ShakeAlert® Earthquake Early Warning in Water Utilities

The City of Grants Pass uses the USGS-managed ShakeAlert® Earthquake Early Warning (EEW) System to protect its water supplies when shaking is expected.

The water division of the City of Grants Pass serves over 10,000 customers in southwestern Oregon. The city worked with a ShakeAlert Licensed Operator (LtO) to set up automatic closure of water system valves when earthquake shaking is expected to prevent massive water loss if a pipe is damaged. This will save water for drinking and fire protection.

What is the ShakeAlert System?

The US Geological Survey-managed ShakeAlert Earthquake Early Warning System rapidly detects significant earthquakes, estimates the amount of shaking around the quake, and issues ShakeAlert Messages. Then, ShakeAlert Licensed Operators use the information contained in these Messages to deliver alerts and trigger automated actions to protect people, vital systems, and infrastructure.

The Challenge and the Opportunity

Grants Pass is exposed to potentially hazardous shaking from three main sources: shallow, crustal fault earthquakes; deeper earthquakes, such as the 2001 Nisqually earthquake; and “The Big One,” a magnitude 9+ earthquake in the Cascadia Subduction Zone. The availability of adequate water supply is critical following earthquakes, which can cause fires due to broken fuel lines or downed power lines. Making matters worse, earthquakes can damage pipes and lead to loss of valuable water for human consumption, fire protection, and agriculture. Strong ground motion can even cause the unintended release of massive, uncontrolled quantities of water.

The potential seconds of advance warning enabled by ShakeAlert EEW allows water utilities to close valves at critical locations before power is lost or infrastructure is damaged.
• Getting Started with the ShakeAlert System

When a Grants Pass city official saw a USGS presentation about the ShakeAlert System, they realized there was an opportunity to protect the city’s water supplies. Grants Pass soon began work with RH2 Engineering,* one of several ShakeAlert LtOs that delivers ShakeAlert-powered alerts to water utilities. “We were very eager because we had several great locations where ShakeAlert-powered services could be implemented,” said Grants Pass Public Works Director Jason Canady.

Canady said the decision to integrate ShakeAlert EEW was an easy one for the Grants Pass city council and mayor. Grants Pass had long been focused on earthquake resilience. Around 20 years ago, the city installed a localized earthquake sensor (not a part of the ShakeAlert sensor network) to monitor for damaging earthquakes. This sensor was ineffective. “It was maintenance-intensive and required a lot of human intervention. By the time the local sensor indicated there was shaking, the potential for danger and damage was already there,” Canady recalled. But ShakeAlert EEW is different; by using a large network of sensors, rather than a single instrument on site, it offers Grants Pass the potential to act before shaking begins.

IMPLEMENTATION

By September 2019, Grants Pass had integrated ShakeAlert EEW at a 5-million-gallon reservoir as a pilot project. Now, when ShakeAlert sensors detect an earthquake likely to cause shaking in Grants Pass, reservoir output valves that require power will be closed to retain water, either partially or fully, depending on thresholds set by the city. Valves can be closed in under a minute. If the reservoir is three-quarters full at the time of the earthquake, that would save over 3.5 million gallons of water, enough to provide each customer with 10 gallons per day for a month. That represents an adequate emergency supply if Grants Pass were to become isolated from lifelines after a major earthquake.

Grants Pass also plans to integrate ShakeAlert EEW technology into its replacement water treatment plant, which is under construction and slated to go online in 2026-2027. “Because our radio network is integrated and we have near real-time data communications, our goal is for the ShakeAlert-powered hardware at the water treatment plant to signal a series of actions across the distribution system, as well as shut off all very large rotating loads to preserve water in the distribution system and keep equipment from tearing itself up under shaking,” explained Canady.

• Cost-Benefit Considerations

COSTS

From initial integration in September 2018 until early 2022, the cost of ShakeAlert EEW implementation has totaled just over $17,000.

For Grants Pass, ShakeAlert EEW implementation had a negligible impact on water rates for customers. Canady explained, “We want to assure our customers that we are innovative and working alongside USGS to provide technology that enables us to be responsive in an earthquake. Now we know the technology is secure and works, and we look forward to expanding with it.”

Rising to the Challenge

“Our water division treats and distributes over 2 billion gallons of water annually to more than 10,000 customers. We are excited to implement ShakeAlert-powered technology to further protect this precious commodity in our largest distribution reservoir, which could be threatened during an earthquake.”

Jason Canady, Public Works Director
City of Grants Pass, OR
**BENEFITS**

**Provides Earlier Warning, Faster Response** – Because the ShakeAlert-powered implementation at Grants Pass is fully automated, staff members are not forced to make rapid decisions about valve closures during the high-pressure situation of a major earthquake.

**Preserves Water** – Preserving and protecting water during an earthquake is critical to offsetting secondary impacts, such as fires. ShakeAlert-powered technology can help secure water, so it can be available for human consumption and fire protection.

**Protects Infrastructure Assets** – When ShakeAlert-powered technology is integrated into the new water treatment plant, it will enable the shut-off of large rotating equipment that could be compromised by shaking.

*The City of Grants Pass, Oregon, recognizes the value of ShakeAlert EEW ... because seconds matter.*

**Next Steps**

- To learn more about how to boost safety in the utility sector, see the [Utility Sector ShakeAlert Messaging Toolkit](#).
- To learn more about ShakeAlert Technical Partners, see the [FAQ: Understanding ShakeAlert Partnerships and the Seismic Network](#) and the [FAQ: How to Become a Technical Partner](#).
- See the current list of ShakeAlert LtOs [here](#).
- Contact a ShakeAlert Technical Engagement Regional Coordinator (below).

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