

# Analysis of the Early Earthquake Warning System and Early Warning Labs



## Abstract

The future of emergency preparedness will be the advance warning of earthquakes disseminated to our stakeholders in the City of Newport Beach. The objective of this study is to inform the reader of the facts with regards to the United States Geographical Survey (USGS) Early Earthquake Warning System and Warning Labs products for use on city properties

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# **Table of Contents**

Issue Statement	Pages 2
Stakeholders	Pages 4
Recommendations	Page 7
Pictures	Page 7

## **Issue Statement**

This study analysis is to inform of the early earthquake warning systems and implementation to public buildings in the City of Newport Beach. California residents are aware of the earthquake faults that threaten our communities and the potential for catastrophic events such as the San Francisco and Northridge incidents. According to the United States Geological Survey, there are about 10,000 earthquakes a year in Southern California. Several hundred are greater than 3.0 and about 15-20 are greater than a magnitude of 4.0.

The City of Newport Beach has several faults including: Newport-Inglewood, Whittier, San Andreas, and San Joaquin Hills fault. Seismologists agree that it's not a matter of if a catastrophic earthquake will happen on these faults, but when it will happen in our lifetime. Our community will expect us to lead them during a catastrophic disaster, which begins with early earthquake notification to City employees. Early notification would allow firefighters to position apparatus in safe zones escaping damage from collapsed fire stations and City employees to seek cover so they can successfully fill positions in the Emergency Operations Center and begin the efforts of surveying earthquake damage.

### *United States Geological Survey System*

The United States Geological Survey is a bureau of the United States Department of the Interior. They are a federal agency that manages Shake Alert, which is developing and testing an Earthquake Early Warning system. There are seismic sensors strategically located or planned in Southern California. Currently, the closest seismic sensors to our city are located at John Wayne Airport and South Coast

Metro. The United States Geological Survey dictates where the seismic sensors are located and ensures that the City of Newport Beach has complete coverage based on current and planned sensor sites.

The cost for each seismic sensor is \$60,000. President Trump approved the budget, which includes completing the earthquake early-warning system. In 2014, the initial cost to complete the Earthquake Early Warning system was 38 million dollars with an annual cost 16 million dollars for maintenance. The United States Geological Survey was not able to disclose the current costs for 2018. The United States Geological Survey did state that it is much easier to install the seismic sensors on private property versus public property due to permit and environmental protection requirements.

The goal of the United States Geological Survey is to have notifications sent via the Federal Integrated Public Alert / Warning System and the Wireless Emergency Alerts with the four major cell phone providers: Sprint, T-Mobile, Verizon, and AT&T. Below is a timeline of how the United States Geological Survey Earthquake Early Warning system works:

1. Seismic meters sense an earthquake is going to occur in a given region
2. Field meters transmit signals using telemetry to a processing center
3. Processing centers analyzes the data and generates an alert
4. Alerts are transferred to various distributors such as FEMA, Early Warning Labs, Integrated Public Alert / Warning System, and Wireless Emergency Alerts

#### *Early Warning Lab*

Early Warning Labs is a private company led by founder Joshua Bashioum. Early Warning Labs is partnered with the United States Geological Survey and developed

simple hardware / software and receivers that notifies personnel of an incoming earthquake ranging from 30 to 90 seconds prior to the shaking. The system can be connected to fire stations, which could automatically open up apparatus doors with a verbal alert allowing personnel to remove the engine, trucks, and medic vans from collapse zones.

It is a cloud hosted system directly connected to the United States Geological Survey Shake Alert. Los Angeles County Fire Station 51 was used as a closed beta tester. The testing has concluded and LA County will be installing it at all of their fire stations. The system is currently used at Los Angeles Metro Operations Center and a San Diego news station. Plans are in place to have it installed at Los Angeles City Hall, Santa Monica Colleges, and Cedars-Sinai Hospital.

The cost is \$2,500 for set up and installation of hardware / software. The estimated cost of \$4,500 per site that includes software maintenance, service, support, system upgrades, warranty, and five-year hardware replacement. The annual costs are flexible depending on the number of systems purchased.

### **Stakeholders**

The stakeholders considered in this analysis are the City of Newport Beach employees, residents, and visitors. The Early Warning System directly affects our constituents by reducing risk to our City infrastructure to provide emergency services. Survivability rates would increase with an early notification of an earthquake. The City could have a better chance of placing the emergency operations center with a full staff mitigating the emergency needs of our residents.

Public safety personnel could be in a better position for operational readiness allowing for faster response times to our schools, hospitals, and high density senior areas for fires and medical needs. Police officers would be able to provide order and direction post-earthquake due to crimes associated with a natural disaster such as looters. The dimensions of the analysis include, but are not limited to:

*Type of Issue*

Early Warning Labs' earthquake detection system is an economic and social issue. Our constituents would be directly affected by the system. In the event of a catastrophic earthquake, federal aid would not arrive for days due to the overwhelming incidents impacting all of Southern California. Each department would be challenged until federal aid arrived. The cost of the initial set up and annual maintenance fees would have an economic cost for the City.

*Scale*

The issue is a macro-scale one because it involves numerous stakeholders and utilizes public resources. Early Earthquake Warning Systems have been a high profile issue in the media relating to the Federal Budget. The budget passed with money allocated to complete the system set up. The City of Newport Beach would be the first city in Orange County to implement this system, causing other jurisdictions to conduct their own analysis of the Earthquake Early Warning system.

