

CHAPTER 7: DISASTER PREPAREDNESS, RESPONSE AND RECOVERY

A disaster is a sudden and dramatic emergency. When a disaster occurs, the impacted community strives to: 1) protect its residents, 2) care for victims, and 3) restore basic services as soon as feasible. To do this, a community needs to respond quickly, dynamically, and as effectively as possible. This requires preparation at all levels, from individual neighborhoods, families and businesses, up to the Federal government (for large-scale disasters). Emergency managers note, however, that it is difficult to sustain interest in disaster preparedness at the local level because most of us are too preoccupied with the day-to-day details of work, school and family to worry about a potential disaster that may or may not occur in our lifetime. Having said this, history shows that people impacted by a disaster generally respond actively to the situation, seeking safety for themselves, their families and others, improvising as necessary to respond to changing conditions. Some basic level of preparedness, however, can be very helpful.

To that end, emergency managers realize the need to regularly educate and/or remind the public about these potential hazards, and encourage individuals, families and businesses to be prepared. Agencies responsible for emergency response should review and update their preparedness plans and emergency operations plan as new conditions and requirements develop – this is a continuous process. Emergency response personnel need to be familiar with the preparedness plans by reviewing these documents regularly and practicing their assigned roles during drills held frequently. Since January 1, 2008, jurisdictions have been required to adopt a Local Hazard Mitigation Plan (or Disaster Mitigation Plan) as part of their Safety Element. The City of Coachella is a participant member of the Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Plan (HMP) approved by FEMA in March 2005 and ongoing updates to that document. Given that this multi-jurisdictional document covers the entire County of Riverside, it has to be relatively general in its scope and implementation actions. The City can opt to prepare a single-jurisdiction Hazard Mitigation Plan in the future, with that document addressing in greater depth the hazards that are specific to Coachella. Data provided in the new Safety Element of the General Plan for the City of Coachella, including in this Technical Background Report to the Safety Element, can be used extensively for this endeavor. The Hazard Mitigation Plan, either as part of the County's Multi-Jurisdictional effort, or as a single jurisdiction, should be adopted as an addendum to the Safety Element.

Planning issues pertaining to emergency response, disaster preparedness, and disaster recovery require an assessment of the hazards, identification of functions and resources to handle both short-term and long-term response, and development of recovery procedures. Planning can help speed the response to an emergency, while ensuring that the response is appropriate to the situation. Coordination between all levels of responders is critical. Direct, clear updates on the situation, provided in a timely manner by public officials, are important as this engenders cooperation from the public. Emergency preparedness includes having an alerting system that can be put to use immediately to warn the community of impending danger, and to transfer information post-disaster. It is also essential to have provisions in place to deal with handicapped individuals, and people that do not understand or speak English and need to be notified of the disaster preparedness, response and recovery efforts in their native language. Recognizing and being sensitive to cultural differences are also important for effective emergency preparedness and response in multi-ethnic communities.

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7.1 Risk Analysis

Earthquakes typically pose the greatest challenge because they occur with little or no warning, and can set into motion a number of linked events, but other natural and man-made hazards also have the potential to cause damage to the community. Analysis conducted for the City of Coachella shows that an earthquake on the section of the San Andreas fault that extends through the city would be the worst-case scenario for this community. In most parts of the city, shaking will be severe, whereas in those areas within about ½ mile from the fault zone, ground shaking is expected to be violent.

The HazUS analyses conducted for Coachella suggest that a magnitude 7.8 earthquake on the southern San Andreas fault, including the section of the fault that extends through the General Plan area, will impact several of the critical facilities in and near the city. Significantly, the buildings that comprise JFK Memorial Hospital in Indio, the closest hospital to Coachella, are expected to experience moderate to complete damage as a result of this earthquake. The hospital is expected to be non-functional immediately after and for at least one month after the earthquake, with only about 30 percent functionality 90 days after. A smaller magnitude 7.1 earthquake on the San Andreas fault is also expected to cause significant damage to this facility, with only 12 percent functionality immediately after and for the next three days after the event. By day 30, the hospital is expected to be only about 30 percent functional.

Other critical facilities in and near Coachella are expected to perform better than the local hospital, but will still be impaired. None of the local schools is expected to be more than 50 percent functional the day after the earthquake. The same is expected for the primary Emergency Operations Center (EOC) and the local police stations. Only one of the local fire stations is expected to be more than 50 percent functional after a magnitude 7.8 earthquake on the San Andreas fault. On the other hand, after a smaller 7.1 earthquake on the San Andreas fault, the primary EOC, the police stations and the fire stations are all expected to be more than 50 percent functional. For more information, refer to Chapter I, Section I.9.3.

Coachella is susceptible to several types of hazards other than seismic. The risk that the various hazards discussed in the Safety Element and accompanying Technical Background Report pose to essential facilities, schools and other critical facilities in and near Coachella are summarized in Table 7-1. Some of these hazards, like liquefaction, only occur in response to seismic shaking. Other hazards can be triggered by seismic shaking but can also happen in response to some other cause not related to an earthquake. These include slope instability (which can occur in response to storms, man-made activities, or shaking), hazardous materials releases (which can occur due to an accident, an intentional release, flooding, seismic shaking or earthquake-induced ground deformation), and flooding (due to storms, or the catastrophic failure of a water retention facility, such as a channel levee). Wildfires are not prevalent in this area, occurring very rarely in or near the developed areas in the valley floor. While urban fires are not included in Table 7-1, it is important to remember that an earthquake can be followed by fires ignited by fallen and arcing electric lines, gas leaks, chemical reactions, and toppled water heaters and other appliances. Several fires after an earthquake can quickly overwhelm the local fire department if personnel are engaged in search and rescue operations. Urban fires are particularly dangerous in heavily developed, older areas, where unsprinklered buildings not constructed of fire-resistant materials are located close together.

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**Table 7-1: Risk Analysis of Essential Facilities and Schools
in and Near Coachella**

(based on their location and relative to the hazards described in the Technical Background Report only;
located in Coachella unless address says differently)

Map Identifier	Essential / Critical Facility	Ground Shaking	Surface Fault Rupture	Liquefaction	Slope Instability	Wildfire Susceptibility	Flooding, Inundation	Near Hazmat Site or Pipeline
Essential Facilities – for locations, refer to Plate 7-1								
CH / EOC1	City Hall and Primary EOC 1515 Sixth Street	Se	N	Y	N	N	Y	Y
PS-1	Coachella Police Substation 790 Vine Avenue	Se	N	Y	N	N	Y	Y
PS-Indio	Indio Sheriff Station 82-695 Dr. Carreon Blvd., Indio	Se	N	Y	N	N	Y	Y
EOC2	Alternate EOC 53-462 Enterprise Way	Se	N	Y	N	N	Y	Y
FS-79	Fire Station #79 1377 Sixth Street	Se	N	Y	N	N	Y	Y
FS-86	Fire Station #86 46-990 Jackson Street, Indio	Se	N	Y	N	N	Y	Y
FS-39	Fire Station #39 86-911 Avenue 58, Thermal	Se	N	Y	N	N	Y	N
FS-70	Fire Station #70 54-001 Madison Avenue, La Quinta	Se	N	Y	N	N	N	N
JFK	JFK Memorial Hospital 47111 Monroe Street, Indio	Se	N	Y	N	N	Y	Y
CMdP	Clínicas Médicas del Pueblo 49-111 Grapefruit Boulevard	Se	N	Y	N	N	Y	Y
FSPN	First Steps Pre-Natal Care 1490 Sixth Street	Se	N	Y	N	N	Y	Y
CMdV	Clínica Médica del Valle 52-665 Harrison Street	Se	N	Y	N	N	Y	Y
CSdP	Clínicas de Salud del Pueblo 53-990 Enterprise Way	Se	N	Y	N	N	Y	Y
SRdVM	Santa Rosa del Valle Medical 1293 Sixth Street	Se	N	Y	N	N	Y	Y
WRP	Water Reclamation Plant 54 th Avenue and Polk Street	Se	N	Y	N	N	Y	Y
Schools – for locations, refer to Plates 7-1 and 7-2								
S1	Valley View Elementary 85-270 Valley Road	Se	N	Y	N	N	Y	Y
S2	Palm View Elementary 1390 Seventh Street	Se	N	Y	N	N	Y	Y

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Map Identifier	Essential / Critical Facility	Ground Shaking	Surface Fault Rupture	Liquefaction	Slope Instability	Wildfire Susceptibility	Flooding, Inundation	Near Hazmat Site or Pipeline
S3	Cesar Chavez Elementary 49-601 Avenida de Oro	Se	N	Y	N	N	Y	Y
S4	Peter Pendleton Elementary 84-750 Calle Rojo	Se	N	Y	N	N	Y	Y
S5	Valle del Sol Elementary 51-433 Education Way	Se	N	Y	N	N	Y	Y
S6	Coral Mountain Academy 51-375 Van Buren	Se	N	Y	N	N	Y	N
S7	Bobby Duke Middle 85-358 Bagdad Avenue	Se	N	Y	N	N	Y	Y
S8	Cahuilla Desert Academy 82-489 Avenue 52	Se	N	Y	N	N	Y	N
S9	Coachella Valley High 83-800 Airport Boulevard	Se	N	Y	N	N	N	N
S10	Olive Crest & Nova Academies 52-780 Frederick Street	Se	N	Y	N	N	Y	Y
S11	Adult School 1099 Orchard Avenue	Se	N	Y	N	N	Y	Y
S12	Jordan Christian Academy 50-930 Calhoun Street	Se	N	Y	N	N	Y	N
S13	Tlaquepaque Head Start 51-354 Tyler Street	Se	N	Y	N	N	Y	Y
S14	Las Casas Head Start 51-500 Tyler Street	Se	N	Y	N	N	Y	Y
<i>Parks and Community Centers that can be used as Shelters – for their locations, refer to Plate 7-2; for additional information regarding these sites, refer to Table 7-2</i>								
P1	Bagdouma Park 51-723 Douma Street	Se	N	Y	N	N	Y	Y
P2	Dateland Park 85-421 Bagdad Avenue	Se	N	Y	N	N	Y	Y
P3	De Oro Park 49-801 Avenida de Oro	Se	N	Y	N	N	Y	Y
P4	Sierra Vista Park Calle Mendoza and Avenue 50	Se	N	Y	N	N	Y	Y
P5	Vietnam Veterans Park 4 th Street, between Orchard Street and Vine Avenue	Se	N	Y	N	N	Y	Y
<i>Churches that can be used as Shelters – for their locations, refer to Plate 7-2; for additional information regarding these sites, refer to Table 7-2</i>								
C1	Pentecostal Church of Philadelphia 84-542 Avenue 49	Se	N	Y	N	N	Y	Y
C2	Islamic Society of Palm Springs 84-650 Avenue 49	Se	N	Y	N	N	Y	Y

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Map Identifier	Essential / Critical Facility	Ground Shaking	Surface Fault Rupture	Liquefaction	Slope Instability	Wildfire Susceptibility	Flooding, Inundation	Near Hazmat Site or Pipeline
C3	Calvary Landmark Baptist Church 85-120 Bagdad Street	Se	N	Y	N	N	Y	Y
C4	Latin Assembly of God 1491 Third Street	Se	N	Y	N	N	Y	Y
C5	Our Lady of Soledad Catholic Church 52-555 Oasis Palms Avenue	Se	N	Y	N	N	Y	Y
C6	Primera Iglesia Bautista 85-246 Valley Road	Se	N	Y	N	N	Y	Y
C7	Centro Libre Cristiano 83-246 Avenue 50, Indio	Se	N	Y	N	N	Y	N
C8	Coachella Valley Christian Church 50-100 Jackson Street, Indio	Se	N	Y	N	N	Y	N
C9	Church of Christ of Latter Day Saints 81-870 Avenue 48, Indio	Se	N	Y	N	N	Y	Y
C10	Las Palmas Community Church 47-783 Monroe Street, Indio	Se	N	Y	N	N	Y	Y

Explanation for Table 7-1:

Se = Severe; **Y** = Yes; **N** = No.

