

# Paradise Dam Emergency Response Overview

**Updated October 2020**

## **Purpose**

Sunwater is committed to ensuring the community has access to information on the risks of Paradise Dam and how they are managed.

This document has been revised and re-issued in October 2020 to include updated information about how our emergency response will be modified during the next stage of works at the dam.

## **What is a dam Emergency Action Plan?**

Paradise Dam requires an Emergency Action Plan (EAP) by law as people downstream could be in danger if the dam failed. This is known information and the dam has had an EAP since it was built.

An Emergency Action Plan identifies:

- dam hazards and possible emergency events
- the area likely to be affected by an emergency event
- circumstances that increase the likelihood of emergency events
- people who may be harmed and whose property may be impacted, and how these people are warned, and
- the actions to be taken in response to a dam hazard or emergency event and who is responsible.

## **What could cause Paradise Dam to fail?**

Dams are complex structures that can be threatened by a natural event such as flooding or an earthquake, or a deliberate act such as a terrorist activity.

As examples, Paradise Dam could fail due to:

- **Overtipping and sliding:** a large concrete block or section of wall (a monolith) moves or collapses and the water released cannot be controlled. This could occur under flood loading because of weakness in:
  - the Roller Compacted Concrete (RCC) within the wall, or
  - the dam foundation below the wall.
- **Scouring and undermining:** a flood may cause high velocity flows, damaging and scouring the area downstream and undercutting the dam wall
- **Piping:** over time, water movement can lead to internal erosion which can result in a hole or "pipe" forming. If not detected and repaired, the pipe could expand and lead to the collapse of the dam
- **Terrorism or deliberate act:** whilst unlikely, dam owners remain vigilant to this threat.

## Background

Paradise Dam was damaged during flooding in 2011 and 2013 (with more significant damage in 2013), and flood repairs were completed by December 2013. Early-stage improvement works were carried out from 2015 to 2017. Over time more testing and risk assessments have identified more structural issues with Paradise Dam.

In September 2019, Sunwater confirmed the increased risk of shear (sliding) failure through reduced strength of the roller compacted lift joints making up the dam wall. This could result in potentially large sections of the dam wall suddenly failing through sliding and overturning, should a major flood occur again at Paradise Dam.

A dam the size of Paradise should not be in danger of collapse if a recently experienced flood event were to occur again. The fact that risk has increased is why Paradise Dam's storage level was reduced and Sunwater is conducting Essential Works to lower the spillway height.

## How has lowering the spillway reduced the risk of a dam failure?

Lowering the dam wall was completed in September 2020. This will reduce pressure on the dam wall in a flood. We are now drilling and grouting passive steel anchors through the RCC layers, and will soon start construction of the 600 mm thick concrete crest on top of the wall.

We aim to complete most of these works by mid-December 2020 but may be slowed by wet weather. It is likely some works will need to be completed after the wet season. In the period leading up to December, the risk will continue to improve, though residents should remain prepared.

## Changes to evacuation triggers during the next stage of Essential Works

Work is now focused on installing the passive anchors to secure the new concrete crest. Concrete pours for the new crest are planned to start this month, and will continue through to December, weather dependant.

During the Essential Works the gauge at Mount Lawless, upstream of the dam, is being used to monitor river heights. Flows that pass through Mount Lawless travel to Paradise Dam. It has been agreed by the Local Disaster Management Group that the Mount Lawless stream gauge be used as a common reference point.

New trigger points have been created to reflect the progress of works and the improvements to date compared to the commencement of construction in May 2020. These changes have been documented in a second Addendum to the EAP. The following table summarises the change in place for the next stage of works.

Before the Essential Works, evacuations would be activated when:	From May 2020, evacuations would be activated when:	From 24 September 2020, evacuations will be activated when:
The dam experienced a 1 in 50-year flood event	The dam experienced a 1 in 7-year flood event	The dam experiences a 1 in 50-year flood event
Which was 6.9 metres over the original spillway crest level	Equivalent to 7.2 m at the Mount Lawless gauge (upstream of Paradise Dam)	Equivalent to 14.7 m at the Mount Lawless gauge (upstream of Paradise Dam)
Equivalent to 14.7 m at the Mount Lawless stream gauge		
Equivalent to 8.5 m at the Targo Street gauge in Bundaberg*	Equivalent to 3.4 m at the Targo Street gauge in Bundaberg*	Equivalent to 8.5 m at the Targo Street gauge in Bundaberg*
Equivalent to 20.8 m at the Walla flood gauge*	Equivalent to 10.9 m at the Walla flood gauge*	Equivalent to 20.8 m at the Walla flood gauge*

*\*These numbers do not include any additional inflows downstream of the dam and should be used as a general guide only. Details on any forecast levels should always be sourced from the Bureau of Meteorology.*

A further Addendum will be made to the Paradise Dam EAP once the works to install passive anchors and the new concrete crest have been significantly progressed.

### **What does this change mean for downstream communities?**

The triggers have been revised to reflect the progress of the Essential Works. This ensures that the evacuation process takes into account the current conditions and understanding of risk to ensure public safety.

With a higher Mt Lawless stream gauge level as an evacuation trigger, the likelihood of requiring evacuation of downstream residents is now lower than it was whilst the spillway was being lowered.

Sunwater and the local councils are focussed on protecting lives.

Any evacuations will be managed by the district and local disaster management groups.

It is important to understand that areas that were not evacuated in previous floods may also be asked by local councils to leave early to ensure they are protected from floodwaters and do not become isolated.

