

## **Ventura County: Disaster Evacuation Planning**

### **SUMMARY**

The 2006–2007 Ventura County Grand Jury (Grand Jury) made protocol visits to several police and fire departments within the County. The Grand Jury also visited the Ventura County Sheriff's Department's Office of Emergency Services (VC OES).

The Grand Jury focused on specific areas of disaster planning, including possible vulnerabilities and deficiencies relating to flooding, dam failures, and tsunamis and associated evacuation strategies. An investigation was opened when it was determined that further study of these events was appropriate. This investigation does not address earthquake disasters except as they may cause dam failures.

The Grand Jury found that fixed-point warning systems (sirens) are not adequately maintained in potential flood areas, such as those below the Casitas Dam. Evacuation maps are not readily available to residents in repetitive flood zones, below dams, and in tsunami inundation areas. Additionally, evacuation directional street signs have not been installed in County areas that are subject to inundation.

The Grand Jury concluded that there are actions that could be implemented to improve disaster evacuation planning within the County, thus enhancing the overall level of public safety.

The Grand Jury recommends that priority be given to improving community education and preparedness regarding potential disaster vulnerabilities, particularly in the areas subject to flooding, dam failures, and tsunamis.

### **Background**

Disasters such as fires, earthquakes, floods, and other serious problems can occur unexpectedly throughout the County. Emergency responders are trained to plan and rapidly execute appropriate responses to minimize loss of life and damage to property. Response planning and execution depend to a large extent on the location and type of disaster.

Certain disasters, however, require responses based on detailed advanced planning. Inundations caused by dam failures have a known spill path. A tsunami arrives from the ocean and can inundate up to three miles from the shore. Floods and mudslide areas are well mapped as are rivers, streams, and levees. While nothing can be done to prevent most disasters, evacuation plans can be developed and publicized so that when such an event occurs or a warning is issued, people will know where to go for reasonable safety.

The Ventura County Board of Supervisors (BOS) has officially designated the Sheriff as the Director of Disaster Services. The Sheriff manages this function through VC OES. The VC OES operates the County's Emergency Operations Center (EOC), which is a centralized location for coordinating countywide emergency response

activities. The EOC is the coordination point among the cities, special districts, and the Governor's Office of Emergency Services.

VC OES is a component of the Ventura County Disaster Council (VCDC), which was created and authorized by the BOS. As of April 3, 2007, it is comprised of representatives of 12 County agencies, as well as the California Department of Highway Patrol, the California Department of Transportation, and the Ventura County Chapter of the American Red Cross. Various Ventura County cities and other critical local organizations consult and interact with this body. The VCDC conducts quarterly meetings which are open to the public.

## **Methodology**

The Grand Jury interviewed several senior managers in the Ventura County Sheriff's Department, Ventura County Sheriff's Department's Office of Emergency Services, Ventura County Fire Department, and the Ventura County Watershed Protection Agency who were familiar with many of the issues. Public documents from various governmental agencies were gathered and reviewed, and an Internet search was conducted to locate and study additional relevant documents.

## **Findings**

### Flooding and Dam Failure Inundation

- F-01.** The Ventura County Watershed Protection District (WPD), as part of its flood control responsibility, has mapped certain flood scenarios and developed maps from which Ventura County Sheriff's Department's Office of Emergency Services (VC OES) and local emergency responders can create evacuation plans.
- F-02.** Repetitive flood areas and levee break/overflows are mapped by WPD with some recommended evacuation routes mapped by VC OES. [Ref-01]
- 100-year flood inundation scenarios are mapped for levee break/overflow by WPD without evacuation route recommendations.
  - 500-year flood inundation scenarios are mapped by WPD for dam failures only.
- F-03.** The November 15, 2005, Ventura County General Plan, Hazards Appendix, states that there are 20 dams with inundation potential in the County. At least 16 of the 20 are earth-fill dams. (An earth-fill dam is a simple embankment of compacted earth, typically with a watertight core or upstream face of concrete or clay.) [Ref-02]
- F-04.** According to the Casitas Dam Evacuation Map, published approximately 14 years ago by the U.S. Bureau of Reclamation (USBR), the downhill water course from a failure of the Casitas Dam will follow the Ventura River, Highway 33, and Ventura Avenue to the ocean. [Ref-03]

