Emergency Action Plan

LAKE MACDONALD DAM

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Approved by the delegate of the Chief Executive, Department of Regional Development, Manufacturing and Water until 1 October 2025.

QUICK REFERENCE GUIDE

Dam Hazard	Activation Level			
	Alert	**Lean Forward**	**Stand Up**	**Stand Down**
Flood Event (Section 5.1)	• Lake level equal to or greater than Full Supply Level (**95.32 m AHD**); AND • Bureau expected to issue Flood Warnings in South East Queensland.	• Lake level or predicted lake level equal to or greater than **96.40 m AHD**.	1. Lake level or predicted lake level equal to or greater than 96.80 m AHD. 2. Lake level judged likely to exceed 97.30 m AHD (Flood of Record). 3. Lake level judged likely to exceed 98.00 m AHD. • Activation level indicates potential need for downstream evacuations.	• Lake level below Full Supply Level; OR • Lake level equal to or greater than Full Supply Level and no current Flood Warnings in South East Queensland.
Significant Increase in Seepage or New Area of Seepage (Sections 5.2 and 5.4)	• Earthquake of Magnitude 3 or higher detected in SEQ; or • Significant new or increased seepage areas identified at the Dam; or • Seepage areas containing earth material identified at the Dam.	• Seepage is increasing or earth material evident in the seepage is increasing; and • The seepage increases and cannot be controlled.	• Dam failure is considered possible via an identified failure mechanism. • Activation level indicates potential need for downstream evacuations.	• Seepage through the Dam is controlled; and • No indicators of potential dam failure are present.
Structural Damage to Dam (Sections 5.3 and 5.4)	• Earthquake of Magnitude 3 or higher detected in SEQ; or • New structural damage or movement areas identified at the Dam.	• A Terrorist Threat or Incident is reported at the Dam Site; or • New structural damage or movement areas have not stabilised and are demonstrating indications of continued worsening.	• New structural damage or movement areas indicate some potential for a structural failure of the Dam.	• Dam embankment is stable; and • No indicators of potential Dam failure are present.

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Distribution Control

Hard copy document distribution list

Controlled Document No.	Agency	Position	Location
1	Seqwater	Storage Supervisor	Lake Macdonald Dam Office
2	Seqwater	Dam Safety Team	Flood Operations Centre, Brisbane
3	Seqwater	Dam Safety Team	Flood Operations Centre, Ipswich

Electronic document distribution list

Group / Agency	Position	Location
Queensland Fire and Emergency Services	Emergency Management Coordinator	State Disaster Coordination Centre
Noosa Council	Local Disaster Coordinator	Noosa
Gympie Regional Council	Local Disaster Coordinator	Gympie
Sunshine Coast District Disaster Management Group	Executive Officer / DDMG Chair	Sunshine Coast
Gympie District Disaster Management Group	Executive Officer / DDMG Chair	Gympie
Seqwater	Incident and Emergency Management Team	Emergency Operations Centre, Brisbane and Ipswich

Document version history

EAP Version numbering convention

Seqwater EAP versions are identified as EAP Issue numbers.

If the EAP Issue number ends in a decimal point other than zero (e.g., 7.1) this indicates that the EAP contains only non-substantive amendments (e.g., contact updates or error corrections) and therefore has not been reviewed for technical content. These Issues have approval for Amendment by Agreement from the Dam Safety Regulator.

If the EAP Issue number ends in a zero (e.g. 7.0) this indicates that the EAP contains substantive amendments (e.g., inundation map updates or changes to trigger levels) and therefore has been reviewed for technical content. These Issues have been formally approved by the Dam Safety Regulator.

Version / Issue No.	Date	Version Description
0.0	October 2008	Original
1.0	August 2009	Revision 1
2.0	September 2010	Revision 2
2.1	June 2011	Contact register updated
3.0	September 2011	Revision 3
4.0	August 2012	Revision 4
5.0	November 2013	Revised and updated in accordance with new guidelines from the Department of Energy and Water Supply.
6.0	October 2014	Revised following discussions with the Department of Energy and Water Supply and other stakeholders.
7.0	August 2015	Revision 7
8.0	August 2016	Revision 8
9.0	June 2018	Revision 9
9.1	August 2019	Non-substantive amendments to incorporate LDMG and DDMG feedback
9.2	September 2020	Annual review and non-substantive amendments made.
9.3	September 2021	Annual review and non-substantive amendments made.
10.0	July 2022	Revision 10.
11.0	August 2023	Revised and updated to reflect updated risk assessment conducted as part of upgrade project.

Glossary

Term	Definitions
the Dam	Refers to the specific Dam mentioned on the front cover of this Emergency Action Plan, for which the Plan is written about.
Dam Hazard	A foreseeable situation that may: a) Cause or contribute to the failure of the Dam; or b) Require a release of water from the Dam that may cause harm to persons or property.
Dam Hazard Event	An event arising from a dam hazard where persons or property may be harmed because of the event; and where a coordinated response involving two or more Disaster Response Agencies is required.
Sunny Day Failure	A failure of the Dam that occurs when no natural flooding is occurring.
Emergency Event	An event arising from a dam hazard if: a) Persons or property may be harmed; and b) Any of the following apply: i) A coordinated response involving two or more Disaster Response Agencies is likely to be required; ii) A disaster situation has been declared under the Disaster Management Act; iii) An entity performing functions under the State Disaster Management Plan requires Seqwater to give the entity information about the event.
Disaster Management Agency	An agency with a management role in responding to an Emergency Event. Disaster Management Agencies include Local Disaster Management Groups, District Disaster Management Groups and Queensland Fire and Emergency Services.
Disaster Response Agency	Any Government Agency involved in Disaster Response.
Population at Risk	Persons in potentially habitable buildings that, as a result of a dam failure event, are impacted by flooding or increased flooding.
Near Population at Risk	Population residing in potentially habitable buildings located within the 0 to 1 hour Time to Flood dam failure extent that is shown on the Dam Failure Maps in Section 7.
Judged likely	Means an event or circumstance being, in the professional judgement of a Duty Engineer in the Seqwater Flood Operations Centre, sufficiently certain to occur.

Abbreviation	Definitions
Act	Water Supply (Safety and Reliability) Act 2008
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ANCOLD	Australian National Committee of Large Dams
Bureau	Bureau of Meteorology
CEO	Chief Executive Officer
D/S	Downstream
DCF	Dam Crest Flood
DCL	Dam Crest Level

Abbreviation	Definitions
DDC	District Disaster Coordinator
DDMG	District Disaster Management Group
DDMP	District Disaster Management Plan
DRDMW	Department of Regional Development, Manufacturing and Water
EA	Emergency Alert
EAP	Emergency Action Plan
EER	Emergency Event Report
ERP	Emergency Response Plan
FSL	Full Supply Level
FOC	Flood Operations Centre
LB	Left bank
LDC	Local Disaster Coordinator
LDMG	Local Disaster Management Group
LDMP	Local Disaster Management Plan
LGA	Local Government Area
ML	Megalitres
M(L)	Magnitude (Local) – Earthquake magnitude as reported by Geoscience Australia
PAR	Population at Risk
PLL	Probable Loss of Life
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PMPDF	Probable Maximum Precipitation Design Flood
QFES	Queensland Fire and Emergency Services
QPS	Queensland Police Services
RB	Right bank
SDCC	State Disaster Coordination Centre
SDF	Sunny Day Failure
U/S	Upstream

1 Purpose

The purpose of this EAP is to allow Seqwater:

- To respond quickly to potential emergency incidents as soon as they are identified.
- To undertake targeted and effective intervention actions to prevent the situation developing into an emergency event.
- To provide appropriate and effective notifications in relation to dam safety emergency incidents and events, including flood events.

It is possible for more than one dam hazard to exist at the Dam at the one time. In such a circumstance, it may be necessary to act on the procedures within separate sections of this EAP simultaneously.

2 Scope

This EAP applies to all employees, contractors and consultants working for or on behalf of Seqwater, unless otherwise stated.

This EAP is supported by the following Seqwater internal programs and plans that aim to ensure the structural safety of each Seqwater dam and also ensure that Seqwater can respond effectively to any emergency event impacting on its water supply infrastructure:

- Seqwater Dam Safety Management Program;
- Seqwater Dam Safety Inspection and Surveillance Program;
- Seqwater Portfolio Risk Assessment Program;
- Seqwater Dam Portfolio – Routine Scheduled Maintenance and Capital Refurbishment Program;
- Emergency Response Plan;
- Seqwater Fatigue Management Plan.

Seqwater has developed this EAP to deal with reasonably foreseeable dam hazard events and emergency situations. However, there is always considerable uncertainty about how any emergency situation or flood event might develop and progress. Factors such as the weather, the dam failure mechanism, and the progression rate and size of the dam breach will affect the actions required to protect communities impacted by the emergency event. Therefore, in an actual emergency event some variation to the actions contained in this EAP may be necessary to protect communities downstream, particularly in situations where the event develops quite differently to what has been assumed in this EAP.

2.1 Engagement framework

This EAP is implemented under Seqwater's Emergency Response Plan which has been prepared in accordance with the provisions of the Act.

The Emergency Response Plan does not provide detailed site-specific or situation-specific actions for incidents or emergencies as that information is provided by other Seqwater documents, including this EAP. Specifically, this EAP provides response actions for the Dam should the following situations occur at the Dam:

- Dam outflows associated with flood events (refer to Section 5.1).
- Uncontrolled seepage from the Dam or structural damage to the Dam (refer to Sections 5.2 to 5.3).

2.2 Exercising of Emergency Action Plan

Seqwater runs a series of Flood Operations Centre exercises around October each year in preparation for the wet season. Seqwater's EAPs are exercised as part of this annual exercise series. Representatives from Local Disaster Management Groups, District Disaster Management Groups, State Disaster Coordination Centre and DRDMW are invited to participate in or observe these exercises. Recommendations from reviews of these exercises are incorporated into Seqwater's EAPs when appropriate.

Seqwater also conducts desktop exercises with Disaster Management Groups as part of these Groups exercising their flood and / or dam failure scenario responses.

3 Roles and Responsibilities

The following table shows the entities with dam safety incident responsibilities for the Dam.

Table 1: Roles and responsibilities for dam safety management

AGENCY	Responsibilities
Seqwater	• Prepare, implement and maintain this EAP in accordance with the provisions of the Act; • Prepare, implement and maintain an ERP; • Maintain an ongoing Incident and Emergency Roster in accordance with the ERP; • Undertake emergency response at the dam site, including managing public safety, undertaking physical intervention actions to prevent the dam failing, and provide all dam overflow and dam safety notifications in accordance with the EAP.
Dam Safety Regulator (DRDMW)	• Provide regulatory input during a dam safety emergency in accordance with the requirements of the Act and the *Emergency Action Planning for Referable Dams Guideline, DRDMW 2021.*
Local Disaster Management Groups	• Exercise primary responsibility for disaster response and management within its boundaries, in accordance with the Queensland *Disaster Management Act 2003.* • Deploy all appropriate resources to contribute to response and recovery during the dam safety emergency, until its resources are fully committed. • Mobilise disaster response assistance from other relevant Disaster Response Agencies, as appropriate during the emergency.
District Disaster Management Groups	• To complete the responsibilities of a District Disaster Management Group within its boundaries, in accordance with the Queensland *Disaster Management Act 2003.*

For Lake Macdonald Dam, the following Local Governments and Districts form the LDMGs and DDMGs, listed in order of impact downstream of the Dam.

Table 2: Relevant Disaster Management Groups for the Dam

Group	Relevant Council areas for the Dam
Local Disaster Management Groups	• Noosa • Gympie
District Disaster Management Groups	• Gympie • Sunshine Coast

A Contact Register for these and other stakeholder agencies is included in Appendix A.

4 Dam details

Table 3: Basic Dam Details

Item	Value
Population at Risk[1] (Weighted PAR)	Sunny Day Failure: 6
	Flood: 141
Failure Impact Rating	2
Consequence Category	High A
Dam Owner	Seqwater
Name of Reservoir	Lake Macdonald
Year Complete	1965, upgraded in 1980
Location	Approximately 4 km North East of Cooroy Latitude: 26°22'57"S Longitude: 152°55'49"E
Water Course	Six Mile Creek
Purpose	Town water
Type of Construction	Zoned earth and rockfill embankment
Outlet Works	Uncontrolled ogee crest spillway
Catchment Area	49 km^2
FSL	95.32 m AHD
Full Supply Capacity	8,018 ML
Surface Area at FSL	253 ha
MAIN DAM and SPILLWAY	
Main Dam Crest	99.5 m AHD
Main Dam Embankment Length	501 m
Maximum Height of Main Dam Embankment	11.5 m
Width at Top of Main Dam Embankment	3.0 m
Width at Base of Dam embankment	56.0 m
Spillway Crest – Low Level	95.32 m AHD
Spillway Length – Low Level	11.0 m
Spillway Crest – High level	95.35 m AHD
Spillway Length – High Level	79 m
Regulator valves	Nil (pumped outflow)
Spillway Capacity[2]	1,147 m^3/s
HYDROLOGY	
Maximum Outflow as a Result of PMF[2]	1,697 m^3/s
AEP of Spillway Capacity	1 in 250,000
Peak Water Level as a Result of PMF[2]	99.98 m AHD
Maximum Historic Storage Level	97.29 m AHD (February 2012)

[1] Detailed Potential Loss of Life Assessment, HARC May 2022 (Weighted Total PAR), [2] Design Hydrology (with AR&R 2016), Seqwater 2018

5 Dam hazards: Actions and notifications

This section contains tables that provide activation triggers, actions, and notifications for the following dam hazards:

- Flood events (Section 5.1).
- Significant dam seepage (Section 5.2 and Section 5.4).
- Structural damage to the Dam (Section 5.3 and Section 5.4).

The following notes apply to all tables in Sections 5.1 to 5.4:

- Near PAR is persons potentially impacted in the first hour of a dam failure event as defined in Section 7.1.
- Emergency Alert PAR notifications will be made based on Seqwater's polygon boundaries that reside on the State Disaster Management Portal.
- At any point in time during an Emergency Event, the operational state of Disaster Management Groups may be at different activation levels shown in the tables due to other impacting circumstances.
- In an Emergency Event, the decision as to the level of activation of the EAP will be made by the Emergency Manager on the advice of the Incident Management Team Leader. If an Emergency Manager has not been appointed, the decision will be taken by the Incident Management Team Leader.
- Guidance on preparing and issuing the notifications required by the tables is contained in Section 6.

5.1 Flood events

Lake Macdonald Dam is an earth and rockfill embankment that is unlikely to withstand being overtopped. An updated failure risk position for Lake MacDonald Dam was completed in March 2023 as part of Seqwater's planning activities for the upgrade of the Dam. The updated failure risk position shows a probability of dam failure of around 1 in 10 for a flood that exceeds the current flood of record level (97.30 m AHD).

Reports produced to document the physical context of the existing dam, in particular the geotechnical conditions, have identified the following key deficiencies and shortfalls of good practice being met:

- The site: Not well suited for a Dam;
- The foundation conditions: Challenging due to recent and older alluvial materials.
- The existing dam design: Unconventional and missing key defensive design measures, including sand filters in the embankment.

The Flood Triggers outlined in this Emergency Action Plan have been amended to account for this updated failure risk position.

Seqwater is continuing to review available data and potential upgrade options to reduce the societal risk to As Low as Reasonably Practicable (ALARP). Seqwater is also currently investigating whether interim works to lower the dam failure risks associated with a flood of record can be undertaken prior to the full upgrade of the Dam.

Table 4: Design Flood Estimates
(Source: Lake Macdonald Design Hydrology (with AR&R 2016), Seqwater 2018)

AEP (1 in Y)	Peak Inflow (m^3/s)	Peak Outflow (m^3/s)	Peak Lake Level (m AHD)
5	259	134	96.6
10	336	177	96.8
20	402	227	97
50	444	307	97.2
100	507	363	97.4
200	615	401	97.5
500	730	479	97.7
1,000	826	545	98
2,000	931	612	98.2
5,000	1,078	708	98.5
10,000	1,194	763	98.6
50,000	1,466	943	99.1
100,000	1,580	1,040	99.3
300,000	1,745	1,217	99.5
500,000	1,819	1,297	99.6
1,000,000	1,909	1,429	99.7
PMP-DF	2,106	1,697	99.8

5.1.1 Flood Event triggers and actions

Table 5: Flood event triggers and actions

FLOOD EVENT TRIGGERS AND ACTIONS				
Activation Level	**Trigger / Lake Level (m AHD)**	**Flood Operations Centre Actions**	**Emergency Manager Actions**	**Notifications**
Stand Down (First Overflow)	• **≥ 95.32 m AHD**; • Bureau NOT expected to issue Flood Warnings in South East Queensland.	• Instruct operators to continue regular site monitoring and dam surveillance and to report any anomalies that have the potential to develop into a dam hazard to Seqwater FOC [redacted] or Incident Hotline [redacted]	No Emergency Manager is appointed during normal dam operations.	Stakeholder and public notifications in accordance with Table 6.
Alert	• **≥ 95.32 m AHD**; AND Bureau expected to issue Flood Warnings in South East Queensland.	• Instruct operators to continue regular site monitoring and dam surveillance and to report any anomalies that have the potential to develop into a dam hazard to Seqwater FOC [redacted] or Incident Hotline [redacted] • Consider increased on-site dam surveillance based on predicted size of the flood event. • No Incident Management Team formed at this Activation Level.	No Emergency Manager is appointed at the Alert Activation Level.	Stakeholder and public notifications in accordance with Table 6.