### **Protecting lives and property**

Sunwater monitors Paradise Dam and the Mount Lawless gauge (data is available on the Bureau of Meteorology website) daily and our EAP identifies specific actions to be taken as water rises. Figure one over the page shows the actions taken as the water level at the Mount Lawless gauge reaches specific heights.

Sunwater and local councils have shared evacuation information with residents within approximately 10 km of Paradise Dam.

It is critical that all residents respond to evacuation alerts.

### **Testing the Emergency Action Plan**

The Emergency Action Plan is regularly tested with the Local Disaster Management Group and the District Disaster Management Group. The most recent tests were held successfully in July and October this year.

### **More information**

- Access the Paradise Dam Emergency Action Plan at [https://www.sunwater.com.au/wp-content/uploads/Home/Community/Preparing-for-weather-events/Stay-informed/EAP/Paradise\\_Dam\\_EAP.pdf](https://www.sunwater.com.au/wp-content/uploads/Home/Community/Preparing-for-weather-events/Stay-informed/EAP/Paradise_Dam_EAP.pdf)
- Refer to local disaster information at <http://disaster.bundaberg.qld.gov.au/> and <http://emergency.northburnett.qld.gov.au/>
- Access interactive flood mapping: <https://www.bundaberg.qld.gov.au/interactive-mapping-system>

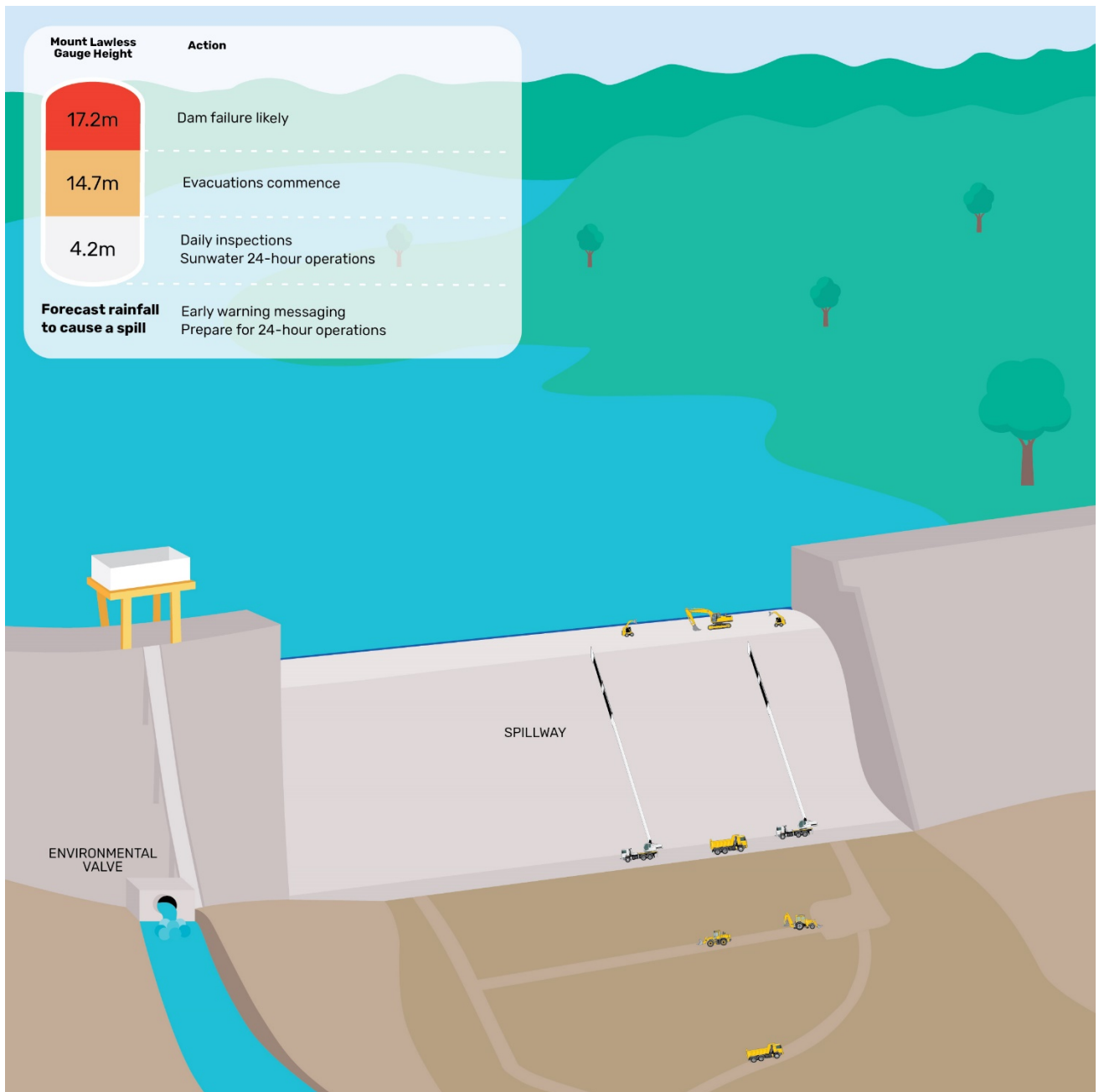


Figure 1: The actions taken as the water level at the Mount Lawless gauge reaches specific heights.

The information presented in this flyer is current at the time of publication in October 2020. It may be updated over time in response to new information.

Refer to [sunwater.com.au](http://sunwater.com.au) for the latest information about Paradise Dam.