*Location*

This analysis takes place in the City of Newport Beach. The City is a coastal community that is known for its harbor, Balboa Peninsula, beaches, fine residential areas, and Fashion Island. The population is 86,738 exceeding 100,000 during the

summer months. The City was incorporated September 1, 1906. There are seven City Council Members operating under a Council-Manager form of government. The City provides public safety protection with their own Police and Fire Departments.

### *Intensity*

The issue is currently high intensity because the Federal Budget was passed, allowing for the completion of the Earthquake Early Warning system. In the past few months, there has been much debate as to whether or not the funding should cease for this project. Many stakeholders looked at other countries such as Mexico and Japan having their systems in place ready for an earthquake. We can expect public / private businesses and residents in our City wanting to take ownership of an Early Warning System once this information goes on the council meeting agenda.

### *Extensiveness*

The Federal Program of early warning notification extends to Oregon on the West Coast. This analysis specifically targets the City of Newport Beach buildings such as City Hall, Fire Stations, the Police Department, and the City Yard.

### *Problem Timeline*

The passage of time alone will cause changes in the Earthquake Early Warning system and notification systems offered by Early Warning Labs. The variables influencing the changes are the Federal System being completed, Early Warning Labs being purchased and calling into question the responsibility for the hardware / software, and cell phone carriers agreeing to the Wireless Emergency Alerts program. Regardless of the variables, the City has an opportunity to be on the forefront of early earthquake notifications in Orange County.

## Recommendations

Recommendations cannot be given at this time because I was tasked with analyzing the Federal Early Earthquake Warning Systems and Early Warning Lab products. The analysis and data gathered is based on telephone calls with Robert de Groot, shake Alert coordinator for communication, education, and outreach at United States Geological Survey, meetings with Joshua Bashoum of Early Warning Lab, LA County Fire Station 51 visit demonstrating the product, and research at:

[www.usgs.gov](http://www.usgs.gov)

[www.earlywarninglabs.com](http://www.earlywarninglabs.com)



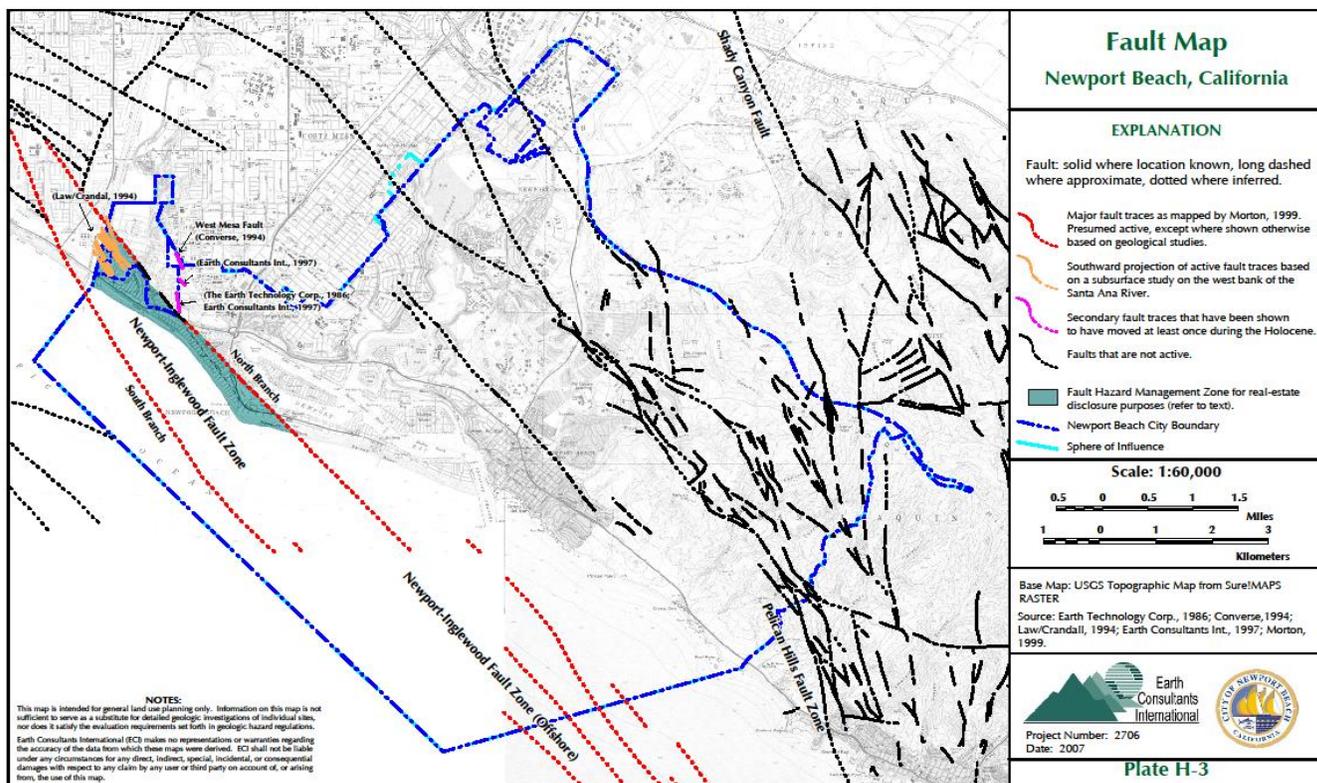
**This picture depicts Los Angeles County Fire Station 51**



**This picture depicts the early warning lab device connected to the station announcement system and garage door opener**



**This picture depicts the system being tested**



This picture depicts the earthquake faults near the City of Newport Beach