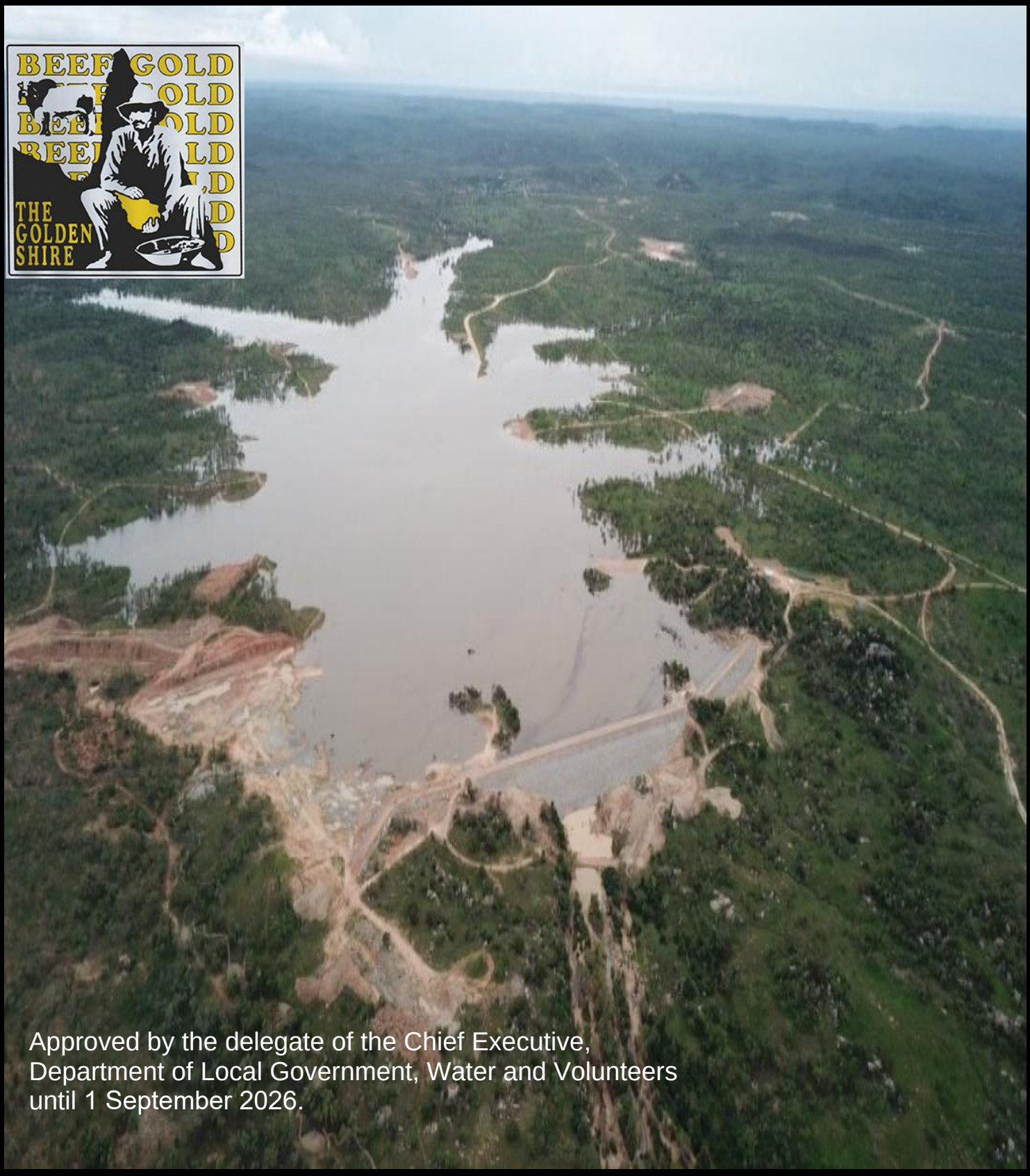


Approved by the delegate of the Chief Executive,
Department of Local Government, Water and Volunteers
until 1 September 2026.

Etheridge Shire Council

Charleston Dam - Emergency Action Plan

DAM ID 2507

VERSION 4 – 1ST SEPTEMBER 2025

Controlled Copy List

Copy No	Name	Position	Location
Etheridge Shire Council			
1	[redacted]	Chief Executive Officer	Georgetown Council Chambers
2	[redacted]	Director of Engineering Services	Georgetown Works Depot
3	[redacted]	Project Engineer	Georgetown Works Depot
4	[redacted]	Dam Inspector - Town and Water Manager	Georgetown Works Depot
5	[redacted]	Dam Inspector - Water Supervisor	Georgetown Works Depot
6	[redacted]	Dam Inspector - IT Coordinator	Georgetown Council Chambers
7	[redacted]	Dam Inspector - Stores Officer	Georgetown Works Depot
GHD Pty Ltd			
8	[redacted]	Dam Safety Engineer	Townsville
Etheridge Shire Council Local Disaster Management Group			
9	[redacted]	Mayor	Georgetown Council Chambers
10	[redacted]	Georgetown Police	Georgetown Police Station
District Disaster Management Group (Far North)			
11	[redacted]	Sergeant Executive Officer	Mareeba District Disaster Management Group

DOCUMENT CONTROL DETAILS

Controlled Copy Number:

Revision status:

Rev No	Revision description	Revision date	Etheridge Shire Council Authorisation Print Name	Etheridge Shire Council Authorisation Signature	Dam Safety Regulator Approval Date
A	Working draft for interim use	December 2020			
B	Working draft with update and revision	September 2021			
0	Final	October 2021	[redacted]		2nd December 2021
1	1st Revision	July 2022	[redacted]		29 July 2022
2	2nd Revision	February 2024	[redacted]		14 February 2024
3	3rd Revision	April 2025	[redacted]		
4	4th Revision	September 2025	[redacted]	[redacted]	1/9/2025

EMERGENCY ACTIVATION QUICK REFERENCE GUIDE – DAM HAZARDS

The Emergency Action Plan (EAP) for Charleston Dam covers four (4) dam hazards that are summarised in the table below. The Director of Engineering Services (DES) is responsible for the decision to activate the EAP. Should the DES be unavailable, the Dam Operator (DO) or Dam Owner (CEO), whom is the CEO, is responsible for the decision.

Dam hazards and section numbers	**Activation Levels**				
	Alert	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
	Managed locally (DO, DES).	Managed locally (DO, DES, Dam Owner).	Managed locally (DO, DES) with advice from Dam Safety Engineer.	Managed locally (DO, DES) with advice from DDLGWV and Dam Safety Engineer.	Managed locally (DO, DES) with advice from DDLGWV and Dam Safety Engineer.
	Activation triggers for emergency conditions related to dam hazards				
Significant Flow Through Spillway (refer to Section **5.2**)	EL 387.3 m AHD and rising.	EL 387.6 m AHD.	EL 388.6 m AHD (spillway crest + 1m).	EL 391.72 m AHD (maximum design flood level, 4.12m above spillway crest).	EL 388.2 m AHD and falling.
	Alert	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Earthquake & Embankment Instability (refer to Section 5.3)	Earthquake reported or felt in the area.	Earthquake reported or felt in the area, AND change detected during surveillance inspection	Earthquake reported or felt in the area, AND A change detected from surveillance, with a possible failure path identified.	Failure in progress or likely due to earthquake.	Risk assessment has determined that failure risk has reduced
	Alert	**Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Down**
Piping (refer to Section 5.4)	Increasing leakage through the embankment or the foundation.	Increasing leakage through an embankment or the foundation with cloudy water.	Piping condition has been established	Failure in progress or likely due to piping, AND Sufficient water in storage to create a dam hazard.	Risk assessment has determined that failure risk has reduced.
	Alert / **Lean Forward**	**Stand Up 1**	**Stand Up 2**	**Stand Up 3**	**Stand Down**
Terrorism / High Energy Impact (refer to Section 5.5)	N/A	Possible terrorist activity noticed at dam or threat received.	Large explosion heard/observed at dam (e.g., bomb explosion, aircraft or meteorite strike).	Failure in progress or likely due to impact or explosion AND sufficient water storage to create a dam failure hazard.	Risk assessment has determined that failure risk has reduced.

TABLE OF CONTENTS

TABLE INDEX

FIGURE INDEX

APPENDIXES

1. BUSINESS TERMS AND DEFINITIONS

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

Term	Definition
Terms defined with reference to the Water Supply (Safety and Reliability) Act 2008	
Dam Hazard	Means a reasonably foreseeable situation or condition that may: a) Cause or contribute to the failure of the dam, if the failure may cause harm to persons or property; or b) Require an automatic or controlled release of water from the dam if the release of the water may cause harm to persons or property.
Dam Hazard Event	Means an event arising from a dam hazard if: a) Persons or property may be harmed because of the event. b) A coordinated response, involving 2 or more of the following relevant entities, is unlikely to be required; each local group and district group for the EAP, each local government whose area may be affected, the chief executive, another entity the owner of the dam considers appropriate, and c) The event is not an emergency event.
Disaster Management Group	Of a district group or local government, means the groups or local government's disaster management plan under the Disaster Management Act. The Group definition shouldn't discuss plan.
District Disaster Management Group	For an emergency action plan, means a district group established under the Disaster Management Act 2003, section 22 whose disaster district under the Act could, under the plan, be affected by a dam hazard.
Emergency Event	For a dam, means an event arising from a dam hazard if— • Persons or property may be harmed because of the event; and • Any of the following apply: i. A coordinated response involving 2 or more of the relevant entities mentioned in paragraphs (b) to (d) of the definition *relevant entity* is likely to be required to respond to the event. ii. The event may arise because of a disaster situation declared under the Disaster Management Act.

Term	Definition
	iii. An entity performing functions under the State disaster management plan may, under that plan, require the owner of the dam to give the entity information about the event.
Local Disaster Management Group	For an EAP, means a local group established under the Disaster Management Act, section 29 whose local government area could, under the plan, be affected by a dam hazard. A local government must establish a Local Disaster Management Group (a local group) for the local government's area. Section 29.
Notice Response	A Dam Owner's written response to a notice following an assessment of an EAP by a local government or district group.
Referable Dam	A dam, or a proposed dam after its construction, will be referable dam if: • A failure impact assessment of the dam, or the proposed dam, is carried out under the Act. • The assessment states the dam has, or the proposed dam after its construction will have, a category 1 or category 2 failure impact rating. • The chief executive has, under section 349 of the Act, accepted the assessment. • Also, a dam is a referrable dam if: • Under section 342B of the Act, the owner of a dam is given a referrable dam notice and, before the effective day for the notice, does not give the chief executive a failure impact assessment for the dam; and • The chief executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam.
Relevant entity	For a dam, means each of the following under the emergency action plan for the dam: • The persons who may be affected, or whose property may be affected, if a dam hazard event or emergency event were to happen for the dam. *Examples for paragraph (a)—* • The owners of parcels of farmland adjacent to the dam. • Residents of a township. a) Each local group and district group for the emergency action plan.

Term	Definition
	c) Each local government whose local government area may be affected if a dam hazard event or emergency event were to happen for the dam. d) The Chief Executive Officer. e) Another entity the owner of the dam considers appropriate. *Example for paragraph (d)—* • The Queensland Police Service.
Terms Consistent with Queensland Disaster Management Guidelines and the Emergency Action Plan for Referable Dam Guideline	
Activation levels	
Bureau of Meteorology flood level classifications	The three levels of flooding are: ***Minor flooding***: This causes inconvenience such as closing of minor roads and the submergence of low-level bridges and makes the removal of pumps located adjacent to the river necessary. ***Moderate flooding***: This causes the inundation of low-lying areas requiring the removal of stock and/or the evacuation of some houses. Main traffic bridges may be closed by flood waters. ***Major flooding***: This causes inundation of large areas, isolating towns and cities. Major disruptions occur to road and rail links. Evacuation of many houses and business premises may be required. In rural areas widespread flooding of farmland is likely.
Concurrent Flooding	Flood flows downstream of a dam that are not a result of dam outflows, for instance those from adjacent catchments or from the sea, and which occur in the same period as downstream releases or flooding from the dam.
Dam Crest	The lowest elevation of the non-overflow crest section of the dam excluding handrails, parapets or wave walls that have not been designed to store water.
Dam Crest Flood	The flood event which, when routed through the reservoir, results in a still water reservoir level equivalent to the lowest dam crest level.
Dam Failure	Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents.
Downstream Releases	Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam.

Term	Definition
Earthquake	A sudden release of energy in the Earth's crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity, resulting in the generation of seismic waves that can be destructive. The potential consequences of an earthquake include: • Settlement. • Sliding. • Overturning of monoliths in the dam wall. • Initiation of seepage lines in the foundations or abutments that could lead to piping damage. • Potential inoperability of appurtenant works.
Flood Release	A flood release from a dam occurs when catchment inflows raise the storage level above the Full Supply Level (FSL) resulting in a discharge from the spillway of the dam.
Piping	Internal scour caused by the water flow and seepage that occurs through earth dams, dam foundations, or dam abutments. The internal scour can lead to the formation of a pipe, which can lead to a failure of the dam.
Plane Strike or Other Impact	The impact of a plane, meteorite, or other high-energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam.
Probable Maximum Flood	The flood resulting from the probable maximum precipitation coupled with the worst flood-producing catchment conditions that can be realistically expected in the prevailing meteorological conditions.
Probable Maximum Precipitation	The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin.
Probable Maximum Precipitation Design Flood	The flood resulting from the probable maximum precipitation coupled with typical design catchment conditions.
'Sunny Day' Failure	'Sunny day' dam failure is where the failure occurs at the full supply level and there is no concurrent rain associated flooding.
Terrorist Activity	A deliberate attempt to damage or fail or contaminate a dam.

2. ABBREVIATIONS

Acronyms relevant to this Emergency Action Plan are summarised in **TABLE 2-1**.

TABLE 2-1 ACRONYMS / ABBREVIATIONS

Acronym	Term
AFC	Acceptable Flood Capacity
AHD	Australian Height Datum
CEO	Etheridge Shire Council Chief Executive Officer
DDC	Disaster District Coordinator
DDMG	District Disaster Management Group
DDS	Director Dam Safety
DES	Director of Engineering Services
DNRME	Department of Natural Resources, Mines and Energy
DO	Dam Operator
DLGWV	Department of Local Government, Water and Volunteers
DSR	Dam Safety Regulator
EA	Emergency Alert
EAP	Emergency Action Plan
EER	Emergency Event Report
EOC	Emergency Operations Centre
ESC	Etheridge Shire Council
FSL	Full Supply Level
LDMG	Etheridge Shire Council Local Disaster Management Group
MM	Modified Mercalli
OMM	Operation and Maintenance Manual
PAR	Population at Risk
PMF	Probable Maximum Flood
PMP-DF	Probable Maximum Precipitation – Design Flood
RL	Reduced Level
SDCC	State Disaster Coordination Centre
EL	Elevation

3. INTRODUCTION

3.1 BACKGROUND

Dam safety of referable dams is regulated to protect the community from dam failure. The Chief Executive Officer of the Department of Local Government, Water and Volunteers (DLGMV), is responsible for regulating referable dams in accordance with the Water Supply (Safety and Reliability) Act 2008 (the Act).

The Act (s352E and s352F) requires dam owners to develop and have approved by the Chief Executive, an Emergency Action Plan (EAP) for each referable dam under their control. A dam only becomes a 'referable' dam if it would put population at risk (PAR) if it were to fail. Charleston Dam meets this requirement and therefore requires this EAP.

Under the current version – Emergency Action Plan for referable Dam guideline version 4 (1 October 2023) issued by DLGWV the EAP is to be consistent with the disaster management plan/s and provide the procedures to respond collaboratively with disaster management groups, local government/s and emergency agencies to manage the consequences of a dam hazard event and a dam emergency event.

This EAP has been prepared for Etheridge Shire Council (ESC), who act as both the Dam Owner and the local government whose area may be affected by an event.

3.2 PURPOSE

The purpose of this EAP is to provide ESC the framework within which it can effectively manage any dam hazard or emergency event at Charleston Dam and communicate with and manage the safety of the identified PAR.

The purpose of this EAP is:

- To minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam happens.
- To identify dam hazards that could occur at Charleston Dam and the area likely to be affected for each hazard.
- To prescribe emergency actions taken by the Dam Owner and operating personnel in identifying and responding to dam hazards and notifying relevant entities.

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

The focus of this EAP is the management of dam hazards at Charleston Dam by the owner of the dam (ESC) and the communication and notification of dam hazards to DLGWV, Local Disaster Management Groups (LDMGs) and the broader community. This EAP has been prepared in accordance with the Emergency Action Plan for Referable Dam Guideline – June 2021 (Queensland Government).

3.3 SCOPE

The Charleston Dam EAP covers:

- Dam hazards evaluated within ESC's Dam Safety Management Program and the dam design.
- Details about the dam that are relevant to a dam hazard.
- Identification of circumstances that indicates a material increase in the likelihood of a dam hazard event and/or emergency event happening.
- Triggers for activation of a tiered response to dam hazard event and/or emergency event.
- Roles and responsibilities in responding to a dam hazard event and/or emergency event.
- Notification, warning, and communication protocols.
- Inspection, monitoring, and reporting protocols during emergencies.

- Other relevant information that may assist with identifying the area affected by a dam hazard event and/or emergency event, and the management of such.

3.4 OBJECTIVES

The primary objectives of this plan are to:

- Minimise the risk of harm to persons or property if a dam hazard event or emergency event occurs.
- Clearly define the roles, responsibilities, instructions, accountabilities, and authority in managing a dam hazard event or emergency event.
- Provide a coordinated response in the shortest possible time to minimise the loss of life and/or injury to PAR and to minimise the damage to property.
- Provide a structured assessment framework to facilitate the activation and escalation of an appropriate response in a timely manner.
- Integrate with ESC's Local Disaster Management Group capability.

3.5 EAP TRAINING AND EXERCISE

Annual EAP desktop training in preparation for the wet season should be conducted to ensure all dam personnel are familiar with EAP activation triggers and roles and responsibilities. This training is vital for the assessment of developing situations at all levels of responsibility.

