



CEDAR POCKET DAM EMERGENCY ACTION PLAN

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2016

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Agency	Position	Location
Seqwater	Storage Supervisor	Cedar Pocket Dam
Seqwater	Principal Engineer Dam Safety	Brisbane
Department of Energy and Water Supply	Director of Dam Safety	Brisbane
Queensland Fire and Emergency Services	Duty Officer	Brisbane
Gympie Regional Council	Local Disaster Coordinator	Gympie
Police	District Disaster Management Coordinator	Gympie

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Revision Status

Rev No.	Date	Revision Description
0	October 2008	Original
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2	September 2010	Revision 2
2.1	June 2011	Contact register updated
3	September 2011	Revision 3
4	August 2012	Revision 4
5	November 2013	Revised and updated in accordance with new guidelines from the Department of Energy and Water Supply
6	November 2014	Revised following discussions with the Department of Energy and Water Supply and other stakeholders
7	August 2015	Revision 7
8	August 2016	Downstream Release Hazard Maps added. Contacts updated.

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ABBREVIATIONS

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AMTD	Adopted Middle Thread Distance
ANCOLD	Australian National Committee on Large Dams
BoM	Bureau of Meteorology
DCF	Dam Crest Flood
EAP	Emergency Action Plan
ERP	Emergency Response Plan or Bulk Authority Emergency Response Plan
FSL	Full Supply Level
FOC	Flood Operations Centre, Seqwater
GS	Gauging Station
ML	Megalitre
DEWS	Department of Energy and Water Supply
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PMPDF	Probable Maximum Precipitation Design Flood

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1 INTRODUCTION

The risk of a structural failure at any dam owned by Seqwater is very low. Seqwater does not expect that a catastrophic dam failure event will ever occur at any Seqwater dam. As described below, Seqwater is committed to maintaining a comprehensive dam safety management program aimed at ensuring the continued safe and reliable operation of all of its dams. However because the consequences of a dam failure event are high, this Emergency Action Plan has been prepared with the following aims:

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

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

- Seqwater Dam Safety Inspection and Surveillance Program.
- Seqwater Dam Portfolio Risk Assessment Program.
- Seqwater Dam Portfolio - Routine Scheduled Maintenance and Capital Refurbishment Program.
- Bulk Authority Emergency Response Plan (prepared in accordance with the provisions of the *Water Act 2000*).

Seqwater is committed to correcting any identified potential dam safety issues at all of its dams and ensuring that its dams both remain safe, and efficiently fulfil their intended purpose.

1.1 Seqwater Dam Safety Policy Statement

Seqwater is committed to ensuring the continued safe operation of its dams, by managing its dams in accordance with the Queensland Dam Safety Management Guidelines and the ANCOLD Guidelines on Dam Safety Management.

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1.2 Dam Safety - Staff Development and Training

Dam operations personnel within Seqwater receive appropriate dam safety training based on a combination of practical exercises and classroom instruction. This includes site exercises and “on the job” training in the operation and maintenance of large dams, and training seminars covering the dam safety management practices recommended by ANCOLD and the Queensland Dam Safety Regulator. In relation to their responsibilities associated with the management of Seqwater’s dams, the training ensures that dam operations personnel understand the purpose and detail of the following:

- the equipment at the dam and the location of controls, tools and keys required to properly operate the dam;
- the Emergency Action Plan;
- the Standard Operating Procedures;
- the Operation and Maintenance Manuals;
- the Flood Operations Procedures.
- the dam safety routine inspection and surveillance procedures including proper practices for collecting and recording dam safety instrumentation data.

1.3 Dam Safety Documentation

Seqwater requires the following documentation to be available for each of its dams to support the Emergency Action Plan:

- Investigation, Design, and Construction Documentation including the Data Book and (if available), the Design Report.
- As-Constructed Details including plans and drawings.
- Standing Operating Procedures.
- Operations and Maintenance Manuals.
- Dam Inspection and Evaluation Reports.
- Dam Safety Reviews.
- Manual of Flood Mitigation (required only for gated spillway dams).
- Flood Operations Procedures.

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1.4 Dam Safety Inspection and Surveillance

Surveillance Policy

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

Annual and Five Year Comprehensive Inspections

Seqwater schedules and completes Annual and Five Yearly Inspections at its dams in accordance with dam safety conditions issued by the Queensland Government. These inspections are undertaken by a team lead by a suitably qualified and experienced Dam Safety Engineer. The inspections are conducted in accordance with the Queensland Dam Safety Management Guidelines and the ANCOLD Guidelines on Dam Safety Management. Copies of the inspection reports are provided to the Dam Safety Regulator for independent review once the inspections are completed.

Dam Safety Review

Seqwater schedules and completes Dam Safety Reviews for its dams in accordance with dam safety conditions issued by the Queensland Government. The reviews are conducted in accordance with the Queensland Dam Safety Management Guidelines and the ANCOLD Guidelines on Dam Safety Management. Copies of the Dam Safety Review reports are provided to the Dam Safety Regulator.

Dam Safety Routine Inspection

Routine visual inspection is undertaken at Seqwater dams to identify and report on conditions of interest for dam safety. These inspections are undertaken by the staff responsible for day to day operations at the dams as part of their routine duties at the dam. The frequency of inspection is dependent on dam hazard and consequence category and is in accordance with ANCOLD guidelines. The normal frequency for routine inspections at Cedar Pocket Dam is tri-weekly.

All routine inspection reports are completed in written hardcopy and sent electronically to Seqwater's Principal Engineer for Dam Safety for review. Any reported anomalies or unusual observations are investigated by a suitably qualified Dam Safety Engineer.

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Dam Safety Instrumentation Data Gathering and Analysis

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

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

The instrumentation installed at Cedar Pocket Dam includes the following:

- Electronic water level recorder to continuously monitor lake level.
- Surface settlement points to measure structural movement at the dam.

1.5 Flood Event Modelling

Seqwater maintains hydrologic models to forecast inflows into its dams and to estimate peak lake levels during flood events. These models can use rainfall forecast information provided by the Bureau of Meteorology for prediction purposes. This rainfall forecast information is supplied to Seqwater automatically in a digital format as soon as it is released for use by the Bureau. To compliment this process, Seqwater holds direct discussions with the Duty Meteorologists at the Bureau during flood events to allow improved interpretation of the rainfall forecast information provided.

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1.6 Earthquake Monitoring

Seqwater receives Earthquake Notifications in real time directly from Geoscience Australia as earthquakes are detected. The Notifications provide an indication of Earthquake Magnitude by a number that characterizes the relative size of an earthquake based on the maximum motion recorded by a seismograph. An indication of the relationship between Earthquake Magnitude and potential impacts (in accordance with the Mercalli Intensity Scale) is shown in the table below.

Earthquake Magnitude	Typical Maximum Modified Mercalli Intensity
1.0-3.0	I
3.0-3.9	II-III
4.0-4.9	IV-V
5.0-5.9	VI-VII
6.0-6.9	VII-IX
7.0 and higher	VIII or higher
Abbreviated Modified Mercalli Intensity Scale	
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

(Source: Magnitude / Intensity Comparison, U.S Department of the Interior | U.S Geological Survey, September 2014, http://earthquake.usgs.gov/learn/topics/mag_vs_int.php)

The actions undertaken by Seqwater following receipt of an Earthquake Notification from Geoscience Australia are described in Sections 7.2 and 7.3.

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2 NOTIFICATION ARRANGEMENTS

2.1 Engagement Framework

In accordance with the provisions of the *Water Supply (Safety and Reliability) Act 2008*, Seqwater must prepare, implement and maintain an Emergency Action Plan (EAP) for Cedar Pocket Dam. This EAP addresses these requirements.

The EAP is implemented under Seqwater's Bulk Authority Emergency Response Plan (Emergency Response Plan) which has been prepared in accordance with the provisions of the Water Act 2000. The Emergency Response Plan provides a framework to coordinate incident and emergency management and response across the entire South East Queensland water supply chain, including incidents and emergencies at Seqwater's dams. The purpose of the Emergency Response Plan is to:

- Provide the foundation for effective emergency management;
- Provide the framework to manage incidents for which impacts may disrupt continuity of drinking water supply, including infrastructure for water supply; and
- Provide for 'all-hazards' emergency management response.

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

- Dam safety incidents or emergencies;
- Dam overflows.

Specific descriptions of dam safety incidents / emergencies relevant to this EAP are contained in Section 7.

2.2 Management Structure

The framework for how Seqwater engages with emergency management stakeholders including Disaster Management Groups during emergencies is contained in the Emergency Response Plan. The Emergency Response Plan is supported by the

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Seqwater Emergency Management Manual (Man-00276) which defines the arrangements, roles and responsibilities of the Emergency Management Team.

The management structure used by Seqwater to manage an emergency, including dam safety emergencies, is shown in Figure 1.1.