The entire Coachella General Plan area can experience severe to violent ground shaking as a result of a regional earthquake on the San Andreas fault.

Refer to Figure 1-4 in Chapter 1 of the Technical Background Report. Also refer to Plates 1-1 (faults), 2-2 for slopes, 3-1 for flooding, and 4-1 for fire hazards.

A site marked “Yes” for Hazardous Materials is located within about 1 mile of a facility that handles significant hazardous materials or a Toxic Release Inventory (TRI) site, or is located within ½ mile of a high-pressure gas or hazardous liquid pipeline (see Plate 5-1 in the Technical Background Report).

7.2 Emergency Shelters

Earthquakes, flooding, wildland fires and other disasters can cause loss of function or habitability of buildings that provide housing. Displaced households may need alternate short-term shelter provided by family, friends, temporary rentals, or public shelters established by relief organizations such as the Red Cross in facilities around the city.

Potential shelter locations in and near Coachella include parks, schools and churches. These are short-term shelter facilities to be used for a few hours to a few days. These locations are generally ideal as shelters because they have: 1) open space where people can set up tents, 2) restroom facilities and possibly kitchens or barbeque pits, and 3) fairly large parking lots where displaced families can park their cars and, if they have them, recreational vehicles, which can be used for housing. Given that not all of these facilities may be available or fully functional after a disaster, it is preferable to have several options.

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Table 7-2 includes several potential shelter locations distributed throughout Coachella, and in Indio, immediately to the north and west. Many of these facilities are located in areas susceptible to liquefaction and flooding, and all facilities will be impacted by strong ground shaking. Thus, the selection of which sites to open during an emergency should be made after consideration of the hazard involved, whether or not the potential shelter location has been damaged (such as by ground shaking), and the potential for the hazard of concern to progress into the area where a shelter has been established (flooding or wildfire). We have considered all parks in Coachella that have restroom facilities. There are three additional parks in the City’s list of parks (Shady Lane Park, Tot Lot Park and Ye’we’vichem Park; <http://www.coachella.org/index.aspx?NID=72>), but these are small, don’t appear to have restroom facilities, barbeque pits, or other amenities that would be desirable when using the park as a shelter location. Given the limited number of parks in the city of Coachella, we have also included some parks in Indio, immediately north and west of Coachella. Because an earthquake on the San Andreas fault would also severely impact the city of Indio, the shelter locations included here may be overwhelmed by residents from Indio looking for alternate, short-term housing after an earthquake.

Table 7-2: Potential Emergency Shelters In and Near Coachella
(For locations, refer to Plate 7-2;
in the city of Coachella unless indicated otherwise in the address)

Parks and Community Centers				
Map Identifier	Name	Address	Size (Approx. Acres)	Amenities
P1	Bagdouma Park	51-723 Douma Street	34	Restrooms, pavilion, tables, benches, parking, open grass, soccer/football and baseball/softball fields, swimming pool, drinking fountains, playground, parking.
P2	Dateland Park	85421 Bagdad Avenue	4.1	Skate park with restroom facilities, open grassy areas and shaded areas.
P3	De Oro Park	49801 Avenida de Oro	4.6	Restrooms, tables, open grass, BBQ/grill area, playground. Limited parking.
P4	Sierra Vista Park	Tyler Street, between Calle Mendoza and Avenue 50	2	Open grass, playground, restrooms(?), no parking except along street. Park is adjacent to Whitewater River – likely to flood if river overflows.
P5	Vietnam Veterans Park	4th Street, between Orchard St. and Vine Ave.	1.5	Restrooms, drinking fountain, tables and benches, open grass, playground, pool (water source), limited parking on street and in the City Hall parking lot to the south.
P6	South Jackson Park	Jackson and Date Streets, Indio	9	Shaded picnic tables with BBQ grills, restrooms, grass areas, playground facilities, drinking fountain; parking; next to pool (water source).
P7	Dr. Carreon Park	Dr. Carreon Blvd. east of Monroe Street, Indio	3	Shaded areas with tables, BBQ areas, grass areas, restrooms; limited parking. Open space to the east.
P8	Riverside County Fairgrounds	82-503 Hwy. 111, Indio	71	Large open areas, extensive parking, holding areas for large animals.

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Churches			
Map Identifier	Church Name	Address	Amenities, Opportunities
C1	Pentecostal Church of Philadelphia	84-542 Avenue 49, Coachella	Parking lot, 1 building, open space to the north of the property.
C2	Islamic Society of Palm Springs	84-650 Avenue 49, Coachella	Parking lot, 1 building, open space to the north and west of lot.
C3	Calvary Landmark Baptist Church	85-120 Bagdad Street	Building complex with parking lot to the east and north, grass areas to the east and north, between buildings and parking lot; vacant lot to the west.
C4	Latin Assembly of God	1491 Third Street	Building, limited parking, no grass areas or vacant lots nearby.
C5	Our Lady of Soledad Catholic Church	52-555 Oasis Palms Avenue	Building complex, large parking lot to the north, west and south sides; no grass areas or vacant lots nearby.
C6	Primera Iglesia Bautista	85-246 Valley Road	2 buildings, grass area in between, parking lot to the north and east, vacant open space to the west, south and east.
C7	Centro Libre Cristiano	83-246 Avenue 50, Indio (at border with Coachella)	Small parking lot and larger paved area to the north, 1 large building and 1 smaller, open grass area to the north and west of main building, with playground, open space to the north, east and west.
C8	Coachella Valley Christian Church	50-100 Jackson Street, Indio (near Coachella)	2 buildings with a central, grass courtyard, parking lot to the west and north of buildings, open space in the northeastern portion of lot.
C9	Church of Christ of Latter Day Saints	81-870 Avenue 48, Indio	1 building, large parking lot to the east and west of building; vacant lots to the east and west
C10	Las Palmas Community Church	47-783 Monroe Street, Indio	1 building, parking on the north side, grass area to the east and potentially west of building

Long-term alternative housing may require import of manufactured homes, occupancy of vacant units, net emigration from the impacted area, and, eventually, the repair or reconstruction of new private and public housing.

7.3 Evacuation Routes

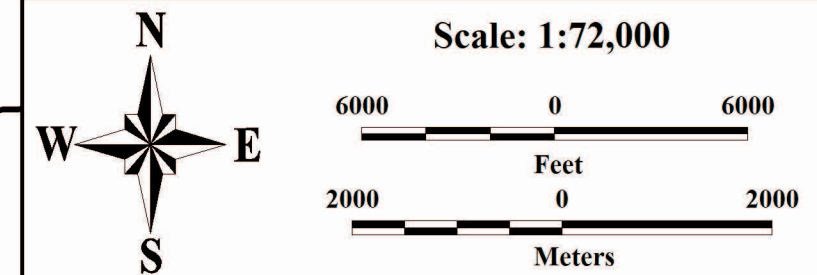
Evacuation refers to the movement of people that are at risk of being impacted by a disaster to a safer location, using routes that do not pose a significant danger to the evacuees. Thus, both the destination and the route need to be scrutinized, preferably before the evacuation orders are issued. This involves making a decision as to which of the potential temporary shelters identified in the previous section will be opened, based on the shelters' locations relative to the approaching disaster, and their ease of accessibility from the routes identified as safest.

Critical and Essential Facilities Coachella, California

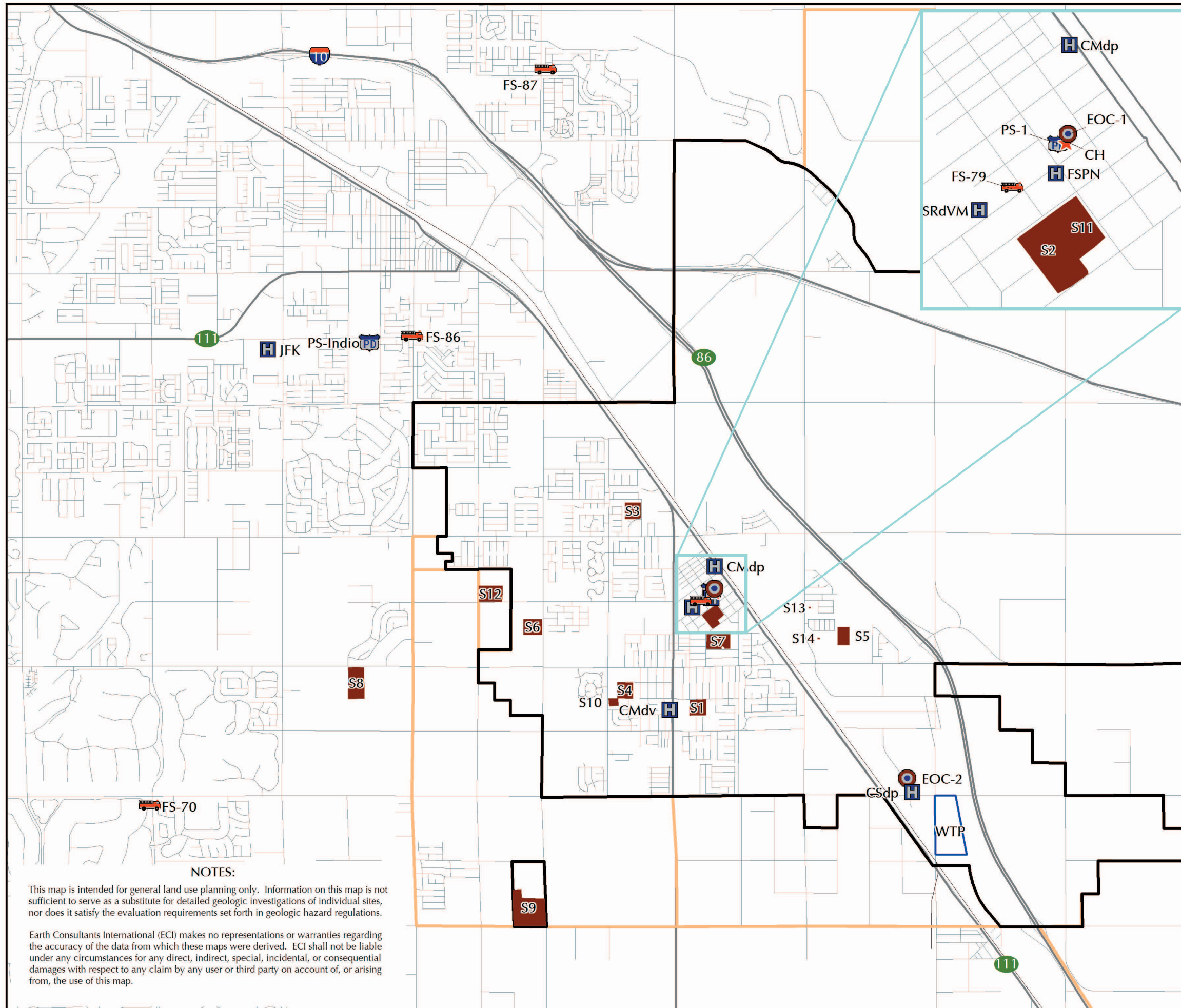
Explanation

-  School Property
-  Police Department
-  Fire Station
-  EOC
-  Hospital
-  City Hall
-  Water Treatment Plant
-  Coachella City Boundary
-  Coachella Planning Area Boundary

