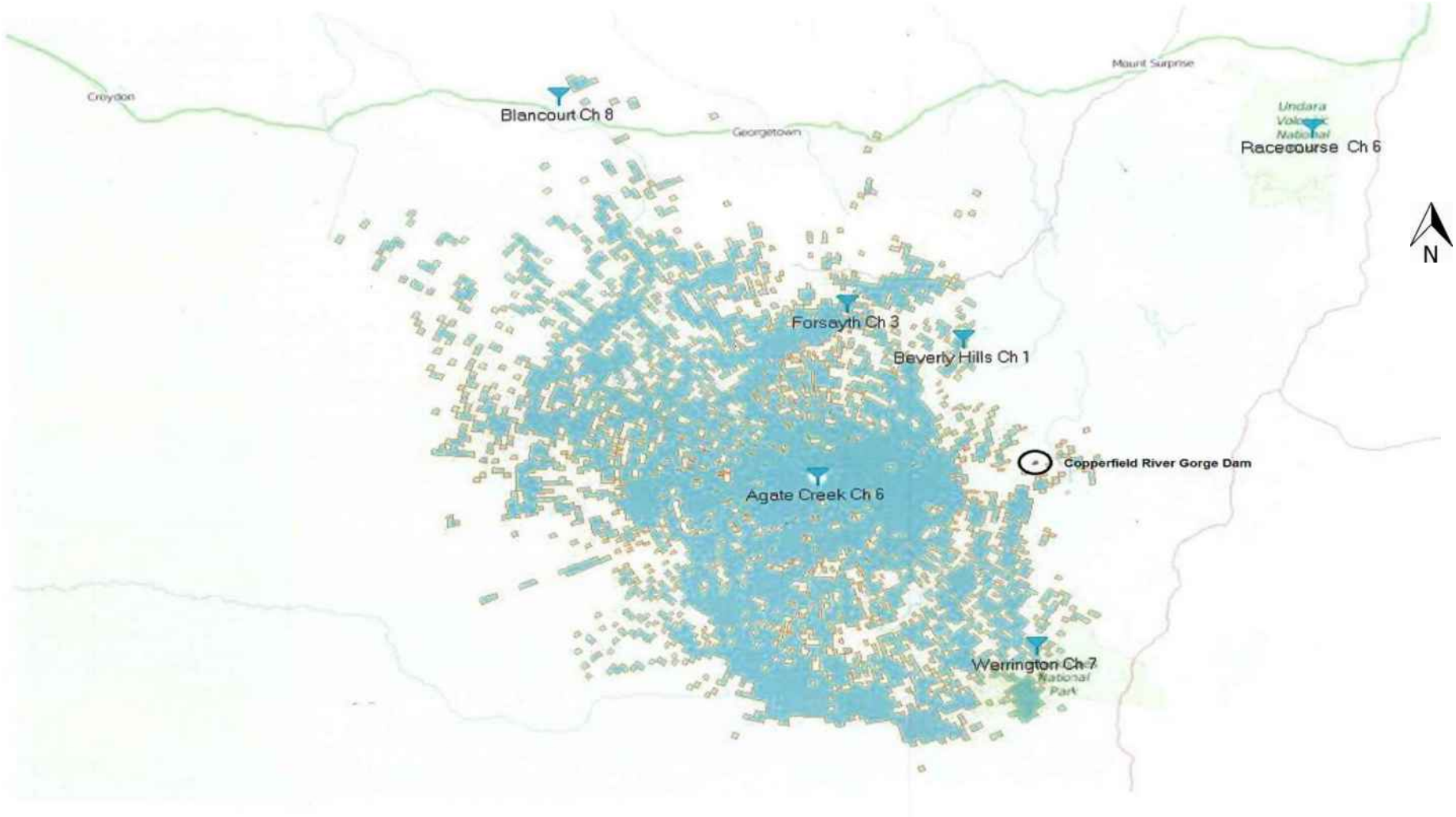


Figure 15.4 Racecourse Station (Channel 6) coverage

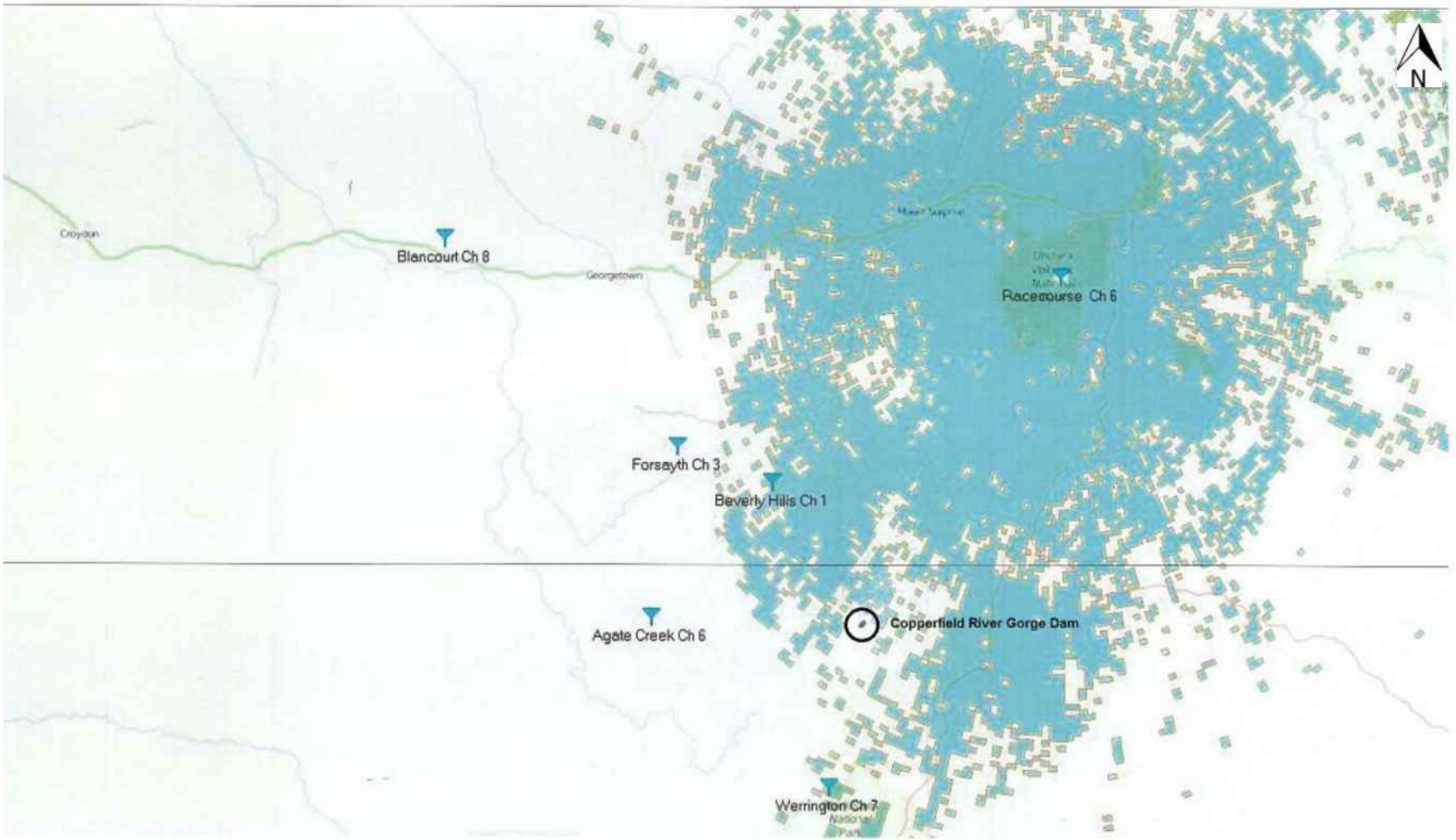
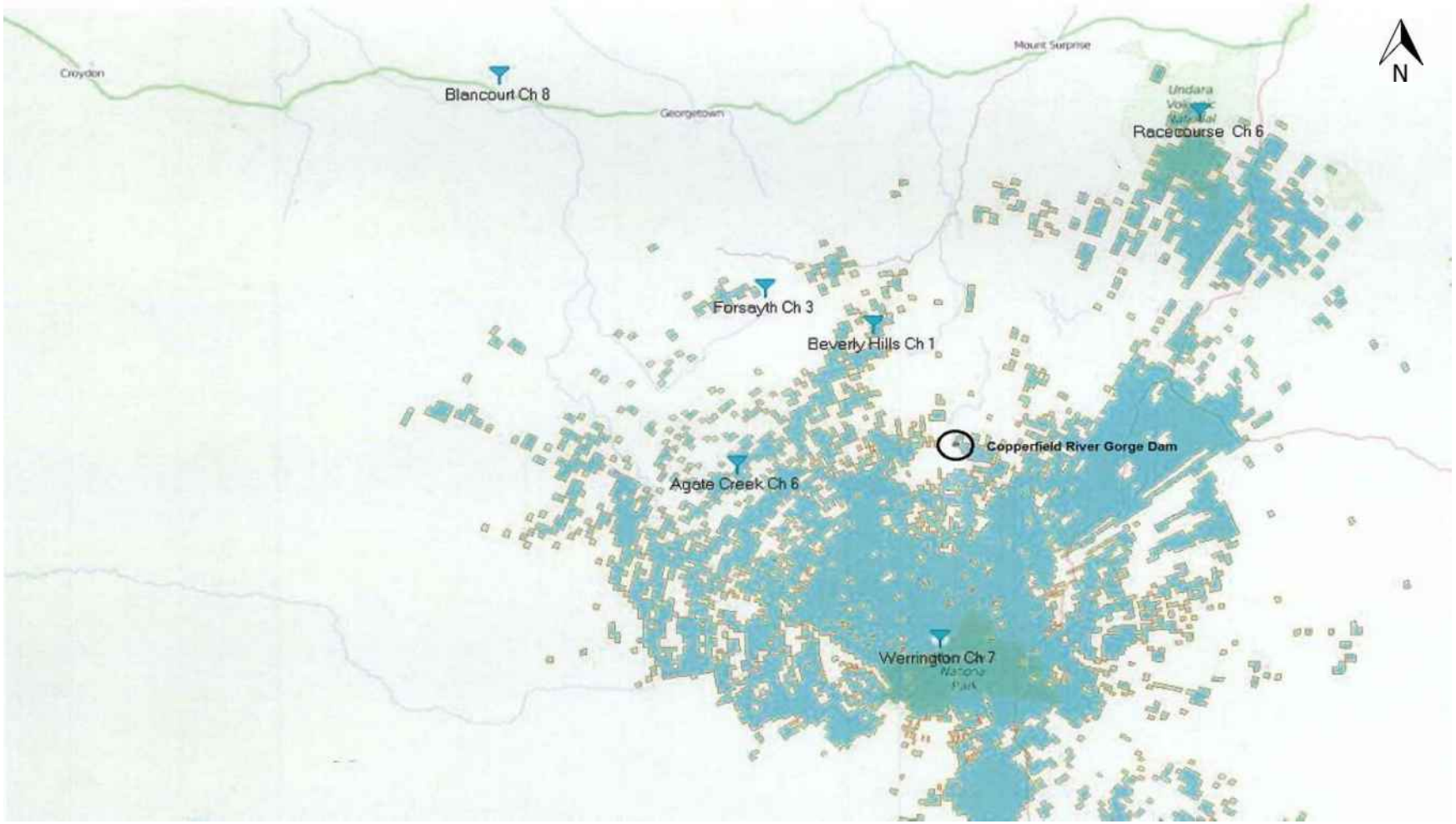


Figure 15.5 Werrington Station (Channel 7) coverage



Appendix 16 SOP 16 – River Releases

Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development

Copperfield River Gorge Dam

Standing Operating Procedure

For

Water Releases

SOP - 16

Table of Contents

Appendices

1 Purpose

Define a procedure for managing water releases from the Copperfield River Gorge Dam (the dam) to the Kidston mine pipeline and to the Copperfield River.

2 Scope

This procedure covers:

Pipeline releases of approximately 4,650 ML of water per year that are made from the dam to the former Kidston mine.

Environmental river releases that are made during the dry times from the dam to Copperfield River to replenish the waterholes as far as the Einasleigh Gorge.

Releases that are made for maintenance purposes are not included in this procedure.

3 Background

Copperfield River Gorge Dam is owned by the State and managed by the Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD), Technical Services. The dam has been assessed as a referable dam which means that there is a Population At Risk (PAR) downstream of the dam.

The owner of a referable dam must have an approved Emergency Action Plan (EAP) for the dam that provides the procedures the dam owners will utilise to manage emergency events.

The dam is located approximately 70 kilometres south of the township of Einasleigh and has a maximum storage of 20,600 megalitres (elevation level (EL) 586.00 metres) and a catchment area of approximately 123,300 hectares.

DNRMMRRD has engaged Etheridge Shire Council (ESC) as a contractor to undertake routine inspections of the dam, to open and close of the cone valve for environmental river releases, to monitor the level of water across the causeway at the dam, and other tasks as directed by DNRMMRRD.

Currently, there is a contract in place between DNRMMRRD and Kidston Hydro Project Co Pty Ltd for the supply of 4,650ML of water per annum, via a Kidston-owned pipeline which takes water from the dam and delivers it to the former Kidston mine. The mine supply outlet consists of two 508 mm diameter cement lined steel pipes that pass through the dam wall (one of the pipes is a reserve that is sealed at both ends) and connects to a 500 mm diameter butterfly valve located in the valve chamber. The water gravity feeds to the mine and is metered via a Sitrans Sonokit8000 flowmeter housed in a shed approximately 40 metres from the dam structure. The gravity feed system does not operate if the dam storage level is lower than EL571.00 metres.

The intake of water for the environmental river releases is via a 20 metre long, floating 500 mm high-density polyethylene pipe with a hinged base located beside the upstream wall of the left embankment. The pipe adjoins a 600 mm diameter fixed cone dispersion valve that discharges water into the spillway roller bucket. The valve is opened and closed manually and is set to a determined percentage opening for a release.

Because the outlet pipe for the river releases is only 600mm wide this restricts the ability to have any major effect on storage levels in the dam during flooding events, as the amount

of water that can be released during an event is insignificant and unlikely to lower the storage levels sufficiently within a reasonable time period for an event; though it may be considered during a structural event, depending on circumstances.

Additionally, during a flooding event, it is highly likely that physical access to the dam to open the valve would not be appropriate due to the level of the water and local road conditions.

Environmental river releases, to assist riparian users and the community of Einasleigh during dry times, may be made following a request by the Einasleigh Progress Association (EPA). Whether a release occurs is dependent on the results of the Department's assessment.