Technically qualified personnel should be trained in the incident management process, including detection, evaluation, notification, and appropriate response actions during all emergency level determinations.

Several staff should be trained to ensure sufficient coverage of the EAP at any time. An invitation should be extended to key stakeholders such as the LDMG to participate in EAP activation scenario exercises. When an EAP scenario training exercise is conducted with one or more stakeholders a standing offer is to be extended to the dam safety regulator to attend as an observer.

- Exercise management.
- Exercise evaluation of emergency.
- Evaluation of emergency management programs.

Training exercises can be sourced by emailing [redacted] or alternatively refer to the Australian Disaster Resilience Handbook, Managing Exercises HB.3.

Extending an invitation to the LDMG to participate in EAP activation scenario exercises can assist in identifying plan deficiencies and ensuring all participants are familiar with the prescribed procedures and their roles. It will also assist the LDMG to consider developing evacuation and emergency shelter plans for people who would be affected by an emergency event.

Training also provides an opportunity to identify areas of improvement. Consider training, and subsequent application of lessons learnt, as part of EAP review and renewal.

To assist dam owners in planning and developing a dam safety exercise, the Dam Safety EAP team can run a range of capability programs for your team in relation to the EAP, including:

- Exercise management.
- Exercise evaluation.
- Evaluation of emergency management programs.

Training Schedule

Training	Attendees	Frequency
Training Exercise	Chief Executive Officer Director of Engineering Services Project Engineer Dam Inspector - Town and Water Manager Dam Inspector - Water Supervisor Dam Inspector - Water Supervisor Dam Inspector - IT Coordinator Dam Inspector - Stores Officer	Annually
Training	New Staff as required	At time of onboarding

3.6 FATIGUE MANAGEMENT PLAN

Etheridge Shire Council is in process to develop a Fatigue Management Procedure. This document recognise fatigue as an important workplace hazard and has identified and outlined control processes to mitigate the risk of fatigue impaired HSE incidents. A copy of ESC's Fatigue Management Procedure will be provided after development and Council's approval.

3.7 COMMUNITY INFORMATION

Etheridge Shire Council will ensure community education around messaging and impacts of the EAP and its related events is undertaken and continually improved.

ESC currently provides information externally to customers, downstream residents and the community in a range of methods or channels in relation to dam hazards and emergency situations. Individuals can access information through Facebook, the ESC website, ESC community information magazine and at several show /field days across regional Queensland where ESC may have stalls and information available.

In the event of an emergency event or when otherwise required, ESC is in process to develop an Emergency Alert System to send a voice message and SMS.

A redacted copy of the ESC 's Charleston dam EAP is available to the public on the ESC website to protect people's personal details.

2/8/2025 _ Field day – Stall

Event	Event Frequency
Forsayth Turnout	Held yearly in early August each year

DAM DETAILS

Charleston Dam consists of a zoned earth fill embankment with clay core, general fill, upstream and downstream rock protection and filter material. The dam includes an unlined spillway channel with a left abutment rock wall and right abutment excavated into natural fill.

Charleston Dam is located on Delaney River, approximately 30 km upstream of Georgetown, which is situated on the Savannah Way approximately 385 km south-west of Cairns.

Charleston Dam was constructed to provide town water to Forsayth and to Georgetown as well as recreational use.

3.8 NAME AND LOCATION

Description	Value
Name of dam:	Charleston Dam
Easting:	771636
Northing:	7947536
Parish:	Yaramulla
County	Tate
Local Authority	Etheridge Shire Council
Nearest Town:	Forsayth
Stream:	Delaney River
AMTD:	30.3 km
Property Locality Description:	Lot 14 on SP323729

3.9 OWNERSHIP

Description	Value
Dam Number	2507
Current Owner:	Etheridge Shire Council
Designer(s):	GHD Pty Ltd and Etheridge Shire Council.
Construction Contractors:	LDI Constructions and Bolwarra Enterprises Crushing and Screening.
Construction Date	December 2020

3.10 DATA

Description	Value
Dam Type	Zoned earth fill embankment dam and saddle dam with and unlined, uncontrolled spillway channel.
Purpose	Water supply.
Catchment Area	206 km2 (approx.)
Full Supply Level (FSL)	EL 387.3 m AHD
Storage Capacity at FSL	10,084 ML
Inundation Area at FSL	236 ha (approximate)
Main dam embankment	
Type	Zoned earth fill with clay core, general fill, upstream and downstream rock protection and filter material (chimney and blanket filters) from chainage 180 to 495 m. Uncontrolled rockfill embankment from chainage 495 m onwards to spillway.
Total Length	310 m (length approx.)
Crest Elevation	EL 392.07m AHD
Batters	1V:3H (Upstream) 1V:2.5H (Downstream)
Crest Width	5.2m

Maximum Embankment Height	20.0m (approx.)
Saddle Dam	
Type	Zoned earth fill embankment with clay core, general fill, upstream and downstream rock protection and filter material (chimney and blanket filters) from chainage -10 to 160m.
Total Length	170m
Crest Elevation	EL 392.03m AHD
Batters	1V:3H (Upstream) 1V:2.5H (Downstream)
Crest Width	5.2m
Maximum Embankment Height	5.5m (approx.)
Spillway	
Type	Unlined channel excavated in rock with left abutment rockfill embankment.
Invert Level	EL 387.6m AHD
Width	350m (approx.)
Approach Channel	Unlined natural channel
Energy Dissipation Method	Nil.
Fish Ladder Level	EL 387.3m AHD
Dam Crest Flood (Design)	4,906m^3/s (approx.)
Design flood (AFC flood) **Frequency** **Peak Flood Inflow** **Peak Spillway Discharge** **Peak Reservoir Level**	 1 in 87,000 AEP 4993m^3/s 3935m^3/s EL 391.72m AHD
Floating Offtake	
Intake Pipe **Forsayth Line** **Georgetown Line**	250mm PN16 100mm 150mm
Pump Station on Pontoon	Grundfos SP-95-3PM (13 KW, 36m head, 95m^3/hr)
Inline Pump at Forsayth Line	Grundfos PN-SNA-96501918 (7.5 KW, 17m^3/hr)
Telemetry System	
Cameras	2 x FLIR PTZ IR LED
Rain Guage	1 x TB4/1.0/M
OTT Bubblers	2 x OTT CBS
Data Loggers	2 x Cambell Scientific CR310
Modems	1 x SAT Hughes 9502 2 x 4G Cybertec 2155x

3.11 POPULATION AT RISK

TABLE 3-1 Presents the population at risk from the dam failure impact assessment, considering a range of different dam failure scenarios (concurrent flood events) for Georgetown (GHD, 2024).

TABLE 3-1 ESTIMATED INCREMENTAL PAR

Event	Dam Failure PAR (incremental) - Day	Dam Failure PAR (incremental) -Night
SDF	0.00	0.00
1 in 61,000 AEP	28.00	7.00
1 in 150,000 AEP	28.00	77.00
1 in 800,000 AEP	29.00	87.00
1 in 1,500,000 AEP	31.00	87.00
PMF	0	0

The estimated maximum incremental Population at Risk (PAR) for a 1 in 1,500,000 AEP event in the dam catchment; and the 1 in 100 AEP in the downstream catchment as well as a 1 in 800,000 AEP event in the dam catchment; and the 1 in 50 AEP in the downstream catchment is 87. This results in the dam being classed as a Category 1 referrable dam under the Water Supply (Safety & Reliability) Act 2008.

3.12 SPILLWAY ADEQUACY

The spillway arrangement generally comprises an unlined channel spillway on the right abutment to pass the 1 in 87,000 AEP design flood event as per the AFC requirements. This is 4.42m above the FSL of EL 387.3 m AHD. This configuration is based as constructed drawings. The peak inflow is estimated to be 4993m^3/s.

3.13 GENERAL ARRANGEMENT

The general arrangement drawing is in **Appendix A.**

3.14 CATCHMENT AND LOCALITY

Catchment and locality plans are located in **Appendix B.**

3.15 EMERGENCY INSPECTIONS AND MONITORING

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

3.16 INSPECTIONS

- **Routine visual inspections:** Conducted as per ANCOLD Guidelines and the Operations and Maintenance Manual (OMM).
- **Comprehensive inspection**: Conducted 5-yearly.
- S**pecial inspections: Conducted** as required following significant events (e.g. first filling, spilling depth > 1.0m) or as directed by the Dam Safety Regulator.

3.17 INSTRUMENTATION AND MONITORING

To confirm the behaviour and safety of the embankment, the following instrumentation was installed, and is monitored, at Charleston Dam:

- Settlement/movement measurement.
- Four (4) permanent survey benchmarks.

- Nine (9) surface survey monuments.
- Three (3) PVC standpipe piezometers.
- Nine (9) gauge boards on the left abutment of the saddle dam.
- Two (2) seepage wells at the toe of the dam.
- One Tipping bucket rain gauge located adjacent to the Dam Wall accessible by QTEQ system.
- Two water level monitors (bubbler) accessible by QTEQ system.
- Two PTZ CCTV cameras accessible by QTEQ system.

The location of instrumentation and monitoring equipment is shown in **Appendix C.**

Access to the monitoring system is available through the following portals:

Cameras – Ability to control cameras – https://etheridge.disasterwatch-iotp.com.au

Water Level Gauges (and camera dashboard) - https://dataonline.io/ui/pros14/Etheridge/ETHE-06_Charleston_Dam_4G/Dashboard/?m=show&v=dash&mo=showfiltered&s=dash&f=alarm&et=all&en=all&el=info&ct=D-7D

CEO, DES, DO's staff have access to both systems.

Council's administrators for the Qteq system are:

Name	Role	Phone	Mobile	Email
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	

4. ROLES AND RESPONSIBILITIES

4.1 GENERAL

Etheridge Shire Council is responsible for the operation and maintenance of this EAP. The LDMG is responsible for directing community response in the event of emergency conditions.

The roles and responsibilities not associated with the EAP function are provided within the OMM. Roles and responsibilities of individual officers that are specific to the EAP function are outlined below:

4.2 DIRECTOR OF ENGINEERING SERVICES (DES)

- Ensure the EAP is activated and implemented appropriately, carrying out the DES role as required.
- Advise the Dam Owner of the emergency situation and likely trajectory of the emergency situation.
- Authorise the issuing of EAPs, OMMs and amendments.
- Ensure the work instructions are correct and the EAP, OMM, Dam Data Book (DDB), and dam logbook are reviewed annually as per the Dam Safety Condition Schedule.
- Ensure that risks identified in inspection reports or other technical reports undertaken in relation to dam safety are included in the EAP.
- Facilitate dam safety training courses such as EAP desktop training which includes Dam Operators and other key stakeholders such as the LDMG and ensure that all staff required to undertake dam safety work are trained and accredited.
- Manage Fatigue of teams throughout the course of an emergency and request additional skilled and trained resources through LDMG if event is prolonged.
- Record communications, notifications and observations as required.
- Delegate responsibilities during absence.
- Liaise with the LDMG or proxy.
- Discuss issues with peers and other technical experts and make sound decisions to mitigate dam safety risks.
- Advise DO on surveillance frequencies (based on Dam Safety Engineer advice if required)

4.3 DAM OPERATOR (DO)

- Monitor the dam for any potential emergency conditions.
- Monitor and record emergency situation including photographs (when access to site is available or via telemetry).
- Assist the DES throughout an emergency situation.
- Ensure the EAP is implemented appropriately and carry out the DO role as required.
- Take direction from the DES as required.
- In or immediately following an emergency situation, as per this EAP, arrange an immediate dam safety site inspection and make an assessment on the situation.
- Escalate any issue not covered in the EAP or where actions are not clear.
- Record communications, notifications and observations as required.

4.4 DAM OWNER (CEO)

The Dam Owner is the Chief Executive Officer (CEO) of ESC.

During a potential emergency condition, the DES and DO must contact the Dam Owner but if they have not, the Dam Owner shall:

- Attempt to contact the DES and DO.
- Enact the EAP if the DES and DO cannot be contacted and assumed DES, DO and Dam Owner responsibilities.
- If required, act for and on behalf of the DES and DO during the emergency event.
- Assist the DES and DO throughout the emergency.
- Delegate responsibilities during absence.
- Council has legislated local government functions, as per Section 80 of the Queensland Disaster Management Act (2003). These include:
- Ensure it has a disaster response capability.
- Approve its local disaster management plan.
- Ensure information about an event or a disaster in its area is promptly given to the district disaster coordinator for the disaster district in which area it is situated.
- Perform other functions given to the local government under the Act.
- Must assess (in consultation with its LDMG) the EAP for consistency with the Local Disaster Management Plan.

4.5 DAM SAFETY REGULATOR (DSR)

- Liaise with relevant Minister on necessary actions.
- Approve this document as required under legislation.
- Liaise with Chief Executive as required in administering (regulating) the Water Supply (Safety and Reliability) Act 2008.

4.6 LOCAL DISASTER MANAGEMENT GROUP

- Be aware of the EAP requirements and ensure alignment with Local Disaster Management Plan.
- Determine actions to protect community during an emergency situation based on the recommendations of the DES.
- Coordinate and, if required direct evacuations of downstream residents.
- Authorise and submit Emergency Alert Requests to the State Disaster Coordination Centre Watch Desk and advise DDMG.
- Prepare Requests for Assistance to support emergency response if required.

4.7 GEORGETOWN POLICE

- Be aware of the EAP requirements.
- Act on the directions of the LDMG.
- Undertake on-ground activities required for the preservation of life as well as law and order.
- Provide evacuation warning to residents, if required to supplement the Emergency Alert process.

4.8 DAM SAFETY ENGINEER

- Provide assistance to Etheridge Shire Council personnel as requested, e.g., special inspections, design advice on emergency repairs.

5. EMERGENCY EVENTS AND ACTIONS

5.1 GENERAL

The following events are defined as emergency events:

- ❖ Significant flow through spillway.
- ❖ Earthquake / tremor / landslide / embankment stability issues.
- ❖ Significant new seepage / sudden increase in existing seepage.
- ❖ Terrorism / high energy impact.

The proceeding sections describe what actions should be directly implemented in the event of an emergency.

5.2 SIGNIFICANT FLOW THROUGH SPILLWAY

5.2.1 OVERVIEW

Whilst discharge through the spillway is not an emergency event itself it does increase the potential for damage to the spillway and dam safety, particularly above the flood of record. For this reason, any significant flow through the spillway should be monitored and the EAP enacted as identified in **TABLE 5-1**.

Details of the potential nature of the downstream flood hazard are provided in Section 8. There is water level and CCTV monitoring telemetry at Charleston Dam which is the primary means of monitoring spillway discharge during an emergency event. There is no remote telemetry on the downstream watercourses of the Delaney River. Flood intelligence during events comes from telemetry at the dam and surveillance and communication to relevant parties (including QPS officers upstream, noting these resources are not always available). The Charleston Dam catchment is 206 km^2 and the catchment response time is relatively short (e.g. critical duration of 3-6 hours for the PMP-DF and 1 % in 1000 AEP flood events respectively).

5.2.2 EMERGENCY ACTIONS

Activation levels and emergency actions for significant flow through the spillway are provided in **TABLE 5-1.** It should be noted that as the levels of activation increase, the required actions for the new level of activation generally add to the actions from all lower levels of activation.

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

TABLE 5-1 FLOOD EMERGENCY ACTIVATION TRIGGER SUMMARY

Alert	Storage rising due to rain in catchment. Storage above EL 387.3 m AHD (0.3 m below spillway crest) and rising. OR Access to site is restricted due to flooding.
Lean forward	Storage at spillway crest (EL 387.60 m AHD) and rising, discharge from spillway occurring. OR If access to site restricted due to flooding, evidence of spillway flow in river downstream
Stand up 1	Storage above EL 388.60 m AHD (1 m above spillway crest) and rising
Stand up 2	Storage reaches EL 391.72 m AHD (maximum design flood level, 4.12 m above spillway crest).
Stand down	Storage level EL 388.2 m AHD and falling, no more rain observed in prior 24 hours or forecast in next 72 hours.

While this EAP is not triggered until Charleston Dam reaches EL 387.3 m AHD, when the Bureau of Meteorology (BOM) forecasts an extreme weather event with rainfall that could result in the activation of the EAP, the DO will commence planning and preparation for the activation of the EAP.

When Charleston Dam reaches a level where this plan is triggered access to the site will be restricted due to flooding. Onsite telemetry becomes the primary means of monitoring water levels and rainfall. The Georgetown Airport weather station should also be used to monitor the latest weather observations. The DO should register with the BOM to receive direct flood warning notifications.

5.2.3 EMERGENCY ACTION ROLES

Activation levels and emergency actions for significant flow through the spillway are provided in **TABLE 5-2**. It should be noted that as the levels of activation increase, the required actions for the new level of activation generally add to the actions from all lower levels of activation.