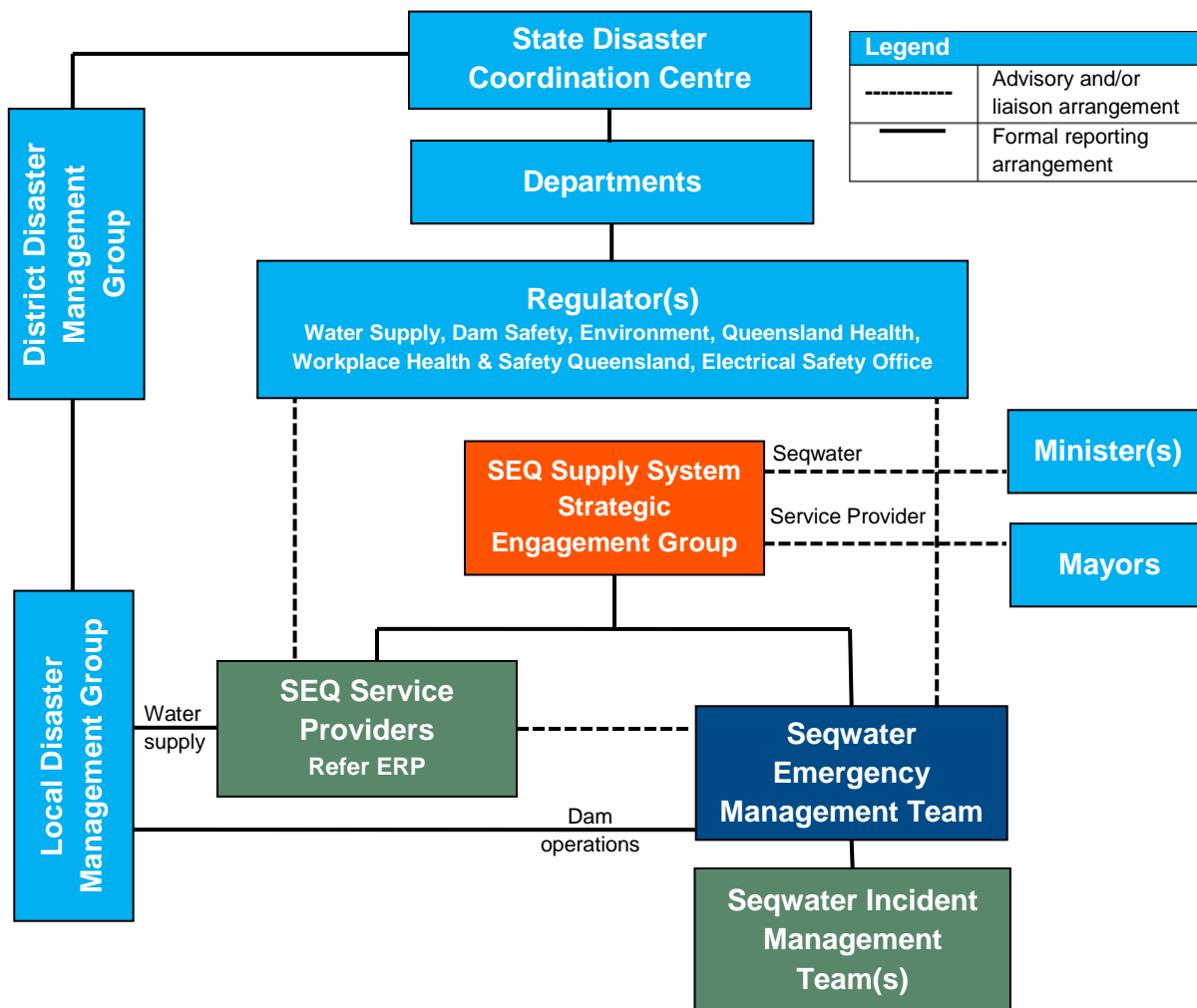


Figure 1.1 – Seqwater Emergency Management Structure

The generic intent of roles, responsibilities and functions of Seqwater Emergency Management Teams and Incident Management Teams are described in the Seqwater Emergency Management Manual (Man-00276). For this EAP further specific information on the agency roles and responsibilities of the Dam Safety Regulator and Local Disaster Management Group(s) is described in Section 4.

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2.2.1 Roles for Dam Safety Incidents and Emergencies

When a potential dam safety incident is initially identified by an Seqwater staff member it is immediately reported to Seqwater’s Duty Emergency Advisor via Seqwater’s 24/7 incident and emergency hotline by phoning (07) 3270 4040. Once the potential incident is reported and verified, an Incident Management Team Leader is appointed by the Duty Emergency Advisor using the Dam Safety Incident Roster. Prior to the Incident Management Team Leader being appointed, normal operational arrangements apply to the management of the site. An Emergency Manager will also be appointed from the Incident Roster when the incident is reported if judged necessary by the Incident Management Team Leader.

Further details of the requirements of these roles are:

- **Emergency Manager** - The Emergency Manager is a suitably experienced Senior Seqwater Manager who will take responsibility for the overall management of Seqwater’s response to the emergency including:
 - directing the actions to be undertaken by Seqwater at the dam site;
 - determining the emergency condition level, and;
 - providing suitable notifications to stakeholder agencies and the public.

During a dam safety emergency, the Emergency Manager can be contacted by phoning (07) 3270 4040.

- **Incident Management Team Leader** - The Incident Management Team Leader is an experienced Dam Safety Engineer. On-site response at the dam is managed by an Incident Management Team Leader who also provides advice to the Emergency Manager in relation to:
 - Appropriate frequency of site inspection.
 - Requirement to mobilise an operator to site for continuous monitoring.
 - Actions required on site to ensure public safety.
 - Physical intervention actions to ensure the structural safety of the dam.
 - Escalation of emergency condition level.
 - Likelihood of a dam breach leading to release of water and consequent increased hazard to people downstream.

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If the Incident Management Team is formed prior to the appointment of an Emergency Manager, the Incident Management Team Leader will undertake the role of the Emergency Manager until an Emergency Manager is appointed. During a dam safety emergency, the Incident Management Team Leader can be contacted by phoning (07) 3270 4040.

2.2.2 Roles for Seqwater Dam Release Notification Service

Rainfall events can cause overflows at the dam and trigger notification of potential downstream release hazard to comply with the *Water Supply (Safety and Reliability) Act 2008*. Similar overflow events and corresponding notifications (refer Section 2.3) occur frequently at multiple Seqwater dams. In this context, downstream release hazard notifications while at ALERT status (refer Table 7.2) are generally routine, are not an incident for Seqwater’s Emergency Response Plan and rarely impact on public safety.

The roles to perform the routine (non-incident) downstream release hazard notifications for this EAP are undertaken by:

- Seqwater’s Duty (On-Call) Communications Advisor is responsible for issuing the public notifications in accordance with Seqwater’s Dam Release and Spilling Communication Procedure Document (PRO-00598); and
- Seqwater’s Duty (On Call) Senior Flood Operations Engineer is responsible for providing technical advice to the Duty (On-Call) Communications Advisor.

The Duty Senior Flood Operations Engineer is responsible for monitoring dam overflows and escalating response in accordance with Section 7 of this EAP if necessary.

2.3 Notification Details

This EAP requires Seqwater to issue notifications for downstream release hazards and potential or actual dam safety emergency events. A summary of these notification requirements is outlined in the Tables below.

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**DOWNSTREAM RELEASE HAZARD - OPERATIONAL STATE IS STAND DOWN
(BoM not expected to issue Flood Warnings across South East Queensland)**

Situation	Priority	Notification	
Onset of potential downstream release hazard. <i>This situation is not a potential dam failure emergency</i>	1	Who	Seqwater Dam Release Notification Service subscribers.
		How	Dam Release Notification service. Subscribers can choose to receive email, and/or SMS text to mobile and/or recorded message to landline telephone.
	2	Who	General Public.
		How	Information on Seqwater webpage and social media.

**DOWNSTREAM RELEASE HAZARD - OPERATIONAL STATE IS ALERT
(BoM expected to issue Flood Warnings across South East Queensland)**

Situation	Priority	Notification	
Onset of potential downstream release hazard. <i>This situation is not a potential dam failure emergency</i>	1	Who	QFES, DEWS, relevant Disaster Management Groups and other government and non-government stakeholders.
		How	Talking point updates issued a minimum of twice daily.
	2	Who	Seqwater Dam Release Notification Service subscribers.
		How	Dam Release Notification service. Subscribers can choose to receive email, and/or SMS text to mobile and/or recorded message to landline telephone.
	3	Who	General Public
		How	Until the management of the Weather Event impacts are taken over by QFES or another Disaster Management Agency, Seqwater will issue Media releases/statements a minimum of twice daily and will hold a daily media conference/briefing if requested to do so by media organisations. Once QFES or another Disaster Management Agency takes over the management of the event, Seqwater will revert to being a support agency and will provide information in accordance with directions received.
	4	Who	General Public.
		How	Information on Seqwater webpage and social media.

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DAM SAFETY EMERGENCY EVENT - OPERATIONAL STATE IS ALERT

Situation	Priority	Notification	
<p>A new event has impacted the Dam. The event is associated with water seepage, physical damage or the occurrence of an earthquake. The impacts of the event on the structural safety of the dam are not fully understood, but the dam is not expected to be at any risk of failure (refer to Sections 7.3 and 7.4)</p> <p><i>This situation is not a potential dam failure emergency</i></p>	1	Who	QFES, DEWS, relevant Disaster Management Groups and other government and non-government stakeholders.
		How	Talking point updates issued a minimum of daily unless it is agreed that less frequent updates are appropriate.

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**DOWNSTREAM RELEASE HAZARD OR DAM SAFETY EMERGENCY EVENT
OPERATIONAL STATE IS LEAN FORWARD**

Situation	Priority	Notification		
<p>Flood Overflow trigger in table 7.2 or flood of record predicted at the dam, or;</p> <p>Significant Seepage or Structural Damage has been identified resulting in a Lean Forward Alert Level in accordance with Sections 7.3 and 7.4.</p> <p><i>The Operational State of Disaster Management Groups may be Stand Up due to other circumstances impacting their areas of responsibility.</i></p> <p><i>Once the incident escalates to a potential dam failure emergency the Operational State immediately moves to "Stand Up"</i></p>	1	Who	Priority 1 contact for Local Council or Local Disaster Management Group defined in contact register - Appendix A.	
		How	Telephone call. The purpose of this initial notification is to provide a situation brief and agree on the arrangements for further reporting and incident management. The agreed arrangements will depend on how the flood event or emergency situation is predicted to develop.	
	2	Who	If Priority 1 above cannot be contacted then subsequent priority contacts in contact register - Appendix A.	
		How	Telephone call. The purpose of this initial notification is to provide a situation brief and identify any requirements for additional incident management arrangements not currently in place.	
	3	Who	QFES, DEWS, relevant Disaster Management Groups and other government and non-government stakeholders.	
		How	Talking point updates issued a minimum of twice daily.	
	4 <i>(Flood Events Only)</i>	Who	Near PAR ^(Note 1)	
		How	If dam outflows are predicted to cause flooding of residences within the area defined as containing the Near PAR ^(Note 1) , Seqwater will contact the Disaster Management Agency responsible for managing the impacts of the flood event downstream of the dam and discuss and agree on appropriate notification arrangements, including message content, for the Near PAR. If required, Seqwater's available personnel and communications resources will assist the responsible Disaster Management Agency to provide these notifications.	
	5 <i>(Flood Events Only)</i>	Who	General Public	
		How	Until the incident has escalated to a potential dam failure emergency or the management of the potential impacts of the incident is taken over by a Disaster Management Agency, Seqwater will issue Media releases/statements a minimum of twice daily for flood events and will hold a daily media conference/briefing if requested to do so by media organisations. Once a Disaster Management Agency takes over the management of the potential impacts of the incident, Seqwater will provide information in accordance with directions received.	
	6	Who	General Public.	
		How	Information on Seqwater's webpage and via social media.	

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DOWNSTREAM RELEASE HAZARD OR DAM SAFETY EMERGENCY EVENT
OPERATIONAL STATE IS STAND UP and
Dam failure is possible but unlikely within the next 12 hours

Situation	Priority	Notification	
<p>Flood level may overtop the dam (refer to table in Section 7.2) or;</p> <p>Significant seepage that may cause the dam to fail has been identified (refer to table in Section 7.3) or;</p> <p>Structural damage that may cause the dam to fail has been identified (refer to table in Section 7.4).</p> <p><i>This situation is an Emergency.</i></p>	1	Who	Local Disaster Management Groups defined in contact register - Appendix A.
		How	Telephone call. The purpose of this initial notification is to provide a situation brief and agree on the arrangements for further reporting, incident management and communications to the near PAR ^(Note 1) . The agreed arrangements will depend on how the emergency situation is predicted to develop.
	2	Who	Near PAR ^(Note 1)
		How	Seqwater will discuss and agree with the Disaster Management Agency responsible for managing the impacts of the potential dam failure event on appropriate messaging to the Near PAR ^(Note 1) . Depending upon the anticipated time to dam failure and other prevailing factors, this could include site visits by police or emergency services personnel and/or initiation of the National Emergency Alert System. If required, Seqwater's available personnel and communications resources will assist the responsible Disaster Management Agency to provide these notifications.
	3	Who	PAR
		How	Seqwater will discuss and agree with the Disaster Management Agency responsible for managing the impacts of the potential dam failure event on appropriate messaging to the PAR. Depending upon the anticipated time to dam failure and other prevailing factors, this could include initiation of the National Emergency Alert System and/or public message broadcasts through the media.
	4	Who	QFES, DEWS, relevant Disaster Management Groups and other government and non-government stakeholders.
		How	Talking point updates will be issued a minimum of twice daily or at the frequency required by the Disaster Management Group responsible for managing the impacts of the potential dam failure event.
	5	Who	General Public
		How	Seqwater will provide information in accordance with directions received by the Disaster Management Group responsible for managing the impacts of the potential dam failure event. Seqwater will also provide information on Seqwater webpages and via social media.