4 Personnel Affected and Responsibilities

Officer	Responsibility
Central Operations Manager, Resources (COM)	Manages the distribution and revision control of this document. The person from Technical Services responsible for determining if a release can be made, the circumstances and details of the release and approving the commencement and cessation dates for the release.
Department of Resources (Resources)	The department responsible for the management of Copperfield River Gorge Dam.
Emergency Event Coordinator (EEC)	Manages the updating and communication process in this document. The person from Technical Services who is responsible for informing ESC to open and close the outlet valve for the environmental releases and reporting the details of the releases to the COM. Also responsible for coordinating emergency events such as flooding.
Emergency Event Manager (EEM)	The person from Technical Services responsible for monitoring conditions at the dam using a combination of reports from the EEC, Spanner Waterhole, RSAS and BOM websites, and the provision of technical assistance and information to the LDMG as necessary to assist in the implementation of this EAP.
Einasleigh Progress Association (EPA)	The organisation who requests the COM to make an environmental release when the Einasleigh waterholes are dry. EPA will inform the Riparian Downstream Water Users (RDSWU) when a release begins and ceases; will monitor the location of the water each week; and be the focal point for enquiries about releases. Contact for the Association is [redacted]
ESC Dam Inspection officer (DIO)	ESC inspection officers based at Georgetown are responsible for routine inspections and specific tasks as directed by DNRMMRRD.

Technical Services (TS)	Technical Services, Asset Management, DNRMMRRD
Kidston Hydro Project Co Pty Ltd (Kidston)	The owner of the mine supply pipeline and hold an agreement with the department for the supply of water from the dam.
Riparian Downstream Water Users (RDSWU)	See section 10 for the list of people and contact details.

5 Legislative Requirements

Water Licence 36192K, held by the department, authorises the interfering of the flow of water in Copperfield River.

A condition of the licence stipulates that "*when there is a flow in the watercourse into the storage sufficient downstream flow must be maintained to meet downstream requirements*."

This condition of the licence will be taken into consideration by the COM when determining whether river releases can be made. Also, it may impact whether a river release shall continue, for example, during extreme climatic conditions or the onset of rain in the catchment.

6 Departmental Position for Environmental River Releases

The department's position, once a request for a river release has been received from EPA, will be to determine whether there will be sufficient water remaining in the dam for contractual arrangements that require the provision of water in the dam to other users. The decision whether to release water to the river will take into consideration the dam volume, contractual obligations and climatic conditions. For example, should the wet season provide little inflow into the dam, the department may be unable to meet its year-round commitment to other water users.

In addition, it has been estimated that a high percentage of the released water is lost in the transmission due to groundwater recharge along the riverbanks; and because there is little retention of water in the soil profile due to large sand deposits along the length of the river. Therefore, this knowledge may be used when deciding whether to release or to continue a release of water.

There is no certainty that a release of water from the dam can be made every year and each request will be considered by the COM on a case-by-case basis. A river release may even be ceased before the water reaches the Einasleigh Gorge, or after a certain amount of time or volume has been released, in order to ensure that legislative requirements are met and/or that contractual arrangements can be upheld.

7 The Role of EPA in Environmental River Releases

EPA's role in the river releases will be to undertake the following:

Email a request for an environmental releases via an email to the COM at

Establish locations where EPA will monitor the water and provide this information to the EEC via email.

Contact the riparian downstream water users at the beginning and end of each release to notify them of the details of the release and notify the EEC via email within 24 hours of this occurring.
Identify the location of the released water at a minimum of each week of the release and communicate this information via email to the EEC.
Notify the EEC via email within 24 hours when the released water reaches Einasleigh Gorge.
Be the focal point for enquiries and information dissemination for local residents and other relevant stakeholders regarding the status of releases.

8 Procedure for an Environmental River Release

a. Requesting and Determining if a Release can be made

When EPA determines a need for a river release, it will email the COM at providing details of the request such as the reasons for the release and preferred commencement date.

Pending climatic conditions at the time, it is preferable that the request occurs as early as possible in the dry season (i.e. before the beginning of September).

The COM will determine whether a river release can be made based on factors such as dam volume, contractual obligations to Kidston mine, and climatic conditions.

b. Approval

If approval is granted by the COM for a river release, the EEC will inform the EPA that approval has been given and when the release will commence.

EPA will notify the relevant downstream water users that a release is about to commence and will, within 24 hours, notify the EEC that this has occurred.

c. Opening of Outlet Valve and Notification

The EEC will advise the ESC that a river release has been approved and that the outlet valve is to be opened to a certain percentage at the next weekly inspection.

To minimise water causing damage to downstream fences and infrastructure, the outlet valve is generally set to 30% and/or 1,000 ML per week but this may vary according to the COM. It can take a release of approximately 3,000-5,000 ML to replenish waterholes as far as Einasleigh Gorge.

See Appendix K, Operation & Maintenance Manual: 600mm Diameter Flow Regulating Valve (Cone Valve) - Manual Hydraulic Power Unit. This document provides details on the cone valve mechanism.

See Standing Operating Procedure 12 – Outlet Works. This document provides instructions for opening the Cone Valve.

See Standing Operating Procedure 16 – Water Releases. This document provides the procedure for managing releases of water from the dam.

d. Monitoring of Release Water

At a minimum of one week intervals, EPA will monitor the progress of the water released to the river at relevant locations, and notify the EEC via email of the location of the water.

Each week TS will review the tailwater figures (see Appendix B) to ascertain the percentage of valve opening required. The percentage that the outlet valve will be opened to may be increased or reduced during the release based on information such as the length of time it takes for the water to travel downstream; the climatic conditions and subsequent recharge and evaporation factors (see hydrographic data in Appendix A); the time of year (releases later in the year are more impacted by hotter weather thus higher evaporation rates); and the amount of water remaining in the dam.

e. Weekly Reporting by EPA

EPA must report to the EEC via email each week the location of the water once a release has commenced. It is up to the EPA to determine accurately where the water is.

It should be noted that the COM may at any time during the release increase or decrease the flow from the outlet valve and/or cease the release. EPA will be notified of these changes via email and/or text and they shall notify relevant stakeholders accordingly.

f. Enquiries

EPA will be the focal point for enquiries about the releases, for example, a member of the public asking about the location of the water along the river.

g. Closing the Outlet Valve

The COM will determine when the outlet valve will be closed.

The EEC will request the ESC to close the valve within a stipulated timeframe and will notify the EPA of the ceasing of the release.

EPA will notify the RDSWU that the river release has ceased and will, within 24 hours, notify the EEC that this has occurred.

h. Report on the River Release

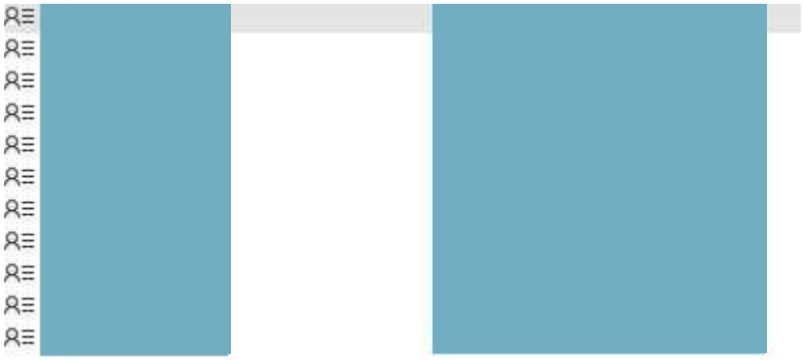
Details of the release must be provided by the EEC via email to the COM within two weeks of the closure.

9 References

SOP 12 – Standing Operating Procedures for Outlet Works

10 Riparian Downstream Water Users Contacts

The contact details for the Riparian Downstream Water Users are:

Property	Name	Phone	Email
Genex / Kidston Pumped Storage Project Contacts (Resources staff to contact)			
			
Here's a link to a Word document with all these emails addresses so that you can cut and paste them:			

11 Technical Information

Technical information can be found at

This includes:

- Minimum monthly inflows as determined from Spanner Waterhole records
- Volumes available for release
- Tail water flow ratings
- Calculation of storage levels
- Evaporation amounts per month

Appendix A

Hydrographic data

Month	Month of year	Evaporation (mm)		Month of Year	Minimum Monthly Inflow (megalitres)
January	1	179.6		12	199
February	2	134.6		1	517
March	3	154.8		2	287
April	4	134.0		3	837
May	5	108.3		4	154
June	6	86.0		5	46
July	7	92.8		6	35
August	8	126.9		7	22
September	9	170.0		8	4
October	10	213.7		9	0
November	11	209.0		10	0
December	12	204.4		11	0
January	1	179.6		12	199
February	2	134.6			
March	3	154.8			
April	4	134.0			
May	5	136.4			
June	6	108.3			
July	7	92.8			
August	8	126.9			
September	9	170.0			
October	10	213.7			
November	11	209.0			
December	12	204.4			

Appendix B

Calculating the number of megalitres/day being released during river release

Example

1. Check Qteq web portal tailwater level 1.911 metres
2. Check Kidston tailwater rating tables (see below) 1.911 m = 1.65 m3/sec
3. Multiple 86,400 (number of seconds in a day) x 1.65 m3/sec = 142,560
4. Divide 142,560 by 1,000 = 142.56 ML/day being discharged

Kidston Tailwater Rating Table

QLD DNRM WMDB - Production SQL HYRATAB V173 Output 24/10/2018

Site 917118A Copperfield River at Kidston Dam Tailwater

Rating Table 3.00 27/11/1996 to Present Interpolation = Log CTF = 1.0000

Converting 100 Stream Water Level in Metres
Into 140 Stream Discharge in Cumecs

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.30	0.00133	0.00184	0.00252	0.00342	0.00460	0.00558	0.00672	0.00807	0.00963	0.0114
1.40	0.0135	0.0160	0.0187	0.0219	0.0255	0.0285	0.0317	0.0353	0.0392	0.0434
1.50	0.0479	0.0528	0.0581	0.0638	0.0700	0.0773	0.0851	0.0937	0.103	0.113
1.60	0.123	0.135	0.147	0.161	0.175	0.190	0.206	0.224	0.242	0.267
1.70	0.296	0.329	0.365	0.404	0.446	0.492	0.543	0.597	0.657	0.721
1.80	0.791	0.867	0.949	1.04	1.13	1.24	1.33F	1.39F	1.45F	1.52F
1.90	1.58F	1.65F	1.72F	1.79F	1.86F	1.94F	2.02F	2.10F	2.18F	2.27F
2.00	2.36F	2.45F	2.54F	2.63F	2.73F	2.83F	2.94F	3.04F	3.15F	3.27F
2.10	3.38F	3.50F	3.62F	3.74F	3.87F	4.00F	4.11F	4.23F	4.35F	4.47F
2.20	4.59F	4.72F	4.85F	4.98F	5.11F	5.25F	5.38F	5.53F	5.67F	5.81F
2.30	5.96F	6.11F	6.27F	6.42F	6.65F	6.97F	7.29F	7.63F	7.99F	8.35F
2.40	8.73F	9.13F	9.53F	9.96F	10.4F	10.9F	11.3F	11.8F	12.3F	12.9F
2.50	13.4F	14.0F	14.5F	15.2F	15.8F	16.4F	17.1F	17.8F	18.5F	19.2F
2.60	20.0F	20.8P	21.6P	22.4P	23.2P	24.1P	25.0P	25.9P	26.9P	27.9P
2.70	28.9P	29.9P	31.0P	32.1P	33.3P	34.5P	35.7P	36.9P	38.2P	39.5P
2.80	40.9P	42.3P	43.7P	45.2P	46.7P	48.3P	49.9P	51.5P	53.2P	55.0P
2.90	56.8P	58.6P	60.5P	62.4P	64.4P	66.4P	68.5P	70.7P	72.9P	75.2P
3.00	77.5P	79.9P	82.3P	84.8P	87.4P	90.0P	91.9P	93.8P	95.8P	97.8P
3.10	99.8P	102P	104P	106P	108P	110P	113P	115P	117P	120P
3.20	122P	124P	127P	129P	132P	134P	137P	139P	142P	145P
3.30	148P	150P	153P	156P	159P	162P	165P	168P	171P	174P
3.40	177P	180P	184P	187P	190P	194P	197P	201P	204P	208P
3.50	211P	215P	219P	222P	226P	230P	234P	238P	242P	246P
3.60	250P	253P	255P	258P	260P	263P	266P	268P	271P	274P
3.70	276P	279P	282P	284P	287P	290P	293P	296P	298P	301P
3.80	304P	307P	310P	313P	316P	319P	322P	325P	328P	331P
3.90	334P	337P	340P	343P	346P	349P	352P	355P	358P	362P
4.00	365P	368P	371P	375P	378P	381P	384P	388P	391P	394P
4.10	398P	401P	405P	408P	412P	415P	419P	422P	426P	429P
4.20	433P	436P	440P	443P	447P	451P	454P	458P	462P	466P
4.30	469P	473P	477P	481P	484P	488P	492P	496P	500P	504P
4.40	508P	512P	516P	520P	524P	528P	532P	536P	540P	544P
4.50	548P	552P	556P	561P	565P	569P	573P	578P	582P	586P
4.60	591P	595P	599P	604P	608P	612P	617P	621P	626P	630P
4.70	635P	639P	644P	649P	653P	658P	662P	667P	672P	676P
4.80	681P	686P	691P	695P	700P	705P	710P	715P	720P	725P

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
4.90	730P	734P	739P	744P	749P	755P	760P	765P	770P	775P
5.00	780P	784P	789P	793P	797P	801P	806P	810P	814P	819P
5.10	823P	827P	832P	836P	841P	845P	850P	854P	859P	863P
5.20	867P	872P	876P	881P	886P	890P	895P	899P	904P	908P
5.30	913P	918P	922P	927P	932P	936P	941P	946P	951P	955P
5.40	960P	965P	970P	975P	980P	984P	989P	994P	999P	1004P
5.50	1009P	1014P	1019P	1024P	1029P	1034P	1040P	1045P	1050P	1055P
5.60	1060P	1065P	1070P	1075P	1081P	1086P	1091P	1096P	1102P	1107P
5.70	1112P	1117P	1123P	1128P	1133P	1139P	1144P	1149P	1155P	1160P
5.80	1166P	1171P	1176P	1182P	1187P	1193P	1198P	1204P	1209P	1215P
5.90	1220P	1226P	1231P	1237P	1243P	1248P	1254P	1260P	1265P	1271P
6.00	1277P									

Appendix 17 SOP 17 – Emergency Event Coordination

Department of Resources

Copperfield River Gorge Dam

Standing Operating Procedure

For

Emergency Event Coordination

SOP - 17

Table 1 Acronyms

EEC	Emergency Event Coordinator
DM	Director, Asset Management
EEM	Emergency Event Manager, Technical Services

Procedure

The RSAS Alert System will send an automatic SMS Alert message instantaneously to the On-Call Contact List as per Table 2, detailing the dam name, date, time, activation status, and latest relevant instrumentation readings.

The nominated EEC for the particular dam will have 5 minutes to respond via SMS text to the On-call Group using SMS indicating to the EEM and rest of the group they have acknowledged the alert and are responding. Example, 'I've got this event'. All other officers are to stand by.

If the nominated EEC does not respond within 5 minutes the EEM or DM will respond via SMS text to the On-call Group via SMS they have acknowledged the alert and will appoint an alternative EEC officer.