FLOOD EVENT TRIGGERS AND ACTIONS				
Activation Level	**Trigger / Lake Level (m AHD)**	**Flood Operations Centre Actions**	**Emergency Manager Actions**	**Notifications**
Lean Forward	• Lake level has exceeded or is predicted to exceed: **≥ 96.40 m AHD**	• FOC commence 24/7 monitoring and use the real time ALERT system to constantly monitor the lake level and catchment rainfall in real time and using hydrologic models (if available for the Dam) to predict future lake levels. • Raise an Incident by contacting Incident Hotline on [redacted] • Establish an Incident Log to record all significant events in preparation for the development of an Emergency Event Report. • Consider implementing continuous on-site dam safety monitoring (if access is possible). • Direct site staff to undertake manual lake level readings as required to verify ALERT system readings. • Provide daily updates to the Seqwater Incident Roster Duty Manager. • Escalate the EAP Activation Level as appropriate in accordance with observed site conditions.	While the Activation Level is at the Lean Forward level, the incident will continue to be managed by the Incident Management Team (in the case of a flood event this is the Flood Operations Centre). If the emergency event is escalated to the Stand Up Activation Level, then an Emergency Manager will be appointed. Consider development of structure for the management of the emergency event by Seqwater as described in Appendix K.	Stakeholder notifications in accordance with Table 6. Incident Hotline: [redacted]

FLOOD EVENT TRIGGERS AND ACTIONS				
Activation Level	**Trigger / Lake Level (m AHD)**	**Flood Operations Centre Actions**	**Emergency Manager Actions**	**Notifications**
Stand Up (1)	• **Lake level has exceeded or is predicted to exceed 96.80 m AHD**; **AND** • There are no current indicators of imminent dam failure.	• Use the Incident Log to record all significant events in preparation for the development of an Emergency Event Report. • Mobilise site staff and direct staff to undertake a full dam surveillance inspection at least daily. • Monitor the situation using the real time ALERT system to constantly monitor the lake level and catchment rainfall and using hydrologic models to predict future lake levels. • Use hydrologic models at a minimum interval of once every 100 mm rise in actual lake level above 96.80 m AHD to determine if escalation of the EAP activation level is required. • Direct site staff to undertake manual lake level readings as required to verify ALERT system readings.	• Manage Seqwater's emergency response. • Provide appropriate ongoing notifications, including advice in relation to the need for downstream evacuations, to stakeholders and the public, in accordance with Table 6.	Stakeholder notifications in accordance with Table 6.
Stand Up (2)	• **Lake level judged likely to exceed:** **Flood of Record** **≥ 97.30 m AHD** **This situation is an Emergency due to the increased probability of dam failure above this level.**	• As for above Activation Level. • Obtain expert dam safety advice and technical assistance as required. • Organise and manage any required remedial works on site. • Provide advice on the likelihood of dam failure and the need for downstream evacuations.	• Manage Seqwater's emergency response. • Provide advice in relation to the need for downstream evacuations, to stakeholders in accordance with Table 6.	Stakeholder and public notifications in accordance with Table 6.

FLOOD EVENT TRIGGERS AND ACTIONS				
Activation Level	**Trigger / Lake Level (m AHD)**	**Flood Operations Centre Actions**	**Emergency Manager Actions**	**Notifications**
Stand Up (3)	• **Lake level judged likely to exceed Extreme Flood Level: ≥ 98.00 m AHD** **This situation is an Emergency due to the increased probability of dam failure above this level.**	• As for above Activation Level. • Obtain expert dam safety advice and technical assistance as required. • Organise and manage any required remedial works on site. • Provide advice on the likelihood of dam failure and the need for downstream evacuations.	• Manage Seqwater's emergency response. • Provide advice in relation to the need for downstream evacuations, to stakeholders in accordance with Table 6.	Stakeholder and public notifications in accordance with Table 6.
Stand Down (Normal Operations)	• Lake level < 95.32 m AHD.	• If the Activation Level has reached Stand Up, prepare and submit an appropriate Emergency Event Report to DRDMW in accordance with the requirements of the Act.	• Close the incident in accordance with the requirements of the Emergency Response Plan.	Stakeholder and public notifications in accordance with Table 6.

5.1.2 Flood Event external notifications

The following table outlines the external notifications for flood events, as defined in Table 5. Notifications are listed in order of priority to be issued, and stakeholder agencies are listed in order of priority where required.

Table 6: Flood event external notifications

FLOOD EVENT: EXTERNAL NOTIFICATIONS				
Activation Level	**Trigger for communications**	**Group to contact**	**Method**	**Message content**
Stand Down (First Overflow)	• ≥ 95.32 m AHD; • Bureau NOT expected to issue Flood Warnings in South East Queensland.	• Seqwater Dam Release Notification subscribers.	• Dam Release Notification Service.	• Lake Macdonald Dam is spilling.
		• General public.	• Information on Seqwater webpage and social media accounts.	
Alert (1)	• ≥ 95.32 m AHD; AND • Bureau expected to issue Flood Warnings in South East Queensland.	• All SEQ Disaster Management Agencies with responsibilities in dam safety incidents.	• **Email:** Talking Points issued a minimum of daily unless it is agreed that less frequent updates are appropriate.	• Talking Points template as per *Seqwater's Dams Releases and Spilling Procedure.*
		• Seqwater Dam Release Notification Subscribers.	• Dam Release Notification Service.	• Lake Macdonald Dam is spilling, and the Bureau may / are issuing warnings for South East Queensland.
		• General Public.	• Information on Seqwater webpage and social media accounts.	• Lake Macdonald Dam is spilling, and the Bureau may / are issuing warnings for South East Queensland.

FLOOD EVENT: EXTERNAL NOTIFICATIONS				
Activation Level	**Trigger for communications**	**Group to contact**	**Method**	**Message content**
Lean Forward	• Lake level has exceeded or is predicted to exceed: **≥ 96.40 m AHD** **Outflows impact Lake Macdonald Drive**	• LDMG 1 Contact • LDMG 2 Contact	• **Telephone call** to at least 1 contact at each affected LDMG.	• Initial notification to provide a situation brief, including impacts on Lake Macdonald Drive, and identify any requirements for additional incident management arrangements. • Refer to Lean Forward notification template in Appendix D.
		• All SEQ Disaster Management Agencies with responsibilities in dam safety incidents.	• **Email:** Talking Points issued a minimum of daily unless it is agreed that less frequent updates are appropriate.	• Talking Points template as per *Seqwater's Dams Releases and Spilling Procedure.*
		• General Public	• Information on Seqwater webpage and social media accounts.	• Lake Macdonald Dam is spilling, outflows have increased, and the Bureau may issue / are issuing warnings for South East Queensland.

FLOOD EVENT: EXTERNAL NOTIFICATIONS				
Activation Level	**Trigger for communications**	**Group to contact**	**Method**	**Message content**
Stand Up (1)	• Lake level has exceeded or is predicted to exceed: **≥ 96.80 m AHD;**	• LDMG 1 Contact • Near PAR (via LDMG 1) • LDMG 2 Contact	• **Telephone call** to at least 1 contact at the affected LDMG.	• Refer to Stand Up notification template in Appendix D. The discussion with the LDMG should resolve the following issues: • Should an Emergency Alert be issued / not issued based on the likelihood of reaching the Flood of Record? • If an Emergency Alert is to be issued, the arrangements for drafting and issuing the Emergency Alert Request to the SDCC.
Stand Up (2)	• **Lake level is judged likely to exceed the Flood of Record level: ≥ 97.30 m AHD** **While no indicators of dam failure are present, this situation is an Emergency due to the increased probability of dam failure above this level.**	• SDCC Watch Desk (QFES)	**Telephone call to** [redacted] **Email to** [redacted]	Request that SDCC Watch Desk immediately issue the **Watch and Act** message to the relevant polygons under the Emergency Alert. *If SDCC advise Emergency Alert is unavailable, contact affected LDMG to enact their communications and response processes.*
		• LDMG 1 Contact • DDMG 1 Contact • LDMG 2 Contact • DDMG 2 Contact	**Telephone call** to at least 1 contact at each affected LDMG and DDMG. **Arrange Teleconference call if possible.** **Email:** Follow up telephone call with email of discussion.	Refer to Stand Up notification template in Appendix D.
		• All SEQ Disaster Management Agencies with responsibilities in dam safety incidents.	**Email:** Talking Points issued a minimum of daily unless it is agreed that less frequent updates are appropriate.	Talking Points template as per *Seqwater's Dams Releases and Spilling Procedure*.

FLOOD EVENT: EXTERNAL NOTIFICATIONS				
Activation Level	**Trigger for communications**	**Group to contact**	**Method**	**Message content**
Stand Up (3)	• **Lake level judged likely to exceed:** **Extreme Flood Level:** **≥ 98.00 m AHD** **This situation is an Emergency due to the increased probability of dam failure above this level.**	• SDCC Watch Desk (QFES)	**Telephone call to** **Email EA Warning Request Form (Appendix C) to**	Request that SDCC Watch Desk immediately issue the **Warning** message to the relevant polygons under the Emergency Alert. *If SDCC advise Emergency Alert is unavailable, contact affected LDMG to enact their communications and response processes.*
		• LDMG 1 Contact • DDMG 1 Contact • LDMG 2 Contact • DDMG 2 Contact	**Telephone call** to at least 1 contact at each affected LDMG and DDMG. **Arrange Teleconference call if possible.** **Email:** Follow up telephone call with email of discussion.	Refer to Stand Up notification template in Appendix D.
		• All SEQ Disaster Management Agencies with responsibilities in dam safety incidents.	**Email:** Talking Points issued a minimum of twice daily unless it is agreed that less frequent updates are appropriate.	Talking Points template as per *Seqwater's Dams Releases and Spilling Procedure.*
		• General Public	Information on Seqwater webpage and social media accounts as agreed with LDMGs.	• What is the event? • What is the status? • Refer to AWS format message templates in Appendix C for guidance.
Stand Down (Normal Operations)	• Lake level falls below Full Supply Level.	• Seqwater Dam Release Notification Subscribers	• Dam Release Notification Service.	• Lake Macdonald Dam has stopped spilling.
		• General Public	• Information on Seqwater webpage and social media accounts.	

5.2 Significant dam seepage

Table 7: Significant dam seepage triggers and actions

SEEPAGE TRIGGERS AND ACTIONS				
Activation Level	**Triggers**	**Incident Management Team Actions**	**Emergency Manager Actions**	**Notifications**
Alert	• Earthquake of M3 or higher detected in SEQ.	• Undertake routine dam safety inspection as soon as practical. • Check dam safety instrumentation for indications of potential development of a structural dam safety issue. • No further action required if no new seepage or damage is detected during inspection.	Dam hazard to be managed by the Incident Management Team at the Alert Activation Level.	1. Incident Hotline [redacted] 2. Stakeholder notifications in accordance with Table 10 (Section 5.4).
	• Earthquake of M3 or higher detected in SEQ. • Significant new or increased seepage areas identified at the Dam. • Seepage areas containing earth material identified at the Dam.	• Manage physical response on site. • IMT Leader to be experienced Dam Safety Engineer. • Establish an Incident Log to record all significant events. • Increase the frequency of on-site dam safety monitoring (if access is possible). • Monitor the situation by estimating rate of seepage flow, observing clarity of seepage flow, making notes, and taking photographs. • Determine if the new condition is related to a potential structural failure mechanism at the Dam. • Provide it is safe to do so, instruct operators to undertake increased dam safety inspections and instrumentation readings. • Organise and manage any remedial works on site. • Provide daily updates to the Seqwater Incident Roster Duty Manager. • Escalate the EAP Activation Level as appropriate in accordance with observed site conditions.		

SEEPAGE TRIGGERS AND ACTIONS				
Activation Level	**Triggers**	**Incident Management Team Actions**	**Emergency Manager Actions**	**Notifications**
Lean Forward	• Seepage is increasing or earth material evident in the seepage is increasing, and the increases cannot be controlled.	• Use Incident Log to record all significant events in preparation for the development of an Emergency Event Report. • Implement continuous on-site dam safety monitoring (if access is possible). • Monitor the situation by estimating rate of seepage flow, observing clarity of seepage flow, making notes, and taking photographs. • Determine if the new condition is related to a potential structural failure mechanism at the Dam. • Provide it is safe to do so, instruct operators to undertake increased dam safety inspections and instrumentation readings. • Obtain expert dam safety advice and technical assistance as required. • Organise and manage any required remedial works on site. • Provide update reports to the Emergency Manager as directed. • Provide advice on the likelihood of dam failure and the need for downstream evacuations. • Escalate the EAP Activation Level as appropriate in accordance with observed site conditions.	• Manage Seqwater's emergency response. • Provide appropriate ongoing notifications, including advice in relation to the need for downstream evacuations, to stakeholders and the public, in accordance with Table 10 (Section 5.4).	1. Stakeholder and public notifications in accordance with Table 10 (Section 5.4).
Stand Up	• **Dam failure is considered possible via an identified failure mechanism.**	• As per previous Activation Level.	• Manage Seqwater's emergency response. • Provide appropriate ongoing notifications, including advice in relation to the need for downstream evacuations, to stakeholders and the public, in accordance with Table 10 (Section 5.4).	1. Stakeholder and public notifications in accordance with Table 10 (Section 5.4).

SEEPAGE TRIGGERS AND ACTIONS				
Activation Level	**Triggers**	**Incident Management Team Actions**	**Emergency Manager Actions**	**Notifications**
Stand Down	• Seepage through the Dam is controlled. • No indicators of potential dam failure are present.	• If the Activation Level has reached Stand Up, prepare, and submit an appropriate Emergency Event Report to DRDMW in accordance with the requirements of the Act.	• Close the incident in accordance with the requirements of the Emergency Response Plan.	1. Stakeholder and public notifications in accordance with Table 10 (Section 5.4).

5.3 Structural damage to the Dam

Structural damage to the Dam can be caused in many ways including earthquake, explosion, vandalism, or large objects crashing into the dam structure or lake. Structural damage can be identified through visual inspection or by examining instrumentation data that is collected for the Dam on a regular basis in accordance with ANCOLD guidelines.

If the dam hazard is a Terrorist Threat or Act, the incident will be managed by the Queensland Police Service with Seqwater providing input as required.

5.3.1 Potential indicators of structural damage to the Dam

There are many potential indicators of structural damage to a dam. The significance of these will depend on the particular event and the circumstances at the Dam. If new instances of any of the following indicators are discovered at the Dam, the actions in Table 9 should be followed.

All indicators should be checked for during routine inspections, with the table below listing events that may exacerbate these indicators.

Table 8: Structural damage indicators

Problem	General characteristic	When to Check	What to check for
Slide	Slide in downstream or upstream face.	After heavy or long periods of rainfall	Cracks or scarps near the crest and bulges at the toe.
Flow slide	Collapse and flow of soil around the reservoir rim.		Material displacement around the reservoir rim.
Gullying	No rock protection or vegetation cover on embankment batters or poor drainage.		Damage to rock protection and vegetation cover on embankment (and if present, saddle dam) batters.
Toe erosion	Erosion of embankment toe by spillway discharge or diversion flows.		Signs of erosion along embankment toe.
Spillway damage	Damage to the spillway, dissipater, or areas downstream of the spillway.	During and after spillway overflows	Damage or unusual flow patterns on spillway and areas downstream
Foundation failure	Sliding, rotation, or settlement of part or entire dam	After earthquakes	Evidence of foundation movement or displacement immediately adjacent to the Dam.
Landslide	Mass movement of soil or rock from slopes and valley walls around the storage.		Material displacement.
Damage to structural concrete	Movement or cracking of structural concrete.	• After earthquakes • When mechanical problems (such as burst pipes) occur	Any movement or cracking of structural concrete.

Problem	General characteristic	When to Check	What to check for
Failure of appurtenant structures or operating equipment	Loss of ability to supply water or discharge floods safely.	After detecting an operational anomaly	Identity and investigate cause of failure
Loss of storage contents	Excessive loss from the storage and / or occasionally increased seepage or increased groundwater levels near the storage.	Routine inspections	Environmental changes such as vegetation damage, salt scalds, etc
Wave erosion	Beaching or notching of the upstream face of the embankment by waves generated over long periods of strong wind.	During and after periods of strong wind	Signs of erosion on upstream face of embankment and saddle dams.
Major mechanical or electrical failures	Mechanical or electrical failures can impact on the operation of infrastructure at the Dam.	Routine maintenance	Report all mechanical and electrical failures impacting dam infrastructure to the appropriate line supervisor.