For additional information regarding these facilities refer to Tables SE-1 & SE-2.



Base Map: City of Coachella
Sources: www.google.com, <http://www.cde.ca.gov>,
<http://www.greatschools.org/california/>, and <http://www.coachella.org>



NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

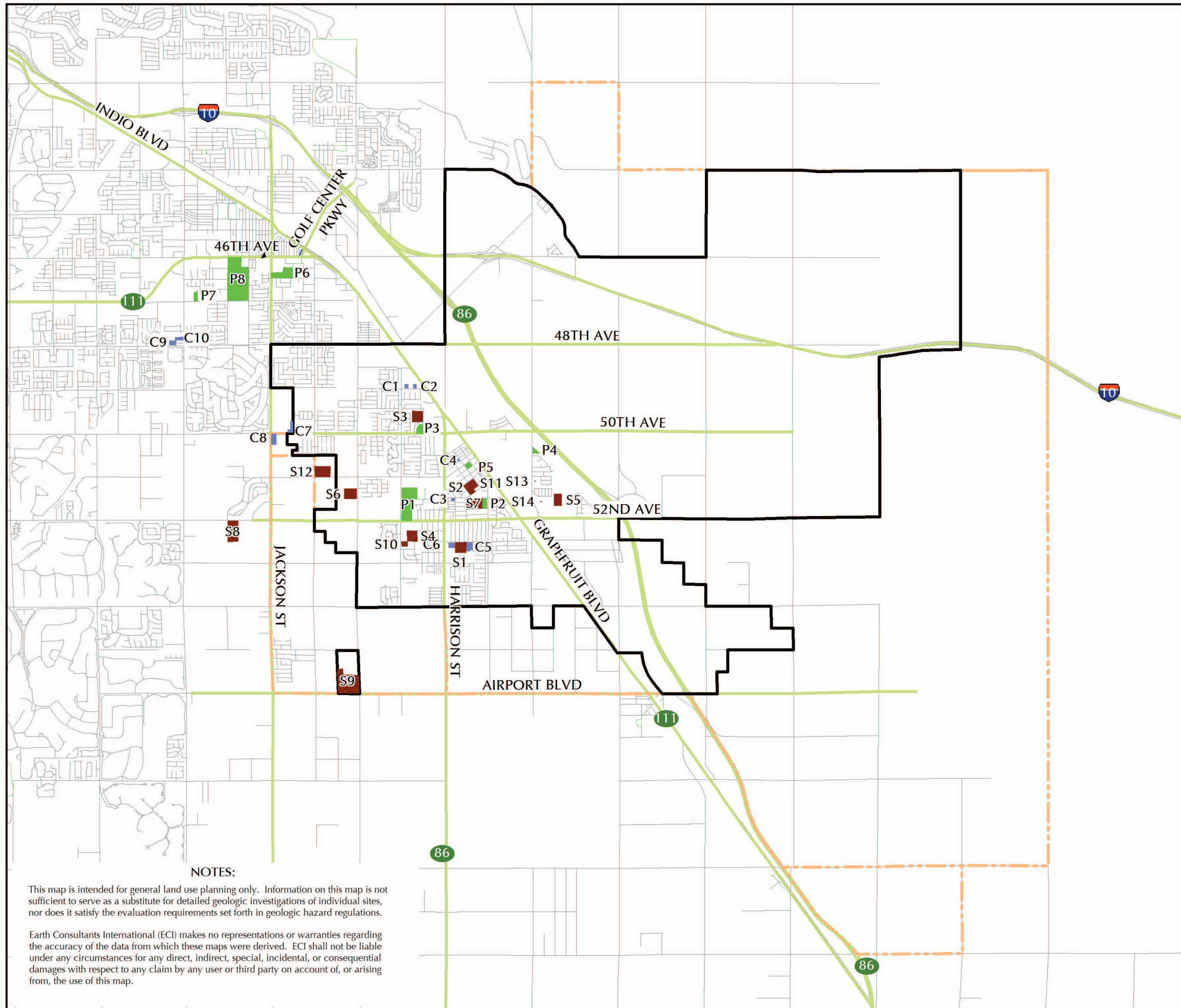
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Insert Plate 7-2

Potential Emergency Shelters and Evacuation Routes

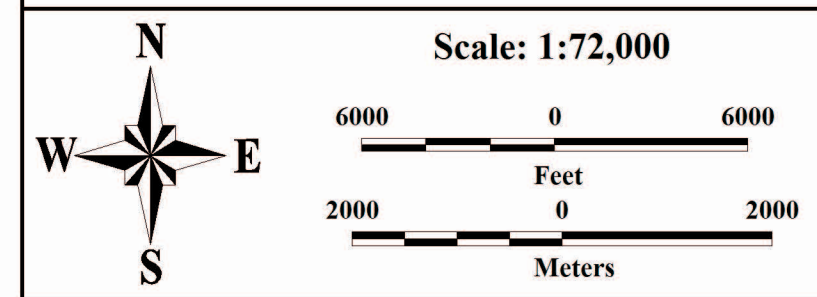
Coachella, California



Explanation

- S14 School Property
- P8 Park
- C10 Church Property
- Evacuation Routes
- Coachella City Boundary
- Coachella Planning Area Boundary

For additional information regarding these facilities refer to Tables SE-1 & SE-2.



Base Map: City of Coachella
 Sources: www.google.com, <http://www.cde.ca.gov>,
<http://www.greatschools.org/california/>, and <http://www.coachella.org>



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 Date: 2014

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The Police Department typically serves as the lead organization in carrying out evacuations, supported by the Fire Department as appropriate. The Public Works Department typically assists in the identification of the best evacuation routes and in barricading the evacuated areas.

Plate 7-2 identifies several potential evacuation routes, mostly trending east-west, and north-south. Notice that several of the evacuation routes identified were selected because they lead to the potential emergency shelters discussed above. Which routes should be used will depend on the specific disaster:

1. Earthquakes occur suddenly and for the most part without warning. Evacuation may be necessary post-disaster if the ground shaking or fault rupture causes a secondary disaster, such as the failure of a levee or water tank, or the release of a toxic cloud from ruptured containers of hazardous materials. Post-earthquake fires may also require the evacuation of certain areas, but these are generally localized areas with a limited number of affected individuals. Which evacuation routes to use will depend on which area is at risk from any of these secondary hazards.
2. Wildfires in the Coachella region typically start in the mountains or foothills to the east, and in the San Jacinto mountains to the west. Minor vegetation fires have also occurred to the south, in the Thermal area. These fires have historically not impacted the city of Coachella proper. With the future development of the hillsides in the eastern portion of the General Plan area, however, there will be an increased potential for wildfires to impact development, especially if the prevailing winds at the time fan the fires so that they spread onto the wildland-urban interface. If this happens, evacuation of the potentially affected neighborhoods may be required. In general, evacuees would take roads leading toward the more developed areas of the city, to the west and south of the hillsides.
3. Flooding and inundation in Coachella can impact the central, western and southern portions of the city preferentially. Localized flooding due to storm events can occur throughout the planning area, both in the valley, as shallow, but extensive flooding, and in the foothills, as sheet flow and runoff concentrated in the washes and gullies. The appropriate evacuation routes to use in response to this hazard will therefore depend on where localized flooding is more severe, and on the destination (i.e., shelter location). In general, routes leading west, away from the Whitewater River, would be preferred. In the hillside areas, evacuation may involve merely getting out of the washes and onto higher ground.

In the event of a breach of the Coachella Canal as a result of rupture of the San Andreas fault, the areas to the west and south of the canal would be flooded. Most of this area is currently undeveloped, used primarily as farmland. However, several residential neighborhoods have been permitted in the area, and are likely to be built as the housing market improves. Evacuating to higher ground to the east of the canal would be preferable, however that is expected to be unfeasible given that currently very few roads cross easterly across the canal, and those that do would be damaged by faulting. The developed part of the city is expected to be spared inundation if the canal fails, as the resulting runoff would eventually make its way into the channel of the Whitewater River if it floods that far west and south. Thus, evacuation of the affected areas would entail taking the west-trending routes into the center of town, where most of the potential shelters are located.

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4. Releases of hazardous materials, either as a result of a leak in one of the facilities that handle these substances in the city, a leak from a gas line, or as a result of an accident-caused spill on the freeway or railroad tracks, generally will require the evacuation of a relatively small area, possibly within a 1- to 2-mile radius of the release. The evacuation routes to follow would be designated by the Sheriff Department based on an assessment of prevailing wind directions, traffic flow and location of the emergency shelter(s) opened for that event.

7.4 Recovery

Many communities do well in preparing for a disaster but are ill-prepared for the recovery phase, possibly in part because they hope that if their pre-disaster planning is effective, their long-term damages will be relatively small. This is certainly what an emergency planning organization aims for. However, some post-disaster, recovery efforts may be necessary to restore community life. This includes the re-establishment of essential services and the rebuilding and repair of impacted properties. Recovery is an opportunity to improve the community so that it becomes more sustainable and less likely to be impacted by a future, similar disaster. Examples include avoiding reconstruction projects in areas susceptible to ground rupture, slope instability, and flooding. Having a recovery plan in place can help with the decision-making process of reconstruction, by improving communication with other levels of government that were involved in the disaster response phase and now have a vested interest in the recovery process, and possibly most importantly, by engendering support for mitigation efforts. If plans for a major mitigation effort exist prior to a disaster, public and government support (at the State and Federal levels) for such a project, including the appropriation of money to fund such a project, may become available. An example of this would be the reconstruction of the Coachella Canal so as to avoid the San Andreas fault as much as possible, with fewer crossings of the fault.

