

El Niño '98: San Leandro's Response to a "Private" Problem

Dan Lunsford

San Leandro, California—a progressive and conventional, medium-sized city of about 75,000 people—is located in San Francisco's East Bay between the cities of Oakland and San Jose. During the past several decades, community leaders and management officials have developed a community culture based on traditional family values and a distinctive quality of life normally associated with a small-town environment. The foundation that anchors management staff and elected officials to the community is their commitment to "doing the right thing," giving back more than the city government receives, supporting citizens and being supported, and embracing and being embraced.

San Leandro is situated among several well-known earthquake faults; one of these is the Hayward fault. More than a million people live adjacent to the Hayward fault, which stretches 60 miles along the East Bay and consists of a northern and a southern segment; at the apex of these two segments is San Leandro. Because of its location, the city has implemented a comprehensive emergency-services plan that addresses the East Bay's natural and man-caused hazards and has called that plan the Partnership for Preparedness Program.

This program incorporates the principle that prepared-

ness and mitigation are local issues and thus accepts the responsibility for reducing the impact of disasters. A significant element of the city's vision statement is dedicated to the goal of becoming a disaster-resistant community.

Preparing for El Niño

In late summer 1997, the media began to highlight a weather condition approaching the San Francisco Bay Area called El Niño, characterized by a significant weakening of the trade winds and a warming of the surface layers in the eastern and central equatorial Pacific Ocean. During this time, the National Weather Service hesitated to forecast the weather's impact, as it had minimal El Niño data from which to analyze and predict.

Also during this period, Vice President Gore, state officials, and city officials held a summit in Los Angeles solely to discuss El Niño issues and funding available to California. Thus, San Leandro was just beginning to prepare for what looked like a wet winter. A few of the tasks the city identified as needed to prepare for the impact of El Niño were:

1. Revision and distribution of the city's new emergency organization under the state's Standardized Emergency Management System (SEMS), using the Incident Command System.
2. Development and distribution of the city's new Management Operation Plan, which provided procedures for the emergency operations center (EOC).
3. SEMS training for city officials, and continuity of government training for elected officials as standby officers.
4. Preparedness training, available monthly and on request to community members and groups as well as businesses and schools.
5. Addition of a "Disaster Update" section to the city's Web site.
6. Upgrading of the city's low-band radio-station hardware used for broadcasting emergency information.



February 10, 1998 (top photo): After 19 inches of rain fell between January 1 and February 9, small breaks in the ground near the top of the hill appeared as the hill began to move down-slope.

September 10, 1998: A large scarp measuring 25 feet wide and 17 feet deep is exposed as the 70,000 cubic yards of compromised bedrock continue to move down-slope.



7. Acquisition of satellite weather monitors to obtain news of ongoing weather conditions, forecasts, and warnings.

El Niño events occur irregularly at intervals of two to seven years and typically last 12 to 18 months, often causing heavy rain. As San Leandro entered the New Year of 1998, city management and elected officials felt prepared for and confident about the long-awaited challenges of El Niño. But as the weather system approached the Bay Area, reports from the National Weather Service became more direct and direr. The weather service realized that what was beginning was more than just a wet winter, that in fact northern California could expect more than 177 percent of normal rainfall over the upcoming winter months!

The Onset

El Niño arrived in San Leandro during the first weekend in February, and it arrived with a vengeance. On February 4, the chief of police initiated a Level II (partial) activation of the city's EOC, requiring that city officials who had been assigned key billets in the emergency organization report for duty at the EOC. Throughout the city, major water damage and flooding were causing a variety of public safety concerns; city officials were working 24 hours a day, seven days a week, responding to these problems. On February 6, the city manager, functioning as the city's emergency services director, declared a local emergency, which was ratified by the city council three days later.

Although the heavy and relentless rain caused erosion and ground failure



Houses like this one that were in the path of the landslide in San Leandro, California, were moved forward to the edge of the curb and set on railroad ties.

at several locations in the community, city officials felt certain that big landslides were not a threat. The city's hillside community of Bay-O-Vista, built on private property, was the place most vulnerable to landslides, but it was located on the Hayward fault, and the homes rested solidly on bedrock. There was no recent history of landslides in Bay-O-Vista, though infrequent shaking of the ground occurred because of the presence of the Hayward and other nearby faults.

The Unthinkable Happens

On February 9, after several days of continuous intense rain, a worried homeowner in the Bay-O-Vista area contacted the city's building division, requesting that an inspector survey the hill above and behind his property. As the inspector went to the area, he thought that this was just another in a series of routine calls about the rain-saturated ground and the resultant abnormal water runoff.

When the inspector arrived at the scene, he began what appeared to be a normal inspection; to his surprise, he found a series of small breaks in the

ground running in a north/south pattern at the top of the 300-foot hillside. By afternoon, the small ground breaks had grown into large ones, and a supervisory inspector and a local geotechnical engineer had determined the unthinkable: the hill, solid bedrock, was moving.

Twelve houses rested at the base of the hill, with another dozen standing at the top of it. A joint decision was reached by the city's management staff to notify all homeowners in the Hillside Drive section of the Bay-O-Vista area of the immediate danger and to determine quickly which houses were at extreme risk and required evacuation.

The Response

The hill was monitored throughout the night. By the next morning, it was clear that the breaks in the earth at the top of the hill had grown, while the cracks in the tipped retaining walls at the hill's base had resulted from the earth's inching forward toward the homes.