- F-05.** California has sustained 16 earthquakes exceeding magnitude 7.0 since 1812, including the following two near Casitas Dam:
- a magnitude 7.1 earthquake west of Ventura in the Santa Barbara Channel on December 21, 1812, approximately 10 miles from Casitas Dam
  - a magnitude 7.9 earthquake near Fort Tejon on January 9, 1857, approximately 50 miles from Casitas Dam
- F-06.** In 1999, the USBR began a two-year seismic retrofit of the Casitas Dam. This modernization program was engineered to enable the dam to withstand a magnitude 7.0 earthquake.
- F-07.** According to VC OES, 11 fixed-point warning systems (sirens) were installed in the inundation zone by the USBR during the Casitas Dam seismic retrofit. Operation and maintenance of the sirens were transferred to the Casitas Municipal Water District upon completion of the retrofit. The Ventura County Disaster Council (VCDC) has not decided which agency will ultimately be responsible for these sirens.
- F-08.** The VC OES has assumed oversight of the Casitas Dam sirens. The sirens are tested quarterly at the direction of VC OES. As of May 2007, several of the sirens are non-operative because of repair needs.
- F-09.** Since assuming oversight of the sirens, VC OES has repaired some of them, although funds have not been budgeted for regular on-going maintenance. VC OES has estimated that refurbishment of the current system would cost approximately \$60,000 to \$70,000. Annual maintenance costs would run approximately \$10,000 to \$15,000.
- F-10.** VC OES formally proposed to the VCDC that the siren system be decommissioned. As of June 2007, no decision had been made.
- F-11.** VC OES also assumed oversight responsibility for the two remote-controlled warning sirens that are located near the Piru Dam. These sirens are operable and are tested monthly by the Ventura County Fire Department.

### Tsunami

- F-12.** According to the Tsunami Safety Committee of the California Seismic Safety Commission, more than 80 tsunamis have been observed or recorded along the California coastline during the past 200 years. Nine of these tsunamis caused minor damage in various California ports and harbors, and two caused major damage.
- F-13.** Although the last destructive tsunami which affected Ventura County was in 1812, several small non-destructive tsunamis have occurred since that time.
- F-14.** Ventura County is subject to threats from both tele-tsunamis (distance generated, trans-oceanic) and locally generated events from the Santa Barbara Channel and Gulf of Catalina.

- F-15.** Ventura County has 42 miles of coastline, approximately half of which is at potential risk for a ten-meter (33-foot) tsunami. A significant number of small communities within the County would be affected by a major tsunami. [Ref-04]
- F-16.** Japan has developed a very effective tsunami warning system. The Japanese model has shown that the threat to human life during a tsunami can be mitigated by an effective warning system and clearly defined evacuation routes when advance notice is available.
- F-17.** The West Coast and Alaska Tsunami Warning Center (WCATWC) provides tsunami warning guidance for British Columbia and all west coast states. If the United States Geological Survey detects an earthquake of magnitude 7.0 or greater in the Pacific Ocean, it alerts WCATWC, which monitors pressure sensors in the ocean and tidal gauges along the coast. The WCATWC then alerts the appropriate emergency service organizations on the west coast. For California, that is the Governor's Office of Emergency Services (State OES) in Sacramento, who in turn alerts the VC OES. VC OES is responsible for notifying local communities that would most likely be affected.
- F-18.** VC OES only makes recommendations to local municipal emergency managers whether to evacuate or not; local authorities are responsible for formulating and executing evacuation plans for their jurisdictions under a tsunami warning.
- F-19.** In August 2006, the VC OES posted a 52-page Ventura County Operational Area Tsunami Evacuation Plan (Tsunami Evacuation Plan) on its Web site. The stated intent of the plan is to inform the public about potential inundation areas, warning communication systems, and evacuation routes.
- F-20.** The California Department of Transportation (CALTRANS) has issued an official notification that authorizes local authorities to install tsunami signs in tsunami inundation areas as defined by the National Oceanic and Atmospheric Administration (NOAA). These signs are intended for placement on state highways, local streets and roads, near the coast in parking lots, and at parks and beaches to identify hazard zones and evacuation routes, and to direct road users (including pedestrians and bicyclists) to safe areas.
- F-21.** There are currently no tsunami evacuation route signs posted in the inundation areas of Ventura County.
- F-22.** Several cities along the Pacific coastline in potential tsunami inundation zones have created comprehensive public awareness campaigns to educate residents about the hazards of tsunamis. Such efforts have included the distribution of tsunami brochures throughout the community, installation of public information kiosks at beach access points, and installation of evacuation route signs.

