

Resilience and Safety of the Waimea Community Dam

A strong future

The Waimea Community Dam has been designed to be highly resilient. It has been designed and independently peer reviewed by dam engineering experts to meet the latest and highest international design standards under the NZ Dam Safety Guidelines.

Resilient design

Key elements of the dam's resilient design include:

1. Reinforced concrete facing and a grout curtain into the rock foundation to provide upstream waterproofing.
2. Erosion resistant and flexible rock fill, which enables movement during an earthquake to minimise subsequent failure.
3. Joints to prevent leakage in between the foundation plinth and concrete facing have primary and back-up PVC water stops.
4. A flow-limiting filter layer under the upstream face to reduce leaks and movement in the dam over time.
5. A spillway that is able to pass water in the maximum probable flood without overtopping the embankment and an upstream debris boom to keep out logs.
6. A system to ensure that if in the unlikely event of a leak, the release of water would be gradual, with water safely carried to the toe of the dam through an open-graded drainage layer of high-quality rock, without causing damage.
7. Dam design standards to ensure it will not release its contents in an uncontrolled manner in a 1:10,000-year earthquake. Modelling of such an event completed by New Zealand and international experts have shown that the dam's planned drainage layers can accommodate resultant water flows even if there was significant damage to the concrete face and/or movement of the fill.

Early detection of issues

Measures to ensure the dam's resilience and early resolution of issues:

- Real time monitoring of inflows, outflows, and reservoir levels.
- Leak detection and measurement of water within the embankment.
- Seismographs to measure earthquake loads.
- Regular surveying for deformation.
- Onsite cameras for remote monitoring.
- Trained observers on site for monitoring when significant floods are expected, or after earthquakes.
- A comprehensive and regular schedule of inspections.

The Waimea Community Dam Emergency Action Plan (EAP)

Part of being a responsible dam owner is to develop and test emergency plans. Good ongoing procedures and processes allows issues to be identified and resolved before they become emergencies.

All dams are required to have an EAP to ensure people are trained in what to do in the unlikely event of an emergency at the dam and the co-ordination of all actions. The EAP addresses a range of potential scenarios and provides pre-planned actions to keep people safe if in the event of a breach of the dam there is a flood.

The Waimea Community Dam EAP is prepared in accordance with the New Zealand Dam Safety Guidelines 2015, with input from our contractors and consultants, Civil Defence, New Zealand Police, Tasman District Council, and the other emergency services.

During construction there is a version called the Construction Emergency Action Plan (CEAP), which looks at scenarios for when the river is temporarily diverted and there is little to no water stored.

After the dam is commissioned in 2022, the EAP will be in place for the life of the dam, with reviews scheduled every five years and any updates then made if necessary.

In summary, the key EAP components are:

- **Preparation:** monitoring any incoming flows into the dam to provide advance warning of possible floods. Setting up reporting and co-ordination plans with NZ Police and Civil Defence.
- **Activation:** how issues are identified, and responses begun.
- **Response:** a contact flowchart and plan for who does what to respond to the issues.
- **Monitoring:** when and how monitoring is undertaken.
- **Notification/warnings:** In the highly unlikely event that an emergency is declared (often even then only as a precaution), maps showing which areas might flood are used to implement emergency services' evacuation plans.

Current EAP status

The Construction Emergency Action Plan (CEAP) is already in effect. Monitoring equipment and flood procedures are in place. Site staff and Lee Valley residents are being trained in the CEAP procedures, which will be very similar to those in use for the long term.

FREQUENTLY ASKED QUESTIONS

What is an Emergency Action Plan?

All dams are required to have an EAP to ensure people are trained in what to do in the unlikely event of an emergency at the dam, and that all actions are co-ordinated. The EAP identifies a range of potential scenarios and provides pre-planned actions to keep people safe if there is a breach of the dam resulting in a flood.

Meanwhile, natural flooding will continue to affect properties and infrastructure and will be managed with TDC's flood response processes.

Will the Waimea Community Dam impact naturally occurring flooding downstream?

No, the dam is not intended or designed to reduce naturally occurring flooding downstream. The dam collects and stores water over winter and spring for release throughout summer.

Excess water will be safely passed over the spillway at about the same rate of flow that it enters the reservoir.

The dam will not significantly alter natural flood frequency or severity.

Will this affect my LIM or house values?

LIMs are produced on request and updated with the knowledge and information available about individual properties at that time. With the recent start to the construction of the dam and the knowledge gained through the subsequent risk assessment, the LIMs for directly affected properties will contain the relevant information.

Capital or market property values are set either by Quotable Value or the market, using information derived from many sources.

If there is an emergency, would I need to evacuate?

Most emergencies would be identified and resolved well before there is a danger to people downstream.

In the unlikely event that an emergency develops and emergency services consider that an evacuation is required (most likely as a precaution), the extent of evacuation will depend on the weather and dam levels at the time and will be guided by the inundation mapping.

How do I find out if my house is within the inundation zone of a dam breach?

There are two maps that show how flooding might impact your property.

1. Natural flooding is shown on the Tasman District Council's 100-year flood mapping found on tasman.govt.nz.
2. The dam breach flooding is shown on the Dam Breach Study and maps on www.waimeawater.nz.

What is the difference between the 2020 dam breach modelling and the 2009 Tonkin and Taylor report?

The dam breach study done in 2020 has almost identical results to the Tonkin and Taylor report done more than a decade earlier.

The key difference is that the two studies were produced for different reasons.

The 2009 study considered only one scenario and was used to help classify the dam for design and consenting purposes. The 2020 study considered a wider range of scenarios (rainfall, water levels, breach types), used more recent information about land levels and cover, and was produced at a higher level of detail to assist with emergency planning.

How does the dam resist earthquakes? Are earthquakes an 'emergency' for the dam?

The dam is designed to move flexibly during earthquakes, and we expect some movement to occur in large earthquakes. The dam is designed to behave safely during and after these movements. Several layers of resilience are built into the dam so that it will still retain and/or release water safely.

The dam will be instrumented by two seismographs (earthquake movement monitors), and any earthquake at the dam will trigger a response by Waimea Water depending on the magnitude of the earthquake and movement at the dam site. An earthquake is considered an incident until the dam has been checked, and would only escalate to an emergency if the dam performed unexpectedly or suffered extreme damage.

How likely is it that the dam might suddenly fail?

An unexpected and sudden failure is highly unlikely. Incidents leading to a breach tend to have prior warning signs that escalate gradually. Concrete faced rockfill dams like the Waimea Community Dam are highly resistant to sudden failure.

The dam's construction includes layers of resilience designed to prevent sudden collapse and so that it will still retain and/or release water safely. The dam is also continuously monitored.

Should people be prepared to evacuate at a moment's notice?

No.

How will warnings go out if an evacuation is necessary?

In the very unlikely event that evacuation is required, the public will be alerted through established Civil Defence procedures.

For more information, go to our website www.waimeawater.nz/the-build/eap/