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**DOWNSTREAM RELEASE HAZARD OR DAM SAFETY EMERGENCY EVENT
OPERATIONAL STATE IS STAND UP and
Dam failure is either currently occurring or likely within the next 12 hours**

STAND UP	Priority	Notification	
Flood level may overtop the dam (refer to table in Section 7.2), or; Significant seepage that may cause the dam to fail has been identified (refer to table in Section 7.3) or; Structural damage that may cause the dam to fail has been identified (refer to table in Section 7.4). <i>This situation is an Emergency.</i>	1	Who	QFES (If QFES not previously notified of predicted failure).
		How	Telephone call. The purpose of this notification is to request or confirm that QFES will issue an immediate alert to the public under the National Emergency Alert System to advise of the high public safety risks associated with the likely dam failure situation. If the National Emergency Alert System is unavailable, QFES will initiate their back-up emergency notification process.
	2	Who	Local Disaster Management Groups defined in contact register - Appendix A (If Groups not previously notified of predicted failure).
		How	Telephone call. The purpose of this initial notification is to provide a situation brief and agree on the arrangements for further reporting, incident management and communications to the near PAR ^(Note 1) . The agreed arrangements will depend on how the emergency situation is predicted to develop.
	3	Undertake priority steps 2 to 5 of the Stand Up Notification Table on the previous page.	

Note 1: Near PAR is persons potentially impacted in the first hour of a dam failure event as defined in the Dam Failure Hazard Inundation Maps in Section 8.

2.3.1 Seqwater Dam Release Notification Service

Cedar Pocket Dam is as an uncontrolled spillway dam. Seqwater does not have any scope for modifying the outflow from Cedar Pocket Dam when the dam fills and overflows.

Seqwater provides a free Dam Release Notification Service to residents living downstream of dams and for any other interested parties. This free notification service provides subscribers with notifications by their choice of email, SMS/text messages to mobile phones, or recorded messages to telephone landlines. These notifications are issued to inform the subscriber that an overflow from the dam is commencing or about to commence; or that overflows have reached a level where they may pose a hazard to the safety of persons or property downstream of the dam (downstream release hazard).

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

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

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

- Details of road closures, inundation flood mapping and information regarding any evacuation arrangements, from Local Councils and Disaster Management Groups;
- Information on river levels and flooding from the Bureau of Meteorology; and
- Emergency services warnings, including from Police and Queensland Fire and Emergency Services.

2.3.2 Local Disaster Management Group Dam Overflow Notifications

Seqwater monitors dam outflows and advises impacted Local Councils (Contact Register contained in Appendix A) of flooding at the dam at the LEAN FORWARD trigger level in Table 7.2. Local Councils may also be advised of status of flooding at the dam at levels below the trigger specified in Table 7.2 in accordance with pre-agreed protocols with the Council. In some situations when the Seqwater Flood Operations Centre is mobilised and if time and resources are available, predicted peak dam levels and outflow can also be provided however the provision of this information cannot be guaranteed.

The notification to the Local Councils will be made as a telephone call as a first priority.

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2.3.3 Notifications Associated with a Potential Dam Failure

If a situation is identified that has the potential to cause or contribute to a dam failure emergency condition at the dam, Seqwater will provide appropriate notifications and inter-agency coordination to Local Councils and Disaster Management Stakeholders. The triggers for these notifications are contained in Section 7 of this EAP. Seqwater will provide these notifications and two-way communication in accordance with the Emergency Response Plan. The Emergency Response Plan provides for verbal communication (typically teleconference) supplemented with written requests and situation reports. Dam failure emergencies can develop rapidly. The need for direct verbal communication for expediency of response should be assumed unless a situation specific assessment identifies sufficient time is available for alternative communication.

If a situation arises where the failure of the dam is considered possible, Seqwater or the Agency managing the overall emergency response will liaise directly with Queensland Fire and Emergency Services (QFES) to issue appropriate notifications to persons located downstream of the dam using the National Emergency Alert System. This system is the national telephone based emergency warning system that sends messages to a nominated area:

- via landlines based on the location of the handset,
- via mobile phones based on an individual's billing address, and
- for Telstra mobile account holders based on the device's location.

(Further details of the National Emergency Alert System can be found at <http://www.disaster.qld.gov.au/>).

The National Emergency Alert System has the ability to import digital spatial data files (polygons in Google Earth KML format) that define a particular geographic area for the issue of an Emergency Alert. For a dam safety emergency associated with potential or actual dam failure, these polygons are defined by Seqwater and extend over the Dam Failure Hazard Inundation Maps shown in Section 8. The polygons are not defined exactly to the extents of Dam Failure Inundation Maps because the QFES specifications for Emergency Alert polygons require simplified area definition for expediency of use the National Emergency Alert system.

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Polygons in Google Earth KML format for the National Emergency Alert System have been uploaded to reside directly within the National Emergency Alert System for immediate use by QFES if needed for a dam failure emergency. Initiation of the National Emergency Alert System is the system used by Seqwater to warn populations at risk near to the dam of the likely hazards associated with the onset of a potential dam failure.

The initiating agency responsible for direct liaison with QFES if the National Emergency Alert System is to be used will depend on the speed of development of the emergency situation. If a potential a dam failure situation develops relatively quickly (e.g. a matter of hours) and notification is required before the managing Emergency Response Agency can be mobilised, liaison with QFES and initiation of notifications using the National Emergency Alert System will be the responsibility of Seqwater. If dam failure situation has developed at a slower rate (e.g. a matter of days), liaison with QFES and initiation of notifications using the National Emergency Alert System will be undertaken by the managing Emergency Response Agency, with advice from Seqwater. If the situation is not clear, the decision on how a notification will be initiated and liaison with QFES is the responsibility of the Emergency Manager (see Section 2.2).

Once a notification is initiated from the National Emergency Alert System, consequent management measures undertaken by QFES will be event-dependent but will normally include:

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

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2.3.4 Content of Notification Messages

The content of notification messages sent out in a real time dam safety emergency will depend on many factors. These factors include:

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

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

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

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3 BASIC DETAILS OF THE DAM

Population at Risk¹	Sunny Day Failure: 12 Flood: <100 (not fully assessed)
Failure Impact Rating	1
Hazard Category	High C
Dam Owner	Seqwater
Name of Reservoir	Unnamed
Year Complete	1984
Location	20 km east of Gympie
Water Course	Deep Creek
Purpose	Irrigation
Type of Construction	Partially mass concrete, partially earth and rockfill with a central clay core
Outlet Works	Uncontrolled ogee crest with energy dissipater
Catchment Area	17.8 km ²
FSL	101.07 m AHD
Full Supply Capacity	735 ML
Surface Area at FSL	22 ha
Main Dam Crest - Left Abutment	105.43 m AHD
Main Dam Crest - Right Abutment	105.93 m AHD
Main Dam Embankment Length	117 m
Maximum Height of Main Dam Embankment	20 m
Width at Top of Main Dam Embankment	2.05 metres
Spillway Crest	101.07 m AHD
Spillway Length	51.8 m (10.36 m at EL 101.07 m AHD and 41.44 m at 101.57 m AHD)
Peak Water Level as a Result of PMF	105.88 m AHD
Spillway Capacity (DCF)	860 m ³ /s
Maximum Outflow as a Result of PMF²	1,100 m ³ /s
AEP of Spillway Capacity	1 in 1,000,000
Mean annual pan evaporation	1,423 mm at nearby 040093 Gympie
Mean annual rainfall	1,125 mm at nearby 040093 Gympie
Hydroelectric Facilities	Nil
Notable flood events	1999, 2012
Maximum Historic Storage Level	103.4 m AHD Jan 2012
Comment	The main purpose of Cedar Pocket Dam is to provide an irrigation water supply for dairy land pastures downstream of the dam. Recreational use of the storage and surrounding area is promoted and the dam is stocked with a variety of fish species.

1 Seqwater Dams Portfolio Risk Assessment Report, Cedar Pocket Dam, 2013 (Weighted Total PAR)

2 SunWater Design Flood Hydrology Report, 2003

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4 ROLES AND RESPONSIBILITIES

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

AGENCIES	RESPONSIBILITIES
Seqwater	<ul style="list-style-type: none"> • Prepare, implement and maintain an Emergency Action Plan for Cedar Pocket Dam in accordance with the provisions of the Water Supply (Safety and Reliability) Act 2008 and prepare, implement and maintain a Bulk Authority Emergency Response Plan (Emergency Response Plan) in accordance with the provisions of the Water Act 2000. • Maintain an ongoing Incident and Emergency Roster in accordance with the Emergency Response Plan. • For all incidents, Seqwater will appoint an Incident Management Team in accordance with the Emergency Response Plan. The Incident Management Team will undertake emergency response at the dam site including site control, manage public safety at the dam, undertake physical intervention actions that aim to prevent an uncontrolled release of water and, until an Emergency Manager is appointed, provide all dam overflow and dam safety notifications in accordance with Section 2. If the Emergency progresses to a point that requires appointment of an Emergency Manager (see Section 7), the Incident Management Team Leader will also provide advice and recommendations to the Emergency Manager on the provision of notifications and the Emergency Condition Level. • Once the incident progresses to a point that requires appointment of an Emergency Manager (see Section 7), Seqwater will appoint an Emergency Manager to manage Seqwater’s overall emergency response and to undertake appropriate liaison and engagement with local, district and state disaster management groups and other stakeholder agencies in accordance with the Emergency Response Plan. The Emergency Manager will also provide all dam overflow and dam safety notifications in accordance with Section 2 and provide advice to stakeholders on the need for downstream evacuations.