Table 9: Structural damage to the Dam triggers and actions

STRUCTURAL DAMAGE TRIGGERS AND ACTIONS				
Activation Level	**Triggers**	**Incident Management Team Actions**	**Emergency Manager Actions**	**Notifications**
Alert	• Earthquake of M3 or higher detected in SEQ.	• Undertake routine dam safety inspection as soon as practical. • Check dam safety instrumentation for indications of potential development of a structural dam safety issue. • No further action required if no new damage is detected during inspection.	Dam hazard to be managed by the Incident Management Team at the Alert Activation Level.	1. Incident Hotline [redacted] 2. Stakeholder notifications in accordance with Table 10 (Section 5.4).
	• Earthquake of M3 or higher detected in SEQ; OR • New structural damage or movement areas identified at the Dam.	• Manage physical response on site. • IMT Leader to be experienced Dam Safety Engineer. • Establish an Incident Log to record all significant events. • Increase the frequency of on-site dam safety monitoring (if access is possible). • Monitor the situation by estimating rate of change to the new structural damage or movement areas, making notes, and taking photographs. • Determine if the new condition is related to a potential structural failure mechanism at the Dam. • Provide it is safe to do so, instruct operators to undertake increased dam safety inspections and instrumentation readings. • Organise and manage any remedial works on site. • Provide daily updates to the Seqwater Incident Roster Duty Manager. • Escalate the EAP Activation Level as appropriate in accordance with observed site conditions.	Dam hazard to be managed by the Incident Management Team at the Alert Activation Level.	1. Incident Hotline [redacted] 2. Stakeholder notifications in accordance with Table 10 (Section 5.4).

STRUCTURAL DAMAGE TRIGGERS AND ACTIONS				
Activation Level	**Triggers**	**Incident Management Team Actions**	**Emergency Manager Actions**	**Notifications**
Lean Forward	• Terrorist Threat or act is reported at the Dam, OR • New structural damage or movement areas have not stabilised and are demonstrating indications of continued worsening.	• Use Incident Log to record all significant events in preparation for the development of an Emergency Event Report. • Implement continuous on-site dam safety monitoring (if access is possible). • Monitor the situation by estimating rate of change to the new structural damage or movement areas, making notes, and taking photographs. • Determine if the new condition is related to a potential structural failure mechanism at the Dam. • Provide it is safe to do so, instruct operators to undertake increased dam safety inspections and instrumentation readings. • Obtain expert dam safety advice and technical assistance as required. • Organise and manage any required remedial works on site. • Provide update reports to the Emergency Manager as directed. • Provide advice on the likelihood of dam failure and the need for downstream evacuations. • Escalate the EAP Activation Level as appropriate in accordance with observed site conditions.	• Manage Seqwater's emergency response. • Provide appropriate ongoing notifications, including advice in relation to the need for downstream evacuations, to stakeholders and the public, in accordance with Table 10 (Section 5.4).	1. Stakeholder and public notifications in accordance with Table 10 (Section 5.4).

STRUCTURAL DAMAGE TRIGGERS AND ACTIONS				
Activation Level	**Triggers**	**Incident Management Team Actions**	**Emergency Manager Actions**	**Notifications**
Stand Up	• **New structural damage or movement areas indicate some potential for a structural failure of the Dam.**	• As per previous Activation Level.	• Manage Seqwater's emergency response. • Provide appropriate ongoing notifications, including advice in relation to the need for downstream evacuations, to stakeholders and the public, in accordance with Table 10 (Section 5.4).	1. Stakeholder and public notifications in accordance with Table 10 (Section 5.4).
Stand Down	• Dam embankment is stable. • No indicators of potential dam failure are present.	• If the Activation Level has reached Stand Up, prepare, and submit an appropriate Emergency Event Report to DRDMW in accordance with the requirements of the Act.	Close the incident in accordance with the requirements of the Emergency Response Plan.	1. Stakeholder and public notifications in accordance with Table 10 (Section 5.4).

5.4 Notification details for dam safety hazard events

The following table summarises the external notifications to be made when increased seepage or structural damage to the Dam is identified, as outlined in Table 7 (Section 5.2) and Table 9 (Section 5.3).

Table 10: Dam safety hazard external notification table

DAM SAFETY HAZARD: EXTERNAL NOTIFICATIONS				
Activation Level	**Trigger for communications**	**Group to Contact**	**Method**	**Message Content**
Alert	• New event impacted the Dam: – Seepage – Physical damage – Earthquake greater than M3 in SEQ	• All SEQ Disaster Management Agencies with responsibilities in dam safety incidents for the Dam.	**Email:** Situation Report issued a minimum of daily unless it is agreed that less frequent updates are appropriate.	• Advise EAP is at Alert • What is the event? • What is the status? • Impacts of event on dam safety not fully understood, but the Dam is not expected to be at any risk of failure.
Lean Forward	• Terrorist Act is reported at the Dam Site	• Terrorist Event Agencies as listed in Appendix A.	**Telephone Call** to report the Terrorist Act to National Security Hotline and QPS.	• Advise EAP is at Lean Forward • What is the event? • What is the status?
	• Terrorist Act is reported at the Dam; OR • Significant seepage has been identified, earth material is evident in seepage and the increases cannot be controlled; OR • Structural damage or movement areas have not stabilised and are demonstrating indications of continued worsening.	• LDMG 1 Contact • LDMG 2 Contact	**Telephone call** to at least 1 contact at each affected LDMG.	• Advise EAP is at Lean Forward • What is the event? • What is the status? • Requirements for additional incident management?
		• All SEQ Disaster Management Agencies with responsibilities in dam safety incident for the Dam.	**Email:** Situation Report issued a minimum of daily unless it is agreed that less frequent updates are appropriate.	• Advise EAP is at Lean Forward • What is the event? • What is the status?
		• General Public	Information on Seqwater webpage and social media accounts as agreed with LDMGs.	• What is the event? • What is the status?

DAM SAFETY HAZARD: EXTERNAL NOTIFICATIONS				
Activation Level	**Trigger for communications**	**Group to Contact**	**Method**	**Message Content**
Stand Up (1)	Stand Up 1 activation level is not applicable for dam safety hazards.			
Stand Up (2)	• Dam failure is considered possible via an identified failure mechanism; • New structural damage or movement areas indicate some potential for a structural failure of the Dam; AND • **Dam failure possible, but unlikely within the next 12 hours.** • **This situation is an Emergency.**	• SDCC Watch Desk (QFES)	**Telephone call to** **Email EA Watch and Act Request Form (Appendix C) to**	Request that SDCC Watch Desk immediately issue the **Watch and Act** message to the relevant polygons under the Emergency Alert. *If SDCC advise Emergency Alert is unavailable, contact affected LDMG to enact their communications and response processes.*
		• LDMG 1 Contact • DDMG 1 Contact • LDMG 2 Contact • DDMG 2 Contact	**Telephone call** to at least 1 contact at each affected LDMG and DDMG. **Arrange Teleconference call if possible.** **Email:** Follow up telephone call with email of discussion.	• Advise EAP is at Stand UP • What is the event? • What is the status?
		• All SEQ Disaster Management Agencies with responsibilities in dam safety incidents.	**Email:** Talking Points issued a minimum of daily unless it is agreed that less frequent updates are appropriate.	• Advise EAP is at Stand UP • What is the event? • What is the status?
		• General Public	Information on Seqwater webpage and social media accounts as agreed with LDMGs.	• What is the event? • What is the status?

DAM SAFETY HAZARD: EXTERNAL NOTIFICATIONS				
Activation Level	**Trigger for communications**	**Group to Contact**	**Method**	**Message Content**
Stand Up (3)	• Dam failure is considered possible via an identified failure mechanism; • New structural damage or movement areas indicate some potential for a structural failure of the Dam; AND • **Dam failure is either currently occurring or likely within the next 12 hours.** • **This situation is an Emergency.**	• SDCC Watch Desk (QFES)	**Telephone call to** [redacted] **Email EA Warning Request Form (Appendix C) to** [redacted]	Request that SDCC Watch Desk immediately issue the **Warning** message to the relevant polygons under the Emergency Alert. *If SDCC advise Emergency Alert is unavailable, contact affected LDMG to enact their communications and response processes.*
		• LDMG 1 Contact • DDMG 1 Contact • LDMG 2 Contact • DDMG 2 Contact	**Telephone call** to at least 1 contact at each affected LDMG and DDMG. **Arrange Teleconference call if possible.** **Email:** Follow up telephone call with email of discussion.	• Advise EAP is at Stand Up • What is the event? • What is the status?
		• All SEQ Disaster Management Agencies with responsibilities in dam safety incidents.	**Email:** Talking Points issued a minimum of daily unless it is agreed that less frequent updates are appropriate.	• Advise EAP is at Stand Up • What is the event? • What is the status?
		• General Public	Information on Seqwater webpage and social media accounts as agreed with LDMGs.	• What is the event? • What is the status?
Stand Down	• Dam safety hazard is stable. No indicators of potential dam failure are present.	• All SEQ Disaster Management Agencies with responsibilities in dam safety incidents.	**Email:** Final Talking Points issued.	• What is the event? • What is the status? • Advise EAP has been deactivated.

6 Notification details

This section provides guidance around developing and issuing the notifications required in Section 5.

6.1 Media notifications

Once an Emergency Event has reached a Stand Up Activation Level, Seqwater will issue media releases/statements a minimum of daily and make a spokesperson available for daily media conferences or briefings if requested to do so by media organisations. This will continue until the responsibility for the management of the incident response is taken over by another Agency. Once this occurs, Seqwater will provide information to that Agency in accordance with directions received.

6.2 Public notification messages

The content of notification messages sent out in a real time dam safety emergency will depend on many factors. These factors include, but are not limited to:

- The type of emergency encountered.
- Whether localised or widespread flooding is occurring in conjunction with the dam safety emergency.
- The location and state of local evacuation centres.
- The state, condition, and capacity of transport routes likely to be used for evacuation.
- The estimated time to dam failure.

As some of these factors depend upon disaster management arrangements that would be put in place by Local Disaster Management Groups, Seqwater works with these Groups to develop a range of appropriate specific messaging in readiness for a range of potential dam safety emergency events and scenarios. In an emergency event, messaging will primarily focus on providing the following information:

- The nature of the emergency.
- The area impacted by the emergency.
- The expected time that the impacts will commence.
- Instructions to evacuate to or remain in a safe area.

Seqwater has uploaded messages to the State Disaster Management Portal for use by the SDCC if needed during an Emergency Event. These messages and associated approval forms are contained in Appendix C. These messages can be used as starting points by Disaster Management Agencies to formulate a situation appropriate message in an Emergency Event. Alternatively, Seqwater will initiate issuing these messages via an EA if considered appropriate due to the fast-developing nature of the Emergency Event.

6.3 Disaster Management Agency - flood event messaging

Seqwater has developed notification scripts which will be used as a basis for developing stakeholder messaging during flood events. Copies of theses scripts are contained in Appendix D. In a flood event, Seqwater will edit these scripts as the situation requires.

Stakeholders may also be advised of the Dam status at levels below the triggers specified in Section 5.1 in accordance with pre-agreed protocols. In some situations when the Seqwater Flood Operations Centre is mobilised, predicted peak lake levels and outflows may also be provided, however the provision of this information cannot be guaranteed. These notifications will be made by telephone as a first priority.

6.4 Disaster Management Agency - dam failure messaging

If a potential dam failure situation arises, Seqwater will provide appropriate notifications and inter-agency coordination to Local Councils and Disaster Management Stakeholders, as outlined in Table 6 and Table 10. Seqwater will provide these notifications and two-way communication in accordance with the Emergency Response Plan. The Emergency Response Plan provides for verbal communication (typically teleconference) supplemented with written Situation Reports. Dam failure emergencies can develop rapidly. The need for direct verbal communication for expediency of response should be assumed unless a situation specific assessment identifies sufficient time is available for alternative communication.

If a situation arises where the failure of the Dam is considered possible, Seqwater or the Agency managing the overall emergency response will liaise directly with the State Disaster Coordination Centre to issue appropriate notifications to persons located downstream of the Dam using EA. Details of the Agencies to take responsibility for this liaison and initiation are outlined in Table 11.

Table 11: Agency responsible for liaison with SDCC and initiation of Emergency Alert notifications

Speed of development of dam hazard	Agency responsible for liaising with SDCC
Slow (days)	Lead Emergency Response Agency (likely downstream LDMG / DDMG), with advice from Seqwater
Fast (hours)	Seqwater

To assist with expediating this process, pre-approved Emergency Alert messages and polygons are available in Appendix C and have been uploaded to the SDCC Disaster Management Portal.

Once a notification is initiated from EA, consequential management measures undertaken by the SDCC Watch Desk will be event dependent but will normally include:

- Informing others of the notifications, with primary considerations being:
  - Media (particularly local radio), through QFES Media and Corporate Communications
  - CEOs of impacted Local Government Areas
  - Minister's Office
- Ensuring, together with Telstra, that the use of the system does not adversely affect the telecommunications network
- Ensuring pre-prepared websites have relevant information
- Establishment of a system to measure the effectiveness of the campaign and other messages on the ground.

7 Dam failure flood maps

7.1 Near Population at Risk

Seqwater defines the Near Population at Risk as potentially habitable buildings located within the 0–1-hour Time to Flood dam failure event extent as shown in the Dam Failure Inundation maps. Figure 1 below shows the area downstream of Lake Macdonald Dam. To assist in evacuation planning, an address list of potentially habitable buildings impacted within the first hour following a dam failure event is shown in Table 12.

The list of potentially habitable buildings is not an exhaustive list and should be reviewed by emergency response personnel when planning evacuations downstream of Lake Macdonald Dam.

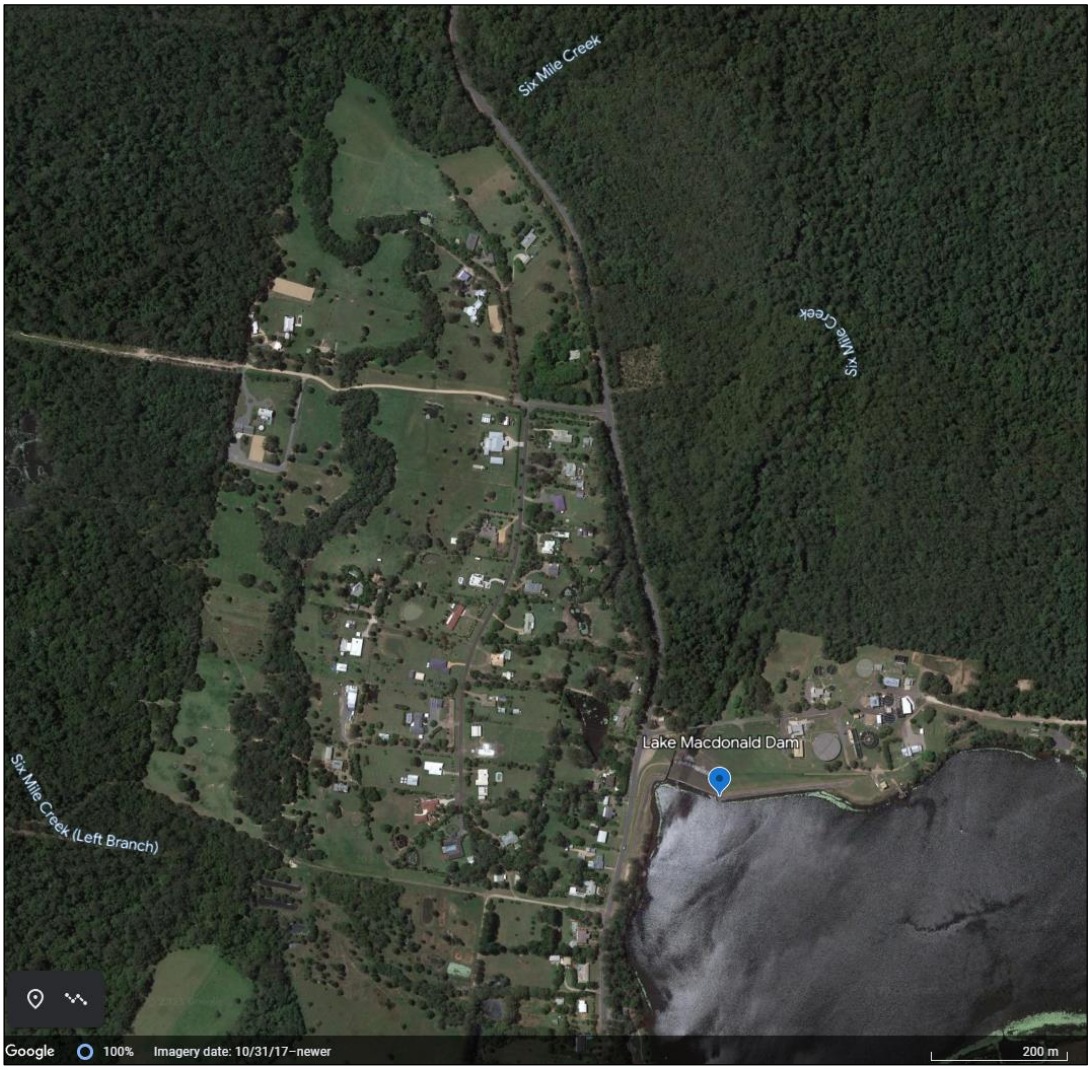


Figure 1: Location of potentially habitable buildings immediately downstream of Lake Macdonald Dam

Table 12 has been redacted

7.2 Dam Failure Flood Maps

The following maps provide an indication of potential flood inundation from a failure of the Dam. Determining the extent of this flood inundation involves complex modelling techniques that contain considerable uncertainties. Accordingly, in a potential dam failure scenario it is recommended that all areas within the Probable Maximum Flood (PMF) failure extent be evacuated, with evacuation priority given to areas close to the Dam.