The Federal Emergency Management Agency (FEMA) encourages the development and regular update of emergency preparedness documents by providing grant money to communities that have approved and adopted Local Hazard Mitigation Plans. Similarly, the State of California, through the California Disaster Assistance Act, limits the State share for an eligible project that is in response to a fire disaster to no more than 75 percent of total state eligible costs, except if the local agency has adopted a Local Hazard Mitigation Plan as part of their Safety Element, and complies with several requirements imposed by the State Fire Marshal (Senate Bill 1764, 2008). If the community complies with all requirements, the state share may be up to 100 percent of the cost.

APPENDIX A: REFERENCES and USEFUL WEBSITES

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Useful Websites

Geologic Hazards in General

<http://geohazards.cr.usgs.gov/>

USGS Hazard Team website. Hazard information on commonly recognized hazards such as earthquakes, landslides, and volcanoes. Contains maps and slide shows.

<http://www.usgs.gov/themes/hazard.html>

A webpage by the USGS on hazards such as hurricanes, floods, wildland fire, wildlife disease, coastal storms and tsunamis, and earthquakes. Also has information on their Hazard Reduction Program.

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<http://www.consrv.ca.gov/cgs/index.htm>

Homepage for the California Geologic Survey (formerly the Division of Mines and Geology). Information their publications (geologic reports and maps), programs (seismic hazard mapping, Alquist-Priolo Earthquake Fault Study Zone maps); and other brochures (asbestos, natural hazard disclosure).

www.oes.ca.gov/

California Governor's Office of Emergency Services website. Contains information on response plans regarding natural disasters (earthquakes), terrorist attacks, and electrical outages, and information on past emergencies.

Geologic Maps

<http://wrgis.wr.usgs.gov/wgmt/scamp/scamp.html>

Homepage for the Southern California Aerial Mapping Project (SCAMP), which is the USGS' program to update geologic maps of Southern California at a 1:100,000 scale and release these in a digital GIS format.

Seismic Hazards, Faults, and Earthquakes

<http://gmw.consrv.ca.gov/shmp/>

Shows the current list of seismic hazard maps available from the California Geologic Survey. These can be downloaded in a pdf format.

www.scecdc.scec.org

Southern California Earthquake data center (hosted by SCEC, USGS, and Caltech). Shows maps and data for recent earthquakes in Southern California and worldwide. Catalogs of historic earthquakes.

<http://www.consrv.ca.gov/cgs/rghm/quakes/index.htm>

List of California earthquakes (date, magnitude, latitude longitude, description of damage).

<http://geohazards.cr.usgs.gov/eq/html/canvmap.html>

Website at the USGS Earthquake Hazard's Program that lists seismic acceleration maps available for downloading.

www.seismic.ca.gov/

Homepage of the California Seismic Safety Commission. Contains information on California earthquake legislation, safety plans, and programs designed to reduce the hazards from earthquakes. Includes several publications of interest, including "The Homeowner's Guide to Earthquake Safety." Also contains a catalog of recent California earthquakes.

<http://neic.usgs.gov/>

Homepage of the National Earthquake Information Center. Maintains an extensive global seismic database on earthquake parameters. Its mission is to rapidly determine the location and size of all destructive earthquakes worldwide, and disseminate that information as quickly as possible to concerned national and international agencies, scientists, and the public in general.

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<http://www.scsn.org/>

Site where Shakemaps for actual and scenario earthquakes can be obtained.

Landslides and Debris Flows

<http://landslides.usgs.gov/index.html>

USGS Landslide webpage. Links to their publications, recent landslide events, and bibliographic databases.

<http://gmw.consrv.ca.gov/shmp/>

California Geologic Survey website on Seismic Hazard maps.

<http://vulcan.wr.usgs.gov/Glossary/Lahars/framework.html>

USGS Volcanic Observatory website list of links regarding mudflows, debris flows and lahars.

<http://www.fema.gov/hazards/landslides/landslif.shtm>

Federal Emergency Management Agency (FEMA) fact sheet website about landslides and mudflows.

Flooding, Dam Inundation, and Erosion (Note: the information on some of these web sites has been removed due to safety concerns; but may be posted again in the future in limited form).

<http://vulcan.wr.usgs.gov/Glossary/Sediment/framework.html>

US Geological Survey Volcanic Observatory website list of links regarding sediment and erosion.

<http://www.usace.army.mil/public.html#Regulatory>

US Army Corps of Engineers website regarding waterway regulations.

<http://www.fema.gov/fima/>

FEMA website about the National Flood Insurance Program.

www.fema.gov/levees

Numerous recently updated webpages discussing facts about levees and levee flood risk.

<http://www.worldclimate.com/>

Precipitation rates at different rain stations in the world measured over time.

<http://waterdata.usgs.gov>

Stream gage measurements for rivers throughout the US.

Others

[http:// www.bsc.ca.gov](http://www.bsc.ca.gov)

Site of the California Building Standards Commission. Provides information regarding the status of the building codes being considered for future approval in California.

APPENDIX B: GLOSSARY

Acceleration – The rate of change for a body’s magnitude, direction, or both over a given period of time.

Active fault – For implementation of Alquist-Priolo Earthquake Fault Zoning Act (APEFZA) requirements, an active fault is one that shows evidence of having experienced surface displacement within the last 11,000 years. APEFZA classification is designed for land use management of surface rupture hazards. A more general definition by the National Academy of Sciences (1988) is "a fault that on the basis of historical, seismological, or geological evidence has the finite probability of producing an earthquake." The American Geological Institute (1972) defines an active fault as one along which there is recurrent movement, usually indicated by small, periodic displacements or seismic activity.

Acute – Quick, one-time exposure to a chemical.

Adjacent grade – Elevation of the natural or graded ground surface, or structural fill, abutting the walls of a building. See *highest adjacent grade* and *lowest adjacent grade*.

Aeolian (or eolian) – Related to or pertaining to the wind; carried, eroded or deposited by wind action.

Aftershocks – Minor earthquakes following a greater one and originating at or near the same location.

Aggradation – The building up of earth’s surface by deposition of sediment.

Alluvial – Pertaining to, or composed, of alluvium, or deposited by a stream or running water.

Alluvial fan – A low, outspread relatively flat to gently sloping surface consisting of loose sediment that is shaped like an open fan, deposited by a stream at the place where the stream comes out of a narrow canyon onto a broad valley or plain. Alluvial fans are steepest near the mouth of the canyon, and spread out, gradually decreasing in gradient, away from the stream source.

Alluvium – Surficial sediments of poorly consolidated gravels, sand, silts, and clays deposited by flowing water.

Amplitude – The height of a wave between its crest (high point) and its mid-point.

Anchor – To secure a structure to its footings or foundation wall in such a way that a continuous load transfer path is created and so that it will not be displaced by flood, wind, or seismic forces.

Aplite – A light-colored igneous rock with a fine-grained texture and free from dark minerals. Aplite forms at great depths beneath the earth’s crust.

Apparatus – Fire apparatus includes firefighting vehicles of various types.

Aquifer – A body of rock or sediment that contains sufficient saturated permeable material to allow the flow of ground water and to yield economically significant quantities of ground water to wells and springs.

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Argillic – Alteration in which certain minerals of a rock or sediments are converted to clay. Also said of a soil horizon characterized by the illuvial accumulation of clay.

Armor – To protect slopes from *erosion* and *scour* by *flood* waters. Techniques of armoring include the use of riprap, gabions, or concrete.

Artesian – An adjective referring to ground water confined under hydrostatic pressure. The water level in wells drilled into an **artesian** aquifer (also called a confined aquifer) will stand at some height above the top of the aquifer. If the water reaches the ground surface, the well is referred to as a “flowing” **artesian** well.

Aspect – The direction a slope faces.

Attenuation – The reduction in amplitude of a wave with time or distance traveled.

Automatic Aid Agreement – An agreement between two or more agencies whereby such agencies are automatically dispatched simultaneously to predetermined types of emergencies in predetermined areas.

A zone – Under the *National Flood Insurance Program*, area subject to inundation by the *100-year flood* where wave action does not occur or where waves are less than 3 feet high, designated Zone A, AE, A1-A30, A0, AH, or AR on a *Flood Insurance Rate Map (FIRM)*.

Base flood – *Flood* that has as 1-percent probability of being equaled or exceeded in any given year. Also known as the *100-year flood*.

Base Flood Elevation (BFE) – Elevation of the *base flood* in relation to a specified datum, such as the *National Geodetic Vertical Datum* or the *North American Vertical Datum*. The Base Flood Elevation is the basis of the insurance and *floodplain management* requirements of the *National Flood Insurance Program*.

Basement – Under the *National Flood Insurance Program*, any area of a building having its floor subgrade on all sides. (Note: What is typically referred to as a “walkout basement,” which has a floor that is at or above grade on at least one side, is not considered a basement under the *National Flood Insurance Program*.)

Beaufort Scale – A scale devised in 1805 by Admiral Francis Beaufort of the British Navy to classify wind speed based on the wind’s effect on the seas and vegetation. The scale goes from 0 (calm) to 12 (hurricane).

Bedding – The arrangement of a sedimentary rock or deposit in beds or layers of varying thickness and character.

Bedrock – Designates hard rock that is in its natural intact position and underlies soil or other unconsolidated surficial material.

Bench – A grading term that refers to a relatively level step excavated into earth material on which fill is to be placed. A bench is also a long, narrow, relatively level or gently inclined platform of land or rock bounded by steeper slopes above and below.

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Bioregion – A major, regional ecological community characterized by distinctive life forms and distinctive plant and animal species.

Biotite – A general term to designate all ferromagnesian micas. More specifically, biotite is a widely distributed and important rock-forming mineral that is usually black, brown or dark green, and that is an original constituent of igneous and metamorphic rocks, or a detrital constituent of sedimentary rocks.

Blind thrust fault – A thrust fault is a low-angle reverse fault (where the top block is being or has been pushed over the bottom block). A "blind" thrust fault refers to one that does not reach the surface.

Braided stream – A stream that divides into or follows an interlacing or tangled network of several, small, branching and reuniting shallow channels separated from each other by channel bars. Also referred to as an **anastomosing** stream.

Brush – A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low-growing trees.

Brushfire – A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.

Building code – Regulations adopted by local governments that establish standards for construction, modification, and repair of buildings and other structures.

Carcinogen – Material capable of causing cancer in humans.

Cast-in-place concrete – Concrete that is poured and formed at the construction site.

CEQA – The California Environmental Quality Act (Chapters 1 through 6 of Division 13 of the Public Resources Code). A state statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.

Chronic – Continual or repeated exposure to a hazardous material.