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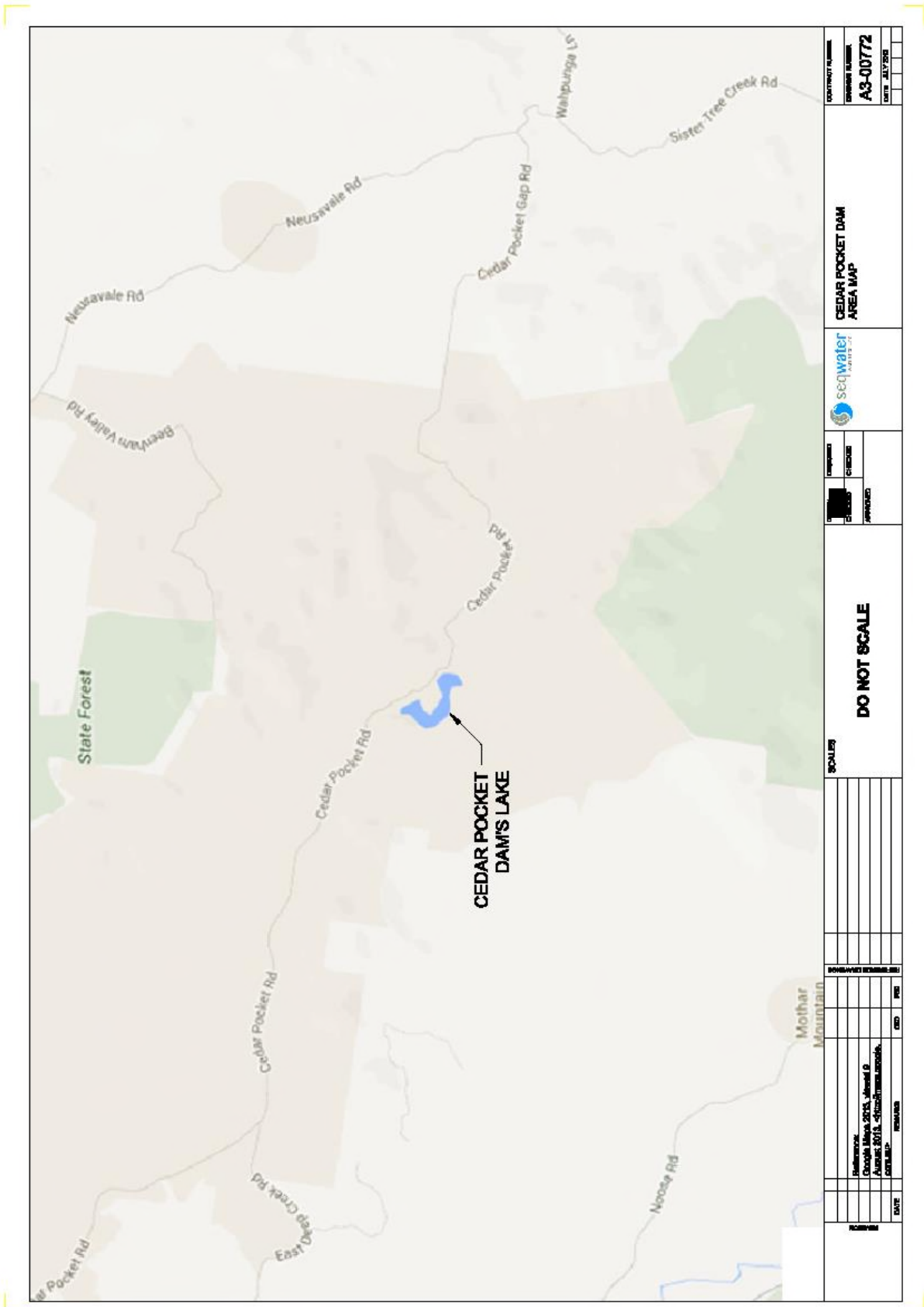
<p>Dam Safety Regulator (DEWS)</p>	<ul style="list-style-type: none"> • Provide regulatory input during a dam safety emergency in accordance with the requirements of the <i>Water Supply (Safety and Reliability) Act 2008</i>.
<p>Council of the Region of Gympie (Local Disaster Management Group)</p>	<ul style="list-style-type: none"> • Exercise primary responsibility for disaster response and management within its boundaries, in accordance with the Queensland <i>Disaster Management Act 2003</i>. • Deploy all appropriate resources to contribute to response and recovery during the dam safety emergency, until its resources are fully committed. • Mobilise disaster response assistance from other relevant Disaster Response Agencies, as appropriate during the emergency.

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

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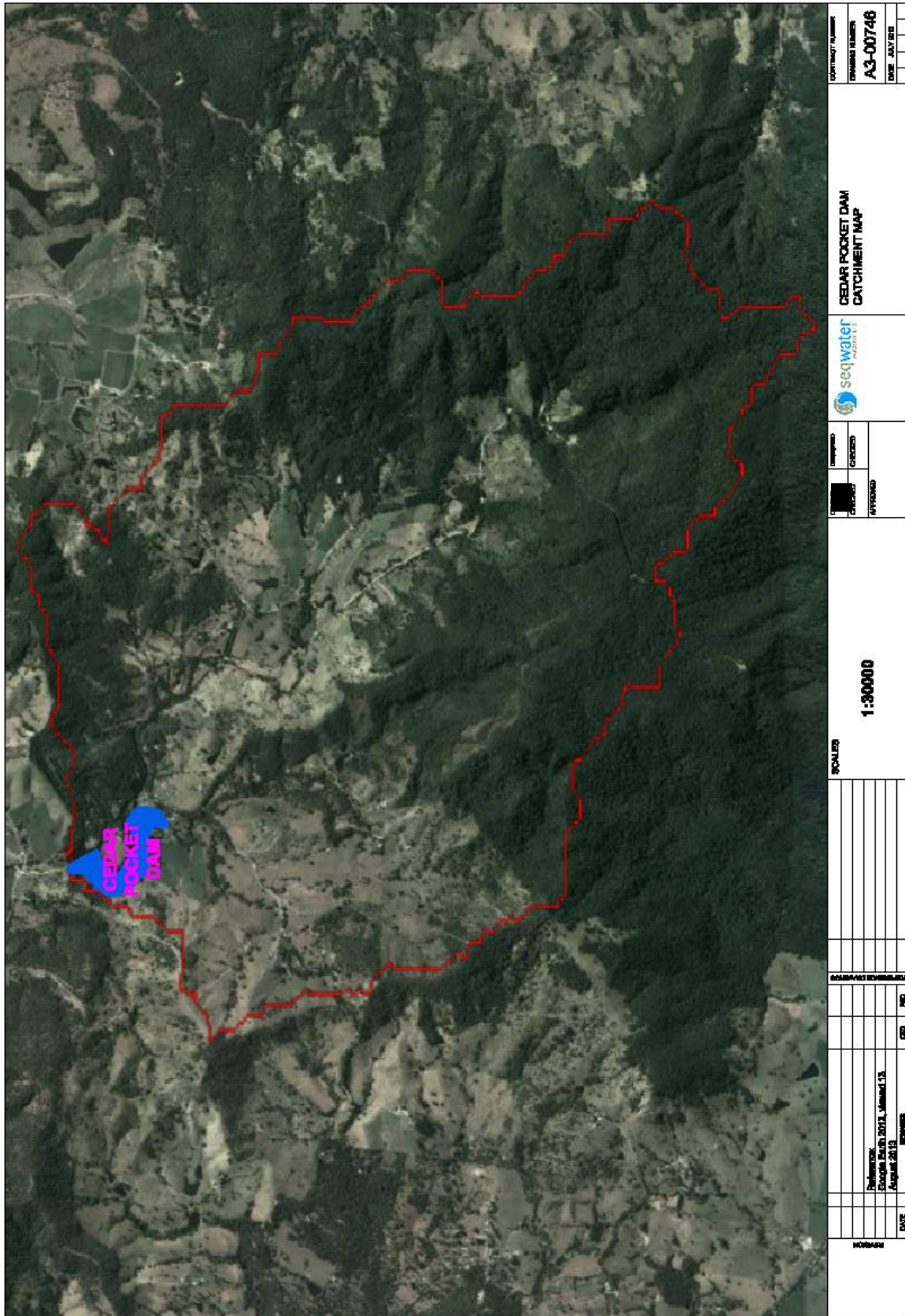
5 AREA MAP

Access to the dam is via Cedar Pocket Road. This road is subject to flooding when the dam overflows.



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6 DRAWING OF THE STORAGE CATCHMENT AREA



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7 EMERGENCY EVENTS AND ACTION LIST

The following events define the triggers for dam safety incidents, emergencies and notifications. Emergency Event Reports are prepared for the following trigger events.

- Extreme Flood Event - Reservoir Level exceeds a “Lean Forward” Emergency Condition Level shown in Section 7.1 and a structural safety condition requiring further investigation is identified.
- Significant increase in seepage or new area of seepage
- Significant structural damage to the dam.

Continuous remote lake level monitoring is available at Cedar Pocket Dam via a radio telemetry system (ALERT). Levels are monitored at Seqwater’s Flood Operations Centre which mobilises to 24/7 operations during flood events in accordance with the requirements of Table 7.1.

In addition to this, Seqwater undertakes routine Dam Safety Inspections at Cedar Pocket Dam in accordance with ANCOLD Guidelines. These routine inspections are designed to identify the onset of a potential emergency event and inspection frequency is increased as appropriate once a dam safety incident trigger is encountered. Options for continuous monitoring of site conditions by Seqwater staff are available (see Section 5 for site access arrangements) and will be activated if required.

The action lists for each of the dam safety trigger events are shown in the sections below. The decision as to the level of activation of the EAP will be taken by the Emergency Manager on the advice of the Leader of the Incident Management Team. If an Emergency Manager has not been appointed, the decision will be taken by the Leader of the Incident Management Team.

A Dam Safety Risk Assessment undertaken in accordance with ANCOLD Guidelines has been completed for the Cedar Pocket Dam. The failure modes that remained after the risk assessment screening process, their initiating events, and the section of this document under which these failure modes would be managed if a dam safety incident trigger associated with the failure mode is encountered, is summarised in Table 7.1.

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Table 7.1 – Cedar Pocket Dam Identified Structural Failure Modes

FAILURE MODE DESCRIPTION	INITIATING EVENT	RELEVANT SECTION OF EMERGENCY ACTION PLAN
Stability Failure of the Right Bank Training Wall	Flood	Use Section 7.1 at flood commencement and move to Section 7.3 should any new structural damage or movement areas associated with the right bank training wall be identified through the routine inspection processes undertaken during the flood event.
Piping through the earth embankment including through the concrete dam interface	Flood	Use Section 7.1 at flood commencement and move to Section 7.2 should any new seepage, increased seepage or seepage containing earth material be identified during routine inspection processes undertaken during the flood event.
Piping through the earth embankment including through the concrete dam interface	Seepage Or Earthquake	Use Section 7.2 should any new seepage, increased seepage or seepage containing earth material be identified during routine inspection processes or in an inspection initiated by an earthquake event.

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7.1 Flood Event

The structural performance of the dam is monitored by regular routine site inspection from the commencement of the flood event. Any issues associated with structural performance as a result of these inspections are sent to the Senior Flood Engineer on duty for evaluation and appropriate action.

If the “Lean Forward” Emergency Condition Level as outlined in Table 7.2 is reached, the initial action is to register an incident by either phoning 07 3270 4040, or submitting an Incident Notification Form to the Seqwater Incident Mailbox (Emergency@seqwater.com.au). These actions are managed by the Senior Flood Engineer on duty.

Once the incident is registered, an Incident Management Team (IMT) will be formed by the Seqwater Incident Roster Duty Manager to monitor the flood event on a 24/7 basis. The IMT will be coordinated from Seqwater’s Flood Operations Centre and the leader of the IMT will be the Senior Flood Engineer on duty.

While the Emergency Condition Level is at the “Lean Forward” condition, the incident will be managed by the Incident Management Team. However if the Emergency Condition Level is escalated to “Stand Up”, then an Emergency Manager will be appointed and a structure for the management of the Dam Safety Emergency by Seqwater as described in Section 2.2 will be established.

The dam is a mass concrete embankment that is likely to withstand some overtopping. The dam overtops when the lake level reaches 105.43 metres AHD. This equates to a flood event with an AEP that is less frequent than 1 in 1 000 000 (see Table 7.3).