Within 24 hours, inspectors had identified three houses as at greatest risk, requiring evacuation, and three other homes for which evacuation was

recommended. City officials decided to place plastic tarps over the vulnerable areas of the hillside to slow down the hill's saturation from the incessant rain. Officials from the city's building division and police department began 24-hour monitoring of Hillside Drive. The building division's first emergency response role had eventually evolved into that of on-site manager for the affected families and their neighbors. City officials helped families move and relocate within the community or to neighboring communities, while El Niño continued to pulverize the city. San Leandro had received more than 19 inches of continuous rain by February 9, spanning the biblical 40 days and 40 nights. The intolerable rain and wind of El Niño appeared to be unending.

Suddenly, without warning, the hill began to move toward the vacant houses, traveling some six to seven inches in a 24-hour period. Several of the homes began to feel the stress of the moving hill, as patios, sidewalks, retaining walls, and fences began to shift and break apart; even the homes' foundations began to crumble. At this point, the city contracted with a second geotechnical engineer for peer evaluation and additional emergency response services.

As the hill moved toward the houses, city officials finally conceded their worst fear: nothing the city could do would stop the inexorable power of the hill's movement, with its 70,000 cubic yards of hurtling earth. The city would be forced to wait until the hill found its own equilibrium, stopping its own movement.

As El Niño continued to wreak havoc, the building division suggested the unusual idea of moving the houses out of harm's way, away from the hill; this decision would have to be finalized and implemented quickly. Unfortunately, the affected homeowners were emotionally and physically drained and incapable of going shopping for a house mover! The mayor, city manager, and chief of police unhesitatingly made a collective decision that was to become the turning point of this crisis: the city

would not let the homes be destroyed. The city would locate and contract with a house mover, moving the homes out of harm's way for their owners.

After several more days of heavy rain and strong wind, El Niño took a day off. Immediately, the city had the house movers lifting two homes off their foundations and moving them some 20 feet forward, away from the moving hillside. The public works department assisted by clearing and removing debris and material from the homeowners' yards and from the streets. City volunteers helped a homeowner prepare her yard and save her plants before her house was moved.

The second geotechnical engineer took advantage of the break in the weather to begin an investigation of the entire hillside. As part of the investigation, a detailed topographic and geologic map was developed, and six deep-bore holes were drilled in the hillside and geotechnical instruments inserted for hillside monitoring. More than 12 inches of rain fell in the month of February, and the wet weather continued without interruption into March, dumping several more inches of rain. City officials worked around the clock to provide Hillside Drive residents with on-site emergency services for more than 60 days at the height of El Niño's battering rainfall.

During this period, the hill continued to move toward the temporarily relocated houses, which had been moved to the edge of the street and placed on railroad ties. On March 2, 1998, as the weather finally abated, the city's emergency operations center was deactivated, and the council ended the state of emergency.

The Aftermath

By May, three months after the hill had begun moving, the toe of the hillside had moved forward approximately 42 feet and underlaid one of the temporarily relocated houses, which still was resting on railroad ties. The hill's movement now was not only a threat to the homes but also on a collision course with the

city's infrastructure; the hill's toe was only about 34 feet from the city's sidewalk and utility lines (located beneath the street).

By early April, the hill's movement had slowed to one inch every 24 hours. The severe and unyielding weather of February and March was past, but El Niño continued to plague the city with brisk weather through May.

In April, the geotechnical engineer completed his investigation of the hillside, concluding that the hill would continue to move downslope and place the houses, as well as the city right-of-way, in jeopardy. The final plan to stop the movement—a procedure involving a series of large shear pins to be driven into the hillside and anchored there—is estimated to cost \$3.5 million. City officials believe that the landslide continues to pose an imminent danger to San Leandro's public facilities and that the temporary stopping of the hill's movement is in the public interest until a permanent solution can be implemented. Funding is being requested from the Federal Emergency Management Agency (FEMA) and the California State Office of Emergency Services (OES) with which to implement the geotechnical plan.

Doing the Right Thing

It will be a long time before San Leandro forgets the rage and anger of El Niño '98, which dumped more than 200 percent of the normal rainfall on the city in Bay Area's wettest winter of this century. Although lives were displaced and the future for many people remains uncertain, something remarkable happened on Hillside Drive in this bayside community. The property involved was all private, and city officials could have walked away after their initial evaluation of the homes at risk.

The city, however, refused to allow its residents to stand alone in the wake of El Niño, an overpowering and destructive force of nature. Without hesitation, it did the right thing. Together, city officials and homeowners fought over-

whelming odds to save the houses. San Leandro provided immediate and ongoing on-site emergency management and financial assistance, as well as reassurance to the residents that they would not be abandoned in their time of need.

At the height of El Niño's worst assault, these homeowners were serving meals, providing drinks, and furnishing shelter to the city workers who were providing emergency services. City officials became permanent members of this section of the community. Special bank accounts were set up to receive donations for the displaced families. Town meetings were conducted during which there was no arguing, fighting, or placing of blame, only embracing, understanding, and sharing.

The council, city officials, community leaders, and Hillside Drive residents came together for support and relief in their search for a mutual solution. With the hill still inching toward the relocated homes and the city's public facilities, the fight is not over. The city council and city officials are continuing to move forward in support of the Hillside Drive solution and encouraging FEMA and OES to join them in doing the right thing. **DM**

Dan Lunsford is emergency services manager, San Leandro, California.

This article has been adapted from an article that originally appeared in Disaster Recovery Journal and is used with that magazine's permission.

News Update

In August 1998, FEMA denied obligated funding to permanently fix the hill's continued movement. In September, city officials prepared further documentation for a first appeal with local FEMA officials, which is supported by the California Governor's State Office of Emergency Services.

At this writing, the hill continues to move.