FIGURE 5-1 SIGNIFICANT FLOW THROUGH SPILLWAY FLOWCHART

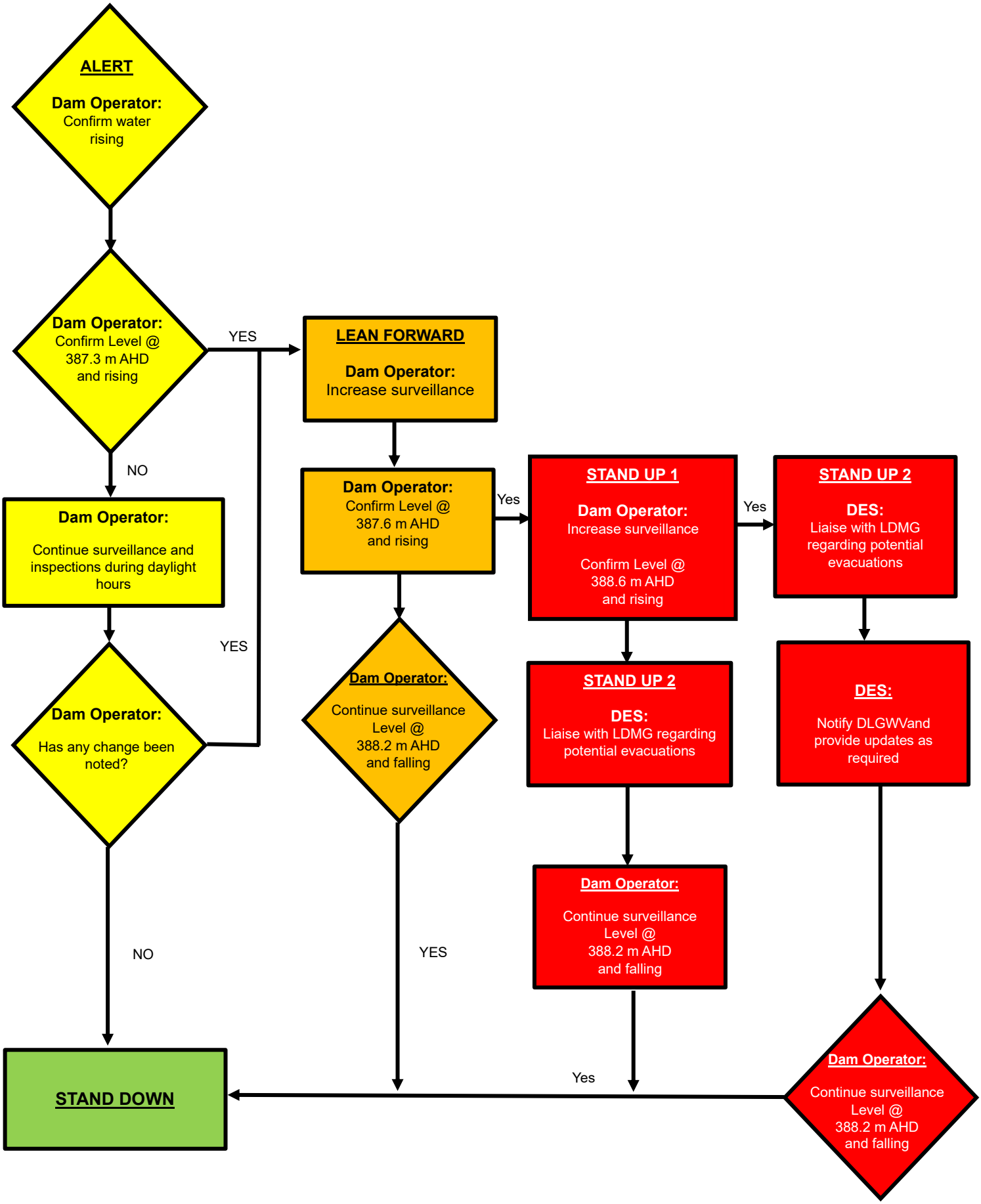


TABLE 5-2 EMERGENCY ACTION TRIGGER AND ACTIONS FOR SIGNIFICANT FLOW THROUGH SPILLWAY

Activation Level	Alert	Lean Forward	Stand Up 1 (>1 m spillway flood)	Stand Up 2 (spillway capacity)	Stand Down
Activation Trigger	• Storage rising due to rain in catchment. • Storage above EL 387.3m AHD (0.3 m below spillway crest) and rising. • Access to site restricted due to flooding.	• Storage at spillway crest (EL 387.6m AHD) and rising, discharge from spillway occurring. • Access to site restricted due to flooding • Evidence of spillway flow in river downstream	• Storage above EL 388.6m AHD (1m above spillway crest) and rising.	• Storage reaches EL 391.72m AHD (maximum design flood level, 4.12 m above spillway crest).	• EL 388.2m AHD and falling, no more rain observed in prior 24 hours or forecast in next 72 hours.
Actions DO	• Confirm water level is rising using telemetry systems (water level and cameras) • Increase surveillance frequencies as directed by DES. • Photograph state of spillway and embankment (using telemetry cameras to take images). • Monitor rainfall radar to assess likelihood of event escalation. • Record situation. • Notify Internal Stakeholders. • Record all communication. • Advise on the activation and end of EAP activation.	• As per previous activation level.	• As per previous activation level.	• As per previous activation level	• Once access is available and no chance of being isolated (levels dropping and no further rain forecast) undertake inspection in accordance with Appendix D. • Notify DES of inspection outcome. • Return to routine activities.

Activation Level	Alert	Lean Forward	Stand Up 1 (>1 m spillway flood)	Stand Up 2 (spillway capacity)	Stand Down
Actions DES	• Record situation. • Record all communication. • Review surveillance reports and determine if any additional actions are required. • Advise on the activation and end of EAP activation.	• As per previous activation level AND • Notify External Stakeholders and provide updates as required. • Advise on the activation and end of EAP activation.	• As per previous activation level AND • Notify LDMG to contact the PAR immediately downstream and provide updates as required Notify DDLGWV and provide updates as required. • Advise LDMG regarding potential for evacuation • Contact Dam Safety Engineer for advice on the appropriate surveillance frequency and notify to Dam Operator.	• As per previous activation level AND • Notify DDLGWV and provide updates as required. • Consult with Dam Safety Engineer. • Contact Dam Safety Engineer for advice on the appropriate .surveillance frequency and notify to Dam Operator.	• Review inspection report and if appropriate request. • Follow up inspection by Dam Safety Engineer. • Return to routine activities. • Compile data, recording sheets, photographs for EER are required. • Submit EER to Dam Owner. • Inform all previously notified contacts of stand down.
Actions Dam Owner	• N/A	• Assist the DES and DO throughout the emergency situation.	• As per previous activation level.	• As per previous activation level.	• Submit EER to DDLGWV.
Actions LDMG	• N/A	• Authorise and submit Emergency Alert Requests to SDCC. • Provide feedback to DES from QPS on water levels upstream (if information available). • Issue: Etheridge Shire Local Disaster Management Group ADVICE WARNING Charleston Dam is now spilling. Take appropriate precautions and	• As per previous activation level AND • Notify Georgetown Police and provide updates as required. • Confirm list of PAR and prepare to evacuate PAR located downstream. • Provide feedback to DES from QPS on water levels upstream (if information available). • Issue Etheridge Shire Local Disaster Management Group WATCH AND ACT	• As per previous activation level. • Evacuate PAR located downstream. • Provide feedback to DES from QPS on water levels upstream (if information available). • Issue: Etheridge Shire Local Disaster Management Group EMERGENCY WARNING Charleston Dam is now experiencing a significant flood event	• Advise EAP has been stood down. • Issue advice: Etheridge Shire Local Disaster Management Group. ADVICE Residents are advised that the flood risk from Charleston Dam has now passed. Return home, following the direction of emergency services.

Activation Level	Alert	Lean Forward	Stand Up 1 (>1 m spillway flood)	Stand Up 2 (spillway capacity)	Stand Down
		consider evacuation should conditions deteriorate. For more information https://dashboard.etheridge.qld.gov.au/	WARNING Charleston Dam is experiencing a significant flood event and reservoir levels are rising. Take emergency actions. For more information https://dashboard.etheridge.qld.gov.au/	and there is a possibility of failure. Take emergency actions and evacuate to higher ground now. For more information https://dashboard.etheridge.qld.gov.au/	
Actions Dam Safety Engineer	• N/A	• Provide technical assistance to ESC personnel as requested.	• As per previous activation level.	• As per previous activation level.	• If requested by DES Inspect dam and spillway as soon as safe access is possible after the event. • Assist with preparation of EER.
Internal notifications	1. DO 2. DES 3. Dam Owner	• As per previous activation level.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External notifications	• Nil.	1) LDMG 2) DDMG 3) PAR 4) SDCC 5) DLGMV 6) Dam Safety Engineer.	• As per previous activation level AND • Georgetown Police. • PAR. • SDCC (to issue warning). • DLGMV	• As per previous activation level AND • DLGMV.	• Inform all previously notified contacts of stand down.
External message	• Advise EAP has been activated to alert.	• Advise EAP has been activated to Lean Forward. • Advise of any forecasts you are aware of (i.e., continuing rainfall forecast).	• Advise EAP has been activated to Stand Up – 1. • Confirm evacuations are required/ underway/ complete.	• Advise EAP has been activated to Stand Up – 2 • Confirm evacuations are required/ underway/ complete.	• Inform all previously notified contacts of stand down.

Note: 1,2,3,4,5,6, in the internal and external notifications in the Alert and Lean forward columns are the priority list.

Update following GHD risk assessment and installation of river monitoring gauges refer to https://www.disaster.qld.gov.au/__data/assets/pdf_file/0027/339417/M1174-Queensland-Emergency-Alert-Manual.pdf

5.3 EARTHQUAKE / TREMOR FELT IN THE AREA / EMBANKMENT STABILITY ISSUE

5.3.1 OVERVIEW

The emergency action described in this section relates to a potential dam failure hazard due to an earthquake causing damage to the dam embankment, foundations or spillway. Damage could take the form of the following:

- Settlement as well as longitudinal and transverse cracking of the embankment, particularly near the crest of the dam.
- Liquefaction, or loss of shear strength, due to an increase in pore pressures induced by the earthquake in the embankment and its foundations.
- Instability of the upstream slope of the dam resulting from strength loss causing deformation or slides.
- Transverse cracking in which internal erosion and piping may develop leading to increased seepage.

If damage does occur, then a dam failure may result. If damage is detected early, remedial repairs may be possible depending on the nature of the damage. This may include buttressing the slopes with additional rockfill, replacement of fill, constructing a filter and weighting zone over the pipe exit, if safe to do so, and in consultation with the advice from the Dam Safety Engineer.

The area likely to be affected by this emergency event is described as:

- If dam failure does not occur, then there will not be any area affected.
- If dam failure does occur, then the maximum area affected zone would be area identified and described for the Sunny Day Failure in **Section 8.**

5.3.2 EMERGENCY ACTIONS

Activation levels and emergency actions for earthquake, tremor or embankment stability issues are provided in **TABLE 5-3**.

FIGURE 5-2 EARTHQUAKE FLOWCHART

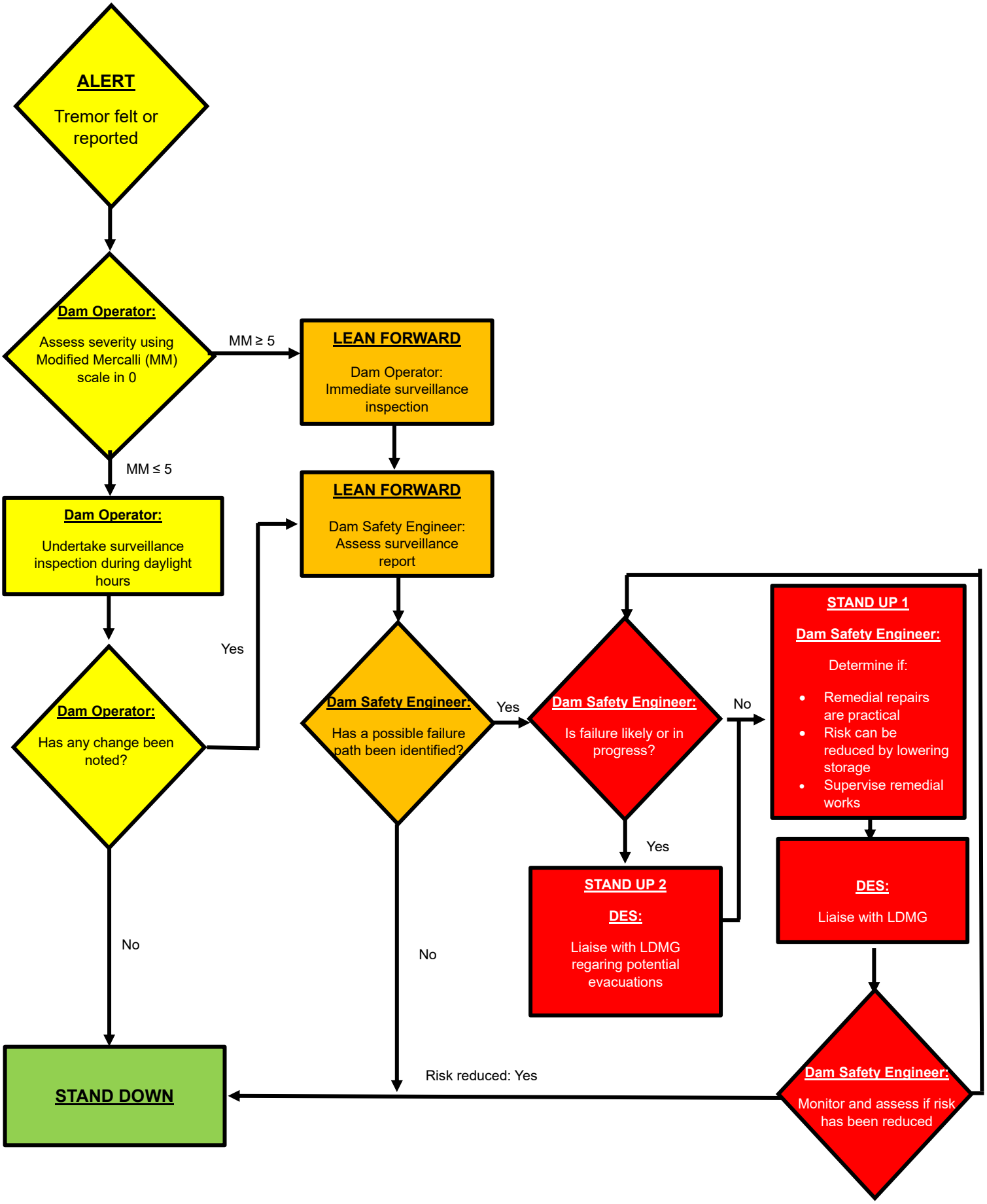


TABLE 5-3-A EMERGENCY ACTION TRIGGERS AND ACTIONS FOR EARTHQUAKE / TREMOR FELT IN THE AREA / EMBANKMENT STABILITY ISSUE – DAM OPERATOR

Activation Level	Alert	Lean Forward	Stand Up 1 (Potential Failure)	Stand Up 2 (Developing Failure)	Stand Down
Activation Trigger	• Earthquake reported or felt within 200km of the dam.	• Earthquake reported or felt within 200km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND change detected during surveillance inspection.	• Earthquake reported or felt within 200km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND • A change detected from surveillance, with a possible failure path identified.	• Failure in progress or likely due to earthquake.	• Risk assessment has determined that failure risk has reduced.
Actions	• Immediately inspect the dam and spillway. Check for signs of movement, slope failure, cracking, deformation, seepage or erosion using the inspection checklist in D. • Report on findings of inspection to the DES and Dam Owner. • Record situation including photos. • Notify Internal Stakeholders. • Record all communication. • Advise on the activation and end of EAP activation.	• As per previous activation level. • Monitor and record situation and photograph at suitable intervals. Attempt to measure width and length of any cracks, approximate shape of any slump. • Visually observe seepage and attempt to quantify seepage, take water samples, observe cloudiness.	• As per previous activation level.	• As per previous activation level.	• Return to routine surveillance frequencies.

TABLE 5-3-B EMERGENCY ACTION TRIGGERS AND ACTIONS FOR EARTHQUAKE / TREMOR FELT IN THE AREA / EMBANKMENT STABILITY ISSUE – DES

Activation Level	Alert	Lean Forward	Stand Up 1 (Potential Failure)	Stand Up 2 (Developing Failure)	Stand Down
Activation Trigger	• Earthquake reported or felt within 200 km of the dam.	• Earthquake reported or felt within 200 km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND change detected during surveillance inspection.	• Earthquake reported or felt within 200 km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND • A change detected from surveillance, with a possible failure path identified.	• Failure in progress or likely due to earthquake	• Risk assessment has determined that failure risk has reduced.
Actions	• Record situation. • Record all communication. • Review surveillance reports and determine if any additional actions are required. • Advise on the activation and end of EAP activation.	• Report on findings of inspection to the Dam Owner. • Notify External Stakeholders • Record situation. • Record all communication.	• Advise LDMG regarding potential for evacuation. • Continue to monitor at regular intervals until satisfied risk of event developing into an emergency has passed (DES). • As per previous activation level.	• As per previous activation level.	• Return to routine surveillance frequencies. • Compile data, recording sheets, photographs for EER. • Submit EER to Dam Owner.
Internal Notifications	• DO • DES • DAM OWNER (CEO	• As per previous activation level.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Notifications	• Dam Safety Engineer.	• LDMG • DDMG • DDLGWV • PAR • SDCC (to issue warning.	• As per previous activation level AND • Georgetown Police. • DDLGWV	• As per previous activation level AND • DDLGWV	• Inform all previously notified contacts of stand down
External Message	• Advise	• Watch and Act.	• Emergency Warning.	• Emergency Warning.	• Inform all previously notified contacts of stand down.

TABLE 6-3-C EMERGENCY ACTION TRIGGERS AND ACTIONS FOR EARTHQUAKE / TREMOR FELT IN THE AREA / EMBANKMENT STABILITY ISSUE – DAM OWNER (CEO)

Activation Level	Alert	Lean Forward	Stand Up 1 (Potential Failure)	Stand Up 2 (Developing Failure)	Stand Down
Activation Trigger	• Earthquake reported or felt within 200km of the dam.	• Earthquake reported or felt within 200km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND change detected during surveillance inspection.	• Earthquake reported or felt within 200km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND • A change detected from surveillance, with a possible failure path identified.	• Failure in progress or likely due to earthquake.	• Risk assessment has determined that failure risk has reduced.
Actions	• Assist the DES and DO throughout the emergency situation. • Advise on the activation and end of EAP activation.	• Assist the DES and DO throughout the emergency situation.	• Notify External Stakeholders and provide updates as required. • Undertake remedial work as required in consultation with DDLGWV and Dam Safety Engineer.	• As per previous activation level.	• Submit EER to DDLGWV.