If neither the EEM nor DOM respond in 5 minutes any other nominated EEC officer can respond via SMS text that they will assume the EEC role and contact the EEM or DOM directly by phone, after which other officers are to stand by.

Table 2 below is to be updated when officers go on leave and distributed to the EEC's, EEM and DM.

Table 2 On-Call Contact List

Role	Name	Dam	Mobile Number
EEC		Copperfield River Gorge Dam, Corella Dam	
		Crooks Dam, Glen Niven Dam	
EEM		All	
		All	
DM		All	
Backup EEC		As required	
		As required	
		As required	

Appendix 18 Inundation Maps

The following maps show the extent of inundation following the 2022 FIA Report.

Figure 1 Overview of Area - Sunny Day Dam Failure Inundation Map

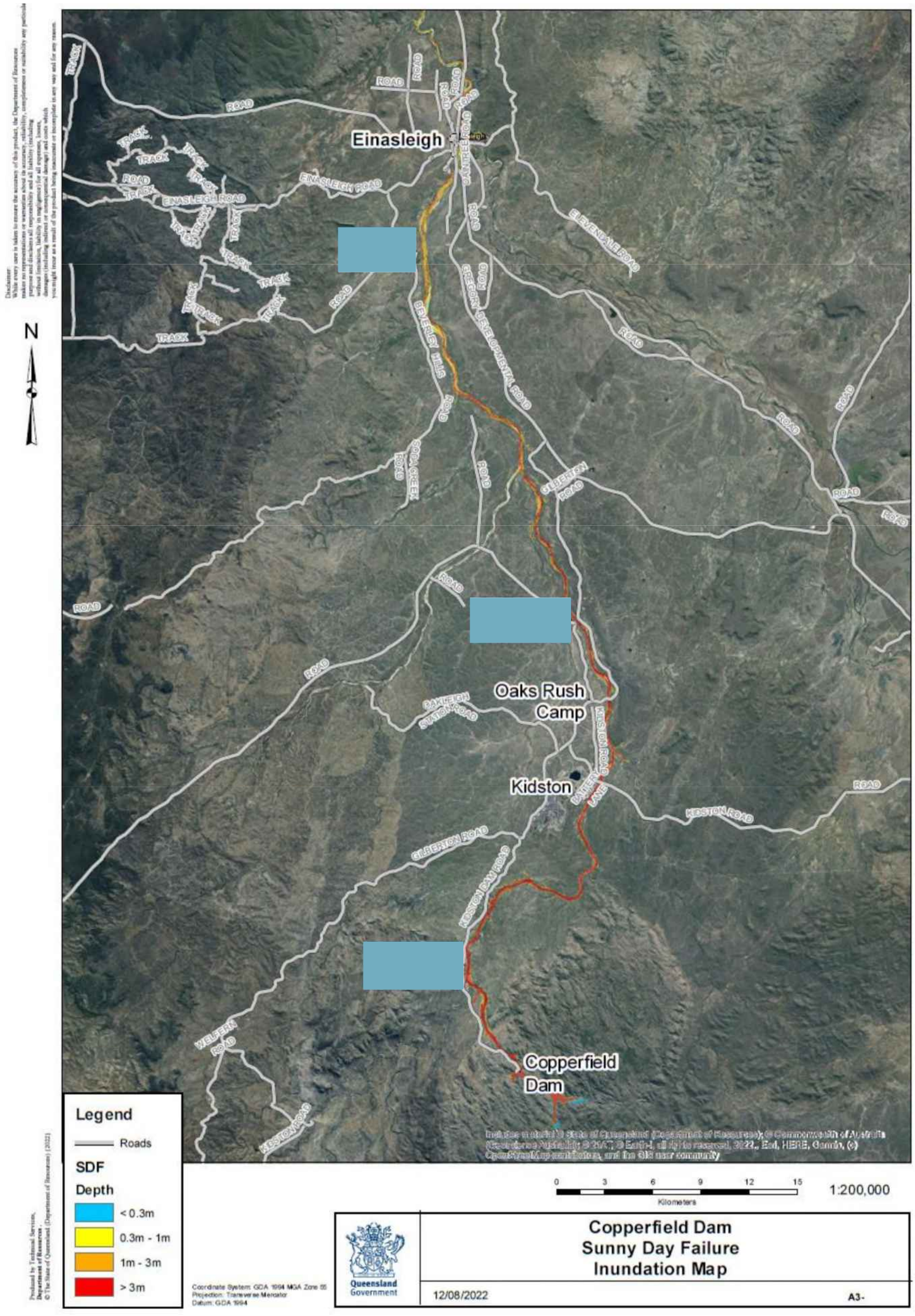


Figure 2 **Sunny Day Dam Failure Inundation Map**

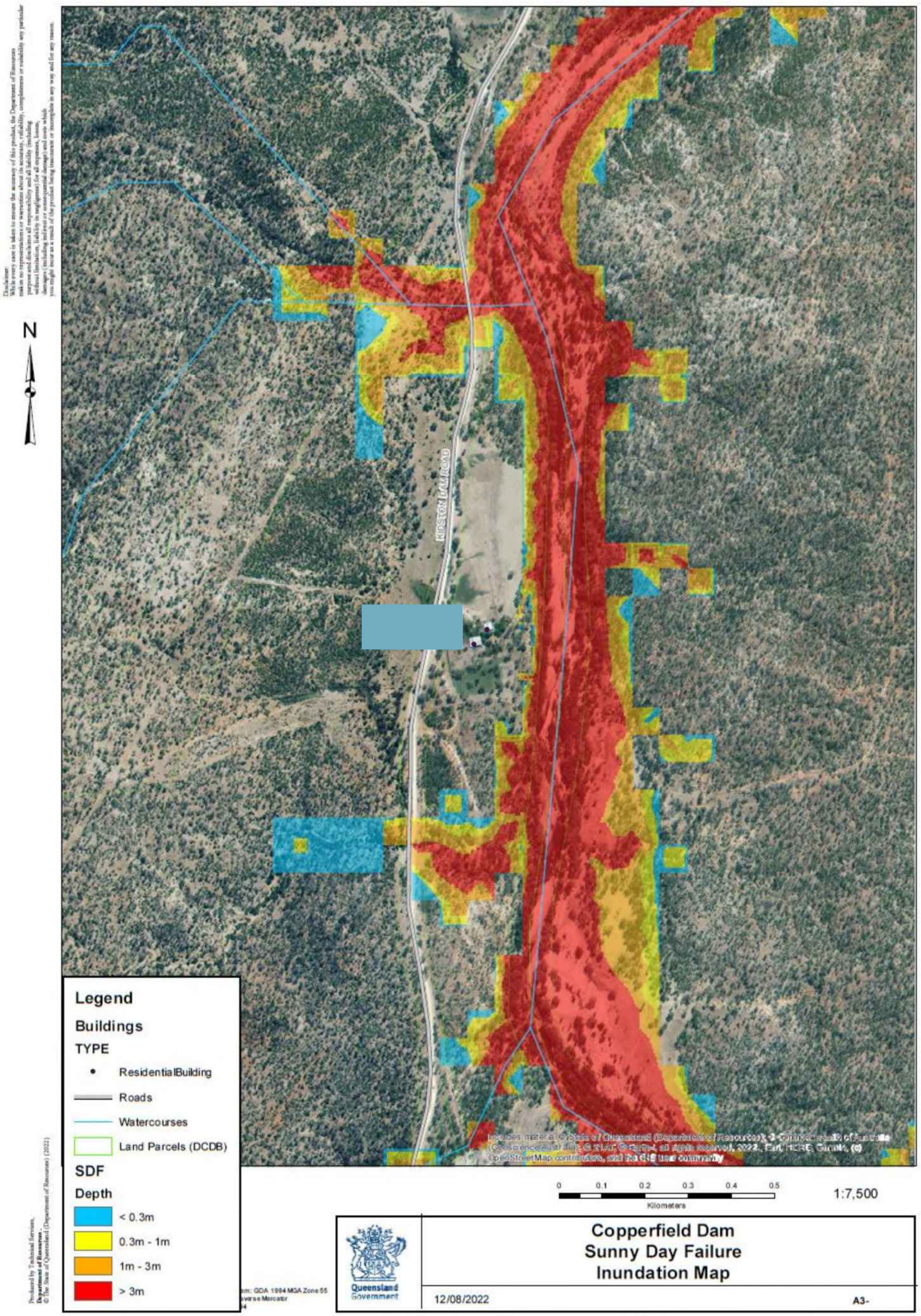


Figure 3 Kidston Township Sunny Day Dam Failure Inundation Map

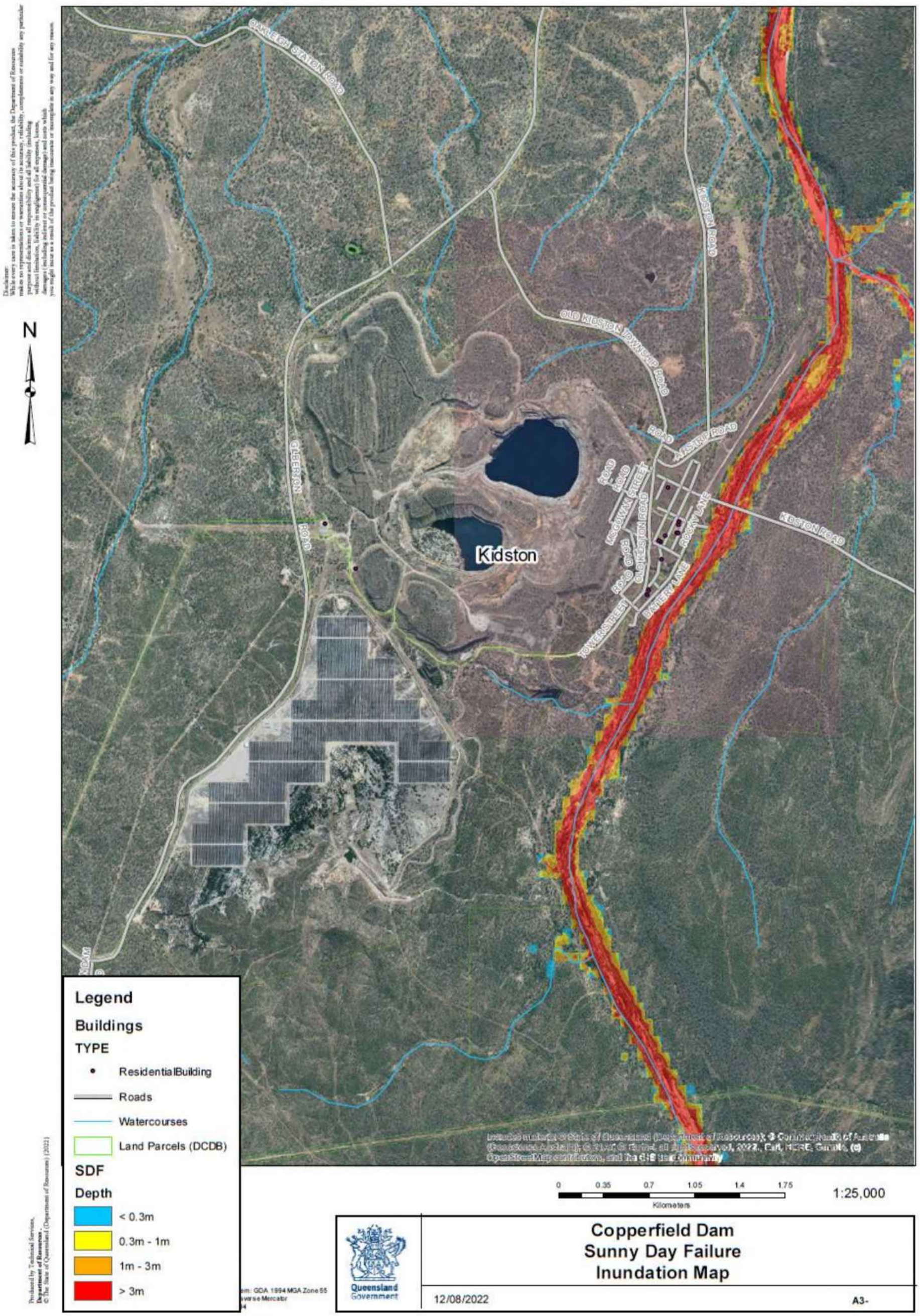


Figure 4 **Sunny Day Dam Failure Inundation Map**