Cladding – Exterior surface of the building envelope that is directly loaded by the wind.

Clay – A rock or mineral fragment having a diameter less than 1/256 mm (4 microns, or 0.00016 in.). A clay commonly applied to any soft, adhesive, fine-grained deposit.

Claystone – An indurated clay having the texture and composition of shale, but lacking its fine lamination. A massive mudstone in which clay predominates over silt.

Climate – The average condition of weather over time in a given region.

Code official – Officer or other designated authority charged with the administration and enforcement of the code, or a duly authorized representative, such as a building, zoning, planning, or *floodplain management* official.

Collapse – A relatively sudden change in the volume of a soil mass resulting in the local settlement of the ground surface, with the potential to cause significant damage to overlying structures. If due to strong ground shaking, the soil grains in the soil column are re-arranged by the shaking so that the pore

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space between grains is reduced and the grains become more tightly packed, resulting in the overall reduction of the thickness of the soil column. This is referred to as earthquake-induced subsidence. Collapse can also occur in certain types of sediments, where with the introduction of water (due to an increase in irrigation, for example), the cement between soil grains dissolves, allowing the soil particles to become more tightly packed, again resulting in the local settlement of the ground surface. This process is also referred to as **hydro-collapse** or **hydroconsolidation**.

Column foundation – Foundation consisting of vertical support members with a height-to-least-lateral-dimension ratio greater than three. Columns are set in holes and backfilled with compacted material. They are usually made of concrete or masonry and often must be braced. Columns are sometimes known as posts, particularly if the column is made of wood.

Community at Risk – Wildland interface community in the vicinity of Federal lands that is at high risk from wildfire.

Complex (Fire) – Two or more individual incidents located in the same general area and assigned to a single incident commander or unified command.

Compressible soil – Geologically young unconsolidated sediment of low density that may compress under the weight of a proposed fill embankment or structure.

Concrete Masonry Unit (CMU) – Building unit or block larger than 12 inches by 4 inches by 4 inches made of cement and suitable aggregates.

Conglomerate – A coarse-grained sedimentary rock composed of rounded to subangular fragments larger than 2 mm in diameter set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica or hardened clay. The consolidated equivalent of gravel.

Connector – Mechanical device for securing two or more pieces, parts, or members together, including anchors, wall ties, and fasteners.

Consolidation – Any process whereby loosely aggregated, soft earth materials become firm and cohesive rock. Also the gradual reduction in volume and increase in density of a soil mass in response to increased load or effective compressive stress, such as the squeezing of fluids from pore spaces.

Corrosion-resistant metal – Any nonferrous metal or any metal having an unbroken surfacing of nonferrous metal, or steel with not less than 10 percent chromium or with not less than 0.20 percent copper.

Coseismic rupture - Ground rupture occurring during an earthquake but not necessarily on the causative fault.

Cretaceous – The final period of the Mesozoic era (before the Tertiary period of the Cenozoic era), thought to have occurred between about 136 and 65 million years ago.

Dead load – Weight of all materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding, and other similarly incorporated architectural and structural items and fixed service equipment.

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Debris – (Seismic) The scattered remains of something broken or destroyed; ruins; rubble; fragments. (Flooding, Coastal) Solid objects or masses carried by or floating on the surface of moving water.

Debris Burning – Any fire originally set for the purpose of clearing land or for burning rubbish, garbage, range, stubble, or meadow burning.

Debris impact loads – Loads imposed on a structure by the impact of flood-borne debris. These loads are often sudden and large. Though difficult to predict, debris impact loads must be considered when structures are designed and constructed.

Debris flow – A saturated, rapidly moving saturated earth flow with 50 percent rock fragments coarser than 2 mm in size which can occur on natural and graded slopes.

Debris line – Line left on a structure or on the ground by the deposition of debris. A debris line often indicates the height or inland extent reached by *flood* waters.

Defensible space –An area, either natural or manmade, where material capable of causing a fire to spread has been treated, cleared, reduced, or changed in order to provide a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, defensible space is defined as an area with a minimum of 100 feet around a structure that is cleared of flammable brush or vegetation. Distance from the structure and the degree of fuels treatment vary with vegetation type, slope, density, and other factors.

Deflected canyons – A relatively spontaneous diversion in the trend of a stream or canyon caused by any number of processes, including folding and faulting.

Deformation - A general term for the process of folding, faulting, shearing, compression, or extension of rocks.

Design flood – The greater of either (1) the *base flood* or (2) the *flood* associated with the *flood hazard area* depicted on a community's flood hazard map, or otherwise legally designated.

Design Flood Elevation (DFE) – Elevation of the *design flood*, or the flood protection elevation required by a community, including wave effects, relative to the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or other datum.

Development – Under the *National Flood Insurance Program*, any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations or storage of equipment or materials.

Differential settlement – Non-uniform settlement; the uneven lowering of different parts of an engineered structure, often resulting in damage to the structure. Sometimes included with liquefaction as ground failure phenomenon.

Dike – A tabular shaped, igneous intrusion that cuts across bedding of the surrounding rock.

Diorite – A group of igneous rocks that form at great depth beneath the earth's crust. These rocks are intermediate in composition between acidic and basic rocks.

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Dispatch – The implementation of a command decision to move a resource or resources from one place to another.

Displacement - The length, measured in kilometers (km), of the total movement that has occurred along a fault over as long a time as the geologic record reveals.

DMA 2000 - Disaster Mitigation Act of 2000. Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by Public Law 106-390, October 30, 2000. DMA 2000 is intended to establish a continuing means of assistance by the Federal Government to State and local governments in carrying out their responsibilities to alleviate the suffering and damage which result from disasters by (1) revising and broadening the scope of existing disaster relief programs; (2) encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by the States and by local governments; (3) achieving greater coordination and responsiveness of disaster preparedness and relief programs; (4) encouraging individuals, States, and local governments to protect themselves by obtaining insurance coverage to supplement or replace governmental assistance; (5) encouraging hazard mitigation measures to reduce losses from disasters, including development of land use and construction regulations; and (6) providing Federal assistance programs for both public and private losses sustained in disasters.

Dynamic analysis – A complex earthquake-resistant engineering design technique capable of modeling the entire frequency spectra, or composition, of ground motion. The method is used to evaluate the stability of a site or structure by considering the motion from any source or mass, such as that dynamic motion produced by machinery or a seismic event.

Earth flow – Imperceptibly slow-moving surficial material in which 80% or more of the fragments are smaller than 2 mm, including a range of rock and mineral fragments.

Earthquake – Vibratory motion propagating within the Earth or along its surface caused by the abrupt release of strain from elastically deformed rock by displacement along a fault.

Earth's crust – The outermost layer or shell of the Earth.

Effective Flood Insurance Rate Map (FIRM) – See *Flood Insurance Rate Map*.

El Niño – Phenomenon that originates, every few years, typically in December or early January, in the southern Pacific Ocean, off of the western coast of South America, characterized by warmer than usual water. This warmer water is statistically linked with increased rainfall in both the southeastern and southwestern United States, droughts in Australia, western Africa and Indonesia, reduced number of earthquakes in the Atlantic Ocean, and increased number of hurricanes in the Eastern Pacific.

Emergency Planning and Community Right to Know (EPCRA) – The portion of SARA that specifically outlines how industries report chemical inventory to the community.

Encroachment – Any physical object placed in a floodplain that hinders the passage of water or otherwise affects the flood flows.

Engineering geologist – A geologist who is certified by the State as qualified to apply geologic data, principles, and interpretation to naturally occurring earth materials so that geologic factors affecting planning, design, construction, and maintenance of civil engineering works are properly recognized and

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used. An engineering geologist is particularly needed to conduct investigations, often with geotechnical engineers, of sites with potential ground failure hazards.

Environmental Protection Agency (EPA) – Federal agency tasked with ensuring the protection of the environment and the nation’s citizens.

Ephemeral stream – A stream or reach of a stream that flows only briefly in direct response to precipitation.

Epicenter – The point at the Earth's surface directly above where an earthquake originated.

Erodible soil – Soil subject to wearing away and movement due to the effects of wind, water, or other geological processes during a flood or storm or over a period of years.

Erosion – Under the *National Flood Insurance Program*, the process of the gradual wearing away of landmasses. In general, erosion involves the detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.

Erosion analysis – Analysis of the short- and long-term *erosion* potential of soil or strata, including the effects of wind action, *flooding* or *storm surge*, moving water, wave action, and the interaction of water and structural components.

Evacuation – Movement of people from an area, typically their homes, to another area considered to be safe, typically in response to a natural or man-made disaster that makes an area unsafe for people.

Expansive soil – A soil that contains clay minerals that take in water and expand. If a soil contains sufficient amount of these clay minerals, the volume of the soil can change significantly with changes in moisture, with resultant structural damage to structures founded on these materials.

Extremely hazardous substance – A substance that shows high acute or chronic toxicity, carcinogenicity, bioaccumulative properties, is persistent in the environment, or is water reactive (California Code of Regulations, Title 22).

Fanglomerate – A sedimentary rock consisting of a heterogeneous mix of fragments of all sizes, originally deposited in an alluvial fan and subsequently cemented into a firm rock. Generally said of the coarser, consolidated rock material that occurs in the upper part of an alluvial fan.

Fault – A fracture (rupture) or a zone of fractures along which there has been displacement of adjacent earth material.

Fault segment – A continuous portion of a fault zone that is likely to rupture along its entire length during an earthquake.

Fault slip rate – The average long-term movement of a fault (measured in cm/year or mm/year) as determined from geologic evidence.

Federal Emergency Management Agency (FEMA) – Independent agency created in 1979 to provide a single point of accountability for all Federal activities related to disaster mitigation and

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emergency preparedness, response and recovery. FEMA administers the *National Flood Insurance Program*.

Federal Insurance Administration (FIA) – The component of the *Federal Emergency Management Agency* directly responsible for administering the flood insurance aspects of the *National Flood Insurance Program*.

Federal Responsibility Areas (FRA) – Areas within which a federal government agency has the financial responsibility of preventing and suppressing fires.

Feldspar – The most widespread of any mineral group; constitutes ~60% of the earth's crust. Feldspars occur as components of all kinds of rocks and, on decomposition, yield a large part of the clay of a soil.

Fill – Material such as soil, gravel, or crushed stone placed in an area to increase ground elevations or change soil properties.

Fire behavior – The manner in which a fire reacts to the influences of fuel, weather and topography.

Fire flow – The flow rate of a water supply expressed in gallons per minute (gpm), measured at 20 pounds per square inch (psi) residual pressure, that is available for fire fighting.

Fire frequency – The number of fires occurring within a defined area in a given time period.

Fire regime – The long-term fire pattern characteristic of a region or ecosystem described using a combination of seasonality, fire return interval, size, spatial complexity, intensity, severity, and fire type.