Google Earth (.kml) files showing PMF and Sunny Day Failure inundation extents are available to Disaster Management Groups as a component of this Emergency Action Plan. These files can generally be used more effectively than hardcopy maps, and so are recommended for use by Disaster Management Groups as the primary source of dam failure inundation information.

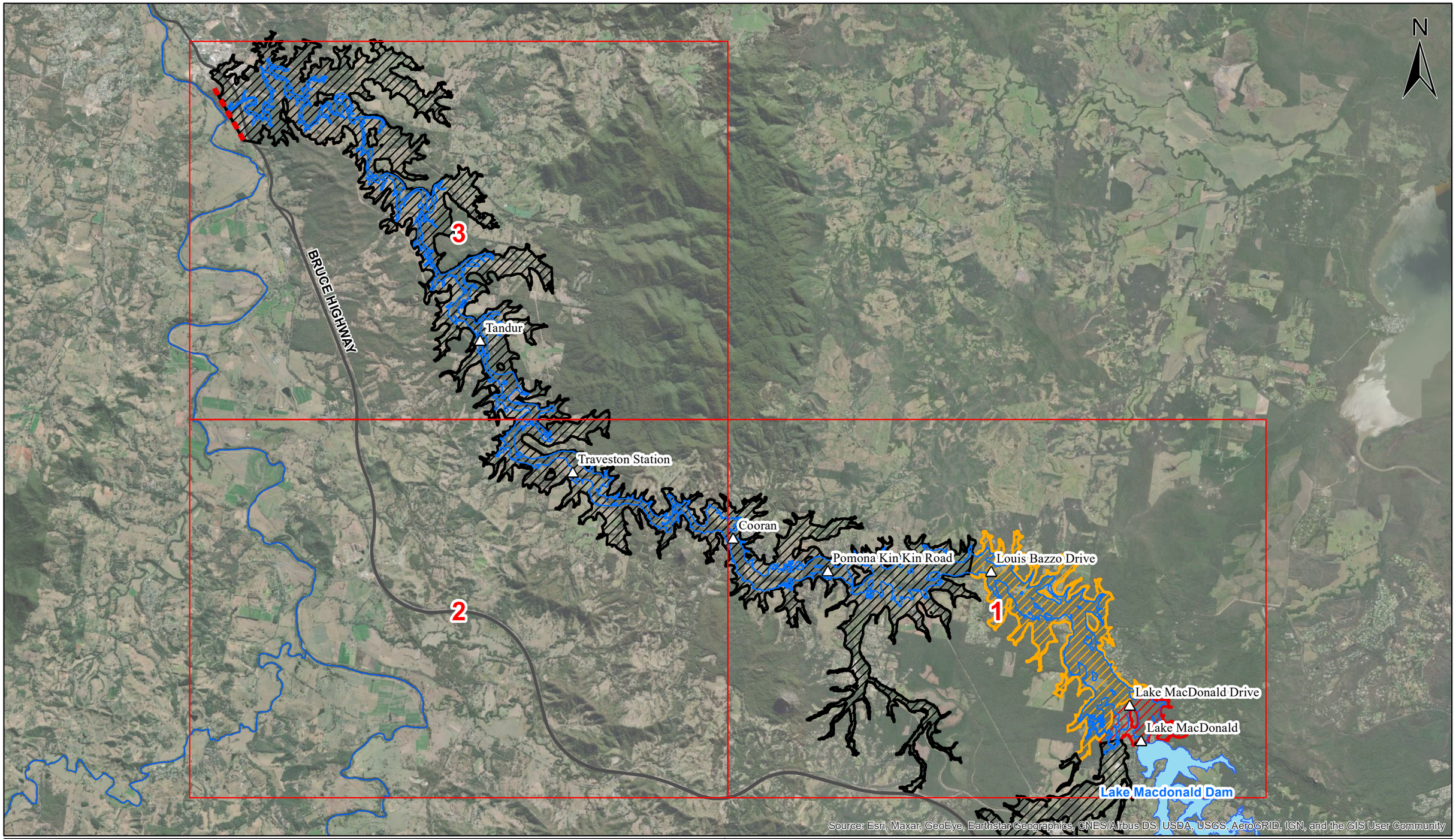
These maps have been developed to assist emergency event response and evacuation. The purpose of the maps is to provide a guide that allows Disaster Management Groups to understand the potential area that may be impacted by a dam failure scenario.

A dam failure may cause considerable damage to the road network downstream of the Dam due to extreme flood level rises, high velocities and debris that could potentially be generated by the failure. Therefore, for emergency event planning purposes, it should be assumed that all roads within the dam failure inundation extents on the following maps would be rendered unserviceable should a failure of the Dam occur.

The maps do not define property flood risks and do not in any way relate to flooding potential associated with natural flood events that do not involve a failure of the Dam. Property flood risk is generally defined by flood studies and associated land use planning controls prepared by and made available to the public by Local Governments.

The maps do not define the probability of a flood or the probability of dam failure. Dam failure risk at all Seqwater dams is very low.

The ‘Time to Flood’ extents shown on the maps should be regarded as an indication only. In an actual dam failure scenario, ‘Time to Flood’ extents will be heavily influenced by factors that cannot be predicted with any degree of certainty. These factors include the nature of the dam failure, the speed at which the failure develops, the final size of the dam breach, and concurrent rainfall and flooding.



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Legend

Estimate of Time to Impact (hours) for the Additional Impact of Dam Failure

- Inundation possible but might not be due to dam failure impact
- 0-1
- 1-2
- 2-3
- 3-6
- Major roads
- Extent of modelling
- Water storage
- Major waterway
- Sunny Day Failure Line

Lake MacDonald Dam Probable Maximum Flood Failure and Sunny Dam Failure Overview

0 1 2 3 4 5

km

Scale 1:94,500 @ A3

Disclaimer:

Estimates of Time to Imapct for the additional impact of dam failure are relative to the approximate time of dam failure.
Estimated additional impact of dam failure are a simulated scenario, and actual conditions in a dam failure event could vary at different locations depending on flooding occuring downstream, and timing of actual dam failure.
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If you have any queries, please contact Seqwater.

Date: 24/03/2022

Maps created by Hydrology and Risk Consulting

GDA
GDA 94 Zone 56

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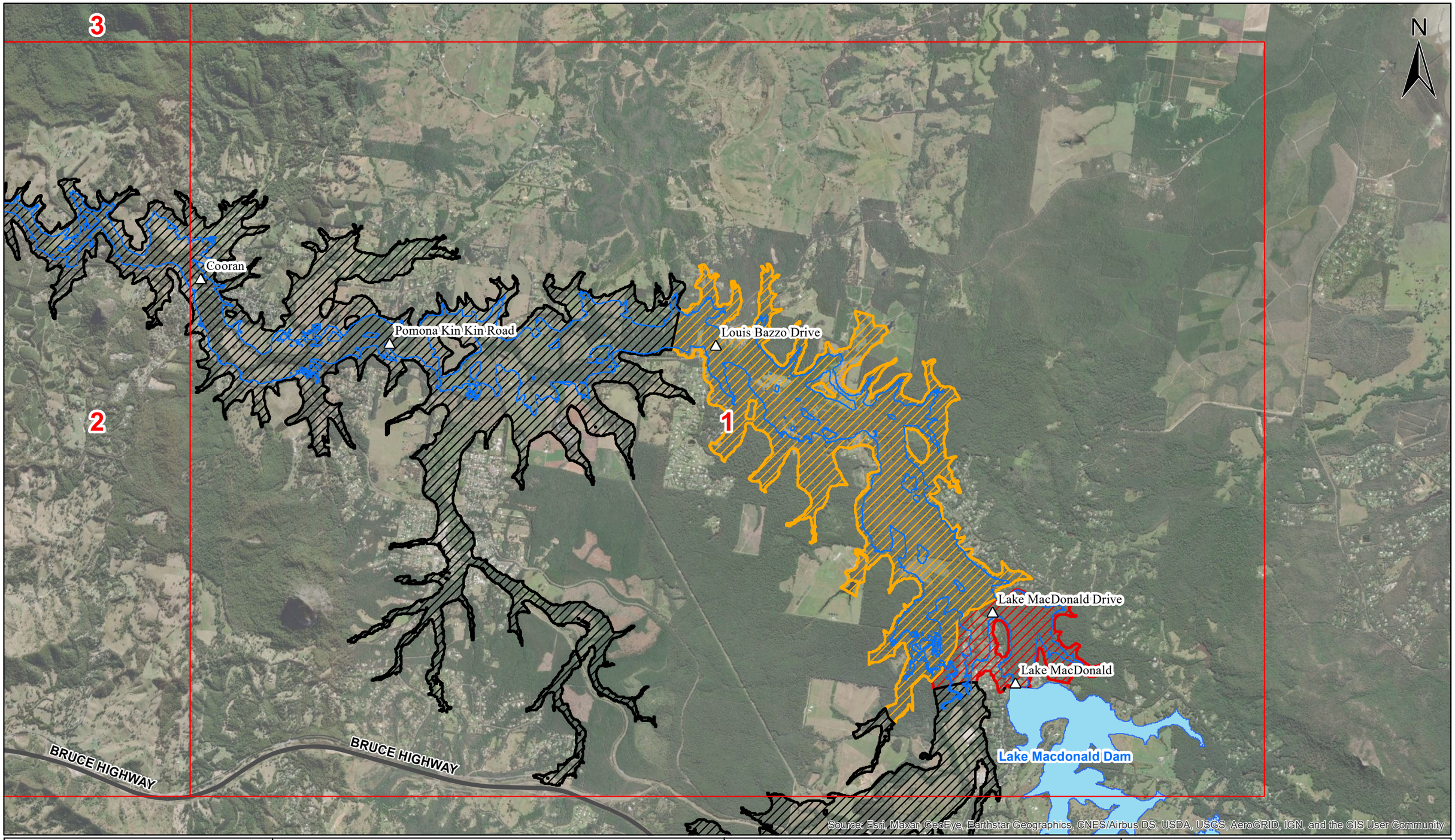

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Legend

Estimate of Time to Impact (hours) for the Additional Impact of Dam Failure

Inundation possible but might not be due to dam failure impact

0-1
1-2
2-3
3-6

Major roads

Extent of modelling

Water storage

Major waterway

Sunny Day Failure Line

Lake MacDonald Dam Probable Maximum Flood Failure and Sunny Dam Failure Map 1

0 0.5 1 1.5 2 2.5

km

Scale 1:47,300 @ A3

Disclaimer:

Estimates of Time to Imapct for the additional impact of dam failure are relative to the approximate time of dam failure.
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Date: 24/03/2022

Maps created by Hydrology and Risk Consulting

GDA
GDA 94 Zone 56

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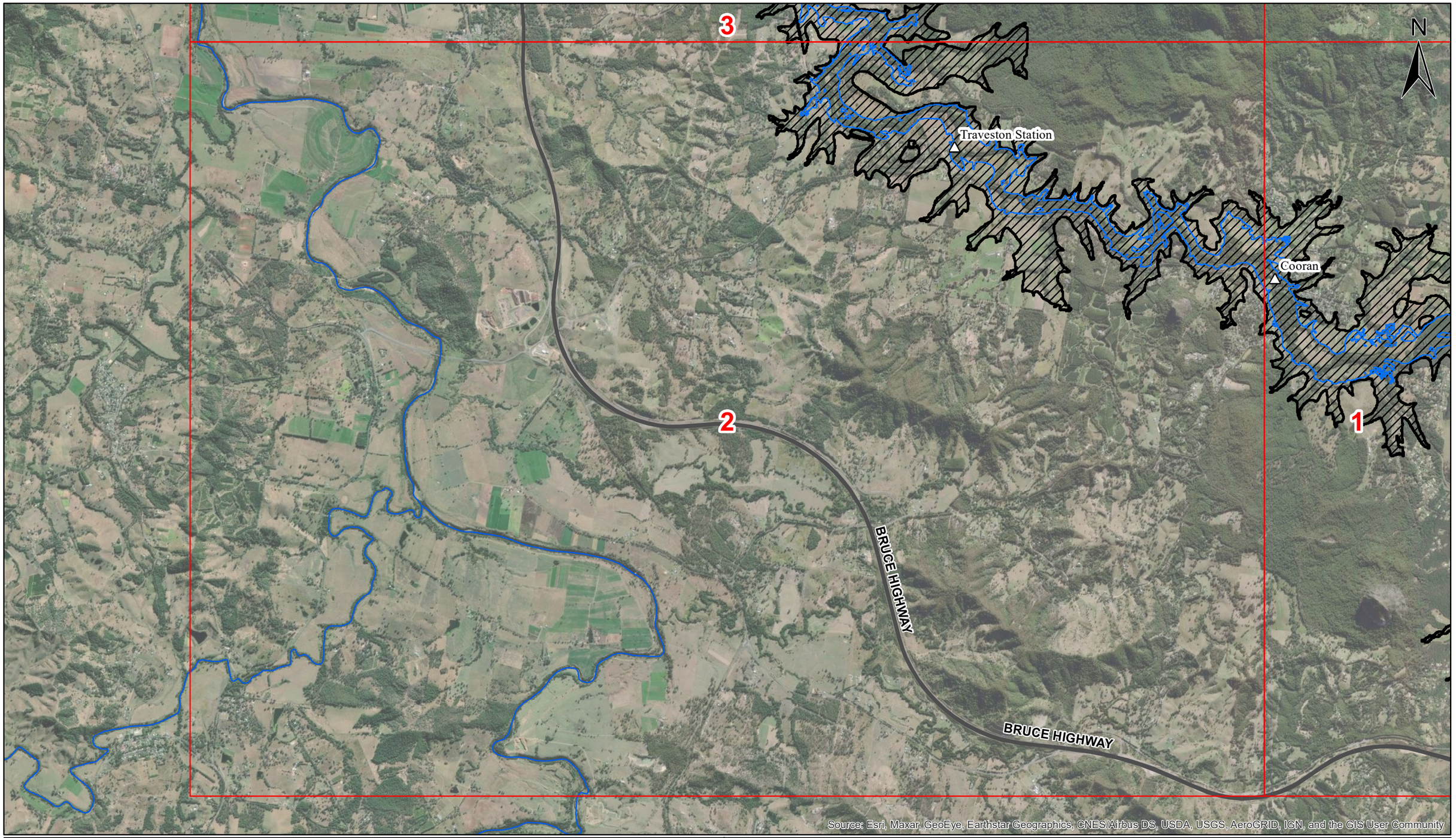

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Legend

Estimate of Time to Impact (hours) for the Additional Impact of Dam Failure

- Inundation possible but might not be due to dam failure impact
- 0-1
- 1-2
- 2-3
- 3-6
- Major roads
- Extent of modelling
- Water storage
- Major waterway
- Sunny Day Failure Line

Lake MacDonald Dam
Probable Maximum Flood Failure and Sunny Dam Failure
Map 2

0 0.5 1 1.5 2 2.5

km

Scale 1:47,300 @ A3

Disclaimer:

Estimates of Time to Imapct for the additional impact of dam failure are relative to the approximate time of dam failure.
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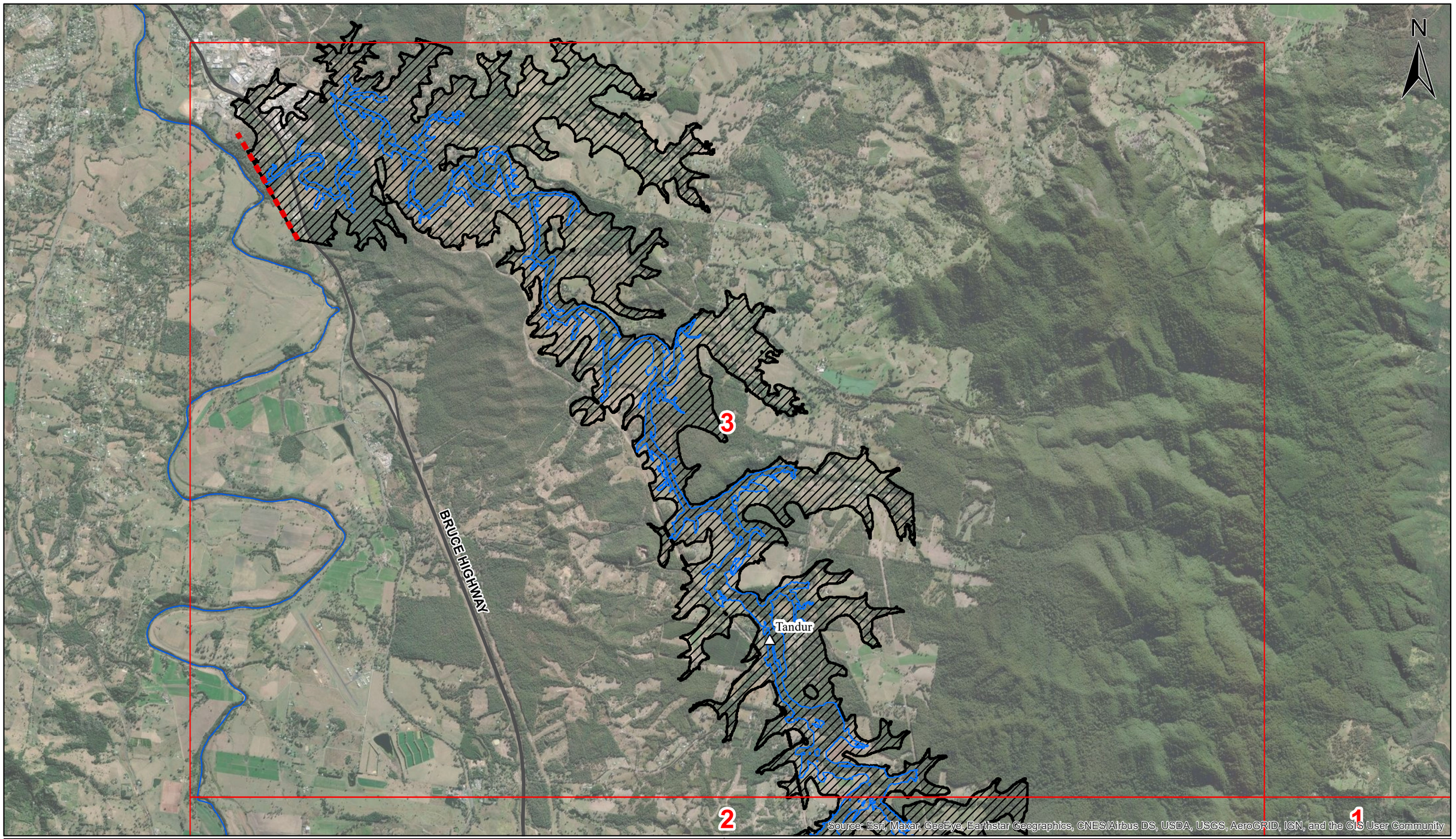
If you have any queries, please contact Seqwater.

Date: 24/03/2022

Maps created by Hydrology and Risk Consulting

GDA
GDA 94 Zone 56

Path: S:\3_Projects\SEQ00024\5_Technical\Spatial\WOR\EAP_maps\EAP_Lake_Macdonald_Dam_PMF_A3_Landscapey.mxd



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Legend

Estimate of Time to Impact (hours) for the Additional Impact of Dam Failure

- Inundation possible but might not be due to dam failure impact
- 0-1
- 1-2
- 2-3
- 3-6
- Major roads
- Extent of modelling
- Water storage
- Major waterway
- Sunny Day Failure Line

Lake MacDonald Dam
Probable Maximum
Flood Failure and Sunny Dam Failure
Map 3

0 0.5 1 1.5 2 2.5

km

Scale 1:47,300 @ A3

Disclaimer:

Estimates of Time to Imapct for the additional impact of dam failure are relative to the approximate time of dam failure.
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If you have any queries, please contact Seqwater.

Date: 24/03/2022

Maps created by Hydrology and Risk Consulting

GDA
GDA 94 Zone 56

Path: S:\3_Projects\SEQ00024\5_Technical\Spatial\WOR\EAP_maps\EAP_Lake_Macdonald_Dam_PMF_A3_Landscapey.mxd

8 Maximum dam outflow flood maps (no dam failure)

The following maps provide an indication of potential flood inundation close to the Dam that may occur due to the maximum spillway flow from the Dam in situations where the Dam does not fail. **For maps that account for dam failure, see Section 7.**

These maps do not show the maximum possible flooding downstream of the Dam because such flooding can be influenced by sources of floodwater that are not part of releases or outflows from the Dam. Such sources include run-off generated from localised flash flooding generated from unpredictable high intensity rainstorms occurring downstream of the Dam.

These maps do not replace approved flood maps for the area that have been published by a Local Government Authority, Disaster Management Group, State Government Agency, or Federal Government Agency. However, these maps can be used as a guide to potential flooding due to outflows from the Dam in the absence of approved flood maps.

8.1 Purpose and exclusions

The following maps have been produced to identify the areas likely to be flooded by a dam hazard event which is associated with natural flooding caused by water that has flowed naturally into the Dam.

The occurrence of a such an event does not automatically mean that there are concerns for the structural safety of the Dam or that emergency intervention is required at the Dam. In most cases, the occurrence of a such an event is an indication that sufficient rainfall has fallen to cause flooding. This flooding would be worse if the Dam had not been constructed.

8.2 Determination of maximum outflow

Seqwater has calculated the maximum outflow from the Dam to assist stakeholders to assess the potential impacts of major floods. Maximum outflow has been calculated by assuming that the lake level in the Dam has reached the Dam crest and the Dam has not failed. If the water level in the Dam exceeds the crest, the Dam is likely to fail.

8.3 Relevance of maximum outflow maps

Spillway flows from the Dam can combine with other downstream flows to produce an emergency for people and property downstream of the Dam (for example an *event* or *disaster* as defined in the *Disaster Management Act 2003*). This EAP does not define the disaster or emergency response actions for downstream flooding of this nature.

The following maps provide an indication of the potential hazard area that may be impacted by spillway outflows or releases from the Dam. In the absence of more detailed flood maps, these maps can be used to assist Disaster Management Groups and the public in identifying areas that may be potentially impacted by dam outflows.

The emergency response to flooding within these areas is led by Local Disaster Management Groups, with a range of agencies (including Seqwater) supporting these Groups in accordance with the *Emergency Management Assurance Framework, IGEM 2014*. Seqwater's contribution is providing information on the nature of the hazard arising from outflows from the Dam. The following maps assist in providing that information.

As noted above, when using the following maps, it is important to understand that the maps do not identify all possible downstream flooding scenarios. Downstream flooding could be significantly different to that shown in the maps due to the circumstances of each flood event. Some examples include, but are not limited to:

- Flooding at the Dam and no other floodwaters joining downstream of the Dam, which means the downstream flooding is entirely due to the Dam outflows.
- No flooding at the Dam and flooding occurs downstream due to rainfall downstream of the Dam or rainfall and flows on tributary catchments that join downstream of the Dam, which means that the Dam is not contributing to flooding.
- Flooding at the Dam and downstream flooding is more than dam outflows due to inflows from rainfall downstream of the Dam or rainfall and inflows on tributary catchments downstream of the Dam, which means that the Dam is partially contributing to flooding.

These numerous combinations of contribution to downstream flooding mean these maps should not be used as an alternative to published flood maps, but rather should be used to support other flood map information.

8.4 Maximum outflow extent map limitations of accuracy

Determining the extent of dam outflow flood inundation involves complex modelling techniques that contain considerable uncertainties. The map accuracy can be limited by:

- Accuracy of topographic survey;
- Accuracy of modelling methods;
- Omissions of hydraulic structures; and
- Omission of any changes to channel and floodplain conditions (e.g. land development) that occurred after the time of the survey information used to produce the maps.

The maps do not define property flood risks.

The maps do not define the probability of a flood.

The maps only show the maximum spillway outflow. The maps do not show outflow conditions for any of the trigger levels and notifications as defined in Section 5.1.

8.5 Available flood intelligence for Disaster Management Groups

In addition to the information contained in this EAP, Disaster Management Agencies can obtain real time information on dam levels and dam outflows for all Seqwater's un-gated dams during flood events directly and on a continuing basis at https://damoutflow.seqwater.com.au.

Kin Kin

N

Boreen

1

3

Traveston

Cooran

Pinbarren

BRUCE HIGHWAY

Pomona

2

4

seqwater
WATER FOR LIFE

Legend

- Major Roads
- Major Waterway
- Indicative Flood Extent
- Water Storage
- Map Index

Lake Macdonald
Downstream Release Hazard Inundation Extents
Maximum Dam Release for Scenario Without Dam Failure
Overview

0 1 2 3 4 5

Km

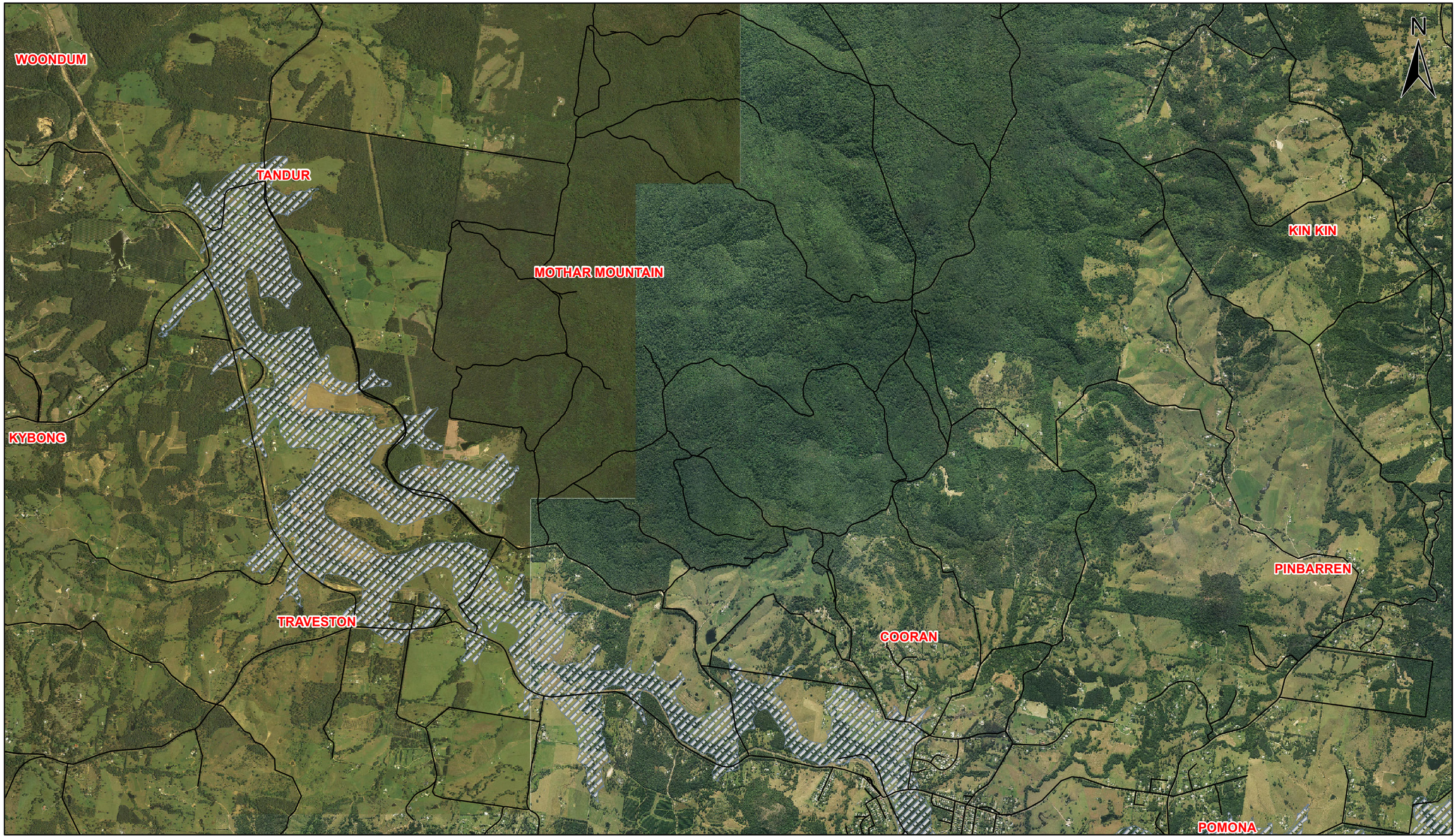
Scale 1:75,000 @ A3

Disclaimer: **Date: 3/02/2016**

Seqwater makes no representation or warranty as to the accuracy, completeness, reliability or suitability of the GIS data and any other information provided by Seqwater for any specific purpose and disclaims any responsibility or liability for any expenses, losses, damages and costs which may be suffered or incurred as a result of or in connection with using or relying on the data or the information provided by Seqwater. Please ensure the map attached accurately represents the location of proposed works. you have any queries, please contact Seqwater.

GDA
GDA 94 Zone 56

Path: Z:\Data_Management_Plan\MAPS\ESRI\MXDs\Modelling\Flood_Maps_2016_January\20160203_Lake_Macdonald_DCFNF_Overview_A3_Landscape.mxd



seqwater
WATER FOR LIFE

Legend

- Major Road
- Street
- Indicative Flood Extent
- Water Storage

Lake Macdonald
Downstream Release Hazard Inundation Extents
Maximum Dam Release for Scenario Without Dam Failure
Map 1

0 0.5 1 1.5 2
Km
Scale 1:35,000 @ A3

Disclaimer: **Date: 3/02/2016**

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GDA
GDA 94 Zone 56

Path: Z:\Data_Management_Plan\MAPS\ESRI\MXDs\Modelling\Flood_Maps_2016_January\20160202_Lake_Macdonald_DCFNF_A3_Landscape.mxd

seqwater
WATER FOR LIFE

Legend

- Major Road
- Street
- Indicative Flood Extent
- Water Storage

Lake Macdonald
Downstream Release Hazard Inundation Extents
Maximum Dam Release for Scenario Without Dam Failure
Map 2

0 0.5 1 1.5 2
Km
Scale 1:35,000 @ A3

Disclaimer: **Date: 3/02/2016**

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GDA
GDA 94 Zone 56

Path: Z:\Data_Management_Plan\MAPS\ESRI\MXDs\Modelling\Flood_Maps_2016_January\20160202_Lake_Macdonald_DCFNF_A3_Landscape.mxd

seqwater
WATER FOR LIFE

Legend

- Major Road
- Street
- Indicative Flood Extent
- Water Storage

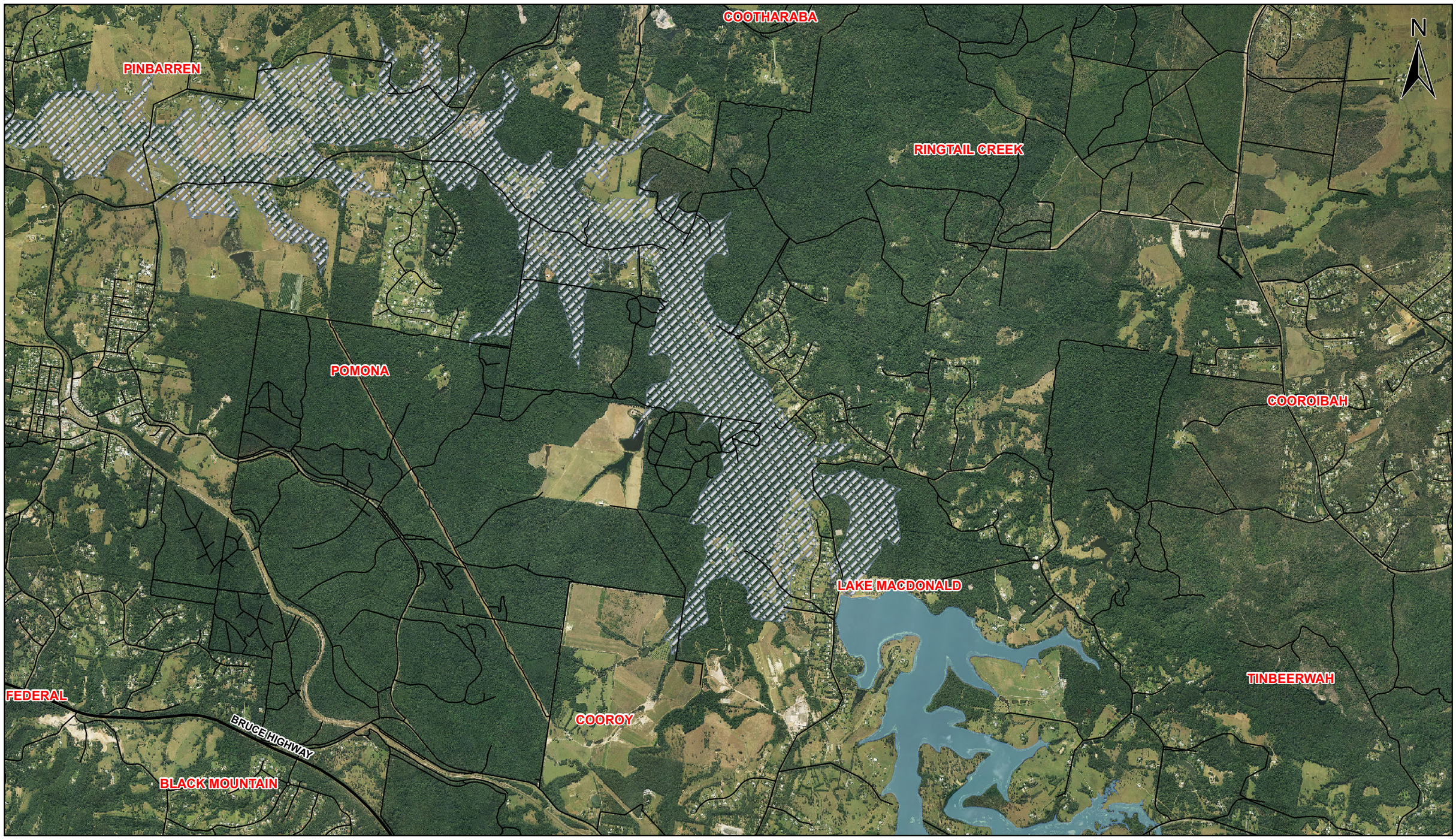
Lake Macdonald
Downstream Release Hazard Inundation Extents
Maximum Dam Release for Scenario Without Dam Failure
Map 3