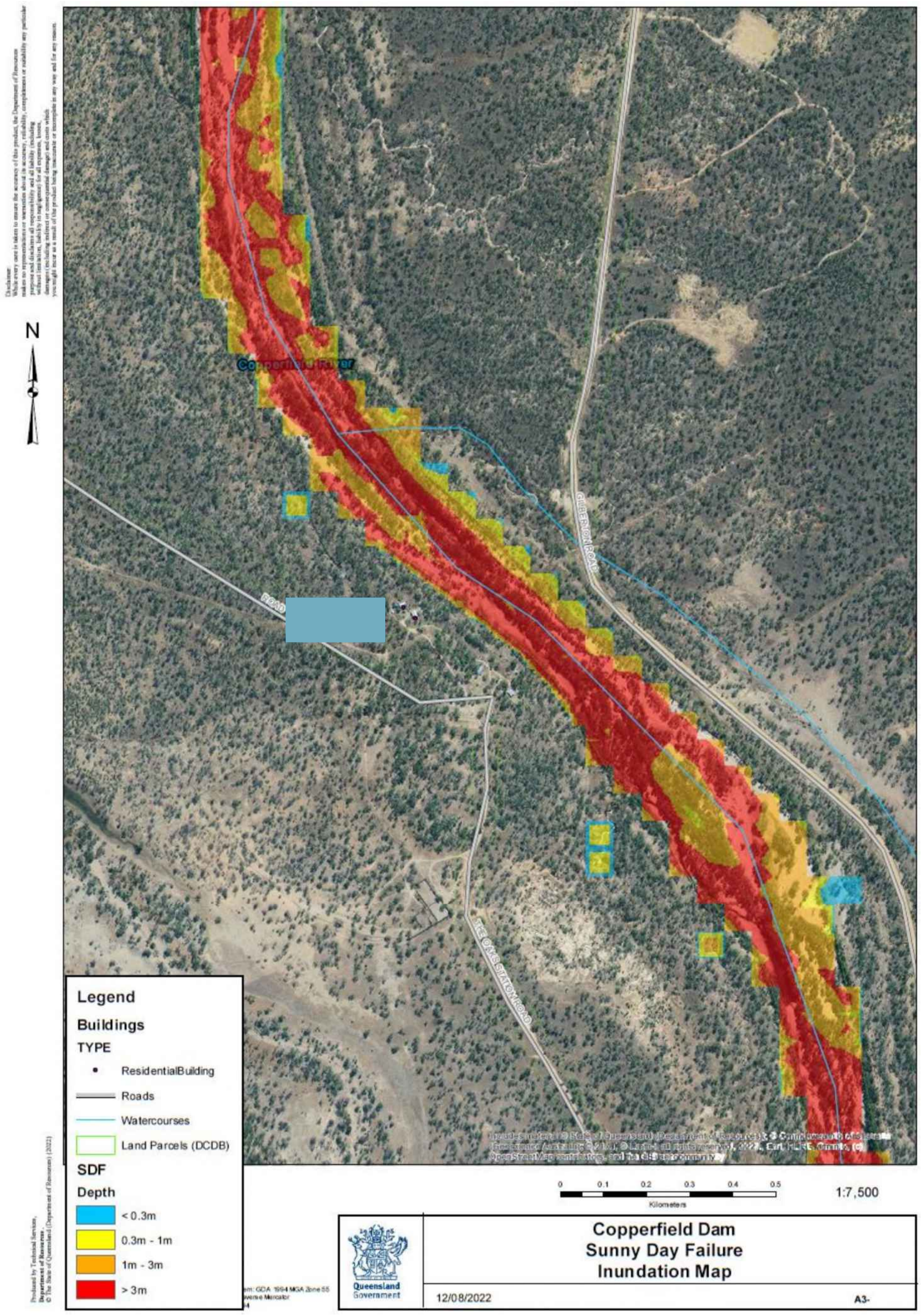


Figure 5 Narrawa Road Sunny Day Dam Failure Inundation Map

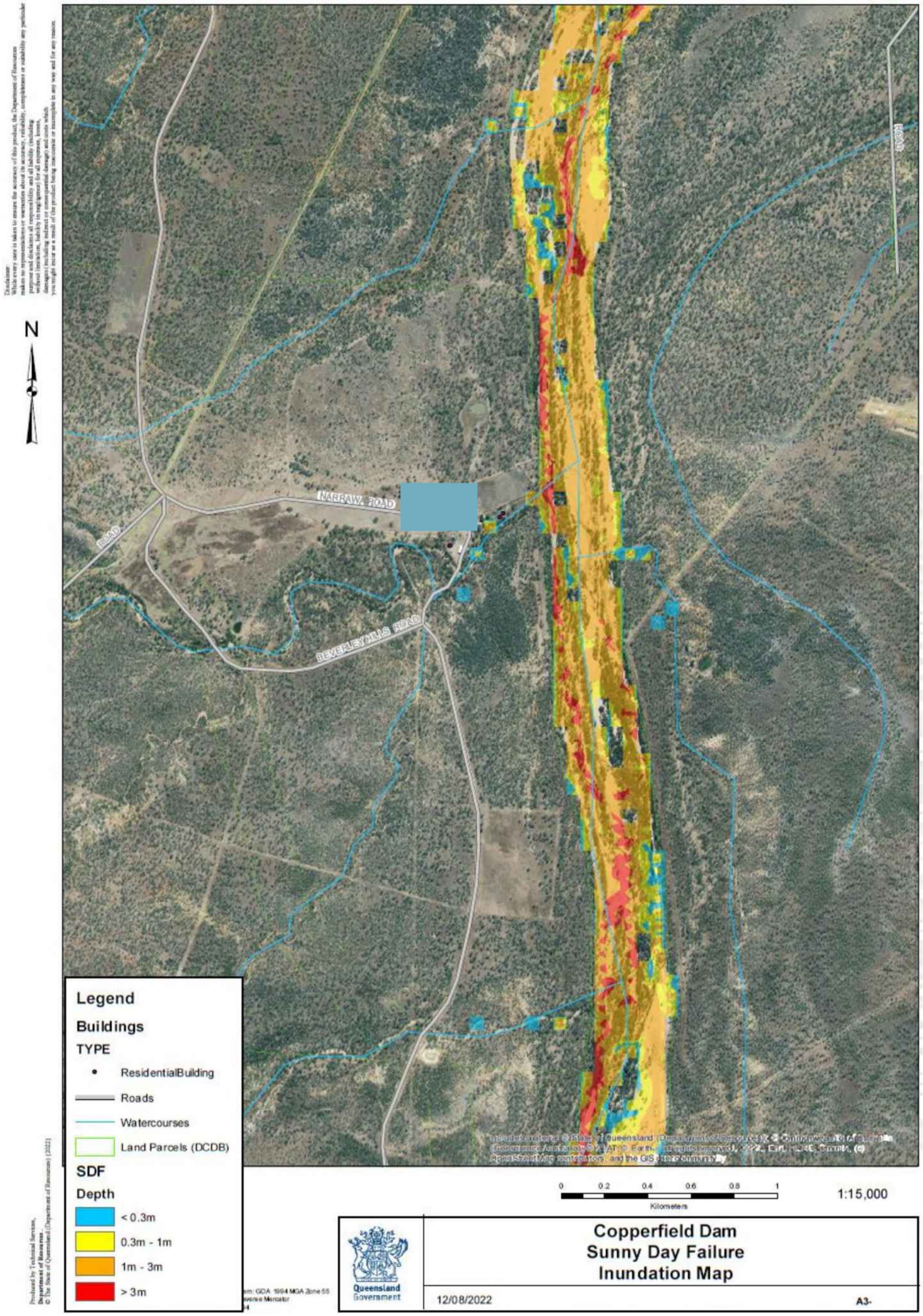


Figure 6 Einasleigh Sunny Day Dam Failure Inundation Map

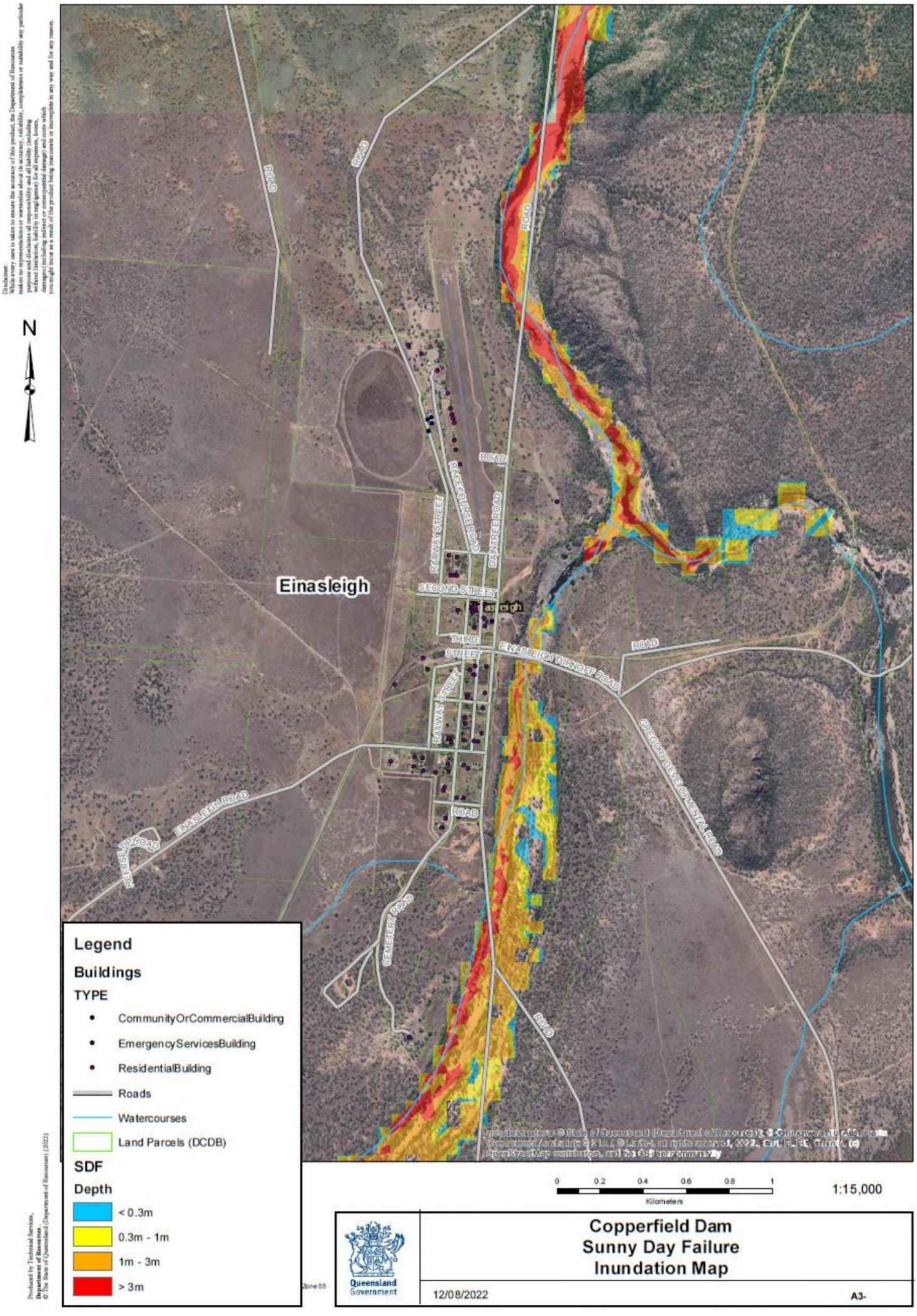


Figure 7 Overview of Area - 1:1,000 AEP (CFF) Inundation Map

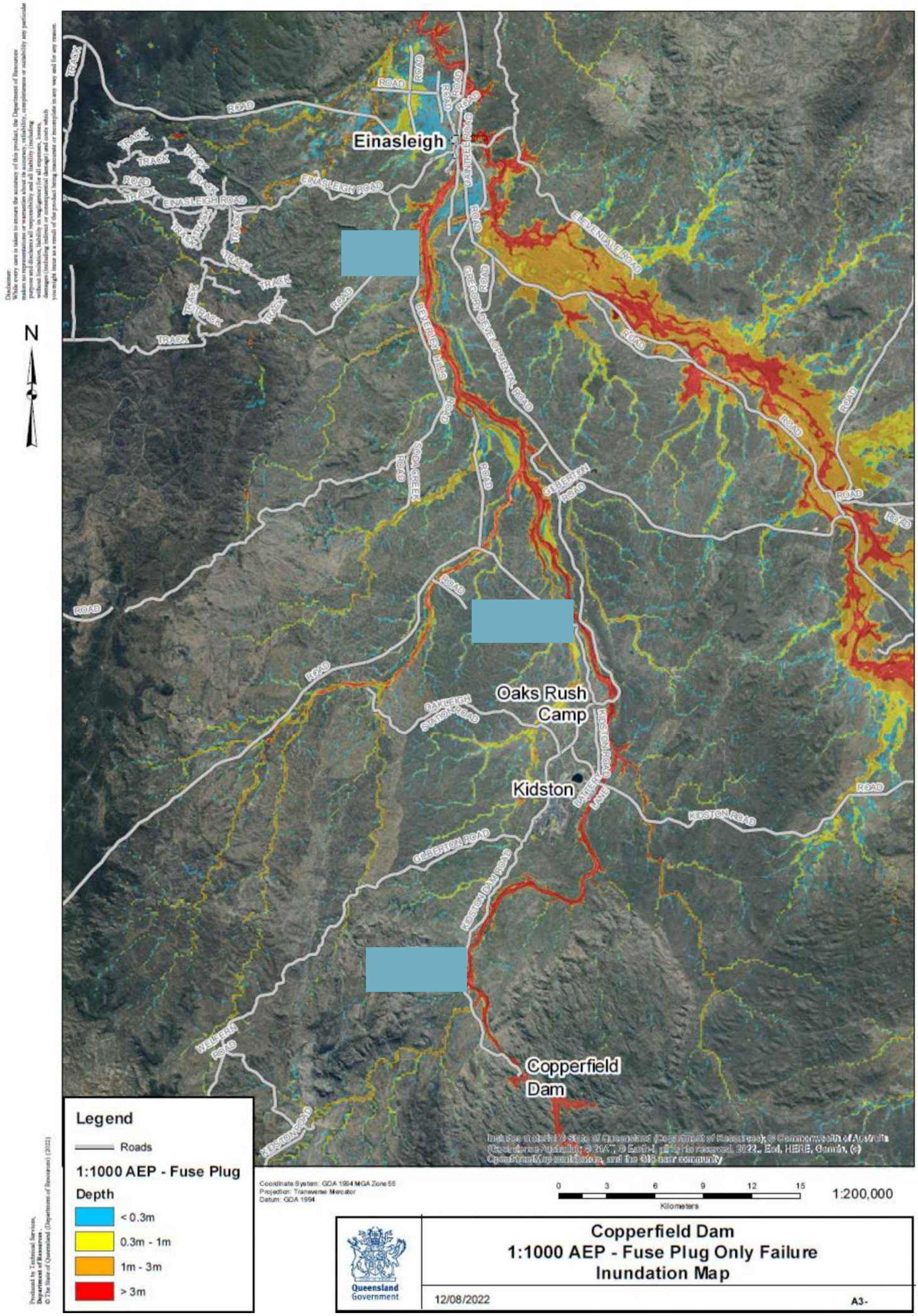


Figure 8 **1:1,000 AEP (CFF) Inundation Map**

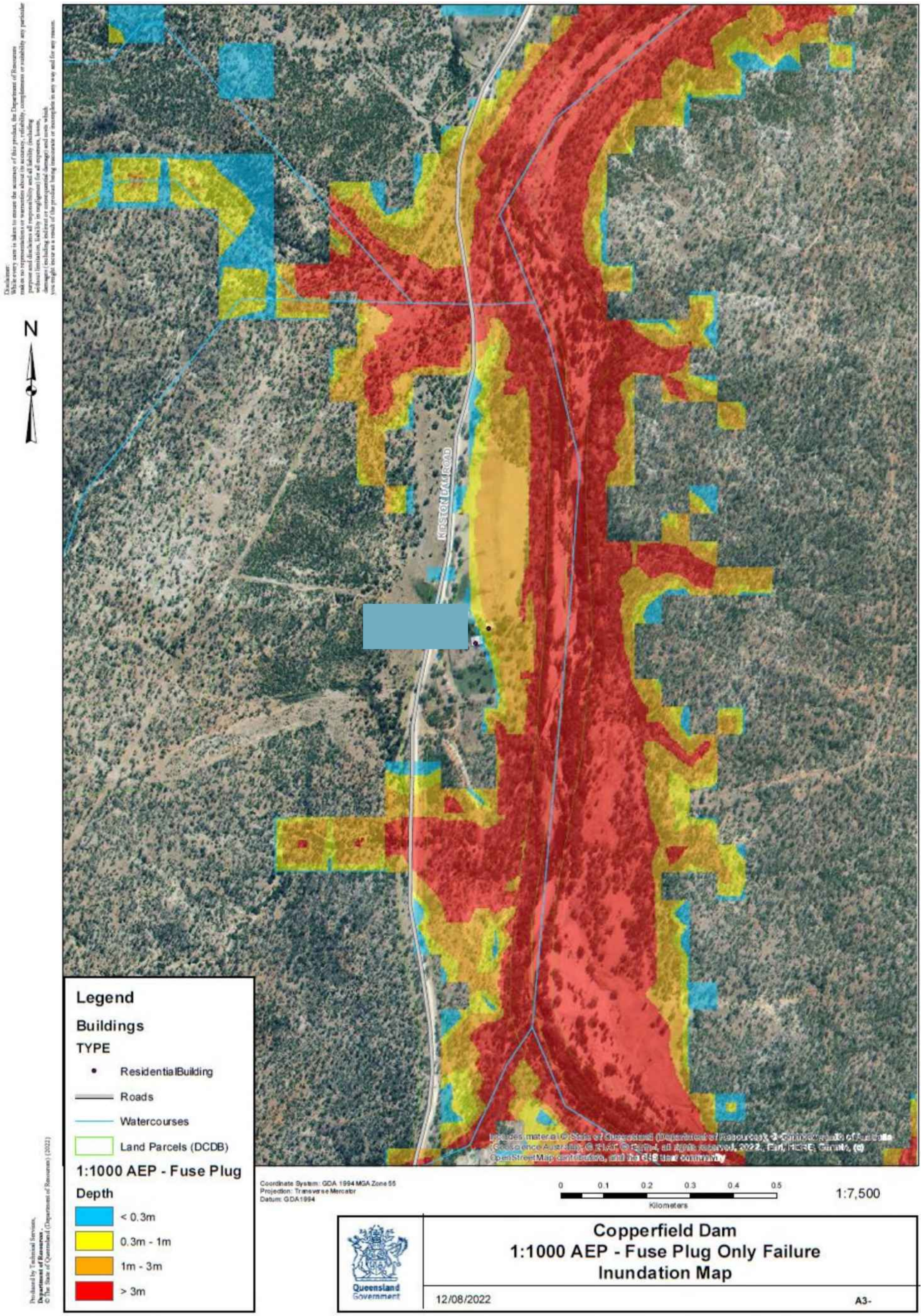


Figure 9 Kidston Township 1:1,000 AEP (CFF) Inundation Map