- F-23.** The National Weather Service (a department of NOAA) has established a “Tsunami Ready” certification for jurisdictions that have satisfied certain criteria such as:
- the ability to disseminate warnings
  - having a designated emergency operations center
  - implementing a community awareness program
  - designation of hazard zones
  - development of evacuation plans
- F-24.** Currently there are 40 “Tsunami Ready” sites in ten states. California sites that have achieved Tsunami Ready certification are the cities of Crescent City, Dana Point, and Huntington Beach, as well as the University of California at Santa Barbara.
- F-25.** The current County tsunami warning and evacuation plan is to broadcast warnings via the Emergency Alert System (radio, television), helicopter and police vehicle public address systems, and by knocking on doors.
- F-26.** The Board of Supervisors (BOS) recently voted to implement a “Reverse 911” Interactive Community Notification System, which would allow direct telephone notification to residents throughout the County during emergency situations. This system is not yet fully operational.
- F-27.** Although discussed by VC OES and VCDC, there has been no decision or agreement as to whether a fixed-point audible warning system along the Ventura County coastline should be installed, maintained, and operated.
- F-28.** According to a December 2005 study by the State of California Seismic Safety Commission titled “The Tsunami Threat for California”, two of the five final recommendations include the necessity for obtaining matching funds from state or federal sources for local jurisdictions.

### Evacuation Strategies

- F-29.** The Ventura County Transportation Commission is working on a VCDC proposal to mobilize county bus operators to assist with evacuation transportation. An operational plan is not yet in place.
- F-30.** Strategies and public educational campaigns to mitigate vehicle traffic gridlock in the event of an evacuation have not been implemented.
- F-31.** VC OES does not coordinate evacuation training with municipalities except for joint training efforts with coastal cities regarding tsunami evacuations. All law enforcement agencies within the County have been given copies of all disaster plans and maps. VC OES expects each municipality to develop its own evacuation plans, train its own personnel, and distribute appropriate maps.

- F-32.** A “Hot Spots” manual [Ref-05], which identifies areas vulnerable to repetitive flooding, has been developed by VC OES in conjunction with the WPD. The manual is updated annually, and copies are distributed to each emergency response agency to assist responding personnel in the event of an evacuation alert.
- F-33.** The “Hot Spots” manual does not identify evacuation routes or recommend assembly areas.
- F-34.** The November 2003 WPD manual *Weathering the Storm* [Ref-06] advises residents to plan and practice an evacuation route and to contact the VC OES for a copy of the community flood evacuation plan.
- F-35.** The VC OES Web site only lists three radio stations (one Spanish language) in the County that will broadcast emergency information.
- F-36.** The Ventura County Information Systems Department (ISD) Geographic Information Services developed and published a photographic poster of the Ventura County coastline dated October 25, 2006, which shows the evacuation routes for coastal residents living in tsunami inundation areas. This poster is unique and is exhibited in the basement area of the Hall of Administration (near Employee Health).

## Conclusions

- C-01.** It is important that individuals in susceptible areas be educated about and prepared for flooding, dam failures, and tsunamis before they happen. Evacuation warnings and information without prior public education will not be effective if the public does not receive, know how to use, and act upon this information. A lack of adequate planning could potentially create panic and gridlock, severely hampering the evacuation process. (F-26, F-28 through F-30, F-34 through F-36)
- C-02.** VC OES and VCDC have discussed evacuation signage for floods and tsunamis, as well as continuing research on the effectiveness and necessity of siren warning systems. Experience suggests that the County may need to take a more aggressive approach to educating at-risk communities about the potential dangers they face and what they should do in the event of an alert. (F-28 through F-36)
- C-03.** Emergency responders (e.g., police, fire, paramedics) may not have adequate information and training to respond appropriately in the event of an evacuation order. (F-30 through F-34, F-36)
- C-04.** The current lack of information being disseminated to the public may be the result of inadequate funding and a lack of coordination between different jurisdictions. (F-29 through F-33)
- C-05.** The National Weather Service “Tsunami Ready” certification, if pursued and implemented in Ventura County, would result in an increased level of safety for residents and visitors. (F-23, F-24)

- C-06.** Emergency information broadcasts by only three radio stations may not be sufficient. (F-35)