TABLE 6-3-D EMERGENCY ACTION TRIGGERS AND ACTIONS FOR EARTHQUAKE / TREMOR FELT IN THE AREA / EMBANKMENT STABILITY ISSUE – LDMG

Activation Level	Alert	Lean Forward	Stand Up 1 (Potential Failure)	Stand Up 2 (Developing Failure)	Stand Down
Activation Trigger	• Earthquake reported or felt within 200km of the dam.	• Earthquake reported or felt within 200km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND change detected during surveillance inspection.	• Earthquake reported or felt within 200 km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND • A change detected from surveillance, with a possible failure path identified.	• Failure in progress or likely due to earthquake.	• Risk assessment has determined that failure risk has reduced.
Actions	• Not applicable.	• Authorise and submit Emergency Alert Requests to SDCC.	• Notify Georgetown Police and provide updates as required. • Contact downstream properties and advise of potential to evacuate (refer table 9.3). • Authorise and submit Emergency Alert Requests to SDCC. • Issue Etheridge Shire Local Disaster Management Group WATCH AND ACT Charleston Dam at risk of failure. Delaney River levels could rise very quickly without warning. Do not approach Delaney River or low areas. Remain vigilant and await further instruction from Emergency Services. For more information **https://dashboard.etheridge.qld.gov.au/**		•

TABLE 6-3-E EMERGENCY ACTION TRIGGERS AND ACTIONS FOR EARTHQUAKE / TREMOR FELT IN THE AREA / EMBANKMENT STABILITY ISSUE – DAM SAFETY ENGINEER

Activation Level	Alert	Lean Forward	Stand Up 1 (Potential Failure)	Stand Up 2 (Developing Failure)	Stand Down
Activation Trigger	• Earthquake reported or felt within 200km of the dam.	• Earthquake reported or felt within 200km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND change detected during surveillance inspection.	• Earthquake reported or felt within 200km of the dam, AND • Severity assessed using Modified Mercalli (MM) scale to be MM ≥ 5 AND • A change detected from surveillance, with a possible failure path identified.	• Failure in progress or likely due to earthquake.	• Risk assessment has determined that failure risk has reduced.
Actions	• Provide technical assistance to ESC personnel as requested.	• As per previous activation level.	• As per previous activation level AND • Assess and advise DES if failure likely. • Assess if risk can be reduced by lowering storage and advise DES	• As per previous activation level.	• Inspect as safe access is possible after the event. • Assist with preparation of EER.

Update following GHD risk assessment and installation of river monitoring gauges refer to

https://www.disaster.qld.gov.au/__data/assets/pdf_file/0027/339417/M1174-Queensland-Emergency-Alert-Manual.pdf

5.4 SIGNIFICANT NEW SEEPAGE, SUDDEN INCREASE IN EXISTING SEEPAGE

5.4.1 OVERVIEW

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

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

The area likely to be affected by this emergency event is described as:

- If dam failure does not occur, then there will not be any area affected.
- If dam failure does occur, then the likely area affected zone would be area identified and described for the Sunny Day Failure in **Section 8**.

Regular review of seepage data is an important aspect of this plan, with consideration of historic seepage rates and storage levels, such that any changes in seepage can be promptly investigated.

5.4.2 EMERGENCY ACTIONS

Activation levels and emergency actions for significant new seepage or sudden increase in existing seepage are provided in **TABLE 5-4**.

FIGURE 5-3 PIPING: EMBANKMENT, FOUNDATION OR ABUTMENTS FLOWCHART

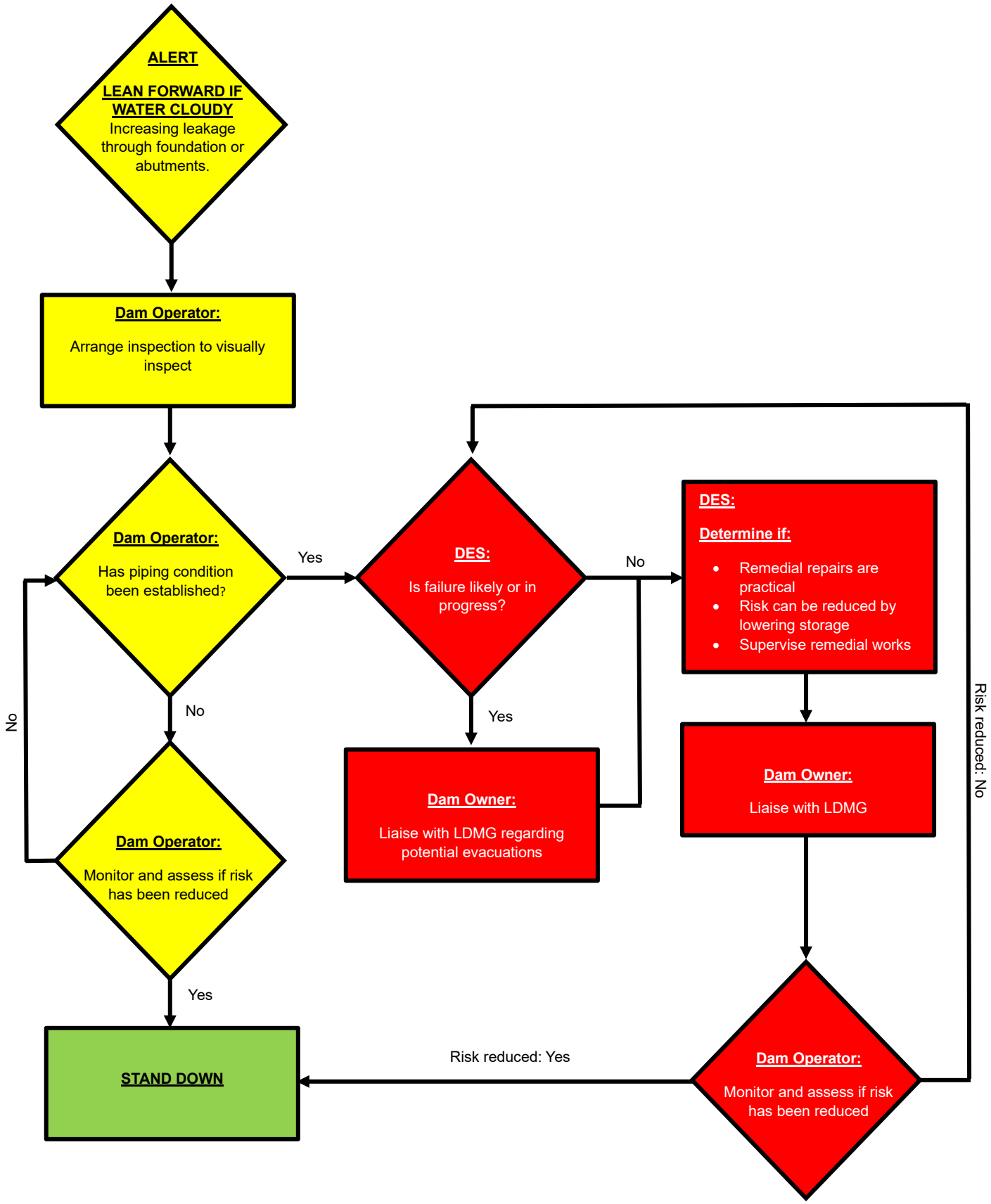


TABLE 5-4 EMERGENCY ACTION TRIGGERS AND ACTIONS FOR SIGNIFICANT NEW SEEPAGE / SUDDEN INCREASE IN EXISTING SEEPAGE

Activation Level	Alert	Lean Forward	Stand Up 1 (Potential Failure)	Stand Up 2 (developing failure)	Stand Down
Activation Trigger	• Increasing leakage through the embankment, foundations or abutments.	• Increasing leakage through the embankment, foundation abutments with cloudy water.	• Piping condition has been established.	• Failure in progress or likely due to piping, AND • Sufficient water in storage to create a dam hazard.	• Risk assessment has determined that piping risk has reduced.
Actions DO	• Visually observe seepage and attempt to quantify seepage, take water samples, observe cloudiness. • Inspect the upstream face for signs of new cracks or whirlpools that might indicate the source of new or increased seepage. • Report on findings of inspection to the Dam Safety Engineer. • Record situation including photos.. • Notify Internal Stakeholders. • Record all communication.	• As per previous activation level.	• As per previous activation level.	• As per previous activation level. • Vacate the immediate vicinity downstream of the piping condition.	• Return to routine surveillance frequencies.
Actions DES	• Record situation. • Record all communication. • Notify external stakeholders • Review surveillance reports and determine if any additional actions are required.	• Continue to monitor at regular intervals until satisfied risk of event developing into an emergency has passed. • Notify External Stakeholders. • Notify LDMG and include distribution of report on findings of inspection.	• As per previous activation level.	• As per previous activation level.	• Undertake risk assessment to determine piping risk has reduced to acceptable levels. • Return to routine surveillance frequencies. • Compile data, recording sheets, photographs for EER.

Activation Level	Alert	Lean Forward	Stand Up 1 (Potential Failure)	Stand Up 2 (developing failure)	Stand Down
	• Advise on the activation and end of EAP activation.	• Lower storage through the outlet works and additional pumps and siphons in consultation with the Dam Safety Engineer.			• Submit EER to Dam Owner.
Actions Dam Owner	N/A.	• Assist the DES and DO throughout the emergency situation.	• As per previous activation level AND • Undertake remedial work as required in consultation with DDLGWV and Dam Safety Engineer.	• As per previous activation level.	• Submit EER to DDLGWV.
Actions LDMG	N/A	• Authorise and submit Emergency Alert Requests to SDCC.	• Notify Georgetown Police and provide updates as required. • Authorise and submit Emergency Alert Requests to SDCC. • Issue Etheridge Shire Local Disaster Management Group WATCH AND ACT WARNING Charleston Dam at risk of failure. Delaney River levels could rise very quickly without warning. Do not approach Delaney River or low areas. Remain vigilant and await further instruction from Emergency Services. For more information **https://dashboard.etheridge.qld.gov.au/**	• As per previous activation level. • Evacuate downstream properties (refer table 9.5). • Issue Etheridge Shire Local Disaster Management Group EMERGENCY WARNING Dam Breach at Charleston Dam. Delaney River levels will rise very quickly without warning. Do not approach Delaney River or low areas. For more information **https://dashboard.etheridge.qld.gov.au/**	• Advise EAP has been stood down. • Issue advice: ADVICE Residents are advised that the failure risk from Charleston Dam has now passed.
Actions Dam Safety Engineer	• Provide technical assistance to Etheridge Shire Council personnel as requested.	• As per previous activation level.	• As per previous activation level.	• As per previous activation level.	• Inspect the dam as soon as safe access is possible after the event.
Internal Notifications	1. DO 2. DES 3. Dam Owner.	• As per previous activation level.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.

Activation Level	Alert	Lean Forward	Stand Up 1 (Potential Failure)	Stand Up 2 (developing failure)	Stand Down
External Notifications	• Advice.	• LDMG • DDMG • DDLGWV • PAR • SDCC	• Emergency Warning.	• Emergency Warning.	• Inform all previously notified contacts of stand down.

Update following GHD risk assessment and installation of river monitoring gauges refer to

https://www.disaster.qld.gov.au/__data/assets/pdf_file/0027/339417/M1174-Queensland-Emergency-Alert-Manual.pdf

5.5 TERRORISM / HIGH ENERGY IMPACT EVENT

5.5.1 OVERVIEW

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

The vulnerability of Charleston Dam to a terrorist attack is very low.

The area likely to be affected by this emergency event is described as:

- If dam failure does not occur, then there will not be any area affected.
- If dam failure does occur, then the likely area affected zone would be area identified and described for the Sunny Day Failure in **Section 8.**

5.5.2 EMERGENCY ACTIONS

Activation levels and emergency actions for terrorism / high energy impact are provided in **TABLE 5-5**.

FIGURE 5-4 TERRORIST THREAT/ACTIVITY OR HIGH ENERGY IMPACT FLOWCHART

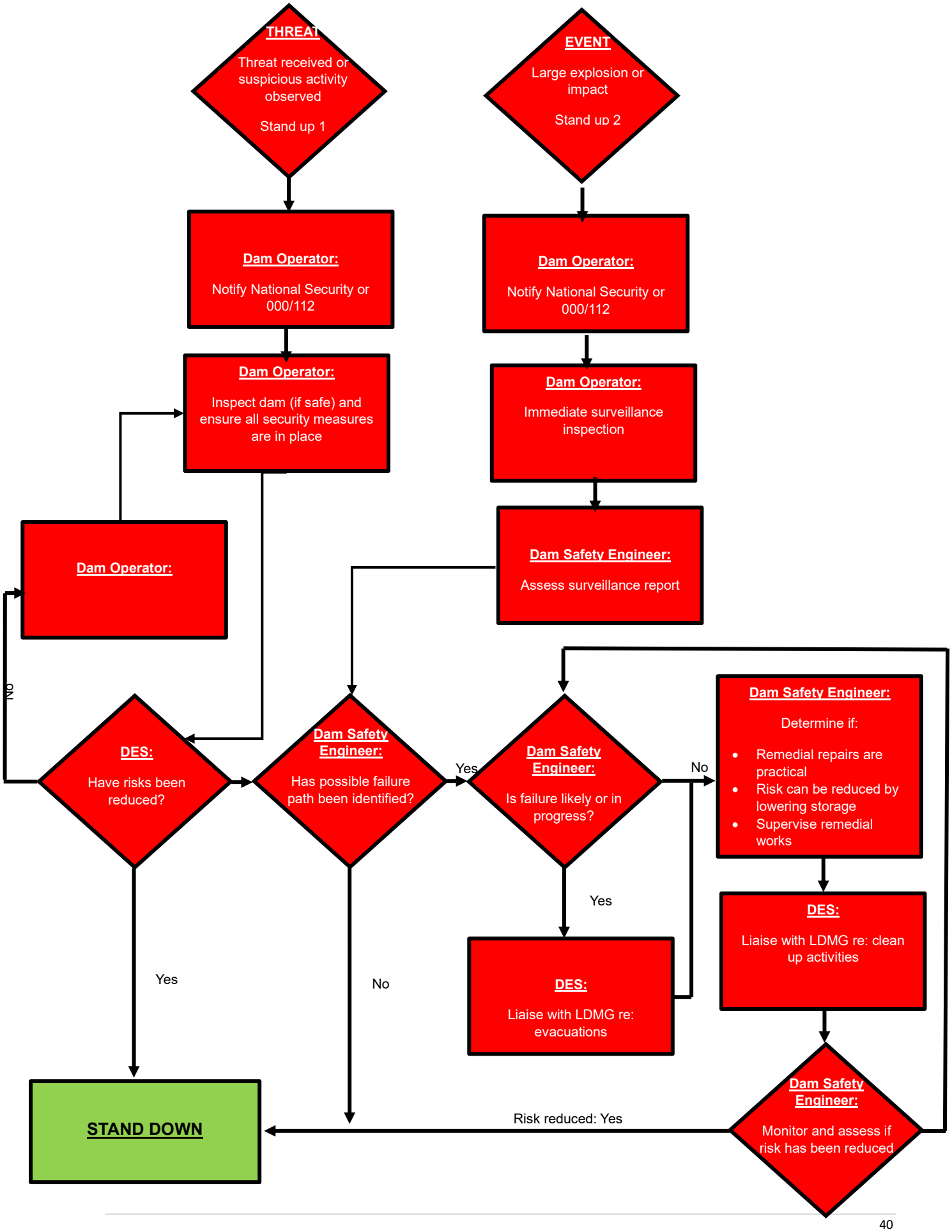


TABLE 5-5-A EMERGENCY ACTION TRIGGERS AND ACTIONS FOR TERRORISM / HIGH ENERGY IMPACT- DAM OPERATOR

Activation Level	Alert / Lean Forward	Stand Up 1 (Threat)	Stand Up 2 (Event)	Stand Up 3 (Response)	Stand Down
Activation Trigger	• N/A.	Possible terrorist activity noticed at dam OR Threat received.	Large explosion heard/observed at dam (e.g., bomb explosion, aircraft or meteorite strike).	Failure in progress or likely due to impact or explosion AND Sufficient water in storage to create a dam failure hazard.	Risk assessment has determined that failure risk has reduced.
Actions DO	• N/A	• If suspicious notify National Security 1800 123 400 or 000/112. • Notify Internal Stakeholders.	• As per previous activation level AND • Vacate the immediate vicinity of the affected area.	• As per previous activation level.	• Return to routine surveillance frequencies.
Internal Notifications	• N/A	1. DO 2. DES 3. Dam Owner.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Notifications	• N/A	1. LDMG 2. DDMG 3. PAR 4. SDCC (to issue warning). 5. Georgetown Police. 6. Dam Safety Engineer. 7. DDLGWV 8. National Security.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Message	• Advice.	• Watch and Act.	• Emergency Warning.	• Emergency Warning.	• Inform all previously notified contacts of stand down.

TABLE 5.5-B EMERGENCY ACTION TRIGGERS AND ACTIONS FOR TERRORISM / HIGH ENERGY IMPACT – DES

Activation Level	Alert / Lean Forward	Stand Up 1 (Threat)	Stand Up 2 (Event)	Stand Up 3 (Response)	Stand Down
Activation Trigger	• N/A.	Possible terrorist activity noticed at dam OR Threat received.	Large explosion heard/observed at dam (e.g., bomb explosion, aircraft or meteorite strike).	Failure in progress or likely due to impact or explosion AND Sufficient water in storage to create a dam failure hazard.	Risk assessment has determined that failure risk has reduced.
Actions DES	• N/A.	• Report on findings of inspection to the Dam Owner if safe to do so. • Record situation including photos. • Record all communication.	• Inspect the dam as soon as possible, when safe to do so. • Advise LDMG regarding potential for evacuation.	• As per previous activation level.	• Return to routine surveillance frequencies. • Compile data, recording sheets, photographs for EER. • Submit EER to Dam Owner.
Internal Notifications	• N/A	1. DO 2. DES 3. Dam Owner.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Notifications	• N/A	1. LDMG 2. DDMG 3. PAR 4. SDCC (to issue warning). 5. Georgetown Police. 6. Dam Safety Engineer. 7. DDLGWV 8. National Security.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Message	• Advice.	• Watch and Act.	• Emergency Warning.	• Emergency Warning.	• Inform all previously notified contacts of stand down.