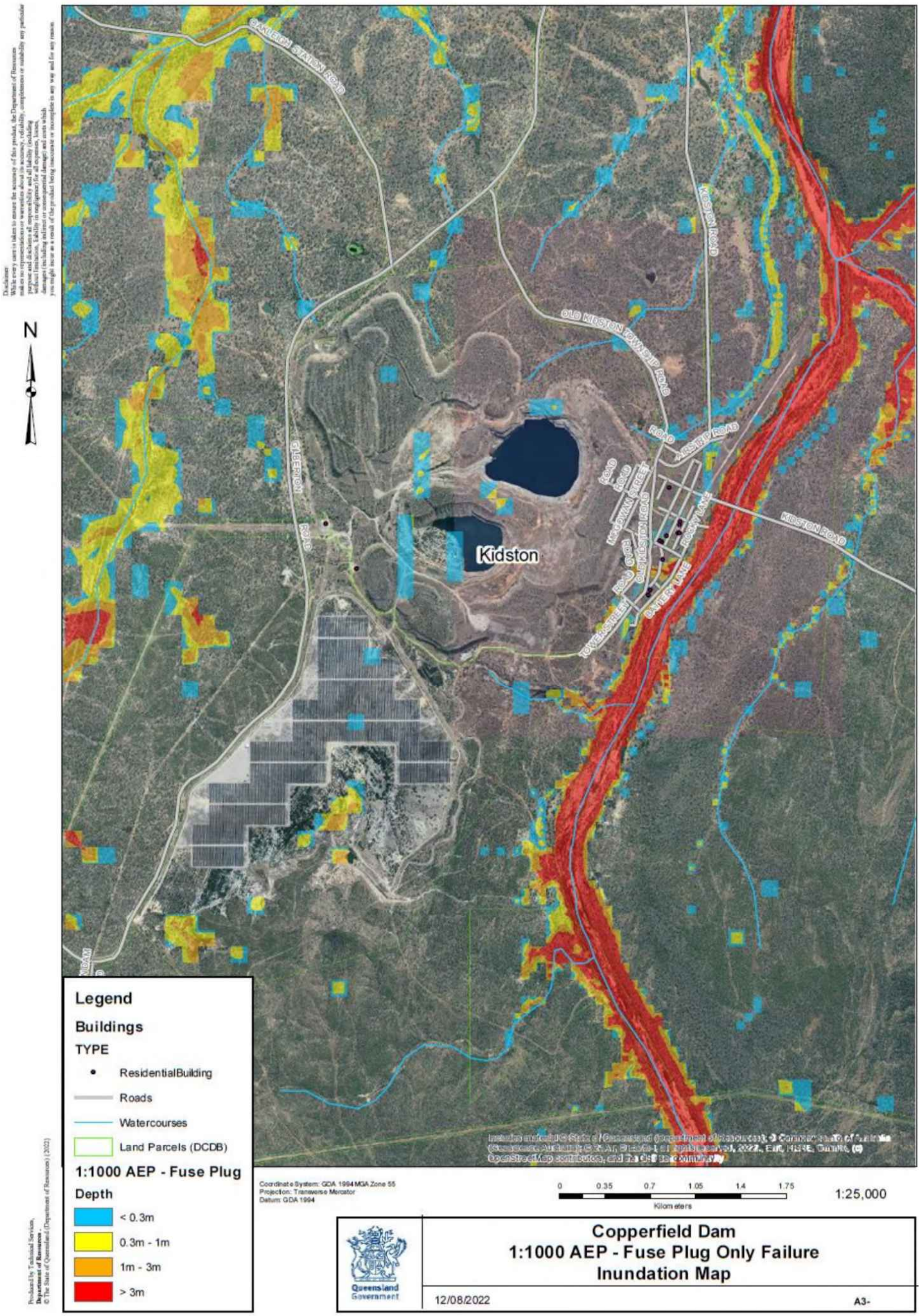


Figure 10 **1:1,000 AEP (CFF) Inundation Map**

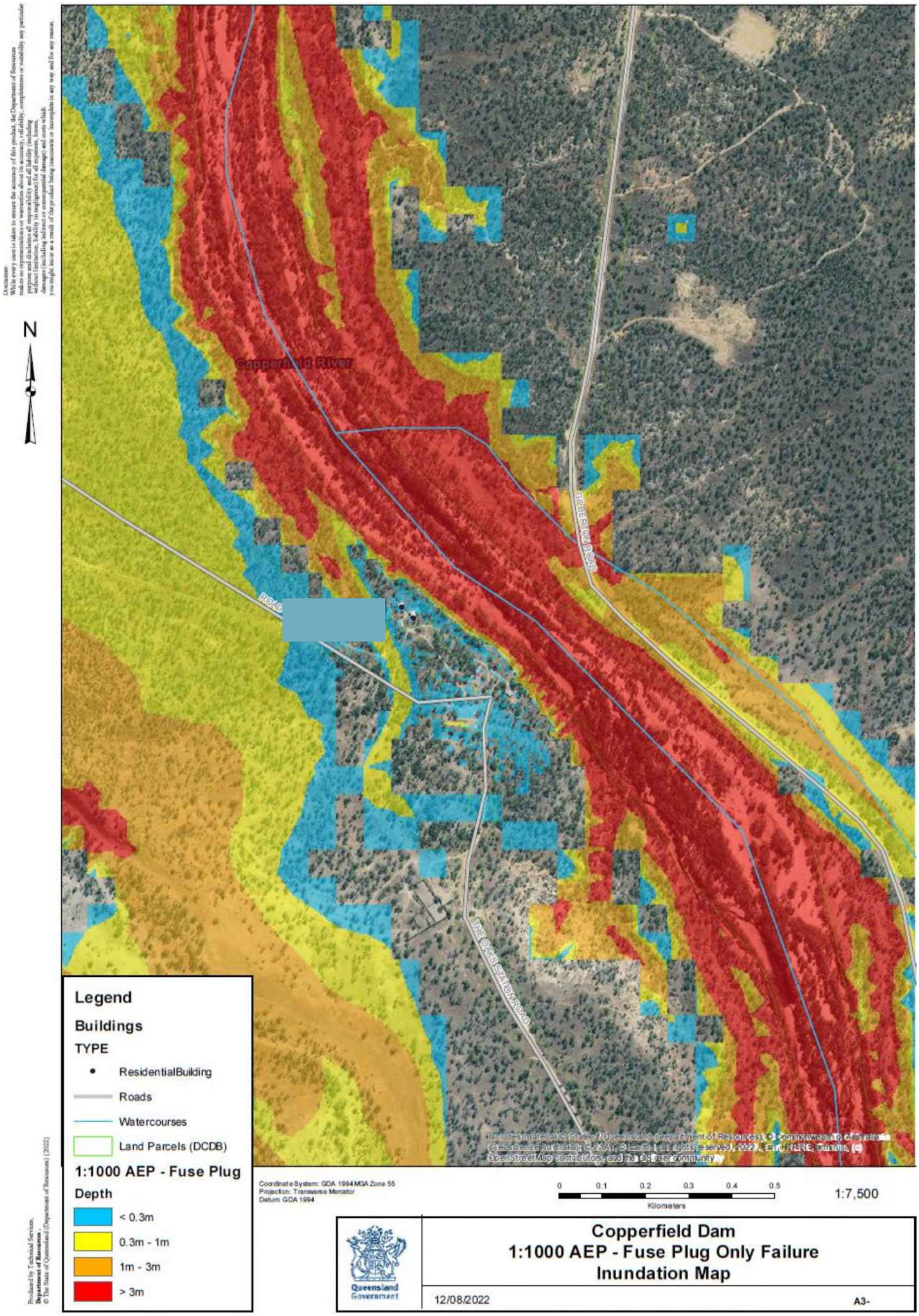


Figure 11 Narrawa Road 1:1,000 AEP (CFF) Inundation Map

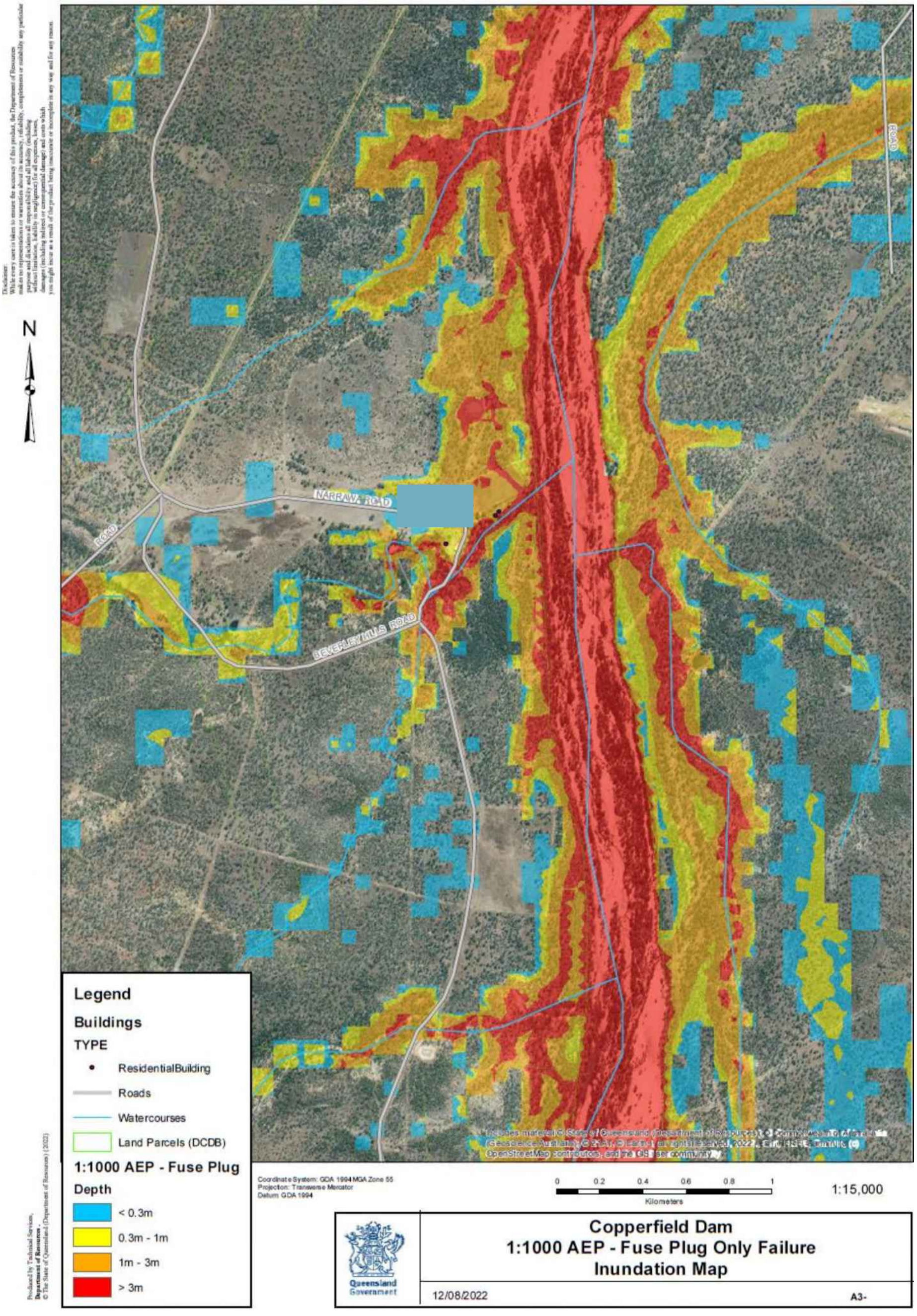


Figure 12 Einasleigh 1:1,000 AEP (CFF) Inundation Map

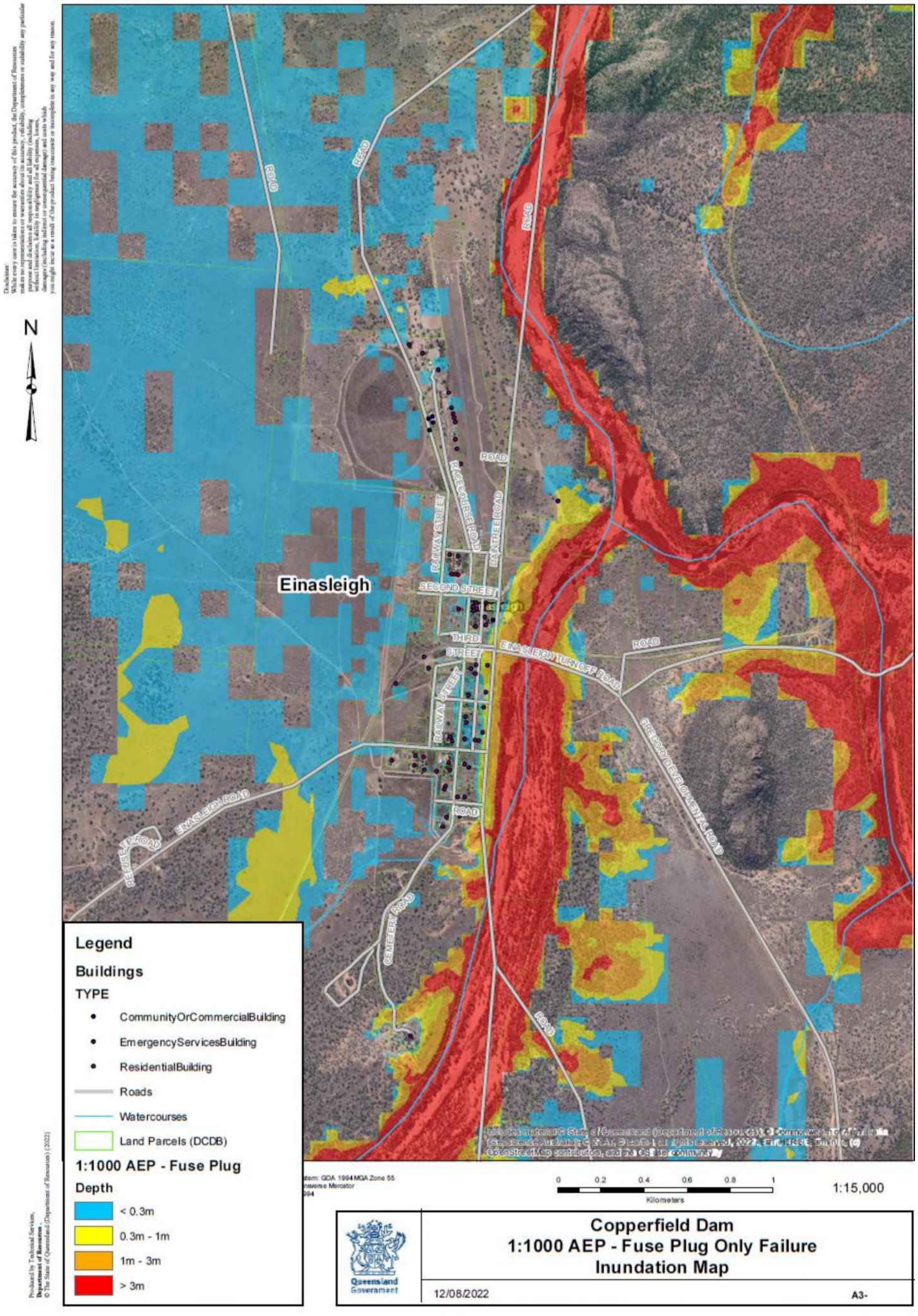


Figure 13 Overview of Area - Dam Crest Flood Inundation Map

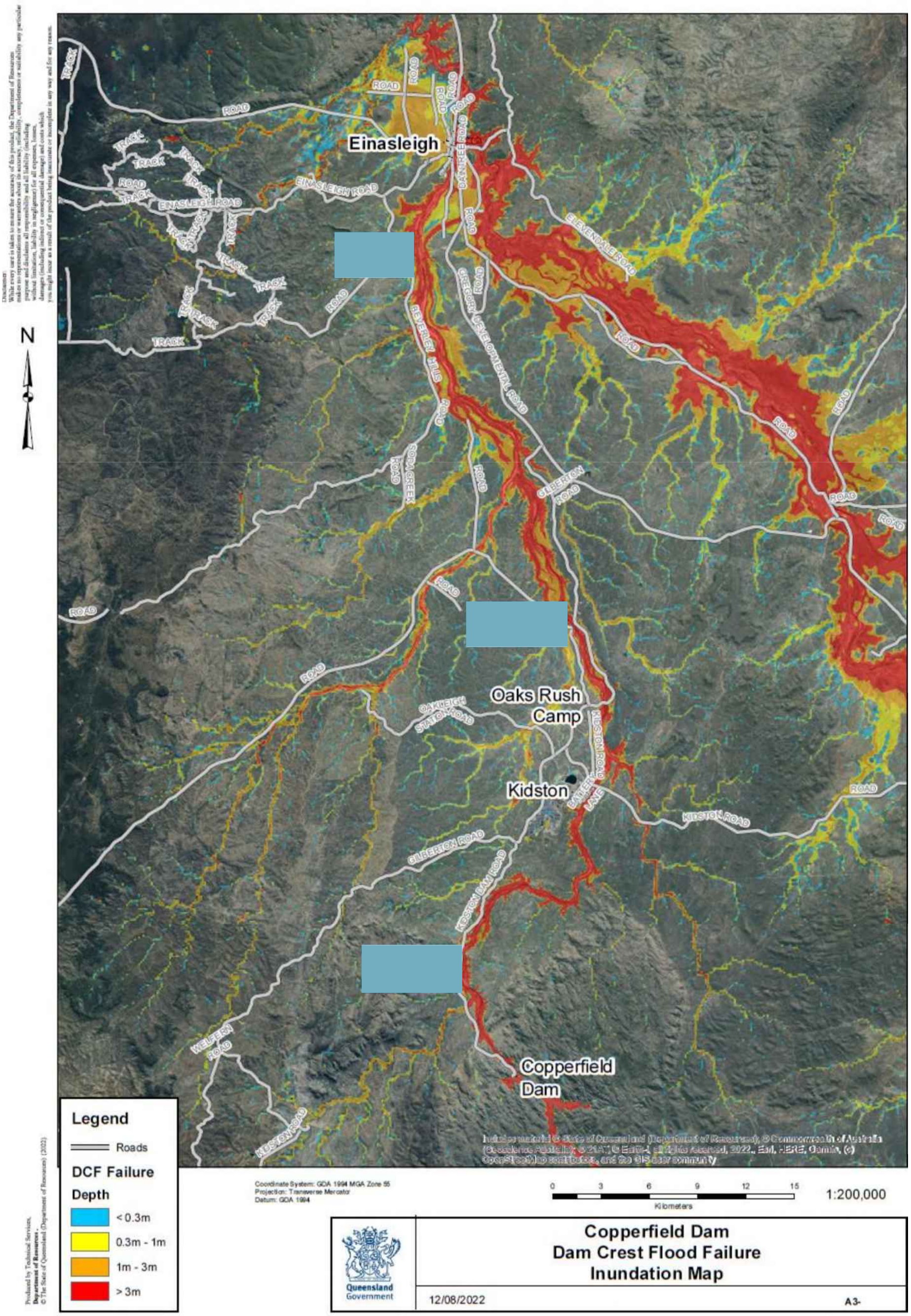


Figure 14 **Dam Crest Flood Inundation Map**