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Table 7.2 - Notification Trigger Levels

Trigger Level	Description	Level (m AHD)	Emergency Condition Level
No Overflow	Dam Level below Full Supply Level	<101.07	STAND DOWN
First Overflow	Spillway Level	101.07	ALERT (Consider Increased On-site Monitoring)
Flood Overflow	Impacts Road immediately downstream of the dam	102.20	LEAN FORWARD^ (Consider Continuous On-site Monitoring)
Flood Overflow	Flood of Record ⁺	102.63	LEAN FORWARD^ (Consider Continuous On-site Monitoring)
Emergency Action	Extreme Flood Level	104.50	STAND UP* (Continuous On-site Monitoring)

* This Emergency Condition Level relates to preparing for and undertaking evacuations associated with a potential failure of Cedar Pocket Dam due to flood overtopping.

^ Seqwater’s Flood Operations Centre will operate on a 24/7 basis to monitor water levels and catchment conditions once the “Lean Forward” Emergency Condition Level is reached. This condition also triggers the need for the completion and submission of a report to the Dam Safety Regulator in accordance with the requirements of the Water Supply Act.

+ If hydrologic modelling indicates that the Flood of Record is likely to be reached, the “Lean Forward” Emergency Condition Level should be activated.

Table 7.3 - Design Flood Estimates

(Source: Cedar Pocket Dam Design Flood Hydrology Based on January 2003 GSDM – June 2003).

AEP (1 in ...)	Peak Inflow (m ³ /s)	Peak Outflow (m ³ /s)	Peak Water Level (m)
100	139	114	102.39
500	183	157	102.71
1000	206	179	102.84
2000	227	199	102.95
5000	259.6	230.8	103.10
10,000	289.0	258.8	103.23
50,000	378.3	346.1	103.58
100,000	428.8	398.1	103.74
1,000,000	678.7	640.8	104.50
10,000,000 (PMF)	1,143	1,065	105.88

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The following table provides a guide to appropriate actions that would be undertaken by the Incident Management Team and the Emergency Manager during a flood event.

	INCIDENT MANAGEMENT TEAM	EMERGENCY MANAGER
NORMAL OPERATIONS	<ul style="list-style-type: none"> ▶ Regular site monitoring and dam safety inspections are undertaken in accordance with Standing Operating Procedures. ▶ Any anomalies arising from routine monitoring and inspection that are considered to have the potential to threaten the structural safety of the dam are to be reported by either phoning 07 3270 4040, or submitting an Incident Notification Form to the Seqwater Incident Mailbox (Emergency@seqwater.com.au). 	<ul style="list-style-type: none"> ▶ No Emergency Manager is appointed during normal dam operations.
EMERGENCY CONDITION LEVEL (Alert)	<ul style="list-style-type: none"> ▶ An Incident Management Team will not be formed until the Emergency Condition Level reaches “Lean Forward”. ▶ Regular site monitoring and dam safety inspection will continue as normal. Increased on-site dam safety monitoring will be considered based on the predicted size of the flood event. • Any anomalies arising from routine monitoring and inspection that are considered to have the potential to threaten the structural safety of the dam are to be reported by either phoning 07 3270 4040, or submitting an Incident Notification Form to the Seqwater Incident Mailbox (Emergency@seqwater.com.au). 	<ul style="list-style-type: none"> ▶ No Emergency Manager is appointed at the “Alert” Emergency Condition Level.

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	INCIDENT MANAGEMENT TEAM	EMERGENCY MANAGER
EMERGENCY CONDITION LEVEL (Lean Forward)	<ul style="list-style-type: none"> ▶ Mobilise Flood Operations Centre to 24/7 operations. ▶ Establish an Incident Log to record all significant events. ▶ Monitor the situation by using the real time ALERT system to constantly monitor the dam water level and catchment rainfall in real time, and by using hydrologic models to predict future dam water levels. ▶ Consider implementing continuous on-site dam safety monitoring. ▶ Direct site staff to take manual water level readings when required to verify ALERT system readings. ▶ Undertake stakeholder and public notifications in accordance with Section 2. ▶ Provide daily update reports to the Seqwater Incident Roster Duty Manager. ▶ Escalate the Emergency Condition Level as appropriate in accordance with observed site conditions. 	<ul style="list-style-type: none"> • While the Emergency Condition Level is at the “Lean Forward” condition, the incident will be managed by the Incident Management Team. However if the Emergency Condition Level is escalated to “Stand Up”, then an Emergency Manager will be appointed and a structure for the management of the Dam Safety Emergency by Seqwater as described in Section 2.2 will be established.
EMERGENCY CONDITION LEVEL (Stand Up)	<ul style="list-style-type: none"> ▶ Use the Incident Log to record all significant events. ▶ Monitor the situation by using the real time ALERT system to constantly monitor the dam water level and catchment rainfall in real time, and by using hydrologic models to predict future dam water levels. ▶ Implement continuous on-site dam safety monitoring if possible. ▶ Direct site staff to take manual water level readings when required to verify ALERT system readings. ▶ Obtain expert dam safety advice and technical assistance as required. ▶ Organise and manage any required remedial works on site. ▶ Provide update reports to the Emergency Manager as directed. ▶ Provide advice on the likelihood of dam failure and the need for downstream evacuations. 	<ul style="list-style-type: none"> ▶ Manage Seqwater’s emergency response, including the provision of appropriate ongoing notifications (including advice in relation to the need for downstream evacuations) to stakeholders and the public, in accordance with the Bulk Authority Emergency Response Plan (Emergency Response Plan) and the notification requirements of Section 2.
FINAL ACTIONS	<ul style="list-style-type: none"> ▶ If the Emergency Condition Level has reached Lean Forward or Stand Up prepare and submit an appropriate Incident Report to DEWS in accordance with the requirements of the Water Supply Act. 	<ul style="list-style-type: none"> ▶ Once satisfied that the incident is resolved, close the incident in accordance with the requirements of the Emergency Response Plan.

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7.2 Significant Increase in Seepage or New Area of Seepage

If a significant increase in seepage or a significant new area of seepage is identified, the initial action is to register an incident by either phoning 07 3270 4040, or submitting an Incident Notification Form to the Seqwater Incident Mailbox (Emergency@seqwater.com.au). When registering such an incident, the following table should be used as a guide to determining Emergency Condition Level.

Trigger Conditions	Emergency Condition Level
Earthquake of Magnitude 3 or higher detected in the vicinity of the dam. Significant new or increased seepage areas identified at the Dam. Seepage areas containing earth material identified at the Dam.	ALERT (Increased On-site Monitoring)
Seepage is increasing or earth material evident in the seepage is increasing, and the increases cannot be controlled.	LEAN FORWARD (Continuous On-site Monitoring)
Dam failure is considered possible via an identified failure mechanism.	STAND UP (Commence Public Warnings/Evacuations)
Seepage through the Dam is controlled. No indicators of potential Dam failure are present.	STAND DOWN

Once the incident is registered, an Incident Management Team (IMT) will be formed by the Seqwater Incident Roster Duty Manager to manage the physical response on site, and advise on emergency condition level and the likelihood of a significant downstream release hazard. The leader of the IMT will be an experienced Dam Safety Engineer.

While the Emergency Condition Level is at the “Alert” condition, the incident will be managed by the Incident Management Team. However if the Emergency Condition Level is escalated to either “Lean Forward” or “Stand Up”, then an Emergency Manager will be appointed and a structure for the management of the Dam Safety Emergency by Seqwater as described in Section 2.2 will be established.

The following table provides a guide to appropriate actions that would be undertaken by the Incident Management Team and the Emergency Manager in these circumstances.

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	INCIDENT MANAGEMENT TEAM	EMERGENCY MANAGER
NORMAL OPERATIONS	<ul style="list-style-type: none"> ▶ Regular site monitoring and dam safety inspections are undertaken in accordance with Standing Operating Procedures. ▶ Any anomalies arising from routine monitoring and inspection that are considered to have the potential to threaten the structural safety of the dam are to be reported by either phoning 07 3270 4040, or submitting an Incident Notification Form to the Seqwater Incident Mailbox (Emergency@seqwater.com.au). 	<ul style="list-style-type: none"> ▶ No Emergency Manager is appointed during normal dam operations.
EMERGENCY CONDITION LEVEL (Alert)	<ul style="list-style-type: none"> ▶ Establish an Incident Log to record all significant events. ▶ If an Earthquake of Magnitude 3 or higher was the trigger for moving to the “Alert” Emergency Condition Level, undertake a routine dam safety inspection as soon as practical, including a check on whether the dam safety instrumentation readings have moved into a state that indicates the potential development of a structural dam safety issue. No further action is required if no new seepage or damage is detected during this inspection. ▶ Increase the frequency of on-site dam safety monitoring. ▶ Monitor the situation by estimating the rate of seepage flow, observing the clarity of the seepage flow, making notes and taking photographs and determining if the new condition is related to a potential structural failure mechanism at the dam. ▶ Provided it is safe to do so, undertake regular dam safety inspections and instrumentation readings. ▶ Organise and manage any required remedial works on site. ▶ Provide daily update reports to the Seqwater Incident Roster Duty Manager. ▶ Escalate the Emergency Condition Level as appropriate in accordance with observed site conditions. 	<ul style="list-style-type: none"> ▶ While the Emergency Condition Level is at the “Alert” condition, the incident will be managed by the Incident Management Team. However if the Emergency Condition Level is escalated to either “Lean Forward” or “Stand Up”, then an Emergency Manager will be appointed and a structure for the management of the Dam Safety Emergency by Seqwater as described in Section 2.2 will be established.

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	INCIDENT MANAGEMENT TEAM	EMERGENCY MANAGER
EMERGENCY CONDITION LEVEL (Lean Forward and Stand Up)	<ul style="list-style-type: none"> ▶ Use the Incident Log to record all significant events. ▶ Implement continuous on-site dam safety monitoring. ▶ Monitor the situation by estimating the rate of seepage flow, observing the clarity of the seepage flow, making notes and taking photographs and determining if the new condition is related to a potential structural failure mechanism at the dam. ▶ Provided it is safe to do so, undertake regular dam safety inspections and instrumentation readings. ▶ Obtain expert dam safety advice and technical assistance as required. ▶ Organise and manage any required remedial works on site. ▶ Provide update reports to the Emergency Manager as directed. ▶ Escalate the Emergency Condition Level as appropriate in accordance with observed site conditions. ▶ Provide advice on the likelihood of dam failure and the need for downstream evacuations. 	<ul style="list-style-type: none"> ▶ Manage Seqwater's emergency response, including the provision of appropriate ongoing notifications (including advice in relation to the need for downstream evacuations) to stakeholders and the public, in accordance with the Bulk Authority Emergency Response Plan (Emergency Response Plan) and the notification requirements of Section 2.
FINAL ACTIONS	<ul style="list-style-type: none"> ▶ If the Emergency Condition Level has reached Lean Forward or Stand Up prepare and submit an appropriate Incident Report to DEWS in accordance with the requirements of the Water Supply Act. 	<ul style="list-style-type: none"> ▶ Once satisfied that the incident is resolved, close the incident in accordance with the requirements of the Emergency Response Plan.