TABLE 5.5-C EMERGENCY ACTION TRIGGERS AND ACTIONS FOR TERRORISM / HIGH ENERGY IMPACT – DAM OWNER

Activation Level	Alert	Lean Forward	Stand Up 1 (Threat)	Stand Up 2 (Event)	Stand Up 3 (Response)	Stand Down
Activation Trigger	• N/A		Possible terrorist activity noticed at dam OR Threat received.	Large explosion heard/observed at dam (e.g., bomb explosion, aircraft or meteorite strike).	Failure in progress or likely due to impact or explosion AND Sufficient water in storage to create a dam failure hazard.	Risk assessment has determined that failure risk has reduced.
Actions DO	• N/A		• If suspicious notify National Security 1800 123 400 or 000/112. • Notify Internal Stakeholders.	• As per previous activation level AND • Vacate the immediate vicinity of the affected area.	• As per previous activation level.	• Return to routine surveillance frequencies.
Internal Notifications	• N/A		1. DO 2. DES 3. Dam Owner.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Notifications	• N/A		1. LDMG 2. DDMG 3. PAR 4. SDCC (to issue warning). 5. Georgetown Police. 6. Dam Safety Engineer. 7. DDLGWV 8. National Security.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Message	• Advice.		• Watch and Act.	• Emergency Warning.	• Emergency Warning.	• Inform all previously notified contacts of stand down.

TABLE 5.5-D EMERGENCY ACTION TRIGGERS AND ACTIONS FOR TERRORISM / HIGH ENERGY IMPACT - DAM SAFETY ENGINEER

Activation Level	Alert / Lean Forward	Stand Up 1 (Threat)	Stand Up 2 (Event)	Stand Up 3 (Response)	Stand Down
Activation Trigger	• N/A	Possible terrorist activity noticed at dam OR Threat received.	Large explosion heard/observed at dam (e.g., bomb explosion, aircraft or meteorite strike).	Failure in progress or likely due to impact or explosion AND Sufficient water in storage to create a dam failure hazard.	Risk assessment has determined that failure risk has reduced.
Actions Dam Safety Engineer	• N/A	• As per previous activation level.	• Inspect the dam as soon as possible, when safe to do so. • Assess if there is a risk of potential failure or if remedial repairs are possible. • Advise if risks can be reduced by lowering the storage. • Monitor situation and assess risks.	• As per previous activation level.	• Inspect the dam as soon as safe access is possible after the event.
Internal Notifications	• N/A	1. DO 2. DES 3. Dam Owner.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Notifications	• N/A	1. LDMG 2. DDMG 3. PAR 4. SDCC (to issue warning). 5. Georgetown Police. 6. Dam Safety Engineer. 7. DDLGWV 8. National Security.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Message	• Advice	• Watch and Act.	• Emergency Warning.	• Emergency Warning.	• Inform all previously notified contacts of stand down.

TABLE 5.5-E **EMERGENCY ACTION TRIGGERS AND ACTIONS FOR TERRORISM / HIGH ENERGY IMPACT – LDMG**

Activation Level	Alert / Lean Forward	Stand Up 1 (Threat)	Stand Up 2 (Event)	Stand Up 3 (Response)	Stand Down
Activation Trigger	• N/A	Possible terrorist activity noticed at dam OR threat received.	Large explosion heard/observed at dam (e.g., bomb explosion, aircraft or meteorite strike).	Failure in progress or likely due to impact or explosion AND Sufficient water in storage to create a dam failure hazard.	Risk assessment has determined that failure risk has reduced.
Actions LDMG	• N/A	• Notify Georgetown Police and provide updates as required. • Authorise and submit Emergency Alert Requests to SDCC.	• Notify Georgetown Police and provide updates as required. • Evacuate downstream properties (refer table 9.5). • Authorise and submit Emergency Alert Requests to SDCC. • Issue Etheridge Shire Local Disaster Management Group. • Emergency Warning. A flash flood is happening now at Etheridge River Bridge. MOVE TO THE HIGHER GROUND / TAKE SHELTER NOW. Listen to local radio or go to Etheridge Shire Council web site. **https://dashboard.etheridge.qld.gov.au/** If your life is in danger call 000	• As per previous activation level. • Issue Etheridge Shire Local Disaster Management Group EMERGENCY WARNING. • A flash flood is happening now at Etheridge River Bridge. MOVE TO THE HIGHER GROUND / TAKE SHELTER NOW. Listen to local radio or go to Etheridge Shire Council web site. https://dashboard.etheridge.qld.gov.au/ If your life is in danger call 000	• Advise EAP has been stood down. • Issue advice: Etheridge Shire Local Disaster Management Group ADVICE Residents are advised that the failure risk from Charleston Dam has now passed.
Internal Notifications	• N/A	1. DO 2. DES 3. Dam Owner.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.

Activation Level	Alert	Lean Forward	Stand Up 1 (Threat)	Stand Up 2 (Event)	Stand Up 3 (Response)	Stand Down
External Notifications	• N/A		1. LDMG 2. DDMG 3. PAR 4. SDCC (to issue warning). 5. Georgetown Police. 6. Dam Safety Engineer 7. DDLGWV 8. National Security.	• As per previous activation level.	• As per previous activation level.	• Inform all previously notified contacts of stand down.
External Message	• Advice		• Message type: Watch and Act	• Message type: Emergency Warning.	• Message type: Emergency Warning	• Inform all previously notified contacts of stand down.

Update following GHD risk assessment and installation of river monitoring gauges refer to https://www.disaster.qld.gov.au/__data/assets/pdf_file/0027/339417/M1174-Queensland-Emergency-Alert-Manual.pdf

6. COMMUNICATIONS

6.1 EQUIPMENT

The means of communication to be engaged for this EAP and to be used by the resources responding to a dam safety incident shall include:

Equipment	Location	Equipment Owner
Landline Telephone	Georgetown Council Office and Works Depot	Various Council Staff
Mobile Telephone (including text messaging)	Georgetown Council Office and Works Depot	Various Council Staff
Satellite Telephone (where mobile phone coverage is not available or unreliable)	Georgetown Council Office and Works Depot	Council DO and Infrastructure and Engineering Services Manager
Local ABC and FM Radio Broadcast	Georgetown Council Office and Works Depot	Various Council Staff
Police radio	QPS station and vehicles	QPS staff
Email	info@etheridge.qld.gov.au Email monitored by multiple Council Staff	Various Council Staff
UHF Radio	Council Vehicles and Depot	Various Council Staff
Facsimile	N/A	N/A

All persons engaged in this plan shall maintain a log of any communications sent or received together with any corresponding actions taken, observations and other relevant notes. The National Emergency Alert System is also considered to be a means of issuing alerts and warnings via SMS (Text) messages through nominated polygons. It is to be noted that both Satellite Telephone and Mobile Phone systems can be impacted by adverse weather conditions. Where possible, backup communications are to be provided

6.2 ISSUING FLOOD WARNINGS AND EVACUATION NOTICES

The following methods of issuing flood notifications, warnings and evacuation notices are to be used where appropriate:

- Notifications and Warnings issued using the National Emergency Alert “Polygon” System (SMS alert through the mobile phone system).
- Use of loudspeakers via a vehicle travelling the streets.
- Door knocking selected properties known vulnerable residents.
- Local emergency response personnel making public broadcasts and where necessary door knocking individual residences or places of occupancy.
- Local media releases including Radio and Television.
- The sounding of audible warning devices to alert both general and transient populations.
- Through social media.

7. OTHER EMERGENCY SITUATION – COMMUNICATIONS FAILURE

7.1 OVERVIEW

Communication protocols for coordination of emergency response and disaster management are outlined for the various emergency events within **Section 5.**

The emergency action described in this section relates to either:

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

This section specifies actions and provides guidance for the three situations, further protocols and personnel responsibilities are described in *SOP 06 – Communication procedures and procedures covering the loss of communication during an emergency event*.

7.2 EMERGENCY ACTIONS

Due to the large number of different possible scenarios, **TABLE 7-1** only covers the most common or likely conditions.

7.2.1 ACTIVATION TRIGGERS

TABLE 7-1 COMMUNICATIONS FAILURE EMERGENCY ACTIVATION TRIGGER SUMMARY

Communications failure dam site		Unable to communicate to or from dam site including failure of telemetry (usually affects Dam Operator and Director of Engineering Services).
Communications failure local area		Unable to communicate to or from local area (likely to affect LDMG or ESC).
Communications Failure external site		Unable to communicate to or from external sites (could affect Dam Safety Engineer or DDLGWV).

7.2.2 ASSESSMENT OF CIRCUMSTANCES THAT INDICATES THE LIKELIHOOD OF COMMUNICATIONS FAILURE ESCALATING THE ACTIVATION LEVEL OF A CURRENT DAM HAZARD

The DO (Infrastructure and Engineering Services Manager) will assess the weather and flood warnings daily in accordance with *SOP 10 – Water level monitoring and monitoring of inflow events*. The DO (Infrastructure and Engineering Services Manager) will escalate to the DES any warnings that have the potential to cause a significant communications failure.

Etheridge Shire Council will escalate to the DO (Infrastructure and Engineering Services Manager) any local intelligence on conditions that could increase the probability of a significant communications failure.

The DO (Infrastructure and Engineering Services Manager) will determine whether it is reasonably likely that there will be significant communications failure within the subsequent 24 hours and assess the likely effect on current dam hazards. If required, the DO (Infrastructure and Engineering Services Manager) will instruct the DES to escalate the activation level of any current dam hazards.

7.2.3 COMMUNITY WARNING

The most recent Failure Impact Assessment dated 24TH April 2024 identified an incremental Population at Risk (PAR) of 87 people for a 1 in 1,500,000 AEP event in the dam catchment; and the 1 in 100 AEP in the downstream catchment as well as a 1 in 800,000 AEP event in the dam catchment; and the 1 in 50 AEP in the downstream catchment.

In imminent failure events, it is feasible for local disaster responders to directly notify the PAR. The responsibility for such warning rests with Police and ESC. In regard to notification for residents at risk, the Local Disaster Management Group has documents containing relevant details (*Information and Warning Sub-Plan* and *Evacuation Management Sub Plan*).

Notwithstanding, it is appropriate to have community warning also undertaken using the Emergency Alert (EA) system. **TABLE** 7-2 outlines how the Emergency Alert system will be used to support emergency events covered within the EAP. Partially completed Emergency Alert Request form along with EA polygons are provided in APPENDIX H**.** A completed Emergency Alert Request form should be submitted by the LDMG to the SDCC watch desk (contact details are provided in APPENDIX G). These messages and polygons have been pre-filled with the watch desk to expedite the EA process. In time-critical situations, a representative of ESC may be required to submit the EA request.

TABLE 7-2 USE OF EMERGENCY ALERT SYSTEMS TO SUPPORT EAP

Emergency Event	Activation Level	EA Message Severity	EA Message Intent
Significant flow through spillway.	Lean forward	Watch and act	Advise
	Stand Up 1 or 2	Emergency warning	Direct evacuation
	Stand Down	Advice	Safe return
Earthquake / tremor / embankment stability.	Stand Up 1 or 2	Emergency warning	Direct evacuation
	Stand Down	Advice	Safe return
Significant new seepage, sudden increase in existing seepage.	Stand Up 1 or 2	Emergency warning	Direct evacuation
	Stand Down	Advice	Safe return
Terrorism / high energy impact event.	Stand Up 1, 2 or 3	Emergency warning	Direct evacuation
	Stand Down	Advice	Safe return

7.2.4 COMMUNITY WARNING BACK-UP

In the event that community warning is required supplementary to the EA system process (e.g. system failure or urgent warning required). Community warning will be undertaken with door-knocking and/or a loud hailer drive-around Georgetown Police. Should Georgetown Police be unavailable, an ESC representative will undertake community warning in a similar manner.

Guides to complete steps 1 to 4

Step 1. EA Polygon Area (e.g. detailed description and location reference to allow positive identification of message area, including street names with cross street, areas of interest such as parks, rivers, dams, coastal areas) it is preferable to attach a map identifying the message area. If a Threat Direction has been requested, please clearly indicate it on the map.

Step 2. Tick applicable box and note the file name.

Step 3. Voice Message: type or handwritten the required message. As the message will be translated by a text-to-speech process it is important that words are not unintelligible when translated e.g. qld" used in a web site address must be entered as "q l d", similarly the word "dot" must be entered into a web address instead of a full stop. Voice Message ideally should have no more than 450 characters including spaces. Do not use special characters – refer to EA Manual for details. Warning message must start with "Emergency Emergency"

Step 4. SMS Is restricted to a maximum of 160 characters including spaces and punctuation. Either type the message or handwrite the characters into the boxes.

8. FLOOD CHARACTERISTICS & FLOOD INUNDATION MAPS

8.1 GENERAL

This section reports on flood levels and time travels for the following events:
Sunny day failure (i.e. flooding due to dam failure only).

Probable maximum:

- ❖ No overtopping failure of dam.
- ❖ Overtopping failure of dam.

The inundation maps for the Sunny Day Failure, the 1 in 600,000 AEP and Probable Maximum Flood with overtopping failure of dam are provided in **Appendix J.** Results relevant for the EAP are provided below. Results are based on the updated FIA based on the actual constructed levels.

A summary of the travel times is provided in Table 8.1, considering time since the start of the rainfall and since the start of the breach to reach peak water level at representative points of PAR locations showed in Figure 8.1. It is noted that for SDF no properties are impacted by the dam failure.

Table 8.1 Travel times for Charleston dam break inundation

ID	Since the start of the rainfall (hours)				Since the start of the breach (hours)				
	1 in 61,000 with 0.2% AEP	1 in 150,000 with 0.2% AEP	1 in 800,000 with 0.05% AEP	1 in 1,500,000 with 0.02% AEP	SDF	1 in 61,000 with 0.2% AEP	1 in 150,000 with 0.2% AEP	1 in 800,000 with 0.05% AEP	1 in 1,500,000 with 0.02% AEP
1	26.0	26.1	26.8	25.5	-	21.2	20.9	20.7	20.7
9	26.1	26.2	26.9	25.6	-	21.3	21.0	20.8	20.8
51	26.2	26.2	26.9	25.6	-	21.4	21.0	20.8	20.8
177	26.2	26.2	27.0	25.7	-	21.4	21.0	20.9	20.9
23	26.3	26.4	27.0	25.8	-	21.5	21.2	20.9	21.0

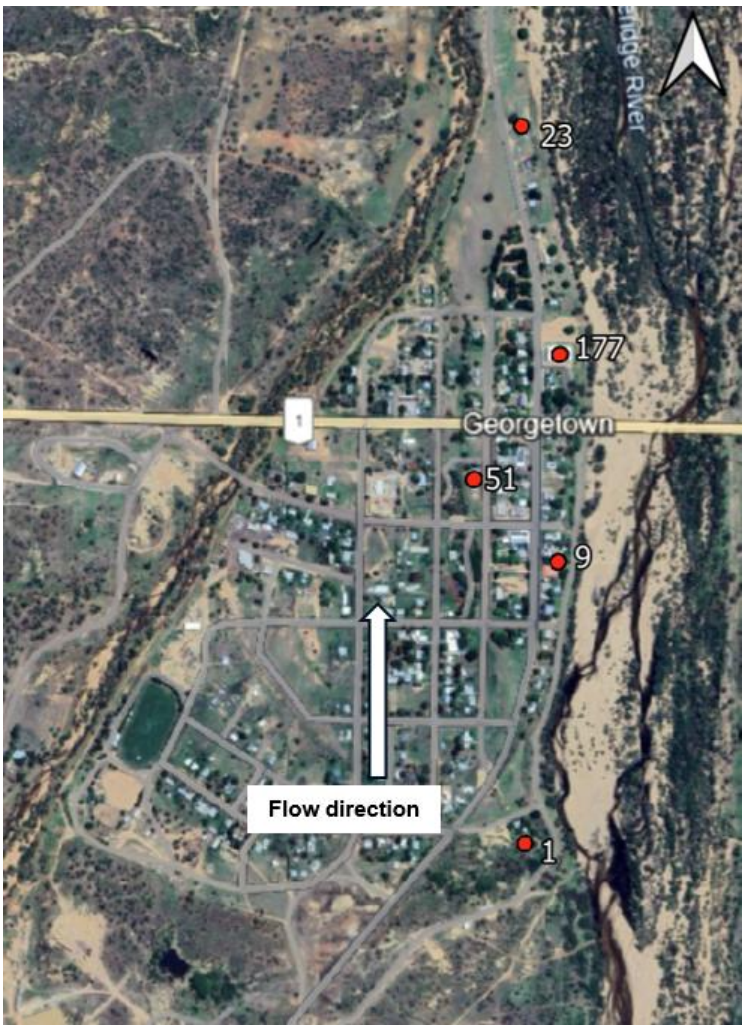


FIGURE 8.1 SELECTED PAR LOCATIONS FOR CHARLESTON DAM

8.2 PEAK FLOOD LEVELS

TABLE 8-2 PROBABLE MAXIMUM FLOOD EVENT

Location	Distance downstream (km)	Peak flood level (m AHD)	
		PMP with No Failure	PMP with Failure
Charleston Dam	0.0	337.99	338.36
Section 1 – Lorne vale Stockyard	4.4		365.46
Section 2 – Lorne vale Homestead Residences	12.3		338.19
Section 2 – Lorne vale Homestead Sheds	12.3	335.75	338.19
Section 3 – Mt Sullivan Caretake	24.8	308.04	311.45
Section 4 – Roseglen Stockyard	26.0	305.03	307.44
Georgetown*	30.0	307.23	307.48

8.3 TIME FOR FLOOD TO REACH FLOOR LEVELS

The Sunny Day Failure (SDF) flood level does not reach any of the structures between Charleston Dam and Georgetown. **TABLE 8-3** presents the floor level of the structures and the time for the no failure and failure PMP-DF flood to reach that level.

For Georgetown, the results presented in **TABLE 8-3** is of the lowest lying structure. Hence, the results presented below reflect the time when the flood hits the first structure.