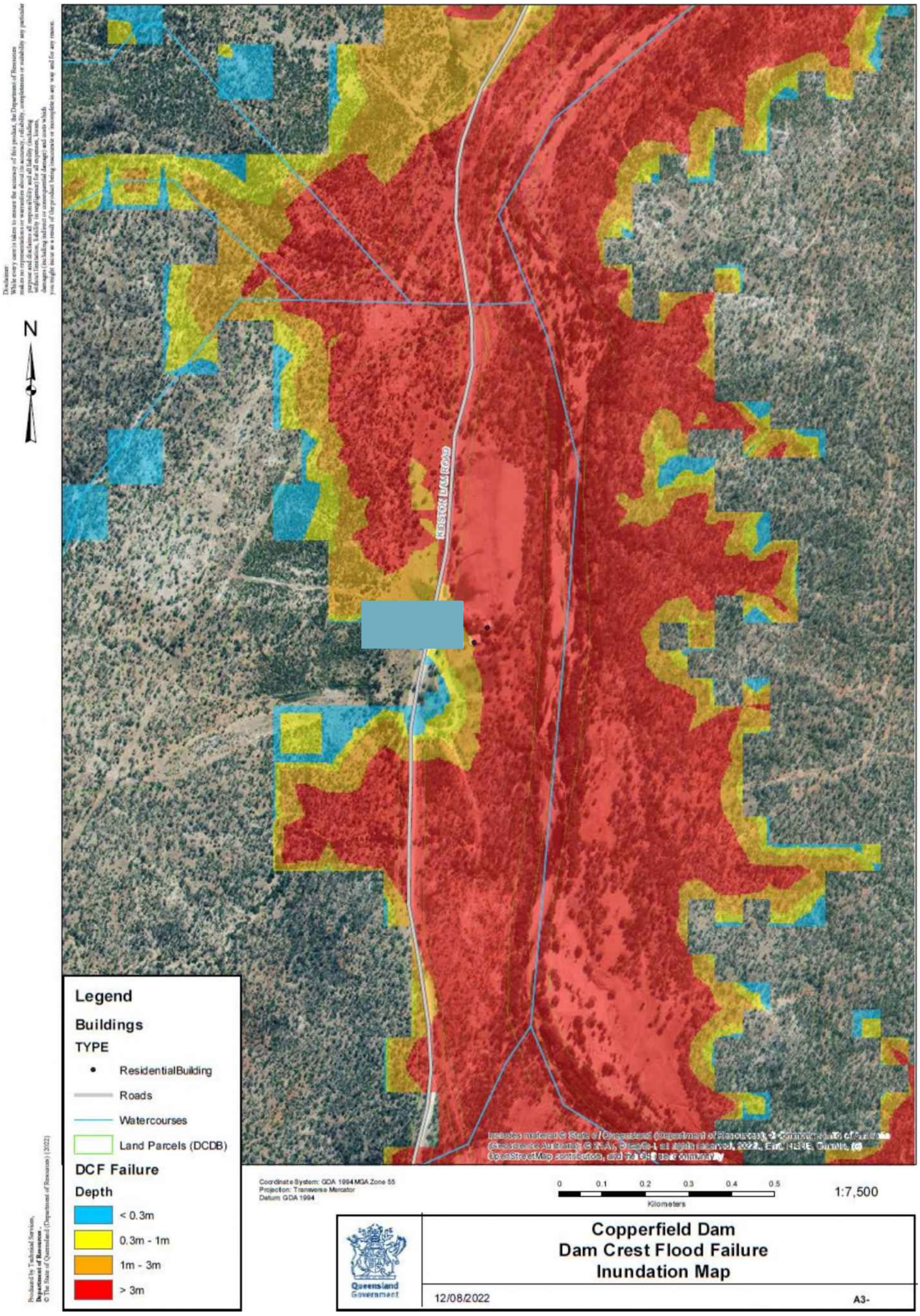


Figure 15 Kidston Township Dam Crest Flood Inundation Map

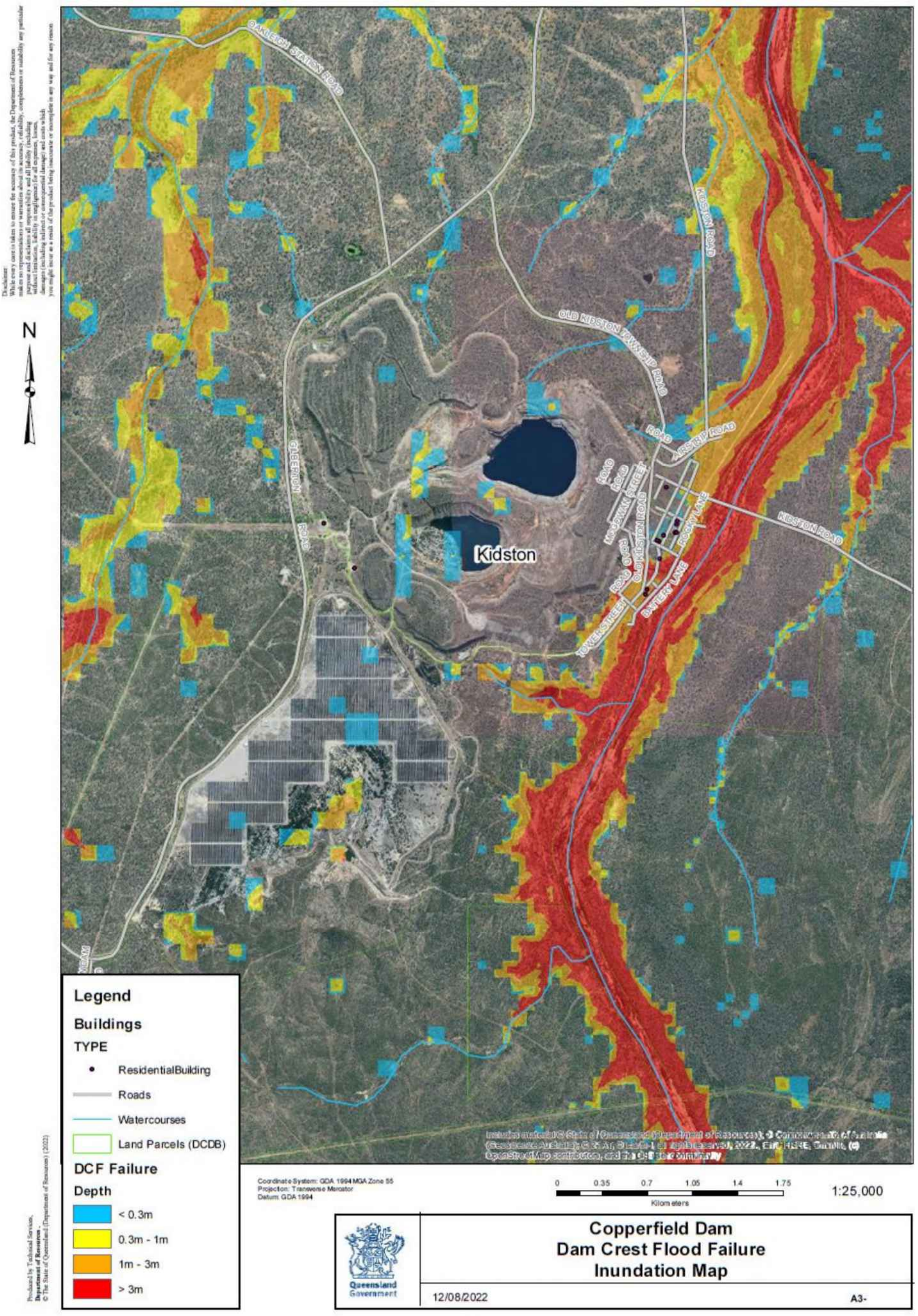


Figure 16 **Dam Crest Flood Inundation Map**

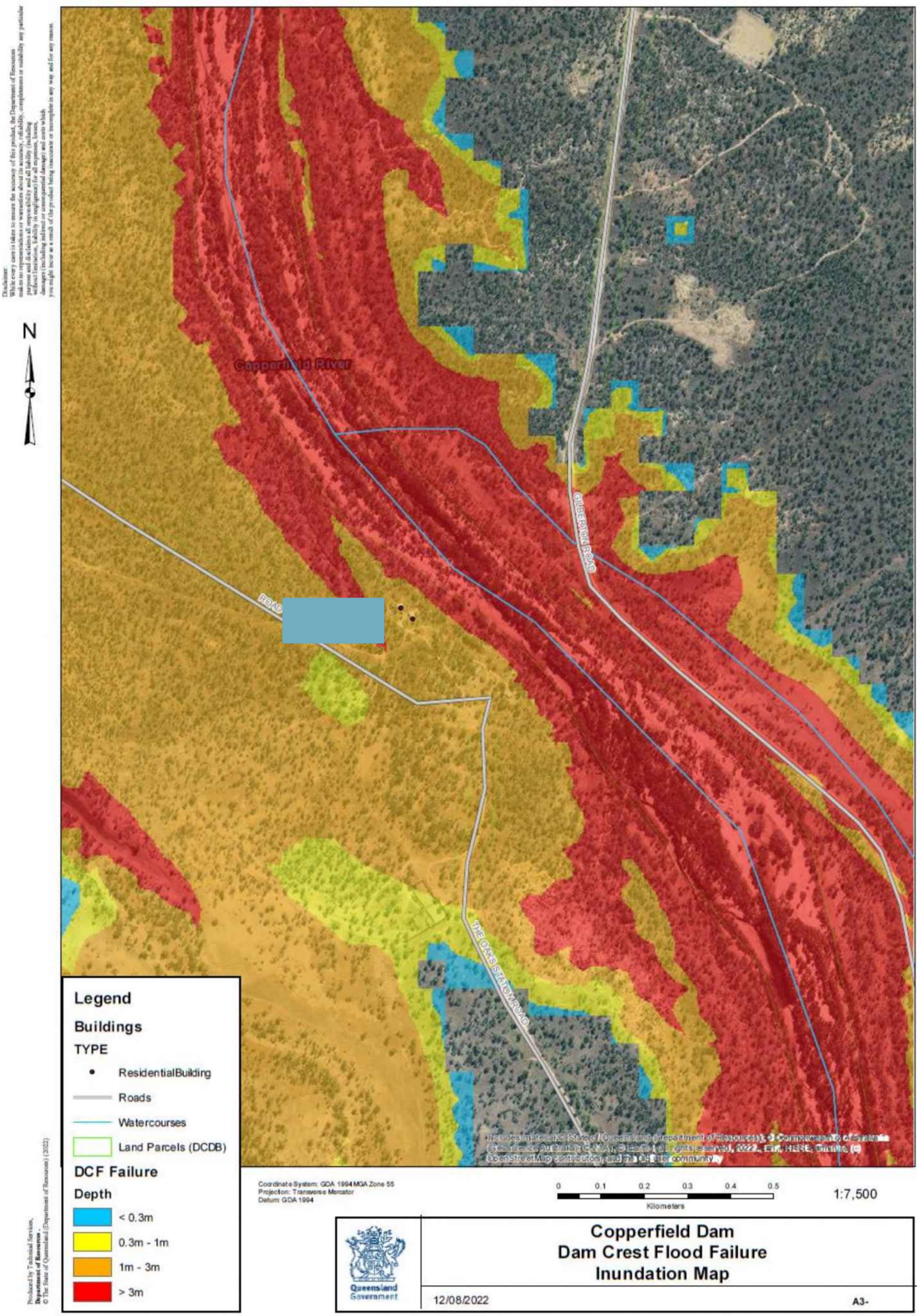


Figure 17 Narrawa Road Dam Crest Flood Inundation Map

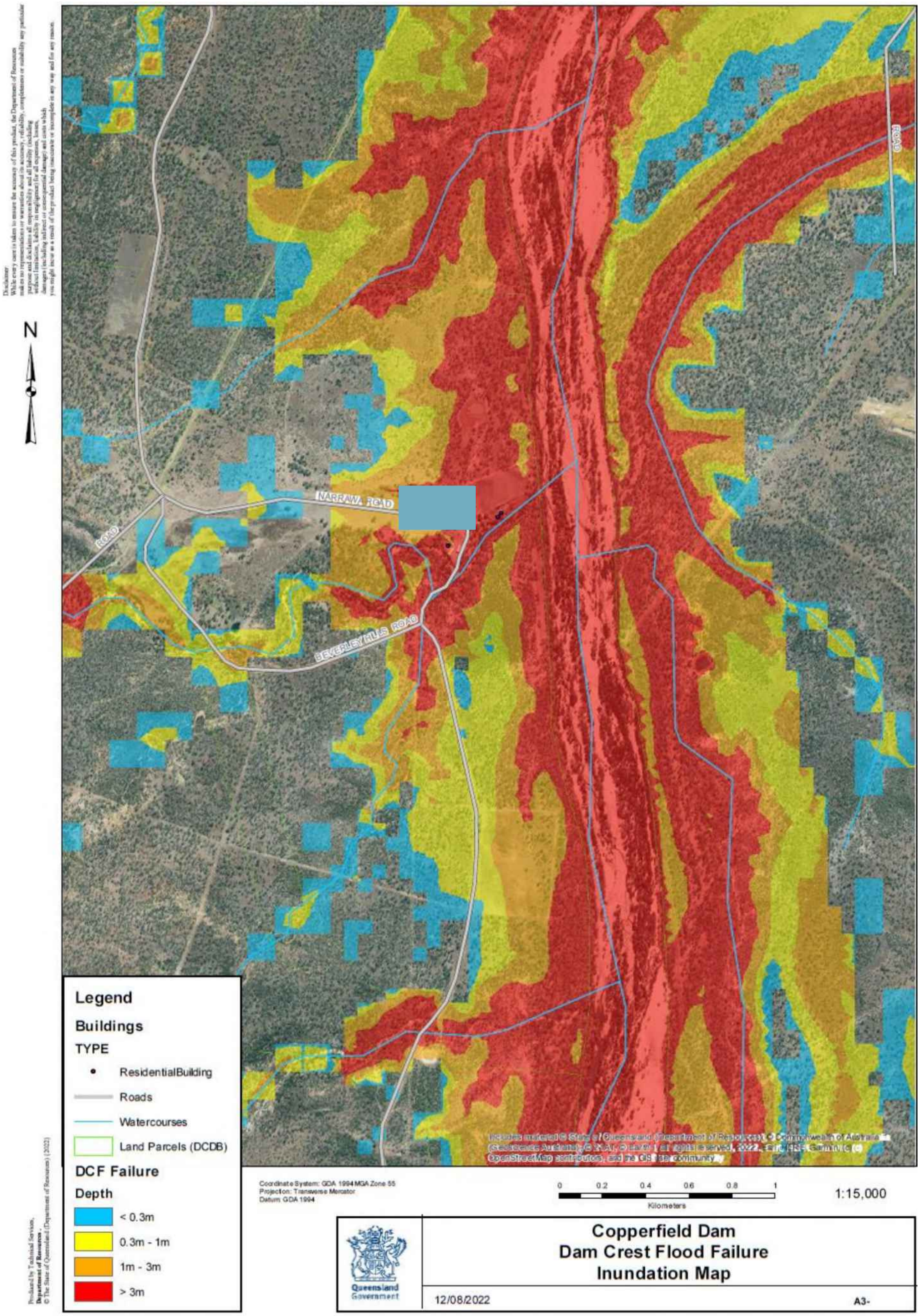


Figure 18 Einasleigh Dam Crest Flood Inundation Map

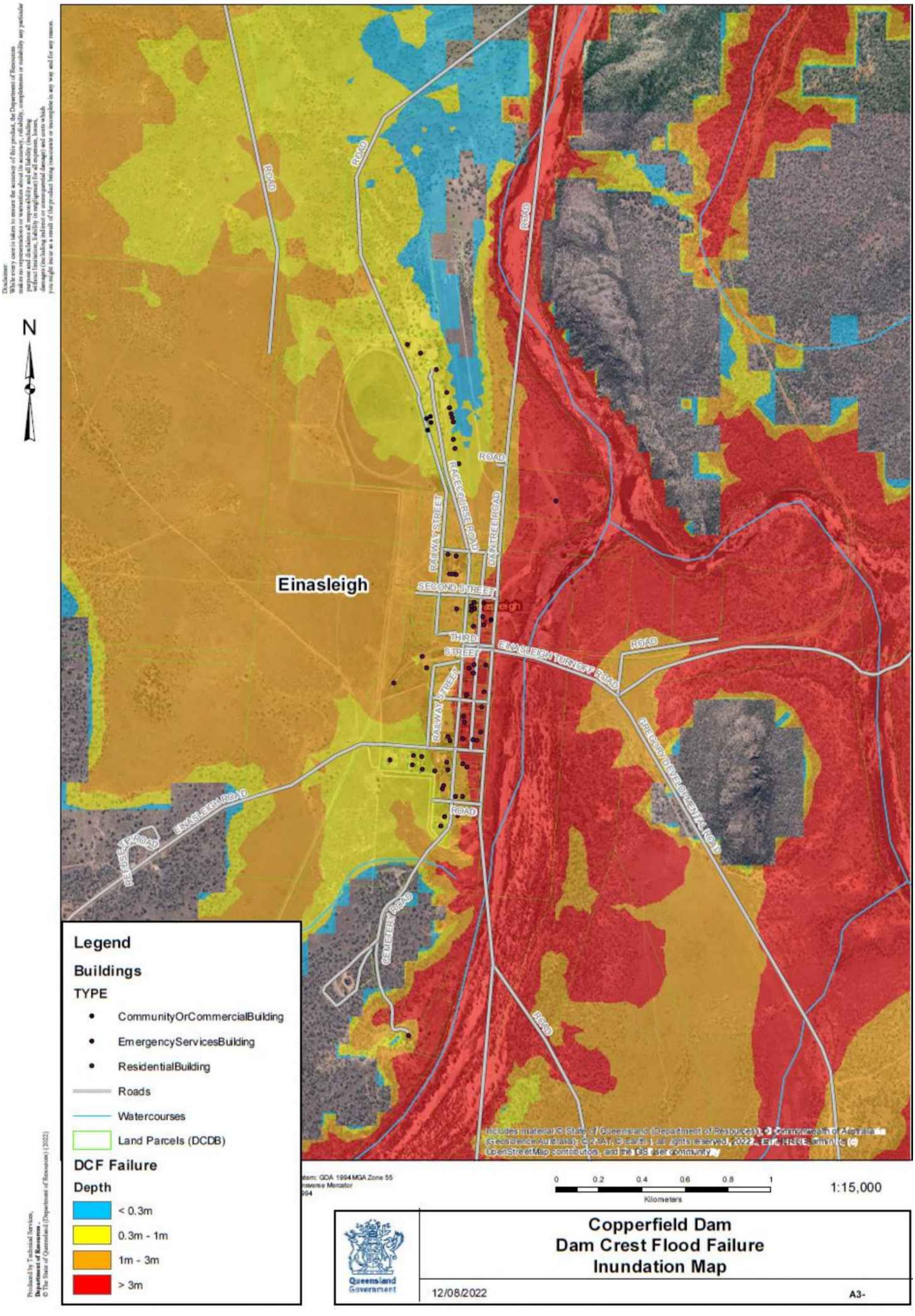


Figure 19 Overview of Area - Probable Maximum Flood Inundation Map