Fire resistant – A characteristic of a plant species that allows individuals to resist damage or mortality during a fire. Also used to describe construction materials that resist damage to fire.

First responders – A group designated by the community as those who may be first to arrive at the scene of a fire, accident, or chemical release.

Fire weather – The weather conditions that influence fire behavior, including air temperature, atmospheric moisture, atmospheric stability, clouds and precipitation.

Five-hundred (500)-year flood – Flood that has as 0.2% probability of being equaled or exceeded in any given year.

Flash flood – A local and sudden flood or torrent overflowing a stream channel in an usually dry valley, carrying an immense load of mud and rock fragments, and generally resulting from a rare and brief but heavy rainfall over a relatively small area having steep slopes.

Flood – A rising body of water, as in a stream or lake, which overtops its natural and artificial confines and covers land not normally under water. Under the *National Flood Insurance Program*, either:

(a) a general and temporary condition or partial or complete inundation of normally dry land areas from:

- (1) the overflow of inland or tidal waters,
- (2) the unusual and rapid accumulation or runoff of surface waters from any source, or

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- (3) mudslides (i.e., mudflows) which are proximately caused by flooding as defined in (2) and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when the earth is carried by a current of water and deposited along the path of the current, or
- (b) the collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in (1), above.

Flood-damage-resistant material – Any construction material capable of withstanding direct and prolonged contact (i.e., at least 72 hours) with floodwaters without suffering significant damage (i.e., damage that requires more than cleanup or low-cost cosmetic repair, such as painting).

Flood elevation – Height of the water surface above an established elevation datum such as the *National Geodetic Vertical Datum, North American Vertical Datum, or mean sea level.*

Flood hazard area – The greater of the following: (1) the area of special flood hazard, as defined under the *National Flood Insurance Program*, or (2) the area designated as a flood hazard area on a community's legally adopted flood hazard map, or otherwise legally designated.

Flood insurance – Insurance coverage provided under the National Flood Insurance Program.

Flood Insurance Rate Map (FIRM) – Under the *National Flood Insurance Program*, an official map of a community, on which the *Federal Emergency Management Agency* has delineated both the special hazard areas and the risk premium zones applicable to the community. (Note: The latest FIRM issued for a community is referred to as the *effective FIRM* for that community.)

Flood Insurance Study (FIS) – Under the *National Flood Insurance Program*, an examination, evaluation, and determination of *flood* hazards and, if appropriate, corresponding *water surface elevations*, or an examination, evaluation, and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards in a community or communities. (Note: The *National Flood Insurance Program* regulations refer to Flood Insurance Studies as “flood elevation studies.”)

Flood-related erosion area or flood-related erosion prone area – A land area adjoining the shore of a lake or other body of water, which due to the composition of the shoreline or bank and high water levels or wind-driven currents, is likely to suffer *flood-related erosion* damage.

Flooding – See *Flood*.

Floodplain – Under the *National Flood Insurance Program*, any land area susceptible to being inundated by water from any source. See *Flood*.

Floodplain management – Operation of an overall program of corrective and preventive measures for reducing *flood* damage, including but not limited to emergency preparedness plans, flood control works, and *floodplain management regulations*.

Floodplain management regulations – Under the *National Flood Insurance Program*, zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance, and erosion control ordinance), and other applications of

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police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of *flood* damage prevention and reduction.

Floodway – The channel of a river or other watercourse, and the adjacent land areas that must be kept free of encroachment in order to discharge the base flood without cumulatively increasing the water surface elevation more than a certain height.

Flow failure – A type of liquefaction-induced failure that generally occurs in slopes greater than 3 degrees, and that is characterized by the displacement, often over tens to hundreds of feet, of blocks of soil riding on top of the liquefied substrate.

Footing – Enlarged base of a foundation wall, pier, post, or column designed to spread the load of the structure so that it does not exceed the soil bearing capacity.

Footprint – Land area occupied by a structure.

Freeboard – Under the *National Flood Insurance Program*, a factor of safety, usually expressed in feet above a *flood* level, for the purposes of *floodplain management*. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the heights calculated for a selected size flood and floodway conditions, such as the hydrological effect of urbanization of the watershed.

Fuel – The source of heat that sustains the combustion process. In wildland fires, fuel is the combustible plant biomass, including grass, leaves, ground litter, shrubs, plants and trees.

Fuel load – The amount of fuel that is potentially available for combustion.

Fuel moisture – The moisture content expressed as a percentage of the dry weight of the fuel.

Gabbro – A group of dark-colored intrusive igneous rocks composed principally of plagioclase. The approximate intrusive equivalent of basalt.

Geomorphology – The science that treats the general configuration of the Earth's surface. The study of the classification, description, nature, origin and development of landforms, and the history of geologic changes as recorded by these surface features.

Geotechnical engineer – A licensed civil engineer who is also certified by the State as qualified for the investigation and engineering evaluation of earth materials and their interaction with earth retention systems, structural foundations, and other civil engineering works.

Gneiss – A metamorphic rock in which bands of granular minerals alternate with bands in which mineral have a flaky or prismatic habit, with less than 50 percent of the minerals showing preferred parallel orientation.

Grading – Any excavating or filling or combination thereof. Generally refers to the modification of the natural landscape into pads suitable as foundations for structures.

Granite – Broadly applied, any completely crystalline, quartz-bearing, plutonic rock.

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Ground failure – Permanent ground displacement produced by fault rupture, differential settlement, liquefaction, or slope failure.

Ground lurching – A form of earthquake-induced ground failure where soft, saturated soils move in a wave-like manner in response to intense seismic ground shaking, forming ridges or cracks at the surface.

Ground oscillations – A type of liquefaction-induced failure where liquefaction occurs at depth, in an area where the ground surface is too level to permit the lateral displacement of the overlying soil blocks. The blocks instead separate from one another and oscillate above the liquefied layer. This may result in the opening and closing of fissures or cracks, and the formation of sand boils or volcanoes.

Ground rupture – Displacement of the earth's surface as a result of fault movement associated with an earthquake.

Hazardous material (HAZMAT) – Substance that has the ability to harm humans, property or the environment. The United States Environmental Protection Agency defines hazardous waste as substances that:

- 1) may cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness;
- 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed; and
- 3) whose characteristics can be measured by a standardized test or reasonably detected by generators of solid waste through their knowledge of their waste.

Hazardous waste is also ignitable, corrosive, or reactive (explosive) (EPA 40 CFR 260.10). A material may also be classified as hazardous if it contains defined amounts of toxic chemicals.

Hazardous Waste Operations and Emergency Response (HAZWOPER) – The Occupational Safety and Health Agency (OSHA) regulation that covers safety and health issues at hazardous waste sites and response to chemical incidents.

Hazard reduction – Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Highest adjacent grade – Elevation of the highest natural or regarded ground surface, or structural fill, that abuts the walls of a building.

Holocene – An epoch of the Quaternary period spanning from the end of the Pleistocene to the present time (the past about 11,000 years).

Hornblende – The most common mineral of the amphibole group. It is a primary constituent in many intermediate igneous rocks.

Hydrocompaction – Settlement of loose, granular soils that occurs when the loose, dry structure of the sand grains held together by a clay binder or other cementing agent collapses upon the introduction of water.

Hydrodynamic loads – Loads imposed on an object, such as a building, by water flowing against and around it. Among these loads are positive frontal pressure against the structure, drag effect along the sides, and negative pressure on the downstream side.

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Hydrostatic loads – Loads imposed on a surface, such as a wall or floor slab, by a standing mass of water. The water pressure increases with the square of the water depth.

Hypocenter – The earthquake focus, that is, the place at depth, along the fault plane, where an earthquake rupture started.

Igneous – Type of rock or mineral that formed from molten or partially molten magma.

Ignition point – The location of the ignition.

Ignition source – The origin or source of a fire.

Infiltration – The process by which water seeps into the soil, as influenced by soil texture, soil structure, and vegetation cover.

Intensity – A measure of the effects of an earthquake at a particular place. Intensity depends on the earthquake magnitude, distance from the epicenter, and on the local geology.

Invasive plants – Plants that aggressively expand their ranges over the landscape, typically at the expense of native plants that are displaced or destroyed by the newcomers. Invasive species are typically considered a major threat to biological diversity.

ISO – Insurance Services Office. Private organization that formulates fire safety ratings based on fire threat and responsible agency's ability to respond to the threat. ISO ratings from one (excellent) to ten (no fire protection). Many insurance companies use ISO ratings to set insurance premiums. ISO may establish multiple ratings within a community, such as a rating of 5 in the hydranted areas and one of 8 in the non-hydranted areas.

Jet stream – A relatively narrow stream of fast-moving air in the middle and upper troposphere. Surface cyclones develop and move along the jet stream.

Jetting (of piles) – Use of a high-pressure stream of water to embed a pile in sandy soil.

Joist – Any of the parallel structural members of a floor system that support, and are usually immediately beneath, the floor.

ka – thousands of years before present.

Lacustrine flood hazard area – Area subject to inundation by *flooding* from lakes.

Landslide – A general term covering a wide variety of mass-movement landforms and processes involving the downslope transport, under gravitational influence, of soil and rock material en masse.

Lateral force – The force of the horizontal, side-to-side motion on the Earth's surface as measured on a particular mass; either a building or structure.

Lateral spreading – Lateral movements in a fractured mass of rock or soil which result from liquefaction or plastic flow or subjacent materials.

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Left-lateral fault – A strike-slip fault across which a viewer would see the block on the opposite side of the fault move to the left.

Level-of-service standard (LOS standard) – Quantifiable measures against which services being delivered by a service provider can be compared. Standards based upon recognized and accepted professional and county standards, while reflecting the local situation within which services are being delivered. Levels-of-service standards for fire protection may include response times, personnel per given population, and emergency water supply. LOS standards can be used to evaluate the way in which fire protection services are being delivered, for use in countywide fire planning efforts.

Lifeline system – Linear conduits or corridors for the delivery of services or movement of people and information (e.g., pipelines, telephones, freeways, railroads)

Lineament – Straight or gently curved, lengthy features of earth's surface, frequently expressed topographically as depressions or lines of depressions, scarps, benches, or change in vegetation.

Liquefaction – Changing of soils (unconsolidated alluvium) from a solid state to weaker state unable to support structures; where the material behaves similar to a liquid as a consequence of earthquake shaking. The transformation of cohesionless soils from a solid or liquid state as a result of increased pore pressure and reduced effective stress.

Litter – Recently fallen plant material that is only partially decomposed, forming a surface layer on some soils.

Live loads – *Loads* produced by the use and occupancy of the building or other structure. Live loads do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load, or dead load. See *Loads*.

Load-bearing wall – Wall that supports any vertical load in addition to its own weight.

Loads – Forces or other actions that result from the weight of all building materials, occupants and their possessions, environmental effects, differential movement, and restrained dimensional changes. Permanent loads are those in which variations over time are rare or of small magnitude. All other loads are variable loads.