TABLE 8-3 PROBABLE MAXIMUM FLOOD EVENT

Location	Floor Level (m AHD)	Time to Reach Floor Level (hrs)	
		PMP with No Failure	PMP with Failure
Section 1 – Lorne vale Stockyard	368.39	N/A	N/A
Section 2 – Lorne vale Homestead Residences	344.83	N/A	N/A
Section 2 – Lorne vale Homestead Sheds	336.54	3.0	3.0
Section 3 – Mt Sullivan Caretake	308.32	4.3	4.2
Section 4 – Roseglen Stockyard	302.71	4.3	4.2
Georgetown	291.03	5.3	5.2

8.4 FLOOD INUNDATION MAPS

Flood inundation maps are included in **Appendix I** and are as follows:

- ❖ Sunny Day Failure.
- ❖ Probable Maximum Flood with overtopping failure.

8.5 DOWNSTREAM PROPERTIES

Downstream Persons at Risk (PAR) properties and contact details. The list below is on the priority basis and has been developed the list starts from the downstream of the Etheridge Bridge.

Address	Lot/Plan	Owner	Contact details

List of downstream properties have been redacted

TABLE 8-4 ROAD OVERTOPPING DUE TO FLOODING

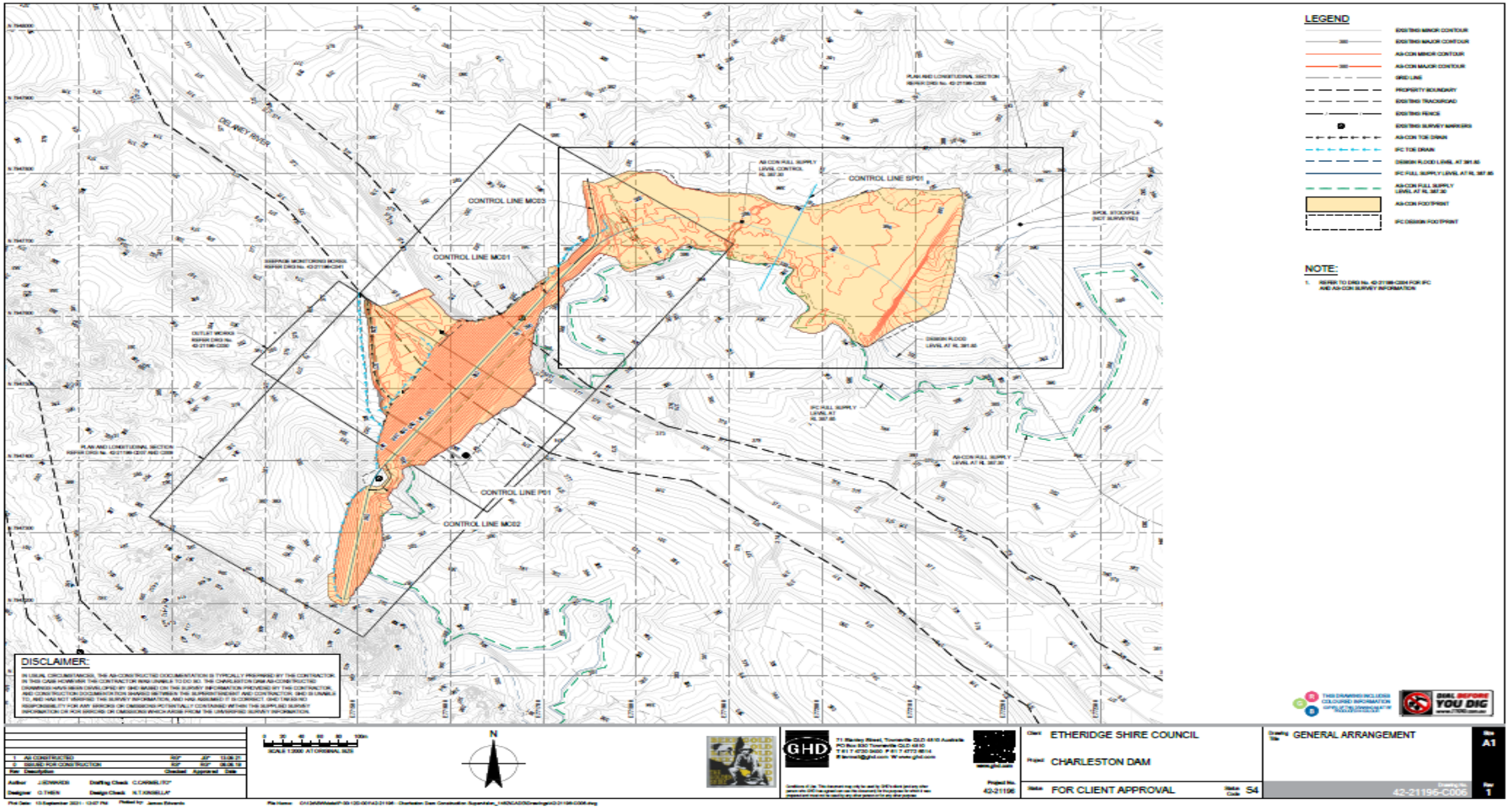
Location	Depth Over Road (m)		
	Sunny Day Failure	PMF with no failure	PMF with overtopping failure
Saint George Street	N/A	7.1	7.3
Gulf Development Road (taken over Etheridge River)	N/A	6.0	6.2
Abingdon Downs Road	N/A	4.4	4.6

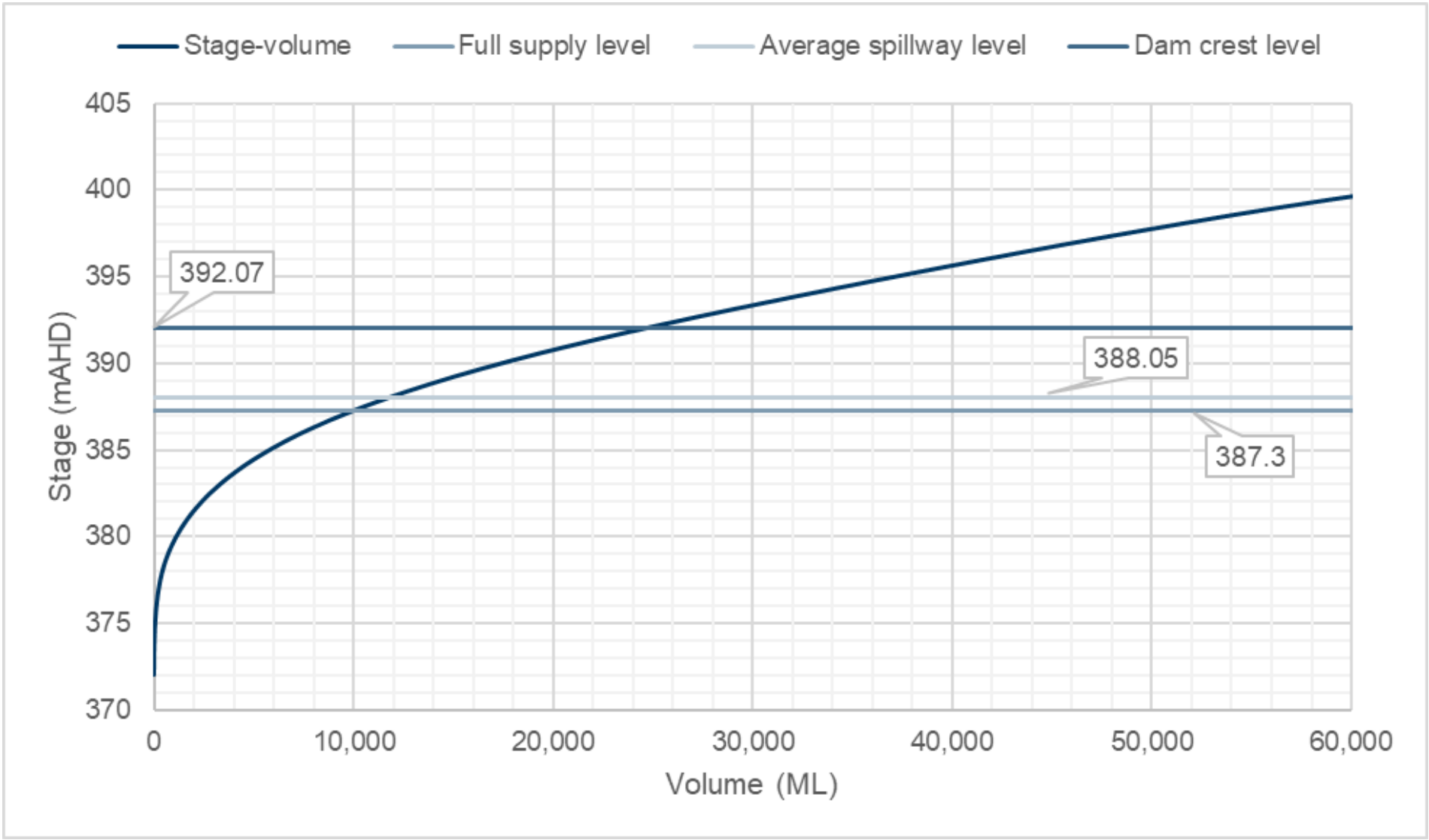
8.7 UNCERTAINTY IN THE MODEL RESULTS

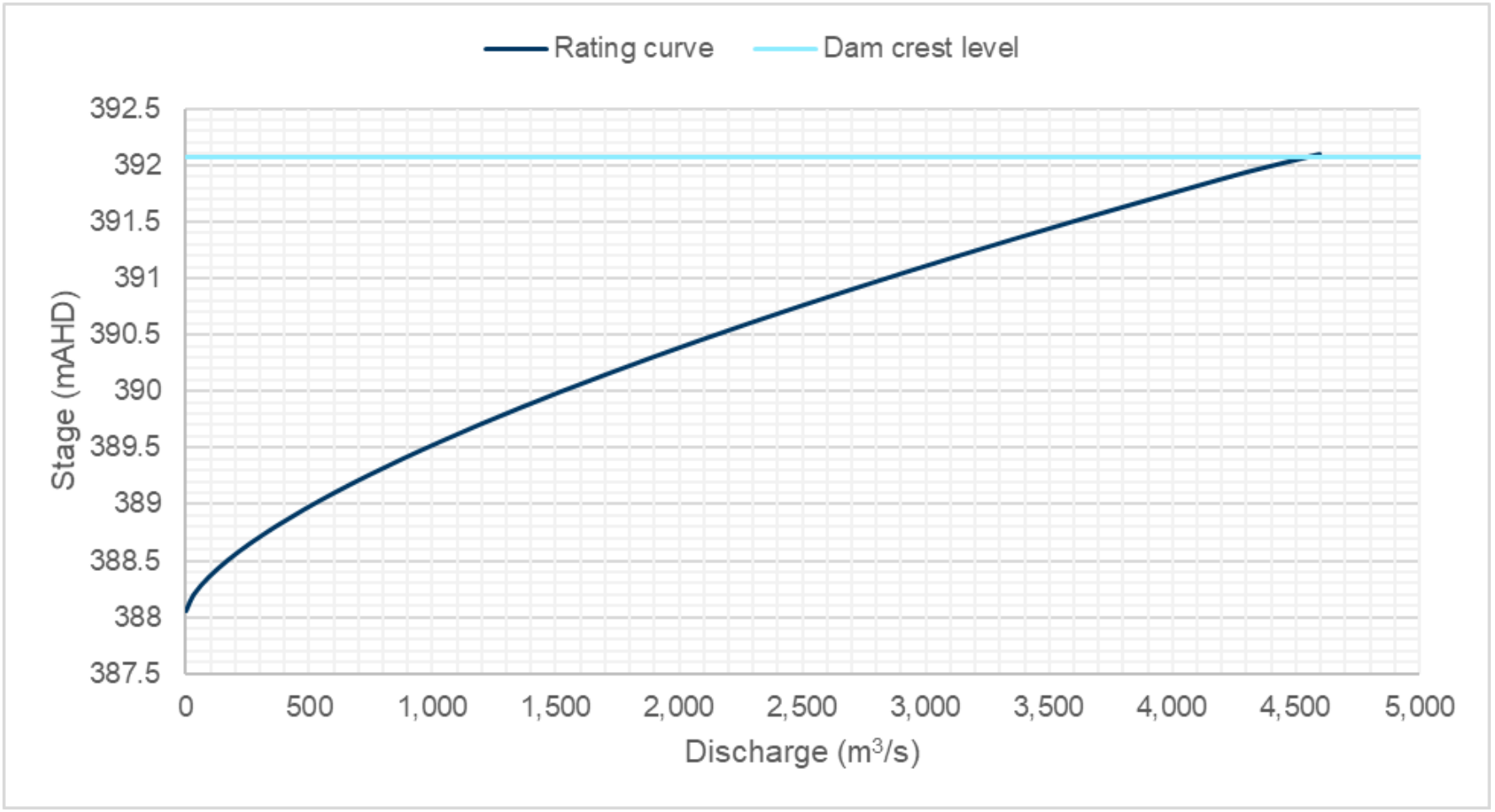
It should be noted that there are limitations in terms of data used and methodologies for this study that have resulted in uncertainties within the results.

- 2D modelling for the region from Charleston Dam to Georgetown has been done using a 30 m grid cell size with 5 m vertical accuracy, which have been extracted from 10 m contour intervals. Uncertainty arises from the process of interpolating a raster from contour data and as such, it may not fully reflect the terrain accurately. Further, the course accuracy of the available data may impact the propagation of the flood done the system, impacting timing and magnitude.
- In order to account for this, a separate 1-D HEC-RAS model was developed using surveyed cross-sections and used to inform the peak water levels at the key infrastructure sites. However, it should be noted that a 1-D model may not be able to fully capture the storage effects that a channel and floodplain system may inherently have.
- There are inherent uncertainties associated with the derivation of PMP rainfall depths and the subsequent calculation of PMP-DF flows, however, these are based on industry standard values.

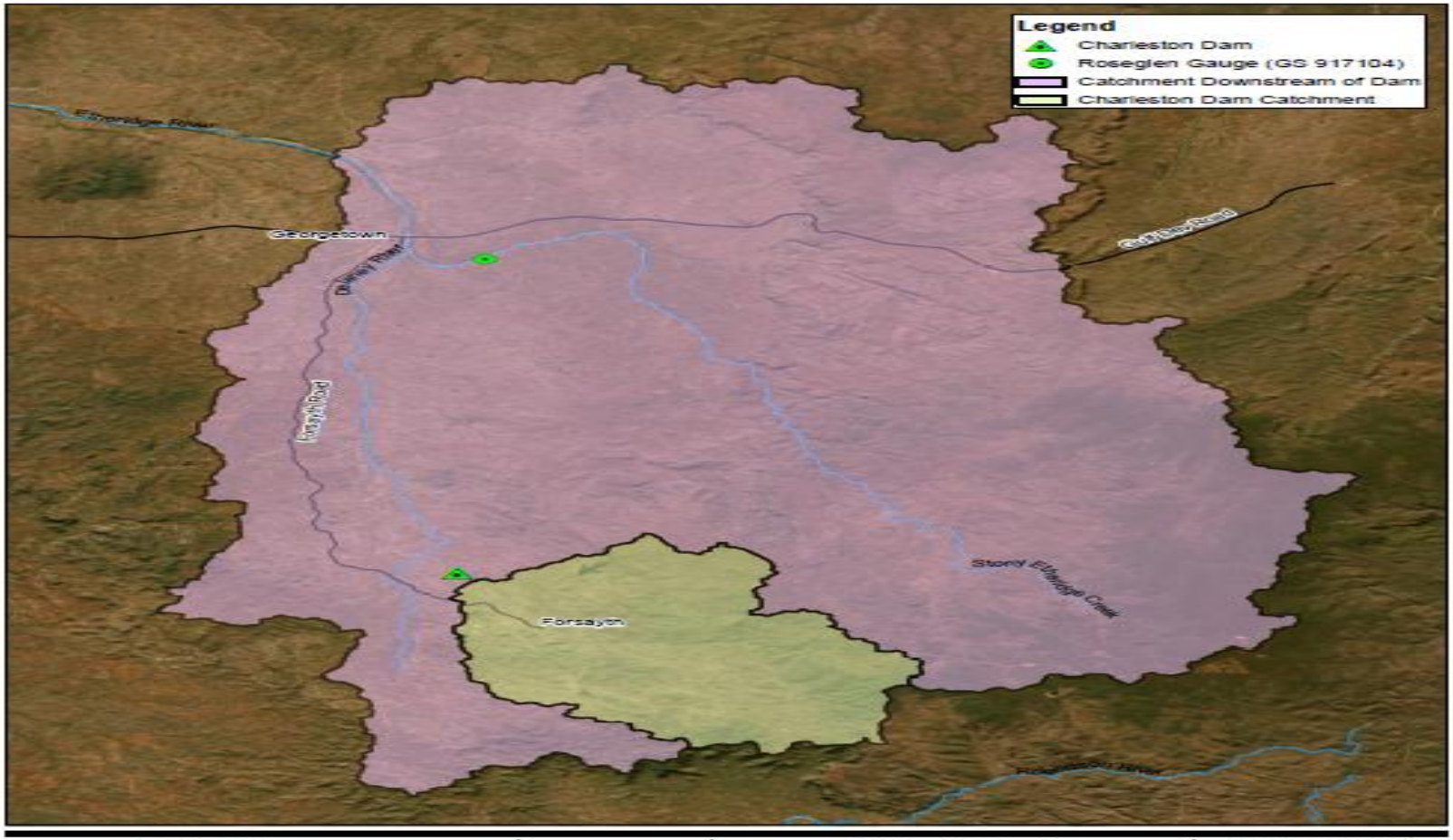
Appendix A - DAM DRAWINGS, STORAGE CURVE & SPILLWAY RATING CURVE