0 0.5 1 1.5 2
Km
Scale 1:35,000 @ A3

Date: 3/02/2016

GDA
GDA 94 Zone 56

Path: Z:\Data_Management_Plan\MAPS\ESRI\MXDs\Modelling\Flood_Maps_2016_January\20160202_Lake_Macdonald_DCFNF_A3_Landscape.mxd



seqwater
WATER FOR LIFE

Legend

- Major Road
- Street
- Indicative Flood Extent
- Water Storage

Lake Macdonald
Downstream Release Hazard Inundation Extents
Maximum Dam Release for Scenario Without Dam Failure
Map 4

0 0.5 1 1.5 2

Km

Scale 1:35,000 @ A3

Date: 3/02/2016

Disclaimer:
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GDA
GDA 94 Zone 56

Path: Z:\Data_Management_Plan\MAPS\ESRI\MXDs\Modelling\Flood_Maps_2016_January\20160202_Lake_Macdonald_DCFNF_A3_Landscape.mxd

9 References

Description	Status	Location
Emergency Management Assurance Framework	2014	https://www.igem.qld.gov.au/sites/default/files/2019-11/IGEM-EMAF.pdf
Emergency Response Plan	Current	ERP-00001
Seqwater Dam Safety Management Program	2021	PLN-00336
Seqwater Fatigue Management Procedure	2021	PRO-00696
Seqwater Dams – Release and Spilling Communication Procedure	December 2020, Revision 6	PRO-00598

Appendix A – Contact register

Appendix A and Appendix B have been redacted

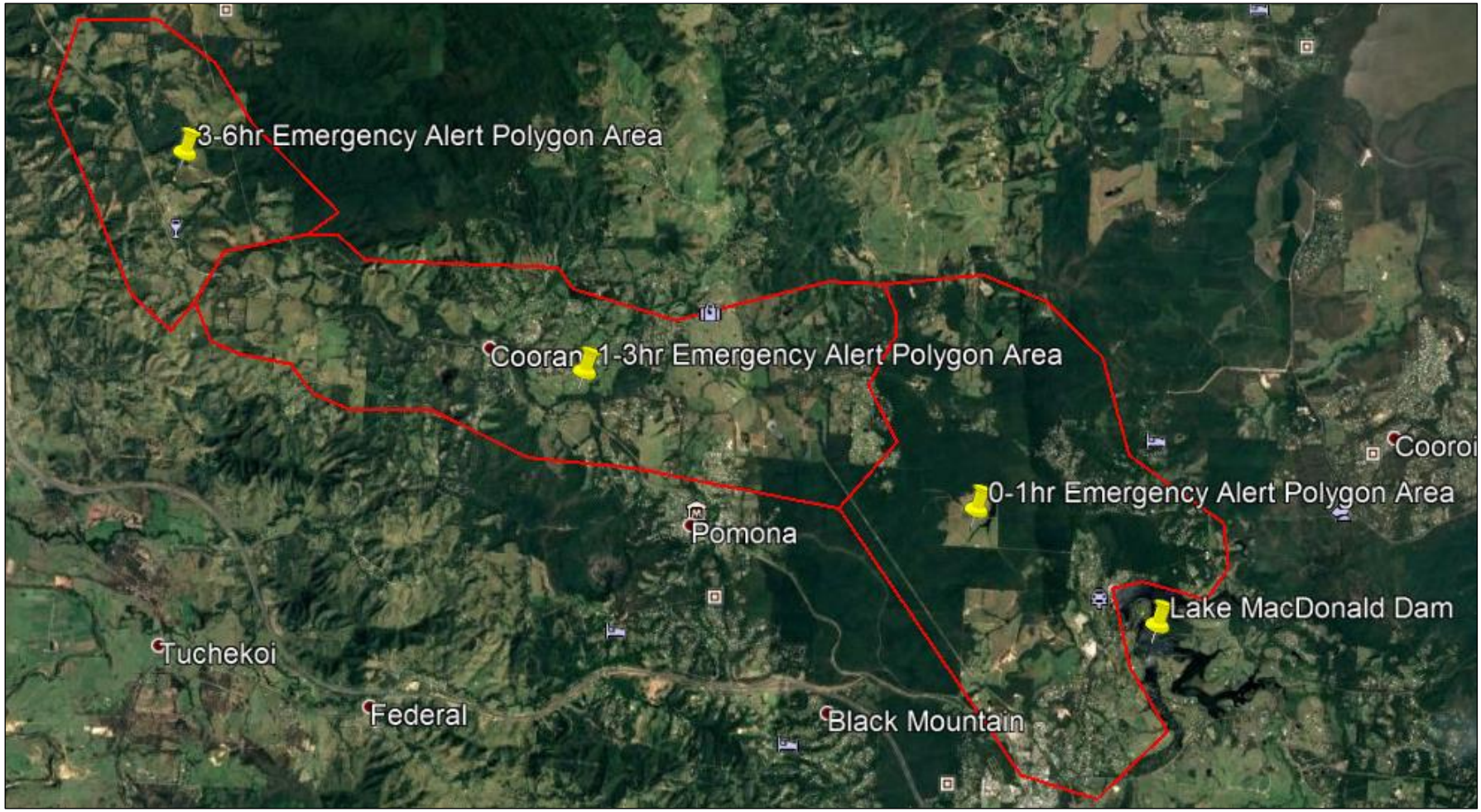
Appendix C – Emergency Alert polygons and scripts

Emergency Alert polygons

Emergency Alert (EA) is the system used by Seqwater to warn populations at risk downstream of the Dam of a potential or actual dam failure. Details of EA can be found at http://www.disaster.qld.gov.au/.

The EA system can import digital spatial data files (polygons in Google Earth KML format) that define a particular geographic area for the issue of an EA. For an Emergency Event associated with potential or actual dam failure, these polygons have been defined by Seqwater and extend over the Dam Failure Flood Maps shown in Section 7. The polygons are not defined exactly to the extents of Dam Failure Flood Maps due to the requirements for EA polygons, which require simplified area shapes for expediency of use.

Polygons in KML format for EA have been uploaded to reside directly within the SDCC Disaster Management Portal for immediate use by the SDCC Watch Desk if needed during an Emergency Event.


3-6hr Emergency Alert Polygon Area
Cooran
1-3hr Emergency Alert Polygon Area
Cooroi
0-1hr Emergency Alert Polygon Area
Pomona
Lake MacDonald Dam
Tuchekoi
Federal
Black Mountain

Queensland Government

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

EMERGENCY ALERT REQUEST

Location of Alert: Lake Macdonald Dam – Major issue detected, may lead to potential dam failure flood event (e.g. Suburb, Town)	**Date:** DD/MM/YYYY
LGA/Agency requesting: Seqwater	**Time:** **XX:XX hrs**

Requesting Officer (e.g. Disaster Coordinator/Incident Controller)
Name: **<ENTER SEQWATER PERSONNEL DETAILS>**
Agency/Position: Seqwater

Telephone: [redacted]
(SDCC Watch Desk may telephone you)

Email: [redacted]

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

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

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

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

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

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

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

EA Messaging Filename (Doc, Pdf):

Polygon Filename, (Kml, Kmz, Gml, GeoJSON):
DIRECTION BASED ON HOURLY PROGRESSION AS REFERENCED IN FILE NAME
[redacted]

Number of polygons _3 (if multiple, attach list in order of priority)

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

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

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

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

Watch & Act msg from Seqwater. Lake Macdonald Dam possibility of dam failure.Prepare to evacuate away from Six Mile Creek.Warn others.Listen to local ABC radio or www.disaster.qld.gov.au

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

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

Send to [redacted] **to confirm receipt**

FOR USE BY SDCC

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

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

EA User Name:
Signature: Date: / /

Emergency Alert No:

Authorising Officer Name:
Signature: Date: / /

EMS EA Campaign Report ID:

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

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

Queensland Government

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

EMERGENCY ALERT REQUEST

Location of Alert: Lake Macdonald Dam – Potential for dam failure flood event (e.g. Suburb, Town)

Date: DD/MM/YYYY

LGA/Agency requesting: Seqwater

Time: XX:XX hrs

Requesting Officer (e.g. Disaster Coordinator/Incident Controller)
Name: <ENTER SEQWATER PERSONNEL DETAILS>
Agency/Position: Seqwater

Telephone: [redacted]
(SDCC Watch Desk may telephone you)

Email: [redacted]

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

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

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

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

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

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

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

EA Messaging Filename (Doc, Pdf):

Polygon Filename, (Kml, Kmz, Gml, GeoJSON):
DIRECTION BASED ON HOURLY PROGRESSION AS REFERENCED IN FILE NAME
[redacted]

Number of polygons __3__ (if multiple, attach list in order of priority)

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

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

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

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

Emergency Warning from Seqwater. Lake Macdonald Dam imminent failure risk.Move immediately from Six Mile Creek to high ground.Warn others. Listen to local ABC radio or www.disaster.qld.gov.au

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

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

Send to [redacted] **to confirm receipt**

FOR USE BY SDCC

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

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

EA User Name:
Signature: Date: / /

Emergency Alert No:

Authorising Officer Name:
Signature: Date: / /

EMS EA Campaign Report ID:

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

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

AWS messaging

The following templates may be used to develop a message to be released alongside the relevant Emergency Alert messages during a dam failure event. The LOCATION, HAZARD and CALL TO ACTION should be reviewed and selected as appropriate for the current situation.

The list of places identified in the following templates are locations that fall within the PMF-Failure polygons for Lake Macdonald Dam. Refinement of the impacted areas should occur in real-time if the situation permits.

The following templates can be used to create messages to warn people likely to be flooded to get ready to leave for their own safety. This could be due to danger from flooding, or likelihood of extended isolation.

Possible dam failure > Watch and Act > Prepare to leave

PREPARE TO LEAVE – Noosa Shire Council Area – possible failure of Lake Macdonald Dam as at [time, day, date, year]

Warning Level: Watch and Act

Warning area: Noosa Shire Council area downstream of Lake Macdonald Dam and in proximity to Six Mile Creek

People in the following places must prepare to leave:

- Cooran
- Cooroy
- Lake Macdonald
- Pinbarren
- Pomona
- Ringtail Creek

Water levels in Six Mile Creek may rise rapidly. Prepare to move to higher ground and for isolation.

Do not expect emergency services to come to your door.

If your life is in danger, call Triple Zero (000) immediately.

What you should do:

- Prepare to leave so you can go quickly if the water levels in Six Mile Creek start to rise. Get ready now.
- Decide where you and the people you live with will go. Find a safe and high place away from flooding.
- If you do not have a safe place, [an evacuation centre has / evacuation centres have] been set up at:
  - Venue name and full address
  - Venue name and full address
- Warn friends, family and neighbours in the area of the possibility of dam failure.

More information:

For Noosa Shire Council updates and a map of areas that may flood, go to https://disaster.noosa.qld.gov.au/

The next update will be sent at [time, day, date] or when the situation changes.

This warning is from [issuing agency name].

Possible dam failure > Watch and Act > Prepare to leave

PREPARE TO LEAVE – Gympie Regional Council Area – possible failure of Lake Macdonald Dam as at [time, day, date, year]

Warning Level: Watch and Act

Warning area: Gympie Regional Council area downstream of Lake Macdonald Dam and in proximity to Six Mile Creek

People in the following places must prepare to leave:

- Mothar Mountain
- Tandur
- Traveston

Water levels in Six Mile Creek may rise rapidly. Prepare to move to higher ground and for isolation.

Do not expect emergency services to come to your door.

If your life is in danger, call Triple Zero (000) immediately.

What you should do:

- Prepare to leave so you can go quickly if the water levels in Six Mile Creek start to rise. Get ready now.
- Decide where you and the people you live with will go. Find a safe and high place away from flooding.
- If you do not have a safe place, [an evacuation centre has / evacuation centres have] been set up at:
  - Venue name and full address
  - Venue name and full address
- Warn friends, family and neighbours in the area of the possibility of dam failure.

More information:

For Gympie Regional Council updates and a map of areas that may flood, go to http://disaster.gympie.qld.gov.au/

The next update will be sent at [time, day, date] or when the situation changes.

This warning is from [issuing agency name].

This warning template can be used to develop a message to warn people still in the area that it may be too late to leave, and they should get as high as possible.

Dam Failure > Emergency Warning > Too dangerous to leave/Move to higher ground

TOO DANGEROUS TO LEAVE/MOVE TO HIGHER GROUND – [Local Government Area – potential failure of Lake Macdonald Dam as at [time, day, date, year]

Warning Level: EMERGENCY WARNING

Warning area: [insert names of area/s likely to be impacted as per Watch and Act Template]

People in the following places must immediately move to higher ground:

- [List places as per relevant Watch and Act template]

Get up as high as you can where you are. There is likely to be dangerous, fast-moving flooding and debris along Six Mile Creek.

You are in serious danger. You must get up as high as you can to survive.

If your life is in danger, call Triple Zero (000) immediately.

What you should do:

- Stay where you are and get up as high as you safely can. This could be upstairs or on the roof.
- Help other people who are with you if you can.
- Tell someone where you are.
- Stay in place until you are rescued, or the water goes down enough to safely leave.

More information:

- For [Local Government area] updates and a map of areas that may flood, go to [website/disaster dashboard].

The next update will be sent at [time, day, date] or when the situation changes.

This warning is from [issuing agency name].

Appendix D – Example LDMG Flood Event notification scripts

The following summaries and scripts can be used to develop key message conversations with external agencies during Flood Events. These conversations are intended to initially be a telephone conversation with the same key messages of the conversation then sent in a follow up email to the agency contacted.

The text in black would generally be expected to be provided in all situations. The text in red would be provided only if relevant to the situation being reported.

Lean Forward – Large flood notification

Hello, this is [YOUR NAME] from the Seqwater Flood Operations Centre. I'm calling regarding the issue of a Lean Forward notification required under the Lake Macdonald Dam Emergency Action Plan.

*This notification is related to exceeding the Lake Macdonald Drive trigger, identified as lake level **96.40 m AHD.***

*The lake level is currently **XXX m AHD** and **rising / steady**. The level is expected to **continue to rise / peak by TIME / reach the trigger by XXX**. This is subject to further rainfall within the catchment.*

*This level indicates the dam outflows **are / are expected to*** impact Lake Macdonald Drive.

*The Lake Macdonald Dam EAP is **now at / will soon reach** the Lean Forward Activation Level. Your organisation should enact any of your organisations plans related to this trigger.*

*We will not contact you again unless the lake level reaches the next trigger level listed in the EAP, which is **96.80 m AHD**. This **is / is not** expected to happen within the next **XXX hours**. However, please don't hesitate to contact the Flood Operations Centre on [redacted] if you require any further information.*

Stand Up 1 and 2 – Flood event trigger

Hello, this is [YOUR NAME] from the Seqwater Flood Operations Centre. I'm calling regarding the issue of a Stand Up notification required under the Lake Macdonald Dam Emergency Action Plan.