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7.3 Structural Damage to Dam

If structural damage to the dam is identified, the initial action is to register an incident by either phoning 07 3270 4040, or submitting an Incident Notification Form to the Seqwater Incident Mailbox (Emergency@seqwater.com.au). Section 7.4 provides a list of potential indicators of structural damage to the Dam. Structural damage to the dam can be caused in many ways including earthquake, explosion, vandalism, or large objects crashing into the dam or reservoir. Structural damage can be identified through visual inspection or by examining instrumentation data that is collected for the dam on a regular basis in accordance with ANCOLD guidelines.

When registering a structural damage incident, the following table should be used as a guide to determining Emergency Condition Level.

Trigger Conditions	Emergency Condition Level
Earthquake of Magnitude 3 or higher detected in the vicinity of the dam. New structural damage or movement areas identified at the Dam.	ALERT (Increased On-site Monitoring)
New structural damage or movement areas have not stabilised and are demonstrating indications of continued worsening.	LEAN FORWARD (Continuous On-site Monitoring)
New structural damage or movement areas indicate some potential for a structural failure of the Dam.	STAND UP (Commence Public Warnings/Evacuations)
Dam embankment is stable. No potential indicators of potential Dam failure are present.	STAND DOWN

Once the incident is registered, an Incident Management Team (IMT) will be formed by the Seqwater Incident Roster Duty Manager to manage the physical response on site, and advise on emergency condition level and the likelihood of a significant downstream release hazard. The leader of the IMT will be an experienced Dam Safety Engineer.

While the Emergency Condition Level is at the “Alert” condition, the incident will be managed by the Incident Management Team. However if the Emergency Condition Level is escalated to either “Lean Forward” or “Stand Up”, then an Emergency Manager will be appointed and a structure for the management of the Dam Safety Emergency by Seqwater as described in Section 2.2 will be established.

The following table provides a guide to appropriate actions that would be undertaken by the Incident Management Team and the Emergency Manager in these circumstances.

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	INCIDENT MANAGEMENT TEAM	EMERGENCY MANAGER
NORMAL OPERATIONS	<ul style="list-style-type: none"> ▶ Regular site monitoring and dam safety inspections are undertaken in accordance with Standing Operating Procedures. ▶ Any anomalies arising from routine monitoring and inspection that are considered to have the potential to threaten the structural safety of the dam are to be reported by either phoning 07 3270 4040, or submitting an Incident Notification Form to the Seqwater Incident Mailbox (Emergency@seqwater.com.au). 	<ul style="list-style-type: none"> ▶ No Emergency Manager is appointed during normal dam operations.
EMERGENCY CONDITION LEVEL (Alert)	<ul style="list-style-type: none"> ▶ Establish an Incident Log to record all significant events. ▶ If an Earthquake of Magnitude 3 or higher was the trigger for moving to the “Alert” Emergency Condition Level, undertake a routine dam safety inspection as soon as practical, including a check on whether the dam safety instrumentation readings have moved into a state that indicates the potential development of a structural dam safety issue. No further action is required if no new seepage or damage is detected during this inspection ▶ Increase the frequency of on-site dam safety monitoring. ▶ Monitor the situation by estimating the rate of change to the new structural damage or movement areas, making notes and taking photographs, and determining if the new condition is related to a potential structural failure mechanism at the dam. ▶ Provided it is safe to do so, undertake regular dam safety inspections and instrumentation readings. ▶ Organise and manage any required remedial works on site. ▶ Provide daily update reports to the Seqwater Incident Roster Duty Manager. ▶ Escalate the Emergency Condition Level as appropriate in accordance with observed site conditions. 	<ul style="list-style-type: none"> ▶ While the Emergency Condition Level is at the “Alert” condition, the incident will be managed by the Incident Management Team. However if the Emergency Condition Level is escalated to either “Lean Forward” or “Stand Up”, then an Emergency Manager will be appointed and a structure for the management of the Dam Safety Emergency by Seqwater as described in Section 2.2 will be established.

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	INCIDENT MANAGEMENT TEAM	EMERGENCY MANAGER
EMERGENCY CONDITION LEVEL (Lean Forward and Stand Up)	<ul style="list-style-type: none"> ▶ Use the Incident Log to record all significant events. ▶ Implement continuous on-site dam safety monitoring. ▶ Monitor the situation by estimating the rate of change to the new structural damage or movement areas, making notes and taking photographs, and determining if the new condition is related to a potential structural failure mechanism at the dam. ▶ Provided it is safe to do so, undertake regular dam safety inspections and instrumentation readings. ▶ Obtain expert dam safety advice and technical assistance as required. ▶ Organise and manage any required remedial works on site. ▶ Provide update reports to the Emergency Manager as directed. ▶ Escalate the Emergency Condition Level as appropriate in accordance with observed site conditions. ▶ Provide advice on the likelihood of dam failure and the need for downstream evacuations. 	<ul style="list-style-type: none"> ▶ Manage Seqwater's emergency response, including the provision of appropriate ongoing notifications (including advice in relation to the need for downstream evacuations) to stakeholders and the public, in accordance with the Bulk Authority Emergency Response Plan (Emergency Response Plan) and the notification requirements of Section 2.
FINAL ACTIONS	<ul style="list-style-type: none"> ▶ If the Emergency Condition Level has reached Lean Forward or Stand Up prepare and submit an appropriate Incident Report to DEWS in accordance with the requirements of the Water Supply Act. 	<ul style="list-style-type: none"> ▶ Once satisfied that the incident is resolved, close the incident in accordance with the requirements of the Emergency Response Plan.

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7.4 Potential indicators of structural damage to the dam

There are many potential indicators of structural damage to a dam. The significance of these will depend on the particular event and the circumstances at the dam. If new instances of any of the following indicators are discovered at Cedar Pocket Dam, the actions listed in Section 7.3 should be followed.

Problem	General Characteristic	When and What to Check
Foundation Failure	Sliding, rotation, or settlement of part of or entire dam.	During routine inspections and after earthquakes inspect for evidence of foundation movement or displacement immediately adjacent to the dam.
Slide in downstream or upstream slope	Slide in the downstream or upstream face.	During routine inspections and after heavy or long periods of rainfall look for cracks or scarps near the crest and bulges at the toe.
Flow slide	Collapse and flow of soil around the storage periphery.	During routine inspections and after heavy or long periods of rainfall look for material displacement around the storage rim.
Gullying	No rock protection or vegetation cover on embankment batters or poor drainage.	During routine inspections and after heavy or long periods of rainfall inspect embankment (and if present, saddle dam) batters for damage to rock protection or vegetation cover.
Landslide	Mass movement of soil or rock from slopes and valley walls around the storage.	During routine inspections and after earthquakes look for material displacement.
Damage to structural concrete	Movement or cracking of structural concrete.	During routine inspections, after earthquakes and when mechanical problems such as burst pipes occur – look for any movement or cracking of structural concrete.
Failure of appurtenant structures or operating equipment	Loss of ability to supply water or discharge floods safely.	After detecting an operational anomaly identify and investigation cause.
Loss of storage contents	Excessive loss from the storage and / or occasionally increased seepage or increased groundwater levels near the storage.	During routine monitoring look for environmental changes such as vegetation damage, salt scalds, etc

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Problem	General Characteristic	When and What to Check
Toe erosion	Erosion of embankment toe by spillway discharge or diversion flows.	During routine inspections and after heavy or long periods of rainfall inspect embankment toe.
Wave erosion	Beaching or notching of the upstream face of the embankment by waves generated over long periods of strong wind.	During routine inspections and during or after periods of strong wind inspect upstream face of embankment and saddle dam.
Spillway damage	Damage to the spillway, dissipater or areas downstream of the spillway.	During routine inspections and during or after spillway overflows inspect the spillway and areas downstream of the spillway for damage or unusual flow patterns.
Major mechanical or electrical failures.	Mechanical or electrical failures can impact on the operation of infrastructure at the dam.	Report all mechanical and electrical failures impacting dam infrastructure.

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8 DAM FAILURE HAZARD INUNDATION MAPS

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

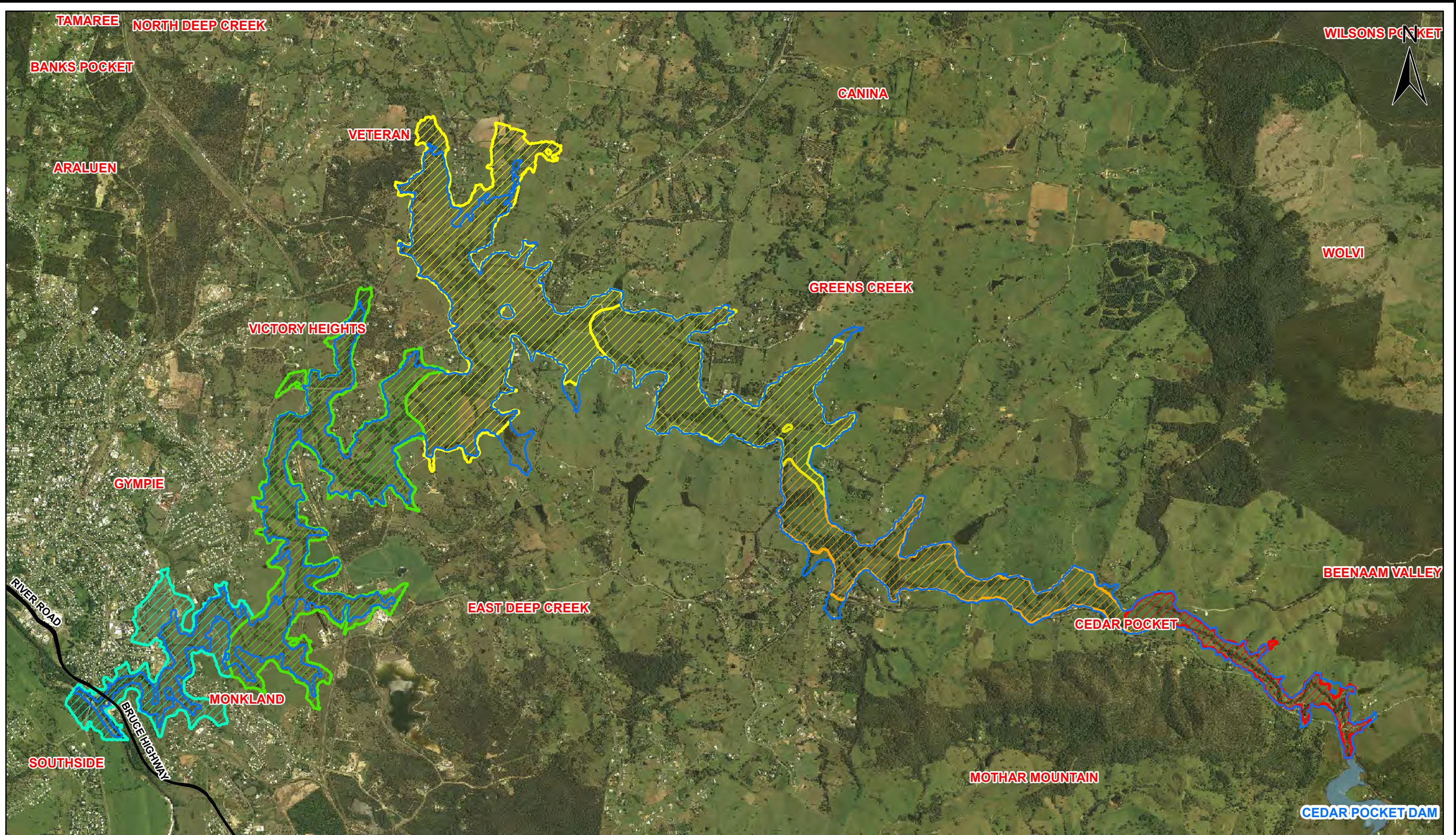
Google Earth (.kml) files showing PMF and Sunny Day Failure inundation extents are available to Disaster Management Groups as a component of this Emergency Action Plan. Because these files can generally be used more effectively than hardcopy maps, it is recommended that these files are used by Disaster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

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

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

The maps do not define the probability of a flood or the probability of dam failure. As previously stated in this Plan, dam failure risk at all Seqwater dams is very low.