## **Recommendations**

- R-01.** VC OES and the VCDC should work with the ten cities in the County to facilitate development of coordinated and integrated emergency evacuation plans for each of these communities. These plans should include how the public and emergency service providers are to be informed of an alert and what their responses should be. These local plans need to recognize that the VC OES is the chief disaster coordinator in the County; the plans need to be readily available to the public. (C-01)
- R-02.** The VCDC should decide whether to maintain the fixed-point warning sirens that currently exist near the Casitas and Piru Dams. (C-02 through C-05)
- R-03.** If the VCDC decides to maintain the warning siren system, adequate maintenance funds need to be allocated and an agency should be identified that will be responsible for siren operational maintenance and testing. (C-02 through C-05)
- R-04.** The County should install evacuation route signage along all dam spill paths. (C-02 through C-05)
- R-05.** The VC OES and VCDC should decide if a coastal tsunami audible warning system is necessary and advisable. (C-02)
- R-06.** Any evacuation plans developed by VC OES and the cities or special districts in Ventura County should be publicized and widely distributed. A user-friendly brochure detailing preparedness actions and evacuation routes should be developed for distribution to all residents in the County. As maps and plans are updated, the changes should be similarly publicized. (C-01, C-02)
- R-07.** VC OES should revise and reissue the "Hot Spots" manual to include evacuation routes and safe assembly areas. A copy should be maintained in every emergency response vehicle within Ventura County. (C-03)
- R-08.** The County should obtain approval and/or permits from appropriate governmental agencies for tsunami warning signage in potential inundation danger areas. Signs should be installed as soon as possible. (C-02)
- R-09.** All County radio, television, and cable networks should be included in the emergency notification procedure, including broadcasters based in neighboring counties. (C-06)
- R-10.** Ventura County, as well as all coastal cities in the County, should meet required standards to obtain "Tsunami Ready" certification from the National Weather Service. (C-05)
- R-11.** VC OES should work closely with the BOS to obtain all funding required to complete the County's "Reverse 911" notification system. (C-04)

- R-12.** The BOS should make available to all public agencies in the County the ISD Geographic Information Services photographic tsunami evacuation poster. The poster should be prominently displayed in all public buildings throughout the County. (C-01, C-03)

## **Responses**

### Responses Required From:

Board of Supervisors (R-01 through R-08, R-10 through R-12)  
Ventura County Sheriff (R-01 through R-03, R-05 through R-07, R-09, R-11)  
Camarillo City Council (R-01, R-06)  
Fillmore City Council (R-01, R-06)  
Moorpark City Council (R-01, R-06)  
Ojai City Council (R-01, R-06)  
Oxnard City Council (R-01, R-06, R-10)  
Port Hueneme City Council (R-01, R-06, R-10)  
Santa Paula City Council (R-01, R-06)  
Simi Valley City Council (R-01, R-06)  
Thousand Oaks City Council (R-01, R-06)  
Ventura City Council (R-01, R-06, R-10)

### Responses Requested From:

Ventura County Fire Protection District (VCFD) (R-01, R-06)  
Ventura County Transportation Commission (VCTC) (R-06)  
Ventura County Council of Governments (VCOG) (R-01, R-06)

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- Ref-01.** *Repetitive Loss Structure, Repetitive/100-year Floodplain*, URS Corporation for Watershed Management Agency, August 30, 2004
- Ref-02.** "Dams with Inundation Potential" (Table), *Ventura County General Plan*, "Hazards Appendix", November 15, 2005
- Ref-03.** Casitas Dam Evacuation Map, Federal Bureau of Reclamation, 1993
- Ref-04.** Ventura County Hazards Map: Tsunami Inundation Hazards, U.S. Geological Survey Topographic Quadrangle Map, 2002
- Ref-05.** Ventura County Sheriff's Patrol Services Flooding "Hot Spots", February 2007



**Ref-06.** *Weathering The Storm*, Ventura County Watershed Protection Agency, November 2003

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*Modeling Small Area Evacuation*, California Department of Transportation, April 2002

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## **Additional Bibliography: Internet Web Sites**

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About Tsunami's, California Geological Survey:

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<<http://tsunamiready.noaa.gov/ts-communities.htm>> ,

University of Southern California Tsunami Research Center:

<<http://www.usc.edu/dept/tsunamis/2005/index.php>>

Tsunami Evacuation Maps, Oregon Department of Geology:

<<http://www.oregongeology.com/sub/earthquakes/coastal/tsubrochures.htm>>

Ventura River Project: <<http://www.usbr.gov/dataweb/html/ventura.html>>

Ventura County Tsunami Animation:

<[http://www.usc.edu/tsunamis/2005/video/video\\_socal.htm](http://www.usc.edu/tsunamis/2005/video/video_socal.htm)>

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