*This Stand Up notification is related to exceeding the Flood of Record for Lake Macdonald Dam, identified as lake level **97.3 m AHD.***

*The lake level is currently **XXX m AHD** and **rising / steady**. The level is expected to **continue to rise / peak by TIME / reach the trigger by XXX**. This is subject to further rainfall within the catchment.*

*This level indicates the dam is **expected to experience / is experiencing** the highest water level at the dam since construction, and the performance of the dam at these loads has not been physically validated. While we are not anticipating any issues, we are monitoring the situation and will notify you if any dam safety concerns are identified during surveillance.*

*The Lake Macdonald Dam EAP **is now at / expected to soon reach** the Stand Up Activation Level. Due to the speed of the situation, the **Watch & Act Emergency Alert/Warning Emergency Alert has been / should be issued**. Your organisation should enact any plans related to this trigger, including any necessary evacuations of downstream communities.*

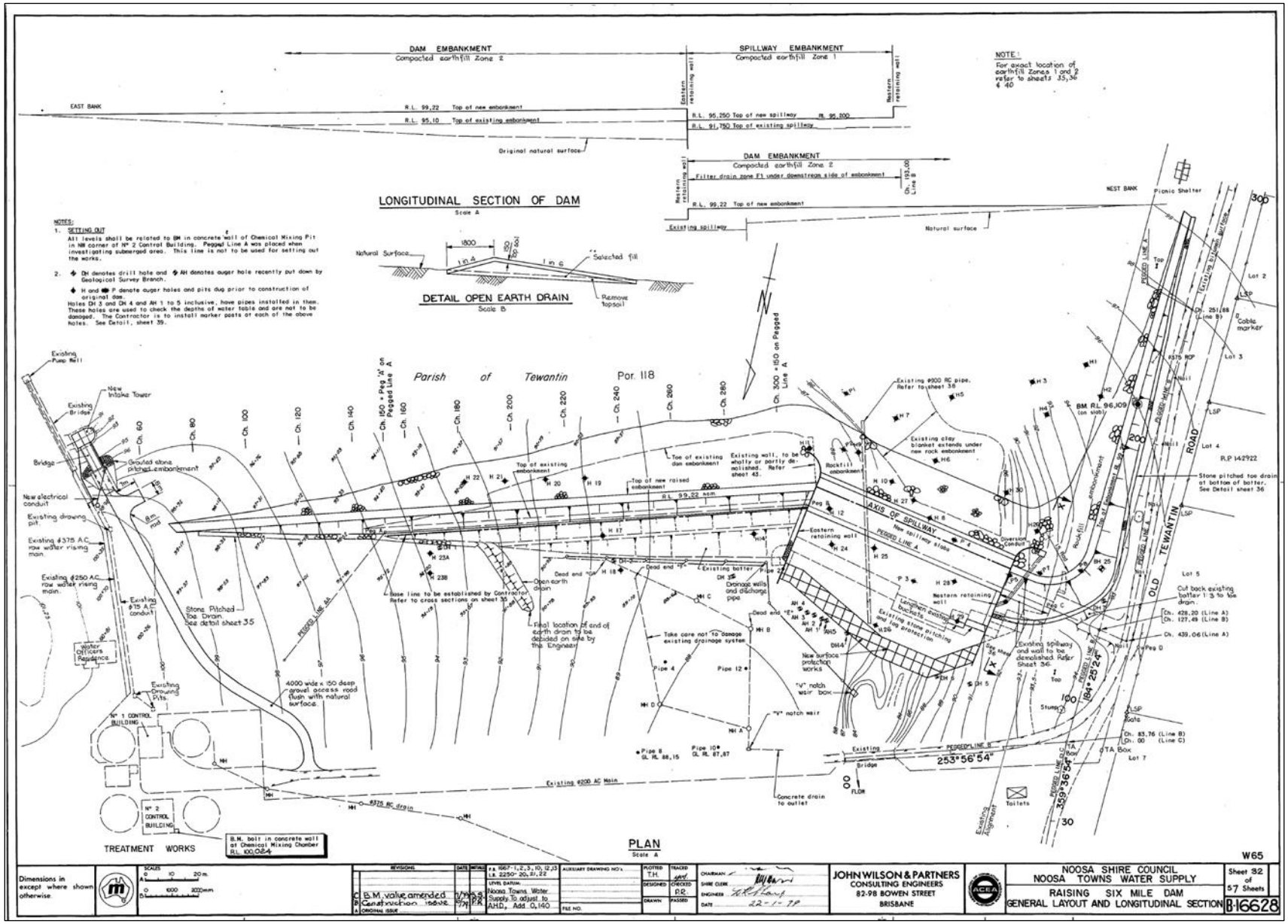
(If EA already triggered): Be aware your community will be receiving these messages, be prepared for enquiries. Our communications team is available to assist with message content and sharing if required.

*We will not contact you again unless the situation changes significantly, or another Emergency Alert is required to be issued. This **is / is not** expected to happen within the next XXXX hours.*

We will follow this phone call up with an email, which will confirm this conversation and include the pre-agreed content of the next EA that would be issued. If no adjustments are provided, we will request the issuing of this EA when we reach the secondary spillway and notify your organisation.

*In summary, Lake Macdonald Dam is experiencing an Emergency Flood Level. While dam failure **is / is not imminent**, residents should be prepared to evacuate. We will be in further contact if the situation changes. Please don't hesitate to contact the Flood Operations Centre on [redacted] if you require any further information.*

Appendix E – General arrangement plans


DAM EMBANKMENT
Compacted earthfill Zone 2
SPILLWAY EMBANKMENT
Compacted earthfill Zone 1
NOTE:
For exact location of earthfill Zones 1 and 2 refer to sheets 35,36 & 40
EAST BANK
R.L. 99,22 Top of new embankment
R.L. 95,10 Top of existing embankment
R.L. 95,250 Top of new spillway
R.L. 91,750 Top of existing spillway
Original natural surface
Eastern retaining wall
Western retaining wall
DAM EMBANKMENT
Compacted earthfill Zone 2
Filter drain zone F1 under downstream side of embankment
Ch. 193,00 Line B
WEST BANK
Picnic Shelter
Existing spillway
Natural surface
LONGITUDINAL SECTION OF DAM
Scale A
NOTES:
1. SETTING OUT
All levels shall be related to BM in concrete wall of Chemical Mixing Pit in NW corner of N° 2 Control Building. Pegged Line A was placed when investigating submerged area. This line is not to be used for setting out the works.
2. DH denotes drill hole and AH denotes auger hole recently put down by Geological Survey Branch.
H and P denote auger holes and pits dug prior to construction of original dam.
Holes DH 3 and DH 4 and AH 1 to 5 inclusive, have pipes installed in them. These holes are used to check the depths of water table and are not to be damaged. The Contractor is to install marker posts at each of the above holes. See Detail, sheet 39.
Natural Surface
1800
1 in 4
1 in 6
Selected fill
Remove topsoil
DETAIL OPEN EARTH DRAIN
Scale B
Existing Pump Well
New Intake Tower
Existing Bridge
Bridge
Grouted stone pitched embankment
New electrical conduit
Existing drowning pit.
Existing ϕ375 A.C. raw water rising main.
Existing ϕ250 A.C. raw water rising main.
Existing ϕ75 A.C. conduit
Water Officers Residence
Existing Drowning Pits.
N° 1 CONTROL BUILDING
N° 2 CONTROL BUILDING
TREATMENT WORKS
B.M. bolt in concrete wall of Chemical Mixing Chamber R.L. 100,024
Parish of Tewantin Por. 118
Ch. 60
Ch. 80
Ch. 100
Ch. 120
Ch. 140
Ch. 150 + Peg 'A' on Pegged Line A
Ch. 160
Ch. 180
Ch. 200
Ch. 220
Ch. 240
Ch. 260
Ch. 280
Ch. 300 + 150 on Pegged Line A
Top of existing embankment
Toe of existing dam embankment
Top of new raised embankment
R.L. 99,22 asm
Existing wall, to be wholly or partly de-polished. Refer sheet 43.
Rockfill embankment
Existing ϕ900 RC pipe. Refer to sheet 36
Existing clay blanket extends under new rock embankment
BM. R.L. 96,109 (on slab)
AXIS OF SPILLWAY
New spillway slabs
Eastern retaining wall
Diversion Conduit
Western retaining wall
Existing batter
Drainage wells and discharge pipe
Base line to be established by Contractor Refer to cross sections on sheet 35
Open earth drain
Dead end
Final location of end of earth drain to be decided on site by the Engineer
Take care not to damage existing drainage system
Stone Pitched Toe Drain. See detail sheet 35
4000 wide x 150 deep gravel access road flush with natural surface.
Existing stone pitching and toe protection
New surface protection works
"V" notch weir box
"V" notch weir
Existing spillway and wall to be demolished. Refer Sheet 36
Pipe 4
Pipe 12
Pipe 8 GL RL 88,15
Pipe 10 GL RL 87,87
Existing ϕ200 AC Main
ϕ375 RC drain
Concrete drain to outlet
Existing Bridge
FLOR
Toilets
Existing Alignment
253°56'54"
359°36'54"
184°25'24"
OLD TEWANTIN ROAD
R.P 142922
Stone pitched toe drain at bottom of batter. See Detail sheet 36
Cut back existing batter 1:3 to toe drain.
Ch. 428,20 (Line A)
Ch. 127,49 (Line B)
Ch. 439,06 (Line A)
Ch. 83,76 (Line B)
Ch. 00 (Line C)
Cable marker
Ch. 251,88 (Line B)
Lot 1
Lot 2
Lot 3
Lot 4
Lot 5
Lot 7
PLAN
Scale A
W65
Dimensions in except where shown otherwise.
B.M. valve amended
Construction issue
JOHN WILSON & PARTNERS
CONSULTING ENGINEERS
82-98 BOWEN STREET
BRISBANE
NOOSA SHIRE COUNCIL
NOOSA TOWNS WATER SUPPLY
RAISING SIX MILE DAM
GENERAL LAYOUT AND LONGITUDINAL SECTION
Sheet 32 of 57 Sheets
B-16628

Appendix F – Identified structural failure modes

A Dam Safety Risk Assessment undertaken in accordance with ANCOLD Guidelines has been completed for Lake Macdonald Dam. The failure modes that remained after the risk assessment screening process, their initiating events, and the section of this EAP under which these failure modes would be managed if a dam hazard trigger associated with the failure mode occurs is summarised in the table below.

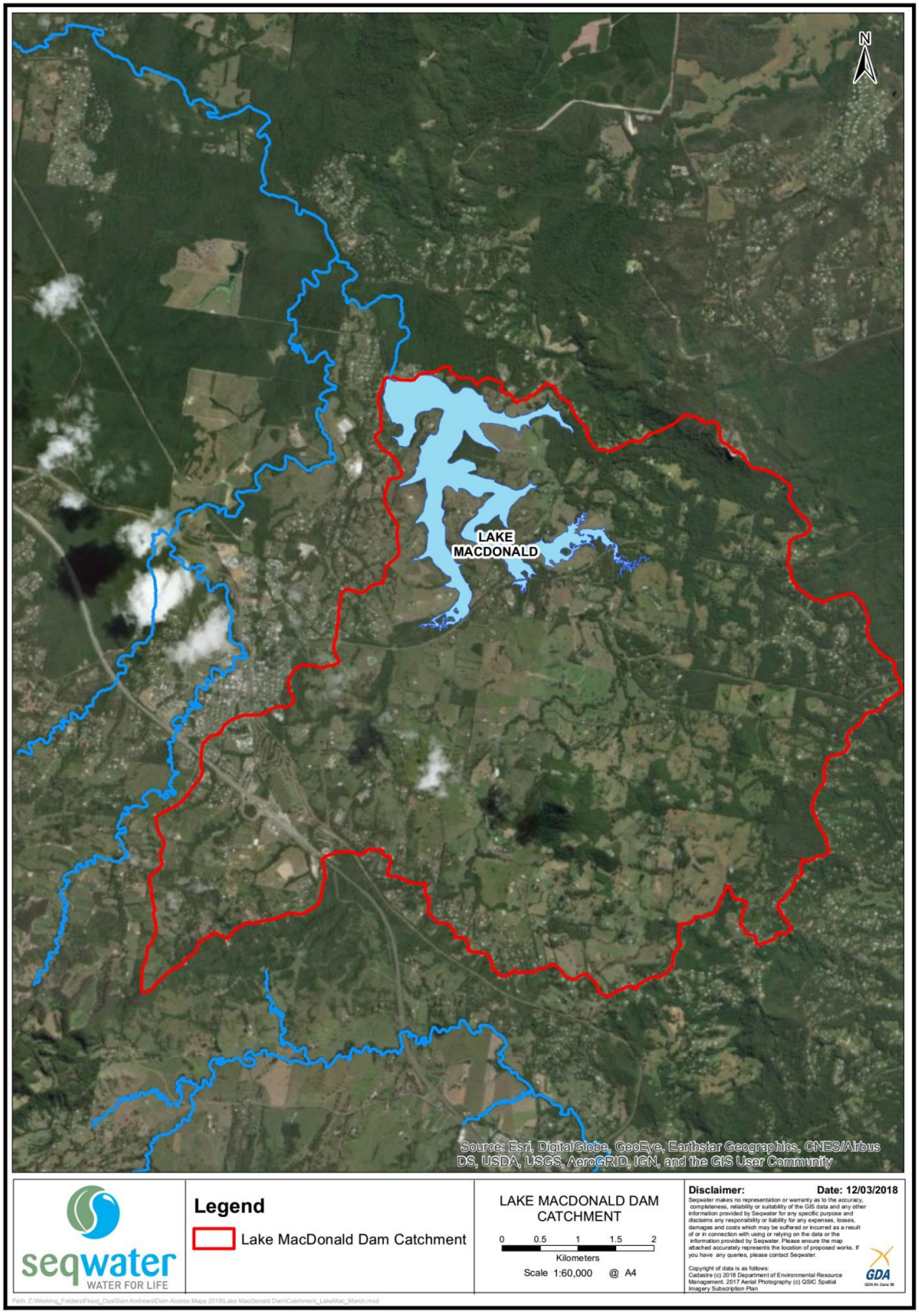
Table 13: Identified structural failure modes for Lake Macdonald Dam

Failure Mode Description	Initiating Event	Relevant Section of EAP for Actions	Relevant Section of EAP for Notifications
Main embankment flood overtopping	Flood	Section 5.1 – flood event Section 5.3 should any new structural damage or movement areas identified.	Use Table 6 for flood event notifications, and Table 10 for notifications for structural damage.
Piping through the main embankment, main embankment foundations or spillway foundations during a flood event	Flood	Section 5.1 – flood event Section 5.3 should any new structural damage or movement areas identified.	Use Table 6 for flood event notifications, and Table 10 for notifications for structural damage.
Failure of the spillway during a flood event	Flood	Section 5.1 – flood event Section 5.3 should any new structural damage or movement areas identified.	Use Table 6 for flood event notifications, and Table 10 for notifications for structural damage.
Piping through the main embankment, main embankment foundations, or spillway foundations	Seepage	Section 5.2 should any new seepage, increased seepage or seepage containing earth material be identified during routine inspection.	Table 10
Foundation liquefaction under the embankment or spillway as a result of an earthquake event.	Earthquake	Section 5.3 should any new structural damage or movement areas identified.	Table 10
Failure of spillway walls or spillway	Flood or Earthquake	Section 5.1 – flood event Section 5.3 should any new structural damage or movement areas identified.	Use Table 6 for flood event notifications, and Table 10 for notifications for structural damage.

Appendix G – Area map and site access arrangements

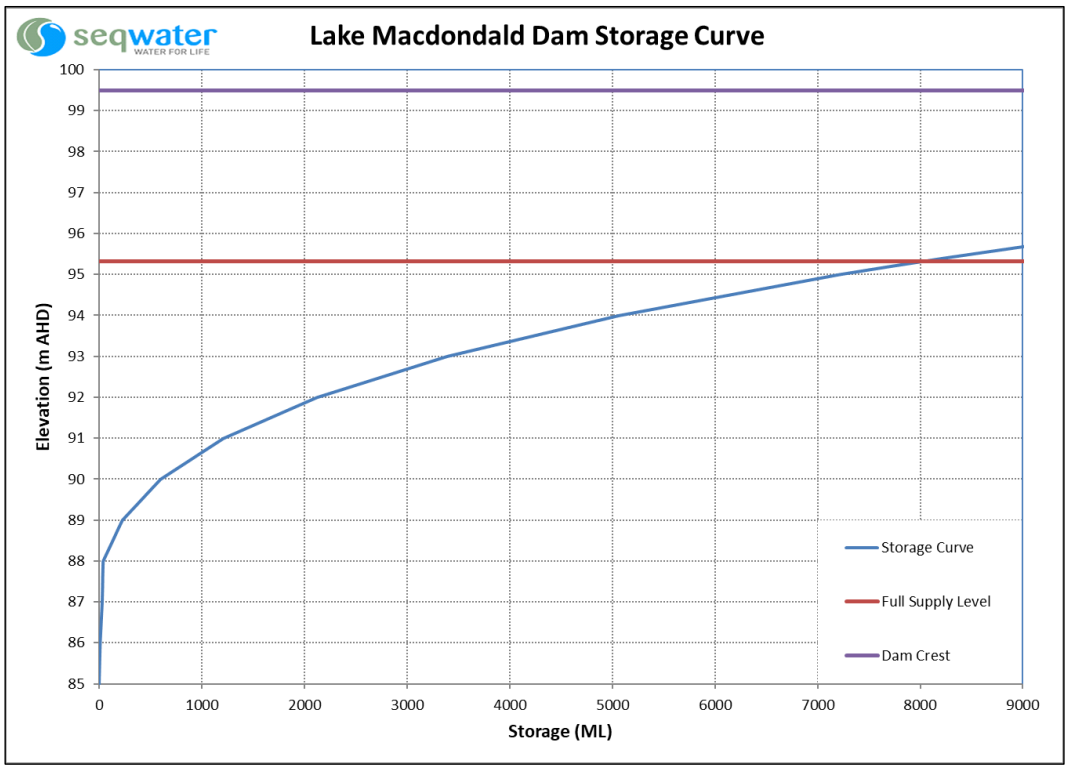
Access is generally available to the Dam primarily via Lake Macdonald Drive. Alternative access if available via Coolwood Road and the Noosa Water Treatment Plant.