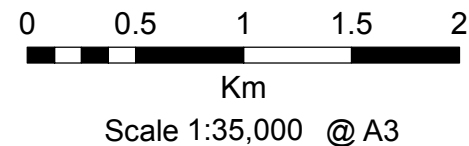
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Legend

Major Road	1 - 2
Water Storage	2 - 3
Sunny Failure Line	3 - 4
Time To Flood	4 - 5
0 - 1	5 - 6

**Cedar Pocket
Probable Maximum
Flood Failure and Sunny Day Failure Extents**



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Date: 12/02/2016

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9 DOWNSTREAM RELEASE HAZARD MAPS

The following maps provide an indication of potential flood inundation close to the Dam that may occur due to the maximum possible spillway flow from the Dam. These maps are indicative of maximum *downstream release* for a situation that is not dam failure.

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

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

9.1 Purpose and Exclusions

The following downstream release hazard maps have been produced to meet the requirements of Section 352 H (1)(b)(i) of the *Water Supply Safety and Reliability Act 2008* to identify the areas likely to be affected by a *downstream release hazard* which is defined in Section 352C of the Act, and for which definitions in Section 352A would be an *emergency condition*.

In practice, the occurrence of a *downstream release hazard* does not automatically generate an *emergency condition* for the Dam, and it does not mean that there are concerns for the structural safety of the Dam or that emergency intervention is required at the dam. In the vast majority of cases, the occurrence of a *downstream release hazard* is an indication that sufficient rainfall has fallen to cause flooding. Generally this flooding would be worse if the Dam had not been constructed.

Emergency events that specifically threaten the structural safety of the Dam are defined in Section 7 and the relevant maps for these potential dam failure *emergency events* are in Section 8.

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9.2 Relevance of Downstream Release Hazard Maps

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

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

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

As noted above and in Section 2.3, when using these maps it is important to understand that the maps do not identify all possible downstream flooding scenarios. Downstream flooding could be significantly different to that shown in the maps due to the particular circumstances of each flood event. Some examples include:

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

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

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9.3 Downstream Release Hazard Map Limitations of Accuracy

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

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

The maps do not define property flood risks.

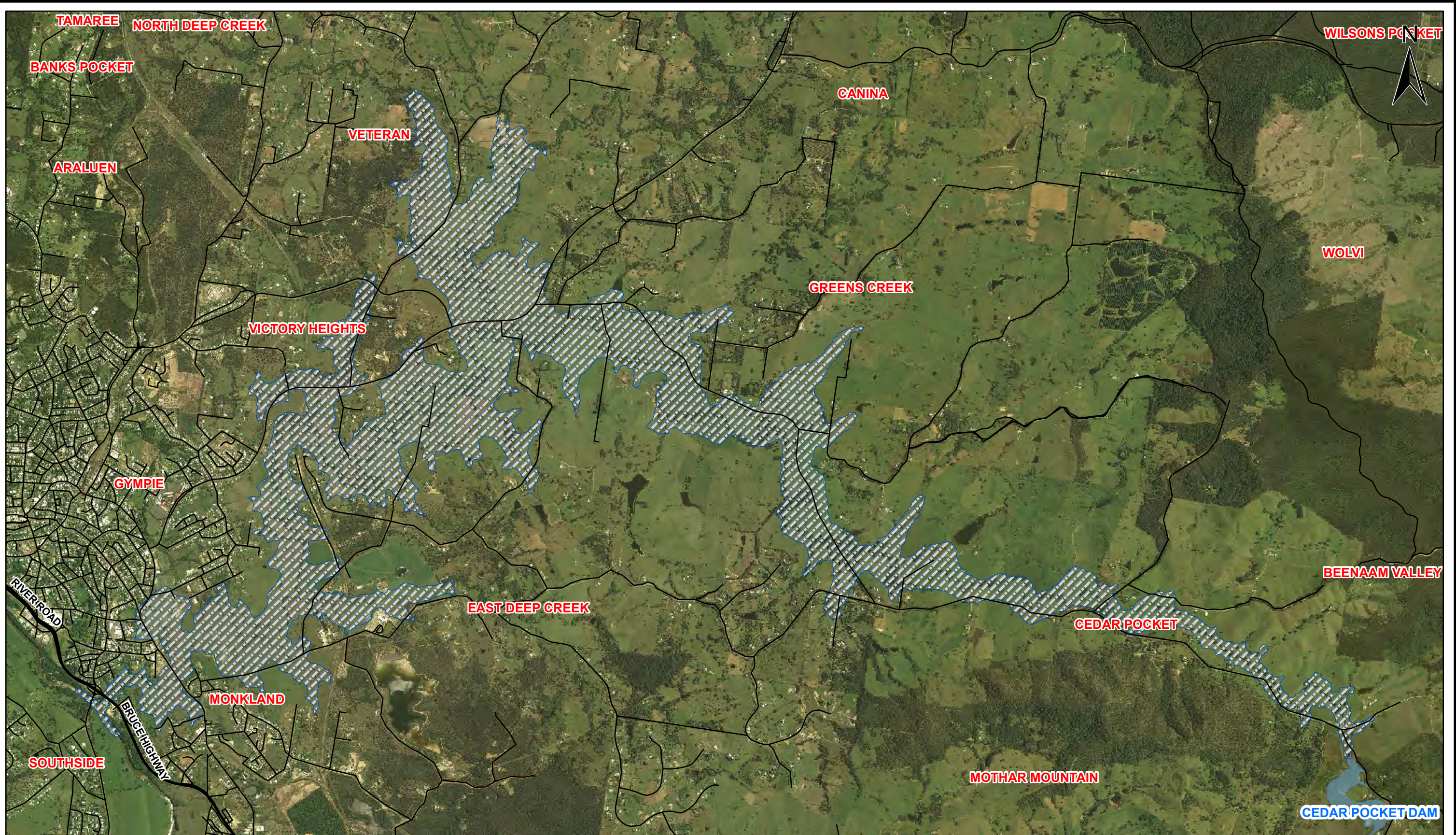
The maps do not define the probability of a flood.

The maps only show the maximum spillway flow. The maps do not show the minimum downstream release hazard flow for conditions when the downstream release hazard (dam overflow) notification is issued as defined in Section 2.3 in this EAP.

9.4 Available Flood Intelligence of Actual Dam Release during Events for Local Councils and Disaster Management Groups

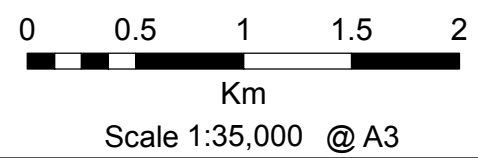
In addition to the information contained in this EAP, Disaster Management Agencies can obtain real time information on dam levels to determine dam outflows for all Seqwater’s un-gated dams during flood events directly and on a continuous basis using hardware and software available through the Bureau of Meteorology. Please contact Seqwater for further information.

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

**Cedar Pocket
Downstream Release Hazard Inundation Extents
Maximum Dam Release for Scenario Without Dam Failure**



Date: 12/02/2016

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Appendix A has been redacted

APPENDIX A – Contact Register

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Appendix B has been redacted

APPENDIX B – Dam Safety Emergency – Assistance to Site

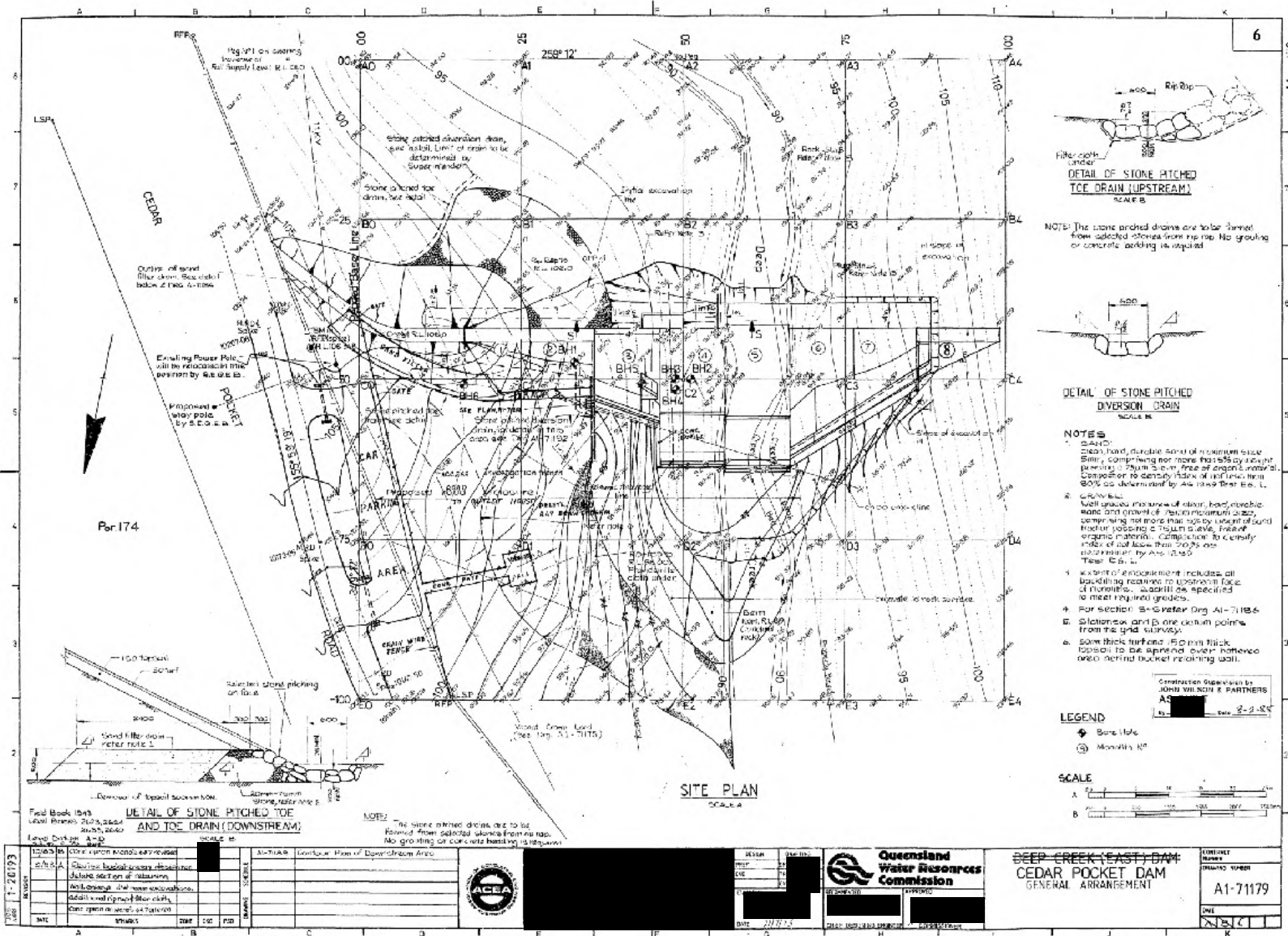
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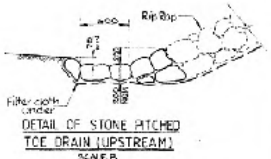
APPENDIX C – General Arrangement Plans

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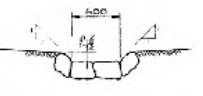
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6



NOTE: The stone pitched drains are to be formed from selected stones from rip rap. No grouting or concrete bedding is required.