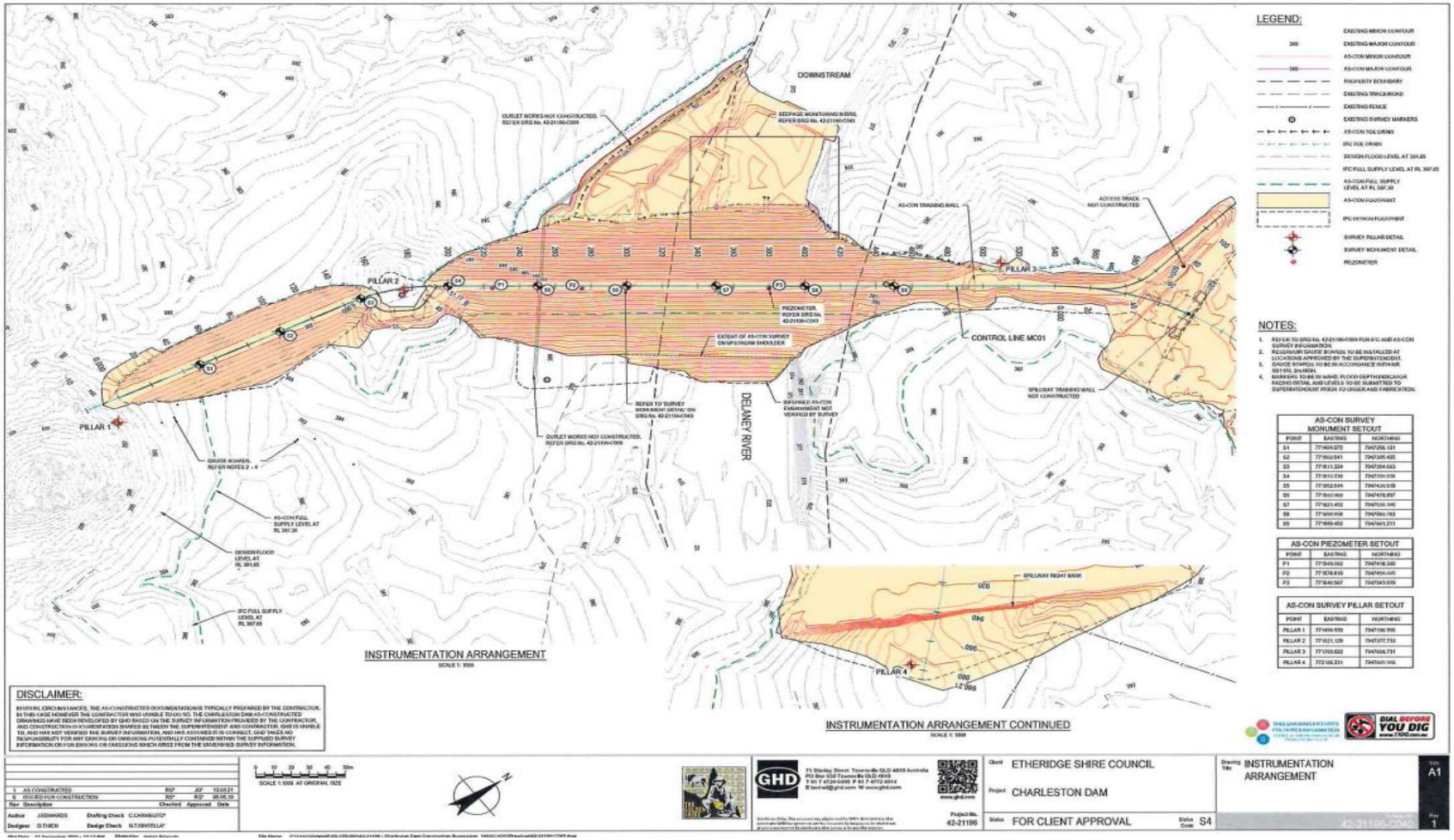

Stage-volume
Full supply level
Average spillway level
Dam crest level
405
400
395
390
385
380
375
370
Stage (mAHD)
392.07
388.05
387.3
0
10,000
20,000
30,000
40,000
50,000
60,000
Volume (ML)


Rating curve
Dam crest level
392.5
392
391.5
391
390.5
390
389.5
389
388.5
388
387.5
Stage (mAHD)
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
Discharge (m3/s)

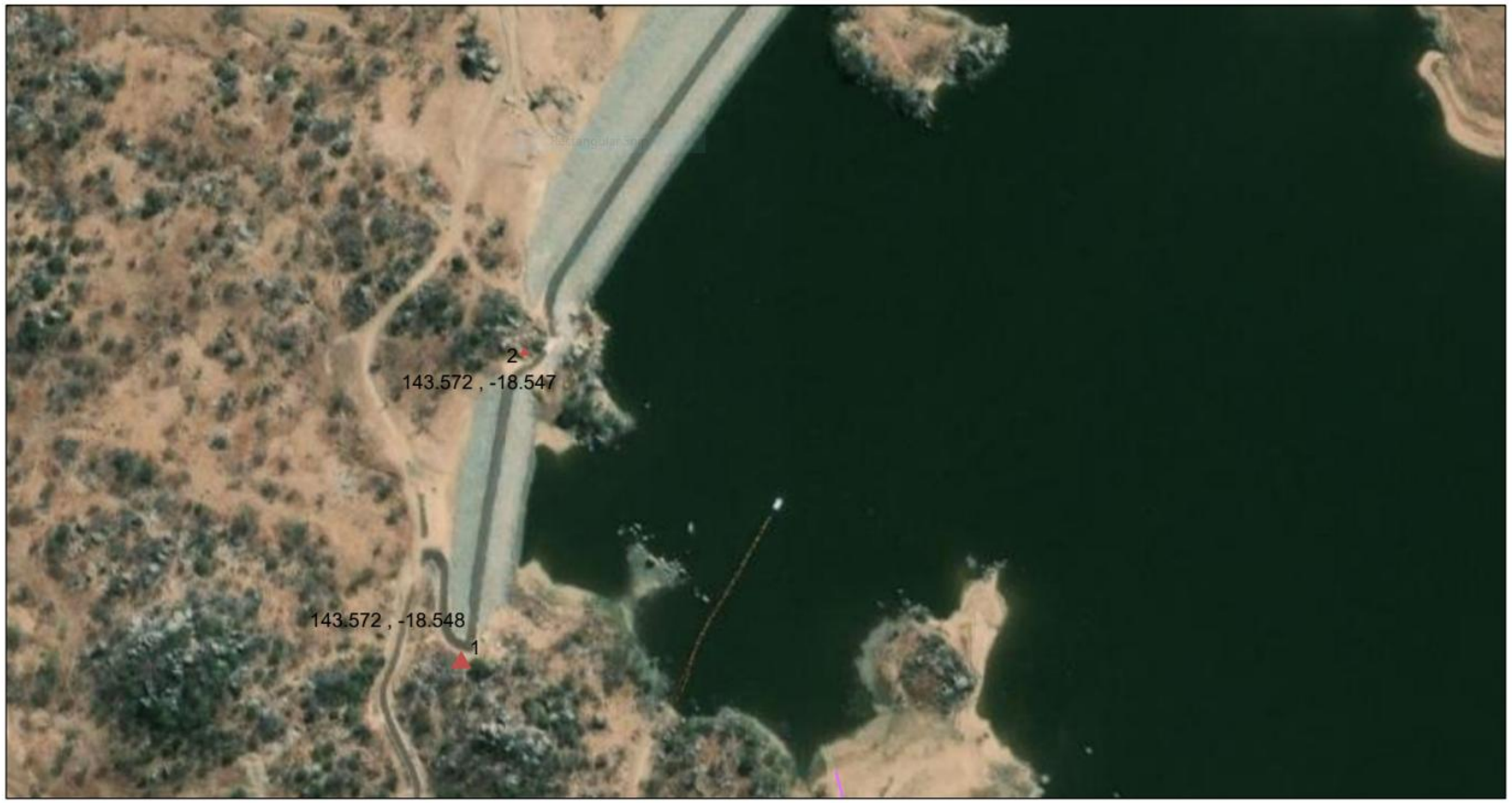
Appendix B - CATCHMENT AND LOCALITY PLANS



Appendix C - LOCATION OF INSTRUMENTATION AND MONITORING EQUIPMENT



Appendix D - LOCATION OF TELEMETRIES



Appendix E - INSPECTION CHECKLIST

Inspection Date:		**Inspection No.:**	
Arrival Time:		**Departure Time:**	
Inspector:		**Inspector Signature:**	
Weather & Site Conditions:	**Fine** ❑ **Overcast** ❑ **Light rain** ❑ **Heavy rain** ❑ **Other** ❑ **Comments and site condition:**		
Water level:	_____m AHD (Note: Full Supply Level = 387.30 m AHD). *Refer to the gauge boards located near the left abutment of the saddle dam.*		
Rainfall since the last inspection:	_____mm	**Rainfall in the past 7 days:**	_____mm

STANDPIPE PIEZOMETER LEVEL MONITORING		
Feature	**Depth to Observed Water**	**Comments, Condition, and Observations**
Piezometers		
• Piezometer No. 1. Ch. 225 m.	_____m	
• Piezometer No. 2. Ch. 275	___ _____m	
• Other comments and	_____m	
SEEPAGE WELL LEVEL MONITORING		
Seepage monitoring		
• Seepage monitoring well No.1 (LHS, facing downstream).	_____m	
• Seepage monitoring well No.2 (RHS, facing downstream).	___ _____m	
• Other comments		

CONDITION REPORT CHECKLIST AND NOTES

Observed as – Constructed Feature	**Acceptable Condition Per Dam**		**Comments, Condition and Observations *(list approximate chainages where applicable0***
Embankment Crest Road and Access			
General	Yes	No	
Surface condition eg. Any cracking, wheel rutting, scouring or sinkholes	Yes	No	
Alignment	Yes	No	
Vegetation	Yes	No	
Access ramp(s)	Yes	No	
Concrete ramp and batter at approximately CH. 170m	Yes	No	
Animal burrows/termite mounds	Yes	No	
Repairs required?	Yes	No	
Other comments			
Upstream Face of the Embankment			
General condition of the rockfill	Yes	No	
Slides/slips	Yes	No	
Depressions/shape irregularities	Yes	No	
Beaching and scarping	Yes	No	
Scour	Yes	No	
Deleterious vegetation of materials	Yes	No	

Animal burrows	Yes	No	
Other comments			
Downstream Face of the Embarkment			
General condition of the rockfill	Yes	No	
Slides/slips	Yes	No	
Depreciation/shape irregularities	Yes	No	
Deleterious/ vegetation or materials	Yes	No	
Scour	Yes	No	
Animal burrows	Yes	No	
Toe-drain condition (e.g. clear of debris)	Yes	No	
Seepage	Yes	No	
Boils	Yes	No	
Condition of the downstream channel near Ch. 250 m	Yes	No	
Other comments			
Concrete Training Wall			
Damage e.g. cracking, movement of spalling	Yes	No	
Other comments			
Ancillary Instrumentation			
Survey pillars (4no. of total)	Yes	No	

Embankment Crest Road guideposts	Yes	No	
Embankment Crest Road survey monuments (9 no. of total)	Yes	No	
Gauge Boards (9 no. of total)	Yes	No	
Spillway			
Left wall (erosion, riling, subsidence, etc)	Yes	No	
Right wall (erosion, riling, subsidence, etc)	Yes	No	
Spillway invert	Yes	No	
Erosion Control Sill (if applicable)	Yes	No	
Fishway (e.g. Channel and resting pools unobstructed, free of debris/sediment, damage to rock)	Yes	No	
Condition of the Approach Channel	Yes	No	
Condition of the Downstream Channel	Yes	No	
Other Comments			

General commentary and other observations

Attachments:

1. Inspection photographs (to be digitally attached).

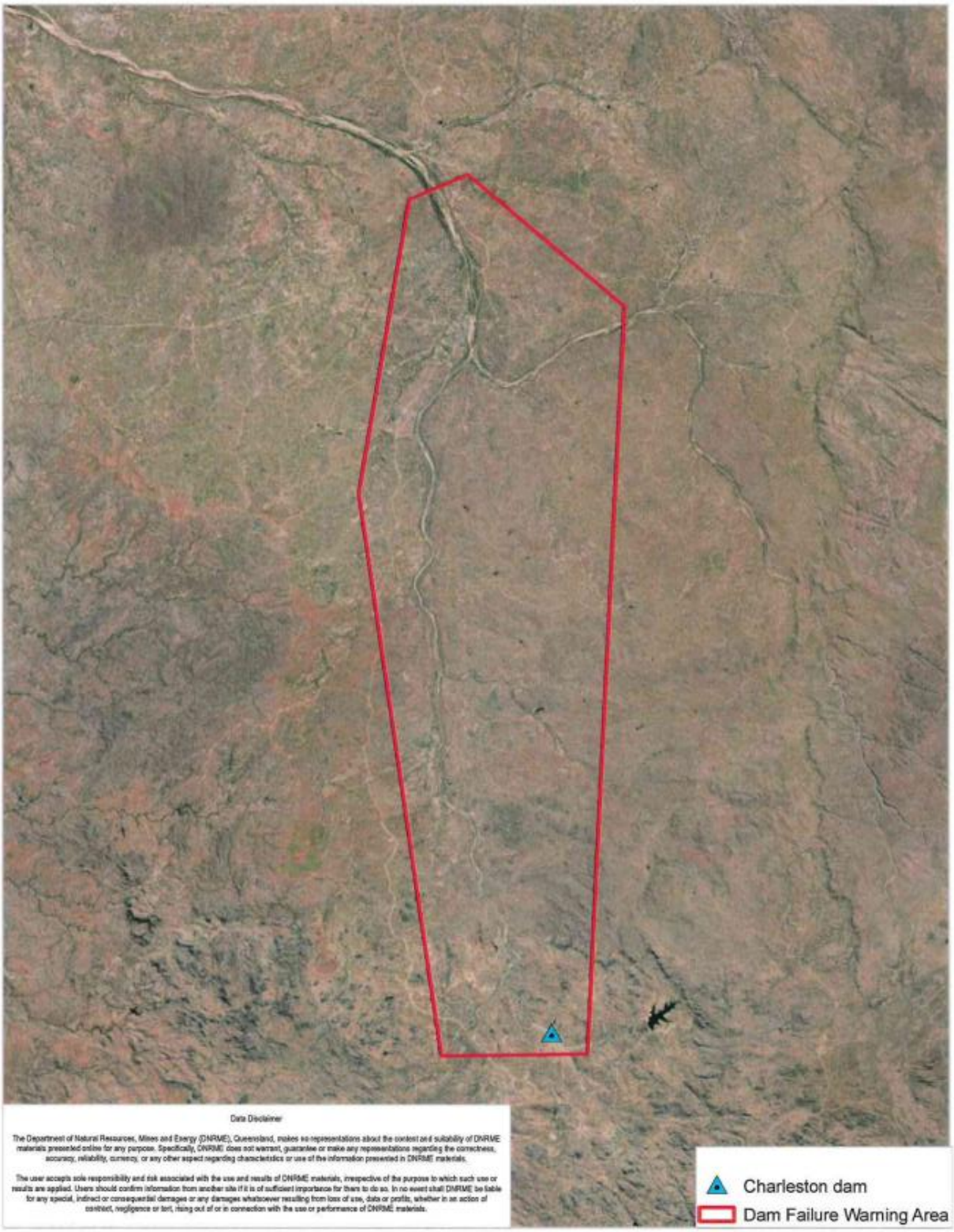
PHOTOGRAPHS *Chainages are approximated based on site features.*	
Photo 001 –	**Photo 002 –**
Photo 003 –	**Photo 004 –**
Photo 005 –	**Photo 006 –**

Appendix F - MODIFIED MERCALLI INTENSITY SCALE

CIIM Intensity	People's Reactions	Furnishings	Built Environment	Natural Environment
I	Not felt			Changes in level and clarity of well water are occasionally associated with great earthquakes at distances beyond which the earthquakes felt by people.
II	Felt by a few.	Delicately suspended objects may swing.		
III	Felt by several; vibration like passing of truck.	Hanging objects may swing appreciably.		
IV	Felt by many; sensation like heavy body striking building.	Dishes rattle.	Walls creak: windows rattle.	
V	Felt by nearly all, frightens a few.	Pictures swing out of place, small objects move, a few objects fall from shelves within the community.		Trees and bushes shaken noticeably.
VI	Frightens many, people move unsteadily.	Many objects fall from shelves.	A few instances of fallen plaster, broken windows and damaged chimneys within the community.	Some fall of tree limbs and tops, isolated rock falls and landslides and isolated liquefaction.
VII	Frightens most, some lose balance.	Heavy furniture overturned.	Damage negligible in buildings of good design and construction, but considerable in some poorly built or badly designed structures. Weak chimneys broken at roof line, fall off unbraced parapets.	Tree damage, rock falls, landslides and liquefaction are more severe and widespread with increasing intensity.
VIII	Many find it difficult to stand.	Very heavy furniture moves conspicuously.	Damage slight in buildings designed to be earthquake resistant, but severe in some poorly built structures. Widespread fall of chimneys and monuments.	
IX	Some forcibly thrown to the ground.		Damage considerable in some buildings designed to be earthquake resistant, buildings shift off foundations if not bolted to them.	
X			Most ordinary masonry structures collapse, damage moderate to severe in many buildings designed to be earthquake resistant.	