Appendix H – Catchment area map

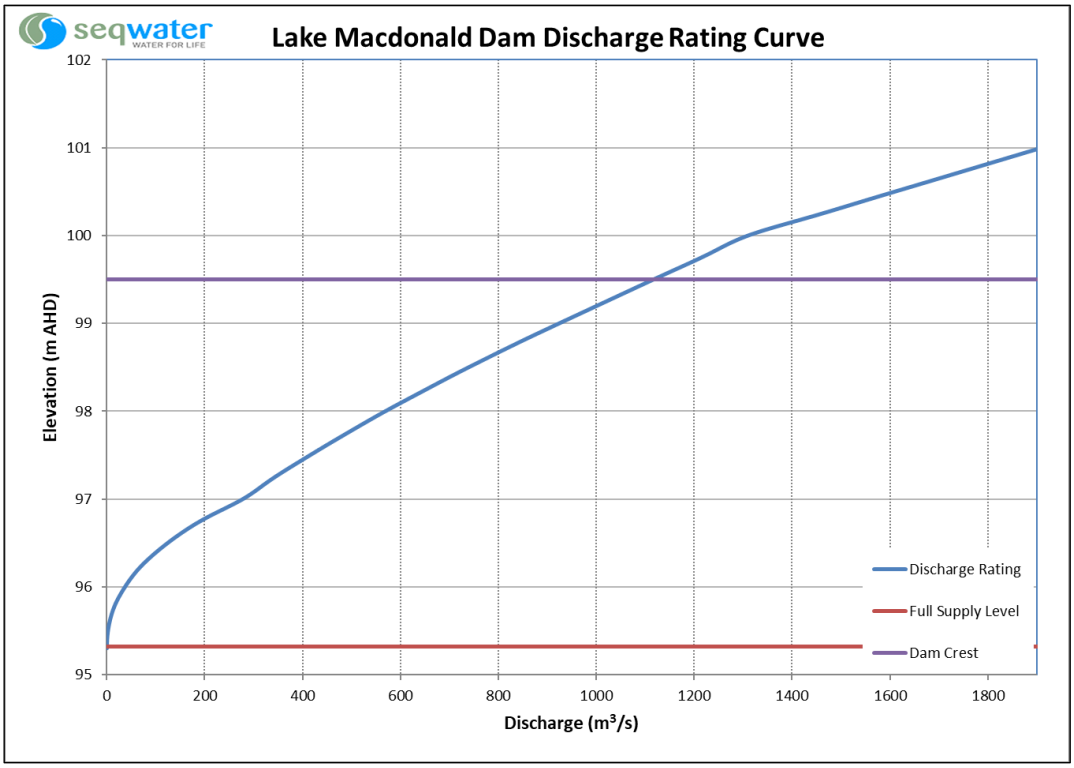


Appendix I – Storage and discharge curves

Storage curve



Discharge curve



Appendix J – Seqwater Dam Safety management information

Dam Safety – Staff development and training

Dam Safety training for Seqwater personnel involved in the operation and maintenance of the Dam occurs through both site instruction from suitably experienced staff members and formal education. The formal education component includes Certificate Level training at TAFE as well as attendance at industry training courses such as those provided by ANCOLD and the Queensland Dam Safety Regulator.

This training ensures that dam operations personnel understand the purpose and details around the following aspects of Dam Safety Management:

- Equipment at the Dam and the location of controls, tools and keys required to properly operate and maintain the Dam;
- The use of Operation and Maintenance Manuals;
- The use of Emergency Action Plans;
- The use of Flood Mitigation Manuals (if applicable);
- The routine surveillance and dam safety inspection procedures used at the Dam; and
- The proper practices for collecting and recording dam safety instrumentation data.

Seqwater also provides appropriate in-house dam safety training. This can include presentations to the Seqwater Board as well as Seqwater's Executive and Senior leadership teams. The program also involves training of dam operations personnel to ensure that their role in the management of the dams is properly understood.

The need for operator training varies depending on the individual operator's qualifications and experience; however mandatory training requirements apply to all operations staff with responsibilities at Seqwater's gated dams. Seqwater also conducts annual flood exercises that simulate Flood Events at is gated dams, in accordance with the requirements of relevant Flood Mitigation Manuals.

Seqwater's approach to dam safety training is to develop an ongoing awareness of the need for vigilance, surveillance and maintenance in providing a successful Dam Safety Management Program. Seqwater believes that safe management of dams is a frame of mind that involves all the people concerned; from Seqwater's CEO to the dam operators responsible for day-to-day operations and maintenance at a dam site.

Dam Safety documentation

Seqwater requires the following documentation to be available for the Dam to support the Emergency Action Plan:

- Investigation, Design, and Construction documentation and if available, the Design Report. This information is collated within the Dam Data Book;
- As Constructed details including plans and drawings;
- Operation and Maintenance Manuals;
- Dam Inspection Reports;
- Dam Safety Reviews;
- Flood Mitigation Manuals (required only for gated dams);
- Flood Operations procedures.

Dam Safety inspections and surveillance

Surveillance policy

Seqwater undertakes dam surveillance in accordance with the recommendations contained in the *ANCOLD Guidelines on Dam Safety Management*. This is considered best practice for the management of large dams in Australia. This relates to both routine visual inspection of the Dam and the gathering and analysis of data from dam safety instrumentation installed at the Dam. Seqwater undertakes the following inspections at the Dam on a continual basis.

Annual and five-yearly comprehensive inspections

Seqwater schedules and completes Annual and five-yearly Comprehensive inspections at the Dam in accordance with the *Dam Safety Conditions* issued by the Dam Safety Regulator. These inspections are undertaken by a suitably qualified and experienced Dam Safety Engineer. The inspections are conducted in accordance with the *Queensland Dam Safety Management Guidelines* and the *ANCOLD Guidelines on Dam Safety Management.* Copies of the inspection reports are provided to the Dam Safety Regulator for independent review once the inspections are completed.

Dam Safety review

Seqwater schedules and completes a Dam Safety Review at the Dam in accordance with the *Dam Safety Conditions* issued by the Dam Safety Regulator. The reviews are conducted in accordance with the *Queensland Dam Safety Management Guidelines* and the *ANCOLD Guidelines on Dam Safety Management.* Copies of the Dam Safety review reports are provided to the Dam Safety Regulator.

Dam Safety routine inspection

Routine visual inspections are undertaken at the Dam to identify and report on dam safety deficiencies by visual observation. These inspections are undertaken by the staff responsible for day-to-day operations at the Dam as part of their duties. Frequency of inspection is dependent on the dam consequence category provided in the ANCOLD guidelines. Additionally, a risk assessment is undertaken by Seqwater to determine if a reduced or increased frequency of inspection is acceptable to the frequency of inspections outlined by ANCOLD. The consequence category of the Dam is High, and inspections are undertaken daily.

Dam Safety instrumentation data gathering and analysis

Dam Safety instrumentation is used to monitor the structural performance of a dam. This instrumentation monitors a range of dam safety parameters that vary from dam to dam but can include rainfall, lake level, seepage, pore pressure and uplift pressure, surface movement, internal movement, and post tensioning. Frequency of data gathering is dependent on dam hazard and consequence category and is undertaken in accordance with ANCOLD guidelines.

All gathered instrumentation data is provided electronically to Seqwater's Dam Safety Team. The data is graphed and analysed by a suitable qualified Dam Safety Engineer and any anomalies are investigated by a suitably qualified Dam Safety Engineer.

Earthquake monitoring

Seqwater receives earthquake notifications in real time directly from Geoscience Australia as earthquakes are detected. The notifications provide an indication of earthquake magnitude by a number that characterises the relative size of an earthquake base on the maximum motion recorded by a seismograph. The actions undertaken by Seqwater following receipt of an earthquake notification from Geoscience Australia identifying an earthquake of greater than magnitude 3 in South East Queensland are described in Sections 5.2 and 5.3.

Appendix K – Notification and management arrangements

Management structure

The management structure used by Seqwater to manage an emergency, including dam safety emergencies, is shown Figure 2.

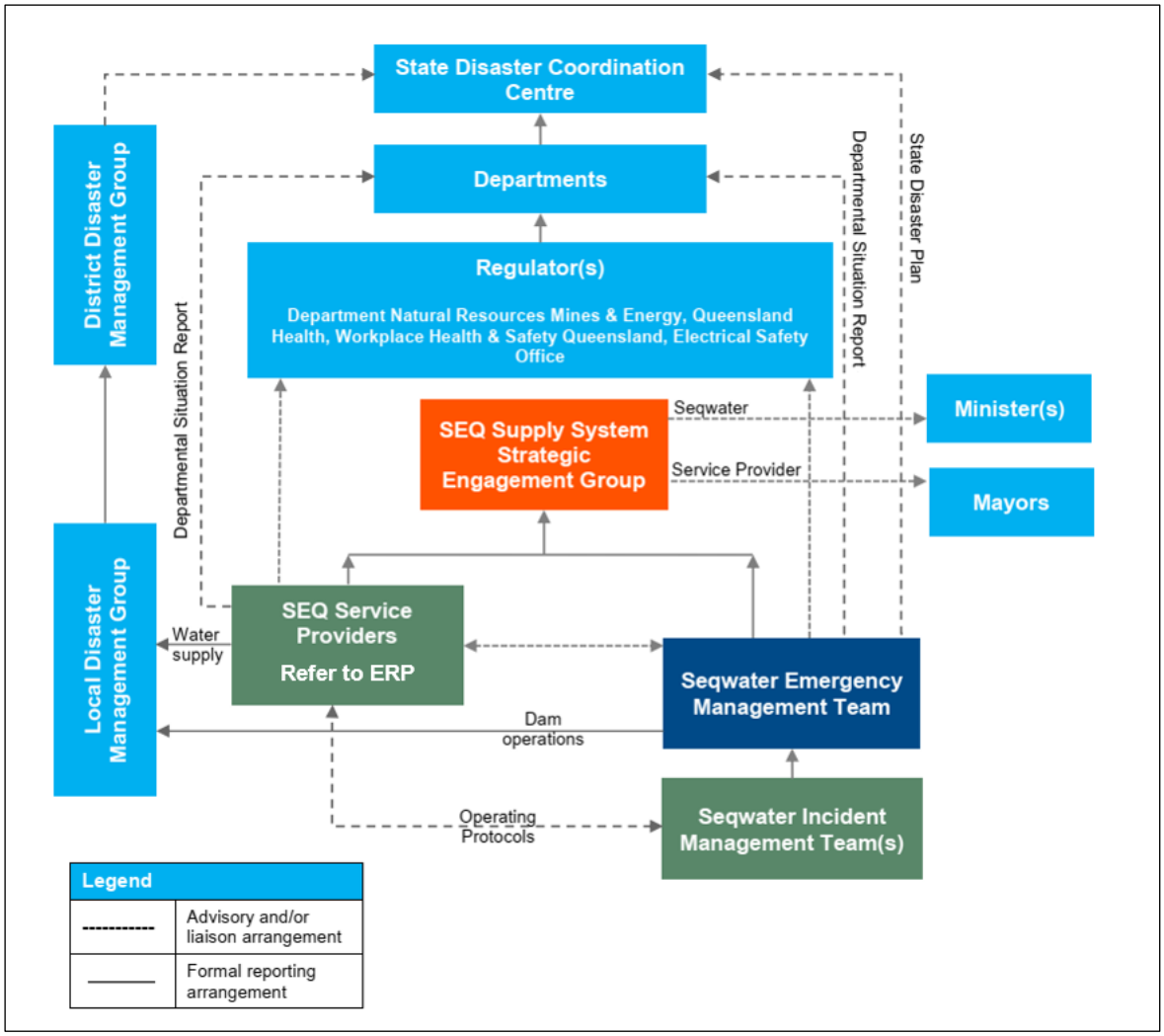


Figure 2: Seqwater Emergency Management structure

Roles for Dam Safety incidents and emergencies

When a potential dam hazard is initially identified by a Seqwater staff member it is immediately reported to Seqwater's Duty Emergency Advisor via Seqwater's 24/7 Incident and Emergency Hotline by phoning [redacted]

If the incident or emergency is a terrorist act, the Terrorism contacts in Appendix A should be contacted first. In this situation, Queensland Police Service will be the leading response agency with Seqwater providing input as required.

Once a potential dam hazard is reported and verified, an Incident Management Team Leader is appointed by the Duty Emergency Advisor using the appropriate roster. Prior to the incident Management Team Leader being

appointed, normal operational arrangements apply to the management of the site. An Emergency Manager will be appointed from the Incident Roster when the incident is reported if judged necessary by the Incident Management Team Leader.

Further details of the requirements of these roles are outline in the table below.

Table 14: Incident management roles

Role	Requirements
Emergency Manager	• Suitably experienced Senior Seqwater Manager • Takes responsibility for overall management of Seqwater's response to the emergency, including: – Directing the actions to be undertaken by Seqwater at the Dam; – Determining the EAP Activation Level; and – Providing suitable notifications to stakeholder agencies and the public.
Incident Management Team Leader	• Experienced Dam Safety Engineer • Manages on-site response • Provides advice to Emergency Manager in relation to: – Appropriate frequency of site inspection; – Requirement to mobilise an operator to site for continuous monitoring; – Actions required on site to ensure public safety; – Physical intervention actions to ensure the structural safety of the Dam; – Escalation of the EAP Activation Level; – Likelihood of dam failure leading to release of water and consequent increased hazard to people downstream.

If the Incident Management Team is formed prior to the appointment of an Emergency Manager, the Incident Management Team Leader will undertake the role of an Emergency Manager until an Emergency Manager is appointed. During a dam safety incident or emergency, the Incident Management Team Leader and Emergency Manager can be contacted by phoning [redacted]

Roles for Seqwater Dam Release Notification service

Rainfall events can cause outflows at the Dam and trigger notification of potential dam hazards. Similar outflow events and corresponding notifications (refer Section 5.4) occur frequently at multiple Seqwater dams at once. In this context, dam hazard notifications while at Alert status are generally routine, are not an incident for Seqwater's Emergency Response Plan and rarely impact on public safety.

The roles to perform the routine (non-incident) dam outflow notifications for this EAP are as follows:

- Seqwater's Duty Communications Advisor: responsible for issuing the public notifications in accordance with Seqwater's *Dam Release and Spilling Communication Procedure;* and
- Seqwater's Duty Senior Flood Operations Engineer: responsible for providing technical advice in relation to any notifications required.

The Duty Senior Flood Operations Engineer is responsible for monitoring dam outflows and lake levels and escalating response in accordance with Section 5.1 if necessary.

Seqwater Dam Release Notification service

Seqwater provides a free Dam Release Notification service to residents living downstream of dams and for any other interested parties. This free notification service provides subscribers with notifications by their choice of email, SMS to mobile phones, or recorded messages to telephone landlines. These notifications are issued to inform the subscriber that an outflow from the Dam has commenced or is about to commence; outflows have reached a level where they may pose a hazard to the safety of persons or property downstream of the Dam (referred to as downstream release hazard); and when the Bureau commences issuing relevant flood warnings for the watercourse downstream of the Dam.

Seqwater has widely promoted and continues to promote the Dam Release Notification Service. Details of this service are available on Seqwater's website – www.seqwater.com.au

It is important to understand that Dam Release Notifications from Seqwater are advice of the outflows from the Dam. There may be other sources of water contributing to flooding in waterways and floodplains downstream of the Dam. It is also important to be aware that these notifications are not indicating that there is a definite downstream release hazard, but rather that the Dam is overflowing and operating normally and that safety hazards downstream of the Dam are possible due to Dam outflows.

Dam Release Notifications do not provide information on river levels, or predictions about areas that may be inundated by flood waters in a flood event. Subscribers to the service should consider information available from other sources, which may include:

- Details of road closures, inundation flood mapping and information regarding and evacuation arrangements, from Local Councils and Disaster Management Groups.
- Information on river levels and flooding from the Bureau. Seqwater issues a notification to subscribers when the Bureau commences issuing relevant flood warnings for the watercourse downstream of the Dam. Seqwater does not issue further Dam Release Notifications while the Bureau are issuing flood warnings in the same area. The reasons for this are:
    - The Bureau is the lead agency for the provision of flood warning information to the public. Flood warning information issued by other agencies that can be seen to be in competition with flood warning information issued by the Bureau has the potential to create public confusion during an emergency event.
    - Flooding downstream of the Dam will be caused by a combination of dam outflows and flow contributions from other sources. These flow contributions from other sources are not assessed or estimated by Seqwater. Therefore, the Bureau are better placed than Seqwater to advise the public on flooding downstream of the Dam once the Bureau commence issuing flood warnings.
- Emergency services warnings, including from Queensland Police Service, and Queensland Fire and Emergency Services.