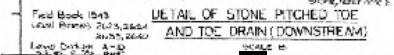
DETAIL OF STONE PITCHED DIVERSION DRAIN SCALE B

- NOTES**
1. SAND: clean, hard, durable sand of maximum size 5mm, comprising not more than 5% by weight passing 75µm sieve. Free of organic material. Compaction to density ratio of not less than 80% as determined by AS 1080 Part 10.1.
 2. GRADINGS: well graded mixture of clean, hard, durable sand and gravel of maximum size 20mm, comprising not more than 5% by weight of sand finer than 75µm sieve, free of organic material. Compaction to density ratio of not less than 80% as determined by AS 1080 Part 10.1.
 3. EXCAVATION: includes all backfilling required to establish face of foundation. Quantity as specified to meet required grades.
 4. For section B-C refer to A1-7119.4
 5. Stationing on D is one datum point from the grid survey.
 6. 50mm thick turf and 150mm thick riprap to be applied over homocore area behind bucket finishing wall.

Construction Supervised by
JOHN WILSON & PARTNERS
A/C
No. 2-2-24

LEGEND
 ● Bore hole
 ⊕ Monitoring Pt

SCALE
 A 0 10 20 30 40
 B 0 100 200 300 400 500



NOTE: The stone pitched drains are to be formed from selected stones from rip rap. No grouting or concrete bedding is required.

DATE	BY	CHKD	APPD



DATE: 21/11/21
 PROJECT: CEDAR POCKET DAM
 DRAWING: GENERAL ARRANGEMENT



**BEPP CREEK EAST DAM
 CEDAR POCKET DAM
 GENERAL ARRANGEMENT**
 SHEET NUMBER: A1-71179
 DATE:

DWG 71179C.tif

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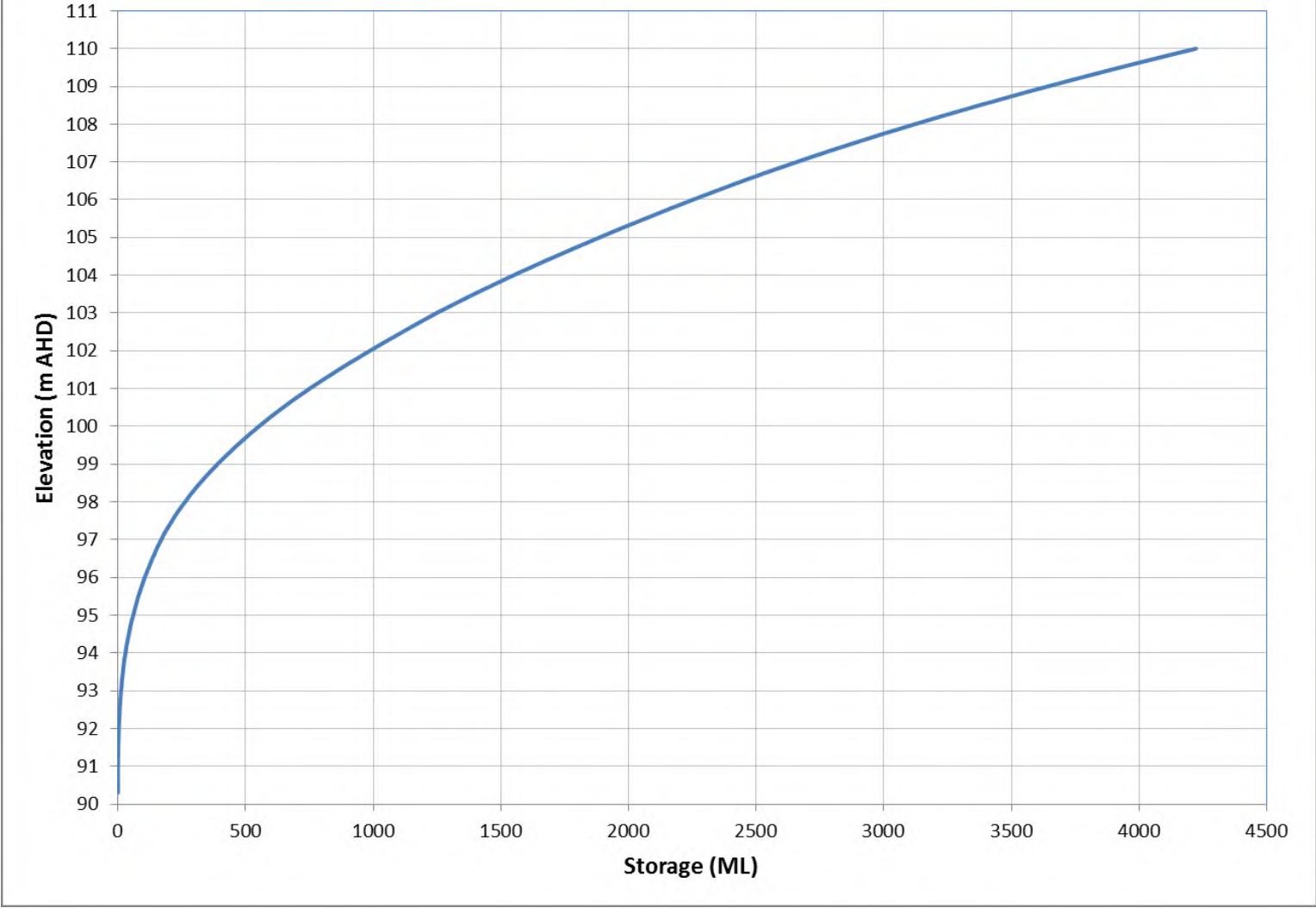
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APPENDIX D – STORAGE AND DISCHARGE CURVES

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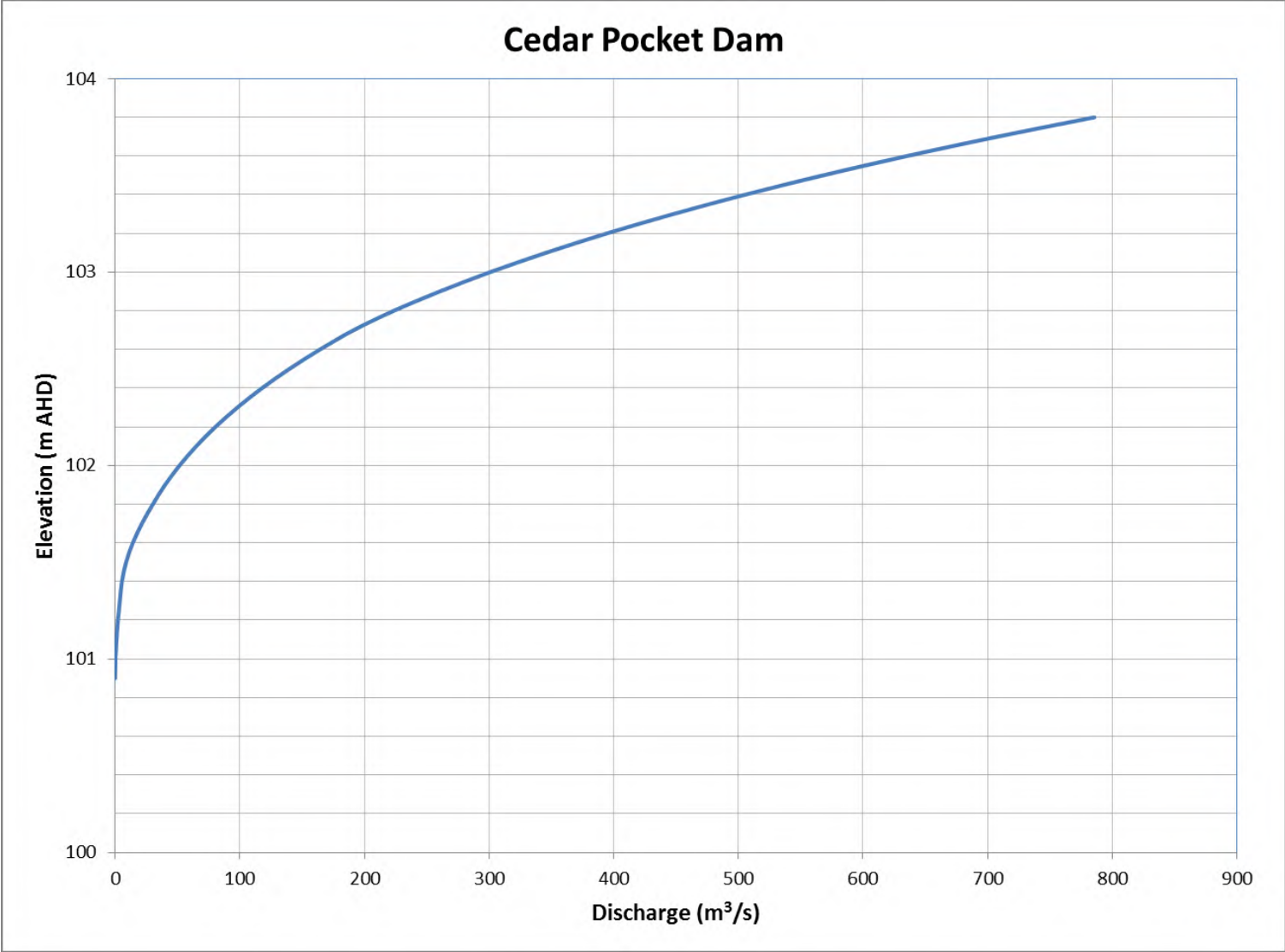
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Cedar Pocket Dam



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APPENDIX E – INCIDENT NOTIFICATION AND LOG

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Incident Name:

Incident Manager:

Complete and email to: "Incident Mailbox"

Date and time of incident	Date:
	Time:
Address / location of incident	
Reported by	
Details of what happened (include any risks or impacts to employees, customers, the environment or assets)	
Actions being taken or planned to be undertaken to mitigate the incident	<ol style="list-style-type: none"> 1. 2. 3. 4. 5.
Nominees for Incident Team (consider reps from WQ, environment, catchments, Dam Safety)	<ul style="list-style-type: none"> • • • • • •

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Incident Log



Incident Name:

Incident Manager:

The purpose of the Incident Log is to record all decisions, actions, direction and other pertinent information. It is important for all personnel involved in managing / responding to the incident record information that may be required as part of a post incident review or some other investigation.

Date	Time	Item	Recorded by

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