Appendix G has been redacted

Appendix H - EMERGENCY ALERT REQUEST FORMS AND POLYGONS



Queensland Government

PHONE THE [redacted] – ADVISE EA IS BEING DEVELOPED

EMERGENCY ALERT REQUEST

Location of Alert: (e.g. Suburb, ~~Town~~) **Etheridge Shire – Charleston Dam EAP**	**Date:**
LGA/Agency requesting: Etheridge Shire Council	**Time:**

Requesting Officer **Name:** [redacted] **Agency/Position: Etheridge LDC/CEO**	**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): [redacted]		**Polygon Filename, (Kml, Kmz, Gml, GeoJSON):** [redacted] **Number of polygons 1** (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)

Emergency ~~Emergency~~. This is a flash flood Emergency Warning from Etheridge Shire Council. Heavy rain has lead to spilling of the Charleston dam. People in low lying areas between Charleston Dam and Georgetown need to LEAVE IMMEDIATELY. Conditions are very dangerous. Go to Etheridge Shire Council Facebook or disaster dashboard. If your life is in danger call triple zero

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

Emergency Warning. This is a flash flood Emergency Warning from Etheridge Shire Council. Heavy rain has lead to spilling of the Charleston Dam. People in low lying areas between Charleston Dam and Georgetown need to LEAVE IMMEDIATELY. Conditions are very dangerous. Go to Etheridge Shire Council Facebook or disaster dashboard. If your life is in danger call 000

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

Requesting Officer: Mark Watt **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:	Emergency Alert No:
Signature: Date: / /	
Authorising Officer Name:	EMS EA Campaign Report ID:
Signature: Date: / /	
Report provided to Requestor on EA outcomes: ☐ YES ☐ NO	

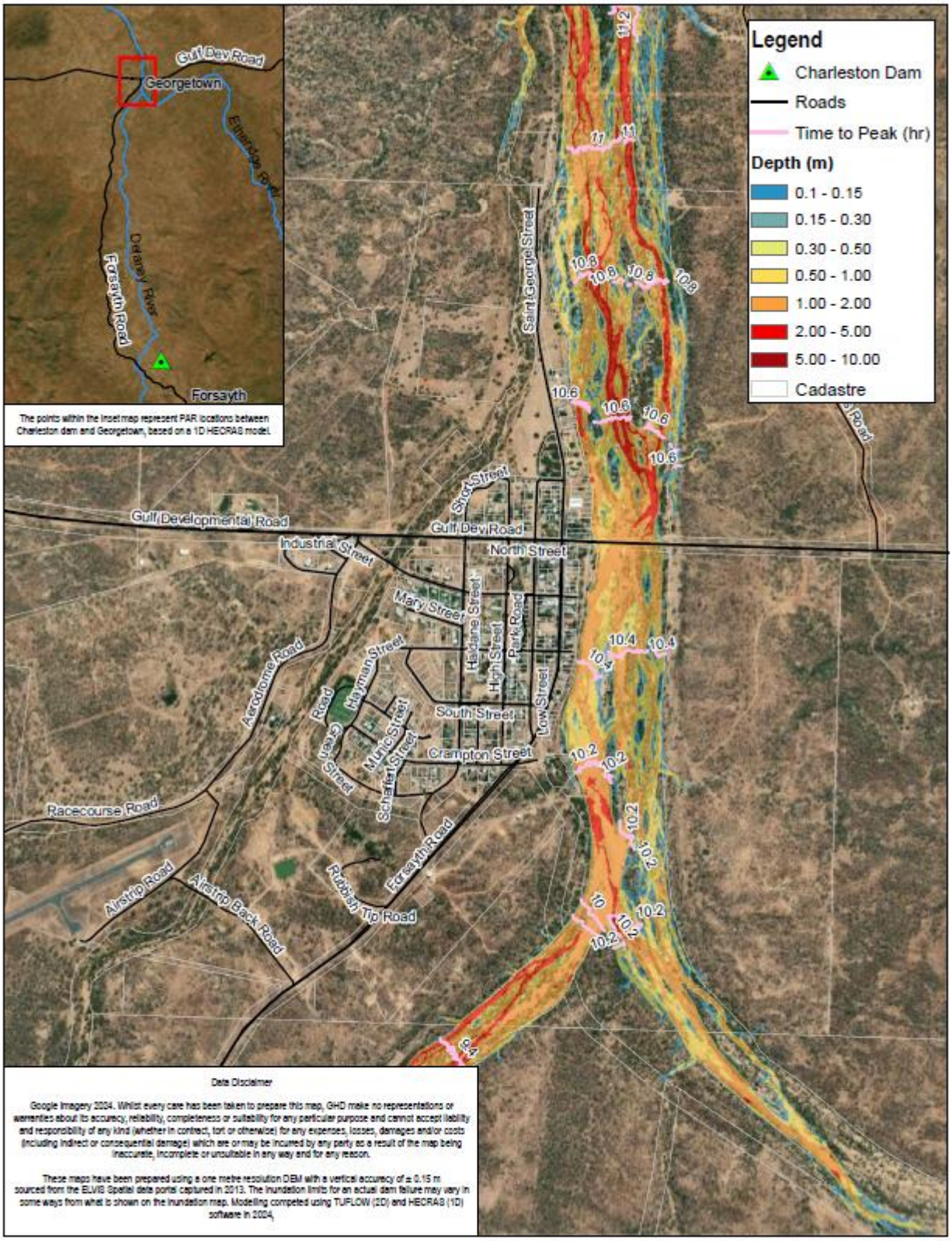
The EA Manual, EA Quick Reference Guide, EA Request Form Template are available at: www.disaster.qld.gov.au

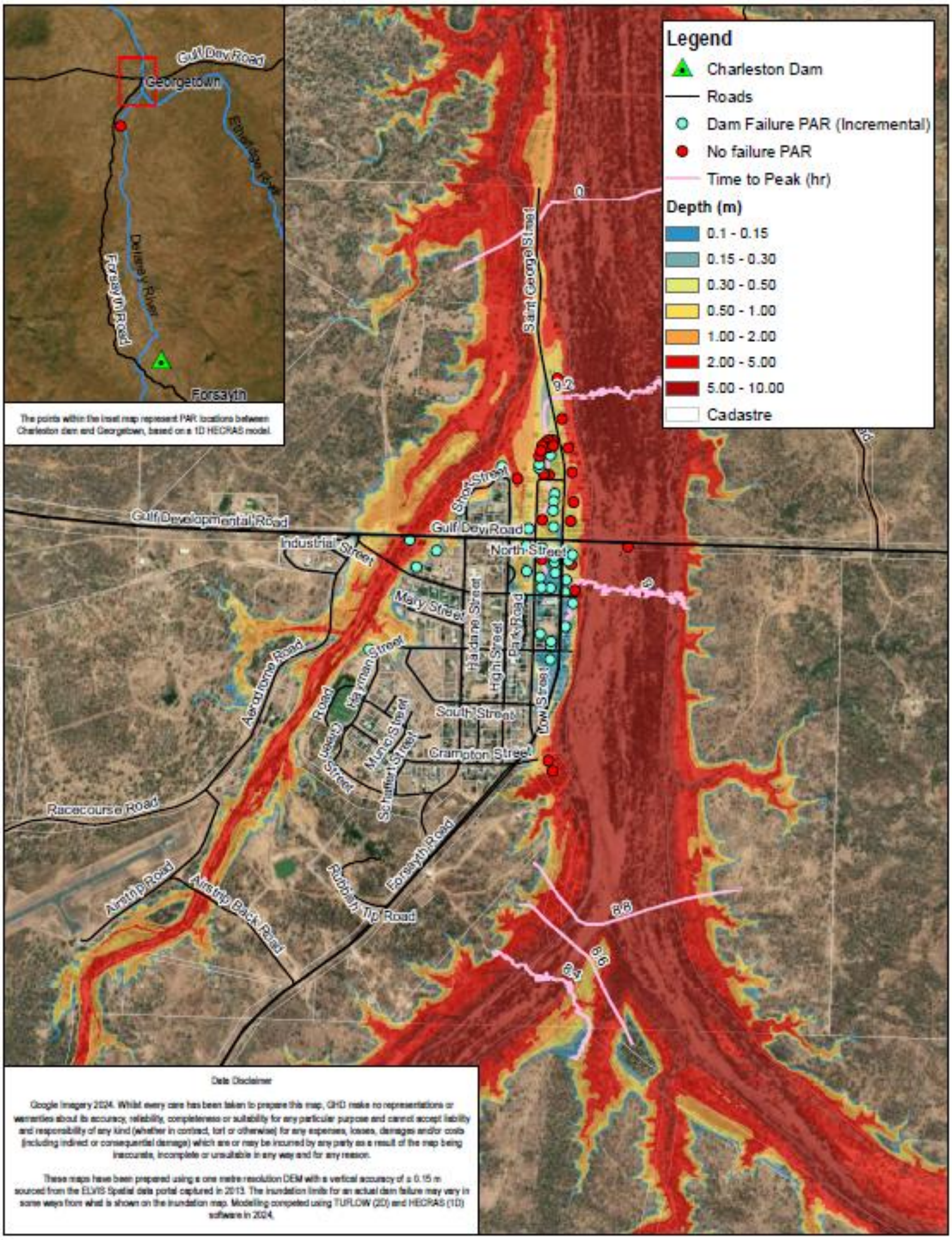
EA Request Form – F.1.177 Last Updated: 31 October 2022 Version: 3.0

Appendix I - EMERGENCY EVENT REPORT (EER)

Emergency Event Report for Charleston Dam **Date:** **Dam Owner / Operator: Etheridge Shire Council** **Current EAP Version: Version 2**	
1. Description of the Event	*Provide a description of the event.* *Was it part of a larger rain/flood event or cyclone?*
2. General Comments and/or Recommended Changes to the E	*Provide comments on how effective the event was managed, learnings from the event, and are there any changes that could be made to the EAP to make it more effective.*
3. Management of the Event	*Provide details of how the EAP was implemented.* *What actions were undertaken to monitor the dam and the affected area.* *What EAP activation triggers were reached?* *Provide the actual instrument and/or rain gauge readings* *Description of any damage to the dam, include photos of overflows, erosion, scouring etc.* *Details of communication undertaken with internal stakeholders and external parties i.e. PAR, Regulator, LDMG, Police, Social Media etc.* *Provide comment on if the communication strategy was effective. Did the PAR receive the SMS/Phone messages, did they act on the direction?* *Was power lost? Did this impact on communications?* *Include any other relevant information*

Appendix J - INUNDATION MAPS





Paper Size ISO A4
0 125 250 375 500
Meters
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

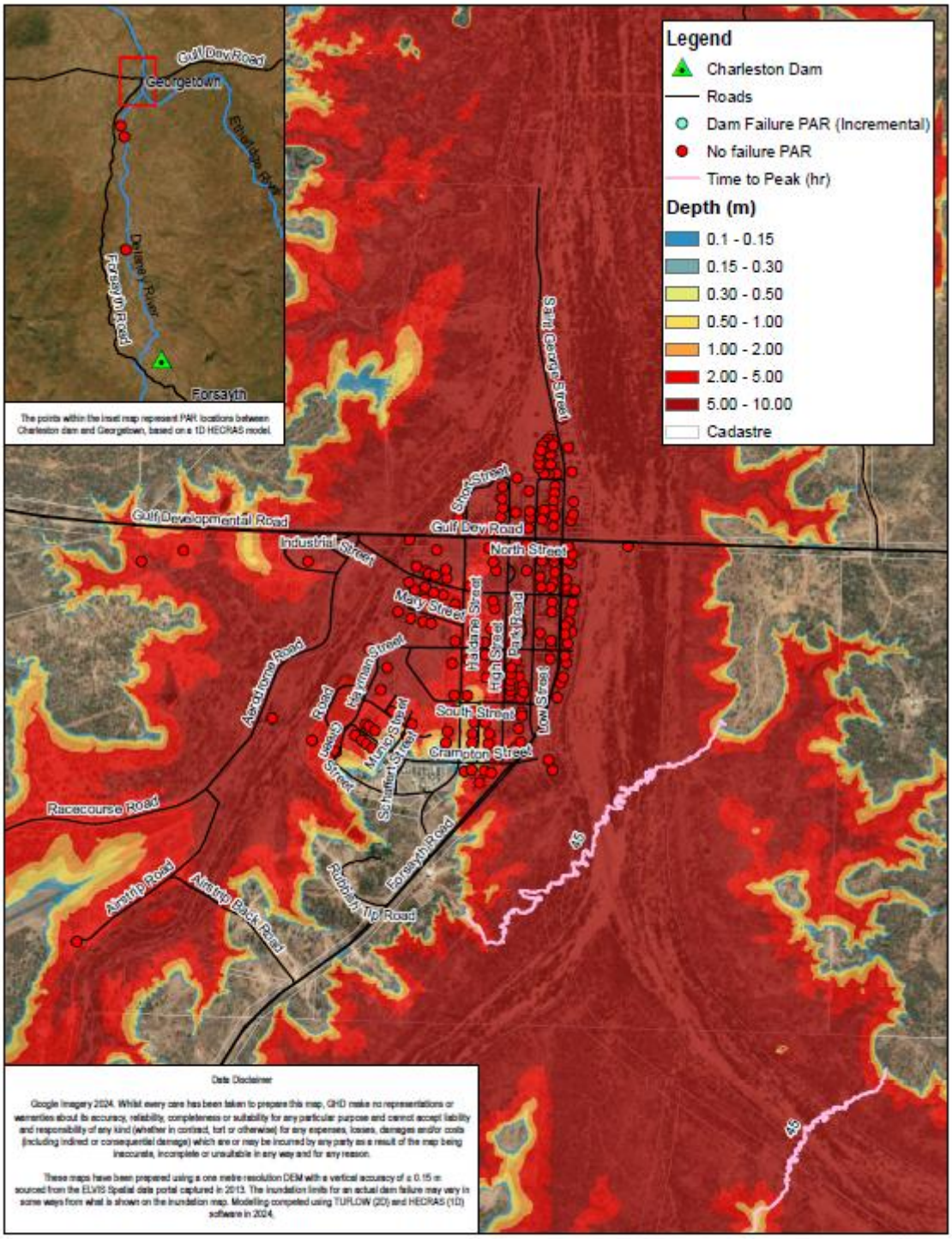
N

Etheridge Shire Council
Charleston Dam
Failure Impact Assessment

Project No. 12598510
Revision No. A
Date 26 Aug 2025

1 in 600,000 AEP with 2% AEP Flood Depth and Extent - No Failure

Figure 2



Paper Size ISO A4

0 125 250 375 500

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

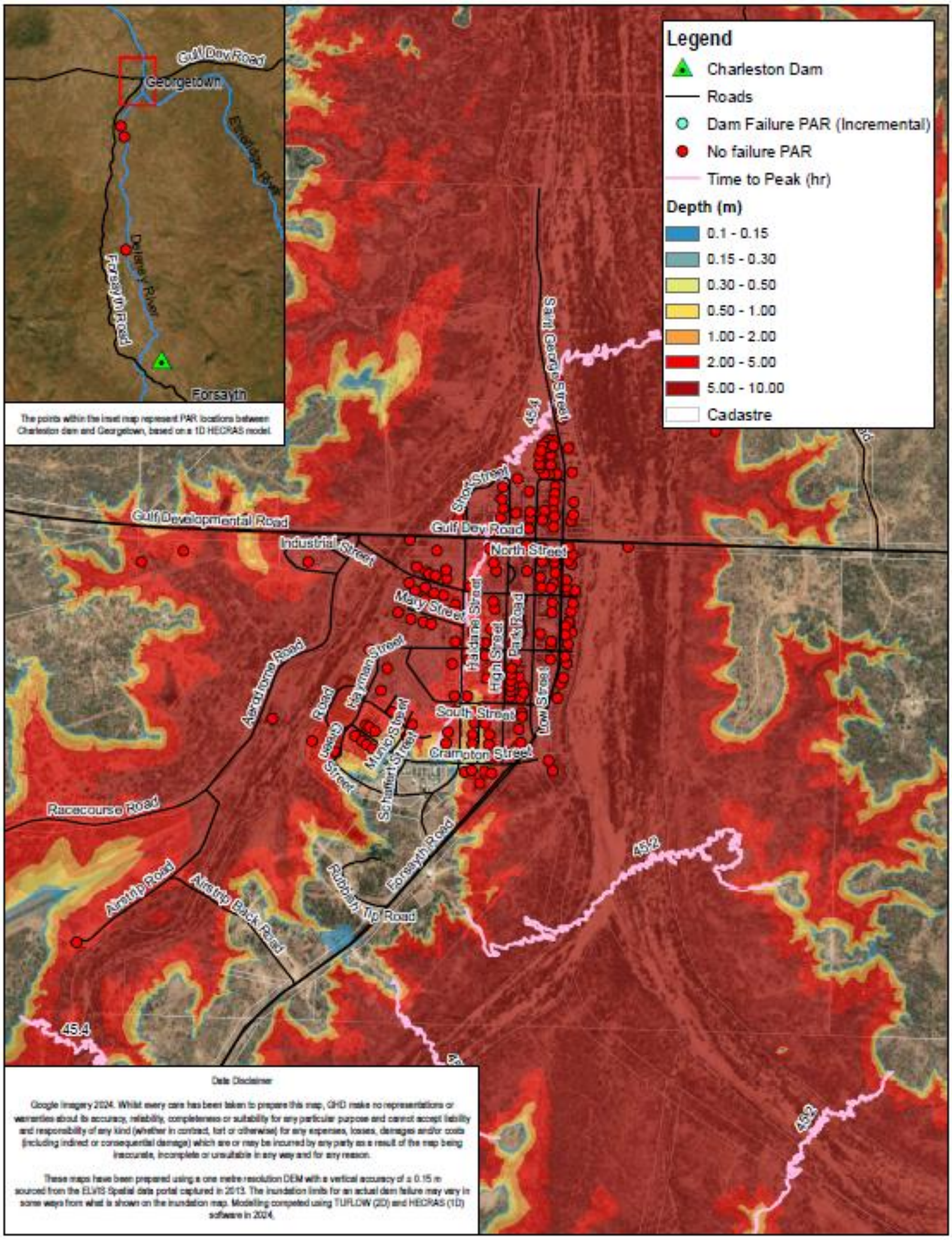
GHD

Etheridge Shire Council
Charleston Dam
Failure Impact Assessment

Project No. 12598510
Revision No. A
Date 26 Aug 2025

PMF with PMF
Flood Depth and Extent - No Failure

Figure 3



Paper Size ISO A4
0 125 250 375 500
Meters
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

Etheridge Shire Council
Charleston Dam
Failure Impact Assessment

Project No. 12598510
Revision No. A
Date 26 Aug 2025

PMF with PMF
Flood Depth and Extent - Failure

Figure 4