Lowest floor – Under the *National Flood Insurance Program*, the lowest floor of the lowest enclosed area (including basement) of a structure. An unfinished or *flood-resistant* enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement is not considered a building's lowest floor, provided that the enclosure is not built so as to render the structure in violation of *National Flood Insurance Program* regulatory requirements.

Lowest horizontal structural member – In an elevated building, the lowest beam, *joist*, or other horizontal member that supports the building. *Grade beams* installed to support vertical foundation members where they enter the ground are not considered lowest horizontal structural members.

Ma – millions of years before present.

Macroburst – A strong downdraft over 2.5 miles in diameter that can cause damaging winds lasting 5 to 20 minutes. Formed by an area of significantly rain-cooled air that after hitting ground levels spreads out in all directions.

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Magnitude – A measure of the size of an earthquake, as determined by measurements from seismograph records. Also refers to both a fire’s intensity and severity.

Main shock – The biggest earthquake of a sequence of earthquakes that occur fairly close in time and space. Smaller shocks before the main shock are called **foreshocks**; smaller shocks that occur after the main shock are called **aftershocks**.

Major earthquake – Capable of widespread, heavy damage up to 50+ miles from epicenter; generally near Magnitude range 6.5 to 7.0 or greater, but can be less, depending on rupture mechanism, depth of earthquake, location relative to urban centers, etc.

Manufactured home – Under the *National Flood Insurance Program*, a *structure*, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term “manufactured home” does not include a “recreational vehicle.”

Masonry – Built-up construction of combination of building units or materials of clay, shale, concrete, glass, gypsum, stone, or other approved units bonded together with or without mortar or grout or other accepted methods of joining.

Mass casualty – Incident in which the number of victims exceeds the capability of the emergency management system to manage the incident effectively.

Material Safety Data Sheets (MSDS) – Information sheets for employees that provide specific information about a chemical that they may come in contact at their place of work, with attention to health effects, handling, and emergency procedures.

Maximum Contaminant Level (MCL) – Federal drinking water standard: "the maximum permissible level of a contaminant in water which is delivered to any user of a public water system" (Code of Federal Regulations [CFR], Title 40, Part 141.2).

Maximum Magnitude Earthquake (Mmax) – The highest magnitude earthquake a fault is capable of producing based on physical limitations, such as the length of the fault or fault segment.

Maximum Probable Earthquake (MPE) – The design size of the earthquake expected to occur within a time frame of interest, for example within 30 years or 100 years, depending on the purpose, lifetime or importance of the facility. Magnitude/frequency relationships are based on historic seismicity, fault slip rates, or mathematical models. The more critical the facility, the longer the time period considered.

Mediterranean climate – The climate characteristic of the Mediterranean region and most of California, characterized by hot, dry summers, and cool, wet winters.

Metamorphic rock – A rock whose original mineralogy, texture, or composition has been changed due to the effects of pressure, temperature, or the gain or loss of chemical components.

Mean sea level (MSL) – Average height of the sea for all stages of the tide, usually determined from hourly height observations over a 19-year period on an open coast or in adjacent waters having free access to the sea. See *National Geodetic Vertical Datum*.

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Microburst – A very localized zone of sinking air, less than 2.5 miles in diameter, producing damaging, straight-line, divergent winds at or near the ground surface lasting 2 to 5 minutes.

Mitigation – Any action taken to reduce or permanently eliminate the long-term risk to life and property from natural hazards.

Mitigation Directorate – Component of *Federal Emergency Management Agency* directly responsible for administering the flood hazard identification and *floodplain management* aspects of the *National Flood Insurance Program*.

Moderate earthquake – Capable of causing considerable to severe damage, generally in the range of Magnitude 5.0 to 6.0 (Modified Mercalli Intensity <VI), but highly dependent on rupture mechanism, depth of earthquake, and location relative to urban center, etc.

Modified Mercalli Intensity – A qualitative measure of the size of an earthquake based on people's description of how strongly the earthquake was felt, and the damage it caused to the built environment. The scale has 12 divisions, ranging from I (felt by only a very few people) to XII (total damage).

Mutual Aid Agreement – A reciprocal aid agreement between two or more agencies that defines what resources each will provide to the other in response to certain predetermined types of emergencies. Mutual aid response is provided upon request.

National Fire Incident Reporting System (NFIRS) – A database of fire incident reports compiled at the local fire department level. NFIRS was an outgrowth of the 1974 National Fire Prevention and Control Act, Public Law 93–498. The U.S. Fire Administration (USFA), an entity of the Department of Homeland Security, developed NFIRS as a means of assessing the nature and scope of the fire problem in the United States.

National Fire Protection Association (NFPA) – A group that issues fire and safety standards for industry and emergency responders.

National Flood Insurance Program (NFIP) – Federal program created by Congress in 1968 that makes *flood* insurance available in communities that enact and enforce satisfactory *floodplain management regulations*.

National Geodetic Vertical Datum (NGVD) – Datum established in 1929 and used as a basis for measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or *Mean Sea Level*. The *Base Flood Elevations* shown on most of the *Flood Insurance Rate Maps* issued by the *Federal Emergency Management Agency* are referenced to NGVD or, more recently, to the *North American Vertical Datum*.

Natural Attenuation – Reduction in mass or concentration of a compound in groundwater over time or distance from the source of constituents of concern due to naturally occurring physical, chemical, and biological processes, such as biodegradation, dispersion, dilution, adsorption, and volatilization. (American Society for Testing and Materials, 2003).

Near-field earthquake – Used to describe a local earthquake within approximately a few fault zone widths of the causative fault which is characterized by high frequency waveforms that are destructive to above-ground utilities and short period structures (less than about two or three stories).

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New construction – For the purpose of determining flood insurance rates under the *National Flood Insurance Program*, structures for which the start of construction commenced on or after the effective date of the initial *Flood Insurance Rate Map* or after December 31, 1974, whichever is later, including any subsequent improvements to such structures. (See *Post-FIRM structure*.) For *floodplain management* purposes, new construction means structures for which the start of construction commenced on or after the effective date of a *floodplain management regulation* adopted by a community and includes any subsequent improvements to such structures.

Non-coastal A zone – The portion of the *Special Flood Hazard Area* in which the principal source of flooding is runoff from rainfall, snowmelt, or a combination of both. In non-coastal A zones, flood waters may move slowly or rapidly, but waves are usually not a significant threat to buildings. See *A zone* and *coastal A zone*. (Note: the *National Flood Insurance Program* regulations do not differentiate between non-coastal A zones and *coastal A zones*.)

Non-load-bearing wall – Wall that does not support vertical loads other than its own weight. See *Load-bearing wall*.

North American Vertical Datum (NAVD) – Datum used as a basis for measuring flood, ground, and structural elevations. NAVD is used in many recent *Flood Insurance Studies* rather than the *National Geodetic Vertical Datum*.

Oblique-reverse fault – A fault that combines some strike-slip motion with some dip-slip motion in which the upper block, above the fault plane, moves up over the lower block.

Offset ridge – A ridge that is discontinuous on account of faulting.

Offset stream – A stream displaced laterally or vertically by faulting.

One hundred (100)-year flood – See *Base flood*.

Orthoclase – One of the most common rock-forming minerals; colorless, white, cream-yellow, flesh-reddish, or grayish in color.

Paleoseismic – Pertaining to an earthquake or earth vibration that happened decades, centuries, or millennia ago.

Peak flood – The highest discharge or stage value of a flood.

Peak Ground Acceleration (PGA) – The greatest amplitude of acceleration measured for a single frequency on an earthquake accelerogram. The maximum horizontal ground motion generated by an earthquake. The measure of this motion is the acceleration of gravity (equal to 32 feet per second squared, or 980 centimeter per second squared), and generally expressed as a percentage of gravity.

Pedogenic – Pertaining to soil formation.

Pegmatite – An igneous rock with extremely large grains, more than a centimeter in diameter.

Perched ground water – Unconfined ground water separated from an underlying main body of ground water by an unsaturated zone.

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Perennial Stream – A stream that flows continuously throughout the year.

Plagioclase – One of the most common rock forming minerals.

Playa – Term used in the Southwestern US to describe a flat-floored, typically unvegetated area composed of thin, stratified sheets of fine clay, silt or sand that represent the bottom or central part of a shallow, completely closed or undrained desert lake basin where water accumulates after a rainstorm and quickly evaporates, leaving behind deposits of soluble salts.

Plutonic – Pertaining to igneous rocks formed at great depth.

Plywood – Wood structural panel composed of plies of wood veneer arranged in cross-aligned layers. The plies are bonded with an adhesive that cures on application of heat and pressure.

Pore pressure – The stress transmitted by the fluid that fills the voids between particles of a soil or rock mass.

Post foundation – Foundation consisting of vertical support members set in holes and backfilled with compacted material. Posts are usually made of wood and usually must be braced. Posts are also known as columns, but columns are usually made of concrete or masonry.

Post-FIRM structure – For purposes of determining insurance rates under the *National Flood Insurance Program*, structures for which the *start of construction* commenced on or after the effective date of an initial *Flood Insurance Rate Map* or after December 31, 1974, whichever is later, including any subsequent improvements to such structures. This term should not be confused with the term *new construction* as it is used in *floodplain management*.

Potentially active fault – According to the Alquist-Priolo Earthquake Fault Zone Act guidelines, a fault showing evidence of movement within the last 1.6 million years but that has not been shown conclusively whether or not it has ruptured in the past about 11,000 years ago. The U.S. Geological Survey considers a fault potentially active if it has moved in the time period between about 11,000 years ago (the Holocene) and 750,000 years ago, and that is thought capable of generating damaging earthquakes.

Precast concrete – Structural concrete element cast elsewhere than its final position in the structure. See *Cast-in-place concrete*.

Prescribed Fire – A fire ignited under known conditions of fuel, weather, and topography to achieve specific objectives.

Primary fault rupture - Fissuring and displacement of the ground surface along a fault that breaks in an earthquake.

Project – A development application involving zone changes, variances, conditional use permits, tentative parcel maps, tentative tract maps, and plan amendments.

Quartzite – A metamorphic rock consisting mostly of quartz.

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Quartz monzonite – A plutonic rock containing major plagioclase, orthoclase and quartz; with increased orthoclase it becomes a granite.

Quaternary – The second period of the Cenozoic era, consisting of the Pleistocene and Holocene epochs; covers the last approximately 1.6 to 2 million years.

Rain shadow – A reduction in precipitation in an area on the leeward side of a mountain or range of mountains, caused by the release of moisture on the windward side.

Resonance – Amplification of ground motion frequencies within bands matching the natural frequency of a structure and often causing partial or complete structural collapse; effects may demonstrate minor damage to single-story residential structures while adjacent 3- or 4-story buildings may collapse because of corresponding frequencies, or vice versa.

Recurrence interval – The time between earthquakes of a given magnitude, or within a given magnitude range, on a specific fault or within a specific area.