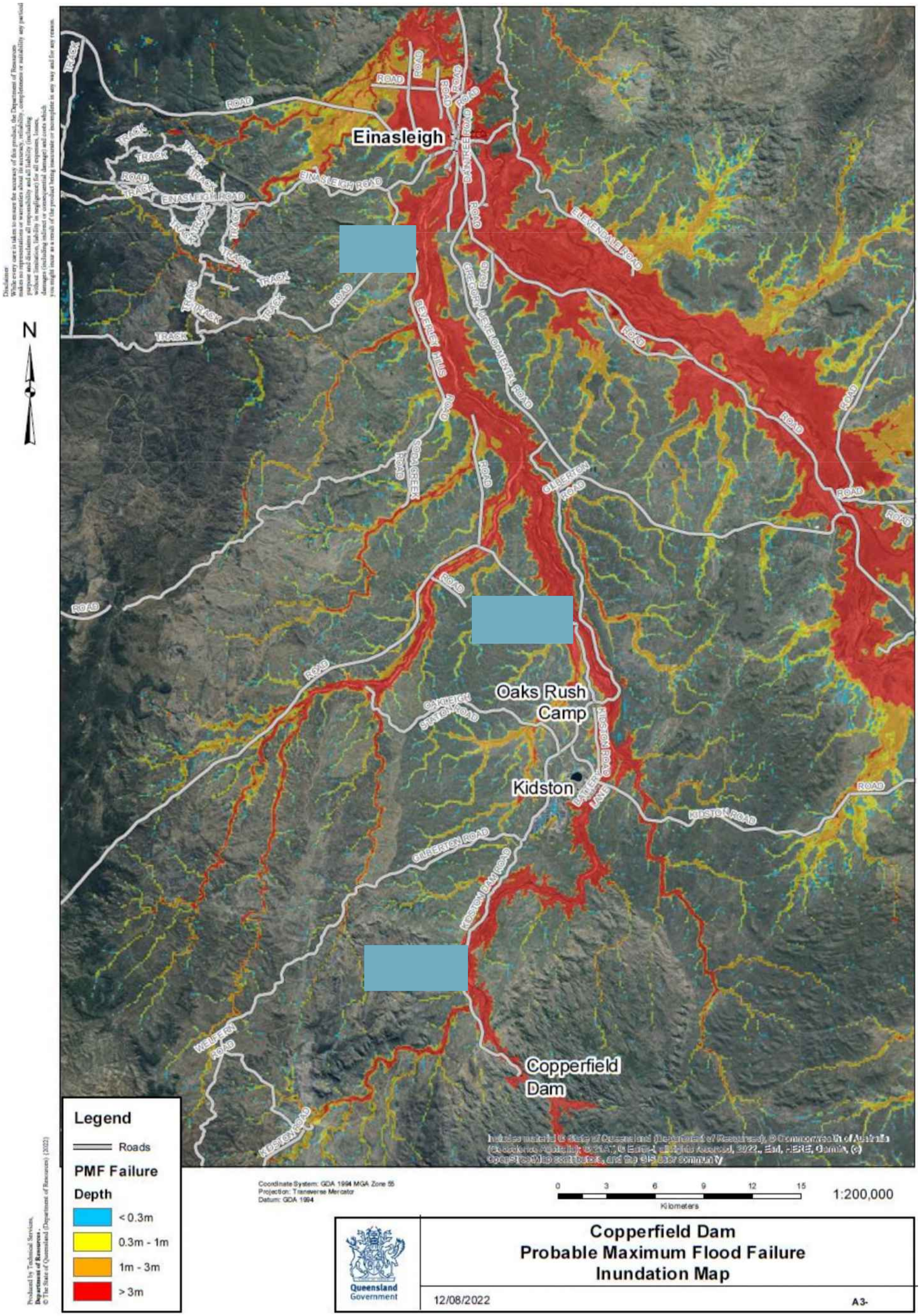


Figure 20 **Probable Maximum Flood Inundation Map**

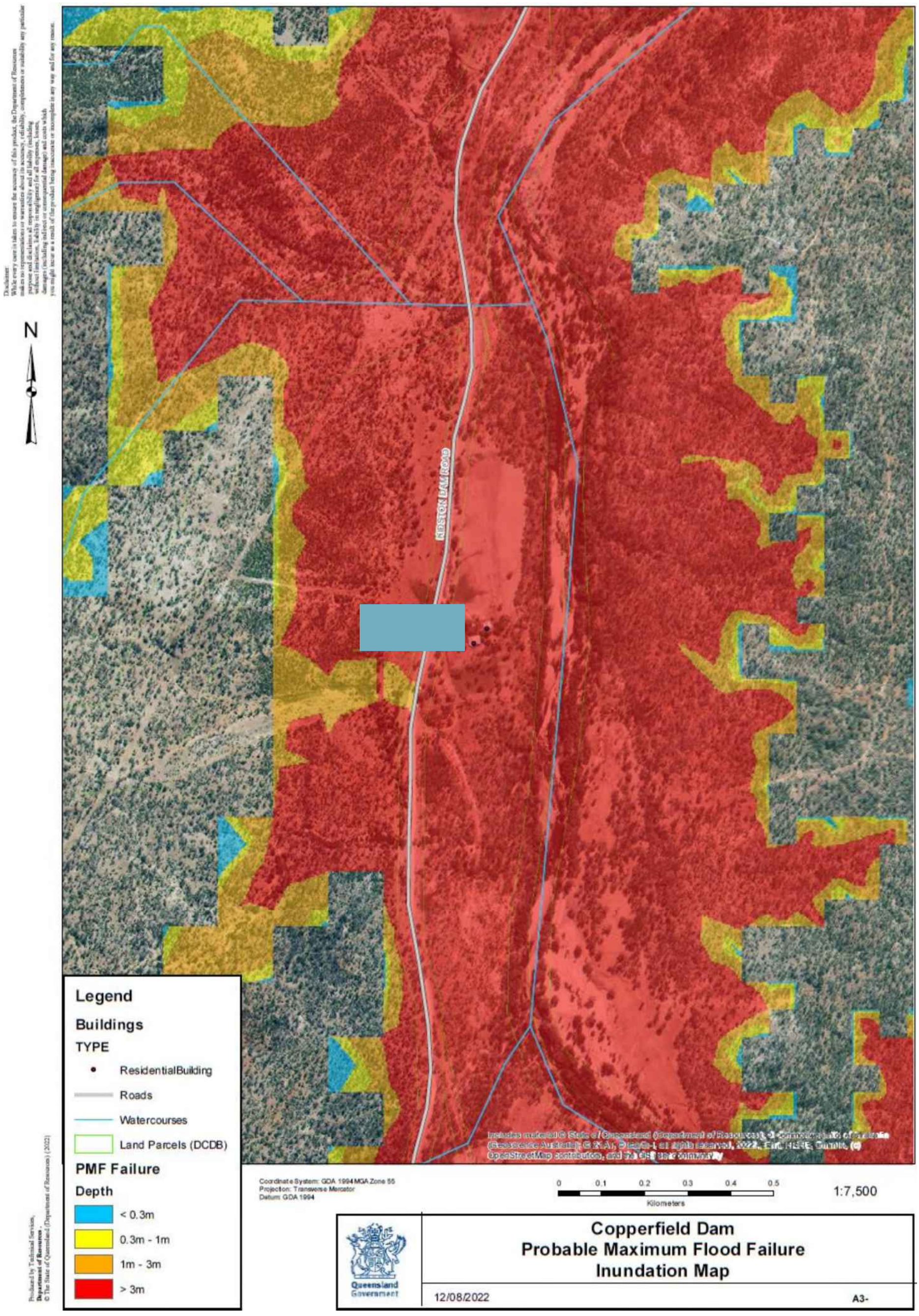


Figure 21 Kidston Township Probable Maximum Flood Inundation Map

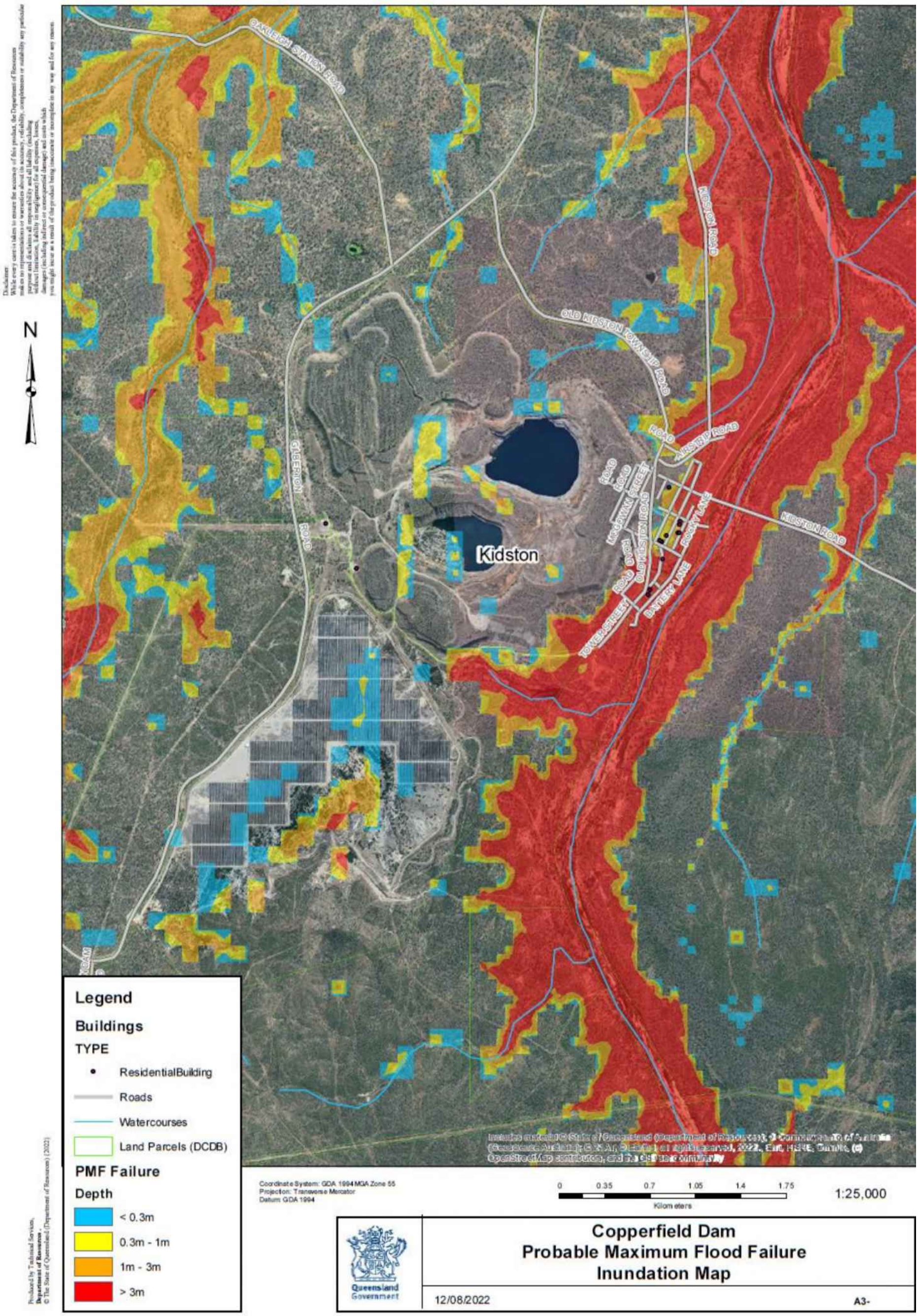


Figure 22 **Probable Maximum Flood Inundation Map**

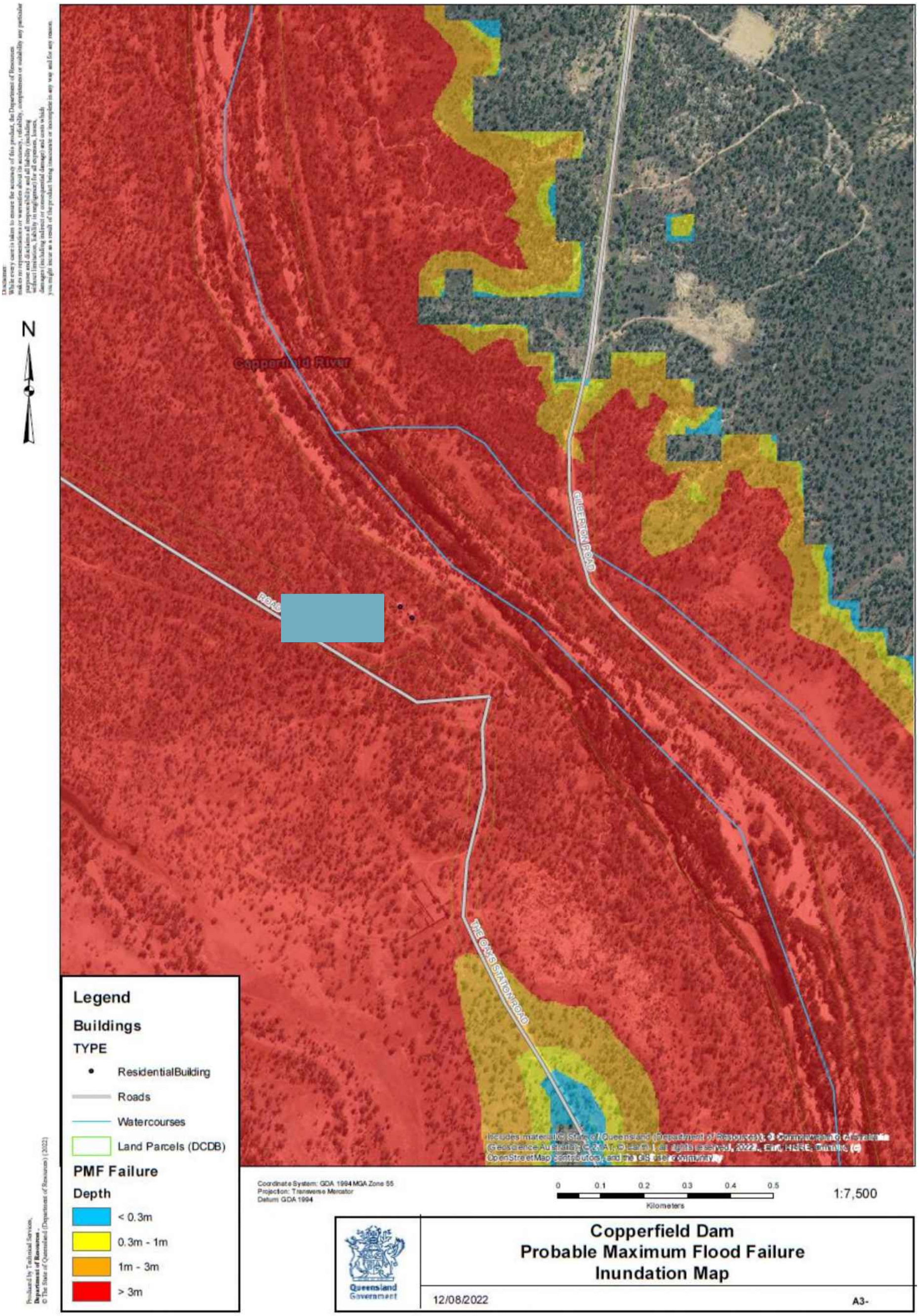


Figure 23 Narrawa Road Probable Maximum Flood Inundation Map

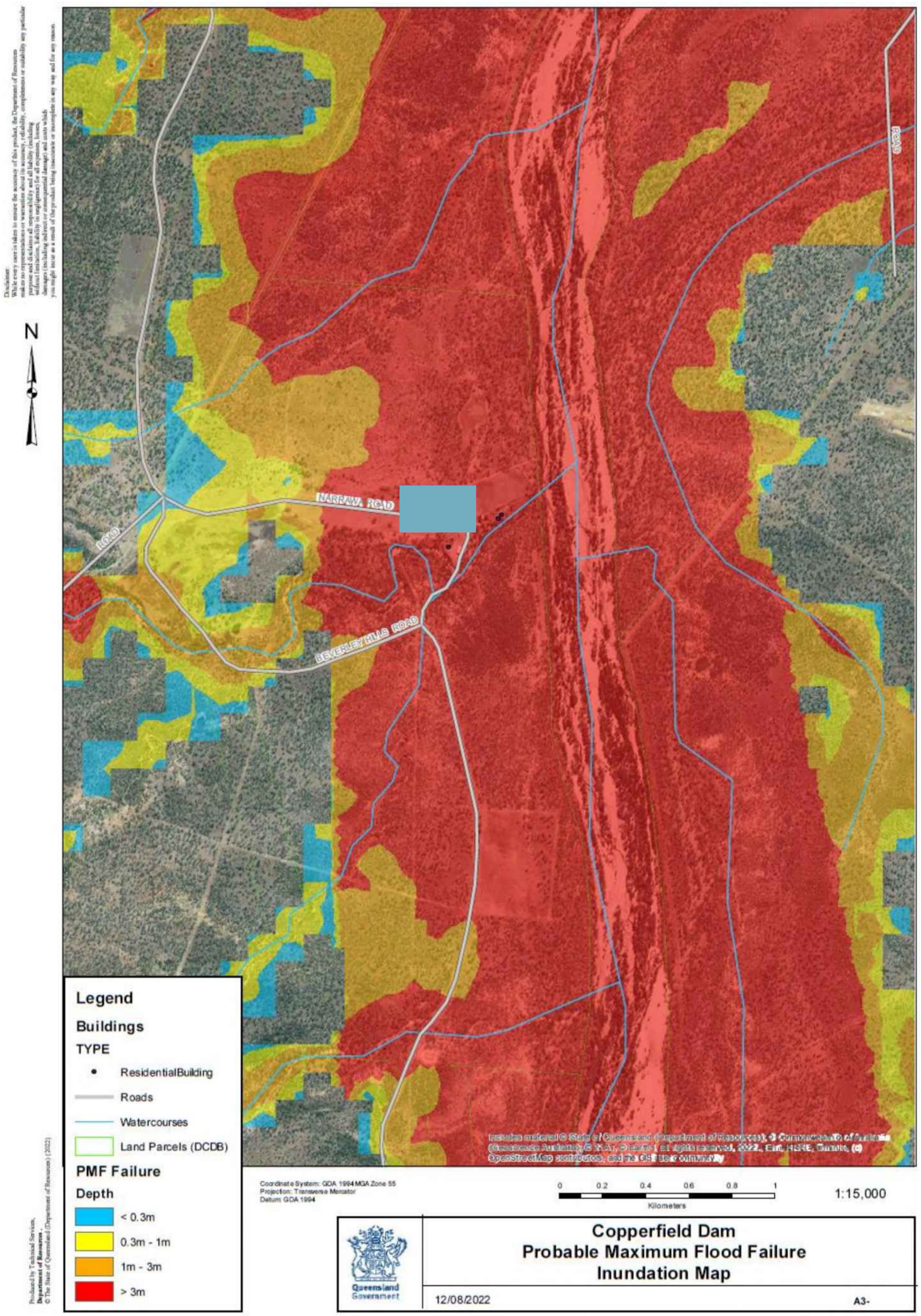


Figure 24 Einasleigh Probable Maximum Flood Inundation Map