Reinforced concrete – *Structural concrete* reinforced with steel bars.

Remote shutoff – Valve that can be used to shut off the flow of a substance or chemical from a location away from the spill or break.

Reportable quantity – A term used by the EPA and the Department of Transportation (DOT) to denote a quantity of chemicals that require some kind of action, such as reporting an inventory or reporting an accident involving a certain amount of chemicals.

Response spectra – The range of potentially damaging frequencies of a given earthquake applied to a specific site and for a particular building or structure.

Response Time – The time that elapses between the moment a 911 call is placed to the emergency dispatch center and the time that a first-responder arrives on scene. Response time includes dispatch time, turnout time (the time it takes firefighters to travel to the fire station, don their personal protection equipment, and prepare the apparatus), and travel time.

Retrofit – Any change made to an existing structure to reduce or eliminate damage to that structure from flooding, *erosion*, high winds, earthquakes, or other hazards.

Revetment – Facing of stone, cement, sandbags, or other materials placed on an earthen wall or embankment to protect it from *erosion* or *scour* caused by *flood* waters or wave action.

Rhyolite – A group of extrusive igneous rocks, generally exhibiting flow texture, with large crystals (phenocrysts) of quartz and alkali feldspar in a glassy to cryptocrystalline groundmass. The approximate extrusive equivalent of granite.

Ridgetop shattering – An earthquake-induced type of ground failure that occurs along at or along the top of ridges, forming linear, fault-like fissures, and leaving the area looking like it was plowed.

Right-lateral fault – A strike-slip fault across which a viewer would see the block on the opposite side of the fault move to the right.

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Riprap – Broken stone, cut stone blocks, or rubble that is placed on slopes to protect them from *erosion* or *scour* caused by *flood* waters or wave action.

Rockfall – Free-falling to tumbling mass of bedrock that has broken off steep canyon walls or cliffs.

Sand boil – An accumulation of sand resembling a miniature volcano or low volcanic mound produced by the expulsion of liquefied sand to the sediment surface. Also called sand blows, and sand volcanoes.

Sandstone – A medium-grained, clastic sedimentary rock composed of abundant rounded or angular fragments of sand size set in a fine-grained matrix and more or less firmly united by a cementing material.

Santa Ana (or Santana) wind – Strong, typically extremely dry offshore winds that characteristically blow through southern California and northern Baja California in late fall and winter. They typically originate in the Great Basin or upper Mojave Desert, and can be either hot or cold. The winds tend to funnel down the valleys and canyons, where gusts can attain speeds of 60 to 90 miles per hour (mph). Several devastating wildfires in southern California have been associated with Santa Ana winds.

Saturated – Said of the condition in which the interstices of a material are filled with a liquid, usually water.

Scarp – A line of cliffs produced by faulting or by erosion. The term is an abbreviated form of escarpment.

Schist – A metamorphic rock characterized by a preferred orientation in grains resulting in the rock's ability to be split into thin flakes or slabs.

Scour – Removal of soil or fill material by the flow of *flood* waters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence. See *Erosion*.

Secondary fault rupture - Ground surface displacements along faults other than the main traces of active regional faults.

Sediment – Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, ice, or that accumulates by other natural agents, such as chemical precipitation from solution, and that forms in layers on the Earth's surface in a loose, unconsolidated form.

Seiche – A free or standing-wave oscillation of the surface of water in an enclosed or semi-enclosed basin (such as a lake, bay, or harbor), that is initiated chiefly by local changes in atmospheric pressure, aided by winds, tidal currents, and earthquakes, and that continues, pendulum-fashion, for a time after cessation of the originating force.

Seismic Moment – A measure of the size of an earthquake that is associated with the amount of energy released (the force that was necessary to overcome the friction along the fault plane), the area of the fault rupture, and the average amount of slip.

Seismogenic – Capable of producing earthquake activity.

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Seismograph – An instrument that detects, magnifies, and records vibrations of the Earth, especially earthquakes. The resulting record is a seismogram.

Shearwall – *Load-bearing wall or non-load-bearing wall* that transfers in-plane lateral forces from lateral loads acting on a structure to its foundation.

Sheet flow – An overland flow or downslope movement of water taking the form of a thin, continuous film over relatively smooth soil or rocks surfaces and not concentrated into channels larger than rills.

Shutter ridge – That portion of an offset ridge that blocks or “shutters” the adjacent canyon.

Sidehill fill – A wedge of artificial fill typically placed on the side of a natural slope to create a roadway or a level building pad.

Silt – A rock fragment or detrital particle smaller than a very fine sand grain and larger than coarse clay, having a diameter in the range of 1/256 to 1/16 mm (4-62 microns, or 0.00016-0.0025 in.). An indurated silt having the texture and composition of shale but lacking its fine lamination is called a siltstone.

Slip Rate – The speed at which a fault is moving, typically expressed in millimeters per year (mm/yr), and generally estimated by measuring the amount of offset that has occurred in a given, known amount of time.

Slope ratio – Refers to the angle or gradient of a slope as the ratio of horizontal units to vertical units. For example, in a 2:1 slope, for every two horizontal units, there is a vertical rise of one unit (equal to a slope angle, from the horizontal, of 26.6 degrees).

Slump – A landslide characterized by a shearing and rotary movement of a generally independent mass of rock or earth along a curved slip surface.

Soft-story building – Building with a story, generally the ground or first floor, lacking adequate strength or toughness due to too few shear walls. Examples of this type of structure include apartments above glass-fronted stores, and buildings perched atop parking garages.

Soil horizon – A layer of soil that is distinguishable from adjacent layers by characteristic physical properties such as structure, color, or texture.

Special Flood Hazard Area (SFHA) – Under the *National Flood Insurance Program*, an area having special flood, mudslide (i.e., mudflow) and/or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map or *Flood Insurance Rate Map* as Zone A, AO, AI-A30, AE, A99, AH, V, VI-V30, VE, M or E.

Spot fire – Ignition resulting from embers from the fireline transported aerially in front of the fireline and often increasing fire spread.

Standardized Emergency Management System (SEMS) – (Government Code § 8607). The group of principles developed for coordinating state and local emergency response in California. SEMS provides for organization of a multiple-level emergency response, and is intended to structure and facilitate the flow of emergency information and resources within and between the organizational levels—the field response, local government, operational areas, regions and the state management level. SEMS

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incorporates by reference: the Incident Command System (ICS); multi-agency or inter-agency coordination; the State's Mutual Aid Program; and Operational Areas.

State Responsibility Area (SRA) – Per California Public Resources Code 4125-4127, the lands in which the State has primary financial responsibility for preventing and suppressing fires.

Storage capacity – Dam storage measured in acre-feet or decameters, including dead storage.

Strike-slip fault – A fault with a vertical to sub-vertical fault surface that displays evidence of horizontal and opposite displacement.

Structural concrete – All concrete used for structural purposes, including *plain concrete* and *reinforced concrete*.

Structural engineer – A licensed civil engineer certified by the State as qualified to design and supervise the construction of engineered structures.

Structural fill – Fill compacted to a specified density to provide structural support or protection to a *structure*. See *Fill*.

Structure – Something constructed, such as a building, or part of one. For *floodplain management* purposes under the *National flood Insurance Program*, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home. For insurance coverage purposes under the NFIP, structure means a walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a *manufactured home* on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration, or repair, but does not include building materials or supplies intended for use in such construction, alteration, or repair, unless such materials or supplies are within an enclosed building on the premises.

Subsidence – The sudden sinking or gradual downward settling of the Earth's surface with little or no horizontal motion.

Swale – In hillside terrace, a shallow drainage channel, typically with a rounded depression or “hollow” at the head.

Talus – The cone-shaped accumulation of angular fragments of rock or soil at the base of a cliff that has experienced rockfalls.

Tectonic plate – Any of several large pieces, or blocks, of the Earth's lithosphere that are slowly moving relative to each other as part of the process called plate tectonics.

Tornado – A localized but violently destructive windstorm occurring over land (at sea it is called a waterspout) characterized by a funnel-shaped cloud extending toward the ground.

Thrust fault – A fault, with a relatively shallow dip, in which the upper block, above the fault plane, moves up over the lower block.

Transform system – A system in which faults of plate-boundary dimensions transform into another plate-boundary structure when it ends.

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Transpression – In crustal deformation, an intermediate stage between compression and strike-slip motion; it occurs in zones with oblique compression.

Tsunami – Great sea wave produced by submarine earth movement, volcanic eruption, oceanic meteor impact, or underwater nuclear explosion.

Typhoon – Name given to a *hurricane* in the area of the western Pacific Ocean west of 180 degrees longitude.

Unconfined aquifer – Aquifer in which the upper surface of the saturated zone is free to rise and fall.

Unconsolidated sediments – A deposit that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth.

Underground Storage Tank (UST) – Tank, commonly used to store gasoline, diesel or other chemical, that is buried under the ground.

Undermining – Process whereby the vertical component of erosion or scour exceeds the depth of the base of a building foundation or the level below which the bearing strength of at the foundation is compromised.

Unreinforced Masonry (URM) structure – Building without adequate anchorage of the masonry walls to the roof and floor diaphragms and lack of steel reinforcement, of limited strength and ductility, and as a result, that tends to perform poorly when shaken during an earthquake.

Uplift – Hydrostatic pressure caused by water under a building. It can be strong enough lift a building off its foundation, especially when the building is not properly anchored to its foundation.

Upper bound earthquake – Defined as a 10% chance of exceedance in 100 years, with a statistical return period of 949 years.

Variance – Under the *National Flood Insurance Program*, grant of relief by a community from the terms of a *floodplain management regulation*.

Violation – Under the *National Flood Insurance Program*, the failure of a structure or other development to be fully compliant with the community's *floodplain management regulations*. A *structure* or other *development* without the elevation certificate, other certifications, or other evidence of compliance required in Sections 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) of the NFIP regulations is presumed to be in violation until such time as that documentation is provided.

Watershed – A topographically defined region draining into a particular river or lake.

Water surface elevation – Under the *National Flood Insurance Program*, the height, in relation to the *National Geodetic Vertical Datum* of 1929 (or other datum, where specified), of *floods* of various magnitudes and frequencies in the *floodplains* of coastal or riverine areas.

Water table – The upper surface of groundwater saturation of pores and fractures in rock or surficial earth materials.

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Water year – The 12-month period from October 1 through September 30 of the following year.

Weather – The short-term state of the air or atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness, or any other meteorologic phenomena.

X zone – Under the *National Flood Insurance Program*, areas where the *flood hazard* is less than that in the *Special Flood Hazard Area*. Shaded X zones shown on recent *Flood Insurance Rate Maps* (B zones on older maps) designate areas subject to inundation by the *500-year flood*. Un-shaded X zones (C zones on older *Flood Insurance Rate Maps*) designate areas where the annual probability of flooding is less than 0.2 percent.